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10 CFR 50.73

March 20, 2015

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-53 and DPR-69
NRC Docket Nos. 50-317 and 50-318

Subject: Licensee Event Report 2015-001, Revision 00
Component Cooling and Shutdown Heat Exchanger Lineup Potential to Exceed Design Basis Temperatures

The attached report is being sent to you as required by 10 CFR 50.73.

There are no regulatory commitments contained in this correspondence.

Should you have questions regarding this report, please contact Mr. Michael J. Fick at (410) 495-6714.

Respectfully,

Mark D. Flaherty
Plant Manager

MDF/PSF/bjm

Attachment: As stated

cc: NRC Project Manager, Calvert Cliffs
NRC Regional Administrator, Region I
NRC Resident Inspector, Calvert Cliffs
S. Gray, MD-DNR

IE22
NRR

NRC FORM 366 (02-2014) | U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 | EXPIRES: 01/31/2017

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Calvert Cliffs Nuclear Power Plant, Unit 1	05000317	1 OF 4

4. TITLE

Component Cooling and Shutdown Heat Exchanger Lineup Potential to Exceed Design Basis Temperatures

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	
01	22	15	2015	-001	00	03	20	15	CCNPP, Unit 2	05000318
									FACILITY NAME	

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☒ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☒ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
100	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☒ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Pat Furio, Principal Engineer	410-495-4374

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
D	CC	HX	S445						

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On January 22, 2015, it was determined that a certain line-up of component cooling and shutdown cooling heat exchangers could exceed the design basis outlet temperatures for the component cooling water (CCW) system following a design basis accident. Although not a safety concern at the time of discovery because of low ultimate heat sink temperatures (which cools CCW), in the past, the ultimate heat sink temperature has been high enough to create this condition. A review of Control Room logs for previous three years identified periods of time where Unit 1 and Unit 2 were in an unanalyzed line-up with the ultimate heat sink temperature greater than the maximum allowed. This condition results in both component cooling loops being inoperable due to their cross-connected design. The cause of the event was the failure to evaluate some CCW system testing and maintenance line-ups to ensure consistency with the design assumptions. Corrective actions taken to date include revising several Emergency Operating and Abnormal Operating procedures to provide operator direction, and updating the Technical Specification Bases. Additional evaluation(s) will be performed to further define the operable basis for Component Cooling configurations. The system condition is reportable in accordance with 10 CFR 50.73(a)(2)(ii)(B), 50.73(a)(2)(i)(B), 50.73(a)(2)(v)(D), and 50.73(a)(2)(vii).

NARRATIVE

I. DESCRIPTION OF EVENT:

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

A. INITIAL CONDITIONS:

Unit 1 was operating in Mode 1 on January 22, 2015 prior to the event.

B. EVENT:

The Component Cooling Water [CC] (CCW) system for each unit consists of three motor-driven component cooling circulating pumps [P], two component cooling heat exchangers [HX], a head tank [TK], associated valves, piping, instrumentation, and controls. The two CCW loops are cross-tied and are not independent of each other. The design basis of the CCW system is to support containment cooling (via the Containment Spray [BE] system) and removing core decay heat (via the Shutdown Cooling [BP] (SDC) heat exchangers). It performs this function by maintaining the outlet temperature of the CCW heat exchangers at 120 degrees F or less. This function is needed approximately 35 minutes after a design basis loss-of-coolant accident (LOCA) during the recirculation phase of the accident. For this long-term cooling function, two CCW pumps and two CCW heat exchangers provide the necessary cooling capacity for both SDC heat exchangers. The SDC heat exchangers cool the recirculated fluid from the containment [NH], which provides containment cooling via the containment spray system and provides core cooling via the safety injection system. Component cooling water will be supplied to both SDC heat exchangers because of the cross-tie.

On occasion during the last three years (and since at least 1992), a CCW heat exchanger has been removed from service for maintenance or cleaning and the corresponding SDC heat exchanger was not removed from service. Technical Specification (TS) Condition 3.7.5.A was entered for one CCW loop inoperable. However, because of the design of the CCW system (permanently cross-tied), water from both SDC heat exchangers can flow through the one remaining operable CCW loop. In this configuration, during a design basis accident (post-Recirculation Actuation Signal (RAS)), the remaining CCW loop is unable to remove the heat load from both SDC heat exchangers without exceeding the design basis outlet temperature for the CCW heat exchanger (120 degrees F or less) under some ultimate heat sink temperature conditions. Therefore, the remaining CCW loop becomes inoperable.

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

There were no structures, systems or components inoperable at the start of the event that contributed to the event.

D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

Specifically, Unit 1 was in this condition 10 times in the past three years and Unit 2 was in this condition 8 times in the past three years. This configuration existed for between 2.5 hours and 52.5 hours depending on the type of maintenance or cleaning work being performed. Cleaning of a CCW heat exchanger averaged 4.4 hours and scheduled maintenance on the CCW system averaged 22 hours. These times are well within the 72 hour Required Action Completion Time in TS Condition 3.7.5.A, for one CCW loop inoperable.

E. FAILURE MODES:

There were no failed components associated with this event.

F. METHOD OF DISCOVERY:

The site Nuclear Regulatory Commission Senior Resident Inspector questioned TS Basis 3.7.5 for operability of the CCW system following a LOCA. The TS Bases offers three lineups to maintain the CCW heat exchanger outlet temperature below 120 degrees F during a LOCA. Reviews of Chesapeake Bay temperatures during the last three years found times where Calvert Cliffs was not in one of the TS Bases lineups when the Chesapeake Bay temperature exceeded 60.5 degrees F (as initially determined by engineering judgment) and may not have been capable of performing its safety function.

This event is documented in the site's Corrective Action Program under IR 02439913.

II. CAUSE OF EVENT

The cause of the event was the failure to evaluate some CCW system testing and maintenance line-ups to ensure consistency with the design assumptions.

A. SAFETY CONSEQUENCES:

There were no automatic or manually initiated safety system responses.

If a design basis accident had occurred when CCW was in the line-up described above, it is possible that the CCW heat exchanger outlet temperature may have exceeded the design basis limit during the recirculation phase of an accident and affected long-term cooling. However, the potential safety consequences would have been minimal as described below.

The CCW system has been evaluated for a passive failure during the recirculation phase of an accident resulting in the loss of the CCW function. The Unit can still be maintained in a safe condition since the containment coolers would be utilized in lieu of the containment spray pumps and SDC heat exchangers to cool the Containment. One of the air cooled spray pumps would be manually aligned from outside the emergency core cooling system rooms for safety injection into the core. Flow of one spray pump is sufficient to keep the core covered during the recirculation of the containment sump.

As described above, these potentially adverse system lineups were of short duration when compared to the Required Action Completion Time of 72 hours in TS 3.7.5 Condition A.

This event was reviewed for potential probabilistic risk assessment impact and the change in risk is quantitatively less than 1E-6 change in core damage frequency or 1E-7 change in large early release frequency. This represents events of very low safety significance.

The subject condition satisfies the criteria in NUREG-1022, Revision 3, for an event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety. Therefore, this event is reportable pursuant to 10 CFR 50.73(a)(2)(ii). Additionally, the times when the CCW heat exchanger was taken out-of-service (while entering the appropriate TS Condition) and the Chesapeake Bay temperature was higher than currently evaluated, could have led to a condition where the CCW system may not have fulfilled its safety function. Because of the interconnected design of the system, the condition of one CCW loop being inoperable would lead to the other loop being inoperable. There is no TS Condition for two CCW loops inoperable, and therefore TS Limiting Condition for Operation 3.0.3 would have been entered and a plant shutdown required to commence. Subsequently, a violation of TS occurred on each occasion when the conditions existed. Therefore this event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(B). Because of the design of the CCW system, where the inoperability of one loop, under certain conditions, would lead to the inoperability of the other redundant loop, this event is also reportable as an event or condition that could have prevented fulfilment of a safety function and as a common cause inoperability of independent trains or channels. Therefore, this event is also reportable pursuant to 10 CFR 50.72 (a)(2)(v)(D) and 10 CFR 50.73(a)(2)(vii). An immediate event notification report (50752) was made pursuant to 10 CFR 50.72(b)(3)(ii)(B).

B. CORRECTIVE ACTIONS:

Corrective actions taken to prevent recurrence include revising several Emergency Operating and Abnormal Operating procedures to reflect the revised design basis calculation assumptions and provide operator direction. The TS Basis was also updated. Additional evaluation(s) will be performed to further define the operable basis for CCW configurations.

III. PREVIOUS SIMILAR EVENTS:

A review of Calvert Cliffs' events during the last four years was performed. No previous licensee event reports were identified that involved the same underlying concern or reason for this event.

A. COMPONENT INFORMATION:

Component Cooling Heat Exchanger, Struthers Wells, Inc.
Shutdown Cooling Heat Exchanger, Engineers & Fabricators