

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Susquehanna Steam Electric Station - Unit 1						DOCKET NUMBER(2) 0 5 0 0 0 3 8 7 1			PAGE (3) OF 0 5		
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TITLE (4)  
Operation With the Ultimate Heat Sink Temperature in Above the Maximum Allowed

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																			
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES			DOCKET NUMBER(S)																
0	7	1	9	9	7	9	7	9	0	1	4	0	0	0	7	2	3	9	7	Susquehanna SES - Unit 2	0	5	0	0	0	3	8	8

OPERATING MODE (9) 1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 101.11: (Check one or more of the following) (11)										
POWER LEVEL (10) 1 0 0	<input type="checkbox"/>	20.402(b)	<input type="checkbox"/>	20.405(c)	<input type="checkbox"/>	50.73(a)(2)(v)	<input type="checkbox"/>	73.71(b)				
	<input type="checkbox"/>	20.405(a)(1)(X)	<input type="checkbox"/>	50.38(c)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	<input type="checkbox"/>	73.71(c)				
	<input type="checkbox"/>	20.405(a)(1)(X)	<input type="checkbox"/>	50.38(c)(2)	<input type="checkbox"/>	50.73(a)(2)(v)	<input type="checkbox"/>	OTHER (Specify in Abstract below and in Text, NRC Form 366A)				
	<input type="checkbox"/>	20.405(a)(1)(X)(#)	<input type="checkbox"/>	50.73(a)(2)(X)	<input type="checkbox"/>	50.73(a)(2)(v)(X)	<input type="checkbox"/>					
	<input type="checkbox"/>	20.405(a)(1)(X)(v)	<input checked="" type="checkbox"/>	50.73(a)(2)(X)(#)	<input type="checkbox"/>	50.73(a)(2)(v)(X)(B)	<input type="checkbox"/>					
	<input type="checkbox"/>	20.405(a)(1)(X)(v)	<input type="checkbox"/>	50.73(a)(2)(X)(#)	<input type="checkbox"/>	50.73(a)(2)(X)	<input type="checkbox"/>					

NAME (LICENSEE CONTACT FOR THIS LER) (12) Stephen J. Ellis - Licensing Engineer						TELEPHONE NUMBER					
						AREA CODE					
						7 1 7 5		4 2 - 3 5 3 7			

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)						EXPECTED SUBMISSION DATE (15)		
YES (If yes, complete EXPECTED SUBMISSION DATE)						X NO		
						MONTH DAY YEAR		

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On June 23, 1997 at 0900, with Unit 1 and Unit 2 both in Condition 1 (Power Operation) at 100% power, engineering personnel determined that on several occasions the average temperature of the Ultimate Heat Sink (UHS) exceeded the maximum initial temperature allowed (as supported by calculations). During an engineering review, a calculational methodology error was identified in the decay heat input to the UHS calculation. Correct inputs were entered into the calculation for UHS initial temperature, which resulted in a lower UHS maximum allowed initial temperature. The original (flawed) calculation indicated a maximum allowed initial temperature of 88°F, as does the Technical Specifications, while the new calculation could support only an 82°F initial temperature with the operating procedures as they existed. There were 10 occasions in the past where 82°F was exceeded. Analysis indicates that, although the initial temperature was exceeded, the safety significance of these events were very minor. PP&L immediately took steps to administratively control UHS average temperature to ensure it did not exceed that value supported by calculation. PP&L has also made procedural changes, supported by calculation, to allow an increase in the maximum UHS initial average temperature from 82°F to 85°F. At no time was the health and safety of the public compromised as a result of this event. Also, at no time were the current Technical Specification limits exceeded. This is being reported to the Commission pursuant to 10CFR5073(a)(2)(ii) as a condition where the plant operated outside of its design basis, although, as stated previously, the conditions discussed here were of minor significance from a safety perspective. Corrective actions include: a review of other calculations that may have used the calculation methodology error, performance of a calculation to bound UHS temperature with design basis conditions, initiating Final Safety Analysis Report changes, requesting a Technical Specifications change, counseling appropriate engineering personnel on use of the decay heat standard, and reviewing the event for inclusion in Engineering Continuing Training.

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FACILITY NAME (1)		DOCKET NUMBER (2)						LER NUMBER (6)						PAGE (3)							
Unit								YEAR	SEQUENTIAL NUMBER			REVISION NUMBER									
Susquehanna Steam Electric Station		0	5	0	0	0	3	8	7	9	7	—	0	1	4	—	0	0	2	OF	5

TEXT (if more space is required, use additional NRC Form 366A's) (17)

**EVENT DESCRIPTION**

On June 23, 1997, at 0900, with Unit 1 in Condition 1 (Power Operation) at 100% power, and with Unit 2 in Condition 1 (Power Operation) at 100% power, engineering personnel (utility; non-licensed) determined that on several occasions in the past, the average temperature of the Ultimate Heat Sink (UHS) (EIS Code: BS) exceeded the maximum initial temperature allowed (as supported by calculations). The maximum allowed initial temperature is the maximum average temperature of the UHS prior to an accident, that can accommodate the heat dissipated following a DBA LOCA on one unit and the simultaneous shutdown and decay heat contribution of the other unit, on a design basis day (as defined by US NRC Regulatory Guideline 1.27), with the UHS not exceeding 97°F. 97°F is considered the maximum temperature that Emergency Service Water (EIS Code: BI) can reach before the Emergency Diesel Generators (EIS Code: EK) are challenged.

**CAUSE OF EVENT**

Engineering personnel were reviewing the decay heat calculation used in the UHS calculation to determine if the assumptions used would still be valid for 24 month cycle operation and for the use of Atrium 10 fuel. During this investigation it became apparent that the decay heat calculation methodology was in error. The error stems from the mixing of the 1979 Decay Heat Standard (DHS), ANSI/ANS-5.1-1979, and the 1973 DHS as described in the Branch Technical Position (ASB 9-2). The original calculation was performed in 1984.

Since the UHS calculation used the incorrect decay heat inputs, the peak UHS (spray pond) temperature computed is non-conservative. The original calculation supported an UHS maximum temperature of 88°F, which is reflected in Technical Specification 4.7.1.3.a. An updated calculation, using the correct methodology for decay heat values, could support only a 82°F maximum temperature when considering existing operating procedural requirements.

The root cause evaluation performed has identified the following human performance causes:

- Documents were not followed correctly.
- Analysis/calculation deficiencies.

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**REPORTABILITY/ANALYSIS**

The event was determined reportable per 10CFR50.73(a)(2)(ii) as a condition outside of the design basis, in that the maximum UHS temperature supported by calculation was 82°F, and on 10 occasions between 1986 and 1993, the plant operated at temperatures above this maximum. Technical Specification 4.7.1.3.a specifies 88°F as the maximum average temperature of the UHS. This value was never challenged. The highest spray pond temperature noted was 84°F. Calculations indicate that with the UHS at 84°F at design basis conditions, and a Loss Of Coolant Accident (LOCA) on one unit and a shutdown on the other unit, the maximum UHS temperature following the accident could reach 97.8°F, which is 0.4°F higher than the prediction performed for power uprate of 97.4°F. Since the time that the UHS temperature is above the design limit of 97°F is relatively short (approximately 16 hours), it is judged that there would be no loss of function or operability of any safety equipment, such as the emergency diesel generators. In addition, there is an assumption in the calculation that if real conditions are applied, results in some conservatism. The calculation assumes zero wind speed. It was found that a small wind, as little as 4 miles/hour, reduces the peak UHS temperature considerably. At Susquehanna SES the UHS rarely experiences zero wind speed. Based on the above consideration, the safety significance of exceeding 82°F UHS average temperature on the 10 occasions noted is minor. The health and safety of the public as a result of this event were not compromised.

The 82°F maximum average temperature of the UHS is based on failure of the spray pond bypass valve to close. This would divert flow from the spray network and has been identified as the most limiting single failure. Historically, procedures required operations staff to transfer loads from the Emergency Service Water loop with the failed valve to the other loop at a UHS temperature of 93°F. Calculations have shown that by making this transfer at 90°F, removing of the Reactor Building Closed Cooling Water (RBCCW) (EHS Code: CC) heat exchanger loads, and making more realistic solar heat assumptions, the maximum average UHS temperature prior to the accident can be increased to 85°F. Appropriate procedure changes have been made, and the administrative limit for average UHS temperature is now 85°F.

In accordance with the guidelines provided in NUREG-1022, Supplement 1, Item 14.1, the required submission date for this report was determined to be July 23, 1997.

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**CORRECTIVE ACTIONS**

The following corrective actions were identified and completed:

- Spray Pond (UHS) temperature has been administratively controlled to ensure that the average UHS temperature does not exceed the calculational limit. This includes approval of a Technical Specification Interpretation limiting UHS temperature to 85°F, changes to Operation Rounds and inclusion of a description of the event in Operator's required reading, and change plant procedures as required by calculation to support a maximum allowed initial UHS temperature of 85°F.
- Establishment of an approved calculation to determine the maximum allowed initial UHS temperature for present Operational conditions.

The following corrective actions have been identified:

- Prepare and submit to the Commission a request to change the Technical Specifications.
- Discuss the use of the DHS and the decay heat calculation with the appropriate engineering personnel.
- Review of other calculations, such as those associated with Fuel Pool Boiling, to evaluate the effect of the decay heat calculation error on these calculations. No significant effect has been identified to date. PP&L's Current Licensing Basis (CLB) project, which is looking at calculations in general, will also be reviewing appropriate calculations.
- Provide a review of the event to the Susquehanna Training Center for inclusion in upcoming Engineering Continuing training.
- Modify Licensed Operator training to incorporate operator actions required as a result of procedural changes made to allow UHS average temperature to reach 85°F.

In addition to the actions noted above, PP&L will modify the plant in a manner that removed the spray pond bypass valve as the most limiting single failure. This modification is currently being designed. It is PP&L's intention with this modification to approach the 88°F maximum initial UHS temperature that is now in the Technical Specifications. Prior to installation of the modification, a

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proposed change to the Technical Specifications must be submitted to, and approved by, the Commission. This proposed change to the Technical Specifications is currently scheduled to be submitted to the NRC in the 4th quarter of 1997.

**ADDITIONAL INFORMATION**

Past Similar Events:           None

Failed Component:           None