

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

October 14, 1983

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Before the Atomic Safety and Licensing Board

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

Docket Nos. 50-440
50-441
(Operating License)

OCRE RESPONSE TO STAFF AND APPLICANT ANSWERS TO OCRE's
MOTION TO RESUBMIT ITS CONTENTION #2

Pursuant to the Licensing Board's October 6, 1982 Memo-
randum and Order (Concerning Procedures for Late-Filed
Contentions)^{1/}, Ohio Citizens for Responsible Energy ("OCRE")
hereby responds to the answers filed by the NRC Staff^{2/} and
Applicants^{3/} to OCRE's September 16 Motion to Resubmit Its
Contention #2.

The Staff has fundamentally misunderstood the thrust of
OCRE's motion. OCRE is not contending that the Division 3
HPCS diesel generator should be replaced, as Staff asserts
(Staff Response at 4), but rather that another, 7000 kW

1/ OCRE has found it necessary to include some new material
in this brief that was not cited in the original motion. The
attached article is included because it is necessary to demon-
strate the unreliability of Delaval diesel engines and because
it was not available to OCRE at the time of the September 16
filing.

2/ "NRC Staff Response to OCRE Motion to Resubmit Rejected
Proposed Contention 2" dated October 6, 1983, "Staff Response".

3/ "Applicants' Answer to Ohio Citizens for Responsible Energy
Motion to Resubmit Its Contention #2" dated October 3, 1983,
"Applicants' Answer".

standby diesel generator be added to the two already present, bringing the total number of 7000kW diesels per unit at Perry to three (four diesel generators total, counting HPCS). OCRE maintains that the smaller HPCS diesel generator should not be considered in evaluating the reliability of on-site AC power. The HPCS diesel generator instead should be considered an auxiliary to the HPCS system. OCRE did not advocate the replacement of the HPCS diesel generator. On the contrary, the HPCS diesel generator should be left intact as it is essential to the operation of that ECCS subsystem.

Applicants claim that the contention lacks basis. They claim that the Shoreham difficulties are due to a design and/or practices specific to that plant. They also state, without citation to reliable authority, that the Perry diesel engines have longer crankshafts, larger crankpin diameters, and lower torsional stresses than those at Shoreham.^{4/} Applicants' Answer at 9, note 3. However, the Staff states that the crankshafts are of the same general design. Staff Response at 5.

Applicants and Staff also assert that the reportable deficiencies cited by OCRE either have been (or will be) resolved or are not applicable to PNPP. OCRE does not disagree with this;^{5/} however, OCRE believes that the large number of

^{4/} Assuming these statements are true, the lower torsional stresses may not be a factor favoring safety. It is important to note that, at Shoreham, the two cracked crankshafts probably would not have been detected had the third not failed. If material or design defects are the cause, lower torsional stresses could cause lower crack growth rate, such that testing of the diesels would not cause failure; the cracks would go undetected until failure, which might occur during an accident when the diesels are needed.

deficiencies discovered relating to the Delaval diesels are an indication of their unreliability. See also the attached article, which tells of a high rate of failures in Delaval engines used in ships. Having both standby diesel generators made by a firm with so many failures and problems increases the vulnerability of common-mode failure due to substandard quality. Thus, it can be questioned whether the intent of GDC 17, regarding independence and redundancy, has really been met.

Applicants state that the testing experience at Grand Gulf should be more relevant to Perry than that at Shoreham since the Grand Gulf diesels are identical to Perry's. Applicants' Answer at 16. It is of interest to note Attachment G to the Staff's Response, which states that, at Grand Gulf, a fuel oil line broke, thereby shutting down the engine and starting a fire. It is also significant that, of the 15 plants utilizing Trans-america Delaval engines, only four (San Onofre, Shoreham, Grand Gulf, and Comanche Peak) have conducted any testing. The number and severity of the deficiencies discovered from only a few diesels substantiates OCRE's concerns.

As to the five factors of 10 CFR 2.714(a)(1), OCRE believes that Staff and Applicant arguments lack merit. Applicants

5/ OCRE does not claim good cause for late filing based on these reports; rather, they were cited as additional basis for the contention. Curiously, the Staff first (Staff Response at 6) dismisses the reportable occurrences as a basis for the contention, and then (Id. at 7) claims that OCRE has not acted in a timely manner (not meeting the good cause requirement of 10 CFR 2.714 (a)(1)) because these occurrences had been reported for some time. The Staff cannot have it both ways.

appear to claim that the fact that they will comply with NRC regulatory requirements somehow negates the second factor, concerning the availability of other means by which to protect OCRE's interests. Applicants' Answer at 7. Although this argument would be better addressed to the fourth factor, the extent to which OCRE's interests will be protected by others, there too it fails. To claim that an adversary party (Applicants) is protecting OCRE's interests is absurd.

Applicants may mean that the Staff is protecting OCRE's interests, as the Staff itself claims. Staff Response at 8. While this Licensing Board and others have held that the Staff supposedly represents the public interest (LBP-81-24, Special Prehearing Conference Memorandum and Order, at 41), it has also been held that, this point notwithstanding, the Staff cannot be expected to pursue all issues with the same diligence as an intervenor would pursue its own issue; furthermore, the issue would not be resolved in an adjudicatory context. Cincinnati Gas and Electric (Zimmer Nuclear Power Station), LBP-79-22, 10 NRC 213, 215 (1979). Also, OCRE does not believe that the Staff represents its interests. This should be obvious, or OCRE would not be a party to this proceeding.

The Staff also states that the Licensing Board at the OL stage should not duplicate the Staff's efforts on uncontested issues. Staff Response at 8. However, OCRE, by filing the contention, has made diesel generator reliability a contested issue.

The Staff, in addressing the second factor of 10 CFR 2.714 (a)(1), states that other means, such as the submission of a

petition under 10 CFR 2.206, exist whereby OCRE can protect its rights. However, that remedy should not be used when the matter can be dealt with in the OL proceeding. Commonwealth Edison (Byron Station, Units 1 and 2), DD-81-5, 13 NRC 728 (1981); Long Island Lighting Co. (Shoreham Nuclear Power Station) DD-81-9, 13 NRC 1125 (1981).

Both Staff and Applicants claim that OCRE has failed to meet the third test, OCRE's ability to contribute to a sound record, since the Licensing Board rejected the contention at the Special Prehearing Conference because OCRE showed no special competence at that time. OCRE believes that its competence now, not at the start of this proceeding, should be evaluated here.

The Staff goes even further, citing cases which purportedly would require OCRE to identify witnesses (and summarize their testimony) it intends to call on the issue. Staff Response at 9. While OCRE cannot comment on ALAB-743 since it has not seen it, the Summer cases (as well as the Greenwood and Grand Gulf decisions) apply to the situation where a petitioner has filed a late petition to intervene, and the question becomes one of admitting a party, not an additional contention. The third factor would obviously be more important in that situation (although the five factors are to be used here as well).

To employ the Staff's suggestion would violate the precedent set in Houston Lighting and Power (Allens Creek), ALAB-590, 11 NRC 542 (1980): that an intervenor need not prove its case at the outset, when submitting contentions. It is improper to expect more than a basis for the contention at this time.

Furthermore, as to the value of OCRE's participation on this issue, the Appeal Board has held that public participation through intervention is a positive factor in the licensing process and that intervenors perform a valuable function. See, e.g., Virginia Electric and Power Co. (North Anna, Units 1 and 2), ALAB-256, 1 NRC 10, 18 at n.9.

Finally, it should be noted that, when an especially strong showing has been made on the first factor of 10 CFR 2.714(a)(1), good cause for late filing, the showing necessary on the other four factors of that section is attenuated. Puget Sound Power and Light Co. (Skagit Nuclear Power Project, Units 1 and 2), ALAB-523, 9 NRC 58, 63 (1979). Thus, even though OCRE believes that the other four factors favor the admission of the contention, they need not be considered controlling, as OCRE has good cause for the resubmission of the contention, the motion for which was filed as soon as was reasonably possible after the receipt of Information Notice 83-58.

OCRE therefore concludes that the contention should be admitted.

Respectfully submitted,



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Shoreham Diesels' Troubled History

Signs of early problems,
NRC concerns emerge

By Stuart Dimmond
Newsday Environment Writer

In 1974, Long Island Lighting Co. went shopping for three back-up diesel generators for its first atomic power plant. The utility eventually chose Transamerica Delaval, a reputable California company that had made marine diesels for decades and was trying to get into the nuclear business. LILCO was its first nuclear customer.

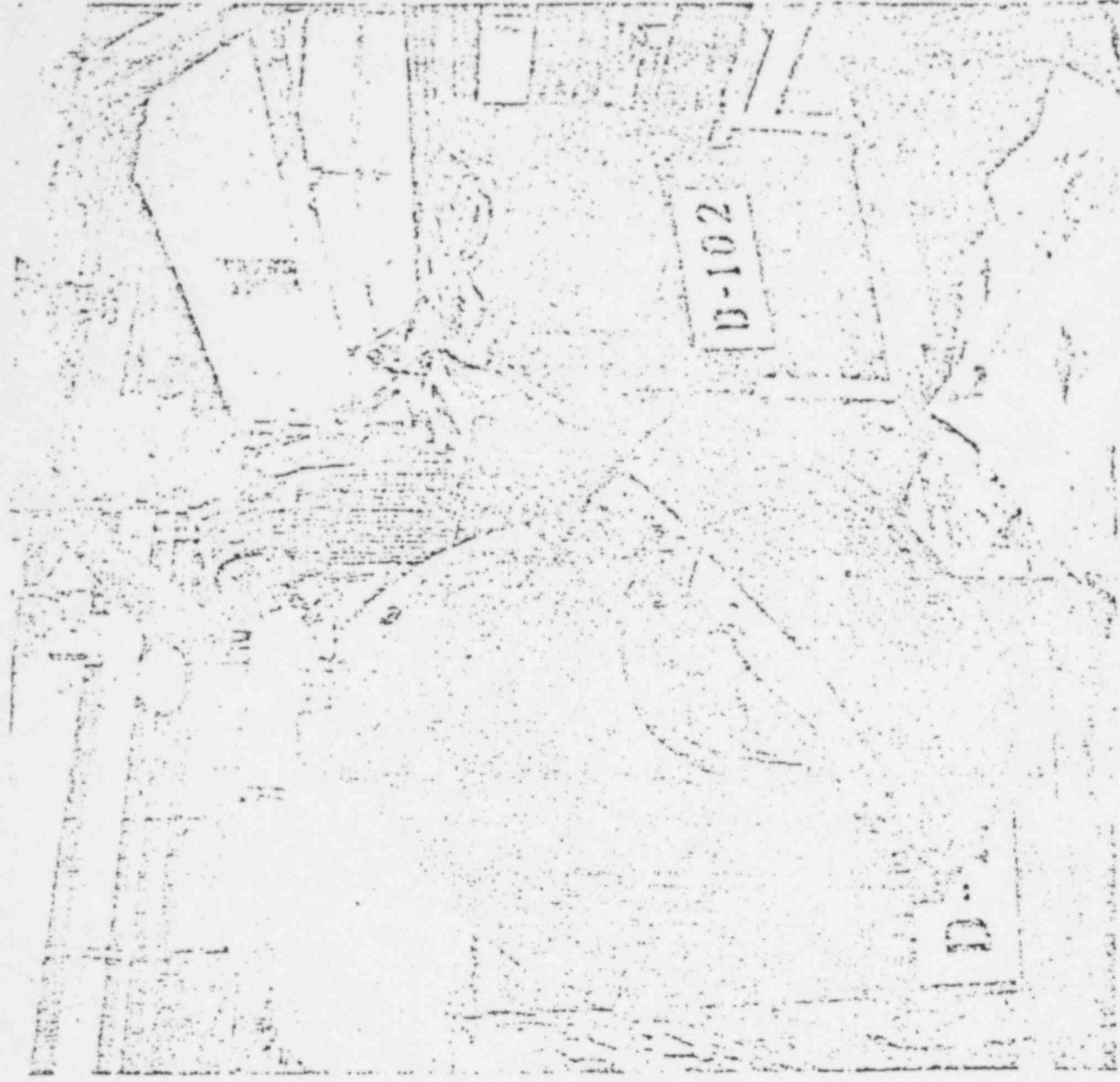
Today, the three diesels are broken. One, disassembled, lies in pieces on the floor of a building at the Shoreham atomic plant site. Another awaits disassembly. All three have cracked engine shafts. No one seems to know the cause.

The failed machines have become the latest, perhaps most visible obstacle to LILCO in its more than 10-year attempt to build a nuclear plant. Already, the cracked shafts, discovered last month, have caused a delay of six to seven months for the practically finished, \$3.4 billion reactor, which was to open in October.

The tab for the delay alone is about \$250 million — for diesels that cost only \$700,000 each. And since diesels are sometimes needed to safely shut the reactor, federal officials will not let LILCO operate the plant until the units work perfectly.

At stake, however, is not just the plant's opening, but also LILCO's management and liability. The state Public Service Commission plans to examine the diesel problem to determine if LILCO acted properly and, if not, whether the utility should be financially penalized. While praising LILCO for its testing record, officials of the federal Nuclear Regulatory Commission say LILCO's handling of the repairs will show its "character," adding that it's the utility's responsibility, not theirs, to install the right equipment.

Testing the diesels is the last of 130 Shoreham safety examinations. The other tests were successfully completed. "We really believe this is the last problem," said William Musler, LILCO's nuclear office head. Meanwhile, LILCO's 56.5 per cent rate increase request also has been postponed.



LILCO engineer Tom Carey examines part of crankshaft 102 after diesel disassembly yesterday morning.

Testing the diesels is the last of 130 Shoreham safety examinations. The other tests were successfully completed. "We really believe this is the last problem," said William Museler, LILCO's nuclear office head. Meanwhile, LILCO's 56.5 per cent rate increase request also has been postponed.

Yesterday, as LILCO and its consultants began to examine pieces of the diesel for clues, fragments of a long, troubled history continued to emerge. That history, it now appears, includes dozens of manufacturing problems, repeated NRC criticism of Delaval and increasing federal concern over the many diesel breakdowns at Shoreham and reactors with similar units. On some occasions, the Shoreham problems were viewed with greater concern by NRC officials than by LILCO.

"We're not satisfied with what we see," said Richard W. Starosteki, an NRC official who directs inspections of nuclear power plants in the Northeast. "When you have to fix odds and ends time after time, at a certain point you step back and say . . . do I have a problem or am I going to the wrong dealer?"

Delaval officials reportedly have declined to comment. LILCO says its own role has been consistently proper. "We've proceeded according to all appropriate

LILCO engineer Tom Carey examines part of crankshaft 102 after diesel disassembly yesterday morning

criteria and methods," said spokeswoman Jan Hickman. And Museler added that problems have been promptly found and corrected, and "we'll run over this hurdle too, just like every other one."

Experts, officials, critics and more than 1,000 pages of audits, memos and other documents disclose continual problems.

• Made in 1974, the diesels were delivered to Shoreham in 1976 and warehoused for two years until the plant was complete enough to install them. They did not operate until 1980. The units are an older design and Delaval has admitted to defects in their production, with manufacturing equipment a Delaval official later called "poor" and "worn." Delaval says manufacturing has improved for newer units. Because of delays in Shoreham's operation, LILCO could not test the die-

sels — now nine years old — earlier.

• There have been more than 50 problems or failures in the LILCO diesels over the past 18 months alone. Other problems go back as far as 1977. LILCO's Museler called most of them "normal shakedown" for new, large equipment. Federal officials say both the number and type of problems is unusual.

• Delaval told LILCO that the Shoreham diesels are the same basic design used since the early 1950s on ships, with few problems. But some NRC officials question whether the nuclear application is the same. For example, diesels in nuclear plants must reach maximum load very quickly, causing higher stresses. Also, recent surveys by Suffolk County experts found failures in 25 per cent to 35 per cent of the diesels Delaval

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Shoreham Diesels' Troubled History

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made for ships — although LILCO contends the true failure rate is much lower.

• This summer, LILCO replaced all 24 cylinder heads in its diesels with models that were to reflect better manufacturing. But a recent NRC inspection report, obtained this week, found a flaw or crack in one of the new models. And in eight of 13 new cylinders examined, the walls were thinner than provided for in the specifications. LILCO and Delaval say the deviations will not affect diesel operation. NRC officials say the issue merits further study.

Diesel generators have a special place in nuclear reactors. They are a safety net — a source of power to control valves, pumps and other equipment needed to safely cool down a reactor if normal power is not available. The normal power is the utility's main grid, but those grids have had many blackouts in past decades.

In 25 years of commercial nuclear power, diesels have been needed about 50 times, said Patrick Baranowski of the NRC's risk analysis section. The units usually run five to 10 minutes until offsite power is restored, he said — but sometimes they have been needed for several hours. In a reactor's lifetime, diesels are needed one to three times, he added.

Officials are also concerned about diesel reliability because the units must quickly start and run emergency cooling systems following a nuclear accident during a blackout. The units are always warm and ready to start at moment's notice.

Diesels were chosen for back-up because they are tough, proven machines — used for decades to power ships, trains, cars and trucks. As nuclear safety equipment in atomic plants, diesels must be manufactured and tested under strict standards.

Only a few companies make diesels for nuclear plants. LILCO sent bids to six manufacturers and got three responses. The utility was unable to say whether Delaval was the low bidder. But Stone & Webster, LILCO's architect-engineer, recommended the concern after inspecting Delaval's Oakland, Calif., manufacturing plant, talking to previous customers and ensuring that the units met specifications. The price was \$2.11 million; the contract was signed May 27, 1974. LILCO cited Delaval's good reputation. Started in Sweden by Gustav Delaval in the 1850s, the company moved to



General view of crankshaft 102, which broke during testing last month

The NRC, meanwhile, found recurring problems during audits of Delaval beginning in 1979, including unqualified welders and suppliers, material control failures and improper engineering logs. The July 12 NRC report said Delaval's program to assure high quality was "weakly implemented." Problems have been documented in at least 13 of the nearly 30 reactors that ordered Delaval diesels.

The agency also criticized LILCO's management. On Feb. 24, 1983, the NRC said LILCO had used an improper test procedure but the test was approved by three layers of management reviewers. The NRC said it was "concerned about the effectiveness of your management control systems" and cited "a lack of aggressive oversight on the part of LILCO to pursue, identify and

But LILCO officials have expressed concern. In an April 6 memo, Edward Youngling, Shoreham start-up manager, told James Rivello, Shoreham plant manager, he was concerned about the cylinder head failures. Delaval had told LILCO that casting defects caused cylinder head cracks two per cent of the time. But at Shoreham three of 24 heads cracked — 12.5 per cent. Moreover, Youngling said, Delaval told LILCO to expect cracks in two to three more cylinders. "This is a rather high level in my judgment," he wrote.

As a result, LILCO has replaced all 24 cylinder heads with new models. But since there were only defects in five heads, LILCO's replacement of the others was voluntary. So the utility paid \$1.4 million for the new

LILCO Photo

ing plant, talking to previous customers and ensuring that the units met specifications. The price was \$2.11 million; the contract was signed May 27, 1974. LILCO cited Delaval's good reputation. Started in Sweden by Gustav Delaval in the 1880s, the company opened a U.S. branch in 1901.

Even before the diesels arrived at Shoreham, however, there were problems. Audit reports obtained by *Newsday* show that in 1975 and 1976, Stone & Webster criticized Delaval for such things as "lack of controls of quality workmanship," errors in design drawings, failure to inspect suppliers and failures in training. But Delaval corrected the problems, Stone & Webster reported, and LILCO officials say they were satisfied.

At Shoreham, dirt was found in the diesels' electric relays, meaning the units might not operate reliably. Suffolk in 1977 urged that the issue be included in hearings on Shoreham's operating license, but LILCO agreed to make changes and the matter was dropped. In 1978, LILCO began attaching the units to electric cables, fuel and water lines, and securing them to the floor to withstand earthquakes.

Delaval started to change its fabrication in 1978. Questioned by a Suffolk attorney on Aug. 3 of this year, foundry manager Edward Dobrec said some changes stemmed from "poor equipment . . . that was worn." In 1981, the company said problems in the piston area of its units were due to "improperly manufactured spherical washers." This past July, Richard Pratt, Delaval customer service manager, said in an affidavit that cylinder cracks at Shoreham were "caused by casting imperfections."

LILCO began reporting problems to the NRC. In February, 1981, LILCO reported oil problems in some bearings. In November, LILCO found piston problems. In 1982, a cooling water pipe broke after only 170 hours of operation. Several months later a water pump ruptured. In early 1983, three cylinder heads cracked and the NRC was compiling dozens of failures reported by LILCO — in the piston area, the exhaust, the crankshaft area and the turbocharger.

In a March 24, 1983, inspection report, the NRC said "an apparent overall excessive vibration problem exists" and diesel reliability "is questionable." It said the problems were "an immediate concern." LILCO disagreed. Museler said the vibration was "normal," but some of the components were not secured so they shook loose. A July 12 NRC consultant's report, however, said the parts shook loose due to "excessive vibration."

Some of the repairs were paid for under warranty by Delaval; LILCO paid others as part of general equipment upgrading. Except for the three cylinder heads and the later crankshafts, Museler called the problems "normal shakedown of large equipment."

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LILCO paid the fine last month. Museler said the utility disagreed with the fine but it was cheaper to pay than fight. The utility said the incident did not show management problems but occurred because an engineer did not document valid judgments on how the test was done.

By April, Suffolk, which opposes Shoreham's operation, saw an opportunity to add diesels to its grievances. But LILCO initially refused to provide Suffolk more information. In a March 28 letter, LILCO attorney Taylor Reveley told Suffolk: "LILCO will cooperate with the county if it, in turn, cooperates with the company." But Suffolk, which has refused to participate in emergency planning, countered that LILCO was trying "to bargain with the safety of Shoreham in a desperate attempt to secure an emergency plan."

LILCO also barred Suffolk consultants from a May 16 diesel test after Suffolk was invited by the NRC. Suffolk officials charged LILCO was covering up problems. The utility, however, said it was reporting problems to the NRC as required. LILCO also notes that Suffolk's consultant was allowed inside the plant yesterday to inspect one of the failed crankshafts.

On May 2, Suffolk urged new hearings on the diesels. A federal panel granted the request June 22 — although the sessions have been indefinitely delayed due to the crankshaft failures.

Over the summer, Suffolk questioned Delaval officials and got various internal documents. Delaval claimed 97 of its diesels with 1,267 years of operating time are similar to Shoreham's and have few problems. Many of those diesels are on ships but Delaval's Pratt said the operation of marine units applies to nuclear applications.

There is some disagreement on that. The NRC's Starostecki said each Shoreham diesel "is not a standard, off the shelf piece of equipment. It is rated for a different speed. It's differently sized." He said stresses may be greater. Beyond that, Suffolk consultants found major problems with Delaval's standard marine engines. Per Meulengracht, one consultant, said an informal survey found that 25 per cent to 35 per cent of Delaval ship diesels had cracked cylinder heads. LILCO attorney Anthony Earley said such problems are "based on a very small sample" and are much too high.

As a result, LILCO has replaced all 24 cylinder heads with new models. But since there were only defects in five heads, LILCO's replacement of the others was voluntary. So the utility paid \$416,000 for the new heads, after receiving a \$312,000 discount.

Problems continued to be found. On May 17, NRC officials said oil was leaking and that tubing was loose and vibrating. On June 15, the NRC said that while LILCO was "making progress" in fixing the problems, there were "many problems with the diesel generators and the replacement of many parts."

Delaval has said it has found no cracks in its new cylinder heads "of the type found at Shoreham." Suffolk contends it is unclear if the new heads are adequate. Suffolk attorney Alan Dynner said it is "incredible" that LILCO accepted one new cylinder with a flaw and eight below thickness specifications. But Museler said the flaw is insignificant. "On any piece of metal you will find some indications [of flaws]," he said. He added that while the wall thickness is technically below the specification, it is still thicker than needed. The NRC's Starostecki said the agency is studying the matter.

One of the major questions is whether the crankshaft failures are related to past problems. LILCO believes they are not, but does not rule out that possibility. On Friday, NRC expert J.T. Beard said some past problem — such as overheating — may have caused a cascade of failures that resulted in the crankshaft cracks. Experts hope the current analysis will provide answers.

Although the warranty for two of the diesels expired before the crankshaft cracks, LILCO says it will try to collect damages for anything that is Delaval's fault. Three new crankshafts cost \$750,000; the minimum hardware repair is \$2 million, Museler said. It is unclear how the \$250 million interest cost of delay might be paid.

The NRC's Starostecki said the diesel problem does not appear to reflect LILCO's overall management, since other tests passed. The NRC has praised LILCO for detecting the shaft failures and devising an analysis plan. But Starostecki termed it "highly unusual" to have so many problems with one set of diesels. NRC officials say LILCO must solve its own problems. "They can replace a part of the whole machine, as long as they can assure the staff, the NRC and public that generators are reliable," said the NRC's Edward Greenman. Otherwise, "they can't run the plant," he said.

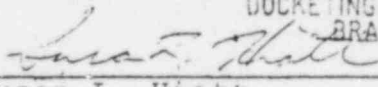
He said every plant seems to have a nagging problem just before completion. "In some ways it is a test of the whole process, seeing how well the last problem is resolved," he said. "It is also a test of LILCO's character: How they approach the problem and how they fix it." He added: "The jury's still out on this one."

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