



Commonwealth Edison
72 West Adams Street, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago Illinois 60690 - 0767

June 30, 1989

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: Byron Station Units 1 and 2
Braidwood Stations Units 1 and 2
Supplemental Response to NRC Bulletin 88-04
Docket Nos. 50-454/455, 50-456/457

References: (a) NRC Bulletin No. 88-04, dated May 5, 1988.
(b) W.E. Morgan letter to U.S. NRC, dated
July 11, 1988.
(c) M.H. Richter letter to U.S. NRC, dated February 21,
1989.

Dear Sir:

Reference (a) requested that licensees investigate and correct as applicable two miniflow design concerns. The first concern involves the potential for the dead-heading of one or more pumps in safety-related systems that have a miniflow line common to two or more pumps or other piping configurations that do not preclude pump-to-pump interaction during miniflow operation. A second concern is whether or not the installed miniflow capacity is adequate for even a single pump in operation.

Reference (b) provided Commonwealth Edison's (Edison's) initial response for Byron and Braidwood Stations to Reference (a), and Reference (c) provided pump vendor information in accordance with the direction given in Reference (a). This letter supplements the pump vendor information presented in Reference (c).

Reference (c) indicated that Ingersoll-Rand, the manufacturer of the Residual Heat Removal (RHR) pumps at Byron and Braidwood Stations, was conducting a study in an effort to relate flow rates to service life for the RHR pumps. Edison provided RHR pump data for this study and recently received the Ingersoll-Rand minimum flow evaluation for those pumps.

Ingersoll-Rand indicated that operation of an RHR pump near, or below, its recommended minimum flow rate has a time dependent cumulative effect on the overall useful life of the pump. Hydraulic recirculation occurring at operation below design flows will cause noisy and rough operation. This will lead to a gradual degradation of the pump due to several possible causes such as: cavitation damage, increased hydraulic loads (leading to shortened bearing life and/or shaft damage), and excessive vibration.

8907050298 890630
PDR ADOCK 05000454
Q PDC

IEH

Ingersoll-Rand recommended the following minimum flow rates for the RHR pumps at Byron and Braidwood Stations.

- Continuous operation - 1,000 to 2,000 gallons-per-minute (GPM),
- Short period operation - 300 to 500 GPM, and
- Start/Stop operation - 100 GPM.

Where:

- Continuous operation is defined as pump operation exceeding a 3 hour duration in a 24 hour time period.
- Short period operation is defined as pump operation of 3 hours or less.
- Start/Stop operation is defined as pump operation of 30 minutes or less, and is based primarily on thermal rise considerations.

These recommended minimum flow rates were based on pump fluid temperature rise and Ingersoll-Rand's experience with the hydraulic effects of low flow operation. Ingersoll-Rand also indicated that to fully determine the adequacy of a minimum flow condition, performance monitoring was important to detect any pump degradation and in-service wear.

As indicated in Reference (b), mechanisms are in place to ensure any pump degradation is detected. Surveillance tests are conducted quarterly for the RHR pumps at Byron and Braidwood Stations to satisfy ASME Section XI pump performance requirements, and to ensure the operational readiness of the pumps. The results of the surveillance tests are trended and evaluated to detect any degradation and determine the need for any pump maintenance. A review of RHR pump vibration data, which is obtained during surveillance tests, revealed that there were no adverse vibration trends (with the exception of the vibration caused by the inadequate motor supports for the Byron RHR pumps, which have been modified to correct the problem, as reported in Reference (b)).

Test results from Byron and Braidwood Stations have indicated that the RHR pumps operate at minimum flow rates greater than 500 GPM, which is above the recommended minimum flow rate specified by Ingersoll-Rand for "start/stop" and "short period" operations. RHR pump operation in the minimum flow condition occurs primarily during quarterly surveillance testing. Typically, these tests do not operate an RHR pump in the minimum flow condition for greater than 3 hours. Additionally, the surveillance procedures allow initiation of the Component Cooling Water System to prevent high pump suction temperature. During a small break LOCA condition, the RHR pumps may operate simultaneously in a minimum flow configuration for an extended period of time, however, it should be noted that procedural controls direct that the RHR pumps be shutdown if not required by plant conditions.

Edison believes that the current operating practices and performance monitoring surveillances for Byron and Braidwood Stations meet the intent of the vendor recommendations in order to assure acceptable performance of the RHR pumps.

Please address any questions that you may have concerning this response to this office.

Respectfully,

Milton H. Richter

M.H. Richter
Generic Issues Administrator

9001k/31-33

cc: A.B. Davis

Resident Inspector - BY/BW

Subscribed and Sworn to
before me this 30th day
of June, 1989

Lelia F. Mayo
Notary Public

