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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
THE CLEVELAND ELECTRIC)
ILLUMINATING COMPANY, ET AL.)
)
(Perry Nuclear Power Plant,)
Units 1 and 2))

Docket Nos. 50-440
50-441

AFFIDAVIT OF EDWARD C. CHRISTIANSEN

County of Lake)
) ss:
State of Ohio)

I, Edward C. Christiansen, being duly sworn, state as follows:

1. I am employed by the Cleveland Electric Illuminating Company as a Senior Design Engineer. A complete description of my responsibilities with respect to the Transamerica Delaval, Inc. ("TDI") diesel generators at the Perry Nuclear Power Plant ("Perry"), as well as my technical and professional qualifications, appears following Transcript 2179 (April 9, 1985) and in my Affidavit dated February 1, 1985, in support of Applicants' Motion for Summary Disposition of Issue 16, dated February 5, 1985. I have personal knowledge of the matters set forth herein and believe them to be true and correct.

2. Each of the four TDI diesel generators in place at Perry utilize five Williams-Hager, Style 329 valves in their lubricating oil systems. The size and pressure ratings of these valves are as follows:

- o Two 6", 125 psi valves,
- o Two 2", 150 psi valves,
- o One 2-1/2", 125 psi valve.

Although these valves are similar to the airstart system header check valves identified in TDI's 10 C.F.R. Part 21 letter of May 12, 1985^{1/}, the valves are considered acceptable for use in the lube oil system of the engines for a number of reasons.

3. The problems with the starting air check valves at Grand Gulf Nuclear Station were due to low and high cycle fatigue. Upon receipt of an engine start signal, the starting air solenoid valves open rapidly, allowing air-receiver tank air to open the check valves and pressurize the air headers. The valve is opened by a sudden surge of 200 to 250 psi compressed air. After several hundred starts subjected to this amount of sudden pressure, one of the valves failed.

4. The lube oil check valves open as pressure and lube oil flow increase during a pump startup. A relatively slow, steady increase in pressure (from 0 to 50 psi) and lube oil flow allows the valves to open slowly (as pressure increases and overcomes check valve spring tension). The relatively high

^{1/} This letter identified the problem on which Ohio Citizens for Responsible Energy based its motion to reopen the record on Issue 16.

viscosity of the lube oil (in comparison with air) is another factor causing the lube oil check valves to open much more slowly than those in the airstart system. This type of actuation causes minimal stress on the valves.

5. The starting air check valves are normally closed at all times other than during the actual starting cycle. Since the starting air check valves have a light spring tension, the valves vibrate during engine operation, causing high cycle fatigue and fretting. By contrast, the lube oil check valves are either open or held closed by oil pressure and spring tension (to prevent backflow) during engine operation. This virtually eliminates stresses due to engine vibration.

6. The Williams-Hager, Style 329 valves are used extensively in both commercial and nuclear diesel support systems as well as in the natural gas and fluid transfer industries. The valves were included in the TDI Diesel Generator Owners Group Component Tracking System, the computerized database which collected operating experience (both nuclear and non-nuclear) with diesel engines. No adverse operating history was evidenced for these valves.

7. The Owners Group performed an engineering application review of the Williams-Hager check valves used in the lube oil system to determine whether or not the valves were adequately designed. The Owners Group concluded that they were acceptable for their intended service.

8. Failure Analysis Associates ("FaAA") recently performed a review of the application of these valves in the lube oil systems of the Shoreham Nuclear Power Station diesels. FaAA concluded that the valves were acceptable for their intended service.

9. Based on the foregoing, Perry considers the subject valves acceptable for use in the diesel engines' lube oil systems without additional inspection or maintenance requirements. As a conservative approach, Perry will remove and inspect the valves during the first refueling outage.

Edward C. Christiansen
Edward C. Christiansen

Subscribed and sworn to before me this 18 day of July, 1985.

Jane E. Mott
Notary Public

JANE E. MOTT
Notary Public, State of Ohio
My Commission Expires February 28, 1987
(Recorded in Lake County)