



MAY 26 2004

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United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

LICENSEE EVENT REPORT NO. 2004-001-00
BOTH TRAINS OF HIGH PRESSURE SAFETY
INJECTION INOPERABLE FOR APPROXIMATELY 25 MINUTES

Ladies and Gentlemen:

The attached Licensee Event Report is submitted in accordance with the requirements of 10 CFR 50.73. Should you have any questions regarding this matter, please contact Mr. C. T. Baucom, Supervisor – Licensing/Regulatory Programs, at (843) 857-1253.

Sincerely,

A handwritten signature in black ink that reads 'Timothy P. Cleary'.

Timothy P. Cleary
Plant General Manager
H. B. Robinson Steam Electric Plant, Unit No. 2

CTB/cac

Attachment

c: Mr. L. A. Reyes, NRC, Region II
Mr. C. P. Patel, NRC, NRR
NRC Resident Inspector, HBRSEP

Handwritten initials 'JEZZ' in black ink, located in the bottom right corner of the page.

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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 reverse for required number of digits/characters for each block)

FACILITY NAME (1)

H. B. Robinson Steam Electric Plant, Unit No. 2

DOCKET NUMBER (2)

05000261

PAGE (3)

1 OF 7

TITLE (4)

Both Trains of High Pressure Safety Injection Inoperable for Approximately 25 Minutes

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	28	2004	2004	- 001 - 00		05	26	2004	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)							
POWER LEVEL (10)		100%	20.2201(b)			20.2203(a)(3)(ii)	X		50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
			20.2201(d)			20.2203(a)(4)			50.73(a)(2)(iii)	50.73(a)(2)(x)
			20.2203(a)(1)			50.36(c)(1)(i)(A)			50.73(a)(2)(iv)(A)	73.71(a)(4)
			20.2203(a)(2)(i)			50.36(c)(1)(ii)(A)			50.73(a)(2)(v)(A)	73.71(a)(5)
			20.2203(a)(2)(ii)			50.36(c)(2)			50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)	
			20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)	X		50.73(a)(2)(v)(D)	
			20.2203(a)(2)(v)			50.73(a)(2)(i)(B)			50.73(a)(2)(vii)	
			20.2203(a)(2)(vi)			50.73(a)(2)(i)(C)			50.73(a)(2)(viii)(A)	
			20.2203(a)(3)(i)			50.73(a)(2)(ii)(A)			50.73(a)(2)(viii)(B)	

LICENSEE CONTACT FOR THIS LER (12)

NAME

C. T. Baucom

TELEPHONE NUMBER (Include Area Code)

843-857-1253

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	BQ	P	W318	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE). X NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

At approximately 1343 hours on March 27, 2004, during a routine hand-rotation check of the "C" high pressure safety injection (HPSI) pump, it was discovered that the pump shaft was exhibiting some binding. At the time, the "C" HPSI pump was in service as the "B" Train HPSI pump. The "C" HPSI pump was declared inoperable and Condition A of Technical Specifications Limiting Condition for Operation (LCO) 3.5.2 was entered. This LCO Condition requires restoration of the inoperable HPSI train within 72 hours. At that time, the "B" HPSI pump was in service as the Train "A" HPSI pump. The "A" HPSI pump was out-of-service due to a previously discovered condition of minor flange leakage near two of the casing bolts. It was determined that the "A" pump could be restored to operable status and placed back in service to restore two trains of HPSI. In order to do so, the "B" HPSI pump was removed from service as the Train "A" pump and placed in service as the Train "B" pump. Therefore, at 1026 hours on March 28, 2004, for approximately 25 minutes, during the process of placing the "B" HPSI pump in service on Train "B," which was necessary to allow the "A" HPSI pump to be returned to service, there was no HPSI pump automatically available to provide HPSI to the Reactor Coolant System. The cause of the event was the sequence of mechanical equipment failures that necessitated the transfer of the "B" HPSI pump from Train "A" to Train "B." This condition is being reported in accordance with 50.73(a)(2)(ii)(B) and 50.73(a)(2)(v)(D).

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
H. B. Robinson Steam Electric Plant, Unit No. 2	05000261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 7
		2004	- 001	- 00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

I. DESCRIPTION OF EVENT

At approximately 1343 hours on March 27, 2004, during a routine hand-rotation check of the "C" high pressure safety injection (HPSI) pump, it was discovered that the pump shaft was exhibiting some binding (System: BQ, Component: P). At the time, the "C" HPSI pump was in service as the "B" Train HPSI pump. The "C" HPSI pump was declared inoperable and Condition A of Technical Specifications Limiting Condition for Operation (LCO) 3.5.2 was entered. This LCO Condition requires restoration of the inoperable safety injection train within 72 hours. At that time, the "B" HPSI pump was in service as the Train "A" HPSI pump. The "A" HPSI pump was out-of-service due to a previously discovered condition of minor flange leakage observed near two of the casing bolts. The H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, HPSI system has three HPSI pumps. The "A" HPSI pump is the normal Train "A" pump, the "C" pump is the normal Train "B" pump, and the "B" pump is capable of serving as either the Train "A" or the Train "B" pump in the place of the "A" or "C" HPSI pump.

At the time of discovery of the binding in the "C" HPSI pump, the "B" HPSI pump was in service as the Train "A" HPSI pump. It was determined that the "A" pump could be restored to operable status and placed back in service to restore two trains of HPSI. In order to do so, the "B" HPSI pump was removed from service as the Train "A" pump and placed in service as the Train "B" pump. Therefore, at 1026 hours on March 28, 2004, for approximately 25 minutes, during the process of placing the "B" HPSI pump in service on Train "B," which was necessary to allow the "A" HPSI pump to be returned to service, there was no HPSI pump automatically available to provide HPSI to the Reactor Coolant System.

Therefore, this condition was determined to be immediately reportable in accordance with 10 CFR 50.72(b)(3)(v)(D) as a condition that could have prevented the fulfillment of a safety function of systems needed to mitigate the consequences of an accident. An additional 8-hour reporting criterion associated with the plant being in an unanalyzed condition that significantly degrades plant safety, 10 CFR 50.72(b)(3)(ii), was also identified due to the inoperability of the HPSI system.

It was known prior to the switching the "B" HPSI pump to Train "B" that this would cause inoperability of both trains of HPSI. It was also known that LCO 3.0.3 (which is the LCO Applicability general requirement that is invoked when an action is not provided in the LCO section in effect) would be entered due to this circumstance. This situation was not avoidable, based on the sequence of events. The time in this

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
H. B. Robinson Steam Electric Plant, Unit No. 2	05000261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 7
		2004	- 001	- 00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

condition was minimized, the operators were fully aware of plant conditions, and no other system inoperabilities existed that would have complicated the situation. Both trains of HPSI were restored to operable status at approximately 1455 hours on March 28, 2004. The power level before and during this event remained at or near 100% power.

The inoperability of HPSI for approximately 25 minutes on March 28, 2004, was the result of the following sequence of events:

- March 18, 2004, the "A" HPSI pump was declared inoperable due to a discovered condition of minor leakage near two of the casing bolts.
- March 19, 2004, the "B" HPSI pump was placed in service on Train "A" (E1 Bus) in place of the "A" HPSI pump.
- At approximately 1343 hours on March 27, 2004, during a routine hand-rotation check of the "C" HPSI pump, it was discovered that the pump shaft was exhibiting some binding. At the time, the "C" HPSI pump was in service as the "B" Train HPSI pump. The "C" HPSI pump was declared inoperable and Condition A of LCO 3.5.2 was entered. This LCO Condition requires restoration of the inoperable safety injection train within 72 hours.
- March 28, 2004, it was determined that "C" HPSI pump would remain inoperable and that the "A" HPSI pump could be placed back in service after additional examination.
- March 28, 2004, 1026 hours, "B" HPSI pump was removed from service to allow realignment to "B" Train electrical bus (E2 Bus). LCO 3.0.3 was entered due to inoperability of both trains of HPSI.
- March 28, 2004, 1037 hours, "B" HPSI pump breaker was connected to the "B" Train (E2 Bus). The "B" HPSI pump is considered "available" at this time (total unavailability time of 11 minutes).
- March 28, 2004, 1051 hours, "B" HPSI pump declared operable with power supplied by the "B" Train. LCO 3.0.3 exited.
- March 28, 2004, 1128 hours, "A" HPSI pump available with power supplied by the Train "A" Bus (E1 Bus).

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
H. B. Robinson Steam Electric Plant, Unit No. 2	05000261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 7
		2004	- 001	- 00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

- March 28, 2004, 1455 hours, return-to-service testing of "A" HPSI pump complete. Exited LCO 3.5.2, Condition A.

LCO 3.5.2 requires two trains of HPSI (also referred to as Emergency Core Cooling System) to be operable in MODES 1, 2, and 3. Condition A of LCO 3.5.2 allows only one train of HPSI to be inoperable. There is no allowed condition for both trains of HPSI to be inoperable, therefore, LCO 3.0.3 is applicable when both trains of HPSI are inoperable. In the situation described in this Licensee Event Report, two trains of HPSI were inoperable, hence LCO 3.0.3 was entered as required.

This situation placed the plant in a condition where no HPSI was available for about 11 minutes and LCO 3.0.3 was in effect for about 25 minutes. This condition was reported to the NRC at approximately 1500 hours on March 28, 2004, as documented in NRC Event Report 40617.

II. CAUSE OF EVENT

The cause of the event has been determined to be the sequence of mechanical equipment failures that necessitated the transfer of the "B" HPSI pump from Train "A" to Train "B." The causes for the mechanical equipment failures are being investigated separately (Nuclear Condition Reports 121862 and 122806). The causes and corrective actions for these conditions are being determined in accordance with the HBRSEP, Unit No. 2, Corrective Action and Corrective Maintenance programs.

III. ANALYSIS OF EVENT

As previously stated, it was known prior to the switching the "B" HPSI pump to Train "B" that this would cause inoperability of both trains of HPSI. It was also known that LCO 3.0.3 would be entered due to this circumstance. This situation was not avoidable, based on the sequence of events. The time in this condition was minimized, the operators were fully aware of plant conditions, and no other system inoperabilities existed that would have complicated the situation.

The Updated Final Safety Analysis Report (UFSAR) for HBRSEP, Unit No. 2, describes the various analyzed accidents. Chapter 15 of the UFSAR describes several analyzed accident event types that utilize the HPSI system for accident mitigation. The Chapter 15 event types that use HPSI for accident mitigation include Loss of Coolant Accidents (LOCA), Secondary System Piping Breaks (e.g., main steam line break [MSLB]), and Steam Generator Tube Rupture (SGTR). During the brief period of time that the

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
H. B. Robinson Steam Electric Plant, Unit No. 2	05000261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 7
		2004	- 001	- 00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

HPSI system was inoperable, if one of these events had occurred, the HPSI system would not have automatically operated as analyzed for these events. Depending on the severity of the accident, it is likely the operators would have been able to restore the system in time to maintain the fission product barriers within the limits described in the UFSAR. This is based on the operators being actively in the process of manipulating the breakers and controls to restore the "B" HPSI pump to operational status and, if needed, the pump could have been restored to either 480 volt emergency bus (E1 Bus or E2 Bus).

A probabilistic safety evaluation was conducted for the inoperability of the HPSI system. This review is summarized as follows:

The Conditional Core Damage Probability (CCDP) associated with an 11 minute unavailability of all HPSI was estimated using the HBRSEP, Unit No. 2, Equipment Out-of-Service (E0OS) model, which utilizes the EPRI E0OS software. Both trains of HPSI were set in the model to be out-of-service and a Core Damage Frequency (CDF) of 1.13E-3 resulted. Note that this result is highly conservative because the "B" HPSI pump and possibly the "A" HPSI pump could have been placed in service quickly had there been an actual demand. It is therefore conservative to assume that the pumps were truly unavailable. Based on this information, the CCDP for the HPSI system unavailability period is estimated as 2.36E-8.

It is possible that the plant could have continued in operation with only Train "A" of HPSI in service (via the "B" HPSI pump) while Train "B" ("C" HPSI pump) was repaired. If it is assumed that a minimum period of 24 hours would have been required to repair and restore the "C" HPSI pump, the risk associated with this option is estimated to be 1.33E-7. This value is greater than the CCDP of 2.36E-8 calculated above for the actions which were taken. Therefore, based on the CCDP estimates, the action to realign the HPSI pumps did not result in an inappropriate increase in risk.

An alternate calculation can be performed to compare the risk in terms of Incremental Core Damage Probability (ICDP). The ICDP associated with the 11 minute HPSI unavailability is calculated to be 2.28E-8. The ICDP associated with a 24 hour repair to the "C" HPSI pump is calculated to be 2.36E-8. This calculation also supports the conclusion that the action to realign the HPSI pumps did not result in an inappropriate increase in risk.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
H. B. Robinson Steam Electric Plant, Unit No. 2	05000261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 7
		2004	- 001	- 00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

The risk associated with the HPSI pump realignment was small in comparison with other alternatives, such as performing a controlled shutdown to MODE 5, performing the realignment in MODE 5, and restarting. It is estimated that a controlled shutdown to MODE 5 would take approximately one day. There is not a quantitative transition risk model for HBRSEP, Unit No. 2, but it is generally accepted that the risk associated with maneuvering the plant to shutdown is greater than the risk of a similar period of steady-state operation. If it is assumed that the risk of a shutdown is equal to or greater than the risk of 24 hours of power operation, then the risk associated with the HPSI pump realignment was less than the risk associated with a shutdown. Therefore, the decision to realign the HPSI pumps at power did not result in increased risk in comparison with the alternative of shutting down to perform the realignment.

The CDF of 1.13E-3 is classified as "red" within E00S. EPRI TR-105396 indicates that "[c]onfiguration-specific risk levels in excess of 1E-3/year should be carefully considered before voluntarily entering such conditions." NEI 93-01, Revision 3, also states, "Maintenance configurations with a configuration-specific CDF in excess of 1E-3/year should be carefully considered before voluntarily entering such conditions." Therefore, while entry into this risk level is not encouraged, it is allowed when necessary.

This condition is reportable in accordance with 10 CFR 50.72(b)(3)(v)(D) and 50.73(a)(2)(v)(D) as a condition that could have prevented the fulfillment of a safety function of systems needed to mitigate the consequences of an accident. Additional reporting criteria associated with the plant being in an unanalyzed condition that significantly degraded plant safety, 10 CFR 50.72(b)(3)(ii) and 50.73(a)(2)(ii)(B), have also been identified due to the inoperability of the HPSI system.

IV. CORRECTIVE ACTIONS

The condition being reported for this event involves the decision to briefly allow the HPSI system to be inoperable in lieu of the plant transient to place the unit outside the mode of applicability for HPSI operability (i.e., shutdown the unit to MODE 5). This decision was necessitated by the sequence of equipment failures. There are no specific corrective actions for the decision-making process that was used because no inappropriate act occurred.

The likelihood of this condition recurring can be minimized by maintaining the operational readiness of the three HPSI pumps. The repairs of the "C" and "A" HPSI

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
H. B. Robinson Steam Electric Plant, Unit No. 2	05000261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	7 OF 7
		2004	- 001	- 00	

NARRATIVE (if more space is required, use additional copies of NRC Form 366A) (17)

pumps are being managed through the work management process, commensurate with the safety importance of this system. The repair to the "C" HPSI pump is currently planned for completion by June 17, 2004. The repair to the "A" HPSI pump is currently planned for completion by August 12, 2004. It should be further noted that the "A" HPSI pump is operable and the planned corrective maintenance for the repair of the minor flange leakage is not required for pump operability. The "C" HPSI pump has been completely refurbished by an off-site vendor and is in the process of being re-installed and returned to service.

V. ADDITIONAL INFORMATION

A. Failed Component Information:

The "A" and "C" HPSI pumps are Worthington Corporation Model 3WTS811.

B. Previous Similar Events:

A review of recent events at HBRSEP, Unit No. 2, for similar conditions that could have prevented the fulfillment of a safety function was conducted. No similar events were found in which a safety system was made inoperable due to equipment failures and subsequent restoration methods.