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EXHIBIT 4

NUCLEAR REGULATORY COMMISSION

Docket No. 50-322-0L Official Ex. No. 4  
 In the matter of Lilco  
 Staff ✓ IDENTIFIED \_\_\_\_\_  
 Applicant \_\_\_\_\_ RECEIVED ✓  
 Intervenor \_\_\_\_\_ REJECTED \_\_\_\_\_  
 Cent'g Off'r \_\_\_\_\_  
 Contractor \_\_\_\_\_ DATE 9-24-84  
 Other \_\_\_\_\_ Witness Panel  
 Reporter W. Bloom

8503280566 40924  
PDR ADOCK 05000322  
G 3 PDR

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# American Bureau of Shipping

*Sixty-five Broadway*

*New York, N.Y. 10036*

RTW:ml

T8-3

3 May 1984

Transamerica Delaval DSR-48 Diesel Engine/Generator  
for Long Island Lighting Company Shoreham Plant  
Report on Crankshaft Torsional Stresses.

Transamerica Delaval Inc.  
Engine & Compressor Division  
550 85th Avenue  
P. O. Box 2161  
Oakland, CA 94621

Attention: Mr. Roland T. M. Yang  
Manager Applied Mechanics.

Gentlemen:

We have your letter of 3 April 1984 submitting copies of the above subject report for our review, and with regard thereto have to advise as follows:

We note from the submitted report that the torsional vibration stress in the crankshaft for the first mode  $5\frac{1}{2}$  order critical speed (422 RPM) was expected to approach or exceed that permitted by the Rules for the submitted crankshaft material.

We further note from the submitted report that tests were conducted to determine the actual stresses in the crankshaft, and that these tests indicated a substantial margin of safety against fatigue failure due to torsional vibration.

Based on the submitted test data, and on submitted service experience with similar engines having similar torsional critical speed arrangements, we advise that we would have no objection to the submitted torsional critical speed arrangement for use on diesel generator sets on an ocean going vessel, insofar as our classification requirements for marine service are concerned.

Three (3) copies of the subject report, stamped to indicate our review, are being returned.

Very truly yours,

AMERICAN BUREAU OF SHIPPING

W. M. HANNAN  
Vice President

G.E.T.    A.R.F.    M.H.L.  
S.O.      R.T.Y.    C.R.C.

RECEIVED

TICKLER MAY 07 1984 UPDATE

ENGINEERING

CIRC. FORWARD COPY

TO FILE: \_\_\_\_\_; SEE ME

cc: LILCO. (E. Montgomery)  
Accounting Dept. w/enclosure  
Legal Dept. (M. Adams)  
Subject File 460

by: *Robert A. Giuffre*  
Robert A. Giuffre  
Principal Surveyor - Machinery

REPORT

ON

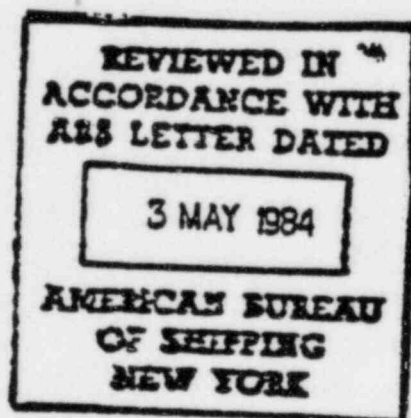
CRANKSHAFT TORSIONAL STRESSES

TRANSAMERICA DELAVAL MODEL DSR-48

Serial No. 74010/12

for

LONG ISLAND LIGHTING COMPANY



Roland Yang.  
April 4, 1984  
Transamerica Delaval  
Oakland, CA.

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Section Four	Operating Hours Logged	" to

ALLOWABLE TORSIONAL STRESS CALCULATION.

Based on Para. 34.47 of 1984 ABS Rules.

$$S = \left( \frac{U + 23180}{18} \right) C_k C_d C_r$$

where U = Minimum Tensile Strength of Shaft Material 100000 PSI

C<sub>k</sub> is .55 for propeller shafts and crankshafts

C<sub>d</sub> is size factor,  $.35 + 0.487 / \sqrt[5]{12} = .6463$

C<sub>r</sub> is speed ratio factor, 1.38 for 90% to 105% rated RPM.

$$S = \left( \frac{100000 + 23180}{18} \right) (.55) (.6463) (1.38)$$

= 3357 PSI due to single order

Total Allowable Stress = 150% of 3357 = 5035 PSI

ALLOWABLE TORSIONAL STRESS CALCULATION.

Based on Table 34.3 of 1982 ABS Rules.

<u>Engine Speed</u>	<u>.3 x 450 RPM</u>	<u>.8 x 450 RPM</u>	<u><del>.75 to 1.0</del> x 450 RPM</u>	<u>1.05 x 450 RPM</u>
	<u>= 135 RPM</u>	<u>= 360 RPM</u>	<u>427.5 to 450</u>	<u>472.5 RPM</u>

Grade 2, 60000 psi	5689 psi	3556 psi	2134 psi	3556 psi
Grade 4, 100000 psi	8217 psi	5136 psi	3082 psi	5136 psi

Stress limit multiplier =  $\frac{2}{3} \left( \frac{100000 - 60000}{60000} \right) + 1 = 1.4444$   
 for adjustment from 60000 psi  
 to 100000 psi material.