YANKEE ATOMIC ELECTRIC COMPANY

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February 17, 1981

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing

References:
(a) License No. DPR-3 (Docket No. 50-29)
(b) YAEC Letter to USNRC, dated August 29, 1980 (WYP 80-99)
(c) YAEC Letter to USNRC, dated September 5, 1980 (WYR 80-104)
(d) USNRC Letter to YAEC, dated December 1, 1980

Subject: Additional Information Related to the Yankee Rowe Turbine Repair

Dear Sir:

In References (b) and (c) we submitted information related to the Yankee Rowe low pressure turbine. As requested in Refrence (d) we are submitting additional information regarding the low pressure turbine failure and subsequent repair. This information is enclosed as Attachment A to this letter.

We trust that you will find this information satisfactory; however, if you have any questions, please contact us.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

J. A. Kay

J. A. Kay
Senior Engineer - Licensing

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ATTACHMENT A
YANKEE ATOMIC ELECTRIC COMPANY

Background Information

On February 14 1980, at approximately 11:35 A.M., the Yankee Rowe turbine was rotating at approximately 1800 rpm (operating speed) in preparation for a generator phase to the electrical grid.

At that time the l w pressure turbine No. 1 generator end disc failed, which in turn caused the failure of the No. 1 governor end disc. These failures resulted in damage to the inner casing and turbine blading. All turbine parts were contained within the machine and its inlet piping. Prior to the incident, turbine eccentricity, turbine vibration, cylinder expansion and bearing oil temperatures were all observed to be normal.

Inspection and Repair of the Rotor

A complete ultrasonic inspection (UT) of the keyway and disc bore areas of the rotor was performed. In order to accomplish this, both No. 2 discs were removed from the rotor by machining. This procedure facilitated access to the previously unaccessible No. 3 disc inlet side. No cracks were detected by the ultrasonic inspection on the remaining discs.

Friction discoloration occurred on the low pressure turbine rotor as a result of contact of the rotor with a fractured section of disc material. Hardness tests on the rotor were conducted by Westinghouse. The results were within the Westinghouse acceptance criteria. Also, the rotor was checked for trueness and was found to be acceptable for service.

A modification to the center plane of the rotor was performed to compensate for mis-alignment of the coupling spigots. This modification encompassed the machining of center plane balance holes on the rotor.

Inspection and Repair of the Inner Cylinder

All blades, seals, and liners were machined out of inner cylinder, all stay bars and joint material were also removed. Both halves of the inner cylinder were dust blasted and examined by non-destructive means (NDE). Cracks discovered by NDE and visual inspection were repaired. The inner cylinder bolt holes, distorted as a result of the incident, were welded up and redrilled. Due to the distortion of the inner cylinder, the bores and blade grooves were completely filled with weld material in preparation for machining. Both inner cylinder halves were then furnace stress relieved.

The horizontal joint was then machined to specification, and the rough and final machining of the bore and blade grooves was completed. Pressure reduction baffles were installed in place of blade rows one through four. Installation of the stationary blade rows, seal shrouds, and support liners completed the necessary shop modifications.

Other Repairs

Both rotating and fixed blades in rows five and six were replaced. The inner cylinder inlet diaphram was also replaced. Four bearings were rebabbited and the steam and oil seals were reconditioned. Machine work and reconditioning was performed on the thrust bearing. The outer cylinder dowel boss which was cracked as a result of the disc failure, was machined out and replaced with a bolted dowel boss.

Other Information

This information is supplied in response to a verbal request by NRC.

1. In the current baffled configuraton, keyway temperatures are expected to remain within approximately 5°F of the original temperature.

2. None of the remaining discs on the Yankee Rowe machine are expected to operate under conditions conducive to the stress corrosion cracking phenomenon. Examination of these discs by ultrasonics showed no indication of cracking, as would be expected.

3. As stated in Reference (c), a schedule to re-inspect discs #3-6 on the low pressure rotor has not been established. A decision on a schedule will be made after recommendations from Westinghouse are received and evaluated.