ITS PACKAGE CONTENTS

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3.8

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PACKAGE 3.8

ELECTRICAL POWER SYSTEMS

PART A

INTRODUCTION

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
UNITS 1 AND 2

Improved Technical Specifications
Conversion Submittal

LICENSE AMENDMENT REQUEST DATED December 11, 2000
Conversion to Improved Standard Technical Specifications

3.8
PART A

Introduction to the Discussion of the proposed Changes to the Current Technical Specifications, Justification of Differences from the Improved Standard Technical Specifications, and the supporting No Significant Hazards Determination

Pursuant to 10 CFR Part 50, Sections 50.59 and 50.90, the holders of Operating Licenses DPR-42 and DPR-60 hereby propose changes to the Facility Operating Licenses and Appendix A, Technical Specifications, as follows and as presented in the accompanying Parts B through G of this Package.

BACKGROUND

Over the past several years the nuclear industry and the Nuclear Regulatory Commission (NRC) have jointly developed Improved Standard Technical Specifications (ISTS). The NRC has encouraged licensees to implement these improved technical specifications as a means for improving plant safety through the more operator-oriented technical specifications, improved and expanded bases, reduced action statement induced plant transients, and more efficient use of NRC and industry resources.

This License Amendment Request (LAR) is submitted to conform the Prairie Island Nuclear Generating Plant (PINGP) Current Technical Specifications (CTS) to NUREG-1431, Improved Standard Technical Specifications, Westinghouse plants, Revision 1 issued April 1995 (ISTS). The resulting new Technical Specifications (TS) for Prairie Island (PI) are the PI Improved Technical Specifications (ITS) which incorporates the PI plant specific information.

NUREG-1431 is based on a hypothetical four loop Westinghouse plant. Since PI is similar in design and vintage to the R.E. Ginna Nuclear Power Plant which has already completed conversion to improved technical specifications, this amendment request relies on the Ginna ITS.

This LAR is also supported by Parts B through G. Part B contains a "clean" copy of the proposed PI ITS and Bases. Part C contains a mark-up of the PI CTS. Part D is the Description of Changes (DOC) to the PI CTS. Part E is a mark-up of the ISTS and Bases which shows the deviations from the standard incorporated to meet PI plant specific requirements. Part F gives the Justification for Deviations (JFD) from the ISTS and Part G provides the No Significant Hazards Determinations (NSHD) for changes to the PI CTS. To facilitate review of this LAR, cross-reference numbers from changes and deviations to the corresponding DOC, JFD and NSHD are provided. The methodology for mark-up and cross-references are described in the next section.

MARK-UP METHODOLOGY

The TS conversion package includes mark-ups of the CTS, the ISTS and the ISTS Bases in accordance with this guidance. Mark-up may be electronic or by hand as indicated.

Current Technical Specifications

The mark-up of the CTS is provided to show where current requirements are placed in the ITS, to show the major changes resulting from the conversion process, and to allow reviewers to evaluate significant differences between the CTS and ITS.

This ITS conversion LAR has been prepared in 14 packages following the Chapter/Section outline of the ITS as follows: 1.0, 2.0, 3.0, 3.1 . . . 3.9, 4.0 and 5.0. Accordingly, each package contains all the elements of Parts A through G as described above. The CTS Bases are not included in the CTS mark-up packages since the Bases have been rewritten in their entirety.

The current Specifications addressed by the associated ITS Chapter/Section are cross-referenced in the left margin to the new ITS location by Specification number and type (G-General, SL-Safety Limit, LCO-Limiting Condition for Operation or SR-Surveillance Requirements). Those portions of each CTS page which are not addressed in the associated ITS Chapter/Section are shadowed (electronic) or clouded and crossed out (by hand) and in the right margin is the comment, “Addressed Elsewhere”.

The CTS are marked-up to incorporate the substance of NUREG-1431 Revision 1. It is not the intent to mark every nuance required to make the format change from CTS to ITS.

In general, only technical changes have been identified. However, some non-technical changes have also been included when the changes cannot easily be determined to be non-technical by a reviewer, or if an explanation is required to demonstrate that the change is non-technical.

Some apparent changes result from the different conventions and philosophies used in the ITS. Generally these apparent changes will not be marked-up in the CTS if there is no resulting change in plant operating requirements.

Changes are identified by a change number in the right margin which map the changed specification requirement to Part D, Discussion of Changes, and Part G, No Significant Hazards Determination (NSHD) and indicate the NSHD category. The change number form is R3.4-02 where the first two numbers, 3.4 in this example, refer to ITS Chapter/Section number 3.4, and the second number, 02 in this example, is a sequentially assigned number for changes within that Chapter/Section, starting with 01. The prefix letter(s) indicates the classification of the change impact. For CTS changes this is also the NSHD category.

The change impact categories defined below conveniently group the type of changes for consideration of the effect of the change on the current plant license in Part D and are also useful for efficient discussion in Part G the "No Significant Hazards Determination" (NSHD) section. If the same change is made in Part E, then the change impact category will also show up in the change number in Part F. These categories are:

A - Administrative changes, editorial in nature that do not involve technical issues. These include reformatting, renaming (terminology changes), renumbering, and rewording of requirements.

L - Less restrictive requirements included in the PI ITS in order to conform to the guidance of NUREG-1431. Generally these are technical changes to existing TS which may include items such as extending Completion Times or reducing Surveillance Frequencies (extended time interval between surveillances). The less restrictive requirements necessitate individual justification. Each is provided with its specific NSHD.

LR - Less restrictive Removal of details and information from otherwise retained specifications which are removed from the CTS and placed in the Bases, Technical Requirements Manual (TRM), Updated Safety Analysis Report (USAR) or other licensee controlled documents. These changes include details of system design and function, procedural details or methods of conducting surveillances, or alarm or indication-only instrumentation.

M - More restrictive requirements included in the PI ITS in order to provide a complete set of Specifications conforming to the guidance of NUREG-1431. Changes in this category may be completely new requirements or they may be technical changes made to current requirements in the CTS.

R - Relocation of Current Specifications to other controlled documents or deletion of current Specifications which duplicate existing regulatory requirements.

Current requirements in the LCOs or SRs that do not meet the 10 CFR 50.36 selection criteria and may be relocated to the Bases, USAR, Core Operating Limits Report (COLR), Operational Quality Assurance Plan (OQAP), plant procedures or other licensee controlled documents. Relocating requirements to these licensee controlled documents does not eliminate the requirement, but rather, places them under more appropriate regulatory controls, such as 10CFR 50.54 (a)(3) and 10 CFR 50.59, to manage their implementation and future changes. Maintenance of these requirements in the TS commands resources which are not commensurate with their importance to safety and distract resources from more important requirements. Relocation of these items will enable more efficient maintenance of requirements under existing regulations and reduce the need to request TS changes for issues which do not affect public safety.

Deletion of Specifications which duplicate regulations eliminates the need to change Technical Specifications when changes in regulations occur. By law, licensees shall meet applicable requirements contained in the Code of Federal Regulations, or have NRC approved exemptions; therefore, restatement in the Technical Specifications is unnecessary.

The methodology for marking-up these changes is as follows:

As discussed above, administrative changes may not be marked-up in detail. Portions of the specifications which are no longer included are identified by use of the electronic strike-out feature (or crossed out by hand). Information being added is inserted into the specification in the appropriate location and is identified by use of shading features (or handwritten/insert pages).

Improved Standard Technical Specifications (NUREG-1431, Rev. 1)

The ISTS mark-up is to identify changes from the ISTS required to create a plant specific ITS by incorporating plant specific values in bracketed fields and identifying other changes with cross-reference to the Part F Justification For Differences.

All deviations from the ISTS are cross-referenced to the Part F justification for differences by a change number in the right margin. The change number form is CL3.4-05 where the prefix letter(s), CL in this example, indicate the classification of the reason for the difference, the first two numbers, 3.4 in this example, refer to the ITS Chapter/Section number 3.4, and the second number, 05 in this example, is a sequentially assigned number for deviations within that Chapter/Section, starting with a number which is larger than the last number from the Part C CTS mark-up. In some instances where a change has been made to the CTS and ISTS, the Part D change number is given since the justification for difference is the same as the discussion of change. The following categories are used as prefixes to indicate the general reason for each difference:

CL - Current Licensing basis. Issues that have been previously licensed for PI and have been retained in the ITS. This includes Specifications dictated by plant design features or the design basis. Since no plant modifications have been or will be made to accommodate conversion to ITS, the plant design basis features shall be incorporated into the PI ITS.

PA - Plant, Administrative. Plant specific wording preference or minor editorial improvements made to facilitate operator understanding.

TA - Traveler, Approved. Deviations made to incorporate an industry traveler which has been approved by the NRC.

TP - Traveler, Proposed. Deviation made to incorporate a proposed industry traveler which as of the time of submittal has not been approved by the NRC.

X - Other, Deviation from the ISTS for any other reason than those given above.

Material which is deleted from the ISTS is identified by use of the WordPerfect strike-out feature (or crossed out by hand). Information being added to the ISTS to generate the PI ITS due to any of the deviations discussed above is identified by use of WordPerfect red-line features (or handwritten/insert pages).

Bracketed Information

Many parameters, conditions, notes, surveillances, and portions of sections are bracketed in the ISTS recognizing that plant specific values are likely to vary from the "generic" values provided in the standard.

If the bracketed value applies to PI, then the "generic" information is retained without any special indication and the brackets are marked using the WordPerfect strike-out feature. In some instances, bracketed material is not discussed. If bracketed material is discussed, a change number is provided which includes the appropriate prefix as described above. When bracketed "generic" material is not incorporated, the bracketed material and brackets are marked with the WordPerfect strike-out feature (or crossed out by hand), the plant specific information is substituted for the bracketed information and a change number is provided which includes the appropriate prefix. Information added is indicated by the WordPerfect red-line (shading) feature (or handwritten/insert pages).

Optional Sections

Due to differing Westinghouse plant designs and methodologies, some ISTS section numbers include a letter suffix indicating that only one of these sections is applicable to any specific plant. The appropriate section is indicated in the Table of Contents, the suffix letter is deleted, and justification, if required, is included in the appropriate Chapter/Section package.

Bases, Improved Standard Technical Specifications (NUREG-1431, Rev. 1)

The ISTS Bases have been marked-up to support the plant specific PI ITS and allow reviewers to identify changes from NUREG-1431. To the extent possible, the words of NUREG-1431, Rev. 1 are retained to maximize standardization. Where the existing words in the NUREG are incorrect or misleading with respect to Prairie Island, they have been revised. In addition, descriptions have been added to cover plant specific portions of the specifications. Change numbers have been provided for the ISTS Bases with the same format as the ISTS Specification mark-up. In some instances, the same change number is used to describe the change.

Material which is deleted from the ISTS Bases is identified by use of the strike-out feature of WordPerfect (or crossed out by hand). Information being added to the ISTS Bases to generate the PI ITS is identified by use of the red-line (shading) feature of WordPerfect (or handwritten/insert pages).

Bracketed Material

Many parameters and portions of Bases are bracketed in the ISTS recognizing that plant specific values and discussions are likely to vary from the "generic" information provided in the standard.

If the bracketed information applies to PI, then the "generic" information is retained without any special indication and the brackets are marked using the WordPerfect strike-out feature. No change number or justification is provided for use of bracketed material, unless special circumstances warrant discussion.

When bracketed "generic" Bases material is not incorporated, the bracketed material and brackets are marked with the WordPerfect strike-out feature (or crossed out by hand) and the plant specific information substituted for the bracketed information is indicated by the WordPerfect red-line (shading) feature (or handwritten/insert pages). A change number with the same format as those used for the ISTS Specification mark-up is provided.

ACRONYMS

Many acronyms are used throughout this submittal. The intent of the final ITS (Part B) is that in general acronyms be written in full prior to the first use. Commonly used acronyms may not be written in full. Other parts of this package may not always write in full each acronym prior to first use; therefore, a list of acronyms is attached to assist in the review of this package.

Attachment to Part A

LIST OF ACRONYMS

AB	Auxiliary Building
ABSVS	Auxiliary Building Special Ventilation System
AFD	Axial Flux Difference
AFW	Auxiliary Feedwater System
ALARA	As Low As Reasonably Achievable
ALT	Actuation Logic Test
ASA	Applicable Safety Analyses
ASME	American Society of Mechanical Engineers
AOO	Anticipated Operational Occurrences
AOT	Allowed Outage Time
BAST	Boric Acid Storage Tank
BIT	Boron Injection Tank
BOC	Beginning of Cycle
CC	Component Cooling
COT	CHANNEL OPERATIONAL TEST
CAOC	Constant Axial Offset Control
CET	Core Exit Thermocouple
CL	Cooling Water
CLB	Current Licensing Basis
COLR	Core Operating Limits Reports
CRDM	Control Rod Drive Mechanism
CRSVS	Control Room Special Ventilation System
CS	Containment Spray
CST	Condensate Storage Tanks
CTS	Current Technical Specification(s)
DBA	Design Basis Accident
DDCL	Diesel Driven Cooling Water
DG	Diesel Generator
DNB	Departure from Nucleate Boiling
DNBR	Departure from nucleate boiling ratio
ECCS	Emergency Core Cooling System

EDG	Emergency Diesel Generators
EFPD	Effective Full Power Days
EOC	End of Cycle
ESF	Engineered Safety Feature
ESFAS	Engineered Safety Features Actuation System
FWLB	Feedwater Line Break
GDC	General Design Criteria
GITS	Ginna Improved Technical Specifications
HELB	High Energy Line Break
HZP	Hot Zero Power
IPE	Individual Plant Evaluation
ISTS	Improved Standard Technical Specifications
ITC	Isothermal Temperature Coefficient
ITS	Improved Technical Specifications
LA	License Amendment
LAR	License Amendment Request
LBLOCA	Large Break LOCA
LCO	Limiting Conditions for Operation
LHR	Linear Heat Rate
LOCA	Loss of Coolant Accident
LTOP	Low Temperature Overpressure Protection
MFIV	Main Feedwater Isolation Valve
MFRV	Main Feedwater Regulation Valve
MFW	Main Feedwater
MOSCA	MODE or Other Specified Condition of Applicability
MOV	Motor Operated Valve
MSIV	Main Steam Isolation Valves
MSLB	Main Steam Line Break
MSLI	Main Steam Line Isolation
MSSV	Main Steam Safety Valves
MTC	Moderator Temperature Coefficient
NIS	Nuclear Instrumentation System
NMC	Nuclear Management Company
NPSH	Net Positive Suction Head

NRCV	Non-Return Check Valve
NUREG-1431	The ISTS for Westinghouse plants
OPPS	OverPressure Protection System
PCT	Peak Cladding Temperature
PI	Prairie Island
PITS	Prairie Island Technical Specifications
PIV	Pressure Isolation Valve
PORV	Power Operated Relief Valve
PRA	Probabilistic Risk Assessment
PSV	Pressurizer Safety Valve
PTLR	Pressure and Temperature Limits Report
QTPR	Quadrant Power Tilt Ratio
RCCA	Rod Cluster Control Assembly
RCP	Reactor Coolant Pump
RCPB	Reactor Coolant Pressure Boundary
RCS	Reactor Coolant System
RHR	Residual Heat Removal System
RPI	Rod Position Indication
RPS	Reactor Protection System
RTB	Reactor Trip Breaker
RTBB	Reactor Trip Bypass Breaker
RTP	Rated Thermal Power
RTS	Reactor Trip System
RWST	Refueling Water Storage Tank
SBLOCA	Small Break Loss of Coolant Accident
SBVS	Shield Building Ventilation System
SCWS	Safeguards Chilled Water System
SDM	Shut Down Margin
SFDP	Safety Function Determination Program
SFP	Spent Fuel Pool
SG	Steam Generator
SGTR	Steam Generator Tube Rupture
SI	Safety Injection
SL	Safety Limit

SLB	Steam Line Break
SR	Surveillance Requirements
SSC	Structures, Systems and Components
TADOT	Trip Actuating Device Operational Test
TDAFW	Turbine Driven Auxiliary Feedwater
TRM	Technical Requirements Manual
TS	Technical Specifications
TSSC	Technical Specification Selection Criteria
TSTF	Term used for a NUREG change (traveler)
VCT	Volume Control Tank
VFTP	Ventilation Filter Test Program
UHS	Ultimate Heat Sink
USAR	Updated Safety Analysis Report
WCAP	Westinghouse technical report

PACKAGE 3.8

ELECTRICAL POWER SYSTEMS

PART B

PROPOSED PRAIRIE ISLAND IMPROVED TECHNICAL SPECIFICATIONS AND BASES

List of Pages

PRAIRIE ISLAND NUCLEAR GENERATING PLANT UNITS 1 AND 2

Improved Technical Specifications
Conversion Submittal

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources-Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two paths between the offsite transmission grid and the onsite 4 kV Safeguards Distribution System; and

b. Two diesel generators (DGs) capable of supplying the onsite 4 kV Safeguards Distribution System.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One path inoperable.	A.1 Perform SR 3.8.1.1 for the OPERABLE path.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u>	
	A.2 Restore path to OPERABLE status.	7 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One DG inoperable.	B.1 Perform SR 3.8.1.1 for the paths.	1 hour AND Once per 8 hours thereafter
	AND	
	B.2 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	----------------NOTE---------------- Completion of ACTIONS B.3.1 and B.3.2 are not required if DG inoperability is due to preplanned preventative maintenance or testing. --	
	AND	
	B.3.1 Determine OPERABLE DG is not inoperable due to common cause failure. OR	24 hours

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.3.2 Perform SR 3.8.1.2 for OPERABLE DG.	24 hours
	<u>AND</u>	
	B.4 Restore DG to OPERABLE status.	7 days
C. Two paths inoperable.	C.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable.	12 hours from discovery of Condition C concurrent with inoperability of redundant required features
	<u>AND</u>	
	C.2 Restore one path to OPERABLE status.	24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One path inoperable. <u>AND</u> One DG inoperable.	----------------NOTE---------------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems-Operating," if Condition D is entered with no AC power source to either train. --	
	D.1 Restore path to OPERABLE status.	12 hours
	<u>OR</u>	
	D.2 Restore DG to OPERABLE status.	12 hours
E. Two DGs inoperable.	E.1 Restore one DG to OPERABLE status.	2 hours
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3.	6 hours
	<u>AND</u>	
	F.2 Be in MODE 5.	36 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Two DGs inoperable and one or more paths inoperable. OR One DG inoperable and two paths inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each path.	7 days
SR 3.8.1.2	---------------------------NOTES------------------------ 1. Performance of SR 3.8.1.6 satisfies this SR. 2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. 3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR in consideration of manufacturer's recommendations. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.6 must be met. --- Verify each DG starts and achieves steady state voltage $\geq$ 3740 V and $\leq$ 4580 V, and frequency $\geq$ 58.8 Hz and $\leq$ 61.2 Hz.	31 days

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.3	---------------------------NOTES--------------------------- 1. DG loadings may include gradual loading in consideration of manufacturer's recomendations. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.6. --- Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load: a. Unit 1; ≥ 1650 kW; and b. Unit 2; ≥ 5100 kW and ≤ 5300 kW.	31 days
SR 3.8.1.4	Verify fuel level in each day tank .	31 days
SR 3.8.1.5	Verify the fuel oil transfer system operates to transfer fuel oil from storage tank to the day tank.	31 days

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.6	---------------------------NOTE-------------------------- All DG starts may be preceded by an engine prelube period. --- Verify each DG starts from standby condition and achieves: a. in ≤ 10 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and b. steady state voltage ≥ 3740 V and ≤ 4580 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days
SR 3.8.1.7	Verify each DG does not trip during and following a load rejection of: 1. Unit 1 ≥ 650 kW; and 2. Unit 2 ≥ 860 kW.	24 months
SR 3.8.1.8	Verify each DG's automatic trips are bypassed on an actual or simulated safety injection signal except: a. Engine overspeed; b. Generator differential current; and c. Ground fault (Unit 1 only).	24 months

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.9	------------------------------NOTE------------------------------ Momentary transients outside the load range do not invalidate this test. -- Verify each DG operates for ≥ 24 hours: a. For ≥ 2 hours loaded: Unit 1 ≥ 2832 kW and ≤ 3000 kW Unit 2 ≥ 5562 kW and ≤ 5940 kW; and b. For the remaining hours of the test loaded: Unit 1 ≥ 2475 kW; and Unit 2 ≥ 4860 kW. c. Achieves steady state voltage ≥ 3740 V and ≤ 4580 V; and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	24 months

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.10	-----NOTE----- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ---------- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated safety injection actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and energizes emergency loads in ≤ 60 seconds.	24 months

3.8 ELECTRICAL POWER SYSTEMS

3.8.2 AC Sources-Shutdown

LCO 3.8.2 The following AC electrical power sources shall be OPERABLE:

a. One path between the offsite transmission grid and the onsite 4 kV Safeguards Distribution System required by LCO 3.8.10, "Distribution Systems-Shutdown "; and

b. One diesel generator (DG) capable of supplying one train of the onsite 4 kV Safeguards Distribution System required by LCO 3.8.10.

---------------------------------------NOTE---------------------------------------
LCO 3.8.2 may not be applicable for a period of 8 hours during the performance of SR 3.8.1.10.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

---NOTE---
LCO 3.0.3 not applicable.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required path inoperable.	------------------NOTE--------------- Enter applicable Conditions and Required Actions of LCO 3.8.10, if one required train de-energized as a result of Condition A. --	
	A.1 Declare affected required feature(s) with no path available inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	
	A.2.4 Initiate action to restore required path to OPERABLE status.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One required DG inoperable.	B.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	B.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	B.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	
	B.4 Initiate action to restore required DG to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	---------------------------NOTE--------------------------- The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.3, and SR 3.8.1.7 through SR 3.8.1.10. -- For AC sources required to be OPERABLE, the SRs of Specification 3.8.1, "AC Sources-Operating," are applicable.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil

LCO 3.8.3 The stored diesel generator (DG) fuel oil supply shall be within limits.

APPLICABILITY: When the DG(s) is required to be OPERABLE.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DGs stored fuel oil supply: Unit 1 < 42,000 gal and > 36,000 gal; Unit 2 < 75,000 gal and > 65,000 gal.	A.1 Restore fuel oil supply to within limits.	48 hours
B. Required DG fuel oil tank with stored fuel oil properties not within limit(s).	B.1 Restore fuel oil tank properties to within limit(s).	7 days
C. Required Action and associated Completion Time of Condition B not met.	C.1 Initiate action to isolate the associated DG fuel oil tank.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Stored DG fuel oil supply: Unit 1 < 36,000 gal; Unit 2 < 65,000 gal. OR Required Action and associated Completion Time of Conditions A and C not met.	D.1 Declare DGs inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify stored DG fuel oil supply contains: Unit 1 ≥ 42,000 gal; Unit 2 ≥ 75,000 gal of fuel.	31 days
SR 3.8.3.2	Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources-Operating

LCO 3.8.4 The Train A and Train B DC safeguards electrical power sources shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery charger inoperable.	A.1 Verify the associated battery OPERABLE.	2 hours
	AND	
	A.2 Restore battery charger to OPERABLE status.	8 hours
B. One battery inoperable.	B.1 Restore battery to OPERABLE status.	8 hours
C. One DC safeguards electrical power source inoperable for reasons other than Condition A or B.	C.1 Restore DC safeguards electrical power source to OPERABLE status.	8 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and Associated Completion Time not met.	D.1 Be in MODE 3. <u>AND</u> D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is ≥ the minimum float voltage recommended by the battery manufacturer.	7 days
SR 3.8.4.2	Verify each battery charger supplies a load equal to the manufacturer's rating. <u>OR</u> Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.	24 months

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.3	------------------------------NOTES------------------------------ 1. The modified performance discharge test in SR 3.8.6.6 may be performed in lieu of the service test in SR 3.8.4.3. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. --- Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	24 months

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources-Shutdown

LCO 3.8.5 One DC electrical power source shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems-Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

---NOTE---

LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required DC electrical power sources inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM boron concentration.	Immediately
	<u>AND</u>	
	A.2.4 Initiate action to restore required DC electrical power sources to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	---NOTE--- The following SRs are not required to be performed: SR 3.8.4.2 and SR 3.8.4.3. --- For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1 SR 3.8.4.2 SR 3.8.4.3.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Parameters

LCO 3.8.6 Battery parameters shall be within limits.

APPLICABILITY: When the battery is required to be OPERABLE.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each battery.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more batteries with one or more battery cell float voltages < 2.07 V.	A.1 Perform SR 3.8.4.1.	2 hours
	AND	
	A.2 Perform SR 3.8.6.1.	2 hours
	AND	
	A.3 Restore affected cell voltage ≥ 2.07 V.	72 hours
B. One or more batteries with float current ≥ 2 amps.	B.1 Restore battery float current to ≤ 2 amps.	24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. ----------NOTE----------- Required Action C.2 shall be completed if electrolyte level was below the top of plates. --------------------------- One or more batteries with one or more cells electrolyte level less than minimum established design limits.	C.1 Restore electrolyte level to above top of plates.	8 hours
	AND	
	C.2 ------------NOTE------------ Only applicable if electrolyte level is below the top of plates. -------------------------------- Perform SR 3.8.6.5 for affected cells.	Once per 12 hours for 7 days
	AND	
	C.3 Restore electrolyte level to greater than or equal to minimum established design limits.	31 days
D. One or more batteries with pilot cell electrolyte temperature less than minimum established design limits.	D.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours
E. Required Actions and associated Completion Time of Condition A, B, C, or D not met.	E.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.6.1	------------------------------NOTE--------------------------- Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. --- Verify each battery float current is ≤ 2 amps.	7 days
SR 3.8.6.2	Verify each battery pilot cell voltage is ≥ 2.07 V.	31 days
SR 3.8.6.3	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.4	Verify each battery pilot cell temperature is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.5	Verify each battery connected cell voltage is ≥ 2.07 V.	92 days

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.6.6	-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ----- Verify battery capacity is ≥ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months <u>AND</u> 12 months when battery shows degradation or has reached 85% of the expected life with capacity < 100% of manufacturer's rating <u>AND</u> 24 months when battery has 85% of the expected life with capacity ≥ 100% of manufacturer's rating

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters-Operating

LCO 3.8.7 Three Reactor Protection Instrument AC inverters shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required Reactor Protection Instrument AC inverter inoperable.	A.1 -------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating" if any Reactor Protection Instrument AC Panel is de-energized. -------------------------------- Restore inverter to OPERABLE status.	 8 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.7.1	Verify correct inverter voltage and alignment to required Reactor Protection Instrument AC Panels.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters-Shutdown

LCO 3.8.8 One Reactor Protection Instrument AC inverter shall be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required inverter inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate action to restore required inverter to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.8.1	Verify correct inverter voltage and alignment to required Reactor Protection Instrument AC Panel.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems-Operating

LCO 3.8.9 Train A and Train B safeguards AC and DC, and Reactor Protection Instrument AC electrical power distribution subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more safeguards AC electrical power distribution subsystems inoperable.	A.1 Declare associated required supported feature(s) inoperable. OR A.2 Restore safeguards AC electrical power distribution subsystem to OPERABLE status.	Immediately 8 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more safeguards DC electrical power distribution subsystem inoperable.	B.1 Declare associated required supported feature(s) inoperable.	Immediately
	<u>OR</u>	
	B.2 Restore safeguards DC electrical power distribution subsystem to OPERABLE status.	2 hours
C. One Reactor Protection Instrument AC Panel inoperable.	C.1 Declare associated required supported feature(s) inoperable.	Immediately
	<u>OR</u>	
	C.2 Restore Reactor Protection Instrument AC Panel to OPERABLE status.	2 hours
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 3.	6 hours
	<u>AND</u>	
	D.2 Be in MODE 5.	36 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two trains with inoperable distribution subsystems that result in a loss of safety function. OR Two or more Reactor Protection Instrument AC Panels inoperable.	E.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker and switch alignments and voltage to safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution subsystems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems-Shutdown

LCO 3.8.10 The necessary portion of safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

-----NOTE-----
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required safeguards AC, DC, or Reactor Protection Instrument AC electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	
	A.2.4 Initiate actions to restore required safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution subsystems to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare associated required residual heat removal subsystem(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker and switch alignments and voltage to required safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution subsystems.	7 days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources-Operating

BASES

BACKGROUND

The unit 4 kV Safeguards Distribution System AC sources consist of the offsite power sources, and the onsite standby power sources (Train A and Train B diesel generators (DGs)). As required by AEC GDC Criterion 39 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The onsite Safeguards AC Distribution System is divided into redundant trains so that the loss of any one train does not prevent the minimum safety functions from being performed. Each train has two connections to the offsite power sources, and one to an onsite DG.

Offsite power is supplied to the unit switchyard(s) from the transmission network by five transmission lines. From the switchyard(s), electrically and physically separated paths provide AC power, through step down station auxiliary transformers, to the 4 kV safeguards buses. A detailed description of the offsite power network and the paths to the safeguards buses is found in Reference 2.

A path consists of all breakers, transformers, switches, cabling, and controls required to transmit power from the offsite transmission network to the safeguards bus(es).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Safeguards AC Distribution System under postulated worst case loading conditions. Within 1 minute after the load restore signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service via the load

BASES

BACKGROUND (continued)

sequencer. The transformers are capable of block loading (operation without load sequencing), when loading and motor starting is selectively restricted.

The onsite standby power source for each 4kV safeguards bus is a dedicated DG. For Unit 1, DGs 1 and 2 are dedicated to buses 15 and 16, respectively. For Unit 2, DGs 5 and 6 are dedicated to buses 25 and 26, respectively. A DG starts automatically on a safety injection (SI) signal (e.g., low pressurizer pressure or high containment pressure signals) or on a 4 kV safeguards bus degraded voltage or undervoltage signal (refer to LCO 3.3.4, "4 kV Safeguards Bus Voltage Instrumentation"). After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of safeguards bus undervoltage or degraded voltage, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the safeguards bus on an SI signal alone. Following the trip of offsite power, a sequencer strips nonpermanent loads from the bus. When the DG is tied to the bus, loads are then sequentially connected to its respective bus by the automatic load sequencer. The sequencing logic controls the start permissive for motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of offsite power, the safeguards electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within 1 minute after the load restore signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

BASES

BACKGROUND (continued)

Ratings for the Unit 1 DGs meet the intent of Safety Guide 9 and Unit 2 DGs satisfy the intent of Regulatory Guide 1.9, as discussed in the USAR (Ref. 2). The continuous service rating of each Unit 1 DG is 2750 kW with a 30 minute rating of 3250 kW. The continuous service rating of each Unit 2 DG is 5400 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The safeguards loads that are powered from the 4 kV safeguards buses are listed in Reference 2.

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the USAR (Ref. 3) assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite or offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power; and

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES (continued)

LCO

Two paths between the offsite transmission grid and the onsite 4 kV Safeguards Distribution System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

The paths are described in the USAR and are part of the licensing basis for the unit. Plant auxiliary power can be supplied from four separate external power sources which have multiple offsite network connections:

a. A reserve transformer (1R) from the 161 kV portion of the plant substation;

b. A second reserve transformer (2RS/2RY) from the 345 kV portion of the plant substation;

c. A cooling tower transformer (CT1/CT11) supplied from the 345 kV portion of the plant substation; and

d. A cooling tower transformer (CT12) supplied from a tertiary winding on the substation auto transformer.

Each path must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the safeguards buses.

Each DG must be capable of starting, accelerating to required speed and voltage, and connecting to its respective safeguards bus on detection of bus undervoltage. The DG will be ready to load within 10 seconds following receipt of a start signal. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the safeguards buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot and DG in standby with the engine at ambient conditions.

BASES

LCO (continued)

Proper sequencing of loads is a required function for DG OPERABILITY.

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs; and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources-Shutdown."

The load Sequencer requirements are covered in LCO 3.3.4, "4 kV Safeguards Bus Voltage Instrumentation".

ACTIONS

A.1

To ensure a highly reliable power source remains with one path inoperable, it is necessary to verify the OPERABILITY of the remaining path on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if the second path fails SR 3.8.1.1, there are no OPERABLE paths, and Condition C, for two paths inoperable, is entered.

A. 2

Operation may continue in Condition A for a period that should not exceed 7 days. With one path inoperable, the reliability of the

BASES

ACTIONS

A.2 (continued)

offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. In this Condition, however, the remaining OPERABLE path and DGs are adequate to supply electrical power to the onsite Safeguards Distribution System.

The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.1

To ensure a highly reliable power source remains with an inoperable DG, it is necessary to verify the availability of the paths on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a path fails to pass SR 3.8.1.1, it is inoperable and additional Conditions and Required Actions apply.

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related trains. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG.

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered

BASES

ACTIONS

B.2 (continued)

inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An inoperable DG exists; and

b. A required feature on the other train (Train A or Train B) is inoperable.

If at any time during the existence of this Condition (one DG inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one required DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DG, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

In this Condition, the remaining OPERABLE DG and paths are adequate to supply electrical power to the onsite Safeguards Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

ACTIONS

B.3.1 and B.3.2

The Required Actions of Condition B.3 are modified by a Note that does not require completion of Action B.3.1 and B.3.2 if the DG inoperability is due to preplanned preventative maintenance or testing.

Required Action B.3.1 provides an allowance to avoid unnecessary testing of the OPERABLE DG. If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on the other DG, the other DG would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DG, performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the plant corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to the Maintenance Rule, 24 hours is reasonable to confirm that the OPERABLE DG is not affected by the same problem as the inoperable DG.

B.4

Operation may continue in Condition B for a period that should not exceed 7days.

In Condition B, the remaining OPERABLE DG and paths are adequate to supply electrical power to the onsite Safeguards

ACTIONS

B.4 (continued)

Distribution System. The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

C.1 and C.2

Required Action C.1, which applies when two paths are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions. The Completion Time for this failure of redundant required features is 12 hours. The rationale for the 12 hours is that a Completion Time of 24 hours is allowed for two paths inoperable, based upon the assumption that two complete safety trains are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a Completion Time of 12 hours is appropriate. These features are powered from redundant AC safety trains.

The Completion Time for Required Action C.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. Both paths are inoperable; and

b. A required feature on either train is inoperable.

If at any time during the existence of Condition C (two paths inoperable) a required feature becomes inoperable, this Completion Time begins to be tracked.

BASES

ACTIONS

C.1 and C.2 (continued)

Operation may continue in Condition C for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

With both of the required paths inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the paths commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

With the available offsite AC sources, two less than required by the LCO, operation may continue for 24 hours. If two paths are restored within 24 hours, unrestricted operation may continue. If only one path is restored within 24 hours, power operation continues in accordance with Condition A.

D.1 and D.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition D are modified by a Note to indicate that if Condition D is entered with no AC source to either train, the Conditions and Required Actions for LCO 3.8.9, "Distribution Systems-Operating," must be

BASES

ACTIONS

D.1 and D.2 (continued)

immediately entered. This allows Condition D to provide requirements for the loss of one path and one DG, without regard to whether a train is de-energized. LCO 3.8.9 provides the appropriate restrictions for a de-energized train.

Operation may continue in Condition D for a period that should not exceed 12 hours.

In Condition D, redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition C (loss of both required paths). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

E.1

With Train A and Train B DGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since inadvertent generator trips could result in a total loss of offsite AC power,

BASES

ACTIONS

E.1 (continued)

however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

With both DGs inoperable, operation may continue for a period that should not exceed 2 hours.

F.1 and F.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

G.1

Condition G corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system may cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

BASES (continued)

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, as discussed in the USAR (Ref. 2). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs are in accordance with regulatory guidance as addressed in the USAR.
The voltages and frequencies discussed in these SRs are consistent with analysis described in the USAR (Ref. 2).

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their offsite power source. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.6

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs are modified by a Note (Note 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.6 (continued)

In order to reduce stress and wear on diesel engines, some manufacturers recommend a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

SR 3.8.1.6 requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the USAR (Ref. 3). Standby conditions for a DG mean that the diesel engine coolant and oil temperatures are being maintained consistent with manufacturer recommendations.

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.6 applies.

Since SR 3.8.1.6 requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is the intent of Note 1 of SR 3.8.1.2.

The 31 day Frequency for SR 3.8.1.2 and the 184 day Frequency for SR 3.8.1.6 provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the manufacturer's recommended loads. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the DG is connected to the offsite source.

The 31 day Frequency for this Surveillance is consistent with SR 3.8.1.2.

This SR is modified by four Notes. Note 1 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 2 states that momentary transients, because of changing loads or system characteristics, do not invalidate this test. Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from path or grid perturbations. Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank is at or above the level at which fuel oil is automatically added. The level is selected to ensure adequate fuel oil for a minimum of 2 hours for Unit 1 (1 hour of DG operation at full load plus 10% for Unit 2).

The 31 day Frequency is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are provided and facility operators would be aware of any large uses of fuel oil during this period.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.5

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The design of fuel transfer systems is such that pumps operate automatically in order to maintain an adequate volume of fuel oil in the day tanks during or following DG testing. Therefore, a 31 day Frequency is appropriate.

SR 3.8.1.6

See SR 3.8.1.2.

SR 3.8.1.7

This Surveillance demonstrates the DG capability to reject a load equivalent to the largest single load without tripping. The DG load rejection may occur because of an inadvertent breaker tripping. This Surveillance ensures proper engine response under the simulated test

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.7 (continued)

conditions. This test simulates a load rejection and verifies that the DG does not trip upon loss of the largest single load.

The 24 month Frequency is consistent with the expected fuel cycle lengths.

SR 3.8.1.8

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on an actual or simulated safety injection (SI) signal, and critical protective functions (e.g., engine overspeed, generator differential current, and ground fault (Unit 1)) trip the DG to avert substantial damage to the DG unit. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The 24 month Frequency is based on engineering judgment, taking into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.9

Demonstrate once per 24 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, ≥ 2 hours of which is at a load equivalent to 103 - 110% of the continuous duty rating and the remainder of the time at a load equivalent to > 90% of the continuous duty rating, voltage, and frequency of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The 24 month Frequency takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by a Note. The Note states that momentary transients due to changing loads do not invalidate this test.

SR 3.8.1.10

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation during a loss of offsite power actuation test signal in conjunction with an SI actuation signal. In lieu of actual demonstration of connection and loading of emergency loads, testing that adequately shows the

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.10 (continued)

capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of 24 months takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of 24 months.

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. The reason for Note 2 is that the performance of the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

REFERENCES

1. AEC "General Design Criteria for Nuclear Power Plant Construction Permits," Criterion 39, issued for comment July 10, 1967, as referenced in the USAR, Section 1.2.

2. USAR, Section 8.

3. USAR, Section 14.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources-Shutdown

BASES

BACKGROUND

A description of the AC sources is provided in the Bases for LCO 3.8.1, "AC Sources-Operating."

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the minimum AC sources during MODES 5 and 6 and during movement of irradiated fuel assemblies ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate AC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shut down, the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

BASES

APPLICABLE SAFETY ANALYSES (continued)

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODES 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on:

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

In the event of an accident during shutdown, this LCO ensures the capability to support systems necessary to avoid immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite diesel generator (DG) power.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES (continued)

LCO

One path capable of supplying the onsite 4 kV Safeguards Distribution subsystem(s) of LCO 3.8.10, "Distribution Systems - Shutdown," ensures that all required loads are powered from offsite power. An OPERABLE DG, associated with the distribution system train required to be OPERABLE by LCO 3.8.10, ensures a diverse power source is available to provide electrical power support, assuming a loss of the path. Together, OPERABILITY of the required path and DG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

The path must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Safeguards bus(es). Paths are those that are described in the USAR and are part of the licensing basis for the unit.

The DG must be capable of starting, accelerating to required speed and voltage, and connecting to its respective Safeguards bus on detection of bus undervoltage. The DG must be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the Safeguards buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot or DG in standby at ambient conditions.

Proper sequencing of loads is a required function for DG OPERABILITY.

A Note has been added allowing the LCO not being applicable for a period of 8 hours during the performance of SR 3.8.1.10. This is acceptable since the DG(s) will be procedurally controlled and considering the small likelihood of a severe transient or event in this time period.

BASES (continued)

APPLICABILITY

The AC sources required to be OPERABLE in MODES 5 and 6 and during movement of irradiated fuel assemblies provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

b. Systems needed to mitigate a fuel handling accident are available;

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The AC power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.1.

The Load Sequencer requirements are covered in LCO 3.3.4, "4 kV Safeguards Bus Voltage Instrumentation".

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Entering LCO 3.0.3 while in MODES 1, 2, 3, or 4 would require the unit to be shutdown unnecessarily.

BASES

ACTIONS (continued)

A.1

A required path would be considered inoperable if it were not available to at least one required Safeguards train. Although two trains may be required by LCO 3.8.10, the one train with offsite power available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By the allowance of the option to declare required features inoperable, with no offsite power available, appropriate restrictions will be implemented in accordance with the affected required features LCO's ACTIONS.

A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4

With the required path not available to at least one required train, the option would still exist to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

BASES

ACTIONS

A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4 (continued)

Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the unit safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the unit safety systems may be without sufficient power.

Pursuant to LCO 3.0.6, the Distribution System's ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC power to any required Safeguards bus, the ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the path, whether or not a train is de-energized. LCO 3.8.10 would provide the appropriate restrictions for the situation involving a de-energized train.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled

BASES

SURVEILLANCE REQUIREMENTS	SR 3.8.2.1 (continued) with the offsite power grid or otherwise rendered inoperable during performance of SRs, and to preclude deenergizing a required 4 kV Safeguards bus or disconnecting a required path during performance of SRs. With limited AC sources available, a single event could compromise both the required path and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and required path is required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.
REFERENCES	None.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil

BASES

BACKGROUND

Each unit is provided with a fuel oil capacity sufficient to operate the diesel generator (DGs) as discussed in the USAR (Ref. 1). This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

New DG fuel oil is placed in a receiving tank where it is tested in accordance with the PI Diesel Fuel Oil Testing Program. Once the test results have verified that the fuel oil is within limits, the fuel oil may be transferred to the safeguards fuel oil storage tanks. Fuel oil is then transferred from the safeguards fuel oil storage tank to the day tank by the fuel oil transfer pumps associated with each storage tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve or tank to result in the loss of more than one DG.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the USAR (Ref. 2) assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

Since the diesel fuel oil system supports the operation of the standby AC power sources, it satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES (continued)

LCO

Stored diesel fuel oil is required to have sufficient supply for one DG on each unit to operate for 14 days (Ref. 1). It is also required to meet specific standards for quality. This requirement, in conjunction with an ability to obtain replacement supplies within 14 days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an anticipated operational occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the safeguards storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources-Operating," and LCO 3.8.2, "AC Sources-Shutdown."

APPLICABILITY

The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Since stored diesel fuel oil supports LCO 3.8.1 and LCO 3.8.2, it is required to be within limits when the DG(s) is required to be OPERABLE.

ACTIONS

A.1

In this Condition, the 14 day fuel oil supply for the DGs is not available. However, the Condition is restricted to fuel oil supply reductions that maintain at least a 12 day supply. These circumstances may be caused by events, such as full load operation required after an inadvertent start while at minimum required supply, or feed and bleed operations, which may be necessitated by increasing particulate levels or any number of other oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank(s). A period of 48 hours is considered sufficient to complete restoration of the required supply prior to declaring the DG inoperable. This period is

BASES

ACTIONS

A.1 (continued)

acceptable based on the remaining capacity (> 12 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.2. If fuel oil properties in a DG fuel oil tank are not within limits, actions must be taken to restore the fuel oil properties to within limits. If the fuel oil properties in the fuel oil tank are not within limits, it does not mean failure of the fuel oil to burn properly in the diesel engine, and particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (in accordance with the Diesel Fuel Oil Testing Program), it is prudent to allow a brief period prior to declaring the associated DG inoperable or isolating the associated fuel oil tank. Therefore the 7 day Completion Time allows for further evaluation, resampling and re-analysis of the DG fuel oil.

C.1

With a Required Action and associated Completion Time of Condition B not met, the associated fuel oil tank must be isolated immediately. Isolation of a specific fuel oil tank may not make the associated DG inoperable since the DG can take suction from another fuel oil tank. Isolation of the associated fuel oil tank may cause entry into Conditions A or D which could result in the DG being inoperable.

BASES

ACTIONS (continued)

D.1

With the stored fuel oil supply not within the limits specified or Required Actions and associated Completion Times of Conditions A or C not met, the DGs may be incapable of performing their intended function and must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support the operation of one DG for 14 days. The 14 day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

The tests for the new fuel oil prior to addition into the safeguards storage tank(s) are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate, detrimental impact on diesel engine combustion. If results from these tests are within acceptable limits, the fuel oil may be added to the safeguards storage tanks without concern for contaminating the entire volume of fuel oil in the safeguards storage tanks. These tests are to be conducted prior to adding the new fuel to the safeguards storage tank(s), but in no case is the time between receipt of new fuel and addition of new fuel oil

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.3.2 (continued)

to the safeguards storage tank(s) to exceed 31 days. The tests and limits for new and stored fuel are described in the Diesel Fuel Oil Testing Program of Specification 5.5.11.

Failure to meet any of the limits specified in the Diesel Fuel Oil Testing Program is cause for rejection the new fuel oil, but does not represent a failure to meet the LCO concern since the fuel oil is not added to the storage tanks. Failure to meet any of the limits for stored fuel requires entry into Condition B.

REFERENCES

1. USAR, Sections 8.4 and 10.3.
2. USAR, Section 14.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources-Operating

BASES

BACKGROUND

The DC safeguards electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and preferred Reactor Protection Instrument AC Panel power (via inverters). As required by AEC GDC 39 (Ref. 1), the DC safeguards electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure.

The 125 VDC safeguards electrical power system consists of two independent and redundant safety related DC safeguards electrical power subsystems (Train A and Train B). The sources for a train are a 125 VDC battery, a battery charger, and all the associated control equipment and interconnecting cabling.

There is one portable battery charger which can provide backup service in the event that a stationary battery charger is out of service. If the portable battery charger is substituted for the stationary battery charger, then the requirements of independence and redundancy between subsystems are maintained.

During normal operation, the 125 VDC load is powered from the battery chargers with the batteries floating on the system. In case of loss of normal power to the battery charger, the DC load is automatically powered from the station batteries.

The Train A and Train B DC safeguards electrical power sources provide the control power for their associated safeguards AC power load group, 4 kV switchgear, and 480 V switchgear. The DC safeguards electrical power sources also provide backup DC electrical power to the inverters, which power the Reactor Protection Instrument AC Panels.

BASES

BACKGROUND (continued)

The DC safeguards power distribution system is described in more detail in Bases for LCO 3.8.9, "Distribution Systems-Operating," and LCO 3.8.10, "Distribution Systems-Shutdown."

Each battery has adequate storage capacity as discussed in Reference 2.

Each 125 VDC battery is separately housed in a ventilated room with its charger and distribution centers. Each subsystem is located in an area separated physically and electrically from the other subsystem to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing between redundant safeguards subsystems, such as batteries, battery chargers, or distribution panels.

Each battery charger has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery fully charged. Each battery charger also has sufficient capacity to restore the battery to its fully charged state within 24 hours while supplying normal steady state loads discussed in the USAR (Ref. 2).

The battery charger is normally in the float-charge mode. Float-charge is the condition in which the charger is supplying the connected loads and the battery cells are receiving adequate current to optimally charge the battery. This assures the internal losses of a battery are overcome and the battery is maintained in a fully charged state.

When desired, the charger can be placed in the equalize mode. The equalized mode is at a higher voltage than the float mode and charging current is correspondingly higher. The battery charger is operated in the equalize mode after a battery discharge or for routine maintenance. Following a battery discharge, the battery recharge characteristic accepts current at a current limit of the battery charger (if the discharge was significant, e.g., following a battery service

BASES

BACKGROUND (continued)	test) until the battery terminal voltage approaches the charger voltage setpoint. Charging current then reduces exponentially during the remainder of the recharge cycle. Lead-calcium batteries have recharge efficiencies of greater than 95%, so once at least 105% of the ampere-hours discharged have been returned, the battery capacity would be restored to the same condition as it was prior to the discharge. This can be monitored by direct observation of the exponentially decaying charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery.
APPLICABLE SAFETY ANALYSES	The initial conditions of Design Basis Accident (DBA) and transient analyses in the USAR (Ref. 3) assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC safeguards electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation. The OPERABILITY of the DC sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining the DC sources OPERABLE during accident conditions in the event of: a. An assumed loss of all offsite AC power; and b. A worst case single failure. The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).
LCO	The DC safeguards electrical power subsystems, each subsystem consisting of a battery, battery charger and the corresponding control equipment and interconnecting cabling, supplying power to the associated panel within the train, are required to be OPERABLE to ensure the availability of the required power to shut down the reactor

BASES

LCO (continued)

and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA. Loss of any train DC safeguards electrical power subsystem does not prevent the minimum safety function from being performed (Ref. 2).

An OPERABLE DC safeguards electrical power subsystem requires the battery and a respective charger to be operating and connected to the associated DC panel.

APPLICABILITY

The DC safeguards electrical power sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure safe unit operation and to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and

b. Adequate core cooling is provided, and containment integrity and other vital functions are maintained in the event of a postulated DBA.

The DC electrical power requirements for MODES 5 and 6 are addressed in the Bases for LCO 3.8.5, "DC Sources-Shutdown."

ACTIONS

A.1 and A.2

Condition A represents one battery charger inoperable. Required Action A.1 allows 2 hours to establish that the battery capacity remains (or is restored) sufficient to perform its required safety function (duty cycle). This provides assurance that in the event of a DBA during the 8 hours allowed by Required Action A.2 to restore the battery charger to OPERABLE status, the battery will be available to perform its assumed function. If at the expiration of the initial 2 hour period the battery capacity can not be determined to be

BASES

ACTIONS

A.1 and A.2 (continued)

sufficient to perform the design duty cycle, the battery must be declared inoperable and Condition B entered. It is not required to perform a test (e.g., battery service test) to confirm the battery capacity; rather the intent of this Required Action can be evaluated by indirect means, such as observation of the charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery. Consideration of excess capacity that was determined by previous testing may also be utilized in this evaluation.

During the 2 hour Completion Time for Required Action A.1, provided the battery is otherwise not known to be inoperable (including charging currents not in excess of 10 amps), the battery may be considered OPERABLE and operation continued in accordance with Action A. This is an acceptable presumption based on the limited discharge of the battery (< 2 hours).

Required Action A.2 limits the restoration time for the inoperable battery charger to 8 hours. The 8 hour Completion Time reflects a reasonable time to effect restoration of the battery charger to OPERABLE status.

B.1

With the battery inoperable, the DC panel is being supplied by the OPERABLE battery charger. Any event that resulted in a loss of the Motor Control Center (MCC) supporting the battery charger will also result in loss of DC to that train. Therefore, it is imperative that the operator's attention focus on restoring the battery, thereby minimizing the potential for a complete loss of DC power to the affected train. The 8 hour limit allows sufficient time to effect

BASES

ACTIONS

B.1 (continued)

restoration of an inoperable battery while minimizing the risk of a loss of AC power to the associated battery charger as a result of imposing a required unit shutdown. During this time, additional single failures are not required to be assumed.

C.1

If one of the required DC safeguards electrical power sources is inoperable for reasons other than Condition A or B, the remaining DC safeguards electrical power source has the capacity to support a safe shutdown and to mitigate an accident condition. Since a subsequent worst case single failure could, however, result in the complete loss of minimum necessary DC safeguards electrical sources to mitigate a worst case accident, continued power operation should not exceed 8 hours. The 8 hours reflects a reasonable time to assess unit status as a function of the inoperable DC safeguards electrical power source and, if the DC safeguards electrical power source is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

D.1 and D.2

If the inoperable DC safeguards electrical power source cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems. The Completion Time to bring the unit to MODE 5 is consistent with other standard shutdown conditions.

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge helps to ensure the effectiveness of the battery chargers which support the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a fully charged state while supplying the continuous steady state loads of the associated DC subsystem. On float charge, battery cells will receive adequate current to optimally charge the battery. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the minimum float voltage established by the battery manufacturer. The 7 day Frequency is consistent with manufacturer recommendations.

SR 3.8.4.2

This SR verifies the design capacity of the battery chargers. The battery charger is sized based on the largest combination of the various steady state loads and the charging capacity to restore the battery to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied. This charging capacity exceeds the minimum requirements for the charger to support the required steady state DC loads in analyzed accidents.

This SR provides two options. One option requires that the battery charger be capable of supplying a nominal 300 amps at the float voltage for approximately 2 hours. The ampere requirements are based on the output rating of the chargers. The voltage requirements are based on the charger voltage level after a response to a loss of AC power. The time period is sufficient for the charger temperature to have stabilized.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.2 (continued)

The other option requires that each battery charger be capable of recharging the battery after a discharge test coincident with supplying the expected normal operating loads. The duration for this test may be longer than the charger sizing criteria since the battery recharge is affected by float voltage, temperature, and the exponential decay in charging current. The battery is fully recharged when the measured charging current is ≤ 2 amps.

The Surveillance Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing to ensure adequate charger performance during these 24 month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

SR 3.8.4.3

A battery service test is a special test of battery capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length should correspond to the design duty cycle requirements as specified in Reference 2.

The Surveillance Frequency of 24 months is consistent with the need to perform this test during refueling operations or at some other outage, with intervals between tests, not to exceed 24 months.

This SR is modified by two Notes. Note 1 allows the performance of a modified performance discharge test in lieu of a service test.

The reason for Note 2 is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems.

BASES (continued)

REFERENCES

1. AEC "General Design Criteria for Nuclear Power Plant Construction Permits." Criterion 39, issued for comment July 10, 1976, as referenced in USAR, Section 1.2.

2. USAR, Section 8.

3. USAR, Section 14.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources-Shutdown

BASES

BACKGROUND

A description of the DC sources is provided in the Bases for LCO 3.8.4, "DC Sources-Operating."

In addition to the safeguards DC sources, the service building battery or charger may be used as alternate power sources during plant shutdown. These alternate sources may be considered to be a required power source available to provide reliable power to various plant systems and equipment that are required to be OPERABLE to support shutdown conditions.

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the minimum DC electrical power sources during MODES 5 and 6 and during movement of irradiated fuel assemblies ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shut down, the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case

BASES

APPLICABLE SAFETY ANALYSES (continued)

bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODES 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on:

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The Shutdown Technical Specification requirements are designed to ensure that the unit has the capability to mitigate the consequences of certain postulated accidents. Worst case DBA which are analyzed for operating MODES are generally viewed not to be a significant concern during shutdown MODES due to lower energies involved. The Technical Specifications therefore require a lesser complement of electrical equipment to be available during shutdown than is required during operating MODES. More recent work completed on the potential risks associated with shutdown, however, have found significant risk associated with certain shutdown evolutions. As a result, in addition to the requirements established in the Technical Specifications, the industry has adopted NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management" as an Industry initiative to manage shutdown tasks and associated electrical support to maintain risk at an acceptable low level. This may require the availability of additional equipment beyond that required by the shutdown Technical Specifications.

The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Each DC electrical power subsystem consists of a battery, battery charger, and the corresponding control equipment and interconnecting cabling within the train. One battery or charger is required to be OPERABLE to support required trains of the distribution systems required OPERABLE by LCO 3.8.10, "Distribution Systems-Shutdown." This ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

BASES (continued)

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 5 and 6, and during movement of irradiated fuel assemblies, provide assurance that:

a. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

b. Required features needed to mitigate a fuel handling accident are available;

c. Required features necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The DC electrical power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.4.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Entering LCO 3.0.3 while in MODE 1, 2, 3, or 4 would require the unit to be shut down unnecessarily.

BASES

ACTIONS (continued)

A.1, A.2.1, A.2.2, A.2.3, and A.2.4

The OPERABLE DC power source may be capable of supporting sufficient systems to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features inoperable with the associated DC power source(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCO ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power source(s) and to continue this action until restoration is accomplished in order to provide the necessary DC electrical power to the unit safety systems.

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required DC electrical power source(s) should be completed as quickly as possible in order to minimize the time during which the unit safety systems may be without sufficient power.

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.2 requires performance of all Surveillances required by SR 3.8.4.1 through SR 3.8.4.3. Therefore, see the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DC sources from being discharged below their capability to provide the required power supply or otherwise rendered inoperable during the performance of SRs. It is the intent that these SRs must still be capable of being met, but actual performance is not required.

REFERENCES

None.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Parameters

BASES

BACKGROUND

This LCO delineates the limits on battery float current as well as electrolyte temperature, level, and float voltage for the DC power source batteries. A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.4, "DC Sources-Operating," and LCO 3.8.5, "DC Sources-Shutdown." In addition to the limitations of this Specification, plant procedures also require monitoring various battery parameters that are based on the recommendations of Reference 1.

The battery cells are of flooded lead acid construction with a nominal specific gravity as required by the manufacturer. This specific gravity corresponds to an open circuit battery voltage of approximately 120V for a 58 cell battery (i.e., cell voltage of 2.065 volts per cell (Vpc)). The open circuit voltage is the voltage maintained when there is no charging or discharging. Once fully charged with its open circuit voltage > 2.065 Vpc, the battery cell will maintain its capacity for > 30 days without further charging per manufacturer's instructions. Optimal long term performance; however, is obtained by maintaining a float voltage which limits the formation of lead sulfate and self discharge.

The current flow into the battery is also a primary parameter used to monitor the capacity of the battery. During a service test or performance test discharge, the fully charged battery voltage (nominal open circuit voltage at 2.065 Vpc) will decrease to approximately 1.8 Vpc (or for a 58 cell battery 105 V battery terminal voltage). The battery recharges at the current limit of the battery charger (300 amps) until the battery terminal voltage approaches the voltage setpoint for the charger (on equalize the

BASES

BACKGROUND (continued)

battery terminal voltage will be approximately 135 V or 2.33 Vpc). Charging current reduces exponentially during the remainder of the recharge cycle. Industry test data has shown that when charging at float voltage or greater, and the charging current reduces to approximately 2 amps, 98% of the original battery capacity is restored. Industry test data has also shown that when charging at equalized voltage, and the charging current reduces to approximately 13% of the chargers current limit setting (40 amps), 95% of the original battery capacity has been restored. With the design margins in battery sizing and the excess capacity available above the maximum assumed load, battery OPERABILITY (including post maintenance return to service) is assured at charging currents well above 10 amps.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the USAR (Ref. 2) assume Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators, emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining at least one train of DC sources OPERABLE during accident conditions, in the event of:

a. An assumed loss of all offsite AC power; and

b. A worst case single failure.

Battery parameters satisfy the Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES (continued)

LCO

Battery parameters must remain within acceptable limits to ensure availability of the required DC power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. Battery parameter limits are conservatively established, allowing continued DC electrical system function even with limits not met. Additional preventative maintenance, testing, and monitoring performed in accordance with the plant procedures is conducted without direct impact on the requirements of this Specification. Failure of any procedural requirement is evaluated against the Technical Specifications limits, but does not necessarily result in failure to meet this LCO.

APPLICABILITY

The battery parameters are required solely for the support of the associated DC electrical power subsystems. Therefore, battery parameter limits are only required when the DC power source is required to be OPERABLE. Refer to the Applicability discussion in Bases for LCO 3.8.4 and LCO 3.8.5.

ACTIONS

A Note has been added to provide clarification that, for this LCO, separate Condition entry is allowed for each battery. This is acceptable, since Required Actions for each Condition provide appropriate compensatory actions.

A.1, A.2, and A.3

With one or more cells in one or more batteries < 2.07 V, the battery is degraded. Within 2 hours verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage (SR 3.8.4.1) and of the overall battery state of charge by monitoring the battery float charge current (SR 3.8.6.1). This assures that there is still sufficient battery capacity to perform the intended function. Therefore, the affected battery is not required to

BASES

ACTIONS

A.1, A.2, and A.3 (continued)

be considered inoperable solely as a result of one or more cells in one or more batteries < 2.07 V, and continued operation is permitted for a limited period up to 72 hours.

Since the Required Actions only specify "perform," a failure of SR 3.8.4.1 or SR 3.8.6.1 acceptance criteria does not result in this Required Action not met. However, if one of the SRs is failed, the applicable Condition in the associated Specification is entered.

B.1

One or more batteries float current > 2 amps indicates that a partial discharge of the battery capacity has occurred. This may be due to a temporary loss of a battery charger or to one or more battery cells in a low voltage condition reflecting some loss of capacity. Taking into consideration that, while battery capacity is degraded, sufficient capacity exists to perform the intended function acceptable for operation prior to declaring the DC batteries inoperable.

C.1, C.2, and C.3

With one or more batteries with one or more cells electrolyte level below the minimum established design limits, the battery still retains sufficient capacity to perform the intended function. Even in the event level drops slightly below the top of the plates, the plates are porous and acid will wick from the immersed plate. Therefore, the affected battery is not required to be considered inoperable solely as a result of electrolyte level not met. Within 8 hours level is required to be restored to above the top of plates and within 31 days the minimum established design limits for electrolyte level must be re-established.

BASES

ACTIONS

C.1, C.2, and C.3 (continued)

Required Action C.2 is modified by a Note that requires that the affected cell voltage be monitored (SR 3.8.6.5) only if electrolyte level was below the top of the plates. Furthermore, Condition C is modified by a Note that required Action C.2 be completed whenever electrolyte is discovered below the top of the plates. Since this Condition may be exited well before the end of the 7 day period, this Note is required to complete the necessary monitoring period. With electrolyte level below the top of the plates there is a potential for dryout and plate degradation. Therefore, this monitoring will ensure continued plate integrity. Since the Required Action only specified "perform," a failure of SR 3.8.6.5 acceptance criteria does not result in this Required Action not met. However, if one or more cell voltages fail to meet SR 3.8.6.5, Condition A is entered.

D.1

With one or more batteries with pilot cell temperature less than the minimum established design limits, 12 hours is allowed to restore the temperature to within limits. A low electrolyte temperature limits the power available. Since the battery is sized with margin, while battery capacity is degraded, sufficient capacity exists to perform the intended function and the affected battery is not required to be considered inoperable solely as a result of the pilot cell temperature not met.

E.1

With one or more batteries with any battery parameter outside the allowances of the Required Actions for Condition A, B, C, or D, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding battery must be declared inoperable.

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

Verifying battery float current while on float charge is used to determine the state of charge of the battery. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a charged state. The float current requirements are based on the float current indicative of a charged battery. Use of float current to determine the state of charge of the battery is consistent with IEEE-450 (Ref. 1). The 7 day Frequency is consistent with IEEE-450 (Ref. 1).

This SR is modified by a Note that states the float current requirement is not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. When this float voltage is not maintained LCO 3.8.4 ACTION A is being taken, which provides the necessary and appropriate verifications of the battery condition. Furthermore, the float current limit of 2 amps is established based on the nominal float voltage value and is not directly applicable when this voltage is not maintained.

SR 3.8.6.2 and 3.8.6.5

Optimal long term battery performance is obtained by maintaining a float voltage greater than or equal to the minimum established design limits provided by the battery manufacturer. This limits the formation of lead sulfate and self discharge. The Frequency for cell voltage verification every 31 days for pilot cell and 92 days for each connected cell is consistent with IEEE-450 (Ref. 1).

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.6.3

The limit specified for electrolyte level ensures that the plates suffer no physical damage and maintain adequate electron transfer capability. The Frequency is consistent with IEEE-450 (Ref. 1).

SR 3.8.6.4

This Surveillance verifies that the pilot cell temperature is greater than or equal to the minimum established design limits. Pilot cell electrolyte temperature is maintained above this temperature to assure the battery can provide the required current and voltage to meet the design requirements. Temperatures lower than assumed in battery sizing calculations act to inhibit or reduce battery capacity. The Frequency is consistent with IEEE-450 (Ref. 1).

SR 3.8.6.5

See SR 3.8.6.2.

SR 3.8.6.6

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.6.6; however, only the modified performance discharge test may be used to satisfy the battery service test requirements of SR 3.8.4.3.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.6.6 (continued)

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 1) and IEEE-485 (Ref. 3). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. A modified discharge test is the test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

It may consist of just two rates, for instance the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test must remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.6.6 (continued)

months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-450 (Ref. 1), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is ≥ 10% below the manufacturer's rating. These Frequencies are consistent with the recommendations in IEEE-450 (Ref. 1).

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

REFERENCES

1. IEEE-450-1995.
2. USAR, Section 14.
3. IEEE-485-1983.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Inverters-Operating

BASES

BACKGROUND	The inverters are the preferred source of power for the Reactor Protection Instrument AC Panels because of the stability and reliability they achieve. The function of the inverter is to provide AC electrical power to the Reactor Protection Instrument AC Panels. The inverters can be powered from an internal AC source/rectifier or from the station battery. The station battery provides an uninterruptible power source for the instrumentation and controls for the Reactor Protection System (RPS) and the Engineered Safety Feature Actuation System (ESFAS)(Ref. 1).
APPLICABLE SAFETY ANALYSES	The initial conditions of Design Basis Accident (DBA) and transient analyses in the USAR (Ref. 2) assume Engineered Safety Feature systems are OPERABLE. The inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the RPS and ESFAS instrumentation and controls so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems. The OPERABILITY of the inverters is consistent with the initial assumptions of the accident analyses and is based on meeting the design basis of the unit. This includes maintaining required Reactor Protection Instrument AC Panels OPERABLE during accident conditions in the event of: a. An assumed loss of all offsite AC electrical power; and

BASES

APPLICABLE SAFETY ANALYSES (continued)

b. A worst case single failure.

Inverters satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The inverters ensure the availability of AC electrical power for the systems instrumentation required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Maintaining the required inverters OPERABLE ensures that the redundancy incorporated into the design of the RPS and ESFAS instrumentation and controls is maintained. The inverters ensure an uninterruptible supply of AC electrical power to the Reactor Protection Instrument AC Panels even if the 4 kV Safeguards buses are de-energized.

OPERABLE inverters require the associated Reactor Protection Instrument AC Panel to be powered by the inverter with power supply to the inverter from a 125 VDC station battery. Normally, the power supply is from an internal AC source via rectifier with the station battery available as the uninterruptible power supply.

APPLICABILITY

The inverters are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs; and

b. Adequate core cooling is provided, and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

BASES

APPLICABILITY (continued)

Inverter requirements for MODES 5 and 6 are covered in the Bases for LCO 3.8.8, "Inverters-Shutdown."

ACTIONS

A.1

With a required Reactor Protection Instrument AC inverter inoperable, its associated Reactor Protection Instrument AC Panel may become inoperable until it is re-energized from a safety related alternate source.

For this reason a Note has been included in Condition A requiring the entry into the Conditions and Required Actions of LCO 3.8.9, "Distribution Systems-Operating." This ensures that the Reactor Protection Instrument AC Panel is re-energized within 2 hours.

Required Action A.1 allows 8 hours to fix the inoperable inverter and return it to service. The 8 hour limit is based upon engineering judgment, taking into consideration the time required to repair an inverter and the additional risk to which the unit is exposed because of the inverter inoperability. This has to be balanced against the risk of an immediate shutdown, along with the potential challenges to safety systems such a shutdown might entail. When the Reactor Protection Instrument AC Panel is powered from its alternate source, it is relying upon interruptible AC electrical power sources (offsite and onsite). The uninterruptible inverter source to the Reactor Protection Instrument AC Panel is the preferred source for powering instrumentation trip setpoint devices.

B.1 and B.2

If the inoperable devices or components cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3

BASES

ACTIONS

B.1 and B.2 (continued)

within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and Reactor Protection Instrument AC Panels energized from the inverter. The verification of proper voltage output ensures that the required power is readily available for the instrumentation of the RPS and ESFAS connected to the Reactor Protection Instrument AC Panels. The 7 day Frequency takes into account the redundant capability of the inverters and other indications available in the control room that alert the operator to inverter malfunctions.

REFERENCES

1. USAR, Section 8.
2. USAR, Section 14.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Inverters-Shutdown

BASES

BACKGROUND

A description of the inverters is provided in the Bases for LCO 3.8.7, "Inverters-Operating."

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the inverter to the Reactor Protection Instrumentation AC Panel during MODES 5 and 6 ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is available to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shutdown, the Technical Specification requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

BASES

APPLICABLE SAFETY ANALYSES (continued)

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODES 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on:

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

The Shutdown Technical Specification requirements are designed to ensure that the unit has the capability to mitigate the consequences of certain postulated accidents. Worst case DBA which are analyzed for operating MODES are generally viewed not to be a significant concern during shutdown MODES due to lower energies involved. The Technical Specifications therefore require a lesser complement of electrical equipment to be available during shutdown than is

BASES

APPLICABLE SAFETY ANALYSES (continued)

required during operating MODES. More recent work completed on the potential risks associated with shutdown, however, have found significant risk associated with certain shutdown evolutions. As a result, in addition to the requirements established in the Technical Specifications, the industry has adopted NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management" as an Industry initiative to manage shutdown tasks and associated electrical support to maintain risk at an acceptable low level. This may require the availability of additional equipment beyond that required by the shutdown Technical Specifications.

The inverters satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

At least one Reactor Protection Instrument AC Panel energized by a battery backed inverter provides uninterruptible supply of AC electrical power to at least one Reactor Protection Instrument AC Panel even if the 4 kV safeguards buses are de-energized.

This ensures the availability of sufficient inverter power to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

APPLICABILITY

The inverter required to be OPERABLE in MODES 5 and 6 and during movement of irradiated fuel assemblies provides assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

b. Systems needed to mitigate a fuel handling accident are available;

BASES

APPLICABILITY (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

Inverter requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.7.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4

If the required inverter is inoperable, the remaining OPERABLE Reactor Protection Instrument AC Panel power supplies as required by LCO 3.8.10, "Distribution Systems-Shutdown," may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, or operations with a potential for positive reactivity additions. By the allowance of the option to declare required features inoperable with the associated inverter inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required inverter and to continue this action until restoration is accomplished in order to provide the necessary inverter power to the unit safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverter should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the required inverter is functioning properly with all required circuit breakers closed and Reactor Protection Instrument AC Panel energized from the inverter. The verification of proper voltage output ensures that the required power is readily available for the instrumentation connected to the Reactor Protection Instrument AC Panel. The 7 day Frequency takes into account the reliability of the instrument panel power sources and other indications available in the control room that alert the operator to malfunctions.

REFERENCES

None.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.9 Distribution Systems-Operating

BASES

BACKGROUND

The onsite safeguards AC and DC electrical power distribution systems are divided by train into two redundant and independent electrical power distribution subsystems. The onsite Reactor Protection Instrument AC Distribution System is divided by channels into four separate subsystems (Ref. 1).

Each AC electrical power subsystem consists of a safeguards 4 kV bus and two 480 V buses. These in turn supply power to distribution panels and motor control centers (MCCs). Each safeguards 4 kV bus has two offsite sources of power as well as a dedicated onsite diesel generator (DG) source. Each safeguards 4 kV bus is normally connected to an offsite source. After a loss of this offsite power source, a transfer to the alternate offsite source is accomplished by a load sequencer, initiated by bus undervoltage relays. If all offsite sources are unavailable, the onsite emergency DG supplies power to the safeguards 4 kV bus. Control power for the 4 kV and 480 V bus breakers is supplied from the safeguards DC distribution system. Additional description of the safeguards AC system may be found in the Bases for LCO 3.3.4, "4 kV Safeguards Bus Voltage Instrumentation," and the Bases for LCO 3.8.1, "AC Sources-Operating."

The AC electrical power distribution system for each train includes the safety related buses, MCCs, and distribution panels shown in Table B 3.8.9-1.

The 120 V Reactor Protection Instrument AC Panels are arranged in four load groups and are normally powered from inverters. An alternate power supply for the instrument panels is the inverter bypass transformer powered from the same MCC as the associated inverter. Another alternate power supply is from the unit 208/120

BASES

BACKGROUND (continued)	VAC interruptable panel. Use of these supplies is governed by LCO 3.8.7, "Inverters-Operating." There are two independent 125 VDC electrical power distribution subsystems (one for each train). The 125 VDC safeguards electrical power system consists of two independent and redundant safety related DC safeguards electrical power subsystems (Train A and Train B). The sources for each train are a 125 VDC battery, a battery charger, and all the associated control equipment and interconnecting cabling. The list of the required Reactor Protection Instrument AC and safeguards DC distribution panels is presented in Table B 3.8.9-1.
APPLICABLE SAFETY ANALYSES	The initial conditions of Design Basis Accident (DBA) and transient analyses in the USAR (Ref. 2) assume ESF systems are OPERABLE. The safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems. The OPERABILITY of the safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution systems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining power distribution systems OPERABLE during accident conditions in the event of:

BASES

APPLICABLE SAFETY ANALYSES (continued)

a. An assumed loss of all offsite power; and

b. A worst case single failure.

The distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The required power distribution subsystems listed in Table B 3.8.9-1 ensure the availability of safeguards AC, DC, and Reactor Protection Instrument AC electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA. The safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution subsystems are required to be OPERABLE.

Maintaining the Train A and Train B safeguards AC and DC, and Reactor Protection Instrument AC electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor. This does not preclude redundant safeguards 4 kV buses from being powered from the same offsite path.

OPERABLE AC electrical power distribution subsystems require the associated buses, MCCs, and distribution panels to be energized to their proper voltages. OPERABLE DC electrical power distribution subsystems require the associated panels to be energized to their proper voltage from either the associated battery or charger. OPERABLE Reactor Protection Instrument AC electrical power distribution subsystems require the associated panels to be energized to their proper voltage.

BASES (continued)

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs; and

b. Adequate core cooling is provided, and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

Electrical power distribution subsystem requirements for MODES 5 and 6 are covered in the Bases for LCO 3.8.10, "Distribution Systems-Shutdown."

ACTIONS

A.1 and A.2

With one or more required safeguards AC buses, MCCs, or distribution panels, except Reactor Protection Instrument AC Panels, inoperable, the remaining AC electrical power distribution subsystem is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining power distribution subsystems could result in the minimum required ESF functions not being supported. Therefore, there are two Required Actions that can be taken. Required Action A.1 would allow declaring the associated supported feature(s) powered from the safeguards AC electrical power distribution system inoperable. If Required Action A.1 is used, LCO 3.0.6 would also be entered to verify that no loss of function would exist. If LCO 3.0.6 identifies that a loss of function did exist, Condition E would be entered. Required Action A.2 requires AC buses, MCCs, and distribution panels to be restored to OPERABLE status within 8 hours.

ACTIONS

A.1 and A.2 (continued)

Condition A worst scenario is one train without AC power (i.e., no offsite power to the train and the associated DG inoperable). In this Condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operator's attention be focused on minimizing the potential for loss of power to the remaining train by stabilizing the unit, and on restoring power to the affected train. The 8 hour time limit before requiring a unit shutdown in this Condition is acceptable because of:

a. The potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected train, to the actions associated with taking the unit to shutdown within this time limit; and

b. The potential for an event in conjunction with a single failure of a redundant component in the train with AC power.

B.1 and B.2

With one or more safeguards DC panel inoperable, the remaining safeguards DC electrical power distribution subsystem is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining safeguards DC electrical power distribution subsystem could result in the minimum required ESF functions not being supported. Therefore, there are two Required Actions that can be taken. Required Action B.1 would allow declaring the associated supported feature(s) powered from the safeguards DC panel inoperable. If Required Action B.1 is used, LCO 3.0.6 would also be entered to verify that no loss of function would exist. If LCO 3.0.6 identifies that a loss of function did exist, Condition E would be entered. Required Action B.2 requires the

BASES

ACTIONS

B.1 and B.2 (continued)

DC panels be restored to OPERABLE status within 2 hours by powering the bus from the associated battery, charger, or portable charger.

The worst case scenario is one train without safeguards DC power; potentially with both the battery significantly degraded and the associated charger nonfunctioning. In this situation, the unit is significantly more vulnerable to a complete loss of all DC power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining trains and restoring power to the affected train.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that would be without power. Taking exception to LCO 3.0.2 for components without adequate DC power, which would have Required Action Completion Times shorter than 2 hours, is acceptable because of:

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) while allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous applicable Conditions and Required Actions for components without DC power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected train; and

c. The potential for an event in conjunction with a single failure of a redundant component.

BASES

ACTIONS (continued)

C.1 and C.2

With one Reactor Protection Instrument AC Panel inoperable, the remaining OPERABLE Reactor Protection Instrument AC Panels are capable of supporting the minimum safety functions necessary to shut down the unit and maintain it in the safe shutdown condition. Overall reliability is reduced, however, since an additional single failure could result in the minimum ESF functions not being supported. Therefore, there are two Required Actions that can be taken. Required Action C.1 would allow declaring the associated supported feature(s) powered from the Reactor Protection Instrument AC inoperable. If Required Action C.1 is used, LCO 3.0.6 would also be entered to verify that no loss of function would exist. If LCO 3.0.6 identifies that a loss of function did exist, Condition E would be entered. Required Action C.2 requires the Reactor Protection Instrument AC Panel to be restored to OPERABLE status within 2 hours by powering the panel from the associated inverter, inverter bypass transformer, or interruptable panel.

Condition C represents one Reactor Protection Instrument AC Panel without power. In this situation, the unit is significantly more vulnerable to a complete loss of all noninterruptible power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining instrument panels and restoring power to the affected instrument panel.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that are without adequate instrument AC power. Taking exception to LCO 3.0.2 for components without adequate instrument AC power, that would have the Required Action Completion Times shorter than 2 hours if declared inoperable, is acceptable because of:

BASES

ACTIONS

C.1 and C.2 (continued)

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) and not allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous applicable Conditions and Required Actions for components without adequate instrument AC power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected train; and

c. The potential for an event in conjunction with a single failure of a redundant component.

The 2 hour Completion Time takes into account the importance to safety of restoring the Reactor Protection Instrument AC Panel to OPERABLE status, the redundant capability afforded by the other OPERABLE instrument panels, and the low probability of a DBA occurring during this period.

D.1 and D.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

BASES

ACTIONS (continued)

E.1

With two trains with inoperable distribution subsystems that result in a loss of safety function, adequate core cooling, containment OPERABILITY and other vital functions for DBA mitigation would be compromised. Condition E also addresses two or more Reactor Protection Instrument AC Panels inoperable. If the plant is in this Condition, an immediate plant shutdown in accordance with LCO 3.0.3 is required.

SURVEILLANCE REQUIREMENTS

SR 3.8.9.1

This Surveillance verifies that the required safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution systems, presented in Table B.3.8.9-1, are functioning properly, with the correct circuit breaker and switch alignment. The correct breaker and switch alignment ensures the appropriate separation and independence of the electrical divisions is maintained, and the appropriate voltage is available to each required subsystems. The verification of proper voltage ensures that the required voltage is readily available for motive as well as control functions for critical system loads. Various indications are available to the operators which demonstrate correct voltage for the subsystems. The 7 day Frequency takes into account the redundant capability of the safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. USAR, Section 8.

2. USAR, Section 14.

Table B 3.8.9-1 (page 1 of 1)
Safeguards AC and DC Electrical Power Distribution Systems

TYPE	DISTRIBUTION EQUIPMENT	UNIT 1 TRAIN A AND B	UNIT 2 TRAIN A AND B
Safeguards AC	4 kV Buses	15, 16	25, 26
	480 V Buses	111, 112, 121, 122	211, 212, 221, 222
	Motor Control Centers	1A1, 1A2 1AB1*, 1AB2* 1AC1, 1AC2 1K1, 1K2, 1KA2 1LA1, 1LA2 1M1, 1M2 1MA1*, 1MA2* 1T1*, 1T2* 1TA1, 1TA2 1X1, 1X2	2A1, 2A2 1AB1*, 1AB2* 2AC1, 2AC2 2K1, 2K2, 2KA2 2LA1, 2LA2 2M1, 2M2 1MA1*, 1MA2* 1T1*, 1T2* 2TA1, 2TA2 2X1, 2X2
Safeguards DC	125 VDC Panels	11, 12 15, 16 14*, 19* 17*, 18* 151, 161 152, 162 153, 163 191	21, 22 25, 26 14*, 19* 17*, 18* 27, 28 251, 261 252, 262 253
Reactor Protection Instrument AC	120 VAC Panels	111, 112, 113, 114	211, 212, 213, 214

* Denotes MCC's or Panels that are transferrable between units.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.10 Distribution Systems-Shutdown

BASES

BACKGROUND

A description of the safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution systems is provided in the Bases for LCO 3.8.9, "Distribution Systems-Operating."

In addition to the safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution systems listed in Table B 3.8.9-1, the following are examples of alternate power distribution equipment that may also be used during plant shutdown:

a. 4kV bus ties;

b. 480V alternate feeds;

c. Uninterruptable Panel 117 (217 for Unit 2);

d. Uninterruptable Panel 117 to 217 cross tie; and

e. Service Building DC to Safeguards DC cross tie.

This alternate equipment may be used to maintain reliable power to various plant systems and equipment that are required to be OPERABLE to support shutdown conditions.

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the minimum safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution subsystems during MODES 5 and 6, and during movement of irradiated fuel assemblies ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

BASES

APPLICABLE SAFETY ANALYSES (continued)

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shut down, the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODES 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on:

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

BASES

APPLICABLE SAFETY ANALYSES (continued)

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

The safeguards AC and DC electrical power distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific plant condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system, as presented in Table B 3.8.9-1, necessary to support OPERABILITY of required systems, equipment, and components — all specifically addressed in each LCO and implicitly required via the definition of OPERABILITY. In addition, the alternate equipment described in the Background Section may be used to maintain OPERABILITY of the Electrical Distribution subsystems.

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the unit in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

BASES (continued)

APPLICABILITY

The AC and DC electrical power distribution subsystems required to be OPERABLE in MODES 5 and 6, and during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

b. Systems needed to mitigate a fuel handling accident are available;

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition and refueling condition.

The safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution subsystems requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.9.

ACTIONS

LCO 3.0.3 is not applicable while in MODES 5 and 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Entering LCO 3.0.3 while in MODE 1, 2, 3, or 4 would require the unit to be shutdown unnecessarily.

BASES

ACTIONS (continued)

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5

Although redundant required features may require redundant trains of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem train may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystem LCO's Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6)). Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to not result in reducing core reactivity below the required SDM or refueling boron concentration limit.

Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required safeguards AC and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the unit safety systems.

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Notwithstanding performance of the above conservative Required Actions, a required residual heat removal (RHR) subsystem may be inoperable. In this case, Required Actions A.2.1 through A.2.4 do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the RHR ACTIONS would not be entered. Therefore, Required Action A.2.5 is provided to direct declaring the associated RHR inoperable, which results in taking the appropriate RHR actions.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution subsystems should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power.

SURVEILLANCE REQUIREMENTS

SR 3.8.10.1

This Surveillance verifies that the safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution subsystems are functioning properly, with the required buses and panels energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the capability of the electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

None.

PACKAGE 3.8

ELECTRICAL POWER SYSTEMS

PART C

MARKUP OF PRAIRIE ISLAND CURRENT TECHNICAL SPECIFICATIONS

List of Pages

PRAIRIE ISLAND NUCLEAR GENERATING PLANT UNITS 1 AND 2

Improved Technical Specifications
Conversion Submittal

3.7 AUXILIARY ELECTRICAL SYSTEMS

Applicability [A3.8-01]

~~Applies to the availability of electrical power for the operation of plant auxiliaries.~~

~~Objectives~~

~~To define those conditions of electrical power availability necessary to assure safe reactor operation and continuing availability of engineered safeguards.~~

~~Specification~~

[LCO3.8.1] [LCO3.8.4 LCO3.8.7 LCO3.8.9]

A. ~~A reactor shall not be made or maintained critical nor shall reactor coolant system average temperature exceed 200°F unless all of the following requirements are satisfied for the applicable unit (except as specified in 3.7.B below).~~ MODES 1, 2, 3, and 4 [A3.8-56]

[LCO3.8.1] 1. ~~At least~~ two ~~separate~~ paths from the offsite transmission grid to the 4 kV safeguards distribution system ~~each capable of providing adequate power to minimum safety related equipment,~~ shall be OPERABLE.

[LCO3.8.9] 2. ~~The~~ Train A and B 4 kV safeguards buses ~~15 and 16 (Unit 2 buses: 25 and 26)~~ shall be OPERABLE ~~energized~~. [LR3.8-02]

[LCO3.8.9] 3. ~~The~~ Train A and B 480 V safeguards buses ~~111, 112, 121, and 122 (Unit 2 buses: 211, 212, 221 and 222), and their safeguards motor control centers~~ shall be OPERABLE ~~energized~~. [LR3.8-02]

[LCO3.8.9] 4. Reactor protection instrument AC buses shall be OPERABLE ~~energized: 111, 112, 113 and 114 (Unit 2 buses: 211, 212, 213 and 214)~~. [LR3.8-02]

5. ~~The following unit specific conditions apply:~~

[LCO3.8.1] [LCO3.8.3 COND A]

(a) Unit 1~~: D1 and D2~~ diesel generators are OPERABLE and capable of supplying the onsite 4KV Safeguards Distribution System, and a stored fuel oil supply of ~~51,000~~42,000 gallons ~~is available for the D1 and D2 diesel generators in the Unit 1 interconnected diesel fuel oil storage tanks.~~ If not within limits, restore within 48 hours. [LR3.8-02] [L3.8-12]

[Addressed Elsewhere]

A total fuel supply of 70,000 gallons is available for the D1 and D2 diesel generators and the diesel-driven cooling water pumps in the Unit 1 interconnected diesel fuel oil storage tanks.

A3.8-01

LCO3.8.1 (b) Unit 2~~: D5 and D6~~ diesel generators are OPERABLE and capable of supplying the onsite 4KV Safeguards Distribution System and a stored fuel oil supply of 75,000 gallons ~~is available for D5 and D6 diesel generators in the Unit 2 interconnected diesel fuel oil storage tanks.~~ If not within limits, restore within 48 hours. LR3.8-02

LCO3.8.3 COND A

L3.8-12

LCO3.8.4 6. Both batteries with their associated chargers and both d-c safeguard systems shall be OPERABLE. LR3.8-02

LCO3.8.7 7. ~~No more than one of the Instrument AC Panels 111, 112, 113 and 114 (Unit 2 panels: 211, 212, 213 and 214) shall be powered from Panel 117 (Unit 2 panel: 217) or its associated instrument inverter bypass source~~ Three Reactor Protection Instrument AC Bus inverters shall be OPERABLE.

Add LCOs 3.8.2, 3.8.5, 3.8.6, 3.8.8, and 3.8.10 M3.8-04

LCO3.8.2

LCO 3.8.2 AC SOURCES - SHUTDOWN. This LCO identifies the AC electrical power sources that are required to be OPERABLE during plant SHUTDOWN.

LCO3.8.5

LCO 3.8.5 DC SOURCES - SHUTDOWN. This LCO identifies the DC electrical power sources that are required to be OPERABLE during plant SHUTDOWN.

LCO3.8.6

LCO 3.8.6 BATTERY PARAMETERS. This LCO requires that the battery cell parameters shall be within limits.

LCO3.8.8

LCO 3.8.8 Inverters - SHUTDOWN. This LCO requires one inverter shall be OPERABLE.

LCO3.8.10

LCO 3.8.10 DISTRIBUTION SYSTEMS - SHUTDOWN. This LCO requires necessary portions of the safeguards AC, DC, and reactor protection instrument AC electrical power distribution subsystems to be OPERABLE to support equipment required to be OPERABLE.

A3.8-01

3.7.B. ~~During STARTUP OPERATION or POWER OPERATION, any of the following conditions of inoperability may exist for the times specified, provided STARTUP OPERATION is discontinued until OPERABILITY is restored.~~ If OPERABILITY is not restored within the time specified, place the affected unit(s) in at least ~~HOT SHUTDOWN~~ MODE 3 within the next 6 hours and be in ~~COLD SHUTDOWN~~ MODE 5 within the following 30 hours. A3.8-17

LCO3.8.9 COND D
LCO3.8.1 COND F
LCO3.8.4 COND D
LCO3.8.7 COND B

LCO3.8.1 COND B

1. One diesel generator ~~may be~~ inoperable for 7 days ~~provided (a) the OPERABILITY of the other diesel generator is demonstrated* by~~ performance ~~of~~ surveillance requirement 3.8.1.2 ~~4.6.A.1.e~~ within 24 hours or determine OPERABLE DG is not inoperable due to common cause failure within 24 hours. Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable 4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s). ~~**, (b) all engineered safety features equipment associated with the operable diesel generator is OPERABLE, (c)~~ the two required paths from the grid to the plant 4 kV safeguards distribution system are OPERABLE ~~and (d)~~ the OPERABILITY of the ~~two required~~ paths ~~from the grid~~ shall be verified OPERABLE within 1 hour and ~~at least~~ once per 8 hours thereafter. M3.8-06 L3.8-07 A3.8-10

SR 3.8.1.2

LCO3.8.1 COND A

2. One ~~of the two required~~ path~~s~~ ~~from the grid to the unit 4 kV safeguards distribution system may be~~ inoperable for 7 ~~days provided (a) D1 and D2 (Unit 2: D5 and D6) diesel generators are already operating or are demonstrated to be OPERABLE by sequentially performing surveillance requirement 4.6.A.1.e on each diesel generator within 24 hours and (b)~~ the OPERABLE path ~~fromthe grid~~ shall be verified OPERABLE within 1 hour and ~~at least~~ once per 8 hours thereafter. L3.8-09

LCO3.8.1 COND D

3. One ~~of the two required~~ path~~s~~ ~~from the grid to the unit 4 kV safeguards distribution system~~ and one diesel generator inoperable for 12 hours ~~provided, (a) the OPERABILITY of the other diesel generator is demonstrated* by performance of Surveillance Requirement 4.6.A.1.e within 8 hours **, (b) all engineered safety features equipment associated with the OPERABLE diesel generator is OPERABLE, and (c) the OPERABLE path from the grid shall be verified OPERABLE within 1 hour and at least once per 8 hours thereafter.~~ L3.8-09 A3.8-10

LCO3.8.1 COND C

4. ~~Both of the~~ two ~~required~~ paths ~~from the grid to the unit 4 kV safeguards distribution system may be~~ inoperable for ~~12~~ 24 hours ~~provided the D1 and D2 (Unit 2: D5 and D6) diesel generators are already operating or are demonstrated to be OPERABLE by sequentially performing Surveillance requirement 4.6.A.1.e on each diesel generator within 8 hours.~~ Declare required feature(s) inoperable when its redundant required feature(s) is inoperable, 12 hours from discovery of Condition C concurrent with inoperability of redundant required features.

L3.8-11

L3.8-09

L3.8-07

LCO3.8.1 COND B NOTE

* The OPERABILITY of the other diesel generator need not be demonstrated if the diesel generator inoperability was due to preplanned preventative maintenance or testing.

L3.8-09

~~** This test is required to be completed regardless of when the inoperable diesel generator is restored to OPERABILITY.~~

LCO3.8.1

Add LCO 3.8.1, Condition G

A3.8-13

Two DGs inoperable and one or more paths inoperable OR one DG inoperable and two paths inoperable, enter LCO 3.0.3 immediately.

Add LCO 3.8.1, Condition D, NOTE

A3.8-15

Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," if Condition D is entered with no AC power source to any train.

A3.8-01

3.7.B.5. ~~D1 and D2 (Unit 2: D5 and D6)~~ Two diesel generators ~~may be~~ inoperable for 2 hours ~~provided the~~ two required paths from the grid to the unit 4 kV safeguards distribution system are OPERABLE and the OPERABILITY of the two required paths from the grid are verified OPERABLE within 1 hour.

LCO3.8.1 COND E

LCO3.8.3

Add LCO 3.8.3, Required Action B:
Required DG fuel oil tank with stored fuel oil properties not within limits, Restore the fuel oil tank properties to within limits within 7 days

M3.8-14

Add LCO 3.8.3, Required Action C:
Required Action and associated Completion Time of Condition B not met, isolate the associated DG fuel oil tank immediately.

M3.8-14

Add LCO 3.8.3, Condition D:
Stored DG fuel oil supply for unit 1 < 40,000 gallons, unit 2 < 64,000 gallons OR Required Action and associated Completion Time of Conditions A and C not, declare associated DGs inoperable immediately.

M3.8-14

LR3.8-02

6. One or more 4 kV safeguards AC electrical power distribution subsystem ~~bus (and/or its associated 480 V buses including associated safeguards motor control centers) may be~~ inoperable ~~or not fully energized~~ for 8 hours ~~provided the redundant 4 kV safeguards bus and its associated 480 V safeguards buses are verified OPERABLE and the diesel generator and safeguards equipment associated with the redundant train are OPERABLE.~~ Declare associated required supported feature(s) inoperable immediately.

LCO3.8.9 COND A

L3.8-16

L3.8-09

7. One battery charger ~~may be~~ inoperable, restore the battery charger to OPERABLE status within for 8 hours ~~provided, (a)~~ its associated battery is OPERABLE, ~~(b) its redundant counterpart is verified OPERABLE~~ within 2 hours~~, and (c) the diesel generator and safeguards equipment associated with its counterpart are OPERABLE.~~

LCO3.8.4 COND A

M3.8-18

L3.8-09

A3.8-19

8. One battery ~~may be~~DC safeguards electrical power source inoperable for reasons other than Condition A and B, restore to OPERABLE within ~~for~~ 8 hours ~~provided that the other battery and both battery chargers remain OPERABLE.~~

LCO3.8.4 COND B and C

L3.8-09

9. ~~In addition to the requirements of Specification TS.3.7.A.7 a second inverter supplying Instrument AC Panels 111, 112, 113, and 114 may (Unit 2 panels 211, 212, 213 and 214) be powered from an inverter bypass source for 8 hours.~~

LR3.8-02

TS 3.7-3
REV 110 5/17/94 (overflow)

ITS LCO3.8.7 Cond. A

Add LCO 3.8.7, Condition A:
One required Reactor Protection Instrument AC inverter inoperable, restore the inverter to OPERABLE status within 8 hours. A NOTE requires that entry into applicable Conditions and Required Actions of LCO 3.8.9 if any Reactor Protection Instrument AC Panel is de-energized. A3.8-20

ITS LCO3.8.9 Cond. B, C, and E

Add LCO 3.8.9, Condition C:
One reactor protection instrument AC Panel inoperable, declare associated required supported feature(s) inoperable immediately OR restore to OPERABLE status within 2 hours. M3.8-21

Add LCO 3.8.9, Condition B:
One or more safeguards DC electrical power distribution subsystem inoperable, declare associated required supported feature(s) inoperable immediately OR restore to OPERABLE status within 2 hours. M3.8-21 L3.8-16

Add LCO 3.8.9, Condition E:
Two trains with inoperable distribution subsystems that result in a loss of safety function or two or more Reactor Protection Instrument AC Panels inoperable, enter LCO 3.0.3 immediately. A3.8-22 L3.8-16

TS LCO3.8.3 PPLICABILITY

Add LCO 3.8.3 Applicability
"When the DG(s) is required to be OPERABLE" A3.8-01

A3.8.-01

4.6 PERIODIC TESTING OF EMERGENCY POWER SYSTEM

~~Applicability~~

~~Applies to periodic testing and surveillance requirements of the emergency power system.~~

~~Objective~~

~~To verify that the emergency power sources and equipment are OPERABLE.~~

~~Specification~~

~~The following tests and surveillance shall be performed:~~

A. Diesel Generators

1. At least once each month, for each diesel generator:

SR3.8.1.4 a. Verify the fuel level in the day tank. A3.8-25

SR3.8.3.1 b. Verify the ~~fuel level in the~~ total available fuel oil quantity ~~storage tank~~ greater than or equal to 51,0000 gallons for Unit 1 (greater than or equal to 75,000 gallons for Unit 2).

SR3.8.3.2 c. Deleted Verify fuel oil properties of new and stored fuel oil are tested in accordance with and maintained within the limits of the Diesel Fuel Oil Testing Program. A3.8-39

SR3.8.1.5 d. Verify the fuel oil transfer ~~pump can be started and~~ system operates to transfers fuel oil from the storage tank(s) ~~system~~ to the day tank. A3.8-40

SR3.8.1.3N1 SR3.8.1.2 SR3.8.1.3 SR3.8.1.2N2 e. Verify the diesel generator ~~can~~ start and gradually accelerate. Verify the generator starts and achieves steady state voltage and frequency ~~can be adjusted to~~ 4160 ± 420 volts and 60 ± 1.2 Hz. ~~Subsequently~~, ~~manually~~ synchronize the generator, gradually load to at least 1650 kW (Unit 2: 5100 kW to 5300 kW), and operate for at least 60 minutes. This test should be conducted in consideration of the manufacturer's recommendations regarding engine prelube, warm-up, gradual loading ~~and shutdown procedures where possible.~~ A3.8-51 A3.8-38

TS 4.6.1
REV 113 1/5/95 (overflow)

ITS
SR3.8.1.1

Add SR 3.8.1.1:
Verify correct breaker alignment and indicated power availability for each path every 7 days. M3.8-27

ITS
SR3.8.1.2

Add SR 3.8.1.2 Notes 1 and 3:
1. Performance of SR 3.8.1.6 satisfies this SR. L3.8-28
3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR in consideration of the manufacturer's recommendations. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.6 must be met.

ITS
SR3.8.1.3

L3.8-29

Add SR 3.8.1.3 Notes 2, 3, and 4:
2. Momentary transients outside the load range do not invalidate this test.

3. This Surveillance shall be conducted on only one DG at a time. A3.8-30

4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.6 M3.8-31

4.6.A.2. At least once each 6 months, for each diesel generator:

SR3.8.1.6 a. Verify the diesel generator starts from standby conditions and achieves generator steady state voltage and frequency of 4160 ± 420 volts and 60 ± 1.2 Hz [within 10 seconds] ~~after the start signal~~.

~~b. Manually synchronize the generator, load to at least 1650 kW (Unit 2: 5100 kW to 5300 kW) in less than or equal to 60 seconds and operate for at least one hour.~~ A3.8-51 LR3.8-34

SR3.8.1.6N c. This test should be conducted from standby conditions in consideration of the manufacturer's recommendations regarding engine prelube ~~and shutdown procedures where possible.~~ A3.8-38

3. At least once each ~~18~~24 months: A3.8-35

a. ~~Subject each diesel generator to a thorough inspection in accordance with procedures prepared in consideration of the manufacturer's recommendations for this class of standby service.~~ LR3.8-34

SR3.8.1.10 b. ~~For each unit,~~ simulate or actual ~~a~~ loss of offsite power in conjunction with a safety injection signal, and: L3.8-36

1. Verify de-energization of the emergency buses and load shedding from the emergency buses.

SR3.8.1.10N 2. Verify the diesels start on the auto-start ~~signal~~ and energize the emergency ~~buses~~loads in one minute. This test should be conducted in consideration of the manufacturer's recommendations regarding engine prelube ~~and shutdown procedures where possible~~. M3.8-55 A3.8-38

~~3. During this test, operation of the emergency lighting system shall be ascertained.~~ LR3.8-37

SR3.8.1.9

LR3.8-44

c. ~~For~~ Verify each diesel generator, ~~demonstrate full load carrying capability for an interval of not less than~~ operates for at least 24 hours, of which at least 2 hours are at a load equal to ~~103 to 110 percent of the continuous rating of the emergency diesel generator (i.e.,~~ 2832 to 3000 kW [Unit 2: 5562 to 5940 kW]), and the remainder of the 24 hours are at a load greater than or equal to ~~90 percent of its continuous rating (i.e.,~~ 2475 kW [Unit 2: 4860 kW]).

SR3.8.1.9N

Verify the generator voltage and frequency to be 4160 $\pm$ 420 volts and 60 $\pm$ 1.2 Hz. Momentary transients outside the load ranges do not invalidate this test.

SR3.8.1.7

d. Verify the capability of each generator to reject a load of at least 650 kW (Unit 2: 860 kW) without tripping.

~~e. For each unit,~~ simulate or actual ~~a~~ safety injection signal and verify that the diesel generator system trips, except ~~those~~ for engine overspeed, ground fault, and generator differential current (Unit 2: except those for engine overspeed and generator differential current), are automatically bypassed.

SR3.8.1.8

L3.8-36

Add ITS Shutdown Surveillances 3.8.2, 3.8.5, 3.8.6, 3.8.8, and 3.8.10.

SR3.8.2.1

M3.8-41

SR 3.8.2.1 AC sources required to be OPERABLE.

ITS SR3.8.5.1

SR 3.8.5.1 verify the power sources can supply loads for associated equipment.

ITS SR3.8.6

SR 3.8.6.1 verifies battery float voltage.
SR 3.8.6.5 verifies battery connected cell voltage.
SR 3.8.6.6 verifies battery capacity.

ITS SR3.8.8.1

SR 3.8.8.1 verifies correct inverter voltage and alignment.

ITS SR3.8.10.1

SR 3.8.10.1 verifies correct breaker alignment.

ITS SR3.8.9.1

M3.8-42

Add SR 3.8.9.1:
Verify correct breaker and switch alignments and voltage to safeguards AC, DC and Reactor Protection Instrument AC electrical power distribution subsystems within 7 days.

A3.8-01

B. Station Batteries

SR3.8.6.2 | SR3.8.6.4 | LR3.8-43 | A3.8-53

~~1.~~ Verify Each battery ~~shall be tested~~ each month. ~~Tests shall include measuring~~ voltage of each cell ~~to the nearest hundredth volt,~~ and measuring the temperature ~~and density~~ of a pilot cell in each battery.

SR3.8.4.1 | M3.8-52

Verify battery terminal voltage is greater than minimum float voltage recommended by the battery manufacturer.

SR3.8.6.3 | LR3.8-43 | M3.8-50

2. ~~The following additional measurements shall be made~~ Verify every ~~three~~ months~~: the density and height of electrolyte in every cell, the amount~~ level of water ~~added to~~ each cell~~, and the temperature of each fifth cell.~~

LR3.8-43 | A3.8-54

3. ~~All measurements shall be recorded and compared with previous data to detect signs of deterioration or need of equalization charge according to the manufacturer's recommendation.~~

SR3.8.4.3 Notes 1 and 2 | LR3.8-45

4. The batteries shall be subjected to a modified performance test in SR 3.8.6.6 may be performed in lieu of the service test in SR 3.8.4.3. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ~~discharge during the first refueling and once every five years thereafter Battery voltage shall be monitored as a function of time to establish that the battery performs as expected during heavy discharge and that all electrical connections are tight.~~

L3.8-46

5. ~~Integrity of Station Battery fuses shall be checked once each day when the battery charger is running.~~

SR3.8.4.2 | M3.8-47

Add SR 3.8.4.2:
Verify each battery charger supplies a load equal to the manufacturer's rating or verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state every 24 months.

SR3.8.4.3 | M3.8-48

Add SR 3.8.4.3:
Verify battery capacity is adequate to supply and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test every 24 months.

A3.8-01

Addressed elsewhere

~~C. Pressurizer Heater Emergency Power Supply~~

~~The emergency pressurizer heater supply shall be demonstrated OPERABLE at least once every 18 months by transferring Backup Heater Group "B" from its normal bus to its safeguards bus and energizing the heaters.~~

SR3.8.7.1

Add SR 3.8.7.1:
Verify correct inverter voltage and alignment to required Reactor Protection Instrument AC Panels every 7 days.

M3.8-49

PACKAGE 3.8

ELECTRICAL POWER SYSTEMS

PART D

DISCUSSION OF CHANGES (DOC)

to

PRAIRIE ISLAND CURRENT TECHNICAL SPECIFICATIONS

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
UNITS 1 AND 2

Improved Technical Specifications
Conversion Submittal

Part D

PACKAGE 3.8

ELECTRICAL POWER SYSTEMS

DISCUSSION OF CHANGES TO CURRENT TECHNICAL SPECIFICATIONS

The proposed changes to PI Operating License Appendix A, TS are discussed below and the specific wording changes are shown in Parts B, C and E.

For ease of review, all package parts and discussions are organized according to the proposed PI ITS Table of Contents.

NSHD category	Change number 3.8-	Discussion Of Change
A	01	CTS 3.7 and 4.6 throughout. The CTS includes Applicability and Objective Statements at the beginning of each TS Section. For the most part, these statements are vague, provide information that is irrelevant, and not consistent with ISTS format or standard wording. These general CTS statements do not establish any regulatory requirements; therefore the Applicability and Objective statements have been revised to comply with the ISTS format and wording. All reformatting, renumbering, and editorial rewording is in accordance with the Westinghouse Standard Technical Specifications, NUREG-1431. During the development certain wording preferences, Plant terminology, system names, or English language conventions were adopted. As a result, the Technical Specifications (TS) should be more readily readable, and

NSHD category	Change number 3.8-	Discussion Of Change
A	01	(continued) therefore understandable, by plant operators and other users. During the reformatting, renumbering, and rewording process, no technical changes (either actual or interpretational) to the TS were made unless they were identified and justified. These changes are considered administrative changes since they do not change or delete any technical requirements.
LR	02	3.7.A. CTS 3.7.A.2, 3.7.A.3, 3.7.A.4, 3.7.A.5, 3.7.A.6, 3.7.A.7, 3.7.B.6 and 3.7.B.9 The CTS contains various information that is not incorporated into the ITS because it does not meet the criteria in 10 CFR 50.36(c)(2)(ii). Therefore the following information is being relocated either to the ITS Bases or a Licensee Controlled Document: CTS 3.7.A.2 specifically identifies buses 15 and 16 (Unit 2 buses 25 and 26) for the 4kV safeguards buses. This information is currently discussed in detail in the USAR and also discussed in the ITS Bases 3.8.9. CTS 3.7.A.3 specifically states in part, "... buses 111, 112, 121, and 122 (Unit 2 busses: 211, 212, 221, and 222), and their safeguards motor control center ... ." The identification of the specific buses is important and is discussed in the USAR as well as the ITS Bases 3.8.9. CTS 3.7.A.4 again identifies specific buses 111, 112, 113, and 114 (Unit 2 buses: 211, 212, 213, and 214). This information is discussed in the USAR as well as the ITS Bases 3.8.9.

NSHD category	Change number 3.8-	Discussion Of Change
LR	02	(continued)

CTS 3.7.A.5.a provides additional information about D1 and D2 diesel generator in Unit 1 such as the fuel tanks are interconnected. This information is discussed in the USAR as well as being relocated to the ITS Bases 3.8.3. CTS 3.7.A.5.b also provides information that the Unit 2 diesel generator fuel tanks are interconnected. This information is also being relocated to the ITS Bases 3.8.3.

CTS 3.7.A.7 states, "No more than one of the Instrument AC Panels 111, 112, 113, and 114 (Unit 2 panels: 211, 212, 213, and 214) shall be powered from Panel 117 (Unit 2 panel: 217) or its associated instrument inverter bypass source." This information is being relocated to a Licensee Controlled Document such as the TRM or appropriate plant procedures.

CTS 3.7.B.6 provides additional information concerning the associated 480 V bus including the associated motor control center. This information is being relocated to the ITS Bases. In addition, CTS 3.7.B.6 provides descriptive information that is being relocated to the ITS Bases 3.8.9.

CTS 3.7.B.9 states that in addition to the requirements of Specification 3.7.A.7, a second inverter supplying instrument AC panels 111, 112, 113, and 114 (Unit 2 panels 211, 212, 213, and 214) may be powered from an inverter bypass source for 8 hours. This information does not meet the NRC criteria for inclusion into the ITS and therefore is being relocated to the TRM or plant procedures.

These changes are consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
	03	Not used.
M	04	NEW SPECIFICATIONS. ITS LCOs 3.8.2, 3.8.5, 3.8.6, 3.8.8, and 3.8.10 are being added. All these new specifications are associated with Shutdown and battery cell parameter Specifications which PI does not have in the CTS. The addition of these ITS requirements constitutes a more restrictive change since these additional LCOs, Applicability, Conditions, Required Actions, Completion Times, and Surveillance Requirements are not currently in the CTS. This change is consistent with NUREG-1431.
	05	Not used.
M	06	CTS 3.7.B.1. Add ITS LCO 3.8.1, Required Action B.3.1 which states, "determine OPERABLE DG is not inoperable due to common cause failure" within "24 hours". This is a new requirement that was not in the CTS. Since the Required Action B.3.1 requires new and additional actions by plant personnel to make the determination of a potential common mode failure, this change is considered to be more restrictive in nature. This change is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
L	07	CTS 3.7.B.1, 3.7.B.4 and 3.7.B.6.1. CTS 3.7.B.1 in part states, "(b) all engineered safety features equipment associated with the operable diesel generator is OPERABLE, "This statement is being replaced with a new Required Action which states; "Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable," and an associated Completion Time of, "4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)." The ITS LCO 3.8.1, Required Action provides two relaxations:

1) Rather than a plant shutdown requirement, the ITS requires that the feature(s) supported by the inoperable diesel generator be declared inoperable if its redundant counterpart is inoperable. This provides for actions appropriate to the actual inoperabilities which may avoid an immediate shutdown and the risks associated with a plant shutdown, For example, if the "B" diesel generator is inoperable in conjunction with the "A" hydrogen recombiner, CTS Actions would require a shutdown to commence immediately, while ITS would allow entering Actions for both hydrogen recombiners being inoperable. Not requiring a unit shutdown is acceptable since Required Action B is intended to address the loss of safety function in the event of a loss of offsite power. These features are designed with redundant safety related trains. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable diesel generator. In this Condition, the remaining OPERABLE diesel generator is adequate to supply electrical power to

NSHD category	Change number 3.8-	Discussion Of Change
L	07	(continued) the onsite class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function may not have been lost. 2. The CTS does not provide a specific Completion Time for ensuring that the subject SSCs are OPERABLE; therefore, it is intended to mean as soon as practical. The ITS, however, allows 4 hours to commence the specified action. This extension provides additional time to restore either the inoperable diesel generator or the inoperable feature, and is considered a reasonable time to effect repairs prior to requiring a forced shutdown of the unit. This extension is acceptable since it takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC Sources, a reasonable time for repairs, and the low probability of a DBA occurring during the period. The justification for CTS 3.7.B.4 is the same as above except the time is changed from 4 hours to 12 hours. Reference DOC 3.8.L-09 for additional information. This change is consistent with the philosophy of NUREG-1431.
	08	Not used.

NSHD category	Change number 3.8-	Discussion Of Change
L	09	CTS 3.7.B.2, 3, 4, 5, 6, 7 **, and 8**. CTS 3.7.B.2 requires that if a path is inoperable, the associated DG(s) either are already operating or are demonstrated to be OPERABLE by sequentially performing surveillance requirement 4.6.A.1.e on each DG within 24 hours. CTS SR 4.6.A.1.e is the equivalent to PI ITS SR 3.8.1.2. The ITS requires, for the same condition, the performance of SR 3.8.1.1 which verifies that the correct breaker alignment and indicated power is available for the OPERABLE path. There is no requirement to start the DGs, thereby minimizing starting, operating, stopping, and over testing of the DGs. The performance of ITS SR 3.8.1.1 ensures a highly reliable power source remains with one path inoperable. This is considered to be a less restrictive change since the ITS does not require the DGs to be tested and only requires verification of the other path. This change is consistent with NUREG-1431. CTS 3.7.B.3 requires that with one path and one DG inoperable, that the OPERABILITY of the other DG be demonstrated by the performance of CTS SR 4.6.A.1.e within 8 hours. CTS 4.6.A.1.e is the equivalent to PI ITS 3.8.1.2. The ITS only requires, for the same Condition, that either the path or DG be restored to OPERABLE status within 12 hours. While in this plant condition (ITS Condition D) and the inoperable path is restored to OPERABLE status, and the DG is still inoperable, then ITS Condition B is applicable. ITS Condition B provides for the option to either verify the paths are OPERABLE and declare the supported feature(s) of the inoperable DG inoperable and determine that there is not a common failure OR

NSHD category	Change number 3.8-	Discussion Of Change
L	09	(continued)

perform SR 3.8.1.2 (CTS 4.6.A.1.e) within 24 hours. This is considered to be a less restrictive change since the ITS provides several options thus not only requiring the performance of the SR. In addition, the ITS allows 24 hours to perform the SR, not 12 hours as in the CTS. This change is consistent with NUGRE-1431.

CTS 3.7.B.4 requires that if two paths are inoperable, that both unit DGs are either running or are demonstrated to be OPERABLE by sequentially performing SR 4.6.A.1.e on each DG within 8 hours. ITS Condition C requires that the feature(s) be declared inoperable when its redundant required feature(s) are inoperable and to restore the path to OPERABLE status within 24 hours. The ITS does not require the DGs to be tested; therefore, this change is considered to be less restrictive. It is assumed that since they have passed their last SR and are not known otherwise to be inoperable, that they are in fact considered to be OPERABLE. With both of the required paths inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. This change is consistent with NUREG-1431.

CTS ** states that the performance of CTS SR 4.6.A.1.e (PI ITS 3.8.2) is required to be completed regardless of when the inoperable DG is restored to OPERABLE. This requirement does not exist in the ITS. If the SR is not

NSHD category	Change number 3.8-	Discussion Of Change
L	09	(continued)

due to be performed and not being used to demonstrate OPERABILITY of the DG, then it does not have to be completed once started. This is considered to be a less restrictive change and consistent with NUREG-1431.

CTS 3.7.B.6 requires that when one or more 4 kV safeguards AC electrical power distribution subsystems is inoperable that the 4 kV safeguards bus and its associated 480 V safeguards buses are verified to be OPERABLE and the DGs and safeguards equipment associated with the redundant train are OPERABLE. ITS 3.8.9 provides an option to either declare the associated required supported feature(s) inoperable or restore the safeguards AC electrical power distribution subsystem to OPERABLE status within 8 hours. This is considered to be a less restrictive change since the ITS provides an option. In addition, the ITS does not require the DGs to be verified to be OPERABLE. This change is consistent with NUREG-1431.

CTS 3.7.B.7 requires that with one battery charger inoperable, the DG and safeguards equipment associated with its counterpart are OPERABLE. The ITS only requires verification within 2 hours that the associated battery is OPERABLE and that the charger OPERABILITY be restored within 8 hours. The ITS does not require verification of OPERABILITY of the DG or safeguards equipment associated with the other battery. Therefore, this change is considered to be less restrictive and consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
L	09	(continued)

CTS 3.7.B.7 states that one battery charger may be inoperable for 8 hours provided its redundant counterpart is verified OPERABLE. The ITS does not contain this requirement. It is assumed that the redundant counterpart is OPERABLE if it is known to be able to meet its intended safety function, passed its last surveillance test, and the surveillance test is current. Deleting this requirement is a less restrictive change and consistent with NUREG-1431.

CTS 3.7.B.8 states one battery may be inoperable for 8 hours provided that the other battery and both battery chargers remain OPERABLE. The ITS only requires that the DC safeguards subsystem be restored to OPERABLE status. There is no requirement that both chargers and the other battery be OPERABLE. If the other battery or charger(s) become inoperable while in this Condition, the ITS provides other specific Required Actions and Completion Times to ensure continued safe operation or possible shutdown while in this degraded condition. This is considered to be a less restrictive change consistent with NUREG-1431.

In conclusion, it is the philosophy of NUREG-1431, that SSCs are considered to be OPERABLE unless it is known that they will not perform their intended function when required, a surveillance was missed or failed, or they are considered inoperable for any other reason. Therefore, all the above CTS requirements are being deleted. This is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
A	10	CTS 3.7.B.1 and 3.7.B.3. The CTS requires, "all engineered safety features equipment associated with the OPERABLE diesel generator is OPERABLE". This statement is being deleted since it is assumed that the subject equipment is OPERABLE unless it is known that they will not perform their intended function when required, a surveillance is missed or not passed, or they are considered inoperable for any other reason. In addition, LCO 3.0.6 requires that supported systems of the inoperable DG be evaluated for OPERABILITY and compared to the opposite train to ensure no loss of function would exist. This is consistent with NUREG-1431.
L	11	CTS 3.7.B.4. The CTS requires that two required paths from the grid to the 4 kV safeguards distribution system may be inoperable for 12 hours. The 12 hours has been extended to 24 hours consistent with the ISTS. Twenty four hours is acceptable since, with both required offsite circuits inoperable, sufficient onsite AC Sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. A simultaneous loss of offsite AC Source, a LOCA, and a worst case single failure were postulated as a part of a design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria. This change is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
L	12	CTS 3.7.A.5. CTS 3.7.A.5 currently contains fuel oil quantities for both Unit 1 and Unit 2 DGs. During the ITS conversion, new calculations for Unit 1 DG were performed based on the DG consumption rate while loaded in accordance with the USAR, the CTS TS requirement of 51,000 gallons is actually 42,000 gallons. Therefore, the ITS will reflect the 42,000 gallon fuel oil limit for Unit 1 DGs. In addition, in the event the fuel oil quantity falls below the values in the CTS, the DGs are declared inoperable. The CTS allows two DGs to be inoperable for 2 hours. If at the end of the two hours, and the DGs are still inoperable due to low fuel oil quantity, the unit must shutdown. The ITS allows 48 hours to restore the fuel oil to within limits. These changes are considered to be a less restrictive change since the CTS Unit 1 fuel oil limit has changed to 42,000 gallons and the ITS allows 48 hours to replenish the fuel oil prior to declaring the DGs inoperable and a possible unit shutdown. This change is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
A	13	NEW Specification Requirement. CTS does not have a specific condition or action with 3 or more electrical sources are inoperable. In this case, the plant would be in a condition not described by the CTS. Therefore current operating practice would be to enter LCO 3.0.3. ITS LCO 3.8.1 has added Condition G which directs entry into ITS LCO 3.0.3 if: 1) two DGs are inoperable and one or more paths are inoperable; or 2) one DG is inoperable with two or more paths inoperable. This avoids confusion as to the proper Action when multiple Conditions can be entered for multiple inoperabilities. Since this Action results in the same Action as intended by the CTS and is consistent with current operational practices, this change is considered to be administrative in nature and consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
M	14	New Specification. ITS LCO 3.8.3, Conditions B, C and D for the Diesel Fuel Oil have been added to the CTS requirements. ITS Condition B was added requiring the fuel oil properties of the stored fuel oil be tested every 7 days to be within the limits of the Diesel Fuel Oil Testing Program. CTS 4.6.A.1 requires testing of the stored diesel fuel oil on a monthly basis. The increase in frequency constitutes a more restrictive change and is consistent with NUREG-1431. ITS Condition C has been added requiring that if the DG stored fuel oil cannot be restored to within limits within 7 days, immediately isolate the subject storage tank. This is a new action which is not contained in the CTS. The addition of this Condition constitutes a more restrictive change. ITS Condition D has been added requiring that if the stored fuel oil falls below the analyzed fuel oil needed to support the PI safety analysis, the DGs are to be declared inoperable. This Condition is not included in the ITS and places a more restrictive condition on the plant. Incorporating these ITS requirements constitutes a more restrictive change since these additional Conditions, Required Actions, or Completion Times that are not currently in the CTS and requires additional plant personnel actions. This change is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
A	15	ITS LCO 3.8.1, Condition D and ITS LCO 3.8.7, Condition A have been modified by a Note requiring entry into applicable Conditions and Required Actions of ITS LCO 3.8.9 and LCO 3.8.10 (Distribution Systems) if one required train or subsystem is de-energized. The Note is necessary because power sources (AC, DC, and inverters) are considered a support system to the Distribution System; therefore, ITS LCO 3.0.6 would allow taking Actions for the AC Sources only. However, in the case of an inoperable electrical power source such that a distribution system was de-energized, additional Actions may be required to assure continued safe operation. Rather than specify those additional Actions in the sources Specifications, direction is provided to apply the Actions of the supported Distribution System. This is an administrative change with no impact on safety because the new requirement is consistent with a reasonable interpretation of the CTS.

NSHD category	Change number 3.8-	Discussion Of Change
L	16	CTS 3.7.B.6. CTS 3.7.B.6 allows restoration times for one 4 kV safeguards bus inoperable. ITS LCO 3.8.9, Conditions A and B, allow one "or more" electrical power distributions systems to be inoperable for the same times, respectively. Concurrently, however, ITS LCO 3.8.9 Condition E is also added to require that if two or more Reactor Protection Instrument AC Panels are inoperable, resulting in a loss of function, enter ITS 3.0.3 immediately. The combination of the "or more" addition to ITS LCO 3.8.9 Conditions A and C, and the addition of Condition E, along with ITS LCO 3.0.6, Safety Function Determination Program, ensure that with the loss of any electrical power distribution system, no loss of function will occur without the appropriate action. Therefore, this less restrictive change will have a negligible impact on safety.
A	17	CTS 3.7.B. CTS states that "any of the following conditions of inoperability may exist ..." This requirement prevents two or more of the listed conditions from existing at the same time. The limitation that only one condition of inoperability may exist is not explicitly stated in ISTS. In ISTS, these conditions may be in more than one specification. However, in the NUREG-1431 format, the SFDP exists to provide a mechanism to assure that entry into multiple TS Conditions will not result in loss of safety function. Thus, the SFDP limits these conditions from simultaneous existence when there is a loss of safety function. The Maintenance Rule will also assure that multiple equipment inoperabilities are evaluated for reduction of plant safety. Since the ITS includes provisions to address this clause, there is no net change in plant safety and this is an administrative change.

NSHD category	Change number 3.8-	Discussion Of Change
M	18	CTS 3.7.B.7. CTS 3.7.B.7 states that one battery charger may be inoperable for 8 hours provided its associated battery is OPERABLE; however, the CTS does not provide a specific time for the verification of the associated battery OPERABILITY. ITS 3.8.4, Required Action A.1 also requires verification that the associated battery is OPERABLE, and provides a Completion Time of 2 hours. The addition of 2 hours is considered to be a more restrictive change since it is a new requirement not currently in the CTS. This change requires additional actions and monitoring to be performed by the plant staff. This change is consistent with NUREG-1431.
A	19	CTS 3.7.B.8. Add ITS LCO 3.8.4 Condition C stating with one DC safeguards electrical power source inoperable for reasons other than Conditions A or B, restore DC safeguards electrical power source to OPERABLE status within 8 hours. This requirement is specifically being added; however, this requirement is implied and consistent with the CTS and current operating practices. This change only provides clarification and is consistent with the intent of NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
A	20	New Specification. ITS LCO 3.8.7, Condition A has been added to the CTS. This Condition requires that when one required reactor protection instrument AC Panel inverter is inoperable, restore the inverter to OPERABLE status within 8 hours. The 8 hour restoration time is consistent with CTS 3.7.B.9. The Note requires entry into applicable Conditions and Required Actions of LCO 3.8.9 with any instrument AC Panel de-energized. This change is considered to be administrative since it is consistent with the intent of the CTS and NUREG-1431.
M	21	New requirements. Add LCO 3.8.9, Conditions B and C. Condition B states that with one or more safeguards DC electrical power distribution subsystems inoperable, declare associated required supported feature(s) inoperable immediately or restore to OPERABLE status within 2 hours. Condition C states that with one reactor protection instrument AC panel inoperable, declare associated required supported feature(s) inoperable or restore to OPERABLE status within 2 hours. The 2 hours Completion Time takes into account the importance of safety or restoring the equipment to OPERABLE status, the redundant capability afforded by the other OERABLE equipment, and the low probability of a DBA occurring during this period. These new requirements and Completion Times represent more restrictive changes. These changes are consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
A	22	New Specification. LCO 3.8.9, Condition E has been added stating that with two trains with inoperable distribution subsystems that result in a loss of safety function, or two or more Reactor Protection Instrument AC Panels inoperable, enter LCO 3.0.3 immediately. Although not specifically stated as a Condition in the CTS, current operating practices would require entry into LCO 3.0.3 since there would not be any specific Action to enter. In other words, the rules of usage for the CTS would require LCO 3.0.3 entry. Specifically stating this Action in the ITS only provides clarification and does not add any requirements or Actions. This change is considered to be administrative and consistent with NUREG-1431.
	23	Not used.
	24	Not used.

NSHD category	Change number 3.8-	Discussion Of Change
A	25	CTS 4.6.A.1.b. CTS 4.6.A.1.b requires that the "fuel level in the" fuel oil storage tank be verified at least once each month. ITS SR 3.8.3.1 requires verification of the total available fuel oil quantity. Since the fuel oil supply at PI comprises a system of multiple interconnected tanks, the level in any individual tank is not relevant. This change provides a more accurate description of the PI design and current operating practices. This change is considered to be Administrative and consistent with guidance of NUREG-1431. In addition, the diesel fuel from the fuel storage tank is to be verified to be within limits specified in Table 1 of ASTM D975-77 when checked for viscosity, water, and sediment. These requirements are being relocated to the Diesel Fuel Oil Testing Program and other Licensee Controlled Documents. This is consistent with NUREG-1431.
	26	Not used.
M	27	New SR. The ITS adds SR 3.8.1.1 which verifies correct breaker alignment and indicated power availability for each qualified path every 7 days. This SR is not required by the CTS. Since this SR adds specific actions and an associated Frequency, this is a more restrictive change. This change is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
L	28	CTS 4.6.A.1.e. ITS SR 3.8.1.2 Notes 1 and 3 are added in accordance with NUREG-1431. Note 1 allows credit to be taken for the performance of SR 3.8.1.6 which encompasses SR 3.8.1.2, only with a Frequency of 184 days. Note 3 allows a modified DG start involving idling and gradual acceleration to synchronous speed to satisfy SR 3.8.1.2. The CTS does not allow the performance of a modified start test to satisfy SR 3.8.1.2; therefore, the DG would be tested again. This would result in excessive testing and operation of the DGs which is contrary to NRC, industry, and manufacturer's efforts to reduce unnecessary testing of SSCs. This change is considered to be less restrictive and consistent with NUREG-1431.
L	29	CTS 4.6.A.1.e. ITS SR 3.8.1.3 Note 2 was added which states that a momentary transient outside the load range does not invalidate the test. Momentary transients may occur for various reasons during loading, unloading, and steady state operation of the DG. However, these transients are quickly restored to within the limits and do not reflect an inability of the DG system to fulfill its function. Therefore, these transients should not be considered as a failure of the Surveillance. This change is considered to be less restrictive and consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
A	30	CTS 4.6.A.1.e. ITS SR 3.8.1.3 Note 3 was added which states that this Surveillance shall be conducted on only one DG at a time. This is a clarification as to how the testing should be performed. Since this is consistent with how PI currently conducts this testing, this is considered to be an administrative change which is consistent with NUREG-1431.
M	31	CTS 4.6.A.1.e. ITS SR 3.8.1.3 added Note 4 which states that this SR shall be preceded by and immediately following, without shutdown, a successful performance of SR 3.8.1.2 or 3.8.1.6. The CTS requires SR 4.6.A.1.e (PI ITS SR 3.8.1.3) to be performed on a monthly basis, however the CTS does not require SR 4.6.A.1.e to be preceded by, and immediately following without shutdown, a successful performance of an additional DG SR (PI ITS SR 3.8.1.2 or 3.8.1.6). The ITS however, does impose this limitation on the DG load test which is considered to be a more restrictive change. This change is consistent with NUREG-1431.
	32	Not used.
	33	Not used.

NSHD category	Change number 3.8-	Discussion Of Change
LR	34	CTS 4.6.A.2.b and 4.6.A.3.a. CTS 4.6.A.2.b requires that the DG be manually synchronized and loaded to at least 1650 kW (Unit 2: 5100 kW to 5300 kW) in less than or equal to 60 seconds and operate for at least one hour once every 6 months. The ITS does not require either manual loading of the generator nor bringing the DG to load within 60 seconds. The 60 second requirement is PI CTS and is therefore being relocated to the TRM or other Licensee Controlled Document. Reference DOC 3.8.A-51 for manual loading the generator. CTS 4.6.A.3.a requires that every 18 months that each diesel generator be thoroughly inspected in accordance with procedures prepared in consideration of the manufacturer's recommendations for this class of standby service. The ITS does not incorporate this requirement nor does it meet the NRC Criteria to be included in the Technical Specifications. Therefore, this requirement is being relocated to the TRM or other Licensee Controlled Document. These changes are consistent with NUREG-1431.
A	35	CTS 4.6.A.3. PI is on a 24 month cycle. All references to a 12 month cycle in the CTS as well as the NUREG-1431 have been changed to reflect the 24 month cycle. The NRC has approved the PI submittal for fuel cycle extension to 24 months. Therefore, this is considered to be an administrative change.

NSHD category	Change number 3.8-	Discussion Of Change
L	36	CTS 4.6.A.3.b and e. CTS 4.6.A.3.b and e are revised to add the word "actual" in reference to the test signals used to actuate the DGs. The CTS wording "simulate" does not allow for an actual signal to be applied in meeting the Specification. The revised wording will allow the plant to take credit for an actual signal to initiate the protective function being tested, as well as a simulated signal. Therefore, this change is less restrictive. This clarification is consistent with NUREG-1431.
LR	37	CTS 4.6.A.3.b.3. CTS 4.6.A.3.b.3 requires that during the loss of offsite power in conjunction with a SI signal test, that operation of the emergency lighting system shall be ascertained. This requirement is not in the ITS since it does not meet the NRC Criteria for inclusion in the Technical Specifications. This requirement will be relocated to the TRM or other Licensee Controlled Documents. This change is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
A	38	CTS 4.6.A.1.e, 4.6.A.2.c, and 4.6.A.3.b.2. Various places in the CTS, it is stated that manufacturer's recommendations regarding engine prelube and "shutdown procedures where possible" are to be used for conducting various DG SRs. This statement does not provide any pertinent information nor does it meet any of the NRC criteria for inclusion in the ITS. PI procedures for DG testing are consistent with the guidance provided by the manufacturer, therefore, this statement can be deleted. This is considered to be an Administrative change consistent with the philosophy of NUREG-1431.
A	39	CTS 4.6.A.1.c. ITS SR 3.8.3.2 has added a new requirement to verify the fuel oil properties of new and stored fuel oil are tested and maintained within the limits of the PI Diesel Fuel Oil Testing Program. Adding this requirement is consistent with the current operating practices and considered to be an administrative change. This change is consistent with NUREG-1431.
A	40	CTS 4.6.A.1.d. CTS 4.6.A.1.d requires verification that " ... the fuel oil transfer pump can be started and transfers ... ." PI ITS SR 3.8.1.5 revises this statement by replacing the phrase "pump can be started" with "system operates". In order for the system to operate, the pump must be operating and therefore must have been started. This change is editorial in nature, but provides a more accurate description and intent for the fuel oil transfer system. This change is Administrative and is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
M	41	New SRs. The CTS does not have specific shutdown Technical Specifications. In adopting the ITS, PI also had to accept the ITS LCOs 3.8.2, 3.8.5, 3.8.6, 3.8.8, and 3.8.10. PI did modify the subject LCOs to be applicable to PI. Accepting these new requirements resulted in additional requirements, actions, and manpower thus, being considered to be a more restrictive change consistent with NUREG-1431.
M	42	New SR. ITS SR 3.8.9.1 and 3.8.10.1 have been added. SR 3.8.9.1 requires verification of the correct breaker alignments and voltage to safeguards AC, DC, and reactor protection instrument AC electrical power distribution subsystems within 7 days. SR 3.8.10.1 also requires breaker alignment verification. Since this is a new requirement and does require additional operator action, this change is considered to be more restrictive. This change is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
LR	43	CTS 4.6.B.1, 2, and 3. The CTS contains the following information that does not meet the criteria of 10 CFR 50.36 (c)(2)(ii) for inclusion into the ITS: CTS 4.6.B.1 states in part that "Tests shall include measuring voltage of each cell to the nearest hundredth volt, and measuring the temperature and density of a pilot cell in each battery." The requirement to measure each cell to the nearest hundredth volt and the density of each cell does not meet the NRC criteria for inclusion into the ITS; therefore, it will be relocated to a Licensee Controlled Document. CTS 4.6.B.2 states, "The following additional measurements shall be made every three months: the density and height of electrolyte in every cell, the amount of water added to each cell, and the temperature of each fifth cell." The requirement to verify water level of each cell is reworded and retained in PI ITS SR 3.8.6.3. The rest of the CTS SR is being relocated to a Licensee Controlled Document since it does not meet the NRC criteria for inclusion into the ITS. CTS 4.6.B.3 states, "All measurements shall be recorded and compared with previous data to detect signs of deterioration or need of equalization charge according to the manufacturer's recommendations." This information will be relocated to a Licensee Controlled Document since it does not meet the NRC criteria for inclusion into the ITS.

NSHD category	Change number 3.8-	Discussion Of Change
LR	44	CTS 4.6.A.3.c. CTS 4.6.A.3.c contains various information about the DG full load carrying capability for an interval of not less than 103 to 110 percent of the continuous rating of the emergency DG, and information about the 90% of its continuous rating. This information does not meet the NRC criteria for inclusion into the ITS and is therefore being relocated to the ITS Bases, USAR or other Licensee Controlled Documents. This change is consistent with NUREG-1431.
LR	45	CTS 4.6.B.4. CTS 4.6.B.4 requires in part a battery performance test discharge during the first refueling and once every five years thereafter. Battery voltage shall be monitored as a function of time to establish that the battery performs as expected during heavy discharge and that all electrical connections are tight. This SR is being relocated to other Licensee Controlled Documents.
L	46	CTS 4.6.B.5. The CTS requires that the integrity of Station Battery fuses be checked once every day when the battery charger is running. This SR is being deleted. In accordance with PI design, there is a fuse disconnect switch which would alarm in the Control Room if the subject fuse blows. In addition, ISTS, SR 3.8.4.1 requires weekly checks on battery voltage. If the subject fuse is blown, not only would the alarm be received, but the battery would not pass the weekly check as required by the NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
M	47	New ITS SR 3.8.4.2 has been added. This SR requires verification that each battery charger supplies a load equal to the manufacturer's rating or verify each charger can recharge the battery to the fully charged state within 24 hours while supplying the demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state every 24 months. Adding this SR requires additional actions and testing that is not currently required by the CTS or plant procedures. Therefore, the addition of this SR constitutes a more restrictive change. This change is consistent with NUREG-1431.
M	48	New ITS SR 3.8.4.3 has been added. This SR requires the verification of battery capacity to ensure adequacy to supply and maintain the required emergency loads for the design duty cycle when subjected to a battery service test every 24 months. The additional requirements, testing, and personnel actions associated with the addition of this SR constitutes a more restrictive change. This change is consistent with NUREG-1431.
M	49	New SR. ITS 3.8.7.1 has been added which states, "Verify correct inverter voltage and alignment to the Reactor Protection Instrumentation AC panels every 7 days." This change is considered to be more restrictive since the CTS nor operating procedures do not specifically require this action or Frequency. This change requires additional operator action and testing and is therefore considered to be more restrictive. This change is consistent with NUREG-1431.

NSHD category	Change number 3.8-	Discussion Of Change
M	50	CTS 4.6.B.2. CTS 4.6.B.2 requires, in part, to measure the amount (level) of water in each cell every three months. The ITS requires that the water level of each battery cell be verified monthly. The requirements in the CTS and NUREG are essentially the same and would be considered to be an administrative change, however, NUREG-1431 as modified by TSTF-360 increases the Frequency from three months to monthly. This increase in Frequency is considered to be a more restrictive change.
A	51	CTS 4.6.A.1.e and 4.6.A.2.b. CTS 4.6.A.1.e and 4.6.A.2.b refer to manually synchronizing the generator. The word "manually" is being deleted since this is the only way the DG can be synchronized. Therefore, specifically specifying how the DG is synchronized does not provide any important detail in the ITS. This is considered to be an Administrative change consistent with NUREG-1431.
M	52	CTS 4.6.B.1. CTS 4.6.B.1 requires that the batteries be tested each month. ITS 3.8.4.1 changes the Frequency from monthly to 7 days. The 7 days has been changed to be consistent with IEEE-450 and NUREG-1431. Since the ITS substantially shortened the SR Frequency, this is considered to be a more restrictive change.

NSHD category	Change number 3.8-	Discussion Of Change
A	53	CTS 4.6.B.1. CTS 4.6.B.1 states, "Each battery "shall be tested" ... ." ITS SR 3.8.4.1 revises this to "Verify that each battery ... ." Replacing the word "tested" with "verify" is an administrative change. This change is consistent with NUREG-1431.
A	54	CTS 4.6.B.3. ITS 3.8.4.3 Note clarifies that SR 3.8.4.3 shall not be performed in MODE 1, 2, 3, or 4. Although not specifically stated as MODES 1, 2, 3, or 4, the CTS has this SR in the section for SRs to be performed once per 24 months. The subject Frequency in the CTS and ITS is technically the same and is therefore considered to be an Administrative change consistent with NUREG-1431.
M	55	CTS 4.6.A.3.b.2 states in part that, "... the diesels start on the auto-start signal and energize the emergency buses ... ". This has been revised by changing "buses" to "loads". CTS only requires energizing the buses which actually verifies that the diesel generators start. This CTS requirement does not require any verification of any loads. Therefore, requiring verification of the loads is a more restrictive change instead of just verifying the diesel generators start.
A	56	CTS 3.7.A provides descriptive wording describing MODES 1, 2, 3, and 4. The ISTS does not use descriptive wording for identifying MODES; therefore the PI ITS have been revised to be consistent with NUREG-1431.

PACKAGE 3.8

ELECTRICAL POWER SYSTEMS

PART E

MARKUP OF NUREG-1431 IMPROVED STANDARD TECHNICAL SPECIFICATIONS AND BASES

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PRAIRIE ISLAND NUCLEAR GENERATING PLANT UNITS 1 AND 2

Improved Technical Specifications Conversion Submittal

PA3.8-100

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources – Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two ~~qualified~~ paths~~circuits~~ between the offsite transmission grid~~network~~ and the onsite 4 kV Safeguards~~Class 1E AC Electrical Power~~ Distribution System; ~~[and]~~

b. Two diesel generators (DGs) capable of supplying the onsite 4 kV Safeguards~~Class 1E power~~ Ddistribution ~~subs~~System~~(s)[; and~~ CL3.8-110

~~c. Automatic load sequencers for Train A and Train B]~~.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

PA3.8-100

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One ~~[required]offsite~~ path~~circuit~~ inoperable.	A.1	Perform SR 3.8.1.1 for the ~~[required]~~ OPERABLE ~~offsite~~path ~~circuit~~.	1 hour AND Once per 8 hours thereafter
	~~AND~~		
	~~A.2~~	~~Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.~~	~~24 hours~~ CL3.8-104 ~~from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)~~
	AND		
			(continued)

ACTIONS

PA3.8-100

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.32 Restore [required] offsitepathcircuit to OPERABLE status.	CL3.8-105 72 hours 7 days AND CL3.8-106 6 days from discovery of failure to meet LCO

ACTIONS

PA3.8-100

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One ~~[required]~~ DG inoperable.	B.1 Perform SR 3.8.1.1 for the ~~[required] offsite~~paths ~~circuit(s)~~.	1 hour AND Once per 8 hours thereafter
	AND	
	B.2 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	------------NOTE------------ Completion of ACTIONS B.3.1 and B.3.2 are not required if DG inoperability is due to preplanned preventative maintenance or testing. ----------------------------	CL3.8-107
	AND	
	B.3.1 Determine OPERABLE DG~~(s)~~ is not inoperable due to common cause failure. OR	~~[~~24~~]~~ hours

ACTIONS

PA3.8-100

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.3.2 Perform SR 3.8.1.2 for OPERABLE DG~~(s)~~. AND B.4 Restore ~~[required]~~ DG to OPERABLE status.	~~[~~24~~]~~ hours 7 days~~72 hours~~ CL3.8-108 ~~AND~~ ~~6 days from discovery of failure to meet LCO~~ CL3.8-106
C. Two ~~[required]~~ ~~offsite~~paths ~~circuits~~ inoperable.	C.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable. AND C.2 Restore one ~~[required] offsite~~ path~~circuit~~ to OPERABLE status.	12 hours from discovery of Condition C concurrent with inoperability of redundant required features 24 hours

(continued)

ACTIONS (continued) PA3.8-100

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One ~~[required]offsite~~ path~~circuit~~ inoperable. AND One ~~[required]~~ DG inoperable.	------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems – Operating," ~~when~~If Condition D is entered with no AC power source to either~~any~~ train. -----------------------------	PA3.8-111
	D.1 Restore ~~[required]offsite~~ path~~circuit~~ to OPERABLE status.	12 hours
	OR	
	D.2 Restore ~~[required]~~ DG to OPERABLE status.	12 hours
E. Two ~~[required]~~ DGs inoperable.	E.1 Restore one ~~[required]~~ DG to OPERABLE status.	2 hours

(continued)

ACTIONS (continued)

PA3.8-100

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. ----REVIEWER'S NOTE--- This Condition may be deleted if the unit design is such that any sequencer failure mode will only affect the ability of the associated DG to power its respective safety loads following a loss of offsite power independent of, or coincident with, a Design Basis Event. ------------------------- One [required] [automatic load sequencer] inoperable.	F.1 Restore [required] [automatic load sequencer] to OPERABLE status.	PA3.8-112 [12] hours
FG. Required Action and associated Completion Time of Condition A, B, C, D, [or] E[, or F] not met.	FG.1 Be in MODE 3. AND FG.2 Be in MODE 5.	6 hours 36 hours

ACTIONS (continued)

PA3.8-100

CONDITION	REQUIRED ACTION	COMPLETION TIME
GH. ~~Three or more [required] AC sources inoperable.~~ Two DGs inoperable and one or more paths inoperable. OR One DG inoperable and two paths inoperable.	GH.1 Enter LCO 3.0.3.	Immediately PA3.8-113

PA3.8-100

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each ~~[required] offsite~~ path~~circuit~~.	7 days
SR 3.8.1.2	-------------------NOTES------------------ 1. Performance of SR 3.8.1.~~7~~6 satisfies this SR. 2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. ~~3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR~~ ~~as recommended by the~~in consideration of manufacturer's recommendations. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.~~7~~6 must be met. --- Verify each DG starts ~~from standby conditions~~ and achieves steady state voltage ≥ ~~[~~3740~~]~~ V and ≤ ~~[~~4580~~]~~ V, and frequency ≥ ~~[~~58.8~~]~~ Hz and ≤ ~~[~~61.2~~]~~ Hz.	CL3.8-116 PA3.8-115 TA3.8-137 31 days~~As specified in Table 3.8.1-1~~

(continued)

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE		FREQUENCY
SR 3.8.1.3	-------------------NOTES------------------ 1. DG loadings may include gradual loading ~~as recommended by the~~ in consideration of manufacturer's recomendations. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.~~7~~6. --- Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load: a. Unit 1: ≥ 1650 kW; and b. Unit 2: ≥ ~~[4550~~100~~]~~ kW and ≤ ~~[5~~3000~~]~~ kW.	CL3.8-116 TA3.8-137 31 days~~As specified in Table 3.8.1-1~~ PA3.8-103
SR 3.8.1.4	Verify fuel level in each day tank ~~[and engine mounted tank] contains ≥ [220] gal of fuel oil~~.	31 days CL3.8-118
~~SR 3.8.1.5~~	~~Check for and remove accumulated water from each day tank [and engine mounted tank].~~	~~[31] days~~ CL3.8-197

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE		FREQUENCY
SR 3.8.1.65	Verify the fuel oil transfer system operates to [automatically] transfer fuel oil from storage tank[s] to the day tank [and engine mounted tank].	31[92] days PA3.8-102
SR 3.8.1.76	-------------------NOTE------------------- All DG starts may be preceded by an engine prelube period. -- Verify each DG starts from standby condition and achieves: a. in ≤ [10] seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and b. steady state voltage ≥ [3740] V and ≤ [4580] V, and frequency ≥ [58.8] Hz and ≤ [61.2] Hz.	184 days TA3.8-120
SR 3.8.1.8	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. -- Verify [automatic [and] manual] transfer of AC power sources from the normal offsite circuit to each alternate [required] offsite circuit.	PA3.8-102 [18 months]

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE		FREQUENCY
		(continued)
~~SR 3.8.1.9~~	-------------------NOTES------------------- ~~1. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.~~ ~~2. If performed with the DG synchronized with offsite power, it shall be performed at a power factor ≤ [0.9].~~ ---	CL3.8-121
	~~Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and:~~ ~~a. Following load rejection, the frequency is ≤ [63] Hz;~~ ~~b. Within [3] seconds following load rejection, the voltage is ≥ [3740] V and ≤ [4580] V; and~~ ~~c. Within [3] seconds following load rejection, the frequency is ≥ [58.8] Hz and ≤ [61.2] Hz.~~	~~[18 months]~~

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE		FREQUENCY
SR 3.8.1.7~~10~~	-------------------NOTE------------------ ~~This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.~~ --- Verify each DG ~~operating at a power factor ≤ [0.9]~~ does not trip ~~and voltage is maintained ≤ [5000] V~~ during and following a load rejection of ~~≥ [4500] kW and ≤ [5000]~~ 1. Unit 1 ≥ 650 kW; and 2. Unit 2 ≥ 860 kW.	CL3.8-122 TA3.8-123 CL3.8-125 ~~[18~~ X3.8-126 24 months~~]~~ PA3.8-103

(continued)

SURVEILLANCE REQUIREMENTS (continued)

PA3.8-100

SURVEILLANCE		FREQUENCY
3.8.1.11	---NOTES--- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. ------ Verify on an actual or simulated loss of offsite power signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ [10] seconds, 2. energizes auto-connected shutdown loads through [automatic load sequencer], 3. maintains steady state voltage ≥ [3740] V and ≤ [4580] V, 4. maintains steady state frequency ≥ [58.8] Hz and ≤ [61.2] Hz, and 5. supplies permanently connected [and auto-connected] shutdown loads for ≥ 5 minutes.	CL3.8-128 [18 months]

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE	FREQUENCY
	(continued)
SR 3.8.1.12 -------------------NOTES------------------- 1. All DG starts may be preceded by prelube period. 2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. --- Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and: a. In ≤ [10] seconds after auto-start and during tests, achieves voltage ≥ [3740] V and ≤ [4580] V; b. In ≤ [10] seconds after auto-start and during tests, achieves frequency ≥ [58.8] Hz and ≤ [61.2] Hz; c. Operates for ≥ 5 minutes; d. Permanently connected loads remain energized from the offsite power system; and e. Emergency loads are energized [or auto-connected through the automatic load sequencer] from the offsite power system.	PA3.8-102 [18 months]

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE		FREQUENCY
		(continued)
SR 3.8.1.813	-----NOTE----- This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.	CL3.8-122 TA3.8-123
	Verify each DG's automatic trips are bypassed on [actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated safety injection ESF actuation signal] except: a. Engine overspeed; [and] b. Generator differential current; and c. Ground fault (Unit 1 only). [Low lube oil pressure;] d. [High crankcase pressure;] and e. [Start failure relay].	[1824 months] X3.8-126 PA3.8-103

(continued)

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE		FREQUENCY
SR 3.8.1.9~~14~~	------------------NOTE~~S~~------------------ ~~1.~~ Momentary transients outside the load ~~and power factor~~ range~~s~~ do not invalidate this test. ~~2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.~~ --	CL3.8-125 CL3.8-122 TA3.8-123
	Verify each DG ~~operating at a power factor ≤ [0.9]~~ operates for ≥ 24 hours: a. For ≥ ~~[2]~~ hours loaded: Unit 1 ≥ 2832~~[5250]~~ kW and ≤ 3000~~[5500]~~ kW Unit 2 ≥ 5562~~[5250]~~ kW and ≤ 5940~~[5500]~~ kW; and b. For the remaining hours of the test loaded: Unit 1 ≥ 2475~~[4500]~~ kW; ~~and~~ Unit 2 ≥ 4860~~≤ [5000]~~ kW. c. Achieves steady state voltage ≥ 3740 V and ≤ 4580 V; and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	~~[18~~24 months~~]~~ X3.8-126 PA3.8-103 CL3.8-129

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE		FREQUENCY
~~SR 3.8.1.15~~	-------------------NOTES------------------- ~~1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ [2] hours loaded ≥ [4500] kW and ≤ [5000] kW.~~ ~~2. All DG starts may be preceded by an engine prelube period.~~ --- ~~Verify each DG starts and achieves in ≤ [10] seconds, voltage ≥ [3740] V, and ≤ [4580] V and frequency ≥ [58.8] Hz and ≤ [61.2] Hz.~~	CL3.8-130 ~~[18 months]~~

(continued)

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE		FREQUENCY
~~SR 3.8.1.16~~	-------------------NOTE------------------- ~~This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.~~ --- ~~Verify each DG:~~ ~~a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power;~~ ~~b. Transfers loads to offsite power source; and~~ ~~c. Returns to ready-to-load operation.~~	CL3.8-131 ~~[18 months]~~

SURVEILLANCE REQUIREMENTS (continued)

PA3.8-100

SURVEILLANCE		FREQUENCY
SR 3.8.1.17	-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. --------------- Verify, with a DG operating in test mode and connected to its bus, an actual or simulated ESF actuation signal overrides the test mode by: a. Returning DG to ready-to-load operation [; and b. Automatically energizing the emergency load from offsite power].	PA3.8-102 [18 months]
		(continued)
SR 3.8.1.18	-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. --------------- Verify interval between each sequenced load block is within ± [10% of design interval] for each emergency [and shutdown] load sequencer.	CL3.8-138 [18 months]

SURVEILLANCE REQUIREMENTS (continued) PA3.8-100

SURVEILLANCE		FREQUENCY
SR 3.8.1.109	------------------NOTES------------------ 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. --- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESFsafety injection actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loadsemergency loads in ≤ [10]60 seconds,	TA3.8-123 X3.8-126 [1824 months] CL3.8-139 (continued)

SURVEILLANCE REQUIREMENTS

PA3.8-100

SURVEILLANCE		FREQUENCY
~~SR 3.8.1.19 (continued)~~	~~2. energizes auto-connected emergency loads through load sequencer,~~ ~~3. achieves steady state voltage ≥ [3740] V and ≤ [4580] V,~~ ~~4. achieves steady state frequency ≥ [58.8] Hz and ≤ [61.2] Hz, and~~ ~~5. supplies permanently connected [and auto-connected] emergency loads for ≥ 5 minutes.~~	CL3.8-139
~~SR 3.8.1.20~~	~~NOTE~~ ~~All DG starts may be preceded by an engine prelube period.~~ ~~Verify when started simultaneously from standby condition, each DG achieves in ≤ [10] seconds, voltage ≥ [3744] V and ≤ [4576] V, and frequency ≥ [58.8] Hz and ≤ [61.2] Hz.~~	CL3.8-133 ~~10 years~~

PA3.8-100

Table 3.8.1-1 (page 1 of 1)
Diesel Generator Test Schedule

TA3.8-137

NUMBER OF FAILURES IN LAST 25 VALID TESTS[a]	FREQUENCY
≤ 3	31 days
≥ 4	7 days[b] (but no less than 24 hours)

(a) Criteria for determining number of failures and valid tests shall be in accordance with Regulatory Position C.2.1 of Regulatory Guide 1.9, Revision 3, where the number of tests and failures is determined on a per DG basis.

(b) This test frequency shall be maintained until seven consecutive failure free starts from standby conditions and load and run tests have been performed. This is consistent with Regulatory Position [ ], of Regulatory Guide 1.9, Revision 3. If, subsequent to the 7 failure free tests, 1 or more additional failures occur, such that there are again 4 or more failures in the last 25 tests, the testing interval shall again be reduced as noted above and maintained until 7 consecutive failure free tests have been performed.

Note: If Revision 3 of Regulatory Guide 1.9 is not approved, the above table will be modified to be consistent with the existing version of Regulatory Guide 1.108, GL 84-15, or other approved version.

3.8 ELECTRICAL POWER SYSTEMS

3.8.2 AC Sources – Shutdown

LCO 3.8.2 The following AC electrical power sources shall be OPERABLE:

a. One pathqualified circuit between the offsite transmission gridnetwork and the onsite 4 kV SafeguardsClass 1E AC electrical power Ddistribution subsSystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown "; and

b. One diesel generator (DG) capable of supplying one train of the onsite 4 kV SafeguardsClass 1E AC electrical power Ddistribution subsSystem(s) required by LCO 3.8.10.

-----------------------------NOTE-----------------------------
LCO 3.8.2 may not be applicable for a period of 8 hours during the performance of SR 3.8.1.10.

PA3.8-211

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

----------------------NOTE----------------------
LCO 3.0.3 not applicable.

TA3.8-140

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ~~One~~ ~~r~~Required ~~offsite~~ path~~circuit~~ inoperable.	------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.10, ~~with~~if one required train de-energized as a result of Condition A. ----------------------------	PA3.8-111
	A.1 Declare affected required feature(s) with no ~~offsite power~~ path available inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS. AND	Immediately
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 ~~Initiate action to s~~Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately TA3.8-117
	AND	
	A.2.4 Initiate action to restore required ~~offsite~~ pathpower ~~circuit~~ to OPERABLE status.	Immediately

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. One required DG inoperable.	B.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	B.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	B.3	~~Initiate action to s~~Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately TA3.8-117
	AND		
	B.4	Initiate action to restore required DG to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	-------------------NOTE------------------- The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.3, and SR 3.8.1.7~~9~~ through SR 3.8.1.10~~1,~~ ~~SR 3.8.1.13 through SR 3.8.1.16,~~ ~~[SR 3.8.1.18,] and SR 3.8.1.19~~. --	PA3.8-142
	For AC sources required to be OPERABLE, the SRs of Specification 3.8.1, "AC Sources – Operating," ~~except SR 3.8.1.8, SR 3.8.1.17, and SR 3.8.1.20,~~ are applicable.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil~~, Lube Oil, and Starting Air~~

LCO 3.8.3 The stored diesel generator (DG) fuel oil supply~~, lube oil, and starting air subsystem~~ shall be within limits ~~for each required diesel generator (DG)~~.

APPLICABILITY: When ~~associated~~ the DG(s) is required to be OPERABLE.

ACTIONS PA3.8-134

------------------------------------NOTE------------------------------------
~~Separate Condition entry is allowed for each DG.~~

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ~~One or more~~ DGs stored ~~with~~ fuel ~~level~~oil supply: Unit 1 < ~~[33,000]~~ 42,000 gal and ≥ 36,000 gal; Unit 2 ~~> [28,285]~~ < 75,000 gal and ≥ 65,000 gal. ~~in storage tank.~~	A.1 Restore fuel oil ~~level~~supply to within limits.	48 hours PA3.8-103

PA3.8-100

CL3.8-145

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B. One or more DGs with lube oil inventory < [500] gal and > [425] gal.~~	~~B.1 Restore lube oil inventory to within limits.~~	~~48 hours~~
~~C~~B. ~~One or more DGs with~~Required DG fuel oil tank with stored fuel oil properties~~total particulates~~ not within limit(s).	~~C~~B.1 Restore fuel oil tank ~~total particulates~~ properties to within limit(s).	7 days CL3.8-146

(continued)

~~D~~C. ~~One or more DGs with new fuel oil properties not within limits~~Required Action and associated Completion Time of Condition B not met.	~~D.1 Restore stored fuel oil properties to within limits.~~ C.1 Initiate action to isolate the associated DG fuel oil tank.	~~30 days~~ Immediately CL3.8-146

PA3.8-100

CL3.8-145

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~E. One or more DGs with starting air receiver pressure < [225] psig and ≥ [125] psig.~~	~~E.1 Restore starting air receiver pressure to ≥ [225] psig.~~	~~48 hours~~
DF. Stored DG fuel oil supply: Unit 1 < 36,000 gal; Unit 2 < 65,000 gal. OR Required Action and associated Completion Time of Conditions A and C not met. ~~OR~~ ~~One or more DGs diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than Condition A, B, C, D, or E~~.	DF.1 Declare ~~associated~~ DGs inoperable.	Immediately CL3.8-146

PA3.8-100

CL3.8-145

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify ~~each~~stored DG fuel oil supply ~~storage tank~~ contains: Unit 1 ≥ ~~[33,000]~~42,000 gal; Unit 2 ≥ 75,000 gal of fuel.	31 days PA3.8-103

(continued)

~~SR 3.8.3.2~~	~~Verify lubricating oil inventory is ≥ [500] gal.~~	~~31 days~~
SR 3.8.3.2~~3~~	Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
~~SR 3.8.3.4~~	~~Verify each DG air start receiver pressure is ≥ [225] psig.~~	~~31 days~~
~~SR 3.8.3.5~~	~~Check for and remove accumulated water from each fuel oil storage tank.~~	~~[31] days~~ CL3.8-147

CL3.8-145

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
~~SR 3.8.3.6 For each fuel oil storage tank:~~ ~~a. Drain the fuel oil;~~ ~~b. Remove the sediment; and~~ ~~c. Clean the tank.~~	~~10 years~~ TA3.8-156

PA3.8-100

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

LCO 3.8.4 The Train A and Train B DC safeguards electrical power sourcesubsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery charger inoperable.	A.1 Verify the associated battery OPERABLE. AND A.2 Restore battery charger to OPERABLE status.	2 hours TP3.8-160 8 hours CL3.8-171
B. One battery inoperable.	B.1 Restore battery to OPERABLE status.	8 hours TP3.8-160 CL3.8-171
CA. One DC safeguards electrical power sourcesubsystem inoperable for reasons other than Condition A or B.	CA.1 Restore DC safeguards electrical power sourcesubsystem to OPERABLE status.	28 hours TP3.8-160 CL3.8-171

PA3.8-100

CONDITION	REQUIRED ACTION	COMPLETION TIME
D~~B~~. Required Action and Associated Completion Time not met.	D~~B~~.1 Be in MODE 3.	6 hours
	AND	TP3.8-160
	D~~B~~.2 Be in MODE 5.	36 hours

PA3.8-100

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is ≥ [129] the minimum float voltage recommended by the battery manufacturer V on float charge.	7 days TP3.8-160
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify battery connection resistance [is ≤ [1E-5 ohm] for inter-cell connections, ≤ [1E-5 ohm] for inter-rack connections, ≤ [1E-5 ohm] for inter-tier connections, and ≤ [1E-5 ohm] for terminal connections].	92 days TP3.8-160
SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration.	[12] months TP3.8-160
SR 3.8.4.4	Remove visible terminal corrosion, verify battery cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.	[12] months TP3.8-160

PA3.8-100

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
~~SR 3.8.4.5~~	~~Verify battery connection resistance [is ≤ [1E-5 ohm] for inter-cell connections, ≤ [1E-5 ohm] for inter-rack connections, ≤ [1E-5 ohm] for inter-tier connections, and ≤ [1E-5 ohm] for terminal connections].~~	~~[12] months~~ TP3.8-160
SR 3.8.4.~~2~~6	~~-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.~~ ----- Verify each battery charger supplies ~~≥ [400] amps at ≥ [125] V for ≥ [8] hours~~ a load equal to the manufacturer's rating. OR Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.	CL3.8-122 TA3.8-123 ~~[18~~24 months~~]~~ X3.8-126 TP3.8-160

PA3.8-100

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.87	-------------------NOTES------------------ 1. The modified performance discharge test in SR 3.8.64.68 may be performed in lieu of the service test in SR 3.8.4.87 ~~once per 60 months~~. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ~~However, credit may be taken for unplanned events that satisfy this SR.~~ --- Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	TP3.8-160 TA3.8-123 ~~[18~~24 months~~]~~ X3.8-126

PA3.8-100

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.8	------------------NOTE------------------ This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. --	TP3.8-160
	Verify battery capacity is ≥ [80]% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months AND 12 months when battery shows degradation or has reached [85]% of expected life with capacity < 100% of manufacturer's rating AND 24 months when battery has reached [85]% of the expected life with capacity ≥ 100% of manufacturer's rating

PA3.8-100

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 One DC electrical power source~~subsystem~~ shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown." TA3.8-175

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

------------------------------------NOTE------------------------------------
LCO 3.0.3 is not applicable.
-- TA3.8-140

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One ~~or more~~ required DC electrical power sources~~subsystems~~ inoperable.	A.1.1	Declare affected required feature(s) inoperable.	Immediately TA3.8-175
	OR		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	A.2.3	~~Initiate action to s~~Suspend operations involving positive reactivity additions that could result in loss of required SDM boron concentration.	Immediately TA3.8-117
	AND		
	A.2.4	Initiate action to restore required DC electrical power source~~subsystems~~ to OPERABLE status.	Immediately

PA3.8-100

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	------------------NOTE------------------ The following SRs are not required to be performed: SR 3.8.4.~~6~~2~~, SR 3.8.4.7,~~ and SR 3.8.4.~~8~~3. -- For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1 ~~SR 3.8.4.4~~ ~~SR 3.8.4.7~~ SR 3.8.4.2 ~~SR 3.8.4.5~~ ~~SR 3.8.4.8~~. SR 3.8.4.3 ~~SR 3.8.4.6~~	TP3.8-160 In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery ~~Cell~~ Parameters

TP3.8-160

LCO 3.8.6 Battery ~~cell~~ parameters ~~for Train A and Train B batteries~~ shall be within ~~the~~ limits ~~of Table 3.8.6-1~~. PA3.8-174

APPLICABILITY: When the battery is ~~associated DC electrical power subsystems are~~ required to be OPERABLE.

ACTIONS

------------------------------------NOTE------------------------------------
Separate Condition entry is allowed for each battery.

PA3.8-100

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more batteries with one or more battery cell float voltages < 2.07 V ~~parameters not within Category A or B limits~~.	A.1 ~~Verify pilot cell[s] electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.~~ Perform SR 3.8.4.1.	~~21~~ hours TP3.8-160
	AND	
	A.2 ~~Verify battery cell parameters meet Table 3.8.6-1 Category C limits~~ Perform SR 3.8.6.1.	~~24 hours~~ ~~AND~~ ~~Once per 7 days thereafter~~ 2 hours
	AND	
	A.3 Restore ~~battery cell parameters to Category A and B limits of Table 3.8.6-1~~ affected cell voltage ≥ 2.07 V.	~~31 days~~ PA3.8-159 72 hours
B. One or more batteries with float current ≥ 2 amps.	B.1 Restore battery float current to ≤ 2 amps.	24 hours TP3.8-160

PA3.8-100

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. ---------NOTE--------- Required Action C.2 shall be completed if electrolyte level was below the top of plates. --------------------- One or more batteries with one or more cells electrolyte level less than minimum established design limits.	C.1 Restore electrolyte level to above top of plates. AND C.2 ---------NOTE--------- Only applicable if electrolyte level is below the top of plates. --------------------- Perform SR 3.8.6.5 for affected cells. AND C.3 Restore electrolyte level to greater than or equal to minimum established design limits.	8 hours TP3.8-160 Once per 12 hours for 7 days 31 days
D. One or more batteries with pilot cell electrolyte temperature less than minimum established design limits.	D.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours TP3.8-160

PA3.8-100

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~E~~B. Required Actions and associated Completion Time of Condition A, B, C, or D not met. ~~OR~~ ~~One or more batteries with average electrolyte temperature of the representative cells < [60]°F.~~ ~~OR~~ ~~One or more batteries with one or more battery cell parameters not within Category C values.~~	~~E~~B.1 Declare associated battery inoperable.	Immediately TP3.8-160 PA3.8-161

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
~~SR 3.8.6.1 Verify battery cell parameters meet Table 3.8.6-1 Category A limits.~~	~~7 days~~ TP3.8-160

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
~~SR 3.8.6.2~~	~~Verify battery cell parameters meet Table 3.8.6-1 Category B limits.~~	~~92 days~~ ~~AND~~ TP3.8-160 ~~Once within 24 hours after a battery discharge < [110] V~~ ~~AND~~ ~~Once within 24 hours after a battery overcharge > [150] V~~
~~SR 3.8.6.3~~	~~Verify average electrolyte temperature of representative cells is ≥ [60]°F.~~	~~92 days~~ TP3.8-160
SR 3.8.6.1	-------------------NOTE------------------- Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. -- Verify each battery float current is ≤ 2 amps.	TP3.8-160 7 days
SR 3.8.6.2	Verify each battery pilot cell voltage is ≥ 2.07 V.	31 days TP3.8-160

PA3.8-100

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.6.3	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	31 days TP3.8-160
SR 3.8.6.4	Verify each battery pilot cell temperature is greater than or equal to minimum established design limits.	31 days TP3.8-160
SR 3.8.6.5	Verify each battery connected cell voltage is ≥ 2.07 V.	92 days TP3.8-160

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.6	------------------NOTE------------------ This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify battery capacity is ≥ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	TP3.8-160 60 months AND 12 months when battery shows degradation or has reached 85% of the expected life with capacity < 100% of manufacturer's rating AND 24 months when battery has 85% of the expected life with capacity ≥ 100% of manufacturer's rating

TP3.8-160

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameters Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[(a)]	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[(a)]	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V	> 2.07 V
Specific Gravity[(b)(c)]	≥ [1.200]	≥ [1.195] AND Average of all connected cells > [1.205]	Not more than 0.020 below average of all connected cells AND Average of all connected cells ≥ [1.195]

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum during equalizing charges provided it is not overflowing.

PA3.8-100

~~(b) Corrected for electrolyte temperature and level. Level correction is not required, however, when battery charging is < [2] amps when on float charge.~~

~~(c) A battery charging current of < [2] amps when on float charge is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of [7] days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the [7] day allowance.~~

PA3.8-100

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters – Operating

LCO 3.8.7 ~~The required Train A and Train B~~Three Reactor Protection Instrument AC inverters shall be OPERABLE.

PA3.8-102

~~NOTE~~

~~[One/two] inverter[s] may be disconnected from [its/their] associated DC bus for ≤ 24 hours to perform an equalizing charge on [its/their] associated [common] battery, provided:~~

~~a. The associated AC vital bus(es) [is/are] energized from [its/their] [Class 1E constant voltage source transformers] [inverter using internal AC source]; and~~

~~b. All other AC vital buses are energized from their associated OPERABLE inverters.~~

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

PA3.8-100

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One ~~[required]~~ Reactor Protection Instrument AC inverter inoperable.	A.1	---------NOTE-------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating" ~~with~~ If any ~~vital~~ Reactor Protection Instrument AC Panel ~~bus~~ is de-energized. --------------------- Restore inverter to OPERABLE status.	CL3.8-183 ~~24 hours~~ 8 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours

PA3.8-100

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.7.1	Verify correct inverter voltage, [frequency,] and alignment to required Reactor Protection Instrument AC vital busesPanels.	7 days PA3.8-102

PA3.8-100

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters – Shutdown

LCO 3.8.8 ~~Inverters shall be OPERABLE to support the onsite Class 1E AC vital bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."~~ One Reactor Protection Instrument AC inverter shall be OPERABLE. TA3.8-175

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One ~~or more~~ ~~[~~required~~]~~ inverter~~s~~ inoperable.	A.1	Declare affected required feature(s) inoperable.	Immediately TA3.8-175
	OR		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	A.2.3	~~Initiate action to~~ ~~s~~Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately TA3.8-117
	AND		(continued)
A. (continued)	A.2.4	Initiate action to restore required inverter~~s~~ to OPERABLE status.	Immediately

PA3.8-100

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.8.1	Verify correct inverter voltage, [frequency,] and alignments to required Reactor Protection Instrument AC vital busesPanel.	7 days PA3.8-102

PA3.8-100

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems – Operating

LCO 3.8.9 Train A and Train B ~~safeguards~~ AC~~,~~ ~~and~~ DC, and ~~Reactor Protection Instrument~~ AC ~~vital bus~~ electrical power distribution subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One ~~or more safeguards~~ AC electrical power distribution subsystem~~s~~ inoperable.	~~A.1~~	~~Declare associated required supported feature(s) inoperable.~~	~~Immediately~~ PA3.8-213
	OR		
	A.~~1~~2	Restore ~~safeguards~~ AC electrical power distribution subsystem to OPERABLE status.	8 hours ~~AND~~ CL3.8-165 ~~16 hours from discovery of failure to meet LCO~~

PA3.8-100

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B~~C. One Reactor Protection Instrument AC ~~vital bus~~Panel inoperable.	~~B~~C.1 Declare associated required supported feature(s) inoperable.	Immediately PA3.8-213
	OR	
	C.2 Restore Reactor Protection Instrument AC ~~vital bus subsystem~~Panel to OPERABLE status.	2 hours ~~AND~~ CL3.8-165 ~~16 hours from discovery of failure to meet LCO~~
~~C~~B. One or more safeguards DC electrical power distribution subsystem inoperable.	~~C~~B.1 Declare associated required supported feature(s) inoperable.	Immediately PA3.8-213
	OR	
	B.2 Restore safeguards DC electrical power distribution subsystem to OPERABLE status.	2 hours ~~AND~~ CL3.8-165 ~~16 hours from discovery of failure to meet LCO~~

(continued)

PA3.8-100

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours
E. Two trains with inoperable distribution subsystems that result in a loss of safety function. OR Two or more Reactor Protection Instrument AC Panels inoperable.	E.1 Enter LCO 3.0.3.	Immediately CL3.8-214

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker and switch alignments and voltage to ~~[required]~~ safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems.	7 days

PA3.8-100

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portion of Safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

-----------------------------NOTE-----------------------------
LCO 3.0.3 is not applicable.

TA3.8-140

PA3.8-100

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required safeguards AC, DC, or Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 ~~Initiate action to s~~Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately TA3.8-117
	<u>AND</u>	

(continued)

PA3.8-100

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare associated required residual heat removal subsystem(s) inoperable ~~and not in operation~~.	Immediately PA3.8-190

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.10.1 Verify correct breaker and switch alignments and voltage to required safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems.	7 days PA3.8-168

PA3.8-100

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

BACKGROUND

The unit 4 kV Safeguards~~Class 1E AC Electrical Power~~ Distribution System AC sources consist of the offsite power sources~~ (preferred power sources, normal and alternate(s))~~, and the onsite standby power sources (Train A and Train B diesel generators (DGs)). As required by ~~10 CFR 50, Appendix A,~~AEC GDC Criterion 39~~17~~ (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems. CL3.8-172

The onsite Safeguards~~Class 1E~~ AC Distribution System is divided into redundant ~~load groups (~~trains~~)~~ so that the loss of any one ~~group~~train does not prevent the minimum safety functions from being performed. Each train has two connections to the~~two~~ ~~preferred~~ offsite power sources, and ~~a single~~one to an onsite DG.

Offsite power is supplied to the unit switchyard(s) from the transmission network by five~~[two]~~ transmission lines. From the switchyard(s), ~~two~~ electrically and physically separated paths~~circuits~~ provide AC power, through ~~[~~step down station auxiliary transformers~~]~~, to the 4~~.16~~ kV ~~ESF~~safeguards buses. A detailed description of the offsite power network and the paths~~circuits~~ to the safeguards~~Class 1E ESF~~ buses is found in ~~the FSAR, Chapter [8] (~~Reference~~.~~ 2~~)~~.

A~~n offsite circuit~~path consists of all breakers, transformers, switches, ~~interrupting devices,~~ cabling, and controls required to transmit power from the offsite transmission network to the safeguards ~~onsite Class 1E ESF~~ bus(es).

(continued)

PA3.8-100

BASES

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite SafeguardsClass 1E AC Distribution System under postulated worst case loading conditions. Within [1] minute after the initiatingload restore signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service via the load sequencer. The transformers are capable of block loading (operation without load sequencing), when loading and motor starting is selectively restricted. PA3.8-135

BACKGROUND (continued)

The onsite standby power source for each 4.16 kV safeguardsESF bus is a dedicated DG. For Unit 1, DGs [11] and [12] are dedicated to ESF buses [151] and [162], respectively. For Unit 2, DGs 5 and 6 are dedicated to buses 25 and 26, respectively. A DG starts automatically on a safety injection (SI) signal (i.e.e.g., low pressurizer pressure or high containment pressure signals) or on an [ESF4 kV safeguards bus degraded voltage or undervoltage signal] (refer to LCO 3.3.45, "4 kV Safeguards Bus Voltage InstrumentationLoss of Power (LOP) Diesel Generator (DG) Start Instrumentation"). After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of safeguardsESF bus undervoltage or degraded voltage, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the safeguardsESF bus on an SI signal alone. Following the trip of offsite power, [a sequencer/an undervoltage signal] strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the automatic load sequencer. The sequencing logic controls the start permissive forand starting signals to motor breakers to prevent overloading the DG by automatic load application.

(continued)

PA3.8-100

BASES

In the event of a loss of offsitepreferred power, the ESFsafeguards electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within [1] minute after the initiatingload restore signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for the Unit 1 DGs meet the intent of Safety Guide 9 and Unit 2 Train A and Train B DGs satisfy the intentrequirements of Regulatory Guide 1.9, as discussed in the USAR (Ref. 23). The continuous service rating of each Unit 1 DG is 2750 kW with a 30 minute rating of 3250 kW. The continuous service rating of each Unit 2 DG is [7054400] kW with [10]% overload permissible for up to 2 hours in any 24 hour period. The ESFsafeguards loads that are powered from the 4.16 kV safeguardsESF buses are listed in Reference 2. CL3.8-201

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the UFSAR, Chapter [6] (Ref. 4) and Chapter [15] (Ref. B5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not

APPLICABLE SAFETY ANALYSES

exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits;

(continued)

PA3.8-100

BASES

~~(continued)~~ Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite or offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power ~~or all onsite AC power~~; and CL3.8-163

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii)~~NRC Policy Statement~~.

LCO

Two ~~qualified~~ paths~~circuits~~ between the offsite transmission grid~~network~~ and the onsite 4 kV Safeguards~~Class 1E Electrical Power~~Distribution System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

The~~Qualified offsite~~ paths~~circuits are those that~~ are described in the UFSAR and are part of the licensing basis for the unit. Plant auxiliary power can be supplied from four separate external power sources which have multiple offsite network connections: PA3.8-103

a. A reserve transformer (1R) from the 161 KV portion of the plant substation;

(continued)

PA3.8-100

BASES

b. A second reserve transformer (2RS/2RY) from the 345 kV portion of the plant substation;

c. A cooling tower transformer (CT1/CT11) supplied from the 345 kV portion of the plant substation; and

d. A cooling tower transformer (CT12) supplied from a tertiary winding on the substation auto transformer.

In addition, one required automatic load sequencer per train must be OPERABLE. CL3.8-110

Each offsite pathcircuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the safeguardsESF buses.

PA3.8-103

Offsite circuit #1 consists of Safeguards Transformer B, which is supplied from Switchyard Bus B, and is fed through breaker 52-3 powering the ESF transformer XNB01, which, in turn, powers the #1 ESF bus through its normal feeder breaker. Offsite circuit #2 consists of the Startup Transformer, which is normally fed from the Switchyard

(continued)

PA3.8-100

BASES

LCO (continued)

Bus A, and is fed through breaker PA 0201, powering the ESF transformer, which, in turn, powers the #2 ESF bus through its normal feeder breaker.

Each DG must be capable of starting, accelerating to ratedrequired speed and voltage, and connecting to its respective safeguardsESF bus on detection of bus undervoltage. This will be accomplishedThe DG will be ready to load within [10] secondsfollowing receipt of a start signal. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the safeguardsESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot and DG in standby with the engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillance, e.g., capability of the DG to revert to standby status on an ECCS signal while operating in parallel test mode. CL3.8-202 CL3.8-136

Proper sequencing of loads, [including tripping of nonessential loads,] is a required function for DG OPERABILITY.

The AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train. For the DGs, separation and independence are complete. PA3.8-204

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with fast transfer capability to the other circuit OPERABLE, and not violate separation criteria. A circuit that is not connected to an ESF bus is required to have OPERABLE fast transfer interlock mechanisms to at least two ESF buses to support OPERABILITY of that circuit. PA3.8-204

(continued)

PA3.8-100

BASES

APPLICABILITY

The AC sources ~~[and sequencers]~~ are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs ~~or abnormal transients~~; and CL3.8-205

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources – Shutdown."

The Load Sequencer requirements are covered in LCO 3.3.4, "4 kV Safeguards Bus Voltage Instrumentation".

ACTIONS

A.1

To ensure a highly reliable power source remains with one ~~offsite circuit~~path inoperable, it is necessary to verify the OPERABILITY of the remaining ~~required offsite circuit~~path on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if ~~a~~the second ~~required circuit~~path fails SR 3.8.1.1, ~~the second offsite circuit~~there are no OPERABLE paths ~~is inoperable~~, and Condition C, for two ~~offsite circuits~~ paths inoperable, is entered.

~~Reviewer's Note: The turbine driven auxiliary feedwater pump is only required to be considered a redundant required feature, and, therefore, required to be determined OPERABLE~~

(continued)

PA3.8-100

BASES

by this Required Action, if the design is such that the remaining OPERABLE motor or turbine driven auxiliary feedwater pump(s) is not by itself capable (without any reliance on the motor driven auxiliary feedwater pump powered by the emergency bus associated with the inoperable diesel generator) of providing 100% of the auxiliary feedwater flow assumed in the safety analysis.

A.2

CL3.8-104

Required Action A.2, which only applies if the train cannot be powered from an offsite source, is intended to provide assurance that an event coincident with a single failure of the associated DG will not result in a complete loss of safety function of critical redundant required features. These features are powered from the redundant AC electrical power train. This includes motor driven auxiliary feedwater pumps. Single train systems, such as turbine driven auxiliary feedwater pumps, may not be included.

ACTIONS A.2 (continued)

The Completion Time for Required Action A.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required CL3.8-104

(continued)

PA3.8-100

BASES

~~Action, the Completion Time only begins on discovery that both:~~

~~a. The train has no offsite power supplying it loads; and~~

~~b. A required feature on the other train is inoperable.~~

~~If at any time during the existence of Condition A (one offsite circuit inoperable) a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.~~

~~Discovering no offsite power to one train of the onsite Class 1E Electrical Power Distribution System coincident with one or more inoperable required support or supported features, or both, that are associated with the other train that has offsite power, results in starting the Completion Times for the Required Action. Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.~~

~~The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E Distribution System. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.~~

<u>A.~~3~~2</u>

~~According to Regulatory Guide 1.93 (Ref. 6), o~~Operation may continue in Condition A for a period that should not CL3.8-172

(continued)

exceed 72 hoursdays. With one offsite circuitpath inoperable, the reliability of the offsite system is degraded, and the CL3.8-105

ACTIONS A.3 (continued)

potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. In this Condition, however, the remaining OPERABLE offsite circuitpath and DGs are adequate to supply electrical power to the onsite SafeguardsClass 1E Distribution System.

The 72 hourday Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period. CL3.8-105

~~The second Completion Time for Required Action A.3 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DG is inoperable and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the offsite circuit. At this time, a DG could again become inoperable, the circuit restored OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 72 hour and 6 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.~~ CL3.8-106

(continued)

PA3.8-100

BASES

As in Required Action A.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time Condition A was entered. CL3.8-106

B.1

To ensure a highly reliable power source remains with an inoperable DG, it is necessary to verify the availability of

ACTIONS B.1 (continued)

the offsite circuitspaths on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a circuitpath fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit and inoperability, additional Conditions and Required Actions must then be enteredapply.

Reviewer's Note: The turbine driven auxiliary feedwater pump is only required to be considered a redundant required feature, and, therefore, required to be determined OPERABLE by this Required Action, if the design is such that the remaining OPERABLE motor or turbine driven auxiliary feedwater pump(s) is not by itself capable (without any reliance on the motor driven auxiliary feedwater pump powered by the emergency bus associated with the inoperable diesel generator) of providing 100% of the auxiliary feedwater flow assumed in the safety analysis.

B.2

(continued)

PA3.8-100

BASES

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related trains. ~~This includes motor driven auxiliary feedwater pumps. Single train systems, such as turbine driven auxiliary feedwater pumps, are not included.~~ Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG. CL3.8-200

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

~~ACTIONS~~ ~~B.2 (continued)~~

a. An inoperable DG exists; and

b. A required feature on the other train (Train A or Train B) is inoperable.

If at any time during the existence of this Condition (one DG inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one required DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DG, results

(continued)

in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is ~~A~~acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

In this Condition, the remaining OPERABLE DG and ~~offsite circuits~~paths are adequate to supply electrical power to the onsite ~~Class 1E~~Safeguards Distribution ~~S~~ystem. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.3.1 and B.3.2

The Required Actions of Condition B.3 are modified by a Note that does not require completion of Action B.3.1 and B.3.2 if the DG inoperability is due to preplanned preventative maintenance or testing. CL3.8-107

Required Action B.3.1 provides an allowance to avoid unnecessary testing of the OPERABLE DG~~(s)~~. If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on the other DG~~(s)~~, the other DG~~(s)~~ would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot

(continued)

PA3.8-100

BASES

be confirmed not to exist on the remaining DG~~(s)~~, performance of

~~ACTIONS~~ ~~B.3.1 and B.3.2 (continued)~~

SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the ~~[~~plant corrective action program~~]~~ will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to the Maintenance Rule~~Generic Letter 84-15 (Ref. 7)~~, ~~[~~24~~]~~ hours is reasonable to confirm that the OPERABLE DG~~(s)~~ is not affected by the same problem as the inoperable DG. CL3.8-172

B.4

~~According to Regulatory Guide 1.93 (Ref. 6), o~~Operation may continue in Condition B for a period that should not exceed 7~~2 hours~~days. CL3.8-172

In Condition B, the remaining OPERABLE DG and ~~offsite circuits~~paths are adequate to supply electrical power to the onsite ~~Class 1E~~Safeguards Distribution System. The 7~~2 hour~~day Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period. CL3.8-108

~~The second Completion Time for Required Action B.4 establishes a limit on the maximum time allowed for any~~ CL3.8-106

(continued)

combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an offsite circuit is inoperable and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the DG. At this time, an offsite circuit could again become inoperable, the DG restored OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A

ACTIONS B.4 (continued)

and B are entered concurrently. The "AND" connector between the 72 hour and 6 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

As in Required Action B.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time Condition B was entered.

C.1 and C.2

Required Action C.1, which applies when two pathsoffsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions. The Completion Time for this failure of redundant required features is reduced to 12 hours from that allowed for one train without offsite power CL3.8-206

(continued)

PA3.8-100

BASES

(Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours is allowed for two paths required offsite circuits inoperable, based upon the assumption that two complete safety trains are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are powered from redundant AC safety trains. This includes motor driven auxiliary feedwater pumps. Single train features, such as turbine driven auxiliary pumps, are not included in the list. CL3.8-172 CL3.8-200

The Completion Time for Required Action C.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. All required offsite circuitsBoth paths are inoperable; and

b. A required feature on either train is inoperable.

ACTIONS C.1 and C.2 (continued)

If at any time during the existence of Condition C (two offsite circuitspaths inoperable) a required feature becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), oOperation may continue in Condition C for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an CL3.8-172

(continued)

accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

~~Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more DGs inoperable. However, two factors tend to decrease the severity of this level of degradation:~~ CL3.8-207

~~a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and~~

~~b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.~~

With both of the required ~~offsite circuits~~paths inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the ~~offsite circuits~~paths commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

~~According to Reference 6, w~~With the available offsite AC sources, two less than required by the LCO, operation may CL3.8-172

~~ACTIONS~~ ~~C.1 and C.2 (continued)~~

(continued)

continue for 24 hours. If two ~~offsite sources~~paths are restored within 24 hours, unrestricted operation may continue. If only one ~~offsite source~~path is restored within 24 hours, power operation continues in accordance with Condition A.

D.1 and D.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition D are modified by a Note to indicate that ~~when~~if Condition D is entered with no AC source to ~~any~~either train, the Conditions and Required Actions for LCO 3.8.9, "Distribution Systems – Operating," must be immediately entered. This allows Condition D to provide requirements for the loss of one ~~offsite circuit~~path and one DG, without regard to whether a train is de-energized. LCO 3.8.9 provides the appropriate restrictions for a de-energized train. PA3.8-111

~~According to Regulatory Guide 1.93 (Ref. 6), o~~Operation may continue in Condition D for a period that should not exceed 12 hours. CL3.8-172

In Condition D, ~~individual~~ redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition C (loss of both required ~~offsite circuits~~paths). This difference in reliability is offset by the
susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the

(continued)

PA3.8-100

remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

E.1

With Train A and Train B DGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources

~~ACTIONS~~ ~~E.1 (continued)~~

are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since ~~any~~ inadvertent generator trips could ~~also~~ result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

~~According to Reference 6, w~~With both DGs inoperable, operation may continue for a period that should not exceed 2 hours. CL3.8-172

~~F.1~~ PA3.8-112

~~The sequencer(s) is an essential support system to [both the offsite circuit and the DG associated with a given ESF bus]. [Furthermore, the sequencer is on the primary success path for most major AC electrically powered safety systems~~

(continued)

powered from the associated ESF bus.] Therefore, loss of an [ESF bus sequencer] affects every major ESF system in the [division]. The [12] hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining sequencer OPERABILITY. This time period also ensures that the probability of an accident (requiring sequencer OPERABILITY) occurring during periods when the sequencer is inoperable is minimal.

This Condition is preceded by a Note that allows the Condition to be deleted if the unit design is such that any sequencer failure mode will only affect the ability of the associated DG to power its respective safety loads under any conditions. Implicit in this Note is the concept that the Condition must be retained if any sequencer failure mode results in the inability to start all or part of the safety loads when required, regardless of power availability, or results in overloading the offsite power circuit to a safety bus during an event and thereby causes its failure. Also

ACTIONS

F.1 (continued)

implicit in the Note, is that the Condition is not applicable to any train that does not have a sequencer.

FG.1 and FG.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the

(continued)

PA3.8-100

required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

GH.1

Condition HG corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system ~~will~~may cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, as discussed in the USAR~~in accordance with 10 CFR 50, Appendix A, GDC 18~~ (Ref. 28). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs are in accordance with~~the recommendations of~~ rRegulatory guidance~~Guide 1.9 (Ref. 3), Regulatory Guide 1.108 (Ref. 9), and Regulatory Guide 1.137 (Ref. 10),~~ as addressed in the UFSAR. CL3.8-172

~~Where t~~The voltages and frequencies ~~SRs~~ discussed in these SRs are consistent with analysis described in the USAR (Ref. 2) ~~herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of [3740] V is 90% of the nominal 4160 V output voltage. This value, which is specified in~~ PA3.8-208

~~SURVEILLANCE REQUIREMENTS~~ ~~ANSI C84.1 (Ref. 11), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage~~

(continued)

PA3.8-100

BASES

~~(continued)~~

~~is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of [4756] V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).~~

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their offsite~~preferred~~ power source~~, and that appropriate independence of offsite circuits is maintained~~. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room. PA3.8-204

SR 3.8.1.2 and SR 3.8.1.~~7~~6

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

(continued)

PA3.8-100

BASES

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs are modified by a Note (Note 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading.

For the purposes of SR 3.8.1.2 and SR 3.8.1.7 testing, the DGs are started from standby conditions. Standby conditions

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.7 (continued) PA3.8-115

for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, some manufacturers recommend a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

SR 3.8.1.76 requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the UFSAR, Chapter [15] (Ref. 85). Standby conditions for a DG mean that the diesel engine coolant and oil temperatures are being maintained consistent with manufacturer recommendations. PA3.8-115

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as

(continued)

PA3.8-100

BASES

described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.~~7~~6 applies.

Since SR 3.8.1.~~7~~6 requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is the intent of Note 1 of SR 3.8.1.2.

The ~~normal~~ 31 day Frequency for SR 3.8.1.2 ~~(see Table 3.8.1-1, "Diesel Generator Test Schedule," in the accompanying LCO) is consistent with Regulatory Guide 1.9 (Ref. 3).~~ and ~~T~~the 184 day Frequency for SR 3.8.1.~~7~~6 ~~is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies~~ provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing. TA3.8-137 CL3.8-172

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the ~~equivalent of the maximum expected accident loads~~manufacturer's recommended loads. A minimum run time of CL3.8-116

~~SURVEILLANCE REQUIREMENTS~~

~~SR 3.8.1.3 (continued)~~

60 minutes is required to stabilize engine temperatures, while minimizing the time that the DG is connected to the offsite source.

~~Although no power factor requirements are established by this SR, the DG is normally operated at a power factor between [0.8 lagging] and [1.0]. The [0.8] value is the design rating of the machine, while the [1.0] is an operational limitation [to ensure circulating currents are minimized]. The load band is provided to avoid routine~~ CL3.8-125

(continued)

PA3.8-100

BASES

~~overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.~~

The 31 day Frequency for this Surveillance ~~(Table 3.8.1-1)~~ is consistent with SR 3.8.1.2 ~~Regulatory Guide 1.9 (Ref. 3)~~. TA3.8-137 CL3.8-172

This SR is modified by four Notes. Note 1 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 2 states that momentary transients, because of changing ~~bus~~ loads or system characteristics, do not invalidate this test. ~~Similarly, momentary power factor transients above the limit do not invalidate the test.~~ CL3.8-125 Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from ~~offsite circuit~~path or grid perturbations. Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank ~~[and engine mounted tank]~~ is at or above the level at which fuel oil is automatically added. The level ~~is expressed as an equivalent volume in gallons, and~~ is selected to ensure adequate fuel oil for a minimum of ~~1~~2 hours for Unit 1 (1 hour of DG operation at full load plus 10% for Unit 2). CL3.8-118

The 31 day Frequency is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are

~~SURVEILLANCE~~ ~~SR 3.8.1.4 (continued)~~

(continued)

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~~REQUIREMENTS~~

provided and facility operators would be aware of any large uses of fuel oil during this period.

~~SR 3.8.1.5~~

CL3.8-197

~~Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day [and engine mounted] tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventative maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.~~

SR 3.8.1.~~6~~5

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is

(continued)

PA3.8-100

intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

~~The Frequency for this SR is variable, depending on individual system design, with up to a [92] day interval. The [92] day Frequency corresponds to the testing requirements for pumps as contained in the ASME Code,~~ PA3.8-103

~~SURVEILLANCE REQUIREMENTS~~ ~~SR 3.8.1.6 (continued)~~

~~Section XI (Ref. 11); however, t~~The design of fuel transfer systems is such that pumps operate automatically ~~or must be started manually~~ in order to maintain an adequate volume of fuel oil in the day ~~[and engine mounted]~~ tanks during or following DG testing. ~~In such a case~~Therefore, a 31 day Frequency is appropriate. ~~Since proper operation of fuel transfer systems is an inherent part of DG OPERABILITY, the Frequency of this SR should be modified to reflect individual designs.~~

SR 3.8.1.~~7~~6

See SR 3.8.1.2.

~~SR 3.8.1.8~~

~~Transfer of each [4.16 kV ESF bus] power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The [18 month] Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit~~

(continued)

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conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.9

CL3.8-121

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine

SURVEILLANCE REQUIREMENTS

SR 3.8.1.9 (continued)

overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. [For this unit, the single load for each DG and its horsepower rating is as follows:] This Surveillance may be accomplished by:

a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or

(continued)

~~b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.~~

~~As required by IEEE-308 (Ref. 12), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.~~

~~The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b and SR 3.8.1.9.c are steady state voltage and frequency values to which the system must recover following load rejection. The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9).~~

~~This SR is modified by two Notes. The reason for Note 1 is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR. In order to ensure that the DG is tested under load~~

~~SURVEILLANCE REQUIREMENTS~~

~~SR 3.8.1.9 (continued)~~

~~conditions that are as close to design basis conditions as possible, Note 2 requires that, if synchronized to offsite power, testing must be performed using a power factor~~

(continued)

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≤ [0.9]. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

a. Performance of the SR will not render any safety system or component inoperable;

b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and

c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.107

This Surveillance demonstrates the DG capability to reject a full load equivalent to the largest single load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of an system fault or inadvertent breaker tripping. This Surveillance ensures proper engine generator load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG does not trip upon loss of the largest single load. These acceptance criteria provide for DG damage protection. While the DG is not expected to experience this transient during CL3.8-125

(continued)

PA3.8-100

an event and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can
be corrected or isolated. CL3.8-125

SURVEILLANCE REQUIREMENTS

SR 3.8.1.10 (continued)

In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, testing must be performed using a power factor ≤ [0.9]. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience. CL3.8-125

The [1824 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9) and is intended to be consistent with expected fuel cycle lengths. X3.8-126 CL3.8-172

This SR has been modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbation to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR. CL3.8-122 TA3.8-123

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

a. Performance of the SR will not render any safety system or component inoperable;

(continued)

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b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and

c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.11

CL3.8-128

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions

SURVEILLANCE REQUIREMENTS

SR 3.8.1.11 (continued)

encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time.

The DG autostart time of [10] seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

The requirement to verify the connection and power supply of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these

(continued)

PA3.8-100

~~loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, or high pressure injection systems are not capable of being operated at full flow, or residual heat removal (RHR) systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG systems to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.~~

~~The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.~~

~~This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained~~

~~SURVEILLANCE REQUIREMENTS~~ ~~SR 3.8.1.11 (continued)~~

~~consistent with manufacturer recommendations. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.~~

(continued)

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BASES

SR 3.8.1.12

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time ([10] seconds) from the design basis actuation signal (LOCA signal) and operates for ≥ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability. SR 3.8.1.12.d and SR 3.8.1.12.e ensure that permanently connected loads and emergency loads are energized from the offsite electrical power system on an ESF signal without loss of offsite power.

The requirement to verify the connection of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, ECCS injection valves are not desired to be stroked open, or high pressure injection systems are not capable of being operated at full flow, or RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

(continued)

PA3.8-100

BASES

SURVEILLANCE REQUIREMENTS SR 3.8.1.12 (continued)

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.813

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on an loss of voltage signal concurrent with an ESF actuation testactual or simulated safety injection (SI) signal, and critical protective functions (e.g., engine overspeed, generator differential current, and ground fault (Unit 1)[low lube oil pressure, high crankcase pressure, and start failure relay]) trip the DG to avert substantial damage to the DG unit. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG. PA3.8-103

The [1824 month] Frequency is based on engineering judgment, taking into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating X3.8-126

(continued)

PA3.8-100

BASES

experience has shown that these components usually pass the SR when performed at the [1824 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

The SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required DG from service. Credit may be taken for unplanned events that satisfy this SR. CL3.8-122 TA3.8-123

SURVEILLANCE REQUIREMENTS

SR 3.8.1.13 (continued)

[Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

a. Performance of the SR will not render any safety system or component inoperable;

b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and

c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.]

SR 3.8.1.149 CL3.8-172

Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), requires dDemonstrateion once per 1824 months that the DGs can X3.8-126

(continued)

start and run continuously at full load capability for an interval of
not less than 24 hours, ≥ ~~[~~2~~]~~ hours of which is at a load equivalent to 103 - 110% of the continuous duty rating and the
remainder of the time at a load equivalent to ≥ 90% of the continuous duty rating, voltage, and frequency of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR. CL3.8-125

~~In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor of ≤ [0.9]. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.~~ The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. CL3.8-125

~~SURVEILLANCE REQUIREMENTS~~

~~SR 3.8.1.14 (continued)~~

X3.8-126

The ~~[18~~24 month~~]~~ Frequency ~~is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3),~~ takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. CL3.8-172

This Surveillance is modified by a~~two~~ Note~~s~~. The Note ~~1~~ states that momentary transients due to changing ~~bus~~ loads do not invalidate this test. ~~Similarly, momentary power factor transients above the power factor limit will not~~ CL3.8-125

(continued)

PA3.8-100

BASES

~~invalidate the test. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.~~ CL3.8-122 TA3.8-123

~~SR 3.8.1.15~~ CL3.8-130

~~This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within [10] seconds. The [10] second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(5).~~

~~This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least [2] hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.~~

~~SURVEILLANCE REQUIREMENTS~~ ~~SR 3.8.1.16~~ CL3.8-131

(continued)

PA3.8-100

BASES

(continued)

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), and takes into consideration unit conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 13), paragraph 6.2.6(2).

(continued)

PA3.8-100

BASES

The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.12. The intent in the requirement associated with SR 3.8.1.17.b is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable.

SURVEILLANCE REQUIREMENTS

SR 3.8.1.17 (continued)

This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(8), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.18

CL3.8-138

Under accident [and loss of offsite power] conditions loads are sequentially connected to the bus by the [automatic load sequencer]. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The [10]% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and

(continued)

PA3.8-100

BASES

voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SURVEILLANCE REQUIREMENTS

SR 3.8.1.18 (continued)

[Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

a. Performance of the SR will not render any safety system or component inoperable;

b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and]

(continued)

PA3.8-100

BASES

~~c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.~~

SR 3.8.1.109

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation~~, as discussed in the Bases for SR 3.8.1.11,~~ during a loss of offsite power actuation test signal in conjunction with an ~~ESF~~SI actuation signal. In lieu of actual demonstration of connection and loading of emergency loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of ~~[18~~24 months~~]~~ takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of ~~[18~~24 months~~]~~. X3.8-126

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing.~~ For~~

~~SURVEILLANCE REQUIREMENTS~~

~~SR 3.8.1.19 (continued)~~

~~the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations for DGs.~~ The reason for Note 2 is that the performance of the

(continued)

PA3.8-100

BASES

Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. ~~Credit may be taken for unplanned events that satisfy this SR.~~ TA3.8-123

~~SR 3.8.1.20~~

~~This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.~~ CL3.8-133

~~The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9).~~

~~This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations.~~

~~Diesel Generator Test Schedule~~ TA3.8-137

~~The DG test schedule (Table 3.8.1-1) implements the recommendations of Revision 3 to Regulatory Guide 1.9 (Ref. 3). The purpose of this test schedule is to provide timely test data to establish a confidence level associated with the goal to maintain DG reliability > 0.95 per demand.~~

~~According to Regulatory Guide 1.9, Revision 3 (Ref. 3), each DG should be tested at least once every 31 days. Whenever a~~

(continued)

PA3.8-100

BASES

~~DG has experienced 4 or more valid failures in the last 25 valid tests, the maximum time between tests is reduced to 7 days. Four failures in 25 valid tests is a failure rate of 0.16, or the threshold of acceptable DG performance, and~~

~~SURVEILLANCE REQUIREMENTS~~

~~Diesel Generator Test Schedule (continued)~~

~~hence may be an early indication of the degradation of DG reliability. When considered in the light of a long history of tests, however, 4 failures in the last 25 valid tests may only be a statistically probable distribution of random events. Increasing the test Frequency will allow for a more timely accumulation of additional test data upon which to base judgment of the reliability of the DG. The increased test Frequency must be maintained until seven consecutive, failure free tests have been performed.~~

~~The Frequency for accelerated testing is 7 days, but no less than 24 hours. Tests conducted at intervals of less than 24 hours may be credited for compliance with Required Actions. However, for the purpose of re-establishing the normal 31-day Frequency, a successful test at an interval of less than 24 hours should be considered an invalid test and not count towards the 7 consecutive failure free starts, and the consecutive test count is not reset.~~

~~A test interval in excess of 7 days (or 31 days, as appropriate) constitutes a failure to meet the SRs, and results in the associated DG being declared inoperable. It does not, however, constitute a valid test or failure of the DG, and any consecutive test count is not reset.~~

REFERENCES

1. AEC "General Design Criteria for Nuclear Power Plant Construction Permits," Criterion 39, issued for CL3.8-172

(continued)

comment July 10, 1967, as referenced in the USAR Section 1.210 CFR 50, Appendix A, GDC 17.

2. UFSAR, SectionChapter [8].

3. Regulatory Guide 1.9, Rev. 3, [date].

34. FUSAR, SectionChapter [6]14.

5. FSAR, Chapter [15].

6. Regulatory Guide 1.93, Rev. 0, December 1974.

7. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.

8. 10 CFR 50, Appendix A, GDC 18.

REFERENCES (continued)

9. Regulatory Guide 1.108, Rev. 1, August 1977.

10. Regulatory Guide 1.137, Rev. [ ], [date].

11. ASME, Boiler and Pressure Vessel Code, Section XI.

12. IEEE Standard 308-1978.

PA3.8-100

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources – Shutdown

BASES

BACKGROUND	A description of the AC sources is provided in the Bases for LCO 3.8.1, "AC Sources – Operating."

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the minimum AC sources during MODES 5 and 6 and during movement of irradiated fuel assemblies ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate AC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shut down, the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the

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probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed

APPLICABLE SAFETY ANALYSES (continued)

within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODES 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on:

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

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BASES

In the event of an accident during shutdown, this LCO ensures the capability to support systems necessary to avoid immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite diesel generator (DG) power.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii)the NRC Policy Statement.

LCO

One offsite circuitpath capable of supplying the onsite Class 1E power4 KV Safeguards dDistribution subsystem(s) of LCO 3.8.10, "Distribution Systems — Shutdown," ensures that all required loads are powered from offsite power. An OPERABLE DG, associated with the distribution system train required to be OPERABLE by LCO 3.8.10, ensures a diverse power source is available to

LCO (continued)

provide electrical power support, assuming a loss of the offsite circuitpath. Together, OPERABILITY of the required offsite circuitpath and DG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

The qualified offsite circuitpath must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Engineered Safety Feature (ESF)Safeguards bus(es). Qualified offsite circuitsPaths are those that are described in the FUSAR and are part of the licensing basis for the unit.

PA3.8-102

Offsite circuit #1 consists of Safeguards Transformer B, which is supplied from Switchyard Bus B, and is fed through breaker 52-3 powering the ESF transformer XNB01, which, in

(continued)

PA3.8-100

BASES

~~turn, powers the #1 ESF bus through its normal feeder breaker. The second offsite circuit consists of the Startup Transformer, which is normally fed from the Switchyard Bus A, and is fed through breaker PA-0201 powering the ESF transformer, which, in turn, powers the #2 ESF bus through its normal feeder breaker.~~

The DG must be capable of starting, accelerating to required~~rated~~ speed and voltage, and connecting to its respective ~~ESF~~Safeguards bus on detection of bus undervoltage. ~~This sequence must be accomplished within [10] seconds.~~ The DG must be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ~~ESF~~Safeguards buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot or~~and~~ DG in standby at ambient conditions. CL3.8-202

Proper sequencing of loads~~, including tripping of nonessential loads,~~ is a required function for DG OPERABILITY. CL3.8-110

[~~In addition, proper sequencer operation is an integral part of offsite circuit OPERABILITY since its inoperability impacts on the ability to start and maintain energized loads required OPERABLE by LCO 3.8.10.~~]

LCO (continued)

~~It is acceptable for trains to be cross-tied during shutdown conditions, allowing a single offsite power circuit to supply all required trains.~~ CL3.8-210

PA3.8-211

A Note has been added allowing the LCO not being applicable for a period of 8 hours during the performance of SR 3.8.1.10. This is acceptable since the DG(s) will be

(continued)

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BASES

procedurally controlled and considering the small likelihood of a severe transient or event in this time period.

APPLICABILITY

The AC sources required to be OPERABLE in MODES 5 and 6 and during movement of irradiated fuel assemblies provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

b. Systems needed to mitigate a fuel handling accident are available;

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The AC power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.1.

The Load Sequencer requirements are covered in LCO 3.3.4, "4 KV Safeguards Bus Voltage Instrumentation".

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel TA3.8-140

(continued)

BASES

movement is independent of reactor operations. Entering LCO 3.0.3 while in MODES 1, 2, 3, or 4 would require the unit to be shutdown unnecessarily.

ACTIONS

A.1

An offsite circuitA required path would be considered inoperable if it were not available to at least one required ESFSafeguards train. Although two trains aremay be required by LCO 3.8.10, the one train with offsite power available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By the allowance of the option to declare required features inoperable, with no offsite power available, appropriate restrictions will be implemented in accordance with the affected required features LCO's ACTIONS. CL3.8-157

ACTIONS (continued)

A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4

With the offsite circuitrequired path not available to allat least one required trains, the option would still exist to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions . The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained.that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6). Suspending positive reactivity additions that could CL3.8-157 TA3.8-117

(continued)

PA3.8-100

BASES

result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability ~~or~~of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the unit safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the unit safety systems may be without sufficient power.

Pursuant to LCO 3.0.6, the Distribution System's ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC power to any required ~~ESF~~Safeguards bus, the ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the ~~offsite circuit~~path, whether or not a train is de-energized.

(continued)

PA3.8-100

BASES (continued)

LCO 3.8.10 would provide the appropriate restrictions for the situation involving a de-energized train.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. ~~SR 3.8.1.8 is not required to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.17 is not required to be met because the required OPERABLE DG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with the DG(s) that is not required to be operable.~~ PA3.8-142

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power ~~network~~grid or otherwise rendered inoperable during performance of SRs, and to preclude deenergizing a required ~~4160~~4 kV ~~ESF~~Safeguards bus or disconnecting a required ~~offsite circuit~~path during performance of SRs. With limited AC sources available, a single event could compromise both the required ~~circuit~~path and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and ~~offsite circuit~~required path is required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

REFERENCES

None.

PA3.8-100 CL3.8-145

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil~~, Lube Oil, and Starting Air~~

BASES

BACKGROUND

Each ~~diesel generator (DG)~~unit is provided with ~~a storage tank having~~ a fuel oil capacity sufficient to operate ~~that~~the diesel generator (DGs) ~~for a period of 7 days while the DG is supplying maximum post loss of coolant accident load demand~~ as discussed in the ~~F~~USAR~~, Section [9.5.4.2]~~(Ref. 1). ~~The maximum load demand is calculated using the assumption that a minimum of any two DGs is available.~~ This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources. CL3.8-143

New DG fuel oil is placed in a receiving tank where it is tested in accordance with the PI Diesel Fuel Oil Testing Program. Once the test results have verified that the fuel oil is within limits, the fuel oil may be transferred to the safeguards fuel oil storage tanks. Fuel oil is then transferred from the safeguards fuel oil storage tank to the day tank by ~~either of two~~ the fuel oil transfer pumps associated with each storage tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve or tank to result in the loss of more than one DG. ~~All outside tanks, pumps, and piping are located underground.~~ CL3.8-146 PA3.8-150

~~For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 2) addresses the recommended fuel oil practices as supplemented by ANSI N195 (Ref. 3). The fuel oil properties governed by these SRs are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and impurity level.~~ CL3.8-151

(continued)

PA3.8-100 | CL3.8-145

BASES (continued)

~~The DG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated DG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. Each engine oil sump contains an inventory capable of supporting a minimum of [7] days of operation. [The onsite storage in addition to the engine oil sump is sufficient to ensure 7 days of continuous operation.] This supply is sufficient to allow the operator to replenish lube oil from outside sources.~~

~~Each DG has an air start system with adequate capacity for five successive start attempts on the DG without recharging the air start receiver(s).~~

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the F~~S~~USAR~~, Chapter [6]~~ (Ref. 2~~4~~)~~, and in the FSAR, Chapter [15] (Ref. 5),~~ assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

Since the diesel fuel oil~~, lube oil, and the air start sub~~system supports the operation of the standby AC power sources, i~~they~~ satisf~~y~~ies Criterion 3 of 10 CFR 50.36(c)(2)(ii)~~the NRC Policy Statement~~.

(continued)

PA3.8-100 CL3.8-145

BASES (continued)

LCO

Stored diesel fuel oil is required to have sufficient supply for one DG on each unit to operate for 14 days (Ref. 1) 7 days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lubricating oil supply must be available to ensure the capability to operate at full load for 7 days. This requirement, in conjunction with an ability to obtain replacement supplies within 714 days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an anticipated operational occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the safeguards storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources – Operating," and LCO 3.8.2, "AC Sources – Shutdown." CL3.8-152

The starting air system is required to have a minimum capacity for five successive DG start attempts without recharging the air start receivers.

APPLICABILITY

The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Since stored diesel fuel oil, lube oil, and the starting air subsystem supports LCO 3.8.1 and LCO 3.8.2, itstored diesel fuel oil, lube oil,

(continued)

PA3.8-100 CL3.8-145

BASES

~~APPLICABILITY (continued)~~

~~and starting air are~~ is required to be within limits when the ~~associated~~ DG(s) is required to be OPERABLE.

ACTIONS

~~The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) are governed by separate Condition entry and application of associated Required Actions.~~ PA3.8-134

A.1

In this Condition, the ~~7~~14 day fuel oil supply for the~~a~~ DG(s) is not available. However, the Condition is restricted to fuel oil supply~~level~~ reductions that maintain at least a ~~6~~12 day supply. These circumstances may be caused by events, such as full load operation required after an inadvertent start while at minimum required supply~~level~~, or feed and bleed operations, which may be necessitated by increasing particulate levels or any number of other oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank(s). A period of 48 hours is considered sufficient to complete restoration of the required supply~~level~~ prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> ~~6~~12 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period. CL3.8-152

(continued)

PA3.8-100 CL3.8-145

BASES

B.1

With lube oil inventory < 500 gal, sufficient lubricating oil to support 7 days of continuous DG operation at full load conditions may not be available. However, the Condition is restricted to lube oil volume reductions that maintain at least a 6 day supply. This restriction allows sufficient time to obtain the requisite replacement volume. A period of 48 hours is considered sufficient to complete

ACTIONS B.1 (continued)

restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

CB.1

CL3.8-146

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.52. If fuel oil properties in a DG fuel oil tank are not within limits, actions must be taken to restore the fuel oil properties to within limits. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates If the fuel oil properties in the fuel oil tank are not within limits, it does not mean failure of the fuel oil to burn properly in the diesel engine, and particulate concentration is unlikely to change significantly between

(continued)

PA3.8-100 | CL3.8-145

Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (~~within 31 days~~), it is prudent to allow a brief period prior to declaring the associated DG inoperable or isolating the associated fuel oil tank. Therefore, t~~T~~he 7 day Completion Time allows for further evaluation, resampling and re-analysis of the DG fuel oil.

~~D~~G.1

~~With the new fuel oil properties defined in the Bases for SR 3.8.3.4 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.~~ CL3.8-146

With a Required Action and associated Completion Time of Condition B not met, the associated fuel oil tank must be isolated immediately. Isolation of a specific fuel oil tank may not make the associated DG inoperable since the DG can take suction from another fuel oil tank. Isolation of the associated fuel oil tank may cause entry into Conditions A or D which could result in the DG being inoperable. CL3.8-146

(continued)

PA3.8-100 CL3.8-145

BASES

~~ACTIONS (continued)~~ ~~E.1~~

~~With starting air receiver pressure < [225] psig, sufficient capacity for five successive DG start attempts does not exist. However, as long as the receiver pressure is > [125] psig, there is adequate capacity for at least one start attempt, and the DG can be considered OPERABLE while the air receiver pressure is restored to the required limit. A period of 48 hours is considered sufficient to complete restoration to the required pressure prior to declaring the DG inoperable. This period is acceptable based on the remaining air start capacity, the fact that most DG starts are accomplished on the first attempt, and the low probability of an event during this brief period.~~

DF.1

With the stored fuel oil supply not within the limits specified or ~~a~~ Required Actions and associated Completion Times of Conditions A or C not met~~, or one or more DG's fuel oil, lube oil, or starting air subsystem not within limits for reasons other than addressed by Conditions A through D~~, the ~~associated~~ DGs may be incapable of performing ~~its~~their intended function and must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support the operation of one DG~~each DG's operation~~ for 714 days ~~at full load~~. The 714 day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location. CL3.8-152

(continued)

PA3.8-100 CL3.8-145

BASES

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

~~SR 3.8.3.2~~

~~This Surveillance ensures that sufficient lube oil inventory is available to support at least 7 days of full load~~

~~SURVEILLANCE REQUIREMENTS~~ ~~SR 3.8.3.2 (continued)~~

~~operation for each DG. The [500] gal requirement is based on the DG manufacturer consumption values for the run time of the DG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the DG, when the DG lube oil sump does not hold adequate inventory for 7 days of full load operation without the level reaching the manufacturer recommended minimum level.~~

~~A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DG starts and run time are closely monitored by the unit staff.~~

SR 3.8.3.~~3~~2

The tests ~~listed below~~for the new fuel oil prior to addition into the safeguards storage tank(s) are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate, detrimental impact on diesel engine combustion. If results from these tests are within acceptable limits, the fuel oil may be added to the safeguards storage tanks without concern for contaminating the entire volume of fuel oil in the safeguards storage CL3.8-154

(continued)

PA3.8-100 CL3.8-145

BASES

tanks. These tests are to be conducted prior to adding the new fuel to the safeguards storage tank(s), but in no case is the time between receipt of new fuel and conducting the testsaddition of new fuel oil to the safeguards storage tank(s) to exceed 31 days. The tests, and limits, for new and stored fuel areand applicable ASTM Standards described in the Diesel Fuel Oil Testing Program of Specification 5.5.11 are as follows:

a. Sample the new fuel oil in accordance with ASTM D4057-[88] (Ref. 6); CL3.8-155

b. Verify in accordance with the tests specified in ASTM D975-[77] (Ref. 6) that the sample has an absolute specific gravity at 60/60°F of ≥ 0.83 and ≤ 0.89 or an API gravity at 60°F of ≥ 27° and ≤ 39°, a kinematic viscosity at 40°C of ≥ 1.9 centistokes and ≤ 4.1 centistokes, and a flash point of ≥ 125°F; and

c. Verify that the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-[ ] (Ref. 6).

SURVEILLANCE REQUIREMENTS

SR 3.8.3.3 (continued)

Failure to meet any of the above limits specified in the Diesel Fuel Oil Testing Program is cause for rejecting the new fuel oil, but does not represent a failure to meet the LCO concern since the fuel oil is not added to the storage tanks. Failure to meet any of the limits for stored fuel requires entry into Condition B.

Within 31 days following the initial new fuel oil sample, the fuel oil is analyzed to establish that the other properties specified in Table 1 of ASTM D975-[77] (Ref. 7) are met for new fuel oil when tested in accordance with CL3.8-155

(continued)

PA3.8-100 CL3.8-145

BASES

ASTM D975-[77] (Ref. 6), except that the analysis for sulfur may be performed in accordance with ASTM D1552-[ ] (Ref. 6) or ASTM D2622-[ ] (Ref. 6). The 31 day period is acceptable because the fuel oil properties of interest, even if they were not within stated limits, would not have an immediate effect on DG operation. This Surveillance ensures the availability of high quality fuel oil for the DGs.

Fuel oil degradation during long term storage shows up as an increase in particulate, due mostly to oxidation. The presence of particulate does not mean the fuel oil will not burn properly in a diesel engine. The particulate can cause fouling of filters and fuel oil injection equipment, however, which can cause engine failure. CL3.8-155

Particulate concentrations should be determined in accordance with ASTM D2276-[ ], Method A (Ref. 6). This method involves a gravimetric determination of total particulate concentration in the fuel oil and has a limit of 10 mg/l. It is acceptable to obtain a field sample for subsequent laboratory testing in lieu of field testing. [For those designs in which the total stored fuel oil volume is contained in two or more interconnected tanks, each tank must be considered and tested separately.] CL3.8-155

The Frequency of this test takes into consideration fuel oil degradation trends that indicate that particulate concentration is unlikely to change significantly between Frequency intervals. CL3.8-155

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG

(continued)

PA3.8-100 CL3.8-145

BASES

~~is available. The system design requirements provide for a minimum of [five] engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.~~

~~The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.~~

~~SR 3.8.3.5~~

~~Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, and contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.~~ CL3.8-147

(continued)

PA3.8-100 CL3.8-145

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.6

Draining of the fuel oil stored in the supply tanks, removal of accumulated sediment, and tank cleaning are required at 10 year intervals by Regulatory Guide 1.137 (Ref. 2), paragraph 2.f. This SR also requires the performance of the ASME Code, Section XI (Ref. 8), examinations of the tanks. To preclude the introduction of surfactants in the fuel oil system, the cleaning should be accomplished using sodium hypochlorite solutions, or their equivalent, rather than soap or detergents. This SR is for preventive maintenance. The presence of sediment does not necessarily represent a failure of this SR, provided that accumulated sediment is removed during performance of the Surveillance. TA3.8-156

REFERENCES

1. FUSAR, Sections [9.5-8.4 and 10.3.4.2].
2. Regulatory Guide 1.137.
3. ANSI N195-1976, Appendix B.
24. FUSAR, Section [146].
5. FSAR, Chapter [15].
6. ASTM Standards: D4057-[ ]; D975-[77]; D4176-[ ]; D1552-[ ]; D2622-[ ]; D2276, Method A. CL3.8-154
7. ASTM Standards, D975, Table 1.
8. ASME, Boiler and Presser Vessel Code, Section XI. TA3.8-156

PA3.8-100

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources – Operating

BASES

BACKGROUND

The ~~station~~ DC safeguards electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and preferred Reactor Protection Instrument AC Panel~~vital bus~~ power (via inverters). As required by ~~10 CFR 50, Appendix A,~~AEC GDC ~~17~~39 (Ref. 1), the DC safeguards electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. ~~The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and IEEE-308 (Ref. 3).~~ CL3.8-172

The ~~[~~125~~/250]~~ VDC safeguards electrical power system consists of two independent and redundant safety related ~~Class 1E~~ DC safeguards electrical power subsystems (~~[~~Train A and Train B~~]~~). ~~Each subsystem consists of~~The sources for a train are a~~[two]~~ 125 VDC battery~~ies~~ ~~[(each battery [50]% capacity)]~~, a~~the associated~~ battery charger~~(s) for each battery~~, and all the associated control equipment and interconnecting cabling.

~~The 250 VDC source is obtained by use of the two 125 VDC batteries connected in series. Additionally t~~There is ~~[one]~~ ~~spare~~portable battery charger ~~per subsystem,~~ which can provide~~s~~ backup service in the event that a~~the preferred~~stationary battery charger is out of service. If the portable~~spare~~ battery charger is substituted for ~~one of~~ the stationary~~preferred~~ battery charger~~s~~, then the requirements of independence and redundancy between subsystems are maintained. CL3.8-173

(continued)

PA3.8-100

BASES

During normal operation, the [125/250] VDC load is powered from the battery chargers with the batteries floating on the system. In case of loss of normal power to the battery charger, the DC load is automatically powered from the station batteries.

The [Train A and Train B] DC safeguards electrical power sourcessubsystems provide the control power for itstheir associated safeguardsClass 1E AC power load group, [4.16] kV switchgear, and [480] V switchgearload centers. The DC safeguards electrical power sourcessubsystems also provide backup DC electrical power to the inverters, which in turn power the Reactor Protection Instrument AC Panelsvital buses.

BACKGROUND (continued)

The DC safeguards power distribution system is described in more detail in Bases for LCO 3.8.9, "Distribution Systems – Operating," and LCO 3.8.10, "Distribution Systems – Shutdown."

Each battery has adequate storage capacity as discussed in Reference 2. to carry the required load continuously for at least 2 hours and to perform three complete cycles of intermittent loads discussed in the FSAR, Chapter [8] (Ref. 4). TP3.8-160

Each 125 VDC battery is separately housed in a ventilated room withapart from its charger and distribution centers. Each subsystem is located in an area separated physically and electrically from the other subsystem to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing between redundant safeguardsClass 1E subsystems, such as batteries, battery chargers, or distribution panels.

(continued)

PA3.8-100

BASES

~~The batteries for Train A and Train B DC electrical power subsystems are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demand.~~ PA3.8-186

~~Battery size is based on 125% of required capacity and, after selection of an available commercial battery, results in a battery capacity in excess of 150% of required capacity. The voltage limit is 2.13 V per cell, which corresponds to a total minimum voltage output of 128 V per battery discussed in the FSAR, Chapter [8] (Ref. 4). The criteria for sizing large lead storage batteries are defined in IEEE-485 (Ref. 5).~~ TP3.8-160

PA3.8-186

Each ~~Train A and Train B DC electrical power subsystem~~ battery charger has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery ~~bank~~ fully charged. Each battery charger also has sufficient capacity to restore the battery ~~from the design minimum charge~~ to its fully charged state within 24 hours while supplying normal steady state loads discussed in the ~~F~~USAR~~, Chapter [8]~~ (Ref. 24). TP3.8-160 CL3.8-114

The battery charger is normally in the float-charge mode. Float-charge is the condition in which the charger is supplying the connected loads and the battery cells are receiving adequate current to optimally charge the battery. This assures the internal losses of a battery are overcome and the battery is maintained in a fully charged state. TP3.8-160

When desired, the charger can be placed in the equalize mode. The equalized mode is at a higher voltage than the float mode and charging current is correspondingly higher. The battery charger is operated in the equalize mode after a battery discharge or for routine maintenance. Following a battery discharge, the battery recharge characteristic

(continued)

accepts current at a current limit of the battery charger (if the discharge was significant, e.g., following a battery service test) until the battery terminal voltage approaches the charger voltage setpoint. Charging current then reduces exponentially during the remainder of the recharge cycle. Lead-calcium batteries have recharge efficiencies of greater than 95%, so once at least 105% of the ampere-hours discharged have been returned, the battery capacity would be restored to the same condition as it was prior to the discharge. This can be monitored by direct observation of the exponentially decaying charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery. TP3.8-160

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FUSAR ~~Chapter [6]~~ (Ref. 86) ~~and in the FSAR, Chapter [15] (Ref. 7),~~ assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC safeguards electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation.

~~APPLICABLE SAFETY ANALYSES (continued)~~

The OPERABILITY of the DC sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining the DC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite AC power ~~or all onsite AC power~~; and CL3.8-163

b. A worst case single failure.

(continued)

PA3.8-100

BASES

The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii)the NRC Policy Statement.

LCO

The DC safeguards electrical power subsystems, each subsystem consisting of a[two] batteryies, battery charger [for each battery] and the corresponding control equipment and interconnecting cabling, supplying power to the associated panelbus within the train, are required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA. Loss of any train DC safeguards electrical power subsystem does not prevent the minimum safety function from being performed (Ref. 24).

An OPERABLE DC safeguards electrical power subsystem requires theall required batteryies and a respective chargers to be operating and connected to the associated DC panelbus(es).

APPLICABILITY

The DC safeguards electrical power sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure safe unit operation and to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and CL3.8-205

APPLICABILITY (continued)

b. Adequate core cooling is provided, and containment integrity and other vital functions are maintained in the event of a postulated DBA.

(continued)

PA3.8-100

BASES

The DC electrical power requirements for MODES 5 and 6 are addressed in the Bases for LCO 3.8.5, "DC Sources – Shutdown."

ACTIONS

A.1 and A.2 TP3.8-160

Condition A represents one battery charger inoperable. Required Action A.1 allows 2 hours to establish that the battery capacity remains (or is restored) sufficient to perform its required safety function (duty cycle). This provides assurance that in the event of a DBA during the 8 hours allowed by Required Action A.2 to restore the battery charger to OPERABLE status, the battery will be available to perform its assumed function. If at the expiration of the initial 2 hour period the battery capacity can not be determined to be sufficient to perform the design duty cycle, the battery must be declared inoperable and Condition B entered. It is not required to perform a test (e.g., battery service test) to confirm the battery capacity; rather the intent of this Required Action can be evaluated by indirect means, such as observation of the charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery. Consideration of excess capacity that was determined by previous testing may also be utilized in this evaluation. CL3.8-171

During the 2 hour Completion Time for Required Action A.1, provided the battery is otherwise not known to be inoperable (including charging currents not in excess of 10 amps), the battery may be considered OPERABLE and operation continued in accordance with Action A. This is an acceptable presumption based on the limited discharge of the battery (<2 hours). TP3.8-160

Required Action A.2 limits the restoration time for the

(continued)

BASES

inoperable battery charger to 8 hours. The 8 hour Completion Time reflects a reasonable time to effect restoration of the battery charger to OPERABLE status. CL3.8-171

B.1 TP3.8-160

With the battery inoperable, the DC panel is being supplied by the OPERABLE battery charger. Any event that resulted in a loss of the Motor Control Center (MCC) supporting the battery charger will also result in loss of DC to that train. Therefore, it is imperative that the operator's attention focus on restoring the battery, thereby minimizing the potential for a complete loss of DC power to the affected train. The 8 hour limit allows sufficient time to effect restoration of an inoperable battery while minimizing the risk of a loss of AC power to the associated battery charger as a result of imposing a required unit shutdown. During this time, additional single failures are not required to be assumed. CL3.8-171

~~A~~C.1

~~Condition A represents one train with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected train. The 2 hour limit is consistent with the allowed time for an inoperable DC distribution system train.~~ PA3.8-148

If one of the required DC safeguards electrical power sources~~subsystems~~ is inoperable for reasons other than Condition A or B ~~(e.g., inoperable battery, inoperable battery charger(s), or inoperable battery charger and~~ TP3.8-160

(continued)

associated inoperable battery), the remaining DC safeguards electrical power sourcesubsystem has the capacity to support a safe shutdown and to mitigate an accident condition. Since a subsequent worst case single failure couldwould, however, result in the complete loss of minimum necessary DC safeguards electrical sources to mitigate a worst case accidentthe remaining 125 VDC electrical power subsystems with attendant loss of ESF functions, continued power operation should not exceed 82 hours. The 28 hours Completion Time is based on Regulatory Guide 1.93 (Ref. 8) and reflects a reasonable time to assess unit status as a function of the inoperable DC safeguards electrical power sourcesubsystem and, if the DC safeguards electrical power sourcesubsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown. CL3.8-171 CL3.8-172

DB.1 and DB.2 TP3.8-160

If the inoperable DC safeguards electrical power sourcesubsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5

ACTIONS B.1 and B.2 (continued)

within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems. The Completion Time to bring the unit to MODE 5 is consistent with other standard shutdown conditionsthe time required in Regulatory Guide 1.93 (Ref. 8). CL3.8-172

(continued)

PA3.8-100

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge ~~for the batteries~~ helps to ensure the effectiveness of the battery chargers which support the ability of the batteries to perform their intended function. ~~charging system and the ability of the batteries to perform their intended function.~~ Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery ~~(or battery cell)~~ and maintain the battery ~~(or a battery cell)~~ in a fully charged state while supplying the continuous steady state loads of the associated DC subsystem. On float charge, battery cells will receive adequate current to optimally charge the battery. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the minimum float voltage established by the battery manufacturer. ~~The voltage requirements are based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations.~~ The 7 day Frequency is consistent with manufacturer recommendations ~~and IEEE-450 (Ref. 9)~~. TP3.8-160 CL3.8-172

~~SR 3.8.4.2~~ TP3.8-160

~~Visual inspection to detect corrosion of the battery cells and connections, or measurement of the resistance of each intercell, interrack, intertier, and terminal connection, provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance.~~

~~The limits established for this SR must be no more than 20% above the resistance as measured during installation or not above the ceiling value established by the manufacturer.~~

(continued)

PA3.8-100

BASES

~~The Surveillance Frequency for these inspections, which can detect conditions that can cause power losses due to resistance heating, is 92 days. This Frequency is considered acceptable based on operating experience related to detecting corrosion trends.~~

~~SURVEILLANCE REQUIREMENTS (continued)~~

~~SR 3.8.4.3~~ TP3.8-160

~~Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance.~~

~~The 12 month Frequency for this SR is consistent with IEEE-450 (Ref. 9), which recommends detailed visual inspection of cell condition and rack integrity on a yearly basis.~~

~~SR 3.8.4.4 and SR 3.8.4.5~~ TP3.8-160

~~Visual inspection and resistance measurements of intercell, interrack, intertier, and terminal connections provide an indication of physical damage or abnormal deterioration that could indicate degraded battery condition. The anticorrosion material is used to help ensure good electrical connections and to reduce terminal deterioration. The visual inspection for corrosion is not intended to require removal of and inspection under each terminal connection. The removal of visible corrosion is a preventive maintenance SR. The presence of visible corrosion does not necessarily represent a failure of this SR provided visible corrosion is removed during performance of SR 3.8.4.4.~~

(continued)

PA3.8-100

BASES

Reviewer's Note: The requirement to verify that terminal connections are clean and tight applies only to nickel cadmium batteries as per IEEE Standard P1106, "IEEE Recommended Practice for Installation, Maintenance, Testing and Replacement of Vented Nickel - Cadmium Batteries for Stationary Applications." This requirement may be removed for lead acid batteries.

The connection resistance limits for SR 3.8.4.5 shall be no more than 20% above the resistance as measured during installation, or not above the ceiling value established by the manufacturer.

The Surveillance Frequencies of 12 months is consistent with IEEE-450 (Ref. 9), which recommends cell to cell and terminal connection resistance measurement on a yearly basis.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.62

This SR requires that each battery charger be capable of supplying [400] amps and [125] V for ≥ [8] hours. These requirements are based on verifies the design capacity of the battery chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 10), tThe battery charger supply is sizedrequired to be based on the largest combinationed demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied. This charging capacity exceeds the minimum requirements for the charger to support the required steady state DC loads in analyzed accidents. TP3.8-160 CL3.8-114 TP3.8-160

(continued)

PA3.8-100

BASES

This SR provides two options. One option requires that the battery charger be capable of supplying a nominal 300 amps at the float voltage for approximately 2 hours. The ampere requirements are based on the output rating of the chargers. The voltage requirements are based on the charger voltage level after a response to a loss of AC power. The time period is sufficient for the charger temperature to have stabilized. TP3.8-160

The other option requires that each battery charger be capable of recharging the battery after a discharge test coincident with supplying the expected normal operating loads. The duration for this test may be longer than the charger sizing criteria since the battery recharge is affected by float voltage, temperature, and the exponential decay in charging current. The battery is fully recharged when the measured charging current is ≤ 2 amps. TP3.8-160

The Surveillance Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing to ensure adequate charger performance during these ~~[18~~24 month~~]~~ intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths. X3.8-126

~~This Surveillance is required to be performed during MODES 5 and 6 since it would require the DC electrical power subsystem to be inoperable during performance of the test.~~ TP3.8-160

~~This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.~~

(continued)

BASES

SR 3.8.4.~~7~~3

A battery service test is a special test of battery capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length should correspond to the design duty cycle requirements as specified in Reference ~~2~~4.

The Surveillance Frequency of ~~[18~~24 months~~]~~ is consistent with the~~ recommendations of Regulatory Guide 1.32 (Ref. 10) and Regulatory Guide 1.129 (Ref. 11), which state that the battery service test should be performed during~~ need to perform this test during refueling operations or at some other outage, with intervals between tests, not to exceed ~~[18~~24 months~~]~~. X3.8-126 CL3.8-172

SURVEILLANCE REQUIREMENTS

SR 3.8.4.~~7~~3 (continued)

This SR is modified by two Notes. Note 1 allows the performance of a modified performance discharge test in lieu of a service test~~ once per 60 months~~.

~~The modified performance discharge test is a simulated duty cycle consisting of just two rates; the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a rated one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test should remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.~~ TP3.8-160

(continued)

PA3.8-100

A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test. TP3.8-160

The reason for Note 2 is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR. TA3.8-123

SR 3.8.4.8 TP3.8-160

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

SURVEILLANCE REQUIREMENTS

SR 3.8.4.8 (continued)

A battery modified performance discharge test is described in the Bases for SR 3.8.4.7. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.8; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.8 while satisfying the requirements of SR 3.8.4.7 at the same time.

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 9) and IEEE-485 (Ref. 5). These

(continued)

BASES

references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-450 (Ref. 9), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is ≥ [10%] below the manufacturer's rating. These Frequencies are consistent with the recommendations in IEEE-450 (Ref. 9). TP3.8-160

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

REFERENCES

1. 10 CFR 50, Appendix AAEC "General Design Criteria for Nuclear Power Plant Construction Permits," Criterion 39, issued for comment July 10, 1976, as referenced in USAR, Section 1.2, GDC 17.

2. Regulatory Guide 1.6, March 10, 1971.

3. IEEE-308-[1978].

(continued)

BASES (continued)

REFERENCES (continued)

24. FUSAR, ChapterSection [8].

5. IEEE-485-[1983], June 1983.

36. FUSAR, ChapterSection [6] 14. TP3.8-160

7. FSAR, Chapter [15].

8. Regulatory Guide 1.93, December 1974. CL3.8-172

9. IEEE-450-[1987].

10. Regulatory Guide 1.32, February 1977.

11. Regulatory Guide 1.129, December 1974.

PA3.8-100

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources – Shutdown

BASES

BACKGROUND

A description of the DC sources is provided in the Bases for LCO 3.8.4, "DC Sources – Operating."

PA3.8-212

In addition to the safeguards DC sources, the service building battery or charger may be used as alternate power sources during plant shutdown. These alternate sources may be considered to be a required power source available to provide reliable power to various plant systems and equipment that are required to be OPERABLE to support shutdown conditions.

PA3.8-192

APPLICABLE SAFETY ANALYSES

~~The initial conditions of Design Basis Accident and transient analyses in the FSAR, Chapter [6] (Ref. 1) and Chapter [15] (Ref. 2), assume that Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators, emergency auxiliaries, and control and switching during all MODES of operation.~~

~~The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.~~

The OPERABILITY of the minimum DC electrical power sources during MODES 5 and 6 and during movement of irradiated fuel assemblies ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

(continued)

PA3.8-100

BASES

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shut down, the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems. TA3.8-175

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODES 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on: PA3.8-192

(continued)

PA3.8-100

BASES

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

The Shutdown Technical Specification requirements are designed to ensure that the unit has the capability to mitigate the consequences of certain postulated accidents. Worst case DBA which are analyzed for operating MODES are generally viewed not to be a significant concern during shutdown MODES due to lower energies involved. The Technical Specifications therefore require a lesser complement of electrical equipment to be available during shutdown than is required during operating MODES. More recent work completed on the potential risks associated with shutdown, however, have found significant risk associated with certain shutdown evolutions. As a result, in addition to the requirements established in the Technical Specifications, the industry has adopted NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management" as an Industry initiative to manage shutdown tasks and associated electrical support to maintain risk at an acceptable low level. This may require the availability TA3.8-175

(continued)

PA3.8-100

of additional equipment beyond that required by the shutdown Technical Specifications.

The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii) the NRC Policy Statement.

LCO

~~LCO~~

~~(continued)~~

~~The~~Each DC electrical power subsystem~~s, each subsystem~~ consist~~s~~ing of ~~a~~two batter~~y~~ies, ~~one~~ battery charger ~~per battery~~, and the corresponding control equipment and interconnecting cabling within the train~~s,~~. One battery or charger is~~are~~ required to be OPERABLE to support required trains of the distribution systems required OPERABLE by LCO 3.8.10, "Distribution Systems – Shutdown." This ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents). CL3.8-177

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 5 and 6, and during movement of irradiated fuel assemblies, provide assurance that:

a. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

b. Required features needed to mitigate a fuel handling accident are available;

c. Required features necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

(continued)

BASES

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The DC electrical power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.4.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Entering LCO 3.0.3 while in MODE 1, 2, 3, or 4 would require the unit to be shut down unnecessarily. TA3.8-140

A.1, A.2.1, A.2.2, A.2.3, and A.2.4

~~If two trains are required by LCO 3.8.10, t~~The OPERABLE DC power source ~~remaining train with DC power available~~ may be capable of supporting sufficient systems to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features inoperable with the associated DC power source(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCO ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the CL3.8-177

~~ACTIONS~~ ~~A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)~~

(continued)

PA3.8-100

BASES

allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions) that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained. TA3.8-117

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power source(s) subsystems and to continue this action until restoration is accomplished in order to provide the necessary DC electrical power to the unit safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required DC electrical power source(s) subsystems should be completed as quickly as possible in order to minimize the time during which the unit safety systems may be without sufficient power.

(continued)

PA3.8-100

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

CL3.8-215

SR 3.8.5.1 requires performance of all Surveillances required by SR 3.8.4.1 through SR 3.8.4.38. Therefore, see the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DC sources from being discharged below their capability to provide the required power supply or otherwise rendered inoperable during the performance of SRs. It is the intent that these SRs must still be capable of being met, but actual performance is not required.

REFERENCES

~~1. FSAR, Chapter [6].~~

~~2. FSAR, Chapter [15].~~None.

(continued)

PA3.8-100

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery ~~Cell~~ Parameters

BASES

BACKGROUND

This LCO delineates the limits on battery float current as well as electrolyte temperature, level, and float voltage~~,~~ ~~and specific gravity~~ for the DC power source batteries. A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.4, "DC Sources – Operating," and LCO 3.8.5, "DC Sources – Shutdown." In addition to the limitations of this Specification, plant procedures also require monitoring various battery parameters that are based on the recommendations of Reference 1. TP3.8-160 CL3.8-172

The battery cells are of flooded lead acid construction with a nominal specific gravity as required by the manufacturer. This specific gravity corresponds to an open circuit battery voltage of approximately 120V for a 58 cell battery (i.e., cell voltage of 2.065 volts per cell (Vpc)). The open circuit voltage is the voltage maintained when there is no charging or discharging. Once fully charged with its open circuit voltage ≥ 2.065 Vpc, the battery cell will maintain its capacity for ≥ 30 days without further charging per manufacturer's instructions. Optimal long term performance, however, is obtained by maintaining a float voltage which limits the formation of lead sulfate and self discharge. TP3.8-160 PA3.8-162

The current flow into the battery is also a primary parameter used to monitor the capacity of the battery. During a service test or performance test discharge, the fully charged battery voltage (nominal open circuit voltage at 2.065 Vpc) will decrease to approximately 1.8 Vpc (or for a 58 cell battery 105 V battery terminal voltage). The battery recharges at the current limit of the battery TP3.8-160

(continued)

PA3.8-100

BASES

charger (300 amps) until the battery terminal voltage approaches the voltage setpoint for the charger (on equalize the battery terminal voltage will be approximately 135 V or 2.33 Vpc). Charging current reduces exponentially during the remainder of the recharge cycle. Industry test data has shown that when charging at float voltage or greater, and the charging current reduces to approximately 2 amps, 98% of the original battery capacity is restored. Industry test data has also shown that when charging at equalized voltage, and the charging current reduces to approximately 13% of the chargers current limit setting (40 amps), 95% of the original battery capacity has been restored. With the design margins in battery sizing and the excess capacity available above the maximum assumed load, battery OPERABILITY (including post maintenance return to service) is assured at charging currents well above 10 amps.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FUSAR~~, Chapter [6] (Ref. 1) and Chapter [15]~~ (Ref. 2)~~,~~ assume Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators, emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining at least one train of DC sources OPERABLE during accident conditions, in the event of:

a. An assumed loss of all offsite AC power ~~or all onsite AC power~~; and CL3.8-163

b. A worst case single failure.

(continued)

PA3.8-100

BASES (continued)

Battery~~-cell~~ parameters satisfy the Criterion 3 of 10 CFR 50.36(c)(2)(ii)~~the NRC Policy Statement~~.

LCO

Battery~~-cell~~ parameters must remain within acceptable limits to ensure availability of the required DC power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. ~~Electrolyte~~Battery parameter limits are conservatively established, allowing continued DC electrical system function even with~~-Category A and B~~ limits not met. Additional preventative maintenance, testing, and monitoring performed in accordance with the plant procedures is conducted without direct impact on the requirements of this Specification. Failure of any procedural requirement is evaluated against the Technical Specifications limits, but does not necessarily result in failure to meet this LCO. TP3.8-160

APPLICABILITY

The battery~~-cell~~ parameters are required solely for the support of the associated DC electrical power subsystems. Therefore, battery ~~electrolyte is~~parameter limits are only required when the DC power source is required to be OPERABLE. Refer to the Applicability discussion in Bases for LCO 3.8.4 and LCO 3.8.5. TP3.8-160

ACTIONS

A Note has been added to provide clarification that, for this LCO, separate Condition entry is allowed for each battery. This is acceptable, since Required Actions for each Condition provide appropriate compensatory actions. PA3.8-158

A.1, A.2, and A.3

With one or more cells in one or more batteries ≤ 2.07 V, the battery is degraded. Within 2 hours verification of the required battery charger OPERABILITY is made by TP3.8-160

(continued)

PA3.8-100

BASES (continued)

monitoring the battery terminal voltage (SR 3.8.4.1) and of the overall battery state of charge by monitoring the battery float charge current (SR 3.8.6.1). This assures that there is still sufficient battery capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of one or more cells in one or more batteries < 2.07 V, and continued operation is permitted for a limited period up to 72 hours ~~not within limits (i.e., Category A limits not met, Category B limits not met, or Category A and B limits not met) but within the Category C limits specified in Table 3.8.6-1 in the accompanying LCO, the battery is degraded but there is still sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of Category A or B limits not met and operation is permitted for a limited period.~~ PA3.8-159

~~The pilot cell electrolyte level and float voltage required to be verified to meet the Category C limits within 1 hour (Required Action A.1). This check will provide a quick indication of the status of the remainder of the battery cells. One hour provides time to inspect the electrolyte level and to confirm the float voltage of the pilot cells. One hour is considered a reasonable amount of time to perform the required verification.~~ TP3.8-160

~~Verification that the Category C limits are met (Required Action A.2) provides assurance that during the time needed to restore the parameters to the Category A and B limits, the battery is still capable of performing its intended function. A period of 24 hours is allowed to complete the initial verification because specific gravity measurements must be obtained for each connected cell. Taking into consideration both the time required to perform the required verification and the assurance that the battery~~ TP3.8-160

(continued)

PA3.8-100

BASES

~~cell parameters are not severely degraded, this time is considered reasonable. The verification is repeated at 7 day intervals until the parameters are restored to Category A or B limits. This periodic verification is consistent with the normal Frequency of pilot cell Surveillances.~~

~~ACTIONS~~ ~~A.1, A.2, and A.3 (continued)~~

~~Continued operation is only permitted for 31 days before battery cell parameters must be restored to within Category A and B limits. With the consideration that, whilebattery capacity is degraded, sufficient capacity exists to perform the intended function and to allow time to fully restore the battery cell parameters to normal limits, this time is acceptable prior to declaring the battery inoperable.~~ TP3.8-160

Since the Required Actions only specify "perform," a failure of SR 3.8.4.1 or SR 3.8.6.1 acceptance criteria does not result in this Required Action not met. However, if one of the SRs is failed, the applicable Condition in the associated Specification is entered. TP3.8-160

B.1

TP3.8-160

One or more batteries float current > 2 amps indicates that a partial discharge of the battery capacity has occurred. This may be due to a temporary loss of a battery charger or to one or more battery cells in a low voltage condition reflecting some loss of capacity. Taking into consideration that, while battery capacity is degraded, sufficient capacity exists to perform the intended function, this time is acceptable for operation prior to declaring the DC batteries inoperable.

(continued)

C.1, C.2, and C.3

TP3.8-160

With one or more batteries with one or more cells electrolyte level below the minimum established design limits, the battery still retains sufficient capacity to perform the intended function. Even in the event level drops slightly below the top of the plates, the plates are porous and acid will wick from the immersed plate. Therefore, the affected battery is not required to be considered inoperable solely as a result of electrolyte level not met. Within 8 hours level is required to be restored to above the top of plates and within 31 days the minimum established design limits for electrolyte level must be re-established.

Required Action C.2 is modified by a Note that requires that the affected cell voltage be monitored (SR 3.8.6.5) only if electrolyte level was below the top of the plates. Furthermore, Condition C is modified by a Note that required Action C.2 be completed whenever electrolyte is discovered below the top of the plates. Since this Condition may be exited well before the end of the 7 day period, this Note is required to complete the necessary monitoring period. With electrolyte level below the top of the plates there is a potential for dryout and plate degradation. Therefore, this monitoring will ensure continued plate integrity. Since the Required Action only specified "perform," a failure of SR 3.8.6.5 acceptance criteria does not result in this Required Action not met. However, if one or more cell voltages fail to meet SR 3.8.6.5, Condition A is entered. TP3.8-160

D.1

With one or more batteries with pilot cell temperature less than the minimum established design limits, 12 hours TP3.8-160

(continued)

PA3.8-100

BASES

is allowed to restore the temperature to within limits. A low electrolyte temperature limits the power available. Since the battery is sized with margin, while battery capacity is degraded, sufficient capacity exists to perform the intended function and the affected battery is not required to be considered inoperable solely as a result of the pilot cell temperature not met.

EB.1

With one or more batteries with any~~one or more~~ battery ~~cell~~ parameters outside the ~~Category C limit for any connected cell~~allowances of the Required Actions for Condition A, B, C, or D, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding ~~DC~~ battery~~electrical power subsystem~~ must be declared inoperable. ~~Additionally, other potentially extreme conditions, such as not completing the Required Actions of Condition A within the required Completion Time or average electrolyte temperature of representative cells falling below 60°F, are also cause for immediately declaring the associated DC electrical power subsystem inoperable.~~ TP3.8-160

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

~~This SR verifies that Category A battery cell parameters are consistent with IEEE-450 (Ref. 3), which recommends regular battery inspections (at least one per month) including voltage, specific gravity, and electrolyte temperature of pilot cells.~~ Verifying battery float current while on float charge is used to determine the state of charge of the battery. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and TP3.8-160

(continued)

PA3.8-100

BASES

maintain the battery in a charged state. The float current requirements are based on the float current indicative of a charged battery. Use of float current to determine the state of charge of the battery is consistent with IEEE-450 (Ref. 1). The 7 day Frequency is consistent with IEEE-450 (Ref. 1). CL3.8-172

This SR is modified by a Note that states the float current requirement is not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. When this float voltage is not maintained LCO 3.8.4 ACTION A is being taken, which provides the necessary and appropriate verifications of the battery condition. Furthermore, the float current limit of 2 amps is established based on the nominal float voltage value and is not directly applicable when this voltage is not maintained. TP3.8-160

SR 3.8.6.2 and 3.8.6.5

~~The quarterly inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 3). In addition, within 24 hours of a battery discharge < [110] V or a battery overcharge > [150] V, the battery must be demonstrated to meet Category B limits. Transients, such as motor starting transients, which may momentarily cause battery voltage to drop to ≤ [110] V, do not constitute a battery discharge~~ TP3.8-160

(continued)

PA3.8-100

BASES

~~SURVEILLANCE REQUIREMENTS~~ ~~SR 3.8.6.2 (continued)~~

~~provided the battery terminal voltage and float current return to pre-transient values. This inspection is also consistent with IEEE-450 (Ref. 3), which recommends special inspections following a severe discharge or overcharge, to ensure that no significant degradation of the battery occurs as a consequence of such discharge or overcharge.~~ Optimal long term battery performance is obtained by maintaining a float voltage greater than or equal to the minimum established design limits provided by the battery manufacturer. This limits the formation of lead sulfate and self discharge. The Frequency for cell voltage verification every 31 days for pilot cell and 92 days for each connected cell is consistent with IEEE-450 (Ref. 1). TP3.8-160 CL3.8-172

SR 3.8.6.3

~~This Surveillance verification that the average temperature of representative cells is > 60°F, is consistent with a recommendation of IEEE-450 (Ref. 3), that states that the temperature of electrolytes in representative cells should be determined on a quarterly basis.~~ TP3.8-160

~~Lower than normal temperatures act to inhibit or reduce battery capacity. This SR ensures that the operating temperatures remain within an acceptable operating range. This limit is based on manufacturer recommendations.~~ The limit specified for electrolyte level ensures that the plates suffer no physical damage and maintain adequate electron transfer capability. The Frequency is consistent with IEEE-450 (Ref. 1). TP3.8-160 CL3.8-172

(continued)

PA3.8-100

BASES

~~Table 3.8.6-1~~

~~This table delineates the limits on electrolyte level, float voltage, and specific gravity for three different categories. The meaning of each category is discussed below.~~ TP3.8-160

~~Category A defines the normal parameter limit for each designated pilot cell in each battery. The cells selected as pilot cells are those whose temperature, voltage, and electrolyte specific gravity approximate the state of charge of the entire battery.~~

~~The Category A limits specified for electrolyte level are based on manufacturer recommendations and are consistent with the guidance in IEEE-450 (Ref. 3), with the extra ¼ inch allowance above the high water level indication for operating margin to account for temperatures and charge effects. In addition to this allowance, footnote a to Table 3.8.6-1 permits the electrolyte level to be above the specified maximum level during equalizing charge, provided it is not overflowing. These limits ensure that the plates~~

~~SURVEILLANCE REQUIREMENTS~~ ~~Table 3.8.6-1 (continued)~~

~~suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 3) recommends that electrolyte level readings should be made only after the battery has been at float charge for at least 72 hours.~~

~~The Category A limit specified for float voltage is ≥ 2.13 V per cell. This value is based on the recommendations of IEEE-450 (Ref. 3), which states that prolonged operation of cells < 2.13 V can reduce the life expectancy of cells.~~

(continued)

BASES

TP3.8-160

~~The Category A limit specified for specific gravity for each pilot cell is ≥ [1.200] (0.015 below the manufacturer fully charged nominal specific gravity or a battery charging current that had stabilized at a low value). This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).~~

~~The specific gravity readings are corrected for actual electrolyte temperature and level. For each 3°F (1.67°C) above 77°F (25°C), 1 point (0.001) is added to the reading; 1 point is subtracted for each 3°F below 77°F. The specific gravity of the electrolyte in a cell increases with a loss of water due to electrolysis or evaporation.~~

~~Category B defines the normal parameter limits for each connected cell. The term "connected cell" excludes any battery cell that may be jumpered out.~~

~~The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. The Category B limit specified for specific gravity for each connected cell is ≥ [1.195] (0.020 below the manufacturer fully charged, nominal specific gravity) with the average of all connected cells > [1.205] (0.010 below the manufacturer fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that the effects of a highly charged or newly installed cell will not mask overall degradation of the battery.~~

~~SURVEILLANCE REQUIREMENTS~~ ~~Table 3.8.6-1 (continued)~~

(continued)

~~Category C defines the limits for each connected cell. These values, although reduced, provide assurance that sufficient capacity exists to perform the intended function and maintain a margin of safety. When any battery parameter is outside the Category C limits, the assurance of sufficient capacity described above no longer exists, and the battery must be declared inoperable.~~ TP3.8-160

~~The Category C limits specified for electrolyte level (above the top of the plates and not overflowing) ensure that the plates suffer no physical damage and maintain adequate electron transfer capability. The Category C limits for float voltage is based on IEEE-450 (Ref. 3), which states that a cell voltage of 2.07 V or below, under float conditions and not caused by elevated temperature of the cell, indicates internal cell problems and may require cell replacement.~~

~~The Category C limit of average specific gravity ≥ 1.195 is based on manufacturer recommendations (0.020 below the manufacturer recommended fully charged, nominal specific gravity). In addition to that limit, it is required that the specific gravity for each connected cell must be no less than 0.020 below the average of all connected cells. This limit ensures that the effect of a highly charged or new cell does not mask overall degradation of the battery.~~

~~The footnotes to Table 3.8.6-1 are applicable to Category A, B, and C specific gravity. Footnote (b) to Table 3.8.6-1 requires the above mentioned correction for electrolyte level and temperature, with the exception that level correction is not required when battery charging current is < [2] amps on float charge. This current provides, in general, an indication of overall battery condition.~~

~~Because of specific gravity gradients that are produced during the recharging process, delays of several days may~~

(continued)

PA3.8-100

BASES

occur while waiting for the specific gravity to stabilize. A stabilized charger current is an acceptable alternative to specific gravity measurement for determining the state of charge. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote © to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for

TP3.8-160

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

up to [7] days following a battery recharge. Within [7] days, each connected cell's specific gravity must be measured to confirm the state of charge. Following a minor battery recharge (such as equalizing charge that does not follow a deep discharge) specific gravity gradients are not significant, and confirming measurements may be made in less than [7] days.

Reviewer's Note: The value of [2] amps used in footnote (b) and © is the nominal value for float current established by the battery vendor as representing a fully charged battery with an allowance for overall battery condition.

SR 3.8.6.4

TP3.8-160

This Surveillance verifies that the pilot cell temperature is greater than or equal to the minimum established design limits. Pilot cell electrolyte temperature is maintained above this temperature to assure the battery can provide the required current and voltage to meet the design requirements. Temperatures lower than assumed in battery sizing calculations act to inhibit or reduce battery capacity. The Frequency is consistent with IEEE-450 (Ref. 1).

CL3.8-172

SR 3.8.6.5

TP3.8-160

See SR 3.8.6.2

PA3.8-100

BASES

SR 3.8.6.6 TP3.8-160

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.6.6; however, only the modified performance discharge test may be used to satisfy the battery service test requirements of SR 3.8.4.3. TP3.8-160

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 1) and IEEE-485 (Ref. 3). TP3.8-160 CL3.8-172 These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. A modified discharge test is the test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

It may consist of just two rates; for instance the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without TP3.8-160

PA3.8-100

BASES

compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test must remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-450 (Ref. 1), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is ≥ 10% below the manufacturer's rating. These Frequencies are consistent with the recommendations in IEEE-450 (Ref. 1). TP3.8-160 CL3.8-172

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR. TP3.8-160

REFERENCES

1. FSAR, Chapter [6].

2. FUSAR, ChapterSection [145]. TP3.8-160

13. IEEE-450-[19801995]. CL3.8-172

3. IEEE-485-1983.

PA3.8-100

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Inverters – Operating

BASES

BACKGROUND

The inverters are the preferred source of power for the Reactor Protection Instrument AC Panels vital buses because of the stability and reliability they achieve. The function of the inverter is to provide AC electrical power to the Reactor Protection Instrument AC Panels vital buses. The inverters can be powered from an internal AC source/rectifier or from the station battery. The station battery provides an uninterruptible power source for the instrumentation and controls for the Reactor Protectionve System (RPS) and the Engineered Safety Feature Actuation System (ESFAS). Specific details on inverters and their operating characteristics are found in the FUSAR, Chapter [8] (Ref. 1). CL3.8-216

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FUSAR, Chapter [6] (Ref. 2) and Chapter [15] (Ref. 3), assume Engineered Safety Feature systems are OPERABLE. The inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the RPS and ESFAS instrumentation and controls so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the inverters is consistent with the initial assumptions of the accident analyses and is based on meeting the design basis of the unit. This includes

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(continued)

BASES (continued)

maintaining required Reactor Protection Instrument AC Panelsvital buses OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite AC electrical power or all onsite AC electrical power; and CL3.8-163

b. A worst case single failure.

Inverters are a part of the distribution system and, as such, satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii)the NRC Policy Statement. PA3.8-217

LCO

The inverters ensure the availability of AC electrical power for the systems instrumentation required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Maintaining the required inverters OPERABLE ensures that the redundancy incorporated into the design of the RPS and ESFAS instrumentation and controls is maintained. The four inverters [(two per train)] ensure an uninterruptible supply of AC electrical power to the Reactor Protection Instrument AC Panelsvital buses even if the 4.16 kV safetySafeguards buses are de-energized.

OPERABLEOperable inverters require the associated vitalReactor Protection Instrument AC Panel bus to be powered by the inverter with output voltage and frequency within tolerances, and power supplyinput to the inverter from a [125 VDC] station battery. AlternativelyNormally, the power supply may beis from an internal AC source via rectifier as long aswith the station battery is available as the uninterruptible power supply. CL3.8-180

(continued)

BASES (continued)

~~This LCO is modified by a Note that allows [one/two] inverters to be disconnected from a [common] battery for ≤ 24 hours, if the vital bus(es) is powered from a [Class 1E constant voltage transformer or inverter using internal AC source] during the period and all other inverters are operable. This allows an equalizing charge to be placed on one battery. If the inverters were not disconnected, the resulting voltage condition might damage the inverter[s]. These provisions minimize the loss of equipment that would occur in the event of a loss of offsite power. The 24 hour time period for the allowance minimizes the time during which a loss of offsite power could result in the loss of equipment energized from the affected AC vital bus while taking into consideration the time required to perform an equalizing charge on the battery bank.~~ PA3.8-185

~~The intent of this Note is to limit the number of inverters that may be disconnected. Only those inverters associated with the single battery undergoing an equalizing charge may be disconnected. All other inverters must be aligned to their associated batteries, regardless of the number of inverters or unit design.~~ PA3.8-185

APPLICABILITY

The inverters are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs ~~or abnormal transients~~; and CL3.8-205

b. Adequate core cooling is provided, and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

Inverter requirements for MODES 5 and 6 are covered in the Bases for LCO 3.8.8, "Inverters – Shutdown."

(continued)

BASES

ACTIONS

A.1

With a required Reactor Protection Instrument AC inverter inoperable, its associated Reactor Protection Instrument AC Panel~~vital bus becomes inoperable until it is [manually]~~ may become inoperable until it is re-energized from a safety related alternate source ~~its [Class 1E constant voltage source transformer or inverter using internal AC source]~~.

For this reason a Note has been included in Condition A requiring the entry into the Conditions and Required Actions of LCO 3.8.9, "Distribution Systems – Operating." This ensures that the ~~vital~~Reactor Protection Instrument AC Panel ~~bus~~ is re-energized within 2 hours.

CL3.8-183

Required Action A.1 allows ~~24~~8 hours to fix the inoperable inverter and return it to service. The ~~24~~8 hour limit is based upon engineering judgment, taking into consideration the time required to repair an inverter and the additional risk to which the unit is exposed because of the inverter inoperability. This has to be balanced against the risk of an immediate shutdown, along with the potential challenges to safety systems such a shutdown might entail. When the Reactor Protection Instrument AC Panel~~vital bus~~ is powered from its alternate ~~constant voltage~~ source, it is relying upon interruptible AC electrical power sources (offsite and onsite). The uninterruptible inverter source to the Reactor Protection Instrument AC Panel ~~vital buses~~ is the preferred source for powering instrumentation trip setpoint devices.

ACTIONS (continued)

B.1 and B.2

If the inoperable devices or components cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within

BASES

36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and Reactor Protection Instrument AC Panels ~~vital buses~~ energized from the inverter. The verification of proper voltage ~~and frequency~~ output ensures that the required power is readily available for the instrumentation of the RPS and ESFAS connected to the Reactor Protection Instrument AC Panels ~~vital buses~~. The 7 day Frequency takes into account the redundant capability of the inverters and other indications available in the control room that alert the operator to inverter malfunctions. PA3.8-102

REFERENCES

1. ~~F~~USAR, ~~Chapter~~ Section ~~[8]~~.

2. ~~F~~USAR, ~~Chapter~~ Section ~~[6]~~ 14.

~~3. FSAR, Chapter [15].~~

PA3.8-100

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Inverters – Shutdown

BASES

BACKGROUND

A description of the inverters is provided in the Bases for LCO 3.8.7, "Inverters – Operating."

APPLICABLE SAFETY ANALYSES

~~The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter [6] (Ref. 1) and Chapter [15] (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC to AC inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the Reactor Protective System and Engineered Safety Features Actuation System instrumentation and controls so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.~~ PA3.8-192

~~The OPERABILITY of the inverters is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.~~

The OPERABILITY of the ~~minimum~~ inverters to the Reactor Protection Instrumentation AC Panel ~~each AC vital bus~~ during MODES 5 and 6 ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

(continued)

PA3.8-100

BASES

c. Adequate power is available to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shutdown, the Technical Specification requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems. TA3.8-175

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODES 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on: PA3.8-192

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

(continued)

PA3.8-100

BASES

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

The Shutdown Technical Specification requirements are designed to ensure that the unit has the capability to mitigate the consequences of certain postulated accidents. Worst case DBA which are analyzed for operating MODES are generally viewed not to be a significant concern during shutdown MODES due to lower energies involved. The Technical Specifications therefore require a lesser complement of electrical equipment to be available during shutdown than is required during operating MODES. More recent work completed on the potential risks associated with shutdown, however, have found significant risk associated with certain shutdown evolutions. As a result, in addition to the requirements established in the Technical Specifications, the industry has adopted NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management" as an Industry initiative to manage shutdown tasks and associated electrical support to maintain risk at an acceptable low level. This may require the availability of additional equipment beyond that required by the shutdown Technical Specifications. TA3.8-175

(continued)

PA3.8-100

BASES (continued)

The inverters were previously identified as part of the distribution system and, as such, satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii) the NRC Policy Statement. PA3.8-217

LCO

The inverters ensure the availability of electrical power for the instrumentation for systems required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. At least one Reactor Protection Instrument AC Panel energized by a The battery backed powered inverters provides uninterruptible supply of AC electrical power to theat least one Reactor Protection Instrument AC vital busesPanel even if the 4.16 kV safetysafeguards buses are de-energized. OPERABILITY of the inverters requires that the AC vital bus be powered by the inverter. PA3.8-176 CL3.8-177

This ensures the availability of sufficient inverter power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

APPLICABILITY

The inverters required to be OPERABLE in MODES 5 and 6 and during movement of irradiated fuel assemblies provides assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

b. Systems needed to mitigate a fuel handling accident are available;

(continued)

PA3.8-100

BASES (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

Inverter requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.7.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4

If the required inverter is inoperable, the remaining OPERABLE Reactor Protection Instrument AC Panel power suppliestwo trains are as required by LCO 3.8.10, "Distribution Systems – Shutdown," the remaining OPERABLE Inverters may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, andor operations with a potential for positive reactivity additions. By the allowance of the option to declare CL3.8-177

~~ACTIONS~~

~~A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)~~

required features inoperable with the associated inverter~~(s)~~ inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions~~). The Required Action to suspend positive reactivity additions does not preclude actions~~ TA3.8-117

(continued)

PA3.8-100

BASES

~~to maintain or increase reactor vessel inventory, provided the required SDM is maintained.~~ that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required inverter~~s~~ and to continue this action until restoration is accomplished in order to provide the necessary inverter power to the unit safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverter~~s~~ should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power ~~or powered from a constant voltage source transformer~~. CL3.8-177

PA3.8-100

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the required inverters ~~are~~is functioning properly with all required circuit breakers closed and Reactor Protection Instrument AC Panel ~~vital buses~~ energized from the inverter. The verification of proper voltage ~~and frequency~~ output ensures that the required power is readily available for the instrumentation connected to the Reactor Protection Instrument AC ~~vital buses~~Panel. The 7 day Frequency takes into account the ~~redundant capability~~reliability of the ~~inverters~~instrument panel power sources and other indications available in the control room that alert the operator to ~~inverter~~ malfunctions. PA3.8-102

REFERENCES

~~1. FSAR, [6].~~

~~2. FSAR, Chapter [15].~~None.

(continued)

PA3.8-100

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.9 Distribution Systems – Operating

BASES

BACKGROUND

The onsite safeguardsClass 1E AC, and DC, and AC vital bus electrical power distribution systems are divided by train into [two] redundant and independent AC, DC, and AC vital bus electrical power distribution subsystems. The onsite Reactor Protection Instrument AC Distribution System is divided by channels into four separate subsystems (Ref. 1). CL3.8-167

EachThe AC electrical power subsystem for each train consists of a primary safeguardsEngineered Safety Feature (ESF) 4.16 kV bus and twosecondary [480 and 120] V buses. These in turn supply power to distribution panels, and motor control centers (MCCs) and load centers. Each safeguards [4.16 kV ESF bus] has twoat least [one separate and independent offsite sources of power] as well as a dedicated onsite diesel generator (DG) source. Each safeguards [4.16 kV ESF bus] is normally connected to an preferred offsite source. After a loss of this preferred offsite power source to a 4.16 kV ESF bus, a transfer to the alternate offsite source is accomplished by a load sequencer, initiated byutilizing a time delayed bus undervoltage relays. If all offsite sources are unavailable, the onsite emergency DG supplies power to the safeguards 4.16 kV ESF bus. Control power for the 4.16 kV and 480 V bus breakers is supplied from the safeguards DC distributionClass 1E batteries system. Additional description of the safeguards ACthis system may be found in the Bases for LCO 3.3.4, "4 kV Safeguards Bus Voltage Instrumentation," and the Bases for LCO 3.8.1, "AC Sources – Operating," and the Bases for LCO 3.8.4, "DC Sources – Operating." CL3.8-167

(continued)

PA3.8-100

BASES (continued)

The ~~secondary~~ AC electrical power distribution system for each train includes the safety related buses~~load centers~~, ~~motor control centers~~MCCs, and distribution panels shown in Table B 3.8.9-1.

The 120 V Reactor Protection Instrument AC ~~vital buses~~Panels are arranged in four~~two~~ load groups ~~per train~~ and are normally powered from ~~the~~ inverters. An~~The~~ alternate power supply for the instrument panels is~~vital buses are Class 1E constant voltage source~~ the inverter bypass transformer~~s~~ powered from the same MCC~~train~~ as the associated inverter. Another alternate power supply is from the unit 208/120 VAC interruptable panel. ~~, and its~~ Use of these supplies is governed by LCO 3.8.7, "Inverters – Operating." ~~Each constant voltage source transformer is powered from a Class 1E AC bus.~~ CL3.8-167

There are two independent 125~~/250~~ VDC electrical power distribution subsystems (one for each train). The 125 VDC safeguards electrical power system consists of two independent and redundant safety related DC safeguards electrical power subsystems (Train A and Train B). The sources for each train are a 125 VDC battery, a battery charger, and all the associated control equipment and interconnecting cabling. CL3.8-167

The list of the~~all~~ required Reactor Protection Instrument AC and safeguards DC distribution panels~~buses~~ is presented in Table B 3.8.9-1.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR~~, Chapter [6] (Ref. 1), and in the FSAR, Chapter [15]~~ (Ref. 2)~~,~~ assume ESF systems are OPERABLE. The safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution systems are designed to provide sufficient capacity,

(continued)

PA3.8-100

capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution systems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining power distribution systems OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power ~~or all onsite AC electrical power~~; and CL3.8-163

b. A worst case single failure.

The distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii) ~~the NRC Policy Statement~~.

LCO

The required power distribution subsystems listed in Table B 3.8.9-1 ensure the availability of safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA. The safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems are required to be OPERABLE.

(continued)

PA3.8-100

BASES

Maintaining the Train A and Train B safeguards AC, and DC, and Reactor Protection Instrument AC vital bus electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor. This does not preclude redundant safeguards 4 kV buses from being powered from the same offsite path.

CL3.8-167

LCO (continued)

OPERABLE AC electrical power distribution subsystems require the associated buses, load centers, MCCs motor control centers, and distribution panels to be energized to their proper voltages. OPERABLE DC electrical power distribution subsystems require the associated panels buses to be energized to their proper voltage from either the associated battery or charger. OPERABLE Reactor Protection Instrument AC vital bus electrical power distribution subsystems require the associated panels buses to be energized to their proper voltage from the associated [inverter via inverted DC voltage, inverter using internal AC source, or Class 1E constant voltage transformer].

CL3.8-167

In addition, tie breakers between redundant safety related AC, DC, and AC vital bus power distribution subsystems, if they exist, must be open. This prevents any electrical malfunction in any power distribution subsystem from propagating to the redundant subsystem, that could cause the failure of a redundant subsystem and a loss of essential safety function(s). If any tie breakers are closed, the affected redundant electrical power distribution subsystems are considered inoperable. This applies to the onsite, safety related redundant electrical power distribution subsystems. It does not, however, preclude redundant Class 1E 4.16 kV buses from being powered from the same offsite circuit.

(continued)

PA3.8-100

BASES (continued)

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs ~~or abnormal transients~~; and CL3.8-205

b. Adequate core cooling is provided, and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

Electrical power distribution subsystem requirements for MODES 5 and 6 are covered in the Bases for LCO 3.8.10, "Distribution Systems – Shutdown."

ACTIONS

A.1 and A.2

With one or more required safeguards AC buses, ~~load centers, motor control centers~~MCCs, or distribution panels, except Reactor Protection Instrument AC ~~vital buses~~Panels, ~~in one train~~ inoperable, the remaining AC electrical power distribution subsystem ~~in the other train~~ is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining power distribution subsystems could result in the minimum required ESF functions not being supported. PA3.8-213
Therefore, there are two Required Actions that can be taken. Required Action A.1 would allow declaring the associated supported feature(s) powered from the safeguards AC electrical power distribution system inoperable. If Required Action A.1 is used, LCO 3.0.6 would also be entered to verify that no loss of function would exist. If LCO 3.0.6 identifies that a loss of function did exist, Condition E would be entered. Required Action A.2 requireds AC buses, ~~load centers,~~ MCCs~~motor control centers~~, and

(continued)

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distribution panels ~~must~~to be restored to OPERABLE status within 8 hours.

Condition A worst scenario is one train without AC power (i.e., no offsite power to the train and the associated DG inoperable). In this Condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operator's attention be focused on minimizing the potential for loss of power to the remaining train by stabilizing the unit, and on restoring power to the affected train. The 8 hour time limit before requiring a unit shutdown in this Condition is acceptable because of:

a. The potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected train, to the actions associated with taking the unit to shutdown within this time limit; and

b. The potential for an event in conjunction with a single failure of a redundant component in the train with AC power.

CL3.8-165

~~The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DC bus is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 2 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the AC distribution system. At this time, a DC circuit could again~~

~~ACTIONS A.1 (continued)~~

~~become inoperable, and AC distribution restored OPERABLE. This could continue indefinitely.~~

(continued)

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~~The Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition A was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely~~.

BC.1 and C.2

With one Reactor Protection Instrument AC Panel ~~vital bus~~ inoperable, the remaining OPERABLE Reactor Protection Instrument AC Panels ~~vital buses~~ are capable of supporting the minimum safety functions necessary to shut down the unit and maintain it in the safe shutdown condition. Overall reliability is reduced, however, since an additional single failure could result in the minimum ~~[required]~~ ESF functions not being supported. Therefore, there are two Required Actions that can be taken. Required Action C.1 would allow declaring the associated supported feature(s) powered from the Reactor Protection Instrument AC inoperable. If Required Action C.1 is used, LCO 3.0.6 would also be entered to verify that no loss of function would exist. If LCO 3.0.6 identifies that a loss of function did exist, Condition E would be entered. Required Action C.2 ~~the~~ requireds the Reactor Protection Instrument AC Panel ~~vital bus must~~ to be restored to OPERABLE status within 2 hours by powering the panel ~~bus~~ from the associated ~~[~~inverter ~~via inverted DC~~, inverter ~~using internal AC source, or Class 1E constant voltage~~bypass transformer~~]~~ or interruptable panel. PA3.8-213

Condition ~~B~~C represents one Reactor Protection Instrument AC ~~vital bus~~Panel without power~~; potentially both the DC source and the associated AC source are nonfunctioning~~. In this situation, the unit is significantly more vulnerable to CL3.8-167

(continued)

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BASES

a complete loss of all noninterruptible power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining instrumentvital busespanels and restoring power to the affected instrumentvital buspanel.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that are without adequate instrumentvital AC power. Taking exception to LCO 3.0.2 for components without adequate instrumentvital AC power, that would have the Required Action Completion Times shorter than 2 hours if declared inoperable, is acceptable because of:

ACTIONS B.1 (continued)

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) and not allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous Aapplicable Conditions and Required Actions for components without adequate instrumentvital AC power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected train; and

c. The potential for an event in conjunction with a single failure of a redundant component.

The 2 hour Completion Time takes into account the importance to safety of restoring the Reactor Protection Instrument AC

(continued)

vital busPanel to OPERABLE status, the redundant capability afforded by the other OPERABLE instrumentvital buses panels, and the low probability of a DBA occurring during this period.

The second Completion Time for Required Action B.1 establishes a limit on the maximum allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an AC bus is inoperable and subsequently returned OPERABLE, the LCO may already have been not met for up to 8 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the vital bus distribution system. At this time, an AC train could again become inoperable, and vital bus distribution restored OPERABLE. This could continue indefinitely. CL3.8-165

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition B was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

ACTIONS (continued)

CB.1 and B.2

With one or more safeguards DC panel(s)bus(es) in one train inoperable, the remaining safeguards DC electrical power distribution subsystems are is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining safeguards DC electrical power distribution subsystem could

(continued)

result in the minimum required ESF functions not being supported. Therefore, there are two Required Actions that can be taken. Required Action B.1 would allow declaring the associated supported feature(s) powered from the safeguards DC panel inoperable. If Required Action B.1 is used, LCO 3.0.6 would also be entered to verify that no loss of function would exist. If LCO 3.0.6 identifies that a loss of function did exist, Condition E would be entered. Required Action B.2 the [required]s the DC panels buses must be restored to OPERABLE status within 2 hours by powering the bus from the associated battery, or charger, or portable charger. PA3.8-213

Condition C represents one train The worst case scenario is one train without adequate safeguards DC power; potentially with both with the battery significantly degraded and the associated charger nonfunctioning. In this situation, the unit is significantly more vulnerable to a complete loss of all DC power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining trains and restoring power to the affected train.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that would be without power. Taking exception to LCO 3.0.2 for components without adequate DC power, which would have Required Action Completion Times shorter than 2 hours, is acceptable because of:

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) while allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous applicable Conditions and Required Actions for components without DC power and not

(continued)

providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected train; and

c. The potential for an event in conjunction with a single failure of a redundant component.

~~The 2 hour Completion Time for DC buses is consistent with Regulatory Guide 1.93 (Ref. 3).~~ PA3.8-169

~~ACTIONS~~ ~~C.1 (continued)~~

~~The second Completion Time for Required Action C.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition C is entered while, for instance, an AC bus is inoperable and subsequently returned OPERABLE, the LCO may already have been not met for up to 8 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the DC distribution system. At this time, an AC train could again become inoperable, and DC distribution restored OPERABLE. This could continue indefinitely.~~ CL3.8-165

~~This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition C was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.~~

D.1 and D.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the required Completion Time, the

BASES (continued)

unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

E.1

With two trains with inoperable distribution subsystems that result in a loss of safety function, adequate core cooling, containment OPERABILITY and other vital functions for DBA mitigation would be compromised~~,~~. Condition E also addresses two or more Reactor Protection Instrument AC Panels inoperable. If the plant is in this Condition, ~~and~~ immediate plant shutdown in accordance with LCO 3.0.3 is required. CL3.8-214

SURVEILLANCE REQUIREMENTS

SR 3.8.9.1

This Surveillance verifies that the ~~[required]~~ safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution systems presented in Table B 3.8.9-1 are functioning properly, with the correct circuit breaker and switch alignment. The correct breaker and switch alignment ensures the appropriate separation and independence of the electrical divisions is maintained, and the appropriate voltage is available to each required subsystem ~~bus~~. The verification of proper voltage ~~availability on the buses~~ ensures that the required voltage is readily available for motive as well as control functions for critical system loads ~~connected to these buses~~. Various indications are available to the operators which demonstrate correct voltage for the subsystems. The 7 day Frequency takes into account the redundant capability of the safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems, and

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BASES (continued)

other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. UFSAR, Section 8~~Chapter [6]~~.
2. UFSAR, Section 14~~Chapter [15]~~. CL3.8-172
3. ~~Regulatory Guide 1.93, December 1974.~~

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Table B 3.8.9-1 (page 1 of 1)
AC and DC Electrical Power Distribution Systems

TYPE	VOLTAGE	TRAIN A *	TRAIN B*
AC buses	[4160 V]	[ESF Bus] [NB01]	[ESF Bus] [NB02]
	[480 V]	Load Centers [NG01, NG03]	Load Centers [NG02, NG04]
	[480 V]	Motor Control Centers [NG01A, NG01I, NG01B, NG03C, NG03I, NG03D]	Motor Control Centers [NG02A, NG02I, NG02B, NG04C, NG04I, NG04D]
	[120 V]	Distribution Panels [NP01, NP03]	Distribution Panels [NP02, NP04]
DC buses	[125 V]	Bus [NK01] Bus [NK03] Distribution Panels [NK41, NK43, NK51]	Bus [NK02] Bus [NK04] Distribution Panels [NK42, NK44, NK52]
AC vital buses	[120 V]	Bus [NN01] Bus [NN03]	Bus [NN02] Bus [NN04]

* Each train of the AC and DC electrical power distribution systems is a subsystem.

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Table B 3.8.9-1 (page 1 of 1)
Safeguards AC and DC Electrical Power Distribution Systems

TYPE	DISTRIBUTION EQUIPMENT	UNIT 1 TRAIN A AND B	UNIT 2 TRAIN A AND B
Safeguards AC	4 kV Buses	15, 16	25, 26
	480 V Buses	111, 112, 121, 122	211, 212, 221, 222
	Motor Control Centers	1A1, 1A2 1AB1*, 1AB2* 1AC1, 1AC2 1K1, 1K2, 1KA2 1L1, 1L2 1LA1, 1LA2 1M1, 1M2 1MA1*, 1MA2* 1T1*, 1T2* 1TA1, 1TA2 1X1, 1X2	2A1, 2A2 1AB1*, 1AB2* 2AC1, 2AC2 2K1, 2K2, 2KA2 2L1, 2L2 2LA1, 2LA2 2M1, 2M2 1MA1*, 1MA2* 1T1*, 1T2* 2TA1, 2TA2 2X1, 2X2
Safeguards DC	125 VDC Panels	11, 12 15, 16 14*, 19* 17*, 18* 151, 161 152, 162 153, 163 191	21, 22 25, 26 14*, 19* 17*, 18* 27, 28 251, 261 252, 262 253
Reactor Protection Instrument AC	120 VAC Panels	111, 112, 113, 114	211, 212, 213, 214

* Denotes MCC's or Panels that are transferrable between units.

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B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.10 Distribution Systems – Shutdown

BASES

BACKGROUND

A description of the safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution systems is provided in the Bases for LCO 3.8.9, "Distribution Systems – Operating."

PA3.8-191

In addition to the safeguards AC, DC, and Reactor Protection Instrument AC electrical power distribution systems listed in Table B 3.8.9-1, the following are examples of alternate power distribution equipment that may also be used during plant shutdown:

a. 4KV bus ties;

b. 480V alternate feeds;

c. Uninterruptable Panel 117 (217 for Unit 2);

d. Uninterruptable Panel 117 to 217 cross tie; and

e. Service Building DC to Safeguards DC cross tie.

This alternate equipment may be used to maintain reliable power to various plant systems and equipment that are required to be OPERABLE to support shutdown conditions.

APPLICABLE SAFETY ANALYSES

PA3.8-192

~~The initial conditions of Design Basis Accident and transient analyses in the FSAR, Chapter [6] (Ref. 1) and Chapter [15] (Ref. 2), assume Engineered Safety Feature (ESF) systems are OPERABLE. The AC, DC, and AC vital bus electrical power distribution systems are designed to~~

(continued)

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BASES

~~provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.~~

~~The OPERABILITY of the AC, DC, and AC vital bus electrical power distribution system is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.~~

The OPERABILITY of the minimum safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems during MODES 5 and 6, and during movement of irradiated fuel assemblies ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shut down, the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and PA3.8-192

(continued)

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BASES

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pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODES 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on: PA3.8-192

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

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BASES (continued)

The safeguards AC and DC electrical power distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii)~~the NRC Policy Statement~~.

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific plant condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system, as presented in Table B 3.8.9-1, necessary to support OPERABILITY of required systems, equipment, and components – all specifically addressed in each LCO and implicitly required via the definition of OPERABILITY. In addition, the alternate equipment described in the Background Section may be used to maintain OPERABILITY of the Electrical Distribution subsystems. PA3.8-191

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the unit in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

APPLICABILITY

The AC and DC electrical power distribution subsystems required to be OPERABLE in MODES 5 and 6, and during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

b. Systems needed to mitigate a fuel handling accident are available;

(continued)

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BASES (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition and refueling condition.

The safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.9.

ACTIONS

LCO 3.0.3 is not applicable while in MODES 5 and 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Entering LCO 3.0.3 while in MODE 1, 2, 3, or 4 would require the unit to be shutdown unnecessarily. TA3.8-140

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5

Although redundant required features may require redundant trains of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem train may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystem LCO's Required Actions. In many instances, this option may involve undesired

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BASES (continued)

administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (MODE 5) or boron concentration (MODE 6)). Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to not result in reducing core reactivity below the required SDM or refueling boron concentration limit. TA3.8-117

Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required safeguards AC and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the unit safety systems.

Notwithstanding performance of the above conservative Required Actions, a required residual heat removal (RHR) subsystem may be inoperable. In this case, Required Actions A.2.1 through A.2.4 do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the RHR ACTIONS would not be entered. Therefore, Required Action A.2.5 is provided to direct declaring the associated RHR inoperable, which results in taking the appropriate RHR actions.

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BASES (continued)

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution subsystems should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power.

SURVEILLANCE REQUIREMENTS

SR 3.8.10.1

This Surveillance verifies that the safeguards AC, DC, and Reactor Protection Instrument AC ~~vital bus~~ electrical power distribution subsystems are functioning properly, with ~~all~~ the required buses and panels energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the capability of the electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

~~1. FSAR, Chapter [6].~~

~~2. FSAR, Chapter [15].~~