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SUBJECT: LER 90-009-00: on 900612, svc water booster pumps control cable separation.

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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
LICENSEE EVENT REPORT 90-009

Gentlemen:

The enclosed Licensee Event Report (LER) is submitted in accordance with
10 CFR 50.73 and NUREG-1022 including Supplements No. 1 and 2.

Very truly yours,

R. E. Morgan
General Manager
H. B. Robinson S. E. Plant

CTB:lko

Enclosure

cc: Mr. S. D. Ebnetter
Mr. L. W. Garner
INPO

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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) H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2	DOCKET NUMBER (2) 0 5 0 0 0 2 6 1	PAGE (3) 1 OF 0 5
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TITLE (4)
SERVICE WATER BOOSTER PUMPS CONTROL CABLE SEPARATION

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 6	1 2	9 0	9 0	0 0 9		0 0	0 7	1 2	9 0		0 5 0 0 0	
OPERATING MODE (9) N			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
POWER LEVEL (10) 1 1 0 1 0			20.402(b)			20.405(c)			50.73(a)(2)(iv)			73.71(b)
			20.405(a)(1)(i)			50.36(c)(1)			50.73(a)(2)(v)			73.71(c)
			20.405(a)(1)(ii)			50.36(c)(2)			50.73(a)(2)(vii)			OTHER (Specify in Abstract below and in Text, NRC Form 366A)
			20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)(A)			
			20.405(a)(1)(iv)			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 C. T. Baucom - Senior Specialist								TELEPHONE NUMBER AREA CODE 8 0 3 3 8 3 - 1 2 5 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
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)					<input checked="" type="checkbox"/> NO		

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

During validation of the Service Water System Design Basis Document, the routing of four cables associated with the Service Water Booster Pumps (SWBP) were identified as violating cable separation requirements. These cables were installed by a plant modification in 1975 and provide a bypass of the SWBP low suction pressure interlock upon initiation of a safeguards actuation. The cause of this design inadequacy was attributed to organizational, programmatic, and documentation deficiencies that existed at the time of modification development. An assessment of possible failure modes indicates an insignificant increase in risk for a two year period, during which time permanent resolution will be developed and implemented. This situation was reported via the Emergency Notification System at 1000 hours on June 12, 1990 pursuant to 10CFR50.72(b)(1)(ii)(B). This Licensee Event Report is submitted pursuant to 10CFR50.73(a)(2)(ii)(B).

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-3164

EXPIRES: 8/31/86

FACILITY NAME (1) H. B. ROBINSON, UNIT NO. 2	DOCKET NUMBER (2) 0 5 0 0 0 2 6 1	LER NUMBER (8)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 0	- 0 0 9	- 0 0	0 2	OF	0 5

TEXT (if more space is required, use additional NRC Form 362A's) (17)

I. Description of Event

On June 12, 1990, the unit was operating at steady-state conditions with reactor power at 100%.¹ As part of the on-going Design Basis Document (DBD) Reconstitution Program, a validation team was performing a review of cable separation for the Service Water (SW) System. This review included 385 cables, four of which were suspected of being improperly installed. Specifically, the routing of four cables associated with the Service Water Booster Pumps (SWBP) was considered suspect. These cables are routed between the Safeguards and Auxiliary Relay Racks and provide a bypass of the SWBP low suction pressure interlock upon initiation of a safeguards actuation. During normal (non-emergency) conditions this interlock functions to prevent the start of the SWBPs if insufficient net positive suction head (NPSH) exists.

To support the methodology used by the validation team, the installation of these cables was physically verified, to the extent practical, by personnel from the on-site and off-site engineering groups. This inspection determined that the suspect cables were installed as documented.

A further review was performed of documentation associated with the installation of these cables which identified that Plant Modification 298 had installed these cables in 1975. As stated within the modification package, "this modification will allow the Service Water Booster Pumps to start simultaneously with the Service Water Pumps on [a safeguards] signal. At present, these pumps will not start until the net positive suction head required by the pumps has developed. The description given in FSAR Table 8.2-4 states that the SWBP's will start simultaneously with the Service Water Pumps. This change will assure the proper sequence." Review of this modification package confirmed that the installation had been correctly analyzed by the validation team, and that separation of these redundant cables for the SWBPs was not maintained in the original design.

Based on the above reviews, it was verified on June 12, 1990 that electrical separation in accordance with the Service Water DBD was not maintained. This situation was reported to the NRC via the Emergency Notification System at 1000 hours on June 12, 1990. This report was made pursuant to 10CFR50.72(b)(1)(ii)(B) as a condition outside the design basis of the plant.

1

H. B. Robinson Steam Electric Plant Unit No. 2 is a Westinghouse Pressurized Water Reactor power plant in commercial operation since March 1971.

NRC Form 366A
(9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMS NO. 3150-3164

EXPIRES: 8/31/88

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (8)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
H. B. ROBINSON, UNIT NO. 2	0 5 0 0 0 2 6 1	9 0	0 0 9	0 0	0 3	OF	0 5

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

II. Cause of Event

As stated above, the cables in question were installed in 1975 by Plant Modification 298. Based on the significant length of time between installation of these cables and identification of this situation, it is difficult to positively establish a root cause for the improper installation of these cables. However, certain factors have been identified which may have contributed to this situation.

Firstly, the modification was designed by on-site engineering and approved by site personnel. None of the associated personnel had formal training or experience in the area of cable routing or cable separation. Further, at the time of the modification, there were no formal procedures regarding proper methods of cable routing or cable separation, even though records of previous routing were available.

Second, at the time of the modification, there was no formally documented design basis for the cable raceway system, nor was there a clear understanding of the records for the routing of existing cables. Therefore, the routing of cables at that time may not have included a thorough understanding of the possible interactions between newly installed and existing cables, i.e., functional separation of trains between new and existing cables could not easily be determined.

In summary, personnel experience, design procedures, and design basis are areas where inadequacies contributed to the failure to maintain functional separation of the affected cables. These factors collectively resulted in the installation of an inadequate design.²

III. Analysis of Event

To ensure that the identified cable routings do not adversely impact the safe operation of the unit, a review of potential failure modes was performed. This review included internal cable faults (open circuit, short to ground, short to power), external events (fire, missiles, seismic), and damage from falling objects or operation of equipment. Based on this review, the only postulated failure warranting further evaluation was the short to ground, which for the purposes of the analysis, was assumed to be the single failure. It was shown through the subsequent analysis that the available fault current and fault duration for the cables in question was insufficient to damage the cable for the redundant SWBP. Therefore, at least one SWBP would remain available.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-3104

EXPIRES: 8/31/86

FACILITY NAME (1) H. B. ROBINSON, UNIT NO. 2	DOCKET NUMBER (2) 0 5 0 0 0 2 6 1	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 0	- 0 0 9	- 0 0 0	4	OF	0 5

TEXT (If more space is required, use additional NRC Form 364A's) (17)

To further support the analysis of the postulated short to ground, probabilistic risk assessment techniques were used which included the conservative assumption that the fault affected both SWBPs. Even with the conservative inputs, the contribution to core damage frequency for exposure periods of 3 months and 2 years was determined to be 6.6×10^{-7} per year and 5.2×10^{-6} per year, respectively. This increase in risk is not considered significant.

With regard to containment cooling capability, both containment spray pumps would be available to provide cooling, assuming that the single failure was a fault in one cable which affected the redundant SWBP. This equipment will provide sufficient heat removal capability to maintain post-accident containment pressure below the design value. Existing Emergency Operating Procedures require plant operators to verify SWBP and containment spray pump operation as immediate actions following initiation of a safeguards actuation signal. Therefore, the consequences of the failure of these cables would be promptly identified by plant operators, and, since the containment spray pumps would be operating, recovery actions to restore the SWBP(s) would not be crucial.

This situation was reported to NRC via the Emergency Notification System as a one-hour non-emergency event report pursuant to 10CFR50.72(b)(1)(ii)(B) and is reportable within the Licensee Event Report system pursuant to 10CFR50.73(a)(2)(ii)(B). Both of these reports are required due to a condition outside the design basis of the plant.

IV. Corrective Actions

Design of major plant modifications is now assigned to a centralized engineering design organization. Within this organization, specific disciplines are available to review and evaluate various aspects of design, i.e., an electrical group is available to review cable routings in support of modification development. Plant personnel are no longer tasked with the design of major plant modifications, however, various site units are involved in the review of modifications. In addition, the central engineering design organization now has formal, documented guidance for cable routing and separation. The "H. B. Robinson Steam Electric Plant Cable and Raceway Separation/Isolation Summary Document" is available for the development and review of plant modifications.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-3104

EXPIRES: 8/31/88

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (3)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
H. B. ROBINSON, UNIT NO. 2	0 5 0 0 0 2 6 1	9 0	0 0 9	0 0	0 5 OF 0 5	

TEXT (If more space is required, use additional NRC Form 305A's) (17)

The design basis for the cable and raceway system has been documented within the Cable and Raceway System Design Basis Document, issued for preliminary use on June 30, 1989. This documented design basis will provide a foundation for future modifications and will help ensure that cable routings and separation are proper and correct. Also, the on-going DBD Reconstitution Program should serve to identify similar situations, should such situations exist.

To assess and document the safety significance of this situation, a Justification for Continued Operation (JCO) was prepared.³ This JCO was reviewed and approved by the Plant Nuclear Safety Committee on June 15, 1990.

Finally, to provide permanent resolution to the lack of functional separation for the cables identified, a project will be initiated to identify and implement appropriate, permanent corrective actions prior to the expiration of the 2 year interval discussed above. Therefore, these actions will be completed by June 15, 1992.

V. Additional Information

A. Failed Component Identification

None

B. Previous Similar Events

None

3

JCO No. 90-01 (Engineering Evaluation No. 90-053), "Service Water Booster Pumps Control Cable Separation."