Bryce L. Shriver
Senior Vice President and
Chief Nuclear Officer

PPL Susquehanna, LLC
769 Salem Boulevard
Berwick, PA 18603
Tel. 570.542.3120 Fax 570.542.1504
blshriver@pplweb.com

ppl™

MAY 20 2002

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station OP1-17
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION RE: RESIDUAL HEAT REMOVAL SERVICE WATER SYSTEM AND ULTIMATE HEAT SINK TECHNICAL SPECIFICATION MODIFICATIONS (PROPOSED AMENDMENT NO. 237 TO OPERATING LICENSE NO. NPF-14 AND PROPOSED AMENDMENT NO. 203 TO OPERATING LICENSE NO. NPF-22)
PLA-5473

Docket Nos. 50-387 and 50-388

Reference: 1. PLA-5319, R. G. Byram (PPL) to USNRC, "Proposed Amendment No. 237 to License NPF-14 and Proposed Amendment No. 203 to License NPF-22: Residual Heat Removal and Ultimate Heat Sink," dated June 1, 2001.

2. Letter, T. G. Colburn (USNRC) to R. G. Byram (PPL), "Susquehanna Steam Electric Station, Units 1 and 2 – Request for Additional Information RE: Residual Heat Removal Service Water System and Ultimate Heat Sink Technical Specifications Modifications (TAC Nos. MB2119 and MB2120)," dated March 19, 2002.

The purpose of this letter is to provide supplemental information as contained in Attachment 1, necessary for the NRC staff to continue its review of the license amendment originally proposed in Reference 1.

The need for this supplemental information was identified during teleconferences held between NRC and PPL. Attachment 1 provides response to the specific questions, which resulted from those discussions as documented in Reference 2.

In June 2001, PLA-5319 (Reference 1), proposed modification of Technical Specification 3.7.1 to add operability requirements and surveillance requirements for the Ultimate Heat Sink spray bypass and large array valves and reduced the allowed completion times for the conditions applicable to the Residual Heat Removal Service Water (RHRSW) system.

A001

If you have any questions on this submittal, please contact Mr. Cornelius T. Coddington at (610) 774-4019.

Sincerely,

B. L. Shriver

copy: NRC Region I
Mr. S. L. Hansell, NRC Sr. Resident Inspector
Mr. T. G. Colburn, NRC Sr. Project Manager

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of :

PPL Susquehanna, LLC: Docket No. 50-387

Response to NRC Request for Additional Information
Re: Residual Heat Removal Service Water System
and Ultimate Heat Sink Technical Specification Modifications
Proposed Amendment No. 237 to Operating License No. NPF-14
Unit No. 1

Licensee, PPL Susquehanna, LLC, hereby files a response to Proposed Amendment No. 237 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:

B. L. Shriver
Sr. Vice-President and Chief Nuclear Officer

Sworn to and subscribed before me
This 21st day of May, 2002.

Notary Public

Notarial Seal
Nancy L. Garcia, Notary Public
Salem Twp., Luzerne County
My Commission Expires May 31, 2003
Member, Pennsylvania Association of Notaries

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of :

PPL Susquehanna, LLC: Docket No. 50-388

Response to NRC Request for Additional Information
Re: Residual Heat Removal Service Water System
and Ultimate Heat Sink Technical Specification Modifications
Proposed Amendment No. 203 to Operating License No. NPF-22
Unit No. 2

Licensee, PPL Susquehanna, LLC, hereby files a response to Proposed Amendment No. 203 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 1 Technical Specifications.

PPL Susquehanna, LLC
By:

[signature]
B. L. Shriver
Sr. Vice-President and Chief Nuclear Officer

Sworn to and subscribed before me
This 21st day of May, 2002.

[signature]
Notary Public

Notarial Seal
Nancy L. Garcia, Notary Public
Salem Twp., Luzerne County
My Commission Expires May 31, 2003
Member, Pennsylvania Association of Notaries

ATTACHMENT 1 TO PLA-5473

Attachment 1

NRC Question 1:

The description of the residual heat removal service water (RHRSW) subsystems provided on page 2 of Attachment 1 to your application does not match the simplified schematic provided in Figure 1 of Attachment 1, nor the apparent arrangement in P&ID M-112 for the RHRSW system. The description states that each subsystem contains a return header along with other components. However, the drawings and schematic indicate that there is only one return header per loop. Please clarify.

PPL Response:

The schematic provided in Figure 1 of Attachment 1 and the P&ID M-112 are correct. The description provided on page 2 of Attachment 1 is revised to clarify. The revised description is provided below.

> "The return header is shared with the emergency service water (ESW) system and the other RHRSW subsystem in that loop. The header directs the return flow from both RHRSW subsystems and the ESW system to a network of UHS return loops."

NRC Question 2:

On P&ID M-112 for the RHRSW system, what water is being returned at coordinates E-9 and G-9?

PPL Response:

The fluid being returned on P&ID M-112-E-9 and G-9 comes from P&ID M-111 Sheet 4, location A-9. The fluid referenced in that location is ESW fluid returning from the lube oil, jacket water and intercoolers from the emergency diesel generators.

NRC Question 3:

The Nuclear Regulatory Commission (NRC) staff Safety Evaluation Report (SER), NUREG-0776, Supplement 4, noted that the design of the Emergency Service Water (ESW) system was modified to prevent water hammer in the event of an automatic pump start by changing the normal position of the spray bypass valves to closed. How has the water hammer issue been addressed considering that the current design has returned the normal position of this valve to open?

PPL Response:

The ESW system water hammer issue was addressed through a series of modifications. These modifications include:

- addition of vacuum breakers on the ESW piping,
- addition of motor-operated valves on the ESW return lines from the control structure chillers,
- addition of check valves on the ESW supply lines from the control structure chillers,
- addition of motor-operated valves on the ESW return lines from the Dx units on Unit 2 and
- addition of check valves on the ESW supply lines from the Dx units on Unit 2.

These culminated in Technical Specification changes issued in Operating License Amendments 30 and 15 (Unit 1 and Unit 2 respectively) in 1985.

Thus the ESW water hammer issue was resolved such that the spray bypass valves could be maintained in the normally open position.

The following is a listing of the NRC/PPL correspondence related to the ESW water hammer issue:

1. Letter, PLA-1129, from N. W. Curtis (PP&L) to R. C. Haynes (USNRC), "Interim Report of a Deficiency Involving Emergency Service Water (ESW) System Water Hammer", dated June 18, 1982.

2. Letter, PLA-1258, from B. D. Kenyon (PP&L) to R. C. Haynes (USNRC), "Second Interim Report of a Deficiency Involving Emergency Service Water (ESW) System Water Hammer", dated August 27, 1982.

3. Letter, PLA-1274, from B. D. Kenyon (PP&L) to R. C. Haynes (USNRC), "Clarification of the Second Interim Report of a Deficiency Involving Emergency Service Water (ESW) System Water Hammer", dated September 3, 1982.

4. Letter, PLA-1315, from B. D. Kenyon (PP&L) to A. Schwencer (USNRC), "Proposed Amendment 7 to License No. NPF-14", dated September 21, 1982.

5. Letter, PLA-1314, from B. D. Kenyon (PP&L) to A. Schwencer (USNRC), "Proposed Amendment 8 to License No. NPF-14", dated September 24, 1982.

6. Letter, from B. J. Youngblood (USNRC) to N. W. Curtis (PP&L), "Amendment No. 3 to Facility Operating License No. NPF-14", dated October 4, 1982.

7. Letter, PLA-1604, from B. D. Kenyon (PP&L) to J. A. Allen USNRC), "Third Interim Report of a Deficiency Involving Emergency Service Water (ESW) System Water Hammer", dated April 12, 1983.

8. Letter, PLA-1812, from N. W. Curtis (PP&L) to T. E. Murley USNRC), "Final Report of a Deficiency Involving Emergency Service Water (ESW) System Water Hammer", dated September 22, 1983.

9. Letter, PLA-2297, from N. W. Curtis (PP&L) to A. Schwencer (USNRC), "Proposed Amendment 47 to License NPF-14 and 8 to License NPF-22", dated September 19, 1984.

10. Letter, PLA-2297, from N. W. Curtis (PP&L) to A. Schwencer (USNRC), "Proposed Amendment 9 to License NPF-22", dated September 25, 1984.

11. Letter, PLA-2356, from N. W. Curtis (PP&L) to A Schwencer (USNRC), "Schedule Revision Proposed Amendment 9 to NPF-22", dated November 12, 1984.

12. Letter, PLA-2386, from N. W. Curtis (PP&L) to A. Schwencer (USNRC), "Additional Information Requested by NRC on Support of Proposed Amendments 47 to License NPF-14 and 8 to License NPF-22", dated January 8, 1985.

13. Letter from A. Schwencer (USNRC) to N. W. Curtis (PP&L), "Amendment Nos. 30 and 6 to Facility Operating License Nos. NPF-14 and NPF-22", dated February 7, 1985.

14. Letter from W. R. Butler (USNRC) to N. W. Curtis (PP&L), "Amendment No. 15 to Facility Operating License No. NPF-22", dated September 4, 1985.

NRC Question 4A:

Please provide additional information regarding why the current application is explicitly removing the small spray bypass arrays from the Technical Specifications (TSs). As you note, each small spray array is subject to the same single failure (of a spray array bypass valve) that can make the same division's large spray array inoperable. Appendix A to your application indicates that you considered adding a 30-day limiting condition for operation (LCO) for the small spray array valves, and determined that such an LCO posed an undue risk of a dual-unit shutdown with no increase in overall safety.

As described in your application, it appears that PPL Susquehanna, LLC, has reanalyzed the ultimate heat sink (UHS) for Susquehanna Steam Electric Station (SSES), Units 1 and 2, such that there are three 100-percent spray arrays for design-basis accident conditions; two large spray arrays and the combination of the two small arrays. The NRC staff SER, NUREG-0776, dated April 1981, indicates that the original analysis of the spray pond, and independent NRC staff analysis of the UHS design were performed assuming a single failure such that one spray pond cooling loop (one division/spray network, including both the large and the small arrays in the division) was available. Please provide further details of the analysis (or provide the analysis) which demonstrate the adequacy of the spray pond using only one large spray array. Also, please provide the details of the design-bases calculations which address the statement that the RHRSW/UHS requirements bound the ESW return path and UHS spray capability requirement as discussed in the proposed Bases, Insert I to your application.

PPL Response:

The small arrays are not currently addressed by the SSES Unit 1 and Unit 2 Technical Specifications (TSs). Appendix A of reference 1 provides, for information, the PPL 10CFR50.36 analysis which supports exclusion of the small arrays from the Technical Specifications. The small array valves are included in the plant design to allow operational flexibility, as they can be used during system testing. The small array valves are normally maintained in the closed position.

As stated in Attachment 1 page 4 (bottom paragraph) of reference 1, failure of a small array valve to close does not have any adverse impact on the UHS. Should a small array valve fail to close when a large array is required, flow that would otherwise be directed to the large array would be diverted to the small array, thereby reducing the spray efficiency of the large array. Calculations have been performed to show that the heat dissipitation provided by the small array more than makes up for the reduced efficiency of the large array. Therefore, the position of the small array valve (open or closed) has no adverse impact on performance of the UHS. Since the position of the small array valves is not relevant to UHS performance and since the 10CFR50.36 analysis concluded they need not be included in Technical Specifications, the small array valves have been omitted. PPL has not reperformed the UHS design basis analysis to include use of the small array's. The description of the analysis which demonstrates the adequacy of only one large spray array follows.

Two separate and distinct calculations form the design basis performance calculations for the ultimate heat sink (UHS). One is performed to determine the minimum heat transfer (MHT) and the other determines the maximum water loss (MWL) (discussed in the answer to Question 4b). Each of these calculations is performed in accordance with Regulatory Guide 1.27.

The MHT calculation is performed assuming that both units have operated for six years at 3510 MWt (using this value sets the maximum rate of decay heat production). The analysis assumes that all automatic heat loads from ESW are initially aligned to the RHRSW/ESW return loop whose spray bypass valve will not close. It is assumed that the RHR heat exchangers are manually aligned to the loop that has sprays available. In accordance with direction provided in Regulatory Guide 1.27, the worst case meteorological conditions are assumed and it is also assumed that there is no wind velocity. These assumptions minimize the heat transfer from the fluid droplets to the atmosphere. In addition, procedures provide the Operations Staff direction for using spray arrays based on the amount of loop flow available.

SSES procedures provide guidance that, for less than 17,000 GPM per return loop, the small spray arrays are used. The large spray arrays are used for return flow between 17,000 GPM and 26,000 GPM. Both small and large arrays are used for flows greater than 26,000 GPM. The basis of these limits is to maintain the proper pressure drop range at the nozzles. The MHT analysis shows that the design basis flows range between 18,900 GPM and 22,100 GPM, therefore, these flows fall into the large spray array range for the OPERABLE return header. No spray cooling is assumed in the loop that has the spray bypass valve failed open, for the design basis event.

The MHT analysis shows that the single failure of the spray bypass valve failing to close is more severe than the loss of an entire spray loop because, with the bypass valve failing to close, hot water is returned directly to the UHS without any spray cooling occurring. This extra heat load is significant in the early portion of a design basis event. Procedures direct realignment of the heat loads to the loop that has spray capability when the UHS temperature reaches 90°F. The MHT analysis assumes unnecessary heat loads are isolated from the UHS at approximately 24 hours following the initiation of the event.

The RHRSW/UHS requirements are considered to bound the ESW requirements as discussed in the Bases, Insert I because of the following:

1. The ESW heat loads relative to the RHRSW heat loads are small and thus have a relatively small impact on the UHS performance.

2. The completion time specified in LCO 3.7.2.C, for one ESW subsystem out of service, is 7 days. If an ESW subsystem is out of service as a result of the loss of return path to the UHS, the LCO in 3.7.1.A specifies a completion time of 72 hours. Therefore, the completion time specified in LCO 3.7.1 bounds the requirements specified in LCO 3.7.2, when the return loop to the UHS is involved.

To provide clarification, Bases Insert I has been revised to read as follows:

> "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 of appropriate ESW heat loads to the spray loop is required. This realignment is manual and can be done several hours or more after accident initiation."

The completion time specified in LCO 3.7.2.C, for one ESW subsystem out of service, is 7 days. If an ESW subsystem is out of service as a result of the loss of return path to the UHS, LCO 3.7.1.A for RHRSW return path specifies a completion time of 72 hours. Therefore, the completion time specified in LCO 3.7.1 bounds the requirements specified in LCO 3.7.2 when the return loop to the UHS is involved.

NRC Question 4B:

Address whether the current analysis considered both thermal efficiency (maintain temperature of the pond below design) and maximum water loss due to drift, etc., for the 30-day duration. These two aspects were discussed as based on separate analysis in NUREG-0776. Specifically, address the effect of using only a single large spray; which will increase spray nozzle differential pressure that was analyzed and confirmed by spray pond testing during initial licensing.

PPL Response:

The MHT (thermal efficiency) and MWL aspects of the UHS evaluation have been analyzed for the 30-day duration. For the MHT analysis, the minimum amount of return spray flow, coupled with the worst case single failure, results in a return path in one loop through the large spray array and, in the opposite loop, through the failed spray bypass valve. This situation results in a conservative (that is, higher) spray pond temperature. For the MWL situation, returning the flow from each loop through the large spray array maximizes drift loss. In the MWL situation, returning all flow through the large spray array rather than using both arrays (i.e. small and a large) in a loop maximizes nozzle pressure, thereby maximizing drift loss. The flow rate through the nozzles directly determines the pressure differential across the nozzle, which then directly affects the evaporative cooling rate and efficiency. The nozzle pressure differential, as evaluated for a single large spray array, is well within the range of values verified during the startup testing. Therefore, the model remains acceptable for use in this application, as verified by the original testing.

NRC Question 4C:

If the small arrays were credited in some scenarios with other degraded or inoperable components, then it would appear that less severe allowed outage times would be more appropriate than those in certain LCOs proposed in the TSs. For example, in Table 1 of Attachment 1 to the Application, the condition with two large spray arrays out of service indicates that this condition represents an inoperable UHS and would require entry into TS 3.0.3 for both units. If both small arrays were operable under these conditions, then the plant would have full UHS capacity for design-basis conditions (as stated in your application), yet be required to follow a TS action requiring simultaneous shutdown of both units. Other proposed LCO's (e.g. 3.7.1.A) with 8-hour completion times based on insufficient RHRSW capacity remaining with a large spray array valve inoperable would appear to be justified for a 72-hour completion time with the availability of both small spray arrays.

PPL Response:

PPL did consider adding the small spray arrays to the Technical Specifications but determined inclusion was not required or warranted as discussed in response to NRC Question 4A.

NRC Question 5:

The application states that the UHS analysis did not specifically address valve leakage; however, the flow values used for the RHRSW and ESW systems contain considerable margin from the actual flow values obtained from flow balances. Please provide the flow values used in the analysis and those typically obtained from flow balances.

PPL Response:

The MHT analysis is done for two plant configurations. The first analyzes UHS performance prior to heat load realignment and the second analyzes UHS performance after the heat load realignment. The heat load realignment occurs when the spray pond temperature reaches 90°F. For the worst case scenario, this occurs at approximately 6 hours into the design basis event.

The flows assumed in the MHT analysis for the operable loop prior to realignment is 18900 GPM (2900 GPM from ESW and 16000 from RHRSW) versus a typical flow balance total value of 19170 GPM. After realignment, the flow assumed in the analysis is 22100 GPM (6100 GPM from ESW and 16000 GPM from RHRSW) versus a typical flow balance value of 22474 GPM. The difference is that the analysis conservatively assumes ESW and RHRSW minimum flows and not typical actual measured flowrates.

The MWL analysis conservatively assumes a larger flow (to ensure spray nozzle pressure) than the measured flow rate of 24000 GPM for the large arrays to maximize the amount of vaporization and drift losses.

Flow balances on the ESW and RHRSW systems are performed on a three year cycle and have historically shown greater than minimum flows at all measured locations. Therefore, potential valve leakage is effectively accounted for by the margin between test acceptance criteria and the analysis assumed flowrates.

NRC Question 6:

In your application, you propose adding TS Surveillance Requirement (SR) 3.7.1.4 to verify that the spray loop bypass valves close upon receipt of a closing signal. Why is the automatic opening of these valves not similarly being added to the TSs? As stated in your application, these valves receive such a signal to ensure an adequate path exists for avoiding deadheaded conditions upon automatic starting of an associated RHRSW or ESW pump. Also, in this context, provide additional information explaining the proposed SR 3.7.1.4 Bases statement that 'The failure of the spray bypass valve to open on demand is not limiting and, therefore, would not cause the loop to be inoperable.'

PPL Response:

The spray bypass valve is normally maintained in the open position to preclude deadhead of the ESW and RHRSW pumps. An open large array valve or small array valve will perform the same function. Thus with a bypass valve not capable of automatically opening and an open large or small array valve, pump deadhead cannot occur and the bypass valve is in the position required by the design basis analysis. No action or completion time to fix the bypass valve so that it can automatically open is warranted since it would be in the position required for accident mitigation.

The RHRSW and UHS TS requires a return flow path to the UHS be available for the RHRSW and ESW systems to be considered operable. This requirement is discussed in the Bases for TS 3.7.1 and TS 3.7.2. An operable return flow path consists of either an open spray bypass valve or an open spray array valve. If a return flow path to the UHS for ESW or RHRSW is not available, the return path is not operable. Both RHRSW subsystems and the ESW subsystem associated with the inoperable return loop, would be declared inoperable. Therefore, the inoperable spray bypass valve automatic open condition is effectively addressed by the TS.

It should be pointed out that the procedure that exercises the spray bypass valves and the large and small spray array valves on a quarterly basis checks for both opening and closing on demand for each of the valves.

NRC Question 7:

As proposed in your application for the condition of one inoperable Unit 1 RHRSW subsystem, TS 3.7.1.B appears to be missing a completion time requirement of 8 hours from the discovery of the both Unit 2 RHRSW systems inoperable (similar omission for Unit 2 TSs). Please address omission of this completion time which is discussed in your application and as one of the matrix completion times provided in Table 1 of Attachment 1 to the application (the similar Unit 2 requirement would be expected in proposed TS 3.7.1.C and subject to an 8-hour completion time.)

PPL Response:

TS 3.7.1.B is not missing an 8 hour completion time for discovery of both Unit 2 RHRSW systems inoperable.

A completion time of 8 hours only applies when three of the four RHRSW subsystems are inoperable. This condition is covered by Condition C. The other unit would be in Condition B with a 72-hour Completion Time since only one (1) RHRSW system would be inoperable.

For clarification, Table 1 has been revised to specifically reflect the condition of each unit. This revised table is included in Attachment 2.

NRC Question 8:

Clarify the 8-hour completion time associated with proposed TS 3.7.1.A. For example, if one of the loop B valves in TS Table 3.7.1-1 is inoperable, thereby placing both Units in LCO 3.7.1, and the Unit 1 loop A RHRSW subsystem is subsequently discovered to be inoperable, are both Units 1 and 2 actions required to be completed within 8 hours.

PPL Response:

Yes, both Unit 1 and 2 actions are required to be completed within 8 hours. The 8-hour completion time for both units is appropriate since only 1 RHRSW subsystem is available between both Unit 1 and 2 and a return path is unavailable for both units.

NRC Question 9:

The proposed Unit 2 Bases, Insert G of the application, appears to be improperly formulated (not appropriately revised from the Unit 1 Bases, Insert G). Please provide the appropriate change.

PPL Response:

The Unit 2 Bases Insert G (changed the "1" to a "2") has been revised as follows:

> "With both Unit 2 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 1 results in the cooling capacity being less than the minimum required for response to a design basis event. Therefore, an 8-hour Completion Time is appropriate."

NRC Question 10:

Actions Note 2 proposed in your application for separate condition entry is unclear. The NRC staff recommends individual notes, as needed, in Actions A and B. Notes are not needed for Actions C and D. Action A is on a valve or loop basis and Action B is on an RHRSW subsystem basis.

PPL Response:

PPL agrees that the Actions Note 2 applies to Condition A and should be located in Condition A. This convention is consistent with the use and application Section 1.0 Example 1.3-5 of the SSES TS's.

The Note 2 doesn't apply to Condition B since Condition C addresses two inoperable RHRSW subsystems. As stated, the note does not apply to Conditions C and D. Revised markup pages and camera ready pages reflecting relocation of the note are included in Attachment 3.

ATTACHMENT 2 TO PLA-5473

Attachment 2

Table 1:

Summary of Equipment Out of Service and Proposed Completion Times

Equipment Out Of Service										
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	Condition	Completion Time	Justification
x								3.7.1B	7 Days – Unit 1 None – Unit 2	Only 1 RHRSW subsystem affected; no effect on ESW
	x							3.7.1B	None – Unit 1 7 Days – Unit 2	Only 1 RHRSW subsystem affected; no effect on ESW
		x						3.7.1B	7 Days – Unit 1 None – Unit 2	Only 1 RHRSW subsystem affected; no effect on ESW
			x					3.7.1B	None – Unit 1 7 Days – Unit 2	Only 1 RHRSW subsystem affected; no effect on ESW
x		x						3.7.1C	72 Hrs. – Unit 1 None – Unit 2	RHRSW System not Single Failure Proof; no effect on ESW
	x		x					3.7.1C	None – Unit 1 72 Hrs. – Unit 2	RHRSW System not Single Failure Proof; no effect on ESW
x	x							3.7.1B 3.7.1B	72 Hrs. – Unit 1 72 Hrs. – Unit 2	RHRSW System not Single Failure Proof; no effect on ESW
		x	x					3.7.1B 3.7.1B	72 Hrs. – Unit 1 72 Hrs. – Unit 2	RHRSW System not Single Failure Proof; no effect on ESW
x	x	x						3.7.1C 3.7.1B	8 Hrs. – Unit 1 72 Hrs. – Unit 2	Insufficient RHRSW Capacity remaining; no effect on ESW
x		x	x					3.7.1C 3.7.1B	8 Hrs. – Unit 1 72 Hrs. – Unit 2	Insufficient RHRSW Capacity remaining; no effect on ESW
x	x		x					3.7.1C 3.7.1B	72 Hrs. – Unit 1 8 Hrs. – Unit 2	Insufficient RHRSW Capacity remaining; no effect on ESW
	x	x	x					3.7.1B 3.7.1C	72 Hrs. – Unit 1 8 Hrs. – Unit 2	Insufficient RHRSW Capacity remaining; no effect on ESW

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				3.7.1A & 3.7.1B	72 Hrs. – Unit 1 72 Hrs. – Unit 1	RHRSW and ESW return path affected
								3.7.1A & 3.7.1B	72 Hrs. – Unit 2 72 Hrs. – Unit 2	
					x			3.7.1A & 3.7.1B	72 Hrs. – Unit 1 72 Hrs. – Unit 1	RHRSW and ESW return path affected
								3.7.1A & 3.7.1B	72 Hrs. – Unit 2 72 Hrs. – Unit 2	
						x		3.7.1A & 3.7.1B	72 Hrs. – Unit 1 72 Hrs. – Unit 1	RHRSW and ESW return path affected
								3.7.1A & 3.7.1B	72 Hrs. – Unit 2 72 Hrs. – Unit 2	
							x	3.7.1A & 3.7.1B	72 Hrs. – Unit 1 72 Hrs. – Unit 1	RHRSW and ESW return path affected
								3.7.1A & 3.7.1B	72 Hrs. – Unit 2 72 Hrs. – Unit 2	

Equipment Out Of Service										
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	**Condition**	**Completion Time**	**Justification**
				x		x		**3.7.1A & 3.7.1B**	72 Hrs. – Unit 1 72 Hrs. – Unit 1	RHRSW and ESW return path affected
								3.7.1A & 3.7.1B	72 Hrs. – Unit 2 72 Hrs. – Unit 2	
					x		x	**3.7.1A & 3.7.1B**	72 Hrs. – Unit 1 72 Hrs. – Unit 1	RHRSW and ESW return path affected
								3.7.1A & 3.7.1B	72 Hrs. – Unit 2 72 Hrs. – Unit 2	
		x				x		**3.7.1A & 3.7.1C**	8 Hrs. – Unit 1 8 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1B	8 Hrs. – Unit 2 72 Hrs. – Unit 2	
			x			x		**3.7.1A & 3.7.1B**	8 Hrs. – Unit 1 72 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1C	8 Hrs. – Unit 2 8 Hrs. – Unit 2	

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							x	3.7.1A & 3.7.1C	8 Hrs. – Unit 1 8 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1B	8 Hrs. – Unit 2 72 Hrs. – Unit 2	
	x						x	3.7.1A & 3.7.1B	8 Hrs. – Unit 1 72 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1C	8 Hrs. – Unit 2 8 Hrs. – Unit 2	
		x		x				3.7.1A & 3.7.1C	8 Hrs. – Unit 1 8 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1B	8 Hrs. – Unit 2 72 Hrs. – Unit 2	
			x	x				3.7.1A & 3.7.1B	8 Hrs. – Unit 1 72 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1C	8 Hrs. – Unit 2 8 Hrs. – Unit 2	

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					x			3.7.1A & 3.7.1C	8 Hrs. – Unit 1 8 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1B	8 Hrs. – Unit 2 72 Hrs. – Unit 2	
	x				x			3.7.1A & 3.7.1B	8 Hrs. – Unit 1 72 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1C	8 Hrs. – Unit 2 8 Hrs. – Unit 2	
		x		x		x		3.7.1A & 3.7.1C	8 Hrs. – Unit 1 8 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1B	8 Hrs. – Unit 2 72 Hrs. – Unit 2	
			x	x		x		3.7.1A & 3.7.1B	8 Hrs. – Unit 1 72 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1C	8 Hrs. – Unit 2 8 Hrs. – Unit 2	

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					x		x	3.7.1A & 3.7.1C	8 Hrs. – Unit 1 8 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1B	8 Hrs. – Unit 2 72 Hrs. – Unit 2	
	x				x		x	3.7.1A & 3.7.1B	8 Hrs. – Unit 1 72 Hrs. – Unit 1	Insufficient RHRSW Capacity Remaining and ESW return path affected
								3.7.1A & 3.7.1C	8 Hrs. – Unit 2 8 Hrs. – Unit 2	
x	x	x	x					3.0.3 3.0.3	S/D – Unit 1 S/D – Unit 2	Insufficient RHRSW Capacity and No Effect on ESW
						x	x	3.0.3 3.0.3	S/D – Unit 1 S/D – Unit 2	Insufficient Spray Capacity
					x	x		3.0.3 3.0.3	S/D – Unit 1 S/D – Unit 2	Insufficient Spray Capacity
				x			x	3.0.3 3.0.3	S/D – Unit 1 S/D – Unit 2	Insufficient Spray Capacity and ESW System affected
				x	x			3.0.3 3.0.3	S/D – Unit 1 S/D – Unit 2	Insufficient Spray Capacity
				x	x	x		3.0.3 3.0.3	S/D – Unit 1 S/D – Unit 2	Insufficient Spray Capacity
				x	x		x	3.0.3 3.0.3	S/D – Unit 1 S/D – Unit 2	Insufficient spray Capacity
				x		x	x	3.0.3 3.0.3	S/D – Unit 1 S/D – Unit 2	Insufficient Spray Capacity

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	x	x	x	3.0.3 3.0.3	S/D – Unit 1 S/D – Unit 2	Insufficient Spray Capacity

(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 3 TO PLA-5473

Technical Specification Markups

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

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

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.

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

(continued)

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

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

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.

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

(continued)

INSERT A

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ---------NOTE--------------- Separate Condition entry is allowed for each valve. -------------------------------- 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 subsystem 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

INSERT A

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ---------NOTE--------------- Separate Condition entry is allowed for each valve. -------------------------------- 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 subsystem 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

“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

---NOTE---
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.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ---------------NOTE--------------- Separate Condition entry is allowed for each valve. ------------------------------------ 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)

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

---NOTE---

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.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ---------------NOTE--------------- Separate Condition entry is allowed for each valve. ------------------------------------- One valve in Table 3.7.1-1 inoperable. <u>OR</u> One valve in Table 3.7.1-2 inoperable. <u>OR</u> 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. <u>AND</u> 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) <u>AND</u> 72 hours

(continued)