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 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-005-01: on 900302, failure to test RPS logic channels
 in accordance w/Tech Specs.

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(10 CFR 50.73)

United States Nuclear Regulatory Commission
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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
LICENSEE EVENT REPORT 90-005-01

Gentlemen:

The enclosed Supplemental Licensee Event Report (LER) is submitted in accordance with 10 CFR 50.73 and NUREG-1022 including Supplements No. 1 and 2. This Supplemental LER is required to clarify certain aspects of the previous report, and to expand upon the corrective actions which have been taken. Revised portions are indicated by a right-hand margin bar. This supplement should replace existing copies of the original report dated April 2, 1990.

Very truly yours,

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

CTB:lht

Enclosure

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

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PDR ADDCK 05000261
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IE22

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 8	
TITLE (4) FAILURE TO TEST RPS LOGIC CHANNELS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS																	
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 3	0 2	9 0	9 0	0 0 5	0 1	0 8	3 0	9 0					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)				50.73(a)(2)(v)				73.71(c)			
0 6 8		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)				X 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	MANUFAC- Turer	REPORTABLE TO NPDs		CAUSE	SYSTEM	COMPONENT	MANUFAC- Turer	REPORTABLE TO NPDs							
SUPPLEMENTAL REPORT EXPECTED (14)												EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR	
YES (If yes, complete EXPECTED SUBMISSION DATE)												X NO					

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

On March 2, 1990, site maintenance personnel identified a procedural deficiency in that monthly testing of logic channels associated with certain Reactor Protection System (RPS) features was not being performed in accordance with Technical Specification Table 4.1-1, Item 27. The logic channels affected are only applicable during plant startup and reduced power operation. The cause of this procedural deficiency has been attributed to the configuration of originally installed equipment for testing of RPS logic channels, and a misinterpretation of the Technical Specifications. Changes to applicable procedures were promptly implemented for testing of logic channels for RPS features which are credited for mitigation of analyzed accidents. The logic channels for these features were successfully tested on March 14 and 15, 1990. The remaining affected RPS logic channels have either been incorporated into monthly test procedures, or have been addressed by an amendment to the Technical Specifications. This Licensee Event Report is submitted pursuant to 10CFR50.73(a)(2)(i)(B) as an operation or condition prohibited by the plant's Technical Specifications.

NRC Form 364A
(9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED CMS NO. 3150-0104

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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 5	- 0 1	0 2	OF 0 8

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

I. Description of Event

In February of 1990, H. B. Robinson Unit No. 2 was at 68% power for fuel conservation and load management.¹ Site maintenance personnel were involved in the review and upgrade of certain maintenance surveillance test procedures for the testing of Train "A" and Train "B" of the Reactor Protection System (RPS) logic. These test procedures included:

MST-011, Reactor Protection Logic Train "A" and "B" at "0" Power

MST-020, Reactor Protection Logic Train "A" at Power

MST-021, Reactor Protection Logic Train "B" at Power

Test procedure MST-011 is performed prior to startup at either cold shutdown or hot shutdown during outages in which the monthly intervals of MST-020 and MST-021 cannot be maintained. Test procedures MST-020 and MST-021 are performed monthly when the unit is at power. The performance of these tests satisfies the Surveillance Requirements of Technical Specification Table 4.1-1, Item 27.

During review of these surveillance test procedures, certain differences between the at power tests (MST-020 and MST-021) and the prior to startup test (MST-011) caused maintenance personnel to more closely examine the scope of these tests. Technical Specification Table 4.1-1, Item 27, states only that "Logic Channel Testing" shall be performed monthly during hot shutdown and power operations. When periods of reactor cold shutdown and refueling extend this interval beyond one month, this testing shall be performed prior to startup. Further review by site personnel revealed that the following logic channels were being tested prior to startup by MST-011, but were not being tested monthly by MST-020 and MST-021 while the unit was at power:

1. Source Range High Flux Trip
2. Intermediate Range High Flux Trip
3. Power Range High Flux Trip - Low Setpoint
4. Two-of-Three Loop Low Flow Trip

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 364A
(9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED CWS NO. 3150-3104

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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 5	0 1	0 3	OF 0 8	

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Based on these reviews, it was identified on March 2, 1990, that testing of these logic channels was not incorporated into MST-020 and MST-021, and that monthly testing was not being performed when the unit was at power.

Further analysis of these Technical Specification requirements was performed and documented within a Reply to Notice of Violation (dated July 9, 1990) identified by NRC Inspection Report No. 50-261/90-11. Within this Reply, it was acknowledged that the failure to test the Power Range High Flux Trip - Low Setpoint and Two-of-Three Loop Low Flow Trip constituted a violation of the Technical Specifications. It was also determined, based on review of the Technical Specifications and the plant specific hardware configuration, that testing of the Source Range High Flux Trip is only appropriate prior to reactor startup. To address this situation, a license amendment was requested and approved which clarifies Item 27 of Technical Specification Table 4.1-1. Finally, it was determined that logic channel testing of the Intermediate Range High Flux Trip will be performed monthly, unless periods of reactor cold shutdown extend the interval beyond one month, in which case testing will be performed prior to reactor startup.

II. Cause of Event

The cause of this event is a procedural deficiency in that the surveillance tests in question did not address monthly logic channel testing of the affected RPS features.² Two factors have been identified which ultimately resulted in this procedural deficiency.

First, the design of plant equipment originally installed for the testing of RPS logic channels did not consider testing of the four logic channels in question. This equipment can be used to perform functional tests of these logic channels, however, the required testing sequence is atypical of the testing method for RPS logic channels associated with normal, at-power RPS features. For example, at-power testing of the Source Range High Flux Trip logic channel would require the use of jumpers, and could also result in the application of damaging voltages to essential elements of the Source Range channel. In summary, the design of originally installed testing hardware contributed to the presumption that routine monthly testing of these RPS logic channels was not required.

NRC Form 364A
(9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED CMB NO. 3150-2104

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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 5	— 0 1	0 4	OF 0 8	

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Second, the Technical Specification requirements for testing of the affected logic channels are not explicit and were subject to misinterpretation. Specifically, the Source Range High Flux Trip, Intermediate Range High Flux Trip, and Power Range High Flux Trip - Low Setpoint are blocked when reactor power is above 10%. Since these features are not normally in service during steady-state, full power operation, it was assumed that monthly testing was not required. This assumption, however, does not account for the possibility that a significant amount of time might elapse between performances of MST-011. Any shutdown occurring during this time period which did not last longer than one month would not have required performance of MST-011 prior to startup. This in turn would create a situation where the affected logic channels would be required for service, but would not have been tested within the preceding month. Similarly, the Two-of-Three Loop Low Flow Trip is only applicable when reactor power is above 10%, but less than 40%. This feature is also not applicable during steady-state, full power operation, which again resulted in the assumption that monthly testing was not required. However, any reactor shutdown or period of operation at less than 40% reactor power would have required that this feature be operable. If MST-011 had not been performed within the month preceding the unit shutdown or reduced power operation, this RPS feature would have been required for service without having been tested. In summary, the limited applicability of the affected RPS features contributed to the failure to address the Technical Specification testing requirements within the at-power test procedures.

It should be noted, however, that during the period between identification of the deficiency on March 2, 1990, and completion of testing on March 15, 1990, the unit was not operated at power levels which would have required operability of these RPS features.

III. Analysis of Event

A review of the affected RPS features and associated logic channels has been performed to assess the safety significance of the identified procedural deficiencies. Based on this review, it has been determined that these deficiencies have only minor safety significance. As described in Section 7.2.1.1.6 of the Updated Final Safety Analysis Report (UFSAR), the logic channel identity begins at the logic relay coil/relay contact interface (Reference Figure 1). This interface defines the transition from channel identity to logic identity, and provides both electrical and physical separation between the analog and the logic portions of the RPS. The RPS logic channels would, therefore, encompass the wiring and relays between the analog channels and the reactor trip breakers. The testing requirements of the Technical Specifications for the analog channels and reactor trip breakers were verified to be properly addressed within site surveillance procedures; therefore, the logic channel testing only affects the wiring and relays between the analog channels and the reactor trip breakers.

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(9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED CMS NO. 3150-01CA

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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 5	— 0 1	0 5	OF	0 8

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Typically, the wiring and relays associated with these logic channels are assumed to be more reliable than other components such as transmitters and detectors. These components are not subject to "instrument drift;" there is no check or calibration associated with the logic channels, only a functional test. The potential for a failure or malfunction of these components is considered small. Should a failure occur, the component would fail to the trip or actuate position. Therefore, such a failure would not degrade the ability of the system to respond to a transient. Also, it is considered unlikely that simultaneous failures would occur which would affect both Train "A" and Train "B" of a particular RPS feature.

With respect to the specific RPS features in question, Section 7.2.1.1.2 of the UFSAR describes the Source Range High Flux Trip, the Intermediate Range High Flux Trip, and the Power Range High Flux Trip - Low Setpoint as features that provide protection during reactor startup. Also, Section 15.4.1 of the UFSAR credits the Power Range High Flux Trip - Low Setpoint for terminating the uncontrolled rod cluster control assembly bank withdrawal from subcritical or low power. It is considered unlikely that both trains of three separate startup protection features could be rendered inoperable by the simultaneous failure of independent logic channel components. Therefore, there is a reasonable assurance that one or more of these RPS features would have automatically actuated in response to a reactivity event from a subcritical or low power condition.

Section 7.2.1.1.2 of the UFSAR describes the Reactor Coolant System Low Flow Trip as core protection from Departure from Nucleate Boiling (DNB) following a low flow or loss of flow accident. Also, Section 15.3 of the UFSAR describes the Decrease in RCS Flow Rate Event, however, the analyzed transient is initiated from 102% reactor power, as this is the bounding transient. The Two-of-Three Loop Low Flow Trip is only applicable when reactor power is between 10% and 40%. Typically, reactor operation at less than 40% power occurs infrequently. During periods of reactor operation at less than 40% power, this feature is partially backed up by the RPS actuation from Reactor Coolant Pump (RCP) breakers opening or an undervoltage on the RCP electrical busses. Also, although the automatic response would be delayed by some amount, other RPS features such as the high pressurizer pressure reactor trip would be available for event mitigation. Finally, it is again considered unlikely that both trains of this RPS feature would be rendered inoperable by the simultaneous failure of independent logic channel components during the period when this feature would be required for service, i.e., between 10% and 40% reactor power.

It should again be noted that during the period between identification of the deficiency on March 2, 1990, and completion of testing on March 15, 1990, the unit was not operated at power levels which would have required operability of these RPS features.

NRC Form 366A
(9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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APPROVED CUB NO. 3150-010A

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (8)			PAGE (3)															
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER																
		0	5	0		0	2	6	1	9	0	-	0	0	5	-	0	1	0	6

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This Licensee Event Report is submitted pursuant to 10CFR50.73(a)(2)(i)(B) as an operation or condition prohibited by the plant's Technical Specifications

IV. Corrective Actions

As stated above in the Analysis of Event, the Power Range High Flux Trip - Low Setpoint and the Two-of-Three Loop Low Flow Trip are credited for mitigation of events analyzed in Chapter 15 of the UFSAR. In order to promptly address testing of these features, temporary procedure changes were implemented on March 13, 1990 which incorporated monthly testing of these features into MST-020 and MST-021. These revised procedures were used to successfully test affected Train "A" logic channels on March 14, 1990, with successful testing of affected Train "B" logic channels being completed on March 15, 1990. These temporary procedure changes were implemented as permanent procedure revisions on April 3, 1990.

Logic channel testing of the Intermediate Range High Flux Trip has been incorporated into MST-020 and MST-021. This feature will be tested monthly, unless periods of reactor cold shutdown extend the interval beyond one month, in which case testing will be performed prior to startup in accordance with MST-011. Permanent changes to MST-020 and MST-021 were completed and implemented on June 15, 1990.

Further review of the Technical Specifications and the plant specific hardware configuration indicate that testing of the Source Range High Flux Trip logic channels is only appropriate prior to reactor startup. The hardware configuration is such that the use of jumpers would be required to accomplish this testing, and testing of this logic channel during power operation could result in the application of damaging voltages to essential elements of the Source Range channel. As such, at-power testing could result in the loss of both Source Range channels, making them unavailable for a subsequent reactor shutdown. Therefore, at-power testing of this logic channel is considered an unacceptable practice. To address this situation, a license amendment request was submitted to clarify Item 27 of Technical Specification Table 4.1-1. This license amendment request was issued on June 21, 1990 as Amendment No. 127 to the Operating License. Also, procedure revision(s) will be prepared and implemented which will ensure logic channel testing of the Source Range High Flux Trip prior to reactor startup, if testing has not been performed within the preceding seven days. Appropriate procedure revisions will be prepared and implemented by September 28, 1990.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED CMB NO. 3150-0104

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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 5	- 0 1	0 7	OF 0 8

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To help ensure that no similar issues exist with regard to Technical Specification surveillance requirements, the Plant Nuclear Safety Committee has initiated an independent assessment of the instances identified, and of the overall implementation of Technical Specification surveillance requirements. It is expected that this independent assessment, when considered with previous Technical Specification reviews, will eliminate the potential for future similar occurrences. The scope of this independent assessment, and a plan and schedule for its implementation, is currently under development. Consistent with verbal agreements made with NRC Region II personnel, this plan and schedule will be submitted to the NRC in writing by September 21, 1990.

Finally, the failure to properly incorporate testing of these RPS logic channels into surveillance test procedures will be further reviewed within the Corrective Action Program. Significant Condition Report No. 90-019 has been initiated to evaluate this event and determine root cause. This review will help to ensure that each causal factor which contributed to this occurrence has been identified and addressed.

V. Additional Information

A. Failed Component Identification

None

B. Previous Similar Events

Licensee Event Report No. 88-011-01 described a situation where periodic TROTS functional test and calibration procedures required by Technical Specification Table 4.1-1, Item 28, had omitted the TROTS solenoid valves for the turbine stop and control valves.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (8)

PAGE (2)

H. B. ROBINSON, UNIT NO. 2

0 5 0 0 0 2 6 1

9 0

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OF

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FIGURE 1

