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SUBJECT: LER 92-018-00:on 920824,SI pump B declared inoperable due to inadequate recirculation flow & declining trend in flow. Caused by foreign matl blockage within min recirculation flow line.Sys recovery plan initiated.W/920922 ltr.

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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
LICENSEE EVENT REPORT NO. 92-018-00

Gentlemen:

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

Very truly yours,

Roy H. Chambers

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

RDC:sgk

Enclosure

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

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NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2	05000261	1

TITLE (4)

DEGRADED CONDITION: LOSS OF BOTH SAFETY INJECTION PUMPS DUE TO FOREIGN MATERIAL INTRUSION

EVENT DATE (5)			LER NUMBER (6)					REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR		SEQ. NO.		REV. NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	24	92	92	-	018	-	00	09	22	92		05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)							
			20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
POWER LEVEL (10)	000		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 and Text)
			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	TELEPHONE NUMBER
DAVID CROOK, SENIOR SPECIALIST - REGULATORY COMPLIANCE	(803)383-1179

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

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

On August 24, 1992, H. B. Robinson Unit No. 2 was in hot shutdown condition and preparing for startup. At 1826 hours during performance of a surveillance test, the licensee declared Safety Injection pump "B" inoperable due to inadequate recirculation flow. At 2258 hours, Safety Injection pump "A" was declared inoperable due to an observed declining trend in the pump's recirculation flow. With both Safety Injection pumps inoperable, Technical Specification 3.0 was entered, which requires that the plant be placed in cold shutdown condition within 30 hours. The plant achieved cold shutdown condition at 0020 hours on August 25, 1992.

The cause of the Safety Injection pump "B" reduced recirculation flow is attributed to foreign material blockage within the associated minimum flow recirculation line flow orifice. This material had been previously identified and reported in LER 92-013. A system recovery plan was initiated, which included extensive system inspection, cleaning, and pump testing, and installation of permanent recirculation line strainers.

This report is submitted pursuant to 10 CFR 50.73(a)(2)(i)(A) as the completion of a plant shutdown required by the plant's Technical Specifications.

I. DESCRIPTION OF EVENT

On August 24, 1992, H. B. Robinson Unit No. 2[1] was in hot shutdown condition and preparing for startup following a reactor trip.[2] At 1826 hours, following performance of an unscheduled surveillance test to redemonstrate Safety Injection system operability, the licensee declared Safety Injection pump "B" inoperable due to inadequate recirculation flow. At 2258 hours, Safety Injection pump "A" was declared inoperable due to an observed declining trend in the pump's recirculation flow. Although the recirculation flow acceptance criteria was satisfied, after consultation with the licensee's Operations Manager, the pump was conservatively declared inoperable based on a greater than ten percent decline in flow rate from the last three tests. With both Safety Injection pumps inoperable, Technical Specification 3.0 was entered, which requires that the plant be placed in cold shutdown condition within 30 hours. A shutdown was initiated and the plant achieved cold shutdown condition at 0020 hours on August 25, 1992. The NRC was notified of this shutdown via the ENS as required by 10 CFR 50.72(b)(1)(i)(A).

II. CAUSE OF EVENT

Event investigation[3] has been completed. The cause of the Safety Injection pump "B" reduced recirculation flow is attributed to foreign material blockage within the associated minimum flow recirculation flow orifice. Through tracing materials used on site, the likely source of the material and its system entry point were determined.

It was confirmed through interviews that during Refueling Outage 14, the construction crew on Modification 1087, RHR Minimum Flow Recirculation Line Modification, had experienced problems resulting from inadequate purge during the welding process. They employed the use of a plastic sheet material to attempt a mechanical line block, or purge dam. Four circular pieces were cut for use as purge dams to support installation of check valves RHR-782 and RHR-783. All of the pieces were taken into the RHR Heat Exchanger room, but only two were taken up the scaffolding to the immediate work area. The line was sufficiently large to attempt the installation of these plastic dams, and they were taped in place inside the ten inch piping for RHR Train "A". However, it was determined to be too difficult to obtain a satisfactory seal in the line with the material, and this effort was subsequently abandoned. During completion of the job the material was used to protect the seats of the check valves during grinding work.

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[1]H. B. Robinson Steam Electric Plant Unit No. 2, is a Pressurized Water Reactor in commercial operation since March, 1971.

[2]Licensee Event Report LER 92-017.

[3]Adverse Condition Reports ACR 92-249 & ACR 92-250

It is suspected that pieces entered the RHR system piping due to breakage. Although the exact amount and mechanism of material introduction is unknown, it is suspected that a maximum of two discs (approximately 155 square inches) may have entered the piping. Follow-up interviews and investigations were unsuccessful in quantifying the amount of material that entered the piping or the mechanism for entry. During closure of the line, Quality Control personnel employed the use of a camera to inspect the line for cleanliness. This was performed by inserting a camera into the vertical line, and looking down and up through the open check valve. This did not include inserting the camera beyond the elbow below the valve, and they were not able to see around the elbow into the horizontal run. As such, the QC inspection did not detect the presence of any foreign material.

The modification was completed and the system refilled for testing and return to service. Acceptance testing for Modification 1087 operated the RHR system at various flowrates using various flowpaths. During testing and operation, it is assumed that the material was pumped through the RHR system. It is further theorized that some of the material was deposited behind the SI-863A valve, which was a "dead leg" projecting at a right angle away from the main flow path during recirculation. This made a natural trap for the material. Later, when the cavity was drained, this valve was opened, and the material was swept toward the RWST and SI pump suction header. When the RWST level reached forty percent, cavity draining was suspended, and SI pump full flow was conducted. Cavity draining was then resumed. The material was discovered during testing in July in the SI Pump "B" recirculation orifice.[4]

The blockage identified in August was thought not to be a new piece, but a residual that was too large to enter the recirculation line during July. It is speculated that subsequent use of the SI pumps eroded the material sufficiently to allow it to enter the recirculation line during August. It had been originally thought that the material was broken into very small pieces from the SI pump and the material would easily enter the piping. This observation was determined by the fragments found in the orifice in July. No other material has since been recovered from the any of the SI pumps or associated piping.

The only other material located has been in the RWST as expected and previously communicated.

III. ANALYSIS OF EVENT

The blockage of the limiting flow orifice in the Safety Injection pump recirculation piping prevented the minimum recirculation flows needed to assure reliability of the pump during periods when the pump is not flowing water to the Reactor Coolant System. During periods of operation under minimum recirculation flow conditions, this recirculation flow provides the only source of cooling to the pump.

Evaluation of the chemical composition and physical properties of the foreign material found determined that, had the material entered the Reactor Coolant System (RCS), it would decompose. No material remnants have been found, and there has been no evidence seen through sampling of a substantial deposition in the RCS.

This report is submitted pursuant to 10 CFR 50.73(a)(2)(i)(A) as the completion of a plant shutdown required by the plant's Technical Specifications.

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[4] LER 92-013, Plant Shutdown Due to Safety Injection Pump Inoperability, July 27, 1992.

IV. CORRECTIVE ACTIONS

Adverse Condition Report (ACR) 92-333 was initiated to document the unsuccessful efforts to remove debris from the Safety Injection system as initially identified in July, 1992 and documented by ACR 92-249.

Two teams were established for system recovery which was initiated in August, 1992. One team was established to determine operability and cleanliness of the Safety Injection pumps. The second team was to investigate the source, potential locations, effects, and significance of the foreign material. A single project manager was established for the total effort. Special procedures were developed to control work, responsibilities, and evaluation of items found. The reactor was to remain in cold shutdown until all activities were completed to ensure the reliability and operability of the SI System.

The recovery efforts were intended to accomplish the following:

- Identification of the foreign material.
- Identification of possible entry points of the foreign material, its possible present locations, and a method to retrieve or flush material from the system, as appropriate.
- Evaluate potential damage and assure potentially effected Emergency Core Cooling System (ECCS) equipment is operable and can be relied upon during any flow condition.
- Assure that the potential presence of foreign material will not impact the operability of plant systems or components in the future.
- Identify the root cause of the problem and the corrective actions which will be taken to preclude recurrence.

In order to facilitate identification of the foreign material and the potential impact it may have had on plant safety systems, visual inspections of the interior of tanks, components, and piping determined through evaluation to potentially contain foreign material were conducted. Documentation of the evaluation of areas, piping, and components determined not to require visual inspection was also prepared. These areas included:

- The Reactor Coolant System
- Portions of the Residual Heat Removal (RHR) System
- The Chemical and Volume Control System Purification
- The Spent Fuel Pool Cooling System
- The Charging Pump Suction
- Portions of the Safety Injection System
- The Containment Spray Pump Eductor

The components inspected included:

- The Refueling Water Storage Tank, (Using Divers and Cameras)
- Both SI pump Minimum Flow Recirculation Line
- The SI Pump "B" Discharge
- The SI and Containment Spray Pump Suction Line
- The Spray Additive Tank Flow Transmitter
- Piping From the RWST to the SI-862A Valve
- Containment Spray Pump Discharge Lines

As a result of the RWST inspection, cleaning of the tank was performed. For Safety Injection Pump "B", the piping and orifice were removed and the source of blockage was determined to be one thin piece of white plastic, approximately one-half inch in diameter, identical to the foreign material discovered during investigations in July 1992. Analysis of material confirmed it to be Delrin, the same material found in previous investigations.

Plant Modification M-1134 was developed and implemented to install permanent strainers in SI pump recirculation lines. Original plant design did not provide equipment to prevent plugging of the recirculation line flow orifices. These strainers, which would include flush and vent valves for each SI pump recirculation line, would serve to facilitate removal of any foreign material that should enter the system, and prevent the orifices from plugging.

A high velocity flush of each SI pump was conducted to provide assurance that the pumps were free of additional foreign material. The SI Pump vendor was consulted, and full flow testing of each pump was conducted on August 30, 1992 to assure no damage effecting pump performance had occurred as a result of the passage of the material through the pumps, or as a result of running the SI pump "B" with inadequate recirculation flow.

The inspections discussed above showed that the Delrin material was only in the RWST and SI pump "B". Since none of the material was found in the SI pump "A", the decision made regarding the trend seen during the previous flow tests was considered to be conservative with respect to the condition of the SI pump "B". Evaluations and tests of choke points and system interconnections reveal no other places where Delrin, if present, could cause a significant safety problem. Pump and valve tests have demonstrated acceptable performance of equipment, and cleaning and flushing of piping and components has assured that the material should not reenter systems or components.

All results, evaluations, and conclusions were reviewed on September 10, 1992 by the Plant Nuclear Safety Committee prior to plant restart.

V. ADDITIONAL INFORMATION

A. Component Failures

None

B. Previous Similar Events

LER 92-013