

LILCO, July 7, 1983

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)	
)	
LONG ISLAND LIGHTING COMPANY)	Docket No. 50-322 (OL)
)	
(Shoreham Nuclear Power Station,)	
Unit 1))	

MOTION FOR PARTIAL SUMMARY DISPOSITION
OF SC'S DIESEL GENERATOR CONTENTION

I.
Preliminary Statement

On June 22, 1983, the Board issued a "Memorandum and Order Ruling on Suffolk County's Motion to Admit New Contention." The Board's opinion directed the parties to attempt to settle or obtain summary disposition of the portions of the admitted diesel generator contention on vibration and cracking of the cylinder heads. See Board Opinion at 43. Moreover, the Board suggested that summary disposition of the low power testing aspects of the cylinder head cracking issue might also be resolved by summary disposition. Id. at 38. Long Island Lighting Company (LILCO), in conformance with the Board's opinion, now moves this Board to summarily dispose of the issue of cylinder head cracking.^{1/} The statement of material facts and

^{1/} The Board's Order established that the cracking issue must be resolved prior to fuel load but that the vibration issue

(footnote cont'd)

the affidavits attached to this motion as well as the affidavits attached to "LILCO's Opposition to Suffolk County's Motion to Add an Emergency Diesel Generator Contention" (May 16, 1983) and "LILCO's Reply to Suffolk County's 'Response' on Proposed Diesel Generator Contention" (June 9, 1983) and the all-day, on-the-record conference of the parties (June 10, 1983, Tr. 21,179-438), demonstrate that there is no genuine issue of material fact to be heard.^{2/}

(footnote cont'd)

could be litigated after fuel load. Because of the immediacy of the former, this motion for summary disposition addresses only the cracking issue. If the parties are unable to reach agreement on the vibration issue, LILCO expects to file a motion for summary disposition on that issue at a later date.

^{2/} LILCO had intended to move for expedited filing of responses to this motion. Such a request is no longer necessary in light of the agreement between Suffolk County and LILCO that the County's response will be filed on July 22 if the issue is not settled. See LILCO's Diesel Generator Schedule, dated July 6, 1983, at 3. Subsequent to LILCO's filing of the schedule, Staff counsel informed LILCO that it would request additional time for filing the Staff's response. LILCO does not oppose several additional days for the Staff's response as long as it does not result in delaying LILCO's proposed schedule for litigation should that be necessary.

II.
Standard for Summary Disposition

Summary disposition is governed by § 2.749 of the NRC's Rules of Practice. Section 2.749 provides that contentions may be dismissed in whole or in part

if the filings in the proceeding, depositions, answers to interrogatories, and admissions on file, together with the statements of the parties and the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a decision as a matter of law.

Both the Commission and the Appeal Board have long encouraged parties and licensing boards to use summary disposition procedures to resolve issues where, as here, the proponent of the issue has failed to establish that a genuine issue exists. Northern States Power Co. (Prairie Island Nuclear Generating Station, Units 1 and 2), CLI-73-12, 6 AEC 241, 242 (1973), aff'd sub nom. BPI v. AEC, 502 F.2d 424 (D.C. Cir. 1974); Mississippi Power & Light Co. (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-130, 6 AEC 423, 424-25 (1973); Dusquesne Light Co. (Beaver Valley 1), ALAB-109, 6 AEC 243, 246 (1973). The Commission, in its Statement of Policy on Conduct of Licensing Proceedings, CLI-81-8, 13 NRC 452, 457 (1981), reaffirmed its belief in the benefits of summary disposition.

In exercising its authority to regulate the course of a hearing, the boards should encourage the parties to invoke the summary disposition procedure on issues where there is no genuine issue of material fact so that evidentiary hearing time is not unnecessarily devoted to such issues.

Here, the County has not presented any genuine issue of material fact. Rather, it has offered unsupported assertions concerning points raised in LILCO's affidavits and during the June 10 conference and speculative opinion regarding possible factual scenarios. Neither the assertions nor speculative opinions raise an issue of fact. Houston Lighting & Power Co. (Allens Creek Nuclear Generating Station, Unit 1), ALAB-629, 13 NRC 75, 81 (1981). Moreover, the County's repeated claim that it does not have enough information to determine whether or not a problem exists is an insufficient basis for defeating a motion for summary disposition. Virginia Electric and Power Co. (North Anna Nuclear Power Station, Units 1 and 2), ALAB-584, 11 NRC 451, 455 (1980).

In North Anna, intervenors responded to applicant's motion for summary disposition with a statement of facts "confined to an enumeration of those paragraphs in the applicant's statement with which the Intervenor's disagreed" and an affidavit from a consultant. The Board found that:

The thrust of the affidavit was that neither the Applicant nor the Staff had provided an adequate "factual and analytical basis on which to determine whether [the applicant's proposal] is economically more advantageous" than the Intervenor's suggested alternatives. For this reason, the affiant found himself unable, without the availability of further documentation, to express a professional opinion on the economic justification for rejecting the alternatives. With respect to the third alternative, he also averred that insufficient information existed to evaluate the Applicant's insistence that the pool for Units 3 and 4 could not be completed in sufficient time to accommodate the storage needs of the other two units.

Id. at 455 (footnotes omitted; emphasis in the original). Section 2.749, as the Appeal Board noted, requires that an opposition to a motion for summary disposition set forth specific facts showing that there is a genuine issue of fact; an opposition may not rest upon mere allegations or denials. After reviewing the intervenor's response against that standard, the Appeal Board affirmed the summary disposition, concluding that:

As is seen from the foregoing, the Intervenor's asserted no facts which might bring into genuine question the Applicant's assertion that each of the three proposed alternatives was unacceptable by reason of both cost and timing. Rather, they confined themselves to a general denial of the assertion, coupled with an insistence on the part of their economic consultant that more information was needed. In short, what the intervenors in effect put forth was a disclaimer of

their ability to ascertain whether a genuine issue of material fact existed with respect to the feasibility of their alternatives.

In the instant case, as in North Anna, intervenors have done nothing more than allege that certain factual scenarios might be true and that they are without sufficient factual information to determine whether controverted facts exist. Summary disposition is appropriate in such circumstances.

III. Argument

The relevant portion of SC's Contention on Diesel Generators, as admitted by the Board, alleges "that the diesels may not start or operate as required unless and until the cylinder head cracking problem is resolved for the Shoreham diesels." Memorandum and Order Ruling on Suffolk County's Motion to Admit New Contention (June 22, 1983) at 37. As will be demonstrated, however, no genuine issue of material facts regarding the operability and reliability of the Shoreham diesel generators.

Because LILCO has committed to replace all diesel generator cylinder heads with an improved design, Material Fact 10, the cracking issue can be divided in two parts. First,

prior to the replacement of all cylinder heads, is there adequate assurance that cracks in the cylinder heads will not prevent the diesel generators from performing their required functions, including rapid start-up, safely and reliably? And second, following replacement of all cylinder heads, is there adequate assurance that the improved heads will not experience cracking failures of the sort discovered in the original heads which could jeopardize the long term safe and reliable operation of the diesels? Although LILCO has committed to install the improved cylinder heads as soon as practicable, schedule considerations may dictate replacement of the remaining cylinder heads after fuel load. Thus, the first question must be resolved prior to fuel load and low power operation but the second might be deferred until after fuel load if the answer to the first is affirmative. This motion, however, deals with both aspects of the cylinder head cracking issue.

- A. There Is Adequate Assurance That The Diesels Will Perform Their Intended Function Safely And Reliably Prior To Replacement Of The Original Diesel Generator Heads.

Assuming that the testing schedule at Shoreham does not permit replacement of the original cylinder heads with the improved, current production model cylinder heads prior to fuel

load, there is adequate assurance that cylinder head cracks will not adversely affect diesel generator reliability in the interim.

1. Cracks Are Unlikely

Diesel generator reliability will not be adversely affected by cracks in the interim period prior to installation of the improved model cylinder heads because such cracks are not likely to occur. Material Facts 1, 2. The nature of the cracks observed at Shoreham is such that any cracking, if it is to occur, will do so soon after the initial operation of the engine. This conclusion is consistent with LILCO's experience at Shoreham where the only three cracked heads discovered were found within the first three hundred hours of operation. Material Fact 2. It is also confirmed by Delaval's extensive experience with heads of the Shoreham design. According to Delaval, cracks such as those observed at Shoreham are not likely to occur after 600 hours of operation. Id. Each of the Shoreham diesels has now operated for more than 600 hours. Id. Consequently, there is a high degree of assurance that additional cylinder head cracks will not occur at Shoreham. This conclusion is reinforced by the substantial successful operating history at other nuclear plants for cylinder heads identical to Shoreham's original heads. Material Fact 1.

2. Even If Cracks Occur, Diesel Reliability Will Not Be Affected

In the unlikely event that a crack should develop in a diesel cylinder head prior to replacement with the improved design, such a crack would not adversely affect the ability of the diesel to perform its intended function. First, a crack such as those experienced at Shoreham and the resulting leakage would have no adverse impact on the performance of a diesel during operation. Material Fact 8. Second, such a crack would not degrade the rapid start capability of a diesel. As explained by Messrs. Youngling and Pratt, the leaks observed at Shoreham are caused by operating stresses acting upon preexisting casting defects. Material Fact 1. These operating stresses cause the crack to open, allowing leakage into the cylinder firing chamber. When the diesel is shut down, the operating stress and thus the leakage is reduced substantially. Material Fact 5. Indeed, once the diesel has cooled down, operating stresses on the head will be eliminated, any crack, if one exists, will close completely, and no further leakage will occur. Id. This phenomena was confirmed by the observations at Shoreham where only small amounts of water were found after shutdown in those cylinders with cracks in the head. Id. This small amount of water in the cylinder would not affect the rapid restart capability of the diesel. Material Fact 6.

Thus, even if a leak of the sort previously found at Shoreham went undetected, there is adequate assurance that the diesels could start and operate as required.

LILCO, however, has taken an additional step to increase assurance that cracks, should they occur, will not adversely affect the safety and reliability of the diesels. The Company has committed to have in place a surveillance procedure designed to detect any cylinder head leakage. Material Fact 4. This "barring over" procedure is conducted following shutdown of the diesels at intervals recommended by Delaval. Id. The intervals were selected to insure that leakage of the magnitude expected at Shoreham would not interfere with the rapid start capability of the diesel between surveillances. Id. The procedure is also conducted for a sufficient period of time (12 hours) following shutdown to confirm that no leakage will occur prior to the next operation of the diesel. Material Fact 7. This conclusion can be reached if no leakage has been observed after twelve hours because, as already noted, the type of crack found at Shoreham will not leak once the diesel is cooled down. Material Fact 5.

In summary, even if a cylinder head crack were to occur at Shoreham prior to completing the installation of the improved cylinder heads, the crack would not adversely

impact the operation of the diesels. Those cracks would also have no detrimental effect on the rapid start capability because (a) the amount of water leakage would be small, and (b) LILCO has devised a surveillance procedure to detect even this small amount of leakage.

3. Technical Specification Requirements Provide An Additional Reason For Allowing Low Power Testing Prior To Replacement Of The Original Cylinder Heads

The facts and conclusions set out in sections III.A.1 and 2 above provide justification for operation of the Shoreham plant prior to the replacement of the original cylinder heads with the improved current production models. The facts and conclusions are valid for operation of the plant during low power testing and normal (high power) operation. There is, however, an additional reason to allow LILCO to proceed with fuel load and low power testing in the interim period. Under the Shoreham Technical Specifications, only two diesels are required to be operable during low power testing. Material Fact 9. Although LILCO expects that all three diesels will be operable at fuel load and during low power testing operations, the Technical Specification requirement gives an added degree of assurance the plant can be operated safely prior to completing replacement of the original cylinder heads. Thus, even in the extremely unlikely (and, indeed virtually

impossible) event (i) that a crack were to develop, (ii) that the crack were to leak at a rate that would impact the rapid start or operational capability of the diesel, and (iii) that the crack remained undetected, Technical Specification requirements could be met by the two remaining operable diesels.

B. The Improved Cylinder Heads Will Not Crack

LILCO replaced the three diesel cylinder heads found to be leaking with an improved, current production model. Material Fact 3. In addition, to further ensure reliable diesel operation in the future, LILCO has made a commitment to the NRC to replace all of the remaining cylinder heads of the original design with the improved model. Material Fact 10. As Mr. Pratt's affidavit reflects, it is highly unlikely that this improved model will experience the type of cracks found in three of the original cylinder heads on the Shoreham diesels. As already noted these cracks are caused by operating stresses acting upon a flaw left by the casting process. Material Fact 1. Since the production of the original Shoreham heads, Delaval has improved both its casting process and the inspection and testing techniques it employs. Material Fact 10. As a result of the improvements in the casting process, the already small (Material Fact 1) likelihood that a defect could occur in a cylinder head is greatly reduced. Material Fact 10. The

improved inspection and testing techniques give additional assurance that any defects that do occur will be found and corrected. Id. LILCO has confirmed that these improvements in the manufacturing process for the cylinder heads have been effectively implemented by Delaval. Material Fact 11. Thus, it is very improbable that the improved, current production model cylinder heads will not be susceptible to the type of cracking previously found in three of Shoreham's original cylinder heads. Material Fact 10. This conclusion is confirmed by actual operating experience. Current production model heads in six marine diesel engines have accumulated over 19,000 hours of reliable operation without any evidence of similar casting imperfections or head cracking failures. Id.

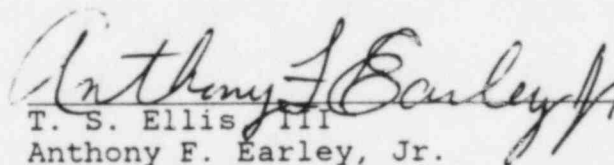
IV. Conclusion

The undisputed facts reflect that (1) there is reasonable assurance that the cylinder heads currently installed at Shoreham will not leak in the future, (2) if a leak does occur and remains undetected, it will not affect the operation or quick start capability of the diesel generators, and (3) if a leak does occur, it will be timely detected. Consequently, LILCO has demonstrated that diesel generator head cracks will not adversely affect the safe and reliable operation of the

diesels prior to installation of the improved, current production model cylinder heads. In addition, the undisputed facts reflect that the improved model cylinder heads will not experience cracks of the sort previously observed at Shoreham. Thus, the diesel generator cylinder head cracking contention presents no issue of material fact for either low power testing or full power operation and should be summarily dismissed.

Respectfully submitted,

LONG ISLAND LIGHTING COMPANY

A handwritten signature in cursive script, appearing to read "Anthony F. Earley, Jr.", is written over the typed name.

T. S. Ellis, III
Anthony F. Earley, Jr.
Daniel O. Flanagan

Hunton & Williams
707 East Main Street
P. O. Box 1535
Richmond, Virginia 23212

DATED: July 7, 1983

Statement of Material Facts

1. The cracks discovered in three of the 24 original cylinder heads on the Shoreham diesels were caused by operating stresses acting upon latent casting defects (hot tears and shrinkage). Pratt Affidavit at ¶¶ 4, 5. These casting defects appear in only about two percent of the original model cylinder heads manufactured by Delaval. Pratt Affidavit at ¶ 6. Thus, cracks such as those experienced at Shoreham would occur only on a small number of cylinder heads. The reliability of these heads is reflected in the substantial successful operating record of these heads at other nuclear plants. Id.

2. Because of the nature of cracking experienced at Shoreham (operating stresses acting upon preexisting defects), it is expected that such cracks will develop, if at all, shortly after initial operation of the diesels. Pratt Affidavit at ¶ 7. In fact, each of the three Shoreham cylinder heads that developed cracks did so within 100-300 hours of operation. Id. It is Delaval's experience that cracking of the type found at Shoreham will develop, if at all, within the first 600 hours of operation. Id. Each of the Shoreham diesels has operated for more than 600 hours. Youngling Affidavit at ¶ 5. Consequently, it is unlikely that any of the remaining original cylinder heads will develop cracks similar to those previously

experienced at Shoreham. Pratt Affidavit at ¶ 4; Youngling Affidavit at ¶ 4.

3. Each of the three Shoreham cylinder heads found to contain cracks has been replaced with an improved, current production model cylinder head that will not develop the type of cracks previously found at Shoreham. Pratt Affidavit at ¶ 4; Youngling Affidavit at ¶ 4; see Material Fact 10.

4. Even though Delaval and LILCO believe that leakage in the diesel cylinder heads will not develop in the future, a surveillance procedure ("barring over") will be used at Shoreham to ensure detection of any leakage that might occur. Youngling Affidavit at ¶ 7. The procedure entails barring over of the engines at specified intervals and verifying that no water has leaked into the cylinders. Id. The surveillance intervals, which were recommended by Delaval, have been selected to ensure timely identification of any leakage. Youngling Affidavit at ¶¶ 8, 9; Pratt Affidavit at ¶ 8. This surveillance procedure ensures that leakage, if it occurs, is detected prior to interfering with the rapid start-up capability of the diesel. Youngling Affidavit at ¶ 4; Pratt Affidavit at 4.

5. If a crack were to occur and go undetected, it would result in only very small amounts of leakage into the

cylinder heads after shutdown of the diesels. As already noted, the cracks found at Shoreham were caused by operating stresses acting upon preexisting casting defects in the cylinder heads. Pratt Affidavit at ¶ 7. The operating stresses are created by the cylinder firing pressure. Thus, once the diesel is shut down, these operating stresses are substantially reduced and any cracks which might be present would close. Pratt Affidavit at 10. In addition, stresses are further reduced when the cylinder head cools down to a steady-state temperature. Thus, only small amounts of water would leak into the combustion chamber after shutdown. Id. This conclusion is confirmed by observations made at Shoreham. One cylinder head which had exhibited a leak rate of approximately 9.25 gal/hour during operation of the diesel contained only a cupful of water after shutdown. Id. The conclusion is also confirmed by the hydrostatic testing conducted on one of the cracked Shoreham heads. The test, conducted on an unstressed (cold) head at more than three times the system operating pressure, resulted in only a slight seepage from the crack. Following shutdown of the diesels, the jacket water system, which is also shut down, is at essentially zero pressure. Consequently, no leakage would occur. Id.

6. As noted above, cracks of the sort previously found at Shoreham would only result in a small amount of water in the cylinder after shutdown. Material Fact 5. This small amount of water, even if undetected, would not affect the rapid restart capability of the diesel generators. Pratt Affidavit at ¶ 10.

7. As noted above, LILCO will use a surveillance procedure that ensures the detection of cylinder head leaks in the period following shutdown of the diesels. Material Fact 4. Because of the nature of the cracks, the leak rate is substantially reduced immediately following shutdown. Material Fact 5. Once the diesel generator cools down it is unlikely that any additional leakage will occur. Id. This fact makes it unnecessary to continue the surveillance procedure indefinitely. Thus, LILCO's procedure requires a final barring over 12 hours after shutdown of the diesels. By that time the diesel will be cooled down and no leakage would be expected thereafter. Youngling Affidavit at ¶ 9; Material Fact 5. In other words, if leakage is not detected during the barring over 12 hours after shutdown, none will occur prior to the next start-up of the diesel.

8. Even if a cylinder head leak were to occur during the operation of a diesel, there would be no adverse impact on

its performance. Water leaking into the cylinder is expelled along with combustion by-products. Youngling Affidavit at ¶ 6; Pratt Affidavit at ¶ 9. The Shoreham diesels experienced no adverse effects during operation with cracked heads leaking at a rate of 9.25 gal/hour. Youngling Affidavit at ¶ 6. Indeed, diesels have been safely and reliably operated for extended periods of time with leaks such as those previously discovered at Shoreham. Youngling Affidavit dated May 16, 1983, at ¶ 24. The County's consultant, Mr. Goldsmith, agrees that "[t]he failure in the cooling water jackets in the cylinder heads is of little consequence in operation" Goldsmith Affidavit dated June 2, 1983, at ¶ 25.

9. In the unlikely event that a cylinder head leak did occur during low power testing, rendering a diesel inoperable, Shoreham would still be capable of operating within Technical Specification requirements. Under Shoreham Technical Specification § 3.8.1.2, only two diesel generators are required to be operable during low power testing. Youngling Affidavit at ¶ 7.

10. LILCO has committed to replace all diesel generator heads with Delaval's improved, current production model. Youngling Affidavit at ¶ 4. These current models are produced by an improved casting which substantially reduces the likelihood that casting defects of the type found previously at

Shoreham will occur. Pratt Affidavit at ¶ 11. Delaval has also developed improved inspection and testing techniques which will ensure that any defects, in the very unlikely event they should occur, are detected prior to installation at Shoreham. Id. As a result, there is a high degree of assurance that the improved, current production model cylinder heads will not experience cracks such as those already found at Shoreham. Id. This conclusion is confirmed by the operating history of the improved heads installed in six marine diesels. These heads have accumulated over 19,000 hours of operation without a crack of the type found at Shoreham. Pratt Affidavit at ¶ 12.

11. LILCO has confirmed that improved casting, inspection and testing techniques have been incorporated into Delaval's manufacturing process for new cylinder heads. Youngling Affidavit at ¶ 4.