PVNGS Technical Requirements Manual (TRM)
Revision 63
Replacement Pages and Insertion Instructions

The following Licensing Document Change Requests (LDCRs) are included in this Revision:

LDCRs 10-R010 and 12-R002 - modified the TRM to reflect the removal of a number of Post-Accident Sampling System (PASS) valves from T7.0.300, *Containment Isolation Valves,* identified in TRM Section T7.0, *Component Lists*. License Amendment 136 authorized removal of the system, and the valves are being removed over time.

LDCR 14-R003 - modified the TRM to relocate the description of several containment isolation valves in T7.0.300, *Containment Isolation Valves,* identified in TRM Section T7.0, *Component Lists.* Specifically, the Main Steam isolation bypass valves and the SI drain valve from the drain tank are relocated from the "Normally Open ESF Actuated Closed" table to a new table that reflects "Normally Closed ESF Actuated Closed" valves. This change better reflects the actual valve positions during normal operation.

LDCR 15-R007 - modified the TRM to clarify the functional testing requirements for the Refueling Machine in TLCO 3.9.102 and related TSR. Specifically, the numerical test value is replaced by a description of the elements of the operational load test. This change updates the TRM to reflect load changes that were implemented when the Refueling Machine was modified.

LDCR 15-R008 – modified the TRM Bases to correct various typographical errors. The TRM Bases is being replaced in its entirety, even though the typographical corrections affect only a limited number of pages.

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Stephenson, Carl J(Z05778)

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Technical Requirements Manual

Revision 63
September 30, 2015

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PALO VERDE UNITS 1, 2, 3

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T3.9 REFUELING OPERATIONS

T3.9.102 Refueling Machine

TLCO 3.9.102 The refueling machine shall be used for movement of fuel assemblies and shall be FUNCTIONAL.

APPLICABILITY: During movement of fuel assemblies within the refueling cavity.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. The requirements for the refueling machine FUNCTIONALITY not satisfied.	A.1	Suspend use of the refueling machine from operations involving the movement of fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.9.102.1	The refueling machine used for movement of fuel assemblies shall be demonstrated FUNCTIONAL by performing an operational load test by lifting a simulated fuel assembly that is heavier than a fuel assembly, plus hoist box and grapple to the hoist up limit and demonstrating an automatic load cut off when the refueling machine load exceeds 1600 pounds.	Within 72 hours prior to the start of movement of fuel assemblies.

T3.0 TLCO Applicability

TLCO 3.0.100.1

See ITS LCO 3.0.1 Specification Bases

TLCO 3.0.100.2

See ITS LCO 3.0.2 Specification Bases

TLCO 3.0.100.3

See ITS LCO 3.0.3 Specification Bases for description of typical entry conditions, but not for description of shutdown requirements. TLCO 3.0.100.3 requires immediate notification of the Shift Manager, initiation of corrective actions in accordance with the PVNGS corrective action program and an OPERABILITY DETERMINATION/FUNCTIONAL ASSESSMENT (OD/FA) as necessary to determine the impact on equipment in the Technical Specifications.

This should include an assessment of the plant configuration and a determination of the appropriate compensatory action and/or MODE changes to maintain safe operation and to restore compliance with the design and licensing basis.

The initial decision on whether the unit can continue to operate shall be completed within 7 hours. This is a reasonable period of time to permit mobilization of support from various departments to assist the operations staff in making the determination.

TLCO 3.0.100.4

See ITS LCO 3.0.3 Specification Bases

TLCO 3.0.100.5

See ITS LCO 3.0.4 Specification Bases

(continued)

T3.0 TRM Surveillance Requirent (TRS) Applicability

TSR 3.0.100.1

See ITS SR 3.0.1 Specification Bases

TSR 3.0.100.2

See ITS SR 3.0.2 Specification Bases

TSR 3.0.100.3

See ITS SR 3.0.3 Specification Bases

TSR 3.0.100.4

See ITS SR 3.0.3 Specification Bases

T3.1.100 Flow Paths - Shutdown
T3.1.101 Flow Paths - Operating
T3.1.102 Charging Pumps - Shutdown
T3.1.103 Charging Pumps - Operating
T3.1.104 Borated Sources - Shutdown
T3.1.105 Borated Sources - Operating

BACKGROUND Boration equipment is needed to support reactivity control and the pressure and inventory control safety functions during normal operations and anticipated operational occurrences. A functional boration "system" consists of a borated water source, a gravity-fed suction pathway, a pump capable of being powered from an emergency power supply, and a discharge path to the RCS. Use of redundant components within the chemical and volume control, safety injection, and spent fuel pool cooling systems enhances flexibility and reliability in meeting design requirements.

(continued)

BACKGROUND (continued)

Soluble boron in the reactor coolant and control rods provide two diverse methods of core reactivity control. In accordance with the provisions of GDC 26, boration systems can reliably control the rate of reactivity changes resulting from planned, normal power changes, including xenon burnout, without exceeding acceptable fuel design limits. Each boration system is capable of maintaining the temperature-dependent shutdown margin and KN-1 requirements of the Technical Specifications during a cooldown. In addition, each boration system can add the boron equivalent of 4% $\Delta k/k$, not including the effects of xenon, during a plant cooldown to mode 5 considering only the borated makeup water used to compensate for thermal contraction of the coolant. Under normal conditions with letdown in service, the boration systems are also capable of making the core subcritical from a hot operating condition and holding it subcritical in the hot standby condition. In the event that Technical Specification shutdown margin requirements are not met during normal operations, the associated action statements direct the operator to initiate boration and continue until margins are restored. One boration system can add 1% $\Delta k/k$ of negative reactivity in less than 4 hours assuming "typical" reactor physics parameters and nominal system performance with letdown in service.

In accordance with GDC 33, boration systems can supply reactor coolant makeup for protection against breaks in small lines connected to the reactor coolant pressure boundary. Small lines, such as those for instrument and sample connections, contain flow orifices to limit leakage rates within the capacity of available charging pumps. As part of the normal makeup, the boration systems assure that specified acceptable fuel design limits are not exceeded as a result of minor reactor coolant leakage with or without offsite electrical power.

GDC 10 and GDC 19 require in part that the reactor coolant system be designed with appropriate margin and controls to assure that specified acceptable fuel design limits are not exceeded during normal operation and anticipated operational occurrences. The FUNCTIONALITY of boration systems ensures that primary system pressure and inventory (pressurizer level) can be

(continued)

adequately controlled following a loss of offsite power and subsequent cooldown to cold shutdown conditions. In combination with the shutdown cooling system, boration systems are capable of supporting a natural circulation cooldown in accordance with the requirements of Branch Technical Position (BTP) RSB 5-1 as accepted for PVNGS as a Class 2 plant.

APPLICABLE SAFETY ANALYSIS

None of the accidents analyzed in chapter 15 of the safety analysis report require charging or auxiliary spray for mitigation of the event. The boration systems support general design requirements, and verification that the systems can perform their safety functions is contained in design calculations separate from the accident analyses. Although these calculations are conservative with respect to expected system capability, they are based on nominal system conditions/performance, and the effects of instrument uncertainty are not included. The results of these analyses are summarized in UFSAR 9.3.4. Additional requirements and commitments associated with natural circulation cooldown are presented in UFSAR Appendix 5C.

In addition to performance requirements, the general design criteria also place limits on the damage possible from malfunctions of the boration systems. GDC 28 requires that the rate of reactivity addition be limited so that postulated reactivity accidents do not result in yielding of reactor coolant pressure boundary materials or deformation of fuel and vessel internals that may impair core cooling. This is verified in part by the UFSAR 15.4.6 analysis for inadvertent deboration. Boration systems may also affect GDC 15, which requires that reactor coolant pressure boundary design limits shall not be exceeded during normal or anticipated operational occurrences. UFSAR 15.5.2 shows that charging pump flow is low enough to ensure that the bounding pressurizer level control system malfunction will not overpressurize the primary system.

LCO

The FUNCTIONALITY of the boration systems ensures the capability to control reactivity during power changes, maintain shutdown margin requirements, makeup for reduction in reactor coolant volume due to contraction and nominal system losses, makeup for

(continued)

losses due to small breaks in the RCS pressure boundary, provide reactor coolant pump seal injection, and control reactor coolant pressure through the use of auxiliary spray when required.

The charging pumps have a design flow of approximately 44 gpm, but pump inefficiencies result in a nominal charging pump discharge flow of about 42 gpm. Because of the nature of positive displacement pumps, the pump discharge flow rate does not vary significantly with reactor coolant system pressure. The net charging flow is the total charging pump discharge flow minus the reactor coolant pump controlled bleed-off flow, which does not enter the reactor coolant system. With two pumps required to be FUNCTIONAL, the minimum net charging flow of 26 gpm for a single pump ensures that the boron injection rate described in the basis of the Technical Specifications can be provided even in the event of a single failure. In addition, the nominal charging flow from a single pump provides adequate makeup and auxiliary pressurizer spray for a natural circulation cooldown conducted in accordance the requirements of BTP RSB 5-1, which also postulates the single active failure of the other pump. Lastly, the FUNCTIONALITY of two charging pumps ensures that the system can mitigate the effects of a small break in the reactor coolant system. Consideration of a single failure is not required in support of GDC 33, and the nominal net charging rate of 68 gpm from two charging pumps (i.e., 26 gpm + 42 gpm) exceeds the maximum break flow and provides sufficient makeup to prevent violation of fuel design limits during the subsequent controlled cooldown.

A FUNCTIONAL charging pump must be powered from an OPERABLE ESF bus that can be energized from either an offsite circuit or an emergency diesel generator. Use of safety grade power supplies in combination with gravity-fed flow suction pathways provides a high level of assurance of boration system function during normal operations and following a loss of offsite power.

Requiring two of three boration flowpaths to be FUNCTIONAL provides a high probability that at least one pathway will be available to connect the borated water source to the charging pump suction. All of the specified pathways are gravity-fed and

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therefore do not require use of non-class pumps to provide net positive suction head for the charging pumps. Since the VCT boron concentration is normally much less than 4000 ppm and the tank may be pressurized with a noncondensible gas, the two pathways that utilize the normal charging pump suction are not FUNCTIONAL unless VCT outlet valve CH-501 can be closed. Although not specified, the availability of an additional flow path from the charging pump discharge to the RCS is implied. Actions outside the control room have been acknowledged in aligning the flowpaths. The specified flowpaths are neither fully safety grade nor single failure proof. However, the probability of a single-point vulnerability failing when called upon is low. In addition, high-pressure safety injection in combination with the reactor coolant head vents provides a diverse method of accomplishing the boration safety functions. Overall this results in an acceptable level of functional reliability for the boration systems.

The Refueling Water Tank (RWT) is required per Technical Specifications to be OPERABLE in MODES 1-4 in order to provide an adequate supply of borated water for emergency core cooling systems in the event of a LOCA. The minimum RWT level required in the Technical Specifications ensures that sufficient volume is available above the high suction nozzle in order to conduct a natural circulation cooldown in accordance with the provisions of BTP RSB 5-1. That minimum level also provides adequate borated make-up for a small line break and all credited reactivity control functions. The Spent Fuel Pool (SFP) is also required to be FUNCTIONAL in MODES 1-4 as a redundant borated water source to protect against single failure for the emergency boration function. In other analyses, failure of the RWT as a passive, seismic class 1, safety grade component is not a credible malfunction.

A cold shutdown reserve volume (CSDRV) is maintained to compensate for the change in reactor coolant volume that results from thermal contraction during cooldown to cold shutdown entry conditions with RCP controlled bleed-off isolated. The CSDRV also bounds the volumes of borated water required for postulated reactivity events. The minimum volumes required for both the RWT

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and SFP provide a high degree of reliability with respect to the reactivity control and safe shutdown capabilities. To account for depletion of makeup inventory during cooldown, the cold shutdown reserve volume requirements vary as a function of cold leg temperature. Once the primary has been cooled to cold shutdown conditions, borated water inventory is only required to makeup for further contraction during continued cool down to refueling conditions and to refill the pressurizer.

The requirements on temperature and boron concentration of the borated water sources are consistent with the values used in safety analysis and reactivity calculations. The upper limit spent fuel pool temperature is 180°F; however, the 2% difference in density between water at 120° and 180° has negligible impact on the required volume of makeup water or its reactivity worth.

APPLICABILITY The normal makeup system contains three charging pumps, all of which are normally in service. With the RCS temperature above 210°F, a minimum of two charging pumps is required to mitigate the effects of a small line break over all of the expected operating pressures. A minimum of two boron injection systems is also required to ensure single functional capability in those events where an assumed failure renders one of the systems nonfunctional. With the RCS temperature below 210°F, one system is acceptable without single failure consideration based on the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes.

In MODES 1-4, charging pumps are required in order to accomplish boron injection over the full range of expected reactor coolant system pressure. The provision of three charging pumps when only two are required provides for maintenance and flexibility of operation. In modes 5 and 6, the safety grade high pressure and low pressure safety injection pumps are capable of delivering the required flow rates. Since they are also energized from an emergency power supply, they are acceptable alternatives if a charging pump is not FUNCTIONAL at low system pressures.

(continued)

ACTIONS

In MODES 1-4, the allowable out-of-service period of 72 hours for one required boration system nonfunctional is consistent with those for safety related equipment. This time allows for minor component repair or corrective action without undue risk of overall facility safety during the repair period. If restoration cannot be accomplished in 72 hours, enter TLCO 3.0.100.3 and initiate corrective action in accordance with PVNGS corrective action program and initiate an OD/FA, as necessary to determine the impact on equipment in the technical specifications. This should include an assessment of the plant configuration and a determination of the appropriate compensatory action and/or MODE changes to maintain safe operation and to restore compliance with the design and licensing basis.

In MODES 5-6, the absence of a FUNCTIONAL boration method represents a serious degradation in reactivity management controls. Suspension of core alterations and positive reactivity additions preclude the need for emergency boration until control can be re-established.

SURVEILLANCE REQUIREMENTS

Surveillance tests for the RWT in the Technical Specifications as a supply of emergency core cooling water are more restrictive than those as a borated water source. Since SFP is as stable as the RWT with respect to temperature, level (volume), and boron concentration, the prescribed testing frequency is the same as for the RWT.

Based on operational experience, monthly verification of manual valve position in the boration flowpaths provides reasonable assurance that the system will function as designed, and remedial operator actions outside the control room in addition to those needed to normally align the system are not needed to initiate flow.

The charging pumps and valves in the boration flow paths are tested in accordance with the station in-service testing program.

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TRM SPECIFICATION BASES

T3.1.200 Shutdown Margin - Reactor Trip Breakers Closed
(See the ITS 3.1.2 Specification Bases.)

T3.1.201 This TRM specification is not used and is intentionally left blank.

T3.1.202 Control Element Assembly - Alignment
(See the ITS 3.1.5 Specification Bases.)

T3.1.203 Control Element Assembly - Drop Time
(See the ITS 3.1.5 Specification Bases.)

T3.2.200 Azimuthal Power Tilt - T_q

The limitations on the AZIMUTHAL POWER TILT are provided to ensure that design safety margins are maintained. An AZIMUTHAL POWER TILT greater than the limit specified in the CORE OPERATING LIMITS REPORT with COLSS in service or 0.03 with COLSS out of service is not expected and if it should occur, operation is restricted to only those conditions required to identify the cause of the tilt. The tilt is normally calculated by COLSS. A minimum core power of 20% of RATED THERMAL POWER is assumed by the CPCs in its input to COLSS for calculation of AZIMUTHAL POWER TILT. The 20% RATED THERMAL POWER threshold is due to the neutron flux detector system being inaccurate below 20% core power. Core noise level at low power is too large to obtain usable detector readings. The surveillance requirements specified when COLSS is out of service provide an acceptable means of detecting the presence of a steady-state tilt. It is necessary to explicitly account for power asymmetries because the radial peaking factors used in the core power distribution calculations are based on an untilted power distribution.

The AZIMUTHAL POWER TILT is equal to $(P_{tilt}/P_{untilt})-1.0$ where:

AZIMUTHAL POWER TILT is measured by assuming that the ratio of the power at any core location in the presence of a tilt to the untilted power at the location is of the form:

$$P_{tilt}/P_{untilt} = 1 + T_q\ g \cos(\text{Theta} - \text{Theta}_o)$$

where:

T_q is the peak fractional tilt amplitude at the core periphery
g is the radial normalizing factor
Theta is the azimuthal core location

(continued)

$Theta_0$ is the azimuthal core location of maximum tilt

P_{tilt}/P_{untilt} is the ratio of the power at a core location in the presence of a tilt to the power at that location with no tilt.

The AZIMUTHAL POWER TILT allowance used in the CPCs is defined as the value of CPC addressable constant TR-1.0.

T3.3.100 Supplementary Protection System (SPS) Instrumentation

The OPERABILITY/FUNCTIONALITY of the reactor protective and Engineered Safety Features Actuation Systems instrumentation and bypasses ensures that (1) the associated Engineered Safety Features Actuation action and/or reactor trip will be initiated when the parameter monitored by each channel or combination thereof reaches its setpoint, (2) the specified coincidence logic is maintained, (3) sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance, and (4) sufficient system functional capability is available from diverse parameters.

The OPERABILITY/FUNCTIONALITY of these systems is required to provide the overall reliability, redundancy, and diversity assumed available in the facility design for the protection and mitigation of accident and transient conditions. The integrated operation of each of these systems is consistent with the assumptions used in the safety analyses.

The quarterly frequency for the channel functional tests for these systems is based on the analyses presented in the NRC approved topical report CEN-327-A, "RPS/ESFAS Extended Test Interval Evaluation," and CEN-327-A, Supplement 1, and calculation 13-JC-SB-200-Rev. 01.

The verification of response time at the specified frequencies provides assurance that the protective and ESF action function associated with each channel is completed within the time limit assumed in the safety analyses. The instrumentation response times are made up of the time to generate the trip signal at the detector (sensor response time) and the time for the signal to interrupt power to the CEA drive mechanism (signal or trip delay time).

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167-A, "Elimination of

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TRM SPECIFICATION BASES

Pressure Sensor Response Time Testing Requirements," provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the Topical Report. Response time verification for other sensor types must be demonstrated by test. The allocation of sensor response times must be verified prior to placing a new component in operation and reverified after maintenance that may adversely affect the sensor response time.

T3.3.101 Radiation Monitoring Instrumentation

The FUNCTIONALITY of the radiation monitoring channels ensures that: (1) the radiation levels are continually measured in the areas served by the individual channels and (2) the alarm or automatic action is initiated when the radiation level trip setpoint is exceeded.

T3.3.102 Incore Detectors

The FUNCTIONALITY of the incore detectors with the specified minimum complement of equipment per TLCO 3.3.102.a, b, and c ensures that the measurements obtained from use of this system accurately represent the spatial neutron flux distribution of the reactor core.

The FUNCTIONALITY of the incore detectors with the specified minimum complement of equipment per TLCO 3.3.102.a, b, and d prior to exceeding 30% power after refueling ensures that the assumptions supporting the Inadvertent Loading of a Fuel Assembly analysis are met. The provisions of TLCO 3.0.100.3 apply given that the actual detector compliment may, with specific analysis, be shown to be able to detect a misloaded fuel assembly.

As an alternative to a specific analysis, performing CEA Symmetry checks for at least one CEA group having a CEDM above the 4x4 array of fuel assemblies for each 4x4 not in compliance with TLCO 3.3.102 Condition B is an alternative method of verifying that the assumptions supporting the Inadvertent Loading of a Fuel Assembly analysis are met. This testing is done at Hot Zero Power, xenon free conditions.

The FUNCTIONALITY of the incore detectors with the specified minimum complement of equipment per TLCO 3.3.102.a, b, and d after exceeding 30% power after refueling ensures that the assumptions supporting the Inadvertent Loading of a Fuel Assembly analysis are met. There are misloadings that are not detectable at beginning of cycle. These misloadings become detectable over time with a slowly changing deviation from predicted power distribution.

(continued)

TRM SPECIFICATION BASES

Therefore, the specified minimum complement of equipment per TLCO 3.3.102.a, b, and d requires monitoring during the cycle. The slow rate of change in the power distribution factors into the Completion Time and the applicability of TLCO 3.0.100.3. Specific analysis may show that a misloaded fuel assembly is detectable given the actual equipment configuration and core conditions.

T3.3.103 Seismic Monitoring

The FUNCTIONALITY of the seismic instrumentation ensures that sufficient capability is available to promptly determine the magnitude of a seismic event and evaluate the response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for the facility to determine if plant shutdown is required pursuant to Appendix A of 10 CFR Part 100. The instrumentation is consistent with the recommendations of Regulatory Guide 1.12, "Nuclear Power Plant Instrumentation for Earthquakes," Revision 2 as identified in the PVNGS FSAR.

T3.3.104 Meteorological Instrumentation

The FUNCTIONALITY of the meteorological instrumentation ensures that sufficient meteorological data are available for estimating potential radiation doses to the public as a result of routine or accidental release of radioactive materials to the atmosphere. This capability is required to evaluate the need for initiating protective measures to protect the health and safety of the public and is consistent with the recommendations of Regulatory Guide 1.23 "Onsite Meteorological Programs," February 1972. Wind speeds less than 0.6 MPH cannot be measured by the meteorological instrumentation.

Surveillance requirement TSR 3.3.104.2 is modified by a NOTE to indicate that the windspeed sensors are excluded from the CHANNEL CALIBRATION. The device is fixed by design and no adjustments are possible.

T3.3.105 Post Accident Monitoring Instrumentation

The FUNCTIONALITY of the post-accident monitoring instrumentation ensures that sufficient information is available on selected plant parameters to monitor and assess these variables following an accident. This capability is consistent with the recommendations of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Plants to Assess Plant Conditions During and Following an Accident," December 1975 and NUREG 0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations."

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TRM SPECIFICATION BASES

T3.3.106 Loose-Part Detection Instrumentation

The FUNCTIONALITY of the loose-part detection instrumentation ensures that sufficient capability is available to detect loose metallic parts in the primary system and avoid or mitigate damage to primary system components. The allowable out-of-service times and surveillance requirements are consistent with the recommendations of Regulatory Guide 1.133, "Loose-Part Detection Program for the Primary System of Light-Water-Cooled Reactors," May 1981.

T3.3.107 Explosive Gas Monitoring System

The explosive gas instrumentation is provided for monitoring (and controlling) the concentrations of potentially explosive gas mixtures in the GASEOUS RADWASTE SYSTEM. The FUNCTIONALITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

T3.3.108 Fuel Bldg Essential Ventilation Actuation Signal (FBEVAS)

The FBEVAS is an instrumentation channel that actuates the Fuel Building Essential Ventilation System (FBEVS) to minimize radioactive material released from an irradiated fuel assembly during a Fuel Handling Accident.

TLCO 3.3.108 requires one channel of FBEVAS which includes the Actuation Logic, Manual Trip, and radiation monitor to be FUNCTIONAL. The cross-train trip function is provided as a defense-in-depth capability and is not required for FBEVAS channel FUNCTIONALITY.

During movement of irradiated fuel assemblies in the fuel building with the required FBEVAS channel nonfunctional, a FUNCTIONAL FBEVS train must be immediately placed in the emergency mode of operation (i.e., fan running, valves/dampers aligned to the post-FBEVAS mode, etc.) or movement of irradiated fuel assemblies must be suspended immediately. The first action ensures that no undetected failures preventing FBEVS system operation will occur, and that any active failure will be readily detected. If a FUNCTIONAL FBEVS train is not placed in the emergency mode of operation, this action requires suspension of the movement of irradiated fuel assemblies in order to minimize the risk of release of radioactivity that might require the actuation FBEVS. This does not preclude the movement of fuel to a safe position.

Movement of spent fuel casks containing irradiated fuel assemblies is not within the scope of the Applicability of this technical specification. The

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movement of dry casks containing irradiated fuel assemblies will be done with a single-failure-proof handling system and with transport equipment that would prevent any credible accident that could result in a release of radioactivity.

T3.3.200 RPS Instrumentation - Operating
(See the ITS 3.3.1 Specification Bases.)

If a valid CPC cabinet high temperature alarm is received, it is possible for an OPERABLE CPC and CEAC to be affected and not be completely reliable. Therefore, a CHANNEL FUNCTIONAL TEST must be performed on OPERABLE CPCs and CEACs within 12 hours. The Completion Time of 12 hours is adequate considering the low probability of undetected failure, the consequences of a single channel failure, and the time required to perform a CHANNEL FUNCTIONAL TEST.

T3.4.100 Auxiliary Spray System

The auxiliary pressurizer spray is required to depressurize the RCS by cooling the pressurizer steam space to permit the plant to enter shutdown cooling. The auxiliary pressurizer spray is required during those periods when normal pressurizer spray is not available, such as during natural circulation and during the later stages of a normal RCS cooldown. The auxiliary pressurizer spray also distributes boron to the pressurizer when normal pressurizer spray is not available.

T3.4.101 RCS Chemistry

The limitations on Reactor Coolant System chemistry ensure that corrosion of the Reactor Coolant System is minimized and reduces the potential for Reactor Coolant System leakage or failure due to stress corrosion. Maintaining the chemistry within the Steady State Limits provides adequate corrosion protection to ensure the structural integrity of the Reactor Coolant System over the life of the plant. The associated effects of exceeding the oxygen, chloride, and fluoride limits are time and temperature dependent. Corrosion studies show that operation may be continued with contaminant concentration levels in excess of the Steady State Limits, up to the Transient Limits, for the specified limited time intervals without having a significant effect on the structural integrity of the Reactor Coolant System. The time interval permitting continued operation within the restrictions of the Transient Limits provides time for taking corrective actions to restore the contaminant concentrations to within the Steady State Limits.

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TRM SPECIFICATION BASES

If chemistry cannot be restored within the Steady State Limits within 24 hours, or if chemistry parameters are in excess of Transient Limits while in MODES 1, 2, 3, and 4, enter TLCO 3.0.100.3 and initiate corrective action in accordance with the PVNGS corrective action program and perform an OPERABILITY DETERMINATION/FUNCTIONAL ASSESSMENT (OD/FA), as necessary, to determine the impact on equipment in the Technical Specifications.

This should include an assessment of the plant configuration and a determination of the appropriate compensatory actions and/or MODE changes to maintain safe operation and to restore compliance with the design and licensing basis.

The surveillance requirements provide adequate assurance that concentrations in excess of the limits will be detected in sufficient time to take corrective action.

T3.4.102 Pressurizer Heatup and Cooldown Limits

The limitations imposed on the pressurizer heatup and cooldown rates and spray water temperature differential are provided to assure that the pressurizer is operated within the design criteria assumed for the fatigue analysis performed in accordance with the ASME Code Requirements.

If pressurizer temperature is not restored within limits by the completion time of 30 minutes and/or required engineering evaluation is not met, enter TLCO 3.0.100.3 and initiate corrective action in accordance with the PVNGS corrective action program and perform an OPERABILITY DETERMINATION/FUNCTIONAL ASSESSMENT (OD/FA), as necessary to determine the impact on equipment in the Technical Specifications.

This should include an assessment of the plant configuration and a determination of the appropriate compensatory actions and/or MODE changes to maintain safe operation and to restore compliance with the design licensing basis.

T3.4.103 Intentionally Blank

T3.4.104 RCS Vents (Reactor Head Vents)

Reactor Coolant System vents are provided to exhaust noncondensible gases and/or steam from the primary system that could inhibit natural circulation core cooling. The FUNCTIONALITY of at least one Reactor Coolant System vent

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path from the reactor vessel head ensures the capability exists to perform this function.

A vent path is the flow capability from the reactor vessel head to the reactor drain tank (RDT) or from the reactor vessel head to containment atmosphere. The four vent paths are:

1. From the reactor vessel head through solenoid operated valve (SOV) HV-101, then through SOV HV-105 to the RDT.
2. From the reactor vessel head through SOV HV-101, then through SOV HV-106 directly to containment atmosphere.
3. From the reactor vessel head through SOV HV-102, then through SOV HV-105 to the RDT.
4. From the reactor vessel head through SOV HV-102, then through SOV HV-106 directly to containment atmosphere.

The valve redundancy of the Reactor Coolant System vent paths serves to minimize the probability of inadvertent or irreversible actuation while ensuring that a single failure of a vent valve, power supply, or control system does not prevent isolation of the vent path.

The function, capabilities, and testing requirements of the Reactor Coolant System vent systems are consistent with the requirements of Item II.B.1 of NUREG-0737.

T3.4.200 RCS Pressure and Temperature (P/T) Limits
(See the ITS 3.4.3 Specification Bases.)

T3.4.201 Pressurizer

An OPERABLE pressurizer provides pressure control for the Reactor Coolant System during operations with both forced reactor coolant flow and with natural circulation flow. The minimum water level in the pressurizer assures the pressurizer heaters, which are required to achieve and maintain pressure control, remain covered with water to prevent failure, which could occur if the heaters were energized uncovered. The maximum water level in the pressurizer ensures that this parameter is maintained within the envelope of operation assumed in the safety analysis. The maximum water level also ensures that the RCS is not a hydraulically solid system and that a steam bubble will be provided to accommodate pressure surges during operation. The steam bubble also protects the pressurizer code safety valves against water relief. The requirement to verify that on an Engineered Safety Features Actuation test signal concurrent with a loss-of-offsite power the pressurizer heaters are automatically shed from the emergency power sources is to ensure

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TRM SPECIFICATION BASES

that the non-Class 1E heaters do not reduce the reliability of or overload the emergency power source. The requirement that a minimum number of pressurizer heaters be OPERABLE enhances the capability to control Reactor Coolant System pressure and establish and maintain natural circulation.

T3.4.202 DELETED

T3.4.203 RCS Operational LEAKAGE
(See the ITS 3.4.14 Specification Bases.)

T3.4.204 RCS PIV Leakage
(See the ITS 3.4.15 Specification Bases.)

T3.5.200 Safety Injection Tanks
(See the ITS 3.5.1 and 3.5.2 Specification Bases.)

T3.5.201 Shutdown Cooling System

The FUNCTIONALITY of two separate and independent shutdown cooling subsystems ensures that the capability of initiating shutdown cooling exists when required assuming the most limiting single failure occurs.

The shutdown cooling subsystem operation is described in UFSAR 5.4.7. Many of the components comprising the shutdown cooling system have specific requirements during Modes 1-3 in the Technical Specifications (e.g., emergency core cooling, containment spray, and containment isolation). However, several components do not have specific operability requirements in Technical Specifications, and some components function differently in their shutdown cooling role than they do when performing the other functions required by Technical Specifications. These factors must be considered when determining the OPERABILITY and/or FUNCTIONALITY of the shutdown cooling subsystems.

The safety analysis assumes that shutdown cooling may be placed in operation once cold leg temperature is less than or equal to 350°F and pressurizer pressure is less than approximately 400 psia. Additional information regarding the shutdown cooling system is in UFSAR Section 9.3.4. Since the subsystem is manually initiated, temporary changes in the position of shutdown cooling system valves from their normal line up do not necessarily make them nonfunctional with respect to their shutdown cooling safety function.

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TRM SPECIFICATION BASES (continued)

The allowed outage times are consistent with the durations permitted for those major shutdown cooling components whose operability is controlled by Technical Specifications. The specified outage time allows a reasonable opportunity to effect repairs while providing acceptable limits for the duration of intervals where the system may not be FUNCTIONAL. In combination with the maintenance rule requirements in 10 CFR 50.65, the allowed outage times help ensure that the shutdown cooling subsystems will be functional when required.

If the subsystem(s) cannot be restored or functionality verified within the stated time frame, enter TLCO 3.0.100.3 and initiate corrective action in accordance with the PVNGS corrective action program and perform an operability OPERABILTIY DETERMINATIONdetermination/FUNCTIONAL ASSESSMENT (OD/FA), as necessary, to determine the impact on equipment in the Technical Specifications.

This should include an assessment of the plant configuration and a determination of the appropriate compensatory actions and/or MODE changes to maintain safe operation and to restore compliance with the design and licensing basis.

The surveillance requirement to place each train of shutdown cooling in service every refueling interval demonstrates that the subsystems are functional. In combination with other testing performed to support Technical Specifications, including that conducted as part of the in-service testing and inspection programs, the specified surveillances provide reasonable assurance that the system will be able to perform its intended safety functions.

The SDC systems are normally in a standby, nonoperating mode. As such, flow path piping has the potential to develop voids and pockets of entrained gases. The method of ensuring that any voids or pockets of gases are removed from the shutdown cooling suction piping is to vent the accessible suction piping high points, which is controlled by PVNGS procedures. Maintaining the shutdown cooling system suction piping full of water ensures the system will perform properly by minimizing the potential for degraded pump performance, preventing pump cavitation, and preventing pumping of noncondensible gas (e.g., air, nitrogen, or hydrogen) into the reactor vessel during SDC. The 31 day Frequency takes into consideration the gradual nature of gas accumulation in the SDC piping and the adequacy of the procedural controls governing system operation.

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TRM SPECIFICATION BASES (continued)

References:

1. UFSAR Sections 5.4.7 and 9.3.4

2. Combustion Engineering Owners Group Joint Applications Report for Low Pressure Safety Injection System AOT Extension, CE NPSD-995, dated May 1995, as submitted to NRC in APS letter no. 102-03392, dated June 13, 1995, with updates described in letter no. 102-04250 dated February 26, 1999. Also see TS amendment no. 124 dated February 1, 2000.

T3.5.202 ECCS - Operating
(See the ITS 3.5.3 Specification Bases.)

SURVEILLANCE REQUIREMENT

TSR 3.5.202.4

Maintaining the ECCS suction piping full of water from the Refueling Water Tank and the containment sump to the ECCS pumps ensures that the system will perform properly by minimizing the potential for degraded pump performance. The 31 day frequency takes into consideration the gradual nature of gas accumulation in the ECCS piping and the adequacy of procedural controls governing system operation.

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TRM SPECIFICATION BASES

T3.5.203 ECCS - Shutdown
(See the ITS 3.5.4 Specification Bases.)

T3.6.100 Hydrogen Purge Cleanup System

The FUNCTIONALITY of the equipment and systems required for the control of hydrogen gas ensures that this equipment will be available to maintain the hydrogen concentration within containment below its flammable limit during post-LOCA conditions. The purge system is capable of controlling the expected hydrogen generation associated with (1) zirconium-water reactions, (2) radiolytic decomposition of water and (3) corrosion of metals within containment. The hydrogen control system is consistent with the recommendations of Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a LOCA," March 1971.

The use of ANSI Standard N509 (1980) in lieu of ANSI Standard N509 (1976) to meet the guidance of Regulatory Guide 1.52, Revision 2, Positions C.6.a and C.6.b, has been found acceptable as documented in Revision 2 to Section 6.5.1 of the Standard Review Plan (NUREG-0800).

T3.6.200 Prestressed Concrete Containment Tendon Surveillance

The prestressed concrete containment tendon surveillance program ensures the structural integrity of containment is maintained in accordance with ASME Code Section XI, Subsection IWL of the ASME Boiler and Pressure Vessel Code and applicable addenda as required by 10 CFR 50.55a, except where an exemption or relief has been authorized by the NRC.

Should the acceptance criteria not be met within the specified completion time and an engineering evaluation(s) not accomplished, enter TLCO 3.0.100.3 and initiate corrective action in accordance with the PVNGS corrective action program and perform an OPERABILITY DETERMINATION/FUNCTIONAL ASSESSMENT (OD/FA), as necessary, to determine the impact on equipment in the Technical Specifications.

This should include an assessment of the plant configuration and a determination of the appropriate compensatory actions and/or MODE changes to maintain safe operation and to restore compliance with the design and licensing basis.

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TRM SPECIFICATION BASES

T3.6.201 Containment Spray System

The containment system is normally in a standby, nonoperating mode. As such, flow path piping has the potential to develop voids and pockets of entrained gases. The method of ensuring that any voids or pockets of gases are removed from the containment spray suction piping is to vent the accessible suction piping high points, which is controlled by PVNGS procedures. Maintaining the containment spray system suction piping full of water ensures the system will perform properly by minimizing the potential for degraded pump performance, preventing pump cavitation, and preventing delay of spray delivery to the containment atmosphere. The 31 day Frequency takes into consideration the gradual nature of gas accumulation in the containment spray piping and the adequacy of the procedural controls governing system operation.

T3.6.300 Hydrogen Recombiners

BACKGROUND

The function of the hydrogen recombiners is to eliminate the potential breach of containment due to a hydrogen oxygen reaction. Per 10 CFR 50.44, "Standards for Combustible Gas Control Systems in Light-Water-Cooled Reactors" (Ref. 1), and 10 CFR 50, GDC 41, "Containment Atmosphere Cleanup" (Ref. 2), hydrogen recombiners are required to reduce the hydrogen concentration in the containment following a Loss Of Coolant Accident (LOCA) or Main Steam Line Break (MSLB). The recombiners accomplish this by recombining hydrogen and oxygen to form water vapor. The vapor remains in containment, thus eliminating any discharge to the environment. The hydrogen recombiners are manually initiated since flammability limits would not be reached until several days after a Design Basis Accident (DBA).

Two 100% capacity independent hydrogen recombiners are shared among the three units. Each consists of controls, a power supply, and a recombiner located in the Auxiliary Building. Recombination is accomplished by heating a hydrogen air mixture above 1150°F. The resulting water vapor and discharge gases are cooled prior to discharge from the recombiner. Air flows through the unit at 50 cfm with a 5 hp centrifugal blower in the unit providing the motive force. A single recombiner is capable of maintaining the hydrogen concentration in containment below the 4.0 volume

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TRM SPECIFICATION BASES (continued)

BACKGROUND	percent (v/o) flammability limit. Two recombiners are provided to meet the requirement for redundancy and independence. Each recombiner is powered from a separate Engineered Safety Features bus,
APPLICABLE SAFETY ANALYSIS	The hydrogen recombiners provide for controlling the bulk hydrogen concentration in containment to less than the lower flammable concentration of 4.0 v/o following a DBA. This control would prevent a containment wide hydrogen burn, thus ensuring the pressure and temperature assumed in the analysis are not exceeded and minimizing damage to safety related equipment located in containment. The limiting DBA relative to hydrogen generation is a LOCA.

Hydrogen may accumulate within containment following a LOCA as a result of:

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

b. Radiolytic decomposition of water in the Reactor Coolant System (RCS) and the containment sump;

c. Hydrogen in the RCS at the time of the LOCA (i.e., hydrogen dissolved in the reactor coolant and hydrogen gas in the pressurizer vapor space); or

d. Corrosion of metals exposed to Containment Spray System and Emergency Core Cooling Systems solutions.

To evaluate the potential for hydrogen accumulation in containment following a LOCA, the hydrogen generation as a function of time following the initiation of the accident is calculated. Conservative assumptions recommended in Reference 3 are used to maximize the amount of hydrogen calculated.

TLCO	Two hydrogen recombiners shared among the three units must be FUNCTIONAL. This ensures operation of at least one hydrogen recombiner in the event of a worst case single active failure.

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TRM SPECIFICATION BASES (continued)

TLCO (continued)

Operation with at least one hydrogen recombiner ensures that the post LOCA hydrogen concentration can be prevented from exceeding the flammability limit.

APPLICABILITY

In MODES 1 and 2, two hydrogen recombiners are required to control the post LOCA hydrogen concentration within containment below its flammability limit of 4.0 v/o, assuming a worst case single failure.

In MODES 3 and 4, both the hydrogen production rate and the total hydrogen produced after a LOCA would be less than that calculated for the DBA LOCA. Also, because of the limited time in these MODES, the probability of an accident requiring the hydrogen recombiners is low. Therefore, the hydrogen recombiners are not required in MODE 3 or 4.

In MODES 5 and 6, the probability and consequences of a LOCA are low, due to the pressure and temperature limitations. Therefore, hydrogen recombiners are not required in these MODES.

ACTIONS

The required ACTIONS have been modified by a Note stating that all three PVNGS Units (Units 1, 2, and 3) shall simultaneously comply with the REQUIRED ACTION(s) when the shared portion of the hydrogen recombiner(s) is the cause of a CONDITION. This is necessary since the three PVNGS Units share the two hydrogen recombiners that are required by this TLCO. It will be necessary for the Control Room of the Palo Verde Unit that discovers a nonfunctional shared portion of the hydrogen recombiner(s) to notify the other two Palo Verde Unit's Control Rooms of the nonfunctionality.

<u>A.1</u>

With one containment hydrogen recombiner nonfunctional, the nonfunctional recombiner must be restored to FUNCTIONAL status within 30 days. In this condition, the remaining FUNCTIONAL hydrogen recombiner is adequate to perform the hydrogen control function. The 30 day Completion Time is based on the availability of the other hydrogen recombiner,

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TRM SPECIFICATION BASES (continued)

ACTIONS
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the small probability of a LOCA or MSLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), and the amount of time available after a LOCA or MSLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit.

B.1 and B.2

With two hydrogen recombiners nonfunctional, 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 provided by the Hydrogen Purge Cleanup System. The 1 hour Completion Time allows a reasonable period of time to verify that a loss of hydrogen control function does not exist. In addition, the alternate hydrogen control system capability must be verified every 12 hours thereafter to ensure its continued availability. Both the initial verification and all subsequent verifications 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 FUNCTIONALITY of the alternate hydrogen control system. If the ability to perform the hydrogen control function is maintained, continued operation is permitted with two hydrogen recombiners nonfunctional for up to 7 days.

Seven days is a reasonable time to allow two hydrogen recombiners to be nonfunctional because the hydrogen control function is maintained and because of the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit.

C.1

If the nonfunctional hydrogen recombiner(s) cannot be restored to FUNCTIONAL status within the required Completion Time. TLCO 3.0.100.3 must be entered immediately.

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TRM SPECIFICATION BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.6.7.1

This SR ensures that there are no physical problems that could affect recombiner operation. A visual inspection is sufficient to determine abnormal conditions that could cause failures. The 6 month Frequency for this SR was developed considering that the incidence of hydrogen recombiners failing the SR in the past is low.

SR 3.6.7.2

A functional test of each Hydrogen Recombiner System assures that the recombiners remain operational. The functional test shall include operating the recombiner including the air blast heat exchanger fan motor and enclosed blower motor continuously for at least 30 minutes at a temperature of approximately 800°F reaction chamber temperature. The frequency recommended for this surveillance in the Improved Standard Technical Specifications (NUREG-1432, Rev. 1) is 18 months. The bases for NUREG 1432 was developed for permanently installed hydrogen recombiners. The two portable hydrogen recombiners at PVNGS are shared among the three units; therefore, the 6 month frequency from the initial licensing basis is retained for reliability considerations.

SR 3.6.7.3

Performance of a CHANNEL CALIBRATION to include a system functional test for each hydrogen recombiner ensures that the recombiners are operational and can attain and sustain the temperature necessary for hydrogen recombination. In particular, this SR requires 1) resistance checks of motors, thermocouples, and heater systems, 2) testing/calibration of all flow elements, switches, and temperature elements, and 3) operation of the recombiner to include a functional test at 1200°F (±50°F) for at least 4 hours. Operating experience has shown that these components usually pass the Surveillance when performed at the 12 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

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TRM SPECIFICATION BASES (continued)

REFERENCES

1. 10 CFR 50.44.
2. 10 CFR 50, Appendix A, GDC 41.
3. Regulatory Guide 1.7, Revision 0.
4. UFSAR, Section 6.2.5

T3.7.100 Steam Generator Pressure and Temperature Limitations

The limitation on steam generator pressure and temperature ensures that the pressure induced stresses in the steam generators do not exceed the maximum allowable fracture toughness stress limits. The limitations to 120°F and 230 psig for Units 1 and 3 are based on a steam generator RTNDT of 40°F and are sufficient to prevent brittle fracture. The limitations to 70°F and 650 psig for Unit 2 are based on a steam generator RTNDT of -20°F and are sufficient to prevent brittle fracture.

T3.7.101 Snubbers

All snubbers are required to be able to perform their associated safety function(s) to ensure that the structural integrity of the reactor coolant system and all other safety-related systems is maintained during and following a seismic or other event initiating dynamic loads. Snubbers excluded from this inspection program are those installed on nonsafety-related systems and then only if their failure or failure of the system on which they are installed, would have no adverse effect on any safety-related system.

When one or more snubbers are unable to perform their associated safety function(s), either the supported system must be declared inoperable immediately or TS LCO 3.0.8 must be entered. TS LCO 3.0.8 may only be entered if the restrictions described in the LCO 3.0.8 TS Bases are met. TS LCO 3.0.8 is an allowance, not a requirement. When any snubber is unable to perform its associated safety function, the supported system may be declared inoperable instead of utilizing LCO 3.0.8.

Required Action A.2 must be completed whenever Condition A is entered. This Required Action emphasizes the need to perform the evaluation to determine if the components to which the nonfunctional snubbers are attached were adversely affected by the non-functionality of the snubbers in order to ensure that the component remains capable of meeting the designed service. Restoration alone per Required Action A.1.1 or A.1.2 is insufficient because higher than

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analyzed stresses may have occurred and may have affected the supported system.

A list of individual snubbers with detailed information of snubber location and size and of system affected shall be available at the plant in accordance with Section 50.71(c) of 10 CFR Part 50. The accessibility of each snubber shall be determined and approved by the Plant Review Board. The determination shall be based upon the existing radiation levels and the expected time to perform a visual inspection in each snubber location as well as other factors associated with accessibility during plant operations (e.g., temperature, atmosphere, location, etc.), and the recommendations of Regulatory Guides 8.8 and 8.10. The addition or deletion of any hydraulic or mechanical snubber shall be made in accordance with Section 50.59 of 10 CFR Part 50.

The acceptance criteria specified in the 2001 Edition, 2003 Addenda, of the ASME OM Code, Subsection ISTD are to be used in the visual inspection to determine the functionality of the snubbers.

To provide assurance of snubber functional reliability one of the two functional testing methods specified in the 2001 Edition, 2003 Addenda, of the AMSE OM Code, Subsection ISTD, shall be utilized.

The service life of a snubber is established via manufacturer input and information through consideration of the snubber service conditions and associated installation and maintenance records (newly installed snubber, seal replaced, spring replaced, in high radiation area, in high temperature area, etc.). The requirement to monitor the snubber service life is included in the 2001 Edition, 2003 Addenda, of the ASME OM Code, Subsection ISTD to ensure that the snubbers periodically undergo a performance evaluation in view of their age and operating conditions. These records will provide statistical bases for future consideration of snubber service life.

T3.7.102 Sealed Source Contamination

The limitations on removable contamination for sources requiring leak testing, including alpha emitters, is based on 10 CFR 70.39(c) limits for plutonium. This limitation will ensure that leakage from byproduct, source, and special nuclear material sources will not exceed allowable intake values.

Sealed sources are classified into three groups according to their use, with surveillance requirements commensurate with the probability of damage to a

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source in that group. Those sources which are frequently handled are required to be tested more often than those which are not. Sealed sources which are continuously enclosed within a shielded mechanism (i.e. sealed sources within radiation monitoring or boron measuring devices) are considered to be stored and need not be tested unless they are removed from the shield mechanism.

T3.7.200 Atmospheric Dump Valves (ADVs)

BACKGROUND — See TS Bases B 3.7.4

APPLICABLE SAFETY ANALYSIS — TS Bases B 3.7.4.

ACTIONS

A.1

If the requirements of TSR 3.7.200 are not met, the condition must be documented in the corrective action program and an OPERABILITY DETERMINATION/FUNCTIONAL ASSESSMENT (OD/FA) must be initiated, as necessary, to determine the impact on equipment in the TSs. This action is required to assure compliance with the TSs.

SURVEILLANCE REQUIREMENTS

TSR 3.7.200.1

The nitrogen accumulator tank pressure must be verified to have a pressure of at least 615 psig indicated to ensure that it has sufficient pressurized gas to operate the ADVs for 4 hours at hot standby plus 9.3 hours of operation to reach cold shutdown under natural circulation conditions in the event of failure of the normal control air system, as described in UFSAR 10.3.2.2.4 and based on the RSB 5-1 cooldown evaluation in UFSAR Appendix 5C.

T3.7.201 AFW System
(See the ITS 3.7.5 Specification Bases.)

T3.7.202 DELETED

T3.7.203 DELETED

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TRM SPECIFICATION BASES

T3.7.204 DELETED

T3.7.205 Control Room Emergency Air Temperature Control System (CREATCS)
(See the ITS 3.7.12 Specification Bases.)

T3.7.206 Fuel Storage Pool Water Level
(See the ITS 3.7.14 Specification Bases.)

T3.7.207 Secondary Specific Activity
(See the ITS 3.7.16 Specification Bases.)

T3.8.100 Cathodic Protection

If any other metallic structures (e.g., buildings, new or modified piping systems, conduit) are placed in the ground in the vicinity of the fuel oil storage system or if the original system is modified, the adequacy and frequency of inspections of the cathodic protection system shall be re-evaluated and adjusted in accordance with Regulatory Guide 1.137.

T3.8.101 Containment Penetration Conductor Overcurrent Protective Devices

Containment electrical penetrations and penetration conductors are protected by either deenergizing circuits not required during reactor operation or by demonstrating the FUNCTIONALITY of primary and backup overcurrent protection circuit breakers during periodic surveillance. The circuit breakers will be tested in accordance with NEMA Standard Publication No. AB-2-1980. For a frame size of 250 amperes or less, the field tolerances of the high and low setting of the injected current will be within +40%/-25% of the setpoint (pickup) value. For a frame size of 400 amperes or greater, the field tolerances will be ±25% of the setpoint (pickup) value. The circuit breakers should not be affected when tested within these tolerances.

The surveillance requirements applicable to lower voltage circuit breakers provide assurance of breaker reliability by testing at least one representative sample of each manufacturer's brand of circuit breaker. Each manufacturer's molded case and metal case circuit breakers are grouped into representative samples which are then tested on a rotating basis to ensure that all breakers are tested. If a wide variety exists within any manufacturer's brand of circuit breakers it is necessary to divide that manufacturer's breakers into groups and treat each group as a separate type of breaker for surveillance purposes. There are no surveillance requirements on fuses. For in-line fuses, the applicable surveillance would require removing

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TRM SPECIFICATION BASES

the fuses from the circuit which would destroy the fuse. The test data for surveillance on the other fuses would not indicate whether the fuse was degrading which has been stated by the fuse manufacturer and Idaho National Engineering Laboratory.

T3.8.102 MOV Thermal Overload Protection and Bypass Devices

The OPERABILITY of the motor-operated valves thermal overload protection and/or bypass devices ensures that these devices will not prevent safety related valves from performing their function. The surveillance requirements for demonstrating the FUNCTIONALITY of these devices are in accordance with Regulatory Guide 1.106, "Thermal Overload Protection for Electric Motors on Motor Operated Valves," Revision 1, March 1977.

T3.8.200 AC Sources - Shutdown

(See the ITS 3.8.2 Specification Bases.)

T3.9.100 Decay Time

The minimum requirement for reactor subcriticality prior to movement of irradiated fuel assemblies in the reactor pressure vessel ensures that sufficient time has elapsed to allow the radioactive decay of the short lived fission products. This decay time is consistent with the assumptions used in the safety analyses.

T3.9.101 Communications

The requirement for communications capability ensures that refueling station personnel can be promptly informed of significant changes in the facility status or core reactivity condition during CORE ALTERATIONS.

T3.9.102 Refueling Machine

The FUNCTIONALITY requirements for the refueling machine ensure that: (1) the machine will be used for movement of fuel assemblies, (2) the machine has sufficient load capacity to lift a fuel assembly, and (3) the core internals and pressure vessel are protected from excessive lifting force in the event they are inadvertently engaged during lifting operations.

(continued)

TRM SPECIFICATION BASES

T3.9.103 Crane Travel

The restriction on movement of loads in excess of the nominal weight of a fuel assembly, CEA and associated handling tool over other fuel assemblies in the storage pool ensures that in the event this load is dropped (1) the activity release will be limited to that contained in a single fuel assembly, and (2) any possible distortion of fuel in the storage racks will not result in a critical array. This assumption is consistent with the activity release assumed in the safety analyses. However, the use of a single failure-proof crane to move spent fuel cask components over irradiated fuel stored in an approved cask is allowed by this LCO.

T3.9.104 Fuel Building Essential Ventilation System (FBEVS)

The limitations on the fuel building essential ventilation system ensure that all radioactive material released from an irradiated fuel assembly will be filtered through the HEPA filters and charcoal adsorber prior to discharge to the atmosphere. The FUNCTIONALITY of this system and the resulting iodine removal capacity are consistent with the assumptions of the safety analyses.

If one FBEVS train is nonfunctional, action must be taken to immediately verify that the FUNCTIONAL FBEVS is capable of being powered from an emergency power source and to restore the nonfunctional train to FUNCTIONAL status within 7 days. During this time period, the remaining FUNCTIONAL train is adequate to perform the FBEVS function. The 7 day Completion Time is reasonable, based on the risk from an event occurring requiring the nonfunctional FBEVS train, and ability of the remaining FBEVS train to provide the required protection.

During movement of irradiated fuel assemblies in the fuel building, if the Required Actions of Condition A cannot be completed within the required Completion Time, the operation (i.e., fan running, valves/dampers aligned to the post-FBEVAS mode, etc.) or movement of irradiated fuel assemblies must be suspended immediately. The first action ensures that the remaining train is FUNCTIONAL, that no undetected failures preventing system operation will occur, and that any active failure will be readily detected. If the system is not placed in the emergency mode of operation, this action requires suspension of the movement of irradiated fuel assemblies in order to minimize the risk of release of radioactivity that might require the actuation of FBEVS. This does not preclude the movement of fuel to a safe position.

(continued)

TRM SPECIFICATION BASES

Movement of spent fuel casks containing irradiated fuel assemblies is not within the scope of the Applicability of this technical specification. The movement of dry casks containing irradiated fuel assemblies will be done with a single-failure-proof handling system and with transport equipment that would prevent any credible accident that could result in a release of radioactivity.

When two trains of the FBEVS are nonfunctional during movement of irradiated fuel assemblies in the fuel building, action must be taken to place the unit in a condition in which the LCO does not apply. This LCO involves immediately suspending movement of irradiated fuel assemblies in the fuel building. This does not preclude the movement of fuel to a safe position.

The use of ANSI Standard N509 (1980) in lieu of ANSI Standard N509 (1976) to meet the guidance of Regulatory Guide 1.52, Revision 2, Positions C.6.a and C.6.b, has been found acceptable as documented in Revision 2 to Section 6.5.1 of the Standard Review Plan (NUREG-0800).

T3.9.200 Boron Concentration
(See the ITS 3.9.1 Specification Bases.)

T3.9.201 Containment Penetrations
(See the ITS 3.9.3 Specification Bases.)

T3.10.200 Liquid Holdup Tanks

The tanks referred to in this specification include all those outdoor radwaste tanks that are not surrounded by liners, dikes, or walls capable of holding the tank contents and that do not have tank overflows and surrounding area drains connected to the liquid radwaste treatment system.

Restricting the quantity of radioactive material contained in the specified tanks provides assurance that in the event of an uncontrolled release of the tanks' contents, the resulting concentrations would be less than 10 times the limits of 10 CFR Part 20.1001-20.2402, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in an UNRESTRICTED AREA.

The limit of 60 curies is based on the analyses given in Section 2.4 of the PVNGS FSAR and on the amount of soluble (not gaseous) radioactivity in the Refueling Water Tank in Table 2.4-26.

(continued)

TRM SPECIFICATION BASES

T3.10.201 Explosive Gas Mixture

This specification is provided to ensure that the concentration of potentially explosive gas mixtures contained in the waste gas holdup system is maintained below the flammability limits of hydrogen and oxygen. (Automatic control features are included in the system to prevent the hydrogen and oxygen concentrations from reaching these flammability limits. These automatic control features include isolation of the source of hydrogen and/or oxygen, or injection of dilutants to reduce the concentration below the flammability limits.) Maintaining the concentration of hydrogen and oxygen below their flammability limits provides assurance that the releases of radioactive materials will be controlled in conformance with the requirements of General Design Criterion 60 of Appendix A to 10 CFR Part 50.

T3.10.202 Gas Storage Tanks

This specification considers postulated radioactive releases due to a waste gas system leak or failure, and limits the quantity of radioactivity contained in each pressurized gas storage tank in the GASEOUS RADWASTE SYSTEM to assure that a release would be substantially below the guidelines of 10 CFR Part 100 for a postulated event.

Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting total body exposure to a MEMBER OF THE PUBLIC at the nearest exclusion area boundary will not exceed 0.5 rem. This is consistent with Standard Review Plan 11.3, Branch Technical Position ETSB 11-5, "Postulated Radioactive Releases Due to a Waste Gas System Leak or Failure," in NUREG-0800, July 1981.

T3.11.100 FIRE DETECTION INSTRUMENTATION

FUNCTIONALITY of the fire detection instrumentation ensures that adequate warning capability is available for the prompt detection of fires and that fire suppression systems, that are actuated by fire detectors, will discharge extinguishing agent in a timely manner. Prompt detection and suppression of fires will reduce the potential for damage to safety-related equipment and is an integral element in the overall facility fire protection program.

(continued)

TRM SPECIFICATION BASES

Fire detectors that are used to actuate fire suppression systems represent a more critically important component of a plant's fire protection program than detectors that are installed solely for early fire warning and notification. Consequently, the minimum number of FUNCTIONAL fire detectors must be greater.

The loss of detection capability for fire suppression systems, actuated by fire detectors, represents a significant degradation of fire protection for any area. As a result, the establishment of a fire watch patrol must be initiated at an earlier stage than would be warranted for the loss of detectors that provide only early fire warning. The establishment of frequent fire patrols in the affected areas is required to provide detection capability until the nonfunctional instrumentation is restored to FUNCTIONALITY.

When nonfunctional fire detection instrument(s) are inside containment, REQUIRED ACTIONs B.2 and C.2 require either (1) a fire watch patrol inspect the containment zone(s) with the nonfunctional instrument(s) at least once per 8 hours, or (2) monitor the containment air temperature at least once per hour at each of the 7 locations listed in the Bases for Technical Specification SR 3.6.5.1. The plant computer with the control room installed multi-point recorder and annunciator is an acceptable means of monitoring temperatures inside containment when required. The continuous monitoring of containment air temperature by the plant computer and multi-point recorder exceeds the requirement of hourly monitoring. The plant computer and multi-point recorder utilizes pre-set alarm points for each monitored location. If setpoints are exceeded, an audio annunciation is received that alerts the operator of an abnormal condition.

The fire zones listed in Table 3.3.11.100-1, Fire Detection Instruments, are discussed in Section 9B of the PVNGS UFSAR.

T3.11.101, 102, 103, 104, 105, and 106 FIRE SUPPRESSION SYSTEMS

The FUNCTIONALITY of the fire suppression systems ensures that adequate fire suppression capability is available to confine and extinguish fires occurring in any portion of the facility where safety-related equipment is located. The fire suppression system consists of the water system, spray and/or sprinklers, CO2, Halon, fire hose stations, and yard fire hydrants and associated emergency response vehicles. The collective capability of the fire suppression systems is adequate to minimize potential damage to safety related equipment and is a major element in the facility fire protection program.

TRM SPECIFICATION BASES

In the event that portions of the fire suppression systems are nonfunctional, alternate backup fire fighting equipment is required to be made available in the affected area(s) until the nonfunctional equipment is restored to service. When the nonfunctional fire fighting equipment is intended for use as a backup means of fire suppression, a longer period of time is allowed to provide an alternate means of fire fighting than if the nonfunctional equipment is the primary means of fire suppression.

The surveillance requirements provide assurance that the minimum FUNCTIONALITY requirements of the suppression systems are met. An allowance is made for ensuring a sufficient volume of CO2/Halon in the CO2/Halon storage tank by verifying either the weight or the level of the tank. The interval for some required surveillances for CO2 and Halon systems is based on the statistical reliability methodology provided in Electric Power Research Institute (EPRI) Technical Report 1006756, Fire Protection Equipment Surveillance Optimization and Maintenance Guide. Component failure will be entered into the corrective action program for analysis and trending.

In the event the fire suppression water system becomes nonfunctional, immediate corrective measures must be taken since this system provides the major fire suppression capability of the plant.

3.11.107 FIRE-RATED ASSEMBLIES

The FUNCTIONALITY of the fire barriers and barrier penetrations ensure that fire damage will be limited. These design features minimize the possibility of a single fire involving more than one fire area prior to detection and extinguishment. The fire barriers, fire barrier penetrations for conduits, cable trays and piping, fire dampers, and fire doors are periodically inspected and functionally tested to verify their FUNCTIONALITY.

T7.0 COMPONENT LISTS

T7.0.300 CONTAINMENT ISOLATION VALVES

This list identifies the containment isolation valves that are subject to the testing requirements of TS 3.6.3, "Containment Isolation Valves." All manual vent, drain, and test valves within a Containment Penetration (i.e., between the Containment Isolation Valves) will be maintained locked and closed per the locked valve administrative program or surveilled closed per Technical Specification SR 3.6.3.3 or SR 3.6.3.4.

VALVE NO	ITS 3.6.3 Condition	PENETRATION	VALVES RECEIVING CONTAINMENT ISOLATION (CIAS)
RDA-UV 023	A	9	Containment radwaste sump pump to LRS holdup tank
RDB-UV 024	A	9	Containment radwaste sump pump to LRS holdup tank
SGB-HV 200[a]	A	11	Downcomer feedwater chemical injection
SGB-HV 201[a]	A	12	Downcomer feedwater chemical injection
SIA-UV 708[a][b]	A	23	Containment recirc sump to post-accident sampling system
HCB-UV 044	A	25A	Containment air radioactivity monitor (inlet)
HCA-UV 045	A	25A	Containment air radioactivity monitor (inlet)
HCA-UV 046	A	25B	Containment air radioactivity monitor (outlet)
HCB-UV 047	A	25B	Containment air radioactivity monitor (outlet)
GAA-UV 002	A	29	Nitrogen to steam generator and reactor drain tank
GAA-UV 001	A	30	Nitrogen to SI tanks
HPA-UV 001	A	35	Containment to hydrogen recombiner
HPA-UV 003	A	35	Containment to hydrogen recombiner
HPA-UV 024[c]	A	35	Hydrogen control system
HPB-UV 002	A	36	Containment to hydrogen recombiner
HPA-UV 005	A	38	Containment to hydrogen recombiner
HPB-UV 004	A	36	Hydrogen recombiner return to containment (inlet)
HPA-UV 023[c]	A	38	Hydrogen control system
HPB-UV 006	A	39	Hydrogen recombiner return to containment (inlet)
CHA-UV 516	A	40	Letdown line from RC loop 2B to regenerative heat exchanger and letdown heat exchanger
CHB-UV 523	A	40	Letdown line from RC loop 2B to regenerative heat exchanger and letdown heat exchanger
CHB-UV 924[b]	A	40	Letdown line to post-accident sampling system
SSB-UV 201	A	42A	Pressurizer liquid sample line

(continued)

a. Not Type C Tested
b. In units where DMWO 2778159 has been implemented, applicable valve(s) have been removed.
c. DMWO 2529758 removes piping and valves (manual and/or solenoid) from selected portions of the PASS System piping that are connected to safety-related piping and/or components. In Units where DMWO 2529758 has been implemented, valve CHA-UV-715 is removed and valves HPA-UV-023 & HPA-UV-024 are de-terminated with upstream piping cut and capped as the new containment boundary.

T7.0 COMPONENT LISTS

(continued)

VALVE NO	ITS 3.6.3 Condition	PENETRATION	VALVES RECEIVING CONTAINMENT ISOLATION (CIAS)
SSA-UV 204	A	42A	Pressurizer liquid sample line
SSB-UV 202	A	42B	Pressurizer steam space sample line
SSA-UV 205	A	42B	Pressurizer steam space sample line
SSB-UV 200	A	42C	Hot leg sample line
SSA-UV 203	A	42C	Hot leg sample line
CHA-UV 560	A	44	Reactor Drain tank to pre-holdup ion exchanger
CHB-UV 561	A	44	Reactor Drain tank to pre-holdup ion exchanger
CHA-UV 580	A	45	Makeup to reactor drain tank
CHA-UV 715[c]	A	45	Makeup to reactor drain tank post accident sampling sys
GRA-UV 001	A	52	RDT vent to WG surge tank
GRB-UV 002	A	52	RDT vent to WG surge tank
WCB-UV 63	A	60	Normal chilled water to containment ACU (inlet)
WCB-UV 61	A	61	Normal chilled water to containment ACU (outlet)
WCA-UV 62	A	61	Normal chilled water to containment ACU (outlet)

VALVE NO	ITS 3.6.3 Condition	PENETRATION	VALVES RECEIVING CONTAINMENT PURGE (CPIAS) [Also isolated on CIAS]
CPA-UV 002A	A[a]	56	Containment purge (inlet)
CPB-UV 003A	A[a]	56	Containment purge (inlet)
CPA-UV 002B	A[a]	57	Containment purge (outlet)
CPB-UV 003B	A[a]	57	Containment purge (outlet)
CPA-UV 004A	A	78	Containment purge (inlet)
CPB-UV 005A	A	78	Containment purge (inlet)
CPA-UV 004B	A	79	Containment purge (outlet)
CPB-UV 005B	A	79	Containment purge (outlet)

a. Type C testing is not required when the valve is not a required containment isolation valve per Note 5 of LCO 3.6.3.

T7.0 COMPONENT LISTS

(continued)

VALVE NO	ITS 3.6.3 Condition	PENETRATION	CONTAINMENT ISOLATION CHECK VALVES
SIA-V 164	A	21	Shutdown cooling heat exchanger 1 to CS header 1
SIB-V 165	A	22	Shutdown cooling heat exchanger 2 to CS header 2
CHE-V M70	A	41	Regenerative heat exchanger to RC loop 2A
IAE-V 073	A	59	Containment service air utility station
SIB-V 533[(a)]	A	67	Long term recirculation loop 2
CHN-V 835	A	72	RC pump seal injection water to RCP 1A, 1B, 2A, 2B
AFA-V 079[(a)]	A	75	Steam generator 1 auxiliary feedwater
AFB-V 080[(a)]	A	76	Steam generator 2 auxiliary feedwater
SIA-V 523[(a)]	A	77	Long term recirculation loop 1

VALVE NO	ITS 3.6.3 Condition	PENETRATION	NORMALLY OPEN ESF ACTUATED CLOSED[(d)]
SGA-UV 1133[(a)]	C	2	Steam trap/bypass
SGA-UV 1134[(a)]	C	3	Steam trap/bypass
SGB-UV 1135A[(a)]	C	1	Steam trap/bypass
SGB-UV 1135B[(a)]	C	2	Steam trap/bypass
SGB-UV 1136A[(a)]	C	3	Steam trap/bypass
SGB-UV 1136B[(a)]	C	4	Steam trap/bypass

(continued)

a. Not Type C Tested

d. The economizer and downcomer main feedwater isolation valves (MFIV's) are covered by specification 3.7.3, "MFIVs."

T7.0 COMPONENT LISTS

(continued)

VALVE NO	ITS 3.6.3 Condition	PENETRATION	NORMALLY OPEN ESF ACTUATED CLOSED
SGA-UV 211[(a)]	A	37A	Steam generator blowdown sample
SGB-UV 228[(a)]	A	37A	Steam generator blowdown sample
SGA-UV 204[(a)]	A	37B	Steam generator blowdown sample
SGB-UV 219[(a)]	A	37B	Steam generator blowdown sample
SGA-UV 500P[(a)]	A	46	Steam generator blowdown to SCCS
SGB-UV 500Q[(a)]	A	46	Steam generator blowdown to SCCS
SGB-UV 500R[(a)]	A	47	Steam generator blowdown to SCCS
SGA-UV 500S[(a)]	A	47	Steam generator blowdown to SCCS
SGB-UV 226[(a)]	A	48	SG blowdown to downcomer blowdown sample
SGA-UV 227[(a)]	A	48	SG blowdown to downcomer blowdown sample
SGA-UV 220[(a)]	A	49	SG blowdown to downcomer blowdown sample
SGB-UV 221[(a)]	A	49	SG blowdown to downcomer blowdown sample
SGB-UV 224[(a)]	A	63A	SG2 blowdown sample
SGA-UV 225[(a)]	A	63A	SG2 blowdown sample
SGB-UV 222[(a)]	A	63B	SG2 blowdown sample
SGA-UV 223[(a)]	A	63B	SG2 blowdown sample

VALVE NO	ITS 3.6.3 Condition	PENETRATION	NORMALLY CLOSED ESF ACTUATED CLOSED
SGE-UV 169[(a)]	C	2	Main steam isolation bypass
SGE-UV 183[(a)]	C	3	Main steam isolation bypass
SIA-UV 682	A	28	SI drain from drain tank

VALVE NO	ITS 3.6.3 Condition	PENETRATION	REQUIRED OPEN DURING ACCIDENT
SID-UV 654[(a)]	A	26	From shutdown cooling RC loop 2
SIB-UV 656[(a)]	A	26	From shutdown cooling RC loop 2
SIB-HV 690[(a)]	A	26	From shutdown cooling RC loop 2
SIC-UV 653[(a)]	A	27	From shutdown cooling RC loop 1
SIA-UV 655[(a)]	A	27	From shutdown cooling RC loop 1
SIA-HV 691[(a)]	A	27	From shutdown cooling RC loop 1
HCC-HV 076[(a)(f)]	C	32A	Containment pressure monitor
HPA-HV 007A	A	35	Containment to hydrogen monitor
HPB-HV 008A	A	36	Containment to hydrogen monitor

(continued)

a. Not Type C Tested
f. Enter applicable Conditions and Required Actions of LCO 3.6.1, "Containment," when leakage results in exceeding the overall containment leakage rate acceptance criteria.