GPU &

8

Babcock & Wilcox

Power Generation Group

P.O. Box 1260, Lynchburg, Va. 24505
Telephone: (804) 384-5111

May 10, 1979

Mr. T. M. Novak, Chief
Reactor Systems Branch
Division of Systems Safety
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Novak:

B&W has prepared the following background information on reactor coolant pump operation in response to NRC questions on the B&W report entitled "Evaluation of Transient Behavior and Small Reactor Coolant System Breaks in the 177 Fuel Assembly Plant" (May 7, 1979).

B&W is in the process of passing this information on to our operating utilities for incorporation of appropriate sections into their operating procedures. These limits, when used in conjunction with the information already passed on to the utilities in our operational guidelines, insure satisfactory conditions for starting reactor coolant pumps during small breaks.

I. B&W Assumptions Regarding Pump Status:

A. Component cooling water is maintained or will be re-instated prior to starting RC pumps. (At least to the motor)

B. Seal injection water flow has been maintained to all RC pumps.

C. Seal return flow is maintained or is re-instated prior to starting pumps.

D. On those plants with Westinghouse pumps, the No. 1 seal leakage shall be a minimum of 0.2 gpm and No. 1 seal delta P at least 200 psi or the system pressure increased until these limits are met. (Note: A 230 psig system pressure should be adequate to satisfy these limits.)

GPU
~~Deft.~~ Exh. For ID 8
Pff. Exh. ~~in ev.~~
Charles Shapiro CSR 12/9/80
Doyle Reporting Inc. CS

2. Operating Limits:

   A. Shaft runout (vibration) shall not exceed 30 mils.

   B. Frame vibration as measured on the lower motor mounting flange shall not exceed 5 mils.

   C. Any normal operating restrictions relative to less than four (4) pump operation and associated system pressure and temperature conditions should be considered void.

   D. All other normal operating limits remain in effect. (Note: Shaft vibration and frame vibration have been increased for this emergency condition. While experience shows that these levels of vibration can be sustained without damage, these limits should not be adopted for normal operation.)

3. B&W Position on Pump Integrity:

   Under the above conditions, seal integrity will be maintained because the operating conditions are within those limits that the seals have been designed and tested to meet. Seal and bearing integrity is assured by the maintenance of injection water to the seals and to the pump bearing.

   As far as the effect of cavitation damage to the pump is concerned, it is known that at 250 psig system pressure and 400°F saturation temperature, the energy imparted to the fluid to cause a vapor bubble to form is only a fraction of that which would be required at low system temperatures. Therefore, if a cavitation bubble should reach an area of higher pressure in the pump which could cause its collapse, the energy expended would not be adequate to cause material damage.

   B&W's normal operating limits for these pumps is based upon cold water cavitation and the desire to promote long life availability without damage to the impeller. As indicated in item 2 above, the pump performance parameters that are affected by and are indicative of saturated conditions are shaft and frame vibration. The normal limits for these parameters reflect the reliability objective over the life of the pump. These emergency limits are consistent with the B&W experience and have been found acceptable by the pump designers.

With regard to the capability of the reactor coolant pump motors to be started momentarily (bumped), we have assumed that the most restrictive condition exists at the time the bump is required. That is, the motor stator and rotor temperatures are at the normal operating temperature. At this temperature, the additional heat storage capacity is limited to the heat generated by start. No credit is taken for any heat dissipation between the time the motors are originally de-energized and the time of the subsequent start or bump.

After the first bump, sufficient heat will be dissipated within one hour to allow the motor to be either bumped or started for normal operation.

These restrictions are considered conservative in view of the fact that the motors are normally operated at an output power level under design level. Thus, the operating temperature at the time of the first start or bump is less than the design operating temperature. Finally, these restrictions are considered consistent with the published data of the most limiting motor design on B&W operating plants.

If you have any questions, please contact either myself or E. R. Kane of my staff.

Very truly yours,

Edward R. Kane
for James H. Taylor
Manager, Licensing

JHT:dsf

cc: R. B. Borsum (B&W)

bcc: E. R. Kane
G. O. Geissler
R. K. Kennedy
E. A. Womack
D. F. Hallman

B 182