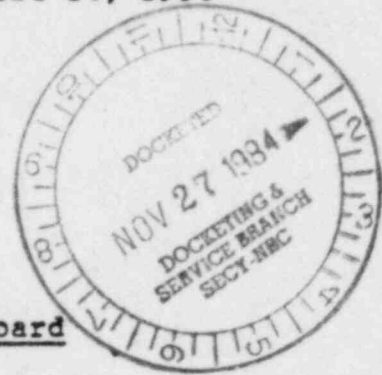


LILCO, August 14, 1984

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board



In the Matter of  
LONG ISLAND LIGHTING COMPANY  
(Shoreham Nuclear Power Station,  
Unit 1)

)  
)  
) Docket No. 50-322 (OL)  
)  
)  
)

TESTIMONY OF DAVID O. HARRIS, DUANE P. JOHNSON,  
ROGER L. MCCARTHY, FRANZ F. PISCHINGER,  
CRAIG K. SEAMAN, LEE A. SWANGER AND  
EDWARD J. YOUNGLING ON BEHALF OF LONG ISLAND LIGHTING  
COMPANY ON SUFFOLK COUNTY CONTENTION REGARDING  
AE PISTON SKIRTS ON DIESEL GENERATORS AT SHOREHAM

Exhibits 1 through 34

Volume 2 of 2

NUCLEAR REGULATORY COMMISSION

Docket No. 50-322(OL) Official Ex. No. F-1-34

In the matter of LILCO-Shoreham Nuclear

Staff \_\_\_\_\_ IDENTIFIED \_\_\_\_\_

Applicant ☒ RECEIVED ☒

Intervenor \_\_\_\_\_ REJECTED \_\_\_\_\_

Cont'g Off'r \_\_\_\_\_

Contractor \_\_\_\_\_ DATE 9/10/84

Other Pischinger, Seaman, Swanger and Youngling Witness Harris, Johnson, McCarthy

Reporter Heywood Waga

8412140060 840910  
PDR ADCK 05000322  
G PDR

LILCO, August 14, 1984

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of

LONG ISLAND LIGHTING COMPANY

(Shoreham Nuclear Power  
Station, Unit 1)

Docket No. 50-322 (OL)

**AE PISTON SKIRT EXHIBITS**

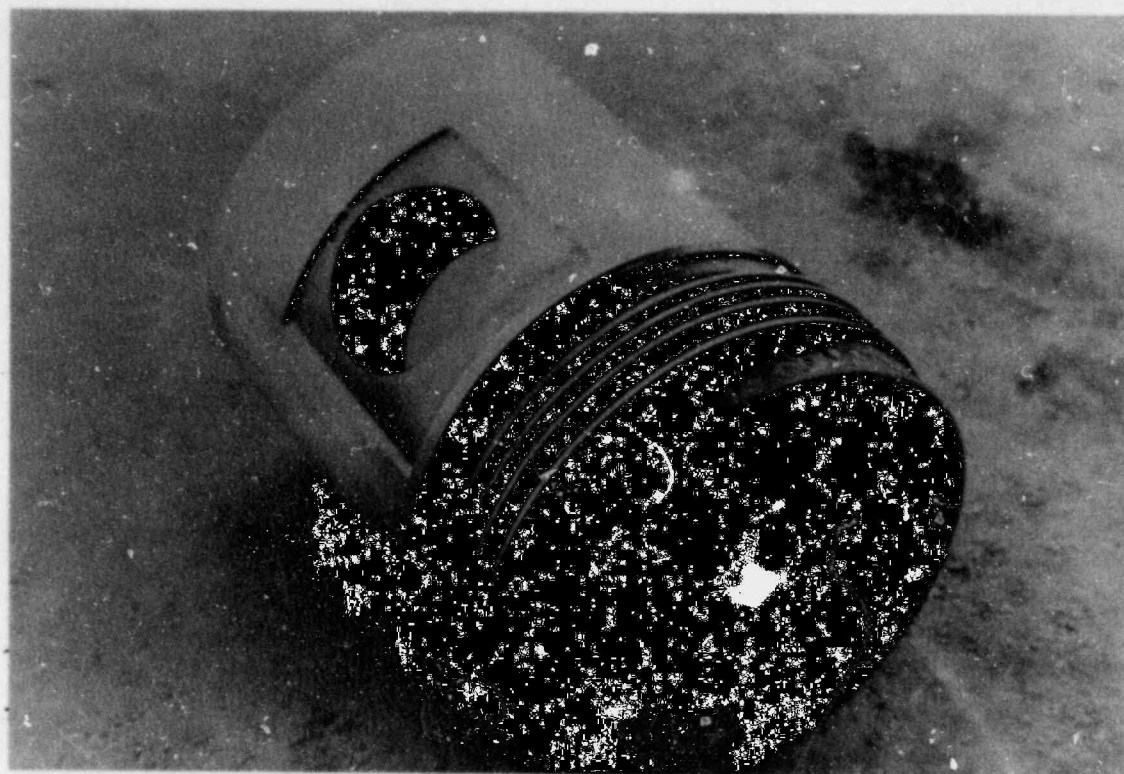
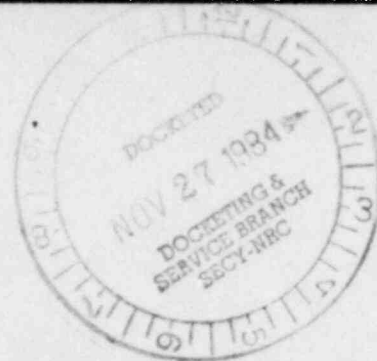
TESTIMONY OF DAVID O. HARRIS, DUANE P. JOHNSON,  
ROGER L. MCCARTHY, FRANZ F. FISCHINGER,  
CRAIG J. SALMAN, LEE A. SWANGER AND  
EDWARD J. YOUNGLING ON BEHALF OF LONG ISLAND LIGHTING  
COMPANY ON SUFFOLK COUNTY CONTENTION REGARDING  
AE PISTON SKIRTS OF DIESEL GENERATORS AT SHOREHAM

- P-1 Photograph of piston skirt with mounted crown and rings
- P-2 Photograph of a piston from Shoreham EDG showing skirt and crown
- P-3 Cross section of crown and skirt indicating the two areas of load transfer from the crown to the skirt
- P-4 Piston reassembly guidelines showing measurement of cold gap
- P-5 Gas pressure versus crank angle diagram
- P-6 Comparison of all AE and AF piston skirts in the region of the stud attachment bosses
- P-7 Representative dimension checks shown on Task Evaluation Reports Q-338, 310, 194, 203 and 182
- P-8 Trip report on nondestructive examination of AE piston skirt and a copy of AE piston skirt, inspection, requirements, certificates of compliance and receipt inspection documentation
- P-9 A sample preoperational test procedure and Appendix F showing peak firing pressures taken before the crankshaft failure and after the crankshaft replacement

- P-10 Strains and sigma III stress from strain gage rosette measurements
- P-11 Results of templog measurements of peak temperature as a function of position on crown
- P-12 Location of strain gage rosettes on instrumented AE skirt
- P-13 Summary of experimental observations related to crown/skirt interaction
- P-14 Strain readings and calculated stresses for AE piston skirt for the complete stud boss rosettes at 1600 psig with a conventional crown
- P-15 Comparison of experimental and numerical values of cyclic stresses for the AE piston skirt
- P-16 Comparison of experimental observations of peak stress at 1627 psig for AE piston skirt with corresponding finite element results using extremes of wrist pin behavior
- P-17 Cyclic stresses in AE piston skirts under isothermal and steady-state conditions
- P-18 Comparison of peak stress in stud boss region of AE piston skirt for loads applied on inner and outer contact rings
- P-19 Comparison of experimental and numerical gap closure and load split
- P-20 Comparison of skirt stiffnesses as evaluated from experimental observation and crown/skirt interaction model with corresponding finite element values
- P-21 Mean and cyclic stresses for infinite fatigue life
- P-22 Stress states for isothermal AE piston skirt for various gap sizes plotted on graph of allowable stress amplitude as a function of mean stress
- P-23 Stress states for AE piston skirt for various conditions plotted on a graph of allowable stress amplitude as a function of mean stress for various gap sizes and for isothermal and steady-state temperature conditions
- P-24 Summary of fracture toughness data from the literature for nodular cast iron with strength levels similar to 100-70-03
- P-25 Applied values of Delta K and R as a function of crack depth and corresponding values of Delta K<sub>th</sub>



- P-26 Liquid dye penetrant inspection results after 100 hours operation for EDGs 101, 102, 103
- P-27 Eddy current test results after 100 hours operation for EDGs 101, 102, 103; FaAA Procedure NDE 11.5, Rev. 0 and Rev. 1
- P-28 Iron Castings Handbook, page 34
- P-29 Results of inspection of AE pistons on the Kodiak Electric Association engine and the TDI R-5 prototype engine
- P-30 Volume I, TDI Owners Manual (sections discussing engine lubrication)
- P-31 Excerpts from Diesel Engine Design by T.D. Walshaw and Internal-Combustion Engines by V. L. Maleev
- P-32 Task evaluation reports and LILCO deficiency reports which discuss the DRQR's visual inspections of AE piston skirts
- P-33 Liquid dye penetrant test results for AF piston skirts
- P-34 Minimum and maximum stresses in AE piston skirt for various peak firing pressures for isothermal and steady state operating conditions; applied values of Delta K and R as a function of crack depth and corresponding values of Delta K<sub>th</sub> (2,200 psig)



Photograph of piston skirt with mounted crown and rings.