FORM 366 U. S. NUCLEAR REGULATORY COMMISSIO

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

N C B E P 1 (2) 0 0 - 0 0 0 0 0 - 0 0 (3) 4 1 1 1 1 (4) (5)
LICENSEE CODE — LICENSE NUMBER — LICENSE TYPE — CAT

REPORT SOURCE L (6) 0 5 0 - 0 3 2 5 (7) 0 4 1 2 7 8 (8) (9)
DOCKET NUMBER — EVENT DATE — REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

The HPCI turbine control valve V9 would not operate during performance of quarterly surveillance test PT 9.5, HPCI pump flow test. (Technical Specification 3.5.1)

SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
S F (11)	E (12)	D (13)	I N S T R U (14)	C (15)	Z (16)

(17) LER/RO REPORT NUMBER

EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
7 8	—	0 3 9	/	0 3	L	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
A (18)	Z (19)	Z (20)	Z (21)	0 0 0 0	Y (23)	Y (24)	N (25)	N 2 9 0

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

(See Attached)

FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
E (28)	0 9 4 (29)	NA	B (31)	Surveillance Test

ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
Z (33)	Z (34)	NA	NA

PERSONNEL EXPOSURES

NUMBER	TYPE	DESCRIPTION (39)
0 0 0 (37)	Z (38)	NA

PERSONNEL INJURIES

NUMBER	DESCRIPTION (41)
0 0 0 (40)	NA

LOSS OF OR DAMAGE TO FACILITY (43)

TYPE	DESCRIPTION
Z (42)	NA

304
428

PUBLICITY (45)
ISSUED Z (44) DESCRIPTION NA

NRC USE ONLY

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LER CONTINUATION RO# 1-78-039

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS:

On April 12, 1978, an attempt was made to perform the quarterly HPCI pump flow test (PT 9.5). The HPCI turbine control valve would not operate for this test. Plant thermal power was 94% at this time. An LCO was initiated, and checkouts were begun. It was discovered that due to excessive corrosion inside the electro/mechanical/hydraulic (EG-R) actuator, the pilot valve plunger would not operate on signal. This, in turn, prevented the control valve from moving. A new EG-R actuator (manufactured by the Woodward Governor Company) was obtained and installed in the Turbine Control System and tested satisfactorily. The other control equipment was checked and found to be satisfactory.

Another attempt was made to perform PT 9.5 on April 15, 1978. The turbine was brought up to speed with the manual control potentiometer, but some adjustments were needed to make rated conditions. The turbine was shut down, adjustments were made, and the turbine was restarted with the pump running on its minimum flow line. At this time, all control of the turbine was lost. The turbine went into an overspeed condition. The mechanical overspeed trip device failed to shut down the machine at the 5000 rpm set point. As the speed continued to increase, the operator attempted unsuccessfully to trip the turbine with the manual pushbutton on the control board. The operator then started closing the motor-operated steam inlet valve. At approximately the same time, a high steamline flow isolation came in. This failed to trip the turbine but did start closing the inboard HPCI steamline containment isolation valve. The outboard steamline valve failed to close and is being covered under a separate LER (1-78-41). After about one minute, the steamline valves were closed, and the overspeed terminated. Top speed was greater than 6000 rpm, and top pump discharg pressure was greater than 1500 psi. The actual pressure and speed cannot be determined exactly because the instruments were off scale.

The equipment was immediately inspected for damage. It was found that the turbine stop valve could be tripped locally at the turbine with the manual trip actuator, which is part of the overspeed trip device. The only damage immediately evident was a blown casing gasket on the main pump. Further checkouts revealed several additional problems. First, the turbine trip solenoid was burned out. All electrical trips (including isolation and manual) operate this energize-to-trip solenoid. This explains why the operator could not trip the turbine from the control board. Second, two blown IC chips were found in the signal converter section of the controller and may have contributed to the cause of the runaway condition. Third, a broken trip ball was found in the mechanical overspeed mechanism. This meant that the counterweight device on the shaft would not come into the necessary contact with the trip actuator to push the actuator up and trip the turbine.

A new trip solenoid coil was obtained from the Skinner Electric Valve Company, installed, and successfully tested. A new ball and tappet holder (supplied by Terry Turbine Company) was installed in the overspeed trip mechanism and was tested by taking the uncoupled turbine up to the 5000 rpm trip speed and observing the trip occur. (The test was successfully done twice.) The control

system was again checked out and recalibrated. Work performed on the pump included replacement of the main pump casing gasket and seals and an inspection of its bearings. The pump end bearing of the turbine was inspected as well. All bearings inspected were found to be in good condition. Pump discharge piping was visually inspected. No evidence of any problem was found.

After all inspections were completed, the turbine was run uncoupled to check the overspeed trip (as mentioned previously) and to check vibration. Vibration levels were found to be acceptable (<1 mil), and the turbine was recoupled to the pump. The unit was brought to rated conditions and vibration data was taken again. All vibration levels were close to the original preoperational values. The discharge piping was visually inspected and found to be acceptable. The unit passed PT 9.5. The final check made was an operational hydro of the discharge piping using the HPCI pump itself. The unit was placed in the torus-to-torus mode using the minimum flow line. It was then brought up in 100 psi discharge pressure increments from 1000 psi to 1500 psi (pump maximum working pressure). At 1500 psi, the discharge piping was visually inspected by Engineering and QA. No problems were discovered. After several more brief checks, the HPCI system was declared operational on April 21, 1978.

The corrosion found in the EG-R actuator is attributed to excessive water that accumulated in the HPCI room in October, 1977. Other actuators of a similar type were inspected, and no sign of corrosion was found. Therefore, this is considered an isolated incident, and no additional action is required. The cause for the failure of the trip solenoid is unknown. PT 9.5 and Operating Procedure 19, HPCI Operation, will be revised to include a step to test HPCI by starting the auxiliary oil pump and verifying that the stop valve can be tripped with the pushbutton on the control board. The cause for the failure of the trip ball on the mechanical overspeed is also unknown. The broken piece has been sent to Terry Turbine Company for evaluation. The trip device on Unit No. 2 will be inspected during the next scheduled shutdown. These measures are adequate to ensure that these problems do not recur.

306

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