Note: The following typed page represents this marked-up page.

3/4.6.2 DEPRESSURIZATION AND

CONTAINMENT SYSTEMS

~~CONTAINMENT~~ COOLING SYSTEMS ~~(OPTIONAL) (Credit taken for iodine removal by spray systems)~~

LOWER CONTAINMENT VENT COOLERS

LIMITING CONDITION FOR OPERATION

3.6.2.~~3~~ 2 {Two} independent ~~groups of containment cooling fans~~ trains of lower containment vent coolers shall be OPERABLE with {two} ~~fan systems~~ coolers to each ~~group. (Equivalent to 100% cooling capacity.)~~ train.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one ~~group~~ of the above required ~~containment cooling fans~~ lower containment vent coolers inoperable ~~and both containment spray systems OPERABLE~~, restore ~~the inoperable group of cooling fans~~ to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With ~~two groups of the above required containment cooling fans~~ two lower containment vent coolers of the same train inoperable, ~~and both containment spray systems OPERABLE,~~ restore ~~at least one group of cooling fans~~ to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. ~~Restore both above required groups of cooling fans to OPERABLE status within 7 days of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.~~

~~c. With one group of the above required containment cooling fans inoperable and one containment spray system inoperable, restore the inoperable spray system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore the inoperable group of containment cooling fans to OPERABLE status within 7 days of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.~~

SURVEILLANCE REQUIREMENTS

4.6.2.~~3~~ 2 Each ~~group of containment cooling fans~~ lower containment vent cooler shall be demonstrated OPERABLE:

a. At least once per 31 days by~~:~~

~~1. Starting each fan group from the control room and~~ verifying that each fan ~~group~~ operates for at least 15 minutes.

2. Verifying a cooling water flow rate of greater than or equal to 200 gpm to each cooler.

b. At least once per 18 months by: ~~verifying that each fan group starts automatically on a ______ test signal.~~

1. Verifying from the control room that each fan starts.

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3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

LOWER CONTAINMENT VENT COOLERS

LIMITING CONDITION FOR OPERATION

3.6.2.2 Two independent trains of lower containment vent coolers shall be OPERABLE with two coolers to each train.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one of the above required lower containment vent coolers inoperable, restore to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With two lower containment vent coolers of the same train inoperable, restore to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.2.2 Each lower containment vent cooler shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each fan operates for at least 15 minutes.

b. At least once per 18 months by:

1. Verifying from the control room that each fan starts.

2. Verifying a cooling water flow rate of greater than or equal to 200 gpm to each cooler.

3/4.6.1.8 EMERGENCY GAS TREATMENT SYSTEM (EGTS)

The OPERABILITY of the EGTS cleanup subsystem ensures that during LOCA conditions, containment vessel leakage into the annulus will be filtered through the HEPA filters and charcoal adsorber trains prior to discharge to the atmosphere. This requirement is necessary to meet the assumptions used in the accident analyses and limit the site boundary radiation doses to within the limits of 10 CFR 100 during LOCA conditions. Cumulative operation of the system with the heaters on for 10 hours over a 31 day period is sufficient to reduce the buildup of moisture on the absorbers and HEPA filters. ANSO N510-1975 will be used as a procedural guide for surveillance testing. FP

3/4.6.1.9 CONTAINMENT VENTILATION SYSTEM

Use of the containment purge lines is restricted to only one pair (one supply line and one exhaust line) of purge system lines at a time to ensure that the site boundary dose guidelines of 10 CFR Part 100 would not be exceeded in the event of a loss of coolant accident during purging operations. The analysis of this accident assumed purging through the largest pair of lines (a 24 inch inlet line and a 24 inch outlet line), a pre-existing iodine spike in the reactor coolant and four second valve closure times.

3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

3/4.6.2.1 CONTAINMENT SPRAY SYSTEM

The OPERABILITY of the containment spray system ensures that containment depressurization and cooling capability will be available in the event of a LOCA. The pressure reduction and resultant lower containment leakage rate are consistent with the assumptions used in the accident analyses.

INSERT 3/4.6.2.2

3/4.6.3 CONTAINMENT ISOLATION VALVES

The OPERABILITY of the containment isolation valves ensures that the containment atmosphere will be isolated from the outside environment in the event of a release of radioactive material to the containment atmosphere or pressurization of the containment. Containment isolation within the time limits specified ensures that the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a LOCA. By letters dated March 3, 1981, and April 2, 1981, TVA will submit a report on the operating experience of the plant no later than startup after the first refueling. This information will be used to provide a basis to re-evaluate the adequacy of the purge and vent time limits. R8

INSERT

3/4.6.2.2 CONTAINMENT COOLING FANS

The OPERABILITY of the lower containment vent coolers ensures that adequate heat removal capacity is available to provide long-term cooling following a non-LOCA event. Postaccident use of these coolers ensures containment temperatures remain within environmental qualification limits for all safety-related equipment required to remain functional.

Note: The following typed page represents this marked-up page.

3/4.6.2 DEPRESSURIZATION AND

CONTAINMENT SYSTEMS

~~CONTAINMENT~~ COOLING SYSTEMS ~~(OPTIONAL) (Credit taken for iodine removal by spray systems)~~

LOWER CONTAINMENT VENT COOLERS

LIMITING CONDITION FOR OPERATION

3.6.2.~~3~~ 2 {Two} independent ~~groups of containment cooling fans~~ trains of lower containment vent coolers shall be OPERABLE with {two} ~~fan systems~~ coolers to each ~~group. (Equivalent to 100% cooling capacity.)~~ train.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one ~~group~~ of the above required ~~containment cooling fans~~ lower containment vent coolers inoperable ~~and both containment spray systems OPERABLE~~, restore ~~the inoperable group of cooling fans~~ to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With ~~two groups of the above required containment cooling fans~~ two lower containment vent coolers of the same train inoperable, ~~and both containment spray systems OPERABLE,~~ restore ~~at least one group of cooling fans~~ to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. ~~Restore both above required groups of cooling fans to OPERABLE status within 7 days of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.~~

~~c. With one group of the above required containment cooling fans inoperable and one containment spray system inoperable, restore the inoperable spray system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore the inoperable group of containment cooling fans to OPERABLE status within 7 days of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.~~

SURVEILLANCE REQUIREMENTS

4.6.2.~~3~~ 2 Each ~~group of containment cooling fans~~ lower containment vent cooler shall be demonstrated OPERABLE:

a. At least once per 31 days by~~:~~

~~1. Starting each fan group from the control room and~~ verifying that each fan ~~group~~ operates for at least 15 minutes.

~~2.~~ Verifying a cooling water flow rate of greater than or equal to 200 gpm to each cooler.

b. At least once per 18 months by: ~~verifying that each fan group starts automatically on a ______ test signal.~~

1. Verifying from the control room that each fan starts.

3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

LOWER CONTAINMENT VENT COOLERS

LIMITING CONDITION FOR OPERATION

3.6.2.2 Two independent trains of lower containment vent coolers shall be OPERABLE with two coolers to each train.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one of the above required lower containment vent coolers inoperable, restore to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With two lower containment vent coolers of the same train inoperable, restore to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.2.2 Each lower containment vent cooler shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each fan operates for at least 15 minutes.

b. At least once per 18 months by:

1. Verifying from the control room that each fan starts.

2. Verifying a cooling water flow rate of greater than or equal to 200 gpm to each cooler.

3/4.6.1.8 EMERGENCY GAS TREATMENT SYSTEM (EGTS)

The OPERABILITY of the EGTS cleanup subsystem ensures that during LOCA conditions, containment vessel leakage into the annulus will be filtered through the HEPA filters and charcoal adsorber trains prior to discharge to the atmosphere. This requirement is necessary to meet the assumptions used in the accident analyses and limit the site boundary radiation doses to within the limits of 10 CFR 100 during LOCA conditions. Cumulative operation of the system with the heaters on for 10 hours over a 31 day period is sufficient to reduce the buildup of moisture on the absorbers and HEPA filters. ANSI N510-1975 will be used as a procedural guide for surveillance testing.

3/4.6.1.9 CONTAINMENT VENTILATION SYSTEM

Use of the containment purge lines is restricted to only one pair (one supply line and one exhaust line) of purge system lines at a time to ensure that the site boundary dose guidelines of 10 CFR Part 100 would not be exceeded in the event of a loss of coolant accident during purging operations. The analysis of this accident assumed purging through the largest pair of lines (a 24 inch inlet line and a 24 inch outlet line), a pre-existing iodine spike in the reactor coolant and four second valve closure times.

3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

3/4.6.2.1 CONTAINMENT SPRAY SYSTEM

The OPERABILITY of the containment spray system ensures that containment depressurization and cooling capability will be available in the event of a LOCA. The pressure reduction and resultant lower containment leakage rate are consistent with the assumptions used in the accident analyses.

INSERT 3/4 6.2.2

3/4.6.3 CONTAINMENT ISOLATION VALVES

The OPERABILITY of the containment isolation valves ensures that the containment atmosphere will be isolated from the outside environment in the event of a release of radioactive material to the containment atmosphere or pressurization of the containment. Containment isolation within the time limits specified ensures that the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a LOCA.

3/4.6.4 COMBUSTIBLE GAS CONTROL

The OPERABILITY of the equipment and systems required for the detection and 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. Either recombiner unit or the purge system

INSERT

3/4.6.2.2 CONTAINMENT COOLING FANS

The OPERABILITY of the lower containment vent coolers ensures that adequate heat removal capacity is available to provide long-term cooling following a non-LOCA event. Postaccident use of these coolers ensures containment temperatures remain within environmental qualification limits for all safety-related equipment required to remain functional.

ENCLOSURE 2

PROPOSED TECHNICAL SPECIFICATION CHANGE

SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-87-37)

DESCRIPTION AND JUSTIFICATION FOR

CONTAINMENT COOLER REQUIREMENTS

ENCLOSURE 2

Description of Change

The Tennessee Valley Authority proposes to modify the Sequoyah Nuclear Plant (SQN) Units 1 and 2 Technical Specifications to add additional requirements for containment cooling for non-loss of coolant accident (LOCA) events. Revised calculations for a main steam line break (MSLB) inside containment (the most severe non-LOCA event for containment temperature) indicate that temperatures would exceed environmental qualification (EQ) limits for certain equipment in the lower compartment and pressurizer enclosure. The proposed change will impose limiting conditions for operation and associated surveillance requirements for the lower containment cooling fans to ensure that temperatures following a MSLB remain below the EQ limits.

Reason for Change

Current EQ temperatures inside containment are based on the reactor coolant system (RCS) conditions reaching cold shutdown. Plant cooldown to cold shutdown is accomplished postaccident by recirculation mode core cooling or by placing the residual heat removal (RHR) system into operation approximately four hours after reactor shutdown, once RCS temperature and pressure are approximately 350^{O}F and 380 psig, respectively. However, an MSLB inside containment creates flooding conditions at the single RCS suction line that could prevent the use of the RHR because one of the series suction isolation valves is submerged. Failure of either suction valve to open would prevent RHR system operation for plant cooldown. Without RHR capabilities, the RCS would have to be maintained in hot standby. This is the present licensing basis for SQN. This causes additional long-term heat loads that drive lower containment and pressurizer enclosure temperatures above the EQ limits. Postaccident use of the lower containment coolers will ensure containment temperatures remain below the current EQ curve. Technical specification requirements are being added since these coolers now have an assumed role in accident mitigation.

Justification for Change

The postaccident effects of an MSLB for containment temperature environment were evaluated using the "MONSTER" containment computer code. The containment was modeled according to standard NRC practice. The model included the upper, lower, ice condenser, and dead-ended regions plus major concrete and steel heat sinks. The RCS was modeled as a time-dependent heat source based on information from Westinghouse, and a separate region for the pressurizer was included. A supporting calculation to establish cooler performance was performed to provide a basis for the cooler model used in the MONSTER analyses. The MSLB analyses from Westinghouse were used to establish initial conditions for the MONSTER runs. Sections 6.2.1 and 15.4.2 of the Final Safety Analysis Report (FSAR) discuss the MSLB. The MONSTER analyses extended the transient after the end of steam generator blowdown until a steady state containment temperature was reached. The results show that the present environmental temperature qualification curve remains bounding for all areas of the lower containment, including the pressurizer enclosure. Key assumptions and cooler data are provided in attachment 1.

The lower containment coolers have been upgraded to safety grade coolers for use in handling RCS heat loads when the plant is in a hot standby condition. This upgrade required the coolers to be 1E, environmentally qualified, and seismic category 1. The coolers were procured as seismic category 1. The documentation was reviewed and determined to still be valid. The ductwork was designed to be seismic category 1L. Upgrading the ductwork to seismic category 1 required the addition of four new supports and a modification to one existing support. These physical modifications have been completed. The adequacy of the remaining duct supports has been formally documented in calculations. The cooler motors and associated cables were powered from 1E trained boards, and the cables are environmentally qualified. However, qualification of the motors could not be established. The motors were rewound under a contract with Buffalo Forge that establishes environmental qualification by reference to Buffalo Forge test reports. The rewind program also upgraded the motors to 1E, and a seismic report has been provided. The coolers are supplied with essential raw cooling water (ERCW), and the piping is TVA class C or better. The coolers, ductwork, and ERCW piping were also reviewed to establish that pipe whip or jet impingement from secondary side breaks would not impair system operation. The FSAR will be revised to reflect this information in the next annual update.

The new technical specification requirements for the containment cooling system were derived from the Standard Technical Specifications (NUREG-0452, revision 4). The action statements were modified to delete containment spray operability requirements. The analyses assume long-term cooling is provided by the coolers only and do not take credit for containment spray once the coolers are placed in operation. The required times to return inoperable equipment to an operable status are consistent with other requirements for loss of containment cooling systems.

The surveillance requirement (SR) for manual fan actuation was modified to reduce the testing interval to 18 months rather than every 31 days. Since these fans are used during normal operation, thus proving fan performance, a SR to stop the fan and then restart it every 31 days is unnecessary. Verifying manual actuation every 18 months will provide reliable assurance of fan performance and is consistent with manual actuation test intervals for engineered safety feature actuation system instrumentation and emergency core cooling equipment.

The testing interval to verify cooling water flow rate was reduced from every 31 days to at least once every 18 months. The purpose of the SR is to demonstrate that a 200-gal/min cooling water flow rate is delivered to the coolers. The SR for ERCW operability (SR 4.7.4.9) requires verification of proper valve alignment to safety-related equipment every 31 days. The plant surveillance instruction that satisfies this requirement will be revised to include necessary lower containment cooler valve verification. Verification of proper valve alignment and throttle position will ensure a proper flow path exists to the coolers. Verification of the 200-gal/min flow rate demonstrates the pump's capability to deliver the required flow.

The SR to verify automatic actuation has been deleted because the fans will only require manual actuation. The analyses showed that the coolers would not be required until after ice bed meltout. This will occur approximately 10 hours into the event. Operator guidance has been established to start the coolers between one and four hours after the event. The one-hour time period ensures that the coolers will not be operating until well after the end of steam generator blowdown, even for very small breaks. This delay in cooler actuation is necessary to ensure that work performed by the fans does not exceed motor capacity. The containment air pressure after steam generator blowdown will have dropped sufficiently at this time to lower the air density the fans are expected to move. The four-hour time period ensures that the coolers will be operating well before a conservative determination of ice bed meltout. Based on these long time periods, manual actuation of the coolers was determined to be acceptable. The coolers can be started and ERCW flow to the coolers established from the main control room. Operator actions outside the control room would only be required if there was a loss of one power train. In this instance, two ERCW valves per cooler located outside containment would have to be manually opened.

Postaccident use of the lower containment coolers and the proposed technical specification requirements ensure the present environmental temperature qualification curve remains bounding for all safety-related equipment inside containment required to remain functional following a non-LOCA event.

ATTACHMENT 1

COOLER DATA

1. Design cooler heat removal capacity at 90°F air outlet and 120°F air inlet temperatures: 2,000,000 Btuh. (4,000,000 Btuh per pair.)

2. Design cooler airflow under clean coil conditions: 65,000 cfm (130,000 cfm per pair).

3.

Heat Removal Per Cooler Pair (Btuh at 122°F)	Total cfm Per Cooler Pair
clean (new) fan cooler: 3,700,000 at 100,000 cfm	clean (new) fan cooler: 100,000
dirty (old) fan cooler: 2,965,000 at 90,000 cfm (analyzed)	dirty (old) fan cooler: 90,000 (analyzed)

ASSUMPTIONS

1. The operator will cool the RCS to 350°F at a rate greater than or equal to 19°F/hour commencing at 2 hours following the MSLB. The decrease in temperature to 350°F should take 12 hours following the MSLB.

2. The operator will further cool the RCS in order to attain an RCS hot leg temperature of 250°F, 200 hours (8.5 days) following the MSLB.

3. Two lower containment coolers are available for use no earlier than one hour and no later than four hours following the MSLB. The combined flow of these coolers is at least 90,000 cfm and a combined heat removal rate of 2,965,000 Btuh at 122°F air inlet temperature. In addition, the water side of each cooler is assumed to have an inlet water temperature of 83°F and a volumetric flow rate of 200 gal/min.

4. Only one train of containment spray operates, and it becomes unavailable after the RWST level reaches its low-low level setpoint. The low-low level setpoint is estimated to occur at 4,250 seconds following the MSLB.

5. Only one air return fan is available and activated 10 minutes after a phase B signal is generated. This fan continues to operate throughout the 100-day postulated event.

ENCLOSURE 3

PROPOSED TECHNICAL SPECIFICATION CHANGES

SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-87-37)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS

SIGNIFICANT HAZARDS EVALUATION

TVA has evaluated the proposed technical specification change and determined that it does not represent a significant hazards consideration based on criteria established in 10 CFR 50.92(c). Operation of SQN in accordance with the proposed amendment will not:

(1) involve a significant increase in the probability or consequences of an accident previously evaluated. The FSAR assumes the worst case condition for long-term cooling following a steam line break is a loss of offsite power with failure of one emergency power train. This condition requires the greatest amount of operator action and the longest time to achieve cold shutdown. The analyses demonstrate that the plant can be maintained safely at hot standby conditions for extended periods of time.

With only onsite power available, the plant can be maintained in a safe hot standby condition using the intact steam generators by supplying feedwater with the auxiliary feedwater system and venting steam through the secondary side, power-operated relief valves. The relief valves will be controlled to gradually reduce pressure and temperature as the core residual heat decays. Two of four steam generators are required to maintain the plant in this safe shutdown condition.

The FSAR considers the containment temperature response resulting from a LOCA to be bounding in all cases. No further consideration was given to the effects of long-term recovery from an MSLB or other less severe non-LOCA events, since the mass and energy release had ended within a short period of time. Therefore, the containment EQ curve was developed without considering the primary system as a major long-term heat source in establishing the most severe inside containment EQ time-dependent temperature profile. Use of the lower containment coolers for non-LOCA accident mitigation and the proposed technical specification requirements will ensure containment temperatures remain within EQ limits for all safety-related equipment required to remain functional following non-LOCA events.

(2) create the possibility of a new or different kind of accident than previously evaluated. The proposed change will not affect normal operation of the plant. A rigorous evaluation of the major heat sources present during the entire accident timeframe has been performed to ensure equipment EQ limits are not exceeded. Modifications were made to upgrade the lower containment coolers to ensure reliable operability during accident conditions. All safety system interfaces have been evaluated to ensure that the required use of the coolers does not degrade other safety systems expected to be operable during the accident. Operator action during the accident is not a burden because a very flexible time period is allowed to complete the required actions. The proposed testing requirements do not require unusual plant configuration and thus do not create a different type of accident than previously evaluated.

(3) involve a significant reduction in a margin of safety. The proposed change adds technical specification requirements for the lower containment coolers since these coolers now have an assumed role in accident mitigation of non-LOCA events. This role is to keep containment temperature within operating limits of equipment required to maintain the safety of the plant. Continued reliable operation of safety-related equipment provides assurance that the margin of safety has not been reduced.