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GNRO-2011/00072

September 12, 2011

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

SUBJECT: Technical Requirements Manual and Technical Specification Bases Update
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

Pursuant to Grand Gulf Nuclear Station (GGNS) Technical Requirements Manual Section 1.04, Entergy Operations, Inc. hereby submits an update of all changes made to the GGNS Technical Requirements Manual since the last submittal (GNRO 2010-00042 dated May 27, 2010). Additionally, Technical Specification Bases are submitted, for all changes made since the last submittal (GNRO 2010-00042 dated May 27, 2010), in accordance with GGNS Technical Specification 5.5.11. These updates are consistent with update frequency listed in 10CFR50.71(e).

This letter does not contain any commitments.

Should you have any questions, please contact Dennis M. Coulter at (601) 437-6595.

Sincerely,

CLP/DMC

Attachment: GGNS Technical Requirements Manual and Technical Specification Bases Revised Pages

cc: (See Next Page)

cc: NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

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Attachment to GNRO 2011-00072

GGNS Technical Requirements Manual and Technical Specification Bases Revised Pages

Grand Gulf Technical Requirements Manual (TRM) Revised Pages

LBDCR #	Affected TRM Pages	Topic of Change
05015	3.3-8-II, 3.3-28-I	Redefined the turbine stop valve closure scram bypass, the turbine control valve fast closure scram bypass and end-of-cycle recirculation pump trip bypass allowable values in terms of percent rated thermal power instead of percent valves wide open steam flow
05027	3.6-8-I	Revised the primary containment airlock low pressure set point from 61 to 60 psig. Revises minimum allowable pressure from 59.1 to 59 psig
05080	3.3-18-II	Revised control rod block instrumentation (low power and high power) trip set points
09033	6.8-10	Added On Line Noble Chemistry circuit breaker to table of primary containment penetration conductor over current protective devices
10042	7-1	Changed title of shift supervisor to control room supervisor
11010	6.3-18	Changed frequency of turbine mechanical over-speed operability surveillance
11047	3.3-43-II, 3.3-43-III, 3.3-43-IIIa, 3.3-47-I	Implemented TS Amendment 185 incorporating TSTF 493 clarifying condensate storage tank level-low set-point methodology

Grand Gulf Technical Specification Bases
Revised Pages

LBDCR #	Affected Bases Pages	Topic of Change
05015	B 3.3-15, B 3.3-16, B 3.3-70	Redefined the turbine stop valve closure scram bypass, the turbine control valve fast closure scram bypass and end-of-cycle recirculation pump trip bypass allowable values in terms of percent rated thermal power instead of percent valves wide open steam flow
10030	B 3.6-78, B 3.6-79, B 3.6-79a, B 3.6-80, B 3.6-81	Revised the use of hydrogen recombiners as detailed in the current technical specifications and allowed by Tech Spec Traveler Form (TSTF) 478
10031	B 3.6-104	Revised the Bases to allow a pressure decay test of drywell bypass leakage and allow a nominal start pressure of 3.0 +/- 0.05 psid for conducting the test
11003	B 3.6-8, B 3.6-8a, B 3.6-108, B 3.6-108a	Clarified that the bulkheads associated with Containment and Drywell Airlock doors are considered part of the doors
11044	B 3.4-9	Added note concerning minor drifting of recirculation flow control valves
11047	B 3.3-87, B 3.3-87a, B 3.3-87b, B 3.3-87c, B 3.3-93, B 3.3-94, B 3.3-122, B 3.3-122a, B 3.3-122b, B 3.3-123, B 3.3-124, B 3.3-125, B 3.3-125a, B 3.3-125b, B 3.3-125c, B 3.3-134, B 3.3-134a, B 3.3-135	Implementation of TS Amendment 185 incorporating TSTF 493 clarifying condensate storage tank level-low set-point methodology
11049	B 3.8-58	Added the letter “B” to the page number indicating a TS bases page

TABLE TR3.3.1.1-1

TECHNICAL SPECIFICATION REACTOR PROTECTION SYSTEM
TRIP SETPOINTS AND RESPONSE TIMES

FUNCTIONAL UNIT	TRIP SETPOINT	RESPONSE TIMES (SECONDS)
11. Reactor Mode Switch Shutdown Position	NA	NA
12. Manual Scram	NA	NA

NOTES

(a) This function is automatically bypassed at or below an Allowable Value of ≤36% RTP equivalent turbine first stage pressure.

(b) $T_L = T_X + T_C$; where:

T_L = Measured total response time of the RPS system instrumentation

T_X = Response time of the channel sensor

T_C = Measured response time of the logic circuit excluding the channel sensor

The given numerical value is the acceptance criterion for T_L.

In case the sensor is replaced or refurbished, a hydraulic response time test must be performed to determine a revised value for T_X. Note: In EPRI NP-7243, the failure modes and effects analysis (FMEA) for Rosemount differential pressure transmitters and pressure transmitters states, "For transmitters without the variable damping feature, no electronic failure modes were found that could affect the sensor response time." Therefore, for transmitters without variable damping, response time testing is not required following replacement of the electronics.

(c) Trip setpoint values for Function 2.d are specified in the COLR.

(d) Not including simulated thermal power time constant.

* See Bases Figure B 3.3.1.1

** Measure from start of turbine control valve fast closure.

\# Response time shall be measured from detector output or from the input of the first electronic component in the channel.

TABLE TR3.3.2.1-1

TECHNICAL SPECIFICATION CONTROL ROD BLOCK INSTRUMENTATION TRIP SETPOINTS

---NOTES---

The below Functions control when different ranges of Control Rod Block Instrumentation are in service.

FUNCTION	TRIP SETPOINT
1. Low Power Setpoint	26% RTP, ± 2% RTP
2. High Power Setpoint	62% RTP, ± 2% RTP

TABLE TR3.3.4.1-1

TECHNICAL SPECIFICATION END OF CYCLE RECIRCULATION PUMP TRIP INSTRUMENTATION
TRIP SETPOINTS AND RESPONSE TIMES

FUNCTION	TRIP SETPOINT	RESPONSE TIMES (MILLISECONDS)
1. Turbine Stop Valve - Closure	≥ 40 psig (a)	≤ 190
2. Turbine Control Valve - Fast Closure	≥ 46.0 psig (a)	≤ 190

(a) This function is automatically bypassed at or below an Allowable Value of ≤36% RTP equivalent turbine first stage pressure.

TABLE TR3.3.5.1-1

TECHNICAL SPECIFICATION EMERGENCY CORE COOLING SYSTEM
TRIP SETPOINTS AND RESPONSE TIMES

FUNCTION		TRIP SETPOINT
1.	Low Pressure Coolant Injection-A (LPCI) and Low Pressure Core Spray (LPCS) Subsystems	
a.	Reactor Vessel Water Level - Low Low Low, Level 1	≥ -150.3 inches*
b.	Drywell Pressure - High	≤ 1.39 psig
c.	LPCI Pump A Start - Time Delay Relay	≤ 5 seconds
d.	Reactor Vessel Pressure - Low (Injection Permissive)	516 psig, decreasing
e.	LPCS Pump Discharge Flow - Low (Bypass)	≥ 1315 gpm
f.	LPCI Pump A Discharge Flow - Low (Bypass)	≥ 1154 gpm
g.	Manual Initiation	NA
2.	LPCI B and LPCI C Subsystems	
a.	Reactor Vessel Water Level - Low Low Low, Level 1	≥ -150.3 inches*
b.	Drywell Pressure - High	≤ 1.39 psig
c.	LPCI Pump B Start - Time Delay Relay	≤ 5 seconds
d.	Reactor Vessel Pressure - Low (Injection Permissive)	516 psig, decreasing
e.	LPCI Pump B and LPCI Pump C Discharge Flow - Low (Bypass)	≥ 1154 gpm
f.	Manual Initiation	NA
3.	High Pressure Core Spray (HPCS) System	
a.	Reactor Vessel Water Level - Low Low, Level 2**	≥ -41.6 inches*
b.	Drywell Pressure - High	≤ 1.39 psig
c.	Reactor Vessel Water Level - High, Level 8	≤ 53.5 inches*
d.	Condensate Storage Tank Level - Low	5.0 ft ***
e.	Suppression Pool Water Level - High	≤ 5.9 inches
f.	HPCS Pump Discharge Pressure - High (Bypass)	≥ 120.6 psig ≤ 1227.0 psig

TABLE TR3.3.5.1-1

TECHNICAL SPECIFICATION EMERGENCY CORE COOLING SYSTEM
TRIP SETPOINTS AND RESPONSE TIMES

FUNCTION		TRIP SETPOINT
3.	High Pressure Core Spray (HPCS) System (continued)	
g.	HPCS System Flow Rate - Low (Bypass)	≥ 1206 gpm ≤ 1267 gpm
h.	Manual Initiation	NA
4.	Automatic Depressurization System (ADS) Trip System A	
a.	Reactor Vessel Water Level - Low Low Low, Level 1	≥ -150.3 inches*
b.	Drywell Pressure - High	≤ 1.39 psig
c.	ADS Initiation Timer	≤ 105 seconds
d.	Reactor Vessel Water Level - Low, Level 3 (Confirmatory)	≥ 11.4 inches*
e.	LPCS Pump Discharge Pressure - High	145 psig, increasing
f.	LPCI Pump A Discharge Pressure - High	125 psig, increasing
g.	ADS Bypass Timer (High Drywell Pressure)	≤ 9.2 minutes
h.	Manual Initiation	NA
5.	ADS Trip System B	
a.	Reactor Vessel Water Level - Low Low Low, Level 1	≥ -150.3 inches*
b.	Drywell Pressure - High	≤ 1.39 psig
c.	ADS Initiation Timer	≤ 105 seconds
d.	Reactor Vessel Water Level - Low, Level 3 (Confirmatory)	≥ 11.4 inches*
e.	LPCI Pump B & C Discharge Pressure - High	125 psig, increasing
f.	ADS Bypass Timer (High Drywell Pressure)	≤ 9.2 minutes
g.	Manual Initiation	NA

*See Bases Figure B 3.3.1.1

**The Reactor Vessel Water Level-Low Low, Level 2 signal delay is <1.0 second. The nominal trip setpoint for this delay is 0.5 seconds with an allowable tolerance of +/-0.1 seconds.

*** (See next page)

TABLE TR3.3.5.1-1

TECHNICAL SPECIFICATION EMERGENCY CORE COOLING SYSTEM
TRIP SETPOINTS AND RESPONSE TIMES

*** Per Tech Spec Table 3.3.5.1-1 3.d note (e), the below as-found tolerance (AFT) and as-left tolerance (ALT) is applied to this set-point in accordance with methodology documented in GIN 2011-00252 per TSTF 493:

For the Trip Unit (TU) only:

AFT-TU= +/-0.113 FT
ALT-TU= +/-0.113 FT

For the Loop (L):

AFT-L= +/-0.414 FT
ALT-L = +/-0.207FT

TABLE TR3.3.5.2-1

TECHNICAL SPECIFICATION REACTOR CORE ISOLATION COOLING SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTION	TRIP SETPOINT
1. Reactor Vessel Water Level - Low Low, Level 2	≥ -41.6 inches*
2. Reactor Vessel Water Level - High, Level 8	≤ 53.5 inches*
3. Condensate Storage Tank Level - Low	4.0 ft **
4. Suppression Pool Water Level - High	≤ 5.9 inches
5. Manual Initiation	NA

*See Bases Figure B 3.3.1.1

** Per Tech Spec Table 3.3.5.2-1 3 note (b), the below as-found tolerance (AFT) and as-left tolerance (ALT) is applied to this set-point in accordance with methodology documented in GIN 2011-00252 per TSTF 493:

For the Trip Unit (TU) only:

AFT-TU= +/-0.113 FT
ALT-TU= +/-0.113 FT

For the Loop (L):

AFT-L= +/-0.414 FT
ALT-L = +/-0.207FT

TR3.6 CONTAINMENT SYSTEMS

TR3.6.1.2 Primary Containment Air Lock Instrumentation

LCO TR3.6.1.2 Two primary containment airlock inflatable seal system seal pressure instrumentation channels per airlock shall be OPERABLE.

APPLICABILITY: When associated air lock is OPERABLE per LCO 3.6.1.2.

ACTIONS

--NOTES--

1. LCO 3.0.3 is not applicable.

2. Separate Condition entry is allowed for each airlock door.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One containment airlock inflatable seal system pressure instrumentation channel inoperable.	A.1 Restore required channel to OPERABLE status.	7 days
B. Required Action and associated Completion Time of Condition A not met.	B.1 Verify the associated inflatable seal pressure to be 70 psig nominal Minimum allowable value 59 psig. Maximum allowable value 90 psig.	Once per 12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR TR3.6.1.2.1	Perform a CHANNEL FUNCTIONAL TEST.	31 days
SR TR3.6.1.2.2	Perform a CHANNEL CALIBRATION with a low pressure setpoint of 60 psig nominal. Minimum allowable value 59 psig.	18 months

SURVEILLANCE REQUIREMENTS

---------------------------------------NOTE---------------------------------------
The provisions of SR 3.0.4 are not applicable.

SURVEILLANCE		FREQUENCY
SR 6.3.8.1	Cycle each of the following valves through at least one complete cycle from the running position using the manual test or Automatic Turbine Tester (ATT): 1) Four high pressure turbine stop valves, 2) Four high pressure turbine control valves, 3) Six low pressure turbine stop valves, and 4) Six low pressure turbine control valves.	92 days
SR 6.3.8.2	Test the two mechanical overspeed devices using the Automatic Turbine Tester or manual test.	8 weeks
SR 6.3.8.3	Disassemble at least one of each type of the following valves and performing a visual and surface inspection of valve seats, disks and stems and verifying no unacceptable flaws. If unacceptable flaws are found, all other valves of that type shall be inspected. 1) Four high pressure turbine stop valves, 2) Four high pressure turbine control valves, 3) Six low pressure turbine stop valves, and 4) Six low pressure turbine control valves.	40 months

TABLE 6.8.1-1 (Continued)

PRIMARY CONTAINMENT PENETRATION CONDUCTOR
OVERCURRENT PROTECTIVE DEVICES

c. 480 VAC Circuit Breakers (Continued)

Molded Case, Type NZM

BREAKER NUMBER	TRIP SETPOINT (Amperes)	RESPONSE TIME (Seconds)	SYSTEM/ COMPONENT AFFECTED
52-1251-26	1200	0.100	LIGHTING XFMR 1X112 (N1R18S112-D)
52-1251-28	5	0.100	MOV - STM TUNNEL COOLER INLET (N1P72F150B-N)
52-1252-23	60	0.100	DRYWELL FLOOR DRAIN SUMP PUMP (N1P45C001B-N)
52-1411-01	38	0.100	MOV - VESSEL HEAD VENTILATION (Q1B21F002-N)
52-1412-01	17.5	0.100	REAC RECIRC HPU OIL PUMP FAN (N1B33D003B3-N)
52-1412-02	60	0.100	CNTMT CHEM WASTE SUMP PUMP (N1P45C027B-N)
52-1412-03	60	0.100	DRYWELL FLOOR DRAIN SUMP PUMP (N1P45C001A-N)
52-1412-05	12.5	0.100	MOV CRD COOL WTR PRESS CONTROL (N1C11F003-N)
52-1412-08	105	0.100	MOV REAC RECIRC PUMP B SUCTION (Q1B33F023B-N)
52-1412-09	175	0.100	RWCU DEMIN PRECOAT PUMP (N1G36C002-N)
52-1412-12	90	0.100	RWCU DEMIN HOLDING PUMP (N1G36C001B-N)
52-1412-15	600	0.100	REAC RECIRC HPU OIL PUMP (N1B33D003B1-N)
52-1412-14	20	0.100	Durability Monitor Pump Panel (1P87P004)

7.0 ADMINISTRATIVE CONTROLS

7.1 Deleted

7.2 ORGANIZATION

7.2.1 The following are the plant specific titles for the personnel fulfilling responsibilities of positions delineated in Technical Specifications:

a. The corporate executive responsible for overall plant nuclear safety is the Vice President, Operations.

b. The Plant manager is the General Manager, Plant Operations.

c. The shift superintendent is the Shift Manager (SM).

d. A non-licensed operator is a Nuclear Operator B.

e. The operations manager is the Manager, Operations.

f. The operations middle manager is the Assistant Operations Manager, Shift.

g. The radiation protection manager is the Manager, Radiation Protection.

h. A health physics technician is an individual certified as a Senior Health Physicist.

i. Health Physics supervision is Radiation Protection personnel, Specialist and above.

7.2.2 As required by 10 CFR 50.54 and Technical Specifications 5.2.2.a and 5.2.2.g except as allowed by Technical Specification 5.2.2.c, each on duty shift shall be composed of at least minimum shift crew composition shown in Table 7.2.2-1. Licensed Personnel shall meet or exceed the criteria of the accredited license training program.

7.2.3 As required by 10 CFR 50.54, all CORE ALTERATIONS shall be observed and directly supervised by either a licensed Senior Reactor Operator or Senior Reactor Operator Limited to Fuel Handling who has no other concurrent responsibilities during this operation.

7.2.4 The Shift Managers, and Control Room Supervisors, shall each hold a Senior Reactor Operators License.

7.2.5 Not Used

7.2.6 INDEPENDENT SAFETY ENGINEERING GROUP (ISEG)

Deleted

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

8.a, b. Scram Discharge Volume Water Level—High (continued)

in MODES 1 and 2, and in MODE 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies, since these are the MODES and other specified conditions when control rods are withdrawn. At all other times, this Function may be bypassed.

9. Turbine Stop Valve Closure, Trip Oil Pressure—Low

Closure of the TSVs results in the loss of a heat sink that produces reactor pressure, neutron flux, and heat flux transients that must be limited. Therefore, a reactor scram is initiated at the start of TSV closure in anticipation of the transients that would result from the closure of these valves. The Turbine Stop Valve Closure, Trip Oil Pressure—Low Function is the primary scram signal for the turbine trip event analyzed in Reference 4. For this event, the reactor scram reduces the amount of energy required to be absorbed and, along with the actions of the End of Cycle Recirculation Pump Trip (EOC-RPT) System, ensures that the MCPR SL is not exceeded.

Turbine Stop Valve Closure, Trip Oil Pressure—Low signals are initiated by the electrohydraulic control (EHC) fluid pressure at each stop valve. Two independent pressure transmitters are associated with each stop valve. One of the two transmitters provides input to RPS trip system A; the other, to RPS trip system B. Thus, each RPS trip system receives an input from four Turbine Stop Valve Closure, Trip Oil Pressure—Low channels, each consisting of one pressure transmitter. The logic for the Turbine Stop Valve Closure, Trip Oil Pressure—Low Function is such that three or more TSVs must be closed to produce a scram.

This Function must be enabled at THERMAL POWER ≥ 40% RTP. This is normally accomplished automatically by pressure transmitters sensing turbine first stage pressure; therefore, to consider this Function OPERABLE, the turbine bypass valves must remain shut at THERMAL POWER ≥ 40% RTP. The setpoint is feedwater temperature dependent as a result of the subcooling changes that affect the turbine first stage pressure/reactor power relationship.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

9. Turbine Stop Valve Closure, Trip Oil Pressure-Low (continued)

The Turbine Stop Valve Closure, Trip Oil Pressure—Low Allowable Value is selected to be high enough to detect imminent TSV closure thereby reducing the severity of the subsequent pressure transient.

Eight channels of Turbine Stop Valve Closure, Trip Oil Pressure—Low Function, with four channels in each trip system, are required to be OPERABLE to ensure that no single instrument failure will preclude a scram from this Function if any three TSVs should close. This Function is required, consistent with analysis assumptions, whenever THERMAL POWER is ≥ 40% RTP. This Function is not required when THERMAL POWER is < 40% RTP since the Reactor Vessel Steam Dome Pressure—High and the Average Power Range Monitor Fixed Neutron Flux—High Functions are adequate to maintain the necessary safety margins.

10. Turbine Control Valve Fast Closure, Trip Oil Pressure-Low

Fast closure of the TCVs results in the loss of a heat sink that produces reactor pressure, neutron flux, and heat flux transients that must be limited. Therefore, a reactor scram is initiated on TCV fast closure in anticipation of the transients that would result from the closure of these valves. The Turbine Control Valve Fast Closure, Trip Oil Pressure—Low Function is the primary scram signal for the generator load rejection event analyzed in Reference 4. For this event, the reactor scram reduces the amount of energy required to be absorbed and, along with the actions of the EOC-RPT System, ensures that the MCPR SL is not exceeded.

Turbine Control Valve Fast Closure, Trip Oil Pressure—Low signals are initiated by the EHC fluid pressure at each control valve. There is one pressure transmitter associated

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Turbine Stop Valve Closure, Trip Oil Pressure — Low (continued)

first stage pressure; therefore to consider this Function OPERABLE, the turbine bypass valves must remain shut at ≥ 40% RTP. Four channels of TSV Closure, with two channels in each trip system, are available and required to be OPERABLE to ensure that no single instrument failure will preclude an EOC-RPT from this Function on a valid signal. The TSV Closure, Trip Oil Pressure—Low Allowable Value is selected high enough to detect imminent TSV closure.

This protection is required, consistent with the safety analysis assumptions, whenever THERMAL POWER is ≥ 40% RTP with any recirculating pump in fast speed. Below 40% RTP or with the recirculation in slow speed, the Reactor Vessel Steam Dome Pressure—High and the Average Power Range Monitor (APRM) Fixed Neutron Flux—High Functions of the Reactor Protection System (RPS) are adequate to maintain the necessary safety margins.

The automatic enable setpoint is feedwater temperature dependent as a result of the subcooling changes that affect the turbine first stage pressure/reactor power relationship.

TCV Fast Closure, Trip Oil Pressure — Low

Fast closure of the TCVs during a generator load rejection results in the loss of a heat sink that produces reactor pressure, neutron flux, and heat flux transients that must be limited. Therefore, an RPT is initiated on TCV Fast Closure, Trip Oil Pressure—Low in anticipation of the transients that would result from the closure of these valves. The EOC-RPT decreases reactor power and aids the reactor scram in ensuring that the MCPR SL is not exceeded during the worst case transient.

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B 3.3 INSTRUMENTATION

B 3.3.5.1 Emergency Core Cooling System (ECCS) Instrumentation

BASES

BACKGROUND

The purpose of the ECCS instrumentation is to initiate appropriate responses from the systems to ensure that fuel is adequately cooled in the event of a design basis accident or transient.

This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ECCS, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

The trip setpoint is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the trip setpoint accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the trip setpoint ensures that SLs are not exceeded. Therefore, for Function 3.d, Condensate Storage Tank Level-Low, the trip setpoint meets the definition of an LSSS (Ref. 5).

(continued)

BASES

BACKGROUND (continued)

The Allowable Value specified in the Table 3.3.5.1-1 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its specified safety function(s)." Relying solely on the trip setpoint to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as-found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the trip setpoint due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the trip setpoint and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as-found" setting of the protection channel. Therefore, the channel would still be OPERABLE because it would have performed its safety function and the only corrective action required would be to reset the channel within the established as-left tolerance around trip setpoint to account for further drift during the next surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

(continued)

BASES

BACKGROUND (continued)

However, there is also some point beyond which the channel may not be able to perform its function due to, for example, greater than expected drift. This value needs to be specified in the Technical Specifications in order to define OPERABILITY of the channels and is designated as the Allowable Value. If the actual setting (as-found setpoint) of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE, but degraded. The degraded condition will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the trip setpoint (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

For most anticipated operational occurrences (AOOs) and Design Basis Accidents (DBAs), a wide range of dependent and independent parameters are monitored.

The ECCS instrumentation actuates low pressure core spray (LPCS), low pressure coolant injection (LPCI), high pressure core spray (HPCS), Automatic Depressurization System (ADS), and the diesel generators (DGs). The equipment involved with each of these systems is described in the Bases for LCO 3.5.1, "ECCS—Operating."

Low Pressure Core Spray System

The LPCS System may be initiated by either automatic or manual means. Automatic initiation occurs for conditions of Reactor Vessel Water Level—Low Low Low, Level 1 or Drywell Pressure—High. Each of these diverse variables is monitored by two redundant transmitters, which are, in turn, connected to two trip units. The outputs of the four trip units (two trip units from each of the two variables) are connected to relays whose contacts are arranged in a one-out-of-two taken twice logic. The high drywell pressure initiation signal is a sealed in signal and must be manually reset. The logic can also be initiated by use of a manual push button. Upon receipt of an initiation signal, the LPCS pump is started immediately after power is available.

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BASES

BACKGROUND

Low Pressure Core Spray System (continued)

The LPCS test line isolation valve, which is also a primary containment isolation valve (PCIV), is closed on a LPCS initiation signal to allow full system flow assumed in the accident analysis and maintains containment isolation in the event LPCS is not operating.

The LPCS pump discharge flow is monitored by a flow transmitter. When the pump is running and discharge flow is

(continued)

BASES

BACKGROUND

Diesel Generators (continued)

Feature (ESF) buses if a loss of offsite power occurs. (Refer to Bases for LCO 3.3.8.1.)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The actions of the ECCS are explicitly assumed in the safety analyses of References 1, 2, and 3. The ECCS is initiated to preserve the integrity of the fuel cladding by limiting the post LOCA peak cladding temperature to less than the 10 CFR 50.46 limits.

ECCS instrumentation satisfies Criterion 3 of the NRC Policy Statement. Certain instrumentation Functions are retained for other reasons and are described below in the individual Functions discussion.

The OPERABILITY of the ECCS instrumentation is dependent upon the OPERABILITY of the individual instrumentation channel Functions specified in Table 3.3.5.1-1. Each Function must have a required number of OPERABLE channels, with their setpoints set within the setting tolerances of the trip setpoint, where appropriate. The actual setpoint is calibrated consistent with applicable setpoint methodology assumptions. Each ECCS subsystem must also respond within its assumed response time. Allowable Values are specified for each ECCS Function specified in Table 3.3.5.1-1. For Function 3.d, Condensate Storage Tank Level-Low, the nominal trip setpoint and methodologies for calculation of the as-left and as-found tolerances are described in the Technical Requirements Manual. The trip setpoints are selected to ensure that the setpoints remain conservative to the as-left tolerance band between CHANNEL CALIBRATIONS. After each calibration the trip setpoint shall be left within the as-left band around the nominal trip setpoint. Table 3.3.5.1-1 is modified by two footnotes. Footnote (a) is added to clarify that the associated functions are required to be OPERABLE in MODES 4 and 5 only when their supported ECCS are required to be OPERABLE per LCO 3.5.2, ECCS-Shutdown. Footnote (b) is added to show that certain ECCS instrumentation Functions also perform DG initiation.

Nominal trip setpoints are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of

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BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

the process parameter exceeds the setpoint, the associated device (e.g., trip unit) changes state. The analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytical limits, corrected for calibration, process, and some of the instrument errors. The nominal trip setpoints are then determined, accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

In general, the individual Functions are required to be OPERABLE in the MODES or other specified conditions that may require ECCS (or DG) initiation to mitigate the consequences of a design basis accident or transient. To ensure reliable ECCS and DG function, a combination of Functions is required to provide primary and secondary initiation signals.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

Low Pressure Core Spray and Low Pressure Coolant Injection Systems

1.a, 2.a. Reactor Vessel Water Level—Low Low Low, Level 1

Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. The low pressure ECCS and associated DGs are initiated at Level 1 to ensure that core spray and flooding functions are available to prevent or minimize fuel damage. The Reactor Vessel Water Level—Low Low Low, Level 1 is one of the Functions assumed to be OPERABLE and capable of initiating the ECCS during the transients and accidents analyzed in References 1, 2, and 3. The core cooling function of the ECCS, along with the scram action of the Reactor Protection System (RPS), ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.1.3

The calibration of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be not within its required Allowable Value specified in Table 3.3.5.1-1. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is not beyond the Allowable Value, the channel performance is still within the requirements of the plant safety analyses. Under these conditions, the setpoint must be readjusted to be equal to or more conservative than the setting accounted for in the appropriate setpoint methodology.

The Frequency of 92 days is based on the reliability analysis of Reference 4.

SR 3.3.5.1.3 for Function 3.d, Condensate Storage Tank Level -Low, is modified by two Notes as identified in Table 3.3.5.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition.

The second Note applied to SR 3.3.5.1.3 for Function 3.d, Condensate Storage Tank Level -Low, requires that the as-left setting for the channel be within the as-left tolerance of the Nominal Trip Setpoint (NTSP). Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures, the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.5.1.3 (continued)

NTSP, then the channel shall be declared inoperable. The second Note also requires that NTSP and the methodologies for calculating the as-left and the as-found tolerances be in the TRM.

SR 3.3.5.1.4 and SR 3.3.5.1.5

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency of SR 3.3.5.1.4 and SR 3.3.5.1.5 is based upon the assumption of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.1.5 for Function 3.d, Condensate Storage Tank Level -Low, is modified by two Notes as identified in Table 3.3.5.1-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition.

The second Note applied to SR 3.3.5.1.5 for Function 3.d, Condensate Storage Tank Level -Low, requires that the as-left setting for the channel be within the as-left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures, the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.5.1.4 and SR 3.3.5.1.5 (continued)

Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable. The second Note also requires that NTSP and the methodologies for calculating the as-left and the as-found tolerances be in the TRM.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.1.6

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required initiation logic for a specific channel. The system functional testing performed in LCO 3.5.1, LCO 3.5.2, LCO 3.8.1, and LCO 3.8.2 overlaps this Surveillance to provide complete testing of the assumed safety function.

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage (except for Division III which can be tested in any operational condition) and the potential for unplanned transients if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 18 month Frequency.

REFERENCES

1. UFSAR, Section 5.2.
2. UFSAR, Section 6.3.
3. UFSAR, Chapter 15.
4. NEDC-30936-P-A, "BWR Owners' Group Technical Specification Improvement Analyses for ECCS Actuation Instrumentation, Part 2," December 1988.
5. Regulatory Guide 1.105, "Setpoints for Safety-Related Instrumentation," Revision 3.

B 3.3 INSTRUMENTATION

B 3.3.5.2 Reactor Core Isolation Cooling (RCIC) System Instrumentation

BASES

BACKGROUND

The purpose of the RCIC System instrumentation is to initiate actions to ensure adequate core cooling when the reactor vessel is isolated from its primary heat sink (the main condenser) and normal coolant makeup flow from the Reactor Feedwater System is unavailable, such that initiation of the low pressure Emergency Core Cooling Systems (ECCS) pumps does not occur. A more complete discussion of RCIC System operation is provided in the Bases of LCO 3.5.3, "RCIC System."

This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RCIC instrumentation, as well as LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include LSSSs for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

The trip setpoint is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the trip setpoint accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the

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BACKGROUND (continued)

channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the trip setpoint ensures that SLs are not exceeded. Therefore, for Function 3, Condensate Storage Tank Level- Low, the trip setpoint meets the definition of an LSSS (Ref. 2).

The Allowable Value specified in Table 3.3.5.2-1 serves as the LSSS such that a channel is OPERABLE if the trip setpoint is found not to exceed the Allowable Value. As such, the Allowable Value differs from the trip setpoint by an amount primarily equal to the expected instrument loop uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the device will still meet the LSSS definition and ensure that a SL is not exceeded at any given point of time as long as the device has not drifted beyond that expected during the surveillance interval.

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its specified safety function(s)." Relying solely on the trip setpoint to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as-found" value of a protection channel setting during a Surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the trip setpoint due to some drift of the setting may still be OPERABLE because drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the trip setpoint and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as-found" setting of the protection channel. Therefore, the channel would still be OPERABLE because it would have performed its safety function and the only corrective action required would be to reset the channel within the established as-left tolerance around trip setpoint to account for further drift during the next surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in accordance with uncertainty assumptions stated in the

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BACKGROUND (continued)

referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

However, there is also some point beyond which the channel may not be able to perform its function due to, for example, greater than expected drift. This value needs to be specified in the Technical Specifications in order to define OPERABILITY of the channels and is designated as the Allowable Value. If the actual setting (as-found setpoint) of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE, but degraded. The degraded condition will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the trip setpoint (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as-found condition will be entered into the Corrective Action Program for further evaluation.

The RCIC System may be initiated by either automatic or manual means. Automatic initiation occurs for conditions of Reactor Vessel Water Level—Low Low, Level 2. The variable is monitored by four transmitters that are connected to four trip units. The outputs of the trip units are connected to relays whose contacts are arranged in a one-out-of-two taken twice logic arrangement. Once initiated, the RCIC logic seals in and can be reset by the operator only when the reactor vessel water level signals have cleared.

The RCIC test line isolation valves close on a RCIC initiation signal to allow full system flow.

The RCIC System also monitors the water levels in the condensate storage tank (CST) and the suppression pool, since these are the two sources of water for RCIC operation. Reactor grade water in the CST is the normal source. Upon receipt of a RCIC initiation signal, the CST suction valve is automatically signaled to open (it is normally in the open position) unless the pump suction from the suppression pool valve is open. If the water level in the CST falls below a preselected level, first the suppression pool suction valve automatically opens and then the CST suction valve automatically closes. Two level transmitters are used

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BASES

BACKGROUND (continued)	to detect low water level in the CST. Either switch can cause the suppression pool suction valve to open and the CST suction valve to close. The suppression pool suction valve also automatically opens and the CST suction valve closes if high water level is detected in the suppression pool (one-out-of-two logic similar to the CST water level logic). To prevent losing suction to the pump, the suction valves are interlocked so that one suction path must be open before the other automatically closes. The RCIC System provides makeup water to the reactor until the reactor vessel water level reaches the high water level (Level 8) trip (two-out-of-two logic), at which time the RCIC steam supply valve closes (the injection valve also closes due to the closure of the steam supply valves) to prevent overflow into the main steam lines. The RCIC System restarts if vessel level again drops to the low level initiation point (Level 2).
APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY	The function of the RCIC System is to provide makeup coolant to the reactor in response to transient events. The RCIC System is not an Engineered Safety Feature System and no credit is taken in the safety analysis for RCIC System operation. Based on its contribution to the reduction of overall plant risk, however, the RCIC System, and therefore its instrumentation, are included as required by the NRC Policy Statement. Certain instrumentation Functions are retained for other reasons and are described below in the individual Functions discussion. The OPERABILITY of the RCIC System instrumentation is dependent on the OPERABILITY of the individual instrumentation channel Functions specified in Table 3.3.5.2-1. Each Function must have a required number of OPERABLE channels with their setpoints set within the setting tolerance of the trips setpoints where appropriate. The actual setpoint is calibrated consistent with applicable setpoint methodology assumptions. Each channel must also respond within its assumed response time. Allowable Values are specified for each RCIC System instrumentation Function specified in Table 3.3.5.2-1. For Function 3, Condensate Storage Tank Level- Low, the nominal trip setpoint and methodologies for calculation of the as-left and as-found tolerances are described in the Technical Requirements Manual. The trip setpoints are selected to ensure that the setpoints remain conservative to the as-left

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BASES

APPLICABLE SAFETY ANALYSES LCO, and APPLICABIITY (continued)

tolerance band between CHANNEL CALIBRATIONS. After each calibration the trip setpoint shall be left within the as-left band around the nominal trip setpoint. Nominal trip setpoints are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device (e.g., trip unit) changes state. The analytical limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytical limits, corrected for calibration, process, and some of the instrument errors. The nominal trip setpoints are then determined, accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.2.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Frequency of 92 days is based on the reliability analysis of Reference 1.

SR 3.3.5.2.3

The calibration of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in Table 3.3.5.2-1. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is not beyond the Allowable Value, the channel performance is still within the requirements of the plant safety analysis. Under these conditions, the setpoint must be re-adjusted to be equal to or more conservative than accounted for in the appropriate setpoint methodology.

The Frequency of 92 days is based on the reliability analysis of Reference 1.

SR 3.3.5.2.4

CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter with the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency is based on the assumption of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.2.4 for Function 3, Condensate Storage Tank Level-Low, is modified by two Notes as identified in Table 3.3.5.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.5.2.4 (continued)

the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition.

The second Note applied to SR 3.3.5.2.4 for Function 3, Condensate Storage Tank Level- Low, requires that the as-left setting for the channel be within the as-left tolerance of the Nominal Trip Setpoint (NTSP). Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures, the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable. The second Note also requires that the NTSP and the methodologies for calculating the as-left and the as-found tolerances be in the TRM.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.2.5

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required initiation logic for a specific channel. The system functional testing performed in LCO 3.5.3 overlaps this Surveillance to provide complete testing of the safety function.

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.

REFERENCES

1. NEDE-770-06-2, "Addendum to Bases for Changes to Surveillance Test Intervals and Allowed Out-of-Service Times for Selected Instrumentation Technical Specifications," February 1991.

2. Regulatory Guide 1.105, "Setpoints for Safety-Related Instrumentation," Revision 3.

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.2 Flow Control Valves (FCVs)

BASES

BACKGROUND	The Reactor Coolant Recirculation System is described in the Background section of the Bases for LCO 3.4.1, "Recirculation Loops Operating," which discusses the operating characteristics of the system and how this affects the design basis transient and accident analyses. The jet pumps and the FCVs are part of the Reactor Coolant Recirculation System. The jet pumps are described in the Bases for LCO 3.4.3, "Jet Pumps." The Recirculation Flow Control System consists of the electronic and hydraulic components necessary for the positioning of the two hydraulically actuated FCVs. The recirculation loop flow rate can be rapidly changed within the expected flow range, in response to rapid changes in system demand. Limits on the system response are required to minimize the impact on core flow response during certain accidents and transients. Solid state control logic will generate an FCV "motion inhibit" signal in response to any one of several hydraulic power unit or analog control circuit failure signals. The "motion inhibit" signal causes hydraulic power unit shutdown and hydraulic isolation such that the FCVs fail "as is." A minor amount of FCV drift may occur depending upon internal hydraulic leakage and friction.
APPLICABLE SAFETY ANALYSES	The FCV stroke rate is limited to ≤ 11% per second in the opening and closing directions on a control signal failure of maximum demand. This stroke rate is an assumption of the analysis of the recirculation flow control failures on decreasing and increasing flow (Refs. 1 and 2). Flow control valves satisfy Criterion 2 of the NRC Policy Statement.
LCO	An FCV in each operating recirculation loop must be OPERABLE to ensure that the assumptions of the design basis transient and accident analyses are satisfied.

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BASES

ACTIONS (continued)

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

With one primary containment air lock door inoperable in one or more primary containment air locks, the OPERABLE door must be verified closed (Required Action A.1) in each affected air lock. In order for a door to be considered OPERABLE, all of its associated component penetration seals must be OPERABLE. Therefore, these Required Actions apply if the door is inoperable due to any inoperable support device/mechanism seal (e.g., operating mechanism seal). This ensures that a leak tight primary containment barrier is maintained by the use of an OPERABLE air lock door. This action must be completed within 1 hour. The 1 hour Completion Time is consistent with the ACTIONS of LCO 3.6.1.1, which requires that primary containment be restored to OPERABLE status within 1 hour.

Note that for the purpose of Required Action A.1, A.2, and A.3, the bulkhead associated with an air lock door is considered to be part of the door. For example, an air lock door may be declared inoperable if the equalizing valve becomes inoperable or if it is replaced. It is appropriate to treat the associated bulkhead as part of the door because a leak path through the bulkhead is no different than a leak path past the door seals. The remaining OPERABLE door/bulkhead provides the necessary barrier between the containment atmosphere and the environs. If an Upper or Lower Containment Test Connection, which has a design function as a primary containment isolation when the air lock inner door is inoperable or during performance of air lock barrel testing or pneumatic tubing testing or at any time the inner airlock door/bulkhead is breached, is inoperable, then the associated air lock door may be declared inoperable and LCO 3.6.1.3 shall be entered.

In addition, the affected air lock penetration must be isolated by locking closed the OPERABLE air lock door within the 24 hour Completion Time. The 24 hour Completion Time is considered reasonable for locking the OPERABLE air lock door, considering the OPERABLE door of the affected air lock is being maintained closed.

Required Action A.3 ensures that the affected air lock with an inoperable door has been isolated by the use of a locked closed OPERABLE air lock door. This ensures that an acceptable primary containment leakage boundary is maintained. The Completion Time of once per 31 days is based on engineering judgment and is considered adequate in view of the low likelihood of a locked door being mispositioned and other administrative controls.

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BASES

ACTIONS

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

Required Action A.3 is modified by a Note that applies to air lock doors located in high radiation areas and allows these doors to be verified locked closed by use of administrative controls. Allowing verification by administrative controls is considered acceptable, since access to these areas is typically restricted. Therefore, the probability of misalignment of the door, once it has been verified to be in the proper position, is small.

The Required Actions have been modified by two Notes. Note 1 ensures that only the Required Actions and associated Completion Times of Condition C are required if both doors in the air lock are inoperable. With both doors in the air lock inoperable, an OPERABLE door is not available to be closed. Required Actions C.1 and C.2 are the appropriate remedial actions. The exception of Note 1 does not affect tracking the Completion Time from the initial entry into Condition A; only the requirement to comply with the

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B 3.6 CONTAINMENT SYSTEMS

B 3.6.3.3 Drywell Purge System

BASES

BACKGROUND

The Drywell Purge System ensures a uniformly mixed post accident containment atmosphere, thereby minimizing the potential for local hydrogen burns due to a pocket of hydrogen above the flammable concentration.

The drywell purge compressor also performs the function diluting the drywell source term with the containment and suppression pool environment by pressurizing the drywell and discharging the drywell source term through the drywell suppression pool vents with the implementation of the Alternative Source Term (Reference 3), this dilution of drywell source term is no longer credited in the Equipment Qualification analysis.

The Drywell Purge System is an Engineered Safety Feature and is designed to operate in post accident environments without loss of function. The system has two independent subsystems, each consisting of a compressor and associated valves, controls, and piping. Each subsystem is sized to pump 1000 scfm. Each subsystem is powered from a separate emergency power supply. Since each subsystem can provide 100% of the mixing requirements, the system will provide its design function with a worst case single active failure.

Following an accident, the drywell is immediately pressurized due to the release of steam into the drywell environment. This pressure is relieved by the lowering of the water level within the weir wall, clearing the drywell vents and allowing the mixture of steam and noncondensibles to flow into the primary containment through the suppression pool, removing much of the heat from the steam. The remaining steam in the drywell begins to condense. As steam flow from the reactor pressure vessel ceases, the drywell pressure falls rapidly. Both drywell purge compressors start automatically 30 seconds after a signal is received from the Emergency Core Cooling System instrumentation, but only when drywell pressure has decreased to within approximately 0.87 psi above primary containment pressure.

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BASES (continued)

APPLICABLE SAFETY ANALYSES

The Drywell Purge System ensures a mixed atmosphere for combustible gas control as required by 10 CFR 50.44 (b) (1). The Drywell Purge System was originally designed to help mitigate the potential consequences of hydrogen generation following a Design Basis Accident (DBA) loss of coolant accident (LOCA). However, more recent studies have shown that the hydrogen release postulated from a DBA LOCA is not risk significant because it is not large enough to lead to early containment failure. The revised rule effective October 16, 2003, eliminated the design basis LOCA hydrogen release from 10 CFR 50.44, but retained the requirement for all containment types to have the capability for ensuring a mixed atmosphere in order to prevent local accumulation of detonable gases that could threaten containment integrity or equipment operating in a local compartment. The Drywell Purge System provides the capability for reducing the drywell hydrogen concentration to approximately the bulk average primary containment concentration following an accident.

Hydrogen may accumulate in primary containment following an accident as a result of:

a. A metal steam reaction between the zirconium fuel rod cladding and the reactor coolant; and

b. Radiolytic decomposition of water in the Reactor Coolant System.

To evaluate the potential for hydrogen accumulation in primary containment following an accident, the hydrogen generation as a function of time following the initiation of the accident is calculated. Evaluation assumptions recommended by Reference 1 are used to determine the timing of the actions to mitigate the event.

The calculation confirms that when the mitigating systems are actuated in accordance with plant procedures, the peak hydrogen concentration in the primary containment remains < 4 v/o.

The Drywell Purge System satisfies Criterion 4 of the NRC Policy Statement.

LCO

Two drywell purge subsystems must be OPERABLE to ensure operation of at least one primary containment drywell purge subsystem in the event of a worst case single active failure. Operation with at least one OPERABLE drywell purge subsystem provides the capability of controlling the hydrogen concentration in the drywell without exceeding the flammability limit.

BASES (continued)

APPLICABILITY

In MODES 1 and 2, the two drywell purge subsystems ensure the capability to prevent localized hydrogen concentrations above the flammability limit of 4.0 v/o in the drywell, assuming a worst case single active failure.

(continued)

BASES

APPLICABILITY (continued)

In MODE 3, both the hydrogen production rate and the total hydrogen produced after an accident would be less than that calculated for an accident in Mode 1 or 2. Also, because of the limited time in this MODE, the probability of an accident requiring the Drywell Purge System is low. Therefore, the Drywell Purge System is not required in MODE 3.

In MODES 4 and 5, the probability and consequences of an accident are reduced due to the pressure and temperature limitations in these MODES. Therefore, the Drywell Purge System is not required in these MODES.

ACTIONS

A.1

With one drywell purge subsystem inoperable, the inoperable subsystem must be restored to OPERABLE status within 30 days. In this condition, the remaining OPERABLE subsystem is adequate to perform the hydrogen mixing function. However, the overall reliability is reduced because a single failure in the OPERABLE subsystem could result in reduced hydrogen mixing capability. The 30 day Completion Time is based on the low probability of failure of the OPERABLE Drywell Purge System. The low probability of an accident that would generate hydrogen in amounts capable of exceeding the flammability limit, and the amount of time available after the event for operator action to prevent hydrogen accumulation from exceeding this limit.

B.1 and B.2

With two drywell purge subsystems inoperable, the ability to perform the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control capabilities are

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

provided by one division of the hydrogen igniters. The 1 hour Completion Time allows a reasonable period of time to verify that a loss of hydrogen control function does not exist. The verification may be performed as an administrative check by examining logs or other information to determine the availability of the alternate hydrogen control system. It does not mean to perform the surveillances needed to demonstrate OPERABILITY of the alternate hydrogen control system. If the ability to perform the hydrogen control function is maintained, continued operation is permitted with two drywell purge subsystems inoperable for up to 7 days. Seven days is a reasonable time to allow two drywell purge subsystems to be inoperable because the hydrogen control function is maintained and because of the low probability of the occurrence of an accident that would generate hydrogen in amounts capable of exceeding the flammability limit.

C.1

If any Required Action and associated Completion Time cannot be met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Time of 12 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.6.3.3.1

Performance of a CHANNEL FUNCTIONAL TEST demonstrates the associated channel will function properly. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology. The 31 day Frequency is reasonable, based on operating experience.

SR 3.6.3.3.2

Operating each drywell purge subsystem from the control room for ≥ 15 minutes ensures that each subsystem is OPERABLE and

(continued)

BASES

ACTIONS

A.1

In the event the drywell is inoperable, it must be restored to OPERABLE status within 1 hour. The 1 hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining the drywell OPERABLE during MODES 1, 2, and 3. This time period also ensures that the probability of an accident (requiring drywell OPERABILITY) occurring during periods when the drywell is inoperable is minimal. Also, the Completion Time is the same as that applied to inoperability of the primary containment in LCO 3.6.1.1, "Primary Containment."

B.1 and B.2

If the drywell cannot be restored to OPERABLE status within the required Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.6.5.1.1

The analyses in Reference 2 are based on a maximum drywell bypass leakage. This Surveillance ensures that the actual drywell bypass leakage is less than or equal to the acceptable $A/\sqrt{k}$ design value of 0.9 ft^2 assumed in the safety analysis. The testing is performed with one airlock door open (the airlock door remaining open is changed for the performance of each required test). As left drywell bypass leakage, prior to the first startup after performing a required drywell bypass leakage test, is required to be $\leq$ 10% of the drywell bypass leakage limit. At all other times between required drywell leakage rate tests, the acceptance criteria is based on design $A/\sqrt{k}$. At the design $A/\sqrt{k}$ the containment temperature and pressurization response are bounded by the assumptions of

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, a DBA could cause a release of radioactive material to the primary containment. In MODES 4 and 5, the probability and consequences of these events are reduced due to the pressure and temperature limitations in these MODES. Therefore, the drywell air lock is not required to be OPERABLE in MODES 4 and 5.

ACTIONS

The ACTIONS are modified by a Note that allows entry and exit to perform repairs on the affected air lock component. If the outer door is inoperable, then it may be easily accessed to repair. If the inner door is inoperable, however, then there is a short time during which the drywell boundary is not intact (during access through the outer door). The ability to open the OPERABLE door, even if it means the drywell boundary is temporarily not intact, is acceptable due to the low probability of an event that could pressurize the drywell during the short time in which the OPERABLE door is expected to be open. The OPERABLE door must be immediately closed after each entry and exit.

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

With one drywell air lock door inoperable, the OPERABLE door must be verified closed (Required Action A.1). In order for a door to be considered OPERABLE, all of its associated component penetration seals must be OPERABLE. Therefore, these Required Actions apply if the door is inoperable due to any inoperable support device/mechanism seal (e.g., operating mechanism seal). This ensures that a leak tight drywell barrier is maintained by the use of an OPERABLE air lock door. This action must be completed within 1 hour. The 1 hour Completion Time is consistent with the ACTIONS of LCO 3.6.5.1, "Drywell," which requires that the drywell be restored to OPERABLE status within 1 hour.

Note that for the purpose of Required Action A.1, A.2 and A.3, the bulkhead associated with an air lock door is considered to be part of the door. For example, an air lock door may be declared inoperable if the equalizing valve become inoperable or if it is replaced. It is appropriate to treat the associated bulkhead as part of the door because a leak path through the bulkhead is no

(continued)

BASES

ACTIONS

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

different than a leak path past the door seals. The remaining OPERABLE door/bulkhead provides the necessary barrier between the containment atmosphere and the environs.

In addition, the air lock penetration must be isolated by locking closed the OPERABLE air lock door within the 24 hour Completion Time. The Completion Time is considered reasonable for locking the OPERABLE air lock door, considering that the OPERABLE door is being maintained closed.

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.7

A battery service test is a special test of the battery's capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length (4 hours for Division 1 and Division 2 and 2 hours for Division 3) correspond to the design duty cycle requirements as specified in Reference 4.

The Surveillance Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 9) and Regulatory Guide 1.129 (Ref. 10), which state that the battery service test should be performed during refueling operations or at some other outage, with intervals between tests not to exceed 18 months.

This SR is modified by two Notes. Note 1 allows the once per 60 months performance of SR 3.8.4.8 in lieu of SR 3.8.4.7. This substitution is acceptable because SR 3.8.4.8 represents a more severe test of battery capacity than SR 3.8.4.7. The reason for Note 2 is that performing the Surveillance would remove a required DC electrical power subsystem from service, perturb the electrical distribution system, and challenge safety systems. The Division 3 test may be performed in MODE 1, 2, or 3 in conjunction with HPCS system outages. Credit may be taken for unplanned events that satisfy the Surveillance.

SR 3.8.4.8

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

The acceptance criteria for this Surveillance is consistent with IEEE-450 (Ref. 8) and IEEE-485 (Ref. 11). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

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