The assumption of 75 degrees F service water has been shown to be nonconservative for brief periods of time. While service water temperature was monitored, the potential significance of elevated service water temperature relative to the operability of critical loads was not previously recognized or addressed.

Corrective Actions

System flow testing and evaluation have resulted in a number of potential corrective actions to ensure adequate cooling is available for critical components following a postulated Design Basis Accident (DBA). Short term corrective actions currently under evaluation include: 1) the isolation of Containment Air Cooler VHX-4 upon SIS, 2) aligning the diesel engine driven fire water pumps [ENG-P;KP] to the Service Water System, 3) service water system flow balancing, and 4) establishing a service water temperature limitation at a value below the currently assumed 75 degree F value. Potential longer term corrective actions include replacement of the service water pumps or long term use of the diesel engine driven fire pumps.

Periodic performance testing of the service water pumps to ensure FSAR requirements continue to be satisfied will be evaluated for implementation.

Corrective action addressing the procurement process may be warranted pending evaluation of the errors involved.

Analysis

The subject deficiencies discovered in the Service Water System, when combined with other discovered deficiencies in the Component Cooling Water System, Containment Air Cooling System and Low Pressure Safety Injection System [BP] (LERs 86-024, 86-031, 86-032 and 86-033) constitute an unanalyzed condition which compromised the Plant's ability to adequately respond to a DBA. Quantification of the extent of the compromise will be determined for the supplemental report to this LER.

Additional Information

The service water pumps were manufactured and supplied by Layne-Bowler; model number 67H-5605.

The subject of adequate service water flow was previously addressed under Palisades SEP Topic IX-3, in 1982.

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October 30, 1986

US Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT -
LICENSEE EVENT REPORT 86-036 - SERVICE WATER CAPABILITY LESS THAN SPECIFIED IN FSAR

Licensee Event Report (LER) 86-036, (Service Water Capability Less Than Specified in FSAR) is attached. This event is reportable to the NRC per 10CFR50.73(a)(2)(i), (ii), (v), and (vii).

Brian D Johnson

Brian D Johnson
Staff Licensing Engineer

CC Administrator, Region III, USNRC
NRC Resident Inspector - Palisades

Attachment

IE22
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OC1086-0178-NL02

NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Palisades Nuclear Plant	0 5 0 0 0 2 5 5	1 OF 0 3

TITLE (4)
Service Water Capability Less Than Specified in FSAR

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 9	3 0	8 6	8 6	0 3 6	0 0	1 0	3 0	8 6	NA	0 5 0 0 0
									NA	0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
N		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
0 0 0		20.405(a)(1)(ii)	50.36(c)(2)	X 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	X 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Keith E Osborne, Technical Engineer, Palisades	AREA CODE 6 1 6 7 6 4 - 8 9 1 3

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)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 1	3 1	8 7

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

In September 1986, testing of the Service Water System disclosed that the performance of the three service water pumps was below the requirements of the Palisades FSAR. The condition is the result of both an inadequate system design and the installation of replacement impellers which were not modified by the vendor to improve performance, as were the original impellers. Additionally, in October 1981, service water temperature was discovered to be higher, on occasion, than the 75 degree F value assumed in the Palisades FSAR.

Determination of short term and long term corrective action is in progress.

The Plant was in cold shutdown condition at the time of discovery. The discovered condition may have compromised the Plant's ability to adequately respond to a DBA. Evaluation of the extent of the compromise is incomplete at this time.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Palisades Nuclear Plant	0 5 0 0 0 2 5 5	8 6	— 0 3 6	— 0 0	0 2 OF 0 3

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

Description

On September 30, 1986, with the plant in cold shutdown condition, flow testing of the service water pumps (P-7A, P-7B and P-7C) [P;BI] revealed that the pumps were incapable of meeting flow/head values of 8000 gpm at 140 feet of head, per pump, as described in the FSAR. The values attained during testing were 7330 gpm at 135 feet of head for P-7A, 7323 gpm at 134 feet of head for P-7B, and 7503 gpm at 136 feet of head for P-7C.

The three service water pumps are divided among two trains of safeguards equipment, with each train powered from a separate emergency diesel generator [DG;EK]. When considering a postulated Loss of Coolant Accident (LOCA), with a concurrent loss of offsite power and the failure of a single emergency diesel generator, the corresponding loss of either one or two service water pumps (depending on which train is assumed to fail) results in insufficient service water capability to the critical service water loads. Evaluation of the impact of the reduced flow on the ability of critical loads (Containment Air Coolers VHX-1, 2, 3 and 4 [CLR;BK], Component Cooling Water Heat Exchangers E-54A and B [HX;CC], Engineered Safeguards Room Coolers VHX-27A and B [CLR;VF], Control Room HVAC VC-10 and 11 [CLR;VI], and Emergency Diesel Generators 1-1 and 1-2) to fulfill their intended safety function is incomplete.

Additionally, during review of the Service Water System, the temperature of the service water was noted to have occasionally been higher than the 75 degree F value assumed in the Palisades FSAR. Review of temperature data showed that it was not uncommon for service water temperatures to exceed 75 degrees F by several degrees during the summer months. On October 10, 1986, review of the data confirmed at least one occasion of previous plant operation (July 19, 1983 through August 5, 1983) with elevated service water temperature. The effect of elevated service water temperature reduces the cooling capability in a similar manner to that of reduced flow, and is being considered in the evaluation of the overall impact on critical components.

Cause

The original pump impellers supplied by the vendor had been modified by "backfiling" to improve performance. Subsequent replacement of the pump impellers (P-7A in 1980, P-7B in 1983 and P-7C in 1982) with impellers which were not similarly modified by the vendor was the primary cause of the reduced performance. Following replacement of the impellers, the testing which was performed was not sufficient to disclose the discrepancy. The cause of the error in the procurement process is not fully understood at this time.

During evaluation of the service water system, it was determined that without system modifications, anything less than a full compliment of three service water pumps results in insufficient service water capacity to satisfy DBA loads and is an apparent original plant design deficiency.