February 16, 1994

Docket No. 52-002

Mr. C. B. Brinkman, Acting Director
Nuclear Systems Licensing
Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095-0500

Dear Mr. Brinkman:

SUBJECT: COMMENTS ON TECHNICAL SPECIFICATIONS (TS) FOR SYSTEM 80+

The Nuclear Regulatory Commission (NRC) staff has reviewed the System 80+ TS, including applicable portions of Amendment U, and the comments are shown on the markup copy of the affected TS in the enclosure. Provide responses to these comments no later than two weeks from your receipt of this letter to allow us to maintain our review schedule.

This affects nine or fewer respondents, and therefore, is not subject to review by the Office of Management and Budget under P.L. 96-511.

Sincerely,

(Original signed by)
Kristine M. Shembarger, Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc: See next page

* WITHOUT ENCLOSURE

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ABB-Combustion Engineering, Inc. Docket No. 52-002

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Throughout:

1. Placement of the word "continued" is contrary to the STS WG. Example: The continuation of SR 3.8.1.19 to the next page should be denoted by a "continued" at the bottom corner of the Frequency column, not below the table boundary. This is a general problem that occurs in ACTIONS tables also.

2. Nesting of Logical Connectors has been ignored; this detracts from the usability of the ACTIONS tables based on human factors considerations.

3. Bottom spacing for Conditions (usually seen in the Required Actions and Completion Time columns) and SRs is contrary to the Writers Guide formatting instructions: there is no blank space.

4. A different font than used in the STS is used.

SURVEILLANCE REQUIREMENTS (Continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.17	-----NOTES----- 1. This surveillance shall not be performed in MODE 1, 2, 3, or 4. 2. 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 loads with offsite power.	[18 months]
SR 3.8.1.18	-----NOTES----- 1. This surveillance shall not be performed in MODE 1, 2, 3, or 4. 2. Credit may be taken for unplanned events that satisfy this SR. ----- Verify the interval between each sequenced load block is within ± [10% of design interval] for each emergency [and shutdown] load sequencer.	[18 months]
SR 3.8.1.19	-----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. 3. Credit may be taken for unplanned events that satisfy this SR. -----	

(Continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
	------NOTE------ Enter applicable Conditions and Required Actions of LCO 3.8.10, with one required division de-energized as a result of Condition A. ------		
A. One required offsite circuit inoperable.	A.1	Declare affected required feature(s) with no offsite power available inoperable.	Immediately
	<u>OR</u>		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2.2	Suspend handling of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	A.2.3	Initiate actions to suspend operations with a potential for draining the reactor vessel.	Immediately
	<u>AND</u>		
	A.2.4	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>		
	A.2.5	Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately

(Continued)

In general, the TSs proposed by CE with respect to RCS Specific Activity are unacceptable. ~~They~~ Some specific comments are noted with markers. In general, the TS should follow the CEOG STS (attached). What CE has proposed is not acceptable.

For example, Action Conditions C. specifies that if Dose Equivalent I-131 is ≤ 60 μCi/gm, shutdown w/ Tavg < 500°F is required w/i 6 hours. In general, the proposed TSs are unacceptable.

2/9/94

In general, these TSs are unacceptable. They need to be made consistent with CEOG STS. They are presently not ~~at~~ at all in keeping with the STS.

(See attached CEOG STS pages)

K. Eccleston
504-1081

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Specific Activity

LCO 3.4.15 The specific iodine activity of the reactor coolant shall be limited to:

a. DOSE EQUIVALENT I-131 specific activity ≤ 1.0 μCi/gm; and

b. Gross specific activity ≤ $100/\bar{E}$ μCi/gm.

APPLICABILITY: MODES 1, 2 and, MODE 3 with RCS average temperature (T_{avg}) ≥500°F.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 > 1.0 μCi/gm.	A.1 Verify DOSE EQUIVALENT I-131 ≤ 60 μCi/gm.	Once per 4 hours
	AND	
	A.2 Restore DOSE EQUIVALENT I-131 to within limit.	48 hours
B. Gross specific activity of the reactor coolant not within limit.	B.1 Perform SR 3.4.15.2.	4 hours
	AND	
	B.2 Be in MODE 3 with T_{avg} < 500°F.	6 hours
C. Required Action and associated Completion Time of Condition B not met. OR DOSE EQUIVALENT I-131 ≤ 60 μCi/gm.	C.1 Be in MODE 3 with T_{avg} < 500°F.	6 hours

This parameter is power dependent. Should refer to STS Fig 3.4.16-1

what limits? 60 μCi/gm or 1.0 μCi/gm?

3.4.15.2 only refers to D.E. I-131 not gross activity.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Verify reactor coolant gross specific activity ≤ 100/Ē μCi/gm.	7 days
SR 3.4.15.2	------------------------NOTE------------------------ Only required to be performed in MODE 1. -- Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤ 1.0 μCi/gm.	14 days <u>AND</u> Between 2 and 6 hours after THERMAL POWER change ≥ 15% RTP within a 1-hour period.
SR 3.4.15.3	------------------------NOTE------------------------ Not required to be performed until 31 days after a minimum of 2 EFPD and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours. -- Determine Ē from a sample taken in MODE 1 after a minimum of 2 EFPD and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.	184 days

APPLICABLE SAFETY ANALYSES (Continued)

When specific activity exceeds the LCO limits due to iodine spiking but is limited to 60 μCi/gm, plant operation is considered acceptable based upon the low probability of an accident occurring during the established 48-hour time limit, together with the fact that iodine spiking is considered in the safety analysis.

The reactor coolant specific activity is a process variable that is an initial condition of a design basis accident that either assumes the failure of, or presents a challenge to, the integrity of a fission product barrier. As such, it satisfies the requirements of Criterion 2 of the NRC Policy Statement.

LCO

The specific iodine activity is limited to 1.0 microcurie per gram DOSE EQUIVALENT I-131 and the gross specific activity in the primary coolant is limited to the number of microcuries per gram equal to 100 divided by $\bar{E}$ (average disintegration energy of the sum of the average beta and gamma energies of the coolant nuclides). The limit on DOSE EQUIVALENT I-131 ensures the two-hour dose to an individual at the site boundary during design basis accidents will be a small fraction of the allowed thyroid dose. The limit on gross specific activity ensures the two-hour whole body dose to an individual at the site boundary during design basis accidents will be a small fraction of the allowed whole body dose.

The SGTR accident analysis (Ref. 2) shows that the 2 hour site boundary dose levels are within acceptable limits.

Violation of the LCO may result in reactor coolant radioactivity levels that could, in the event of an SGTR, lead to site boundary doses that exceed the 10 CFR 100 dose guideline.

APPLICABILITY

In MODES 1, 2, and MODE 3, with RCS average temperature $\geq$ 500°F operation within the LCO limits for DOSE EQUIVALENT I-131 and gross specific activity are necessary to contain the potential consequences of a SGTR to within the acceptable site boundary dose values. For operation in MODE 3 with RCS average temperature <500°F, and in MODES 4, 5, and 6, the probability of a steam, feedwater or letdown line break is small due to the low primary and secondary pressures and the release of radioactivity in the event of a SGTR is prevented since the saturation pressure of the reactor coolant is below the lift pressure settings of the main steam safety valves. In all applicable MODES, with the LCO limits exceeded, an isotopic analysis for iodine concentration is appropriate to monitor the activity level while actions are being taken to reduce the specific activity level.

BASES

APPLICABLE SAFETY ANALYSES (Continued)

When specific activity exceeds the LCO limits due to iodine spiking but is limited to 60 μCi/gm, plant operation is considered acceptable based upon the low probability of an accident occurring during the established 48-hour time limit, together with the fact that iodine spiking is considered in the safety analysis.

The reactor coolant specific activity is a process variable that is an initial condition of a design basis accident that either assumes the failure of, or presents a challenge to, the integrity of a fission product barrier. As such, it satisfies the requirements of Criterion 2 of the NRC Policy Statement.

LCO

The specific iodine activity is limited to 1.0 microcurie per gram DOSE EQUIVALENT I-131 and the gross specific activity in the primary coolant is limited to the number of microcuries per gram equal to 100 divided by $\bar{E}$ (average disintegration energy of the sum of the average beta and gamma energies of the coolant nuclides). The limit on DOSE EQUIVALENT I-131 ensures the two-hour dose to an individual at the site boundary during design basis accidents will be a small fraction of the allowed thyroid dose. The limit on gross specific activity ensures the two-hour whole body dose to an individual at the site boundary during design basis accidents will be a small fraction of the allowed whole body dose.

The SGTR accident analysis (Ref. 2) shows that the 2 hour site boundary dose levels are within acceptable limits.

Violation of the LCO may result in reactor coolant radioactivity levels that could, in the event of an SGTR, lead to site boundary doses that exceed the 10 CFR 100 dose guideline.

APPLICABILITY

In MODES 1, 2, and MODE 3, with RCS average temperature ≥ 500°F operation within the LCO limits for DOSE EQUIVALENT I-131 and gross specific activity are necessary to contain the potential consequences of a SGTR to within the acceptable site boundary dose values. For operation in MODE 3 with RCS average temperature <500°F, and in MODES 4, 5, and 6, the probability of a steam, feedwater or letdown line break is small due to the low primary and secondary pressures and the release of radioactivity in the event of a SGTR is prevented since the saturation pressure of the reactor coolant is below the lift pressure settings of the main steam safety valves. In all applicable MODES, with the LCO limits exceeded, an isotopic analysis for iodine concentration is appropriate to monitor the activity level while actions are being taken to reduce the specific activity level.

BASES

ACTIONS

A.1 and A.2

With the DOSE EQUIVALENT I-131 greater than the LCO limit of 1.0 μCi/gm, frequent samples at intervals not to exceed four hours are to be taken to demonstrate that the limit 60 μCi/gm is not exceeded. The Completion Time of four hours is reasonable based on the typical time to obtain, transport, and analyze a sample. Sampling is to continue to provide a trend. If the limit violation resulted from nominal iodine spiking, then the DOSE EQUIVALENT I-131 should be restored to nominal within 48 hours.

B.1

If a Required Action and associated Completion Time of Condition A are not met, or if the DOSE EQUIVALENT I-131 exceeds the 60 μCi/gm limit or is > 1.0 μCi/gm for a continuous time interval of 48 hours, an abnormal condition is indicated and the reactor must be placed in MODE 3 with RCS average temperature < 500°F within 6 hours. The Completion Time of 6 hours is based on engineering judgment and is considered a reasonable time to get to MODE 3 below 500°F from full power without challenging plant systems.

C.1 and C.2

With the gross activity in excess of the allowed limit, an analysis must be performed within four hours to determine DOSE EQUIVALENT I-131. The Completion Time of four hours is reasonable based on the typical time to obtain, transport, and analyze a sample. The change within 6 hours to MODE 3 and RCS average temperature < 500°F lowers the saturation pressure for the reactor coolant below the setpoints of the main steam safety valves. This action prevents venting of the steam generator to the environment in the event of a SGTR. The Completion Time of six hours is reasonable based on operating experience to reach MODE 3 below 500°F from full power without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

The Surveillance is performed at least once per 7 days to monitor the gamma isotopic analysis of the reactor coolant. It basically is a quantitative measurement of radionuclides with half lives > 15 minutes, excluding radioiodines. This measurement considers the sum of the degassed gamma activity and the total of the identified gaseous activities in the sample taken. This Surveillance provides an indication of any increase in gross specific activity of the reactor coolant. Monitoring of the results of this Surveillance allows for proper remedial actions to be taken prior to reaching the LCO limits under normal operating conditions. This Surveillance is applicable in MODES 1, 2, and in

BASES

SURVEILLANCE REQUIREMENTS (Continued)

MODE 3 with RCS average temperature at least 500°F. The frequency of 7 days considers the unlikelihood of a gross fuel failure during the time.

SR 3.4.15.2

This Surveillance is performed to ensure iodine levels remain within limits during normal operation and following fast power changes when fuel failure is more apt to occur. The 14-day Frequency is adequate to trend changes in the activity level considering that gross activity is monitored every 7 days. The Frequency between two and six hours following a power change ≥ 15% RTP within a one-hour period is established because iodine spikes during this time following fuel failure. Samples at other times would provide inaccurate results.

SR 3.4.15.3

A radiochemical analysis for $\bar{E}$ determination is required to be performed every 184 days (six months) with the plant operating in MODE 1 with equilibrium conditions. These requirements for $\bar{E}$ determination directly relate to the LCO and are required to verify plant operation within the specified gross activity LCO limit. The radiochemical analysis for $\bar{E}$ is a measurement of the average energies per disintegration of isotopes with half lives > 15 minutes, excluding iodines. The Frequency of six months is based on the fact that $\bar{E}$ does not change rapidly during operation. The Frequency of 184 days recognizes $\bar{E}$ does not change rapidly.

This SR has been modified by a Note that indicates sampling is required to be performed within 31 days after 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for at least 48 hours. This ensures the radioactive materials are at equilibrium so the analysis for $\bar{E}$ is representative and not skewed by a crud burst or other similar abnormal event.

REFERENCES

1. 10 CFR 100, "Determination of Exclusion Area, Low Population Zone, and Population Center Distance," USNRC, 1973.

2. CESSAR-DC, Chapter 15.

B 3.4 REACTOR COOLANT SYSTEMS (RCS)

B 3.4.16 RCS Loops - Test Exceptions

BASES

BACKGROUND

This special test exception to LCO 3.4.4, "RCS Loops — MODES 1 and 2," and LCO 3.3.1, "RPS Instrumentation," permits reactor criticality under no flow conditions during PHYSICS TESTS (natural circulation demonstration, station blackout, and loss of offsite power) while at low THERMAL POWER levels. Section XI of 10 CFR Part 50, Appendix B (Ref. 1), requires that a test program be established to ensure that structures, systems, and components will perform satisfactorily in service. All functions necessary to ensure that the specified design conditions are not exceeded during normal operation and anticipated operational occurrences must be tested. This testing is an integral part of the design, construction, and operation of the power plant as specified in 10 CFR 50, Appendix A, GDC 1 (Ref. 2).

The key objectives of a test program are to provide assurance that the facility has been adequately designed to validate the analytical models used in the design and analysis, to verify the assumptions used to predict plant response, to provide assurance that installation of equipment at the facility has been accomplished in accordance with the design, and to verify that the operating and emergency procedures are adequate. Testing is performed prior to initial criticality, during startup, and following low power operations.

The tests will include verifying the ability to establish and maintain natural circulation following a plant trip between 10% and 20% RTP, performing natural circulation cooldown on emergency power, and during the cooldown, showing that adequate boron mixing occurs and that pressure can be controlled using auxiliary spray and pressurizer heaters powered from the emergency power sources.

APPLICABLE SAFETY ANALYSES

RCS loops — test exceptions do not satisfy any Criterion in the NRC Policy Statement, but are included as they support other LCOs that meet a Criterion for inclusion.

LCO

The LCO is provided to allow for the performance of PHYSICS TESTS in MODE 2 (after refueling), where the core cooling requirements are significantly different than after the core has been operating. Without the LCO, plant operations would be held bound to the normal operating LCOs for reactor coolant loops and circulation (MODES 1 and 2), a minimum temperature for criticalities, and minimum pressure, temperature air flow limits. Hence, the appropriate physics tests could not be performed.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

LCO 3.4.16 The specific activity of the primary coolant shall be limited to:

a. A gross specific activity $\leq 100/\bar{E}$ μCi/gm; and

b. A DOSE EQUIVALENT I-131 specific activity ≤ 1.0 μCi/gm.

APPLICABILITY: MODES 1 and 2,
MODE 3 with $T_{avg} \geq [500]$°F.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Gross specific activity of the primary coolant not within limit.	A.1	Determine DOSE EQUIVALENT I-131.	4 hours
	AND		
	A.2	Be in MODE 3 with $T_{avg} < 500$°F.	6 hours
B. DOSE EQUIVALENT I-131 > 1.0 μCi/gm.	B.1	Demonstrate DOSE EQUIVALENT I-131 within the acceptable region of Figure 3.4.16-1.	Once per 4 hours
	AND		
	B.2	Restore DOSE EQUIVALENT I-131 to within limit.	48 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Required Action and associated Completion Time of Condition B not met. <u>OR</u> DOSE EQUIVALENT I-131 in the unacceptable region of Figure 3.4.16-1.	C.1	Be in MODE 3 with T_{avg} < 500°F.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.16.1	Demonstrate primary coolant gross specific activity $\leq 100/\bar{E}$ μCi/gm.	7 days
SR 3.4.16.2	Demonstrate primary coolant DOSE EQUIVALENT I-131 specific activity $\leq$ 1.0 μCi/gm.	14 days <u>AND</u> Between 2 and 6 hours after THERMAL POWER change of $\geq$ 15% of RATED THERMAL POWER within a 1-hour period

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.16.3	-----------------NOTE---------------- 1. SR 3.0.4 is not applicable. 2. Sample after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours. -------------------------------------- Determine $\bar{E}$.	184 days

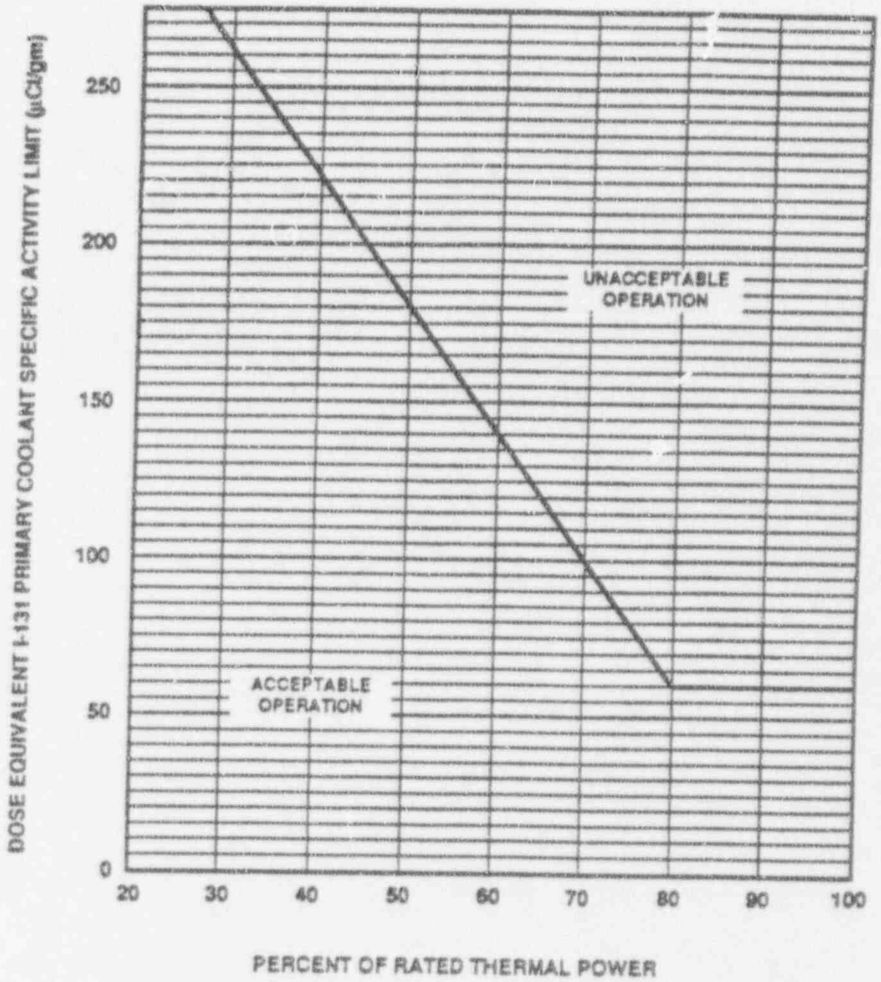

FIGURE 3.4.16-1 (Page 1 of 1)

Primary Coolant DOSE EQUIVALENT I-131 Specific Activity Limit Versus Percent of RATED THERMAL POWER With Primary Coolant Specific Activity > 1.0 µCi/gm DOSE EQUIVALENT I-131.

Items 2, 3, 4
• See the comments on
• p 3.3-7

TABLE 3.3.2-1

REACTOR PROTECTION INSTRUMENTATION - SHUTDOWN

Function		Applicable Modes or Other Specified Conditions	Surveillance Requirements	Allowable Value
1.	Logarithmic Power Level - High(b)	3(a), 4(a), 5(a)	SR 3.3.2.1 SR 3.3.2.3 SR 3.3.2.4 SR 3.3.2.5 SR 3.3.2.6 SR 3.3.2.7 SR 3.3.2.8	≤ [0.018] % RTP
2.	Steam Generator Pressure #1 - Low(c)	3(a)	SR 3.3.2.1 SR 3.3.2.3 SR 3.3.2.4 SR 3.3.2.6 SR 3.3.2.7 SR 3.3.2.8	≥ [843 psia]
3.	Steam Generator Pressure #2 - Low(c)	3(a)	SR 3.3.2.1 SR 3.3.2.3 SR 3.3.2.4 SR 3.3.2.6 SR 3.3.2.7 SR 3.3.2.8	≥ [843 psia]
4.	Reactor Coolant Flow - Low(d)	3(a), 4(a), 5(a)	SR 3.3.2.1 SR 3.3.2.3 SR 3.3.2.4 SR 3.3.2.6 SR 3.3.2.7 SR 3.3.2.8	Rate: [*] psi/sec Floor: [*] psid Step: [*] psi
5.	Local Power Density - High(e)	3(a), 4(a), 5(a)	SR 3.3.2.1 SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.4 SR 3.3.2.5 SR 3.3.2.6 SR 3.3.2.7 SR 3.3.2.8	≤ [21.0] kw/ft
6.	Departure from Nucleate Boiling Ratio - Low(e)	3(a), 4(a), 5(a)	SR 3.3.2.1 SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.4 SR 3.3.2.5 SR 3.3.2.6 SR 3.3.2.7 SR 3.3.2.8	≥ [1.24]

(a) With any Reactor Trip Circuit Breakers (RTCBs) closed and any Control Element Assembly capable of being withdrawn.

(b) Trip may be bypassed when THERMAL POWER is > [1E-4] RTP. Operating bypass shall be automatically removed when THERMAL POWER is ≤ [1E-4]% RTP. Trip may be manually bypassed during physics testing pursuant to LCO [3.4.17] "RCS Loops - Test Exceptions".

(c) The Steam Generator Pressure - Low trip setpoint may be manually decreased as steam generator pressure is reduced, provided the margin between steam generator pressure and the setpoint is maintained at ≤ 200 psi. The setpoint shall be increased automatically as steam generator pressure is increased.

(d) The Reactor Coolant Flow - Low trip setpoints may be manually adjusted when THERMAL POWER is < 10^{-**}.

(e) Trip may be bypassed when THERMAL POWER is < [1E-4]% RTP. Operating bypass shall be automatically removed when THERMAL POWER is ≥ [1E-4]% RTP. During testing pursuant to LCO 3.4.17, trip may be bypassed below [5%] RTP. Operating bypass shall be automatically removed when THERMAL POWER is > [5%] RTP.

* Value to be determined by system detail design.

The applicant should indicate what are the DBA to determine the allowable values for items 1 to 4 and indicate the specific section of CESSAR-DC, which contains the analytical results in support these values.

TABLE 3.3.8-1

ALTERNATE PROTECTION SYSTEM

Function	Applicable Modes	Allowable Value
1. Pressurizer Pressure - Reactor Trip	1,2	≥ [2420 psia]
2. Steam Generator 1 Level - AFAS	1,2	≤ [23.4]%
3. Steam Generator 2 Level - AFAS	1,2	≤ [23.4]%
4. CEDMCS Bus Under Voltage - Turbine Trip	1,2	≤ [*]

* Value to be determined by system detail design.

BASES

LCO (Continued)

if the standby SCS division is not OPERABLE, a sufficient alternate method to provide redundant paths for decay heat removal is two SGs with their secondary side water levels ≥ [25%]. Should the operating SCS division fail, the SGs could be used to remove the decay heat.

Note 1 permits all SCS pumps to be de-energized ≤ 1 hour per 8 hour period. The circumstances for stopping both SCS trains are to be limited to situations where pressure and temperature increases can be maintained well within the allowable pressure (pressure and temperature and low temperature overpressure protection) and 10°F subcooling limits, or an alternate heat removal path through the SG(s) is in operation.

This LCO is modified by a Note that prohibits boron dilution when SCS forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature, so that no vapor bubble would form and possibly cause a natural circulation flow obstruction. In this MODE, the SG(s) can be used as the backup for SCS heat removal. To ensure their availability, the RCS loop flow path is to be maintained with subcooled liquid.

In MODE 5, it is sometimes necessary to stop all RCP or SCS forced circulation. This is permitted to change operation from one SCS division to the other, perform surveillance or startup testing, perform the transition to and from the SCS, or to avoid operation below the RCP minimum net positive suction head limit. The time period is acceptable because natural circulation is acceptable for decay heat removal, the reactor coolant temperature can be maintained subcooled, and boron stratification affecting reactivity control is not expected.

Note 2 allows one SCS division to be inoperable for a period of up to 2 hours provided that the other SCS division is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable division during the only time when such testing is safe and possible.

Incl 4. Change to be consistent with LCO 3.4.7, note 3

Note 3 requires that either of the following two conditions be satisfied before an RCP may be started with any RCS cold leg temperature ≤ [285]°F:

a. Pressurizer water level must be < [60]%; or

b. Secondary side water temperature in each SG must be < [100]°F above each of the RCS cold leg temperatures.

Satisfying either of the above conditions will preclude a low temperature overpressure event due to a thermal transient when the RCP is started.

3.5 EMERGENCY CORE COOLING SYSTEM (ECCS)

3.5.2 Safety Injection System (SIS) - Operating

LCO 3.5.2 Four trains of SIS shall be OPERABLE.

APPLICABILITY: MODES 1, 2 and 3

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required SIS train inoperable.	A.1 Restore train to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours

3.9 REFUELING OPERATIONS

3.9.1 Boron Concentration

LCO 3.9.1 Boron concentrations of the Reactor Coolant System [the refueling canal and the refueling cavity] shall be maintained within the limit specified in the COLR.

General Comment: Since Parameters are to be specific in COLR, Please provide a sample COLR with TS package.

APPLICABILITY: MODE 6

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A.1 Boron Concentration not within limit.	A.1 Suspend CORE ALTERATIONS	Immediately
	AND	
	A.2 Suspend positive reactivity additions.	Immediately
	AND	
	A.3 Initiate actions to restore boron concentration to within limit.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.9.1.1 Verify boron concentration within limit as specified in the COLR.	72 hours

B 3.5 EMERGENCY CORE COOLING SYSTEM (ECCS)

B 3.5.5 Trisodium Phosphate (TSP)

BASES

BACKGROUND

The IRWST is the suction source for the SI pumps and CS pumps during short-term injection and long-term cooling modes of post-accident operation. Reactor coolant lost out through a break (LOCA) sprayed by the containment spray pumps is collected by the Holdup Volume Tank (HVT). Spillways allow accumulated water in the HVT to spill back into the IRWST, thereby replenishing IRWST water volume during accident operations. Trisodium phosphate (TSP) is placed in the Holdup Volume Tank (HVT) of the containment to assure that iodine, which may be dissolved in the recirculated reactor cooling water following a loss of coolant accident (LOCA), remains in solution. TSP also helps inhibit stress corrosion cracking (SCC) of austenitic stainless steel components in containment during the long-term cooling phase following an accident.

Fuel that is damaged during a LOCA will release iodine in several chemical forms to the reactor coolant and to the containment atmosphere. A portion of the iodine in the containment atmosphere is washed to the HVT by containment sprays. The emergency core cooling water is borated for reactivity control. This borated water causes the HVT solution to be acidic. In a low pH (acidic) solution, dissolved iodine will be converted to a volatile form. The volatile iodine will evolve out of solution into the containment atmosphere, significantly increasing the levels of airborne iodine. The increased levels of airborne iodine in containment contribute to the radiological releases and increase the consequences from the accident due to containment atmosphere leakage.

After a LOCA, the components of the core cooling and containment spray systems will be exposed to high temperature borated water. Prolonged exposure to the core cooling water combined with stresses imposed on the components can cause SCC. The SCC is a function of stress, oxygen and chloride concentrations, pH, temperature, and alloy composition of the components. High temperatures and low pH, which would be present after a LOCA, tend to promote SCC. This can lead to the failure of necessary safety systems or components.

Adjusting the pH of the recirculated solution to levels above 7.0 prevents a significant fraction of the dissolved iodine from converting to a volatile form. The higher pH thus decreases the level of airborne iodine in containment and reduces the radiological consequences from containment atmosphere leakage following a LOCA. Maintaining the solution pH above 7.0 also reduces occurrence SCC of austenitic stainless steel components in containment. Reducing SCC reduces the probability of failure of components.

BASES

APPLICABILITY

In MODES 1, 2, and 3, the RCS is at elevated temperature and pressure, providing an energy potential for a LOCA. The potential for a LOCA results in a need for the ability to control the pH of the recirculated coolant.

In MODES 4, 5, and 6, the potential for a LOCA is reduced or nonexistent, and TSP is not required.

ACTIONS

A.1

If it is discovered that the TSP in the HVT is not within limits, action must be taken to restore the TSP to within limits. During plant operation the HVT is not accessible and ~~corrections~~ corrective actions may not be possible.

The Completion Time of 72 hours is allowed for restoring the TSP within limits, where possible, because 72 hours is the same time allowed for restoration of other ECCS ~~components~~ variables.

B.1 and B.2

If the TSP cannot be restored within limits within the Completion Time of Required Action A.1, the plant must be brought to a MODE in which the LCO does not apply. The specified Completion Times for reaching MODES 3 and 4 are those used throughout the Technical Specifications; they were chosen to allow reaching the specified conditions from full power in an orderly manner without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.5.5.1

The stainless steel baskets, which are attached to the walls of the HVT, have a solid top and bottom with mesh sides to permit submergence of the trisodium phosphate. The elevation of the baskets is above the normal operating water level in the holdup volume tank and below the IRWST spillway. Access is provided to the baskets for inspection and sampling. Periodic determination of the volume of TSP in the containment must be performed due to the possibility of leaking valves and components inside containment that could cause the dissolution of TSP during normal operation. A Frequency of 18 months is required to determine visually that a minimum of [796] cubic feet is contained in the TSP baskets. This requirement ensures that there is an adequate volume of TSP to adjust the pH of the post LOCA solution to a value $\geq$ 7.0.

BASES

BACKGROUND (Continued)

Granular TSP is employed as a passive form of pH control for post LOCA containment spray and core cooling water. Baskets of TSP are attached to the walls of the Holdup Volume Tank in the containment to dissolve with released reactor coolant water and containment sprays after a LOCA. Recirculation of the water for core cooling and containment sprays then provides mixing to achieve a uniform solution pH. The dodecahydrate form of TSP is used because of the high humidity inside containment during normal operation. Since the TSP is hydrated, it is less likely to absorb large amounts of water from the humid atmosphere and will undergo less physical and chemical change than the anhydrous form of TSP.

Note: pH values given refer to 298K (25°C).

APPLICABLE SAFETY ANALYSIS

The LOCA radiological consequences analysis takes credit for iodine retention in the sump solution based on the recirculated water pH being ≥ 7.0. The radionuclide releases from the containment atmosphere and the consequences of a LOCA would be increased if the pH of the recirculated water were not adjusted to 7.0 or above.

TSP satisfies criterion 2 of the NRC Policy Statement.

LCO

The TSP is required to adjust the pH of the recirculated water to > 7.0 after a LOCA. A pH > 7.0 is necessary to prevent significant amounts of iodine released from fuel failures and dissolved in the recirculated water from converting to a volatile form and evolving into the containment atmosphere. Higher levels of airborne iodine in containment may increase the release of radionuclides and the consequences of the accident. A pH > 7.0 is also necessary to prevent SCC of austenitic stainless steel components in containment. SCC increases the probability of failure of components.

The required amount of TSP is based upon the extreme cases of water volume and pH possible in the HVT after a large break LOCA. The minimum required volume is the volume of TSP that will achieve a solution pH of ≥ 7.0 when taking into consideration the maximum possible HVT volume and the minimum possible pH. The amount of TSP needed in the containment is based on the mass of TSP required to achieve the desired pH. However, a required volume is specified, rather than mass, since it is not feasible to weigh the entire amount of TSP in containment. The minimum required volume is based on the manufactured density of TSP. Since TSP can have a tendency to agglomerate from high humidity inside containment, the density may increase and the volume decrease during normal plant operation. Due to possible agglomeration and increase in density, estimating the minimum volume of TSP in containment is conservative with respect to achieving a minimum required pH.

Insert: The minimum required amount of TSP is the amount which when dissolved would produce pH ≥ 7.0 [illegible] volume of [illegible] in the HVT and the [illegible] pH. For TSP ...

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.1.1	Verify each SIT isolation valve is fully open.	12 hours
NUMBERS ARE DIFFERENT HERE →	borated water volume in each SIT is ≥ [1600 feet (*% narrow range) and ≤ 1927 cubic % narrow range)].	12 hours
→	nitrogen cover-pressure in each SIT is ≥ [570] id ≤ [632] psig.	12 hours
	boron concentration in each SIT is ≥ [4000] id ≤ [4400] ppm.	31 days AND -NOTE- Only required to be performed for affected SIT Once within 6 hours after each solution volume increase of ≥ [1%] of tank volume that is not the result of addition from the IRWST
SR 3.5.1.5	Verify power is removed from each SIT isolation valve operator when pressurizer pressure is ≥ [900] psia.	31 days
SR 3.5.1.6	-NOTE- Required to be performed when pressurizer is ≥ [900] psia. Verify power is removed from each SIT vent valve operator.	31 days

* Values to be determined by system detail design.

16.7.7 3.4.7 REACTOR COOLANT LOOPS AND CIRCULATION - MODE 5, LOOPS FILLED

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 Reactor Coolant Loops - MODE 5, Loops Filled

LCO 3.4.7 One Shutdown Cooling System (SCS) division shall be OPERABLE and in operation, and either:

a. One additional SCS division shall be OPERABLE, or

b. The secondary side water level of each Steam Generator (SG) shall be ≥ [25%] wide range indication, and

{a containment spray pump can be manually realigned to meet the requirement of a SCS pump.}

-NOTE-

1. SCS pumps may be de-energized for up to 1 hour per 8-hour period provided:

   a. No operations are permitted that would cause reduction of the RCS boron concentration, and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. No RCP shall be started with one or more of the RCS cold leg temperatures ≤ [259°F] during cooldown or [290°F] during heatup (the heatup rate is limited to [40°F/hr or less]) unless the secondary water temperature of each SG is < [100°F] above each of the RCS cold leg temperatures.

3. All SCS trains may be removed from operation during planned heatup to MODE 4 when at least one RCS loop is in operation.

APPLICABILITY: MODE 5 with RCS loops filled.

(H) no time limit? pp. level?

or delete B.1

Initiate actions to

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One SCS division inoperable. AND Two RCS loops inoperable.	B.1 Restore a second RCS loop/SCS division to OPERABLE status. OR B.2 Be in MODE 5.	~~1 hour~~ Immediately ~~25~~ 24 hours
C. No RCS loops or SCS divisions in operation. or Required RCS loop or SCS division inoperable	C.1 Suspend all operations involving reduction in RCS boron concentration. AND C.2 Initiate action to restore one RCS loop/SCS division to operation.	Immediately Immediately

(5) "Initiate" Immediately makes more sense

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.6.1	Verify secondary-side water level of required steam generator(s) ≥ [25]% wide range indication.	12 hours
SR 3.4.6.2	Verify at least one RCS loop or SCS division operating.	12 hours
SR 3.4.6.3	Verify correct breaker alignment and indicated power available to the required pump not in operation.	7 days

16.7.6 3.4.6 RCS LOOPS - MODE 4

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops - MODE 4

LCO 3.4.6 Two RCS loops/Shutdown Cooling System (SCS) divisions consisting of any combination of RCS loops and SCS divisions shall be OPERABLE and at least one loop/division shall be in operation.

NOTE

1. All RCPs and SCS pumps may be de-energized for up to 1 hour per 8-hour period provided:

   a. No operations are permitted that would cause reduction of the RCS boron concentration, and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. No RCP shall be started with any RCS cold leg temperatures ≤ [259°F] during cooldown or [290°F] during heatup (the heatup rate is limited to [40°F/hr or less]) unless the secondary water temperature of each steam generator is < [100°F] above each of the RCS cold leg temperatures.

no limit on pzr. level?

APPLICABILITY: MODE 4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One RCS loop inoperable AND Two SCS divisions inoperable.	A.1 Initiate action to return a second RCS loop/SCS division to OPERABLE status.	Immediately

(continued)

Amendment O
May 1, 1993

B 3.1.1 REACTIVITY CONTROL SYSTEMS

B 3.1.11 Special Test Exceptions - CEDMS Testing

(Use acronyms)
Control Element Drive Mechanism System

BASES

BACKGROUND

CEDMS testing is performed startup to verify the operability of the control element drives. Since this test requires the withdrawal of CEAs, the shutdown margin is reduced. In order that the test may be performed, this special test exception is provided since the requirements of LCO 3.1.1 would be too restrictive to allow performance of the test.

APPLICABLE SAFETY ANALYSIS

Control Element Drive Mechanism Control System

In Ref. 1, the conditions of the CEDMCS testing were analyzed. It was found that sufficient subcriticality is maintained in case of a CEA ejection accident. This is from the fact that prior to testing K(n-1) must be less than 0.99. The margin will preclude inadvertent criticality.

LCO

Suspension of the shutdown margin requirement of LCO 3.1.1 may be suspended for pre-startup testing of the CEDMS if four conditions are met. First, only one CEA may be withdrawn at a time. Second, no CEA may be withdrawn more than seven inches. Third, with RTCBs open, K(n-1) must be less than 0.99 before the start of testing. Fourth, all other operations which involve a reactivity increase must be suspended during testing.

APPLICABILITY

LCO 3.1.11 is applicable during MODES 4 and 5 since these are the modes during which CEDMS testing is performed.

ACTIONS

A.1

any of the four requirements are not met then testing must be suspended and the shutdown margin must be restored to the limit of LCO 3.1.1. This action is necessary for the prevention of an inadvertent criticality.

SURVEILLANCE REQUIREMENTS

SR 3.1.11.1

Determination of the shutdown margin ensures that CEDMS testing is being performed under conditions that would prevent an inadvertent criticality. The frequency of 24 hours is based upon operating experience and the fact that other administrative controls exist to prevent unauthorized reactivity increases.

BASES

ACTIONS

A.1.1, A.1.2, and A.2 (continued)

the SDM to within limit, if the CEA(s) is not restored to within limits prior to this time.

If the CEA(s) is not restored to within limits within 1 hour and the SDM is within limit, then an additional 1 hour is allowed for restoring the CEA(s) to within limits. The 2 hour total Completion Time allows the operator adequate time to adjust the CEA(s) in an orderly manner and is consistent with the required Completion Times in LCO 3.1.5, "Control Element Assembly (CEA) Alignment."

B.1

When Required Action A.1 or Required Action A.2 cannot be met or completed within the required Completion Time, a controlled shutdown should be commenced. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1

Verification that the shutdown CEAs are within their insertion limits prior to an approach to criticality ensures that when the reactor is critical, or being taken critical, the shutdown CEAs will be available to shut down the reactor, and the required SDM will be maintained following a reactor trip. This SR and Frequency ensure that the shutdown CEAs are withdrawn before the regulating CEAs are withdrawn during a unit startup.

Since the shutdown CEAs are positioned manually by the control room operator, verification of shutdown CEA position at a Frequency of 12 hours is adequate to ensure that the shutdown CEAs are within their insertion limits. Also, the Frequency takes into account other information available to the operator in the control room for the purpose of monitoring the status of the shutdown CEAs.

(continued)

BASES

APPLICABILITY (Continued)

MARGIN - SDM") for SDM requirements in MODES 3, 4, and 5. LCO 3.9.1, "Boron Concentration," ensures adequate SDM in MODE 6.

This LCO has been modified by a Note indicating the LCO requirement is suspended during SR 3.1.5.5, which verifies the freedom of the CEAs to move, and requires the shutdown CEAs to move below the LCO limits, which would normally violate the LCO.

ACTIONS

A.1.1, A.1.2, and A.2

Prior to entering this Condition, the shutdown CEAs were fully withdrawn. If a shutdown CEA is then inserted into the core, its potential negative reactivity is added to the core as it is inserted. If boron concentration is not changed at this time, SDM should not change. This, however, is verified within 1 hour, or boration is initiated to bring the SDM to within limit, if the CEA(s) is not restored to within limits prior to this time.

If the CEA(s) is not restored to within limits within 1 hour and the SDM is within limit, then an additional 1 hour is allowed for restoring the CEA(s) to within limits. The 2 hour total Completion Time allows the operator adequate time to adjust the CEA(s) in an orderly manner and is consistent with the required Completion Times in LCO 3.1.5, "Control Element Assembly (CEA) Alignment."

B.1

When Required Action A.1 or Required Action A.2 cannot be met or completed within the required Completion Time, a controlled shutdown should be commenced. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1

¶ missing – see separate sheet

Since the shutdown CEAs are positioned manually by the control room operator, verification of shutdown CEA position at a Frequency of 12 hours is adequate to ensure that the shutdown CEAs are within their insertion limits. Also, the Frequency takes into account other information available to the operator in the control room for the purpose of monitoring the status of the shutdown CEAs.

BASES

APPLICABLE SAFETY ANALYSES (Continued)

CEAs are considered fully withdrawn at 145 inches, since this position places them outside the active region of the core.

On a reactor trip, all CEAs (shutdown CEAs and regulating CEAs), except the most reactive CEA, are assumed to insert into the core. The shutdown and regulating CEAs shall be at their insertion limits and available to insert the maximum amount of negative reactivity on a reactor trip signal. The regulating CEAs may be partially inserted in the core as allowed by LCO 3.1.7, "Regulating Control Element Assembly (CEA) Insertion Limits." The shutdown CEA insertion limit is established to ensure that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM (see LCO 3.1.1, "SHUTDOWN MARGIN (SDM)) following a reactor trip from full power. The combination of regulating CEAs and shutdown CEAs (less the most reactive CEA, which is assumed to be fully withdrawn) is sufficient to take the reactor from full power conditions at rated temperature to zero power, and to maintain the required SDM at rated no load temperature (Ref. 3). The shutdown CEA insertion limit also limits the reactivity worth of an ejected shutdown CEA.

The acceptance criteria for addressing shutdown CEA as well as regulating CEA insertion limits and inoperability or misalignment are that:

a. There be no violation of:

   1. specified acceptable fuel design limits, or
   2. Reactor Coolant System pressure boundary damage integrity; and

b. The core remains subcritical after accident transients.

why not necessarily as done in B3.1.5? (OK now)

The shutdown CEA insertion limits satisfy Criterion 2 of the NRC Policy Statement.

LCO

The shutdown CEAs must be within their insertion limits any time the reactor is critical or approaching criticality. This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip.

APPLICABILITY

The shutdown CEAs must be within their insertion limits, with the reactor in MODES 1 and 2. The Applicability in MODE 2 begins any time any regulating CEA is not fully inserted. This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip. In MODES 1 and 2, if shutdown CEAs are not within their insertion limits, then SDM will be verified by performing a reactivity balance calculation (considering the listed reactivity effects in Bases Section SR 3.1.1.1). In MODE 3, 4, 5, or 6, the shutdown CEAs are fully inserted in the core and contribute to the SDM. Refer to LCO 3.1.1 ("SHUTDOWN

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.1.4.2 is modified by a Note that indicates performance is not required prior to entering MODE 1 or 2. Although this Surveillance is applicable in MODES 1 and 2, the reactor must be critical before the Surveillance can be completed. Therefore, entry into the applicable MODE prior to accomplishing the Surveillance is necessary.

SR 3.1.4.1 and SR 3.1.4.2

SR 3.1.4.2 is modified by a second Note that indicates, if extrapolated MTC is more negative than the EOC COLR limit, the Surveillance may be repeated, and that shutdown must occur prior to exceeding the minimum allowable boron concentration at which MTC is projected to exceed the lower limit. An engineering evaluation is performed if the extrapolated value of MTC exceeds the Specification limits.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 11.

2. CESSAR-DC, Chapter 15.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
	-NOTE- Enter applicable Conditions and Required Actions of LCO 3.8.10, with one required division de-energized as a result of Condition A.		
A. One required offsite circuit inoperable.	A.1	Declare affected required feature(s) with no offsite power available inoperable.	Immediately
	OR		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2.2	Suspend handling of irradiated fuel assemblies.	Immediately
	AND		
	A.2.3	Initiate actions to suspend operations with a potential for draining the reactor vessel.	Immediately

Throughout:

1. Placement of the word "continued" is contrary to the STS WG. Example: The continuation of SR 3.8.1.19 to the next page should be denoted by a "continued" at the bottom corner of the Frequency column, not below the table boundary. This is a general problem that occurs in ACTIONS tables also.

2. Nesting of Logical Connectors has been ignored; thius detracts from the usability of the ACTIONS tables based on human factors considerations.

3. Bottom spacing for Conditions (usually seen in the Required Actions and Completion Time columns) and SRs is contrary to the Writers Guide formatting instructions: there is no blank space.

4. A different font than used in the STS is used.

Throughout:

1. Placement of the word "continued" is contrary to the STS WG. Example: The continuation of SR 3.8.1.19 to the next page should be denoted by a "continued" at the bottom corner of the Frequency column, not below the table boundary. This is a general problem that occurs in ACTIONS tables also.

2. Nesting of Logical Connectors has been ignored; thius detracts from the usability of the ACTIONS tables based on human factors considerations.

3. Bottom spacing for Conditions (usually seen in the Required Actions and Completion Time columns) and SRs is contrary to the Writers Guide formatting instructions: there is no blank space.

4. A different font than used in the STS is used.

	2. Credit may be taken for unplanned events that satisfy this SR. Verify the interval between each sequenced load block is within ± [10% of design interval] for each emergency [and shutdown] load sequencer.	[18 months]
SR 3.8.1.19	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. 3. Credit may be taken for unplanned events that satisfy this SR.	

(Continued)

B 3.5 EMERGENCY CORE COOLING SYSTEM (ECCS)

B 3.5.5 Trisodium Phosphate (TSP)

BASES

BACKGROUND

The IRWST is the suction source for the SI pumps and CS pumps during short-term injection and long-term cooling modes of post-accident operation. Reactor coolant lost out through a break (LOCA) sprayed by the containment spray pumps is collected by the Holdup Volume Tank (HVT). Spillways allow accumulated water in the HVT to spill back into the IRWST, thereby replenishing IRWST water volume during accident operations. Trisodium phosphate (TSP) is placed in the Holdup Volume Tank (HVT) of the containment to assure that iodine, which may be dissolved in the recirculated reactor cooling water following a loss of coolant accident (LOCA), remains in solution. TSP also helps inhibit stress corrosion cracking (SCC) of austenitic stainless steel components in containment during the long-term cooling phase following an accident.

Fuel that is damaged during a LOCA will release iodine in sev[illegible] reactor coolant and to the containment atmosphere. A po[illegible] containment atmosphere is washed to the HVT by containme[illegible] core cooling water is borated for reactivity control. This bor[illegible] solution to be acidic. In a low pH (acidic) solution, dissolve[illegible] to a volatile form. The volatile iodine will evolve out of sol[illegible] atmosphere, significantly increasing the levels of airborne iod[illegible] of airborne iodine in containment contribute to the radiologica[illegible] and increase the consequences from the accident due to containment atmosphere leakage.

Should this be trisodium phosphate or trisodium phosphate dodecahydrate

After a LOCA, the components of the core cooling and containment spray systems will be exposed to high temperature borated water. Prolonged exposure to the core cooling water combined with stresses imposed on the components can cause SCC. The SCC is a function of stress, oxygen and chloride concentrations, pH, temperature, and alloy composition of the components. High temperatures and low pH, which would be present after a LOCA, tend to promote SCC. This can lead to the failure of necessary safety systems or components.

Adjusting the pH of the recirculated solution to levels above 7.0 prevents a significant fraction of the dissolved iodine from converting to a volatile form. The higher pH thus decreases the level of airborne iodine in containment and reduces the radiological consequences from containment atmosphere leakage following a LOCA. Maintaining the solution pH above 7.0 also reduces occurrence SCC of austenitic stainless steel components in containment. Reducing SCC reduces the probability of failure of components.

BASES

ACTIONS (Continued)

In the determination of the required combination of boration flow rate and boron concentration, there is not a unique design basis event which must be satisfied. The only requirement is to restore the boron concentration to its required value as soon as possible. In order to raise the boron concentration of the RCS as soon as possible, the boration solution should be a highly concentrated solution of boric acid.

Once boration is initiated, it must be continued until the boron concentration is restored. The completion time depends on the amount of boron which must be injected to reach the required concentration.

SURVEILLANCE REQUIREMENTS

SR 3.9.1.1

This SR ensures the reactor coolant boron concentration in the RCS, refueling canal and refueling cavity is within the COLR limit. The boron concentration in the coolant is determined periodically by chemical analysis.

Because the likelihood of a significant reduction in t[...] [...]E 6 operations is remote, a minimum frequency of [...] [...]de interval to verify boron concentration. The surve[...] [...]ve operating experience and ensures that the boron [...] [...]te intervals.

Comment on markup not included
Comment:
See page 16A.12-3

REFERENCES

1. 10 CFR 50, Appendix A, Section VI, Criterion 26, "Reactivity Control System Redundancy and Capability."

2. NS-51.2, ANSI/ANS-57.2-1983, Section 6.4.2.2.3, American Nuclear Society, American National Standard, "Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants," 1983.

3. CESSAR-DC, Chapter 15, Accident Analysis.

4. 52 FR 3788, NRC Interim Policy Statement, on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

5. NRC Bulletin No. 89-03, "Potential Loss of Required Shutdown Margin During Refueling Operations," November 21, 1989.

6. CESSAR-DC, Section 19.8, "Shutdown Risk Assessment".

CESSAR TECHNICAL SPECIFICATION
SPLB REVIEW

We have determine that SPLB responsibility includes the following Technical Specification sections:

3.4.14
3.4.12
3.5.3
3.5.4
3.5.5
3.6.1
3.6.2
3.6.3
3.6.4
3.6.5
3.6.6
3.6.7
3.6.8
3.6.9
3.7.1
3.7.2
3.7.3
3.7.4
3.7.5
3.7.6
3.7.7
3.7.8
3.7.9
3.7.10
3.7.11
3.7.12
3.7.13
3.7.14
3.7.15
3.7.16
3.7.17
3.7.18
3.7.19
3.7.20
3.8.3
3.9.1
3.9.3
3.9.4
3.9.5
3.9.6
3.10.3
3.10.4
3.10.5

UNRESOLVED TECHNICAL SPECIFICATION DISCREPANCIES

3.7.5 EMERGENCY FEEDWATER STORAGE TANK (EFWST)

1. Provide justification for how 350,000 gallons in the LCO section of the System 80+ TS can maintain the plant in Mode 3 for 8 hours when 350,000 gallons in the STS can only maintain the plant in Mode 3 for 4 hours. See markup page B 3.7-23.

3.7.8 STATION SERVICE WATER SYSTEM (SSWS)

1. Provide rationale for omitting the STS "SURVEILLANCE REQUIREMENT" for verifying each SSWS automatic valve in the flow path actuates to the correct position on an actual or simulated actuation signal with a frequency of [18] months. See markup page 3.7-16.

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
	------NOTE------ Isolation of SSWS flow to individual components does not render SSWS inoperable.	
SR 3.7.8.1	Verify each SSWS manual, power-operated, and automatic valve in the flow path servicing safety-related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.8.2	Verify each SSWS pump starts automatically on an actual or simulated actuation signal.	[18 months]

PROVIDE RATIONALE FOR OMITTING STS "SURVEILLANCE REQUIREMENT" FOR VERIFYING ACTUATION OF EACH AUTOMATIC VALVE.

PROVIDE JUSTIFICATION FOR THE 8 HOURS

LCO (Continued)

The specified usable volume of [350,000] gallons is based on holding the plant in MODE 3 for eight hours followed by a cooldown to Shutdown Cooling entry conditions at 75°F/hour. This bases is established by BTP RSB 5-1 (Ref. 3) and exceeds the volume required by the accident analysis.

APPLICABILITY

The required condensate volume must be available whenever the steam generators provide the heat sink for the RCS. Once a cooldown commences, the condensate volume may be reduced by using it for the cooldown. Proceeding with the cooldown ensures that the plant can reach shutdown cooling entry conditions on the available condensate inventory. A lesser condensate volume in the EFWST is required in MODES 2, 3 and 4 than in MODE 1 since the mass of fluid in the steam generators is greater at zero power than at full power.

In MODES 5 and 6 the steam generators are not required for cooldown, and the inventory in the EFWST is not required.

ACTIONS

A.1

With the EFWST(s) unable to supply the required volume of cooling water to the EFW pumps, it must be restored to OPERABLE status. Four hours allows time to restore the required volume from the backup supply. Four hours is a reasonable time to limit the risk from accidents and AOOs requiring the plant to cool down. With the level slightly below that required, there is still sufficient inventory to conduct a cooldown, although a cooldown should start immediately should the condenser become unavailable as a heat sink.

A.2

As an alternative to shutting down the unit, verification that the other EFWST is operable may be done before 4 hours expires. In such a case, the EFWST level must be restored within limit in 7 days.

B.1 and B2

When a Required Action cannot be completed within the Completion Time, a controlled shutdown should be commenced. Six hours is a reasonable time, based on operating experience, to reach MODE 3 from full power conditions without challenging plant systems.

UNRESOLVED TECHNICAL SPECIFICATION DISCREPANCIES

3.7.12 CONTROL COMPLEX VENTILATION SYSTEM

1. The fourth paragraph in the "BACKGROUND" should state "radioactive iodines from all of the return air and delivers ..." See markup page B 3.7-45.

2. Provide rationale for deleting the last four original paragraphs from the "BACKGROUND" or reinstate those as applicable. See markup page B 3.7-46.

3. The Control Complex emergency operation temperature in the "APPLICABLE SAFETY ANALYSES" should be between 73°F and 78°F (Not 65°F and 85°F). See markup page B 3.7-46.

3.7.14 SUBSPHERE BUILDING VENTILATION SYSTEM

1. You have stated that RCS level and reactor vessel level as equal to or greater than 120 feet - 0 inches. Explain the proposed reference. See markup page 3.7-24.

2. "SURVEILLANCE REQUIREMENTS" under Bases should state that the system is designed to maintain a slight negative pressure with respect to atmosphere. See markup page B 3.7-55.

3.7.15 FUEL BUILDING VENTILATION SYSTEM

1. Provide your rationale for deleting the "CEOG STS Actions Condition B." See markup page 3.7-26.

2. Revise CESSAR-DC Section 9.4.2.2, last paragraph, to reflect the "SURVEILLANCE REQUIREMENT 3.7.15.4" data (0.1 inches WG) concerning the negative pressure. See markup page 3.7-27.

3.7.18 NUCLEAR ANNEX VENTILATION SYSTEM

1. This system serves the safety-related areas. Therefore, provide your rationale for not providing the TS for the system.

3.7 PLANT SYSTEMS

3.7.14 Subsphere Building Ventilation System (SBVS)

LCO 3.7.14 Two Subsphere Building Ventilation System divisions shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4,
MODE 5 or MODE 6 with RCS level < [120 ft - 0 in].

PROVIDE EXPLANATION FOR ELEVATION

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Subsphere Building Ventilation System division inoperable.	A.1 Restore inoperable division to OPERABLE status.	7 days
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
	AND	
	B.3 Reduce RCS Temperature < 135°F and ensure RCS level > [120'-0"].	[42 hours]

3.7 PLANT SYSTEMS

3.7.15 Fuel Building Ventilation Exhaust System (FBVES)

LCO 3.7.15 Two FBVES divisions shall be OPERABLE.

APPLICABILITY: During movement of irradiated fuel in the fuel building.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One FBVES division inoperable.	A.1 Restore FBVES division to OPERABLE status.	7 days
B. Required Actions and associated Completion Times of Conditions A not met during movement of irradiated fuel in the fuel building.	B.1 Place OPERABLE FBVES division in operation.	Immediately
	OR	
	B.2 Suspend movement of irradiated fuel in the fuel building.	Immediately
C. Two FBVES divisions inoperable during movement of irradiated fuel in the fuel building.	C.1 Suspend movement of irradiated fuel in the fuel building.	Immediately

WHY WAS STS CONDITION "B" DELETED? PROVIDE RATIONALE.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.15.1	Operate each FBVES division in the filtered mode for [≥ 10 continuous hours with the heaters operating or for systems without heaters ≥ 15 minutes].	31 days
SR 3.7.15.2	Perform required FBVES filter testing in accordance with the [Ventilation Filter Testing Program].	In accordance with the [VFTP]
SR 3.7.15.3	[Verify each FBVES division actuates on an actual or simulated actuation signal.]	[18 months]
SR 3.7.15.4	Verify one FBVES division can maintain a negative pressure ≥ [0.1] inches water gauge with respect to atmospheric pressure, during the [post-accident] mode of operation at a flow rate ≤ [25,000] cfm.	[18] months on a STAGGERED TEST BASIS
SR 3.7.15.5	[Verify each FBACS filter bypass damper closes and filter damper opens.]	[18 months]

REVISE CESSAR-DC SECTION 9.4.2.2, LAST PARAGRAPH, TO STATE ABOVE DATA.

B 3.7 PLANT SYSTEMS

B 3.7.12 Control Complex Ventilation System

BASES

BACKGROUND

The Control Complex Ventilation System is designed to maintain the environment in the control room envelope and balance of control building within acceptable limits for the operation of unit controls, for maintenance and testing of the controls as required, and for uninterrupted safe occupancy of the control building area during post-accident shutdown. These systems are designed in accordance with the requirements of General Design Criteria 2, 4, 5, 19, and 60. Refer to Section 6.4 for further information regarding control room habitability.

The main control room air-handling system is divisionally separated and consists of two redundant air-handling units, each with filters, safety related chilled water cooling coils for heat removal, and fans for air circulation. The emergency circulation system consists of filter trains with particulate filters, carbon filters, and fans for emergency air circulation. Each of the filter trains consists of prefilter, electric heater, absolute (HEPA) filter, carbon adsorber and post filter (HEPA) along with ducts and valves and related instrumentation. Chilled water is supplied from the Essential Chilled Water System.

During normal operation, return air from the control room is mixed with a small quantity of outside air for ventilation, is filtered and conditioned in the control room air-conditioning unit, and is delivered to the control room through supply ductwork. Duct-mounted heating coils and humidification equipment provide final adjustments to the control room temperature and humidity for maintaining normal comfort conditions.

The designated MCR filtration units and ventilation fan start automatically on a Safety Injection Actuation Signal (SIAS) or high radiation signal. Upon failure of the designated filtration unit, the redundant filtration unit starts automatically. The ~~emergency circulation system~~ [MCR FILTRATION UNIT] filters particulates and potential radioactive iodines from ~~a portion~~ [ALL] of the return air and delivers the filtered air to the inlet of the main air-handling unit.

The Technical Support Center air-conditioning system consists of an air-handling unit, return air and smoke purge fans, and an emergency filter unit. The computer room air-conditioning system consists of two 100% air-conditioning units and associated fans. Both the Technical Support Center and computer room air-handling systems are non-safety and non-seismic.

The balance of control complex air-conditioning systems consists of two redundant air-handling units, each with roughing filters, essential chilled water cooling coils and fans serving Division I electrical rooms, channel A and channel C. Two equal units are

BASES

BACKGROUND (Continued)

serving Division II channel B and D. Each Division will function with one of the redundant air handling units delivering filtered, conditioned air to the various electrical equipment rooms, including essential battery rooms. Chilled water is supplied from the essential chilled water system. Each Division also contains redundant battery rooms with fans operating continuously to maintain the hydrogen concentration below two percent. Outlet ducts in battery rooms are located near the ceiling for hydrogen control. The safe shutdown area is served by Division II.

Return air from the various essential electrical equipment areas is mixed with a portion of outside air for ventilation, is filtered and conditioned in the air-handling unit, and is delivered to the rooms through supply ductwork. Duct-mounted heating coils provide final adjustments to temperature in selected equipment rooms.

The Operation Support Center, personnel decon rooms, Break Room, Shift Assembly and Offices, Radiation Access Control and Cas. and Sec. Group areas all are served by an individual air handling unit consisting of a centrifugal fan, non essential chilled water coil and roughing filter.

The control room and technical support center receive outside air from the cleanest of two sources.

PROVIDE RATIONALE FOR DELETING THE LAST FOUR ORIGINAL PARAGRAPHS, OR REINSTATE THOSE AS APPLICABLE.

APPLICABLE SAFETY ANALYSES

The Control Complex Ventilation System components are arranged in redundant safety-related ventilation divisions. The location of components and ducting within the control room envelope ensures an adequate supply of filtered air to all areas requiring access. During emergency operation the Control Complex Ventilation System maintains the temperature between ~~65°F and 85°F.~~ [73°F AND 78°F] The Control Complex Ventilation System provides airborne radiological protection for the control room operators as demonstrated by the control room accident dose analyses for the most limiting design basis Loss Of Coolant Accident fission product release presented in CESSAR-DC Chapter 15 (Ref. 2).

The analysis of toxic gas releases demonstrates that the toxicity limits are not exceeded in the control room following a toxic chemical release.

The worst case single active failure of a component of the Control Complex Ventilation System, assuming a loss of offsite power, does not impair the ability of the system to perform its design function.

The Control Complex Ventilation System satisfies Criterion 3 of the NRC Policy Statement.

ACTIONS (Continued)

reasonable based on operating experience to reach the required MODES from full power operation without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.14.1

This SR verifies that a division, having been shutdown when not required for operation, starts and continues to operate. Systems should be checked periodically to ensure they start and function properly. As the environment and normal operating conditions on this system are not severe, testing each division once every month provides an adequate check on this system. Monthly heater operations dry out any moisture that may have accumulated in the charcoal from humidity in the ambient air. [Systems with heaters must be operated for ≥ 10 continuous hours with the heaters energized. Systems without heaters need only be operated for ≥ 15 minutes to demonstrate the function of the system.] Normal operation of the system during required modes satisfies this SR. The 31 day Frequency is based on the known reliability of equipment and the two division redundancy available.

SR 3.7.14.2

This SR verifies that the required SBVS testing is performed in accordance with the [Ventilation Filter Testing Program (VFTP)]. The SBVS filter tests are in accordance with Regulatory Guide 1.52 (Ref. 4). The [VFTP] includes testing HEPA filter performance and the minimum system flow rate. Specific test frequencies and additional information are discussed in detail in the [VFTP].

SR 3.7.14.3

This SR verifies that on an actual or simulated actuation signal each Subsphere Building Ventilation System division starts and operates. The frequency of [18] months is consistent with that specified in RG 1.52.

WITH RESPECT TO ATMOSPHERE

SR 3.7.14.4

This SR verifies the integrity of the SIS Pump Room enclosure. The ability of the SIS Pump Room to maintain a negative pressure with respect to potentially uncontaminated adjacent areas is periodically tested to verify proper function of the Subsphere Building Ventilation System. During the emergency mode of operation, the Subsphere Building Ventilation System is designed to maintain a slight negative pressure in the SIS Pump Room with respect to adjacent areas to prevent unfiltered leakage. The Subsphere Building Ventilation System is designed to maintain this negative pressure at a flow rate of ≤ [13,200] cfm from the subsphere. The frequency of [18] months is consistent with the guidance provided in NUREG 0800, Section 6.5.1 (Ref. 5).

3.5 EMERGENCY CORE COOLING SYSTEM (ECCS)

3.5.5 Trisodium Phosphate (TSP)

LCO 3.5.5 The TSP baskets shall contain ≥ [796] cubic feet of active TSP.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. TSP not within limits.	A.1 Restore TSP to within limits.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in Mode 4.	6 hours [12] hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.5.1	Verify the TSP baskets contain ≥ [796] ft^3 of granular trisodium phosphate dodecahydrate.	[18] months
SR 3.5.5.2	Verify that a sample from the TSP baskets provides adequate pH adjustment of IRWST water.	[18] months

2/4/94

TS and BASES are acceptable.

Chandra (SPLB)

B 3.5 EMERGENCY CORE COOLING SYSTEM (ECCS)

B 3.5.5 Trisodium Phosphate (TSP)

BASES

BACKGROUND

The IRWST is the suction source for the SI pumps and CS pumps during short-term injection and long-term cooling modes of post-accident operation. Reactor coolant lost out through a break (LOCA) sprayed by the containment spray pumps is collected by the Holdup Volume Tank (HVT). Spillways allow accumulated water in the HVT to spill back into the IRWST, thereby replenishing IRWST water volume during accident operations. Trisodium phosphate (TSP) is placed in the Holdup Volume Tank (HVT) of the containment to assure that iodine, which may be dissolved in the recirculated reactor cooling water following a loss of coolant accident (LOCA), remains in solution. TSP also helps inhibit stress corrosion cracking (SCC) of austenitic stainless steel components in containment during the long-term cooling phase following an accident.

Fuel that is damaged during a LOCA will release iodine in several chemical forms to the reactor coolant and to the containment atmosphere. A portion of the iodine in the containment atmosphere is washed to the HVT by containment sprays. The emergency core cooling water is borated for reactivity control. This borated water causes the HVT solution to be acidic. In a low pH (acidic) solution, dissolved iodine will be converted to a volatile form. The volatile iodine will evolve out of solution into the containment atmosphere, significantly increasing the levels of airborne iodine. The increased levels of airborne iodine in containment contribute to the radiological releases and increase the consequences from the accident due to containment atmosphere leakage.

After a LOCA, the components of the core cooling and containment spray systems will be exposed to high temperature borated water. Prolonged exposure to the core cooling water combined with stresses imposed on the components can cause SCC. The SCC is a function of stress, oxygen and chloride concentrations, pH, temperature, and alloy composition of the components. High temperatures and low pH, which would be present after a LOCA, tend to promote SCC. This can lead to the failure of necessary safety systems or components.

Adjusting the pH of the recirculated solution to levels above 7.0 prevents a significant fraction of the dissolved iodine from converting to a volatile form. The higher pH thus decreases the level of airborne iodine in containment and reduces the radiological consequences from containment atmosphere leakage following a LOCA. Maintaining the solution pH above 7.0 also reduces occurrence SCC of austenitic stainless steel components in containment. Reducing SCC reduces the probability of failure of components.

BASES

BACKGROUND (Continued)

Granular TSP is employed as a passive form of pH control for post LOCA containment spray and core cooling water. Baskets of TSP are attached to the walls of the Holdup Volume Tank in the containment to dissolve with released reactor coolant water and containment sprays after a LOCA. Recirculation of the water for core cooling and containment sprays then provides mixing to achieve a uniform solution pH. The dodecahydrate form of TSP is used because of the high humidity inside containment during normal operation. Since the TSP is hydrated, it is less likely to absorb large amounts of water from the humid atmosphere and will undergo less physical and chemical change than the anhydrous form of TSP.

Note: pH values given refer to 298K (25°C).

APPLICABLE SAFETY ANALYSIS

The LOCA radiological consequences analysis takes credit for iodine retention in the sump solution based on the recirculated water pH being ≥ 7.0. The radionuclide releases from the containment atmosphere and the consequences of a LOCA would be increased if the pH of the recirculated water were not adjusted to 7.0 or above.

TSP satisfies criterion 2 of the NRC Policy Statement.

LCO

The TSP is required to adjust the pH of the recirculated water to > 7.0 after a LOCA. A pH > 7.0 is necessary to prevent significant amounts of iodine released from fuel failures and dissolved in the recirculated water from converting to a volatile form and evolving into the containment atmosphere. Higher levels of airborne iodine in containment may increase the release of radionuclides and the consequences of the accident. A pH > 7.0 is also necessary to prevent SCC of austenitic stainless steel components in containment. SCC increases the probability of failure of components.

The required amount of TSP is based upon the extreme cases of water volume and pH possible in the HVT after a large break LOCA. The minimum required volume is the volume of TSP that will achieve a solution pH of ≥ 7.0 when taking into consideration the maximum possible HVT volume and the minimum possible pH. The amount of TSP needed in the containment is based on the mass of TSP required to achieve the desired pH. However, a required volume is specified, rather than mass, since it is not feasible to weigh the entire amount of TSP in containment. The minimum required volume is based on the manufactured density of TSP. Since TSP can have a tendency to agglomerate from high humidity inside containment, the density may increase and the volume decrease during normal plant operation. Due to possible agglomeration and increase in density, estimating the minimum volume of TSP in containment is conservative with respect to achieving a minimum required pH.

SURVEILLANCE REQUIREMENTS (Continued)

The periodic verification is required every 18 months, since access to the TSP baskets is only feasible during outages, and normal fuel cycles are scheduled for 18 months. Operating experience has shown this Surveillance Frequency acceptable due to the margin in the volume of TSP placed in the containment.

SR 3.5.5.2

Testing must be performed to ensure the solubility and buffering ability of the TSP after exposure to the containment environment. A representative sample of [26.7] grams of TSP from one of the baskets in containment is submerged in 1.0 ± 0.05 gallons of water at a boron concentration of [4400] ppm and at the standard temperature of 25 ± 5°C. Without agitation, the solution pH should be raised to ≥ 7.0 within 4 hours. The representative sample weight is based on the minimum required TSP weight of [18,930] kilograms, which at manufactured density corresponds to a minimum volume of [796] cubic feet and maximum possible post LOCA recirculated water volume of [708,316] gallons, normalized to buffer a 1.0 gallon sample. The boron concentration of the test water is representative of the maximum possible boron concentration corresponding to the maximum possible post LOCA HVT recirculated water volume. Agitation of the test solution is prohibited, since an adequate standard for the agitation intensity cannot be specified. The test time of 4 hours is necessary to allow time for the dissolved TSP to naturally diffuse through the sample solution. In the post LOCA HVT, rapid mixing would occur, significantly decreasing the actual amount of time before the required pH is achieved. This would ensure compliance with the Standard Review Plan requirement of a pH ≥ 7.0 by the onset of recirculation after a LOCA.

REFERENCES

None.

3.7 PLANT SYSTEMS

3.7.6 Secondary Specific Activity

LCO 3.7.6 The specific activity of the secondary coolant shall be ≤ [0.10] μCi/gm DOSE EQUIVALENT I-131.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Specific activity not within limits.	A.1 Be in MODE 3. AND A.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.6.1	Verify the specific activity of the secondary coolant is within limit.	[31] days

STET Comment TS 3.7.6 is OK. 2/4/94
But the Bases should be amended as
Earlier comments have not been addressed.
BASES Section acceptable only with changes
as shown in the enclosed mark-up.

Chandra (SPLB)

B 3.7 PLANT SYSTEMS

B 3.7.6 Secondary Specific Activity

BASES

BACKGROUND

Activity in the secondary coolant results from Steam Generator tube out-leakage from the Reactor Coolant System (RCS). Under steady-state conditions, the activity is primarily iodines with relatively short half-lives, and thus is indicative of current conditions. During transients, I-131 spikes have been observed as well as increased releases of some noble gases. Other fission product isotopes, as well as activated corrosion products in lesser amounts, may also be found in the secondary coolant.

A limit on secondary coolant specific activity during power operation minimizes releases to the environment because of normal operation, anticipated operational occurrences, and accidents.

The LCO limit is lower than the activity value which might be expected from a 1.0 gpm tube leak, LCO 3.4.12, "RCS Operation Leakage", of primary coolant at the limit of 1.0 μCi/gram, LCO 3.4.15, "RCS Specific Activity." The steam line (failure) is assumed to result in the release of the noble gas and iodine activity contained in the steam generator inventory, the feedwater, and reactor coolant LEAKAGE. Most of the iodine isotopes have short half-lives, (i.e., less than 20 hours). I-131 with a half-life of 8.04 days concentrates faster than it decays, but does not reach equilibrium because of blowdown and other losses.

With the specified activity limit, the resultant two-hour thyroid dose to a person at the exclusion area boundary would be about [.13 rem] should the MSSVs open for the two hours following a trip from full power. Operating the plant at the allowable limits results in a 2-hour exclusion area boundary (EAB) exposure of a small fraction of the 10 CFR 100 (Ref. 1) limits.

APPLICABLE SAFETY ANALYSES

The accident analysis of the MSLB failure (Ref. 2) assumes the initial secondary coolant specific activity to have a radioactive isotope concentration of 0.1 μCi/g DOSE EQUIVALENT I-131. This assumption is used in the analysis for determining the radiological consequences of the postulated accident. The accident analysis, based on this and other assumptions, shows that the radiological consequences of a MSLB do not exceed a small fraction of the plant exclusion area boundary limits of 10 CFR 100 for whole body and thyroid dose rates.

BASES

ACTIONS (Continued)

restored to within limits in the associated Completion Time. This is done by placing the plant in at east MODE 3 in six hours and in MODE 5 in 36 hours. The allowed Completion Times are reasonable based on operating experience to reach the required MODES from full power operation without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.6.1

This SR ensures that the Secondary Activity is within the limits of the accident analysis. A Gamma Isotopic analysis of the secondary coolant, which determines DOSE EQUIVALENT I-131, confirms the validity of the accident analysis assumptions as to the source terms in post-accident releases. It also serves to identify and trend any unusual isotopic concentrations which might indicate changes in reactor coolant activity or LEAKAGE. The [31] day Frequency allows the level of DOSE EQUIVALENT I-131 to be monitored, increasing trends to be detected, and appropriate action to be taken to maintain levels below the LCO limit.

REFERENCES

1. 10 CFR 100, "Site Dose Criteria".
2. CESSAR-DC Section 15.1, Main Steam Line Break Accident Analysis Radioactivity Release Methodology.

2/4/94

Earlier comments have not been addressed. The suggested changes in the earlier comments should be incorporated as follows:

1. Page B 3.7-25 - Background Section
   The sentence "The steamline is assumed to result in the release of - - - - LEAKAGE" should be changed as indicated in the mark-up. (Note that only steamline failure will result in radioactivity release)
2. Page B 3.7-26 LCO Section
   The word "limit" indicated in the mark-up is appropriate.
3. Page B 3.7-26 Applicability Section
   Applicability ~~should~~ in Modes 1, 2, 3 and 4 should not be qualified by saying "Whenever using the SGs for RCS heat removal." Therefore, incorporate the changes as indicated in the mark-up.

Chandra
SPLB

3.9 REFUELING OPERATIONS

3.9.1 Boron Concentration

LCO 3.9.1 Boron concentrations of the Reactor Coolant System [the refueling canal and the refueling cavity] shall be maintained within the limit specified in the COLR.

APPLICABILITY: MODE 6

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A.1 Boron Concentration not within limit.	A.1 Suspend CORE ALTERATIONS	Immediately
	AND	
	A.2 Suspend positive reactivity additions.	Immediately
	AND	
	A.3 Initiate actions to restore boron concentration to within limit.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.9.1.1 Verify boron concentration within limit as specified in the COLR.	72 hours

as attach P.16 A.1

2/4/94

Proposed TS acceptable. None of the earlier comments, except the one ~~that~~ relating to 15 minutes completion time in the Amendment I version for BASES to ACTION A.3 have been addressed. BASES will be acceptable with modifications as shown in the earlier mark-up (Attached). Amendment V version has not been marked-up since little purpose will be served in re-reviewing the same material again and again.

Chandra (SPLB)

Champion

B 3.9 REFUELING OPERATIONS

B 3.9.1 Boron Concentration

BASES

BACKGROUND

The limit on the boron concentration of the Reactor Coolant System (RCS), refueling cavity and refueling canal during refueling ensures that the reactor remains subcritical during MODE 6. The limit includes an uncertainty allowance of 50 ppm.

Refueling boron concentration is the soluble boron concentration in the reactor coolant in each of these volumes having direct access to the reactor core during refueling or fuel handling. The soluble boron concentration offsets the fuel reactivity and is measured by chemical analysis of the reactor coolant. The refueling boron concentration specified in the COLR maintains overall core reactivity ≤ 0.95 K_{eff} during fuel handling with Control Element Assemblies (CEAs) and fuel assemblies assumed to be in the most adverse (least negative reactivity) configuration allowed by plant procedures.

General Design Criteria 26 of 10 CFR Part 50, Appendix A requires two independent reactivity control systems of different design principles be provided (Ref. 1). One of these systems must be capable of holding the reactor core subcritical under cold conditions. The Chemical and Volume Control System (CVCS) is the system capable of maintaining the reactor subcritical in cold conditions by maintaining the boron concentration.

The reactor is brought to shutdown conditions before beginning operations to open the reactor vessel for refueling. After the RCS is cooled and depressurized, and the reactor vessel head is unbolted, the head is slowly raised. The refueling cavity and canal are then flooded by pumping borated water from the In-containment Refueling Water Storage Tank (IRWST) using the Containment Spray System pump(s).

If additions of boron are required after the vessel has been opened, the CVCS makes the additions through the RCS and open vessel. The pumping action of the SCS and natural circulation due to thermal driving heads in the vessel and cavity mix the added concentrated boric acid with the water in the RCS and the refueling canal. The SCS is kept in service during the refueling period to remove core decay heat and provide forced circulation in the RCS.

2/4/94

See the earlier mark-up (as attached). The BASES as shown in this amendment should be revised as shown in the earlier mark-up to be acceptable.
Chandra (SPLB)

BASES

ACTIONS (Continued)

In the determination of the required combination of boration flow rate and boron concentration, there is not a unique design basis event which must be satisfied. The only requirement is to restore the boron concentration to its required value as soon as possible. In order to raise the boron concentration of the RCS as soon as possible, the boration solution should be a highly concentrated solution of boric acid.

Once boration is initiated, it must be continued until the boron concentration is restored. The completion time depends on the amount of boron which must be injected to reach the required concentration.

SURVEILLANCE REQUIREMENTS

SR 3.9.1.1

This SR ensures the reactor coolant boron concentration in the RCS, refueling canal and refueling cavity is within the COLR limit. The boron concentration in the coolant is determined periodically by chemical analysis.

Because the likelihood of a significant reduction in the boron concentration during MODE 6 operations is remote, a minimum frequency of once every 72 hours is a reasonable interval to verify boron concentration. The surveillance interval is based on extensive operating experience and ensures that the boron concentration is checked at adequate intervals.

REFERENCES

1. 10 CFR 50, Appendix A, Section VI, Criterion 26, "Reactivity Control System Redundancy and Capability."

2. NS-51.2, ANSI/ANS-57.2-1983, Section 6.4.2.2.3, American Nuclear Society, American National Standard, "Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants," 1983.

3. CESSAR-DC, Chapter 15, Accident Analysis.

4. 52 FR 3788, NRC Interim Policy Statement, on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

5. NRC Bulletin No. 89-03, "Potential Loss of Required Shutdown Margin During Refueling Operations," November 21, 1989.

6. CESSAR-DC, Section 19.8, "Shutdown Risk Assessment".

16A.12 B 3.9 REFUELING OPERATIONS

Attachment of Earlier Mark-up.

16A.12.1 B 3.9.1 BORON CONCENTRATION

B 3.9 REFUELING OPERATIONS

B 3.9.1 Boron Concentration

BASES

BACKGROUND

The limit on the boron concentration of the Reactor Coolant System (RCS), refueling cavity and refueling canal during refueling ensures that the reactor remains subcritical during MODE 6. The limit includes an uncertainty allowance of 50 ppm.

define COLR here unless it has been defined in earlier pages

Refueling boron concentration is the soluble boron concentration in the reactor coolant in each of these volumes having direct access to the reactor core during refueling or fuel handling. The soluble boron concentration offsets the fuel reactivity and is measured by chemical analysis of the reactor coolant. The refueling boron concentration specified in the COLR maintains overall core reactivity $\leq 0.95\ K_{eff}$ during fuel handling with Control Element Assemblies (CEAs) and fuel assemblies assumed to be in the most adverse (least negative reactivity) configuration allowed by plant procedures.

General Design Criteria 26 of 10 CFR Part 50, Appendix A requires two independent reactivity control systems of different design principles be provided (Ref. 1). One of these systems must be capable of holding the reactor core subcritical under cold conditions. The Chemical and Volume Control System (CVCS) is the system capable of maintaining the reactor subcritical in cold conditions by maintaining the boron concentration.

The ~~plant~~ reactor is brought to shutdown conditions before beginning operations to open the ~~RCS~~ reactor vessel for refueling. After the ~~plant~~ RCS is cooled and depressurized, and the reactor vessel head is unbolted, the head is slowly raised. The refueling cavity and canal are then flooded by pumping borated water from the In-containment Refueling Water Storage Tank (IRWST) using the Containment Spray System pump(s).

Define SCS here unless it has been defined in earlier pages

If additions of boron are required after the vessel has been opened, the CVCS makes the additions through the RCS and open vessel. The pumping action of the SCS and natural circulation due to thermal driving heads in the vessel and cavity mix the added concentrated boric acid with the water in the RCS

(continued)

assist in maintaining the boron concentration in the RCS, refueling canal and the refueling cavity, and to

BASES

BACKGROUND (continued)

and the refueling canal. The SCS is kept in service during the refueling period to remove core decay heat and provide forced circulation in the RCS.

in conjunction with the unit refueling procedures that demonstrate the correct fuel loading plan (including full core mapping)

APPLICABLE SAFETY ANALYSIS

It is further based on the core activity at the beginning of each fuel cycle (the end of refueling) and includes an uncertainty allowance (50 ppm)

During refueling operations the reactivity condition of the core is consistent with the initial conditions assumed for the boron dilution accident in the accident analysis and is conservative for MODE 6. The magnitude of the boron concentration is based on the nuclear design of each fuel cycle. It also guarantees that the K_{eff} of the core will remain less than 0.95 during the refueling operation. Hence, at least a 5% ΔK/K margin of safety is established during refueling.

During refueling, the water volume in the spent fuel pool, the transfer canal, the refueling cavity, the refueling canal and the reactor vessel form a single mass. As a result, the soluble boron concentration is the same in each of these volumes (Ref. 2).

The limiting boron dilution accident occurs in MODE 5, Reduced RCS Inventory. A detailed discussion of this event is provided in Reference 6.

The RCS boron concentration satisfies Criterion 2 of the NRC policy statement.

LCO

The LCO 3.9.1 requires that a minimum boron concentration be maintained while in MODE 6. The boron concentration limit during fuel handling operations ensures a K_{eff} of ≤ 0.95 is maintained. Violation of the LCO could lead to possible inadvertent criticality during MODE 6.

APPLICABILITY

This LCO is applicable in MODE 6 to ensure that the fuel in the reactor vessel will remain subcritical. The required boron concentration ensures a K_{eff} of ≤0.95. Above MODE 6, LCO 3.1.1, "Shutdown Margin (SDM) - T_{avg} > 200°F," and LCO 3.1.2, "Shutdown Margin (SDM) - T_{avg} ≤ 200°F," ensure that an adequate amount of negative reactivity is available to shutdown the reactor and to maintain the reactor subcritical.

ACTIONS

A.1 and A.2

Continuation of CORE ALTERATIONS or positive reactivity additions is contingent upon maintaining the plant in compliance with the LCO. With the

(continued)

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May 1, 1993

ACTIONS

A.1 and A.2 (continued)

boron concentration of any of the filled portions of the RCS, the refueling canal, or the refueling cavity is less than its limit, all operations involving CORE ALTERATIONS or positive reactivity additions must be suspended immediately. Performance of Required Actions A.1 and A.2 shall not preclude completion of actions to establish a safe condition.

A.3 (where is this mentioned?)

In addition to A.1 and A.2, boration to restore the concentration must be initiated immediately. The 15-minute completion time is the time allowed for an operator to correctly align and start the required systems and components.

In the determination of the required combination of boration flow rate and boron concentration, there is not a unique design basis event which must be satisfied. The only requirement is to restore the boron concentration to its required value as soon as possible. In order to raise the boron concentration of the RCS as soon as possible, the boration solution should be a highly concentrated solution of boric acid and the operator should begin boration immediately.

Once boration is initiated, it must be continued until the boron concentration is restored. The completion time depends on the amount of boron which must be injected to reach the required concentration.

SURVEILLANCE REQUIREMENTS

SR 3.9.1.1

This SR ~~verifies~~ ensures the reactor coolant boron concentration in the RCS, refueling canal and refueling cavity is within the COLR limit. The boron concentration in the coolant is determined periodically by chemical analysis.

Because the likelihood of a significant reduction in the boron concentration during MODE 6 operations is remote, a minimum frequency of once every 72 hours is a reasonable interval to verify boron concentration. The surveillance interval is based on extensive operating experience and ensures that the boron concentration is checked at adequate intervals.

(continued)

BASES

REFERENCES

1. 10 CFR 50, Appendix A, Section VI, Criterion 26, "Reactivity Control System Redundancy and Capability."

2. NS-51.2, ANSI/ANS-57.2-1983, Section 6.4.2.2.3, American Nuclear Society, American National Standard, "Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants," 1983.

3. CESSAR-DC Chapter 15, Accident Analysis.

4. 52 FR 3788, NRC Interim Policy Statement, on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

5. NRC Bulletin No. 89-03, "Potential Loss of Required Shutdown Margin During Refueling Operations," November 21, 1989.

6. CESSAR-DC, Section 19.8, "Shutdown Risk Assessment".

3.7 PLANT SYSTEMS

3.7.10 Fuel Storage Pool Water Level

LCO 3.7.10 The Fuel Storage Pool water level shall be ≥ 23 feet over the top of irradiated fuel assemblies seated in the storage racks.

APPLICABILITY: With irradiated fuel assemblies in the Fuel Storage Pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Fuel Storage Pool water level not within limit.	---NOTE--- LCO 3.0.3 is not applicable.	
	A.1 Suspend movement of irradiated fuel assemblies in Fuel Storage Pool.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.10.1 Verify the Fuel Storage Pool water level is ≥ 23 feet above the top of irradiated fuel assemblies seated in the storage racks.	7 days

B 3.7 PLANT SYSTEMS

B 3.7.10 Fuel Storage Pool - Water Level

BASES

BACKGROUND

The minimum water level in the Fuel Storage Pool meets the assumptions of Iodine decontamination factors following a fuel handling accident. The specified water level shields and minimizes the general area dose when the storage racks are at their maximum capacity. The water also provides shielding during the movement of spent fuel.

A general description of the Fuel Storage Pool design is found in CESSAR-DC, Chapter 9 (Ref. 1). The assumptions of the fuel handling accident are found in CESSAR-DC Section 15.7.4 (Ref. 2).

APPLICABLE SAFETY ANALYSES

The minimum water level in the Fuel Storage Pool meets the assumptions of the fuel handling accident described in RG 1.25 (Ref. 3). The resultant two-hour thyroid dose to a person at the exclusion area boundary (EAB) is a small fraction of the 10 CFR 100 (Ref. 4) limits.

According to Reference 3, there is 23 feet of water between the top of the damaged fuel bundle and the fuel pool surface for a fuel handling accident. With 23 feet water level, the assumptions of Reference 3 can be used directly. In practice, this LCO preserves this assumption for the bulk of the fuel in the storage racks. In the case of a single bundle, dropped and lying horizontally on top of the spent fuel racks, however, there may be less than 23 feet above the top of the fuel bundle and the surface by the width of the bundle. To offset this small non-conservatism, the analysis assumes that all 236 fuel rods fail, although analysis shows that only the first four rows, 60 fuel rods, fail from a hypothetical maximum drop.

The fuel storage pool water level satisfies Criterion 3 of the NRC Policy Statement.

LCO

The specified water level preserves the assumptions of the fuel handling accident analysis (Ref. 2). As such, it is the minimum required for fuel movement within the fuel storage pool.

APPLICABILITY

This LCO applies whenever irradiated fuel is in the Spent Fuel Storage Pool because the potential for a release of fission products exists.

BASES

ACTIONS

A.1

Required Action A.1 is modified by a Note indicating that LCO 3.0.3 does not apply.

When the initial conditions for an accident cannot be met, steps should be taken to preclude the accident from occurring. When the fuel storage pool water level is lower than the required level, the movement of irradiated fuel assemblies in the fuel storage pool is immediately suspended. This effectively precludes a spent fuel handling accident from occurring. This does not preclude moving a fuel assembly to a safe position.

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 MODES 1, 2, 3, and 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies is not sufficient reason to require a reactor shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.7.10.1

This SR verifies sufficient fuel storage pool water is available in the event of a fuel handling accident. The water level in the fuel storage pool must be checked periodically. The 7 day Frequency in appropriate because the volume in the pool is normally stable. Water level changes are controlled by plant procedures and are acceptable, based on operating experience.

During refueling operations, the level in the fuel storage pool is in equilibrium with the refueling canal, and the level in the refueling canal is checked daily in accordance with LCO 3.9.6, "Refueling Water Level."

REFERENCES

1. CESSAR-DC, Chapter 9.

2. CESSAR-DC, Section 15.7.4, Fuel Handling Accident.

3. Regulatory Guide 1.25 (Rev. 00), "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors."

4. 10 CFR 100, Reactor Site Criteria.

3.7 PLANT SYSTEMS

3.7.20 Spent Fuel Assembly Storage

LCO 3.7.20 The combination of initial enrichment and burnup of each spent fuel assembly stored in [Region 2] shall be within the acceptable [burnup domain] of Figure 3.7.20-1 [or in accordance with Specification 4.3.1.1].

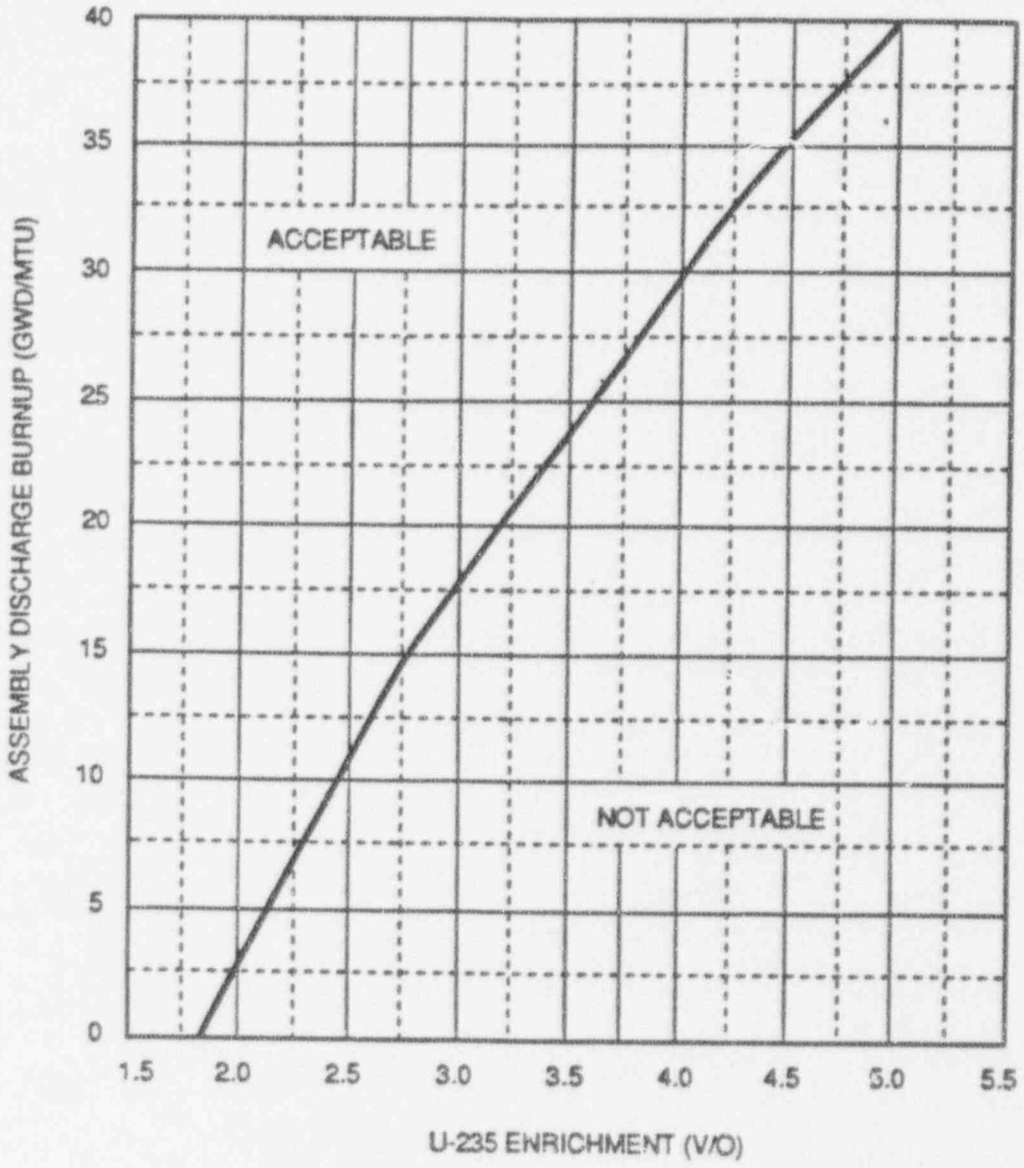
APPLICABILITY: Whenever any fuel assembly is stored in [Region 2] of the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	------NOTE------ LCO 3.0.3 is not applicable. --------------- A.1 Initiate action to move the noncomplying fuel from [Region 2].	 Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.20.1	Verify by administrative means the initial enrichment and burnup of the fuel assembly is in accordance with Figure 3.7.20-1 or Specification 4.3.1.1.	Prior to storing the fuel assembly in [Region 2]



DISCHARGE BURNUP VS. INITIAL ENRICHMENT FOR REGION II RACKS

FIGURE 3.7.20-1

B 3.7 PLANT SYSTEMS

B 3.7.20 Spent Fuel Assembly Storage

BASES

BACKGROUND

The spent fuel storage facility is designed to store either new (nonirradiated) nuclear fuel assemblies, or burned (irradiated) fuel assemblies in a vertical configuration underwater. The storage pool is sized to store [907] irradiated fuel assemblies, which includes storage for [5] failed fuel assemblies. The spent fuel storage cells are installed in parallel rows with center to center spacing of [9.780] inches in one direction, and [9.780] inches in the other orthogonal direction. This spacing and "flux trap" construction using non-poisoned "L" inserts is sufficient to maintain a k_{eff} of $\leq$ 0.95 for spent fuel of original enrichment of up to [5%]. However, as higher initial enrichment fuel assemblies are stored in the spent fuel pool, they must be stored in a checkerboard pattern taking into account fuel burn up to maintain a k_{eff} of 0.95 or less.

APPLICABLE SAFETY ANALYSES

The spent fuel storage facility is designed for noncriticality by use of adequate spacing, and "flux trap" construction.

The spent fuel assembly storage satisfies Criterion 2 of the NRC Policy Statement.

LCO

The restrictions on the placement of fuel assemblies within the spent fuel pool, according to [Figure 3.7.20-1], in the accompanying LCO, ensures that the k_{eff} of the spent fuel pool will always remain < 0.95 assuming the pool to be flooded with unborated water. The restrictions are consistent with the criticality safety analysis performed for the spent fuel pool according to [Figure 3.7.20-1], in the accompanying LCO. Fuel assemblies not meeting the criteria of [Figure 3.7.20-1] shall be stored in accordance with Specification 4.3.1.1.

APPLICABILITY

This LCO applies whenever any fuel assembly is stored in [Region 2] of the spent fuel pool.

ACTIONS

A.1

Required Action A.1 is modified by a NOTE indicating that LCO 3.0.3 does not apply.

When the configuration of fuel assemblies stored in [Region 2] the spent fuel pool is not in accordance with Figure [3.7.20-1], immediate action must be taken to make the necessary fuel assembly movement(s) to bring the configuration into compliance with Figure [3.7.20-1].

BASES

ACTIONS (Continued)	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 operation. Therefore, in either case, inability to move fuel assemblies is not sufficient reason to require a reactor shutdown.
SURVEILLANCE REQUIREMENTS	SR 3.7.20.1 This SR verifies by administrative means that the initial enrichment and burnup of the fuel assembly is in accordance with Figure [3.7.20-1] in the accompanying LCO. For fuel assemblies in the unacceptable range of [Figure 3.7.20-1], performance of this SR will ensure compliance with Specification 4.3.1. (1)
REFERENCES	None.

NEED SECTION 4.3 (FUEL STORAGE)

REV. 1
7/8/94

3.9 REFUELING OPERATIONS

3.9.6 Refueling Water Level

LCO 3.9.6 Refueling water level shall be maintained ≥ 23 feet above the top of reactor vessel flange.

APPLICABILITY: During CORE ALTERATIONS, except during latching and unlatching of control rod drive shafts and during movement of irradiated fuel assemblies within containment.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Refueling water level not within limit.	A.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2	Suspend movement of irradiated fuel assemblies within containment.	Immediately
	AND		
	A.3	Initiate actions to restore refueling water level to within limits.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.6.1	Verify refueling water level ≥ 23 feet above top of the reactor vessel flange.	24 hours

NEED TO ADDRESS THE INSTANCE OF LATCHING AND UNLATCHING OF CRD SHAFTS.

B 3.9 REFUELING OPERATIONS

B 3.9.6 Refueling Water Level

BASES

BACKGROUND

Requirements on water level in the containment, the refueling cavity, the refueling canal, the fuel transfer canal, and the spent fuel pool during refueling ensure that sufficient water depth is available to remove 99% of the iodine gap activity released by the postulated rupture of an irradiated fuel assembly in containment (Ref. 1). The fuel pellet to cladding gap is assumed to contain 10% of the total fuel rod iodine inventory. The movement of fuel assemblies within containment with irradiated fuel in containment requires a minimum water level of 23 feet above the top of the reactor vessel flange which assures offsite doses remain < 25% of the 10 CFR 100 limits as required in Reference 5.

APPLICABLE SAFETY ANALYSES

During CORE ALTERATIONS and during movement of irradiated fuel assemblies, the water level in the refueling cavity and refueling canal is an initial condition design parameter in the analysis of the fuel handling accident in containment postulated by NRC Regulatory Guide 1.25 (Ref. 1). A minimum water level of 23 feet (Regulatory Position C.1.c of Ref. 1) allows a decontamination factor of 100 (Regulatory Position C.1.g of Ref. 1) to be used in the accident analysis for iodine. This relates to the assumption that 99% of the total iodine released from the pellet to cladding gap of all the dropped fuel assembly rods is retained by the refueling cavity water. The fuel pellet to cladding gap is assumed to contain 10% of the total fuel rod iodine inventory (Ref. 1).

The fuel handling accident analysis inside containment is described in Reference 2. With a minimum water level of 23 feet and a minimum decay time of 72 hours prior to fuel handling, the analysis and test programs demonstrate that the iodine release due to a postulated fuel handling accident is adequately captured by the water and offsite doses are maintained within allowable limits (Ref. 4). NOT IN 1st DRAFT BUT O.K.

Refueling water level satisfies Criterion 2 of the NRC Policy Statement.

LCO

A minimum refueling water level of 23 feet above the reactor vessel flange is required to ensure that the radiological consequences of a postulated fuel handling accident inside containment are within acceptable limits.

BASES

APPLICABILITY

LCO 3.9.6, Refueling Water Level, is applicable during CORE ALTERATIONS, except during latching and unlatching of control rod drive shafts, and when moving irradiated fuel assemblies within containment. The LCO minimizes the possibility of a fuel handling accident in containment that is beyond the assumptions of the safety analysis. If irradiated fuel is not present in containment, there can be no significant radioactivity release as a result of a postulated fuel handling accident.

ACTIONS

A.1 and A.2

With a water level of less than 23 feet above the top of the reactor vessel flange, all CORE ALTERATIONS and operations involving movement of irradiated fuel assemblies shall be suspended immediately to ensure a fuel handling accident cannot occur. The suspension of fuel movement shall not preclude completion of movement to a safe position.

A.3

In addition to immediately suspending CORE ALTERATIONS or movement of irradiated fuel, actions to restore refueling cavity water level must be initiated immediately.

SURVEILLANCE REQUIREMENTS

SR 3.9.6.1

Verification of a minimum water level of 23 feet above the top of the reactor vessel flange ensures that the design basis for the postulated fuel handling accident analysis during refueling operations is met. Water at the required level above the top of the reactor vessel flange, mitigates the consequences of a postulated fuel handling accident inside containment which results in damaged fuel rods (Ref. 2).

The 24-hour frequency ensures that the water is at the required level and monitors the level to detect any unplanned changes in water level. Due to the large volume of water and the normal procedural controls of valve positions, significant unplanned level changes are unlikely. The frequency of 24 hours has proven by operating experience to be adequate to determine and monitor water level.

REFERENCES

1. USNRC Regulatory Guide 1.25, Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors, March, 1982.

2. CESSAR-DC Chapter 15, Accident Analysis.

BASES

REFERENCES (Continued)

3. 52 FR 3788, "Proposed Policy Statement on Technical Specifications Improvements for Nuclear Power Plants", February 6, 1987.

4. 10 CFR 100.11, "Determination of Exclusion Area, Low Population Zone and Population Center Distance."

5. NUREG-0800, "Standard Review Plan", Section 15.7.4 Radiological Consequences of Fuel Handling Accidents, U.S. Nuclear Regulatory Commission.

NEED TO ADRESS THE INSTANCE OF LATCHING AND UNLATCHING OF CRD SHAFTS

B 3.7 PLANT SYSTEMS

B 3.7.1 Main Steam Safety Valves (MSSVs)

BASES

BACKGROUND

The Main Steam Safety Valves (MSSVs) mainly provide over-pressure protection for the secondary system. In doing so, the MSSVs also provide protection against overpressurizing the reactor coolant pressure boundary by providing a heat sink for removal of energy from the Reactor Coolant System (RCS) if the preferred heat sink, provided by the Condenser and Circulating Water system, is not available.

Five Main Steam Safety Valves, (ten per steam generator) are located on each Main Steam Line, outside Containment, upstream of the Main Steam Isolation Valves, as described in CESSAR-DC Section 5.2.2 (Ref. 1). The MSSVs' rated capacity passes the full steam flow at 102% RATED THERMAL POWER (RTP)(100 + 2% for instrument error) with the valves full open. This meets the requirements of the ASME Code (Ref. 2) as described in the Over-pressure Protection Report, CESSAR-DC Appendix 5.A. The MSSV design includes staggered setpoints, as shown in Table 3.7.1-2, so that only the number of valves needed will actuate. THE MAXIMUM SYSTEM OVERPRESSURE IS CALCULATED BASED ON MAXIMUM ALLOWABLE TOLERANCE ON THE MSSV SETPOINTS Staggered setpoints reduce the potential for valve chattering because of insufficient steam pressure to fully open all valves following a turbine-reactor trip.

APPLICABLE SAFETY ANALYSES

The design basis for the MSSVs comes from the ASME Code and limits secondary system pressure to ≤ 110% of design pressure when passing 100% of design steam flow. This design basis is more than sufficient to cope with any anticipated operating occurrence (AOO) or accident considered in the Design Basis Accident and Transient Analysis. For most analyzed events, RCS pressure remains below the setpoint of the pressurizer safety valves (PSVs), or, at most, cause only a short opening of the PSVs.

The events that challenge the MSSVs' relieving capacity, and thus RCS pressure, are those characterized as Decreased Heat Removal events, and are presented in Section 15.2 of the CESSAR-DC (Ref. 4). Of these, the full power loss of condenser vacuum (LOCV) event is the limiting AOO. A LOCV isolates the turbine and condenser, and terminates normal feedwater flow to the Steam Generators. Before delivery of Emergency Feedwater (EFW) to the Steam Generators, RCS pressure reaches ≤ [2,726] psia. This peak pressure is less than 110% of the design pressure of 2,500 psia, but high enough to actuate the PSVs. The maximum secondary pressure during the LOCV event is 1273 psia, which is less than 110% of secondary design pressure of 1200 psia.

The limiting accident for peak RCS pressure is the full power feedwater line break, inside Containment, with a loss of offsite power. Water from the affected steam generator is assumed to be lost through the break with minimal additional heat transfer from the RCS.

B 3.7 PLANT SYSTEMS

B 3.7.6 Secondary Specific Activity

BASES

BACKGROUND

Activity in the secondary coolant results from Steam Generator tube out-leakage from the Reactor Coolant System (RCS). Under steady-state conditions, the activity is primarily iodines with relatively short half-lives, and thus is indicative of current conditions. During transients, I-131 spikes have been observed as well as increased releases of some noble gases. Other fission product isotopes, as well as activated corrosion products in lesser amounts, may also be found in the secondary coolant.

A limit on secondary coolant specific activity during power operation minimizes releases to the environment because of normal operation, anticipated operational occurrences, and accidents.

The LCO limit is lower than the activity value which might be expected from a 1.0 gpm tube leak, LCO 3.4.12, "RCS Operation Leakage", of primary coolant at the limit of 1.0 μCi/gram, LCO 3.4.15, "RCS Specific Activity." The steam line FAILURE is assumed to result in the release of the noble gas and iodine activity contained in the steam generator inventory, the feedwater, and reactor coolant LEAKAGE. Most of the iodine isotopes have short half-lives, (i.e., less than 20 hours). I-131 with a half-life of 8.04 days concentrates faster than it decays, but does not reach equilibrium because of blowdown and other losses.

With the specified activity limit, the resultant two-hour thyroid dose to a person at the exclusion area boundary would be about [.13 rem] should the MSSVs open for the two hours following a trip from full power. Operating the plant at the allowable limits results in a 2-hour exclusion area boundary (EAB) exposure of a small fraction of the 10 CFR 100 (Ref. 1) limits.

APPLICABLE SAFETY ANALYSES

The accident analysis of the MSLB failure (Ref. 2) assumes the initial secondary coolant specific activity to have a radioactive isotope concentration of 0.1 μCi/g DOSE EQUIVALENT I-131. This assumption is used in the analysis for determining the radiological consequences of the postulated accident. The accident analysis, based on this and other assumptions, shows that the radiological consequences of a MSLB do not exceed a small fraction of the plant exclusion area boundary limits of 10 CFR 100 for whole body and thyroid dose rates.

BASES

APPLICABLE SAFETY ANALYSES (Continued)

With the loss of offsite power, the remaining steam generator is available for core decay heat dissipation by venting steam to the atmosphere through the main steam safety valves (MSSVs) and steam generator atmospheric dump valves (ADVs). The Emergency Feedwater System supplies the necessary makeup to the Steam Generator. Venting continues until the reactor coolant temperature and pressure has decreased sufficiently for the Shutdown Cooling System to complete the cooldown.

In the evaluation of the radiological consequences of this accident, the activity released from the steam generator connected to the failed steam line is assumed to be released directly to the environment. The unaffected Steam Generator is assumed to discharge steam and any entrained activity through the MSSVs and ADVs during the event.

Secondary specific activity limits satisfy Criterion 2 of the NRC Policy Statement.

LCO

As indicated in the Applicable Safety Analyses, the specific activity limit in the secondary coolant system of 0.1 μCi/g DOSE EQUIVALENT I-131 is required to ~~contain~~ LIMIT the radiological consequences of a DBA to a small fraction of 10 CFR 100.

Monitoring the specific activity of the secondary coolant ensures that when secondary specific activity limits are exceeded, appropriate actions are taken in a timely manner to place the unit in an operational MODE that would minimize the radiological consequences of a DBA.

APPLICABILITY

In MODES 1, 2, 3 and 4 the limits on secondary SPECIFIC activity apply ~~whenever using the Steam Generators for RCS heat removal. This is the time of~~ DUE TO THE potential FOR secondary steam releases to atmosphere. ~~carrying with the steam a portion of the activity in the Steam Generators.~~

In MODES 5 and 6, the Steam Generators are not being used for heat removal. Both the RCS and Steam Generators are depressurized, and primary to secondary leakage is minimal. Therefore, monitoring of secondary activity is not required.

ACTIONS

A.1 and A.2

DOSE EQUIVALENT I-131 exceeding the allowable value is an indication of a problem in the RCS, as well as contributing to increased post-accident doses. The plant should be shut down in an orderly manner to minimize the increased DOSE EQUIVALENT I-131 in the RCS, potentially increasing the secondary activity even further. An orderly shutdown also minimizes potential releases to the environs. The plant must be placed in a MODE in which the requirement does not apply if Secondary Activity cannot be

ENCLOSURE 1

SYSTEM 80+ SHUTDOWN RISK TS REVIEWED BY SRXB

LCO 3.4.6
LCO/BASES 3.4.7
LCO 3.4.8
LCO/BASES 3.5.3
LCO 3.5.4
LCO/BASES 3.9.4
LCO/BASES 3.9.5
LCO/BASES 3.10.3
REDUCED INVENTORY OPERATIONAL GUIDANCE

16.7.6 3.4.6 RCS LOOPS - MODE 4

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops - MODE 4

LCO 3.4.6 Two RCS loops/Shutdown Cooling System (SCS) divisions consisting of any combination of RCS loops and SCS divisions shall be OPERABLE and at least one loop/division shall be in operation.

NOTE

1. All RCPs and SCS pumps may be de-energized for up to 1 hour per 8-hour period provided:

   a. No operations are permitted that would cause reduction of the RCS boron concentration, and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. No RCP shall be started with any RCS cold leg temperatures ≤ [259°F] during cooldown or [290°F] during heatup (the heatup rate is limited to [40°F/hr or less]) unless the secondary water temperature of each steam generator is < [100°F] above each of the RCS cold leg temperatures.

APPLICABILITY: MODE 4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One RCS loop inoperable AND Two SCS divisions inoperable.	A.1 Initiate action to return a second RCS loop/SCS division to OPERABLE status.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One SCS division inoperable. AND Two RCS loops inoperable.	B.1 Restore a second RCS loop/SCS division to OPERABLE status. OR B.2 Be in MODE 5.	1 hour ~~25~~ 24 hours
C. No RCS loops or SCS divisions in operation. or Required RCS loop or SCS division inoperable	C.1 Suspend all operations involving reduction in RCS boron concentration. AND C.2 Initiate action to restore one RCS loop/SCS division to operation.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.6.1	Verify secondary-side water level of required steam generator(s) ≥ [25]% wide range indication.	12 hours
SR 3.4.6.2	Verify at least one RCS loop or SCS division operating.	12 hours
SR 3.4.6.3	Verify correct breaker alignment and indicated power available to the required pump not in operation.	7 days

16.7.7 3.4.7 REACTOR COOLANT LOOPS AND CIRCULATION - MODE 5, LOOPS FILLED

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 Reactor Coolant Loops - MODE 5, Loops Filled

LCO 3.4.7 One Shutdown Cooling System (SCS) division shall be OPERABLE and in operation, and either:

a. One additional SCS division shall be OPERABLE, or

b. The secondary side water level of each Steam Generator (SG) shall be ≥ [25%] wide range indications, and

a containment spray pump can be manually realigned to meet the requirement of a SCS pump.

NOTE

1. SCS pumps may be de-energized for up to 1 hour per 8-hour period provided:

   a. No operations are permitted that would cause reduction of the RCS boron concentration, and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. No RCP shall be started with one or more of the RCS cold leg temperatures ≤ [259°F] during cooldown or [290°F] during heatup (the heatup rate is limited to [40°F/hr or less]) unless the secondary water temperature of each SG is < [100°F] above each of the RCS cold leg temperatures.

3. All SCS trains may be removed from operation during planned heatup to MODE 4 when at least one RCS loop is in operation.

APPLICABILITY: MODE 5 with RCS loops filled.

Amendment O
May 1, 1993

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Only one SCS division OPERABLE. AND Less than the required secondary side water level in any SG.	A.1 Initiate action to return a SCS division to OPERABLE status. OR A.2 Initiate action to restore SG secondary side water level to within limits.	Immediately Immediately
B. ~~No~~ Required SCS division ~~I~~ OPERABLE. OR No SCS division in operation.	B.1 Suspend all operations involving reduction in RCS boron concentration. AND B.2 Initiate action to restore one SCS division to OPERABLE status and operation.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.7.1	Verify required Steam Generator secondary side water level is ≥ [25]% wide range indication.*	12 hours

(continued)

* Only required to be met when only one SCS division is OPERABLE.

16A.7.7 B 3.4.7 RCS LOOPS - MODE 5 (LOOPS FILLED)

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.7 RCS Loops - MODE 5 (Loops Filled)

BASES

BACKGROUND

In MODE 5 with the Reactor Coolant System (RCS) loops filled, the primary function of the RCS loops is the removal of decay heat and transfer of this heat to the steam generator(s) or shutdown cooling (SCS) heat exchangers. While the principle means for decay heat removal is via SCS, the steam generators are specified as a backup means for redundancy. Even through the steam generators cannot produce steam in this MODE, they are capable of being a heat sink due to their large contained volume of secondary water. As long as the steam generator water is at a lower temperature than the reactor coolant, heat transfer will occur. The rate of heat transfer is directly proportional to the temperature difference. The secondary function of the reactor coolant is to act as a carrier for soluble neutron poison, boric acid.

In MODE 5 with RCS loops filled, the SCS divisions are the principle means for heat removal. The number of divisions in operation can vary to suit the operational needs. The intent of this LCO is to provide forced flow from at least one SCS division or RCS loop for decay heat removal and transport. The flow provided by one RCP or SCS division is adequate for decay heat removal. The other intent of this LCO is to require that two paths be available to provide redundancy for heat removal.

The LCO provides for redundant paths of decay heat removal capability. The first path ~~can be an RCS loop or~~ a SCS division which must be OPERABLE and in operation. The second path can be another OPERABLE RCS loop or SCS division~~, or maintaining an adequate water level in each steam generator~~.

This LCO permits limited periods without forced circulation. When the SCS pumps are stopped, no alternate heat removal path exists unless the RCS and steam generators have been placed in service in forced or natural circulation. The response of the RCS without the SCS depends on the core decay heat load and the length of time that the SCS divisions are stopped. As decay heat diminishes the effects on RCS temperature and pressure diminish. Without cooling by SCS, higher heat loads will cause the reactor coolant temperature

Need to be consistent w/LCO

(continued)

BASES

BACKGROUND (continued)

~~load~~ to increase. Because pressure can increase, applicable system pressure limits (pressure and temperature limits or low temperature overpressurization limit) must be observed and forced SCS flow must be reestablished prior to reaching the pressure limit. Entry into a condition with no SCS divisions in operation should only be considered for limited circumstances which include: 1) heat removal path(s) via the RCS and steam generator(s) is in operation, or 2) pressure and temperature increases are easily maintained within the allowable pressure and subcooling limits.

APPLICABLE SAFETY ANALYSES

The only safety analyses performed with initial conditions in MODE 5 are the inadvertent deboration and inadvertent startup of an RCP events. No forced coolant circulation was credited in the inadvertent boration event. For the inadvertent startup of an RCP, not more than two RCPs were assumed to be in operation. (If two RCPs were running, they were assumed to be in the same loop.)

Failure to provide heat removal may challenge the integrity of a fission product barrier. The SCS or RCS loops are a part of a primary success path which functions or actuates to prevent or mitigate a design basis accident or transient that either assumes the failure of, or presents a challenge to, the integrity of a fission product barrier. As such, the LCO satisfies the requirements of Criterion 3 of the NRC Interim Policy Statement (Ref. 1).

LCOs

The purpose of this LCO is to require the availability of a minimum of two paths for heat removal thus providing redundancy. The LCO allows the two paths that are required to be OPERABLE to be comprised of combinations of SCS divisions ~~and~~/or, ~~the~~ RCS loop(s) and ~~associated~~ steam generators.

SCS division and

The LCO Note 1 permits all SCS pumps and RCPs to be stopped. The circumstances for stopping both SCS divisions are to be limited to: 1) situation where pressure and temperature increases can be maintained well within the allowable pressure (PT and LTOP) and [10°F] subcooling limits, or 2) an alternate heat removal path(s) through the steam generator(s) is in operation. The LCO Note prohibits boron dilution when SCS forced flow is stopped because an even concentration distribution cannot be assured.

(continued)

BASES

LCOs (continued)

Core outlet temperature is to be maintained at least [10°F] below saturation temperature so that no vapor bubble would form and possibly cause a natural circulation flow obstruction. In this MODE, the steam generators can be used as a backup for SCS heat removal. To ensure their availability, the RCS loop flow path is to be maintained with subcooled liquid to ensure their availability.

In MODE~~S 3, 4, and~~ 5, it is sometimes necessary to stop all RCP or SCS forced circulation (i.e., change operation from one SCS division to the other, perform surveillance or startup testing, perform the transition to and from the SCS, or to avoid operation below the RCP minimum NPSH limit). The time period is acceptable because natural circulation is acceptable for heat removal or the reactor coolant temperature can be maintained subcooled, and boron stratification affecting reactivity control is not expected.

The second LCO Note requires that the following condition be satisfied before an RCP may be started with any RCS cold leg temperature ≤ [259°F] during cooldown or [290°F] during heatup (the heatup rate is limited to [40°F/hr or less])

a. secondary water temperature in each SG must be < [illegible]°F] above each of the RCS cold leg temperatures.

Satisfying this condition will preclude violating RCS P/T l[illegible] (see LCO 3.4.11). when the RCP is started.

The third LCO Note permits an orderly transition from MODE 5 to MODE 4 during a planned heatup by permitting removal of SCS divisions from operation when at least one RCP is in operation.

Operation in this MODE implies that components are OPERABLE, and an OPERABLE RCS loop consists of a steam generator that can perform as a heat sink (i.e., has an adequate water level), and is OPERABLE in accordance with the steam generator tube surveillance program. RCPs are OPERABLE if they are capable of being powered and are able to provide flow if required. The SCS is OPERABLE when it is capable of providing forced flow for heat exchange.

(continued)

BASES

APPLICABILITY

In MODE 5 with loops filled, this LCO applies because it is possible to remove decay heat with the SCS but the steam generators may be used as an alternate heat sink.

Operation in other MODES is covered by LCOs 3.4.4 (MODES 1 and 2), 3.4.5 (MODE 3), 3.4.6 (MODE 4), 3.4.8 (MODE 5 - Loops Partially Filled), and 3.9.4 and 3.9.5 (MODE 6 - Refueling).

ACTIONS

A.1 and A.2

If only one required means of decay heat removal is OPERABLE, redundancy for heat removal is lost. The Required Action is to initiate activities to restore a second loop/division to OPERABLE status and the action must be taken immediately. An alternative to restoring a second loop/division would be to initiate actions to restore the water level in the required steam generators and the action must be taken immediately. Either Required Action A.1 or A.2 will restore redundant decay heat removal paths. Even though one loop/division is OPERABLE and in operation, the completion time emphasizes the importance of maintaining the availability of two paths for heat removal.

B.1 and B.2

If both required loops/divisions are inoperable or not in operation, the action requires immediate suspension of any operation for boron reduction and requires action to immediately start restoration of one OPERABLE loop/division. The action for restoration does not apply to the condition for no loops in operation when the exemption Note in the LCO is in force. The immediate completion time reflects the importance of maintaining operation for decay heat removal. The action to restore must be continued until one loop/division is restored.

Preventing Boron dilution requires forced circulation for proper mixing, and the margin to criticality must not be reduced in this type of operation

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.7.1

To ensure that the steam generators are available as a backup to the SCS, steam generator water level is verified every 12 hours when the LCO requirement is being met by use of the steam generators. If both SCS divisions are OPERABLE, the surveillance is not needed. The 12-hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analysis assumptions.

SR 3.4.7.2

This surveillance requires verification of the required number of loops/division in operation every 12 hours to ensure forced flow is providing heat removal. Verification of operation includes flow rate and temperature monitoring. The 12-hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analysis assumptions.

SR 3.4.7.3

This surveillance requires verification that the required number of pumps are OPERABLE ensures that additional pumps can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and power available to the required pumps. The Frequency of seven days is accepted industry practice and has been shown to be acceptable by operating experience.

REFERENCES

1. 52 FR 3788, "Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors," USNRC, 2/6/87.

2. Generic Letter 88-17, "Loss of Decay Heat Removal," USNRC, 10/17/88.

3. CESSAR-DC, Section 19.8, "Shutdown Risk Assessment".

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 RCS Loops - MODE 5, Loops Not Filled

LCO 3.4.8 Two Shutdown Cooling (SCS) divisions shall be OPERABLE, and at least one division shall be in operation.

-------------------------NOTES-------------------------

1. One SCS division may be inoperable for up to 2 hours for surveillance testing, provided the other SCS division is OPERABLE and in operation.

2. The operating SCS pump may be de-energized for up to 15 minutes to permit shifting SCS pumps., provided:

(a) Texit is maintained >10°F below Tsat

3. A Containment Spray Pump can be manually realigned to meet the requirement of an SCS pump.

(b) No operations that would cause a reduction of RCS boron concentration are permitted.

(c) No draining operations that further reduce the RCS water volume are permitted.

APPLICABILITY: MODE 5 with RCS loops not filled.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SCS division inoperable.	A.1	Initiate action to restore division to OPERABLE status.	Immediately
B. No Required SCS division INOPERABLE. OR No SCS division in operation.	B.1	Suspend all operations involving reduction in RCS boron concentration.	Immediately
	AND		
	B.2	Initiate action to restore one SCS division to OPERABLE status and operation.	Immediately

Amendment Q
June 30, 1993

16.8.3 3.5.3 SIS DIVISIONS - SHUTDOWN

K

3.5 SAFETY INJECTION SYSTEM (SIS)

3.5.3 SIS - Shutdown

LCO 3.5.3 Two Safety Injection (SI) trains with one pump in each division shall be OPERABLE. K

APPLICABILITY: MODES 4 and 5.

MODE 6 when RCS level ≤ [120' - 0"]

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	Required SI train not OPERABLE.	A.1	Restore at least two SI trains to OPERABLE status.	1 hour
B.	Required Action and associated Completion Time not met.	B.1	Verify RCS temperature <210°F or cooldown as necessary.*	24 hours

K

K

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	Perform the following surveillances for all equipment required to be OPERABLE. SR 3.5.2.1 SR 3.5.2.5 SR 3.5.2.2 SR 3.5.2.6 SR 3.5.2.3 SR 3.5.2.7 SR 3.5.2.4	In accordance with applicable SRs

*LCO 3.0.4 is not applicable. K

BASES

REFERENCES (continued)

4. NRC Memorandum R. L. Bayer to V. Stello, Jr., Recommended Interim Revisions to LCOs for ECCS Components, December 1, 1975.

5. IE Information Notice No. 87-01, RHR Valve Misalignment Causes Degradation of ECCS in PWRs, January 6, 1987.

Additional References

6. 10 CFR 50, Appendix A, GDC 35 - Emergency Core Cooling System.

7. 10 CFR 50, Appendix A, GDC 36 - Inspection of Emergency Core Cooling System.

8. 10 CFR 50, Appendix A, GDC 37 - Testing of Emergency Core Cooling System.

9. 10 CFR 50, Appendix K - ECCS Evaluation Models.

10. GL 85-16, High Boron Concentrations, August 23, 1985.

11. GL 85-22, Potential for Loss of Post-LOCA Recirculation Capability Due to Insulation Debris Blockage.

12. RG 1.1, Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps, Rev. 0, November, 1980.

13. BTP MTEB 6-1, pH for Emergency Coolant Water for PWRs.

14. NUREG-0869, Containment Emergency Sump Performance, October 1985.

15. RG 1.79, Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors, Rev. 01, September 1980.

* Need reference on shutdown risk evaluation report CESSAR-DC Section 19.8A

(continued)

16.8.4 3.5.4 IN-CONTAINMENT REFUELING WATER STORAGE TANK (IRWST)

3.5 SAFETY INJECTION SYSTEM (SIS)

3.5.4 In-containment Refueling Water Storage Tank (IRWST)

LCO 3.5.4 The IRWST shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, 4, and 5.

MODE 6 with RCS level ≤ [120 ft - 0 in] K

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	IRWST borated water volume not within limit.	A.1	Restore IRWST borated water volume to within limit.	1 hour
B.	IRWST boron concentration not within limits. OR IRWST borated water temperature not within limits.	B.1	Restore IRWST to OPERABLE status.	8 hours
C.	Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
		AND		
		C.2	Be in MODE 5 or MODE 6.	36 hours K
		And C.3	Restore IRWST to operable status	prior to any operations that would reduce water level in the RCS

Amendment K
October 30, 1992

16.12.4 3.9.4 SHUTDOWN COOLING SYSTEM (SCS) AND COOLANT CIRCULATION - HIGH WATER LEVEL K

3.9 REFUELING OPERATIONS

3.9.4 Shutdown Cooling System (SCS) and Coolant Circulation - High Water Level K

LCO 3.9.4 Two SCS divisions shall be OPERABLE and at least one division shall be in operation. K

--------------------NOTE--------------------

The required SCS division loop may be removed from operation for ≤ one hour per 8 [2] hour period, provided: K

a. No operations are permitted that would cause dilution of the RCS boron concentration.

APPLICABILITY: MODE 6 with the water level ≥ 23 feet above top of the reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SCS loop requirements not met.	A.1 Suspend operations involving a reduction in reactor coolant boron concentration.	Immediately K
	AND	
	A.2 Suspend operations involving an increase in reactor decay heat load.	Immediately
	AND	
	A.3 Initiate actions to satisfy SCS loop requirements.	Immediately K

INSERT A next page

Amendment K
October 30, 1992

CONDITION	REQUIRED ACTION		COMPLETION TIME
	A.4	Verify that at least one operable channel to monitor containment pressure, temperature, hydrogen concentration and high range radiation.	Prior to boiling in the reactor coolant system
	AND		
Insert A	A.5	Isolate all containment penetration flow paths by use of at least one closed and deactivated automatic valve, closed manual valve, or blind flange capable of sealing against containment design pressure.[1]	Prior to boiling in the reactor coolant system
	AND		
	A.6	Close at least one of each containment air lock(s) door.[2]	Prior to boiling in the reactor coolant system
	AND		
	A.7	Equipment Hatch and temporary penetrations shall be in place and capable of withstanding full containment pressure.	Prior to boiling in the reactor coolant system

[1]An operable isolation valve does not have to comply with Appendix J Criteria.

[2]The containment air lock interlock does not have to be operable.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.4.1	Verify one SCS division operating and circulating reactor coolant.	12 hours

see insert B next page

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.4.1	Verify one SDC train is in operation and circulating reactor coolant at a flow rate ≥ [2,800] gpm	12 hours
SR 3.9.4.2	Perform required visual examinations to verfity operability of containment and isolation of containment penetrations. Leakage testing is not required.	12 hours

INSERT B

BASES

REFERENCES

1. CESSAR-DC Section 5.4.7, Shutdown Cooling System.

2. CESSAR-DC Chapter 15, Accident Analysis.

3. "NRC Staff Review of Nuclear Steam Supply Vendor Owners Groups' Application of the Commission's Interim Policy Statement Criteria to Standard Technical Specifications," transmitted by Thomas E. Murley (NRC) letter to Joseph K. Gasper (CEOG) dated May 9, 1988.

4. 52 FR 3788, NRC Interim Policy Statement, on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

* Need reference on Shutdown Risk evaluation report, CESSAR-DC, Section 19.8A

16A.12.4 B 3.9.4 SHUTDOWN COOLING SYSTEM AND COOLANT CIRCULATION - HIGH WATER LEVEL

B 3.9 REFUELING OPERATIONS

B 3.9.4 Shutdown Cooling System and Coolant Circulation - High Water Level

BASES

BACKGROUND

The two main purposes of the Shutdown Cooling System (SCS) are to remove decay heat and sensible heat from the Reactor Coolant System (RCS) when RCS pressure and temperature are below approximately 350 psig and 350°F, respectively (Ref. 1), and provide sufficient coolant circulation to minimize the effects of a boron dilution accident and prevent boron stratification. Heat is transferred from the RCS by circulating reactor coolant through the SCS where the heat is transferred to the Component Cooling Water (CCW) System via the SCS heat exchangers.

In the decay heat removal mode of operation, each loop of the SCS takes suction from one of the RCS hot legs. Flow from the SCS pumps is discharged through its respective heat exchanger or bypass, and is returned to the RCS via the RCS cold legs. This arrangement provides two redundant SCS loops. Operation of the SCS for normal cooldown or decay heat removal is manually accomplished from the control room.

APPLICABLE SAFETY ANALYSES

Insert C next page

With the plant in MODE 6, the SCS is not required to mitigate any events or accidents evaluated in the safety analyses (Ref. 2). The NRC Interim Policy Statement requires that the SCS in MODE 6 be retained in the Technical Specifications. None of the selection criteria of the Interim Policy Statement were satisfied; however, it is the Commissions's policy that licensees retain in their Technical Specifications systems which operating experience and probabilistic risk assessment have generally shown to be important to public health and safety (Ref. 3).

LCO

Only one SCS loop is required for decay heat removal in MODE 6 with water level ≥ 23 feet above the top of the reactor vessel flange. Only one SCS loop is required because the volume of water above the reactor vessel flange provides backup decay heat capability. At least one SCS loop must be OPERABLE and in operation to:

(continued)

Insert C

If the reactor coolant temperature is not maintained below 200°F, boiling of the reactor coolant could result. This could lead to inadequate cooling of the reactor fuel due to the resulting loss of coolant in the reactor vessel. Additionally, boiling of the reactor coolant could lead to a reduction in boron concentration in the coolant due to the boron plating out on components near the areas of the boiling activity, and because of the possible addition of water to the reactor vessel with a lower boron concentration than is required to keep the reactor subcritical. The loss of reactor coolant and the reduction of the boron concentration in the coolant would eventually challenge the integrity of the fuel cladding. Two divisions of SCS system are required to be OPERABLE, and one division is required to be in operation in MODE 6, with the water level < 23 ft above the vessel flange, to prevent this challenge.

SCS-Low water level satisfies Criterion 2 of the NRC Policy Statement.

BASES

LCO (continued)

a. Provide for decay heat removal,

b. Provide mixing of borated coolant to minimize the possibility of a criticality, and

c. Provide indication of average reactor coolant temperature.

An OPERABLE loop consists of an available SCS pump, and flow path with adequate heat removal capability for existing plant conditions. INSERT A

The requirements of this LCO are derived primarily from experience with decay heat removal in shutdown modes of operation. The principal purpose of this specification is to assure the capability to remove decay heat and to control RCS temperature and chemistry.

The LCO is modified by a Note which allows the operating SCS loop to be removed from service for up to one hour per two-hour period provided no operation that would cause dilution of the RCS boron concentration is in progress. This permits operations such as core mapping or alterations in the vicinity of the reactor vessel hot leg nozzles and RCS-to-SCS isolation valve testing. During this one-hour period, decay heat is removed by natural convection to the large mass of water in the refueling cavity.

APPLICABILITY

One SCS loop must be OPERABLE and in operation in MODE 6 with the water level ≥ 23 feet above the top of the reactor vessel flange to provide decay heat removal. The 23 foot value was selected because it corresponds to the 23 foot requirement established for fuel movement established by LCO 3.9.6. Requirements for the SCS in other MODES are covered by LCOs in Chapter 3.4, Reactor Coolant System.

SCS loop requirements in MODE 6 when water level is < 23 feet are located in LCO 3.9.5, SCS - Low Water Level.

SCS loop requirements in Reduced RCS Inventory are addressed in LCO 3.10.4, Reduced RCS Inventory - Heat Removal.

(continued)

INSERT D

a heat exchanger, valve, piping, instruments, and controls to ensure an OPERABLE flow path and to determine the low end temperature.

BASES

ACTIONS

SCS loop requirements are met by having one SCS loop OPERABLE and in operation except as permitted in the note to the LCO.

A.1

With SCS loop requirements not met, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Reduced boron concentrations can occur by the addition of water with lower boron concentration than that contained in the RCS. Therefore, actions which reduce boron concentration shall be suspended immediately.

A.2

With SCS loop requirements not met, actions shall be taken immediately to suspend operations involving an increase in reactor decay heat load. With no forced circulation cooling, decay heat removal from the core occurs by natural convection to the heat sink provided by the water above the core. A minimum refueling water level of 23 feet above the reactor vessel flange provides an adequate available heat sink. Suspending any operation which would increase decay heat load, such as loading a fuel assembly, is a prudent action under this condition.

See insert E

A.3

With SCS loop requirements not met, immediate actions shall be taken and continued to satisfy the SCS loop requirements. With the unit in MODE 6 and the refueling ~~cavity water level ≥ 23 feet above the top of the reactor vessel~~ flange, ~~15 minutes is a reasonable time to initiate corrective actions.~~ The completion time of immediate ensures that prompt action is taken to meet the necessary SCS loop cooling requirements.

SURVEILLANCE REQUIREMENTS

SR 3.9.4.1

This surveillance verifies that the SCS loop is operating and circulating reactor coolant. The flow rate is determined by the flow rate necessary to provide sufficient decay heat removal capability and to prevent thermal and boron stratification in the core. The frequency of 12 hours is sufficient considering the flow, temperature, pump control, and alarm indications available to the operator to monitor the SCS in the control room. This frequency ensures that SCS loop operation and flow is checked at adequate intervals.

(continued)

BASES

INSERT 4E

If SDC loop requirements are not met, verify that at least one operable channel to monitor containment pressure, temperature, hydrogen concentration, and high-range radiation must be accomplished prior to boiling in the RCS.

The Completion Time of prior to boiling in the RCS is reasonable, based on the time it takes to verify channel operability and the low probability of coolant boiling in the time period it takes to verify channel operability.

A.45

If SDC loop requirements are not met, all containment penetrations providing direct access from the containment atmosphere to the outside atmosphere must be closed ~~within 4 hours~~ prior to boiling in the RCS. With the SDC loop requirements not met, the potential exists for the coolant to boil and release radioactive gas to the containment atmosphere. Closing containment penetrations that are open to the outside atmosphere ensures dose limits are not exceeded.

The Completion Time of ~~4 hours~~prior to boiling is reasonable, based on the time it takes to close containment and the low probability of the coolant boiling in that time period of closure.

A.6

If SDC loop requirements are not met, close at least one door of each containment air lock prior to boiling in the RCS. With the SDC loop requirements not met, the potential exists for coolant to boil and release radioactive gas to the containment atmosphere.

The Completion Time of prior to boiling is reasonable, based on the time it takes to close a containment air lock and the low probability of the coolant boiling in that time period of closure.

A.7

If the SDC loop requirements are not met, the equipment hatch and temporary penetration covers shall be in place to withstand full containment pressure prior to boiling in the RCS. With the SDC loop requirement not met, there exists

(continued)

BASES

INSERT E Cont

the potential for the coolant to boil and release radioactive gas to the containment atmosphere. Having the Equipment Hatch and temporary penetrations closed and capable of withstanding full containment pressure ensures that dose limits are not exceeded.

The Completion Time of prior to boiling is reasonable, based on the time it takes to close the equipment hatch and temporary penetrations and the low probability that coolant will boil in that time period of closure.

SURVEILLANCE REQUIREMENTS

SR 3.9.5.1

This Surveillance demonstrates that the SDC loop is in operation and circulating reactor coolant. The flow rate is determined by the flow rate necessary to provide sufficient decay heat removal capability and to prevent thermal and boron stratification in the core. The Frequency of 12 hours is sufficient, considering the flow, temperature, pump control, and alarm indications available to the operator in the control room for monitoring the SDC System.

SR 3.9.5.2 (4)

This Surveillance demonstrates that the containment is closed and capable of retaining any potential radioactive gases from RCS boiling to ensure that dose limits are not exceeded. The Frequency of 12 hours is sufficient for visual examination of containment and penetrations based on operational experience.

ACTIONS

REFERENCES 1. FSAR, Section [ ].

(continued)

16.12.5 3.9.5 SHUTDOWN COOLING SYSTEM (SCS) AND COOLANT CIRCULATION - LOW WATER LEVEL

3.9 REFUELING OPERATIONS

3.9.5 Shutdown Cooling System (SCS) and Coolant Circulation - Low Water Level

LCO 3.9.5 Two SCS division shall be OPERABLE, and one SCS division shall be in operation.

APPLICABILITY: MODE 6 with the water level < 23 feet above the top of the reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SCS division inoperable with the other SCS division operating.	A.1.1	Initiate actions to restore the inoperable loop to OPERABLE status.	Immediately
	OR		
	A.1.2	Initiate actions to establish ≥ 23 feet of water above the reactor vessel flange.	Immediately
	AND		
	A.2	Establish alternate decay heat removal capabilities.	7 days
B. No SCS division in operation or OPERABLE.	B.1	Suspend operations involving a reduction in reactor coolant boron concentration.	Immediately
	AND		
	B.2.1	Initiate actions to restore one SCS division to OPERABLE status and operation.	Immediately
		OR	

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. (continued)	B.2.2	Initiate actions to establish ≥ 23 feet of water above the reactor vessel flange.	Immediately
	AND		
	B.3	Initiate action to implement alternate decay heat removal.	Immediately

INSERT F next page

K
K

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.5.1	Verify one SCS division operating and circulating reactor coolant.	12 hours

INSERT G

that SCS divisions are operable and

K
K

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. (continued) and	B.4	Verify that at least one operable channel to monitor containment pressure, temperature, hydrogen concentration and high range radiation.	Prior to boiling in the reactor coolant system
INSERT F	AND		
	B.5	Isolate all containment penetration flow paths by use of at least one closed and deactivated automatic valve, closed manual valve, or blind flange capable of sealing against containment design pressure.[1]	Prior to boiling in the reactor coolant system
	AND		
	B.6	Close and lock at least one door of each containment air lock(s)[2].	Prior to boiling in the reactor coolant system
	AND		
	B.7	Equipment Hatch and temporary penetrations shall be in place and capable of withstanding full containment pressure.	Prior to boiling in the reactor coolant system

[1] An operable isolation valve does not have to comply with Appendix J Criteria.

[2] The containment air lock interlock does not have to be operable.

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.9.5.1	Verify that SDC trains are OPERABLE and one SDC train is in operation.	12 hours
SR 3.9.5.2	Perform required visual examination to verify operability of containment and isolation of Containment Penetrations. Leakage rate testing is not required.	12 hours

INSERT G

16A.12.5 B 3.9.5 SHUTDOWN COOLING SYSTEM AND COOLANT CIRCULATION - LOW WATER LEVEL

B 3.9 REFUELING OPERATIONS

B 3.9.5 Shutdown Cooling System (SCS) and Coolant Circulation - Low Water Level

BASES

BACKGROUND

The Background section for Bases B 3.9.4 is applicable to this Bases.

APPLICABLE SAFETY ANALYSES

With the plant in MODE 6, the SCS is not required to mitigate any events or accidents evaluated in the safety analyses (Ref. 2). The NRC Interim Policy Statement requires that the SCS in MODE 6 be retained in the Technical Specifications. None of the selection criteria of the Interim Policy Statement were satisfied; however, it is the Commissions's policy that licensees retain in their Technical Specifications systems which operating experience and probabilistic risk assessment have generally shown to be important to public health and safety (Ref. 3).

see insert of SCS - High water Level

LCO

Only one SCS loop is required for decay heat removal in MODE 6 with water level < 23 feet above the top of the reactor vessel flange. To increase reliability, both SCS loops must be OPERABLE. Additionally, one loop of SCS must be in operation in order to:

a. provide for decay heat removal,

b. provide mixing of borated coolant to minimize the possibility of a criticality, and

c. provide indication of average reactor coolant temperature.

An OPERABLE loop consists of an ~~available~~ SCS pump ~~and flow path with adequate heat removal capability for existing plant conditions.~~

see insert of SCS - high Water Level

The requirements of this LCO are derived primarily from experience with decay heat removal in shutdown modes of operation. The principal purpose of this specification is to assure the capability to remove decay heat and to control RCS, temperature, and chemistry with low water level.

(continued)

BASES

APPLICABILITY

Two SCS loops are required to be OPERABLE and one SCS loop must be in operation in MODE 6 with the water < 23 feet above the top of the reactor vessel flange to provide decay heat removal. Requirements for the SCS in other MODES are covered by LCOs in Chapter 3.4, Reactor Coolant System. MODE 6 requirements with water level ≥ 23 feet above the reactor vessel flange are covered in LCO 3.9.4, SCS - High Water Level.

ACTIONS

A.1.1 and A.1.2

With one SCS loop inoperable and the other SCS loop operating, actions shall be taken and continue until the SCS loop is restored to OPERABLE status or to establish ≥ 23 feet of water level is established above the reactor vessel flange where the Applicability will change to that of LCO 3.9.4 and only one SCS loop is required OPERABLE and in operation. With the unit in MODE 6, immediate corrective actions must be taken.

A.2

Alternate decay heat removal capabilities shall be established to provide a backup method of decay heat removal in the event one of the OPERABLE SCS loops becomes inoperable. Alternate decay heat removal methods are available to the operators for review and pre-planning in the unit Abnormal Procedures. This capability may be established by aligning other pumps and systems, such as containment spray pumps and heat exchanger or the charging pump through the CVCS, to provide reactor coolant circulation. A Completion Time of seven days limits the time a backup heat sink is not available. This is based on the reliability of an operating SCS loop and has been shown to be acceptable through operating experience.

B.1

With no SCS loop in operation, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Reduced boron concentrations can occur by the addition of water with lower boron concentration than that contained in the RCS. Therefore, actions which reduce boron concentration shall be suspended immediately.

(continued)

BASES

ACTIONS (continued)

B.2.1 and B.2.2

With no SCS loop in operation or with both SCS loops inoperable, actions shall be initiated immediately and continued without interruption to restore one SCS loop to OPERABLE status and operation. As the unit is in Conditions A and B concurrently, the restoration of two OPERABLE SCS loops and one operating SCS loop should be accomplished as quickly as possible. With at least one SCS loop operable, water level can be raised ≥ 23 feet above the reactor vessel flange when the applicability will change to that of LCO 3.9.4 and only one SCS loop is required.

B.3

With no SCS loop in operation or both SCS loops inoperable, actions shall be initiated immediately to implement alternate decay heat removal as specified in plant procedures. Decay heat removal may be accomplished by use of the containment spray pumps and heat exchangers or the charging pumps through the CVCS with consideration for the boron concentration. The method used to remove decay heat should be the most prudent and safe choice based upon plant conditions. The choice could be different if the reactor vessel head is in place than if the reactor vessel head is removed.

INSERT #H

SURVEILLANCE REQUIREMENTS

SR 3.9.5.1

This surveillance verifies that the SCS loop is operating and circulating reactor coolant. The flow rate is determined by the flow rate necessary to provide sufficient decay heat removal and to prevent thermal and boron stratification in the core.

In addition, during operation of the SCS loop with the water level in the vicinity of the reactor vessel nozzles, the SCS loop flow rate determination must also consider the SCS pump suction requirements. The frequency of 12 hours is sufficient considering the flow, temperature, pump control, and alarm indications available to the operator to monitor the SCS system in the control room. This frequency ensures that flow is checked and temperature monitored at adequate intervals.

INSERT #I

(continued)

INSERT #H

B.3

If no SDC loop is in operation, all containment penetrations providing direct access from the containment atmosphere to the outside atmosphere must be closed within 4 hours. With the SDC loop requirements not met, the potential exists for the coolant to boil and release radioactive gas to the containment atmosphere. Closing containment penetrations that are open to the outside atmosphere ensures that dose limits are not exceeded.

The Completion Time of 4 hours is reasonable, based on the low probability of the coolant boiling in that time period of closure.

If SDC loop requirements are not met and no SDC loops are in operation, actions shall be initiated and continued in order to satisfy SDC loop requirements. With the unit in MODE 6 and the refueling water level ≥ 23 ft above the top of the reactor vessel flange, corrective actions shall be initiated immediately.

An immediate Completion Time is necessary for an operator to initiate corrective actions.

B.4

If the required SDC loops are not OPERABLE or no SDC loops are in operation, verify that at least one operable channel to monitor containment pressure, temperature, hydrogen concentration and high range radiation must be accomplished prior to boiling in the RCS.

The Completion Time of prior to boiling in the RCS is reasonable, based on the time it takes to verify channel operability and the low probability of coolant boiling in the time it takes to verify channel operability.

B.5

If the required SDC loops are inoperable or no SDC loops are in operation, then all containment penetrations providing direct access from the containment atmosphere to the outside atmosphere must be closed within 8 hours. With the SDC loop requirements not met, the potential exists for the coolant to boil and release radioactive gas to the containment

(continued)

atmosphere. Closing containment penetrations that are open to the outside atmosphere ensures dose limits are not exceeded.

The Completion Time of prior to boiling in the RCS is based on the time it takes to close containment and the low probability of the coolant boiling in that time period of closure.

B.6

If the required SDC loops are inoperable or no SDC loops are in operation, close and lock the containment air lock(s) doors prior to boiling in the RCS. With the SDC loop requirements not met, the potential exists for coolant to boil and release radioactive gas to the containment atmosphere. A relaxation to this Required Action states that the containment air lock interlock does not have to be OPERABLE in closing and locking the containment air lock(s) doors.

The Completion Time of prior to boiling in the RCS is based on the time required to close and lock the containment air lock(s) doors and the low probability that the boiling in the RCS will occur in that time period of closure.

B.7

If the required SDC loops are inoperable or no SDC loops are in operation, the Equipment Hatch and temporary penetration covers shall be in place to withstand full containment pressure prior to boiling in the RCS. With the SDC loop requirement not met, there exists the potential for the coolant to boil and release radioactive gas to the containment atmosphere. Having the Equipment Hatch and temporary penetrations closed and capable of withstanding full containment pressure ensures that dose limits are not exceeded.

The Completion Time of prior to boiling in the RCS is based on the time it takes to close the equipment hatch and temporary penetrations and the low probability that boiling will occur in that period of closure.

SCS

SURVEILLANCE REQUIREMENTS

SR 3.9.6.1

This Surveillance demonstrates that one SDC loop is in operation and circulating reactor coolant. The flow rate is determined by the flow rate necessary to provide sufficient decay heat removal capability and to prevent thermal and boron stratification in the core. In addition, during operation of the SDC loop with the water level in the vicinity of the reactor vessel nozzles, the SDC pump suction requirements must be met. The Frequency of 12 hours is sufficient, considering the flow, temperature, pump control, and alarm indications available to the operator for monitoring the SDC System in the control room.

SR 3.9.6.2 5

INSERT I

This Surveillance demonstrates that the containment is closed and capable of retaining any potential radioactive gases from RCS boiling to ensure that dose limits are not exceeded. The Frequency of 12 hours is sufficient for visual examination of containment and penetrations based on operational experience.

REFERENCES

1. FSAR, Section [5.5.7].

BASES

REFERENCES

1. CESSAR-DC Section 5.4.7, Shutdown Cooling System.

2. CESSAR-DC Chapter 15, Accident Analysis.

3. "NRC Staff Review of Nuclear Steam Supply Vendor Owners Groups' Application of the Commission's Interim Policy Statement Criteria to Standard Technical Specifications," transmitted by Thomas E. Murley (NRC) letter to Joseph K. Gasper (CEOG) dated May 9, 1988.

4. 52 FR 3788, NRC Interim Policy Statement, on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

* Need reference on shutdown risk evaluation report, CESSAR-DC, Section 19.8A.

16.13.3 3.10.3 REDUCED RCS INVENTORY OPERATIONS - VENT PATHS

3.10 REDUCED RCS INVENTORY OPERATIONS

3.10.3 Reduced RCS Inventory Operations - Vent Paths

LCO 3.10.3 A RCS Vent Path of ≥[Pressurizer Manway Removal] is established and maintained. K

APPLICABILITY: MODE 5 REDUCED RCS INVENTORY

AND

MODE 6 REDUCED RCS INVENTORY WITH RX VESSEL HEAD IN PLACE*

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCS Vent Path Isolated	A.1 Initiate action to restore Vent Path.	[Immediately]
	AND	
	A.2 Complete restoration of vent path.	[6 hours] Basis?
	AND	
	A.3 Monitor RCS temperature, level and SCS performance.	[Hourly]
B. Required Action and completion time not met.	B.1 Restore RCS Level to >[EL - 117'0"]	[6 hours] Basis?

* One or more head bolts tensioned.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.10.3.1	Verify Pressurizer Manway is removed and unobstructed or an equivalent vent path is established.	[12 hours]

K

16A.13.3 B 3.10.3 REDUCED RCS INVENTORY OPERATIONS - VENT PATHS

B 3.10 REDUCED RCS INVENTORY OPERATIONS

B 3.10.3 Reduced RCS Inventory Operations - Vent Paths

BASES

BACKGROUND	The requirement for a sufficient RCS vent path to be established during reduced RCS inventory operations prevents the pressurization of the RCS which would be anticipated upon inadequate DHR capability. This pressurization of the RCS could lead to SG nozzle dam failure and a potential loss of reactor coolant. When the pressurizer manway is opened to the containment atmosphere, it provides sufficient venting capacity to prevent core uncovery due solely to pressurization of the hot side resulting from boiling in the core coolant.
APPLICABLE SAFETY ANALYSIS	During reduced RCS inventory operations analyses were performed, Reference 1, and have indicated that with the pressurizer manway opened and relieving to the pressurizer cubicle, RCS boiling at reduced RCS inventory conditions will not cause a pressurization of the RCS that would exceed the SG nozzle dam design pressure of 40 psig.
LCO	The LCO 3.10.3 requires that during reduced RCS inventory operations a vent path of ≥ [Pressurizer Manway Removal] is established and maintained prior to and during reduced RCS inventory conditions.
APPLICABILITY	This LCO is applicable in MODE 5 with reduced RCS inventory and MODE 6 reduced RCS inventory with the reactor vessel head in place and at least one reactor vessel stud tensioned. When the reactor vessel head is removed, a sufficient vent path is established to prevent pressurization of the RCS and therefore does not apply during this condition.

(continued)

BASES

ACTIONS

A.1, A.2 and A.3

Immediate action shall take place to restore the RCS vent path used for reduced inventory operations should it be discovered to be inoperable / isolated.

Basis ?

A time of [6 hours] is provided to allow for vent path restoration.

During the period of time that the vent path is inoperable, reduced RCS inventory instrumentation such as RCS temperature, RCS level and SCS performance shall be monitored hourly by the control room operator in order to detect a trend leading to the loss of DHR.

B.1

Basis ?

The RCS level shall be restored to a level > reduced inventory elevation of [117'-0"] within [6 hours] should any of the allowed Completion Times mentioned above exceed the allotted time period. [6 hours] is considered reasonable time to secure RCS openings and restore RCS level.

SURVEILLANCE REQUIREMENTS

SR 3.10.3.1

Once the vent path is initially established it shall be verified established and unobstructed once per shift [12 hours] by operating personnel. Once per shift is considered a reasonable time interval for operating personnel to perform this verification.

REFERENCES

1. CESSAR-DC, Appendix 19.8A, Shutdown Risk Evaluation Report, Section 2.3.3.3.

REDUCED INVENTORY OPERATIONAL GUIDANCE

1.0 OBJECTIVE

Appendix B provides guidance to develop reduced inventory operating guidelines and procedures. It contains information provided by the plant designer based on analysis and review of reduced inventory operations.

2.0 INITIAL CONDITIONS

2.1 The earliest time to enter reduced inventory operation is 4 days for shutdown from full power.

2.2 The reactor is subcritical, [K_{eff} < .99] for greater than (96 hrs).

2.3 RCS core exit temperature [< 150°F].

2.4 RCS level > El. [117'-0"].

2.5 Technical specification surveillance requirements for reduced inventory are met.

2.6 Maintenance activities are not being performed on the shutdown cooling system or the operable containment spray pump.

2.7 Midloop operations shall only be performed with the Reactor vessel head installed so as to Bensure the availability of the HJTCs.

3.0 PRECAUTIONS

3.1 Reduced inventory operations duration should be minimized to reduce risk of core uncovery due to the loss of decay heat removal.

3.2 Perturbations affecting RCS level should be minimized during reduced inventory operations to minimize the possibility of loss of decay heat removal capabilities.

3.3 Isolation (closure of a containment isolation valve) in the non-operating SCS loop can reduce the possibility of an inadvertent draindown to the RCS.

3.4 Operations directly affecting the reactor vessel pressure boundary, i.e. In-core Instrumentation Seal Table evolutions, shall be prohibited during mid-loop operations.

4.0 OPERATIONAL GUIDANCE

4.1 Verify RCS vent path established per Technical Specification (3.10.3).

Items 4, 6, 8, 9

The available values are not conservative as compared to the values listed in Table 15.0-2 assumed for the transient analysis. They appear in the "high" side. The applicant needs to justify the adequacy of these values.

Also, in the Bases section, how these values are selected should be explained.

Item 12.
applicant needs to provide the allowable values [illegible] in System 80+ [illegible], or provide reasons why these values should not be included in TS.

Table 3.3.1-1 (Sheet 1 of 3)

REACTOR PROTECTIVE SYSTEM INSTRUMENTATION - OPERATING

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Variable Overpower - High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.7 SR 3.3.1.8 SR 3.3.1.9 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [112.7]% RTP (119%, 115%)
2. Logarithmic Power Level - High[(a)]	2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.14 SR 3.3.1.15	≤ [0.018]% RTP (0.05%)
3. Pressurizer Pressure - High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [2370 psia] (2434)
4. Pressurizer Pressure - Low	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.14 SR 3.3.1.15	Trip ≥ [1825 psia] (1705 or 1555) Trip Operating Bypass Removal ≥ [500 psia] Step ≤ [400 psia] Floor ≥ [300 psia]
5. Containment Pressure - High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [2.7] psig
6. Steam Generator #1 Pressure - Low[(b)]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [843 psia] (78 psia, 719)
7. Steam Generator #2 Pressure - Low[(b)]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [843 psia]

(Continued)

(a) Trip may be bypassed when THERMAL POWER is > [1E-4]% RTP. Operating bypass shall be automatically removed when THERMAL POWER is ≤ [1E-4]% RTP. Trip may be manually bypassed during physics testing pursuant to LCO 3.4.17, "RCS Loops - Test Exceptions."

(b) The Steam Generator Pressure - Low trip setpoint may be manually decreased as steam generator pressure is reduced, provided the margin between steam generator pressure and the setpoint is maintained at ≤ 200 psi. The setpoint shall be increased automatically as steam generator pressure is increased.

Table 3.3.1-1 (Sheet 2 of 3)

REACTOR PROTECTIVE SYSTEM INSTRUMENTATION - OPERATING

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
8. Steam Generator #1 Level - Low[c]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [44.2]%
9. Steam Generator #2 Level - Low[c]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [44.2]%
10. Steam Generator #1 Level - High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [90.8]%
11. Steam Generator #2 Level – High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [90.8]%
12. Reactor Coolant Flow - Low[d]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.14 SR 3.3.1.15	Rate: ≤ [*] psi/sec. Floor: ≥ [*] psid Step: [*] psi

(Continued)

(c) The Steam Generator Level-Low trip setpoint varies with reactor power and is rate limited with a preset low power value.

(d) The Reactor Coolant Flow-Low trip setpoint varies with reactor power and is rate limited with a preset low power level.

* Value to be determined by system detail design.

Table 3.3.1-1 (Sheet 2 of 3)

REACTOR PROTECTIVE SYSTEM INSTRUMENTATION - OPERATING

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
8. Steam Generator #1 Level - Low[c]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [44.2]%
9. Steam Generator #2 Level - Low[c]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [44.2]%
10. Steam Generator #1 Level - High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [90.8]%
11. Steam Generator #2 Level – High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [90.8]%
12. Reactor Coolant Flow - Low[d]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.14 SR 3.3.1.15	Rate: ≤ [*] psi/sec. Floor: ≥ [*] psid Step: [*] psi

(Continued)

(c) The Steam Generator Level-Low trip setpoint varies with reactor power and is rate limited with a preset low power value.

(d) The Reactor Coolant Flow-Low trip setpoint varies with reactor power and is rate limited with a preset low power level.

* Value to be determined by system detail design.

1, Items 4, 6, 8, 9
The allowable values are not conservative as compared to the values listed in Table 15.0-2 assumed for the transient analysis. They appear in the "high" side. The applicant needs to justify the adequacy of these values.

Also, in the Bases section, how these values are selected should be explained.

; Item 12. The applicant needs to provide the allowable values established in the System 80+ design, or provide reasons why these values should not be included in this TS.

Table 3.3.1-1 (Sheet 1 of 3)

REACTOR PROTECTIVE SYSTEM INSTRUMENTATION - OPERATING

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Variable Overpower - High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.7 SR 3.3.1.8 SR 3.3.1.9 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [112.7]% RTP
2. Logarithmic Power Level - High[a]	2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.14 SR 3.3.1.15	≤ [0.018]% RTP
3. Pressurizer Pressure - High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [2370 psia]
4. Pressurizer Pressure - Low	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.14 SR 3.3.1.15	Trip ≥ [1825 psia] Trip Operating Bypass Removal ≥ [500 psia] Step ≤ [400 psia] Floor ≥ [300 psia]
5. Containment Pressure - High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [2.7] psig
6. Steam Generator #1 Pressure - Low[b]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [843 psia]
7. Steam Generator #2 Pressure - Low[b]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [843 psia]

(Continued)

(a) Trip may be bypassed when THERMAL POWER is > [1E-4]% RTP. Operating bypass shall be automatically removed when THERMAL POWER is ≤ [1E-4]% RTP. Trip may be manually bypassed during physics testing pursuant to LCO 3.4.17, "RCS Loops - Test Exceptions."

(b) The Steam Generator Pressure - Low trip setpoint may be manually decreased as steam generator pressure is reduced, provided the margin between steam generator pressure and the setpoint is maintained at ≤ 200 psi. The setpoint shall be increased automatically as steam generator pressure is increased.

Table 3.3.1-1 (Sheet 2 of 3)

REACTOR PROTECTIVE SYSTEM INSTRUMENTATION - OPERATING

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
8. Steam Generator #1 Level - Low[c]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [44.2]%
9. Steam Generator #2 Level - Low[c]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≥ [44.2]%
10. Steam Generator #1 Level - High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [90.8]%
11. Steam Generator #2 Level – High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.15	≤ [90.8]%
12. Reactor Coolant Flow - Low[d]	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.8 [SR 3.3.1.10] SR 3.3.1.11 SR 3.3.1.14 SR 3.3.1.15	Rate: ≤ [*] psi/sec. Floor: ≥ [*] psid Step: [*] psi

(Continued)

(c) The Steam Generator Level-Low trip setpoint varies with reactor power and is rate limited with a preset low power value.

(d) The Reactor Coolant Flow-Low trip setpoint varies with reactor power and is rate limited with a preset low power level.

* Value to be determined by system detail design.

3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

LCO 3.8.3 The stored diesel fuel oil, lube oil, and starting air subsystems shall be within limits for each required diesel generator.

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

NOTE

Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more DGs with fuel level < [*] gal. and > [*] gal. in storage tank.	A.1 Restore fuel oil level to within limits.	48 hours
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. One or more DGs with stored fuel oil total particulates not within limits.	C.1 Restore fuel oil total particulates to within limits.	7 days
D. One or more DGs new fuel oil properties not within limits of the Diesel Fuel Oil Testing Program.	D.1 Restore stored fuel oil properties to within limits.	30 days
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

(Continued)

* Value to be determined by system detail design.

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and associated Completion Time not met. OR One or more DGs with diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than Conditions A, B, C, D, or E.	F.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify each fuel storage tank contains ≥ [*] gallons of fuel.	31 days
SR 3.8.3.2	Verify lubricating oil inventory is ≥ [500] gallons.	31 days
SR 3.8.3.3	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
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

* Value to be determined by system detail design.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.3.3

The tests listed below are a means of determining whether fuel is of appropriate grade and has not been contaminated with substances which would have an immediate, detrimental impact on diesel engine combustion/operation. If results from these tests are within acceptable limits, the fuel may be added to the storage tanks without concern for contaminating the entire volume of fuel in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage tank(s), but in no case is the time between receipt of new fuel and conducting the tests to exceed 31 days. The Frequency is established by Regulatory Guide 1.137 (Ref. 2). The tests, limits, and applicable ASTM standards are as follows:

a. Sample new fuel in accordance with ASTM D4054.

b. Verify in accordance with tests specified in ASTM D975-(82) that the sample has an absolute specific gravity at 60/60°F of ≥ 0.83° but ≤ 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 ≥ 125°F.

c. Verify the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-(86).

Failure to meet any of the above limits is cause to reject the new fuel, but does not constitute a diesel generator OPERABILITY concern since the fuel is not added to the storage tanks.

Within 31 days following the initial new fuel oil sample, this surveillance is performed to establish that the other properties specified in Table 1 of ASTM D-975-(82) are met for new fuel oil when tested in accordance with ASTM D975-(82), except that the analysis for sulfur may be performed in accordance with ASTM D1522-(83) or ASTM D975-(82). 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.

ASTM D2622-()

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.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.3.6

The draining of the fuel oil in the storage tanks, removal of accumulated sediment, and tank cleaning is required at ten-year intervals by Regulatory Guide 1.137 (Ref. 2). This also requires the performance of the ASME Code Section XI 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.

REFERENCES

1. CESSAR-DC, Section 9.5.4.2.

2. Regulatory Guide 1.137, "Fuel Oil Systems for Standby Diesel Generators," October 1979.

3. ANSI N195-1976, "Fuel Oil Systems for Standby Diesel Generators," Appendix B.

4. ASTM Standards: D4054; D975; D4175; D1522; D2622; S2276, Method A.

D4176

D2276, Method A.

3.10 REDUCED RCS INVENTORY OPERATIONS

3.10.5 Reduced RCS Inventory Operations - Containment Integrity

LCO 3.10.5 The containment building penetrations shall be in the following status:

a. The equipment hatch closed and held in place by [a minimum of four bolts,]

b. One door in each airlock closed,

c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere is either:

1. Closed by an isolation valve, blind flange, manual valve, water, or equivalent; or

2. Exhausting through OPERABLE Reactor Building Containment Purge Exhaust System HEPA filters and charcoal absorbers, and is capable of being closed by an OPERABLE Containment Purge and Exhaust Isolation System.

APPLICABILITY: MODE 5 with REDUCED RCS INVENTORY

and

MODE 6 with REDUCED RCS INVENTORY

SCSB disagrees → this is not consistent with what was proposed in the attachments from Model STS for CE plants attachment 3 to GL-92-X

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more containment penetrations not in required status.	A.1 Restore containment penetration to required status.	[6 hours]
B. Required Action and Completion Time not met.	B.1 Restore RCS level to >[EL -117'0"].	[6 hours]

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.10.5.1 Verify each required containment building penetration is in its required status.	[12 hours]
SR 3.10.5.2 Verify the Surveillance Requirements of SR 3.9.3.2 are met.	[18 months]

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.10.4.1	Verify at least one SCS division operating.	[12 hours]
SR 3.10.4.2	Verify correct breaker alignment and indicated power available to the SCS pump that is not in operation and the OPERABLE Containment Spray pump.	[24 hours]

3.6 CONTAINMENT SYSTEMS

3.6.Y Containment--Refueling

LCO 3.6.Y Containment shall be OPERABLE unless Core decay heat level is < [13]* MWt and Reactor Coolant System Temperature is < [100]°F

APPLICABILITY: MODE 6 with water level in the refueling cavity < 23 feet above the reactor pressure vessel flange

* This value has been computed based on the heat addition over a 1 hour period needed to raise the average temperature of water and structural mass in the RCS to the saturation temperature corresponding to atmospheric pressure assumming RCS water level is at a mid-loop condition. The 1 hour period corresponds to a typical time in which a PWR containment can be closed.

3.6 CONTAINMENT SYSTEMS

3.6.X Containment--Shutdown

LCO 3.6.X Containment shall be OPERABLE unless:

a. At least [one] steam generator with a water level of at least [ ] FT. and a steam generator secondary vent of at least [ ] Sq. Inches are available for removal of decay heat via natural circulation without Ac power.

OR

b. Core decay heat level is < [13]* MWt and Reactor Coolant System Temperature is < [100]°F

APPLICABILITY: MODE 5

* This value has been computed based on the heat addition over a 1 hour period needed to raise the average temperature of water and structural mass in the RCS to the saturation temperature corresponding to atmospheric pressure assumming RCS water level is at a mid-loop condition. The 1 hour period corresponds to a typical time in which a PWR containment can be closed.

BASES

APPLICABLE SAFETY ANALYSIS

The accident analysis considers the worst case single active failure in the power supply which results in minimum containment cooling. The analysis and evaluation show that under this scenario, the highest peak containment pressure is [48.1] psig (experienced during a MSLB), actual temperature of the containment structure however, remained below the maximum design temperature of [290]°F. (See Bases B 3.6.4 - "Containment Pressure," and B 3.6.5 - "Containment Air Temperature," for a detailed discussion.) The limiting event is a MSLB initiated at 0% RTP. The analysis also assumes that one Containment Spray division is operating and an initial (pre-accident) condition of [110°F] and [0.40] psig for containment temperature and pressure respectively.

The effect of an inadvertent containment spray actuation has been analyzed. An inadvertent containment spray actuation reduces the containment pressure to [-1.83] psig due to the sudden cooling effect in the interior of the air tight containment. The design containment pressure is [-2.0] psig, hence the inadvertent actuation of the Containment Spray System will not exceed containment design limits. Additional discussion is provided in Bases 3.6.4, "Containment Pressure."

The Containment Spray System satisfies Criterion 3 of the NRC Policy Statement.

LCO

During a DBA, one division of Containment Spray is required to maintain containment peak pressure and temperature below design limits. To ensure these requirements are met, two Containment Spray divisions must be OPERABLE during normal operations. This ensures minimum cooling requirements are met if a DBA then occurs concurrently with a loss of offsite power.

LCO Note 1 permits the alignment of an SCS pump if a Containment Spray Pump is not available or becomes inoperable. These pumps are designed to be interchangeable for operational flexibility.

APPLICABILITY

In MODES 1, 2, 3 and 4, a DBA could cause a release of radioactive material to containment and an increase in containment pressure and temperature requiring the operation of the Containment Spray divisions.

In MODES 5 and 6 the probability and consequences of such an event are reduced due to the pressure and temperature limitations of these MODES. The Containment Spray System is not required to be OPERABLE in MODES 5 and 6.

→ SCSB feels at least one Containment Spray Train should be available during modes 5 and 6

ACTIONS

A.1

With one containment spray division inoperable, the inoperable containment spray division must be restored to OPERABLE status within 72 hours. In this condition, the

ACTIONS (Continued)

remaining OPERABLE cooling division is adequate to perform the containment cooling and iodine removal function. However, the overall reliability is reduced because a single failure in the OPERABLE divisions could result in no containment cooling and no iodine removal capability. The 72-hour Completion Time is based on the iodine removal function and is consistent with other Engineered Safety Feature Systems' Completion Times for loss of one redundant division.

B.1 and B.2

If the inoperable containment spray division cannot be restored to OPERABLE status within the required Completion Time, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 84 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems. The extended interval to reach MODE 5 allows additional time for the restoration of the containment spray division and is reasonable when considering that the driving force for a release of radioactive material from the Reactor Coolant System is reduced in MODE 3.

C.1

With two Containment Spray divisions inoperable, the unit is in a condition outside the accident analysis. Therefore, LCO 3.0.3 must be entered immediately.

SURVEILLANCE REQUIREMENTS

SR 3.6.6.1

Verifying the correct alignment for manual, power-operated, and automatic valves in the containment spray flowpath provides assurance that the proper flowpaths will exist for Containment Spray System operation. This SR does not apply to valves which are locked, sealed, or otherwise secured in position since they were verified to be in the correct position prior to locking, sealing, or securing. This SR also does not apply to valves which cannot be inadvertently misaligned, such as check valves. A valve which receives an actuation signal is allowed to be in a non-accident position provided the valve will automatically reposition within the proper stroke time. This SR does not require any valve testing or manipulation. Rather, it involves verifying through a system walkdown that those valves outside containment and capable of being mispositioned, are in the correct position. The 31-day Frequency is appropriate because the valves are operated under procedural control. An improper lineup would only affect a single division, and the probability of an event requiring containment spray actuation during this time period is low. This Frequency has been shown to be acceptable through operating experience.

BASES

ACTIONS (Continued)

remaining OPERABLE cooling division is adequate to perform the containment cooling and iodine removal function. However, the overall reliability is reduced because a single failure in the OPERABLE divisions could result in no containment cooling and no iodine removal capability. The 72-hour Completion Time is based on the iodine removal function and is consistent with other Engineered Safety Feature Systems' Completion Times for loss of one redundant division.

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If the inoperable containment spray division cannot be restored to OPERABLE status within the required Completion Time, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 84 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems. The extended interval to reach MODE 5 allows additional time for the restoration of the containment spray division and is reasonable when considering that the driving force for a release of radioactive material from the Reactor Coolant System is reduced in MODE 3.

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SURVEILLANCE REQUIREMENTS

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3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC Electrical Power Sources shall be OPERABLE.

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Distribution System; and

b. Two diesel generators (DGs), each capable of supplying one division of the onsite Class 1E AC Distribution System.

c. Automatic load sequencers for Division 1 and Division 2.

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

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	One [required] offsite circuit inoperable.	A.1	Perform SR 3.8.1.1 for the [required] OPERABLE offsite 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 from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
		AND		
		A.3	Restore [required] offsite circuit to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO

(Continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
-----NOTE----- Required Action B.3.1 or B.3.2 shall be completed if this Condition is entered.			
B. One [required] DG inoperable.	B.1	Perform SR 3.8.1.1 for the OPERABLE [required] offsite 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 Redundant required feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND		
	B.3.1	Determine OPERABLE DG is not inoperable due to common cause failure.	[24] hours
	OR		
	B.3.2	Perform SR 3.8.1.2 for OPERABLE DG.	[24] hours
	AND		
	B.4	Restore [required] DG to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO

(Continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Two [required] offsite circuits inoperable.	C.1 Declare required feature(s) inoperable when its redundant required feature(s) is inoperable. AND	12 hours from discovery of Condition C concurrent with inoperability of redundant required features
	C.2 Restore one [required] offsite circuit to OPERABLE status.	24 hours
	——— NOTE ——— Enter applicable Conditions and Required Actions of LCO 3.8.9. "Distribution Systems - Operating", when Condition D is entered with no AC power source to one division. ———————	
D. One [required] offsite circuit inoperable. AND One [required] DG inoperable.	D.1 Restore required [offsite] circuits to OPERABLE status. OR D.2 Restore [required] DG to OPERABLE status.	12 hours 12 hours
E. Two [required] DGs inoperable.	E.1 Restore one [required] DG to OPERABLE status.	2 hours
F. Required automatic load sequencer inoperable.	F.1 Restore required automatic load sequencer to OPERABLE status.	72 hours
G. Required Actions and associated Completion Times of Conditions A, B, C, D, E, or F not met.	G.1 Be in MODE 3. AND G.2 Be in MODE 5.	6 hours 36 hours
H. Three or more [required] AC Power Sources inoperable.	H.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 [required] offsite circuit.	7 days
SR 3.8.1.2	-----NOTES----- 1. Performance of SR 3.8.1.7 satisfies this surveillance. 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 the SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances specified in SR 3.8.1.7 must be met.] ---------- Verify each DG starts from standby condition and achieves ~~the following~~ steady state voltage ≥ [3744] volts and ≤ [4576] volts, and frequency ≥ [58.8] Hz and ≤ [61.2] Hz.	As specified by Table 3.8.1-1

(Continued)

SURVEILLANCE REQUIREMENTS (Continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.3	-NOTES- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load and power factor ranges 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. Verify each diesel generator is synchronized and loaded, and operates for ≥ 60 minutes at a load ≥ [5957] kW and ≤ [6255] kW.	As specified by Table 3.8.1-1
SR 3.8.1.4	Verify each day tank [and engine mounted tank] contains ≥ [220] gallons of fuel oil.	31 days
SR 3.8.1.5	Check for and remove accumulated water from each day tank [and engine mounted tank].	31 days
SR 3.8.1.6.	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~~ days 92
SR 3.8.1.7	-NOTE- All diesel generator starts may be preceded by an engine prelube period. Verify each DG starts from standby condition and achieves in ≤ 20 seconds, voltage ≥ 3744 volts and ≤ 4576 volts, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days

(Continued)

SURVEILLANCE REQUIREMENTS (Continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.8	-NOTES- 1. This surveillance shall not be performed in MODE 1 or 2. 2. Credit may be taken for unplanned events which satisfy this SR. Verify automatic and manual transfer of AC power sources from the normal offsite circuit to each alternate [required] offsite circuit.	18 months
SR 3.8.1.9	-NOTES- 1. This surveillance shall not be performed in MODE 1 or 2. 2. Credit may be taken for unplanned events that satisfy this SR. Verify each DG at a power factor ≤ [0.9] rejects a load of ≥ [1037] kW, and; a. Following load rejection, the frequency is ≤ [63] Hz, b. Within [3] seconds following load rejection, the voltage is ≥ [3744] volts and ≤ [4576] volts; and c. Within [3] seconds following load rejection, the frequency is ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months
SR 3.8.1.10	-NOTES- 1. This surveillance shall not be performed in MODE 1 or 2. 2. 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] volts during and following a load rejection of ≥ [5957] kW and ≤ [6255] kW.	[18 months]

(Continued)

SURVEILLANCE REQUIREMENTS (Continued)

SURVEILLANCE		FREQUENCY
SR 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. 3. 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 automatically starts from standby condition and: 1. energizes permanently-connected loads in ≤ 20 seconds, 2. energizes auto-connected shutdown loads through the load sequencer, 3. maintains steady state voltage ≥ 3744 volts and ≤ 4576 volts, 4. maintains steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently-connected and auto-connected loads shutdown for ≥ [5] minutes.	18 months

(Continued)

SURVEILLANCE REQUIREMENTS (Continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.12	NOTES 1. All DG starts may be preceded by an engine prelube period. 2. This surveillance shall not be performed in MODE 1 or 2. 3. Credit may be taken for unplanned events that satisfy this SR. Verify on an actual or simulated Engineered Safety Features (ESF) actuation signal each DG auto-starts from standby condition and: a. In ≤ [20] seconds after auto-start and during tests, achieves voltage ≥ [3744] V and ≤ [4576] V; b. In ≤ 20 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 auto-connected through the load sequencer to the offsite power system.	[18 months]

(Continued)

SURVEILLANCE REQUIREMENTS (Continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.13	NOTES 1. This surveillance shall not be performed in MODE 1 or 2. 2. Credit may be taken for unplanned events that satisfy this SR. Verify each DG automatic trip is bypassed on an [actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal] except: a. Engine Overspeed; b. Generator Differential Current; c. Low Low Lube Oil Pressure; and d. Generator Voltage-Controlled Overcurrent.	18 months
SR 3.8.1.14	NOTES 1. Momentary transients outside the load and power factor ranges do not invalidate this test. 2. This surveillance shall not be performed in MODE 1 or 2. 3. Credit may be taken for unplanned events that satisfy this SR. Verify each DG operating at a power factor ≤ [0.9] operates for ≥ 24 hours: a. For ≥ [2] hours loaded ≥ [6553] kW and ≤ [6881] kW and; b. For the remaining hours of the test loaded ≥ [5957] kW and ≤ [6255] kW.	[18 months]

(Continued)

SURVEILLANCE REQUIREMENTS (Continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.15	——NOTES—— 1. This surveillance shall not be performed within 5 minutes of shutting down the diesel generator after the diesel generator has operated in ≥ [2] hours loaded ≥ [5957] kW and ≤ [6255] kW. Momentary transients outside of load range do not invalidate this test. 2. All DG starts may be preceded by an engine prelube period. 3. Credit may be taken for unplanned events that satisfy this SR. —————— Verify each DG starts and achieves, in ≤ 20 seconds, voltage ≥ [3744] volts and ≤ [4576] volts, and frequency ≥ [58.8] Hz and ≤ [61.2] Hz.	18 months
SR 3.8.1.16	——NOTES—— 1. This surveillance shall not be performed in MODE 1, 2, 3, or 4. 2. 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 source; and c. Returns to ready to load operation.	18 months

(Continued)

SURVEILLANCE REQUIREMENTS (Continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.17	---NOTES--- 1. This surveillance shall not be performed in MODE 1, 2, 3, or 4. 2. 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 loads with offsite power.	[18 months]
SR 3.8.1.18	---NOTES--- 1. This surveillance shall not be performed in MODE 1, 2, 3, or 4. 2. Credit may be taken for unplanned events that satisfy this SR. --- Verify the interval between each sequenced load block is within ± [10% of design interval] for each emergency [and shutdown] load sequencer.	[18 months]
SR 3.8.1.19	---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. 3. Credit may be taken for unplanned events that satisfy this SR. ---	

(Continued)

SURVEILLANCE REQUIREMENTS (Continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.19 (continued) Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG automatically starts from standby condition and: 1. energizes permanently-connected loads in ≤ [20] seconds, 2. energizes auto-connected emergency loads through load sequencer, 3. achieves steady state voltage ≥ [3744] volts and ≤ [4576] volts, 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.	[18 months]
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 ≤ [20] seconds, voltage ≥ [3744] volts and ≤ [~~4756~~] volts, and frequency ≥ [58.8] Hz and ≥ [61.2] Hz.	10 years

4576

TABLE 3.8.1-1

DIESEL GENERATOR TEST SCHEDULE

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. 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.

3.8 ELECTRICAL POWER SYSTEMS

3.8.2 AC Sources - ~~Shutdown~~ Refueling

LCO 3.8.2 The following AC Electrical Power Sources shall be OPERABLE:

a. One qualified circuit between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System required by LCO 3.8.10, "Distribution System - Shutdown"; and

b. One diesel generator (DG) capable of supplying the one train of the onsite Class 1E AC Electrical Power Distribution System required by LCO 3.8.10.

APPLICABILITY: MODE~~S 5 and~~ 6, with water level in the refueling cavity > [23] ft above the reactor pressure vessel flange and during movement of irradiated fuel assemblies.

NOTE

Refer to LCO 3.10.6 (~~Reduced RCS Inventory~~ Shutdown Operations - AC Power Availability) for applicability of AC power sources during reduced inventory operations.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
	---NOTE--- Enter applicable Conditions and Required Actions of LCO 3.8.10, with one required division de-energized as a result of Condition A.		
A. One required offsite circuit inoperable.	A.1	Declare affected required feature(s) with no offsite power available inoperable.	Immediately
	<u>OR</u>		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2.2	Suspend handling of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	A.2.3	Initiate actions to suspend operations with a potential for draining the reactor vessel.	Immediately
	<u>AND</u>		
	A.2.4	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>		
	A.2.5	Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately

(Continued)

B1 Declare affected required feature(s) normally supported by the inoperable DG inoperable.

ACTIONS (Continued) OR

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. ~~One~~ required DG inoperable.	B.2.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	B.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	B.2.3	Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	AND		
	B.2.4	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND		
	B.2.5	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 3.8.1.3, SR 3.8.1.8, through SR 3.8.1.11, SR 3.8.1.13, through SR 3.8.1.16, [SR 3.8.1.18] and SR 3.8.1.19.	
	For AC sources required to be OPERABLE, the SRs of LCO 3.8.1, "AC Sources - Operating", except SR 3.8.1.17 and SR 3.8.1.20, are applicable. SR 3.8.1.8, SR 3.8.1.12, SR 3.8.1.13, SR 3.8.1.19	In accordance with applicable SRs

SR 3.8.1.3 is only required when more than the minimum number of AC sources required by LCO 3.8.2 are available, but at least every six months.

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.1	Verify the battery terminal voltage ≥ [129] volts on float charge.	7 days
SR 3.8.4.2	Verify no visible corrosion at terminals and connectors. OR Verify the connection resistance [is ≤ [1E-5 ohms] for intercell connections, ≤ [1E-5 ohms] for interrack connections, ≤ [1E-5 ohms] for intertier connections, and ≤ [1E-5 ohms] for terminal connections].	92 days
SR 3.8.4.3	Verify the cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration.	[12] months
SR 3.8.4.4	Remove visible terminal corrosion, verify the cell-to-cell and terminal connections are clean and tight, and coated with anti-corrosion material.	[12] months
SR 3.8.4.5	Verify connection resistance [is ≤ [1E-5 ohms] for intercell connections, ≤ [1E-5 ohms] for interrack connections, ≤ [1E-5 ohms] for intertier connections, and ≤ [1E-5 ohms] for terminal connections].	[12] months
SR 3.8.4.6	-------------------NOTES------------------- 1. This surveillance shall not be performed in MODE 1, 2, 3, or 4. 2. Credit may be taken for unplanned events which satisfy this SR. --- Verify each battery charger will supply ≥ [400] amperes at ≥ [125] volts for ≥ [8] hours.	[18 months]

(Continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources - Operating

LCO 3.8.4 The Division 1 and Division 2 DC electrical power subsystems shall be OPERABLE.

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

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	One DC electrical power subsystem within a division inoperable.	A.1	Cross-tie the distribution centers/batteries/battery chargers as appropriate to align the subsystem to provide DC source to the divisional and both channels of 1E loads.	2 hours
		AND		
		A.2	Restore DC electrical power subsystem to OPERABLE status.	72 hours
B.	Two DC electrical power subsystems within a division inoperable.	B.1	Restore one DC electrical power subsystem to OPERABLE status.	2 hours
		AND		
		B.2	Cross-tie the distribution centers/batteries/battery chargers as appropriate to align the subsystem to provide DC source to the divisional and one channel of 1E loads.	2 hours
C.	Required Action and associated Completion Time of Condition A or B not met.	C.1	Be in MODE 3.	6 hours
		AND		
		C.2	Be in MODE 5.	36 hours

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources - ~~Shutdown~~ Refueling

LCO 3.8.5 DC electrical power subsystem 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, (with water level in the refueling cavity ≥ [23] ft above the reactor pressure vessel flange and) during movement of irradiated fuel assemblies.

NOTE

Refer to LCO 3.10.6 (Reduced RCS Inventory Operation - AC Power Availability) for applicability of AC power sources during reduced inventory operations.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required DC electrical power subsystems 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 Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	AND	
	A.2.4 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	A.2.5 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS (Continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.7	---NOTE--- 1. The modified performance discharge test in SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7 once per 60 months. 2. This surveillance shall not be performed in MODE 1, 2, 3, or 4. 3. Credit may be taken for unplanned events which 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.	[18 months]
SR 3.8.4.8	---NOTE--- 1. This surveillance shall not be performed in MODE 1, 2, 3, or 4. 2. Credit may be taken for unplanned events which satisfy this SR. --- 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 ---NOTE--- Only applicable when battery shows degradation or has reached [85%] of the expected life. --- 12 months

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.5.1	~~NOTE~~ ~~The following SRs are not required to be performed: SR 3.8.4.6, SR 3.8.4.7, and SR 3.8.4.8.~~ 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	In accordance with applicable SR.

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

LCO 3.8.6 Battery cell parameters for the Division 1 and Division 2 batteries shall be within the Category A and B limits of Table 3.8.6-1.

APPLICABILITY: When associated DC electrical power subsystems are 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 parameters not within limits.	A.1 Verify the pilot cell[s] electrolyte level and float voltage meet Table 3.8.6-1 Category C values.	1 hour
	AND	
	A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C values.	24 hours
	AND	
	A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days

(Continued)

ACTIONS (Continued)

CONDITION		REQUIRED ACTION		COMPLETION TIME
B.	Required Actions and associated Completion Time of Condition A 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.	B.1	Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	Verify battery cell parameters meet Table 3.8.6-1 Category A limits.	7 days
SR 3.8.6.2	Verify battery cell parameters meet Table 3.8.6-1 Category B limits.	92 days AND Once within 24 hours after a battery discharge of < [110] volts. AND

(Continued)

SURVEILLANCE REQUIREMENTS (Continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.2	(Continued)	Once within 24 hours after a battery overcharge > [150 volts]
SR 3.8.6.3	Verify the average electrolyte temperature of representative cells is ≥ [60]°F.	92 days

TABLE 3.8.6-1

BATTERY ELECTROLYTE REQUIREMENTS

PARAMETER	CATEGORY A:	CATEGORY B:	CATEGORY C:
	Limits for each designated pilot cell	Limits for each connected cell	Allowable value for each connected cell
Electrolyte Level	> Minimum level indication mark, and ≤ 1/4" above maximum level indication mark[a]	> Minimum level indication mark, and ≤ 1/4" above maximum level indication mark[a]	Above top of plates, and not overflowing
Float Voltage	≥ [2.13] volts	≥ [2.13] volts	> [2.07] volts
Specific Gravity[b] [c]	≥ [1.200]	≥ [1.195]	Not more than [0.020] below the average connected cells AND Average of all connected cells ≥ [1.195]

NOTES

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

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

c. Or, battery charging current is < [2] amperes when on float charge. This is acceptable only during a maximum of [7] days following a battery recharge.

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters - Operating

LCO 3.8.7 The required Division 1 and Division 2 inverters shall be OPERABLE.

-----NOTE-----

One inverter per Division may be disconnected from its associated DC bus for ≤ 24 hours to perform an equalizing charge on its associated battery provided:

a. The associated AC vital bus(es) is energized from its Class 1E constant voltage source transformer(s); and

b. All other AC vital buses for both trains are energized from their associated OPERABLE inverters.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One [required] inverter ~~within a division~~ inoperable.	A.1 Power AC vital bus from its [Class 1E] constant voltage source transformer. AND A.2 Restore inverter to OPERABLE status.	2 hours 24 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, [frequency,] and alignment to required AC vital buses.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters - ~~Shutdown~~ Refueling

LCO 3.8.8 Inverter(s) 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."

APPLICABILITY: MODE ~~S and~~ 6 (with water level in the refueling cavity ≥ [23 ft] above the reactor pressure vessel flange and) ~~during movement of irradiated fuel assemblies.~~

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more [required] inverters ~~[illegible]~~ 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 Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	AND	
	A.2.4 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	A.2.5 Initiate action to restore required inverters to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.8.1	Verify correct inverter voltage, [frequency,] and alignments to required AC vital buses.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems - Operating

LCO 3.8.9 Division 1 and Division 2 AC, DC, and 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 AC electrical power distribution subsystem inoperable.	A.1 Restore AC electrical power distribution subsystem to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO.
B. One AC vital bus inoperable.	B.1 Restore AC vital bus subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO.
C. One DC electrical power distribution system inoperable.	C.1 Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO.
D. Required Action associated Completion Time not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.9.1	Verify correct breaker alignment and voltage to the [required] AC, DC and AC vital bus electrical power distribution subsystems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems - ~~Shutdown~~ Refueling

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODE ~~[illegible]~~ 6, with water level in the refueling cavity ≥ [23 ft] above the reactor pressure vessel flange and ~~during movement of irradiated fuel assemblies~~.

---NOTE---

Refer to LCO 3.10.6 (Reduced RCS Inventory Operations - AC Power Availability) for applicability of AC power sources during reduced inventory operations.

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	One or more required AC, DC, or AC vital bus electrical power distribution subsystem inoperable.	A.1	Declare associated supported required feature(s) inoperable.	Immediately
		AND		
		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 suspend operations with a potential for draining the reactor vessel.	Immediately
		AND		
		A.2.4	Initiate actions to suspend operations involving positive reactivity additions.	Immediately
		AND		

(Continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (Continued)	A.2.5	Initiate action to restore required AC, DC, and AC vital electrical power distribution subsystems to OPERABLE status.	Immediately
	AND		
	A.2.6	Declare associated required shutdown cooling system inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution subsystems.	7 days

3.10 SHUTDOWN ~~REDUCED RCS INVENTORY~~ OPERATIONS

3.10.6 SHUTDOWN ~~Reduced RCS Inventory~~ Operations - AC Power Availability

LCO 3.10.6 The following AC Electrical Power Sources shall be OPERABLE.

a. ~~Two independent sources of AC power to each division supplying the Class 1E Distribution System,~~ One qualified circuit between the offsite transmission network and the onsite class 1E AC electrical power distribution subsystems required by LCO 3.8.10, "Distribution Systems - R

AND

b. Two ~~#~~ Diesel Generators ~~in each division*~~ capable of supplying the required OPERABLE features via the onsite class 1E AC electrical power distribution subsystems required by LCO 3.8.10

APPLICABILITY: MODE 5 ~~with REDUCED RCS INVENTORY~~ and 6 with water level in the refueling cavity < [23] feet above the pressure vessel fla. ~~and~~

~~MODE 6 with REDUCED RCS INVENTORY~~

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required offsite circuit inoperable.	------------NOTE------------ Enter applicable Condition and Required Actions of LCO 3.8.10, with one required division de-energized as a result of Condition A. ----------------------------	
	A.1.1 ✓ Initiate action to restore required offsite circuit to OPERABLE status supplying power to all required ESF buses.	Immediately
	AND	

~~* The combustion turbine can replace one Diesel Generator provided the combustion turbine has been demonstrated to be operational within the past seven (7) days.~~

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.1.2	Declare affected required feature(s) with no power available from an OPERABLE offsite circuit inoperable.	8 hours
	<u>OR</u>		
	A.2.1	Suspend CORE ALTERATIONS.	8 hours
	<u>AND</u>		
	A.2.2	Suspend movement of irradiated fuel assemblies in secondary containment.	8 hours
	<u>AND</u>		
	A.2.3	Initiate action to suspend operations with a potential for draining the reactor vessel (OPDRVs).	8 hours
	<u>AND</u>		
	A.2.4	Initiate action to restore required offsite circuit to OPERABLE status supplying power to all required ESF buses.	Immediately

(continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. One required DG inoperable.	B.1	Verify the combustion turbine generator (CTG) is functional by verifying the CTG starts and achieves steady state voltage and frequency within 2 minutes.	1 hour
	<u>AND</u>		
	B.2	Verify the CTG 4.16 circuit breakers are aligned to the ~~6.9~~ kV essential AC bus associated with the inoperable required DG.	1 hour <u>AND</u> once per 8 hours thereafter
	<u>AND</u>		
	B.3	Restore required DG to OPERABLE status.	7 ~~14~~ days

(continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Required Action and Completion Time of Condition B not met. OR ~~[illegible]~~ one or more ~~[illegible]~~ required DGs inoperable.	C.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	C.2	Suspend movement of irradiated fuel assemblies. ~~in secondary containment~~.	Immediately
	AND		
	C.3	Initiate action to suspend OPDRVs.	Immediately
	AND		
	C.4	Initiate action to restore required DG(s) to OPERABLE status.	Immediately
	AND		
	C.5	Declare affected required features supported by the inoperable DG(s) inoperable.	8 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR ~~3.8.11.1~~ 3.10.6	For AC sources required to be OPERABLE, the SRs of Specification 3.8.2 are applicable.	In accordance with applicable SRs

Review of Bases

1 of 2

B 3.8 ELECTRICAL POWER S

B 3.8.1 AC Sources - Operating

BASES

BACKGROUND

The AC Power Sources consist of the offsite power sources (preferred power) and the onsite standby power sources (Division 1 and Division 2 diesel generators). As required by General Design Criterion 17 (Ref. 1), (10 CFR 50, Appendix A,) the design of the AC power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The Division 1 and 2 onsite Class 1E AC Distribution System is divided into redundant load groups (divisions) so that loss of any one group will not prevent the minimum safety functions from being performed. Each division has connections to two preferred (offsite) power supplies and to a single diesel generator.

Independent transmission lines supply offsite power to Preferred Switchyards I & II. Preferred Switchyard I feeds the Unit Main Transformer (UMT) and Preferred Switchyard II feeds the Reserve Auxiliary Transformers (RATs). The UMT transforms 230 kV to 24 kV. This 24 kV is fed to two Unit Auxiliary Transformers (UATs). These UATs each provide power to their respective separate switchgear groups [X] and [Y]. The UATs provide 13.8 kV and 4.16 kV for station distribution.

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus or buses.

UATs provide the normal preferred source of power to the 4160 volt emergency buses. X-UAT provides the power to Division 1 emergency buses and Y-UAT provides the power to Division 2 emergency buses. Backup offsite power for either or both the emergency buses is provided through the RATs. If offsite power is not available, the emergency buses are supplied from their respective diesel generator, (DG). DG1 supplies power to Division 1 emergency buses and DG2 supplies power to Division 2 emergency buses.

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 Class 1E Distribution System. Within [1 minute] after the initiating 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.

BASES

BACKGROUND (Continued)

If power were lost from either UAT, undervoltage relays would sense this condition. The electrical system would then attempt to transfer to the backup preferred power source (the associated RAT). The transfer to the associated RAT will occur on the permanent non-safety bus affected. If power is not available from the backup preferred source, the DG is automatically used to power the associated emergency buses. The DGs start automatically on a Safety Injection Actuation Signal (SIAS) or on a loss of voltage (LOV) on the respective emergency buses. Even though the DGs are started on SIAS, they will not power the emergency buses unless both preferred offsite sources of power are unavailable. The DG automatically ties to its buses on a LOV condition on that bus with offsite power unavailable.

In the event of a loss of preferred power, the ESF 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 initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

In accordance with Regulatory Guide 1.9 (Ref. 2), diesel generators 1 and 2 have [6067] kW continuous and [6674] kW two-hour load ratings.

The diesel generators are rated at 4160 volts, three phase, 60 Hz, and are capable of attaining rated frequency and voltage within twenty seconds after receipt of a start signal (Ref. 3).

The ESF systems which are powered from divisional power sources are listed in Reference 3.

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in CESSAR-DC Chapters 6 (Ref. 4) and 15 (Ref. 5) assume ESF systems are OPERABLE. The AC Power System is 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 design limits are discussed in more detail in the Bases for LCO Sections 3.2 (Power Distribution Limits), 3.4 (Reactor Coolant System), and 3.6 (Containment Systems).

A

3.8-2

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 permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application

B

3.8-3

Qualified offsite circuits are those that are described in CESSAR-DC and are part of the licensing basis for the unit.

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

C

3.8-3

Therefore the AC Power System has a total of four (4) qualified circuits between the offsite transmission network and the onsite Class 1E AC Distribution System. Two circuits per division.

BASES

APPLICABLE SAFETY ANALYSES (Continued)

In general, the safety analysis considered offsite power to be available to ESF equipment following event initiation. Offsite power is not considered to be safety-related. A loss of offsite power (LOOP) alone is an analyzed event since it presents a challenge to the plant's safety features and would result in a total loss of AC power if the diesel generators failed to start.

The OPERABILITY of an offsite AC source is not explicitly required by the safety analyses. Therefore, the need for two independent offsite power circuits was not derived from the safety analysis, since events postulating failure of offsite power considered a complete loss of 230kv power. Such events disable both offsite circuits. The requirement for two offsite circuits was derived from the design criteria (Ref. 1) and standards incorporated into the plant design, which required redundant, independent offsite power sources.

The OPERABILITY of the power sources is consistent with the initial assumptions of the accident analyses and design requirements and is based upon maintaining at least one of the AC and DC Power Sources and associated distribution systems OPERABLE during accident conditions in the event of (1) an assumed loss of all offsite or all onsite AC power, and (2) a worse case single failure.

The AC sources satisfy Criterion 3 of the NRC Policy Statement.

LCO

Two qualified circuits (Ref. 3) between the offsite transmission network and the onsite Class 1E Distribution System, and the two independent diesel generators (Ref. 3), ensure availability of the required power to shutdown the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated design basis accident (DBA).

B

The two circuits from offsite are physically independent such that a single component fault (e.g., breaker trip) will not cause both power sources to be lost to one or more 4160 volt emergency buses. Thus, a physically independent circuit consists of one incoming line to the 230 kV (Preferred Switchyard Interface I) switchyard, a circuit path (including breakers and disconnects) to one energized UAT (X or Y), and a circuit path from the energized UAT to the associated 4160 volt emergency buses. A physically independent circuit also consists of the incoming line to the Preferred Switchyard Interface II, a circuit path (including breakers and disconnects) to the one energized RAT (Division I or II), and a circuit path from that energized RAT to its 4160 volt emergency buses. Each division contains an automatic load sequencer to control sequencing of Accident or Loss-of-Offsite Power loads.

C

BASES

LCO (Continued)

Inoperable AC sources do not necessarily result in inoperable components (which are designed to receive power from that source) unless specifically directed by Required Actions (refer to LCO 3.0.7).

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 20 seconds. 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 ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot, DG in standby with the engine at ambient conditions, and DG operating in a parallel test mode. Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

Certain diesel generator support systems are addressed in other LCOs. During inoperabilities in these support systems, inoperable diesel generators do not necessarily result unless specifically directed by Required Actions. This is in accordance with LCO 3.0.7.

APPLICABILITY

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

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

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

AC Power Source requirements for MODES 5 and 6 are addressed in LCO 3.8.2, AC Sources - Shutdown.

ACTIONS

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

With one of the required offsite circuits inoperable, sufficient offsite power is available from the other required offsite circuit to ensure that the unit can be maintained in a safe shutdown condition following a design basis transient or accident. Even failure of the remaining required offsite circuit will not jeopardize a safe shutdown of the unit because of the redundant standby diesel generator. However, since system reliability is degraded below the LCO requirements, a time limit on continued operation is imposed. To ensure

ACTIONS (Continued)

a highly reliable power source remains, it is necessary to verify the OPERABILITY of the remaining required offsite circuit 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 second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

The specific list of features encompassed by Required Action A.2 is provided in Reference 8. These features are those which are designed with redundant safety-related divisions. Single division systems are not included. Since the Completion Time allowance for this Required Action is limited to 24 hours, those systems with allowed Completion Times ≥ to 24 hours for both divisions inoperable are not included as required features to be checked. 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 Division 1 and Division 2 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. Required Action A.2, which only applies if the division cannot be powered from an offsite source, is intended to provide assurance that an event with a coincident single failure of the associated diesel generator will not result in a complete loss of safety function of critical systems. The term "ensure," as used in Required Action A.2, allows for an administrative check by examining logs or other information, to determine if certain features are out of service for maintenance or other reasons. It does not require unique performance of the Surveillance Requirements needed to demonstrate OPERABILITY of the feature. The Completion Time 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 1) the division has no offsite power supplying its loads, and 2) a required feature on the other division is inoperable. If at any time during the existence of this Condition (one offsite circuit inoperable) a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 8), operation may continue in Condition A for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite circuit inoperable, the reliability of the 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

BASES

ACTIONS (Continued)

OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E AC Distribution System.

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, as a result of 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) would be 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.

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.

The 72-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.1, B.2, B.3.1, B.3.2, and B.4

To ensure a highly reliable power source remains with an inoperable DG, it is necessary to verify the availability of the offsite circuits 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 circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

The specific list of features encompassed by Required Action B.2 is provided in Reference 8. These features are those which are designed with redundant safety related divisions. Single division systems are not included. Since the Completion Time allowance for this Required Action is limited to four hours, those systems with allowed Completion Times ≥ four hours for both divisions inoperable are not included as required features to be checked. Required Action B.2 is intended to provide assurance

ACTIONS (Continued)

that a loss of offsite power, during the period that a diesel generator is inoperable, will not result in a complete loss of safety function of critical systems. The term "ensure," as used in Required Action B.2, allows for an administrative check by examining logs or other information, to determine if certain features are out of service for maintenance or other reasons. It does not require unique performance of the Surveillance Requirements needed to demonstrate OPERABILITY of the feature. The Completion Time 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 1) an inoperable diesel generator exists, and 2) a required feature on the other division is inoperable. If at any time during the existence of this Condition (one diesel generator inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked. The Completion Time is based on engineering judgment taking into consideration the probability of a loss of offsite power occurring while the other Division 1 or 2 diesel generator is inoperable. This is comparable to, but less severe than, Condition D (both diesel generators inoperable) and therefore has a comparable, but less restrictive, Completion Time.

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 offsite circuits are adequate to supply electrical power to 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 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.

The Note in Condition B requires that Required Action B.3.1 or B.3.2 must be completed if Condition B is entered. The intent is that all DG inoperabilities must be investigated for common cause failures regardless of how long the DG inoperability persists.

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DGs. 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

ACTIONS (Continued)

of inoperability exists on 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 be confirmed not to exist on the remaining DG(s), performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

According to Generic Letter 84-15 (Ref. 9), [24] hours is reasonable to confirm that the OPERABLE DG(s) is not affected by the same problem as the inoperable DG.

According to Regulatory Guide 1.93 (Ref. 8), operation may continue in Condition B for a period that should not exceed 72 hours.

In Condition B, the remaining OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72 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.

The second Completion Time for Required Action B.4 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 B is entered while, for instance, an offsite circuit is inoperable and that circuit 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 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 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.

BASES

ACTIONS (Continued)

C.1 and C.2

With both of the required offsite circuits inoperable, sufficient standby AC Electrical Power Sources are available to maintain the unit in a safe shutdown condition in the event of a design basis transient or accident. However, since AC Electrical Power System reliability is degraded below the LCO requirements, a time limit on continued operation is imposed.

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:

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 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 commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

The specific list of features encompassed by Required Action C.1 is provided in Reference 8. These features are those which are designed with redundant safety-related divisions. Single division systems are not included. Since the Completion Time allowance for this Required Action is limited to 12 hours, those systems with allowed Completion Times ≥ 12 hours for both divisions inoperable are not included as required features to be checked. The requirement is intended to provide assurance should a coincident single failure of a diesel generator occur during the period with two offsite circuits inoperable, a complete loss of safety function of critical systems will not result. The term "ensure," as used in Required Action C.1, allows for an administrative check by examining logs or other information, to determine if certain features are out of service for maintenance or other reasons. It does not require unique performance of the Surveillance Requirements needed to demonstrate OPERABILITY of the feature. The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the

ACTIONS (Continued)

normal "time zero" for beginning the allowed outage time "clock". In this Required Action the Completion Time only begins on discovery that 1) both offsite circuits are inoperable, and 2) a required feature on the other division is inoperable. If at any time during the existence of this Condition (both offsite circuits inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked. The Completion Time is based on engineering judgment taking into consideration the probability of an event concurrent with a single failure of a diesel generator occurring (on the division opposite to the inoperable feature) while two offsite circuits are inoperable. During the time this Condition exists (both offsite circuits inoperable), Condition A also exists concurrently for each of the inoperable offsite circuits independently. The Required Actions and associated Completion Times apply as discussed previously. This may result in more restrictive requirements for restoration and/or cross-divisional feature OPERABILITY checks.

In accordance with Regulatory Guide 1.93 (Ref. 8), with the available offsite AC Electrical Power Sources two less than required by the LCO, operation may continue for 24 hours. One offsite source must be restored within 24 hours. Operation may then continue in accordance with the loss of one offsite source in Condition A. If no offsite circuit is restored within 24 hours, or, if either inoperable offsite circuit is not restored within 72 hours of its initial inoperability in accordance with Condition A (which may occur, in some cases, prior to the 24-hour allowance), a controlled shutdown must be initiated per Required Actions F.1 and F.2.

D.1 and D.2

In Condition D, individual redundancy is lost in both the offsite power system and the onsite Division 1 or 2 AC Power System. However, since power system redundancy is provided by two diverse sources of power, the reliability of the power systems in this Condition may appear higher than Condition C (loss of both required offsite circuits). 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 the period.

During the time this Condition exists (one offsite circuit and one diesel generator inoperable), Condition A and B also exist concurrently. The Required Actions and associated Completion Times for these Conditions also apply from time of entry into each individual Condition. This will continue to provide common mode failure considerations for the inoperable diesel generator, cross-divisional feature OPERABILITY considerations, and provide the appropriate time limit for continued operation while repairs are being attempted.

BASES

ACTIONS (Continued)

Per Regulatory Guide 1.93 (Ref. 8), with the available offsite and standby AC Power Sources each one less than the LCO, operation may continue in Condition D for 12 hours. If either an offsite or a standby AC source is restored to OPERABLE status within 12 hours, operation may continue for 72 hours from the time of the initial loss of the remaining inoperable source (consistent with the loss of one AC source in Condition A or B). If neither an offsite source nor a standby source is restored within the 12 hours, or, if either the inoperable diesel generator or the inoperable circuit is not restored within 72 hours of its initial inoperability in accordance with Condition A or B (which may occur, in some cases, prior to the 12-hour allowance), a controlled shutdown must be initiated per Required Actions F.1 and F.2.

E.1

With two required diesel generators inoperable, insufficient standby AC Power Sources are available to power the minimum required ESF functions. Since the offsite 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 (i.e, the immediate shutdown could cause grid instability which could result in total loss of AC power). However, since any inadvertent generator trip could also result in total loss of AC power, the time allowed for continued operation is severely restricted. The intent here is not only to avoid the risk associated with an immediate controlled shutdown but also to minimize the risk associated with this level of degradation. During the time this condition exists (both diesel generators inoperable), Condition B also exists concurrently for each of the inoperable diesel generators independently. The Required Actions and associated Completion Times apply as discussed previously. This will continue to provide common mode failure considerations, cross-divisional feature OPERABILITY, and the appropriate time limit for continued operation while repairs are being attempted.

Per Regulatory Guide 1.93 (Ref. 8), with the available standby AC electrical supplies two less than the LCO, operation may continue for a period that should not exceed two hours. One of the required diesel generators must be restored within these two hours. Operation may then continue in accordance with the loss of one diesel generator in Condition B. If no standby AC supply is restored within two hours, or, if either inoperable diesel generator is not restored within 72 hours of its initial inoperability in accordance with Condition B (which may occur, in some cases, prior to the two-hour allowance), a controlled shutdown must be initiated per Required Actions F.1 and F.2.

ACTIONS (Continued)

F.1

The sequencers are 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 powered from the associated ESF bus.] Therefore, loss of an [ESF bus sequencer] affects every major ESF system in the [division]. The [72] 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.

G.1 and G.2

The plant must be placed in a MODE in which the LCO does not apply if the Required Actions and associated Completion Times cannot be met. This is done by placing the plant in at least MODE 3 in six hours and in MODE 5 in 36 hours. The allowed Completion Times are reasonable based on operating experience to reach the required MODES from full power without challenging plant systems.

H.1

With three or more required AC sources inoperable, insufficient AC sources remain available to ensure safe shutdown of the unit in the event of a transient or accident with any additional single failure. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Immediately is used as an administrative means of not allowing any extension of the LCO 3.0.3 shutdown requirements.

SURVEILLANCE REQUIREMENTS

The AC Power Sources are designed to permit inspection and testing of all important areas and features, especially those which have a standby function, in accordance with 10 CFR 50, Appendix A, General Design Criteria 18 (Ref. 10). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guide 1.9 (Ref. 2), 1.108 (Ref. 11), and 1.137 (Ref. 12), as addressed in CESSAR-DC.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

Where the SRs discussed 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 ANSI C84.1-1982 (Ref. 6), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage 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 80% 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. 2).

SR 3.8.1.1

This Surveillance Requirement assures proper circuit continuity for the offsite AC power supply to distribution network and availability of offsite AC power. The breaker alignment verifies that each breaker is in its correct position to ensure distribution buses and loads are connected to their preferred power source and independence of offsite circuits is maintained. The seven-day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.7

accidents transients

These surveillances help to ensure the availability of the standby power supply to mitigate design basis transients and accidents and maintain the unit in safe shutdown conditions. 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 by an engine prelube period. For the purpose of this testing, the diesel generators shall be started from standby conditions. Standby conditions in this case means the diesel engine coolant and oil are being continuously circulated and temperature 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. This is the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.7 requires, on a 184-day Frequency, the diesel generators start from standby conditions and achieve required voltage and frequency within 20 seconds. The 20-second requirement supports the assumptions in the design basis loss of coolant accident (LOCA) analysis (Ref. 5). The 20-second start requirement is not applicable to SR 3.8.1.2 which is performed on a 31-day Frequency.

The normal 31-day Frequency for SR 3.8.1.2 (see Diesel Generator Test Schedule, Table 3.8.1-1) is consistent with Regulatory Guide 1.9 (Ref. 2). The 184-day Frequency for SR 3.8.1.7 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 9). These Frequencies provide adequate assurance of diesel generator OPERABILITY while minimizing degradation resulting from testing.

SR 3.8.1.3

This surveillance verifies that the diesel generators are capable of synchronizing and accepting ≥ the equivalent of the maximum expected accident loads. The 60-minute run time for the diesel generator (required by Ref. 2) is to stabilize the engine temperature. This will ensure that cooling and lubrication are adequate for extended periods of operation while minimizing the time that the diesel generator is connected to the offsite power 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 [1.0] is an operational limitation [to ensure circulating currents are minimized].

The normal 31-day Frequency for this Surveillance (see Diesel Generator Test Schedule) is consistent with Regulatory Guide 1.9 (Ref. 2).

This Surveillance is modified by four NOTES. The first NOTE allows gradual (manual) loading as recommended by the manufacturer to minimize stress and wear on the diesel engine (Ref. 9). The second NOTE allows momentary transients due to changing bus loads to not invalidate the test. Similarly, momentary power factor transients above the limit will not invalidate the test. The third NOTE requires that this Surveillance be conducted on only one diesel generator at a time. This will avoid a total loss of AC power due to a common cause failure in the offsite circuits or a perturbation on the grid. NOTE 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

D

3.8-14

If a modified start is not used, 20 second start requirement of SR 3.8.1.7 applies. Since SR 3.8.1.7 requires a 20 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.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

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 hour of DG operation at full load plus 10%.

The 31 day Frequency is adequate to assure 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 3.8.1.5

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 oil day 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 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. 12). 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 the performance of this Surveillance.

SR 3.8.1.6

This Surveillance demonstrates that each required fuel oil transfer valve operates and allows fuel oil to transfer by gravity from its associated storage tanks 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 valve 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.

A 92 day Frequency corresponds to the Inservice Testing requirements for the transfer valves; however, the design of fuel transfer systems is such that the transfer valves will operate automatically or a valve in the bypass line must be operated manually in order to maintain an adequate volume of fuel oil in the DG day tank during or following DG testing. In such a case, a 31 day Frequency is appropriate.

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.7

See Bases SR 3.8.1.2/3.8.1.7.

SR 3.8.1.8

Transfer of each 4160 volt emergency bus power supply from the normal preferred offsite circuit to the backup preferred offsite circuit demonstrates the OPERABILITY of the backup circuit distribution network to feed the shutdown loads. The [18 month] Frequency of the Surveillance is based on engineering judgment taking into consideration the plant conditions required to perform the surveillance, and is intended to be consistent with expected fuel cycle lengths. Also, 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 Surveillance is modified by two Notes. The first Note prohibits performance of this Surveillance in MODE 1 or 2. Performance of this surveillance could result in perturbations to the electrical distribution system and cause a challenge to continued steady-state operation in MODES 1 and 2. Therefore, this Surveillance must be performed in MODES 3, 4, 5, or 6. The second Note allows credit to be taken for unplanned events that satisfy this Surveillance Requirement.

SR 3.8.1.9

The diesel generators are 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 overspeed which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the diesel generator load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency limits, which maintains a specified margin to the overspeed trip. The largest single load on the emergency buses corresponds to a Component Cooling Water Pump (1250 BHP, 1037kW) (Ref. 3). As required by IEEE-308 (Ref. 14), the load rejection test is acceptable if the increase in the speed of the diesel does not exceed 75% of the difference between nominal speed and the overspeed trip setpoint, or 15% above nominal, whichever is lower. This represents 63 Hz, equivalent to 75% of the difference between nominal speed and the overspeed trip setpoint.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 2) recommendations for response during load sequence intervals. The [3] seconds specified is equal to 60 percent 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

SURVEILLANCE REQUIREMENTS (Continued)

diesel generator. SR 3.8.1.9.a corresp nds 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 that the system must recover to following load rejection. The 18-month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11) (expected fuel cycle lengths).

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.

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. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.10

This Surveillance demonstrates the diesel generator capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The generator full load rejection may occur due to a system fault or inadvertent breaker tripping. This Surveillance verifies proper engine-generator load-response under the simulated test conditions. This test will simulate the loss of the total connected loads that the diesel generator will experience following a full load rejection and verify that the diesel generator will not trip upon loss of the load. These acceptance criteria provide for diesel generator damage protection. While the diesel generator is not expected to experience this transient during an event and continue to be available, this response will assure the diesel generator is not degraded for future applications, including reconnection to the bus if the trip initiator can be corrected or isolated. The 18-month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11) (expected fuel cycle lengths).

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.

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 perturbation to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.1~~1~~ 2

As required by Regulatory Guide 1.108 (Ref. 11), this Surveillance demonstrates the as-designed operation of the standby power sources during loss of the preferred offsite power source. This test verifies all actions encountered from the loss of offsite power including shedding of the non-essential loads and energization of the emergency buses and respective loads from the diesel generator. It further demonstrates the capability of the diesel generator to automatically achieve the required voltage and frequency within the specified time.

The diesel generator automatic start time of 20 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The minimum steady state output voltage of [3744] volts is 90% of the nominal 4160 volt output voltage. This value, which is specified in ANSI C84.1-1982, allows for voltage drop down to the terminals of 4000 volt rated motors whose minimum operating voltage is specified as 90% or 3600 volts. It also allows for voltage drops to motors and other equipment down through the 120 volt level where minimum operating voltage is also usually specified as 90% of nameplate rating.

The specified maximum steady state output voltage of [4576] volts is equal to the maximum operating voltage specified for 4000 volt rated motors (+ 10% of motor nameplate rating of 4000 volts). It ensures that for a lightly loaded distribution system the voltage at the terminals of 4000 volt motors will be no more than the maximum rated operating voltages.

The specified minimum and maximum steady state output frequency of the diesel generator is 58.8 Hz and 61.2 Hz, respectively. This is equal to ± 2% of the 60 Hz nominal frequency and is derived from the recommendations given in Regulatory Guide 1.9 (Ref. 2) that the frequency should be restored to within 2% of nominal following a load sequence step. The surveillance should be continued for a minimum of five minutes in order to demonstrate all starting transients have decayed and stability has been achieved.

For the purpose of this SR, the diesel generators shall be started from standby conditions. Standby conditions in this case means the diesel engine coolant and oil are being continuously circulated and temperature maintained consistent with manufacturer recommendations.

The requirement to verify the connection and power supply of permanent and auto-connected 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

SURVEILLANCE REQUIREMENTS (Continued)

instance, the Safety Injection System (SIS) injection valves are not desired to be stroked open, high pressure injection systems are not capable of being operated at full flow, or the shutdown cooling system (SCS) performing a decay heat removal function is 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 is consisten[illegible] recommendations of Regulatory Guide 1.108 (Ref. 11), and takes into consideration plant conditions required to perform the surveillance, and is intended to be consistent with expected fuel cycle lengths. Also, 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 Surveillance is modified by three Notes. The first Note permits an engine prelube period which is consistent with manufacturer's recommendations prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating. The second Note prohibits performance of this surveillance in MODES 1, 2, 3 or 4. Performance of this Surveillance requires that offsite power be removed from the 4160V emergency buses which will perturb the electrical distribution system and could challenge safety-related equipment. The third Note acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.1~~2~~1

This surveillance demonstrates that the diesel generator automatically starts and achieves the required voltage and frequency within the specified time (20 seconds) from the design basis activation signal. (It further demonstrates that during a LOOP event, the diesel generator load sequences restart equipment that was deenergized as a result of the LOOP. The five-minute period provides sufficient time to demonstrate stability. The basis for the time, voltage, and frequency tolerances specified in this surveillance are discussed in the Bases for SR 3.8.1.11.

For the purpose of this test, the diesel generators shall be started from standby conditions. Standby conditions in this case means the diesel engine coolant and oil are being continuously circulated and temperature maintained consistent with manufacturer recommendations.

SURVEILLANCE REQUIREMENTS (Continued)

The Frequency of the Surveillance is based on engineering judgment taking into consideration the plant conditions required to perform the surveillance and is intended to be consistent with expected fuel cycle lengths. Also, 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 Surveillance is modified by three Notes. The first Note permits an engine prelube period prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating. The second Note prohibits performance of this surveillance in MODE 1 or 2. Performance of this surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady-state operations. The third Note acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.13

This Surveillance demonstrates that diesel generator non-critical protective functions (e.g. high jacket water temperature) are bypassed as a result of an ESF actuation test signal concurrent with a loss of voltage test signal on the emergency bus. It also verifies that critical protective functions (engine overspeed, generator differential current, generator voltage controlled overcurrent, and low lube oil pressure) trip the diesel generator to avert substantial damage to the diesel generator unit. The non-critical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This provides the operator with sufficient time to react appropriately. The diesel generator 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 diesel generator.

The 18-month Frequency is based on engineering judgment taking into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Also, 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 Surveillance is modified by two Notes. Note 1 prohibits performance of this Surveillance in MODE 1 or 2. Performance of this Surveillance results in diesel generator inoperability and could challenge safety-related equipment. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.14

Regulatory Guide 1.108 (Ref. 11), requires demonstration once per 18 months that the diesel generators can start and run continuously at full load capability for an interval of not less than 24 hours, of which [>2] hours are at a load equivalent to the continuous rating of the diesel and two hours at a load equivalent to the two hour rating of the diesel. The diesel starts for this surveillance can be performed either from cold, standby or hot conditions. The Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11), and takes into consideration plant conditions required to perform the surveillance and is intended to be consistent with expected fuel cycle lengths. 110%

The provisions for prelubricating and warmup, discussed in SR 8.3.1.2, and for gradual loading, discussed in 3.8.1.3, are applicable to this SR.

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.

This Surveillance is modified by three Notes. 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 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. Note 3 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition and achieve the required voltage and frequency within 20 seconds. The 20 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The bases for the voltage and frequency tolerances are discussed in the Bases for SR 3.8.1.11.

This Surveillance demonstrates the diesel generator capability to respond to accident signals while hot, such as subsequent to shutdown from normal Surveillances. The load band is provided to avoid routine overloading of the diesel generator. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain diesel generator OPERABILITY. The 18-month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11).

BASES

SURVEILLANCE REQUIREMENTS (Continued)

This Surveillance is modified by three Notes. The first Note requires that this Surveillance be performed within five minutes of shutting down the diesel generator after it has operated for ≥ two hours at fully loaded conditions and allows momentary transients due to changing bus loads to not invalidate the test. The two-hour time limit is based on the manufacturer's recommendation for achieving hot conditions. The second Note permits an engine prelube period prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating. Note 3 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.16

As required by Regulatory Guide 1.108 (Ref. 11), this Surveillance assures that the manual synchronization and load transfer from the diesel generator to the offsite power source can be made and the diesel generator can be returned to ready-to-load status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the diesel generator to reload if a subsequent loss of offsite power occurs. The diesel generator is considered to be in ready-to-load status when the diesel generator is at rated speed and voltage, the output breaker is open and can receive an auto-close 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. 11) and takes into consideration plant conditions required to perform the Surveillance.

This SR is modified by two Notes. The reason for Note 1 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Note 2 acknowledges that 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 diesel generator availability under accident conditions will not be compromised as the result of testing. Interlocks to the LOCA sensing circuits cause the diesel generator to 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 diesel generator running at rated speed and voltage with the diesel generator output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 14).

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

BASES

SURVEILLANCE REQUIREMENTS (Continued)

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. 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 two Notes. The reason for Note 1 is that performing Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.18

As required by Regulatory Guide 1.108 (Ref. 11), each diesel generator is required to demonstrate proper operation for the DBA loading sequence to ensure that voltage and frequency are maintained within the required limits. Under accident conditions, prior to connecting the diesel generators to their appropriate bus, all loads are shed except load center feeders and those motor control centers which feed Class 1E loads (referred to as permanently-connected loads). Upon reaching 90% rated voltage and frequency, the diesel generators are then connected to their respective bus. Loads are then sequentially connected to the bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers so as to prevent overloading the diesel generators due to high motor starting currents. The 10% load sequence time interval tolerance ensures sufficient time exists for the diesel generator to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 4 provides a summary of the automatic loading of ESF buses.

The Frequency of [18 month] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11), and takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by two Notes. The first Note prohibits performance of this Surveillance in MODE 1, 2, 3, or 4. Performance of this test requires the inoperability of certain ESF equipment and has the potential to perturb the electrical distribution system which would challenge continued steady-state operation. The second Note acknowledges that credit may be taken for unplanned events that satisfy this SR.

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.19

In the event of a design basis accident coincident with a loss of offsite power (LOOP), the diesel generators are required to supply the necessary power to ESF Systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.

This Surveillance demonstrates the diesel generator operation as discussed in the Bases for SR 3.8.1.11 during a LOOP actuation test signal in conjunction with an ESF actuation signal. 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] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11), and takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by three Notes. The first Note permits an engine prelube period prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating. The second Note prohibits performance of this Surveillance in MODE 1, 2, 3 or 4. Performance of this Surveillance requires that offsite power be removed from the 4160V emergency buses which will perturb the electrical distribution system and could challenge continued steady-state operation and safety-related equipment. The third Note acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.20

This Surveillance demonstrates that the diesel generator starting dependence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the diesel generators are started simultaneously. The ten-year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11) and Regulatory Guide 1.137 (Ref. 12).

This Surveillance is modified by a Note which allows an engine prelube period prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

Diesel Generator Test Schedule

The diesel generator test schedule (Table 3.8.1-1) implements the recommendations of Revision 3 to Regulatory Guide 1.9 (Ref. 2). The purpose of this test schedule is to provide timely test data to establish a confidence level associated with the goal to maintain diesel generator reliability above 0.95 per demand.

According to Regulatory Guide 1.9, Revision 3 (Ref. 2), each DG unit should be tested at least once every 31 days. Whenever a 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 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. Therefore, the interval between tests should be no less than 24 hours, and no more than 7 days. A successful test at an interval of less than 24 hours should be considered an invalid test and not count towards the seven consecutive failure free starts. A test interval in excess of 7 days constitutes a failure to meet the SRs.

Regulatory Guide 1.108 (Ref. 11) defines the diesel generator unit as consisting of the engine, generator, combustion air system, cooling water system up to the supply, fuel oil supply system, lubricating oil system, starting energy sources, auto start controls, manual controls, and the diesel generator breaker. Inoperabilities of diesel generators caused by failures of equipment that are not part of the defined diesel generator unit are categorized as invalid failures in accordance with Regulatory Guide 1.108 since the failure would not have prevented the diesel generator from performing its intended safety function. As such, they do not impact the Surveillance Frequency of the diesel generator that failed.

REFERENCES

1. 10 CFR, Appendix A, General Design Criteria 17, "Electric Power Systems."

2. Regulatory Guide 1.9, "Selection, Design, and Qualification of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 3.

3. CESSAR-DC, Chapter 8.

BASES

REFERENCES (Continued)

4. CESSAR-DC, Chapter 6.

5. CESSAR-DC, Chapter 15.

6. ANSI C84.1-1982.

7. ASME Boiler & Pressure Vessel Code Section XI.

8. Regulatory Guide 1.93, "Availability of Electric Power Sources," December 1974.

9. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.

10. 10 CFR 50, General Design Criteria 18, "Inspection and Testing of Electric Power Systems."

11. Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as On-site Electric Power Systems at Nuclear Power Plants," August 1977.

12. Regulatory Guide 1.137, "Fuel Oil Systems for Standby Diesel Generators," October 1979.

13. CESSAR-DC, Section 9.5.6.3.

14. IEEE-308 1978, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources - Shutdown

BASES

BACKGROUND

A description of offsite and onsite AC Power 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 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 an inadvertent draindown of the vessel or 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 MODE 1, 2, 3, and 4 LCO requirements are acceptable during

APPLICABLE SAFETY ANALYSES (Continued)

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 MODE 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 the NRC Policy Statement.

LCO

One offsite circuit capable of supplying the onsite Class 1E power 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 a 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 offsite circuit. Together, OPERABILITY of the required offsite circuit 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 and reactor vessel draindown).

The qualified offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Engineered Safety Feature (ESF) bus(es). Qualified offsite circuits are those that are described in the CESSAR-DC and are part of the licensing basis for the unit.

Inoperable AC Sources do not necessarily result in inoperable components (which are designed to receive power from that source) unless specifically directed by Required Actions (refer to LCO 3.0.7).

The DG must be capable of starting, accelerating to rated speed and voltage, connecting to its respective ESF bus on detection of bus undervoltage, and accepting required loads.

LCO (Continued)

This sequence must be accomplished within [10] seconds. The DG must be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot, DG in standby at ambient conditions, and DG operating in a parallel test mode.

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

In addition, proper sequencer operation is an integral part of offsite circuit OPERABILITY if its inoperability in any way impacts on the ability to start and maintain energized any loads required OPERABLE by LCO 3.8.10.

Certain diesel generator support systems are addressed in other LCOs. During inoperabilities in these support systems, inoperable diesel generators do not necessarily result unless specifically directed by Required Actions (refer to LCO 3.0.7).

APPLICABILITY

The AC power sources that are required to be OPERABLE in MODES 5 and 6 and when handling irradiated fuel assemblies provides assurance that:

1. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel,
2. Systems needed to mitigate a fuel handling accident are available,
3. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and
4. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown or refueling condition.

AC power requirements for MODES 1, 2, 3, and 4 are addressed in LCO 3.8.1, "AC Sources - Operating."

ACTIONS

A.1

An offsite circuit would be considered inoperable if it were not available to one required ESF train. Although two trains are required by LCO 3.8.10 the remaining train with offsite power available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and/or operations with a potential for draining the reactor vessel. 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.

ACTIONS (Continued)

A.2.1, A.2.2, A.2.3, A.2.4, A.2.5, B.1, B.2, B.3, B.4, and B.5 divisions

With the offsite circuit not available to all 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, any activities that could potentially result in inadvertent draining of the reactor vessel, and operations involving positive reactivity additions which would exceed limits specified in LCO 3.1.2 or LCO 3.1.9. 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.

Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability or 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.

Notwithstanding performance of the conservative Required Actions, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

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 are not 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 one ESF 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, whether or not a train is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized train. division

division

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 3.8.1.17

SURVEILLANCE REQUIREMENTS (Continued)	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 DG(s) that are not required to be OPERABLE. 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 or otherwise rendered inoperable. With limited AC Sources available, a single event could compromise both the required circuit 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 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, Lube Oil, and Starting Air

BASES

BACKGROUND

Each diesel generator is provided with two one-half capacity storage tanks having the combined fuel capacity sufficient to operate that diesel for a period of seven days while the diesel generator is supplying maximum post-accident load demand (Ref. 1). The maximum load demand is calculated using the assumption that two diesel generators are available. This onsite fuel capacity is sufficient to operate the diesel generator for longer than the time it would take to replenish the onsite supply from outside sources. Fuel oil is transferred from the storage tanks to the day tank by gravity feed. Redundancy of the storage tanks and piping, and the use of gravity feed, precludes the failure of a pump, or the rupture of any pipe, valve, or tank to result in the loss of more than one DG.

For proper operation of the diesel generators, 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 N195-1976 (Ref. 3). The fuel oil properties governed by these Surveillance Requirements are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and impurity level.

The diesel generator lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated diesel generator 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. The system provides oil to the engine surfaces at a specified temperature during the long anticipated periods of standby duty. Each engine oil sump is of adequate size to contain all the oil in the engine lube oil system and has an inventory capable of supporting a minimum running time of three days. This provides sufficient supply to allow the operator to replenish lube oil from storage facilities onsite. The onsite storage in addition to the engine oil sump is sufficient to ensure seven days continuous operation.

Each DG has an air start system with adequate capacity for five successive start attempts of the DG without recharging the air start receiver(s).

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in CESSAR-DC Chapters 6, Engineered Safety Features, and 15, Accident Analyses, assume ESF systems are OPERABLE. The diesel generators 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 LCO Sections 3.2

BASES

APPLICABLE SAFETY ANALYSES (Continued)

(Power Distribution Limits), 3.4 (Reactor Coolant System), and 3.6 (Containment Systems).

The diesel fuel oil, lubricating oil, and air start subsystems provide the necessary supply to support operation of the diesel generators. They satisfy Criterion 3 of the NRC Policy Statement.

LCO

Stored diesel fuel oil is required to have sufficient supply for 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 7 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 storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources — Operating," and LCO 3.8.2, "AC Sources-Shutdown."

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 starting air subsystems support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil, lube oil and starting air are required to be within limits when the associated DG is required to be OPERABLE.

ACTIONS

A.1

In this Condition, the 7 day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions, that maintain at least a 6 day supply. These circumstances may be caused by events such as full load operation required after an inadvertent start while at minimum required 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. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on

ACTIONS (Continued)

the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

With lube oil inventory < [500] gallons, 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 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.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.3. 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 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 (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling, and re-analysis of the DG fuel oil.

D.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.3 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 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.

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.

F.1

With a Required Action and associated Completion Time not met, or one or more DGs with diesel fuel oil or lube oil not within limits for reasons other than addressed by Conditions A through E, the associated DG may be incapable of performing its 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 each DG's operation for 7 days at full load. The 7 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 operators would be aware of large uses of fuel oil during this period.

SR 3.8.3.2

This surveillance ensures that sufficient lubricating oil inventory is available to support at least seven days of full load operation for the diesel generator. The [500] gallons requirement is based on the diesel generator manufacturer's consumption values for the run-time of the diesel. 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 a sufficient lubricating oil supply is onsite since diesel generator starts and run times are closely monitored by the plant staff.

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.3.3

The tests listed below are a means of determining whether fuel is of appropriate grade and has not been contaminated with substances which would have an immediate, detrimental impact on diesel engine combustion/operation. If results from these tests are within acceptable limits, the fuel may be added to the storage tanks without concern for contaminating the entire volume of fuel in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage tank(s), but in no case is the time between receipt of new fuel and conducting the tests to exceed 31 days. The Frequency is established by Regulatory Guide 1.137 (Ref. 2). The tests, limits, and applicable ASTM standards are as follows:

a. Sample new fuel in accordance with ASTM D4054.

b. Verify in accordance with tests specified in ASTM D975-(82) that the sample has an absolute specific gravity at 60/60°F of ≥ 0.83° but ≤ 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 ≥ 125°F.

c. Verify the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-(86).

E →

Failure to meet any of the above limits is cause to reject the new fuel, but does not constitute a diesel generator OPERABILITY concern since the fuel is not added to the storage tanks.

Within 31 days following the initial new fuel oil sample, this surveillance is performed to establish that the other properties specified in Table 1 of ASTM D-975-(82) are met for new fuel oil when tested in accordance with ASTM D975-(82), except that the analysis for sulfur may be performed in accordance with ASTM D1522-(83) or ASTM D975-(82). 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.

E

3.8-36

[These tests are required to be performed within 31 days prior to adding fuel to the storage tanks. The Frequency is established by Regulatory Guide 1.137.]

BASES

SURVEILLANCE REQUIREMENTS (Continued)

Particulate concentrations should be determined in accordance with ASTM D2276-[82]. 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. Each of the DGs' storage tanks is tested separately.

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.

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG 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 or 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 which can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from fuel storage tanks once per [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 diesel generator operation.

Water may come from any of several sources including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling as well as providing data regarding fuel oil system water tight integrity. 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.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.3.6

The draining of the fuel oil in the storage tanks, removal of accumulated sediment, and tank cleaning is required at ten-year intervals by Regulatory Guide 1.137 (Ref. 2). This also requires the performance of the ASME Code Section XI 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.

REFERENCES

1. CESSAR-DC, Section 9.5.4.2.

2. Regulatory Guide 1.137, "Fuel Oil Systems for Standby Diesel Generators," October 1979.

3. ANSI N195-1976, "Fuel Oil Systems for Standby Diesel Generators," Appendix B.

4. ASTM Standards: D4054; D975; D4175; D1522; D2622; S2276, Method A.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources - Operating

BASES

BACKGROUND

The Class 1E DC Power System provides control power for the AC emergency power system. It also provides both motive and control power to selected safety-related equipment and provides circuit breaker control power for the 600 volts and lower AC distribution system. The DC Power System is also the source of power for the vital instrumentation buses via inverters. The six DC subsystems conform to the independence, and redundancy requirements of 10 CFR 50, Appendix A, GDC-17, Regulatory Guide 1.6 (Ref. 1), IEEE-308 (Ref. 2), and General Design Criteria 17 (Ref. 3). The six batteries are:

Division I	Division II
Division I Battery	Division II Battery
Channel A Battery	Channel B Battery
Channel C Battery	Channel D Battery

Each DC subsystem is energized by a dedicated 125 volt battery and associated 125 volt battery charger. Each battery is exclusively associated with a single 125 volt DC bus and each battery charger is supplied by its associated AC load group.

Each of the six DC subsystems is made up of the following:

- A [120-cell lead-calcium battery] rated at [1650] Ah for eight hours to [108] volts at 77°F;
- A static battery charger rated at [400] amps with 0.5% voltage regulation with an AC supply variation of 10% in voltage and 5% in frequency; and
- associated switchboards and distribution panels.

However, in order to fulfill the battery capacity criteria: "to supply one division battery's loads and one channel of loads," the batteries may be cross-tied to allow coping strategies to be implemented in accordance with the capacity sizing. Additionally, the batteries provide a Station Blackout (SBO) coping capability which, assuming manual load shedding or the use of load management programs, exceeds two hours, and as a minimum, permits operating the instrumentation and control loads associated with the turbine-driven emergency feed water pumps for 8 hours.

F

3.8-39

[During normal operations, the load with the battery 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.

BASES

BACKGROUND (Continued)

Battery operating voltage is 125 volts and each battery has adequate storage to supply the division battery and one channel of loads for two hours without recharging (Ref. 4). Capacity is adequate for all loss of coolant accident (LOCA) conditions or any other emergency shutdown.

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

Each 125 volt DC Class 1E battery is separately housed in a ventilated room apart from its charger and distribution center. Each subsystem is located in an area separated physically and electrically from other subsystems to ensure that a single failure in one subsystem does not cause failure in the redundant subsystem. In normal alignment, there is no sharing between redundant Class 1E subsystems such as batteries, battery chargers, or distribution panels. Class 1E batteries of the same division may be cross-tied together* for accident coping (SBO) and/or LCO purposes.

All batteries 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. Battery size is based on 100% of required capacity, and after selection of an available commercial battery, results in a battery capacity in excess of 125% of required capacity. The voltage design limit is [*] volts per cell which corresponds to a total minimum voltage output of [*] volts per battery bank. 125% 150%

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 bank fully charged. Each battery charger has sufficient capacity to restore the battery bank from the design minimum charge to 95% of its fully charged state in [12] hours while supplying normal steady-state loads (Ref. 4).

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in CESSAR-DC, Chapters 6, Engineering Safety Features, and 15, Accident Analyses, assume Engineered Safety Features (ESF) systems are OPERABLE. The DC power subsystem provides normal and emergency DC power for the diesel generators, emergency auxiliaries, and for control and switching during all MODES of operation. The OPERABILITY of the DC power sources is consistent with the initial assumptions of the

* Values to be determined by system detail design.

APPLICABLE SAFETY ANALYSES (Continued)

accident analyses which are based upon maintaining the required DC power sources and associated distribution systems OPERABLE during accident conditions in the event of (1) an assumed loss of offsite AC power or all onsite AC power; and (2) A worst case single failure.

The DC power sources satisfy Criterion 3 of the NRC Policy Statement.

LCO

The Division 1 and 2 DC electrical power subsystems and corresponding control equipment and cabling are required to be OPERABLE to ensure availability of the required power to shutdown the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated design basis accident. Loss of any one of the DC power subsystems does not prevent the minimum safety function from being performed. Each DC electrical power subsystem is considered OPERABLE if the 125 volt battery and associated battery charger satisfy the applicable Surveillance Requirements.

An OPERABLE DC electrical power subsystem requires all required batteries and respective chargers to be operating and connected to the associated DC buses.

Inoperable DC sources do not necessarily result in inoperable components unless specifically directed by Required Actions (refer to LCO 3.0.7). The electrolyte parameter limits relationship to the OPERABILITY of DC sources is covered by LCO 3.8.6, Battery Cell Parameters. During periods when battery cell parameters are not within limits, DC sources are not necessarily inoperable unless specifically directed by the Required Actions of LCO 3.8.6, Battery Cell Parameters.

APPLICABILITY

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

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

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

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

BASES

ACTIONS

A.1 and A.2

With one of the six DC electrical power subsystems inoperable, the cross-tie may be utilized to allow the remaining two operable subsystems within the division to power the loads of the inoperable power source and fulfill the SBO coping capability. This is possible since each battery is sized to provide the one division battery loads and one channel of loads. Thus, the two remaining operable batteries may power the inoperable battery's loads while it is being restored to OPERABILITY. This design feature should be utilized with the intent of restoring the inoperable components in 72 hours.

B.1 and B.2

With two of the required DC electrical power subsystems inoperable, the remaining DC electrical power subsystems have the capacity to support a safe shutdown and to mitigate an accident condition. However, since a subsequent worst case single failure would result in the loss of the 125 volt Class 1E battery system, continued power operation should not exceed two hours. The two-hour Completion Time is based on Regulatory Guide 1.93 (Ref. 5), and engineering judgment considering the number of available systems and the time required to reasonably complete the Required Actions.

C.1 and C.2

The plant must be placed in a MODE in which the LCO does not apply if the DC electrical power subsystem cannot be restored to OPERABLE status in the associated Completion Time. This is done by placing the plant in at least MODE 3 in six hours and in MODE 5 in 36 hours. The allowed Completion Times are reasonable based on operating experience to reach the required MODES from full power without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the 125/250 volt Class 1E battery helps ensure the effectiveness of the charging system and the ability of the battery to perform its intended function. Float charge is the condition where the charger is supplying the continuous charge required to overcome the internal losses of a battery (or battery cell) and maintain the battery (or battery cell) in a fully charged state. 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 seven-day Frequency is consistent with the manufacturers' recommendations and IEEE-450 (Ref. 6).

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.4.2

Visual inspection to detect corrosion of the battery cells and connections or measurement of the resistance of each cell and terminal connection provide an indication of physical damage or abnormal deterioration which could potentially degrade battery performance. The connection resistance value is a ceiling value established by the battery manufacturer based on calculations taking into consideration the physical configuration of the batteries. The 92-day Frequency is sufficient for detecting trends in these conditions indicative of any problems. A more complete inspection is performed in conjunction with the preventive maintenance program conducted during refueling outages.

SR 3.8.4.3

Visual inspection of the battery cells, cell plates, and battery racks provide an indication of physical damage or abnormal deterioration which could potentially degrade battery performance. The [12]-month Frequency is consistent with IEEE - 450 (Ref. 6).

SR 3.8.4.4 and 3.8.4.5

Visual inspections and resistance measurements of the cell-to-cell and terminal connections provide an indication of physical damage or abnormal deterioration which could indicate degraded battery performance. The anti-corrosion 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 and inspection under each terminal connection. The connection resistance value is a ceiling value established by the manufacturer based on calculations taking into consideration the physical configuration of the batteries. The [12]-month Frequency is consistent with IEEE-450 (Ref. 6).

SR 3.8.4.6

Regulatory Guide 1.32 (Ref. 7), requires that the battery charger supply be based on the largest combined 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 which these demands occur. The minimum required amperes and duration ensures that the DC load requirements can be satisfied (refer to SR 3.8.4.7). The Frequency is based on engineering judgment and industry accepted practice considering the unit conditions required to perform the test, and is intended to be consistent with expected fuel cycle lengths.

This surveillance is modified by two Notes. The first Note prohibits performance of this surveillance in MODES 1, 2, 3, or 4. Performance of this test requires the associated DC Division to be inoperable during the test. Therefore, this test must be performed in

SURVEILLANCE REQUIREMENTS (Continued)

MODES 5 or 6. The second Note allows credit to be taken for unplanned events that satisfy this Surveillance Requirement.

SR 3.8.4.7

Regulatory Guide 1.32 (Ref. 7), requires the performance of a battery service test in accordance with IEEE-450 (Ref. 6) at intervals not to exceed [18] months. A battery service test is a special capacity test to demonstrate the capability of the battery to meet the system analyzed response requirements. Reference 4 provides the load requirements for the batteries.

This surveillance is modified by three notes. The first Note allows 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.

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.

The second Note prohibits performance of this surveillance in MODES 1, 2, 3, or 4. Performance of this test requires the associated DC Division to be inoperable during the test. Therefore, this test must be performed in MODES 5 or 6. The third Note allows credit to be taken for unplanned events that satisfy this Surveillance Requirement.

SR 3.8.4.8

IEEE-450 (Ref. 6) recommends a performance discharge test for each battery at 60-month intervals. A battery performance test is a capacity test of the battery in the "as found" condition, after being in service, to detect any change in the capacity as determined by the new battery acceptance test. The test is intended to determine overall battery degradation due to age and usage.

BASES

SURVEILLANCE REQUIREMENTS (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.

IEEE-485 (Ref. 8) recommends that the battery should be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows the battery rate of deterioration is increasing even if there is ample capacity to meet the load requirements. The acceptance criteria for this Surveillance specifies an [80%] capacity based on the extension of the Frequency for SR 3.8.4.7 from the IEEE-450 recommendation of [12] months to [18] months.

IEEE-450 (Ref. 6) recommends a 60-month Surveillance Frequency or a performance discharge test should be performed every [12] months for any battery that shows signs of degradation or has reached 85% of the service life expected of the application. Degradation is indicated when the battery capacity drops more than 10% of rated capacity from its average on previous performance tests, or is below 90% of the manufacturer's rating.

The Frequencies are consistent with the recommendation in IEEE-450 (Ref. 6).

This surveillance is modified by two Notes. The first Note prohibits performance of this surveillance in MODES 1, 2, 3, or 4. Performance of this test requires the associated DC Division to be inoperable during the test. Therefore, this test must be performed in MODES 5 or 6. The second Note allows credit to be taken for unplanned events that satisfy this Surveillance Requirement.

REFERENCES

1. Regulatory Guide 1.6, "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems," March 10, 1971.

2. IEEE-308 1974, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

3. 10 CFR 50, General Design Criteria 17, "Electric Power Systems."

4. CESSAR-DC, Chapter 8.

5. Regulatory Guide 1.93, "Availability of Electric Power Sources," December 1974.

BASES

REFERENCES (Continued)

6. IEEE-450 1980, "IEEE Recommended Practice for Maintenance Testing and Replacement of Large Lead Storage Batteries for Generating Stations and Subsystems."

7. Regulatory Guide 1.32, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants," February 1977.

8. IEEE-485 1983, Recommended Practices for Sizing Large Lead Storage Batteries for Generating Stations and Substations." June, 1983.11

9. CESSAR-DC, Chapter 6.

10. CESSAR-DC, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B.3.8.5 DC Sources - Shutdown

BASES

BACKGROUND	A description of the DC Power Sources is provided in the Bases for LCO 3.8.4, "DC Sources - Operating."
APPLICABLE SAFETY ANALYSES	The initial conditions of Design Basis Accident (DBA) and transient analyses in the CESSAR-DC, Chapter 6 and Chapter 15, assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC 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 subsystems is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY. The OPERABILITY of the minimum specified DC Power Sources during MODES 5 and 6 ensures that: (1) The plant can be maintained in the shutdown or refueling condition for extended time periods; (2) Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and the CESSAR-DC only addresses bounding analyses, such that a specific design basis is not always stated for operation in MODES 5 and 6. The DC sources satisfy Criterion 3 of the NRC Policy Statement.
LCO	In MODES 5 and 6 and when handling irradiated fuel assemblies, one DC Power Source Division is required to be OPERABLE. This ensures the availability of sufficient power to recover from postulated events in MODES 5 and 6 and when handling irradiated fuel (e.g., fuel handling accident and inadvertent reactor vessel draindown). A description of OPERABILITY requirements for the DC Power Source Division is provided in the Bases of LCO 3.8.4, "DC Sources - Operating". The electrolyte parameter limits relationship to the OPERABILITY of DC sources is dictated by LCO 3.8.6, "Battery Cell Parameters."

BASES

APPLICABILITY

The DC Power Sources required to be OPERABLE in MODES 5 and 6 and when handling irradiated fuel assemblies provide assurance that:

1. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

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

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

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

DC power requirements for MODES 1, 2, 3, and 4 are addressed in LCO 3.8.4, "DC Sources - Operating".

The Applicability is modified by a NOTE. This NOTE alerts the operator to potential additional electrical power source requirement when in REDUCED RCS INVENTORY.

ACTIONS

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

If two divisions are required per LCO 3.8.10, the remaining division with DC power available may be capable of supporting sufficient systems to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. 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, any activities that could result in inadvertent draining of the reactor vessel, 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.

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 subsystems and to continue this action until restoration is

BASES

ACTIONS (Continued)

accomplished in order to provide the necessary DC electrical power to the unit safety systems.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient DC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required DC power sources and continued until the LCO requirements are restored.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required DC electrical power 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.

SURVEILLANCE REQUIREMENTS

The Bases provided for SR 3.8.4.1 through SR 3.8.4.8 in the Bases for LCO 3.8.4, "DC Sources - Operating", are applicable.

REFERENCES

1. CESSAR-DC, Chapter 6.

2. CESSAR-DC, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Cell Parameters

Temperature and

BASES

BACKGROUND

LCO 3.8.6, Battery Cell Parameters, utilizes Table 3.8.6-1 to delineate the limits on electrolyte level, float voltage, and specific gravity for the DC Power Source batteries. A discussion of these batteries and their OPERABILITY requirements are provided in the Bases for LCO 3.8.4, DC Sources - Operating, and LCO 3.8.5, DC Sources - Shutdown. Within this table, Category A defines the limits for each designated pilot cell and Category B does the same for each connected cell.

The Category A limits for the designated pilot cell's float voltage ≥ 2.13 volts and a specific gravity of ≥ 1.200 (0.015 below the manufacturer's fully charged nominal specific gravity) or _ battery charging current that had stabilized at a low value) is characteristic of a charged cell with adequate capacity. The limits on electrolyte level ensures no physical damage to the plates occurs and adequate electron transfer capability is maintained in the event of transient conditions.

The Category B limits for each connected cell's float voltage and specific gravity ≥ 2.13 volts and a specific gravity of ≥ 1.195 (0.020 below the manufacturer's fully charged nominal specific gravity with an average specific gravity of all the connected cells ≥ 1.205 (0.010 below the manufacturer's fully charged nominal specific gravity) ensures the OPERABILITY and capability of the battery. The limits on electrolyte level ensure no physical damage to the plates occurs and adequate electron transfer capability is maintained in the event of transient conditions.

The limits are based upon manufacturer's recommended values to ensure the OPERABILITY and capability of the battery. The specific gravity limits assure a manufacturer's recommended fully charged nominal specific gravity of 1.215. Specific gravity must be corrected for electrolyte temperature and level, and the float voltage limits may be corrected for average electrolyte temperature. These Notes provide for correction of the measured values in accordance with manufacturer's recommendations when the values reflect transient conditions as opposed to battery capacity.

Category C defines allowable values of electrolyte level, float voltage, and specific gravity of each connected cell. These values represent degraded battery conditions. However, operation is permitted when Category C limits are met since sufficient capacity exists to perform the intended function. These values are discussed in more detail in the Actions section of this Bases.

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in CESSAR-DC Chapters 6, Engineering Safety Features, and 15, Accident Analyses, assume all Engineered Safety Features (ESF) systems are OPERABLE. The DC electrical power systems provide normal and emergency DC power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation. The OPERABILITY of the DC subsystem is consistent with the initial assumptions of the accident analyses and is based upon maintaining one division of DC power sources and associated distribution systems OPERABLE during accident conditions in the event of (1) An assumed loss of all offsite AC power or all onsite AC power; and (2) A worst case single failure.

Battery cell parameters satisfy Criterion 3 of 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 limits are conservatively established, allowing continued DC electrical system function even with Category A and B limits not met.

APPLICABILITY

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

ACTIONS

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

Operation with one or more cells in one or more batteries parameters not within limits (i.e., Category A limits not met, or Category B limits not met, or Category A and B limits not met), but within the allowable value (Category C limits are met) specified in Table 3.8.6-1 is permitted for a limited period since sufficient capacity exists to perform the intended function. The pilot cell electrolyte level and float voltage are required to be verified to meet the Category C allowable values within one 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. The Completion Time is based on engineering judgment taking into consideration the time required to perform the Required Action.

Verification that the Category C allowable values are met for all cells (Required Action A.2) will ensure that during the time to restore the parameters to the Category A and B limits that the battery will still be capable of performing its intended function. Twenty four hours are provided to complete Required Action A.2 because specific gravity measurements must be obtained for each connected cell. As such, the Completion Time

ACTIONS (Continued)

is based on engineering judgment taking into consideration the time required to perform the Required Action and the assurance provided by Required Action A.1 that the battery cell parameters are not severely degraded.

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, while battery 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. During this 31-day period:

(1) the allowable values for electrolyte level (above the top of the plates and not overflowing), ensures no physical damage to the plates with an adequate electron transfer capability;

(2) the allowable value for the average specific gravity of all the cells ≥ [1.195 [0.020] below the manufacturer's recommended fully charged nominal specific gravity], or a battery charging current that had stabilized at less than (2) amperes on a float charge is the manufacturer's recommendation and ensures that the decrease in capacity will be less than the margin provided in sizing;

(3) the allowable value for an individual cell's specific gravity [0.020] below the average of all the connected cells ensures that an individual cell's specific gravity will not be [0.040] below the manufacturer's fully charged nominal specific gravity. This is the value recommended by the manufacturer to ensure the overall capability of the battery will be maintained within an acceptable limit; and

(4) the allowable value for an individual cell's float voltage [> 2.07] volts ensures the battery's capability to perform its design function.

The 31-day Completion Time is based on engineering judgment taking into consideration that while battery capacity is degraded, sufficient capacity exists to perform the intended function and allow time to fully restore the battery cell parameters to normal limits.

When any battery parameter is outside the Category C allowable value, sufficient capacity to supply the maximum expected load requirements is not assured and Condition B would be entered.

B.1

With one or more batteries with one or more battery cell parameters outside the Category C Allowable Value for any connected cell, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding DC electrical power subsystem must be declared inoperable. Additionally, other potentially extreme

BASES

ACTIONS (Continued)

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.

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

This SR verifies that Category A battery cell parameters are consistent with IEEE-450 (Ref. 1), which recommends regular battery inspections (at least one per month) including voltage, specific gravity, and electrolyte temperature of pilot cells.

SR 3.8.6.2

The quarterly inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 1). 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. This inspection is also consistent with IEEE-450 (Ref. 1), 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.

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. 1), which states that the temperature of electrolytes in representative cells should be determined on a quarterly basis.

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.

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.

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. 1), with the

SURVEILLANCE REQUIREMENTS (Continued)

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 suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 1) 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 a recommendation of IEEE-450 (Ref. 1), which states that prolonged operation of cells < 2.13 V can reduce the life expectancy of cells.

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. 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 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 of the designated pilot cell. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote c to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for up to [7 days] following a battery equalizing recharge.

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).

BASES

SURVEILLANCE REQUIREMENTS (Continued)

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. Footnote b to Table 3.8.6-1 requires correction of specific gravity for electrolyte temperature and level. This level correction is not required when battery charging current is < [2] amps on float charge.

Category C defines the Allowable Values 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 Allowable Value, the assurance of sufficient capacity described above no longer exists and the battery must be declared inoperable.

The Category C Allowable Values 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 Allowable Value 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 Allowable Value 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.

REFERENCES

1. IEEE-450 1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

2. IEEE-308 1978, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

3. CESSAR-DC, Chapter 6.

4. CESSAR-DC, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Inverters—Operating

BASES

BACKGROUND

The inverters are the preferred source of power for the AC vital buses because of the stability and reliability they achieve in being powered from the 120 VDC battery source. The function of the inverter is to convert DC electrical power to AC electrical power, thus providing an uninterruptible power source for the instrumentation and controls for the Reactor Protective System (RPS) and the Engineered Safety Feature Actuation System (ESFAS). Specific details on inverters and their operating characteristics are found in the CESSAR-DC, Chapter 8 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the CESSAR-DC, Chapter 6 (Ref. 2) and Chapter 15 (Ref. 3), 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 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 AC vital 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

b. A worst case single failure.

Inverters are a part of the distribution system and, as such, satisfy Criterion 3 of the NRC Policy Statement.

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.

LCO (Continued)

Maintaining the required inverters OPERABLE ensures that the redundancy incorporated into the design of the RPS and ESFAS instrumentation and controls is maintained. The six battery powered inverters (three per division) ensure an uninterruptible supply of AC electrical power to the AC vital buses even if the 4.16 kV safety buses are de-energized.

OPERABLE inverters require the associated AC vital bus to be powered by the inverter, which has the correct DC voltage ([120] V) applied from a battery to the inverter input, and inverter output AC voltage and frequency within tolerances.

This LCO is modified by a Note that allows one inverter to be disconnected from a battery for ≤ 24 hours, if the vital bus(es) is powered from a Class 1E constant voltage transformer during the period and all other inverters are operable. This allows an equalizing charge to be placed on one battery. If the inverter(s) 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. When utilizing the allowance, if one or more of the provisions is not met (e.g., 24 hour time period exceeded), LCO 3.0.3 must be entered immediately.

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.

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

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."

BASES

ACTIONS

A.1 and A.2

G

Required Action A.1 allows 24 hours to fix the inoperable inverter and return it to service. The 24 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 AC vital bus is powered from its constant voltage source, it is relying upon interruptible AC electrical power sources (offsite and onsite). The uninterruptible, battery backed inverter source to the AC vital buses 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 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 unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC 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 AC 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.

REFERENCES

1. CESSAR-DC, Chapter 8.
2. CESSAR-DC, Chapter 6.
3. CESSAR-DC, Chapter 15.

G

B 3.8-58

Required Action A.1 is modified by a Note, which states to enter the applicable Conditions the Required Actions of LCO 3.8.9 "Distribution Systems - Operating," when Condition A is entered with one AC Vital bus de-energized. This ensures the Vital bus is returned to OPERABLE status within 2 hours.

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 CESSAR-DC, 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.

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 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

c. Adequate power is available to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The inverters were previously identified as part of the distribution system and, as such, satisfy Criterion 3 of the NRC Policy Statement.

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. The battery powered inverters provide uninterruptible supply of AC electrical power to the AC vital buses even if the 4.16 kV safety buses are de-energized. OPERABILITY of the inverters requires that the

BASES

LCO (Continued)

vital bus be powered by the inverter. 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 and inadvertent reactor vessel draindown).

APPLICABILITY

The inverters required to be OPERABLE in MODES 5 and 6 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 in case of an inadvertent draindown of the reactor vessel;

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.

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, A.2.4, and A.2.5

If two divisions are 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, operations with a potential for draining the reactor vessel, and operations with a potential for 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. By the allowance of the option to declare 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, activities that could potentially result in inadvertent draining of the reactor vessel, and operations involving positive reactivity additions).

BASES

ACTIONS (Continued)

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 inverters and to continue this action until restoration is accomplished in order to provide the necessary inverter power to the unit safety systems.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient AC vital power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC vital power sources and continue until the LCO requirements are restored.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverters 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.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC 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 AC 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.

REFERENCES

1. CESSAR-DC, Chapter 6.

2. CESSAR-DC, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.9 Distribution Systems - Operating

BASES

BACKGROUND

The onsite Class 1E AC, DC, and AC Vital Electrical Power Distribution Systems are divided into two redundant and independent divisional subsystems.

The primary distribution of the onsite AC Power Distribution System is at 4160 volts. There are two 4160 volt emergency buses. Power is distributed to the 4160 volt buses from the offsite power sources as described in the Bases for LCO 3.8.1, "AC Sources - Operating." Control power for the 4160 volt breakers is supplied from the Class 1E batteries as described in the Bases for LCO 3.8.4, "DC Sources -Operating."

The secondary plant distribution is at 480 volts. The 480 volt distribution system* includes load centers [*]. Load centers [*] are normally supplied from 4160 volt buses [*], respectively, through their own transformers. The 480 volt load centers are located in separate rooms in the control building. Control power for the 480 volt breakers is supplied from the Class 1E batteries as described in the Bases for LCO 3.8.4, "DC Sources - Operating."

The safety-related 480 volt AC motor control centers are fed from load centers [*]. The 120 volt AC vital buses are arranged in six load groups (A, B, C, D, Division I, II) and are normally powered from their 125 volt DC switchboards, respectively via the associated DC/AC inverter. The alternate power supply for the vital buses is a Class 1E constant voltage source powered from the same Division as the associated inverter. Use of Class 1E inverters is governed by LCO 3.8.7, "Inverters-Operating."

The 125 volt DC load groups distribution centers are normally powered from their battery charger. The battery chargers are powered from their Divisional 480 volt MCC. A loss of AC power or failure of the battery charger places the associated battery in service to supply its 125 volt DC switchboard.

The list of all required distribution buses is located in Table B 3.8.9-1.

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in CESSAR-DC Chapters 6, Engineering Safety Features, and 15, Accident Analyses, assume Engineered Safety Features (ESF) systems are OPERABLE. The AC, DC, and AC Vital Electrical

* Value to be determined by system detail design.

BASES

APPLICABLE SAFETY ANALYSES (Continued)

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 LCO sections 3.2. (Power Distribution Limits), 3.4 (Reactor Coolant System), and 3.6 (Containment Systems).

The OPERABILITY of the Electrical Power Distribution Systems is consistent with the initial assumptions of the accident analyses and are based upon maintaining at least one of the onsite AC, DC, and Vital AC power sources and associated distribution systems OPERABLE during accident conditions in the event of (1) an assumed loss of all offsite power or all onsite AC power, and (2) a worst case single failure.

The distribution systems satisfy Criterion 3 of the NRC Policy Statement.

LCO

The Power Distribution System Divisions listed in Table B 3.8.7-1 ensure the availability of AC, DC, and Vital AC Electrical power for the systems required to shutdown the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated design basis accident. Two Divisions of the AC, DC, and AC Vital Electrical Power Distribution Systems are required to be OPERABLE.

Maintaining two Divisions of AC, DC, and AC Vital Electrical Power Distribution Systems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Either Division of the distribution system is capable of providing the necessary electrical power to its corresponding ESF Division. Therefore, a single failure within any system or within the electrical distribution systems will not prevent safe shutdown of the plant.

OPERABILITY is met, as it applies to AC and DC Distribution Systems, provided the associated bus is energized to its proper voltage. The AC vital bus is OPERABLE when it is powered from its associated inverter and DC bus at proper voltage [and frequency].

Inoperable distribution systems do not necessarily result in inoperable components unless directed by Required Actions.

APPLICABILITY

The AC, DC, and AC Vital Electrical Power Distribution Systems are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

APPLICABILITY (Continued)

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

AC, DC, and AC Vital Electrical Power Distribution System requirements for MODES 5 and 6 are covered in the Bases for LCO 3.8.10, "Distribution Systems - Shutdown."

ACTIONS

A.1

With one or more required AC buses, load centers, motor control centers, or distribution panels, except AC vital buses, in one division inoperable, the remaining AC electrical power distribution subsystem in the other division 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, the required AC buses, load centers, motor control centers, and distribution panels must be restored to OPERABLE status within 8 hours.

Condition A worst scenario is one division without AC power (i.e., no offsite power to the division 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:

division division

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

division

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

division

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 become inoperable, and AC distribution restored OPERABLE. This could continue indefinitely.

ACTIONS (Continued)

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.

B.1

With one AC vital bus inoperable, the remaining OPERABLE AC vital buses are capable of supporting the minimum safety functions necessary to shutdown the unit and maintain it in the safe shutdown condition. However, overall reliability is reduced since an additional single failure could result in the minimum required ESF functions not being supported. Therefore, the required AC vital bus must be powered from its alternate Class 1E constant voltage source transformer within two hours.

Condition B represents one AC vital bus without power; potentially both the DC source and the associated AC source are nonfunctioning. 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 vital buses, and restoring power to the affected vital bus.

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

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 vital AC power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected division; and

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

ACTIONS (Continued)

The 2 hour Completion Time takes into account the importance to safety of restoring the AC vital bus to OPERABLE status, the redundant capability afforded by the other OPERABLE vital buses, 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.

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.

C.1

With DC bus(es) in one division inoperable, the remaining DC electrical power distribution subsystems are 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 DC electrical power distribution subsystem could result in the minimum required ESF functions not being supported. Therefore, the [required] DC buses must be restored to OPERABLE status within 2 hours.

Condition C represents one division without adequate DC power; potentially 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 division.

ACTIONS (Continued)

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components which 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 division; 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. 1).

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 division could again become inoperable, and DC distribution restored OPERABLE. This could continue indefinitely.

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 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 unit systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.9.1

This Surveillance verifies that the AC, DC, and Vital AC Electrical Power Distribution Systems are functioning properly with all the desired circuit breakers closed and the buses energized from normal power. 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 redundant capability of the AC, DC, and AC vital bus electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. Regulatory Guide 1.93, "Availability of Electric Power Sources," December 1974.
2. CESSAR-DC, Chapter 6.
3. CESSAR-DC, Chapter 15.

Table B 3.8.9-1

ELECTRICAL POWER DISTRIBUTION SYSTEMS

TYPE	VOLTAGE	DIVISION 1	DIVISION 2
AC Emergency Buses	4160 VAC	[*]	[*]
	480 VAC	[*]	[*]
DC Buses	125 VDC	[*] from battery	[*] from battery
		[*] from charger [*]	[*] from charger [*]
		[*] from battery	[*] from battery
		[*] from charger [*]	[*] from charger [*]
AC Vital Buses	120 VAC	[*] from inverter	[*] from inverter
		[*] from inverter [*]	[*] from inverter [*]

* Value to be determined by system detail design.

B 3.8 ELECTRICAL POWER SYSTEMS

B.3.8.10 Distribution Systems - Shutdown

BASES

BACKGROUND

A description of the AC, DC, and AC Vital Power Distribution Systems is provided in the Bases for LCO 3.8.9, "Distribution Systems - Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the CESSAR-DC, 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 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 AC, DC, and AC vital bus electrical power distribution subsystems 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 provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The AC and DC electrical power distribution systems satisfy Criterion 3 of the NRC Policy Statement.

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific unit 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 necessary to support OPERABILITY of required systems, equipment and components-all specifically addressed in each LCO and implicitly required via the definition of OPERABILITY.

BASES

LCO (Continued)

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 and inadvertent reactor vessel draindown).

APPLICABILITY

The AC, DC, and AC Vital bus electrical power distribution subsystems required to be OPERABLE in MODES 5 and 6, and when handling irradiated fuel assemblies assures sufficient power to ensure that:

1. Systems to provide adequate coolant inventory makeup is available for the irradiated fuel in the core in case of an inadvertent draindown of the reactor vessel;
2. Systems needed to mitigate a fuel handling accident are available, and
3. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and
4. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown or refueling condition.

AC, DC, and AC Vital electrical power distribution subsystems requirements for MODES 1, 2, 3, and 4 are addressed in LCO 3.8.9, "Distribution Systems - Operating."

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, A.2.5, and A.2.6

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, fuel movement, and operations with a potential for draining the reactor vessel. 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 subsystems 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, any activities that could result in inadvertent draining of the reactor vessel, and operations involving positive reactivity additions).

BASES

ACTIONS (Continued)

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 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 shutdown cooling system (SCS) may be inoperable. In this case, these Required Actions of Condition A do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the SCS ACTIONS would not be entered. Therefore, the Required Actions of Condition A direct declaring SDC inoperable, which results in taking the appropriate SDC 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 AC, DC, and AC vital bus electrical power distribution system is functioning properly, with all the buses 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 redundant capability of the electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. CESSAR-DC, Chapter 6.

2. CESSAR-DC, Chapter 15.

Shutdown Bases.

2 of 2

B 3.8 ELECTRICAL POWER

B 3.8.1 AC Sources - Operating

BASES

BACKGROUND

10 CFR50, Appendix A

The AC Power [illegible] power sources (preferred power) and the onsite standby power sources (Division 1 and Division 2 diesel generators). As required by General Design Criterion 17 (Ref. 1), the design of the AC power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The Division 1 and 2 onsite Class 1E AC Distribution System is divided into redundant load groups (divisions) so that loss of any one group will not prevent the minimum safety functions from being performed. Each division has connections to two preferred (offsite) power supplies and to a single diesel generator.

Independent transmission lines supply offsite power to Preferred Switchyards I & II. Preferred Switchyard I feeds the Unit Main Transformer (UMT) and Preferred Switchyard II feeds the Reserve Auxiliary Transformers (RATs). The UMT transforms 230 kV to 24 kV. This 24 kV is fed to two Unit Auxiliary Transformers (UATs). These UATs each provide power to their respective separate switchgear groups [X] and [Y]. The UATs provide 13.8 kV and 4.16 kV for station distribution.

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus or buses.

UATs provide the normal preferred source of power to the 4160 volt emergency buses. X-UAT provides the power to Division 1 emergency buses and Y-UAT provides the power to Division 2 emergency buses. Backup offsite power for either or both the emergency buses is provided through the RATs. If offsite power is not available, the emergency buses are supplied from their respective diesel generator, (DG). DG1 supplies power to Division 1 emergency buses and DG2 supplies power to Division 2 emergency buses.

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 Class 1E Distribution System. Within [1 minute] after the initiating 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.

BASES

BACKGROUND (Continued)

If power were lost from either UAT, undervoltage relays would sense this condition. The electrical system would then attempt to transfer to the backup preferred power source (the associated RAT). The transfer to the associated RAT will occur on the permanent non-safety bus affected. If power is not available from the backup preferred source, the DG is automatically used to power the associated emergency buses. The DGs start automatically on a Safety Injection Actuation Signal (SIAS) or on a loss of voltage (LOV) on the respective emergency buses. Even though the DGs are started on SIAS, they will not power the emergency buses unless both preferred offsite sources of power are unavailable. The DG automatically ties to its buses on a LOV condition on that bus with offsite power unavailable.

A →

In the event of a loss of preferred power, the ESF 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 initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

In accordance with Regulatory Guide 1.9 (Ref. 2), diesel generators 1 and 2 have [6067] kW continuous and [6674] kW two-hour load ratings.

The diesel generators are rated at 4160 volts, three phase, 60 Hz, and are capable of attaining rated frequency and voltage within twenty seconds after receipt of a start signal (Ref. 3).

The ESF systems which are powered from divisional power sources are listed in Reference 3.

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in CESSAR-DC Chapters 6 (Ref. 4) and 15 (Ref. 5) assume ESF systems are OPERABLE. The AC Power System is 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 design limits are discussed in more detail in the Bases for LCO Sections 3.2 (Power Distribution Limits), 3.4 (Reactor Coolant System), and 3.6 (Containment Systems).

A
3.8-2

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 permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application

B
3.8-3

Qualified offsite circuits are those that are described in CESSAR-DC and are part of the licensing basis for the unit.

Each offsite circuit must be capable of maintaining rated frequency and Voltage, and accepting sequenced loads during an accident, while connected to the ESF buses

C
3.8-3

Therefore, the AC Power system has a total of four (4) qualified circuits between the offsite transmission network and the onsite Class 1E AC Distribution System. Two circuits per division.

BASES

APPLICABLE SAFETY ANALYSES (Continued)

In general, the safety analysis considered offsite power to be available to ESF equipment following event initiation. Offsite power is not considered to be safety-related. A loss of offsite power (LOOP) alone is an analyzed event since it presents a challenge to the plant's safety features and would result in a total loss of AC power if the diesel generators failed to start.

The OPERABILITY of an offsite AC source is not explicitly required by the safety analyses. Therefore, the need for two independent offsite power circuits was not derived from the safety analysis, since events postulating failure of offsite power considered a complete loss of 230kv power. Such events disable both offsite circuits. The requirement for two offsite circuits was derived from the design criteria (Ref. 1) and standards incorporated into the plant design, which required redundant, independent offsite power sources.

The OPERABILITY of the power sources is consistent with the initial assumptions of the accident analyses and design requirements and is based upon maintaining at least one of the AC and DC Power Sources and associated distribution systems OPERABLE during accident conditions in the event of (1) an assumed loss of all offsite or all onsite AC power, and (2) a worse case single failure.

The AC sources satisfy Criterion 3 of the NRC Policy Statement.

LCO

Two qualified circuits (Ref. 3) between the offsite transmission network and the onsite Class 1E Distribution System, and the two independent diesel generators (Ref. 3), ensure availability of the required power to shutdown the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated design basis accident (DBA).

The two circuits from offsite are physically independent such that a single component fault (e.g., breaker trip) will not cause both power sources to be lost to one or more 4160 volt emergency buses. Thus, a physically independent circuit consists of one incoming line to the 230 kV (Preferred Switchyard Interface I) switchyard, a circuit path (including breakers and disconnects) to one energized UAT (X or Y), and a circuit path from the energized UAT to the associated 4160 volt emergency buses. A physically independent circuit also consists of the incoming line to the Preferred Switchyard Interface II, a circuit path (including breakers and disconnects) to the one energized RAT (Division I or II), and a circuit path from that energized RAT to its 4160 volt emergency buses. Each division contains an automatic load sequencer to control sequencing of Accident or Loss-of-Offsite Power loads.

LCO (Continued)

Inoperable AC sources do not necessarily result in inoperable components (which are designed to receive power from that source) unless specifically directed by Required Actions (refer to LCO 3.0.7).

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 20 seconds. 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 ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot, DG in standby with the engine at ambient conditions, and DG operating in a parallel test mode. Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

Certain diesel generator support systems are addressed in other LCOs. During inoperabilities in these support systems, inoperable diesel generators do not necessarily result unless specifically directed by Required Actions. This is in accordance with LCO 3.0.7.

APPLICABILITY

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

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

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

AC Power Source requirements for MODES 5 and 6 are addressed in LCO 3.8.2, AC Sources - Shutdown.

ACTIONS

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

With one of the required offsite circuits inoperable, sufficient offsite power is available from the other required offsite circuit to ensure that the unit can be maintained in a safe shutdown condition following a design basis transient or accident. Even failure of the remaining required offsite circuit will not jeopardize a safe shutdown of the unit because of the redundant standby diesel generator. However, since system reliability is degraded below the LCO requirements, a time limit on continued operation is imposed. To ensure

ACTIONS (Continued)

a highly reliable power source remains, it is necessary to verify the OPERABILITY of the remaining required offsite circuit 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 second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

The specific list of features encompassed by Required Action A.2 is provided in Reference 8. These features are those which are designed with redundant safety-related divisions. Single division systems are not included. Since the Completion Time allowance for this Required Action is limited to 24 hours, those systems with allowed Completion Times ≥ to 24 hours for both divisions inoperable are not included as required features to be checked. 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 Division 1 and Division 2 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. Required Action A.2, which only applies if the division cannot be powered from an offsite source, is intended to provide assurance that an event with a coincident single failure of the associated diesel generator will not result in a complete loss of safety function of critical systems. The term "ensure," as used in Required Action A.2, allows for an administrative check by examining logs or other information, to determine if certain features are out of service for maintenance or other reasons. It does not require unique performance of the Surveillance Requirements needed to demonstrate OPERABILITY of the feature. The Completion Time 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 1) the division has no offsite power supplying its loads, and 2) a required feature on the other division is inoperable. If at any time during the existence of this Condition (one offsite circuit inoperable) a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 8), operation may continue in Condition A for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite circuit inoperable, the reliability of the 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

BASES

ACTIONS (Continued)

OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E AC Distribution System.

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, as a result of 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) would be 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.

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.

The 72-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.1, B.2, B.3.1, B.3.2, and B.4

To ensure a highly reliable power source remains with an inoperable DG, it is necessary to verify the availability of the offsite circuits 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 circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

The specific list of features encompassed by Required Action B.2 is provided in Reference 8. These features are those which are designed with redundant safety related divisions. Single division systems are not included. Since the Completion Time allowance for this Required Action is limited to four hours, those systems with allowed Completion Times ≥ four hours for both divisions inoperable are not included as required features to be checked. Required Action B.2 is intended to provide assurance

ACTIONS (Continued)

that a loss of offsite power, during the period that a diesel generator is inoperable, will not result in a complete loss of safety function of critical systems. The term "ensure," as used in Required Action B.2, allows for an administrative check by examining logs or other information, to determine if certain features are out of service for maintenance or other reasons. It does not require unique performance of the Surveillance Requirements needed to demonstrate OPERABILITY of the feature. The Completion Time 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 1) an inoperable diesel generator exists, and 2) a required feature on the other division is inoperable. If at any time during the existence of this Condition (one diesel generator inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked. The Completion Time is based on engineering judgment taking into consideration the probability of a loss of offsite power occurring while the other Division 1 or 2 diesel generator is inoperable. This is comparable to, but less severe than, Condition D (both diesel generators inoperable) and therefore has a comparable, but less restrictive, Completion Time.

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 offsite circuits are adequate to supply electrical power to 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 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.

The Note in Condition B requires that Required Action B.3.1 or B.3.2 must be completed if Condition B is entered. The intent is that all DG inoperabilities must be investigated for common cause failures regardless of how long the DG inoperability persists.

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DGs. 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

ACTIONS (Continued)

of inoperability exists on 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 be confirmed not to exist on the remaining DG(s), performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

According to Generic Letter 84-15 (Ref. 9), [24] hours is reasonable to confirm that the OPERABLE DG(s) is not affected by the same problem as the inoperable DG.

According to Regulatory Guide 1.93 (Ref. 8), operation may continue in Condition B for a period that should not exceed 72 hours.

In Condition B, the remaining OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72 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.

The second Completion Time for Required Action B.4 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 B is entered while, for instance, an offsite circuit is inoperable and that circuit 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 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 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.

BASES

ACTIONS (Continued)

C.1 and C.2

With both of the required offsite circuits inoperable, sufficient standby AC Electrical Power Sources are available to maintain the unit in a safe shutdown condition in the event of a design basis transient or accident. However, since AC Electrical Power System reliability is degraded below the LCO requirements, a time limit on continued operation is imposed.

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:

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 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 commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

The specific list of features encompassed by Required Action C.1 is provided in Reference 8. These features are those which are designed with redundant safety-related divisions. Single division systems are not included. Since the Completion Time allowance for this Required Action is limited to 12 hours, those systems with allowed Completion Times ≥ 12 hours for both divisions inoperable are not included as required features to be checked. The requirement is intended to provide assurance should a coincident single failure of a diesel generator occur during the period with two offsite circuits inoperable, a complete loss of safety function of critical systems will not result. The term "ensure," as used in Required Action C.1, allows for an administrative check by examining logs or other information, to determine if certain features are out of service for maintenance or other reasons. It does not require unique performance of the Surveillance Requirements needed to demonstrate OPERABILITY of the feature. The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the

ACTIONS (Continued)

normal "time zero" for beginning the allowed outage time "clock". In this Required Action the Completion Time only begins on discovery that 1) both offsite circuits are inoperable, and 2) a required feature on the other division is inoperable. If at any time during the existence of this Condition (both offsite circuits inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked. The Completion Time is based on engineering judgment taking into consideration the probability of an event concurrent with a single failure of a diesel generator occurring (on the division opposite to the inoperable feature) while two offsite circuits are inoperable. During the time this Condition exists (both offsite circuits inoperable), Condition A also exists concurrently for each of the inoperable offsite circuits independently. The Required Actions and associated Completion Times apply as discussed previously. This may result in more restrictive requirements for restoration and/or cross-divisional feature OPERABILITY checks.

In accordance with Regulatory Guide 1.93 (Ref. 8), with the available offsite AC Electrical Power Sources two less than required by the LCO, operation may continue for 24 hours. One offsite source must be restored within 24 hours. Operation may then continue in accordance with the loss of one offsite source in Condition A. If no offsite circuit is restored within 24 hours, or, if either inoperable offsite circuit is not restored within 72 hours of its initial inoperability in accordance with Condition A (which may occur, in some cases, prior to the 24-hour allowance), a controlled shutdown must be initiated per Required Actions F.1 and F.2.

D.1 and D.2

In Condition D, individual redundancy is lost in both the offsite power system and the onsite Division 1 or 2 AC Power System. However, since power system redundancy is provided by two diverse sources of power, the reliability of the power systems in this Condition may appear higher than Condition C (loss of both required offsite circuits). 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 the period.

During the time this Condition exists (one offsite circuit and one diesel generator inoperable), Condition A and B also exist concurrently. The Required Actions and associated Completion Times for these Conditions also apply from time of entry into each individual Condition. This will continue to provide common mode failure considerations for the inoperable diesel generator, cross-divisional feature OPERABILITY considerations, and provide the appropriate time limit for continued operation while repairs are being attempted.

BASES

ACTIONS (Continued)

Per Regulatory Guide 1.93 (Ref. 8), with the available offsite and standby AC Power Sources each one less than the LCO, operation may continue in Condition D for 12 hours. If either an offsite or a standby AC source is restored to OPERABLE status within 12 hours, operation may continue for 72 hours from the time of the initial loss of the remaining inoperable source (consistent with the loss of one AC source in Condition A or B). If neither an offsite source nor a standby source is restored within the 12 hours, or, if either the inoperable diesel generator or the inoperable circuit is not restored within 72 hours of its initial inoperability in accordance with Condition A or B (which may occur, in some cases, prior to the 12-hour allowance), a controlled shutdown must be initiated per Required Actions F.1 and F.2.

E.1

With two required diesel generators inoperable, insufficient standby AC Power Sources are available to power the minimum required ESF functions. Since the offsite 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 (i.e, the immediate shutdown could cause grid instability which could result in total loss of AC power). However, since any inadvertent generator trip could also result in total loss of AC power, the time allowed for continued operation is severely restricted. The intent here is not only to avoid the risk associated with an immediate controlled shutdown but also to minimize the risk associated with this level of degradation. During the time this condition exists (both diesel generators inoperable), Condition B also exists concurrently for each of the inoperable diesel generators independently. The Required Actions and associated Completion Times apply as discussed previously. This will continue to provide common mode failure considerations, cross-divisional feature OPERABILITY, and the appropriate time limit for continued operation while repairs are being attempted.

Per Regulatory Guide 1.93 (Ref. 8), with the available standby AC electrical supplies two less than the LCO, operation may continue for a period that should not exceed two hours. One of the required diesel generators must be restored within these two hours. Operation may then continue in accordance with the loss of one diesel generator in Condition B. If no standby AC supply is restored within two hours, or, if either inoperable diesel generator is not restored within 72 hours of its initial inoperability in accordance with Condition B (which may occur, in some cases, prior to the two-hour allowance), a controlled shutdown must be initiated per Required Actions F.1 and F.2.

ACTIONS (Continued)

F.1

The sequencers are 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 powered from the associated ESF bus.] Therefore, loss of an [ESF bus sequencer] affects every major ESF system in the [division]. The [72] 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.

G.1 and G.2

The plant must be placed in a MODE in which the LCO does not apply if the Required Actions and associated Completion Times cannot be met. This is done by placing the plant in at least MODE 3 in six hours and in MODE 5 in 36 hours. The allowed Completion Times are reasonable based on operating experience to reach the required MODES from full power without challenging plant systems.

H.1

With three or more required AC sources inoperable, insufficient AC sources remain available to ensure safe shutdown of the unit in the event of a transient or accident with any additional single failure. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Immediately is used as an administrative means of not allowing any extension of the LCO 3.0.3 shutdown requirements.

SURVEILLANCE REQUIREMENTS

The AC Power Sources are designed to permit inspection and testing of all important areas and features, especially those which have a standby function, in accordance with 10 CFR 50, Appendix A, General Design Criteria 18 (Ref. 10). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guide 1.9 (Ref. 2), 1.108 (Ref. 11), and 1.137 (Ref. 12), as addressed in CESSAR-DC.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

Where the SRs discussed 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 ANSI C84.1-1982 (Ref. 6), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage 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 80% 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. 2).

SR 3.8.1.1

This Surveillance Requirement assures proper circuit continuity for the offsite AC power supply to distribution network and availability of offsite AC power. The breaker alignment verifies that each breaker is in its correct position to ensure distribution buses and loads are connected to their preferred power source and independence of offsite circuits is maintained. The seven-day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.7

These surveillances help to ensure the availability of the standby power supply to mitigate design basis transients and accidents and maintain the unit in safe shutdown conditions. 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 by an engine prelube period. For the purpose of this testing, the diesel generators shall be started from standby conditions. Standby conditions in this case means the diesel engine coolant and oil are being continuously circulated and temperature 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. This is the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.7 requires, on a 184-day Frequency, the diesel generators start from standby conditions and achieve required voltage and frequency within 20 seconds. The 20-second requirement supports the assumptions in the design basis loss of coolant accident (LOCA) analysis (Ref. 5). The 20-second start requirement is not applicable to SR 3.8.1.2 which is performed on a 31-day Frequency.

D

The normal 31-day Frequency for SR 3.8.1.2 (see Diesel Generator Test Schedule, Table 3.8.1-1) is consistent with Regulatory Guide 1.9 (Ref. 2). The 184-day Frequency for SR 3.8.1.7 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 9). These Frequencies provide adequate assurance of diesel generator OPERABILITY while minimizing degradation resulting from testing.

SR 3.8.1.3

This surveillance verifies that the diesel generators are capable of synchronizing and accepting ≥ the equivalent of the maximum expected accident loads. The 60-minute run time for the diesel generator (required by Ref. 2) is to stabilize the engine temperature. This will ensure that cooling and lubrication are adequate for extended periods of operation while minimizing the time that the diesel generator is connected to the offsite power 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 [1.0] is an operational limitation [to ensure circulating currents are minimized].

The normal 31-day Frequency for this Surveillance (see Diesel Generator Test Schedule) is consistent with Regulatory Guide 1.9 (Ref. 2).

This Surveillance is modified by four NOTES. The first NOTE allows gradual (manual) loading as recommended by the manufacturer to minimize stress and wear on the diesel engine (Ref. 9). The second NOTE allows momentary transients due to changing bus loads to not invalidate the test. Similarly, momentary power factor transients above the limit will not invalidate the test. The third NOTE requires that this Surveillance be conducted on only one diesel generator at a time. This will avoid a total loss of AC power due to a common cause failure in the offsite circuits or a perturbation on the grid. NOTE 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

D

3.8-14

If a modified start is not used, 20 second start requirement of SR 3.8.1.7 applies. Since SR 3.8.1.7 requires a 20 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.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

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 hour of DG operation at full load plus 10%.

The 31 day Frequency is adequate to assure 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 3.8.1.5

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 oil day 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 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. 12). 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 the performance of this Surveillance.

SR 3.8.1.6

This Surveillance demonstrates that each required fuel oil transfer valve operates and allows fuel oil to transfer by gravity from its associated storage tanks 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 valve 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.

A 92 day Frequency corresponds to the Inservice Testing requirements for the transfer valves; however, the design of fuel transfer systems is such that the transfer valves will operate automatically or a valve in the bypass line must be operated manually in order to maintain an adequate volume of fuel oil in the DG day tank during or following DG testing. In such a case, a 31 day Frequency is appropriate.

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.7

See Bases SR 3.8.1.2/3.8.1.7.

SR 3.8.1.8

Transfer of each 4160 volt emergency bus power supply from the normal preferred offsite circuit to the backup preferred offsite circuit demonstrates the OPERABILITY of the backup circuit distribution network to feed the shutdown loads. The [18 month] Frequency of the Surveillance is based on engineering judgment taking into consideration the plant conditions required to perform the surveillance, and is intended to be consistent with expected fuel cycle lengths. Also, 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 Surveillance is modified by two Notes. The first Note prohibits performance of this Surveillance in MODE 1 or 2. Performance of this surveillance could result in perturbations to the electrical distribution system and cause a challenge to continued steady-state operation in MODES 1 and 2. Therefore, this Surveillance must be performed in MODES 3, 4, 5, or 6. The second Note allows credit to be taken for unplanned events that satisfy this Surveillance Requirement.

SR 3.8.1.9

The diesel generators are 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 overspeed which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the diesel generator load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency limits, which maintains a specified margin to the overspeed trip. The largest single load on the emergency buses corresponds to a Component Cooling Water Pump (1250 BHP, 1037kW) (Ref. 3). As required by IEEE-308 (Ref. 14), the load rejection test is acceptable if the increase in the speed of the diesel does not exceed 75% of the difference between nominal speed and the overspeed trip setpoint, or 15% above nominal, whichever is lower. This represents 63 Hz, equivalent to 75% of the difference between nominal speed and the overspeed trip setpoint.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 2) recommendations for response during load sequence intervals. The [3] seconds specified is equal to 60 percent 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

SURVEILLANCE REQUIREMENTS (Continued)

diesel generator. 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 that the system must recover to following load rejection. The 18-month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11) (expected fuel cycle lengths).

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.

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. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.10

This Surveillance demonstrates the diesel generator capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The generator full load rejection may occur due to a system fault or inadvertent breaker tripping. This Surveillance verifies proper engine-generator load-response under the simulated test conditions. This test will simulate the loss of the total connected loads that the diesel generator will experience following a full load rejection and verify that the diesel generator will not trip upon loss of the load. These acceptance criteria provide for diesel generator damage protection. While the diesel generator is not expected to experience this transient during an event and continue to be available, this response will assure the diesel generator is not degraded for future applications, including reconnection to the bus if the trip initiator can be corrected or isolated. The 18-month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11) (expected fuel cycle lengths).

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.

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 perturbation to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.12

As required by Regulatory Guide 1.108 (Ref. 11), this Surveillance demonstrates the as-designed operation of the standby power sources during loss of the preferred offsite power source. This test verifies all actions encountered from the loss of offsite power including shedding of the non-essential loads and energization of the emergency buses and respective loads from the diesel generator. It further demonstrates the capability of the diesel generator to automatically achieve the required voltage and frequency within the specified time.

The diesel generator automatic start time of 20 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The minimum steady state output voltage of [3744] volts is 90% of the nominal 4160 volt output voltage. This value, which is specified in ANSI C84.1-1982, allows for voltage drop down to the terminals of 4000 volt rated motors whose minimum operating voltage is specified as 90% or 3600 volts. It also allows for voltage drops to motors and other equipment down through the 120 volt level where minimum operating voltage is also usually specified as 90% of nameplate rating.

The specified maximum steady state output voltage of [4576] volts is equal to the maximum operating voltage specified for 4000 volt rated motors (+ 10% of motor nameplate rating of 4000 volts). It ensures that for a lightly loaded distribution system the voltage at the terminals of 4000 volt motors will be no more than the maximum rated operating voltages.

The specified minimum and maximum steady state output frequency of the diesel generator is 58.8 Hz and 61.2 Hz, respectively. This is equal to ± 2% of the 60 Hz nominal frequency and is derived from the recommendations given in Regulatory Guide 1.9 (Ref. 2) that the frequency should be restored to within 2% of nominal following a load sequence step. The surveillance should be continued for a minimum of five minutes in order to demonstrate all starting transients have decayed and stability has been achieved.

For the purpose of this SR, the diesel generators shall be started from standby conditions. Standby conditions in this case means the diesel engine coolant and oil are being continuously circulated and temperature maintained consistent with manufacturer recommendations.

The requirement to verify the connection and power supply of permanent and auto-connected 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

BASES

SURVEILLANCE REQUIREMENTS (Continued)

instance, the Safety Injection System (SIS) injection valves are not desired to be stroked open, high pressure injection systems are not capable of being operated at full flow, or the shutdown cooling system (SCS) performing a decay heat removal function is 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 is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11), and takes into consideration plant conditions required to perform the surveillance, and is intended to be consistent with expected fuel cycle lengths. Also, 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 Surveillance is modified by three Notes. The first Note permits an engine prelube period which is consistent with manufacturer's recommendations prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating. The second Note prohibits performance of this surveillance in MODES 1, 2, 3 or 4. Performance of this Surveillance requires that offsite power be removed from the 4160V emergency buses which will perturb the electrical distribution system and could challenge safety-related equipment. The third Note acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.12 1

This surveillance demonstrates that the diesel generator automatically starts and achieves the required voltage and frequency within the specified time (20 seconds) from the design basis activation signal. (It further demonstrates that during a LOOP event, the diesel generator load sequences restart equipment that was deenergized as a result of the LOOP. The five-minute period provides sufficient time to demonstrate stability. The basis for the time, voltage, and frequency tolerances specified in this surveillance are discussed in the Bases for SR 3.8.1.11.

For the purpose of this test, the diesel generators shall be started from standby conditions. Standby conditions in this case means the diesel engine coolant and oil are being continuously circulated and temperature maintained consistent with manufacturer recommendations.

SURVEILLANCE REQUIREMENTS (Continued)

The Frequency of the Surveillance is based on engineering judgment taking into consideration the plant conditions required to perform the surveillance and is intended to be consistent with expected fuel cycle lengths. Also, 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 Surveillance is modified by three Notes. The first Note permits an engine prelube period prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating. The second Note prohibits performance of this surveillance in MODE 1 or 2. Performance of this surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady-state operations. The third Note acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.13

This Surveillance demonstrates that diesel generator non-critical protective functions (e.g. high jacket water temperature) are bypassed as a result of an ESF actuation test signal concurrent with a loss of voltage test signal on the emergency bus. It also verifies that critical protective functions (engine overspeed, generator differential current, generator voltage controlled overcurrent, and low lube oil pressure) trip the diesel generator to avert substantial damage to the diesel generator unit. The non-critical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This provides the operator with sufficient time to react appropriately. The diesel generator 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 diesel generator.

The 18-month Frequency is based on engineering judgment taking into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Also, 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 Surveillance is modified by two Notes. Note 1 prohibits performance of this Surveillance in MODE 1 or 2. Performance of this Surveillance results in diesel generator inoperability and could challenge safety-related equipment. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.14

Regulatory Guide 1.108 (Ref. 11), requires demonstration once per 18 months that the diesel generators can start and run continuously at full load capability for an interval of not less than 24 hours, of which [>2] hours are at a load equivalent to the continuous rating of the diesel and two hours at a load equivalent to the two hour rating of the diesel. The diesel starts for this surveillance can be performed either from cold, standby or hot conditions. The Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11), and takes into consideration plant conditions required to perform the surveillance and is intended to be consistent with expected fuel cycle lengths. .

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The provisions for prelubricating and warmup, discussed in SR 8.3.1.2, and for gradual loading, discussed in 3.8.1.3, are applicable to this SR.

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.

This Surveillance is modified by three Notes. 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 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. Note 3 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition and achieve the required voltage and frequency within 20 seconds. The 20 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The bases for the voltage and frequency tolerances are discussed in the Bases for SR 3.8.1.11.

This Surveillance demonstrates the diesel generator capability to respond to accident signals while hot, such as subsequent to shutdown from normal Surveillances. The load band is provided to avoid routine overloading of the diesel generator. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain diesel generator OPERABILITY. The 18-month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11).

SURVEILLANCE REQUIREMENTS (Continued)

This Surveillance is modified by three Notes. The first Note requires that this Surveillance be performed within five minutes of shutting down the diesel generator after it has operated for ≥ two hours at fully loaded conditions and allows momentary transients due to changing bus loads to not invalidate the test. The two-hour time limit is based on the manufacturer's recommendation for achieving hot conditions. The second Note permits an engine prelube period prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating. Note 3 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.16

As required by Regulatory Guide 1.108 (Ref. 11), this Surveillance assures that the manual synchronization and load transfer from the diesel generator to the offsite power source can be made and the diesel generator can be returned to ready-to-load status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the diesel generator to reload if a subsequent loss of offsite power occurs. The diesel generator is considered to be in ready-to-load status when the diesel generator is at rated speed and voltage, the output breaker is open and can receive an auto-close 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. 11) and takes into consideration plant conditions required to perform the Surveillance.

This SR is modified by two Notes. The reason for Note 1 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Note 2 acknowledges that 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 diesel generator availability under accident conditions will not be compromised as the result of testing. Interlocks to the LOCA sensing circuits cause the diesel generator to 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 diesel generator running at rated speed and voltage with the diesel generator output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 14).

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

SURVEILLANCE REQUIREMENTS (Continued)

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. 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 two Notes. The reason for Note 1 is that performing Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Note 2 acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.18

As required by Regulatory Guide 1.108 (Ref. 11), each diesel generator is required to demonstrate proper operation for the DBA loading sequence to ensure that voltage and frequency are maintained within the required limits. Under accident conditions, prior to connecting the diesel generators to their appropriate bus, all loads are shed except load center feeders and those motor control centers which feed Class 1E loads (referred to as permanently-connected loads). Upon reaching 90% rated voltage and frequency, the diesel generators are then connected to their respective bus. Loads are then sequentially connected to the bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers so as to prevent overloading the diesel generators due to high motor starting currents. The 10% load sequence time interval tolerance ensures sufficient time exists for the diesel generator to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 4 provides a summary of the automatic loading of ESF buses.

The Frequency of [18 month] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11), and takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by two Notes. The first Note prohibits performance of this Surveillance in MODE 1, 2, 3, or 4. Performance of this test requires the inoperability of certain ESF equipment and has the potential to perturb the electrical distribution system which would challenge continued steady-state operation. The second Note acknowledges that credit may be taken for unplanned events that satisfy this SR.

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.1.19

In the event of a design basis accident coincident with a loss of offsite power (LOOP), the diesel generators are required to supply the necessary power to ESF Systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.

This Surveillance demonstrates the diesel generator operation as discussed in the Bases for SR 3.8.1.11 during a LOOP actuation test signal in conjunction with an ESF actuation signal. 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] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11), and takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by three Notes. The first Note permits an engine prelube period prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating. The second Note prohibits performance of this Surveillance in MODE 1, 2, 3 or 4. Performance of this Surveillance requires that offsite power be removed from the 4160V emergency buses which will perturb the electrical distribution system and could challenge continued steady-state operation and safety related equipment. The third Note acknowledges that credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.20

This Surveillance demonstrates that the diesel generator starting dependence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the diesel generators are started simultaneously. The ten-year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 11) and Regulatory Guide 1.137 (Ref. 12).

This Surveillance is modified by a Note which allows an engine prelube period prior to diesel generator starting to minimize wear on moving parts which are not lubricated unless the engine is operating.

SURVEILLANCE REQUIREMENTS (Continued)

Diesel Generator Test Schedule

The diesel generator test schedule (Table 3.8.1-1) implements the recommendations of Revision 3 to Regulatory Guide 1.9 (Ref. 2). The purpose of this test schedule is to provide timely test data to establish a confidence level associated with the goal to maintain diesel generator reliability above 0.95 per demand.

According to Regulatory Guide 1.9, Revision 3 (Ref. 2), each DG unit should be tested at least once every 31 days. Whenever a 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 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. Therefore, the interval between tests should be no less than 24 hours, and no more than 7 days. A successful test at an interval of less than 24 hours should be considered an invalid test and not count towards the seven consecutive failure free starts. A test interval in excess of 7 days constitutes a failure to meet the SRs.

Regulatory Guide 1.108 (Ref. 11) defines the diesel generator unit as consisting of the engine, generator, combustion air system, cooling water system up to the supply, fuel oil supply system, lubricating oil system, starting energy sources, auto start controls, manual controls, and the diesel generator breaker. Inoperabilities of diesel generators caused by failures of equipment that are not part of the defined diesel generator unit are categorized as invalid failures in accordance with Regulatory Guide 1.108 since the failure would not have prevented the diesel generator from performing its intended safety function. As such, they do not impact the Surveillance Frequency of the diesel generator that failed.

REFERENCES

1. 10 CFR, Appendix A, General Design Criteria 17, "Electric Power Systems."

2. Regulatory Guide 1.9, "Selection, Design, and Qualification of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 3.

3. CESSAR-DC, Chapter 8.

BASES

REFERENCES (Continued)

4. CESSAR-DC, Chapter 6.

5. CESSAR-DC, Chapter 15.

6. ANSI C84.1-1982.

7. ASME Boiler & Pressure Vessel Code Section XI.

8. Regulatory Guide 1.93, "Availability of Electric Power Sources," December 1974.

9. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.

10. 10 CFR 50, General Design Criteria 18, "Inspection and Testing of Electric Power Systems."

11. Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as On-site Electric Power Systems at Nuclear Power Plants," August 1977.

12. Regulatory Guide 1.137, "Fuel Oil Systems for Standby Diesel Generators," October 1979.

13. CESSAR-DC, Section 9.5.6.3.

14. IEEE-308 1978, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources - ~~Shutdown~~ Refueling

BASES

BACKGROUND

A description of offsite and onsite AC Power 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 ensures that: with water level in the refueling cavity [23 ft] above the reactor pressure vessel flange

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 an inadvertent draindown of the vessel or a fuel handling accident and loss of decay heat removal.

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 MODE 1, 2, 3, and 4 LCO requirements are acceptable during

APPLICABLE SAFETY ANALYSES (Continued)

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 MODE 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 the NRC Policy Statement.

LCO

One offsite circuit capable of supplying the onsite Class 1E power 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 a 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 offsite circuit. Together, OPERABILITY of the required offsite circuit 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 and reactor vessel draindown).

The qualified offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Engineered Safety Feature (ESF) bus(es). Qualified offsite circuits are those that are described in the CESSAR-DC and are part of the licensing basis for the unit.

Inoperable AC Sources do not necessarily result in inoperable components (which are designed to receive power from that source) unless specifically directed by Required Actions (refer to LCO 3.0.7).

The DG must be capable of starting, accelerating to rated speed and voltage, connecting to its respective ESF bus on detection of bus undervoltage, and accepting required loads.

LCO (Continued)

This sequence must be accomplished within [10] 20 seconds. The DG must be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot, DG in standby at ambient conditions, and DG operating in a parallel test mode.

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

A — In addition, proper sequencer operation is an integral part of offsite circuit OPERABILITY if its inoperability in any way impacts on the ability to start and maintain energized any loads required OPERABLE by LCO 3.8.10.

Certain diesel generator support systems are addressed in other LCOs. During inoperabilities in these support systems, inoperable diesel generators do not necessarily result unless specifically directed by Required Actions (refer to LCO 3.0.7). — B

APPLICABILITY

The AC power sources that are required to be OPERABLE in MODES 5 and 6 and when handling irradiated fuel assemblies provides assurance that:

1. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel,
2. Systems needed to mitigate a fuel handling accident are available,
3. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and
4. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown or refueling condition.
5. Systems are available to remove decay heat from the irradiated fuel the core

AC power requirements for MODES 1, 2, 3, and 4 are addressed in LCO 3.8.1, "AC Sources - Operating."

ACTIONS

A.1

An offsite circuit would be considered inoperable if it were not available to one required ESF train (division). Although two trains (divisions) are required by LCO 3.8.10 the remaining train (division) with offsite power available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and/or operations with a potential for draining the reactor vessel. 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 [During a shutdown condition, it is acceptable for a single offsite power circuit to supply all required divisions of electrical power.

B [As discussed in Applicable Safety Analyses, in the event of an accident during shutdown, the TS are designed to maintain the plant in a condition such that, even with a single failure, the plant will not be in immediate difficulty

ACTIONS (Continued)

B.2.2 B.2.3 B.2.4 B.2.5
A.2.1, A.2.2, A.2.3, A.2.4, A.2.5, B.1, B.2, B.3, B.4, and B.5 divisions

With the offsite circuit not available to all 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, any activities that could potentially result in inadvertent draining of the reactor vessel, and operations involving positive reactivity additions which would exceed limits specified in LCO 3.1.2 or LCO 3.1.9. 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.

Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability or 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.

Notwithstanding performance of the conservative Required Actions, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

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 are not 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 one ESF 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, whether or not a train is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized train. division

division

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 3.8.1.17

SURVEILLANCE REQUIREMENTS (Continued)

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 DG(s) that are not required to be OPERABLE.

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 or otherwise rendered inoperable. With limited AC Sources available, a single event could compromise both the required circuit 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 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 3.8.4 DC Sources - Operating

BASES

BACKGROUND

The Class 1E DC Power System provides control power for the AC emergency power system. It also provides both motive and control power to selected safety-related equipment and provides circuit breaker control power for the 600 volts and lower AC distribution system. The DC Power System is also the source of power for the vital instrumentation buses via inverters. The six DC subsystems conform to the independence, and redundancy requirements of 10 CFR 50, Appendix A, GDC-17, Regulatory Guide 1.6 (Ref. 1), IEEE-308 (Ref. 2), and General Design Criteria 17 (Ref. 3). The six batteries are:

Division I	Division II
Division I Battery	Division II Battery
Channel A Battery	Channel B Battery
Channel C Battery	Channel D Battery

Each DC subsystem is energized by a dedicated 125 volt battery and associated 125 volt battery charger. Each battery is exclusively associated with a single 125 volt DC bus and each battery charger is supplied by its associated AC load group.

Each of the six DC subsystems is made up of the following:

- A [120-cell lead-calcium battery] rated at [1650] Ah for eight hours to [108] volts at 77°F;
- A static battery charger rated at [400] amps with 0.5% voltage regulation with an AC supply variation of 10% in voltage and 5% in frequency; and
- associated switchboards and distribution panels.

However, in order to fulfill the battery capacity criteria: "to supply one division battery's loads and one channel of loads," the batteries may be cross-tied to allow coping strategies to be implemented in accordance with the capacity sizing. Additionally, the batteries provide a Station Blackout (SBO) coping capability which, assuming manual load shedding or the use of load management programs, exceeds two hours, and as a minimum, permits operating the instrumentation and control loads associated with the turbine-driven emergency feed water pumps for 8 hours.

F

3.8-39

[During normal operation, the load with the battery 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.

BASES

BACKGROUND (Continued)

Battery operating voltage is 125 volts and each battery has adequate storage to supply the division battery and one channel of loads for two hours without recharging (Ref. 4). Capacity is adequate for all loss of coolant accident (LOCA) conditions or any other emergency shutdown.

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

Each 125 volt DC Class 1E battery is separately housed in a ventilated room apart from its charger and distribution center. Each subsystem is located in an area separated physically and electrically from other subsystems to ensure that a single failure in one subsystem does not cause failure in the redundant subsystem. In normal alignment, there is no sharing between redundant Class 1E subsystems such as batteries, battery chargers, or distribution panels. Class 1E batteries of the same division may be cross-tied together for accident coping (SBO) and/or LCO purposes.

All batteries 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. Battery size is based on 100% of required capacity, and after selection of an available commercial battery, results in a battery capacity in excess of 125% of required capacity. The voltage design limit is [*] volts per cell which corresponds to a total minimum voltage output of [*] volts per battery bank. 125 % 150 %

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 bank fully charged. Each battery charger has sufficient capacity to restore the battery bank from the design minimum charge to 95% of its fully charged state in [12] hours while supplying normal steady-state loads (Ref. 4).

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in CESSAR-DC, Chapters 6, Engineering Safety Features, and 15, Accident Analyses, assume Engineered Safety Features (ESF) systems are OPERABLE. The DC power subsystem provides normal and emergency DC power for the diesel generators, emergency auxiliaries, and for control and switching during all MODES of operation. The OPERABILITY of the DC power sources is consistent with the initial assumptions of the

* Values to be determined by system detail design.

BASES

APPLICABLE SAFETY ANALYSES (Continued)

accident analyses which are based upon maintaining the required DC power sources and associated distribution systems OPERABLE during accident conditions in the event of (1) an assumed loss of offsite AC power or all onsite AC power; and (2) A worst case single failure.

The DC power sources satisfy Criterion 3 of the NRC Policy Statement.

LCO

The Division 1 and 2 DC electrical power subsystems and corresponding control equipment and cabling are required to be OPERABLE to ensure availability of the required power to shutdown the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated design basis accident. Loss of any one of the DC power subsystems does not prevent the minimum safety function from being performed. Each DC electrical power subsystem is considered OPERABLE if the 125 volt battery and associated battery charger satisfy the applicable Surveillance Requirements.

An OPERABLE DC electrical power subsystem requires all required batteries and respective chargers to be operating and connected to the associated DC buses.

Inoperable DC sources do not necessarily result in inoperable components unless specifically directed by Required Actions (refer to LCO 3.0.7). The electrolyte parameter limits relationship to the OPERABILITY of DC sources is covered by LCO 3.8.6, Battery Cell Parameters. During periods when battery cell parameters are not within limits, DC sources are not necessarily inoperable unless specifically directed by the Required Actions of LCO 3.8.6, Battery Cell Parameters.

APPLICABILITY

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

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

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

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

BASES

ACTIONS

A.1 and A.2

With one of the six DC electrical power subsystems inoperable, the cross-tie may be utilized to allow the remaining two operable subsystems within the division to power the loads of the inoperable power source and fulfill the SBO coping capability. This is possible since each battery is sized to provide the one division battery loads and one channel of loads. Thus, the two remaining operable batteries may power the inoperable battery's loads while it is being restored to OPERABILITY. This design feature should be utilized with the intent of restoring the inoperable components in 72 hours.

B.1 and B.2

With two of the required DC electrical power subsystems inoperable, the remaining DC electrical power subsystems have the capacity to support a safe shutdown and to mitigate an accident condition. However, since a subsequent worst case single failure would result in the loss of the 125 volt Class 1E battery system, continued power operation should not exceed two hours. The two-hour Completion Time is based on Regulatory Guide 1.93 (Ref. 5), and engineering judgment considering the number of available systems and the time required to reasonably complete the Required Actions.

C.1 and C.2

The plant must be placed in a MODE in which the LCO does not apply if the DC electrical power subsystem cannot be restored to OPERABLE status in the associated Completion Time. This is done by placing the plant in at least MODE 3 in six hours and in MODE 5 in 36 hours. The allowed Completion Times are reasonable based on operating experience to reach the required MODES from full power without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the 125/250 volt Class 1E battery helps ensure the effectiveness of the charging system and the ability of the battery to perform its intended function. Float charge is the condition where the charger is supplying the continuous charge required to overcome the internal losses of a battery (or battery cell) and maintain the battery (or battery cell) in a fully charged state. 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 seven-day Frequency is consistent with the manufacturers' recommendations and IEEE-450 (Ref. 6).

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.4.2

Visual inspection to detect corrosion of the battery cells and connections or measurement of the resistance of each cell and terminal connection provide an indication of physical damage or abnormal deterioration which could potentially degrade battery performance. The connection resistance value is a ceiling value established by the battery manufacturer based on calculations taking into consideration the physical configuration of the batteries. The 92-day Frequency is sufficient for detecting trends in these conditions indicative of any problems. A more complete inspection is performed in conjunction with the preventive maintenance program conducted during refueling outages.

SR 3.8.4.3

Visual inspection of the battery cells, cell plates, and battery racks provide an indication of physical damage or abnormal deterioration which could potentially degrade battery performance. The [12]-month Frequency is consistent with IEEE - 450 (Ref. 6).

SR 3.8.4.4 and 3.8.4.5

Visual inspections and resistance measurements of the cell-to-cell and terminal connections provide an indication of physical damage or abnormal deterioration which could indicate degraded battery performance. The anti-corrosion 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 and inspection under each terminal connection. The connection resistance value is a ceiling value established by the manufacturer based on calculations taking into consideration the physical configuration of the batteries. The [12]-month Frequency is consistent with IEEE-450 (Ref. 6).

SR 3.8.4.6

Regulatory Guide 1.32 (Ref. 7), requires that the battery charger supply be based on the largest combined 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 which these demands occur. The minimum required amperes and duration ensures that the DC load requirements can be satisfied (refer to SR 3.8.4.7). The Frequency is based on engineering judgment and industry accepted practice considering the unit conditions required to perform the test, and is intended to be consistent with expected fuel cycle lengths.

This surveillance is modified by two Notes. The first Note prohibits performance of this surveillance in MODES 1, 2, 3, or 4. Performance of this test requires the associated DC Division to be inoperable during the test. Therefore, this test must be performed in

SURVEILLANCE REQUIREMENTS (Continued)

MODES 5 or 6. The second Note allows credit to be taken for unplanned events that satisfy this Surveillance Requirement.

SR 3.8.4.7

Regulatory Guide 1.32 (Ref. 7), requires the performance of a battery service test in accordance with IEEE-450 (Ref. 6) at intervals not to exceed [18] months. A battery service test is a special capacity test to demonstrate the capability of the battery to meet the system analyzed response requirements. Reference 4 provides the load requirements for the batteries.

This surveillance is modified by three notes. The first Note allows 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.

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.

The second Note prohibits performance of this surveillance in MODES 1, 2, 3, or 4. Performance of this test requires the associated DC Division to be inoperable during the test. Therefore, this test must be performed in MODES 5 or 6. The third Note allows credit to be taken for unplanned events that satisfy this Surveillance Requirement.

SR 3.8.4.8

IEEE-450 (Ref. 6) recommends a performance discharge test for each battery at 60-month intervals. A battery performance test is a capacity test of the battery in the "as found" condition, after being in service, to detect any change in the capacity as determined by the new battery acceptance test. The test is intended to determine overall battery degradation due to age and usage.

BASES

SURVEILLANCE REQUIREMENTS (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.

IEEE-485 (Ref. 8) recommends that the battery should be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows the battery rate of deterioration is increasing even if there is ample capacity to meet the load requirements. The acceptance criteria for this Surveillance specifies an [80%] capacity based on the extension of the Frequency for SR 3.8.4.7 from the IEEE-450 recommendation of [12] months to [18] months.

IEEE-450 (Ref. 6) recommends a 60-month Surveillance Frequency or a performance discharge test should be performed every [12] months for any battery that shows signs of degradation or has reached 85% of the service life expected of the application. Degradation is indicated when the battery capacity drops more than 10% of rated capacity from its average on previous performance tests, or is below 90% of the manufacturer's rating.

The Frequencies are consistent with the recommendation in IEEE-450 (Ref. 6).

This surveillance is modified by two Notes. The first Note prohibits performance of this surveillance in MODES 1, 2, 3, or 4. Performance of this test requires the associated DC Division to be inoperable during the test. Therefore, this test must be performed in MODES 5 or 6. The second Note allows credit to be taken for unplanned events that satisfy this Surveillance Requirement.

REFERENCES

1. Regulatory Guide 1.6, "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems," March 10, 1971.

2. IEEE-308 1974, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

3. 10 CFR 50, General Design Criteria 17, "Electric Power Systems."

4. CESSAR-DC, Chapter 8.

5. Regulatory Guide 1.93, "Availability of Electric Power Sources," December 1974.

REFERENCES (Continued)

6. IEEE-450 1980, "IEEE Recommended Practice for Maintenance Testing and Replacement of Large Lead Storage Batteries for Generating Stations and Subsystems."

7. Regulatory Guide 1.32, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants," February 1977.

8. IEEE-485 1983, Recommended Practices for Sizing Large Lead Storage Batteries for Generating Stations and Substations." June, 1983.11

9. CESSAR-DC, Chapter 6.

10. CESSAR-DC, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B.3.8.5 DC Sources - ~~Shutdown~~ Refueling

BASES

BACKGROUND

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

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the CESSAR-DC, Chapter 6 and Chapter 15, assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC 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 subsystems is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum specified DC Power Sources during MODES 5 and 6 ensures that: (1) The plant can be maintained in the shutdown or refueling condition for extended time periods; (2) Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and the CESSAR-DC only addresses bounding analyses, such that a specific design basis is not always stated for operation in MODES 5 and 6. The DC sources satisfy Criterion 3 of the NRC Policy Statement.

LCO

In MODES 5 and 6 and when handling irradiated fuel assemblies, one DC Power Source Division is required to be OPERABLE. This ensures the availability of sufficient power to recover from postulated events in MODES 5 and 6 and when handling irradiated fuel (e.g., fuel handling accident and inadvertent reactor vessel draindown).

A description of OPERABILITY requirements for the DC Power Source Division is provided in the Bases of LCO 3.8.4, "DC Sources - Operating".

The electrolyte parameter limits relationship to the OPERABILITY of DC sources is dictated by LCO 3.8.6, "Battery Cell Parameters."

BASES

APPLICABILITY

The DC Power Sources required to be OPERABLE in MODES ~~5 and~~ 6 and when handling irradiated fuel assemblies provide assurance that: with water level in the refueling cavity ≥ [23 ft] above the reactor pressure vessel flange;

1. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

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

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

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

DC power requirements for MODES 1, 2, 3, and 4 are addressed in LCO 3.8.4, "DC Sources - Operating".

The Applicability is modified by a NOTE. This NOTE alerts the operator to potential additional electrical power source requirement when in REDUCED RCS INVENTORY.

ACTIONS

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

If two divisions are required per LCO 3.8.10, the remaining division with DC power available may be capable of supporting sufficient systems to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. 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, any activities that could result in inadvertent draining of the reactor vessel, 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.

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 subsystems and to continue this action until restoration is

BASES

ACTIONS (Continued)

accomplished in order to provide the necessary DC electrical power to the unit safety systems.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient DC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required DC power sources and continued until the LCO requirements are restored.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required DC electrical power 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.

SURVEILLANCE REQUIREMENTS

The Bases provided for SR 3.8.4.1 through SR 3.8.4.8 in the Bases for LCO 3.8.4, "DC Sources - Operating", are applicable.

REFERENCES

1. CESSAR-DC, Chapter 6.

2. CESSAR-DC, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Cell Parameters

BASES

BACKGROUND

LCO 3.8.6, Battery Cell Parameters, utilizes Table 3.8.6-1 to delineate the limits on electrolyte level, float voltage, and specific gravity for the DC Power Source batteries. A discussion of these batteries and their OPERABILITY requirements are provided in the Bases for LCO 3.8.4, DC Sources - Operating, and LCO 3.8.5, DC Sources - Shutdown. Within this table, Category A defines the limits for each designated pilot cell and Category B does the same for each connected cell.

The Category A limits for the designated pilot cell's float voltage ≥ 2.13 volts and a specific gravity of ≥ 1.200 (0.015 below the manufacturer's fully charged nominal specific gravity) or a battery charging current that had stabilized at a low value) is characteristic of a charged cell with adequate capacity. The limits on electrolyte level ensures no physical damage to the plates occurs and adequate electron transfer capability is maintained in the event of transient conditions.

The Category B limits for each connected cell's float voltage and specific gravity ≥ 2.13 volts and a specific gravity of ≥ 1.195 (0.020 below the manufacturer's fully charged nominal specific gravity with an average specific gravity of all the connected cells ≥ 1.205 (0.010 below the manufacturer's fully charged nominal specific gravity) ensures the OPERABILITY and capability of the battery. The limits on electrolyte level ensure no physical damage to the plates occurs and adequate electron transfer capability is maintained in the event of transient conditions.

The limits are based upon manufacturer's recommended values to ensure the OPERABILITY and capability of the battery. The specific gravity limits assure a manufacturer's recommended fully charged nominal specific gravity of 1.215. Specific gravity must be corrected for electrolyte temperature and level, and the float voltage limits may be corrected for average electrolyte temperature. These Notes provide for correction of the measured values in accordance with manufacturer's recommendations when the values reflect transient conditions as opposed to battery capacity.

Category C defines allowable values of electrolyte level, float voltage, and specific gravity of each connected cell. These values represent degraded battery conditions. However, operation is permitted when Category C limits are met since sufficient capacity exists to perform the intended function. These values are discussed in more detail in the Actions section of this Bases.

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in CESSAR-DC Chapters 6, Engineering Safety Features, and 15, Accident Analyses, assume all Engineered Safety Features (ESF) systems are OPERABLE. The DC electrical power systems provide normal and emergency DC power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation. The OPERABILITY of the DC subsystem is consistent with the initial assumptions of the accident analyses and is based upon maintaining one division of DC power sources and associated distribution systems OPERABLE during accident conditions in the event of (1) An assumed loss of all offsite AC power or all onsite AC power; and (2) A worst case single failure.

Battery cell parameters satisfy Criterion 3 of 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 limits are conservatively established, allowing continued DC electrical system function even with Category A and B limits not met.

APPLICABILITY

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

ACTIONS

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

Operation with one or more cells in one or more batteries parameters not within limits (i.e., Category A limits not met, or Category B limits not met, or Category A and B limits not met), but within the allowable value (Category C limits are met) specified in Table 3.8.6-1 is permitted for a limited period since sufficient capacity exists to perform the intended function. The pilot cell electrolyte level and float voltage are required to be verified to meet the Category C allowable values within one 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. The Completion Time is based on engineering judgment taking into consideration the time required to perform the Required Action.

Verification that the Category C allowable values are met for all cells (Required Action A.2) will ensure that during the time to restore the parameters to the Category A and B limits that the battery will still be capable of performing its intended function. Twenty four hours are provided to complete Required Action A.2 because specific gravity measurements must be obtained for each connected cell. As such, the Completion Time

ACTIONS (Continued)

is based on engineering judgment taking into consideration the time required to perform the Required Action and the assurance provided by Required Action A.1 that the battery cell parameters are not severely degraded.

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, while battery 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. During this 31-day period:

(1) the allowable values for electrolyte level (above the top of the plates and not overflowing), ensures no physical damage to the plates with an adequate electron transfer capability;

(2) the allowable value for the average specific gravity of all the cells ≥ [1.195 [0.020] below the manufacturer's recommended fully charged nominal specific gravity], or a battery charging current that had stabilized at less than (2) amperes on a float charge is the manufacturer's recommendation and ensures that the decrease in capacity will be less than the margin provided in sizing;

(3) the allowable value for an individual cell's specific gravity [0.020] below the average of all the connected cells ensures that an individual cell's specific gravity will not be [0.040] below the manufacturer's fully charged nominal specific gravity. This is the value recommended by the manufacturer to ensure the overall capability of the battery will be maintained within an acceptable limit; and

(4) the allowable value for an individual cell's float voltage [> 2.07] volts ensures the battery's capability to perform its design function.

The 31-day Completion Time is based on engineering judgment taking into consideration that while battery capacity is degraded, sufficient capacity exists to perform the intended function and allow time to fully restore the battery cell parameters to normal limits.

When any battery parameter is outside the Category C allowable value, sufficient capacity to supply the maximum expected load requirements is not assured and Condition B would be entered.

B.1

With one or more batteries with one or more battery cell parameters outside the Category C Allowable Value for any connected cell, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding DC electrical power subsystem must be declared inoperable. Additionally, other potentially extreme

BASES

ACTIONS (Continued)

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 elec rical power subsystem inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

This SR verifies that Category A battery cell parameters are consistent with IEEE-450 (Ref. 1), which recommends regular battery inspections (at least one per month) including voltage, specific gravity, and electrolyte temp erat ure of pilot cells.

SR 3.8.6.2

The quarterly inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 1). 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. This inspection is also consistent with IEEE-450 (Ref. 1), 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.

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. 1), which states that the temperature of electrolytes in representative cells should be determined on a quarterly basis.

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.

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.

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. 1), with the

BASES

SURVEILLANCE REQUIREMENTS (Continued)

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 suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 1) 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 a recommendation of IEEE-450 (Ref. [illegible]), which states that prolonged operation of cells < 2.13 V can reduce the life expectancy of cells.

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. 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 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 of the designated pilot cell. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote c to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for up to [7 days] following a battery equalizing recharge.

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).

BASES

SURVEILLANCE REQUIREMENTS (Continued)

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. Footnote b to Table 3.8.6-1 requires correction of specific gravity for electrolyte temperature and level. This level correction is not required when battery charging current is < [2] amps on float charge.

Category C defines the Allowable Values 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 Allowable Value, the assurance of sufficient capacity described above no longer exists and the battery must be declared inoperable.

The Category C Allowable Values 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 Allowable Value 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 Allowable Value 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.

REFERENCES

1. IEEE-450 1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

2. IEEE-308 1978, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

3. CESSAR-DC, Chapter 6.

4. CESSAR-DC, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Inverters—Operating

BASES

BACKGROUND

The inverters are the preferred source of power for the AC vital buses because of the stability and reliability they achieve in being powered from the 120 VDC battery source. The function of the inverter is to convert DC electrical power to AC electrical power, thus providing an uninterruptible power source for the instrumentation and controls for the Reactor Protective System (RPS) and the Engineered Safety Feature Actuation System (ESFAS). Specific details on inverters and their operating characteristics are found in the CESSAR-DC, Chapter 8 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the CESSAR-DC, Chapter 6 (Ref. 2) and Chapter 15 (Ref. 3), 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 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 AC vital 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

b. A worst case single failure.

Inverters are a part of the distribution system and, as such, satisfy Criterion 3 of the NRC Policy Statement.

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.

BASES

LCO (Continued)

Maintaining the required inverters OPERABLE ensures that the redundancy incorporated into the design of the RPS and ESFAS instrumentation and controls is maintained. The six battery powered inverters (three per division) ensure an uninterruptible supply of AC electrical power to the AC vital buses even if the 4.16 kV safety buses are de-energized.

OPERABLE inverters require the associated AC vital bus to be powered by the inverter, which has the correct DC voltage ([120] V) applied from a battery to the inverter input, and inverter output AC voltage and frequency within tolerances.

This LCO is modified by a Note that allows one inverter to be disconnected from a battery for ≤ 24 hours, if the vital bus(es) is powered from a Class 1E constant voltage transformer during the period and all other inverters are operable. This allows an equalizing charge to be placed on one battery. If the inverter(s) 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. When utilizing the allowance, if one or more of the provisions is not met (e.g., 24 hour time period exceeded), LCO 3.0.3 must be entered immediately.

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.

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

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."

BASES

ACTIONS

A.1 and A.2

Required Action A.1 allows 24 hours to fix the inoperable inverter and return it to service. The 24 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 AC vital bus is powered from its constant voltage source, it is relying upon interruptible AC electrical power sources (offsite and onsite). The uninterruptible battery backed inverter source to the AC vital buses 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 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 unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC 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 AC 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.

REFERENCES

1. CESSAR-DC, Chapter 8.

2. CESSAR-DC, Chapter 6.

3. CESSAR-DC, Chapter 15.

G

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Required Action A.1 is modified by a Note, which states to enter the applicable Conditions the Required Actions of LCO 3.8.9 "Distribution Systems - Operating," when Condition A is entered with one AC vital bus de-energized. This ensures the vital bus is returned to OPERABLE status within 2 hours.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Inverters — ~~Shutdown~~ Refueling

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 CESSAR-DC, 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.

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 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

c. Adequate power is available to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The inverters were previously identified as part of the distribution system and, as such, satisfy Criterion 3 of the NRC Policy Statement.

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. The battery powered inverters provide uninterruptible supply of AC electrical power to the AC vital buses even if the 4.16 kV safety buses are de-energized. OPERABILITY of the inverters requires that the

BASES

LCO (Continued)

vital bus be powered by the inverter. 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 and inadvertent reactor vessel draindown).

APPLICABILITY

The inverters required to be OPERABLE in MODE[redacted] 6, during movement of irradiated fuel assemblies ~~provide assurance that:~~ with water level in the refueling cavity ≥ [23 ft] at the reactor pressure vessel flange and

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core in case of an inadvertent draindown of the reactor vessel;

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.

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, A.2.4, and A.2.5

If two divisions are 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, operations with a potential for draining the reactor vessel, and operations with a potential for 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. By the allowance of the option to declare 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, activities that could potentially result in inadvertent draining of the reactor vessel, and operations involving positive reactivity additions).

BASES

ACTIONS (Continued)

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 inverters and to continue this action until restoration is accomplished in order to provide the necessary inverter power to the unit safety systems.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient AC vital power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC vital power sources and continue until the LCO requirements are restored.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverters 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.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC 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 AC 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.

REFERENCES

1. CESSAR-DC, Chapter 6.

2. CESSAR-DC, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.9 Distribution Systems - Operating

BASES

BACKGROUND

The onsite Class 1E AC, DC, and AC Vital Electrical Power Distribution Systems are divided into two redundant and independent divisional subsystems.

The primary distribution of the onsite AC Power Distribution System is at 4160 volts. There are two 4160 volt emergency buses. Power is distributed to the 4160 volt buses from the offsite power sources as described in the Bases for LCO 3.8.1, "AC Sources - Operating." Control power for the 4160 volt breakers is supplied from the Class 1E batteries as described in the Bases for LCO 3.8.4, "DC Sources -Operating."

The secondary plant distribution is at 480 volts. The 480 volt distribution system includes load centers [*]. Load centers [*] are normally supplied from 4160 volt buses [*], respectively, through their own transformers. The 480 volt load centers are located in separate rooms in the control building. Control power for the 480 volt breakers is supplied from the Class 1E batteries as described in the Bases for LCO 3.8.4, "DC Sources - Operating."

The safety-related 480 volt AC motor control centers are fed from load centers [*]. The 120 volt AC vital buses are arranged in six load groups (A, B, C, D, Division I, II) and are normally powered from their 125 volt DC switchboards, respectively via the associated DC/AC inverter. The alternate power supply for the vital buses is a Class 1E constant voltage source powered from the same Division as the associated inverter. Use of Class 1E inverters is governed by LCO 3.8.7, "Inverters-Operating."

The 125 volt DC load groups distribution centers are normally powered from their battery charger. The battery chargers are powered from their Divisional 480 volt MCC. A loss of AC power or failure of the battery charger places the associated battery in service to supply its 125 volt DC switchboard.

The list of all required distribution buses is located in Table B 3.8.9-1.

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in CESSAR-DC Chapters 6, Engineering Safety Features, and 15, Accident Analyses, assume Engineered Safety Features (ESF) systems are OPERABLE. The AC, DC, and AC Vital Electrical

* Value to be determined by system detail design.

BASES

APPLICABLE SAFETY ANALYSES (Continued)

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 LCO sections 3.2. (Power Distribution Limits), 3.4 (Reactor Coolant System), and 3.6 (Containment Systems).

The OPERABILITY of the Electrical Power Distribution Systems is consistent with the initial assumptions of the accident analyses and are based upon maintaining at least one of the onsite AC, DC, and Vital AC power sources and associated distribution systems OPERABLE during accident conditions in the event of (1) an assumed loss of all offsite power or all onsite AC power, and (2) a worst case single failure.

The distribution systems satisfy Criterion 3 of the NRC Policy Statement.

LCO

The Power Distribution System Divisions listed in Table B 3.8.7-1 ensure the availability of AC, DC, and Vital AC Electrical power for the systems required to shutdown the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated design basis accident. Two Divisions of the AC, DC, and AC Vital Electrical Power Distribution Systems are required to be OPERABLE.

Maintaining two Divisions of AC, DC, and AC Vital Electrical Power Distribution Systems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Either Division of the distribution system is capable of providing the necessary electrical power to its corresponding ESF Division. Therefore, a single failure within any system or within the electrical distribution systems will not prevent safe shutdown of the plant.

OPERABILITY is met, as it applies to AC and DC Distribution Systems, provided the associated bus is energized to its proper voltage. The AC vital bus is OPERABLE when it is powered from its associated inverter and DC bus at proper voltage [and frequency].

Inoperable distribution systems do not necessarily result in inoperable components unless directed by Required Actions.

APPLICABILITY

The AC, DC, and AC Vital Electrical Power Distribution Systems are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

APPLICABILITY (Continued)

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

AC, DC, and AC Vital Electrical Power Distribution System requirements for MODES 5 and 6 are covered in the Bases for LCO 3.8.10, "Distribution Systems - Shutdown."

ACTIONS

A.1

With one or more required AC buses, load centers, motor control centers, or distribution panels, except AC vital buses, in one division inoperable, the remaining AC electrical power distribution subsystem in the other division 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, the required AC buses, load centers, motor control centers, and distribution panels must be restored to OPERABLE status within 8 hours.

Condition A worst scenario is one division without AC power (i.e., no offsite power to the division 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 (division) by stabilizing the unit, and on restoring power to the affected train (division). 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 (division), 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 (division) with AC power.

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 become inoperable, and AC distribution restored OPERABLE. This could continue indefinitely.

ACTIONS (Continued)

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.

B.1

With one AC vital bus inoperable, the remaining OPERABLE AC vital buses are capable of supporting the minimum safety functions necessary to shutdown the unit and maintain it in the safe shutdown condition. However, overall reliability is reduced since an additional single failure could result in the minimum required ESF functions not being supported. Therefore, the required AC vital bus must be powered from its alternate Class 1E constant voltage source transformer within two hours.

Condition B represents one AC vital bus without power; potentially both the DC source and the associated AC source are nonfunctioning. 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 vital buses, and restoring power to the affected vital bus.

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

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 vital AC power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected division; and

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

BASES

ACTIONS (Continued)

The 2 hour Completion Time takes into account the importance to safety of restoring the AC vital bus to OPERABLE status, the redundant capability afforded by the other OPERABLE vital buses, 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.

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.

C.1

With DC bus(es) in one division inoperable, the remaining DC electrical power distribution subsystems are 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 DC electrical power distribution subsystem could result in the minimum required ESF functions not being supported. Therefore, the [required] DC buses must be restored to OPERABLE status within 2 hours.

Condition C represents one division without adequate DC power; potentially 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 division.

BASES

ACTIONS (Continued)

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components which 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 division; 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. 1).

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 division could again become inoperable, and DC distribution restored OPERABLE. This could continue indefinitely.

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 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 unit systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.9.1

This Surveillance verifies that the AC, DC, and Vital AC Electrical Power Distribution Systems are functioning properly with all the desired circuit breakers closed and the buses energized from normal power. 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 redundant capability of the AC, DC, and AC vital bus electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. Regulatory Guide 1.93, "Availability of Electric Power Sources," December 1974.
2. CESSAR-DC, Chapter 6.
3. CESSAR-DC, Chapter 15.

Table B 3 8.9-1

ELECTRICAL POWER DISTRIBUTION SYSTEMS

TYPE	VOLTAGE	DIVISION 1	DIVISION 2
AC Emergency Buses	4160 VAC	[*]	[*]
	480 VAC	[*]	[*]
DC Buses	125 VDC	[*] from battery	[*] from battery
		[*] from charger [*]	[*] from charger [*]
		[*] from battery	[*] from battery
		[*] from charger [*]	[*] from charger [*]
AC Vital Buses	120 VAC	[*] from inverter	[*] from inverter
		[*] from inverter [*]	[*] from inverter [*]

* Value to be determined by system detail design.

B 3.8 ELECTRICAL POWER SYSTEMS

B.3.8.10 Distribution Systems - ~~Shutdown~~ Refueling

BASES

BACKGROUND

A description of the AC, DC, and AC Vital Power Distribution Systems is provided in the Bases for LCO 3.8.9, "Distribution Systems - Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the CESSAR-DC, 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 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 AC, DC, and AC vital bus electrical power distribution subsystems 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 provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The AC and DC electrical power distribution systems satisfy Criterion 3 of the NRC Policy Statement.

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific unit 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 necessary to support OPERABILITY of required systems, equipment and components-all specifically addressed in each LCO and implicitly required via the definition of OPERABILITY.

BASES

LCO (Continued)

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 and inadvertent reactor vessel draindown).

APPLICABILITY

The AC, DC, and AC Vital bus electrical power distribution subsystems required to be OPERABLE in MODE 6, and when handling irradiated fuel assemblies assures sufficient power to assure that:

1. Systems to provide adequate coolant inventory makeup is available for the irradiated fuel in the core in case of an inadvertent draindown of the reactor vessel;

2. Systems needed to mitigate a fuel handling accident are available, and

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

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

AC, DC, and AC Vital electrical power distribution subsystems requirements for MODES 1, 2, 3, and 4 are addressed in LCO 3.8.9, "Distribution Systems - Operating."

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, A.2.5, and A.2.6

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, fuel movement, and operations with a potential for draining the reactor vessel. 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 subsystems 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, any activities that could result in inadvertent draining of the reactor vessel, and operations involving positive reactivity additions).

BASES

ACTIONS (Continued)

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 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 shutdown cooling system (SCS) may be inoperable. In this case, these Required Actions of Condition A do not adequately address the concerns relating to [illegible] and heat removal. Pursuant to LCO 3.0.6, the SCS ACTIONS would not be entered. Therefore, the Required Actions of Condition A direct declaring SDC inoperable, which results in taking the appropriate SDC 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 AC, DC, and AC vital bus electrical power distribution system is functioning properly, with all the buses 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 redundant capability of the electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. CESSAR-DC, Chapter 6.

2. CESSAR-DC, Chapter 15.

B.3.10 SHUTDOWN OPERATIONS

B.3.10.6 AC SOURCE-SHUTDOWN

new addition

BASES

Background

AC power must be available to a certain degree of reliability since decay heat removal capability must be maintained. AC power includes both the offsite sources to the class 1E distribution system and the diesel generators. The electrical distribution system provides the necessary redundancy, flexibility, and diversity to reduce the likelihood of losing decay heat removal due to a loss of electrical power. The features of the design, the Technical Specifications, and the procedure guidance allow shutdown activities within certain limits and provide operational guidance for system flexibility and assurance that a loss of the decay heat removal is extremely unlikely.

Applicable Safety Analysis

The OPERABILITY of the minimum AC sources during MODE 5 and MODE 6 with water level in the refueling cavity less than [23'.0] above the reactor pressor vessel flange 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 an inadvertent drain down of the vessel, loss of decay heat removal, or a fuel handling accident.

In general, when the unit is shutdown the Technical Specification (TS) 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 loss of all onsite power is not required. The rational 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 bonding 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 significantly reduced or eliminated, and minimal consequences. These deviations from DBA analyses 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 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 typical MODE 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 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 of supporting 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 the NRC Policy Statement.

Electrical power sources need to be carefully managed during shutdown operations to maintain a desired level of safety. This is especially true during reduced inventory operations. Reduced inventory requires heightened awareness to manage the risks of maintaining an electrical source to the Class 1E buses and of insuring an alternate source of power is available. The potential for a complete loss of decay heat removal due to the loss of electrical power is lowered when the electrical supply requirements for shutdown modes and reduced inventory are managed properly.

The management and operation of these electrical sources will be guided by Technical Specifications for shutdown operations and reduced inventory. The operation of the electrical distribution system during shutdown modes and reduced inventory can be guided by procedures for normal alignments and for aligning alternate electrical sources if normal sources are interrupted.

The electrical distribution system design will provide flexibility and redundancy to allow for the management of competing priorities during shutdown. These competing priorities include the need to perform maintenance on electrical system equipment versus the need to have electrical sources available to provide power to the Class 1E buses.

The issue regarding vulnerability during shutdown modes to a loss of decay heat removal (DHR) is resolved by the design features for the Shutdown Cooling System (SCS), instrumentation and controls, electrical power distribution system, new technical specifications and procedure guidance. These features demonstrate the reduced potential for significant radiological releases from fuel cladding failure due to postulated events and radiological releases from a loss of DHR due to loss of SCS events. In particular, features of the SCS and electrical distribution system provide the necessary redundancy, flexibility and diversity to significantly reduce the likelihood of losing DHR.

The electrical distribution system provides diverse sources of power to the Class 1E buses during shutdown modes and reduced inventory in the reactor coolant system and provides redundancy and flexibility to insure re-energizing the Class 1E buses if power is interrupted. The LCO requirements will maintain an adequate margin for the operability of the AC power sources (Ref. 1).

LCO

One offsite circuit capable of supplying onsite Class 1E power distribution subsystem(s) of LCO 3.8.10, "Distribution Systems-Shutdown," ensures that all required loads on Division 1 and Division 11 are powered from offsite power. Two OPERABLE DGs available in standby to supply electrical power to required OPERABLE features via the associated Engineered Safety Features (ESF) buses that are required to be OPERABLE by LCO 3.8.10, ensures a diverse power source is available, assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and DGs ensures the availability of sufficient AC sources to operate the plant in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents, reactor vessel drain down, and loss of decay heat removal).

The qualified offsite circuit must be capable of maintaining rated frequency and voltage while connected to ESF buses, and of accepting required loads during an accident. The qualified offsite circuit is either the normal or alternate preferred power circuits to the AC Electrical Power Distribution System that are described in the CESSAR and are part of the licensing bases for the plant. The normal preferred circuit consists of the switching stations breaker to the main transformers, the generator breaker, the disconnect links to the unit auxiliary transformers, and the circuit path from the offsite transmission network to all of the 4.160 kv ESF buses required by LCO 3.8.10 including feeder breakers at the 4.160 kv ESF buses. The alternate preferred circuit consists of the switching station breaker to the reserve transformer and the circuit path from the offsite transmission network to all the 4.160 kv ESF buses required by LCO 3.8.10 including feeder breakers at the 4.160 kv ESF buses.

The LCO requires that two independent sources of AC power to each division supplying the Class 1E distribution system shall be operable. This is accomplished by providing two independent divisions of AC Electrical Power. Each division has two 4.160 kv Safety Buses with three sources of electrical power.

Each required DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage, and accepting required loads. This sequence must be accomplished within 20 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as: DG in standby with the engine hot, DG in standby with the engine at ambient conditions, and DG operating in parallel test mode.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY. [In addition, proper sequencer operation is an integral part of offsite circuit OPERABILITY if its inoperability in any way impacts on the ability to start and maintain energized any loads required OPERABLE by LCO 3.8.10.]

During a shutdown condition, it is acceptable for a single offsite power circuit to supply all required divisions of electrical power.

As described in Applicable Safety Analyses, in the event of an accident during shutdown, the TSs are designed to maintain the plant in a condition such that, even with a single failure, the plant will not be in immediate difficulty.

The normal source of power to the Safety Buses has three sources of electrical power. The three sources are: (1) Normal - The division related Unit Auxiliary Transformer (UAT) being powered from Switchyard Interface I through the Unit Main Transformer (UMT), (2) Alternate - The division related Reserve Transformer being served from Switchyard Interface II, and (3) Emergency Diesel Generators which are backed-up by the Combustion Turbine. One diesel generator may be replaced by the combustion turbine if its operation has been verified in the past seven (7) days.

Therefore, the Class 1E Safety Buses have the potential to be fed from four different ultimate sources during shutdown modes and reduced inventory operations. These sources are:

1. Switchyard Interface I,
2. Switchyard Interface II,
3. Diesel Generator, and
4. Combustion Turbine.

This distribution system provides the flexibility to perform shutdown activities on one source of power to a division 4.16 kv Safety Bus and still maintain other diverse sources of reliable electrical power to the 4.16 kv Safety Bus.

Applicability

This LCO is applicable in MODE 5 and MODE 6 with reduced RCS inventory. The required AC power sources provide assurance that decay heat removal systems are available to maintain heat removal capability. The LCO provides minimum acceptable electrical distribution alignments. Guidance is also provided by procedure to the operation staff to insure available source alignments are identified whenever shutdown activities are in progress. Additional procedural guidance is provided for aligning any available source(s) to the Safety Bus(es) if power to the bus(es) is interrupted.

The AC sources required to be OPERABLE in MODE 5 and MODE 6 with water level in the refueling cavity less than [23'.0] above the reactor pressure vessel flange provides assurance that:

a. Systems are available to provide adequate coolant inventory makeup to maintain irradiated fuel in the core covered with coolant in case of an inadvertent drain down of the reactor vessel;

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;

d. Instrumentation and control capability is available for shutdown condition or refueling condition; and

e. Systems are available to remove decay heat from the irradiated fuel in the core.

The AC power requirements for MODES 1,2,3, and 4 are covered in LCO 3.8.1; and for MODES 5 and 6 with the water level in the refueling cavity less than [23'.0] above the reactor pressure vessel flange, in LCO 3.8.2.

ACTIONS

A.1.1 and A.1.2

An offsite circuit is considered inoperable if it is not available to both the required ESF buses. If two ESF buses are required per LCO 3.8.10, division (s) with offsite power still available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel for an 8 hour period. This 8-hour period is reasonable provided the Required Actions of LCO 3.8.10 do not apply.

However, if after 8 hours, should any required features still have no power available from an OPERABLE offsite circuit, Required Action A.1.2 requires declaring such features inoperable so that appropriate restrictions can be implemented in accordance with the affected required feature (s) LCOs' ACTIONS.

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

Within 8 hours of determining the required offsite circuit is inoperable (not available to all required ESF buses), Required Action A.1.2 allows the choice of declaring affected required features inoperable. Since this option may involve undesirable administrative efforts, Required Actions A.2.1, A.2.2, A.2.3, and A.2.4 alternatively allow performance of other sufficiently conservative actions, thereby avoiding any undesirable administrative efforts. With the required offsite circuit inoperable (unable to supply all required ESF buses), the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and activities that could potentially result in inadvertent draining of the reactor vessel.

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 initiate action immediately to restore the required offsite circuit to OPERABLE status and to continue this action until restoration is accomplished in order to provide the necessary (and preferred) AC power to the plant safety systems.

Notwithstanding performance of the above conservative Required Actions, the plant is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

The Completion Time of immediately for restoring the required offsite circuit to OPERABLE status 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 plant safety systems may be without sufficient power.

Pursuant to LCO 3.0.6, the Distribution System ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A have been modified by a Note to indicate that when Condition A is entered with no AC power to one ESF bus, 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 whether or not a division is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized division.

B.1, B.2, and B.3

With one required DG inoperable, 14 days are allowed for restoring the DG to OPERABLE status provided the combustion turbine generator (CTG) is verified to be functional through testing within 1 hour and its breakers are verified to be aligned to the ESF bus associated with the inoperable DG within 1 hour and every 8 hours thereafter. As long as the CTG is available to serve as a backup to the inoperable DG, shutdown activities (that would otherwise be prohibited in a low water level condition) in MODES 5 and 6 are permitted. This 14-day Completion Time is considered reasonable because of the reliability and convenience of the CTG, the low probability of a shutdown transient (e.g., loss of decay heat removal) occuring during this time period, and the availability of at least one other OPERABLE DG.

The CTG is considered functional when the requirements of Section ______ of the CESSAR-DC are satisfied and the CTG is verified to start from standby conditions and achieves steady state voltage [4160 kv] and frequency ≥ 58.8 Hz and ≤ 61.2 Hz within 2 minutes. 1✓

C.1, C.2, C.3, C.4, and C.5

When a Required Action and Completion Time of Condition B are not met (either the CTG is not functional or alienable to the required ESF bus, or one DG cannot be restored to OPERABLE status), or when two required DGs are inoperable, the required diversity of AC power sources to plant safety systems is not available. Required Actions C.1, C.2, and C.3, therefore, suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and activities that could potentially result in inadvertent draining of the reactor vessel. 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 initiate action immediately to restore the required DG(s) to OPERABLE status and to continue this action until restoration is accomplished in order to provide the required diversity of AC power sources to plant safety systems.

SURVEILLANCE REQUIREMENTS

SR 3.10.6

For AC sources required to be OPERABLE, the SRs of Specification 3.8.2 are applicable.

REFERENCES

1. CESSAR-DC, Appendix 19.8A, Shutdown Risk Evaluation Report, Section 2.4.3.

2. CESSAR-DC, Section 16.11.1.

02/03/94 All comments included, MLK

4.0 DESIGN FEATURES

4.1 Site

4.1.1 Site and Exclusion Area Boundaries

The site and exclusion area boundaries [shall be as described or as shown in Figure 4.1-1].

4.1.2 Low Population Zone (LPZ)

The LPZ [shall be as described or as shown in Figure 4.1-2].

[

This figure shall consist of [a map of] the site area showing the LPZ boundary. Features such as towns, roads, and recreational areas shall be indicated in sufficient detail to allow identification of significant shifts in population distribution within the LPZ.

]

FIGURE 4.1-2

LOW POPULATION ZONE

4.0 DESIGN FEATURES

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain [241] fuel assemblies. Each assembly shall consist of a matrix of zirconium alloy ← (clad) fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

4.2.2 [Control Rod] Assemblies

The reactor core shall contain [92] control element assemblies (CEAs). The control material shall be [silver indium cadmium, boron carbide, or hafnium metal] as approved by the NRC.

4.0 DESIGN FEATURES

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of [5.0] weight percent;

b. $K_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in [Section 9.1 of the SAR];

[c. A nominal [9.78] inch center to center distance between fuel assemblies placed in [the high density fuel storage racks];]

[d. A nominal [9.78] inch center to center distance between fuel assemblies placed in [the low density fuel storage racks];]

[e. New or partially spent fuel assemblies with a discharge burnup in the "acceptable range" of Figure [3.7.20-1] may be allowed unrestricted storage in [either] fuel storage rack(s); and]

[f. New or partially spent fuel assemblies with a discharge burnup in the "unacceptable range" of Figure [3.7.20-1] will be stored in compliance with the [~~SAR, approved procedures, Licensee Controlled Specification, or etc.~~] [NRC approved procedure, specific approved document, configuration, figure, etc.].]

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of [5.0] weight percent;

b. $K_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in [Section 9.1 of the SAR];

c. $K_{eff} \leq 0.98$ if moderated by aqueous foam, which includes an allowance for uncertainties as described in [Section 9.1 of the SAR]; and

d. A nominal [9.78] inch center to center distance between fuel assemblies placed in the storage racks.

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation [143 ft-0 in].

4.3.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than [907] fuel assemblies.

5.0 ADMINISTRATIVE CONTROLS

5.1 Responsibility

5.1.1 The [Plant Superintendent] shall be responsible for overall unit operation and shall delegate in writing the succession to this responsibility during his absence.

The [Plant Superintendent], or his designee, in accordance with approved administrative procedures, shall approve prior to implementation each proposed test or experiment and proposed changes and modifications to unit systems or equipment that affect nuclear safety.

5.1.2 The [Shift Supervisor (SS)] shall be responsible for the control room command function. A management directive to this effect, signed by the [highest level of corporate or site management] shall be issued annually to all station personnel. During any absence of the [SS] from the control room while the unit is in MODE 1, 2, 3, or 4, an individual with a valid Senior Reactor Operator (SRO) license shall be designated to assume the control room command function. During any absence of the [SS] from the control room while the unit is in MODE 5 or 6, an individual with a valid SRO license or Reactor Operator license shall be designated to assume the control room command function.

5.0 ADMINISTRATIVE CONTROLS

5.2 Organization

5.2.1 Onsite and Offsite Organizations

Onsite and offsite organizations shall be established for unit operation and corporate management, respectively. The onsite and offsite organizations shall include the positions for activities affecting the safety of the nuclear power plant.

a. Lines of authority, responsibility, and communication shall be defined and established for the highest management levels, through intermediate levels, to and including all operating organization positions. These relationships shall be documented and updated, as appropriate, in the form of organization charts, functional descriptions of departmental responsibilities and relationships, and job descriptions for key personnel positions, or in equivalent forms of documentation. These requirements shall be documented in the [SAR];

b. The [Plant Superintendent] shall be responsible for overall safe operation of the plant and shall have control over those onsite activities necessary for safe operation and maintenance of the plant;

c. The [a specified corporate executive position] shall have corporate responsibility for overall plant nuclear safety and shall take any measures needed to ensure acceptable performance of the staff in operating, maintaining, and providing technical support to the plant to ensure nuclear safety; and

d. The individuals who train the operating staff, carry out health physics, or perform quality assurance functions may report to the appropriate onsite manager; however, they shall have sufficient organizational freedom to ensure their independence from operating pressures.

5.2.2 Unit Staff

The unit staff organization shall be as follows:

a. Each on duty shift shall be composed of at least the minimum shift crew composition shown in Table 5.2.2-1.

(continued)

5.2.2 Unit Staff (Continued)

b. At least one licensed Reactor Operator (RO) shall be present in the control room when fuel is in the reactor. In addition, while the unit is in MODE 1, 2, 3, or 4, at least one licensed Senior Reactor Operator (SRO) shall be present in the control room.

c. A [Health Physics Technician] shall be on site when fuel is in the reactor. The position may be vacant for not more than 2 hours, in order to provide for unexpected absence, provided immediate action is taken to fill the required position.

d. Either a licensed SRO or licensed SRO limited to fuel handling who has no concurrent responsibilities during this operation shall be present during fuel handling and shall directly supervise all CORE ALTERATIONS.

e. Administrative procedures shall be developed and implemented to limit the working hours of unit staff who perform safety related functions (e.g., licensed SROs, licensed ROs, health physicists, auxiliary operators, and key maintenance personnel).

Adequate shift coverage shall be maintained without routine heavy use of overtime. The objective shall be to have operating personnel work an [8 or 12] hour day, nominal 40 hour week while the unit is operating. However, in the event that unforeseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintenance, or major plant modification, on a temporary basis the following guidelines shall be followed:

1. An individual should not be permitted to work more than 16 hours straight, excluding shift turnover time;

2. An individual should not be permitted to work more than 16 hours in any 24 hour period, nor more than 24 hours in any 48 hour period, nor more than 72 hours in any 7 day period, all excluding shift turnover time;

3. A break of at least 8 hours should be allowed between work periods, including shift turnover time;

(continued)

5.2.2 Unit Staff (Continued)

[4. Except during extended shutdown periods, the use of overtime should be considered on an individual basis and not for the entire staff on a shift.

Any deviation from the above guidelines shall be authorized in advance by the [Plant Superintendent] or his designee, in accordance with approved administrative procedures, or by higher levels of management, in accordance with established procedures and with documentation of the basis for granting the deviation.

Controls shall be included in the procedures such that individual overtime shall be reviewed monthly by the [Plant Superintendent] or his designee to ensure that excessive hours have not been assigned. Routine deviation from the above guidelines is not authorized.

OR]

[The amount of overtime worked by unit staff members performing safety related functions shall be limited and controlled in accordance with the NRC Policy Statement on working hours (Generic Letter 82-12).]

f. The [Operations Manager or Assistant Operations Manager] shall hold an SRO license.

g. The Shift Technical Advisor (STA) shall provide advisory technical support to the Shift Supervisor (SS) in the areas of thermal hydraulics, reactor engineering, and plant analysis with regard to the safe operation of the unit.

Table 5.2.2-1 (page 1 of 1)

MINIMUM SHIFT CREW COMPOSITION[a]
[Single Unit Facility]

POSITION[b]	MINIMUM CREW NUMBER	
	UNIT IN MODE 1, 2, 3, OR 4	UNIT IN MODE 5 OR 6
SS	1	1
SRO	1	None
RO	2	1
AO	2	1
STA[c]	1	None

(a) The shift crew composition may be one less than the minimum requirements of Table 5.2.2-1 for not more than 2 hours to accommodate unexpected absences of on-duty shift crew members provided immediate action is taken to restore the shift crew composition to within the minimum requirements of Table 5.2.2-1. This provision does not permit any shift crew position to be unmanned upon shift change due to an oncoming shift crewman being late or absent.

(b) Table Notation:

SS - [Shift Supervisor] with a Senior Reactor Operator license;
SRO - Individual with a Senior Reactor Operator license;
RO - Individual with a Reactor Operator license;
AO - Auxiliary Operator;
STA - Shift Technical Advisor.

(c) The STA position may be filled by an on-shift SS or SRO provided the individual meets the Commission Policy Statement on Engineering Expertise on Shift.

5.0 ADMINISTRATIVE CONTROLS

5.3 Unit Staff Qualifications

[5.3.1] Each member of the unit staff shall meet or exceed the minimum qualifications of [Regulatory Guide 1.8, Revision 2, 1987, or more recent revisions, or ANSI Standard acceptable to the NRC staff]. The staff not covered by [Regulatory Guide 1.8] shall meet or exceed the minimum qualifications of [Regulations, Regulatory Guides, or ANSI standards acceptable to NRC staff]. In addition, the Shift Technical Advisor shall meet the qualifications specified by the Commission Policy Statement on Engineering Expertise on Shift.

5.0 ADMINISTRATIVE CONTROLS

5.4 Training

5.4.1 A retraining and replacement training program for the unit staff shall be maintained under the direction of the [position title] and shall meet or exceed the requirements and recommendations of Section [ ] of [an ANSI standard acceptable to the NRC staff], 10 CFR 50.120, 10 CFR 55, and, for appropriate designated positions, shall include familiarization with relevant industry operational experience.

5.0 ADMINISTRATIVE CONTROLS

5.5 Reviews and Audits

{The licensee shall describe the method(s) established to conduct independent reviews and audits. The methods may take a range of forms acceptable to the NRC. These methods may include creating an organizational unit or a standing or ad hoc committee, or assigning individuals capable of conducting these reviews and audits. When an individual performs a review function, a cross disciplinary review determination is necessary. If deemed necessary, such reviews shall be performed by the review personnel of the appropriate discipline. Individual reviewers shall not review their own work. Regardless of the method used, the licensee shall specify the functions, organizational arrangement, responsibilities, appropriate ANSI/ANS 3.1-1981 qualifications, and reporting requirements of each functional element or unit that contributes to these processes. ~~A health physicist shall be appointed as a full time group member of independent review and audit groups.~~}

Reviews and audits of activities affecting plant safety have two distinct elements. The first element is the reviews performed by plant staff personnel to ensure that day to day activities are conducted in a safe manner. These reviews are described in Section 5.5.1. The second element, described in Section 5.5.2, is the [offsite] reviews and audits of unit activities and programs affecting nuclear safety that are performed independent of the plant staff. The [offsite] reviews and audits should provide integration of the reviews and audits into a cohesive program that provides senior level utility management with an assessment of facility operation and recommends actions to improve nuclear safety and plant reliability. It should include an assessment of the effectiveness of reviews conducted according to Section 5.5.1.

5.5.1 Plant Reviews

{The licensee shall describe provisions for plant reviews (organization, reporting, records) and the appropriate ANSI/ANS standard for personnel qualification.}

5.5.1.1 Functions

The [plant review method specified in Specification 5.5.1] shall, as a minimum, incorporate functions that:

a. Advise the [Plant Superintendent] on all matters related to nuclear safety;

b. Recommend to the [Plant Superintendent] approval or disapproval of items considered under Specifications 5.5.1.2.a through 5.5.1.2.f prior to their implementation, except as provided in Specification 5.7.1.3;

c. Determine whether each item considered under Specifications 5.5.1.2.a through 5.5.1.2.d constitutes an unreviewed safety question as defined in 10 CFR 50.59; and

(continued)

5.5.1.1 Functions (Continued)

d. Notify the [Vice President - Nuclear Operations] of any safety significant disagreement between the [review organization or individual specified in Specification 5.5.1] and the [Plant Superintendent] within 24 hours. However, the [Plant Superintendent] shall have responsibility for resolution of such disagreements pursuant to Specification 5.1.1.

5.5.1.2 Responsibilities

The [plant review method specified in Specification 5.5.1] shall be used to conduct, as a minimum, reviews of the following:

a. All proposed procedures required by Specification 5.7.1.1 and changes thereto;

b. All proposed programs required by Specification 5.7.2 and changes thereto;

c. All proposed changes and modifications to unit systems or equipment that affect nuclear safety;

d. All proposed tests and experiments that affect nuclear safety;

e. Review and documentation of judgment concerning prolonged operation with protection channels placed in bypass since the last [plant review meeting] and the repair of these channels; and

f. All proposed changes to these Technical Specifications (TS), their Bases, and the Operating License.

5.5.2 [Offsite] Review and Audit

{The licensee shall describe the provisions for reviews and audits independent of the plant's staff (organization, reporting, and records) and the appropriate ANSI/ANS standards for personnel qualifications. These individuals may be located onsite or offsite provided organizational independence from plant staff is maintained. The [technical] review responsibilities, Specification 5.5.2.4, shall include several individuals located onsite.}

5.5.2.1 Functions

The [offsite review and audit provisions specified in Specification 5.5.2] shall, as a minimum, incorporate the following functions that:

a. Advise the [Vice President - Nuclear Operations] on all matters related to nuclear safety;

(continued)

5.5.2.1 Functions (Continued)

b. Advise the management of the audited organization, and [its Corporate Management and Vice President - Nuclear Operations], of the audit results as they relate to nuclear safety;

c. Recommend to the management of the audited organization, and its management, any corrective action to improve nuclear safety and plant operation; and

d. Notify the [Vice President - Nuclear Operations] of any safety significant disagreement between the [review organization or individual specified in Specification 5.5.2] and the [organization or function being reviewed] within 24 hours.

5.5.2.2 [Offsite] Review Responsibilities

The [review method specified in Specification 5.5.2] shall be responsible for the review of:

a. The safety evaluations for changes to procedures, equipment, or systems, and tests or experiments completed under the provisions of 10 CFR 50.59, to verify that such actions do not constitute an unreviewed safety question as defined in 10 CFR 50.59;

b. Proposed changes to procedures, equipment, or systems that involve an unreviewed safety question as defined in 10 CFR 50.59;

c. Proposed tests or experiments that involve an unreviewed safety question as defined in 10 CFR 50.59;

d. Proposed changes to TS and the Operating License;

e. Violations of codes, regulations, orders, license requirements, and internal procedures or instructions having nuclear safety significance;

f. All Licensee Event Reports required by 10 CFR 50.73;

g. Plant staff performance;

h. Indications of unanticipated deficiencies in any aspect of design or operation of structures, systems, or components that could affect nuclear safety;

i. Significant accidental, unplanned, or uncontrolled radioactive releases, including corrective action to prevent recurrence;

j. Significant operating abnormalities or deviations from normal and expected performance of equipment that affect nuclear safety; and

(continued)

5.5.2.2 [Offsite] Review Responsibilities (Continued)

k. The performance of the corrective action system.

Reports or records of these reviews shall be forwarded to the [Vice President - Nuclear Operations] within 30 days following completion of the review.

5.5.2.3 Audit Responsibilities

The audit responsibilities shall encompass:

a. The conformance of unit operation to provisions contained within the TS and applicable license conditions;

b. The training and qualifications of the unit staff;

c. The implementation of all programs required by Specification 5.7.2;

d. Actions taken to correct deficiencies occurring in equipment, structures, systems, components, or method of operation that affect nuclear safety; and

e. Other activities and documents as requested by the [Vice President - Nuclear Operations].

Reports or records of these audits shall be forwarded to the [Vice President - Nuclear Operations] within 30 days following completion of the review.

5.5.2.4 [Technical] Review Responsibilities

The [technical] review responsibilities shall encompass:

a. Plant operating characteristics, NRC issuances, industry advisories, Licensee Event Reports, and other sources that may indicate areas for improving plant safety;

b. Plant operations, modifications, maintenance, and surveillance to verify independently that these activities are performed safely and correctly and that human errors are reduced as much as practical;

c. Internal and external operational experience information that may indicate areas for improving plant safety; and

d. Making detailed recommendations through the [Vice President - Nuclear Operations] for revising procedures, equipment modifications or other means of improving nuclear safety and plant reliability.

(continued)

5.5.3 Records

Written records of reviews and audits shall be maintained. As a minimum these records shall include:

a. Results of the activities conducted under the provisions of Section 5.5;

b. Recommendations to the management of the organization being audited;

c. An assessment of the safety significance of the review or audit findings;

d. Recommended approval or disapproval of items considered under Specifications 5.5.1.2.a through 5.5.1.2.f; and

e. Determination whether each item considered under Specifications 5.5.1.2.a through 5.5.1.2.e constitutes an unreviewed safety question as defined in 10 CFR 50.59.

5.0 ADMINISTRATIVE CONTROLS

5.6 Technical Specifications (TS) Bases Control

5.6.1 Changes to the Bases of the TS shall be made under appropriate administrative controls and reviewed according to Specification 5.5.1.

5.6.2 Licensees may make changes to Bases without prior NRC approval provided the changes do not involve either of the following:

a. A change in the TS incorporated in the license; or

b. A change to the updated SAR or Bases that involves an unreviewed safety question as defined in 10 CFR 50.59.

5.6.3 The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the SAR.

5.6.4 Proposed changes that meet the criteria of (a) or (b) above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71.

5.0 ADMINISTRATIVE CONTROLS

5.7 Procedures, Programs, and Manuals

5.7.1 Procedures

5.7.1.1 Scope

Written procedures shall be established, implemented, and maintained covering the following activities:

a. The applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978;

b. The emergency operating procedures required to implement the requirements of NUREG-0737 and to NUREG-0737, Supplement 1, as stated in [Generic Letter 82-33];

c. Security plan implementation;

d. Emergency plan implementation;

e. Quality assurance for effluent and environmental monitoring;

f. Fire Protection Program implementation; and

g. All programs specified in Specification 5.7.2.

{h. Modification of core protection calculator (CPC) addressable constants. These procedures shall include provisions to ensure that sufficient margin is maintained in CPC type I addressable constants to avoid excessive operator interaction with CPCs during reactor operation.

Modifications to the CPC software (including changes to algorithms and fuel cycle specific data) shall be performed in accordance with the most recent version of "CPC Protection Algorithm Software Change Procedure", CEN-39(A)-P, which has been determined to be applicable to the facility. Additions or deletions to CPC addressable constants or changes to addressable constant software limit values shall not be implemented without prior NRC approval.}

(continued)

5.7.1.2 Review and Approval

Each procedure of Specification 5.7.1.1, and changes thereto, shall be reviewed in accordance with Specification 5.5.1, approved by the [Plant Superintendent] or his designee in accordance with approved administrative procedures prior to implementation and reviewed periodically as set forth in administrative procedures.

5.7.1.3 Temporary Changes

Temporary changes to procedures of Specification 5.7.1 may be made provided:

a. The intent of the existing procedure is not altered;

b. The change is approved by two members of the plant management staff, at least one of whom holds a Senior Reactor Operator license on the unit affected; and

c. The change is documented and reviewed in accordance with Specification 5.5.1 and approved by the [Plant Superintendent] or his designee in accordance with approved administrative procedures within 14 days of implementation.

5.7.2 Programs and Manuals

The following programs shall be established, implemented, and maintained.

5.7.2.1 Radiation Protection Program

Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR 20 and shall be approved, maintained, and adhered to for all operations involving personnel radiation exposure.

5.7.2.2 Process Control Program (PCP)

The PCP shall contain the current formulas, sampling, analyses, tests, and determinations to be made to ensure that processing and packaging of solid radioactive wastes will be accomplished to ensure compliance with 10 CFR 20, 10 CFR 61, and 10 CFR 71; state regulations; burial ground requirements; and other requirements governing the disposal of solid radioactive waste.

Licensee initiated changes to the PCP:

a. Shall be documented and records of reviews performed shall be retained. This documentation shall contain:

(continued)

5.7.2.2 Process Control Program (PCP) (Continued)

4 TAB

1. Sufficient information to support the change(s) and appropriate analyses or evaluations justifying the change(s); and

   2. A determination that the change(s) maintain the overall conformance of the solidified waste product to the existing requirements of Federal, State, or other applicable regulations.

b. Shall be effective after review and acceptance by the [review method of Specification 5.5.1] and the approval of the [Plant Superintendent].

5.7.2.3 Offsite Dose Calculation Manual (ODCM)

a. The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of the Radiological Environmental Monitoring Program;

b. The ODCM shall also contain the Radioactive Effluent Controls and Radiological Environmental Monitoring programs required by Specification 5.7.2, and descriptions of the information that should be included in the Annual Radiological Environmental Operating, and ~~Semiannual~~ Annual Radioactive Effluent Release Reports required by Specification [5.9.1.3] and Specification [5.9.1.4].

Licensee initiated changes to the ODCM:

a. Shall be documented and records of reviews performed shall be retained as per Section 5.10.3. This documentation shall contain:

   1. Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s);

   2. A determination that the change(s) maintain the levels of radioactive effluent control required pursuant to 10 CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations.

b. Shall become effective after review and acceptance by the [review method of Specification 5.5.1] and the approval of the [Plant Superintendent],

(continued)

5.7.2.3 Offsite Dose Calculation Manual (ODCM) (Continued)

c. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the ~~Semi~~annual Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (i.e., month and year) the change was implemented.

5.7.2.4 Primary Coolant Sources Outside Containment

This program provides controls to minimize leakage from those portions of systems outside containment that could contain highly radioactive fluids during a serious transient or accident to levels as low as practicable. The systems include [the ~~Low Pressure Core Spray, High Pressure Core Spray, Residual Heat Removal, Reactor Core Isolation Cooling~~, Emergency Feedwater System, hydrogen recombiner, and process sampling~~, and Standby Gas Treatment~~]. The program shall include the following:

a. Preventive maintenance and periodic visual inspection requirements; and

b. Integrated leak test requirements for each system at refueling cycle intervals or less.

5.7.2.5 In Plant Radiation Monitoring

This program provides controls to ensure the capability to accurately determine the airborne iodine concentration in vital areas under accident conditions. This program shall include the following:

a. Training of personnel;

b. Procedures for monitoring; and

c. Provisions for maintenance of sampling and analysis equipment.

5.7.2.6 Post Accident Sampling

This program provides controls that ensure the capability to obtain and analyze reactor coolant, radioactive gases, and particulates in plant gaseous effluents and containment atmosphere samples under accident conditions in conformance with 10 CFR 50.34(f)(2)(viii). The program shall include the following:

a. Training of personnel;

b. Procedures for sampling and analysis; and

c. Provisions for maintenance of sampling and analysis equipment.

(continued)

5.7.2.7 Radioactive Effluent Controls Program

This program conforms to 10 CFR 50.36a for the control of radioactive effluents and for maintaining the doses to members of the public from radioactive effluents as low as reasonably achievable. The programs shall be contained in the ODCM, shall be implemented by operating procedures, and shall include remedial actions to be taken whenever the program limits are exceeded. The program shall include the following elements:

a. Limitations on the functional capability of radioactive liquid and gaseous monitoring instrumentation including surveillance tests and setpoint determination in accordance with the methodology in the ODCM;

b. Limitations on the concentrations of radioactive material released in liquid effluents to unrestricted areas, conforming to 10 times the concentration values in Appendix B, Table 2, Column 2 to 10 CFR 20.1001 - 20.2401.

c. Monitoring, sampling, and analysis of radioactive liquid and gaseous effluents pursuant to 10 CFR 20.1302 and with the methodology and parameters in the ODCM;

d. Limitations on the annual and quarterly doses or dose commitment to a member of the public from radioactive materials in liquid effluents released from each unit to unrestricted areas, conforming to 10 CFR 50, Appendix I;

e. Determination of cumulative and projected dose contributions from radioactive effluents for the current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCM at least every 31 days;

f. Limitations on the functional capability and use of the liquid and gaseous effluent treatment systems to ensure that appropriate portions of these systems are used to reduce releases of radioactivity when the projected doses in a period of 31 days would exceed 2% of the guidelines for the annual dose or dose commitment, conforming to 10 CFR 50, Appendix I;

g. Limitations on the dose rate resulting from radioactive material released in gaseous effluents to areas at or beyond the site boundary shall be limited to the following:

   1. For noble gases: less than or equal to a dose rate of 500 mrem/yr to the total body and less than or equal to a dose rate of 3000 mrem/yr to the skin; and

   2. For iodine-131, tritium, and for radionuclides in particular form with half-lives greater than 8 days: less than or equal to a dose rate of 1500 mrem/yr to any organ;

(continued)

5.7.2.7 Radioactive Effluent Controls Program (Continued)

h. Limitations on the annual and quarterly air doses resulting from noble gases released in gaseous effluents from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I;

i. Limitations on the annual and quarterly doses to a member of the public from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives > 8 days in gaseous effluents released from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I; and

j. Limitations on the annual dose or dose commitment to any member of the public due to releases of radioactivity and to radiation from uranium fuel cycle sources, conforming to 40 CFR 190.

5.7.2.8 Radiological Environmental Monitoring Program

This program is for monitoring the radiation and radionuclides in the environs of the plant. The program shall provide representative measurements of radioactivity in the highest potential exposure pathways and verification of the accuracy of the effluent monitoring program and modeling of environmental exposure pathways. The program shall be contained in the ODCM, shall conform to the guidance of 10 CFR 50, Appendix I, and shall include the following:

a. Monitoring, sampling, analysis, and reporting of radiation and radionuclides in the environment in accordance with the methodology and parameters in the ODCM;

b. A Land Use Census to ensure that changes in the use of areas at and beyond the site boundary are identified and that modifications to the monitoring program are made if required by the results of this census; and

c. Participation in an Interlaboratory Comparison Program to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring.

5.7.2.9 Component Cyclic or Transient Limit

This program provides controls to track the CESSAR-DC, Chapter 3 cyclic and transient occurrences to ensure that components are maintained within the design limits.

5.7.2.10 Inservice Inspection Program

This program provides controls for inservice inspection of ASME Code Class 1, 2, and 3 components, including applicable supports. The program shall include the following:

(continued)

5.7.2.10 Inservice Inspection Program (Continued)

a. Provisions that inservice inspection of ASME Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda, as required by 10 CFR 50.55a;

b. Provisions for safety-related snubbers in accordance with 10 CFR 50.55a. The only snubbers excluded from this requirement are installed on nonsafety-related systems and then only if their failure, or failure of the system on which they are installed, would not have an adverse effect on any safety-related system.

The provisions of SR 3.0.2 are applicable to the frequencies for performing inservice inspection activities;

c. Inspection of each reactor coolant pump flywheel per the recommendations of regulation position c.4.b of Regulatory Guide 1.14, Revision 1, August 1975; and

d. Nothing in the ASME Boiler and Pressure Vessel code shall be construed to supersede the requirements of any TS.

5.7.2.11 Inservice Testing Program

This program provides controls for inservice testing of safety-related components including applicable supports. The program shall include the following:

a. Provisions that inservice testing of safety-related pumps, valves, and snubbers shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50.55a;

b. Provisions for safety-related snubbers in accordance with 10 CFR 50.55a. Safety-related snubbers include those installed on safety-related components and those installed on nonsafety-related components if their failure or failure of the component on which they are installed would have an adverse effect on any safety-related system;

(continued)

5.7.2.11 Inservice Testing Program (Continued)

c. Testing frequencies specified in Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as follows:

ASME Boiler and Pressure Vessel Code and applicable Addenda terminology for inservice testing activities	Required frequencies for performing inservice testing activities
Weekly	At least once per 7 days
Monthly	At least once per 31 days
Quarterly or every 3 months	At least once per 92 days
Semiannually or every 6 months	At least once per 184 days
Every 9 months	At least once per 276 days
Yearly or annually	At least once per 366 days
Biennially or every 2 years	At least once per 731 days

d. The provisions of SR 3.0.2 are applicable to the above required Frequencies for performing inservice testing activities;

e. The provisions of SR 3.0.3 are applicable to inservice testing activities; and

f. Nothing in the ASME Boiler and Pressure Vessel Code shall be construed to supersede the requirements of any TS.

5.7.2.12 Steam Generator (SG) Tube Surveillance Program

Each SG shall be demonstrated OPERABLE by performance of an inservice inspection program. The program shall include the following:

a. SG tube sample size selection, sample size expansion, and inspection results classification criteria. Sample selection and testing shall be in accordance with [Regulatory Guide 1.83], Revision [ ], date].

b. The establishment of SG tube inspection frequency dependent upon inspection result classification. Inspection frequency shall be in accordance with [Regulatory Guide 1.83], Revision [ ], date].

c. SG tube plugging/repair limits. These limits shall be [40]% of the nominal tube wall thickness consistent with [Regulatory Guide 1.83], Revision [ ], date].

(continued)

5.7.2.12 Steam Generator (SG) Tube Surveillance Program (Continued)

d. Specific definitions and limits for SG tube inservice inspection acceptance criteria consistent with [Regulatory Guide 1.83], Revision [ ], date].

The content and frequency of written reports shall be in accordance with Specification 5.9.2.

The provisions of SR 3.0.2 are applicable to SG Tube Surveillance Program inspection frequencies except those established by Category C-3 inspection results.

5.7.2.13 Secondary Water Chemistry

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation and low pressure turbine disc stress corrosion cracking. The program shall include:

a. Identification of a sampling schedule for the critical variables and control points for these variables;

b. Identification of the procedures used to measure the values of the critical variables;

c. Identification of process sampling points which shall include monitoring the discharge of the condensate pumps for evidence of condenser in leakage;

d. Procedures for the recording and management of data;

e. Procedures defining corrective actions for all off control point chemistry conditions; and

f. A procedure identifying the authority responsible for the interpretation of the data and the sequence and timing of administrative events, which is required to initiate corrective action.

5.7.2.14 Ventilation Filter Testing Program (VFTP)

A program shall be established to implement the following required testing of Engineered Safety Feature (ESF) filter ventilation systems at the frequencies specified in [Regulatory Guide 1.52], and in accordance with [Regulatory Guide 1.52, Revision 2, and ASME N510-1989] at the system flowrate specified below [± 10%].

(continued)

5.7.2.14 Ventilation Filter Testing Program (VFTP) (continued)

a. Demonstrate for each of the ESF systems that an inplace test of the high efficiency particulate air (HEPA) filters shows a penetration and system bypass < [0.05]% when tested in accordance with [Regulatory Guide 1.52, Revision 2, and ASME N510-1989, at the system flowrate specified as follows [± 10%]:

ESF Ventilation System	Flowrate
[Subsphere Building Fuel Building Exhaust Control Complex Annulus]	[*]

b. Demonstrate for the Control Complex Ventilation System that an inplace test of the charcoal absorber shows a penetration and system bypass < [0.5]% when tested in accordance with [Regulatory Guide 1.52, Revision 2, and ASME N510-1989] at the system flowrate specified as follows [± 10%]:

	Flowrate
[Control Complex]	[*]

c. Demonstrate for the Control Complex Ventilation System that a laboratory test of a sample of the charcoal absorber, when obtained as described in [Regulatory Guide 1.52, Revision 2], shows the methyl iodide penetration less than the value specified below when tested in accordance with [ASTM D3803-1989] at a temperature of ≤ [30°C] and greater than or equal to the relative humidity (RH) specified as follows:

	Penetration	RH
[Control Complex]	[*]	[*]

(continued)

*Values to be determined by system detail design.

5.7.2.14 Ventilation Filter Testing Program (VFTP) (Continued)

d. For each of the ESF systems, demonstrate the pressure drop across the combined HEPA filters, the prefilters, and the charcoal absorbers is less than the value specified below when tested in accordance with [Regulatory Guide 1.52, Revision 2, and ASME N510-1989] at the system flowrate specified as follows [± 10%]:

ESF Ventilation System	Delta P	Flowrate
[Subsphere Building Fuel Building Exhaust Control Complex Annulus]	[*]	[*]

e. [Demonstrate that the heaters for each of the ESF systems dissipate the following specified value [± 10%] when tested in accordance with [ASME N510-1989]:]

ESF Ventilation System	Wattage
[Subsphere Building Fuel Building Exhaust Control Complex Annulus]	[*]

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the VFTP test frequencies.

5.7.2.15 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides control for potentially explosive gas mixtures contained in the [Waste Gas Holdup System], [the quantity of radioactivity contained in gas storage tanks or fed into the offgas treatment system, and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks]. The gaseous radioactivity quantities shall be determined following the methodology in [Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure"]. The liquid radwaste quantities shall be determined in accordance with [Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures"].

(continued)

*Values to be determined by system detail design.

5.7.2.15 Explosive Gas and Storage Tank Radioactivity Montoring Program (Continued)

The program shall include:

a. The limits for the concentrations of hydrogen and oxygen in the [Waste Gas Holdup System] and a surveillance program to ensure the limits are maintained. Such limits shall be appropriate to the system's design criteria (i.e., whether or not the system is designed to withstand a hydrogen explosion);

b. A surveillance program to ensure that the quantity of radioactivity contained in [each gas storage tank and fed into the offgas treatment system] is less than the amount that would result in a whole body exposure of ≥ 0.5 rem to any individual in an unrestricted area, in the event of [an uncontrolled release of the tanks' contents]; and

c. A surveillance program to ensure that the quantity of radioactivity contained in all outdoor liquid radwaste tanks that are not surrounded by liners, dikes, or walls, capable of holding the tanks' contents and that do not have tank overflows and surrounding area drains connected to the [Liquid Radwaste Treatment System] is less than the amount that would result in concentrations less than the limits of 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply and the nearest surface water supply in an unrestricted area, in the event of an uncontrolled release of the tanks' contents.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Explosive Gas and Storage Tank Radioactivity Monitoring Program surveillance frequencies.

5.7.2.16 Diesel Fuel Oil Testing Program

A diesel fuel oil testing program to implement required testing of both new fuel oil and stored fuel oil shall be established. The program shall include sampling and testing requirements, and acceptance criteria, all in accordance with applicable ASTM standards. The purpose of the program is to establish the following:

a. Acceptability of new fuel oil for use prior to addition to storage tanks by determining that the fuel oil has:

    1. An API gravity or an absolute specific gravity within limits;

    2. A flash point and kinematic viscosity within limits for ASTM 2D fuel oil;

    3. A clear and bright appearance with proper color.

(continued)

5.7.2.16 Diesel Fuel Oil Testing Program (Continued)

b. Other properties for ASTM 2D fuel oil are within limits within 30 days following sampling and addition to storage tanks.

c. Total particulate concentration of the fuel oil is ~~within limits~~ ≤ 10mg/L when tested every 31 days in accordance with ASTM D-2276, Method A-2 or A-3.

5.7.2.17 Fire Protection Program

This program provides controls to ensure that appropriate fire protection measures are maintained to protect the plant from fire and to ensure the capability to achieve and maintain safe shutdown in the event of a fire is maintained.

5.7.2.18 Common Mode Failure Evaluation Program

This program provides controls to ensure that appropriate software and hardware evaluation procedures, to protect the plant from common mode failure, are established to ensure that redundant system capability is not adversely affected. This program shall evaluate the cause of the inoperability, the affected components, and the plans and schedule for completing proposed remedial actions. If a determination is made that a common mode failure exists within independent channels or independent systems credited to provide functions controlled by Technical Specifications, then a Special Report shall be submitted in accordance with Specification [5.9.2.f].

5.0 ADMINISTRATIVE CONTROLS

5.8 Safety Function Determination Program (SFDP)

5.8.1 This program ensures loss of safety function is detected and appropriate actions taken. Upon failure to meet two or more LCOs at the same time, an evaluation shall be made to determine if loss of safety function exists. Additionally, other appropriate limitations and remedial or compensatory actions may be identified to be taken as a result of the support system inoperability and corresponding exception to entering supported system Condition and Required Actions. This program implements the requirements of LCO 3.0.6.

5.8.2 The SFDP shall contain the following:

a. Provisions for cross train checks to ensure a loss of the capability to perform the safety function assumed in the accident analysis does not go undetected.

b. Provisions for ensuring the plant is maintained in a safe condition if a loss of function condition exists.

c. Provisions to ensure that an inoperable supported system's Completion Time is not inappropriately extended as a result of multiple support system inoperabilities.

d. Other appropriate limitations and remedial or compensatory actions.

5.8.3 A loss of safety function exists when, assuming no concurrent single failure, a safety function assumed in the accident analysis cannot be performed. For the purpose of this program, a loss of safety function may exist when a support system is inoperable, and:

a. A required system redundant to system(s) supported by the inoperable support system is also inoperable; or

b. A required system redundant to system(s) in turn supported by the inoperable supported system is also inoperable; or

c. A required system redundant to support system(s) for the supported systems (a) and (b) above is also inoperable.

(continued)

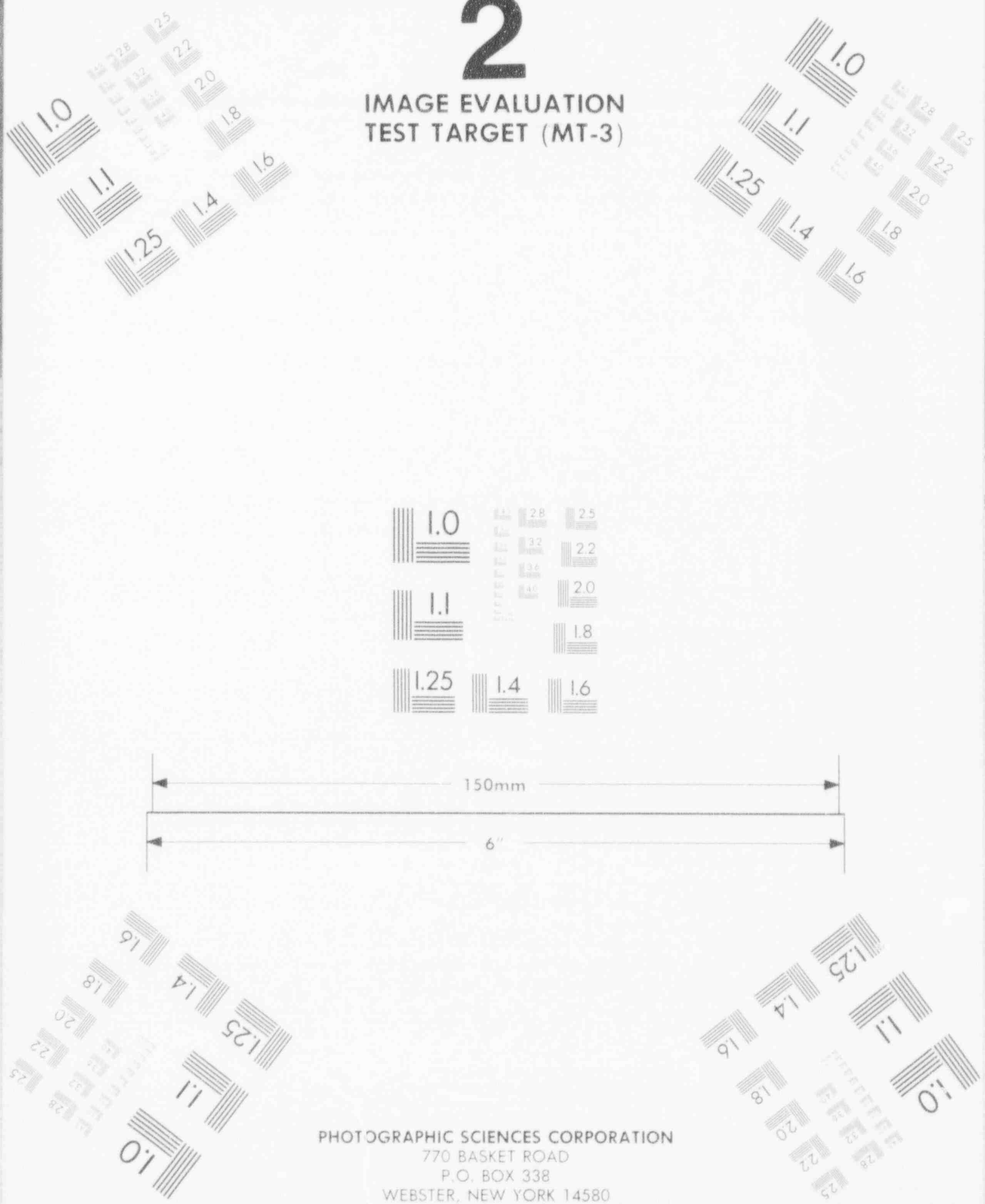
Generic Example:

Train A		Train B	
System i		System i	←Case C
↓		↓	
System ii	←(Support System	System ii	
↓	Inoperable)	↓	
System iii		System iii	←Case A
↓		↓	
System iv		System iv	←Case B

5.8.4 The Safety Function Determination Program identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

2

IMAGE EVALUATION TEST TARGET (MT-3)



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WEBSTER, NEW YORK 14580
(716) 265-1600

2

IMAGE EVALUATION
TEST TARGET (MT-3)

150mm

6″

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2

IMAGE EVALUATION TEST TARGET (MT-3)

1.0 1.1 1.25 1.4 1.6 1.8 2.0 2.2 2.5 2.8 3.2 3.6 4.0

150mm

6"

PHOTOGRAPHIC SCIENCES CORPORATION
770 BASKET ROAD
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(716) 265-1600

2

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6"

2

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6"

5.0 ADMINISTRATIVE CONTROLS

5.9 Reporting Requirements

5.9.1 Routine Reports

The following reports shall be submitted in accordance with 10 CFR 50.4.

5.9.1.1 Startup Report

A summary report of plant startup and power escalation testing shall be submitted following:

a. Receipt of an Operating License;

b. Amendment to the license involving a planned increase in power level;

c. Installation of fuel that has a different design or has been manufactured by a different fuel supplier; and

d. Modifications that may have significantly altered the nuclear, thermal, or hyd---lic performance of the unit.

The initial Startup Report shall address each of the startup tests identified in CESSAR-DC, Chapter 14, and shall include a description of the measured values of the operating conditions or characteristics obtained during the test program and a comparison of these values with design predictions and specifications. Any corrective actions that were required to obtain satisfactory operation shall also be described. Any additional specific details required in license conditions based on other commitments shall be included in this report. Subsequent Startup Reports shall address startup tests that are necessary to demonstrate the acceptability of changes and modifications.

Startup Reports shall be submitted within 90 days following completion of the Startup Test Program; 90 days following resumption or commencement of commercial power operation; or 9 months following initial criticality, whichever is earliest. If the Startup Report does not cover all three events (i.e., initial criticality, completion of Startup Test Program, and resumption or commencement of commercial operation), supplementary reports shall be submitted at least every 3 months until all three events have b[illegible] completed.

(continued)

5.9.1.2 Annual Reports

---NOTE---
A single submittal may be made for a multiple unit station. The submittal should combine sections common to all units at the station.

Annual Reports covering the activities of the unit as described below for the previous calendar year shall be submitted by March 31 of each year. [The initial report shall be submitted by March 31 of the year following initial criticality.]

Reports required on an annual basis include:

a. Occupational Radiation Exposure Report

The tabulation on an annual basis of the number of station, utility, and other personnel (including contractors) receiving exposures > 100 mrem/yr and their associated man rem exposure according to work and job functions (e.g., reactor operations and surveillance, inservice inspection, routine maintenance, special maintenance [describe maintenance], waste processing, and refueling). This tabulation supplements the requirements of 10 CFR 20.2206. The dose assignments to various duty functions may be estimated based on pocket dosimeter, thermoluminescent dosimeter (TLD), or film badge measurements. Small exposures totalling < 20% of the individual total dose need not be accounted for. In the aggregate, at least 80% of the total whole body dose received from external sources should be assigned to specific major work functions; and

[b. Any other unit unique reports required on an annual basis.]

5.9.1.3 Annual Radiological Environmental Operating Report

---NOTE---
A single submittal may be made for a multiple unit station. The submittal should combine sections common to all units at the station.

The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the Radiological Environmental Monitoring Program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

prior to ,1

(continued)

5.9.1.3 Annual Radiological Environmental Operating Report (continued)

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. [The report shall identify the thermoluminescent dosimeter (TLD) results that represent collocated dosimeters in relation to the NRC TLD program and the exposure period associated with each result.] In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

5.9.1.4 Radioactive Effluent Release Report

-----NOTE-----
A single submittal may be made for a multiple unit station. The submittal should combine sections common to all units at the station; however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit.

The Radioactive Effluent Release Report covering the operation of the unit during the previous year shall be submitted prior to May 1 of each year in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODMC and Process Control Program (PCP) and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

5.9.1.5 Monthly Operating Reports

Routine reports of operating statistics and shutdown experience[, including documentation of all challenges to the pressurizer safety valves,] shall be submitted on a monthly basis no later than the 15th of each month following the calendar month covered by the report.

5.9.1.6 Core Operating Limits Report (COLR)

a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

[The individual specifications that address core operating limits must be referenced here.]

(continued)

5.9.1.6 Core Operating Limits Report (COLR) (continued)

b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

   [Identify the Topical Report(s) by number, title, date, and NRC staff approval document, or identify the staff Safety Evaluation Report for a plant specific methodology by NRC letter and date.]

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling System (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any mid cycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.9.1.7 RCS Pressure and Temperature Limits Report (PTLR)

RCS pressure and temperature limits, including heatup and cooldown rates, # criticality, and hydrostatic and leak test limits, shall be established and documented in the PTLR. The analytical methods used to determine the pressure and temperature limits including the heatup and cooldown rates shall be those previously reviewed and approved by the NRC in [Topical Report(s), number, title, date, and NRC staff approval document, or staff safety evaluation report for a plant specific methodology by NRC letter and date]. The reactor vessel pressure and temperature limits, including those for heatup and cooldown rates, shall be determined so that all applicable limits (e.g., heatup limits, cooldown limits, and inservice leak and hydrostatic testing limits) of the analysis are met. The PTLR, including revisions or supplements thereto, shall be provided upon issuance for each reactor vessel fluency period.

5.9.2 Special Reports

Insert →

Special Reports shall be submitted in accordance with 10 CFR 50.4 within the time period specified for each report.

The following Special Reports shall be submitted:

a. In the event an ECCS is actuated and injects water into the RCS in MODE 1, 2, or 3, a Special Report shall be prepared and submitted within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70;

(continued)

Special Reports may be required covering inspection, test, and maintenance activities. These special reports are determined on an individual basis for each unit and their preparation and submittal are designated in the Technical Specifications.

5.9.2 Special Reports (Continued)

b. If an individual emergency diesel generator (EDG) experiences 4 or more valid failures in the last 25 demands, these failures and any non valid failures experienced by that EDG in that time period shall be reported within 30 days. Reports on EDG failures shall include the information recommended in Regulatory Guide 1.9, Revision 3, Regulatory Position C.5, or existing Regulatory Guide 1.108 reporting requirement; and

c. When a Special Report is required by Condition B, F, or G of LCO 3.3.11, "Post Accident Monitoring Instrumentation (PAMI)," a report shall be submitted within 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the function to OPERABLE status.

d. Following each inservice inspection of steam generator (SG) tubes, in accordance with the SG Tube Surveillance Program, the number of tubes plugged and tubes sleeved in each SG shall be reported to the NRC within 15 days.

The complete results of the SG tube inservice inspection shall be submitted to the NRC within 12 months following the completion of the inspection. The report shall include:

1. Number and extent of tubes inspected,

2. Location and percent of wall-thickness penetration for each indication of an imperfection, and

3. Identification of tubes plugged and tubes sleeved.

Results of SG tube inspections which fall into Category C-3 shall be reported to the NRC prior to resumption of plant operation. This report shall provide a description of investigations conducted to determine cause of the tube degradation and corrective measures taken to prevent recurrence.

e. When a special report is required by Section 5.7.2.18, "Common Mode Failure Program," a report shall be submitted to the NRC within 30 days. The report shall include a description of the cause of the failure, the affected components, and plans and schedule for completing proposed remedial activities.

5.0 ADMINISTRATIVE CONTROLS

5.10 Record Retention

5.10.1 The following records shall be retained for at least 3 years:

a. All License Event Reports required by 10 CFR 50.73;

b. Records of changes made to the procedures required by Specification 5.7.1.1; and

c. Records of radioactive shipments.

5.10.2 The following records shall be retained for at least 5 years:

a. Records and logs of unit operation covering time intervals at each power level;

b. Records and logs of principal maintenance activities - inspections, repair, and replacement of principal items of equipment related to nuclear safety;

c. Records of surveillance activities, inspections, and calibrations required by the Technical Specifications (TS) and the Fire Protection Program;

d. Records of sealed source and fission detector leak tests and results; and

e. Records of annual physical inventory of all sealed source material of record.

5.10.3 The following records shall be retained for the duration of the unit Operating License:

a. Records and drawing changes reflecting unit design modifications made to systems and equipment described in the SAR;

b. Records of new and irradiated fuel inventory, fuel transfers, and assembly burnup histories;

c. Records of radiation exposure for all individuals entering radiation control areas;

d. Records of gaseous and liquid radioactive material released to the environs;

e. Records of transient or operational cycles for those unit components identified in CESSAR-DC, Chapter 3;

f. Records of reactor tests and experiments;

g. Records of training and qualification for current members of the unit staff;

(continued)

5.10.3 (Continued)

h. Records of inservice inspections performed pursuant to the TS;

i. Records of quality assurance activities required by the Operational Quality Assurance (QA) Manual not listed in Specification 5.10.1 and which are classified as permanent records by applicable regulations, codes, and standards;

j. Records of reviews performed for changes made to procedures, equipment, or reviews of tests and experiments pursuant to 10 CFR 50.59;

k. Records of the reviews and audits required by Specification 5.5.1 and Specification 5.5.2;

l. Records of the service lives of all hydraulic and mechanical snubbers required by document where snubber requirements relocated to, including the date at which the service life commences, and associated installation and maintenance records;

m. Records of secondary water sampling and water quality;

n. Records of analyses required by the Radiological Environmental Monitoring Program that would permit evaluation of the accuracy of the analysis at a later date (these records should include procedures effective at specified times and QA records showing that these procedures were followed);

o. Records of reviews performed for changes made to the Offsite Dose Calculation Manual and the Process Control Program;

p. Records of steam generator tube surveillances.

5.0 ADMINISTRATIVE CONTROLS

5.11 High Radiation Area

As provided in paragraph 20.1601 (c) of 10 CFR Part 20, the following controls shall be applied to high radiation areas in place of the controls required by paragraphs 20.1601 (a) and (b) of 10 CFR Part 20:

5.11.1 High Radiation Areas with Dose Rates not Exceeding 1.0 rem/hour:*

A. Each entryway to such an area shall be barricaded and conspicuously posted as a high radiation area. Such barricades may be breached only during periods of personnel entry or exit.

B. Access to, and activities in, each such area shall be controlled by means of a Radiation Work Permit (RWP) or equivalent that includes specification of radiation dose rates in the immediate work area(s) and other appropriate radiation protection equipment and measures.

C. Individuals qualified in radiation protection procedures (e.g., health physics technicians) and personnel continuously escorted by such individuals may be exempted from the requirement for an RWP or equivalent while performing their assigned duties provided that they are following plant radiation protection procedures for entry to, exit from, and work in such areas.

D. Each individual (whether alone or in a group) entering such an area shall possess:

(i) A radiation monitoring device that continuously displays radiation dose rates in the area ("radiation monitoring and indicating device"); or

(ii) A radiation monitoring device that continuously integrates the radiation dose rates in the area and alarms when the device's dose alarm setpoint is reached ("alarming dosimeter"), with an appropriate alarm setpoint, or

(iii) A radiation monitoring device that continuously transmits dose rate and cumulative dose information to a remote receiver monitored by radiation protection personnel responsible for controlling personnel radiation exposure within the area, or

(iv) A self-reading dosimeter and,

(a) Be under the surveillance, as specified in the RWP, while in the area, of an individual at the work site, qualified in radiation protection procedures, equipped with a radiation monitoring and indicating device who is responsible for controlling personnel radiation exposure within the area, or

(continued)

5.11.1 High Radiation Areas with Dose Rates not Exceeding 1.0 rem/hour (continued)

(b) Be under the surveillance, as specified in the RWP, while in the area, by means of closed circuit television, of personnel qualified in radiation protection procedures, responsible for controlling personnel radiation exposure in the area.

E. Entry into such areas shall be made only after dose rates in the area have been determined and entry personnel are knowledgeable of them.

5.11.2 High Radiation Areas with Dose Rates Greater than 1.0 rem/hour, * but less than 500 rads/hour;**

A. Each entryway to such an area shall be conspicuously posted as a high radiation area and shall be provided with a locked door or gate that prevents unauthorized entry, and in addition:

(i) All such door and gate keys shall be maintained under the administrative control of the shift foreman or the health physics supervisor on duty.

(ii) Doors and gates shall remain locked except during periods of personnel entry or exit.

B. Access to, and activities in, each such area shall be controlled by means of an RWP or equivalent that includes specification of radiation dose rates in the immediate work area(s) and other appropriate radiation protection equipment and measures.

C. Individuals qualified in radiation protection procedures may be exempted from the requirement for an RWP or equivalent while performing radiation surveys in such areas provided that they are following plant radiation protection procedures for entry to, exit from, and work in such areas.

D. Each individual (whether alone or in a group) entering such an area shall possess:

(i) An alarming dosimeter with an appropriate alarm setpoint, or

(ii) A radiation monitoring device that continuously transmits dose rates and cumulative dose information to a remote receiver monitored by radiation protection personnel responsible for controlling personnel radiation exposure within the area with the means to communicate with and control every individual in the area, or

(iii) A self-reading dosimeter and,

(a) Be under the surveillance, as specified in the RWP or equivalent, of an individual qualified in radiation protection procedures, equipped with a radiation monitoring and indicating device who is responsible for controlling personnel exposure within the area, or

(continued)

5.11.2 High Radiation Areas with Dose Rates Greater than 1.0 rem/hour, but less than 500 rads/hour (Continued)

(b) Be under the surveillance, as specified in the RWP or equivalent, by means of closed circuit television, of personnel qualified in radiation protection procedures, responsible for controlling personnel radiation exposure in the area, and with the means to communicate with and control every individual in the area.

E. Entry into such areas shall be made only after dose rates in the area have been determined and entry personnel are knowledgeable of them.

F. Such individual areas that are within a larger area that is controlled as a high radiation area, where no enclosure exists for purpose of locking and where no enclosure can reasonably be constructed around the individual area need not be controlled by a locked door or gate, but shall be barricaded, conspicuously posted as a high radiation area, and marked by a conspicuous flashing light activated at the area as a warning device which is clearly visible from all access points to the area.

* At 30 centimeters (12 inches) from the radiation source or from any surface penetrated by the radiation.

** At 1 meter from the radiation source or from any surface penetrated by the radiation.