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Docket Nos. 50-315
and 50-316

Mr. John Dolan, Vice President
Indiana and Michigan Electric Company
Post Office Box 18
Bowling Green Station
New York, New York 10004

Dear Mr. Dolan:

We have completed our evaluation of the potential for pipe cracks forming in the chemical and volume control systems (CVCS) due to excessive charging pumps vibrations in Donald C. Cook Unit Nos. 1 and 2. Our review was based on the information provided by Indiana and Michigan Electric Company in letters dated August 8, 1979, October 29, 1979 and May 22, 1980. We have determined that the installation of the dampeners on the reciprocating charging pump discharge flanges in Unit Nos. 1 and 2.will reduce pipe vibrations to levels at which we do not expect pipe cracks could be developed. A copy of our evaluation is enclosed for your information.

Sincerely,

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing

Enclosure:
Safety Evaluation

cc: w/enclosure
See next page

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AUGUST 3 1980

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

August 6, 1980

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and 50-316

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Steven A. Varga, Chief
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Enclosure:
Safety Evaluation

cc: w/enclosure
See next page

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Enclosure

DONALD C. COOK NUCLEAR PLANT UNIT NOS. 1 AND 2

CVCS PUMP VIBRATIONS

SAFETY EVALUATION REPORT

Introduction

Vibrations induced by the operation of positive displacement pumps have been identified as one source that will cause fatigue failure in system piping. On May 18, 1978, NRC requested information on "pipe cracks in chemical volume control system (CVCS) due to excessive charging pump vibrations" from Indiana and Michigan Power Company with respect to Donald C. Cook Units 1 and 2. The requested information was provided in letters dated August 8, 1979, October 29, 1979, and May 22, 1980.

Description

Donald C. Cook Nuclear Plant Units 1 and 2 have similar CVCS arrangements. They each employed two centrifugal charging pumps and one reciprocating (positive displacement) charging pump . A General Atomic Company PDSN 3-200 model dampener was installed on the discharge flange of the Unit 2 reciprocating charging pump during the fall of 1979 refueling outage. Another dampener of the same model will be installed in Unit 1 during the upcoming refueling outage. The performance of these positive displacement metering pumps was calibrated by several tests.

Evaluation and Conclusion

The reciprocating charging pumps preoperational test showed that their usage did not induce excessive vibrations in the CVCS of either unit, however, operating experience indicated that control system responses were affected by the discharge pressure fluctuations. Therefore, the licensee decided to install a dampener on the pump discharge flange to smooth out the pressure pulsations. The Unit 2 dampener was installed during the fall of 1979 refueling outage.

Tests were conducted by an independent consultant before and after the dampener was installed in Unit 2. Pressure transducers were attached at the pump suction, the pump cylinder head, between the pump discharge and the dampener, and downstream of the dampener. Data were taken at various pump speeds. The results showed that the maximum pressure pulsation downstream of the dampener was 3.4% of the normal operating pressure at the maximum pump speed.

The operation of the reciprocating charging pumps with dampeners on the pumps discharge did not induce excessive vibrations. A fluctuation of 3.4% stress in the system will yield an alternate stress corresponding to negligible usage factor. We therefore do not expect that pipe cracks will develop in the CVCS system of Unit 2 due to reciprocating charging pump operation. Similarly, because the same type and model of dampener will also be installed on the discharge flange of the reciprocating charging pump in Unit 1 during the current refueling outage, we do not expect that cracks will develop in the CVCS system of Unit 1 due to reciprocating charging pump operation.