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 Region 3, Chicago, Office of the Director 10/4

SUBJECT: Updated LER 80-009/01X-1: on 800304, while performing refueling outage insp of main HPCI pump, section of split ring was found lodged in impeller first reported on 800318. Caused by improper split ring retention device.

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DUANE ARNOLD ENERGY CENTER
Iowa Electric Light and Power Company
LICENSEE EVENT REPORT-Supplemental Data
Docket No. 050-0331

Licensee Event Update Report Date: 11-12-80

Reportable Occurrence No: 80-009

Event Description

At 0800 hours on March 4, 1980 while performing a refueling outage inspection of the main HPCI pump, a section of split ring was found lodged in the impeller. The HPCI booster pump was disassembled and it was found that both halves of one of the split rings which position the booster pump impeller were missing. The split ring and shaft sleeve spacer are used to position the booster pump impeller. The shaft sleeve spacer (which in turn held the split ring in place) was affixed to the pump shaft with blunt end set screws. The set screws had worked out of the shaft sleeve spacer allowing the shaft sleeve spacer to expand on the pump shaft. The fluid pressure during previous HPCI booster pump operation caused the shaft sleeve spacer to move along the pump shaft uncovering, and thus freeing, the split ring. One half of the split ring was found lodged in the impeller of the main HPCI pump. The missing half of the split ring is a 1/4 inch by 1/4 inch square, semicircular (3-inch inside diameter) ASTM A-276 Type 410 H.T. piece of steel. The split ring/shaft sleeve spacer retainer failure created the potential for the booster pump impeller to thrust and damage itself which would have made the HPCI system inoperable. Reference Technical Specification paragraph 3.5.D.1. The HPCI booster pump, 1P-216, is a Byron Jackson 10 x 10 x 14 $\frac{1}{2}$, single stage, Type DVS, centrifugal pump. No similar event reports have been submitted.

Cause Description

Improper split ring/shaft sleeve spacer retention device. Thermal expansion allowed the set screws to back out of the shaft sleeve spacer and the shaft sleeve spacer to expand on the HPCI booster pump shaft. The booster pump design is such that the fluid pressure tended to push the shaft sleeve spacer along the pump shaft away from the split ring. Thus the split ring was uncovered and free to move.

Corrective Action

The blunt end set screws used to affix the shaft sleeve spacer to the pump shaft have been replaced with dog point set screws which extend 1/16 inch into holes drilled in the pump shaft. This design change accounts for the thermal expansion of the shaft sleeve spacer and should prevent recurrence of this event. Also review of other Byron Jackson pumps at DAEC indicates that the shaft sleeve spacer is heat shrunk to the pump shaft and that the pump designs are such that the fluid pressure tends to push the shaft sleeve spacer over the split ring. Thus it was concluded that this event is not likely to occur in other Byron Jackson pumps at DAEC.

Efforts to locate the missing section of the HPCI booster pump split ring by radiography have been unsuccessful. An investigation by the NSSS vendor determined that the missing split ring piece poses no hazard to fuel or the proper functioning of any primary components. Further the split ring piece will not compromise any safety feature in place at this facility.

No further corrective action concerning this matter is planned at this time.