

CAUSE (Cont'd)

Analysis of vibration indicated that pump shaft/bearing instability was most probable cause of failure. G.E. has designed a new short pump shaft successful in Unit 2 RHR Pumps. The RHR 1B Pump was modified with the new short shaft design during the February, 1984, outage of Unit 1. The RHR 1B Pump was tested satisfactorily and declared operable on 2/29/84.

- I. LER NUMBER: 82-176/03X-2
- II. LASALLE COUNTY STATION: Unit 1
- III. DOCKET NUMBER: 050-373
- IV. EVENT DESCRIPTION:

On December 28, 1982 at 2030 hours, while the RHR B System was in the Suppression Pool Cooling Mode, excessive vibration was noted on the RHP 1B pump shaft. The pump was immediately shut down and declared inoperative.

V. PROBABLE CONSEQUENCES OF THE OCCURRENCE:

At the time of the occurrence the reactor was in the RUN mode producing 1428 MWT, 330 MWE. Pursuant to Technical Specification 3.6.2.3 reactor shutdown commenced within 72 hours of the discovery for major repairs to the RHR B Pump. The HPCS, LPCS, RHR A, and RHR C Systems were operable and in the standby mode for vessel injection. Safe plant operation was maintained at all times.

VI. CAUSE:

Upon pump disassembly, the bearings had signs of excessive wear as per Ingersoll Rand, the pump manufacturer, recommended tolerances. The stuffing box bronze bushing and journal sleeve had one-sided wear. The journal sleeve for the uppermost Graphalloy bearing also showed signs of one-sided wear. All of the Graphalloy bearings were removed for replacement. Four of the journal sleeves were also replaced.

The impeller wear rings showed no sign of contact. All set screws and discharge column flanges were properly torqued. The motor shaft and bearings showed no sign of damage.

Measurements of the upper pump column found significant misalignment which required machining to bring it within allowable tolerances. The pump-motor coupling was also found to have a slight misalignment.

Following pump reinstallation with sensitive vibration equipment, testing indicated that pump shaft/bearing instability is the most probable cause of the vibration problem.

VII. CORRECTIVE ACTION:

Work Request L21352 was written to repair the RHP 1B Pump. The pump was pulled from its sump and disassembled for measurements. All bearings and journal sleeves which had out-of-tolerance wear were removed for replacement.

Work Request L21633 was written to provide for the machining of the upper pump column. This work was completed on 1-14-83.

Modification M-1-i-83-04 was written to provide for the installation of vibration instrumentation at points along the pump casing as delineated in

VII. CORRECTIVE ACTION (Cont'd):

G.E. FDDR #HA1-477. This modification was completed in conjunction with Work Request L21352 on 2-1-83.

LST 83-08 was then performed on 2-1-83 to prove RHR 1B pump operability.

LOS-RH-Q1 was performed on 2-2-83 to satisfy operating surveillance requirements.

The RHR 1B pump was run in various modes of operation under different conditions to effect the collection of vibration data from the equipment installed by General Electric. G.E. found that the most prominent vibrational characteristic was within the pump column and bowl assembly is about 12 Hz. This vibration frequency is not the pump running speed or a multiple of the running speed, therefore analysis of the data dictated that action must be taken to prevent further failures at RHR 1B pump.

General Electric agreed to supply LaSalle Station with six new RHR pump designs (3 for Unit 1, 3 for Unit 2) in which the total length of the individual pumps would be shortened.

The new pump design has been implemented in the Unit 2 RHR pumps. Testing indicated that no vibration was found in the 12 Hz. frequency range.

G.E. FDDR #HA2-357 was written to authorize the pump design change in the Unit 2 RHR pumps.

G.E. FDDR HA1-482 was also written to replace the Unit 1 RHR pumps following satisfactory testing of the Unit 2 Pumps.

The RHR B Pump was modified (M-1-1-83-56) during the February, 1984 Outage in Unit 1. The pump was tested satisfactorily and declared operable on 2-29-84.

Modification of the RHR A and C Pumps will be accomplished in Unit 1 during outages of sufficient length.

Prepared by: R. W. Houston



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May 23, 1984

James G. Keppler
Regional Administrator
Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Sir:

Reportable Occurrence Report #82-176/03X-2 Docket #050-373 is being submitted to your office to supersede previously submitted Reportable Occurrence Report #82-176/03X-1, in accordance with NUREG-0161, "Instructions for Preparation of Data Entry Sheets for Licensee Event Report (LER) File"; General Instruction No. 3.

G. J. Diederich
Superintendent
LaSalle County Station

GJD/MD/kg

Enclosure

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