

Jan. 7, 1969

56-286

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INDIAN POINT NO. 3 - MISSILES

A report on our review of the flywheel missile problem for the
Indian Point No. 3 facility is enclosed.

1/3/

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RT:42A
DRL:C&CTB:MF

Enclosure:
Review of Missile Problem
For Indian Point No. 3

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DATE ▶	1/7/69	1/7/69	1/7/69	1/7/69		

MISSILES

We have initiated a study to assess the adequacy of the design and surveillance provisions to insure the continued integrity during operation of the primary coolant pump flywheels in the Indian Point No. 3 facility. We have also investigated the potential consequences of missiles generated through failure of a flywheel and design features that could be provided to mitigate these consequences.

Our initial review indicates that the design of the flywheel is probably conservative; the bursting speed is 3900 rpm versus a design speed of 1500 rpm for a safety factor of 2.6. The applicant has stated that the flywheel will be designed, fabricated, and installed within a rigorous quality assurance program. The flywheel will receive a 100% volumetric ultrasonic inspection at completion of fabrication. An inspection program for the flywheel will be followed during operation and the ultrasonic inspection will be repeated at intervals during the course of plant life. We conclude that the design and fabrication programs for the flywheels are adequate and that an acceptable in-service inspection program can be established prior to operation.

We have investigated the potential for (1) containment liner penetration and (2) primary system penetration, in the event that missiles are generated through failure of a flywheel.

The flywheels are installed horizontally. Review of the PSAR indicates that, with one general exception, sufficient barriers appear to exist along all potential missile paths to prevent a missile from striking the containment liner. The exception is for a missile traveling in the vertical direction. Vertical motion is possible only through ricochet. The PSAR shows some missile shields over the steam generators but the figures are not detailed enough to show conclusively that a missile moving vertically upward from a pump flywheel will not contact the containment liner. We intend to continue to discuss the adequacy of the liner missile protection with applicant and will resolve this aspect of the problem prior to issuance of the construction permit.

The flywheel is located about 10 feet from the steam generator and is in the horizontal center plane of the generator shell. In the event a missile were to be generated in the direction of the generator it could potentially breach the shell and release the secondary coolant. Concurrent loss of primary coolant is also possible either through missile induced tube failures or through rupture of a primary piping nozzle as a result of bending moments and shear stresses caused by missile impact. The former occurrence appears more probable than the latter. We have not performed sufficient analyses nor has the applicant provided us with information that would permit us to conclude that this type of potential missile damage need not be considered a basis for design. We believe that, if necessary, adequate missile shielding can be provided to protect the steam generator. We intend to pursue this aspect of the

problem with the applicant and will resolve it prior to issuance of the construction permit.

The problem of equipment generated missiles is an industry wide problem and is not limited to the Indian Point No. 3 facility. We intend to continue our general review of this problem for all reactor facilities including review of equipment failures (pump rotors and volutes as well as flywheels) and needed protective features. While this general review will not be completed prior to completion of our Indian Point No. 3 evaluation we believe we understand the associated problems sufficiently to resolve them in an acceptable manner for the Indian Point No. 3 facility.