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SUBJECT: Forwards addl info to support justification for deletion of loss of offsite power test from startup testing program.

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161-01105-EEVB/RAB
June 13, 1988

Docket No. STN 50-530

U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Document Control Desk

References: (1) Letter from E. E. Van Brunt, Jr., ANPP, to NRC, ANPP letter 161-00887, dated March 17, 1988. Subject: Loss of Offsite Power Testing.
(2) Letter from E. E. Van Brunt, Jr., ANPP to NRC, ANPP letter 161-00926, dated April 6, 1988. Subject: Unit 3 Startup Report.

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 3
Loss of Offsite Power Testing
File: 88-001-419.01; 88-056-026

ANPP submitted Reference (1) to provide justification for deletion of the Loss of Offsite Power (LOP) Test from the Unit 3 Startup Testing Program. On June 1, 1988, a meeting concerning this subject was held in the NRC offices and was attended by Mr. Carter Rogers of my staff. During this meeting, NRC staff stated that the subject was under review and invited us to submit any other information which would provide additional details.

We are taking this opportunity to provide additional information which may be useful as you review this matter. A brief description and significance of the enclosures to this letter is contained in Attachment 1.

ANPP has employed the standardized plant concept in the construction of the Palo Verde Station. The balance of plant as well as the nuclear steam supply system is standardized between units. Results of various tests have demonstrated the similarity of responses between units. As noted in Reference (1), since Unit 3 is the same design as Units 1 and 2, and based on a comparison of the test results of the individual tests performed to date, we are convinced that Unit 3 would respond no differently to a LOP than the other units.

Subsequent to our submittal of Reference (1), the NRC has endorsed NUMARC Guidance Document 8700 on Station Blackout. ANPP has evaluated the PVNGS units relative to the guidance in this document, and we have determined that the units currently meet the four (4) hour coping category under station blackout conditions, without the necessity of obtaining an alternate AC power source.

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We would also re-emphasize to you, that the prime motivation for having substituted the LOP test described in R.G. 1.68 in favor of the alternate test program, is to avoid unnecessary transients on the plant and challenging of any safety systems for reasons other than plant safety.

We are sure that the additional information will assist you in your review and further demonstrate that the alternate testing program performed in Unit 3 is adequate to show that the plant would perform as expected during a LOP event.

If you have any further questions, please call A. C. Rogers of my staff at (602) 371-4041.

Very truly yours,

EE Van Brunt, Jr

E. E. Van Brunt, Jr.
Executive Vice President
Project Director

EEVB/RAB/jle
Enclosures

cc:	D. B. Karner	w/attachment 1
	G. W. Knighton	w/attachment 1
	J. B. Martin	w/attachment 1
	T. J. Polich	w/attachment 1
	A. C. Gehr	w/attachment 1
	M. J. Davis	w/all attachments

ATTACHMENT 1

Description and Significance
of Enclosures 1 through 8

Enclosure 1 - 10 CFR 50.59, Evaluation Performed Prior to Deleting the Loss of Offsite Power Test From the Unit 3 Startup Program.

At the June 1988 meeting, the staff reviewers asked if a 10CFR 50.59 evaluation had been performed. ANPP responded that it had been done, and it had been telecopied previously after it was requested. The staff requested that we submit the evaluation formally, and we agreed to do it. As can be seen the evaluation performed is very detailed and supports the deletion of the LOP test from the Unit 3 Startup Program.

Enclosures 2, 3, and 4 - Excerpts from the Unit Startup Test Reports.

The startup test reports for Units 1 and 2 were references for our March 17, 1988 submittal, Reference (1). The Unit 3 report, Reference (2), was submitted subsequent to that. The excerpts from the Unit 1 and Unit 2 reports may be used to compare the results of the LOP tests performed in those units. The excerpts from all three units may be used to compare plant response to large transients such as would be expected during a loss of offsite power event.

Enclosure 5 - Excerpts from Procedure 93PE-3SA01, Integrated Test of Engineered Safety Features.

This enclosure provides a more complete description of the integrated safeguards testing than was provided in Reference (1). Section 1.3 addresses the FSAR and regulatory commitments which are addressed by this procedure. This includes appropriate sections of R.G. 1.68.

Enclosure 6 - Test Results Report, 93PE-3SA01, Integrated Test of Engineered Safety Features

This enclosure provides a more complete description of the integrated safeguards test results than was provided in Reference (1). The integrated test is done on each safeguard train individually. It includes verification of all safeguards actions associated with Loss of Power, including Diesel start, sequencing of loads, safeguards pump starts, valve openings, and safety injection flows. The test results report was prepared by the Test Working Group (TWG). This group was composed of representatives from the Startup Department, the Operating Department, ANPP Engineering, Bechtel Power Corporation, and Combustion Engineering. This group was tasked to review and approve test procedures prior to their implementation and to review and approve test results. This report makes note of the fact that the testing on Train B of safeguards equipment was not completed due to the "B" diesel generator engine failure on December 23, 1986. The TWG notes that testing necessary to complete the requirements would be done using another procedure, and therefore closed out this test procedure.

Enclosure 7 - Excerpt from Procedure 73ST-3DG01, Class 1E Diesel Generator and Integrated Safeguards Surveillance Test - Train A

This enclosure is provided for reference. Although Train A was successfully tested using 93PE-3SA01, it was retested prior to Unit 3 initial criticality and after the repairs and testing were completed on Train B. This test procedure satisfies the Surveillance Requirements in the Technical Specifications and is performed every eighteen (18) months.

Enclosure 8 - Excerpt from Procedure 73ST-3DG02, Class 1E Diesel Generator and Integrated Safeguards Surveillance Test - Train B

This enclosure is similar to Enclosure 7, but it is for Train B. It contains additional requirements, described in Section 1.4, which satisfy the acceptance criteria from 93PE-3SA01 which were not completed due to the diesel failure in December 1986. 73ST-SDG02 was completed and the results were reviewed and approved as meeting the acceptance criteria in 93PE-3SA01.

ENCLOSURE 1

10CFR 50.59 Evaluation
Performed Prior to Deleting the
Loss of Offsite Power Test
From the Unit 3 Startup Program

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FILE: 87-032-404

10CFR50.59

REVIEW AND EVALUATION

ACTION UNDER REVIEW: ______ REVISION: ______

DESCRIPTION OF PROPOSED CHANGE: Deletion of the "Loss of Offsite Power Test" from the Power Ascension Test Program on Unit 3

10CFR50.59 REVIEW

DOES THE PROPOSED CHANGE:

		YES	NO
1.	MAKE CHANGES IN THE FACILITY?		XX
2.	MAKE CHANGES IN PROCEDURES AS THEY ARE DESCRIBED IN THE FSAR?	XX	
3.	INVOLVE TESTS OR EXPERIMENTS NOT DESCRIBED IN THE FSAR?		XX
4.	INVOLVE ANY OTHER CHALLENGES TO NUCLEAR SAFETY FOR PVNGS?		XX
5.	REQUIRE A CHANGE TO THE TECHNICAL SPECIFICATIONS?		XX

10CFR50.59 EVALUATION (Provide Response Justification with References)

		YES	NO
6.	WILL THE PROBABILITY OF AN ACCIDENT PREVIOUSLY EVALUATED IN THE FSAR BE INCREASED?		XX
7.	WILL THE CONSEQUENCES OF AN ACCIDENT PREVIOUSLY EVALUATED IN THE FSAR BE INCREASED?		XX
8.	WILL THE PROBABILITY OF A MALFUNCTION OF EQUIPMENT IMPORTANT TO SAFETY BE INCREASED?		XX
9.	WILL THE CONSEQUENCES OF A MALFUNCTION OF EQUIPMENT IMPORTANT TO SAFETY BE INCREASED?		XX
10.	WILL THE POSSIBILITY OF AN ACCIDENT OF A DIFFERENT TYPE THAN ANY PREVIOUSLY EVALUATED IN THE FSAR BE CREATED?		XX
11.	WILL THE POSSIBILITY OF A MALFUNCTIONING OF A DIFFERENT TYPE THAN ANY PREVIOUSLY EVALUATED IN THE FSAR BE CREATED?		XX
12.	WILL THE MARGIN OF SAFETY AS DEFINED IN THE BASIS FOR ANY TECHNICAL SPECIFICATION BE REDUCED?		XX

XX ANY ANSWER TO QUESTIONS 1 THROUGH 4 "YES", THEN A 10CFR50.59 EVALUATION IS REQUIRED. FSAR CHANGE REQUEST PER PROCEDURE 5N404.01.00 MAY ALSO BE REQUIRED.

___ ANSWER 5 IS "YES", THEN TECHNICAL SPECIFICATION CHANGE REQUEST PER PROCEDURE 5N404.01.00 AND NRC APPROVAL REQUIRED PRIOR TO IMPLEMENTATION.

___ ANY ANSWER TO QUESTIONS 6 THROUGH 12 "YES" THEN AN UNREVIEWED SAFETY QUESTION IS IDENTIFIED. PROCEED TO PROCEDURE 7N407.03.00 PRIOR TO IMPLEMENTATION.

XX ALL ANSWERS 6 THRU 12 ARE "NO" RECOMMEND ACTION APPROVAL.

___ ALL ANSWERS 1 THROUGH 5 ARE "NO", NO 10CFR50.59 EVALUATION REQUIRED, RECOMMEND ACTION APPROVAL.

I verify that the above review/evaluation is adequate and accurate and that at least one of the undersigned has received required training.

[signature] / 3/23/87
INITIATOR / DATE
Mark A. Hulet

[signature] / 3/24/87
INITIATOR's SUPV OR SS / DATE

DESCRIPTION OF PROPOSED CHANGE:

Deletion of the "Loss of Offsite Power Test" from the Power Ascension Testing Program on PVNGS Unit 3.

10CFR50.59 REVIEW

DOES THE PROPOSED CHANGE:

1. Make changes to the facility?

   No.

2. Make changes in procedures as they are described in the FSAR?

   Yes. The Power Ascension Test Program as described in CESSAR 14.2.12 (as referenced by FSAR 14.2.12) is being reduced. Specifically, the "Loss of Offsite Power Test" as described in CESSAR 14.2.12.5.9 is being deleted.

3. Involve tests or experiments not described in FSAR?

   No. Deletion of the described test will not require performance of any additional tests and/or experiments not described in FSAR.

4. Involve any other challenges to nuclear safety for PVNGS?

   No.

5. Require a change to the Technical Specifications?

   No.

10CFR50.59 EVALUATION

6. Will the probability of an accident previously evaluated in the FSAR be increased?

References:

CESSAR 14.2.12.5.9, Loss of Offsite Power Test

CESSAR 15.2.6, Loss of Non-Emergency A-C Power to the Station Auxiliaries

CESSAR 15.3.1, Total Loss of Reactor Coolant Flow

CESSAR 15.2.3, Loss of Condensor Vacuum

FSAR Chapter 15, Safety Analyses

Reg Guide 1.68, Rev 0., Appendix A, D.1.k, Loss of Offsite Power Test

Evaluation:

No. Testing requirements for the Loss of Offsite Power Test do not address the initiating events (assumed by the Safety Analysis to be weather related damage, natural phenomena. loss of onsite AC distribution system, or a regional grid network failure, etc.) Therefore, the probability of occurance of this previously evaluated accident will not be increased by the change.

7. Will the consequences of an accident previously evaluated in the FSAR be increased?

References:

CESSAR 15.2.6, Loss of Non-Emergency A-C Power to the Station Auxiliaries

CESSAR 15.3.1, Total Loss of Reactor Coolant Flow

CESSAR 15.2.3, Loss of Condensor Vacuum

FSAR Chapter 15. Safety Analyses

Reg Guide 1.68, Rev 0., Appendix A, D.1.k, Loss of Offsite Power Test

PVNGS-LGP-M85-262 "Compliance with Loss of Offsite Power Testing Requirements" 11/10/85

73PA-2NA01, Test Results Report "Loss of Offsite Power Test from 50%" performed 6/25/86, approved 10/16/86

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72PA-1RX03, Test Results Report "Natural Circulation Test from 80% Power" performed 1/24-25/86, approved 11/10/86

1-85-004 Post Trip Review Report 09/12/85

1-85-005 Post Trip Review Report 10/03/85

1-86-001 Post Trip Review Report 01/09/86

1-86-002 Post Trip Review Report 01/24/86

2-86-004 Post Trip Review Report 06/25/86

V-CE-33568-CF:FMM "ANPP Preliminary Evaluation of Turbine Trip Test Data (EER 86-RX-002)" 3/21/86

43AO-3ZZ05, "Loss of Nuclear Cooling Water"

43ST-3AF02, "Auxiliary Feedwater Pump AFA-P01 Operability Test"

43ST-3AF03, "Auxiliary Feedwater System Pump AFB-P01 Operability"

43ST-3CH03, "Boron Injection Flowpaths - Operating"

43ST-3CH04, "Boron Injection Flow Test"

72HF-3RC09, "Reactor Coolant System Flow Test"

72PY-3RX30, "Low Power Physics Test Controlling Document"

73PA-3SG01, "Atmospheric Dump and Steam Bypass Control System Valve Capacity Test"

73ST-3ZZ08, "Section XI Valve Stroke Timing"

73ST-9RX01, "CEA Drop Time"

73ST-9ZZ18, "Main Steam and Pressurizer PSV Set Pressure Verification"

77ST-9SB07-10, "CPC Channel A-D Functional Test"

~~91~~ 93 PE-3SA01, "Integrated Test of Engineered Safety Features"

92PE-3SB01-04, "DNBR/LPD Calculator System Channel A-D"

92PE-3SB10-13, "Plant Protection System (Channel A-D)".

[illegible]

Evaluation:

No. The Loss of Offsite Power Test is typically performed during the initial Startup Power Ascension Test Program. The test is intended to be an integrated systems design verification test. The objective of the Loss of Offsite Power Test is to demonstrate that the dynamic response of the plant is in accordance with design for a condition of loss of the turbine-generator coincident with loss of offsite power. The specific acceptance criteria applied to the test is to verify the reactor is shutdown and the NSSS is maintained is Hot Standby for 30 minutes on emergency power following a loss of main generator and offsite power.

Review of the Safety Analysis and system design reveals the independent characteristics of the LOP event which must be tested and demonstrated in order to acceptably justify compliance with the objective. The safety functions which are potentially impacted due to a loss of offsite power are heat removal, reactivity control, pressure and inventory control, maintainance of vital auxiliaries, and indirect radioactive release. Each of these functions have been successfully tested on Units 1 and 2 and will be adequately tested on Unit 3.

Initial decay heat removal from the core is provided by the RCP coastdown flow, followed by the establishment of natural circulation. The residual water inventory in the Steam Generators is used as a heat sink and the resulting steam is released to the atmosphere via the Main Steam Safety Valves until manual control of the Steam Generator pressure and level is taken with the Atmospheric Dump Valves. The Auxiliary Feedwater pumps start automatically on AFAS due to low Steam Generator levels, with the motor driven pump energized from the Diesel Generators.

Reactivity control is maintained via a reactor trip and boration. A low DNBR reactor trip signal is generated by the Core Protection Calculators. The Control Element Assemblies drop into the core upon the trip/LOP. The charging pumps are sequenced onto the ESF buses and suction is transferred to the Refueling Water Tank. Contraction of the RCS provides the capability to borate without letdown to achieve proper negative reactivity shutdown margin. Boration may also be accomplished using the HPSI pumps aligned to the RWT.

Primary system pressure and inventory control is maintained by utilizing manual operation of the charging pumps and related auxiliary spray. Pressurizer level is maintained above the heater cutout allowing use of the emergency powered pressurizer heaters. If necessary immediately following the trip, the peak RCS pressure may be limited by the pressurizer safety valves. Also the rate of change of RCS pressure and PZR level may be controlled by throttling the HPSI discharge valves. Careful monitoring of the secondary steam and feed flows will preclude both RCS overcooling and initiation of Safety Injection. Secondary system integrity is initially maintained by the Main Steam Safety Valves. Secondary pressure and inventory control is transferred to the Atmospheric Dump Valves and Auxiliary Feedwater after the Turbine and Main Feedwater trip.

Vital auxiliaries are maintained by power from the emergency Diesel Generators. Low voltage on the Engineered Safety Features (ESF) bus, due to the loss of offsite power, generates an undervoltage signal which starts the DGs. The non-safety buses are automatically seperated from the safety bus and loads are shed. After the DGs start and reach rated speed, voltage, and frequency, its output breaker is closed connecting it to the ESF bus and loads are automatically sequenced onto the bus. The loads are maintained in the LOP condition until the plant is stabilized and systems are manually controlled.

Indirect radioactive releases are precluded from the Spent Fuel Pool although the Pool Cooling system is terminated on Loss of Offsite Power. The heat capacity of the SFP is utilized as a heat sink until PC is re-energized automatically from the ESF bus and Essential Cooling Water is aligned to the PC heat exchangers.

In review of the safety systems and plant design features utilized for response to the Loss of Offsite Power (Total Loss of Reactor Coolant Flow) event as presented above, the following tests (Pre-operational, Start-up, Surveillance) have been identified to adequately verify proper operation and response to the LOP event. The consolidation of these test results justifies the deletion of performance of the Loss of Offsite Power Test which otherwise would unnecessarily challenge the plant safety systems.

The general plant responses and operator control capabilities were successfully demonstrated during the power ascension test programs on Units 1 and 2. The Unit 1 test results were obtained from an actual unexpected Loss of Offsite Power event while the plant was operating at 52% of full power. Review of the Unit 1 and 2 test results revealed no abnormal safety system design/construction configurations that would not normally be detected by the scheduled routine surveillance testing and preventative maintainance. All other design changes associated with these tests were to non-safety system, did not affect the overall dynamic response of the plant, and have been implemented in each unit. These test results are directly applicable to Unit 3.

The inherent response of the NSSS system design to a loss of flow event was previously demonstrated on PVNGS Unit 1, the first-of-a-kind System 80. Demonstration of adequate core decay heat removal, via a power-to-flow measurement, and adequate boration and mixing capabilities, to provide shutdown margin, were incorporated into the Natural Circulation Test. Core power and reactivity responses will be essentially identical between the units due to identical core loadings. The core physics parameters (CEA worth, Critial Boron Concentration, Boron Worth, Moderator and Fuel Temperature Coefficients) will be verified during the Low Power Physics Tests. Core flow coastdown and pressure distributions will be verified to be within the Safety Analysis per the Post-Core RCS Flow Measurement Test. Identical CPC and RPS hardware and software have been installed

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in Unit 3 as was tested in Unit 1. Therefore the acceptable reactor trip signal generation times recorded during the January 9. 1986 event in Unit 1 are applicable to Unit 3. CPC and RPS operations are functionally tested during pre-operational tests and by routine surveillance tests. CEA insertion rates are measured during the CEA Drop Time test.

Safety System operability is predominately verified by the routine surveillance test program. Proper interfacing of the systems is demonstrated by the Integrated Safeguards Test. This test verifies train seperability, ESF load shed upon LOP, DG start and load, and load sequencing onto the ESF bus in the LOP condition. Safety systems required for the LOP event are verified to be both energized and operating, including DG, SP, ECW, SI, AFW and PC (charging is energized but must be manually restarted.) Operability of the charging boration flow path, typically gravity feed from the RWT, is verified and demonstrated per Operations Surveillance tests. Auxiliary feedwater operability is also verified by an Operations Surveillance test, and ADV stroking and flow capabilities are tested per Engineering Surveillances and Power Ascension tests. An Engineering Surveillance test also demonstrates proper adjustment of the Pressurizer Safety Valves' and Main Steam Safety Valves' setpoints.

Although the LOP test is intended to demonstrate plant responses, operator interfacing with the plant must also be tested when manual control of safety systems is required. Operator control capabilities were satisfactorily demonstrated during the Unit 1 and 2 Loss of Offsite Power tests and Natural Circulation test. Natural circulation control, reactivity (shutdown margin) control, balanced decay heat removal, and stability of primary and secondary system pressures and inventories at Hot Standby have been adequately demonstrated during these tests and other LOP/LOF events in Unit 1.

Therefore, proper response and operability of the systems required during the LOP event will be fully demonstrated and verified by other tests prior to completion of the Power Ascension Test program, and deletion of the Loss of Offsite Power Test will not increase the consequences of this FSAR/CESSAR evaluated accident.

8. Will the probability of a malfunction of equipment important to safety be increased?

Evaluation:

No. No modifications to equipment important to safety nor to the routine surveillances performed to test this equipment will be made by incorporation of the described change. Therefore the probability of a malfunction of safety systems will not be increased.

9. Will the consequences of a malfunction of equipment important to safety be increased?

Evaluation:

No. The response to Question 7 evaluated whether incorporation of the described change would verify design of the safety systems according to the Safety Analysis. The results of the alternate tests will be technically equivalent to those of the standard test to be deleted. Therefore the consequences of a malfunction of equipment important to safety will be verified to be within the scope of the Safety Analysis.

10. Will the possibility of an accident of a different type than any previously evaluated in the FSAR be created?

Evaluation:

No. As described in the response to Question 7, the objectives of the deleted test are satisfied via other tests performed during the Unit Pre-operational, Start-up, and Power Ascension Test programs. These tests are performed within the restrictions of the Safety Analysis and the Technical Specifications. 10CFR50.59 reviews and evaluations have or will be performed on each of these individual alternate tests to verify that they do not subject the plant to an operational configuration that would create the possibility of an accident or malfunction other than those previously evaluated by the FSAR/CESSAR.

11. Will the possibility of a malfunction of a different type than any previously evaluated in the FSAR be created?

Evaluation:

No. The described change only modifies the methodology of review of test results to justify compliance with the objectives of the Loss of Offsite Power Test. Response to this question is addressed in the responses to Questions 7 and 10.

12. Will the margin of safety as defined in the basis for any Technical Specification be reduced?

Evaluation:

No. The described change does not effect the operation of the plant nor does it require exception to the Technical Specifications. Therefore, the margin of safety as defined in the bases of the Technical Specifications is not reduced.

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ENCLOSURE 2

Excerpt From the
Unit 1 Startup Test Report

6.7 Unit Load Rejection
(Section 14.2.12.5.7)

TEST OBJECTIVE AND SUMMARY

The primary objective of this test was to demonstrate that the Nuclear Steam Supply System (NSSS) can accomodate a 100% load rejection (1) without initiating a Reactor Protection System (RPS) signal or an Engineered Safety Features Actuation System (ESFAS) signal, (2) without opening any primary or secondary safety valves, and (3) without causing a turbine trip. Additional objectives of the test were:

1) To collect data for verification of the CESEC transient analysis code for PVNGS Unit 1.
2) To verify that the closing time of the Main Turbine Control Valves was acceptable.
3) To verify that the Power Load Unbalance Circuit (PLU) functions as designed and prevented a turbine trip (caused by development of an overspeed condition) following the 100% load rejection.
4) To assess the operation of the following control systems following a 100% load rejection:
   - Steam Bypass Control System (SBCS)
   - Feedwater Control System (FWCS)
   - Pressurizer Pressure Control System (PPCS)
   - Pressurizer Level Control System (PLCS)
   - Reactor Power Cutback System (RPCS)
   - Control Element Drive Mechanism Control System (CEDMCS).

Testing was accomplished using procedure 73PA-1MA01, "Unit Load Rejection Test" and was successfully completed on January 7, 1986.

TEST DESCRIPTION

This test initiated a unit load rejection by opening the unit generator main output breakers while the plant was operating at essentialy 100% power with a Turbine Generator gross output of 1315 Mwe. The control systems (SBCS, FWCS, RRS, PPCS, PLCS, RPCS and CEDMCS) were all in the automatic mode of operation and were allowed to perform as designed to counteract and control the effects of the load rejection. The RPCS was expected to actuate on the loss of load and drop the selected CEAs. The RRS was expected to match Tavg and Tref by inserting CEAs, while the other control systems performed as designed. To verify that the test was performed successfully, actual plant parameters were compared with the single value acceptance criteria as supplied by the CESEC transient analysis code predictions.

During the performance of this test the house electrical loads were supplied from the startup transformer. This was done to minimize the exposure to a Loss of Offsite Power (LOP) event and to subject the turbine to the maximum credible overspeed condition, i.e. to eliminate any electrical load on the generator from providing any braking effect.

TEST RESULTS

The acceptance criteria were fully satisfied. The Reactor Power Cutback System performed as designed, i.e. the reactor did not trip, no ESFAS signals were initiated and none of the primary or secondary safety valves were opened.

The plant parameters recorded during the sixty seconds following initiation of the transient and their comparison with the single value acceptance criteria supplied by the CESEC transient analysis code are provided in Table 6-8.

CONCLUSIONS

The test demonstrated that the NSSS can sustain a 100% load rejection without a reactor trip, turbine trip, or a lifting of the primary or secondary safety valves. The control systems operated satisfactorily throughout the transient and data was collected to verify the CESEC predictions.

TABLE 6-8

SINGLE VALUE ACCEPTANCE CRITERIA
FOR 100% UNIT LOAD REJECTION

Parameter	Test Results	Acceptance Limit
Max. Pressurizer Pressure (psia)	2339.2	2388
Min. Pressurizer Level (%)	35	29.4
Min. RCS Hot Leg #1 Temp.(°F)	592	574
Min. RCS Hot Leg #2 Temp.(°F)	592	574
Max. SG #1 pressure (psia)	1236.7	1242
Max. SG #2 pressure (psia)	1240.8	1242

6.9 Loss of Offsite Power Test (Section 14.2.12.5.9)

TEST OBJECTIVE AND SUMMARY

The principal objective of the Loss of Offsite Power Test was to demonstrate that the reactor can be shutdown and maintained in a Hot Standby condition following the loss of all AC power. Testing was scheduled for performance at approximately 50% power in accordance with PVNGS procedure 73PA-1NA01 following completion of testing at the 80% power plateau.

On October 3, 1985, however, before the scheduled performance of 73PA-1NA01, PVNGS Unit 1 experienced an actual loss of all AC power while operating at approximately 52% of rated thermal power. The reactor shut down automatically and the plant was maintained in a stable Hot Standby condition for approximately 25 minutes, at which time offsite power was restored. The responses of the plant equipment and personnel during this unanticipated event were reviewed by the PVNGS Test Results Review Group and the Plant Review Board and were determined to have satisfied the objectives of the power ascension test as well as the intent of the regulatory requirements for the performance of this test.

TEST DESCRIPTION

The initial conditions that were to be used for the performance of 73PA-1NA01, Loss of Offsite Power, are summarized in Table 6-10. In addition, the pretest electrical lineup was to be set up such that when the main generator was tripped (the initiating event), plant electrical loads could not be switched to the startup transformers (ie, no "fast transfer" capability) resulting in a complete loss of all AC (LOAC) power. Sufficient data would then be collected to verify natural circulation through the core, stable steam generator levels (supplied by the motor-driven emergency feedwater pump), secondary system heat removal via the atmospheric dump valves (using a backup nitrogen supply) as well as general plant stability using only emergency power supplies (diesel generators). Stable hot standby conditions were to be maintained for approximately 30 minutes, at which time offsite power was to be restored.

TEST RESULTS

Table 6-10 shows the actual plant conditions as they were just prior to the unanticipated loss of offsite power. This data shows the similarity between the actual plant conditions that existed just prior to the unanticipated LOAC and those that were to be used for the power ascension test 73PA-1NA01. Table 6-11 shows the sequence of events that occurred during this event.

Following the loss of power, the reactor tripped on a Core Protection Calculator (CPC) generated low Departure from Nucleate Boiling Ratio (DNBR) signal due to the reactor coolant pumps (RCPs) coasting down. Due to the particular electrical lineup (in place for other electrical testing) the reactor trip, and subsequent master turbine trip, produced a loss of all AC power. The feedwater control system and the steam bypass control system were temporarily unavailable which resulted in the opening of the Main Steam Safety Valves (MSSVs) for secondary pressure control. Once backup power (diesel generators) was available, the control room operator took manual control of the secondary

pressure with the atmospheric dump valves (ADVs) and the MSSVs reseated. Secondary pressure peaked at 1280 psia then decreased as the operator assumed control. Once natural circulation had been established the secondary pressure stabilized around 820 psia.

The first charging pump was manually started approximately one (1) minute after the trip and suction was transferred to the refueling water tank (which had a boron concentration greater than 4000 ppm) within 15 minutes. Shutdown margin was verified to be greater than 6% delta k/k, per the applicable surveillance procedure, within one hour of the trip.

Verification of natural circulation was accomplished within 15 minutes after the trip. Primary parameters were monitored, and periodically recorded, to verify the following:

(1) Hot leg temperatures were stable or decreasing;
(2) Cold leg temperatures were close to and trending the steam generator saturation temperatures;
(3) Core delta T was less than the full power delta T of 57 °F (i.e., power to flow ratio was less than 1);
(4) Hot leg RTDs and Core Exit Thermocouples were trending consistently.

Reactor vessel head and plenum subcooling were maintained at greater than 28 °F to preclude any loop void formation that could degrade natural circulation. The motor-driven emergency feedwater pump supplied flow to the steam generators which maintained their levels above 38% (wide range), thus providing an adequate heat sink for the primary system. The main steam safety valves and the atmospheric dump valves were utilized to release the transferred heat to the atmosphere.

Pressurizer level was maintained between 39% and 47%, thus remaining above the heater cutout level (26%) throughout the event. RCS pressure peaked at 2290 psia (concurrent with the low secondary heat removal and subsequent pressure increase to the MSSV setpoint) and reached a low of 2120 once natural circulation was in progress. Auxiliary spray was utilized twice (for approximately one minute each time) for primary pressure control. Careful monitoring of the secondary steam and feedwater flows precluded both RCS overcooling and initiation of safety injection (SIAS).

CONCLUSIONS

Following the loss of the main generator and all offsite power, the plant was stabilized and natural circulation was verified. Although plant conditions were only maintained for approximately 25 minutes before offsite power was restored, the trended data indicate that Hot Standby conditions could have been maintained for a greater length of time had offsite power not been available. Thus, the equipment, controls and instrumentation necessary to remove decay heat from the core using only emergency power supplies was demonstrated for a sufficient period of time.

The PVNGS Test Results Review Group and the Plant Review Board subsequently reviewed the responses of the plant equipment and personnel to the unanticipated LOAC and determined that the event satisfied the objective of the power ascension test thereby obviating the need to perform 73PA-1NA01 for PVNGS-1. This position was formally submitted to the Nuclear Regulatory Commission via ANPP letter ANPP-34062-EEVB/BJA, E. E. Van Brunt, Jr. to George W. Knighton, dated November 20, 1985.

TABLE 6-10

LOSS OF OFFSITE POWER TEST
INITIAL CONDITIONS

Parameter	Actual Value	Test Value
Reactor Power (%)	52	50
Cold Leg Temperature (°F)	567	565
Pressurizer Pressure (psia)	2230	2250
Steam Generator Pressure (psia)	1140	stable
Steam Generator Level (%)	54	stable
Boron Concentration (ppm)	715	N/A
CEA Position	ARO*	ARO*
Control System Status		
-Reactor Regulating	Auto	Auto
-Control Element Drive	Standby	Standby
-Feedwater Control	Auto	Auto
-Steam Bypass Control	Auto	Auto
-Pzr. Level Control	Auto	Auto
-Pzr. Pressure Control	Auto	Auto
-Reactor Power Cutback	OOS**	OOS**

* -- ARO = All Rods Out = All control rods fully withdrawn
** -- OOS = Out of Service

TABLE 6-11
SEQUENCE OF EVENTS

Date	Time	Event
10/3/85	16:43:45	Electrical supply breakers open causing loss of offsite power
	16:43:46	Reactor and main turbine trip
	16:44	All CEAs inserted; diesel generators started and loaded
	16:44:35	Charging restored (42 GPM)
	16:45	Primary parameters monitored for verification of natural circulation
	16:48	Shifted RCS heat removal to ADVs
	16:57	Charging suction transferred to refueling water tank; Verified motor driven auxiliary feedwater started and feeding both generators
	17:03	Second charging pump started
	17:09	Offsite power restored
	17:10	Verification of shutdown margin commenced
	17:15	Cooldown of 15 °F/hr commenced
	17:35	Shutdown margin verified
	17:38	Diesel generator B unloaded and shutdown
	17:55	Charging pump suction transferred back to Volume Control Tank (VCT)
	18:00	RCS boron concentration = 916 ppm
	20:18	Started reactor coolant pump 1A; Forced circulation restored
	20:24	Started reactor coolant pump 2A
	20:26	Started reactor coolant pump 2B
	20:32	Commenced RCS heatup to normal operating temperature (565 °F)
10/4/85	01:09	Started reactor coolant pump 1B; All 4 RCPs in service

ENCLOSURE 3

Excerpt From the
Unit 2 Startup Test Report

6.5 Unit Load Rejection
(Section 14.2.12.5.7)

TEST OBJECTIVE AND SUMMARY

The primary objective of this test was to demonstrate that the Nuclear Steam Supply System (NSSS) can accomodate a 100% load rejection (1) without initiating a Reactor Protection System (RPS) signal or an Engineered Safety Features Actuation System (ESFAS) signal,and (2) without opening any primary or secondary safety valves. Additional objectives of the test were:

To assess the operation of the following control systems following a 100% load rejection:

- Steam Bypass Control System (SBCS)
- Feedwater Control System (FWCS)
- Pressurizer Pressure Control System (PPCS)
- Pressurizer Level Control System (PLCS)
- Reactor Power Cutback System (RPCS)
- Control Element Drive Mechanism Control System (CEDMCS)
- Turbine Rate Sensitive Power Load Unbalance Circuit (PLU).
- Reactor Regulating System (RRS)

Testing was accomplished using procedure 73PA-2MA01, "Unit Load Rejection Test" and was successfully completed on September 13, 1986.

TEST DESCRIPTION

This test will initiate a unit load rejection by opening the unit generator main output breakers while the plant was operating at essentialy 100% power. The loss of load will allow verification that SBCS, FWCS, PLU, RRS, PPCS, PLCS, CEDMCS and RPCS perform their designed functions.

When the load rejection is accomplished by opening the output breakers, the turbine will respond to the load rejection by initiating the Power Load Unbalance (PLU) circuit. This will momentarily close all turbine control valves to arrest turbine acceleration, then restore normal speed.

As a result of the large reduction in steam flow, the SBCS will signal the RPCS to actuate on "Large Load Regect" (LLR) and open all available steam bypass valves in quick open (Q.O) mode. The RPCS should drop CEA Group 5 into the reactor core to provide immediate power reduction. Following Q.O. activity the steam bypass valves should transfer to control on steam generator pressure in modulation and the RRS will attempt to match primary to secondary power by inserting regulating groups to lower RCS average temperature until the Automatic Motion Inhibit (AMI) is achieved. The other NSSS control systems will function to maintain the plant within the programmed system operating parameters appropriate for the final power level achieved.

TEST RESULTS

This test was originally attempted on September 11, 1986 in conjunction with testing of the Fast Bus Transfer. A reactor trip occurred due to the fast bus transfer so the load rejection portion was repeated and successfully completed on September 13, 1986.

The acceptance criteria were fully satisfied. The Reactor Power Cutback System performed as designed (i.e. the reactor did not trip) no ESFAS signals were initiated and none of the primary or secondary safety valves were opened.

The plant parameters recorded during the sixty seconds following initiation of the transient and their comparison with the single value acceptance criteria supplied by the CESEC transient analysis code are provided in Table 6-7.

CONCLUSIONS

The test demonstrated that the NSSS can sustain a 100% load rejection without a reactor trip, turbine trip, or a lifting of the primary or secondary safety valves. The control systems operated satisfactorily throughout the transient and data was collected to verify the CESEC predictions.

TABLE 6-7

SINGLE VALUE ACCEPTANCE CRITERIA
FOR 100% UNIT LOAD REJECTION

Parameter	Test Results	Acceptance Limit
Max. Pressurizer Pressure (psia)	2318	2388
Min. Pressurizer Level (%)	50	29.4
Min. RCS Hot Leg #1 Temp.(°F)	609	574
Min. RCS Hot Leg #2 Temp.(°F)	609	574
Max. SG #1 pressure (psia)	1208	1242
Max. SG #2 pressure (psia)	1219	1242

6.6 Loss of Offsite Power Test
(Section 14.2.12.5.9)

TEST OBJECTIVE AND SUMMARY

The principal objective of the Loss of Offsite Power Test was to demonstrate that the reactor can be shutdown and maintained in a Hot Standby condition following the loss of all AC power. Testing was performed at approximately 50% power in accordance with PVNGS procedure 73PA-2NA01 following completion of testing at the 50% power plateau.

TEST DESCRIPTION

Simulation of the loss of Main Generator and Offsite AC Power is accomplished by tripping the main turbine and then opening the offsite power supply breakers. The loss of offsite AC power will start the diesel generators, which should reach rated speed, voltage, and frequency within ten (10) seconds. The Engineered Safety Feature sequencer will then load the Class 1E load groups. The RCP motors will stop on loss of non-class power and the reactor will trip on projected low DNBR.

The loss of power and resulting reactor trip will result in a rapid decrease in core flow and decrease in steam generator level and an increase in steam generator pressure. The essential feedpump will be utilized to provide feedwater flow to both steam generators and maintain adequate level to remove decay heat.

The rise in steam generator pressure will be controlled by the operator action using the atmospheric steam dump valves since the steam bypass valves to the condenser will not be available. Emergency systems should maintain the reactor in hot standby under natural circulation flow conditions.

TEST RESULTS

Following the loss of offsite power initiated by a turbine trip at approximately 40% power, the reactor tripped on a Core Protection Calaulator (CPC) generated low Departure from Nucleate Boiling Ratio (DNBR) signal due to the reactor coolant pumps (RCPs) coasting down. All CEAs fully inserted into the core and the ESF busses were sequentially re-energized by the diesel generators within 8 seconds.

The first charging pump was manually started within one (1) minute of the trip followed by the charging suction being transferred to the Emergency Boration Path, then back to the VCT to preclude unneccessary boration of the RCS. Shutdown margin was verified to be greater then 6% delta k/k per the applicable surveillance procedure within one hour of the trip.

Immediately following the trip, the critical safety parameters were monitored and stabilized by the control room operators. Verification of

natural circulation was accomplished within 15 minutes after the trip. Primary parameters were monitored, and periodically recorded, to verify the following:

(1) Hot leg temperatures were stable or decreasing;
(2) Cold leg temperatures were close to and trending the steam generator saturation temperatures;
(3) Core delta T was less than the full power delta T of 57 °F (i.e., power to flow ratio was less than 1);
(4) Hot leg RTDs and Core Exit Thermocouples were trending consistently.

Reactor vessel head and plenum subcooling were maintained at greater than 28 °F to preclude any loop void formation that could degrade natural circulation. The motor-driven emergency feedwater pump supplied flow to the steam generators which maintained their levels above 70% (wide range), thus providing an adequate heat sink for the primary system (the steam generators will provide an adequate heat sink if the U-tubes are at least one third covered, 0% wide range). The main steam safety valves and the atmospheric dump valves were utilized to release the transferred heat to the atmosphere.

Pressurizer level was maintained between 45% and 60%, thus remaining above the heater cutout level (26%) throughout the event. RCS pressure peaked at 2390 psia (concurrent with the low secondary heat removal and subsequent pressure increase to the MSSV setpoint) and reached a low of 2200 while natural circulation was in progress. Auxiliary spray was utilized twice (for approximately one minute each time) for primary pressure control. Careful monitoring of the secondary steam and feedwater flows precluded both RCS overcooling and initiation of safety injection (SIAS). Primary system integrity was maintained as per design throughout the loss of all AC power transient. Included in Table 6-8 is a history of test events in chronological sequence.

CONCLUSIONS

Following the loss of the main generator and all offsite power, the plant was stabilized and natural circulation was verified. Plant conditions were maintained in Hot Standby for approximately 45 minutes before offsite power was restored. Thus, the equipment, controls and instrumentation necessary to remove decay heat from the core using only emergency power supplies was demonstrated thereby satisfying all objectives and acceptance criteria of the test.

TABLE 6-8
SEQUENCE OF EVENTS

Date	Time	Event
6/25/86	11:00:00	40% Full Power. Initial conditions verified
	11:10:00	Turbine trip initiated.
	11:10:03	Loss of Offsite Power initiated.
	11:10:04	Generator Reverse Power Trip
	11:10:04	2-E-NAN-S01 and 2-E-NAN-S02 de-energized (Unit Auxiliary Transformer Output breakers open).
	11:10:05	CPC channel C Low DNBR trip (90% RCP speed).
	11:10:05	Reactor Trip Breakers open. All CEAs inserted.
	11:10:06	4.160 Kv ESF Buses load shed on low voltage.
	11:10:15	Diesel Generators started and class 1E load groups re-energized.
	11:11:00	Started first charging pump.
	11:13	Commenced Auxiliary Spray.
	11:13:40	Operator starting to open Atmospheric Dump Valves.
	11:14	Stopped Auxiliary Spray. Pressurizer pressure ~2325psia
	11:14	Main Steam Safety Valve opens.
	11:14:41	ADVs open.
	11:15	MSSV closed. Controlling RCS press. with PZR heaters
	11:17	Controlling Steam Generator pressures with ADVs.
	11:17:45	Feeding both Steam Generators with Auxiliary Feedwater Pump B.
	11:25	Natural Circulation Declared. RCS stabilized at Hot Standby.
	11:55	Offsite Power Restored.
	12:52	Forced Circulation restored.

ENCLOSURE 4

Excerpt From the
Unit 3 Startup Test Report

6.5 Unit Load Rejection
(Section 14.2.12.5.7)

TEST OBJECTIVE AND SUMMARY

The primary objective of this test was to demonstrate that the Nuclear Steam Supply System (NSSS) can accomodate a 100% load rejection (1) without initiating a Reactor Protection System (RPS) signal or an Engineered Safety Features Actuation System (ESFAS) signal, and (2) without opening any primary or secondary safety valves. Additional objectives of the test were:

To assess the operation of the following control systems following a 100% load rejection:

- Steam Bypass Control System (SBCS)
- Feedwater Control System (FWCS)
- Pressurizer Pressure Control System (PPCS)
- Pressurizer Level Control System (PLCS)
- Reactor Power Cutback System (RPCS)
- Control Element Drive Mechanism Control System (CEDMCS)
- Reactor Regulating System (RRS)

Testing was scheduled to be performed at the end of the 100% power plateau in accordance with procedure 73PA-3MA01, "Unit Load Rejection Test". On December 27, 1987, however, before the scheduled performance of 73PA-3MA01, PVNGS Unit 3 experienced an unplanned turbine trip while operating at approximately 93% of rated thermal power. Reactor power cutback and and SBCS quick open signals were received. No RPS or ESFAS signals were received, no primary or secondary safety valves lifted and reactor power was stablized at approximately 30%. The responses of the plant equipment during this unanticipated event were reviewed by the PVNGS Test Results Review Group and were determined to have satisfied the objectives of the power ascension test as well as the intent of the regulatory requirements for the performance of this test.

TEST DESCRIPTION

The initial conditions that were to be used for the performance of 73PA-3MA01 and the actual conditions at the time of the December 27, 1987 event are listed in table 6-7. Both the planned test and the unplanned turbine trip event allow verification that SBCS, FWCS, RRS, PPCS, PLCS, CEDMCS and RPCS perform their designed functions.

In both the planned test and the unplanned event the load rejection was accomplished by initiating the turbine trip circuitry. This causes all turbine stop and control to rapidly close and opens the main generator output breakers.

As a result of the large reduction in steam flow, the SBCS will signal the RPCS to actuate on "Large Load Reject" (LLR) and open all available steam bypass valves in quick open (Q.O.) mode. The RPCS should drop CEA Group 5 into the reactor core to provide immediate power reduction. Following Q.O. activity the steam bypass valves should transfer to control on steam generator pressure in modulation and the RRS will attempt to match primary to secondary power by inserting regulating groups to lower RCS average temperature until the Automatic Motion Inhibit (AMI) is achieved. The other NSSS control systems will function to maintain the plant within the programmed system operating parameters appropriate for the final power level achieved.

TEST RESULTS

Following the loss of the turbine-generator, the reactor power cutback system in conjunction with the other control systems performed as designed. The reactor did not trip, no ESFAS signals were generated and no primary or secondary safety valves lifted. The single value acceptance criteria of test procedure 73PA-3MA01 were satisfied with the exception of S/G 1 and 2 pressures. These acceptance criteria apply to the first sixty seconds of the transient and are listed in Table 6-8 with the measured results from the turbine trip. The out-of-tolerance results on S/G pressures were determined to be due to misadjustment of the stroke times of the steam bypass valves. The stroke times were subsequently adjusted to provide the proper stroke times.

CONCLUSIONS

The turbine trip event demonstrated that the NSSS can sustain a 100% load rejection without a reactor trip, ESFAS actuation, or lifting of the primary or secondary safety valves. The control systems operated satisfactorily throughout the transient and data was collected to verify the single value acceptance criteria. The incorrectly set steam bypass valve stroke times were corrected.

The PVNGS Test Results Review Group reviewed the responses of plant equipment and personnel and detemined that the event satisfied the objective of the power ascension test, thereby obviating the need to perform 73PA-3MA01. No further testing is planned.

TABLE 6-7

UNIT LOAD REJECTION
INITIAL CONDITIONS

Parameter	Actual Value	Test Value
Reactor Power	93%, increasing	>95%, stable
RCS Average Temperature °F	590	592.5-593.5
Pressurizer Pressure, psia	2250	2234-2265
Steam Generator Pressure, psia	1080	1064-1102
Steam Generator Level, %	54	51.6-53.6
CEA position	ARO*	Above PDIL[1]
Control System Status		
-Reactor Regulating System	Auto	Auto
-Control Element Drive	Standby[2]	Auto
-Feedwater Control System	Auto	Auto
-Steam Bypass Control System	Auto	Auto
-Pressurizer Level Control	Auto	Auto
-Pressurizer Pressure Control	Auto	Auto
-Reactor Power Cutback System	Auto	Auto

* — ARO = All Rods Out = All control rods fully withdrawn

1 — PDIL = Power Dependent Insertion Limit

2 Changed to Auto fifteen seconds after turbine trip by operator

TABLE 6-8

SINGLE VALUE ACCEPTANCE CRITERIA
FOR 100% UNIT LOAD REJECTION

Parameter	Test Results	Acceptance Limit
Max. Pressurizer Pressure (psia)	2375	2388
Min. Pressurizer Level (%)	31	29.4
Min. RCS Hot Leg #1 Temp. (°F)	584	574
Min. RCS Hot Leg #2 Temp. (°F)	584	574
Max. SG #1 pressure (psia)	1247*	1242
Max. SG #2 pressure (psia)	1248*	1242

*Out of tolerance results due to misadjustment of SBCS valve stroke times

ENCLOSURE 5

Excerpt From Procedure 93PE-3SA01
Integrated Test of Engineered Safety Features

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PALO VERDE NUCLEAR GENERATING STATION MANUAL	PROCEDURE NO. 93PE-3SA01	SDC # 001
INTEGRATED TEST OF ENGINEERED SAFETY FEATURES	REVISION 0	Page 1 of 716

STARTUP FILE COPY

PREPARED BY:

AUTHOR ______________ DATE 12/1/86

REVIEWED BY:

TECHNICAL REVIEWER ______________ DATE 12/1/86

LEAD STARTUP ENGINEER ______________ DATE 12-1-86

GROUP SUPERVISOR ______________ DATE 12-1-86

UNIT 1 STARTUP MANAGER N/A DATE N/A

UNIT 2 STARTUP MANAGER N/A DATE N/A

UNIT 3 STARTUP MANAGER ______________ DATE 12/1/86

QA - QUALITY SYSTEMS/ENGINEERING ______________ DATE 12/1/86

TWG ______________ (60.86) DATE 12/1/86

APPROVED BY:

PVNGS STARTUP MANAGER ______________ DATE 12.1.86

DATE EFFECTIVE 12/2/86

DN-0351e DN-0357e
DN-0352e DN-0358e
DN-0353e DN-0359e
DN-0354e DN-0360e
DN-0355e
DN-0356e

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APPENDICES

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APPENDICES - Continued

APPENDICES - Continued

APPENDICES - Continued

1.0 OBJECTIVES

1.1 To demonstrate the independence of the redundant onsite Class 1E electrical power systems and their associated load groups and to verify proper operation of the design accident loads in response to the Engineered Safety Features Actuation System.

1.1.1 To verify that each Class 1E electrical power system (switchgear, load centers, motor control centers, and distribution panels) remain deenergized when the normal, alternate and emergency supply breakers to the load group are isolated. (Subsections 8.1 (Train B), 8.14 (Train A)).

1.1.2 To verify that the Class 1E 125 VDC control centers remain deenergized after being isolated from their associated battery and battery chargers. (Subsections 8.1 (Train B), 8.14 (Train A)).

1.1.3 To demonstrate the proper operation of each Class 1E load group in response to the following ESF actuations (the opposite load group will be deenergized to demonstrate that the successful operation of one load group is in no way affected by the failure of the other load group):

(1) LOP (Subsections 8.2 (Train A), 8.15 (Train B))

(2) SIAS/CIAS (Subsections 8.3 (Train A), 8.16 (Train B))

(3) RAS (Subsections 8.4 (Train A), 8.17 (Train B))

(4) CSAS (Subsections 8.5 (Train A), 8.18 (Train B))

(5) MSIS (Subsections 8.6 (Train A), 8.19 (Train B))

(6) AFAS-1 (Subsections 8.7 (Train A), 8.20 (Train B))

(7) AFAS-2 (Subsections 8.8 (Train A), 8.21 (Train B))

(8) CREFAS (Subsections 8.9 (Train A), 8.22 (Train B))

(9) CRVIAS (Subsections 8.10 (Train A), 8.23 (Train B))

(10) FBEVAS (Subsections 8.11 (Train A), 8.24 (Train B))

(11) CPIAS (Subsections 8.12 (Train A), 8.25 (Train B))

1.1.3.1 To verify that the DG starts automatically and attains the required voltage and frequency within the specified time on an LOP.

1.1.3.2 To verify that on an LOP, the proper loads are shed prior to DG breaker closure.

1.1.3.3 To verify proper operation of the loading sequence for an LOP, SIAS/CIAS, CSAS, AFAS, CREFAS, CRVIAS, and FBEVAS.

1.1.3.4 To verify that the equipment aligns correctly in response to the ESFAS actuations.

1.1.3.5 To verify that the DG breaker does not trip if an SIAS occurs after an LOP.

1.1.3.6 To verify the emergency override of the DG test mode by demonstrating that the DG breaker trips if an SIAS or AFAS occurs with the DG in DROOP mode.

1.1.3.7 To demonstrate that the ESFAS actuated equipment remains in its required safety position when the trip signal is reset.

1.1.3.8 To demonstrate the ability to manually override the trip signal to specified components.

1.1.3.9 To demonstrate the automatic bypass of the motor overload contact for specified components on ESFAS actuations.

1.1.3.10 To demonstrate the ability to synchronize the DG with offsite power and restore the DG to a standby status after an LOP.

1.1.3.11 To demonstrate that on an SIAS or AFAS without LOP, the DG can be manually overriden from the control room.

1.1.4 To demonstrate the independence of the Class 1E electrical power systems from the non class electrical power systems (Subsection 8.27).

1.1.5 To demonstrate that proper operation of each Class 1E load group is not affected by the loss of non class electrical power systems or the simultaneous actuation of both Class 1E load groups in response to SIAS/CIAS/LOP. (Subsection 8.28)

1.1.5.1 To demonstrate that on an SIAS, the DG starts automatically and operates on standby.

1.1.5.2 To demonstrate that if an LOP occurs after an SIAS (DG operating on standby), the load sequencer restarts equipment within specified time.

1.1.5.3 To verify that the equipment aligns correctly in response to the ESFAS actuations.

1.1.6 To demonstrate the proper operation of each Class 1E load group in response to a simulated SIAS/CIAS and subsequent LOP with the SI pumps aligned to inject into a depressurized RCS and with the DG at ambient conditions. (Subsections 8.30, 8.32)

1.1.6.1 To demonstrate that the DG starts automatically and attains the required voltage and frequency and operates on standby.

1.1.6.2 To demonstrate that the safety injection system can deliver the required flow to the RCS within the specified time.

1.1.6.3 To demonstrate that if an LOP occurs after flow is established to the RCS, the DG breaker closes, the load sequencer restarts the loads and flow is reestablished to the RCS within the specified time.

1.1.6.4 To verify that the DG voltage and frequency are maintained within the required limits at all times.

1.1.6.5 To demonstrate proper system alignment in response to the ESFAS actuation.

1.1.6.6 To demonstrate that the Class 1E load groups function independent from each other on an SIAS/CIAS/LOP.

1.1.6.7 To demonstrate the automatic starting of the DG with the control mode switch in LOCAL.

1.1.6.8 To demonstrate that the largest single load on each DG can be shed and that the DG voltage and frequency are maintained within the required limits.

1.1.6.9 To verify that the auto-connected loads on the DG do not exceed the continuous rating of the DG.

1.1.6.10 To demonstrate the full load carrying capability of the DG for an interval of not less than 24 hours (the first two (2) hours of which will be at 110%) after reaching stable temperatures.

1.1.7 To demonstrate the proper operation of each Class 1E load group in response to a coincident LOP/SIAS/CIAS with the pumps aligned to inject into a depressurized RCS and with the DG at full load temperature. (Subsection 8.31, 8.33)

1.1.7.1 To demonstrate that the DG starts automatically and attains the required voltage and frequency within the required limits and time, in response to the ESFAS actuation.

1.1.7.2 To verify the proper operation of the load sequencer and that the DG voltage and frequency are maintained within the specified limits.

1.1.7.3 To demonstrate proper system alignments in response to the ESFAS actuation.

1.1.7.4 To demonstrate the automatic starting of the DG with the control mode switch in REMOTE.

1.1.7.5 To verify that the auto-connected loads on the DG do not exceed the continuous rating of the DG.

1.1.8 To demonstrate the proper operation of ESF equipment in response to an AFAS with subsequent LOP and with the AF pump aligned to inject into a depressurized steam generator. (Subsection 8.34)

1.1.8.1 To demonstrate that on an AFAS the DG starts automatically and attains the required voltage and frequency and operates on standby.

1.1.8.2 To demonstrate that if an LOP occurs after flow is established, the DG breaker closes, the load sequencer restarts the loads and flow is reestablished within the specified time.

1.1.9 To demonstrate the automatic transfer to emergency source on loss of normal power for the 120 VAC non-Class 1E ungrounded instrument and control power. (Subsection 8.27)

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1.2 TEST BOUNDARIES

The test boundaries consist of all equipment actuated by the Engineered Safety Features Actuation System. The specific subsystems and components are listed in Appendix X.

1.3 FSAR and Regulatory Commitments addressed in this procedure:

1.3.1 Verify that Class 1E buses can be transferred from the Control Room. (FSAR 14B.51.3.10)

1.3.2 Verify that redundant features of the electrical emergency power systems function according to design specifications. (R.G. 1.68R0 Appendix A - A.6.E)

1.3.3 Manual control of the diesel generator units will be demonstrated (FSAR 8.3.1.1.4.5)

1.3.4 Demonstrate proper voltage and frequency regulation under transient and steady state conditions for the electrical emergency power system. (R.G. 1.68R0 Appendix A - A.6.E)

1.3.5 During preoperational testing of diesel generator sets, the predicted loads should be verified by test. (R.G. 1.9R0 - C.3)

1.3.6 For the emergency diesel generators, load tests will be conducted to verify the performance of each unit with permanently connected and auto-connected emergency (accident) loads. (FSAR 14.B.9.3.5)

1.3.7 Testing of Diesel Generator units during preoperational test program should demonstrate functional capability at full-load temperature conditions by rerunning test per R.G.1.108R0C.2.A. (R.G. 1.108R1 - C.2.a.(5))

1.3.8 Demonstrate full-load-carrying capability of standby diesel generators for an interval of not less than 24 hours, of which 22 hours should be at a load equivalent to the continuous rating of the diesel generator and 2 hours at a load equivalent to the 2 hour rating of the diesel generator. The test should also verify that the cooling system functions within design limits. Within five (5) minutes after completion of the 24 hour run, the D.G. will be immediately subjected to a HOT START via SIAS/CIAS signals. (R.G. 1.108 R1 - C.2.a.(3)).

1.3.9 Preoperational test program should include electrical system emergency power system tests, under loss of all AC voltage, to demonstrate that the system can start, assume the required loads, and carry them for several hours. (R.G. 1.68R0 Appendix A - A.6.E)

1.3.10 Verify proper safety related bus stripping and separation of nonvital loads. (R.G. 1.68R0-Appendix A - A.6.E)

1.3.11 The onsite electrical power system should be functionally tested successively in the various possible combinations of power sources and load groups. (R.G. 1.41R0.C.2)

1.3.12 The DC and onsite AC buses and related loads not under test should be monitored to verify absence of voltage at these buses and loads during functional test of electric power systems. (R.G. 1.41R0.C.3)

1.3.13 Demonstrate the independence of the redundant onsite (ESF) electrical power systems (Train A and B) to each other and to any other electrical system. (FSAR 14.B.51.3.1)

1.3.14 Verify that the diesel generators respond and the appropriate switchgear, load centers and motor control centers function correctly on a loss of offsite power. (FSAR 14.B.51.3.2)

1.3.15 Simulate design accident actuation signals from the NSSS ESFAS cabinets and BOP ESFAS cabinets and verify design accident loads start. (FSAR 14.B.51.3.3)

1.3.16 Verify that design accident loads associated with a given train remain inoperable when the designed actuation signals are simulated from the opposite train (BOP cross train trips are defeated). (FSAR 14.B.51.3.4)

1.3.17 Verify that the forced shutdown loads associated with Train A and B start when required and after being allowed to reach a stable operating condition will function without abnormal conditions. (FSAR 14.B.51.3.5)

1.3.18 Verify that the Class 1E 125 VDC control centers, after being isolated from their associated battery and battery chargers, will remain deenergized. (FSAR 14.B.51.3.6)

1.3.19 Demonstrate the capability of standby diesel generators to attain and stabilize frequency and voltage within the acceptability limits and time. (IEEE 387-84 6.4.1)

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1.3.20 Site load acceptance tests shall demonstrate capability of standby diesel generators to accept the individual loads that make up the design load, in sequence and duration to maintain voltage and frequency within acceptable limits. (IEEE 387-84 6.4.2)

1.3.21 Loads to be applied, carried, and rejected during site acceptance testing shall be the design load auxiliaries located at the station. (IEEE 387-84 6.4.2)

1.3.22 Site acceptance test loads shall be applied in the sequence and timing specified in the Plant Safety Analysis and shall be carried at least until a steady-state operating temperature is reached. [IEEE 387-84 6.4.1(6)]

1.3.23 Load rejection tests shall be given to standby diesel generators. [IEEE 387-84 6.4.1(4)]

1.3.24 Tests as listed in FSAR 8.3.1.1.4.7 are conducted on each diesel generator unit which is used as standby power supply for onsite AC power systems in accordance with IEEE 387-84. (FSAR 8.3.2.3.3.27-J)

1.3.25 Testing of diesel generator units during preoperational test program and at least once every 18 months should demonstrate proper startup by simulating loss of all alternating current voltage. (R.G. 1.108 R1 C.2.a(1))

1.3.26 Testing of diesel generator units during preoperational test program and at least once every 18 months should demonstrate that the unit can attain required voltage and frequency within acceptable limits and time once it starts. (R.G. 1.108 R1 C.2.a(1))

1.3.27 Testing of diesel generator units during preoperational test program and at least once every 18 months should verify that voltage and frequency are maintained within required limits. (R.G. 1.108 R1 C.2.a(2))

1.3.28 Testing of diesel generator units during preoperational test program and at least once every 18 months should demonstrate proper operation during diesel generator load shedding, including a test of the loss of the largest single load and complete loss of load, and verify that the voltage requirements are met and that the overspeed limits are not exceeded. (R.G. 1.108 R1 C.2.a.(4).)

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1.3.29 Testing of diesel generator units during preoperational test program and at least once every 18 months should demonstrate ability to transfer emergency load to offsite power. [R.G. 1.108 R1 C.2a(6)]

1.3.30 Testing of diesel generator units during preoperational test program and at least once every 18 months should demonstrate ability to (a) synchronize the diesel generator unit with offsite power while the unit is connected to the emergency load, (b) transfer this load to the offsite power, (c) isolate the diesel generator unit, and (d) restore it to standby status. [R.G. 1.108 R1 C.2a(6)]

1.3.31 Preoperational testing of diesel generator units, and testing at least once every 18 months should demonstrate that capability of unit to supply emergency power within required time is not impaired during periodic testing under R.G 1.108.C.2.C. [R.G. 1.108 R1 C.2.a.(8)]

1.3.32 Testing of diesel generator units during preoperational test program and at least once every 18 months should demonstrate proper operation for design-accident-loading sequence to design-load requirements. [R.G. 1.108 R1 C.2.a(2)]

1.3.33 Verify HPSI response to SIAS, CSAS and RAS under both normal and emergency power. (CESSAR 14.2.12.1.22-1.1, 1.2, 3.4, 3.5 and 4.5)

1.3.34 Verify LPSI subsystem response to SIAS, CSAS and RAS under both normal and emergency power. (CESSAR 14.2.12.1.23-1.1, 1.2, 1.4, 3.4, 3.5, 4.5 and 5.1)

1.3.35 Verify CS subsystem response to SIAS, CSAS and RAS. (CESSAR Appendix 6A - 9.1.2, 9.3.4, 9.4.5 and 9.5.5)

1.3.36 Demonstrate and record emergency starting conditions for standby diesel generators. (FSAR 14B.9.3.3)

1.4 FSAR and Regulatory Commitments not addressed in this procedure:

1.4.1 Verification that in the event of a failure of the unit auxiliary transformer an automatic fast transfer of the 13.8 KV buses to the startup transformer is initiated is performed in 93PE-3MA01. (FSAR 14B.51.3.7)

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1.4.2 Verification that in the event of a turbine trip an automatic fast transfer of the 13.8 KV buses to the startup transformer is initiated is performed in 93PE-3NA01. (FSAR 14B.51.3.8)

1.4.3 Verification that DC loads (not verified by system analysis) function properly at a battery terminal voltage equal to a minimum acceptable battery terminal voltage is performed in 93PE-1SA01 and 93PE-3PK03. (FSAR 14.B.4.3.8).

2.0 ACCEPTANCE CRITERIA

NOTE

All acceptance criteria is Section 8 will be identified as per definition 3.3.3.

2.1 Independence of Class 1E Load Group 1 (Train A) from Class 1E Load Group 2 (Train B) deenergized (normal, alternate and emergency supply breakers for E-PBB-S04 open).

2.1.1 Train A switchgear, load centers and motor control centers shall be energized to a nominal voltage as per Appendix B. (FSAR 8.3.1.1.3.7, 8.3.1.1.3.12, 14B.51.3.1) (step 8.1.7 - Appendix B).

2.1.2 Train B switchgear, load centers and motor control centers shall be deenergized as specified in Appendix B. (FSAR 8.3.1.1.3.7, 8.3.1.1.3.12, 14B.51.3.1) (step 8.1.7 - Appendix B).

2.1.3 The Class 1E 125 VDC control centers E-PKB-M42 and E-PKD-M44 will remain deenergized after being isolated from their batteries and battery chargers. In addition, each battery is exclusively associated with a single control center. (FSAR 8.3.2.2.1.3 (R.G. 1.6), 14B.51.3.6, 8.3.2.2.1.19 (IEEE 308)) (Step 8.1.6).

2.1.4 Upon simulation of a loss of offsite power, the following shall occur:

2.1.4.1 Loads are shed as specified in Appendix D-1. (FSAR 8.3.1.1.4.6, 13-10407-J104-43) (step 8.2.20 - Appendix D-1).

2.1.4.2 DG A starts and attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz within 10 seconds. (FSAR 8.3.1.1.4.1, 8.3.1.1.4.6; R.G. 1.108.C.2.A(1); Tech Spec 4.8.1.1.2.d.4.b) (step 8.2.20 - Appendix D-1).

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2.1.4.3 Load sequencing is initiated upon closure of the DG breaker and the sequence times are as specified in Appendix D-1. (FSAR 8.3.1.1.4.6, Table 8.3-3; Tech Spec 4.8.1.1.2.d.12; 13-10407-J104-81; R.G. 1.108.C.2.a.(2)) (step 8.2.20 - Appendix D-1).

2.1.4.4 Train A equipment moves to the required safety configuration as specified in Appendix C-1. (FSAR 8.3.2.2.1.19; R.G. 1.41.C.2; 13-10407-J104-43) (step 8.2.20 - Appendix C-1).

2.1.5 Upon simulation of an SIAS/CIAS with an LOP established, the following shall occur:

2.1.5.1 Train A equipment moves to the required safety configuration as specified in Appendix C-3. (FSAR 7.3.1.1.10.1, 7.3.1.1.10.5; 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.3.19 - Appendix C-3).

2.1.5.2 Starting of the equipment is initiated without shedding any operating equipment. (FSAR 8.3.1.1.4.6) (step 8.3.19 - Appendix D-2).

2.1.5.3 The sequence timing of loads is as specified in Appendix D-2. (FSAR Table 8.3-3, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.3.19 - Appendix D-2).

2.1.5.4 If the DG is paralleled to the preferred power supply, the DG breaker will automatically trip on an SIAS and the DG will continue running. (FSAR 8.3.1.1.4.7; R.G. 1.108.C.2.a.(8)) (step 8.4.61)

2.1.5.5 After the reset of the SIAS, all components will remain in the required safety configuration as specified in Appendix C-3. (IE Bulletin 80 - 06) (step 8.4.61 Appendix C-3).

2.1.6 Upon simulation of an RAS after an SIAS/CIAS/LOP has been established, the following shall occur:

2.1.6.1 Train A equipment moves to the required safety configuration as specified in Appendix C-5. (FSAR 7.3.1.1.10.6, 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.4.61 - Appendix C-5).

2.1.6.2 After the reset of the RAS, all components will remain in the required safety configuration as specified in Appendix C-5. (IE Bulletin 80 - 60) (step 8.4.61 Appendix C-5).

2.1.7 The DG can be synchronized with offsite power while supplying the emergency loads and restored to a standby status. (FSAR 14B.51.3.10; R.G. 1.108.C.2.a.(6)) (step 8.4.61.)

2.1.7.1 The SIAS can be overriden to shutdown the DG when offsite power is available. (FSAR 8.3.1.1.4.5) (step 8.4.61).

2.1.8 Upon simulation of an CSAS, the following shall occur:

2.1.8.1 Train A equipment moves to the required safety configuration as specified in Appendix C-7. (FSAR 7.3.1.1.10.2, 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.5.27 - Appendix C-7).

2.1.8.2 The sequence timing of loads is as specified in Appendix D-3. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.5.27 - Appendix D-3).

2.1.8.3 After reset of the CSAS, all components will remain in the required safety configuration as specified in Appendix C-7. (IE Bulletin 80-06) (step 8.5.27 - Appendix C-7).

2.1.8.4 DG A starts and attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz within 10 seconds and operates on standby for greater than 5 minutes. (Tech Spec 4.8.1.1.2.d.5) (step 8.5.27 - Appendix D-3).

2.1.9 Upon simulation of an MSIS, the Train A equipment moves to the required safety configuration as specified in Appendix C-9. (FSAR 7.3.1.1.10.4, 8.3.2.2.1.19; R.G. 1.4.1.C.2) (step 8.6.14 - Appendix C-9).

2.1.9.1 After reset of the MSIS, all components will remain in the required safety configuration as specified in Appendix C-9. (IE Bulletin 80-06) (step 8.6.14 - Appendix C-9).

2.1.10 Upon simulation of an AFAS-1, the following shall occur:

2.1.10.1 Train A equipment moves to the required safety configuration as specified in Appendix C-11. (FSAR 7.3.1.1.10.7, 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.7.30 - Appendix C-11).

2.1.10.2 DG A starts and attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz within 10 seconds and operates on standby for greater than 5 minutes. (FSAR 8.3.1.1.4.1, 8.3.1.1.4.5; Tech Spec 4.8.1.1.2.d.5) (step 8.7.30 - Appendix D-4).

2.1.10.3 The sequence timing is as specified in Appendix D-4. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.7.30 - Appendix D-4).

2.1.10.4 If the DG is paralleled to the preferred power supply, the DG breaker will automatically trip on an AFAS-1 and the DG will continue running and maintain a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz. (FSAR 8.3.1.1.4.7; R.G. 1.108.C.2a.(8)) (step 8.7.30).

2.1.10.5 The AFAS-1 can be overriden to shutdown the DG when offsite power is available. (FSAR 8.3.1.1.4.5) (step 8.7.30).

2.1.10.6 After reset of the AFAS-1, all components will remain in the required safety configuration as specified in Appendix C-11. (IE Bulletin 80-06) (step 8.7.30 - Appendix C-11).

2.1.10.7 The DG cannot be automatically connected to the bus while the preferred source of power is available. (FSAR 8.3.1.1.4.6) (8.7.30 - Appendix C-11).

2.1.11 Upon simulation of an AFAS-2, the following shall occur:

2.1.11.1 Train A equipment moves to the required safety configuration as specified in Appendix C-13. (FSAR 7.3.1.1.10.7, 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.8.30 - Appendix C-13).

2.1.11.2 DG A starts and attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz within 10 seconds and operates on standby for greater than 5 minutes. (FSAR 8.3.1.1.4.1, 8.3.1.1.4.5; Tech Spec 4.8.1.1.2.d.5) (step 8.8.30 - Appendix D-5).

2.1.11.3 The sequence timing is as specified in Appendix D-5. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.8.30 - Appendix D-5).

2.1.11.4 If the DG is paralleled to the preferred power supply, the DG breaker will automatically trip on an AFAS-2 and the DG will continue running and maintain a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz.. (FSAR 8.3.1.1.4.7; R.G. 1.108.C.2.a.(8)) (step 8.8.30)

2.1.11.5 The AFAS-2 can be overriden to shutdown the DG when offsite power is available. (FSAR 8.3.1.1.4.5) (step 8.8.30).

2.1.11.6 After reset of the AFAS-2, all components will remain in the required safety configuration as specified in Appendix C-13. (IE Bulletin 80-06) (step 8.8.30 - Appendix C-13).

2.1.11.7 The DG cannot be automatically connected to the bus while the preferred source of power is available. (FSAR 8.3.1.1.4.6) (8.8.30 - Appendix C-13).

2.1.12 Upon simulation of a CREFAS, the following shall occur:

2.1.12.1 Train A equipment moves to the required safety configuration as specified in Appendix C-15. (FSAR 7.3.1.1.10.10, 8.3.2.2.1.19; R.G. 1.41.C.2 13-10~0~-J104-40) (step 8.9.21 - Appendix C-15).

2.1.12.2 The sequence timing is as specified in Appendix D-6. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10~0~-J104-81) (step 8.9.21 - Appendix D-6).

2.1.12.3 After reset of the CREFAS, all components will remain in the required safety configuration as specified in Appendix C-15. (IE Bulletin 80-06) (step 8.9.21 - Appendix C-15).

2.1.13 Upon simulation of a CRVIAS, the following shall occur:

2.1.13.1 Train A equipment moves to the required safety configuration as specified in Appendix C-17. (FSAR 7.3.1.1.10.10, 8.3.2.2.1.19; R.G. 1.41.C.2, 13-10~0~-J104-44) (step 8.10.16 - Appendix C-17).

2.1.13.2 The sequence timing is as specified in Appendix D-7. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-S1) (step 8.10.16 - Appendix D-7).

2.1.13.3 After reset of the CRVIAS, all components will remain in the required safety configuration as specified in Appendix C-17. (IE Bulletin 80-06) (step 8.10.16 - Appendix C-17).

2.1.14 Upon simulation of a FBEVAS, the following shall occur:

2.1.14.1 Train A equipment moves to the required safety configuration as specified in Appendix C-19. (FSAR 7.3.1.1.10.8, 8.3.2.2.1.19; R.G. 1.41.C.2, 13-10407-J104-39) (step 8.11.16 - Appendix C-19).

2.1.14.2 The sequence timing is as specified in Appendix D-8. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-S1) (step 8.11.16 - Appendix D-8).

2.1.14.3 After reset of the FBEVAS, all components will remain in the required safety configuration as specified in Appendix C-19. (IE Bulletin 80-06) (step 8.11.16 - Appendix C-19).

2.1.15 Upon simulation of an CPIAS, the Train A equipment moves to the required safety configuration as specified in Appendix C-21. (FSAR 7.3.1.1.10.9, 8.3.2.2.1.19; R.G. 1.4, 1.C.2; 13-10407-J104-41) (step 8.12.18 - Appendix C-21).

2.1.15.1 After reset of the CPIAS, all components will remain in the required safety configuration as specified in Appendix C-21. (IE Bulletin 80-06) (step 8.12.18 - Appendix C-21).

2.1.16 Train B switchgear, load centers and motor control centers shall remain deenergized after all Train A ESFAS actuations. (FSAR 8.3.2.2.1.19; R.G. 1.41.C.3) (8.2.20, 8.3.19, 8.4.61, 8.5.27, 8.6.14, 8.7.30, 8.8.30, 8.9.21, 8.10.16, 8.11.16, 8.12.18).

2.2 Independence of Class 1E Load Group 2 (Train B) with Class 1E Load Group 1 (Train A) deenergized (normal, alternate and emergency supply breakers for E-PBA-S03 open).

2.2.1 Train B switchgear, load centers and motor control centers shall be energized as specified in Appendix F. (FSAR 8.3.1.1.3.7, 8.3.1.1.3.12, 14B.51.3.1) (step 8.14.8 - Appendix F).

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2.2.2 Train A switchgear, load centers and motor control centers shall be deenergized as specified in Appendix F. (FSAR 8.3.1.1.3.7, 8.3.1.1.3.12, 14B.51.3.1) (step 8.14.8 - Appendix F).

2.2.3 The Class 1E 125 VDC control centers E-PKA-M41 and E-PKC-M43 will remain deenergized after being isolated from their batteries and battery chargers. In addition, each battery is exclusively associated with a single control center. (FSAR 8.3.2.2.1.3, R.G. 1.6, 14B.51.3.6, 8.3.2.2.1.19, IEEE 308) (Step 8.14.7).

2.2.4 Upon simulation of a loss of offsite power, the following shall occur:

2.2.4.1 Loads are shed as specified in Appendix H-1. (FSAR 8.3.1.1.4.6, 13-10407-J104-43) (step 8.15.20 - Appendix H-1).

2.2.4.2 DG B starts and attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz within 10 seconds. (FSAR 8.3.1.1.4.1, 8.3.1.1.4.6; R.G. 1.108.C.2.A(1); Tech Spec 4.8.1.1.2.d.4.b) (step 8.15.20 - Appendix H-1).

2.2.4.3 Load sequencing is initiated upon closure of the DG breaker and the sequence times are as specified in Appendix H-1. (FSAR 8.3.1.1.4.6, Table 8.3-3; Tech Spec 4.8.1.1.2.d.12; 13-10407-J104-81; R.G. 1.108.C.2.a.(2)) (step 8.15.20 - Appendix H-1).

2.2.4.4 Train B equipment moves to the required safety configuration as specified in Appendix G-1. (FSAR 8.3.2.2.1.19; R.G. 1.41.C.2; 13-10407-J104-43) (step 8.15.20 - Appendix G-1).

2.2.5 Upon simulation of an SIAS/CIAS with an LOP established, the following shall occur:

2.2.5.1 Train B equipment moves to the required safety configuration as specified in Appendix G-3. (FSAR 7.3.1.1.10.1, 7.3.1.1.10.5; 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.16.19 - Appendix G-3).

2.2.5.2 Starting of the equipment is initiated without shedding any operating equipment. (FSAR 8.3.1.1.4.6) (step 8.16.19 - Appendix H-2).

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2.2.5.3 The sequence timing of loads is as specified in Appendix H-2. (FSAR Table 8.3-3, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.16.19 - Appendix H-2).

2.2.5.4 If the DG is paralleled to the preferred power supply, the DG breaker will automatically trip on an SIAS and the DG will continue running. (FSAR 8.3.1.1.4.7; R.G. 1.108.C.2.a.(8)) (step 8.17.53)

2.2.5.5 After the reset of the SIAS, all components will remain in the required safety configuration as specified in Appendix G-3. (IE Bulletin 80-06) (step 8.17.53 Appendix G-3).

2.2.6 Upon simulation of an RAS after an SIAS/CIAS/LOP has been established, the following shall occur:

2.2.6.1 Train B equipment moves to the required safety configuration as specified in Appendix G-5. (FSAR 7.3.1.1.10.6, 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.17.53 - Appendix G-5).

2.2.6.2 After the reset of the RAS, all components will remain in the required safety configuration as specified in Appendix G-5. (IE Bulletin 80-06) (step 8.17.53 Appendix G-5).

2.2.7 The DG can be synchronized with offsite power while supplying the emergency loads and restored to a standby status. (FSAR 14B.51.3.10; R.G. 1.108.C.2.a.(6)) (step 8.17.53).

2.2.7.1 The SIAS can be overriden to shutdown the DG when offsite power is available. (FSAR 8.3.1.1.4.5) (step 8.17.53).

2.2.8 Upon simulation of an CSAS, the following shall occur:

2.2.8.1 Train B equipment moves to the required safety configuration as specified in Appendix G-7. (FSAR 7.3.1.1.10.2, 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.18.27 - Appendix G-7).

2.2.8.2 The sequence timing of loads is as specified in Appendix H-3. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.18.27 - Appendix H-3).

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2.2.8.3 After reset of the CSAS, all components will remain in the required safety configuration as specified in Appendix G-7. (IE Bulletin 80-06) (step 8.18.27 - Appendix G-7).

2.2.8.4 DG B starts and attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz within 10 seconds and operates on standby for greater than 5 minutes. (Tech Spec 4.8.1.1.2.d.5) (step 8.18.27 - Appendix H-3).

2.2.9 Upon simulation of an MSIS, the Train B equipment moves to the required safety configuration as specified in Appendix G-9. (FSAR 7.3.1.1.10.4, 8.3.2.2.1.19; R.G. 1.4.1.C.2) (step 8.19.14 - Appendix G-9).

2.2.9.1 After reset of the MSIS, all components will remain in the required safety configuration as specified in Appendix G-9. (IE Bulletin 80-06) (step 8.19.14 - Appendix G-9).

2.2.10 Upon simulation of an AFAS-1, the following shall occur:

2.2.10.1 Train B equipment moves to the required safety configuration as specified in Appendix G-11. (FSAR 7.3.1.1.10.7, 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.20.29 - Appendix G-11).

2.2.10.2 DG B starts and attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz within 10 seconds and operates on standby for greater than 5 minutes. (FSAR 8.3.1.1.4.1, 8.3.1.1.4.5; Tech Spec 4.8.1.1.2.d.5) (step 8.20.29 - Appendix H-4).

2.2.10.3 The sequence timing is as specified in Appendix H-4. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2d.12, 13-10407-J104-81) (step 8.20.29 - Appendix H-4).

2.2.10.4 If the DG is paralleled to the preferred power supply, the DG breaker will automatically trip on an AFAS-1 and the DG will continue running and maintain a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz. (FSAR 8.3.1.1.4.7; R.G. 1.108.C.2a.(8)) (step 8.20.29).

2.2.10.5 The AFAS-1 can be overridden to shutdown the DG when offsite power is available. (FSAR 8.3.1.1.4.5) (step 8.20.29).

2.2.10.6 After reset of the AFAS-1, all components will remain in the required safety configuration as specified in Appendix G-11. (IE Bulletin 80-06) (step 8.20.29 - Appendix G-11).

2.2.10.7 The DG cannot be automatically connected to the bus while the preferred source of power is available. (FSAR 8.3.1.1.4.6) (8.20.29 - Appendix G-11).

2.2.11 Upon simulation of an AFAS-2, the following shall occur:

2.2.11.1 Train B equipment moves to the required safety configuration as specified in Appendix G-13. (FSAR 7.3.1.1.10.7, 8.3.2.2.1.19; R.G. 1.41.C.2) (step 8.21.29 - Appendix G-13).

2.2.11.2 DG B starts and attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz within 10 seconds and operates on standby for greater than 5 minutes. (FSAR 8.3.1.1.4.1, Tech Spec 4.8.1.1.2.d.5) (step 8.21.29 - Appendix H-5).

2.2.11.3 The sequence timing is as specified in Appendix H-5. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.21.29 - Appendix H-5).

2.2.11.4 If the DG is paralleled to the preferred power supply, the DG breaker will automatically trip on an AFAS-2 and the DG will continue running and maintain a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz. (FSAR 8.3.1.1.4.7; R.G. 1.108.C.2.a.(8)) (step 8.21.29)

2.2.11.5 The AFAS-2 can be overriden to shutdown the DG when offsite power is available. (FSAR 8.3.1.1.4.5) (step 8.21.29)

2.2.11.6 After reset of the AFAS-2, all components will remain in the required safety configuration as specified in Appendix G-13. (IE Bulletin 80-06) (step 8.21.29 - Appendix G-13).

2.2.11.7 The DG cannot be automatically connected to the bus while the preferred source of power is available. (FSAR 8.3.1.1.4.6) (8.21.29 - Appendix G-13).

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2.2.12 Upon simulation of a CREFAS, the following shall occur:

2.2.12.1 Train B equipment moves to the required safety configuration as specified in Appendix G-15. (FSAR 7.3.1.1.10.10, 8.3.2.2.1.19; R.G. 1.41.C.2, 13-10407-J104-40) (step 8.22.20 - Appendix G-15).

2.2.12.2 The sequence timing is as specified in Appendix H-6. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.22.20 - Appendix H-6).

2.2.12.3 After reset of the CREFAS, all components will remain in the required safety configuration as specified in Appendix G-15. (IE Bulletin 80-06) (step 8.22.20 - Appendix G-15).

2.2.13 Upon simulation of a CRVIAS, the following shall occur:

2.2.13.1 Train B equipment moves to the required safety configuration as specified in Appendix G-17. (FSAR 7.3.1.1.10.10, 8.3.2.2.1.19; R.G. 1.41.C.2, 13-10407-J104-44) (step 8.23.16 - Appendix G-17).

2.2.13.2 The sequence timing is as specified in Appendix H-7. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.23.16 - Appendix H-7).

2.2.13.3 After reset of the CRVIAS, all components will remain in the required safety configuration as specified in Appendix G-17. (IE Bulletin 80-06) (step 8.23.16 - Appendix G-17).

2.2.14 Upon simulation of a FBEVAS, the following shall occur:

2.2.14.1 Train B equipment moves to the required safety configuration as specified in Appendix G-19. (FSAR 7.3.1.1.10.8, 8.3.2.2.1.19; R.G. 1.41.C.2, 13-10407-J104-39) (step 8.24.15 - Appendix G-19).

2.2.14.2 The sequence timing is as specified in Appendix H-8. (FSAR Table 8.3-13, Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (step 8.24.15 - Appendix H-8).

2.2.14.3 After reset of the FBEVAS, all components will remain in the required safety configuration as specified in Appendix G-19. (IE Bulletin 80-06) (step 8.24.15 - Appendix G-19).

2.2.15 Upon simulation of a CPIAS, the following shall occur:

2.2.15.1 Upon simulation of an CPIAS, the Train B equipment moves to the required safety configuration as specified in Appendix G-21. (FSAR 7.3.1.1.10.9, 8.3.2.2.1.19; R.G. 1.4, 1.C.2; 13-10407-J104-41) (step 8.25.18 - Appendix G-21).

2.2.15.2 After reset of the CPIAS, all components will remain in the required safety configuration as specified in Appendix G-21. (IE Bulletin 80-06) (step 8.25.18 - Appendix G-21).

2.2.16 Train A switchgear, load centers and motor control centers shall remain deenergized during all Train B ESFAS actuations. (FSAR 8.3.2.2.1.19; R.G. 1.41.C.3) (8.15.20, 8.16.19, 8.17.53, 8.18.27, 8.19.14, 8.20.29, 8.21.29, 8.22.20, 8.23.16, 8.24.15, 8.25.18)

2.3 Independence of Class 1E Load Groups 1 (Train A) and 2 (Train B) from Non Class 1E electrical systems.

2.3.1 With the Non Class 1E electrical systems deenergized (with the exception of 125VDC required for equipment protection), the Train A and B switchgear, load centers and motor control centers shall be energized as specified in Appendix J. (FSAR 8.3.1.1.3.7, 8.3.1.1.3.12, 14B.15.3.1) (8.27.20 - Appendix J).

2.3.2 Upon simulation of an SIAS/CIAS with offsite power available, the following shall occur:

2.3.2.1 Train A and B equipment moves to the required safety configuration as specified in Appendix K. (FSAR 7.3.1.1.10.1, 7.3.1.1.10.5; 8.3.2.2.1.19; R.G. 1.41.C.2) (8.28.32 - Appendix K).

2.3.2.2 The sequence timing of loads is as specified in Appendix L. (FSAR Table 8.3-3; Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (8.28.32 - Appendix L).

2.3.2.3 The DG cannot be automatically connected to the 4.16 KV bus while the preferred source of power is available. (FSAR 8.3.1.1.4.6) (8.28.32 - Appendix K).

2.3.3 If preferred power is lost after an SIAS/CIAS, the following shall occur:

2.3.3.1 Loads are shed as specified in Appendix L. (FSAR 8.3.1.1.4.6, 13-10407-J104-43) (8.28.32 - Appendix L)

2.3.3.2 Load sequencing is initiated upon closure of the DG breaker and the sequence times are as specified in Appendix L. (FSAR Table 8.3-3, Tech. Spec. 4.8.1.1.2.d.12, 13-10407-J104-81, SFR SA012) (8.28.32 - Appendix L).

2.3.3.3 Train A and B equipment moves to the required safety configuration as specified in Appendix K. (FSAR 7.3.1.1.10.1, 7.3.1.1.10.5, 8.3.2.2.1.19, R.G. 1.41.C.2) (8.28.32 - Appendix K)

2.4 Train A Full Load Testing - SIAS/CIAS/LOP

2.4.1 Upon simulation of an SIAS/CIAS with preferred power available, the safety injection system will develop the following injection flows within 30.0 seconds. (FSAR 6.3.1.3.A.4, Tech Spec 4.5.2.h) (8.30.35 - Appendix N).

LPSI	4800 - 5000 gpm
HPSI (sum of injection flows excluding highest flowrate)	816 gpm minimum

2.4.2 If preferred power is lost after an SIAS/CIAS, the following shall occur:

2.4.2.1 The safety injection pumps are restarted within 6.0 seconds after DG breaker closure. (FSAR 8.3.1.1.4.6) (8.30.35 - Appendix N).

2.4.2.2 Interrupted flow to the RCS is fully reestablished within 13.0 seconds. (FSAR 8.3.1.1.4.6) (8.30.35 - Appendix N)

2.4.2.3 The safety injection pumps will develop the following injection flows when powered from the emergency power source. (Tech Spec 4.5.2.h) (8.30.35 - Appendix N).

LPSI	4800 - 5000 gpm
HPSI (sum of injection flows excluding highest flowrate)	816 gpm minimum

2.4.2.4 The emergency load on the DG does not exceed the continuous rating of 5500 kw. (FSAR 8.3.1.1.4) (8.30.35 - Appendix N).

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2.4.2.5 Train A ESF equipment moves to the required safety configuration as specified in Appendix M. (FSAR 7.3.1.1.10.1, 7.3.1.1.10.5, 8.3.2.2.1.19; RG 1.41.C.2) (8.30.35 Appendix N).

2.4.2.6 The sequence timing of loads is as specified in Appendix N. (FSAR Table 8.3-3; Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (8.30.35 - Appendix N).

2.4.2.7 At no time during the loading sequence shall the frequency and voltage drop below 57 Hertz and 3120 volts, respectively. (RG 1.9.C.4) (8.30.35 - Appendix N).

2.4.2.8 The frequency and voltage shall be restored to within 58.8 to 61.2 Hertz and 3740 to 4580 volts respectively within 60% of each loading sequence as specified in Appendix N. (RG 1.9.C.4) (8.30.35 - Appendix N).

2.4.3 Upon loss of the largest single emergency load (M-SIA-P02, HPSI), the frequency and voltage shall be maintained within 58.8 to 61.2 Hertz and 3740 to 4580 volts, respectively. (Tech Spec 4.8.1.1.2.d.2, RG 1.9.C.4, 1.108.C.2.a(4)) (8.30.35 - Appendix N).

2.4.4 DG A can operate for 24 consecutive hours (22 hours at 100% rating of 5500 kw at 0.8 pf and 2 hours at 110% rating of 6050 kw at 0.8 pf) without exceeding the design limits of the cooling system as specified in Appendix S. (FSAR 8.3.1.1.4; RG 1.9.C.14, 1.108.C.2.a.(3)) (8.30.35)

2.4.5 Upon sudden loss of full load (100% rejection), DG A shall not trip and the output voltage shall not exceed 6240 volts during and following the load rejection. (Tech Spec 4.8.1.1.2.d.3, RG 1.108.C.2.a(4)) (8.31.30 - Appendix P).

2.4.6 Upon simulation of an SIAS/CIAS/LOP with the DG at full load temperature conditions, the following shall occur:

2.4.6.1 DG A starts, attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz and starts accepting loads within 10 seconds. (FSAR 8.3.1.1.4.6; RG 1.108.C.2.a.(5)) (8.31.30 - Appendix P).

2.4.6.2 Load sequencing is initiated upon closure of the DG breaker and the sequence times are as specified in Appendix P. (FSAR 8.3.1.1.4.6, Table 8.3-3; Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81; RG 1.108.C.2.a(2)) (8.31.30 - Appendix P).

2.4.6.3 At no time during the loading sequence shall the frequency and voltage drop below 57 Hertz and 3120 volts, respectively. (RG 1.9.C.4, 1.108.C.2.a(2)) (8.31.30 - Appendix P).

2.4.6.4 The frequency and voltage shall be restored to within 58.8 to 61.2 Hertz and 3740 to 4580 volts respectively within 60% of each loading sequence as specified in Appendix P. (RG 1.9.C.4) (8.31.30 - Appendix P).

2.4.6.5 Train A ESF equipment moves to the required safety configuration as specified in Appendix O. (FSAR 7.3.1.1.10.1, 7.3.1.1.10.5, 8.3.2.2.1.19) (8.31.30 - Appendix O).

2.4.6.6 The safety injection pumps will develop the following injection flows within 30 seconds (FSAR 6.3.1.3.A.4, Tech Spec 4.5.2.h) (8.31.30 - Appendix P).

LPSI	4800 - 5000 gpm
HPSI (sum of injection flows excluding highest flowrate)	816 gpm minimum

2.4.6.7 The emergency load on the DG does not exceed the continuous rating of 5500 kw. (FSAR 8.3.1.1.4) (8.31.30 - Appendix P).

2.4.7 The DG will start automatically in response to an emergency start with the Control Mode Switch in either the LOCAL or REMOTE position. (FSAR 8.3.1.1.4) (8.30.35, 8.31.30).

2.5 Train B Full Load Testing - SIAS/CIAS/LOP

2.5.1 Upon simulation of an SIAS/CIAS with preferred power available, the safety injection system will develop the following injection flows within 30.0 seconds. (FSAR 6.3.1.3.A.4, Tech Spec 4.5.2.h) (8.32.37 - Appendix R).

LPSI	4800 - 5000 gpm
HPSI (sum of injection flows excluding highest flowrate)	816 gpm minimum

2.5.2 If preferred power is lost after an SIAS/CIAS, the following shall occur:

2.5.2.1 The safety injection pumps are restarted within 6.0 seconds after DG breaker closure. (FSAR 8.3.1.1.4.6) (8.32.37 - Appendix R).

2.5.2.2 Interrupted flow to the RCS is fully reestablished within 13.0 seconds. (FSAR 8.3.1.1.4.6) (8.32.37 - Appendix R).

2.5.2.3 The safety injection pumps will develop the following injection flows when powered from the emergency power source. (Tech Spec 4.5.2.h) (8.32.37 - Appendix R).

LPSI	4800 - 5000 gpm
HPSI (sum of injection flows excluding highest flowrate)	816 gpm minimum

2.5.2.4 The emergency load on the DG does not exceed the continuous rating of 5500 kw. (FSAR 8.3.1.1.4) (8.32.37 - Appendix R).

2.5.2.5 Train B ESF equipment moves to the required safety configuration as specified in Appendix Q. (FSAR 7.3.1.1.10.1, 7.3.1.1.10.5, 8.3.2.2.1.19; RG 1.41.C.2) (8.32.37 Appendix Q).

2.5.2.6 The sequence timing of loads is as specified in Appendix R. (FSAR Table 8.3-3; Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81) (8.32.37 - Appendix R).

2.5.2.7 At no time during the loading sequence shall the frequency and voltage drop below 57 Hertz and 3120 volts, respectively. (RG 1.9.C.4) (8.32.37 - Appendix R).

2.5.2.8 The frequency and voltage shall be restored to within 58.8 to 61.2 Hertz and 3740 to 4580 volts respectively within 60% of each loading sequence as specified in Appendix R. (RG 1.9.C.4) (8.32.37 - Appendix R).

2.5.3 Upon loss of the largest single emergency load (M-AFB-P01), the frequency and voltage shall be maintained within 58.8 to 61.2 Hertz and 3740 to 4580 volts, respectively. (Tech Spec 4.8.1.1.2.d.2; RG 1.9.C.4, 1.108.C.2.a(4)) (8.32.37 - Appendix R).

2.5.4 DG B can operate for 24 consecutive hours (22 hours at 100% rating of 5500 kw at 0.8 pf and 2 hours at 110% rating of 6050 kw at 0.8 pf) without exceeding the design limits of the cooling system as specified in Appendix S. (FSAR 8.3.1.1.4; RG 1.9.C.14, 1.108.C.2.a.(3)) (8.32.37)

2.5.5 Upon sudden loss of full load (100% rejection), DG B shall not trip and the output voltage shall not exceed 6240 volts during and following the load rejection. (Tech Spec 4.8.1.1.2.d.3, RG 1.108.C.2.a(4)) (8.33.32 - Appendix U).

2.5.6 Upon simulation of an SIAS/CIAS/LOP with the DG at full load temperature conditions, the following shall occur:

2.5.6.1 DG B starts, attains a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz and starts accepting loads within 10 seconds. (FSAR 8.3.1.1.4.6; RG 1.108.C.2.a.(5)) (8.33.32 - Appendix U).

2.5.6.2 Load sequencing is initiated upon closure of the DG breaker and the sequence times are as specified in Appendix U. (FSAR 8.3.1.1.4.6, Table 8.3-3; Tech Spec 4.8.1.1.2.d.12, 13-10407-J104-81; RG 1.108.C.2.a(2)) (8.33.32 - Appendix U).

2.5.6.3 At no time during the loading sequence shall the frequency and voltage drop below 57 Hertz and 3120 volts, respectively. (RG 1.9.C.4, 1.108.C.2.a(2)) (8.33.32 - Appendix U).

2.5.6.4 The frequency and voltage shall be restored to within 58.8 to 61.2 Hertz and 3740 to 4580 volts respectively within 60% of each loading sequence as specified in Appendix U. (RG 1.9.C.4) (8.33.32 - Appendix U).

2.5.6.5 Train B ESF equipment moves to the required safety configuration as specified in Appendix T. (FSAR 7.3.1.1.10.1, 7.3.1.1.10.5, 8.3.2.2.1.19) (8.33.32 - Appendix T).

2.5.6.6 The safety injection pumps will develop the following injection flows within 30 seconds (FSAR 6.3.1.3.A.4, Tech Spec 4.5.2.h) (8.33.32 - Appendix U).

LPSI	4800 - 5000 gpm
HPSI (sum of injection flows excluding highest flowrate)	816 gpm minimum

2.5.6.7 The emergency load on the DG does not exceed the continuous rating of 5500 kw. (FSAR 8.3.1.1.4) (8.33.32 - Appendix U).

2.5.7 The DG will start automatically in response to an emergency start with the Control Mode Switch in either the LOCAL or REMOTE position. (FSAR 8.3.1.1.4) (8.32.37, 8.33.32).

2.6 Auxiliary Feedwater Flow Test

2.6.1 Upon initiation of an AFAS-1 with normal offsite power available, the motor driven auxiliary feedwater pump will deliver at least 750 gpm within 22 seconds. (FSAR 5.1.5.G.7, 5.1.5.G.6.a) (8.34.27 - Appendix W).

2.6.1.1 Both DG's start and attain a voltage of 3740 to 4580 volts and a frequency of 58.8 to 61.2 Hertz within 10 seconds and operate on standby. (FSAR 8.3.1.1.4.1, Tech Spec 4.8.1.1.2.d.5) (step 8.34.27 - Appendix W).

2.6.2 If offsite power is lost after an AFAS, the following shall occur:

2.6.2.1 The essential motor driven auxiliary feedwater pump is restarted within 11.0 seconds. (FSAR 8.3.1.1.4.6) (8.34.27 - Appendix W.)

2.6.2.2 Interrupted auxiliary feedwater flow to the steam generator is fully reestablished within 23 seconds. (FSAR 8.3.1.1.4.6) (8.34.27 - Appendix W).

2.6.3 ESF equipment moves to the required safety configuration as specified in Appendix V. (FSAR 7.3.1.1.10.7, 8.3.2.2.1.19), (8.34.27 - Appendix V).

2.7 Upon loss of normal power, the 120VAC Non-Class 1E ungrounded instrument and control panel will automatically transfer to the backup source (FSAR Table 8.3 - 3) (8.27.4).

3.0 <u>REFERENCES, DEFINITIONS AND ABBREVIATIONS</u>

3.1 Implementing References

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3.1.1 Support Systems Operating Procedures

(1) 430P-3AF01, Essential Aux Feedwater

(2) 430P-3CH01, CVCS Normal Operation

(3) 430P-3CP01, Containment Purge System

(4) 430P-3CT01, Condensate Transfer and Storage

(5) 430P-3DG01, Emergency Diesel Generator A

(6) 430P-3DG02, Emergency Diesel Generator B

(7) 430P-3EC01, Essential Chilled Water Train A

(8) 430P-3EC02, Essential Chilled Water Train B

(9) 430P-3EW01, Essential Cooling Water Train A

(10) 430P-3EW02, Essential Cooling Water Train B

(11) 430P-3HA01, Aux Bldg HVAC

(12) 430P-3HC01, Containment HVAC

(13) 430P-3HD01, Emergency Diesel Generator A HVAC

(14) 430P-3HD02, Emergency Diesel Generator B HVAC

(15) 430P-3HF01, Fuel Bldg HVAC

(16) 430P-3HJ01, Control Bldg HVAC

(17) 430P-3NA01, 13.8kv Electrical System

(18) 430P-3NB01, 4.16kv Non Class IE Power

(19) 430P-3NK01, 125VDC Non Class IE Electrical System

(20) 430P-3NN01, 120VAC Non Class IE Instrument Power

(21) 430P-3PB01, 4160V Class 1E Power

(22) 430P-3PG01, 480V Class 1E Swgr

(23) 430P-3PH01, 480V Class 1E MCC

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(24) 430P-3PK01, 125VDC Class 1E

(25) 430P-3QB01, Essential Lighting

(26) 430P-3QD01, Emergency Lighting

(27) 430P-3SI01, S/D Clng Initiation

(28) 430P-3SI03, SI Tank Operation

(29) 430P-3SI05, Iodine Removal

(30) 430P-3SP01, Ess Spray Pond Train A

(31) 430P-3SP02, Ess Spray Pond Train B

(32) 430P-3WC01, Norm Chilled Water

(33) 430P-3PN01, 120V Instrument Power Class 1E

(34) 430P-3PN02, 120V Instrument Power Class 1E

(35) 430P-3PN03, 120V Instrument Power Class 1E

(36) 430P-3PN04, 120V Instrument Power Class 1E

(37) 430P-3SG02, Operating the Steam Generators

(38) 430P-3RC02, Reactor Coolant System Fill and Vent

(39) 430P-3RC03, Reactor Coolant System Drain

(40) 430P-3IA01, Instrument Air System

(41) 430P-3GA01, Service Gases - Nitrogen System

(42) 420P-2ZZ01, Cold Shutdown to Hot Standby Mode 5 to Mode 3

(43) 42EP-2ZZ01, Emergency Operations

(44) 43A0-3ZZ32, Inadvertent AFAS.

(45) 42R0-2ZZ09, BLACKOUT.

(46) 430P-3NC01, Nuclear Cooling System Operation.

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3.2 Developmental References

3.2.1 P&ID's

	No.	P&ID's	Rev	Title
DCN 77, 78, 79	1.	13-M-AFP-001	25	Aux Fw Sys
DCN 128 thru 133	2.	13-M-CHP-001	14	CVCS
	3.	13-M-CHP-002	20	CVCS
DCN 154	4.	13-M-CHP-003	23	CVCS
	5.	13-M-CPP-001	19	CNTMT Purge Sys
DCN 63, 64	6.	13-M-CTP-001	14	Cond Stg and Transfer Sys
DCN 77	7.	13-M-DGP-001	20	D.G. Sys
	8.	13-M-ECP-001	22	Ess'l Chilled Wtr Sys
	9.	13-M-EWP-001	14	Ess'l Clng Wtr Sys
DCN 21	10.	13-M-GAP-001	9	N^2 and H^2 Supply Sys
DCN 53	11.	13-N-GRP-001	16	Gaseous Radwaste Sys
DCN 11	12.	13-M-HAP-001	10	HVAC - Auxiliary Bldg
DCN 22	13.	13-M-HAP-002	11	HVAC - Auxiliary Bldg
DCN 38	14.	13-M-HAP-003	14	HVAC - Auxiliary Bldg
	15.	13-M-HCP-001	14	HVAC - Containment Bldg
	16.	13-M-HCP-002	10	HVAC - Containment CEDM
DCN 38	17.	13-M-HFP-001	13	HVAC - Fuel Building
	18.	23-M-HJP-001	13	HVAC - Control Bldg
DCN 45	19.	13-M-HJP-002	11	HVAC - Control Bldg
DCN 56	20.	13-M-HPP-001	12	CNTMT H^2 Control
DCN 32	21.	13-M-NCP-001	12	Nuclear Clng Wtr Sys
DCN 21	22.	13-M-NCP-002	11	Nuclear Clng Wtr Sys
	23.	13-M-NCP-003	12	Nuclear Clng Wtr Sys
DCN 76	24.	13-M-RCP-001	17	Reactor Coolant Sys
	25.	13-M-RCP-002	11	Reactor Coolant Sys
DCN 31	26.	13-M-RDP-001	10	CNTMT - Radwaste Drain Sys
	27.	13-M-RDP-002	16	Aux Bldg - Radwaste Drain Sys
DCN 105	28.	13-M-SGP-001	24	Main Steam Sys
DCN 78	29.	13-M-SGP-002	17	Main Steam Sys
DCN 87	30.	13-M-SIP-001	17 (8)	SI & SHD'N Clng Sys
DCN 61	31.	13-M-SIP-002	14	SI & SHD'N Clng Sys
	32.	13-M-SIP-003	11	SI & SHD'N Clng Sys
DCN 63	33.	13-M-SPP-001	15	Ess Spray Pond Sys
	34.	13-M-SPP-002	11	Ess Spray Pond Sys
DCN 80	35.	13-N-SSP-001	19	Nuclear Sampling Sys
DCN 33	36.	13-N-SSP-002	13	Post Accident Sample Sys
	37.	13-M-WCP-001	16	Normal Chill'd Wtr Sys

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3.2.2 Elementary Diagrams

		DWG NO.	REV.	TITLE
	1.	13-E-AFB-001	10	Aux FW PMP M-AFB-P01
	2.	13-E-AFB-002	10	Aux FDW PMP M-AFN-P01
	3.	13-E-AFB-003	15	AF RGLTG VLV PMP B TO SG1 & 2, J-AFB-HV-30 & J-AFB-HV-31
	4.	13-E-AFB-004	13	AF RGLTG Valve, J-AFA-HV-32
DCN 18,19	5.	13-E-AFB-005	11	AF RGLTG VLV PMP A to SG1 & 2, J-AFB-UV-34 & J-AFB-UV-35
	6.	13-E-AFB-006	10	AF RGLTG VLV J-AFC-HV-33
DCN 13	7.	13-E-AFB-007	11	Aux FDW Turb Trip & Throttle VLV J-AFA-HV-54
	8.	13-E-AFB-008	8	AF Actuation SIG CHAN C Initiation CKT
	9.	13-E-AFB-010	10	AUX FW ISO Valve, J-AFA-UV-37
DCN 11	10.	13-E-AFB-011	11	AF ISOL VLV J-AFC-UV-36
	11.	13-E-CHB-012	9	LT DN TO REGEN HX J-CHA-UV-516 CTMT ISOL VLV
	12.	13-E-CHB-013	12	REGEN HX to LT DN HX ISO VLV, J-CHB-UV-523
	13.	13-E-CHB-014	12	RCP CONTR Bleedoff to VCT, J-CHA-UV-506
	14.	13-E-CHB-015	12	RCP Contr Bleedoff to VCT, J-CHB-UV-505
	15.	13-E-CHB-017	8	RCDT Outlet ISO VLV, J-CHB-UV-561
	16.	13-E-CHB-018	9	RCDT Outlet ISO VLV, J-CHA-UV-560
DCN 15	17.	13-E-CHB-024	10	CHG PMP 1 M-CHA-P01
	18.	13-E-CHB-025	13	CHG PMP 2 M-CHB-P01
	19.	13-E-CHB-026	11	CHG PMP 3 M-CHE-P01
	20.	13-E-CHB-031	14	LT DN Line to REGEN HX VLV, J-CHB-UV-515
	21.	13-E-CHB-037	9	MU to RCDT VLV, J-CHA-UV-580
	22.	13-E-CHB-071	10	Post ACDT SMPLG SYS ISO VLV, J-CHA-UV-715, J-CHB-UV-924 & J-CHN-HV-923
	23.	13-E-CPB-001	9	CTMT Purge Refuel Mode ISO VLV J-CPA-UV-2A & J-CPB-UV3B
DCN 11	24.	13-E-CPB-002	9	Inside CTMT Purge Refuel Mode ISO VLV J-CPA-UV2B & J-CPB-UV3A
	25.	13-E-CPB-003	9	CTMT Purge Pow-Access Mode ISO VLV J-CPA-UV-4A, J-CPA-UV-5B
	26.	13-E-CPB-004	8	CTMT Purge Pow-Access Mode ISO VLV J-CPA-UV-4B & J-CPB-UV-5A
	27.	13-E-CTB-001	10	COND Transfer PMPS A & B, M-CTA-P01 & M-CTB-P01
	28.	13-E-CTB-002	8	CNDS TK to NORM AUX FW PMP ISO VLVS, J-CTA-HV-1 & J-CTB-HV-4

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	DWG NO.	REV.	TITLE
29.	13-E-DGB-007	10	Diesel Engine Control
30.	13-E-ECB-001	12	Essential Chillers, M-ECA-E01 & M-ECB-E01
31.	13-E-ECB-003	6	ESS CHIL'D WTR CIRC PMPS, M-ECA-P01 & M-ECB-P01
32.	13-E-ECB-004	6	Chilled WTR Expansion TK Makeup VLV
33.	13-E-EWB-001	11	ESS CLG WTR PMPS A & B, M-EWA-P01 & M-EWB-P01
34.	13-E-EWB-002	7	ESSEN CLG WTR Surge TK Fill Valve
35.	13-E-EWB-003	8	ECW LP A To/From NCW Cross-Tie VLVS J-EWA-UV-145 & J-EWA-UV-65
36.	13-E-GAB-001	10	N^2 CNTMT ISO VLVS, J-GAA-UV-1, 2
37.	13-E-GRB-003	7	RWDT/Gas Surge HDR Internal CTMT ISO VLV, J-GRA-UV-1
38.	13-E-GRB-004	8	RWDT/Gas Surge HDR External CTMT ISO VLV, J-GRB-UV-2
39.	13-E-HAB-001	4	HPSI PMP RMS A & B ESSEN ACU, M-HAA-Z01 & M-HAB-Z01
40.	13-E-HAB-002	2	LPSI PMP RMS A & B ESSEN ACU, M-HAA-Z02 & M-HAB-Z02
41.	13-E-HAB-003	3	CNTMT Spray PMP RMS A & B ESS ACU, M-HAA-Z03 & M-HAB-Z03
42.	13-E-HAB-004	2	ESS CLG WTR PMP RMS A & B ESS ACU, M-HAA-Z05 & M-HAB-Z05
43.	13-E-HAB-005	7	ELEC PENT RMS A & B ESS ACU, M-HAA-Z06 & M-HAB-Z06
44.	13-E-HAB-006	5	AUX FW PMP RM A & B ESS ACU, M-HAA-Z04, M-HAB-Z04
45.	13-E-HAB-016	9	PMP RMS SPLY & EXH ISO DAMP, M-HAA-M01, M02, M04, M05, M06 & M-HAB-M01, M02, M04, M05, M06
46.	13-E-HAB-017	6	PMP RMS EXH ISO DAMP, M-HAA-M03 & M-HAB-M03
47.	13-E-HCB-001	16	CEDM NORM ACU Fans A & B, M-HCN-A02A & M-HCN-A02B
48.	13-E-HCB-002	12	CEDM NORM ACU Fans C & D, M-HCN-A02C & M-HCN-A02D
49.	13-E-HCB-004	12	CTMT Normal ACU Fans A & D, M-HCN-A01A & M-HCN-A01D
50.	13-E-HCB-005	11	CTMT Normal ACU Fans B & C, M-HCN-A01B & M-HCN-A01C
51.	13-E-HCB-009	9	CTMT ATM RADN MONIT (inside) ISO VLV, J-HCB-UV-44 & 47
52.	13-E-HCB-010	9	CTMT ATM RADN MONIT (outside) ISO, VLV, J-HCA-UV-45 & 46
53.	13-E-HDB-001	15	DG RMS ESS EXH Fans, M-HDA-J01 & M-HDB-J01

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54.	13-E-HDB-005	7		DG CONT EQUIP RMS ESS AHU Fans, M-HDA-A01 & M-HDB-A01
55.	13-E-HFB-001	5		Fuel BLDG NORM AHU A & B Fans, M-HFN-A01A & M-HFN-A01B
56.	13-E-HFB-002	7		Fuel BLDG NORM EXH Fans A & B, M-HFN-J01A & M-HFN-J01B
57.	13-E-HFB-004	15		Fuel & AUX BLDG ESS EXH AFU Fan, M-HFA-J01 & M-HFB-J01
58.	13-E-HFB-005	7		Fuel BLDG ESS EXH AFU DAMP, M-HFA-M05 & M-HFB-M05
59.	13-E-HFB-006	10		Fuel & Aux Bldg ESS EXH AFU heaters, M-HFA-E01 & M-HFB-E01
60.	13-E-HFB-007	8		Fuel BLDG SUP ISO DAMP, M-HFA-M01, M02 & M-HFB-M01, M02
61.	13-E-HFB-008	8		Fuel BLDG EXH ISO DAMP, M-HFA-M03, M04 & M-HFB-M03, M04
62.	13-E-HFB-011	6		AUX BLDG ESS EXH AFU DAMP, M-HFA-M06 & M-HFB-M06
63.	13-E-HJB-002	7	7	Cont Room ESS AHU Fan, M-HJA-F04 & M-HJB-F04
64.	13-E-HJB-006	8		ESF SWGR RM ESS AHU A & B, M-HJA-Z03 & M-HJB-Z03
65.	13-E-HJB-013	9		CR NORM AHU ISO DAMP, M-HJA-M01, M52 & M-HJB-M01, M55
66.	13-E-HJB-014	8		CONT BLDG ESS ISO DAMP, M-HJA-M25, M28, M36, M51, M62, M66
67.	13-E-HJB-015	7		ESF SWGR RMS NORM SUP ISO DAMP, M-HJA-M23
68.	13-E-HJB-016	8		ESF RMS A & C ESS RTN ISO DAMP, M-HJA-M34
69.	13-E-HJB-017	7		CONT BLDG ESS ISO DAMP, M-HJB-M38, M34, M31, M58 & M66
70.	13-E-HJB-018	7		ESF SWGR RMS SUP & EXH DAMP ISO DAMP, M-HJB-M52, M32 & M28
71.	13-E-HJB-019	9		COMM EQUIP RM ESS ISO DAMP, M-HJA-M58, M59 & M-HJB-M10, M13
72.	13-E-HJB-020	7	9	CR ESS ISO DAMP, M-HJA-M56, M57 & M-HJB-M56, M57
73.	13-E-HJB-021	8		CR TOIL & KIT EXH ISO DAMP, M-HJA-M15, M16 & M-HJB-M23, M24
74.	13-E-HJB-022	8		ESF SWGR RMS OUT AIR & EXH ISO DAMP M-HJA-M55, M53, M54
75.	13-E-HJB-023	10		CONT BLDG BAT RMS ESS EXH Fans, M-HJA-J01A, J01B & M-HJB-J01A, J01B
76.	13-E-HJB-024	8	14	CR ESS AHU OSA Intake DAMP, M-HJA-M02, M03 & M-HJB-M02, M03

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77.	13-E-HJB-025	5		ESF EQUIP RM ESS AHU Fan A & B, M-HJA-Z04 & M-HJB-Z04
78.	13-E-HPB-002	10		Hz Control CNTMT ISOL VLVS, J-HPA-UV-1 & J-HPB-UV-2
79.	13-E-HPB-003	10		Hz Control CNTMT ISOL VLVS, J-HPA-UV-3, 5 & J-HPB-UV-4, 6
80.	13-E-HPB-006	6		Post ACCID SMPLG SYS ISO VLVS, J-HPA-UV-23 & J-HPB-UV-24
81.	13-E-HSB-007	5		S/P & Metering Pump House Exhaust Fans, M-HSA-J01, HSB-J01
82.	13-E-IAB-002	9		CNTMT ISO Valve, J-IAA-UV-2
83.	13-E-NCB-002	8		CNTMT ISO Valves, J-NCB-UV-401, J-NCA-UV-402
84.	13-E-NCB-003	8		CNTMT ISO Valve, J-NCB-UV-403
85.	13-E-NHB-006	6		480V Incoming Feeders, E-NHN-M19, M20
86.	13-E-PBB-001	9		4.16KV NORM SUP BKRS, E-PBA-S03 & E-PBB-S04
87.	13-E-PBB-002	9		4.16KV ALT SUP BKRS, E-PBA-S03 & E-PBB-S04
88.	13-E-PBB-004	12		BUS POT XFMRS, E-PBA-S03 & E PBB-S04
89.	13-E-PCB-001	10	15	Fuel Pool CLNG PMPS 1 & 2, M-PCA-P01 & M-PCB-P01
90.	13-E-PEB-001	16	29	4.16KV BKR, DG E-PEA-G01, DG-E-PEB-G02
91.	13-E-PGB-001	8		4.16KV Supply BKR, LC-E-PGA-L31, LC-E-PGB-L32
92.	13-E-PGB-002	8		4.16KV Supply BKR, LC-E-PGA-L33, LC-E-PGB-L34
93.	13-E-PGB-003	7		4.16KV Supply BKR, LC-E-PGA-L35, LC-E-PGB-L36
94.	13-E-PGB-006	10		480V Main FDR BKRS LC-E-PGA-L31, LC-E-PGB-L32
95.	13-E-PGB-007	10		480V Main FDR BKR LC-E-PGA-L33, LC-E-PGB-L34
96.	13-E-PGB-008	10		480V Main FDR BKRS LC-E-PGA-L35 LC-E-PGB-L36
97.	13-E-PHA-001	15	35 & 36	480V Motor Control Center, E-PHA-M31
98.	13-E-PHA-002	15	32 & 33	480V Motor Control Center, E-PHB-M32
99.	13-E-PHA-003	15	20	480V Motor Control Center, E-PHA-M33
100.	13-E-PHA-004	15		480V Motor Control Center, E-PHB-M34

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101.	13-E-PHA-005	12	28, 27	480V Motor Control Center, E-PHA-M35
102.	13-E-PHA-006	14	31 & 29 28 30	480V Motor Control Center, E-PHB-M36
103.	13-E-PHB-002	5		480V Incoming Feeder, MCC E-PHA-M37
104.	13-E-PHB-003	5		480V Incoming Feeder, MCC E-PHB-M32, M34, M36
105.	13-E-PHB-004	5		480V Incoming Feeder, MCC E-PHB-M38
106.	13-E-PKB-004	13		480V AC FDR for NORM & BU BAT CHGRS E-PKA-H11, H15, E-PKC-H13, E-PKB-H12, H16, E-PKD-H14
107.	13-E-PNB-001	6		120V Volt REG E-PNA-V25, E-PNB-V26, E-PNC-V27, E-PND-V28
108.	13-E-QBB-001	6		480 in Feeders, ESS LTG PNLS, E-QBN-D90, D91
109.	13-E-RCB-010	13		PRZR Backup Heaters, M-RCE-B01, B09, A14, B18, B10, A05
110.	13-E-RDB-007	8	9, 10 & 11	CTMT RW Sumps ISO VLV, J-RDB-UV24
111.	13-E-RDB-008	11		CNTMT RW Sumps Internal ISO VLV, J-RDA-UV-23
112.	13-E-RDB-011	7		POST ACDT SMPLG ISOL VLV J-RDB-UV-407
113.	13-E-SAB-002	7	9	BOP ESFAS Manual Actuation
114.	13-E-SAB-003	7		NSSS ESFAS Manual Actuation
115.	13-E-SAB-004	4	10	BOP ESFAS Intertying CKTS, Train A & B
116.	13-E-SGB-001	15		SG-1 to AFW PMP A STM ISO VLV, J-SGA-UV-134
117.	13-E-SGB-002	14	32 & 33	SG-2 to AFW PMP A STM SUP VLV, J-SGA-UV-138
118.	13-E-SGB-003	9	19	SGBD CNTMT ISO VLVS, J-SGA-UV-500P & J-SGB-UV-500R
119.	13-E-SGB-004	8		SGBD CNTMT ISO VLVS, J-SGA-UV-500S & J-SGB-UV-500Q
120.	13-E-SGB-008	7		SG-1 MSIV Bypass Valve, J-SGE-UV-169
121.	13-E-SGB-010	9		Downcomer FW ISO VLV, J-SGA-UV-172 & J-SGB-UV-130
122.	13-E-SGB-011	9		Downcomer FW ISO VLV, J-SGA-UV-175 & J-SGB-UV-135
123.	13-E-SGB-012	6		STM TRAP ISOL VLV J-SGA-UV-1133 & 1134
124.	13-E-SGB-013	4		STM TRAP ISOL VLV J-SGB-UV-1135A, B & J-SGB-UV-1136A, B
125.	13-E-SGB-016	8		SG-2 MSIV Bypass Valve, J-SGE-UV-183

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126.	13-E-SGB-023	7		MSIV, J-SGE-UV-170, UV-171, UV-180 & UV-181
127.	13-E-SGB-024	6		ECONO FW ISO VLVS, J-SGA-UV-174, 177 & J-SGB-UV-132, 137
128.	13-E-SGB-030	8	17	BLO DWN Sample CNTMT ISO, J-SGA-UV-204, 211 & J-SGB-UV-222, 224
129.	13-E-SGB-031	9	9	BLO DWN Sample CNTMT ISO, J-SGA-UV-223, 225 & J-SGB-UV-219, 228
130.	13-E-SGB-038	9	16, 24	BLO DWN Sample CNTMT ISO, J-SGA-UV-220 & J-SGB-UV-226
131.	13-E-SGB-039	10	8	BLO DWN Sample CNTMT ISO, J-SGA-UV-227 & J-SGB-UV-221
132.	13-E-SGB-040	10	8	CHEM INJ ISO VLVS, J-SGB-HV-200 & 201
133.	13-E-SIB-001	11		HPSI PMPS, M-SIA-P02 & M-SIB-P02
134.	13-E-SIB-002	11		LPSI PMPS, M-SIA-P01, M-SIB-P01
135.	13-E-SIB-003	9		CONT SPRY PMPS, M-SIA-P03 & M-SIB-P03
136.	13-E-SIB-005	10	2	SI TANK ISO VLVS, J-SIA-UV-634 & J-SIA-UV-644
137.	13-E-SIB-006	12	11,17 & 27	SI TANK ISO VLVS, J-SIB-UV-614 & J-SIB-UV-624
138.	13-E-SIB-007	12	16	LPSI FLO CONTR to RCS, VLVS J-SIB-UV-615 & J-SIB-UV-625
139.	13-E-SIB-008	9	15	LPSI FLO CONTR to RCS, VLVS J-SIA-UV-635 & J-SIA-UV-645
140.	13-E-SIB-009	10		HPSI-1 FLO CONTR to RCS, VLVS J-SIA-UV-617 & J-SIA-UV-627
141.	13-E-SIB-010	10		HPSI-1 FLO CONTR to RCS, VLVS J-SIA-637 & J-SIA-UV-647
142.	13-E-SIB-011	10		HPSI-2 FLO CONTR to RCS, VLVS J-SIB-UV-616 & 626
143.	13-E-SIB-012	10		HPSI-2 FLO CONTR to RCS, VLVS J-SIB-UV-636, 646
144.	13-E-SIB-013	16	27	Shutdown CLNG ISO VLVS, J-SIA-UV-651 & J-SIB-UV-652
145.	13-E-SIB-014	14		Shutdown CLNG ISO VLVS, J-SIC-UV-653, J-SID-UV-654
146.	13-E-SIB-015	9		Shutdown CLNG CTMT ISO VLV, J-SIA-UV-655, J-SIB-UV656
147.	13-E-SIB-016	10		HPSI RECIRC to RWT VLVS, J-SIA-UV-660 & J-SIB-UV-659
148.	13-E-SIB-017	6		CS PMPS to RWT ISO VLVS, J-SIA-UV-664 & J-SIB-UV-665

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149.	13-E-SIB-018	6		HPSI PMPS TO RWT ISO VLV, J-SIA-UV-666 & J-SIB-UV-667
150.	13-E-SIB-019	9		LPSI PMPS to RWT ISO VLV, J-SIA-UV-669, J-SIB-UV668
151.	13-E-SIB-020	9		CNTMT Spray Control VLV, J-SIA-UV-672 & J-SIB-UV-671
152.	13-E-SIB-021	11	16	CNTMT Sump ISO VLV, J-SIA-UV-673 & J-SIB-UV-675
153.	13-E-SIB-022	6		CNTMT Sump ISO VLV, J-SIA-UV-674 & J-SIB-UV-676
154.	13-E-SIB-023	10		LPSI HDR Discharge VLV, J-SIA-HV-306, J-SIA-HV-307
155.	13-E-SIB-024	9		CNTMT Spray ISO VLV, J-SIA-HV-687, J-SIB-HV-695
156.	13-E-SIB-025	7		Shutdown CLNG HX ISO VLV, J-SIA-HV-684 & J-SIB-HV-689
157.	13-E-SIB-026	5		LPSI PMP ISO VLV, J-SIA-HV-683, J-SIB-HV-692
158.	13-E-SIB-027	13		Shutdown CLNG TEMP CONTR VLV, J-SIA-HV-657, J-SIB-HV-658
159.	13-E-SIB-028	5		Shutdown CLNG Warmup Bypass VLV, J-SIA-HV-691, J-SIB-HV-690
160.	13-E-SIB-029	7	12	Shutdown CLNG HX Bypass VLV, J-SIA-HV-688, J-SIB-HV-693
161.	13-E-SIB-030	7		LPSI PMP Cross Connect VLV, J-SIA-HV-685, J-SIB-HV-694
162.	13-E-SIB-031	8		CNTMT Spray Cross CONN VLV, J-SIA-HV-686, J-SIB-HV-696
163.	13-E-SIB-032	3		SI Drain to RCDT VLV, J-SIE-HV-661
164.	13-E-SIB-033	11		Shutdown CLG HX ISO VLV, J-SIA-HV-678 & J-SIB-HV-679
165.	13-E-SIB-034	8		SI Tank Fill & Drain VLV, J-SIB-UV-611 & J-SIB-UV-621
166.	13-E-SIB-035	9		SI Tank Fill & Drain VLV, J-SIB-UV-631 & J-SIB-UV-641
167.	13-E-SIB-036	5		Spray CHEM ADD PMPS, J-SIA-P05 & M-SIB-P05
168.	13-E-SIB-037	10	16	Hydrazine PMP to CSP VLV, J-SIA-UV-681 & J-SIB-UV-680
169.	13-E-SIB-038	11	~~12~~ 19	Spray CHEM PMPS Suction VLV, J-SIA-UV-603 & J-SIB-UV-602
170.	13-E-SIB-039	4		HPSI PMPS A & B DISCH VLVS, J-SIA-HV-698 & J-SIB-HV-699
171.	13-E-SIB-040	12		HPSI PMPS Long Term CLNG VLV, J-SIA-HV-604 & J-SIB-HV-609
172.	13-E-SIB-041	9	21	HPSI PMP Long Term CLNG VLV, J-SIC-HV-321 & J-SID-HV-331

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	DWG NO.	REV.	DCN	TITLE
173.	13-E-SIB-042	9		SI TK Check VLV Leakage line ISO VLV, J-SIB-UV-618 & 628
174.	13-E-SIB-043	10		SI TK Check VLV Leakage Line ISO VLV, J-SIB-UV-638 & 648
175.	13-E-SIB-044	7		SITK RWT RTN HDR CNTMT ISO VLV, J-SIA-UV-682
176.	13-E-SIB-045	10		Hot Leg Inject Check VLV Leak ISO VLV, J-SIB-UV-322 & J-SIB-UV-332
177.	13-E-SIB-055	7	9	Post ACDT SMPLG SYS ISO VLV, J-SIA-UV-708, 709 & J-SIB-UV-710
178.	13-E-SPB-001	12		ESS Spray Pond PMP, M-SPA-P01, M-SPB-P01
179.	13-E-SQB-001	13	44	Digital Radiation Monitoring SYS
180.	13-E-SSB-001	7		Sample CNTMT ISO VLVS, J-SSB-UV-200, 201
181.	13-E-SSB-002	9	8	Sample CNTMT ISO VLVS, J-SSB-UV-202
182.	13-E-SSB-003	6	28	Sample CNTMT ISO VLVS, J-SSA-UV-203, 204
183.	13-E-SSB-004	8	13	Sample CNTMT ISO VLVS, J-SAA-UV-205
184.	13-E-WCB-001	10		NORM CHL'D WTR, NORM Chiller, M-WCN-E01A
185.	13-E-WCB-009	11		NORM CHL'D WTR RTN CTMT ISO VLV, J-WCB-UV-61
186.	13-E-WCB-010	8		NORM CHL'D WTR RTN & SPLY CTMT ISO VLV J-WCA-UV-62, J-WCB-UV-63
187.	13-E-WCB-013	9		NORM CHL'D WTR VLVS, J-WCN-UV-70 & J-WCN-UV-71
188.	13-E-RCB-017	8		RCS Pressurizer Level Control
189.	13-E-NKA-001	4	5	125VDC Non-Class 1E Power System.
190.	13-E-NKA-002	10		DC Control Center E-NKN-M45
191.	13-E-NKA-003	10	14	Distribution Panel E-NKN-D41
192.	13-E-NKA-004	9		Distribution Panel E-NKN-D42
193.	13-E-NKA-005	8	18	DC Control Center E-NKN-M46
194.	13-E-NKA-006	5		Distribution Panel E-NKN-D19
195.	13-E-NKA-007	9		Distribution Panel E-NKN-D43
196.	13-E-NNA-001	9	19-24 ~~22,23~~	Instrument and Control Panel E-NNN-D11
197.	13-E-NNA-002	13	25-32 ~~28,29~~ ~~30,31~~	Instrument and Control Panel E-NNN-D12
198.	13-E-NNB-001	3	5-7	Instrument and Control Panel E-NNN-D11 and E-NNN-D12 alarm.
199.	13-E-PBA-001	8		Switchgear E-PBA-S03.
200.	13-E-PBA-002	9		Switchgear E-PBB-S04.
201.	13-E-PEB-002	10		Diesel Generator Three Line Metering & Relaying.
202.	13-E-PGA-001	11		Load Center E-PGA-L31
203.	13-E-PGA-002	12		Load Center E-PGB-L32
204.	13-E-PGA-003	11		Load Center E-PGA-L33

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	DWG NO.	REV.	DCN	TITLE
205.	13-E-PGA-004	11		Load Center E-PGB-L34
206.	13-E-PGA-005	7		Load Center E-PGA-L35
207.	13-E-PGA-006	9		Load Center E-PGB-L36
208.	13-E-PHA-007	8	10	Motor Control Center E-PHA-M37
209.	13-E-PHA-008	10	19,18, 14,15, 17,16	Motor Control Center E-PHB-M38
210.	13-E-PHB-001	5		MCC E-PHA-M31, M33, M35 incoming feeder
211.	13-E-PKA-001	4		125VDC Class 1E and 120VAC vital Inst Power System
212.	13-E-PKA-002	15		DC Control Center E-PKA-M41
213.	13-E-PKA-003	12		Distribution Panel E-PKA-D21
214.	13-E-PKA-004	1	18	DC Control Center E-PKC-M43
215.	13-E-PKA-005	12		DC Control Center E-PKB-M42
216.	13-E-PKA-006	13		Distribution Panel E-PKB-D22
217.	13-E-PKA-007	13	17	DC Control Center E-PKD-M44
218.	13-E-PNA-001	14	39	Distr Panels E-PNA-D25 & E-PNC-D27
219.	13-E-PNA-002	13	39	Distr Panels E-PNB-D26 & E- PND-D28
220.	13-E-PNB-002	6		E-PNA-D25 & E-PNC-D27
221.	13-E-PNB-003	5		E-PNA-D26 & E-PNC-D28
222.	13-E-SAB-001	9		NSSS ESFAS Manual Actuation
223.	13-E-HJB-009	4		Battery Rm Normal Exh Fan
3.2.3	Control Logic Diagrams			
1.	13-J-AFL-001	5		AFWP B & AFAS Maintained Logic
2.	13-J-AFL-002	6		AF Regulating VLVS
3.	13-J-AFL-003	4		AF Non-Safety PMPS & Alarms
4.	13-J-AFL-004	7		AFWP A Turb Trip & Throttle VLV J-AFA-HV-54
5.	13-J-CHL-001	4		Post Accident Sampling SYS ISO VLVS
6.	13-J-CPL-001	9	3	CNTMT Purge HVAC ISO VLVS
7.	13-J-CTL-001	6		COND TRFR PMPS & NORM AFP SUCT VLVS
8.	13-J-ECL-001	4		Essential Chillers
9.	13-J-EWL-001	8		ESS CLNG WTR PMPS & Surge TK Fill VLVS
10.	13-J-EWL-002	6		ESS CLNG WTR LOOP & X Tie VLVS & SYS Alarms
11.	13-J-GAL-001	7		N^2 CNTMT ISO VLVS & SYS Alarms
12.	13-J-GRL-002	6		Gas Surge HDR CNTMT ISO Valves
13.	13-J-HAL-002	5		AUX BLDG PMP RMS ISO Dampers
14.	13-J-HAL-003	3		AUX BLDG ELECT Penetration RMS & AFWP RM "A" ACU's
15.	13-J-HCL-001	10		CNTMT HVAC CEDM ACU Fans & SYS Dampers

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	DWG NO.	REV.	DCN	TITLE
16.	13-J-HCL-002	10	5	CNTMT HVAC NORM AHU & RX Cavity Fans
17.	13-J-HCL-003	7		CNTMT HVAC ACU Heaters, AFU & Gallery fans and ISO VLVS
18.	13-J-HDL-001	6		DG RMS HVAC ESS EXH & AHU Fans
19.	13-J-HFL-001	4		Fuel & AUX BLDG ESS EXH Fans & Heaters
20.	13-J-HFL-002	6		Fuel BLDG NORM SUP & EXH Fans & Dampers
21.	13-J-HFL-003	7	3, 2	Fuel BLDG AHU Air Washer PMPS, OIC & SYS Alarms
22.	13-J-HFL-004	4		Fuel & AUX BLDG ESS EXH AFU Dampers
23.	13-J-HJL-004	5	5	CR ESS AHU & Intake Dampers
24.	13-J-HJL-005	5		CONT BLDG ESF & BTRY RM ESS Fans, Damp & Alarms
25.	13-J-HJL-006	6	5, 6	CR & BLDG ESS ISO Dampers
26.	13-J-HJL-007	4		CONT BLDG ESS ISO Dampers
27.	13-J-HJL-008	8		CONT BLDG ESS ISO Dampers
28.	13-J-HPL-001	5		CNTMT Post-Accident H_2 Control
29.	13-J-HPL-003	2		Post Accident Sampling SYS ISO VLVS
30.	13-J-IAL-001	9		Air Compressors, SYS VLVS & Alarms
31.	13-J-PCL-001	5		Fuel Pool Cooling System
32.	13-J-RDL-002	4		CNTMT Radwaste Sumps CNTMT ISO VLVS
33.	13-J-RDL-006	3		Post Accident Sampling SYS ISO VLVS
34.	13-J-SGL-001	8		AFWP TURB MS Supply VLVS
35.	13-J-SGL-002	4		SG MSIV BYP & BLO DWN ISO VLVS
36.	13-J-SGL-006	5		SG BD Sample & CHEM Inject ISO VLVS
37.	13-J-SGL-007	5		MS & FW ISO VLVS
38.	13-J-SIL-001	1	1, 2	Post Accident Sample SYS IOS VLVS
39.	13-J-SPL-001	7		ESS SPRY Pond PMPS
40.	13-J-WCL-002	7		NORM Chiller & CNTMT ISO VLVS

3.2.4 BOP ESFAS Interconnection Diagrams

	DWG NO.	REV.	TITLE
1.	13-J-104-39	9	FBEVAS Train A
2.	13-J-104-67	8	FBEVAS Train B
3.	13-J-104-40	10	CREFAS Train A
4.	13-J-104-68	10	CREFAS Train B
5.	13-J-104-41	8	CPIAS Train A
6.	13-J-104-69	7	CPIAS Train B
7.	13-J-104-42	8	LOP/LS Train A
8.	13-J-104-43	14	LOP/LS Train A

	DWG NO.	REV.	TITLE
9.	13-J-104-70	6	LOP/LS Train B
10.	13-J-104-71	12	LOP/LS Train B
11.	13-J-104-44	12	CRVIAS Train A
12.	13-J-104-72	11	CRVIAS Train B
13.	13-J-104-45	5	DGSS Train A
14.	13-J-104-73	5	DGSS Train B
15.	13-J-104-46	9	Load SEQ/Tester Train A
16.	13-J-104-47	10	Load SEQ/Tester Train A
17.	13-J-104-74	8	Load SEQ/Tester Train B
18.	13-J-104-75	9	Load SEQ/Tester Train B
19.	13-M-723-2	22	ESS Chiller Control Diagram

3.2.5 NSSS ESFAS Actuated Devices

DCN 15	1.	13-J-SAS-001	4	Sheets 1 through 64
DCN 11.12	2.	13-J-SAS-002	4	Sheets 1 through 64
DCN 4	3.	13-J-SAS-003	4	Sheets 1 through 32
DCN 4	4.	13-J-SAS-004	~~4~~ 2	Sheets 1 through 32

TCN 005

3.2.6 PVNGS (FSAR) Final Safety Analysis Report

3.2.6.1 FSAR section 7.3, Amendment 15, Engineered Safety Features Actuation

3.2.6.2 FSAR section 8.3, Amendment 15, On Site Power Systems

3.2.6.3 FSAR Section 14, Amendment 15

3.2.7 NRC IE - Bulletin 80-06, ESP Reset Control

3.2.8 Other

3.2.8.1 CESSAR section 7.3, Amendment 9 ESFAS System

3.2.8.2 Test Guidelines PETG-4-PE1

3.2.9 USNRC Regulatory Guides

3.2.9.1 1.9, Rev. 0, Section of Diesel Generator Set Capacity for Standby Power Supplies

3.2.9.2 1.108, Rev. 1, Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Plants

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3 0 6 5 5 0 9 0 5

3.2.9.3 1.68, Rev. 2, Initial Test Programs for Water-Cooled Reactor Power Plants

3.2.9.4 1.41, Rev. 0, Preoperational Testing of Redundant On Site Power to Verify Proper Load Group Assignments.

3.2.9.5 1.6, Rev. 0, Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems.

3.2.10 American National Standards Institute (ANSI)

N/A

3.2.11 Institute of Electrical and Electronic Engineers (IEEE)

387,1984, Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations.

3.2.12 Station Manual Procedures

3.2.12.1 90AC-0ZZ14 - Startup Procedure Preparation Review and Approval.

3.2.13 Vendor Manuals

3.2.13.1 N001-13.06-87, Rev. 4, ESFAS Aux Relay Cabinet Operation, Maintenance Instructions

3.2.13.2 10407-13-JM-104-81, Rev. 6 Instruction Manual Operations - Maintenance for BOP ESFAS.

3.3 Definitions

3.3.1 "DG A" is defined as the combination of diesel engine M-DGA-H01 and generator E-PEA-E01 which are used throughout this procedure as a single entity.

3.3.2 "DG B" is defined as the combination of diesel engine M-DGB-H01 and generator E-PEB-E01 which are used throughout this procedure as a single entity.

3.3.3 "Required" as used in Section 8.0 and the Appendices is defined as acceptance criteria.

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3.4 Abbreviations

(1) AFAS - Auxiliary Feedwater Actuation Signal

(2) CIAS - Containment Isolation Actuation Signal

(3) CPIAS - Containment Purge Isolation Actuation Signal

(4) CREFAS - Control Room Essential Filtration Actuation Signal

(5) CRVIAS - Control Room Ventilation Isolation Actuation Signal

(6) CSAS - Containment Spray Actuation Signal

(7) CS - Containment Spray

(8) ESFAS - Engineered Safety Features Actuation System

(9) FBEVAS - Fuel Building Essential Ventilation Actuation Signal

(10) LOP - Loss of Offsite Power

(11) MSIS - Main Steam Isolation Signal

(12) PF - Power Factor

(13) RAS - Recirculation Actuation Signal

(14) RE - Responsible Engineer (Operations)

(15) SIAS - Safety Injection Actuation Signal

(16) RIC - Remote Indication and Control Unit

(17) SRPB - System Reset Pushbutton

(18) DG - Diesel Generator

3-10-5-9-09-07

4.0 PREREQUISITES

4.1 Personnel Indoctrination

4.1.1 The minimum number of Startup Engineers and operators required to perform this procedure is as follows:

(1) One Test Director

(2) Four Test Engineers - Level II

(3) Two Nuclear Operators (N.O. III)

(4) Four Nuclear Operators (N.O. II)

(5) Four Maintenance Electricians

(6) Two I & C Technicians

4.1.2 It will take approximately 32 days to complete this procedure after the prerequisites and initial conditions are established.

4.1.3 The Test Director is responsible for the conduct of this test.

4.1.4 Operations will be conducted in the Control Building, Auxiliary Building, Diesel Generator Building, Containment Building and Fuel Handling Building.

4.2 Verify that the pre-operational tests listed in Appendix AA have been completed and any deficiencies which may exist will not affect the successful completion of this procedure and are noted in the Test Log. TE-001 TCN 001

[signature] 1-12/11/86
Signature Date

4.3 Those operating procedures listed in 3.1, Support System Operating Procedures, are available as needed in the Control Room.

Joseph J. Balitski 12-11-86
Signature Date

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PALO VERDE NUCLEAR GENERATING STATION MANUAL	PROCEDURE NO. 93PE-3SA01	
INTEGRATED TEST OF ENGINEERED SAFETY FEATURES	REVISION 0	

4.4 Communication has been established between the following locations:

(1) Control Room

(2) Diesel Generator Control Rooms

(3) Containment near Reactor Cavity

(4) Train A Switchgear Room

(5) Train B Switchgear Room

Signature 12-15-86 Date

4.5 The Master Tracking System has been reviewed for all subsystems listed in Appendix X and outstanding items will not affect this test. An Exception list of outstanding items is attached. TE 001

Signature 1-12/01/86 Date

4.6 The log of temporary modifications for all associated subsystem listed in Appendix X has been reviewed and existing temp. modifications will not affect this test and are noted in the Test Log. TE 001

Signature 1-12/01/86 Date

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4.7 The following calibrated test equipment is available.

Measuring Devices

(4) Gould 8 Channel Recorders
Model GD 2800S or equal

(1) Digital Multimeter
Fluke Model 8024B or equal

(32) Gould DC Amplifiers
Model 13461510 Input Range
DC 25 mV to 500 Volts or
equal

(1) BETALOG 128 Sequential
Events Recorder

Joseph J. Baltutis / 12-11-86
Signature / Date

4.8 Personnel performing tests have been briefed concerning the procedure, special precautions, data collection techniques and action to be taken in the event that abnormal and unexpected conditions occur.

Joseph J. Baltutis / 12-15-86
Signature / Date

4.9 The applicable portion of the subsystems listed in Appendix X are operable and have no outstanding work items that will affect the performance of this test. | TE-001

[signature] / 12/10/86
Signature / Date

4.10 This copy of the Official Test Copy is the latest revision in the SDC file.

Joseph J. Baltutis / 12-11-86
Signature / Date

4.11 References listed in Section 3.0 are the latest applicable revisions.

Joseph J. Baltutis / 12-10-86
Signature / Date

3065092010

4.12 All implemented DCN's and FCR's against the current referenced drawings have been listed in the Test Log and evaluated with reference to impact on the Test.

Joseph J. Balitski / 12-16-84
Signature / Date

4.13 Clearances on subsystems/equipment listed in Appendix X have been reviewed and existing tags will not adversely affect this test.

Joseph J. Balitski / 12-16-84
Signature / Date

4.14 The following material is available.

(1) Sufficient shielded cable for recorder inputs from plant equipment as specified in Appendix 7.

(2) 75 jumpers, approximately two (2) feet long with appropriate lugs.

(3) Sufficient 4/0, #2, #6, #10 and #12 cabling to provide temporary power specified in step 5.39.3.

Joseph J. Balitski / 12-16-84
Signature / Date

5.0 SYSTEM INITIAL CONDITIONS

NOTES

(1) Shift Supervisor's signature for the line ups made in accordance with approved operating procedures will signify that Operations is satisfied with the electrical and valve alignment for that particular Plant Operating Condition.

(2) All initial conditions must be completed prior to starting section 8.0 except as noted. The particular steps not required until a specific subsection in section 8.0 can be completed prior to the performance of that subsection.

5.1 Prior to performing Subsection 8.34 (refer to 8.34.1), verify that the Train B Essential Auxiliary Feedwater System is lined up per Operating Procedure 43OP-3AF01. TE 16

_______________ / _______
Signature / Date

PV216-000 REV. 8/82

5.2 Prior to performing Subsections 8.30 or 8.32 (refer to 8.30.1 and 8.32.1), verify that CVCS charging and letdown are aligned per Operating Procedure 430P-3CH01, to support operation of the charging pumps during injection tests.

Signature ______ Date 12/11/86

5.3 Prior to performing Subsection 8.2 (refer to 8.2.1), verify that Essential Cooling Water Train "A" is lined up per Operating Procedure 430P-3EW01.

Terry L Radtke 12-16-86
Signature Date

5.4 Prior to performing Subsection 8.15 (refer to 8.15.1), verify that Essential Cooling Water Train "B" is lined up per Operating Procedure 430P-3EW02.

Signature ______ Date 12/18/86

5.5 Verify that Auxiliary Building HVAC ESF Equipment Room Essential ACU's are in stand-by per 430P-3HA01.

Terry L Radtke 12-16-86
Signature Date

5.6 Prior to performing Subsection 8.2 (refer to 8.2.1), verify that the Diesel Generator "A" HVAC is lined up per 430P-3HD01.

Terry L Radtke 12-16-86
Signature Date

5.7 Prior to performing Subsection 8.15 (refer to 8.15.1), verify that the Diesel Generator "B" HVAC is lined up per 430P-3HD02.

Signature ______ Date 12/18/86

5.8 Verify that the Fuel Building normal HVAC is in service and the Essential AFU's are aligned per 430P-3HF01.

Terry L Radtke 12-16-86
Signature Date

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PALO VERDE NUCLEAR GENERATING STATION MANUAL	PROCEDURE NO. 93PE-3SA01	
INTEGRATED TEST OF ENGINEERED SAFETY FEATURES	REVISION 0	Page 56 of 716

5.9 Verify that the Control Building normal HVAC is in service and the Essential AHU's are aligned per 430P-3HJ01.

Terry L Radtke / 12-16-86
Signature Date

5.10 Verify that the following Class 1E 120VAC Instrument and Control Distribution Panels are energized from the inverter with the voltage regulator in standby:

NOTE

Perform 5.10.2 and 5.10.4 prior to commencing section 8.14.
Perform 5.10.1 and 5.10.3 prior to commencing section 8.1.

5.10.1 PNA-D25 (refer 430P-3PN01).

Terry L Radtke / 12-16-86
Signature Date

5.10.2 PNB-D26 (refer 430P-3PN02).

Terry L Radtke / 12-16-86
Signature Date

5.10.3 PNC-D27 (refer 430P-3PN03).

Terry L Radtke / 12-16-86
Signature Date

5.10.4 PND-D28 (refer 430P-3PN04).

Terry L Radtke / 12-16-86
Signature Date

5.11 Verify that the Essential Lighting is energized (refer 430P-3QB01).

Terry L Radtke / 12-16-86
Signature Date

5.12 Verify that the Emergency Lighting charger/inverters QDN-N01 and QDN-N02 are energized (refer 430P-3QB01).

Terry L Radtke / 12-16-86
Signature Date

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5.13 4.16 KV Class 1E Bus, PBA-S03 is energized from normal offsite power (refer 430P-3PB01).

Terry L Radtke / 12-16-86
Signature Date

5.14 4.16 KV Class 1E Bus, PBB-S04 is energized from normal offsite power (refer 430P-3PB01).

Terry L Radtke / 12-16-86
Signature Date

5.15 480 VAC Class 1E Load Centers are energized (for Train B, "Local-Remote Local" switches to be in "Remote Local" position - refer 430P-3PG01).

Terry L Radtke / 12-16-86
Signature Date

5.16 480 VAC Class 1E MCC's are energized (refer 430P-3PH01)

Terry L Radtke / 12-16-86
Signature Date

5.17 125 VDC Class 1E MCC's and distribution panels are energized with the applicable batteries and battery chargers in service (refer 430P-3PK01).

Terry L Radtke / 12-16-86
Signature Date

5.18 Prior to performing Subsection 8.2 (refer to 8.2.1), verify that the Essential Spray Pond "A" is lined up per 430P-3SP01.

Terry L Radtke / 12-16-86
Signature Date

5.19 Prior to performing Subsection 8.15 (refer to 8.15.1), verify that the Essential Spray Pond "B" is lined up per 430P-3SP02.

W. Stearns / 12/18/86
Signature Date

5.20 Verify that normal chiller WCN-E01A is either aligned or in service per 430P-3WC01.

Terry L Radtke / 12-16-86
Signature Date

5.21 Verify that the Condensate Storage Tank and Transfer pumps are aligned for normal operation (refer 43OP-3CT01).

Terry L Radtke 12-16-86
Signature Date

5.22 Prior to performing Subsection 8.2 (refer to 8.2.1), verify that Diesel Generator "A" is lined up and ready to support testing per 43OP-3DG01.

Terry L Radtke 12-16-86
Signature Date

5.23 Prior to performing Subsection 8.15 (refer to 8.15.1), verify that Diesel Generator "B" is lined up and ready to support testing per 43OP-3DG02.

(signature) 12/18/86
Signature Date

5.24 Prior to performing Subsection 8.2 (refer to 8.2.1), verify that Essential Chilled Water "A" Train is lined up per Operating Procedure 43OP-3EC01.

Terry L Radtke 12-16-86
Signature Date

5.25 Prior to performing Subsection 8.15 (refer to 8.15.1), verify that Essential Chilled Water "B" Train is lined up per Operating Procedure 43OP-3EC02.

W. (signature) 12/18/86
Signature Date

5.26 Test switches and jumpers installed by 92SU-3SA01 have been removed.

Joseph J. Baltitski 12-16-86
Signature Date

8 5 0 5 6 6 0 9 1 5

5.27 The following equipment circuit breakers are in the TEST position:

Equipment	Breaker Location	Initials/Date
(1) AFB-P01	PBB-S04S	NB 1-12-16-84
(2) AFN-P01	PBA-S03S	NB 1-12-16-84
(3) CHA-P01	PGA-L31C4	NB 1-12-16-84
(4) CHB-P01	PGB-L32C4	NB 1-12-16-84
(5) HCN-A02A	PGA-L31E3	NB 1-12-16-84
(6) HCN-A02B	PGB-L32E2	NB 1-12-16-84
(7) HCN-A02C	PGA-L33D3	NB 1-12-16-84
(8) HCN-A02D	PGB-L34D3	NB 1-12-16-84
(9) RCE-A14, B01, B09	PGA-L33D4	NB 1-12-16-84
(10) RCE-A05, B10, B18	PGB-L32E3	NB 1-12-16-84
(11) SIA-P01	PBA-S03F	NB 1-12-16-84
(12) SIA-P02	PBA-S03E	NB 1-12-16-84
(13) SIA-P03	PBA-S03D	NB 1-12-16-84
(14) SIB-P01	PBB-S04F	NB 1-12-16-84
(15) SIB-P02	PBB-S04E	NB 1-12-16-84
(16) SIB-P03	PBB-S04D	NB 1-12-16-84
(17) PCA-P01	PGA-L31C3	NB 1-12-16-84
(18) PCB-P01	PGB-L36C4	NB 1-12-16-84
(19) PBA-S03	PBA-S03K	NB 1-12-16-84
(20) PBB-S04	PBB-S04L	NB 1-12-16-84

8 6 0 3 0 6 0 9 1 6

5.28 Prior to performing Subsection 8.27 (refer 8.27.1), verify that the Nitrogen System (as a backup to instrument air) is in service per 43OP-3GA01 and the nitrogen storage tank is filled to at least 75%.

Signature / 12/20/86
Signature Date

5.29 Verify that the Containment Normal ACU's are aligned or in service per 43OP-3HC01.

Terry L Radtke / 12-16-86
Signature Date

5.30 Verify that the Instrument Air Compressors and Receivers are in service per 43OP-3IA01.

Terry L Radtke / 12-16-86
Signature Date

5.31 Verify that the battery lead inside each radiation monitoring system microcomputer has been lifted to prevent damage during power outages.

Joseph J. Zolitch / 12-16-86
Signature Date

5.32 Verify that the Steam Generators are in wet layup per 43OP-3SG02.

Terry L Radtke / 12-16-86
Signature Date

5.33 At panel J-SAA-C01 INSTALL/VERIFY INSTALLED jumpers as listed below to defeat PPS trips to NSSS ESFAS Train A.

(1) SIAS 1A and SIAS 3A, TB55-3 to TB65-1

(2) SIAS 2A and SIAS 4A, TB75-1 to TB85-3

(3) CIAS 1A and CIAS 3A, TB65-4 to TB55-6

(4) CIAS 2A and CIAS 4A, TB75-4 to TB85-6

(5) RAS 1A and RAS 3A, TB65-7 to TB55-9

(6) RAS 3A and RAS 4A, TB75-7 to TB85-9

(7) MSIS 1A, TB55-10 to TB55-12

(8) MSIS 3A, TB65-10 to TB65-12

(9) MSIS 4A, TB75-10 to TB75-12

(10) MSIS 2A, TB85-10 to TB85-12

(11) AFAS-1 1A, TB55-13 to TB55-15

(12) AFAS-1 3A, TB65-13 to TB65-15

(13) AFAS-1 4A, TB75-13 to TB75-15

(14) AFAS-1 2A, TB85-13 to TB85-15

(15) AFAS-2 1A, TB55-16 to TB55-18

(16) AFAS-2 3A, TB65-16 to TB65-18

(17) AFAS-2 4A, TB75-16 to TB75-18

(18) AFAS-2 2A, TB85-16 to TB85-18

(19) CSAS 1A and CSAS 3A, TB65-19 to TB55-21

(20) CSAS 2A and CSAS 4A, TB75-19 to TB85-21

Joseph O. Balitski / 12-12-86
Signature / Date

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5.34 At panel J-SAB-C01 INSTALL/VERIFY INSTALLED jumpers as listed below to defeat PPS trips to NSSS ESFAS B.

(1) SIAS 1B and SIAS 3B, TB55-3 to TB65-1

(2) SIAS 2B and SIAS 4B, TB75-1 to TB85-3

(3) CIAS 1B and CIAS 3B, TB65-4 to TB55-6

(4) CIAS 2B and CIAS 4B, TB75-4 to TB85-6

(5) RAS 1B and RAS 3B, TB65-7 to TB55-9

(6) RAS 2B and RAS 4B, TB75-7 to TB85-9

(7) MSIS 1B, TB55-10 to TB55-12

(8) MSIS 3B, TB65-10 to TB65-12

(9) MSIS 4B, TB75-10 to TB75-12

(10) MSIS 2B, TB85-10 to TB85-12

(11) AFAS-1 1B, TB55-13 to TB55-15

(12) AFAS-1 3B, TB65-13 to TB65-15

(13) AFAS-1 4B, TB75-13 to TB75-15

(14) AFAS-1 2B, TB85-13 to TB85-15

(15) AFAS-2 1B, TB55-16 to TB55-18

(16) AFAS-2 3B, TB65-16 to TB65-18

(17) AFAS-2 4B, TB75-16 to TB75-18

(18) AFAS-2 2B, TB85-16 to TB85-18

(19) CSAS 1B and CSAS 3B, TB65-19 to TB55-21

(20) CSAS 2B and CSAS 4B, TB75-19 to TB85-21

Joseph J. Bilitski 12-12-86
Signature Date

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5.35 VERIFY interlock closing CHB-UV-523 on low NC flow (NCN-FSL-613) has been jumpered (E-ZAB-C02 TB4 Term 1 to 2).

Signature / Date: 12/11/86

5.36 Prior to performing Subsection 8.5 and 8.18 (refer to 8.5.1, 8.18.1), the Spray Chemical Addition Tank must contain sufficient Rx grade water to clear the low level pump trip as indicated on PMS points SILS348 and SILS349, "SCST Level CHB, CHA" respectively.

8.5 SILS348 / 12-16-86
8.18 SILS349 / 12/19/86

Signature / Date

5.37 Verify that the Containment Spray Headers are isolated, i.e., blanks are installed in the spectacle flanges in line A-088-GCBC-10" and B-130-GCBC-10" inside containment.

Signature / Date: 12/11/86

5.38 VERIFY that a temporary test switch has been installed in auxiliary power panels J-ECA-E01 and J-ECB-E02 in series with the Essential Chiller Oil pump motor overload contact (J-ECA-E01 and J-ECB-E02 overload contact to terminal 6) and test switches are closed. Reference vendor print M723-2.

Signature / Date: 12/11/86

5.39 Prior to performing Subsection 8.27, perform the following (refer to 8.27.1):

5.39.1 Valve Lineup (Appendix Y) has been performed and verified.

Signature / Date: 12/20/86

5.39.2 The Refueling Water Tank is filled to at least 30% with Grade "A" water.

Signature / Date: 12/20/86

5.39.3 Temporary power has been supplied to the following:

(1) FP CO_2 Storage Unit (M-FPN-X01) (NHN-M2724)
(2) Battery Charger "EF" (E-NKN-H21) (NHN-M0802)
(3) P.A. Battery Charger (E-QFN-F03) (NHN-D0301)
(4) P.A. Amp Rack "A" (E-QFN-T01) (NHN-D0303)
~~(5) ERFDADS Panel E-SDN-D03 (NNN-D1207)~~
(6) Local Multiplex battery Charger (NHN-M5046) TCN 002
(7) E-MAN-C02-02, Billing & Metering (NNN-D1507)
(8) C/R ESS LTG Voltage Regulator (QBA-V01) (PHA-M3132)
(9) C/R ESS LTG Voltage Regulator (QBB-V02) (PHB-M3217)
(10) DEMIN WATER TRANSFER PUMP DWN-P05A (NHN-M1318)

Signature ______ Date 12/14/86

5.40 Prior to performing Subsection 8.30, perform the following (refer to 8.30.1):

5.40.1 The Reactor Vessel Head and internals are removed and the refueling cavity seal ring and fuel transfer tube blind flange are installed and cleanliness control has been established.

Signature ______ Date 12/21/86

5.40.2 Verify that the Reactor Coolant System is lined up per 430P-3RC02 and the Reactor Vessel is filled to the vessel flange with Reactor Grade Water.

Signature ______ Date 12/21/86

5.41 Prior to performing Subsection 8.32, perform the following (refer to 8.32.1), verify that the spectacle flange in the M-AFB-P01 recirculation line B-11-DCCA-6" is installed in the ~~low~~ CLOSED position. TCN 001

Signature Joseph J. Baltich Date 12-21-86

5.42 VERIFY that the recorders are connected in accordance with Appendix Z and that the associated Modifications in Appendix Z are also complete.

Signature ______ Date 12/04/86

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5.43 VERIFY that the thermal overloads are removed from E-PHA-M3324 and E-PHB-M3427 to prevent running M-SIA-P05 and M-SIB-P05, respectively.

Signature ________ 12/11/86 Date

5.44 INSTALL jumpers as listed below to defeat cross train actuation of BOP ESFAS:

(1) J-SAA-C02A TB11-1 to TB11-2 (FBEVAS)
(2) J-SAA-C02A ~~TB11-3 to TB11-4~~ TB15-3 to TB15-4 (FBEVAS)
(3) J-SAA-C02A TB11-5 to TB11-6 (CREFAS)
(4) J-SAA-C02A ~~TB11-7 to TB11-8~~ TB15-7 to TB15-8 (CREFAS)
(5) J-SAA-C02A ~~TB12-9 to TB12-10~~ TB16-11 to TB16-12 (CRVIAS)
(6) J-SAA-C02A TB12-11 to TB12-12 (CRVIAS)
(7) J-SAA-C02A TB13-1 to TB13-2 (CRVIAS)
(8) J-SAA-C02A ~~TB13-3 to TB13-4~~ TB17-3 to TB17-4 (CRVIAS)
(9) J-SAA-C02A TB11-9 to TB11-10 (CPIAS)
(10) J-SAA-C02A ~~TB11-11 to TB11-12~~ TB15-11 to TB15-12 (CPIAS)

TCN 001

Signature ________ 12/11/86 Date

5.45 VERIFY that the interlock tripping Pressurizer backup heaters M-RCE-B01, B09, A14 and M-RCE-B18, B10, A05 on Lo-Lo Pressurizer level has been defeated (lift wire at EPGBL32I 63X/E3 LC110LLB relay term. 16 and EPGAL33I 63X LC110LLA relay term 15).

Signature ________ 12/11/86 Date

5.46 VERIFY that the MSIV and FWIV accumulators have been isolated and tagged to prevent fast closure of the valves. Both "G" and "G1" valves are closed on MSIV's, and "G" valve closed on FWIV's.

TE 002

Signature ________ 12-16-86 Date

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5.47 INSTALL jumpers across latching relay contacts as listed below to allow verification of SIAS contacts in circuits for the equipment noted:

	COMPONENT	RELAY CONTACT	JUMPER LOCATION
(1)	M-HCN-A01A	SX/6E2 15-16	PGAL31E EB6-EB19
(2)	M-HCN-A01B	SX/D3 15-16	PGBL36D EC8-ED32
(3)	M-HCN-A01C	SX/D2 15-16	PGAL33D EB5-EC31
(4)	M-HCN-A01D	SX/D2 15-16	PGBL34D EB5-EB23
(5)	M-HCN-A02A	SX/6E3 15-16	PGAL31E EC4-EC19
(6)	M-HCN-A02B	SX/E2 15-16	PGBL32E EC31-EC32
(7)	M-HCN-A02C	SX/6E3 15-16	PGAL33D EC8-ED32
(8)	M-HCN-A02D	SX/D3 15-16	PGBL34D EC4-EC14
(9)	M-RCE-B01, B09, A14	SX/E3 15-16	PGAL33D ED18-EV3
(10)	M-RCE-B18, B10, A05	SX/E3 15-16	PGBL32E EC13-EC18

[signature] / 12-16-86
Signature / Date

5.48 INSTALL a pneumatic jumper around IAA-UV2 (Instrument Air Containment Isolation) from IAN-V295 to IAN-V296.

[signature] / 12-11-86
Signature / Date

5.49 REMOVE the following electrical penetration fuses to isolate the power circuits inside containment for the associated equipment:

(1)	NGN-B31E3	HCN-A02A
(2)	NGN-B33D3	HCN-A02C
(3)	NGN-B32E2	HCN-AC2B
(4)	NGN-B34D3	HCN-A02D
(5)	NGN-B33D4	RCE-B01, B09, A14
(6)	NGN-B32E3	RCE-B10, B18, A05

[signature] / 12-11-86
Signature / Date

5.50 VERIFY that temporary tubing has been installed on HVAC dampers as specified in Appendix AD in order to maintain normal ventilation during testing with one Class 1E Train deenergized.

[signature] / 12-16-86
Signature / Date

5.51 To Simulate pressurizer Lo Level to the normal running and standby charging pumps, perform the following:

5.51.1 INSTALL/VERIFY INSTALLED the temporary test switches "CH-1" and "CH-2" in cabinet J-ZJN-C01B by performing the following:

JB 12-16-84 (1) LIFT and tape the vendor wire at TB2-4 ~~& 5~~ and INSTALL a temporary test switch "CH-1" in the "OPEN" position on the field side of TB2-4 & 5.

JB 12-16-84 (2) LIFT and tape the vendor wire at TB2-6 ~~& 7~~ and INSTALL a temporary test switch "CH-2" in the "OPEN" position on the field side of TB2-6 & 7.

TCN 001

Joseph J. Baldelli / 12-16-84
Signature / Date

6.0 ENVIRONMENTAL CONDITIONS

None

7.0 SPECIAL PRECAUTIONS

NOTE

The following precautions are the general precautions for this test. Refer to the System Operating Procedures listed in section 3.1.1 for the specific precautions for each system.

7.1 Portions of this test will result in a loss of off-site power to Unit 3. Notification of appropriate personnel is essential to limit the effects of this test on normal plant operation and construction.

7.2 Ensure that the polar crane, turbine crane, and fuel handling equipment are not in use during a loss of off-site power

7.3 Access to the reactor vessel and the refueling cavity area will be restricted during the injection portions of this test. Permission must be obtained from the Shift Supervisor or Test Director prior to entry.

7.4 Allowable variations in the sequence of this procedure are noted in section 8.0.

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7.5 In an Emergency Run Mode, only 3 of 19 automatic shutdowns will stop the Diesel Engine. All others will actuate an alarm and light. The three valid shutdowns are:

7.5.1 Engine Overspeed

7.5.2 Low Engine Lube Oil Pressure

7.5.3 Generator Differential

7.6 If it is necessary to stop a Diesel Generator while it is in the Emergency Run Mode, the Emergency Stop Pushbutton must be pushed. If this fails to stop the unit, the Fuel Racks may be closed manually by a lever located on the left bank side of the engine (generator end).

7.7 Secure testing if any unanticipated and unexpected alarms, indications, unusual noise or vibration is experienced.

7.8 During testing with E-PBA-S03 (train A) deenergized (Subsections 8.14 through 8.26), the fuel building must be surveyed at least once per shift if fuel is stored in fuel building. During all other testing, Radiation Monitor J-SQA-RJ-31 will be in service to monitor the fuel pool.

7.9 If the Diesel Generator trips from an electrical protective device (over current, load unbalance etc), the Normal and Alternate supply breaker CLOSE interlock will be initiated. Reset of this trip must be accomplished at the local diesel generator panel using the protective relay pushbutton. Operator action for this trip should include calling the protective relay tech, and leaving the relay flag dropped that initiated the trip.

7.10 During testing with non-class electrical power deenergized, nitrogen will be used as backup to the instrument air system. The use of oxygen monitors will be required during this portion of test.

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8.0 DETAILED PROCEDURE

NOTES

(1) SEQUENCE OF TESTING: This test is intended to be performed as written. The following are permissible variations to the order in which subsections can be performed. Steps within a subsection must be performed in sequence except as noted in the procedure.

a. Subsections 8.14 through 8.26 (Train B) can be performed prior to subsections 8.1 through 8.13 (Train A).

b. Subsections 8.5, 8.6, 8.7, 8.9, 8.10, 8.11 and 8.12 can be performed in any order within this group.

c. Subsections 8.18, 8.19, 8.20, 8.21, 8.23, 8.24 and 8.25 can be performed in any order within this group.

d. Subsections 8.5 through 8.12 and 8.18 through 8.25 can be performed prior to Subsections 8.2 through 8.4 and 8.15 through 8.17, respectively.

e. Subsections 8.30, 8.32 and 8.34 can be performed in any order.

f. Within an appendix, the components can be verified in any order.

(2) Verification that a component is OPERATING can be accomplished by physically observing the component or a vital indication of the component (i.e., a run light or pump discharge pressure). Verification that a component is ENERGIZED can be accomplished by observing control board indications, verification of functional performance, or as a last resort physically checking for the presence of a voltage. IF VOLTAGES ARE CHECKED INSURE ALL APPLICABLE SAFETY REQUIREMENTS ARE MET. Verification that a component is OPERABLE can be accomplished by verification of functional performance. When breakers for specific components are in the "TEST" position the terms "ON", "START", "RUNNING" will be synonymous with breaker closed, while "OFF", STOP, NOT RUNNING will be synonymous with breaker OPEN.

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(3) Verification that a component is INOPERABLE can be accomplished by observing a vital indication such as an alarm or breaker no voltage indication, or by attempting to operate the component and verifying that it will not operate. Verification that a component is DEENERGIZED can be accomplished by observing a vital indication or physically checking for the lack of power to the component. CAUTION: USE CARE WHEN CHECKING FOR THE LACK OF POWER TO A COMPONENT, CONTROL POWER OR OTHER VOLTAGES MAY BE PRESENT.

(4) For control switch indications of pumps, valves, etc., RED specifies ON or OPEN and GREEN specifies OFF or CLOSED. For control switch indications of electrical distribution breakers, RED specifies CLOSED and GREEN specifies OPEN.

(5) If any M&TE is used in determining equipment status, enter the appropriate information in the M&TE Usage Log.

(6) All recorders will be marked with the following pertinent information in addition to that specified in Section 8.0:

a. Procedure 93PE-3SA01

b. Date

c. Recorder number

d. Chart speed

e. Channel assignment

f. Channel scaling in engr. units as applicable

(7) Additional data sheets can be added to Appendix S, Emergency Diesel Generator-24hr. Test Data, as required. Additional pages will be sequentially numbered 160 A, B, C.

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(8) Simulation of radiation monitoring trip signals for CREFAS, FBEVAS and CPIAS will be done by sequenced operation of the function keys on the respective RIC'S. In the event of RIC non-availability, simulation may be accomplished by installation of test switches at the RIC output terminal boards and isolation of vendor wire to prevent unwanted trips/resets from the disabled RICS. Installation of these switches will be documented in the test log and by appropriate test modifications. Steps referring to RIC TRIP will be substituted by test switch OPEN and steps referring to RIC RESET will be substituted by test switch closed by this note. Usage of test switches may affect time response testing 92PE-3SB17 that will be conducted in parallel with this test. Notify appropriate test director in this event.

(9) Simulation of Lo pressurizer level signal to the normal running and standby charging pumps will be accomplished by actuation of test switches installed by prerequisite section 5.51.

8.1 Verification of Load Group 1-Load Group 2 Deenergized and Non-Class Energized

NOTES

(1) In this subsection, Load Group 2 (Train B) will be deenergized to demonstrate independence of Load Group 1 (Train A). In subsequent subsections, ESF actuations will be initiated to further demonstrate the independence between the load groups. Also in this subsection, the independence of 125VDC Load Group 2 Channels B and D will be verified.

(2) In verifying that electrical equipment is energized/deenergized, voltages referenced are nominal values only and are not to be used as acceptance criteria.

(3) Paragraphs 8.1.1, 8.1.2, 8.1.3 and 8.1.4 can be performed concurrently or in any order.

JB 12-16-84 8.1.1 VERIFY the status of Class 1E electrical equipment as listed in the PRETEST column of Appendix B.

JB 12-16-84 8.1.2 DISABLE DG B by placing the Control Mode Switch DGB-HS-8 on panel J-DGB-B01 to OFF.

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8 3 0 6 6 0 0 9 2 8