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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD

DOCKETED  
USNRC

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Before Administrative Judges:

Lawrence Brenner, Chairman  
Dr. George A. Ferguson  
Dr. Peter A. Morris

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

Docket No. 50-322-OL

July 17, 1984

MEMORANDUM AND ORDER CONFIRMING ADMISSION OF SUFFOLK COUNTY'S  
EMERGENCY DIESEL ENGINE CONTENTIONS AND SCHEDULE FOR HEARINGS

Contentions

At a conference of counsel on July 5, 1984, the Board heard argument and ruled on the admissibility as issues in controversy of Suffolk County's diesel engine contentions. The contentions were specified in Suffolk County's filing of June 11, 1984. A specification of the contentions, including an explanation of the basis of the issues and their nexus to the Shoreham diesel engines, was required by our ruling at the February 22, 1984 conference of counsel. Tr. 21,611 et

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seq. See also the opening summary of the July 5 conference. Tr. 21,660-61.<sup>1/</sup>

The Board admitted, with modifications made by the Board, a Suffolk County contention which alleges inadequacies in four components of the emergency diesel engines at Shoreham manufactured by Transamerica Delaval Inc. ("TDI"). Tr. 21,878-90. Those components are the: 1. crankshaft, 2. cylinder blocks, 3. cylinder heads, and 4. pistons. Other portions of the proposed contention were rejected for lack of specificity and bases and in some cases lack of nexus or relevance to the merits of the Shoreham diesel engines. Tr. 21,890-93. See also 21,839-45. The Board, by a 2-1 vote with Judge Morris dissenting, deferred ruling on subpart 1.B(2) of the crankshaft issue pending notification from the parties of whether the oil passage plugs on the TDI diesel model DSR-48 used by the Rafha Electricity Corp. in Saudi Arabia is the same as the oil plug design to be used on the Shoreham TDI DSR-48 diesels. Tr. 21,881-82.

On July 10, 1984, Suffolk County requested reconsideration of limitations we had placed on the parts of the contention dealing with part 3, replacement cylinder heads (Tr. 21,883-85) and part 4, the

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<sup>1/</sup> The missing word noted as "inaudible" at Tr. 21,660, line 13, was "nexus."

replacement model AE pistons. Tr. 21,889-90. During a July 11, 1984 telephone conference call among the Board and the parties,<sup>2/</sup> the Board admitted the cylinder head issue substantially as respecified in the County's motion for reconsideration.<sup>3/</sup> The Board believed that the issue was now specified, with adequate basis and nexus to the Shoreham diesel engines, so as to state the actual issues in controversy, whereas the contention as worded by the Board at the July 5 conference is not what the County seeks to dispute.

As stated during the conference call, the Board agreed with the County that there was some confusion on both sides of the dialogue at the July 5 conference between the Board and the County, when the Board

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<sup>2/</sup> The conference call was initiated by the Board and included counsel for Suffolk County, LILCO and the NRC Staff. New York State, participating pursuant to 10 C.F.R. § 2.715(c), has not alleged any issues of its own but supports the County's contentions. Due to a miscommunication of instructions within the Board's office, counsel for New York State regrettably was not included in the call contrary to the Board's intention and belief that he would be on the call. In view of the facts that the County filed the motion and argued in support of it, that the State undoubtedly would not have opposed the motion, and that the motion was substantially granted, we see no prejudice to New York State by this unintentional administrative error.

<sup>3/</sup> The Board modified subpart (j), which alleges that the design of the replacement cylinder heads provides inadequate cooling water "in critical areas," to allege that there is inadequate cooling water "for the exhaust side of the head." While this provides apparently greater specificity, the Board could not judge whether the issue was now sufficiently specific to put an expert on fair notice of the particular technical concern. Accordingly, the detail and scope permitted for litigation of this subissue will depend on the substance and specificity of the County's written direct testimony.

attempted to learn the specifics of the County's contention regarding the cylinder heads. The County could and should have filed the cylinder head issue as now set forth in its July 10 motion in its June 11, 1984 specification, and certainly could have specified the issue better at the July 5 conference. Nevertheless, the Board found that there is no surprise to LILCO and the NRC Staff that the County controverts the cylinder heads on the grounds stated in the contention as now admitted, given the earlier cylinder head issues set forth in the Board's July 28, 1983 order (unpublished), at 4-5, and the subject matter disclosed by LILCO's depositions of the County's consultant, Mr. Christensen. In addition, the requirement that the County file its testimony first will further assist the other parties in preparing to engage the merits of the cylinder head issue as now specified.

The County's July 10 motion for reconsideration also sought to supplement part 4 of the diesel contention dealing with the replacement AE pistons. As admitted at the July 5 conference, that contention, inter alia, alleges: that the conclusion of LILCO's consultant, that cracks will not propagate, improperly depends on analysis of an ideal situation which is not valid for the operating conditions of the Shoreham diesels; and that excessive side thrust load has not been considered adequately. Tr. 21,886-87. At the same time, we declined to admit as a part of that issue in controversy a broad allegation that the model AE piston had been inadequately tested, since this allegation lacked specificity and basis. Tr. 21,889-90.

The County's July 10 motion for reconsideration belatedly attempts to supply the specificity and basis for the allegation of inadequate testing as a proposed addition to the admitted contention. The revised contention alleges the operating experience testing which the County believes to exist, and alleges that such testing and operating history is insufficient to adequately assure that the pistons at Shoreham will not crack or fail due to excessive side thrust.

During the July 11 conference call, the Board denied the County's request to revise the piston issue. The Board ruled that the contention, as admitted, permitted the parties to try to prove, for whatever reasons, whether the Shoreham operating conditions would cause cracking contrary to the analysis and whether there would be an excessive side thrust problem. The Board at this stage did not want to assume that the proposed supplement to the contention focusing on operating history and testing by operation would necessarily lead to probative, non-cumulative evidence, material to the issues of piston cracking and excessive side thrust. Nor, on the other hand, does rejection of the supplement to the contention preclude the fact that such evidence could be admissible under the contention as it was admitted at the July 5 conference.

Suffolk County's emergency diesel engine contention, as admitted as an issue in controversy by the rulings described above, is set forth in the attachment to this order.

Schedule

The schedule for receipt of pleadings was established at the July 5 conference of counsel (Tr. 21,910-15), as follows:

- July 31, 1984: Suffolk County (and New York State, if it wishes) written direct testimony.
- August 7: Opportunity for motions to strike Suffolk County or New York State testimony. (Answers to any motions to strike are due one week after receipt of the motions.)
- August 14: LILCO written direct testimony.
- August 21: Opportunity for motions to strike LILCO testimony. (Answers due one week after the motion.)  
NRC Staff written direct testimony.
- August 24: Opportunity for Suffolk County and New York State written rebuttal testimony.
- August 28: Opportunity for motions to strike NRC Staff testimony. (Answers due one week after the motion.)  
Plans for cross-examination of all direct testimony except the NRC Staff's.
- August 31: Opportunity for motions to strike any August 24 rebuttal testimony. (Answers will be heard orally at the hearing.)

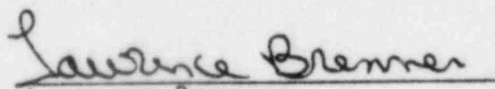


- September 4 or 5: Plans for cross-examination of NRC Staff testimony. (If necessary, the due date for plans for cross-examination of any August 24 written rebuttal testimony will be set at the hearing.)
- September 5: Evidentiary hearing begins at 10:30 am, at the New York State Court of Claims, State Office Building, Veterans Memorial Highway, Hauppauge, New York 11787.

After the first three hearing days of September 5-7, the hearing will probably continue, as necessary, on a Monday through Thursday schedule. However, some schedule adjustments to add a Friday session or delete a Monday session may be warranted on short notice. The Board can give the parties notice now that in the event the hearing is still in progress, there will be no hearing sessions on September 27 or 28 due to the Jewish New Year holiday of Rosh Hashanah.

IT IS SO ORDERED.

FOR THE ATOMIC SAFETY  
AND LICENSING BOARD

  
Lawrence Brenner  
ADMINISTRATIVE JUDGE

Bethesda, Maryland  
July 17, 1984

Attachment: Suffolk County's contentions,  
as admitted.

SHOREHAM EMERGENCY DIESEL GENERATOR CONTENTION

Contrary to the requirements of GDC 1<sup>7</sup>, the emergency diesel generators at Shoreham ("EDGs") manufactured by Transamerica Delaval, Inc. ("TDI") will not operate reliably and adequately perform their required functions because the EDGs are over-rated and undersized, improperly designed, and not satisfactorily manufactured. There can be no reasonable assurance that the EDGs will perform satisfactorily in service and that such operation will not result in failures of other parts or components of the EDGs due to the over-rating or insufficient size of the EDGs or design or manufacturing deficiencies. The EDGs must therefore be replaced with engines of greater size and capacity, not designed or manufactured by TDI. [Suffolk County's Filing Concerning Litigation of Emergency Diesel Generator Contentions, June 11, 1984 ("June 11 Filing") at 2; Tr. 21,891]

BECAUSE:

1.(a) The replacement crankshafts at Shoreham are not adequately designed for operating at full load (3500 kW) or overload (3900 kW), as required by FSAR Section 8.3.1.1.5, because they do not meet the standards of the American Bureau of Shipping, Lloyd's Register of Shipping, or the International Association of Classification Societies. In addition, the replacement crankshafts are not adequately designed for operating at overload, and their design is marginal for operating at full load, under the German criteria used by F.E.V. [Tr. 21,878-79]



(b) The shot peening of the replacement crankshafts was not properly done as set forth by the Franklin Research Institute report, Evaluation of Diesel Generator Failure at Shoreham Unit 1, April 6, 1984, and the shot peening may have caused stress nucleation sites. The presence of nucleation sites may not be ascertainable due to the second shot peening of the crankshafts. [Tr. 21880]

(c) The crankshaft oil passage plugs on the replacement crankshafts are inadequate, as evidenced by the failure of the same design plugs on a TDI DSR-48 engine owned by Rafha Electricity Corp., which damaged the pistons of that engine. [June 11 Filing at 4; Tr. 21,881-82] [Ruling deferred]

2. Cracks have occurred in the cylinder blocks of all EDGs, and a large crack propagated through the front of EDG 103. Cracks have also been observed in the camshaft galley area of the blocks. The replacement cylinder block for EDG 103 is a new design which is unproven in DSR-48 diesels and has been inadequately tested. [Tr. 21,882-83]

3. The replacement cylinder heads on the Shoreham EDGs are of inadequate design and manufacturing quality to withstand satisfactorily thermal and mechanical loads during EDG operation, in that:

(a) the techniques under which the replacement cylinder heads were produced have not solved the problems which caused the cracking of the original cylinder heads on the Shoreham EDGs;

(b) the "barring over" surveillance procedure to which LILCO has committed will not identify all cracks then existing in the replacement cylinder heads (due to symptomatic water leakage);

(c) the nature of the cracking problem and stresses exacerbating the cracks are such that there can be no assurance that no new cracks will be formed during cold shutdown of the EDGs;

(d) there can be no assurance that cracks in the replacement cylinder heads and concomitant water leakage occurring during cold shutdown of the EDGs (which would not be detected by the barring-over procedure) would not sufficiently impair rapid start-up and operation of the EDGs such that they would not perform their required function;

(e) there can be no assurance that cracks in the replacement cylinder heads occurring during operation of the EDGs would not prevent the EDGs from performing their required function;

(f) variations in the dimensions of the firedeck and water deck of the replacement cylinder heads create inadequate cooling, where too thick, and inadequate distance to mechanical loads, where too thin, and create stress risers at their boundaries;

(g) the design of the replacement cylinder head is such that stresses are induced due to non-uniform bolt spacing and the different lengths of the bolts;

(h) the replacement cylinder head design does not provide for adequate cooling of the exhaust valves;

(i) at least one replacement cylinder head at Shoreham has an indication;

(j) the design of the replacement cylinder heads provides inadequate cooling water for the exhaust side of the head; and

(k) the replacement cylinder heads at Shoreham were inadequately inspected after operation, because:

(1) a liquid penetrant test was done on the exhaust and intake valve seats and firedeck area between the exhaust valves on only 9 of the 24 cylinder heads, and such tests were done after only 100 hours of full power operation;

(2) ultrasonic testing was done on the firedeck areas of only 12 cylinder heads;

(3) visual inspections were performed on the valve seat areas of only 32 of the 98 valves, and on only 7 firedecks of the 24 cylinder heads for indications of surface damage. [Suffolk County's Motion for Reconsideration of Portions of Board's July 5 EDG Order, at 1-3, as granted in part and modified (in subparagraph (j)) by order of the Board during a teleconference of the parties on July 11, 1984]

4. All AF piston skirts in the EDGs were replaced with TDI model AE piston skirts. The replacement AE pistons are of inade-

quate design and manufacturing quality to satisfactorily withstand operating conditions, because:

(a) the FaAA report conclusion that cracks may occur but will not propagate improperly depends on a fracture mechanics analysis of an ideal situation which is not valid for the actual conditions which may be experienced by the Shoreham diesels,

(b) excessive side thrust load, which could lead to catastrophic failure, has not been considered adequately, and

(c) the analysis does not adequately consider that the tin-plated design of the pistons could lead to scoring causing excessive gas blow-by, and thereby causing a failure of proper operation. [Tr. 21,886-88]

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Docket No. 50-322-0L

July 17, 1984

COURTESY NOTIFICATION

As circumstances warrant from time to time, the Board will mail a copy of its memoranda and orders directly to each party, petitioner or other interested participant. This is intended solely as a courtesy and convenience to those served to provide extra time. Official service will be separate from the courtesy notification and will continue to be made by the Office of the Secretary of the Commission. Unless otherwise stated, time periods will be computed from the official service.

I hereby certify that I have today mailed copies of the Board's "Memorandum and Order Confirming Admission of Suffolk County's Emergency Diesel Engine Contentions and Schedule for Hearings" to the persons designated on the attached Courtesy Notification List.

*Valarie M. Lane*

Valarie M. Lane  
Secretary to Judge Lawrence Brenner  
Atomic Safety and Licensing Board

Bethesda, Maryland  
July 17, 1984

Attachment

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