

RELATED CORRESPONDENCE
LILCO, December 5, 1984

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USNRC

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

'84 DEC -5 P4:57

Before the Atomic Safety and Licensing Board OFFICE OF SECRETARY
REGULATORY & SERVICE
BRANCH

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

LILCO'S RESPONSE TO SUFFOLK
COUNTY'S MOTION TO COMPEL

LILCO objects to performing an x-ray crystallographic examination on the surface of the cam gallery crack on the grounds that

- (i) the test is unnecessary,
- (ii) there is no assurance that the test will narrow the issues in dispute because substantial uncertainty exists concerning whether it will yield reliable quantitative results, and
- (iii) the County's Motion is untimely.

In the event, however, that the Board orders the test, LILCO believes that the potential for narrowing the issues can be maximized by requiring the test procedures outlined in this Response.

add
J. Horn
OCA

DS03

A. The Test Is Unnecessary

Both LILCO and the NRC Staff testified that x-ray crystallographic examination of the fracture surface is unnecessary. (Tr. 26531-32). LILCO has, in its view, carried its burden of proof and established that the cam gallery cracks are casting induced based on the color and thickness of the oxide layer and the lack of an oxide layer of comparable thickness on the weld shrinkage cracks. FaAA testified that the crack could not have been formed during operation since the oxide is much thicker on the casting shrinkage crack below the weld shrinkage crack. Had the crack been operationally induced, both the crack surface beneath and the weld shrinkage crack surface would have been similarly oxidized. (E.g., Tr. 26469-70, 26498).

The observation of no operationally induced crack propagation is consistent with the prediction of no crack growth based on hand calculations and strain gage test results. These results show that the vertical stresses in the cam gallery area are fully compressive. Accordingly, additional testing of the cam galleries to verify that the cracks are non-propagating and fabrication rather than operationally induced is unnecessary.

B. No Assurance Of Reliable Results Or Narrowing Of Issues

LILCO believes that precise quantitative interpretation of x-ray analysis of the crack surface with oxides formed over a range of temperatures is difficult and indeed may not be possible. FaAA's previous experience with attempts at such analyses by independent laboratories confirms this. Moreover, FaAA has contacted a number of laboratories which perform x-ray crystallography, including McCrone Associates, Inc. and Camet, Inc., regarding this specific analysis. Comments received from these laboratories have further confirmed LILCO's concern that x-ray analysis may not produce quantifiable, reproducible results. Rather, the results may well be ambiguous or conflicting, and thus not dispositive of the issue. Indeed, such results may lead to more litigation rather than less.

Dr. Robert Muggli, who is in charge of the x-ray analysis department at McCrone, advised that he could not be sure he could obtain any results at all, or that results he did obtain would be quantifiable. Dr. Muggli indicated that he would have to perform an x-ray scan of the crack surface in order to determine whether it was possible to obtain any meaningful results. Further, Dr. Muggli indicated that if the initial test indicated that the oxides were non-stoichiometric (i.e., not of

one precise chemical or crystallographic form), the analysis of the oxide would require additional testing with uncertain prospects for obtaining quantifiable results. In LILCO's view, these problems, combined with the absence of any necessity for performing the test and the County's untimeliness, dictate that the test should not be performed.

C. The Motion Is Untimely

The County received LILCO's Supplemental Testimony on the cam gallery cracks on September 20 and knew at that time that LILCO contended the oxide layer on the fracture surface occurred during the fabrication process. In September, the County also examined all of LILCO's photographs and documentation on the cracks, and examined the actual crack samples. At no time during this discovery period did the County seek to perform any test on the samples. Indeed, the County apparently did not consider that an x-ray crystallography test was necessary or desirable until substantially all of the testimony on the blocks was completed. The County's long delay in seeking the test reflects that it is not of vital decisional importance. Moreover, the delay suggests that the County's interest in the test arose only after the County had an opportunity to evaluate the course of litigation.

D. Protocol Required If Test Ordered

If the Board orders the test, it should also order the following procedure for conducting the test in order to maximize the potential for meaningful results.^{1/}

(1) To verify that the test results are capable of reproduction, LILCO may elect to have the test performed by a second independent laboratory. LILCO has determined that Camet, Inc., a Santa Monica, California laboratory, is qualified to perform x-ray crystallography.

(2) To allow for independent verification of results obtained by McCrone, LILCO will retain custody of the specimen and take it to McCrone for the test to be conducted at the County's expense. If independent verification is required, LILCO will take the specimen to Camet for the test to be performed at LILCO's expense. All parties will be permitted to observe the tests at both laboratories.

^{1/} Although the County has requested that x-ray crystallography be performed on the specimen, LILCO does not necessarily concede that x-ray crystallography is the only or even the most appropriate technique for performing a quantitative analysis of the oxides on the crack surface. LILCO reserves the right to utilize other techniques to evaluate ambiguities that x-ray testing may generate.

(3) Since neither McCrone nor Camet can assure that the x-ray crystallography will provide meaningful results, nondestructive testing and data reduction will be performed in two phases. In phase one, the crack surface will first be cleaned with acetone and acetate replicas.^{2/} Next, the left and right sides of the fracture surface in comparable locations will be interrogated by the x-ray. Only the nondestructive technique of back reflection from the fracture surface will be utilized during the x-ray crystallography tests. No physical grinding, chemical treatment, removal of the oxide from the crack surface, or other destructive testing will be permitted since this has the potential of changing the oxide form, distorting the test results, and preventing independent duplication of the oxide analysis by x-ray test or other test method. Furthermore, if interrogation with the x-ray back reflection technique does not produce meaningful, interpretable results, no further testing should be conducted.

(4) After the first portion of the test described above is completed, the data will be examined to determine whether

^{2/} Cleaning is necessary to remove any oxides that might have formed on the fracture surface recently. Dr. Anderson has testified that such oxides might prevent the x-ray from reliably determining the original structure of the oxides on the fracture surface. (Tr. 26474).

the oxides are stoichiometric and whether well-defined intensity peak spectra appear in accepted patterns and positions. If the data indicates clearly defined x-ray peaks, then readily available oxide reference spectra, such as those published by the International Center for Diffraction on Data, will be used to define all the chemical compounds present and to provide a baseline for subsequent quantitative analyses.

(5) However, if the x-ray peaks are irregular, ill-defined, or complex (i.e., the x-ray peak pattern contain extraneous peaks and/or relative peak magnitudes which are not clearly associated with defined oxides), then a second phase of testing should be initiated. For phase two of the test, the standards for analyzing the x-ray spectra will be based on fracture surfaces of the original EDG 103 block that have been oxidized under controlled conditions.^{3/} The laboratories will fabricate these standards by creating fresh fracture surfaces by breaking three pieces of the original EDG 103 provided by FaAA. Then, under controlled temperature, time and

^{3/} LILCO disagrees with the County's suggestion that classical x-ray spectra found in the catalog published by the International Center for Diffraction on Data are accurate and reliable for the purpose of analyzing complex mixtures of oxides on this crack surface. This is because the oxide in contention is thin and the crack surface is irregular.

environmental conditions, the laboratories will produce a separate wustite, magnetite and hematite standard on the fracture surface by holding the samples in a furnace at the appropriate temperatures necessary to create the relevant oxides in a thickness of .2 to .5 mils. The standards created from the new pieces of the original EDG 103 block will then be tested using the same x-ray protocol. These results will be compared to the results generated from the cam gallery fracture surface to establish which oxides are present on the fracture surface.

(6) All parties will be provided with the test results, including raw diffractometer data that shows the entire spectral plot of x-ray intensity at each angle, and copies of all references used to reduce the data.

(7) In order for the test results to be meaningful in narrowing the issues in contention, it is critical that the evaluation criteria be established in advance. Therefore, based on Dr. Anderson's testimony,^{4/} the laboratories will report their conclusions using the following criteria:

^{4/} Dr. Anderson testified that if 10-15% of the oxides on the fracture surface were wustite or magnetite, that would mean the crack formed during the casting process. (Tr. 26862).

- (a) The x-ray crystallography has detected, to a reasonable degree of engineering certainty, the presence of high temperature wustite and/or magnetite oxides in concentrations of 10% or greater.
- (b) The x-ray crystallography has detected, to a reasonable degree of engineering certainty, the presence of high temperature wustite or magnetite oxides, but it cannot quantify the concentrations of these oxides.
- (c) The x-ray crystallography has detected, to a reasonable degree of engineering certainty, that there are no high temperature wustite or magnetite oxides.
- (d) The x-ray crystallography cannot determine, to a reasonable degree of engineering certainty, the form or quantity of the oxides present on the fracture surface.

With respect to the results of the test, if ordered, the County has indicated that it would not contend that the blocks are unqualified on the basis of cam gallery cracks if the results show the presence of high temperature oxides in concentrations in excess of 15%. This is certainly warranted, but it does not go far enough. First, the correct concentration figures, based on Dr. Anderson's testimony, are 10-15%, not 15%. (Tr. 26862). Second, a finding of wustite and magnetite in concentrations greater than 10-15% should eliminate any request that LILCO monitor the cam gallery with wire gages or strain

gages. The ostensible basis for requesting such monitoring was some residual uncertainty concerning whether the cam gallery cracks were process or operational cracks and whether such cracks would propagate during operation. Even if such doubts are warranted, and the record shows they are not, x-ray test results showing magnetite and wustite in concentrations greater than 10-15% removes all such doubts and renders the monitoring unnecessary and unwarranted. Adequate assurance concerning the cracks can be obtained by depth gauge measurements taken at the first refueling outage.

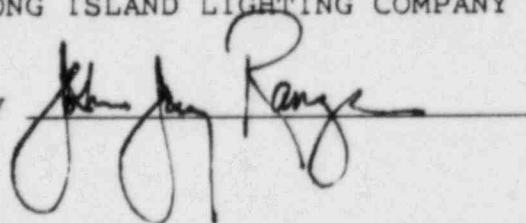
Conclusion

For the reasons stated herein, LILCO respectfully submits that the County's request to conduct an x-ray crystallography test be denied on the grounds that it is unnecessary and untimely and on the ground that there is no assurance that it will lead to a narrowing of the issue in litigation. Should the Board order the test, however, LILCO also respectfully requests that the Board order the test protocol and acceptance criteria set forth in this Response.

Respectfully submitted,

LONG ISLAND LIGHTING COMPANY

By

A handwritten signature in dark ink, appearing to read "John J. Rango", is written over a horizontal line. The signature is stylized with large, flowing loops.

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CERTIFICATE OF SERVICE

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Docket No. 50-322 (OL)

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I hereby certify that copies of LILCO's Response to
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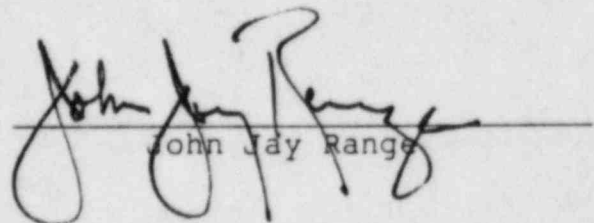
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