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 FACIL: 50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light C 05000261
 AUTH. NAME AUTHOR AFFILIATION
 CROOK, R.D. Carolina Power & Light Co.
 SHEPPARD, J.J. Carolina Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-012-01: on 900925, test results indicated potential for inadequate NPSH available for either safety injection pump. Cause of event not readily determined. Refueling water storage tank level raised. W/910124 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 7
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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(10CFR50.73)

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 90-012-01

Gentlemen:

The enclosed Supplemental Licensee Event Report (LER) is submitted in accordance with 10CFR50.73 and NUREG 1022, Supplements No. 1 and 2. This report adds supplemental information regarding the results of additional testing and analysis related to the condition initially reported. The revised portions of the report are indicated by a right-hand margin bar. This submittal should replace existing copies of the original report of October 26, 1990.

Very truly yours,

J. J. Sheppard
General Manager

Robinson Nuclear Project Department

RDC:td

Enclosure

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

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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 6
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TITLE (4)
POTENTIAL OF INADEQUATE NPSH FOR SAFETY INJECTION PUMPS

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)																																																																																													
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LICENSEE CONTACT FOR THIS LER (12)

NAME R. D. Crook, Senior Specialist, Regulatory Compliance	TELEPHONE NUMBER 8 0 3 3 8 3 - 1 1 7 9
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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)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

On September 25, 1990, with H. B. Robinson Unit No. 2 in cold shutdown for a scheduled refueling outage, a special test was performed to determine the capability of the one Safety Injection pump injecting into three cold legs of the Reactor Coolant System, which could be an expected alignment during certain design basis Loss of Coolant Accidents. The results of the test indicated the potential for inadequate Net Positive Suction Head (NPSH) available for either Safety Injection Pump. Based on this test, both Safety Injection Pumps were conservatively declared inoperable. It should be noted that the plant was in a mode where the pumps were not required to be operable, and there were no safety implications to the public.

The cause for the potential for pump runout could not be initially determined due to the unavailability of information necessary to adequately assess the significance of the concern. Resolution of this issue was actively pursued, and during November, 1990, additional testing was conducted. Upon analysis of this testing, it was determined that the SI pumps could in fact operate properly and perform their safety functions as required.

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

I. DESCRIPTION OF EVENT

On September 25, 1990, with Unit No. 2¹ in cold shutdown for a scheduled refueling outage, a special test was performed in response to an NRC inspection report² to determine the capability of one Safety Injection (SI) pump injecting into three cold legs of the Reactor Coolant System (RCS). This configuration would be the expected alignment during certain design basis Loss of Coolant Accidents (LOCA). The procedure was to test the runout operation of SI pumps "A" and "B" individually, and was modeled after the previous tests of the SI pumping system performed during 1973-74. As such, the same maximum runout limitations were adopted in the testing procedure as were used in the 1973-74 tests. This runout limitation was used in the 1973-74 tests as a conservative value that would adequately protect the SI pumps and motors. However, the 1973-74 work did not test one SI pump lined up to flow through all three cold legs simultaneously.

The results of the test were that approximately 640 gpm flow was achieved with a discharge pressure of 360 psig for each SI pump tested. This is a concern because with one SI pump and one Residual Heat Removal (RHR) pump discharging into the cold legs with the RCS depressurized and the reactor vessel head removed, the SI pump has a higher flow rate and a lower discharge pressure than previous documentation indicated. Previous responses to Net Positive Suction Head (NPSH) issues assumed an SI pump flow of less than 600 gpm. Thus, at the higher flow rates and with minimum level in the Refueling Water Storage Tank (RWST), there may not be sufficient NPSH available for either SI pump.

At 1730 hours on September 25, a 72-hour operability determination was initiated in accordance with Plant procedures to administratively evaluate the status of the SI pumps. On September 28, 1990, the Licensees' Technical Support staff notified Operations management that a lack of sufficient information existed to make a conclusive determination regarding pump operability. Therefore, as a conservative measure, both SI pumps were declared inoperable. This condition was reported to the NRC via the ENS at 1643 hours on September 28, 1990, in accordance with 10CFR50.72(b)(2)(i), as a degraded condition found while shutdown.

¹H. B. Robinson Unit No. 2 is a Westinghouse Pressurized Water Reactor nuclear power plant in commercial operation since March, 1971.

²NRC Inspection Report No. 89-09, URI 89-09-02, dated June 26, 1989.

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

II. CAUSE OF EVENT

The Safety Injection pumps were rebuilt and tested in 1974. The test was performed with all three pumps running aligned with one pump discharging through one RCS injection line and two pumps discharging through three injection lines. The test results indicated a maximum runout of more than 500 psig discharge pressure with below 600 gpm on any single pump. These parameters have been considered the "maximum runout limit" up to this point.

During 1988, a modification was performed to the Automatic Bus Transfer (ABT) system which made SI pump "B" a maintenance pump only.³ This left the possibility of only one SI pump flowing into all three RCS cold legs should one safety train fail. This flow arrangement had not been previously tested for maximum runout. Calculations were performed by the NSSS supplier which determined a runout flow of 596 gpm. However, the NRC initiated an Unresolved Item in 1989 which prompted testing of the new configuration, one pump flowing through three cold legs.

The cause of the potential for increased pump runout could not readily be determined at the time the current configuration was tested. An investigation was initiated which would require additional testing and analysis, and a supplemental report was to be submitted providing the results of the investigation and the corrective actions taken.

³Licensee Event Report 88-003-01, October 24, 1988, Serial No. RNP/88-3511.

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

III. ANALYSIS OF EVENT

This event is considered reportable because the potential exists for the Plant to be in an unanalyzed condition that significantly compromises plant safety, and is thus reportable pursuant to 10CFR50.73(a)(2)(ii)(A).

The primary area of concern for this issue remains with the determination of adequate NPSH for the SI pumps with the increased flowrate. The increase in flow would mean an increase in NPSH required. The level setpoints on the RWST are established to provide required NPSH levels. Inadequate NPSH at the increased pump runout could result in damage to the pump and a loss of the safety injection function.

With respect to the core cooling function of the SI pumps, the measure of effectiveness of the SI system is the ability of the pumps and accumulators to keep the core flooded or to reflood the core rapidly where the core has been uncovered under a postulated LOCA. The Safety Injection function is to limit any increase in clad temperature below a value where emergency core cooling objectives are met.

Without further investigation and testing, information was not readily available to fully and adequately assess SI Pump operability and to make a conclusive determination on the significance of this concern. At the time of the event, the Plant was in cold shutdown condition and in refueling, and there was no requirement for the SI pumps to be operable.

IV. CORRECTIVE ACTION

Resolution of this issue was actively pursued. An investigation was initiated and appropriate corrective actions taken. The operability issue was to be resolved prior to restart from the current refueling outage. The results of the investigation are described in the "Supplemental Information" section of this report.

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

V. ADDITIONAL INFORMATION

A. Failed Component Information

None.

B. Previous Similar Events

None.

VI. SUPPLEMENTAL INFORMATION

Testing and analysis were performed in order to make a conclusive determination of SI Pump operability. The following is a summary of the activities conducted to make this determination:

On November 24, 1990, a Special Test was conducted to gain additional data for SI Pump operation at the maximum flow rate through three cold legs. The NSSS supplier for H. B. Robinson was requested to provide a technical review of this test. Based on their review, they concluded that the test was satisfactorily performed and that the pumps could meet their safety requirements.

An independent engineering firm was requested to perform an analysis of the data collected during the test. Based on their review of this data, pump operation at low-low RWST level injecting into three cold legs does not create an operability concern. However, this review did identify a concern relative to the accuracy of the curve for RWST level versus RWST gallons. Though clearly stating that this is not an operability issue, the review noted a discrepancy regarding the gallons of water per foot used for generating the curve. While that curve shows 2,000 gallons in the tank at zero percent, CP&L calculations state that the amount is closer to 5,000 gallons. Technical Specification 3.3.1.1 requires that not less than 300,000 gallons be maintained in the RWST. The basis for this requirement states that recirculation mode operation may start with a depth of 1.5 feet on the containment floor. This depth of water is equivalent to the amount of water in the primary system plus sixty percent of the RWST, which is approximately 215,000 gallons. This is not a safety concern because normal operating procedures maintain the RWST level at approximately ninety percent, and the Technical Specification requirement has continued to be met. However, an administrative control was determined to be prudent to raise the RWST level until additional investigation could be completed.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

Concurrent with testing, an evaluation was conducted by the CP&L Fuels Department to address the effects of slightly higher flow rates on the FSAR Chapter 15 Analysis. The results of this evaluation document that there are no concerns as related to the Chapter 15 Accident Analysis.

The results of the above testing and analysis document that the SI Pumps can operate properly and perform their safety functions at low-low RWST level while injecting into three cold legs.