



LONG ISLAND LIGHTING COMPANY

SHOREHAM NUCLEAR POWER STATION

P.O. BOX 618, NORTH COUNTRY ROAD • WADING RIVER, N.Y. 11792

July 16, 1982

SNRC-732

Mr. Ronald C. Haynes
Office of Inspection & Enforcement
Region I
631 Park Avenue
King of Prussia, PA 19406

Long Island Lighting Co.
Shoreham Nuclear Power Station - Unit 1
Docket No. ~~50-322~~

Dear Mr. Haynes:

On June 9, 1982, in accordance with 10CFR 50.55(e), we reported verbally to Region I a potential deficiency concerning apparent accelerated corrosion which was evident on the Shoreham Reactor Building Service Water Pumps (RBSWP). This letter serves as our thirty-day written report on this deficiency.

Description of the Deficiency

The four pumps which are of concern were manufactured by the Bingham-Willamette Company of Portland, Oregon and are identified as type 16X26C-VM-two stage.

These deep draft pumps, P41*P-003A, P41*P-003B, P41*P-003C and P41*P-003D, in the Reactor Building Service Water System, are designed to provide cooling water for multiple plant safety related systems. A scheduled inspection of RBSWP "A", which was being performed by our Startup organization to inspect the installed pump shaft keys, revealed that both the first and second stage impellers, as well as various small parts, were experiencing extensive corrosion and pitting. Subsequent inspections of RBSWP "B, C & D" have indicated that the unacceptable rates of corrosion are also occurring on these pumps. Although none of these pumps were degraded to the point where their performance was adversely affected, continuation of corrosion at the rates evidenced could have impacted the pumps' ability to adequately perform their safety related function. Therefore, we have concluded that this situation constitutes a reportable deficiency under 10CFR50.55(e).

Detailed inspections of the RBSWPs have been conducted by vendor representatives, Stone & Webster and LILCO pump, metallurgy and

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cathodic protection specialists. As a result of field inspections and subsequent evaluations, it was determined that there were two possible causes of the accelerated corrosion: improper temper annealing of the affected metal, or galvanic or stray electrical currents causing an accelerated cathodic/anodic reaction to occur. Since those components which were found to be extremely corroded comprised a range of materials, some of which did not require temper annealing, and metallurgical analysis has provided no indication of improper temper annealing, we have concluded that the primary corrosion mechanism appears to be galvanic action.

Testing performed to detect galvanic activity has shown the presence of a D.C. electrical current flowing from the Monel in the pump shaft to the aluminum-bronze pump casing. It appears while the pump is running, the pump shaft and impellers become electrically isolated from the pump casing and the electrical current exits through the aluminum-bronze impeller, cap screws and plate, resulting in galvanic corrosion of these components. In addition, berillium-copper displays a galvanic dissimilarity from Monel and this would explain the corrosion found on the berillium-copper retaining rings.

Also, when the motor is running, an AC current was found to be traveling from the motor shaft across the coupling down the Monel pump shaft, which may have contributed to the galvanic activity already present.

Corrective Action

At present, we are actively implementing modifications which we believe will eliminate this condition. The modifications can be summarized as follows:

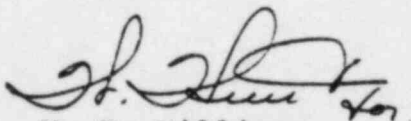
1. Installation of a grounding system to electrically couple the rotating pump shaft to the pump casing. This will serve to significantly alter the surface area ratios of K-Monel (shaft) to aluminum-bronze (impeller and pump casing) and thus minimize the effects due to galvanic action.
2. All small components (cap screws and plate, retaining rings, etc.) which were found to be corroded will be replaced with K-Monel, which is galvanically compatible with the shaft.
3. The motor to pump coupling will be modified to isolate the pump shaft from any stray electrical currents from the motor, which could possible excite galvanic activity in the pump.

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The engineering necessary for the implementation of these modifications is presently underway and it is anticipated that all modifications will be completed by the end of September, 1982.

If during the course of performing this work, it is determined that additional modifications are necessary, we will notify your office. If you have any questions relative to this matter, please do not hesitate to contact us.

Very truly yours,



M. H. Milligan
Project Engineer
Shoreham Nuclear Power Station

WMJ/law

cc: Mr. Richard DeYoung, Director
NRC Office of Inspection & Enforcement
Division of Reactor Operating Inspection
Washington, D.C. 20555

Mr. J. Higgins, Site NRC

All Parties