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SUBJECT: Provides results of completed evaluation re min flow design concerns for safety-related centrifugal pumps,per ~~GL~~ Bulletin 88-04.

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TITLE: Bulletin 88-004 re Potential Safety-Related Pump Loss

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NIAGARA MOHAWK

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May 9, 1990
NMP1L 0501

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

Re: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63
TAC No. 69940

Gentlemen:

Nuclear Regulatory Commission Bulletin 88-04, Potential Safety Related Pump Loss, requested Niagara Mohawk to investigate and correct, as applicable, two minimum flow design concerns for safety-related centrifugal pumps. Our letter of July 7, 1988 (NMP1L 0282) provided the results of our preliminary evaluation of Nine Mile Point Unit 1 (NMP1) regarding these minimum flow design concerns. We indicated that more detailed evaluations of the Core Spray and Condensate Transfer Systems were required in order to determine the adequacy of these systems to prevent damage resulting from operation and testing in the minimum flow mode. In our letter of September 28, 1988 (NMP1L 0307), we stated that based on further evaluation, a recirculation operability test of the Core Spray System was required. This letter provides the results of our completed evaluation, including Core Spray System test results, and represents our final response to Bulletin 88-04.

The initial evaluation of NMP1, conducted by MPR Associates, Inc., concluded that only the Core Spray and Condensate Transfer Systems had the potential for any minimum flow problems. Further evaluation by MPR concluded that minimum flow design concerns were not applicable to the Condensate Transfer System based upon the system configuration, operating procedures, instrumentation, startup logic and operating experience.

Evaluation of the core spray pumps indicated that analysis alone was not sufficient to support a conclusion that a pump set would not be dead-headed during a small-break loss-of-coolant accident (SBLOCA) or that the recirculation line capacity was sufficient to prevent damage as a result of hydraulic instability. Therefore, a test of the Core Spray System was recommended. The test of the Core Spray System (Niagara Mohawk Temporary Procedure N1-88-6-12) simulated SBLOCA conditions including pump initiation sequence and maximum operating time in the minimum flow mode. The test consisted of the following runs:

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- Operating each pump set (which consists of a core spray pump and topping pump in series) at a nominal flow rate to establish the baseline conditions,
- Operating each pump set through the recirculation line to confirm satisfactory operation of each pump set,
- Operating both pump sets in a loop through the common recirculation line to confirm that the pump sets share flow, and
- Operating each pump set at the nominal flow rate to compare with the baseline conditions.

Pump head, pump flow, temperature rise from suction to discharge, and bearing vibration were monitored during the test. Loop #11 was tested in July 1989 and Loop #12 was tested in October and December 1989. The test results verified that the Loop #11 and Loop #12 core spray pumps and topping pumps currently share flow through the recirculation line without degradation over the time the pumps are expected to operate in the minimum flow mode during a SBLOCA. All pumps exhibited substantial margin with regard to temperature rise and vibration limits.

However, the Core Spray System test results would not apply if one pump set in a loop were to degrade relative to the other or if any maintenance were to be done that changes one pump's configuration (e.g., replace an impeller or change wear ring clearances). Either action could result in head-flow characteristics different than the characteristics tested, which might result in dead-heading of a pump set. To ensure sufficient flow division between core spray pump sets in a loop over the life of the plant, Niagara Mohawk is evaluating the following two alternatives. The first alternative would be to repeat the above test periodically and to perform the test following any maintenance that may change a pump's head flow characteristics. A second alternative approach would be to install individual recirculation lines for each pump set. Installing individual recirculation lines would require a system design change but would remove the concerns with flow division. This modification is not required in the short-term as the recent tests verified acceptable short-term operation.

Niagara Mohawk has taken the following action until one of the above alternatives is selected to ensure sufficient flow division between core spray pump sets in a loop over the long-term. The Core Spray System maintenance procedures have been revised such that Engineering is notified prior to performing any maintenance on the Core Spray System. This will allow Engineering to evaluate proposed maintenance activities to determine if the minimum flow test should be repeated upon completion of any maintenance to the system.

In summary, the safety-related pumps at NMP1 have adequate recirculation line capacities with respect to damage resulting from operation and testing in the minimum flow mode. In addition, safety-related pumps at NMP1, except for the pumps in the Core Spray System, have configurations that protect them from dead-heading while operating in the minimum flow mode. The pump sets in the Core Spray System currently have a common recirculation line (flow sharing) while operating in the minimum flow mode. Although recent tests have verified sufficient flow division for short-term operation, core spray flow sharing cannot be guaranteed over the long-term. Niagara Mohawk is currently evaluating alternatives for ensuring sufficient flow division over the life of the plant as noted above.

Very truly yours,

NIAGARA MOHAWK POWER CORPORATION

C. D. Terry
Vice President
Nuclear Engineering and Licensing

AER/mjd
8454G

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	]	
	]	
Niagara Mohawk Power Corporation	]	Docket No. 50-220
	]	
(Nine Mile Point Unit 1)	]	

AFFIDAVIT

C. D. Terry, being duly sworn, states that he is Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

C. D. Terry

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 9th day of May, 1990.

Diane R Kimbrel
Notary Public in and for
Onondaga County, New York

My Commission expires:

DIANE R. KIMBRELL
Notary Public in the State of New York
Qualified in Onondaga County
My Commission Expires May 31, 1990

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