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Carolina Power & Light Company Raleigh, North Carolina 27602 E. E. Utley	9-28-72	10-5-72	x			

TO:	ORIG	CC	OTHER	SENT AEC PDR	SENT LOCAL PDR
D. J. Skovholt	1 signed			X	X

CLASS: (U) PROP INFO	INPUT	NO CYS REC'D	DOCKET NO:
		1	50-261

DESCRIPTION:

Ltr re their 7-24-72 ltr and our 9-20-72 ltr ..furnishing addl info on abnormal occurrence regarding dilution of the boron injection ~~o~~ tank below the concentration specified in Tech Specs w/attached System Diagram....

PLANT NAMES: H. B. Robinson, Unit # 2

ENCLOSURES:

ACKNOWLEDGED

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FOR ACTION/INFORMATION 10-6-72 fod

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Carolina Power & Light Company

Raleigh, North Carolina 27602

September 28, 1972

Mr. Donald J. Skovholt
Assistant Director
for Operating Reactors
Directorate of Licensing
Atomic Energy Commission
Washington, D.C. 20545

50-261

Regulatory File Cy.

H. B. ROBINSON UNIT NO. 2
LICENSE DPR-23
BORON INJECTION TANK DILUTION

Dear Mr. Skovholt:

On July 24, 1972, in a letter to Mr. John F. O'Leary, the Directorate of Licensing, we notified the Commission of an incident regarding the dilution of the boron injection tank below the concentration specified in the Technical Specifications. Your letter of September 20, 1972, requested additional information concerning this abnormal occurrence. This letter is intended to report in greater detail the sequence of events leading to the incident and to provide discussion of the action that has been taken.

It is believed that the dilution of the boric acid concentration in the boron injection tank occurred as a result of a combination of two contributing factors. These factors were the failure of safety injection valve 867A to seat completely and the plugging of the recirculation between the boron injection tank and the boric acid tanks with solidified boric acid. (Refer to enclosed system diagram for valve and piping orientation.)

The first contributing factor to the dilution, the failure of valve 867A to properly seat, was initially observed on July 7. At that time, it was observed on the control board (RTGB) that valves 867A and 867B were indicating an intermediate position following the clearing of a safety injection signal. The safety injection signal had been received as a result of the resetting of the steam dump during recovery from a plant trip. Visual inspection of the valves indicated that they were apparently closed. The valves were cycled and appeared to be operating satisfactorily. The improper position light indication was noted for further investigation. On July 11, as a result of more thorough investigation, it was determined that the valves were partially off their seats. It was concluded that solidified boric acid had accumulated under the valve seats. Insulation was removed and external heat applied to the valve bodies. The valves were operated successfully and proper RTGB indication was observed. On July 12, the valves were cycled again in

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conjunction with operation of the safety injection pumps to further clear any accumulated crystalized boric acid from the valves. During this operation, it was noted that valve 867A again was not closing fully. In that valve 867B was operable and that a flow path was available for safety injection, it was decided to further investigate the operation of valve 867A. Valve 867A was placed in the open position and the actuator removed. A loose lock nut was found. This condition was corrected, the valves tested, and returned to service. This appeared to have corrected the problems associated with proper positioning of valves 867A and 867B.

The second contributing factor, the plugging of the recirculation line between the boron injection tank and the boric acid tanks, was first observed on July 7. Continuing efforts freed this line on July 12. Recirculation flow was initiated to maintain the line open. The boron injection tank boron concentration was 22,574 ppm at this time, and the "A" boric acid tank concentration was 19,770 ppm. It was determined that recirculation would result in a concentration of 20,724 ppm in both tanks. Since portions of the heat tracing had been temporarily removed while efforts were in progress to clear the recirculation line, recirculation was continued at 15-minute intervals each hour to ensure that the boric acid temperature would remain at a temperature to prevent crystalization from once again blocking the line.

Dilution of the boron injection tank could have commenced on July 12; however, it was not suspected at the time and there is no position indication that this in fact did occur. The first real indication that a problem existed with the boron injection tank occurred on July 13 when, during recirculation operations, it was noted that the level in "A" boric acid tank increased each time recirculation was initiated. An investigation indicated that valve 867A was again partially open. An adjustment of the torque limit switch was made. Concurrently, the recirculation supply line was also plugged; however, this was not definitely established until July 16. The partially open valve, 867A, and the plugged recirculation supply line resulted in a flow path from the refueling water storage tank to the boron injection tank. The static head on the refueling water storage tank was apparently sufficient to force water through valve 867A into the boron injection tank and through the recirculation return line to the "A" boric acid tank. The boric acid transfer pump was apparently not recirculating through the boron injection tank but was only recirculating through valves 344 and HCV-110. In retrospect, it is likely that dilution took place at this time.

The concentration in "A" boric acid tank was checked at 3 PM, July 13, and found to be 12,641 ppm. Since the boron injection tank was thought to be recirculating through the "A" boric acid tank, this was recognized as an out-of-specification condition and batching operations began. Boric acid tank "A" was within the required range by 2 PM, July 14. It was assumed that the boron injection tank was at this same concentration, and therefore no Technical Specification violation report was necessary in

that the condition had been corrected within 24 hours. It should be noted that the sample line on the boron injection tank was plugged during this period and it, therefore, was impossible to obtain a direct sample from that tank.

On July 16, the plugged recirculation supply line was discovered. It was evident that recirculation was not taking place and that the concentration in the "A" boric acid tank was not representative of the contents of the boron injection tank. The boron injection tank sample line was cleared and a sample obtained at 5 AM, July 16, indicating the boron concentration had been diluted to 3,045 ppm. This was the first direct indication that the boron injection tank was out of specification. A temporary hose was connected from the boric acid transfer pump to the boron injection tank and adjustment of the tank concentration began. Concurrently, efforts to clear the blocked recirculation supply line were begun. The boron injection tank was returned to a concentration of 19,818 ppm by 9:40 PM, July 16. Overly cautious efforts following the 9:40 PM reading resulted in the tank concentration not being above the required 20,000 ppm until 3 PM, July 17. At this time, a boron injection tank concentration of 20,616 ppm was confirmed. The temporary hose was kept in service until July 19 when the blocked supply line was cleared and correct recirculation flow paths checked.

To prevent recurrence of this incident, plant personnel have been instructed to verify recirculation flow as indicated on the local flow meter, FI-934, located in the same room as the boron injection tank. The results of this flow verification are being recorded in the Shift Foreman's daily log. The boron injection tank is being sampled on a weekly basis rather than on a monthly basis as per Technical Specifications. All plant operators have been cautioned to monitor all heat tracing circuits associated with high concentration boron solutions more closely. Provisions have been made to assist in unplugging the recirculation lines with nitrogen pressure, should further crystallization occur. The reactor vendor, Westinghouse, has been consulted and their engineers are making a careful inspection of the entire system. Those heat tracing circuits on high concentration boron lines are being carefully checked by plant personnel and actual temperature profiles taken on questionable sections of piping. Until complete assurance can be obtained that all heat tracing circuits are performing as designed and that plugging of the recirculation lines is unlikely, recirculation flow is being verified once a shift.

As a result of discussions with the Directorate of Regulatory Operations, it is requested that the Technical Specification be clarified regarding the operation of the boron injection tank.. Specifically, the Technical Specifications do not indicate the length of time the tank can be out of specification. It was assumed that the 24-hour limit allowed for a line out of service, as specified in paragraph 3.3.1.2.e, was applicable.

In summary, it is concluded that the primary cause of boron injection tank dilution was leakage from the refueling water storage tank through valve 867A. Crystallization of boric acid in the recirculating lines was the major contributing factor to the malfunction of this valve

and to the blocking of several sections of the normal recirculation flow paths. The adequacy of the heat tracing on all piping and components containing high concentration boric acid is being carefully investigated. Until this investigation is complete and there is assurance that the high concentration boric acid will remain in solution at all times, the system is being verified for proper flow once a shift. Carolina Power & Light Company is being assisted and advised in this investigation by Westinghouse.

It should be pointed out that this incident is the first and only occurrence where any boric acid crystallization has taken place in the primary safeguard piping. On several occasions, however, temporary plugging has been experienced in the small recirculation lines to and from the boron injection tank.

The H. B. Robinson Plant Safety Committee has reviewed this incident and concurs in the action taken. At the next meeting of the Company Nuclear Safety Committee, scheduled for October 12, 1972, this incident and the status of the continuing investigation will be reviewed.

The corrective action that has been taken and the increased surveillance and testing of the tanks and piping gives assurance that any future deviation from expected recirculation flow rates and boric acid concentrations will be readily detected. The continuing investigation of the system design may prompt additional modifications to increase the reliability of the system. The Commission will be kept fully informed on any future developments.

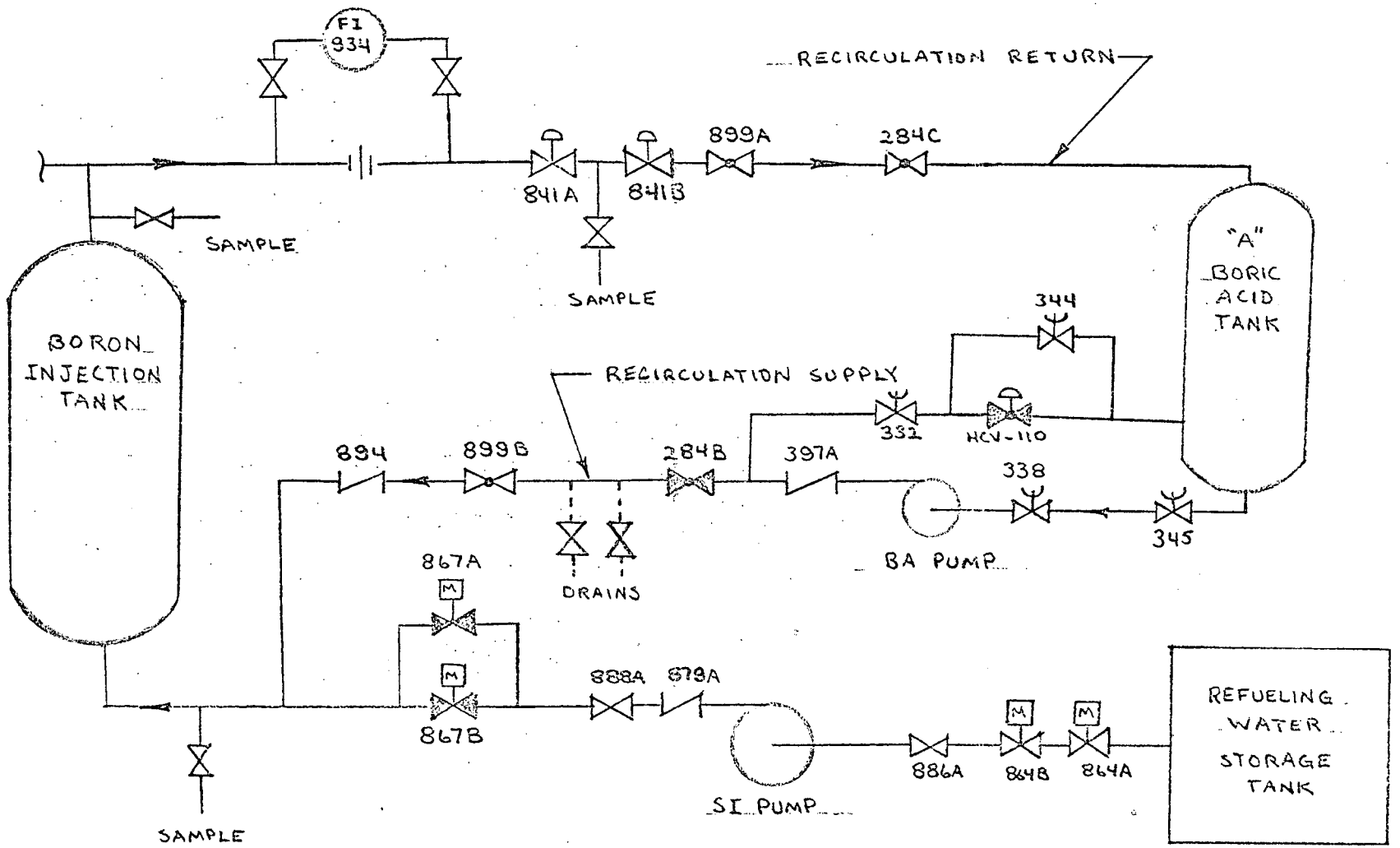
Yours very truly,

E. E. Utley
Vice President
Bulk Power Supply

NBB/za

Attachment

cc: Mr. N. B. Bessac
Mr. C. D. Barham, Jr.
Mr. B. J. Furr



BORON INJECTION TANK RECIRCULATION FLOW PATH