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U. S. Nuclear Regulatory Commission
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**SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED AMENDMENT NO. 237 TO LICENSE
NPF-14 AND PROPOSED AMENDMENT NO. 203
TO LICENSE NPF-22: RESIDUAL HEAT REMOVAL
AND ULTIMATE HEAT SINK
PLA-5319**

**Docket Nos. 50-387
and 50-388**

Pursuant to 10CFR50.59, PPL Susquehanna LLC proposes to amend the Susquehanna Steam Electric Station (SSES) Unit 1 and Unit 2 Technical Specifications (TS). The proposed change will modify TS Surveillance Requirement SR 3.7.1 to add operability requirements and surveillance requirements for the Ultimate Heat Sink (UHS) spray bypass valves and large array valves. This proposed change also reduces the allowed completion times for the conditions applicable to the Residual Heat Removal Service Water (RHRSW) system.

The benefit of these proposed changes is to resolve a PPL Condition Report which identified that the existing TS 3.7.1 conditions do not account appropriately for the worst case single failure. PPL has implemented administrative controls limiting completion times and addressing the spray bypass and large array valves. Implementation of the proposed TS changes will assure the TS's prescribe the necessary administrative controls to control the RHRSW and UHS configuration should equipment become inoperable.

Attachment 1 presents the Safety Assessment for the proposed change.

Attachment 2 contains the "No Significant Hazards Consideration" and "Environmental Considerations" assessments. The "No Significant Hazards Considerations" assessment concludes that the proposed Technical Specification amendments do not involve a significant increase in the probability or consequence of an accident previously evaluated; do not create the possibility of a new or different kind of accident from any

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accident previously evaluated; and do not involve a significant reduction in the margin of safety. The "Environmental Considerations" assessment concludes that the revisions conform to the criteria for actions eligible for categorical exclusion as specified in 10CFR51.22(c)(9), and will not impact the environment.

Attachment 3 contains marked-up pages of the Unit 1 and Unit 2 TS's.

Attachment 4 contains "camera ready" versions of the revised Unit 1 and Unit 2 TS's pages.

Attachment 5 contains, for information, markups of the associated TS bases.

The proposed changes have been approved by the SSES Plant Operations Review Committee and reviewed by the Susquehanna Review Committee.

We request NRC complete the review of this change request by December 31, 2001.

Please contact Mr. M. H. Crowthers at (610) 774-7766 if there are any questions concerning this submittal.

Sincerely,

G. T. Jones

Attachments

cc: NRC Region I
Mr. S. Hansell, NRC Sr. Resident Inspector
Mr. R. G. Schaaf, NRC Sr. Project Manager

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of :

PPL Susquehanna, LLC: Docket No. 50-387

PROPOSED AMENDMENT NO. 237 TO LICENSE NPF-14:
RESIDUAL HEAT REMOVAL AND ULTIMATE HEAT SINK
UNIT NO. 1

Licensee, PPL Susquehanna, LLC, hereby files supplemental information in support of a revision to its Facility Operating License No. NPF-14 dated July 17, 1982.

This amendment involves a revision to the Susquehanna SES Unit 1 Technical Specifications.

PPL Susquehanna, LLC
By:

G. T. Jones
Vice-President - Nuclear Engineering & Support

Sworn to and subscribed before me
this day of , 2001.

Notary Public

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of :

PPL Susquehanna, LLC : Docket No. 50-388

PROPOSED AMENDMENT NO. 203 TO LICENSE NPF-22:
RESIDUAL HEAT REMOVAL AND ULTIMATE HEAT SINK
UNIT NO. 2

Licensee, PPL Susquehanna, LLC, hereby files supplemental information in support of a revision to its Facility Operating License No. NPF-22 dated March 23, 1984.

This amendment involves a revision to the Susquehanna SES Unit 2 Technical Specifications.

PPL Susquehanna, LLC
By:

G. T. Jones
Vice-President - Nuclear Engineering & Support

Sworn to and subscribed before me
this day of , 2001.

Notary Public

Attachment 1 to PLA-5319

Safety Impact Assessment

Section 1: Introduction

The purpose of this Technical Specification change is to modify the Residual Heat Removal Service Water (RHRSW) and Ultimate Heat Sink (UHS) Technical Specification 3.7.1. The change is proposed for two reasons. The first is to add operability conditions and surveillance requirements for the spray bypass valves and the large spray array valves. The second is to reduce the allowed completion times for the situation when one or more residual heat removal service water (RHRSW) subsystems are inoperable so that these completion times are consistent with other Technical Specifications for systems of similar safety impact.

The current completion times for inoperable RHRSW subsystems are based on the evaluation that, with one RHRSW subsystem inoperable, an additional single failure may occur and the overall system can still meet its intended design function. Revised single failure evaluations have identified more restrictive single failures that prevent the system from meeting its intended design function. Therefore, the currently allowed completion times for one or more RHRSW subsystems inoperable are not appropriate. PPL has implemented administrative controls limiting the completion times to those proposed herein by Technical Specification Interpretation.

The Completion Times assigned for revised Technical Specification 3.7.1 are based on the following.

A. A 30-day Completion time is assigned for a given condition when the following criteria are met:

   1. The overall system continues to meet its design requirements.

   2. An additional, worst-case single failure could be tolerated without losing design function.

   3. The function of any other systems is not affected.

   There are no conditions in the proposed Technical Specification for which a 30-day Completion Time can be justified.

B. A 7-day Completion Time is assigned for a given condition when the following conditions are met:

   1. The overall system continues to meet its design requirements.

   2. An additional, worst-case single failure cannot be tolerated without loss of design function.

   3. Neither the function of the opposite Unit nor any other system is affected.

C. A 72-hour Completion Time is assigned for a given condition when the following conditions are met:

   1. The overall system continues to meet its design requirements.

   2. An additional, worst-case single failure cannot be tolerated without loss of design function.

   3. An additional, worst-case single failure would compromise the performance of other systems, or could affect conditions on the opposite Unit.

D. A 8-hour Completion Time is assigned when the system, for a given condition, cannot meet its design basis function. The 8-hour time period is allowed to restore the out-of-service equipment because it is safer to allow a reasonable period of time for repair rather than enduring a challenging unit shutdown.

In addition, these above conditions all result in shutdown if the Completion Times cannot be met. Under normal operating circumstances, the equipment out-of-service is taken as the single failure for design bases evaluations, and no further single failures are considered. However, because of the Completion Time definitions above, a further, worst-case single failure is considered in this evaluation to determine whether the Completion Time should be 7 days or 72 hours. In general, the further, worst-case single failure considered is the failure of the unaffected loop spray bypass valve to close.

It should be noted here that any valve failure discussed herein refers to a valve not attaining a desired position on demand, that is, when the operator requires. The failure to attain correct position may be the failure to either open or close on demand or the spurious change from desired position to undesired position.

The RHRSW/UHS system is presented schematically in Figure 1. The RHRSW system is composed of two loops, with two subsystems assigned to each loop. Each subsystem contains a suction source, one pump, a return header, a heat exchanger, valves, piping and associated instrumentation. The RHRSW pump, taking suction from the ultimate heat sink (UHS), pumps cooling water through the tube side of the RHR heat exchanger. After removing heat from the RHR heat exchanger, the water is discharged back to the UHS through the return header. The discharge headers are shared with the emergency service water (ESW) system and direct the return flow from both the RHRSW and ESW systems to a network of UHS return loops. The return loops are manually controlled and can route the return flow through the spray arrays, where the heat is dissipated directly to the atmosphere, or the spray bypass line, where the return flow, consequently the discharged heat, goes directly to the UHS. A single large spray array or the combination of both small spray arrays is sufficient to remove the shutdown heat load from a design basis event. The individual RHRSW loops may be aligned to either unit, as required. The minimum requirement for the safe shutdown of both units, under either normal or accident conditions is that two of these RHRSW subsystems must be operable.

The UHS return loops must be manually aligned to use either set of spray nozzles. Manual alignment to either array requires manual closure of the spray array bypass valves, which are automatically opened on RHRSW and/or ESW pump start. The spray bypass valves are normally open and receive an automatic open signal on RHRSW/ESW pump start to prevent the possibility of running the pumps under dead head conditions. Use of the spray arrays also requires the manual opening of either the large or the small spray array valves, or both valves, if available. Analysis of the design basis accident for the UHS shows that one large spray array is required to dissipate the heat generated during a design basis loss of coolant accident (LOCA), with concurrent safe shutdown of the non-LOCA unit.

The failure of a spray bypass valve in one UHS return loop to close on demand results in the inability to use the spray arrays on that UHS return loop and, as a result, this failure is the worst case single failure for the combined RHRSW/UHS system. The UHS design analysis has concluded that, with a spray bypass valve open, opening either of the spray array valves on the affected subsystem would not produce sufficient spray nozzle pressure to effectively transfer the heat load to the environment. Operations Staff would not manually load RHRSW pumps on a UHS return loop that has a failed spray array bypass valve, according to plant procedure. Thus, the failure of a spray array bypass valve to close effectively causes two of the four RHRSW subsystems (the subsystems on the loop that contains the failed valve) to be unavailable. The UHS analysis does account for the alignment of ESW system heat loads on the UHS return loop with the failed bypass valve, therefore, the affected ESW subsystems need not be considered inoperable.

Failure of either or both of the small array valves to open on demand is not considered in this Technical Specification because the conclusion is that these valves do not meet the criteria set forth in 10CFR50.36 for inclusion. The small spray arrays are included in the system design to allow operational flexibility during system testing. A small spray array can accommodate the return flow from an entire ESW loop plus one RHRSW pump; therefore, one small spray array can be used when RHR pump surveillance tests are conducted, as well as the return flow to the UHS when suppression pool cooling is in operation. However, failure of either or both small spray arrays does not impact the availability of the large spray array valves, and the RHRSW/UHS system remains single failure proof. An evaluation of the small spray arrays with respect to the criteria for Technical Specification inclusion is attached as an Appendix A to this Safety Assessment.

Failure of one of the large spray array valves to open on demand leaves the plant with a single large spray array and two small spray arrays available. This configuration is not single failure proof, because a failure of the spray bypass valve in the opposite loop results in only a single small spray array available for heat dissipation, which is insufficient to dissipate the heat transferred in the design basis event.

Two small spray arrays are equivalent in heat dissipation to one large spray array and can be used in the design basis event if neither large spray array is available. The small spray arrays are only effective when the bypass valves properly close on demand; therefore, both small spray arrays in operation require both spray bypass valves to close.

Operation of the RHRSW system requires manual actions that are performed according to procedural guidance. The only components in the UHS system that receive an automatic open signal are the spray bypass valves, which receive an automatic open signal (only from their respective loop) given an ESW or RHRSW pump start, to ensure an operable return path to the UHS. The spray bypass valves receive a signal to open and the large spray array valves receive a signal to close when the last ESW/RHRSW pump shuts off. Operation and alignment of the RHRSW system is considered completely manual and does not involve any automatic actions.

Surveillance tests are established for the spray bypass valves and the large spray array valves in this Technical Specification change so that operability of these important valves can be periodically verified. A frequency requirement of 92 days is established and is consistent with the current surveillance frequency of these valves. A review of the test history indicates that problems with these valves have been related to indication or unacceptable leakage through a valve, with the exception that one of the small array valves failed closed and had to be replaced. Valve leakage is not specifically addressed in the design basis UHS analysis. However, the design basis UHS analysis determines heat transfer and spray evaporation effectiveness using flow values for the RHRSW and ESW systems that allow for considerable margin from the actual values that have been obtained from flow balances. Therefore, any reasonable valve leakage is off-set by the margin used in the analysis.

One further single failure that needs to be considered is the failure of a small spray array valve to close when only the large spray array is required to reject the heat. (Note that the small array valves are normally closed.) Under these conditions, flow would be diverted from the large spray array nozzles to the small array, therefore reducing the spray efficiency of the large array. Based on previous calculations, the additional spray area resulting from the small array valves becoming available for heat dissipation more than makes up for the reduced efficiency of the large spray array.

The Technical Specification revision discussed herein is based upon maintaining the UHS temperature within the design bounds, that is, during hot weather operation. During cold weather, or winter, operation, the main concern is the avoidance of destroying the spray nozzles as a result of freezing. There are no requirements in this revised Technical Specification that are inconsistent with cold weather operation.

Potential effects on the ESW Technical Specification (3.7.2) were considered. The specification for ESW requires an operable UHS, determined by Technical Specification 3.7.1. The design basis analysis allows some ESW flow through the failed loop, therefore, ESW can be considered operable as long as a return loop exists, even if a spray array is unavailable. Therefore, ESW remains operable as long as the UHS is operable and no further constraints on ESW are required.

Because of the importance of the RHRSW/UHS system operability on the ability of both units to safely shutdown, the Required Action to shutdown was considered very carefully. However, under non-accident conditions and with off-site power sources available, the challenge to the RHRSW/UHS systems would not be severe, since the condenser could be used and the emergency diesel generators, a significant UHS heat load, are not required. Therefore, shutting both units down in an orderly manner with reduced RHRSW capability is preferable to allowing the plant to continue operation with the possibility that an unforeseen transient would significantly challenge the RHRSW/UHS and the other associated safety related systems.

Section 2: Change Description

The proposed Technical Specification change modifies Section 3.7.1 of the Technical Specifications and Section B3.7.1 of the Technical Specification Bases. One new condition (3.7.1A) is inserted to cover the spray bypass valves and the large spray array valves, because of the importance of these valves on UHS/RHRSW system operation. The existing conditions for one and two RHRSW subsystems inoperable have been moved to conditions 3.7.1B and 3.7.1C, respectively. The completion times for returning the subsystems to operable status have been shortened from 30 days to 7 days for one RHRSW subsystem inoperable and from 7 days to 72 hours for two RHRSW subsystems inoperable. The proposed completion times for these situations are consistent with other Technical Specifications for systems with similar safety significance.

In addition to adding conditions on the spray bypass and large spray array valves, surveillance requirements have been established for these valves. The purpose of these surveillance requirements is to assure that the valves can be operated manually, as required by design basis accident analyses.

Section 3: Safety Assessment

Impacts on Safety Margin

The changes to the Technical Specifications (Section 3.7.1) and Technical Specification Bases (Section B3.7.1) are to add the bypass and array valves to the Technical Specifications and to reduce the completion times to values consistent with other, similar Technical Specification requirements for the RHRSW system conditions. For example, the proposed seven-day completion time for one RHRSW system inoperable is consistent with the completion time for one loop of RHR suppression pool cooling inoperable (Tech. Spec. Section 3.6.2.3).

The failure of either or both of the small spray array valves does not result in any loss of system function, even given a further, worst case, single failure. This conclusion is based on the evaluation that, given both small spray array valves are inoperable, a further single failure still leaves one operable large spray array for heat dissipation and one large spray array is sufficient to meet design basis heat removal requirements. Loss of one or both small spray arrays results in at least both large spray arrays remaining available for operation. Since a single large spray array is sufficient to remove design basis heat loads, the plant continues to be single failure proof under this situation, and only operational flexibility (the ability to use the small arrays instead of the large arrays as conditions warrant) is lost. Therefore, the small spray array valves are not considered in the Technical Specifications, as documented in the Attachment.

The failure of a large spray array valve to open on demand has a significant effect on RHRSW/UHS system performance, because this failure eliminates one of the two large spray arrays from dissipating heat. A 72-hour Completion Time is appropriate because the RHRSW/UHS system can still meet the design requirement because the other large spray array is available. However, failure of either the bypass valve or the large spray array valve in the other loop would result in the loss of the ability to meet the design requirement. Also, loss of a large spray array has potential effects on both units.

The failure of a spray bypass valve to close on demand results in the loss of spray cooling for an entire loop of RHRSW. That is, the failure of a spray bypass valve to close causes the loss of spray cooling effectiveness for one entire spray loop (the large and small spray arrays associated with the failed spray bypass valve). Under these conditions, the failure of either the opposite loop spray bypass valve or the opposite loop large spray array will result in the RHRSW/UHS system, as well as the ESW system, incapable of meeting their design function. Therefore, the completion time for restoring a spray bypass valve to operable is 72 hours, as is shown in condition 3.7.1A of the proposed revision. Under the condition when both spray bypass valves become inoperable, no spray cooling potential remains and LCO 3.0.3 should be entered. Numerous possible combinations of inoperable valves are not specifically addressed in the conditions. These combinations are not addressed in the conditions since they represent conditions for which no spray cooling potential remains. Under the condition when no spray cooling remains, entering LCO 3.0.3 is appropriate. An inoperable UHS puts the plant in condition 3.7.1D, which requires that both units be in hot shutdown within twelve hours followed by cold shutdown within the following twenty-four hours.

The current Technical Specifications allow a completion time of 30 days for a single RHRSW subsystem inoperable that is based on the evaluation that the RHRSW system could withstand a further single failure and still perform its intended function. The current completion time is based on the worst case single failure of a loss of pump or individual flowpath. Under these conditions, even with the loss of an additional RHRSW pump or individual flow path, all the required, design basis heat loads for combined LOCA/safe shutdown remain within the capacity of the remaining, intact RHRSW equipment, properly aligned to each unit. However, the failure of a spray bypass valve to close on demand has been determined to be the worst case single failure for the RHRSW/UHS system. Therefore, should one RHRSW subsystem be inoperable, a single failure of the spray bypass valve in the opposite UHS return loop would result in only one RHRSW subsystem operable to shut down both units, a condition beyond the capability of the RHRSW/UHS system under design bases accident conditions. As a result, it is proposed to reduce the completion time for returning an inoperable loop to service (condition 3.7.1B) from 30 days to 7 days.

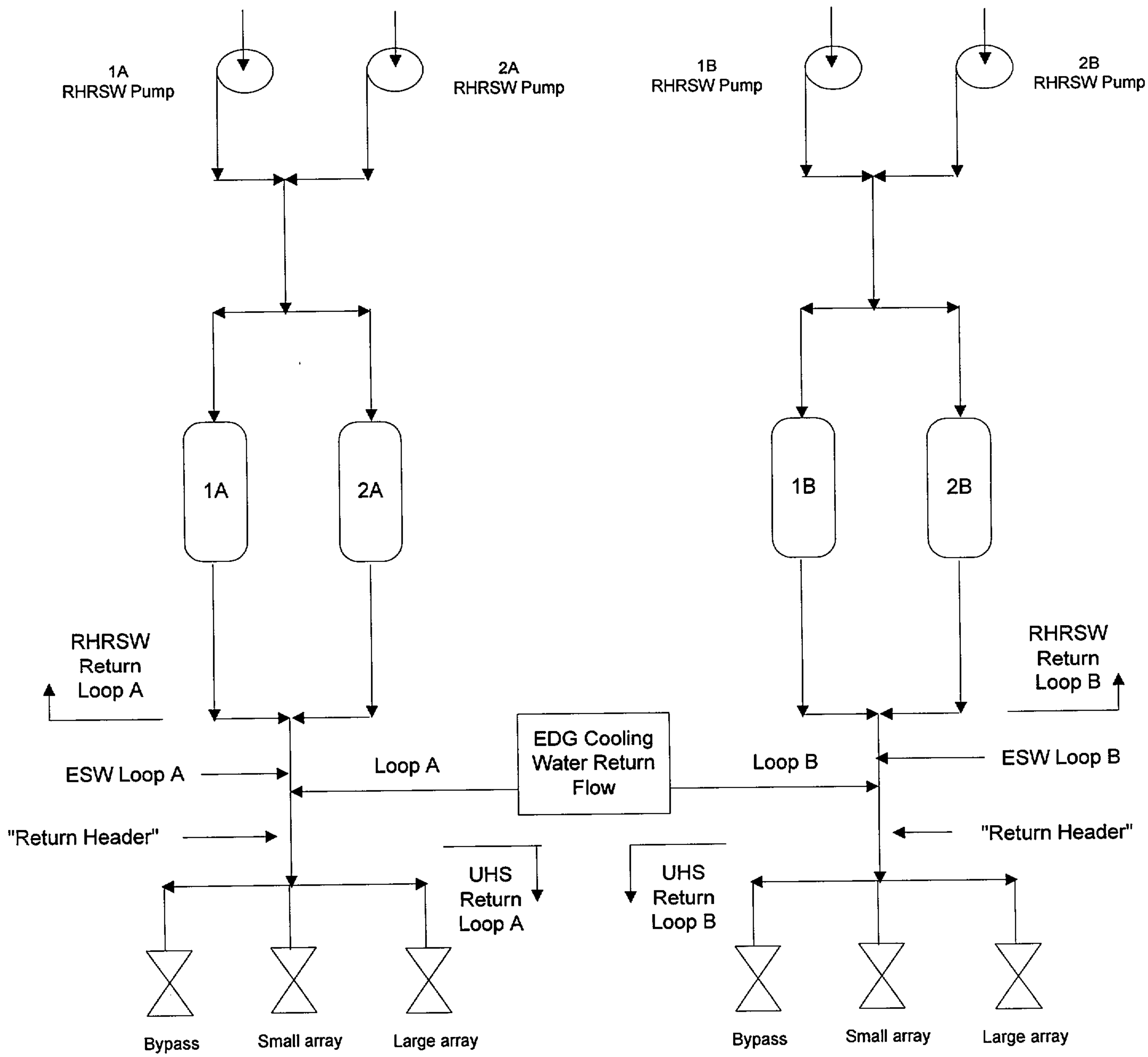
In the case when two RHRSW subsystems are inoperable, a further single failure would result in a situation where the system would not meet the design requirements. In addition, with two RHRSW subsystems inoperable, a failure of the spray bypass valve to close would result in the complete loss of spray cooling. Therefore, the completion time for restoring two RHRSW subsystems to operable status (condition 3.7.1C) is 72 hours.

In the case where more than two RHRSW subsystems become inoperable at the same time, the RHRSW/UHS system can no longer meet its intended design function should a design basis accident occur. Under these circumstances, unless at least the equivalent of two RHRSW subsystems can be returned to operable status in 8 hours, an orderly plant shutdown is required. The orderly plant shutdown is preferred because an orderly shutdown allows the bulk of the decay heat removed from the units to go to the condenser and then be dissipated through the service water system and the cooling towers, rather than challenging the ESW/RHRSW/UHS systems. Table 1 shows, for all possible configurations, which condition applies, the associated completion time requirement and includes a justification for the proposed completion time.

As a result of the discussion presented in this section, the overall effect of the proposed Technical Specification change is to insure that the RHRSW, ESW and UHS systems meet their design intent and perform their design function in the event of a design basis accident.

Figure 1

SSES RHRSW, ESW and UHS System Interfaces and Boundaries



Appendix A

Review of 10CFR50.36 Technical Specification Inclusion Criteria

With Respect to Small Array Valves

The criteria for inclusion of limiting conditions for operation in the Technical Specifications are given in 10CFR50.36. At the February 1, 2001 Plant Operation Review Committee meeting, a proposal to amend Technical Specification 3.7.1, that included a 30 day LCO on the small spray array valves in the ultimate heat sink was not recommended. The committee concluded that this 30 day LCO posed an undue risk of required dual unit shutdown with no increase in overall plant safety. Therefore, a determination of the requirement to add the LCO on the small spray arrays is warranted, and the criteria used are the guidance in 10CFR50.36.

It is concluded, based on the assessment presented below, that the small spray array valves need not be addressed in the SSES Technical Specifications.

10CFR50.36 Criterion 1:

> *Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.*

The small spray arrays are not considered instrumentation, therefore, this criterion does not apply.

10CFR50.36 Criterion 2:

> *A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of the fission product barrier.*

The small spray arrays are not a design feature defining an initial condition of a design basis accident or transient that presents a challenge to the fission product barrier. Therefore, this criterion does not apply to the small spray arrays.

10CFR50.36 Criterion 3:

> *A structure, system or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.*

The small spray arrays are not considered primary path, because the primary design basis success path assumes the availability of the large spray arrays -(Thus, this criterion confirms the need for the large spray array valves to be addressed in the Technical Specifications. The spray bypass valves are required for the large spray array valves to be effective, thus the spray bypass valves are also included in the Technical Specifications). Two small spray arrays can be substituted for one large spray array, a situation that makes the small spray arrays valuable back-ups for the large arrays, but the small arrays are not the primary success path. Therefore, this criterion does not apply to the small spray arrays.

10CFR50.36 Criterion 4:

> *A structure, system or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.*

The Susquehanna SES specific probabilistic risk assessment determined that the failure to initiate RHRSW and ESW is a significant risk contributor to containment failure. This result stems from the fact that the survival of primary containment depends on the availability of decay heat removal and the emergency diesel generators. Decay heat removal from primary containment requires the RHRSW system to effectively transport heat from inside primary containment to the ultimate heat sink via shutdown cooling, alternate shutdown cooling or suppression pool cooling. Operation of the emergency diesel generators depends on ESW for engine cooling and ESW ultimately requires the ultimate heat sink for long term operation.

The SSES IPE assumes that RHRSW and ESW are successful as long as flow to the UHS, regardless of valve alignment, is established. The IPE success path can be satisfied with flow to the UHS without any of the spray valves open (that is, with both spray bypass valves open). Such a configuration, however, would lead to long term failure of the UHS under design basis environmental conditions. Realistically, under moderate environmental conditions, opening a spray path in less than twenty-four hours would result in successful long term operation of all long term support systems. Thus a small spray array or a large spray array would be success paths for long term operation. The large spray arrays, as discussed in item 3, comprise the primary success path for design environmental conditions.

The small spray arrays are not considered risk significant because (1) numerous success paths (both large spray arrays and small spray arrays) exist that will satisfy the IPE requirements for long term cooling under realistic environmental conditions and (2) the SSES IPE did not require successful operation of the small spray arrays as a success path for accident mitigation. In addition, the risk reduction worth (RRW) and the risk achievement worth (RAW) for the small spray arrays were evaluated, based on Maintenance Rule definitions and criteria. A conservative estimate of RRW gave a value of $\sim 5\times10^{-4}$, versus a threshold value of 0.005. A conservative estimate of RAW resulted in a value of 1.33 versus a threshold value of 2. Therefore, the small array values do not meet the Maintenance Rule criteria for risk significant systems.

Operating experience has not shown the small arrays to be significant to public health and safety.

Therefore, it is concluded that the successful operation of the small spray arrays is not risk significant and the small spray array valves do not meet any of the criteria for inclusion into the Technical Specifications. As a result of this analysis, the large spray array valves and the spray bypass valves will be added to the Technical Specifications, but the small spray array valves will not.

Table 1:
Summary of Equipment Out of Service and Proposed Completion Times

Equipment Out Of Service								Condition	Completion Time	Justification
Unit 1 RHRSW A	Unit 2 RHRSW A	Unit 1 RHRSW B	Unit 2 RHRSW B	Lg Spr Array A	Lg Spr Array B	Spr BP Valve A	Spr BP Valve B			
x								3.7.1B	7 Days	Only RHRSW system affected; no effect on ESW
	x							3.7.1B	7 Days	Only RHRSW system affected; no effect on ESW
		x						3.7.1B	7 Days	Only RHRSW system affected; no effect on ESW
			x					3.7.1B	7 Days	Only RHRSW system affected; no effect on ESW
x		x						3.7.1C	72 Hrs.	RHRSW System not Single Failure Proof
	x		x					3.7.1C	72 Hrs.	RHRSW System not Single Failure Proof
x	x							3.7.1B	72 Hrs.	RHRSW System not Single Failure Proof
		x	x					3.7.1B	72 Hrs.	RHRSW System not Single Failure Proof
x	x	x						3.7.1C	8 Hrs.	Insufficient RHRSW Capacity remaining
x		x	x					3.7.1C	8 Hrs.	Insufficient RHRSW Capacity remaining
x	x		x					3.7.1C	8 Hrs.	Insufficient RHRSW Capacity remaining
	x	x	x					3.7.1C	8 Hrs.	Insufficient RHRSW Capacity remaining
				x				3.7.1A	72 Hrs.	RHRSW and ESW system affected
					x			3.7.1A	72 Hrs.	RHRSW and ESW system affected
						x		3.7.1A	72 Hrs.	RHRSW and ESW system affected
							x	3.7.1A	72 Hrs.	RHRSW and ESW system affected
				x		x		3.7.1A	72 Hrs.	RHRSW and ESW system affected
					x		x	3.7.1A	72 Hrs	RHRSW and ESW system affected
		x				x		3.7.1A	8 Hrs.	Insufficient RHRSW Capacity Remaining
			x			x		3.7.1A	8 Hrs.	Insufficient RHRSW Capacity Remaining
x							x	3.7.1A	8 Hrs.	Insufficient RHRSW Capacity Remaining
	x						x	3.7.1A	8 Hrs.	Insufficient RHRSW Capacity Remaining
		x		x		x		3.7.1A	8 Hrs.	Insufficient RHRSW Capacity Remaining
			x	x		x		3.7.1A	8 Hrs.	Insufficient RHRSW Capacity Remaining
x					x		x	3.7.1A	8 Hrs.	Insufficient RHRSW Capacity Remaining
	x				x		x	3.7.1A	8 Hrs.	Insufficient RHRSW Capacity Remaining
x	x	x	x					3.0.3	S/D	Inoperable UHS
					x	x		3.0.3	S/D	Inoperable UHS
				x			x	3.0.3	S/D	Inoperable UHS
				x	x			3.0.3	S/D	Inoperable UHS
				x	x	x		3.0.3	S/D	Inoperable UHS
				x	x		x	3.0.3	S/D	Inoperable UHS
						x	x	3.0.3	S/D	Inoperable UHS

(Notes: 1. An 'x' in any column indicates that that component is out of service.
2. This table only Reflects Completion Times derived for the proposed RHRSW/UHS Technical Specification. Other Technical Specifications may apply, resulting in more restrictive Completion Times.)

Attachment 2 to PLA-5319

No Significant Hazards Consideration and Environmental Consideration

No Significant Hazards Consideration Evaluation

PPL Susquehanna LLC has evaluated the proposed amendment and determined that it involves no significant hazards consideration. According to 10CFR50.92 (c) a proposed amendment to an operating license involves a no significant hazards consideration if operation of the facility with the propose amendment would not:

- Involve a significant increase in the probability of occurrence or consequences of an accident previously evaluated;
- Create the possibility of a new or different kind of accident from any previously analyzed; or
- Involve a significant reduction in a margin of safety.

PPL Susquehanna LLC proposes to:

(1) add operability conditions and surveillance requirements for the UHS spray bypass valves and the UHS large spray array valves to Section 3.7.1 of the SSES Unit 1 and Unit 2 Technical Specifications and

(2) reduce the allowed completion times in Section 3.7.1 of the SSES Unit 1 and Unit 2 Technical Specifications when one or more residual heat removal service water (RHRSW) systems are inoperable so that the completion times are consistent with other Technical Specifications for systems of similar safety impact in the SSES Unit 1 and Unit 2 Technical Specifications.

The Residual Heat Removal Service Water (RHRSW) system is composed of two loops, with two subsystems assigned to each loop. Each subsystem contains a suction source, one pump, a return header, a heat exchanger, valves, piping and associated instrumentation. Each RHRSW pump, taking suction from the ultimate heat sink (UHS), pumps cooling water through the tube side of an RHR heat exchanger. After removing heat from the RHR heat exchanger, the water is discharged back to the UHS through a return header. The individual RHRSW subsystems may be used to support the opposite unit, if required. The minimum requirement for the safe shutdown of both units, under either normal or accident conditions is that two of these RHRSW subsystems must be operable. The return headers are shared with the emergency service water (ESW) system and direct the return flow from both the RHRSW and ESW systems to a network of UHS return loops. The UHS has two return loops, one return loop for each RHRSW loop. Each return loop contains a large spray array, small spray array and bypass line. The return loops are manually controlled and can route the return flow through the spray arrays, where the heat is dissipated directly to the atmosphere, or the spray bypass line, where the return flow, consequently the discharged heat, goes directly to the UHS.

Manual alignment to either array requires manual closure of the bypass valves, which are automatically opened on RHRSW and/or ESW pump start. The bypass valves are normally open and receive an automatic open signal on RHRSW/ESW pump start to prevent the possibility of running the pumps under dead head conditions. Use of the spray arrays also requires the manual opening of the large spray array valves. Analysis of the design basis accident for the UHS shows that one large spray array is required to dissipate the heat generated during a design basis loss of coolant accident (LOCA), with concurrent safe shutdown of the non-LOCA unit.

The determination that the criteria set forth in 10CFR50.92 are met for this amendment as indicated below:

1. Does the proposed change involve a significant increase in the probability of occurrence or consequences of an accident previously evaluated?

   Implementation of the subject changes reduces the probability of occurrence and the probability of adverse consequences of accidents previously evaluated. Inclusion of the large array valves and the bypass valves to the Technical Specifications (TS) recognizes their importance to safe shutdown. The administrative controls that TS's invoke increases the probability that potential inoperability of these valves is controlled and managed in a manner commensurate with their risk significance.

   Reducing the completion time for RHRSW subsystem inoperable conditions recognizes their importance to safe shutdown commensurate with their risk significance.

   These changes do not affect the design or operation of the affected components/ systems and serves to increase the level of administrative control for the UHS and RHRSW system that will help to ensure the ability to achieve safe shutdown.

   Therefore, this proposed amendment does not involve a significant increase in the probability of occurrence or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any previously analyzed?

   The subject changes apply Technical Specification administrative controls to the UHS bypass and large array valves and shortens the completion times applicable to RHRSW inoperable conditions. The design and operation of the affected components and systems is not affected.

Application of these administrative controls does not involve a possibility of a new or different kind of accident from any previously analyzed.

3. Does the proposed change involve a significant reduction in a margin of safety.

   Implementation of the subject changes increases the margin of safety since these changes add Technical Specification controls to components not currently addressed in the Technical Specifications and reduces the completion times for subsystems currently addressed in the Technical Specifications. These changes better account for the affected components/systems impact on safe shutdown.

   Therefore these changes do not involve a significant reduction in margin of safety.

Based upon the above, the proposed amendment does not involve a significant hazards consideration.

Environmental Assessment

An environmental assessment is not required for the proposed change because the requested change conforms to the criteria for actions eligible for categorical exclusion as specified in 10 CFR 51.22(c)(9). The requested change will have no impact on the environment. As discussed above, the proposed change does not involve a significant hazard consideration. The proposed change does not involve a change in the types or increase in the amounts of effluents that may be released off-site. In addition, the proposed change does not involve an increase in the individual or cumulative occupational radiation exposure.

Attachment 3 to PLA-5319

Marked-Up Technical Specification Pages

3.7 PLANT SYSTEMS

3.7.1 Residual Heat Removal Service Water (RHRSW) System and the Ultimate Heat Sink (UHS)

LCO 3.7.1 Two RHRSW subsystems and the UHS shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

NOTES ~~NOTE~~

1. Enter applicable Conditions and Required Actions of LCO 3.4.8, "Residual Heat Removal (RHR) Shutdown Cooling System—Hot Shutdown," for RHR shutdown cooling made inoperable by RHRSW System.

2. Separate Conditions entry is allowed for each requirement of the LCO.

CONDITION	REQUIRED ACTION	COMPLETION TIME
B ~~A.~~ One Unit 1 RHRSW subsystem inoperable. INSERT A	B ~~A~~.1 Restore the Unit 1 RHRSW subsystem to OPERABLE status.	72 hours ~~7 days~~ from discovery of ~~one or both~~ the associated Unit 2 RHRSW subsystem~~s~~ inoperable ~~not capable of supporting associated Unit 1 RHRSW subsystem~~ AND ~~30 days~~ 7 days

(continued)

Unit 1 Technical Specification

Markups

INSERT A

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One valve in Table 3.7.1-1 inoperable **OR** One valve in Table 3.7.1-2 inoperable **OR** One valve in Table 3.7.1-2 and the same return loop valve in Table 3.7.1-1 inoperable.	A.1 Declare the associated RHRSW subsystems inoperable. **AND** A.2 Restore the inoperable valve(s) to OPERABLE status.	Immediately 8 hours from the discovery of an inoperable RHRSW subsystem, in the opposite loop from the inoperable valve(s) **AND** 72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B.~~ C Both Unit 1 RHRSW subsystems inoperable.	~~B~~.1 C Restore one Unit 1 RHRSW subsystem to OPERABLE status.	8 hours from discovery of one ~~or both~~ Unit 2 RHRSW subsystem~~s~~ not capable of supporting associated Unit 1 RHRSW subsystem AND 72 hours ~~7 days~~
~~C.~~ D Required Action and associated Completion Time not met. OR UHS inoperable	~~C~~.1 D Be in MODE 3. AND ~~C~~.2 D Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.1.1	Verify the water level is greater than or equal to 678 feet 1 inch above Mean Sea Level.	12 hours

(continued)

ACTIONS (continued)

SURVEILLANCE		FREQUENCY
SR 3.7.1.2	Verify the average water temperature of the UHS is: a. ---------------- NOTE ---------------- Only applicable with both units in MODE 1 or 2, or with either unit in MODE 3 for less than twelve (12) hours. ------------------------------------- ≤ 85°F; or b. ---------------- NOTE ---------------- Only applicable when either unit has been in MODE 3 for at least twelve (12) hours but not more than twenty-four (24) hours. ------------------------------------- ≤ 87°F; or c. ---------------- NOTE ---------------- Only applicable when either unit has been in MODE 3 for at least twenty-four (24) hours. ------------------------------------- ≤ 88°F.	24 hours
SR 3.7.1.3	Verify each RHRSW manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	31 days

INSERT B

INSERT C

INSERT B

SR 3.7.1.4	Verify that valves HV-01222A and B (the spray loop bypass valves) close upon receipt of a closing signal.	92 days
SR 3.7.1.5	Verify that valves HV-01224A1 and B1 (the large loop spray array valves) open on receipt of an opening signal.	92 days

INSERT C

TABLE 3.7.1-1
Ultimate Heat Sink Spray Cooling Large Array Valves

Valve Number	**Valve Description**
HV-01224A1	Loop A large spray array valve
HV-01224B1	Loop B large spray array valve

TABLE 3.7.1-2
Ultimate Heat Sink Spray Bypass Valves

Valve Number	**Valve Description**
HV-01222A	Loop A spray array bypass valve
HV-01222B	Loop B spray array bypass valve

3.7 PLANT SYSTEMS

3.7.1 Residual Heat Removal Service Water (RHRSW) System and the Ultimate Heat Sink (UHS)

LCO 3.7.1 Two RHRSW subsystems and the UHS shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

-- NOTES ~~NOTE~~ --

1. Enter applicable Conditions and Required Actions of LCO 3.4.8, "Residual Heat Removal (RHR) Shutdown Cooling System – Hot Shutdown," for RHR shutdown cooling made inoperable by RHRSW System.

2. Separate Condition entry is allowed for each requirement of the LCO.

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~A.~~ B. One Unit 2 RHRSW subsystem inoperable.	~~A.1~~ B.1 Restore the Unit 2 RHRSW subsystem to OPERABLE status.	72 hours ~~7 days~~ from discovery of ~~one or both Unit 1 RHRSW subsystems not capable of supporting associated Unit 2 RHRSW subsystem~~ the associated Unit 1 RHRSW subsystem inoperable AND ~~30 days~~ 7 days

INSERT A

(continued)

INSERT A

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One valve in Table 3.7.1-1 inoperable **OR** One valve in Table 3.7.1-2 inoperable **OR** One valve in Table 3.7.1-2 and the same return loop valve in Table 3.7.1-1 inoperable.	A.1 Declare the associated RHRSW subsystems inoperable. **AND** A.2 Restore the inoperable valve(s) to OPERABLE status.	Immediately 8 hours from the discovery of an inoperable RHRSW subsystem, in the opposite loop from the inoperable valve(s) **AND** 72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B.~~ C. Both Unit 2 RHRSW subsystems inoperable.	~~B.1~~ C.1 Restore one Unit 2 RHRSW subsystem to OPERABLE status.	8 hours from discovery of one [redacted] Unit 1 RHRSW subsystem~~s~~ not capable of supporting associated Unit 2 RHRSW subsystem AND ~~7 days~~ 72 hours
~~C.~~ D. Required Action and associated Completion Time not met. OR UHS inoperable	~~C.1~~ D.1 Be in MODE 3. AND ~~C.2~~ D.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.1.1	Verify the water level is greater than or equal to 678 feet 1 inch above Mean Sea Level.	12 hours

(continued)

ACTIONS (continued)

SURVEILLANCE		FREQUENCY
SR 3.7.1.2	Verify the average water temperature of the UHS is: a. ---------------- NOTE ---------------- Only applicable with both units in MODE 1 or 2, or with either unit in MODE 3 for less than twelve (12) hours. -------------------------------------- ≤ 85°F; or b. ---------------- NOTE ---------------- Only applicable when either unit has been in MODE 3 for at least twelve (12) hours but not more than twenty-four (24) hours. -------------------------------------- ≤ 87°F; or c. ---------------- NOTE ---------------- Only applicable when either unit has been in MODE 3 for at least twenty-four (24) hours. -------------------------------------- ≤ 88°F.	24 hours
SR 3.7.1.3	Verify each RHRSW manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	31 days

INSERT B

INSERT C

INSERT B

SR 3.7.1.4	Verify that valves HV-01222A and B (the spray loop bypass valves) close upon receipt of a closing signal.	92 days
SR 3.7.1.5	Verify that valves HV-01224A1 and B1 (the large loop spray array valves) open on receipt of an opening signal.	92 days

INSERT C

TABLE 3.7.1-1
Ultimate Heat Sink Spray Cooling Large Array Valves

Valve Number	Valve Description
HV-01224A1	Loop A large spray array valve
HV-01224B1	Loop B large spray array valve

TABLE 3.7.1-2
Ultimate Heat Sink Spray Bypass Valves

Valve Number	Valve Description
HV-01222A	Loop A spray array bypass valve
HV-01222B	Loop B spray array bypass valve

Attachment 4 to PLA-5319

"Camera-Ready" Technical Specification Pages

3.7 PLANT SYSTEMS

3.7.1 Residual Heat Removal Service Water (RHRSW) System and the Ultimate Heat Sink (UHS)

LCO 3.7.1 Two RHRSW subsystems and the UHS shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

-----NOTES-----

1. Enter applicable Conditions and Required Actions of LCO 3.4.8, "Residual Heat Removal (RHR) Shutdown Cooling System-Hot Shutdown," for RHR shutdown cooling made inoperable by RHRSW System.

2. Separate Condition entry is allowed for each requirement of the LCO.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One valve in Table 3.7.1-1 inoperable. OR One valve in Table 3.7.1-2 inoperable. OR One valve in Table 3.7.1-2 and the same return loop valve in Table 3.7.1-1 inoperable.	A.1 Declare the associated RHRSW subsystems inoperable AND A.2 Restore the inoperable valve(s) to OPERABLE status.	Immediately 8 hours from the discovery of an inoperable RHRSW subsystem in the opposite loop from the inoperable valve(s) AND 72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One Unit 1 RHRSW subsystem inoperable.	B.1 Restore the Unit 1 RHRSW subsystem to OPERABLE status.	72 hours from discovery of the associated Unit 2 RHRSW subsystem inoperable <u>AND</u> 7 days
C. Both Unit 1 RHRSW subsystems inoperable.	C.1 Restore one Unit 1 RHRSW subsystem to OPERABLE status.	8 hours from discovery of one Unit 2 RHRSW subsystem not capable of supporting associated Unit 1 RHRSW subsystem <u>AND</u> 72 hours
D. Required Action and associated Completion Time not met. <u>OR</u> UHS inoperable	D.1 Be in MODE 3. <u>AND</u> D.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.1.1	Verify the water level is greater than or equal to 678 feet 1 inch above Mean Sea Level.	12 hours
SR 3.7.1.2	Verify the average water temperature of the UHS is: a. ------------------------------NOTE------------------------------ Only applicable with both units in MODE 1 or 2, or with either unit in MODE 3 for less than twelve (12) hours. --- ≤ 85°F; or b. ------------------------------NOTE------------------------------ Only applicable when either unit has been in MODE 3 for at least twelve (12) hours but not more than twenty-four (24) hours. --- ≤ 87°F; or c. ------------------------------NOTE------------------------------ Only applicable when either unit has been in MODE 3 for at least twenty-four (24) hours. --- ≤ 88°F	24 hours
SR 3.7.1.3	Verify each RHRSW manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	31 days
SR 3.7.1.4	Verify that valves HV-01222A and B (the spray loop bypass valves) close upon receipt of a closing signal.	92 days
SR 3.7.1.5	Verify that valves HV-01224A1 and B1 (the large loop spray array valves) open on receipt of an opening signal.	92 days

TABLE 3.7.1-1 (PAGE 1 OF 1)

Ultimate Heat Sink Spray Cooling Large Array Valves

VALVE NUMBER	VALVE DESCRIPTION
HV-01224A1	Loop A large spray array valve
HV-01224B1	Loop B large spray array valve

TABLE 3.7.1-2

Ultimate Heat Sink Spray Bypass Valves

VALVE NUMBER	VALVE DESCRIPTION
HV-01222A	Loop A spray array bypass valve
HV-01222B	Loop B spray array bypass valve

3.7 PLANT SYSTEMS

3.7.1 Residual Heat Removal Service Water (RHRSW) System and the Ultimate Heat Sink (UHS)

LCO 3.7.1 Two RHRSW subsystems and the UHS shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

-----NOTES-----

1. Enter applicable Conditions and Required Actions of LCO 3.4.8, "Residual Heat Removal (RHR) Shutdown Cooling System-Hot Shutdown," for RHR shutdown cooling made inoperable by RHRSW System.

2. Separate Condition entry is allowed for each requirement of the LCO.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One valve in Table 3.7.1-1 inoperable. OR One valve in Table 3.7.1-2 inoperable. OR One valve in Table 3.7.1-2 and the same return loop valve in Table 3.7.1-1 inoperable.	A.1 Declare the associated RHRSW subsystems inoperable. AND A.2 Restore the inoperable valve(s) to OPERABLE status.	Immediately 8 hours from the discovery of an inoperable RHRSW subsystem in the opposite loop from the inoperable valve(s) AND 72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One Unit 2 RHRSW subsystem inoperable.	B.1 Restore the Unit 2 RHRSW subsystem to OPERABLE status.	72 hours from discovery of the associated Unit 1 RHRSW subsystem inoperable <u>AND</u> 7 days
C. Both Unit 2 RHRSW subsystems inoperable.	C.1 Restore one Unit 2 RHRSW subsystem to OPERABLE status.	8 hours from discovery of one Unit 1 RHRSW subsystem not capable of supporting associated Unit 2 RHRSW subsystem <u>AND</u> 72 hours
D. Required Action and associated Completion Time not met. <u>OR</u> UHS inoperable.	D.1 Be in MODE 3. <u>AND</u> D.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.1.1	Verify the water level is greater than or equal to 678 feet 1 inch above Mean Sea Level.	12 hours
SR 3.7.1.2	Verify the average water temperature of the UHS is: a. ------------------------------NOTE------------------------------ Only applicable with both units in MODE 1 or 2, or with either unit in MODE 3 for less than twelve (12) hours. -- ≤ 85°F; or b. ------------------------------NOTE------------------------------ Only applicable when either unit has been in MODE 3 for at least twelve (12) hours but not more than twenty-four (24) hours. -- ≤ 87°F; or c. ------------------------------NOTE------------------------------ Only applicable when either unit has been in MODE 3 for at least twenty-four (24) hours. -- ≤ 88°F.	24 hours
SR 3.7.1.3	Verify each RHRSW manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	31 days
SR 3.7.1.4	Verify that valves HV-01222A and B (the spray loop bypass valves) close upon receipt of a closing signal.	92 days
SR 3.7.1.5	Verify that valves HV-01224A1 and B1 (the large loop spray array valves) open upon receipt of an opening signal.	92 days

TABLE 3.7.1-1 (PAGE 1 OF 1)

Ultimate Heat Sink Spray Cooling Large Array Valves

VALVE NUMBER	VALVE DESCRIPTION
HV-01224A1	Loop A large spray array valve
HV-01224B1	Loop B large spray array valve

TABLE 3.7.1-2 (PAGE 1 OF 1)

Ultimate Heat Sink Spray Bypass Valves

VALVE NUMBER	VALVE DESCRIPTION
HV-01222A	Loop A spray array bypass valve
HV-01222B	Loop B spray array bypass valve

Attachment 5 to PLA-5319

Technical Specification Bases Mark-Ups

B 3.7 PLANT SYSTEMS

B 3.7.1 Residual Heat Removal Service Water (RHRSW) System and the Ultimate Heat Sink (UHS)

BASES

BACKGROUND

The RHRSW System is designed to provide cooling water for the Residual Heat Removal (RHR) System heat exchangers, required for a safe reactor shutdown following a Design Basis Accident (DBA) or transient. The RHRSW System is operated whenever the RHR heat exchangers are required to operate in the shutdown cooling mode or in the suppression pool cooling or spray mode of the RHR System.

The RHRSW System consists of ~~the spray pond which acts as the UHS and~~ two independent and redundant subsystems. Each subsystem is made up of a header, one pump, a suction source, valves, piping, heat exchanger, and associated instrumentation. Either of the two subsystems is capable of providing the required cooling capacity to maintain safe shutdown conditions. The two subsystems are separated so that failure of one subsystem will not affect the OPERABILITY of the other subsystem. [BASES INSERT A] ~~The RHRSW System is designed with sufficient redundancy~~ so that no single active component failure can prevent it from achieving its design function. The RHRSW System is described in the FSAR, Section 9.2.6, Reference 1.

Cooling water is pumped by the RHRSW pumps from the UHS through the tube side of the RHR heat exchangers. After removing heat from the RHRSW heat exchanger, the water is ~~discharged to the spray pond (UHS) by way of~~ [the UHS return loops. The UHS return loops direct the return flow to] a network of sprays that dissipate the heat to the atmosphere or directly to the UHS via a bypass valve.

The system is initiated manually from the control room. The system can be started any time the LOCA signal is manually overridden or clears.

[BASES INSERT B]

APPLICABLE SAFETY ANALYSES

The RHRSW System removes heat from the suppression pool to limit the suppression pool temperature and primary containment pressure following a LOCA. This ensures that the primary containment can perform its function of limiting the release of radioactive materials to the environment

(continued)

BASES INSERT A

One Unit 1 RHRSW subsystem and the associated (same division) Unit 2 RHRSW subsystem constitute a single RHRSW loop. The two RHRSW pumps in a loop can each, independently, be aligned to either Unit's heat exchanger.

BASES INSERT B

The ultimate heat sink (UHS) system is composed of a 350,000 cubic foot spray pond and associated piping and spray risers. Each UHS return loop contains a bypass line, a large spray array and a small spray array. The purpose of the UHS is to provide both a suction source of water and a return path for the RHRSW and ESW systems. The function of the UHS is to provide water to the RHRSW and ESW systems at a temperature less than the 97°F design temperature of the RHRSW and ESW systems. UHS temperature is maintained less than the design temperature by introducing the hot return fluid from the RHRSW and ESW systems into the spray loops and relying on spray cooling to maintain temperature. The UHS is designed to supply the RHRSW and ESW systems with all the cooling capacity required during a combination LOCA/LOOP for thirty days without fluid addition. The UHS is described in the FSAR, Section 9.2.7 (Reference 1).

BASES

APPLICABLE SAFETY ANALYSES (continued)

following a LOCA. The ability of the RHRSW System to support long term cooling of the reactor or primary containment is discussed in the FSAR, Chapters 6 and 15 (Refs. 2 and 3, respectively). These analyses explicitly assume that the RHRSW System will provide adequate cooling support to the equipment required for safe shutdown. These analyses include the evaluation of the long term primary containment response after a design basis LOCA.

The safety analyses for long term cooling were performed for various combinations of RHR System failures. The worst case single failure that would affect the performance of the RHRSW System is any failure that would disable one ~~subsystem of the RHRSW System.~~ UHS return loop BASES INSERT C As discussed in the FSAR, Section 6.2.2 (Ref. 2) for these analyses, manual initiation of the OPERABLE RHRSW subsystem and the associated RHR System is assumed to occur 30 minutes after a DBA. In this case, the maximum suppression chamber water temperature and pressure are analyzed to be below the design temperature of 220°F and maximum allowable pressure of 53 psig.

BASES INSERT D

The RHRSW System, together with the UHS, satisfy Criterion 3 of the NRC Policy Statement. (Ref.4)

LCO

Two RHRSW subsystems are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident heat loads, assuming the worst case single active failure occurs coincident with the loss of offsite power.

An RHRSW subsystem is considered OPERABLE when:

a. One pump is OPERABLE; and
b. An OPERABLE flow path is capable of taking suction from the UHS and transferring the water to the RHR heat exchanger and returning it to the UHS at the assumed flow rate, and
c. An OPERABLE UHS.

The OPERABILITY of the UHS is based on having a minimum water level at the overflow weir of 678 feet 1 inch above mean sea level and a maximum water temperature of 85°F; unless either unit is in MODE 3. If a unit enters MODE 3,

(continued)

BASES INSERT C

The failure of the spray array bypass valve to close results in the inability of one UHS return loop to perform its design function because failure of this valve to close results in inadequate spray nozzle pressures on the affected loop.

BASES INSERT D

The failure of the large spray array valve to open on demand is of less consequence than the failure of the spray array bypass valve because the small spray array is still available. Two small spray arrays have the same capacity and can perform the same function as a single large spray array. Each small array can effectively discharge the output of one RHRSW subsystem and one ESW loop to the UHS. The small spray arrays do not meet the 10CFR50.36 criteria for inclusion into the Technical Specifications and are not included. As a result, no credit is taken for the existence of the small spray arrays.

BASES (continued)

LCO (continued)

the time of entrance into this condition determines the appropriate maximum ultimate heat sink fluid temperature. If the earliest unit to enter MODE 3 has been in that condition for less than twelve (12) hours, the peak temperature to maintain OPERABILITY of the ultimate heat sink remains at 85°F. If either unit has been in MODE 3 for more than twelve (12) hours but less than twenty-four (24) hours, the OPERABILITY temperature of the ultimate heat sink becomes 87°F. If either unit has been in MODE 3 for twenty-four (24) hours or more, the OPERABILITY temperature of the ultimate heat sink becomes 88°F.

BASES INSERT E

This OPERABILITY definition is supported by analysis and evaluations performed in accordance with the guidance given in Regulatory Guide 1.27.

APPLICABILITY

In MODES 1, 2, and 3, the RHRSW System and the UHS are required to be OPERABLE to support the OPERABILITY of the RHR System for primary containment cooling (LCO 3.6.2.3, "Residual Heat Removal (RHR) Suppression Pool Cooling," and LCO 3.6.2.4, "Residual Heat Removal (RHR) Suppression Pool Spray") and decay heat removal (LCO 3.4.8, "Residual Heat Removal (RHR) Shutdown Cooling System—Hot Shutdown"). The Applicability is therefore consistent with the requirements of these systems.

In MODES 4 and 5, the OPERABILITY requirements of the RHRSW System are determined by the RHR shutdown cooling subsystem(s) it supports (LCO 3.4.9, "Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown"; LCO 3.9.7, "Residual Heat Removal (RHR) - High Water Level"; and LCO 3.9.8, "Residual Heat Removal (RHR) - Low Water Level").

In MODES 4 and 5, the OPERABILITY requirements of the UHS is determined by the systems it supports.

(continued)

BASES INSERT E

In addition, the OPERABILITY of the UHS is based on having sufficient spray capacity in the UHS return loops to effectively dissipate the heat picked up by the RHRSW and ESW systems. Sufficient spray capacity is defined as one large spray array available for heat dissipation.

BASES (continued)

ACTIONS

The ACTIONS are modified by a Note indicating that the applicable Conditions of LCO 3.4.8, be entered and Required Actions taken if the inoperable RHRSW subsystem results in inoperable RHR shutdown cooling (SDC) (i.e., both the Unit 1 and Unit 2 RHRSW pumps in a loop are inoperable resulting in the associated RHR SDC system being inoperable). This is an exception to LCO 3.0.6 because the Required Actions of LCO 3.7.1 do not adequately compensate for the loss of RHR SDC function (LCO 3.4.8).

BASES INSERT F

~~A~~B.1

Required Action ~~A~~B.1 is intended to ensure that appropriate actions are taken if one Unit 1 RHRSW subsystem is inoperable. Although designated and operated as a unitized system, the associated Unit 2 subsystem is directly connected to a common header which can supply the associated RHR heat exchanger in either unit. The Unit 2 subsystems are considered capable of supporting Unit 1 RHRSW subsystem when the Unit 2 subsystem is OPERABLE and can provide the assumed flow to the Unit 1 heat exchanger. A Completion time of ~~7 days~~ 72 hours, when one ~~or both~~ Unit 2 RHRSW subsystem~~s~~ ~~are~~ is not capable of supporting the Unit 1 RHRSW subsystems, is allowed to restore the Unit 1 RHRSW subsystem to OPERABLE status. In this configuration, the remaining OPERABLE Unit 1 RHRSW subsystem is adequate to perform the RHRSW heat removal function. However, the overall reliability is reduced because a single failure in the OPERABLE RHRSW subsystem could result in loss of RHRSW function. The Completion Time is based on the redundant RHRSW capabilities afforded by the OPERABLE subsystem and the low probability of an event occurring requiring RHRSW during this period.

With one RHRSW subsystem inoperable, and both of the Unit 2 RHRSW subsystems capable of supporting their respective Unit 1 RHRSW subsystems, the design basis cooling capacity for both units can still be maintained even considering a single active failure. However, the configuration does reduce the overall reliability of the RHRSW System. Therefore, provided both of the Unit 2 subsystems remain capable of supporting their respective Unit 1 RHRSW subsystems, the inoperable RHRSW subsystem must be restored to OPERABLE status within ~~30~~ 7 days. The ~~30~~ 7 day Completion Time is based on the remaining RHRSW System heat removal capability.

(continued)

BASES INSERT F

The ACTIONS are modified by a separate note to allow separate Condition entry for each requirement of the LCO. This is acceptable since the Required Actions for each Condition provide appropriate compensatory actions for the remaining conditions not met.

A.1

With one spray array bypass valve inoperable (that is, not capable of being closed on demand), or with one large spray array valve not capable of being opened, the associated Unit 1 and Unit 2 RHRSW subsystems cannot use the spray cooling function of the affected UHS return loop. As a result, the associated RHRSW subsystems must be declared inoperable.

A.2

With one spray array bypass valve or one large spray array valve inoperable, only one large spray array is available for effective spray cooling. Failure of either the spray bypass valve or the large spray array valve in the unaffected loop would result in insufficient spray cooling capacity. The 72-hour completion time is based on the fact that, although adequate UHS spray loop capability exists during this time period, both units are affected and an additional single failure results in a system configuration that will not meet design basis accident requirements.

If an additional RHRSW subsystem on either Unit is inoperable, cooling capacity less than the minimum required for response to a design basis event would exist. Therefore, an 8-hour Completion Time is appropriate. The 8-hour Completion Time provides sufficient time to restore inoperable equipment and there is a low probability that a design basis event would occur during this period.

BASES (continued)

ACTIONS

C
~~B~~.1

C
Required Action ~~B~~.1 is intended to ensure that appropriate actions are taken if both Unit 1 RHRSW subsystems are inoperable. Although designated and operated as a unitized system, the associated Unit 2 subsystem is directly connected to a common header which can supply the associated RHR heat exchanger in either unit. ~~With both Unit 1 RHRSW subsystems inoperable not caused by the inoperability of two Unit 1 RHRSW Pumps (e.g., both subsystems with inoperable flow paths, or one subsystem with an inoperable pump and one subsystem with an inoperable flow path), the RHRSW System is not capable of performing its intended function. At least one subsystem must be restored to OPERABLE status within 8 hours~~. The 8 hour Completion Time for restoring one RHRSW subsystem to OPERABLE status, is based on the Completion Times provided for the RHR suppression pool spray function.

BASES INSERT G

With both Unit 1 RHRSW subsystems inoperable, and both of the Unit 2 RHRSW subsystems capable of supporting their respective Unit 1 RHRSW subsystem, if no additional failures occur which impact the RHRSW System, the remaining OPERABLE Unit 2 subsystems and flow paths provide adequate heat removal capacity following a design basis LOCA. However, capability for this alignment is not assumed in long term containment response analysis and an additional single failure in the RHRSW System could reduce the system capacity below that assumed in the safety analysis. Therefore, continued operation is permitted only for a limited time. One inoperable subsystem is required to be restored to OPERABLE status within ~~7 days~~ 72 hours. The ~~7 day~~ 72 hour Completion Time for restoring one inoperable RHRSW subsystem to OPERABLE status is based on ~~engineering judgment, considering the level of redundancy provided, and the low probability of a DBA with concurrent worst case single failure~~ the fact that the alternate loop is capable of providing the required cooling capability during this time period.

D D
~~C~~.1 and ~~C~~.2

If the RHRSW subsystems cannot be restored to OPERABLE status within the associated Completion Times, or the UHS is determined to be inoperable, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed

(continued)

BASES INSERT G

With both Unit 1 RHRSW subsystems inoperable, the RHRSW system is still capable of performing its intended design function. However, the loss of an additional RHRSW subsystem on Unit 2 results in the cooling capacity to be less than the minimum required for response to a design basis event. Therefore, the 8-hour Completion Time is appropriate.

BASES (continued)

ACTIONS

D.1 and D.2 (continued)

Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.1.1

This SR verifies the water level to be sufficient for the proper operation of the RHRSW pumps (net positive suction head and pump vortexing are considered in determining this limit). The 12 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES.

SR 3.7.1.2

Verification of the UHS temperature, which is the arithmetical average of the UHS temperature near the surface, middle and bottom levels, ensures that the heat removal capability of the ESW and RHRSW Systems are within the assumptions of the DBA analysis. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES.

SR 3.7.1.3

Verifying the correct alignment for each manual, power operated, and automatic valve in each RHRSW subsystem flow path provides assurance that the proper flow paths will exist for RHRSW operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves are verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position, and yet considered in the correct position, provided it can be realigned to its accident position. This is acceptable because the RHRSW System is a manually initiated system.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.1.3 (continued)

This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.

BASES INSERT H →

REFERENCES

1. FSAR, Section 9.2.6.
2. FSAR, Chapter 6.
3. FSAR, Chapter 15.
4. Final Policy Statement on Technical Specifications Improvements, July 22, 1993 (58 FR 39132).

BASES INSERT H

SR 3. 7. 1. 4

The UHS spray array bypass valves are required to actuate to the closed position for the UHS to perform its design function. These valves receive an automatic signal to open upon emergency service water (ESW) or residual heat removal service water (RHRSW) system pump start and are required to be operated from the control room or the remote shutdown panel. A spray bypass valve is considered to be inoperable when it cannot be closed on demand. Failure of the spray bypass valve to close on demand puts the UHS at risk to exceed its design temperature. The failure of the spray bypass valve to open on demand is not limiting and, therefore, would not cause the loop to be inoperable. This SR demonstrates that the valves will move to their required positions when required. The 92-day Test Frequency is based upon engineering judgement and operating/testing history that indicates this frequency gives adequate assurance that the valves will move to their required positions when required.

SR 3. 7. 1. 5

The return loop large spray array valves are required to open in order for the UHS to perform its design function. These valves are manually actuated from either the control room or the remote shutdown panel, under station operating procedure, when the RHRSW system is required to remove energy from the reactor vessel or suppression pool. A large spray array valve is considered inoperable if it cannot be opened on demand, because the valve must be opened to allow spray cooling to occur. This SR demonstrates that the valves will move to their required positions when required. The 92-day Test Frequency is based upon engineering judgement and operating/testing history that indicates this frequency gives adequate assurance that the valves will move to their required positions when required.

BASES

APPLICABLE SAFETY ANALYSES (continued)

pumps is also dependent on the cooling provided by the ESW System.

The ESW System satisfies Criterion 3 of the NRC Policy Statement. (Ref. 3)

LCO

The ESW subsystems are independent of each other to the degree that each has separate controls, power supplies, and the operation of one does not depend on the other. In the event of a DBA, one subsystem of ESW is required to provide the minimum heat removal capability assumed in the safety analysis for the system to which it supplies cooling water. To ensure this requirement is met, two subsystems of ESW must be OPERABLE. At least one subsystem will operate, if the worst single active failure occurs coincident with the loss of offsite power.

A subsystem is considered OPERABLE when it has two OPERABLE pumps, and an OPERABLE flow path capable of taking suction from the UHS and transferring the water to the appropriate equipment and returning flow to the UHS. If individual loads are isolated, the affected components may be rendered inoperable, but it does not necessarily affect the OPERABILITY of the ESW System. Because each ESW subsystem supplies all four required DGs, an ESW subsystem is considered OPERABLE if it supplies at least three of the four DGs provided no single DG does not have an ESW subsystem capable of supplying flow.

An adequate suction source is not addressed in this LCO since the minimum net positive suction head of the ESW pumps is bounded by the Residual Heat Removal Service Water System requirements (LCO 3.7.1, "Residual Heat Removal System and Ultimate Heat Sink (UHS)").

BASES INSERT I →

APPLICABILITY

In MODES 1, 2, and 3, the ESW System is required to be OPERABLE to support OPERABILITY of the equipment serviced by the ESW System. Therefore, the ESW System is required to be OPERABLE in these MODES.

In MODES 4 and 5, the OPERABILITY requirements of the ESW System is determined by the systems it supports.

(continued)

BASIS INSERT I

The ESW return loop requirement, in terms of operable UHS return paths or UHS spray capacity, is also not addressed in this LCO. UHS operability, in terms the return loop and spray capacity is addressed in the RHRSW/UHS Technical Specification (LCO 3.7.1, "Residual Heat Removal Service Water System and Ultimate Heat Sink (UHS)). The design basis calculations for the UHS assume post-accident ESW return flow through the spray bypass valve on one return loop until a UHS temperature is reached whereby realignment to the spray loop is required. This realignment is manual and can be done several hours or more after accident initiation. Therefore, the RHRSW/UHS requirements bound the ESW return path and UHS spray capacity requirements.

Unit 2 Technical Specification

Markups

B 3.7 PLANT SYSTEMS

B 3.7.1 Residual Heat Removal Service Water (RHRSW) System and the Ultimate Heat Sink (UHS)

BASES

BACKGROUND

The RHRSW System is designed to provide cooling water for the Residual Heat Removal (RHR) System heat exchangers, required for a safe reactor shutdown following a Design Basis Accident (DBA) or transient. The RHRSW System is operated whenever the RHR heat exchangers are required to operate in the shutdown cooling mode or in the suppression pool cooling or spray mode of the RHR System.

The RHRSW System consists of ~~the spray pond which acts as the UHS and~~ two independent and redundant subsystems. Each subsystem is made up of a header, one pump, a suction source, valves, piping, heat exchanger, and associated instrumentation. Either of the two subsystems is capable of providing the required cooling capacity to maintain safe shutdown conditions. The two subsystems are separated so that failure of one subsystem will not affect the OPERABILITY of the other subsystem. [BASES INSERT A] The RHRSW System is designed with sufficient redundancy so that no single active component failure can prevent it from achieving its design function. The RHRSW System is described in the FSAR, Section 9.2.6, Reference 1.

Cooling water is pumped by the RHRSW pumps from the UHS through the tube side of the RHR heat exchangers. After removing heat from the RHRSW heat exchanger, the water is discharged to the spray pond (UHS) by way of [the UHS return loops. The UHS return loops direct the return flow to] a network of sprays that dissipate the heat to the atmosphere or directly to the UHS via a bypass valve.

The system is initiated manually from the control room. The system can be started any time the LOCA signal is manually overridden or clears.

[BASES INSERT B]

APPLICABLE SAFETY ANALYSES

The RHRSW System removes heat from the suppression pool to limit the suppression pool temperature and primary containment pressure following a LOCA. This ensures that the primary containment can perform its function of limiting the release of radioactive materials to the environment

(continued)

BASES INSERT A

One Unit 1 RHRSW subsystem and the associated (same division) Unit 2 RHRSW subsystem constitute a single RHRSW loop. The two RHRSW pumps in a loop can each, independently, be aligned to either Unit's heat exchanger.

BASES INSERT B

The ultimate heat sink (UHS) system is composed of a 350,000 cubic foot spray pond and associated piping and spray risers. Each UHS return loop contains a bypass line, a large spray array and a small spray array. The purpose of the UHS is to provide both a suction source of water and a return path for the RHRSW and ESW systems. The function of the UHS is to provide water to the RHRSW and ESW systems at a temperature less than the 97°F design temperature of the RHRSW and ESW systems. UHS temperature is maintained less than the design temperature by introducing the hot return fluid from the RHRSW and ESW systems into the spray loops and relying on spray cooling to maintain temperature. The UHS is designed to supply the RHRSW and ESW systems with all the cooling capacity required during a combination LOCA/LOOP for thirty days without fluid addition. The UHS is described in the FSAR, Section 9.2.7 (Reference 1).

BASES

APPLICABLE SAFETY ANALYSES (continued)

following a LOCA. The ability of the RHRSW System to support long term cooling of the reactor or primary containment is discussed in the FSAR, Chapters 6 and 15 (Refs. 2 and 3, respectively). These analyses explicitly assume that the RHRSW System will provide adequate cooling support to the equipment required for safe shutdown. These analyses include the evaluation of the long term primary containment response after a design basis LOCA.

The safety analyses for long term cooling were performed for various combinations of RHR System failures. The worst case single failure that would affect the performance of the RHRSW System is any failure that would disable one ~~subsystem of the RHRSW System.~~ [UHS return loop] [BASES INSERT C] As discussed in the FSAR, Section 6.2.2 (Ref. 2) for these analyses, manual initiation of the OPERABLE RHRSW subsystem and the associated RHR System is assumed to occur 30 minutes after a DBA. In this case, the maximum suppression chamber water temperature and pressure are analyzed to be below the design temperature of 220°F and maximum allowable pressure of 53 psig.

[BASES INSERT D]

The RHRSW System, together with the UHS, satisfy Criterion 3 of the NRC Policy Statement. (Ref.4)

LCO

Two RHRSW subsystems are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident heat loads, assuming the worst case single active failure occurs coincident with the loss of offsite power.

An RHRSW subsystem is considered OPERABLE when:

a. One pump is OPERABLE; and
b. An OPERABLE flow path is capable of taking suction from the UHS and transferring the water to the RHR heat exchanger and returning it to the UHS at the assumed flow rate, and
c. An OPERABLE UHS.

The OPERABILITY of the UHS is based on having a minimum water level at the overflow weir of 678 feet 1 inch above mean sea level and a maximum water temperature of 85°F;

(continued)

BASES INSERT C

The failure of the spray array bypass valve to close results in the inability of one UHS return loop to perform its design function because failure of this valve to close results in inadequate spray nozzle pressures on the affected loop.

BASES INSERT D

The failure of the large spray array valve to open on demand is of less consequence than the failure of the spray array bypass valve because the small spray array is still available. Two small spray arrays have the same capacity and can perform the same function as a single large spray array. Each small array can effectively discharge the output of one RHRSW subsystem and one ESW loop to the UHS. The small spray arrays do not meet the 10CFR50.36 criteria for inclusion into the Technical Specifications and are not included. As a result, no credit is taken for the existence of the small spray arrays.

BASES (continued)

LCO (continued)

unless either unit is in MODE 3. If a unit enters MODE 3, the time of entrance into this condition determines the appropriate maximum ultimate heat sink fluid temperature. If the earliest unit to enter MODE 3 has been in that condition for less than twelve (12) hours, the peak temperature to maintain OPERABILITY of the ultimate heat sink remains at 85°F. If either unit has been in MODE 3 for more than twelve (12) hours but less than twenty-four (24) hours, the OPERABILITY temperature of the ultimate heat sink becomes 87°F. If either unit has been in MODE 3 for twenty-four (24) hours or more, the OPERABILITY temperature of the ultimate heat sink becomes 88°F.

BASES INSERT E →

This OPERABILITY definition is supported by analysis and evaluations performed in accordance with the guidance given in Regulatory Guide 1.27.

APPLICABILITY

In MODES 1, 2, and 3, the RHRSW System and the UHS are required to be OPERABLE to support the OPERABILITY of the RHR System for primary containment cooling (LCO 3.6.2.3, "Residual Heat Removal (RHR) Suppression Pool Cooling," and LCO 3.6.2.4, "Residual Heat Removal (RHR) Suppression Pool Spray") and decay heat removal (LCO 3.4.8, "Residual Heat Removal (RHR) Shutdown Cooling System—Hot Shutdown"). The Applicability is therefore consistent with the requirements of these systems.

In MODES 4 and 5, the OPERABILITY requirements of the RHRSW System are determined by the RHR shutdown cooling subsystem(s) it supports (LCO 3.4.9, "Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown"; LCO 3.9.7, "Residual Heat Removal (RHR) - High Water Level"; and LCO 3.9.8, "Residual Heat Removal (RHR) - Low Water Level").

In MODES 4 and 5, the OPERABILITY requirements of the UHS is determined by the systems it supports.

(continued)

BASES INSERT E

In addition, the OPERABILITY of the UHS is based on having sufficient spray capacity in the UHS return loops to effectively dissipate the heat picked up by the RHRSW and ESW systems. Sufficient spray capacity is defined as one large spray array available for heat dissipation.

BASES (continued)

ACTIONS

The ACTIONS are modified by a Note indicating that the applicable Conditions of LCO 3.4.8, be entered and Required Actions taken if the inoperable RHRSW subsystem results in inoperable RHR shutdown cooling (SDC) (i.e., both the Unit 1 and Unit 2 RHRSW pumps in a loop are inoperable resulting in the associated RHR SDC system being inoperable). This is an exception to LCO 3.0.6 because the Required Actions of LCO 3.7.1 do not adequately compensate for the loss of RHR SDC Function (LCO 3.4.8).

[BASES INSERT F]

~~A~~ [B].1

Required Action ~~A~~ [B].1 is intended to ensure that appropriate actions are taken if one Unit 2 RHRSW subsystem is inoperable. Although designated and operated as a unitized system, the associated Unit 1 subsystem is directly connected to a common header which can supply the associated RHR heat exchanger in either unit. The Unit 1 subsystems are considered capable of supporting Unit 2 RHRSW subsystem when the Unit 1 subsystem is OPERABLE and can provide the assumed flow to the Unit 2 heat exchanger. A Completion time of ~~7 days~~ [72 hours], when one ~~or both~~ Unit 1 RHRSW subsystem~~s are~~ [is] not capable of supporting the Unit 2 RHRSW subsystems, is allowed to restore the Unit 2 RHRSW subsystem to OPERABLE status. In this configuration, the remaining OPERABLE Unit 2 RHRSW subsystem is adequate to perform the RHRSW heat removal function. However, the overall reliability is reduced because a single failure in the OPERABLE RHRSW subsystem could result in loss of RHRSW function. The Completion Time is based on the redundant RHRSW capabilities afforded by the OPERABLE subsystem and the low probability of an event occurring requiring RHRSW during this period.

With one RHRSW subsystem inoperable, and both of the Unit 1 RHRSW subsystems capable of supporting their respective Unit 2 RHRSW subsystems, the design basis cooling capacity for both units can still be maintained even considering a single active failure. However, the configuration does reduce the overall reliability of the RHRSW System. Therefore, provided both of the Unit 1 subsystems remain capable of supporting their respective Unit 2 RHRSW subsystems, the inoperable RHRSW subsystem must be restored to OPERABLE status within ~~30 days~~ [7 days]. The ~~30 day~~ [7 day] Completion Time is based on the remaining RHRSW System heat removal capability.

(continued)

BASES INSERT F

The ACTIONS are modified by a separate note to allow separate Condition entry for each requirement of the LCO. This is acceptable since the Required Actions for each Condition provide appropriate compensatory actions for the remaining conditions not met.

A.1

With one spray array bypass valve inoperable (that is, not capable of being closed on demand), or with one large spray array valve not capable of being opened, the associated Unit 1 and Unit 2 RHRSW subsystems cannot use the spray cooling function of the affected UHS return loop. As a result, the associated RHRSW subsystems must be declared inoperable.

A.2

With one spray array bypass valve or one large spray array valve inoperable, only one large spray array is available for effective spray cooling. Failure of either the spray bypass valve or the large spray array valve in the unaffected loop would result in insufficient spray cooling capacity. The 72-hour completion time is based on the fact that, although adequate UHS spray loop capability exists during this time period, both units are affected and an additional single failure results in a system configuration that will not meet design basis accident requirements.

If an additional RHRSW subsystem on either Unit is inoperable, cooling capacity less than the minimum required for response to a design basis event would exist. Therefore, an 8-hour Completion Time is appropriate. The 8-hour Completion Time provides sufficient time to restore inoperable equipment and there is a low probability that a design basis event would occur during this period.

BASES (continued)

ACTIONS

~~B.1~~ C.1

Required Action ~~B~~C.1 is intended to ensure that appropriate actions are taken if both Unit 2 RHRSW subsystems are inoperable. Although designated and operated as a unitized system, the associated Unit 1 subsystem is directly connected to a common header which can supply the associated RHR heat exchanger in either unit. ~~With both Unit 2 RHRSW subsystems inoperable not caused by the inoperability of two Unit 2 RHRSW Pumps (e.g., both subsystems with inoperable flow paths, or one subsystem with an inoperable pump and one subsystem with an inoperable flow path), the RHRSW System is not capable of performing its intended function. At least one subsystem must be restored to OPERABLE status within 8 hours.~~ The 8 hour Completion Time for restoring one RHRSW subsystem to OPERABLE status, is based on the Completion Times provided for the RHR suppression pool spray function.

BASES INSERT 6

With both Unit 2 RHRSW subsystems inoperable, and both of the Unit 1 RHRSW subsystems capable of supporting their respective Unit 2 RHRSW subsystem, if no additional failures occur which impact the RHRSW System, the remaining OPERABLE Unit 1 subsystems and flow paths provide adequate heat removal capacity following a design basis LOCA. However, capability for this alignment is not assumed in long term containment response analysis and an additional single failure in the RHRSW System could reduce the system capacity below that assumed in the safety analysis. Therefore, continued operation is permitted only for a limited time. One inoperable subsystem is required to be restored to OPERABLE status within ~~7 days~~ 72 hours. The ~~7 day~~ 72 hour Completion Time for restoring one inoperable RHRSW subsystem to OPERABLE status is based on ~~engineering judgment, considering the level of redundancy provided, and the low probability of a DBA with concurrent worst case single failure~~ the fact that the alternate loop is capable of providing the required cooling capability during this time period.

~~C~~D.1 and ~~C~~D.2

If the RHRSW subsystems cannot be restored to OPERABLE status within the associated Completion Times, or the UHS is determined to be inoperable, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed

(continued)

BASES INSERT G

With both Unit 1 RHRSW subsystems inoperable, the RHRSW system is still capable of performing its intended design function. However, the loss of an additional RHRSW subsystem on Unit 2 results in the cooling capacity to be less than the minimum required for response to a design basis event. Therefore, the 8-hour Completion Time is appropriate.

BASES (continued)

ACTIONS

~~C~~D.1 and ~~C~~D.2 (continued)

Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.1.1

This SR verifies the water level to be sufficient for the proper operation of the RHRSW pumps (net positive suction head and pump vortexing are considered in determining this limit). The 12 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES.

SR 3.7.1.2

Verification of the UHS temperature, which is the arithmetical average of the UHS temperature near the surface, middle and bottom levels, ensures that the heat removal capability of the ESW and RHRSW Systems are within the assumptions of the DBA analysis. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES.

SR 3.7.1.3

Verifying the correct alignment for each manual, power operated, and automatic valve in each RHRSW subsystem flow path provides assurance that the proper flow paths will exist for RHRSW operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves are verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position, and yet considered in the correct position, provided it can be realigned to its accident position. This is acceptable because the RHRSW System is a manually initiated system.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.1.3 (continued)

This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.

BASES INSERT H →

REFERENCES

1. FSAR, Section 9.2.6.
2. FSAR, Chapter 6.
3. FSAR, Chapter 15.
4. Final Policy Statement on Technical Specifications Improvements, July 22, 1993 (58 FR 39132).

BASES INSERT H

SR 3. 7. 1. 4

The UHS spray array bypass valves are required to actuate to the closed position for the UHS to perform its design function. These valves receive an automatic signal to open upon emergency service water (ESW) or residual heat removal service water (RHRSW) system pump start and are required to be operated from the control room or the remote shutdown panel. A spray bypass valve is considered to be inoperable when it cannot be closed on demand. Failure of the spray bypass valve to close on demand puts the UHS at risk to exceed its design temperature. The failure of the spray bypass valve to open on demand is not limiting and, therefore, would not cause the loop to be inoperable. This SR demonstrates that the valves will move to their required positions when required. The 92-day Test Frequency is based upon engineering judgement and operating/testing history that indicates this frequency gives adequate assurance that the valves will move to their required positions when required.

SR 3. 7. 1. 5

The return loop large spray array valves are required to open in order for the UHS to perform its design function. These valves are manually actuated from either the control room or the remote shutdown panel, under station operating procedure, when the RHRSW system is required to remove energy from the reactor vessel or suppression pool. A large spray array valve is considered inoperable if it cannot be opened on demand, because the valve must be opened to allow spray cooling to occur. This SR demonstrates that the valves will move to their required positions when required. The 92-day Test Frequency is based upon engineering judgement and operating/testing history that indicates this frequency gives adequate assurance that the valves will move to their required positions when required.

BASES

APPLICABLE SAFETY ANALYSES (continued)

pumps is also dependent on the cooling provided by the ESW System.

The ESW System satisfies Criterion 3 of the NRC Policy Statement. (Ref. 3)

LCO

The ESW subsystems are independent of each other to the degree that each has separate controls, power supplies, and the operation of one does not depend on the other. In the event of a DBA, one subsystem of ESW is required to provide the minimum heat removal capability assumed in the safety analysis for the system to which it supplies cooling water. To ensure this requirement is met, two subsystems of ESW must be OPERABLE. At least one subsystem will operate, if the worst single active failure occurs coincident with the loss of offsite power.

A subsystem is considered OPERABLE when it has two OPERABLE pumps, and an OPERABLE flow path capable of taking suction from the UHS and transferring the water to the appropriate equipment and returning flow to the UHS. If individual loads are isolated, the affected components may be rendered inoperable, but it does not necessarily affect the OPERABILITY of the ESW System. Because each ESW subsystem supplies all four required DGs, an ESW subsystem is considered OPERABLE if it supplies at least three of the four DGs provided no single DG does not have an ESW subsystem capable of supplying flow.

An adequate suction source is not addressed in this LCO since the minimum net positive suction head of the ESW pumps is bounded by the Residual Heat Removal Service Water System requirements (LCO 3.7.1, "Residual Heat Removal System and Ultimate Heat Sink (UHS)").

BASES INSERT I →

APPLICABILITY

In MODES 1, 2, and 3, the ESW System is required to be OPERABLE to support OPERABILITY of the equipment serviced by the ESW System. Therefore, the ESW System is required to be OPERABLE in these MODES.

In MODES 4 and 5, the OPERABILITY requirements of the ESW System is determined by the systems it supports.

(continued)

BASIS INSERT I

The ESW return loop requirement, in terms of operable UHS return paths or UHS spray capacity, is also not addressed in this LCO. UHS operability, in terms the return loop and spray capacity is addressed in the RHRSW/UHS Technical Specification (LCO 3.7.1, "Residual Heat Removal Service Water System and Ultimate Heat Sink (UHS)). The design basis calculations for the UHS assume post-accident ESW return flow through the spray bypass valve on one return loop until a UHS temperature is reached whereby realignment to the spray loop is required. This realignment is manual and can be done several hours or more after accident initiation. Therefore, the RHRSW/UHS requirements bound the ESW return path and UHS spray capacity requirements.