

*Toledo*  
THE ERBDOCK & WILCOX COMPANY  
POWER GENERATION GROUP

CONFIDENTIAL  
COUNSEL ONLY

To: J. A. LAMER, PROJECT MANAGEMENT

From: J. D. DEMPSEY, PUMPS & DRIVES UNIT (2137) *J. D. Dempsey*

801 443-5

Cust.: TECO NSS-14

File No.  
or Ref.

Subj.: ABNORMAL TRANSIENT AT DAVIS BESSE

Date  
OCTOBER 18, 1977

This letter is cover and contains one and one subject copy.

On September 24, 1977, the Davis Besse Nuclear Plant was subjected to an abnormal system transient. The reactor coolant pumps as a result experienced the conditions outlined in Attachment No. 1.

In order to demonstrate that there was no serious damage to the pumps, a series of operational checks were performed as described and outlined in Attachment 2.

The results of the operational checks described in Attachment 3 have been reviewed by the E&W Engineering Department. We have concluded that no detectable damage has occurred to the pump components and find the pumps to be serviceable for sustained full operational conditions with no immediate requirement for maintenance.

It should be noted that a step increase in vertical vibration of the 2-2 RC pump was later assessed to be spurious instrument noise as a result of a loose connector of an instrument line. After the connector was tightened, vertical vibration remained less than one quarter mills peak to peak amplitude.

RM

Attachments

cc: F. L. Faist  
E. E. Kennedy  
W. E. Spangler

Ex. *6PU432* For ID  
*1-27-88* J.R. Danyo

8307060649 771018  
PDR ADDOCK 05000289  
S HOL

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BALCOCK & WILCOX

TECO DAVIS BL 5E NSS-14 SEPT 25, 1977

Time 01:00 REACTOR TRIP

ALL four RCP's SUBJECTED TO THE FOLLOWING

1:10 SFAS TRIP

1:12 SEAL RETURN VALVE SHUT FOR 1:15

1:14 SEAL INT. VALVE SHUT FOR 1:51

ALL FOUR PUMPS OPERATED FOR 1:13

WITH NO SEAL INJECTION AND NO

SEAL RETURN FLOW DURING AN RCS de-pressure

2:27 SEAL RETURN VALVE OPEN

3:05 SEAL INT. VALVE OPEN

6:00 STEAM FORMATION Pressure fluctuating  
near Psat FOR ~30 to 45 MIN.

36:06 TOTAL SEAL INT. FLOW LOW ALARM

Pump start

Pump 1-1

7:06 Pump tripped

7:45 Shift stop

36:06 ~ 1 min OF LOW SEAL INT. FLOW

24 sec NEAR 2 GPM

36:30 RETURN VALVE SHUT

1:12:55 Standby (Steam imbalance started  
to 1:17:07 level high seal injection)

Pump 2-2

4:20 HIGH VIBRATION

7:05 Pump TRIPPED

36:07 Left injection for ~1 min

Seal return valve shut for ~10 sec

36:22 15 sec

ATTACHMENT 1

## CHECKOUT OF REACTOR COOLANT PUMPS

## PURPOSE:

Assess whether maintenance is required of RC pumps as a result of abnormal transient of 9/24/77. Operational checks will be required to demonstrate that no significant damage has occurred to the pump bearings, shaft and seals. First series of tests will be performed in Mode 5 due to operational restrictions by WRC. Later on operational checks will be performed in Mode 3. Each pump will be operated individually for a duration not to exceed ten (10) minutes, providing all defined parameters remain within limits established in this procedure.

Operational sequence will be as follows:

1. Lift pumps will be started and pump shafts rotated by hand. Torque values are not to exceed 200 ft-lbs. A stethoscope will be provided to detect any unusual mechanical noises in seal housing area. (This has been satisfactorily completed on 10/3/77).
2. Mode 5 testing 225 psig.
  - 2.1 Instrumentation Required - see attached (1A).
  - 2.2 Computer Data -  
Printout RRS special summary trend for running RCP every 15 seconds.
  - 2.3 Following limits shall not be exceeded:
    - A. Shaft vibration - 15 mills peak to peak.
    - B. Total standpipe leakage (upper seal leakage) plus seal return should not exceed 0.6 gpm. If, during the test this limit is exceeded, the possibility exists of an open seal. In no case will total seal leakage be allowed to exceed 1.5 gpm. If this limit is exceeded, maintenance will be required before further pump operation.
    - C. All other normal plant limits and precautions prevail.
  - 2.4 Sequence of Operation:
    - A. Secure standpipe flush.
    - B. Establish seal injection in accordance with plant operating procedure.
    - C. Measure and record standpipe leakage and return flow, confirm that total leakage limits are not exceeded.
    - D. Assure communication between control room and personnel stationed at RCP standpipe leakage drain line.
    - E. Countdown from 10 to 0  
Start strip chart recorder at high speed;  
Start Reactor Coolant Pump 2-2 in accordance with plant op. procedure.  
After approx. 11 sec., reduce strip chart speed.

ATTACHMENT 2



- F. Run pump for two (2) minutes unless any above limits are exceeded.
- G. Data taken will be assessed by B&W and B-J representatives.
- H. Following assessment of data, pump may be run for an additional five (5) minutes to allow for venting procedure requirements.
- I. Follow above sequence on 2-1, 1-2 and 1-1.
- J. Assessment of this data will determine whether any maintenance is required before higher pressure operation is allowed.

*SIMILAR*

- 3. Above test will be repeated with system pressure at greater than 1300 psig before final determination on condition of the pumps is completed.

CCS:nlf  
10/5/77

1215 E43

(1A)

LIST OF POINTS TO BE INSTRUMENTED FOR RC PUMP START UP:

1. Upper and lower cavity pressures - all four pumps.
2. Both horizontal B/E Vibration Probes - all four pumps.
3. WR System Pressure or suction pressure.
4. Vertical probe on 2-2 pump.
5. Standpipe leakage will be collected and measured during the test.

NOTE: All of above should be recorded on an 8 channel brush recorder located in the control room.

RFS:mlf  
10/5/77

11  
Z  
B  
E  
4  
E

# STATUS OF OPERATION OF REACTOR COOLANT PUMPS:

10/1/77

All four Reactor Coolant Pumps were run on 10/5/77, per the attached procedure, with the following results:

## RCP 2-2 10/5/77 Run (2 min.):

System pressure 125 psig  
2nd Seal cavity pressure 165 psig  
3rd Seal cavity pressure 142.9 psig  
Horizontal vibration 5 - 7.5 mils  
Vertical vibration .25 mils

3rd Seal leakage plus  
seal return flow

After the two minute run, the pump was run for ten minutes for system venting. About 30 seconds before the pump was shutdown, there was a sharp increase in vibration to 2.5 mils. The pump was run again on 10/6/77 for 10 minutes to check out this phenomenon. The vertical vibration was again .25 mils until about 5 seconds before shutdown where it increased to 2.5 mils. To check a longer run time, 2-1 and 2-2 pumps were run together for 10 minutes, then 2-2 was run alone for 10 minutes. The vertical vibration stayed at .25 mils the entire run. This will continue to be monitored until pump wear for plant heat up.

## RCP 2-1

System pressure 225 psig  
2nd Seal cavity pressure 132 psig  
3rd Seal cavity pressure 70 psig  
Horizontal vibration 5 - 7.5 mils

3rd Seal leakage plus  
return flow

## RCP 1-2

System pressure 225 psig  
2nd Seal cavity pressure 40.29 psig  
3rd Seal cavity pressure 61.3 psig  
Horizontal vibration 5 - 7.5 mils

3rd Seal leakage plus  
return flow

## RCP 1-1

System pressure 225 psig  
2nd Seal cavity pressure 37.98 psig  
3rd Seal cavity pressure 60.27 psig  
Horizontal vibration 5 - 7.5 mils

3rd Seal leakage plus  
return flow

ATTACHMENT NO 3



The apparent discrepancy in seal cavity pressures on 1-1 and 1-2 was checked on 10/5/77 by installing pressure gauges at the pressure transmitters. The gauges read as follows:

1-1:

114-2nd cavity  
111-3rd cavity

1-2:

114-2nd cavity  
112-3rd cavity

The readings indicate the seals are staging properly.

Based on the above performance, EMI sees no concern which would justify maintenance at this time.

Further testing to be done:

1. During testing, contact EMI (P. F. Smith or C. C. England) whenever TICO plans to start a RPD, so additional data can be taken at EMI's discretion.
2. At system pressure > 1300 psig, 3 pumps running, data will be taken on all four pumps.

CC:mlf  
10/7/77

E 4 2 9 7 5

SUMMARY OF CHECKOUT OF MOTOR COOLANT PUMPS 10/13/77

All four KC Pumps have been run at system pressure greater than 1500 psi.  
KC Pumps 2-1 and 2-2 have continued to run from the initial cold pump starts.  
Below is a typical line of data from each pump.

KCP 2-1

System Pressure - 1650 psig  
2nd Seal Cavity Pressure - 1034 psig  
3rd Seal Cavity Pressure - 500 psig  
Horizontal Vibration - 3 mils

KCP 2-2

System Pressure - 1650 psig  
2nd Seal Cavity Pressure - 1075 psig  
3rd Seal Cavity Pressure - 508 psig  
Horizontal Vibration - 3.5 mils

KCP 1-1

System pressure - 1650 psig  
2nd Seal Cavity Pressure - 1055 psig  
3rd Seal Cavity Pressure - 510 psig  
Horizontal Vibration - 4 mils

KCP 1-2

System Pressure - 1650 psig  
2nd Seal Cavity Pressure - 920 psig  
3rd Seal Cavity Pressure - 520 psig  
Horizontal Vibration - 3 mils

Based on the above data, I feel that all four pumps are in good operating condition and require nothing more at this time than periodic monitoring.

KJS:nlf  
10/13/77

*R.I. Smith*

10/13/77  
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