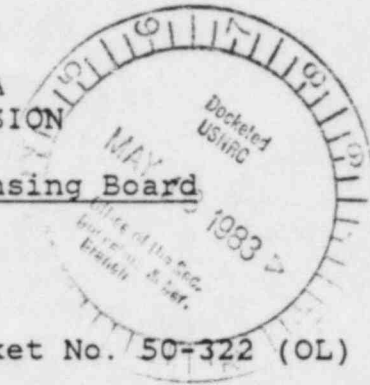


UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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) )

AFFIDAVIT OF EDWARD J. YOUNGLING

Edward J. Youngling, duly sworn, deposes and says as follows:

1. My name is Edward J. Youngling and I am employed by the Long Island Lighting Company (LILCO) as Startup Manager for the Shoreham Nuclear Power Station. My professional qualifications are presented in Attachment A. As Startup Manager, I am responsible for all preoperational test activities. I also coordinate Checkout and Initial Operation (C&IO) testing and preoperational testing. In this role I have been directly involved in the testing of Shoreham's diesel generators and in resolving related issues that develop during testing. Specifically, I am familiar with the five areas discussed in the County's proposed contention on diesel generators.

2. I testified previously in this proceeding as a member of the LILCO panel on the Quality Assurance/Quality Control issues. In that connection, I participated in the

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preparation and review of those portions of the pre-filed testimony on the Quality Assurance contentions relating to the LILCO Preoperational Testing and Startup program. In addition, I responded to cross-examination questions from lawyers for SC relating to the LILCO Preoperational Testing and Startup program.

3. The purpose of this affidavit is to demonstrate that the matters in numbered paragraphs 1 through 5 of Suffolk County's proposed contention on the diesel generators are unsupported by the facts, insubstantial in nature, or remedied. Each of the five paragraphs is separately addressed. Before doing so, however, I will describe briefly the Shoreham Emergency Diesel Generators and the status of the preoperational testing of the generators.

4. There are three identical diesel generators at Shoreham designated as DG-101, DG-102 and DG-103. These diesel generators are eight (8) cylinder in-line engines manufactured by Transamerica Delaval, Inc. and rated at 3500 KW at 450 RPM. As a result of the C&IO program and the Preoperational Test program, the engines to date have accumulated 1906 hours of operating time distributed among the three engines as follows: DG-101-564 hours, DG-102-644 hours, and DG-103-698 hours.

5. The vendor has advised LILCO that the basic diesel engine in the Shoreham diesel generators has been in production since the early 1950's. There are 97 diesel engines in this country that are essentially identical or very similar to the Shoreham diesels. Most of these engines are still in service and collectively have accumulated a total of 1,267 years of operation.

6. In addition to Checkout & Initial Operation testing of components and supporting systems and system flushes, to date the following preoperational tests of the Shoreham diesel generators have been successfully performed:

PT.307.001(A-1)(B-1)(C-1)	Emergency Diesel Generator (101)(102)(103) Mechanical Preoperational Test
PT.307.003(A-1)(B-1)(C-1)	Emergency Diesel Generator (101)(102)(103) Electrical Preoperational Test (includes electrical trips and 72 hour reliability test)
PT.307.005(A)(B)(C)	Emergency Diesel Generator (101)(102)(103) Electrical Preoperational Test (includes electrical transients and 24 hour reliability test)

The results of these tests are currently being reviewed for approval. The only preoperational tests remaining to be performed for the Shoreham diesel generators are

PT.307.004(A)(B)(C)

Emergency Diesel Generator  
Reliability Qualification  
Preoperational Test

PT.307.002

Plant Integrated Electrical Test

I.  
Proposed Contention Paragraph (1)  
(Testing)

7. Paragraph (1) of the SC proposed contention states:

LILCO has failed to test adequately the emergency diesel generators, and has failed to ensure adequate review and approval of test procedures and test results, as documented in I&E Reports 82-35, 83-02, 83-07 and 83-08 and I&E Enforcement Action 83-20. Without adequate testing, reliable operation cannot be assured.

This section of the contention alleges two deficiencies: (1) failure to test the diesel generators adequately and (2) failure to ensure adequate review and approval of test procedures and test results. Neither allegation is valid.

8. The County cites I&E Reports 82-35, 83-02, 83-07, 83-08 and I&E Enforcement Action 83-20. Three of these documents, I&E 82-35, 83-08 and I&E Enforcement Action 83-20, all relate to the 24 hour load test of Diesel Generator 102. LILCO's response (SNRC-884) to the Notice of Violation in EA 83-20 makes it clear that the 24 hour test was properly

conducted and the results of the test demonstrated that this diesel generator did meet its design capabilities. The test in question required, pursuant to Regulatory Guide 1.108, Revision 1, a demonstration of the full load carrying capability of the diesel generator for 24 hours, of which two hours are required to be at a "load equivalent to the two hour rating of the diesel generator." The two hour rating was 3900 KW. The violation concerned the data taken during this two hour period. While data recorded in the control room at 15 minute intervals for the two hour period indicated a range of load values from 3500 KW to 3850 KW, additional data recorded on a high speed chart recorder (Honeywell Visirecorder) showed that the integrated load profile for the two hour period represented a "load equivalent" of more than 99% of the total load that would result from running the diesel generator for two hours at exactly 3900 KW. The Test Engineer properly believed the chart recorder was a more precise indication of the diesel generator load. The Test Engineer's judgment on this point has been confirmed by the fact that the strip chart recorder has now been designated as the primary instrument to be used in all future load tests of the diesel. Thus, as set forth in SNRC-884, LILCO believes that the two hour portion of the test was properly conducted and that the results of this test in fact demonstrated that this diesel generator did meet its design



capabilities. Also, the entire 24 hour reliability test, including the two hour 3900 KW test, has been successfully reperformed, demonstrating again that Diesel Generator 102 can and does perform its functions as required.

9. As reported in LILCO's response to the Notice of Violation, the facts and circumstances described in the notice represent a failure to document judgments made by the Test Engineer in the test report. In addition, the lack of documentation had not been noted in LILCO's review process, which was still in progress at the time the violation was reported. The two additional reviews that had not yet occurred were the OQA final audit and the review by the Review of Operations Committee, including its Preoperational Test Results Review Subcommittee. Significantly, the review by this Subcommittee is designed to focus on the kinds of discrepancies noted by the I&E inspector. The members of the Subcommittee are independent of the preoperational test program and are technically qualified and experienced. The failure to note the lack of documentation does not indicate inadequate review and approval of test procedures and results because the full review required by the LILCO program had not been completed. In addition, the NRC has conducted a review of more than 93% of the completed test procedures and has not noted any similar deficiencies.

10. I&E Report 83-02, the Readiness Assessment Team Inspection, does not support the County's allegation that there has been inadequate testing of the diesel generators or inadequate review of test procedures and test results. In fact, the overall assessment in the report stated that the preoperational test program "appeared to be working as designed except as noted by previously identified items and by one violation identified during this inspection." The violation referred to involved review posting of E&DCR's on multi-sheet drawings reviewed by the I&E inspector as part of his review of RCIC tests. LILCO witnesses testified on this violation during hearings on the RAT Inspection Report. As they indicated, the E&DCR's in question were controlled in accordance with LILCO's program. The observation in I&E 83-02 does not relate to the adequacy of testing or the review of test procedures and results. I&E 83-02 noted a violation relating to the control of rework associated with the diesel generators. This violation, also discussed by LILCO's RAT Inspection witnesses, does not relate to the adequacy of diesel generator testing or the review of test results.

11. Finally, the County refers to I&E Report 83-07. This inspection notes four concerns based on the inspector's review of LILCO's documents and reports and based on the

inspector's observations and witnessing. The report also lists a number of occurrences during the past year based on a review of LILCO deficiency reports. A number of these concerns and occurrences are addressed in this affidavit. It is important to note, however, that this report also reflects that the test program is working. In paragraph 3.1, the inspector noted as follows:

As a result of these discussions [with members of the Startup Group and licensee representatives] review of references, review of documents relative to test program status and implementation, observations, tours through the plant, and witnessing of tests in progress, no discrepancies were noted. The inspector's concerns and findings in specific areas are discussed below:

. . . . .  
The 34 completed test procedures listed in Attachment A were reviewed to verify that adequate testing was planned in order to satisfy regulatory guidance and licensee commitments and to ascertain whether uniform criteria are being applied for evaluating completed preoperational tests in order to assure their technical and administrative adequacy.

The inspector reviewed the test results and verified the licensee's evaluation of test results by review of test changes, test exceptions, test deficiencies, "As-Run" copy of test procedure, acceptance criteria, performance verification, recording conduct of test, QC inspection records, restoration of system to normal after test, independent verification of



critical steps or parameters, identification of personnel conducting and evaluating test data, and verification that the test results have been approved.

Findings:

No discrepancies were noted in the review of these procedures.

I&E Inspection Report 83-07 at 4-5. The inspector thereafter listed a number of unresolved test exceptions which, he stated, would be examined on subsequent inspections for resolution by LILCO and this was made an unresolved item. In addition, the inspector noted no violations or discrepancies as a result of witnessing portions of the 72 hour preliminary electrical test runs of Emergency Diesel Generator sets 101, 102 and 103. Finally, the inspector noted "the excellent care being given the diesel generator rooms and battery rooms including security for these areas." I&E Inspection Report 83-07 at 8.

II.  
Proposed Contention Paragraph (2)  
(Vibration)

12. Paragraph 2 of the SC proposed contention on diesel generators reads:

The diesels have been subjected to excessive vibration, as documented in I&E Report 83-07. Such vibration may reflect a design defect or a fabrication/erection deficiency or a combination thereof. In

any event, such vibration prevents the diesels from reliably performing their intended functions.

This allegation is incorrect in two respects. First, Shoreham's diesels have only the expected and normal vibration and are not subjected to any excessive vibration. Second, this normal, expected vibration does not prevent the diesels from reliably performing their functions.

13. In a study conducted by Stone & Webster Engineering Corporation, the vibratory characteristics of the three Shoreham diesel generators were compared with two other diesel generators of the same R-4 straight eight cylinder model but with a greater number of operating hours. One diesel generator was located in San Antonio, Texas and had 5,800 hours of operating time and the other was in Lincoln, Kansas and had approximately 50,000 hours of operating time. The selection for comparison of the diesel generators in San Antonio, Texas and Lincoln, Kansas is appropriate because they are the same model as the Shoreham diesel generators and because they have extensive operating histories demonstrating their proven reliability. The fact that the San Antonio, Texas and Lincoln, Kansas diesel generators are not installed in nuclear plants has no effect on the validity of the comparison of the vibration characteristics of the engines. Vibrations were measured

for major components of the diesel generators, the foundation and surrounding floor area. Representative data from the study, normalized to reflect differences in power level and RPM, are presented in Attachment B. Attachments C and D show in more detail the points where the vibration measurements were taken.

14. The data in Attachments B, C and D demonstrate that vibration of Shoreham's diesel generators is comparable to and consistent with the vibration of the other two diesel generators that were studied. The amplitudes of the vibratory motions of Shoreham's diesel generators are within expected limits and are acceptable under the industry experience. In short, the generators do not experience excessive vibrations.

15. The County offers I&E Report 83-07 (March 24, 1983) for support of its allegation that the diesel generators are subject to excessive vibration. The NRC inspector's conclusion regarding vibration was apparently based on some of the various categories of the incidents and failures of the diesel generators, which are listed on page 7 of the Report. Only four of these categories involve occurrences due to vibration. In the first group are occurrences in the engine exhaust area. The category includes two types of events: (1) some bolts on the cylinder exhaust pipes and manifold brackets failed, and (2)

some leaks developed in mechanical couplings in the jacket water piping. As a result of its review of conditions (1) and (2) above, LILCO concluded that additional pipe guide clearance in the exhaust manifold would eliminate the situation. LILCO modified the pipe guide to provide greater clearances and there have been no further occurrences observed in the approximately 700 hours of engine operation following the completion of this work.

16. The second grouping listed occurrences in the engine barring device area. This situation was vibration-induced and caused air tubing and supports for the engine barring device to break. This situation did not have an impact on safety. The barring device is not required for engine operation or for engine starting. Rather, it is a pneumatic device used to rotate the engine during various maintenance and checkout activities. Nevertheless, LILCO corrected this situation by rerouting tubing and by adding additional supports and flexible hoses. Although vibration induced, this situation does not reflect excessive vibration; rather it reflects the effects of normal, expected vibration on a particular component. No similar conditions in this area have been noted in the approximately 250 hours of full power engine operation following the preventive actions described above.

17. The third group consists of occurrences in the engine turbocharger area. These incidents involved movement of the engine's turbocharger which was causing capscrews on the turbocharger supports and connecting flanges to break. This movement was due to a resonance at 30 Hz. which was excited by the firing frequency of the engine. This phenomenon was remedied by installing supports for each engine to eliminate the resonance. No further incidents have occurred in approximately 900 hours of engine operation since the supports were installed.

18. The fourth item was a vibration-induced break of the jacket water chemical addition pipe. This situation, however, does not reflect excessive vibration, but the effects of normal, expected vibration on a particular component. This situation would not have impacted safety even if it had occurred while diesel operation was required. The chemical addition funnel and pipe have no function in the starting or operation of the diesel engine. They are maintenance items used for periodic addition of jacket water treatment chemicals. LILCO corrected this situation by adding supports for the chemical addition pipe. No recurrence has been observed in the ensuing 1200 hours of operation.



19. A fifth group which could be construed as vibration related but which was not listed in I&E Report 83-07 involved movement of the exhaust expansion joint. Although this movement was detected visually, it had no effect on the operation or capability of the diesel generators. Measurements were taken and it was determined that the movement was caused by a resonance effect. By replacing these expansion joints with ones that do not resonate sympathetically with the engine firing rate, LILCO eliminated the movement phenomenon which has not been observed in the approximately 1500 hours of engine operation following the replacement of expansion joints.

20. Contrary to the allegations in paragraph (2) in SC's proposed contention, the diesels exhibit normal and expected vibration, not excessive vibration, and this normal vibration does not reflect a design or fabrication defect. This normal vibration does not prevent the diesels from performing their intended functions, as the successful testing to date confirms.

III.  
Proposed Contention Paragraph (3)  
(Component Cracking)

21. Paragraph (3) of the proposed SC contention on diesel generators reads:

The diesels have suffered from cracking of components, as documented by LILCO's verbal report to NRC Region I on March 8 and 30, 1983, and LILCO's written report, SNRC-873, dated April 15, 1982.\* These deficiencies have included water jacket leaks which have the potential to decrease power output and interfere with rapid startup of the diesels. [Footnote omitted.]

These allegations are unfounded and refer to specific models of components either no longer in use or to be replaced at Shoreham. The March 30, 1983 report to the NRC dealt with intermediate and intake rocker arm assembly hold-down capscrews. This oral report was formalized in SNRC-883 (May 4, 1983). The March 8 report and SNRC-873 (April 15, 1983) are concerned with cylinder heads. I will discuss the capscrews first.

22. During testing of Diesel Generator Engine 103, it was discovered that a single intermediate and intake rocker arm assembly hold-down capscrew had broken. There are 96 such capscrews in use at Shoreham. The broken capscrew (or rocker arm shaft bolt) was subject to a detailed analysis to determine the cause of the failure. On the basis of metallurgical examination, it was determined that the failure resulted from high stress cycle fatigue. To preclude similar failures in the future, all 96 such capscrews at Shoreham have been replaced with a modified capscrew. As explained in SNRC-883, the redesign of the capscrew is to:

reduce fatigue sensitivity in the bolt by transferring the regions of highest stress away from the stress concentrations in the root of the threads and reducing the cyclic loading on the bolt. The reduction in cyclic loading is achieved by decreasing the diameter of the shank, thereby increasing the elongation/stress relationship of the bolt. This effectively transfers more of the cyclic load to the stiffer rocker arm shaft, which is loaded in compression.

SNRC-883 at 2. All 96 capscrews have been replaced. Since this replacement, the capscrews have logged approximately 270 hours of high load operation and there have been no additional failures.

23. LILCO's oral report to the NRC on March 8, 1983 as well as SNRC-873 deal with the cracking of the cylinder heads (which is the second set of components referred to by Part 3 of the County's proposed contention). The particular model of cylinder head used on the Shoreham diesel engines does not give rise to a serious threat to the operability of the diesel generators. However, these heads will be replaced with an improved model even though the indications found are not detrimental to engine operation.

24. The following additional facts are pertinent to the diesel generator cylinder heads. Relatively early in the testing program, a leakage rate of 9.25 gallons per hour was

observed in the jacket water standpipe level for DG-101. During subsequent operation of the diesel engines, small amounts of water were also discovered in two of the remaining 23 cylinders. Failure analyses were performed by the vendor. The analyses revealed that in two cylinder heads a leak existed in the exhaust passage near the flange, and in the third head, a leak existed in the fire deck. The observed cracks in the three cylinder heads were attributable to latent casting defects during the manufacturing process. According to the vendor, these latent casting defects occur only in a small percentage of the heads manufactured. Manufacturing techniques have been improved so that such cracks are either prevented in the fabrication process or detected. The vendor reported that improvements in cylinder head casting techniques, and the application of stress-relief techniques have eliminated the condition. Moreover, improved inspection techniques now in use, such as a higher pressure hydro-test and ultrasonic testing now ensure that a crack, in the unlikely event that one does occur, will be detected. The analyses also indicated that the cracks were caused by operating stresses and were self-relieving and non-propagating, indicating that they were not of a serious nature. The analysis also showed that the cracks were of such a nature that they would not have affected the ability of the engines to operate and to carry the required

load because the mechanical strength of the head was not affected. The small amount of water that could enter the combustion chambers would be expelled via the exhaust system along with other combustion byproducts. The harmless nature of these cracks is demonstrated by the fact that marine engineers operate engines with known similar cracks for extended periods until it is convenient to repair the head. Moreover, in more than 700 additional hours of operation no additional cracking of the cylinder heads has been discovered.

25. Nevertheless, even though the cracks do not give rise to serious concern regarding the operability and functioning of the diesel generators, LILCO, to further enhance reliability, has taken, or will take, the following actions. First, the heads exhibiting these small cracks were replaced. Second, as reported in SNRC-873, LILCO will replace all cylinder heads with those of recent manufacture to take advantage of the present prevention and detection capabilities of the vendor. A replacement schedule is being developed, and because of the nonserious nature of the cracks, the replacement work will be on a schedule that will not impact or otherwise interfere with fuel load. In all probability some replacements will occur following fuel load. Third, in addition to the replacement of cylinder heads, LILCO committed in April 1983 to an



inspection program, recommended by the vendor, to detect cylinder head leaks should they occur. This inspection procedure is set forth in SNRC-873.

IV.  
Proposed Contention Paragraph (4)  
(Hot Restart)

26. Paragraph (4) of the proposed contention states as follows:

One of the diesels "locked out" (i.e., would not restart when hot restart was attempted during testing). [Footnote omitted.]

This, the County contends, is a deficiency that shows LILCO has failed to comply with regulatory requirements as they pertain to the diesel generators. The County's allegation on hot restarts is unsupported by the facts.

27. The hot restart capability<sup>1/</sup> of Shoreham's three diesel generators has been fully tested in accordance with Regulatory Guide 1.108 and all three diesel generators successfully completed these tests. The hot restart capability tests

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<sup>1/</sup> Hot restart is the automatic starting of a diesel at operating temperatures. Hot restart capability is demonstrated by subjecting a diesel to the starting sequence following a 24 hour full load run.

of diesel generators 101, 102 and 103 were successfully performed on April 17, April 24, and May 6 of 1983 respectively, and those test results are now in the LILCO review process.

28. A total of 10 hot restarts have been attempted on the Shoreham diesel generators.<sup>2/</sup> Of this number, the engines successfully restarted nine times within ten seconds of receipt of a start signal. On only one occasion did a restart attempt fail for a reason related to the engine. On November 19, 1982, on its first restart attempt, Diesel Generator 101 did not hot restart when hot because a shuttle valve was stuck. This valve was repaired and Diesel Generator 101 successfully passed not one, but two subsequent hot restart tests. In summary, then, 9 of 10 attempted hot restarts were successful. This record confirms that there is no substance to the County's allegation

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<sup>2/</sup> This means that on 10 occasions simulated start signals were sent and received by the diesel generators following a 24 hour full load carrying capability run. In two additional instances (November 12, 1982 and April 15, 1983), the start signal was not received by the diesel generator for reasons unrelated to the diesel generators or their reliability. In one of these instances, a test jumper to simulate a start signal was inadvertently not installed. This was the first of all the attempted hot restarts and it is worth noting that the jumper was promptly installed and a hot restart was attempted and successfully completed. In the second instance, both the normal and redundant power supplies to the instrument logic generating the start signal for the engine were temporarily out of service for maintenance. The engine was restarted, run for another 24 hours and the hot restart test successfully completed.

that the hot restart capability of Shoreham's diesel generators is a deficiency that shows LILCO has failed to comply with applicable regulatory requirements. The opposite is in fact the case, as confirmed by the tests.

V.  
Proposed Contention Paragraph (5)  
(Trends)

29. Paragraph (5) of the proposed SC contention on diesel generators reads:

LILCO has failed to prepare an adequate trend analysis of the diesel problems and occurrences as documented by I&E Report 83-07. Such failure means that there can be no assurance that these diesels have been adequately analyzed to ensure reliable performance of required functions.

The County's allegation is mistaken. LILCO has prepared a trend analysis and this analysis demonstrates that the number of items identified are declining even as the diesel generators are accumulating more operating hours. This is an appropriate and favorable trend.

30. To develop the trend analysis, all work on the diesel generators was classified in accordance with one of five categories. The first category is work involving routine maintenance and construction, e.g., changing oil filters,

installing temporary modifications for system flushes and routine inspections. This category was not included in the trend analysis because it represents routine conditions. All of the remaining categories of work required engineering evaluation and disposition and, therefore, have been included in the trend analysis. The second category is industry reported items and includes those items of generic applicability that were reported by either the vendor or by LILCO. The third category consists of work to remedy Shoreham-specific items that were not of generic applicability. The fourth category relates to ancillary equipment which supports the diesel generators, such as fuel oil transferring equipment, compressed air equipment and motor controls. Included as a fifth category of items for the trend analysis were those items related to product improvement which would further enhance the diesel generator maintainability and margin of reliability. Examples in this category include (1) replacement of air start filters with ones of improved design to decrease maintenance intervals, and (2) relocation of lube oil strainers to provide more accessibility to enhance maintenance.

31. Attachments E and F are two graphs that show the currently declining trends of the diesel generator items to be resolved at Shoreham. Attachment E entitled "Engine Hours and

Items/Month vs. Calendar Date" illustrates that beginning March, 1983, although the testing of the diesels continued and hours were being accumulated rapidly, the number of items identified was sharply declining. Attachment F entitled "Items Resolved Per Month vs. Total Engine Hours" is similar to the first. It shows, even more dramatically, that the number of items identified by preoperational testing is sharply declining even though engine hours are accumulating. It is important to recognize that the initial operation of the diesel generators and the preoperational testing of the diesel generators are expected to identify items requiring resolution. The Shoreham data coincide with the expected trend. As the Attachments show, prior to and just after the initial operation of the diesels, a number of items were identified, with fewer being identified as operating hours accumulated. The start of preoperational testing in September 1982, as expected, identified a number of additional items. Again, the number of items identified declined substantially as the testing progressed and engine hours accumulated.

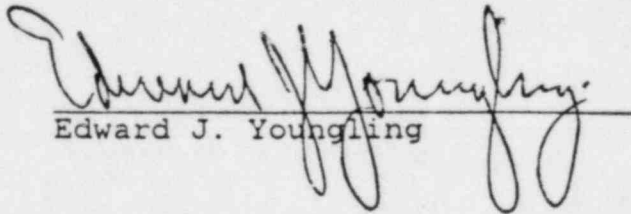
32. In addition to the foregoing trend analyses, LILCO, with the assistance of Stone & Webster and the vendor (Delaval), will continue to review all available data relating to the Shoreham diesel generators to ensure that causes of



conditions are understood and properly corrected and that the potential for recurrence has been minimized or eliminated. In addition, the available data is being systematically analyzed to ascertain the types of conditions, potential common causes, the direction of any discernible trends, and whether any generic implications in the data should be pursued.

33. In summary, contrary to the County's allegations, trend analyses have been performed for Shoreham's diesel generators and these trend analyses provide assurance that items to be resolved on the generators have been identified and corrected and that in the future, the generators will perform safely, reliably and efficiently.

34. NRC I&E is aware of all of the matters referred to in paragraphs (1) through (5) of the SC proposed contention and each of these matters will be followed (i) in connection with I&E's normal inspection of the Shoreham preoperational test program, (ii) as part of the closure of unresolved items identified in I&E inspection reports, or (iii) as part of the closure of items reported to I&E pursuant to regulatory reporting requirements.

  
Edward J. Youngling

Subscribed and sworn to before me this 16<sup>th</sup> day of May, 1983.

  
Notary Public

ELENA O. MAHONEY  
NOTARY PUBLIC, State of New York  
No. 52-4508996  
Qualified in Suffolk County  
Commission Expires March 31, 1985

PROFESSIONAL QUALIFICATIONS

Edward J. Youngling

Startup Manager - Shoreham Nuclear Power Station

LONG ISLAND LIGHTING COMPANY

My name is Edward J. Youngling. My business address is Long Island Lighting Company, Shoreham Nuclear Power Station, P. O. Box 628, Wading River, New York 11792. Since 1981 I have been Startup Manager for the Shoreham Nuclear Power Station where I am responsible for all Preoperational Test activities. I report to the Shoreham Plant Manager. I set initial construction priorities by system/subsystem, and monitor construction progress as it relates to the startup schedule. I have the authority to modify construction schedules as conditions demand. I chair construction release meetings at which the status of construction related to systems scheduled to be released is discussed. I coordinate all checkout and initial Operations and Preoperational Testing.

I graduated from Lehigh University in 1966 with a Bachelor of Science Degree in Mechanical Engineering. From June 1966 to March 1968, I attended Union College and achieved credits towards a Masters of Science Degree in Nuclear Engineering.

I have received a Senior Operator Certification from the General Electric Company on the Duane Arnold Energy Center Boiling Water Reactor.

Before assuming my present position, I was a Nuclear Services Supervisor in the Nuclear Operations Support Division from May 1979 to March 1981. I was responsible for the management and coordination of support services for LILCO's Nuclear Power Stations. These support services included coordination of major station modifications; performance of operational design reviews; coordination of the resources of other LILCO Departments and outside consultants; coordination of long-range planning activities associated with plant maintenance, fuel cycle strategy, and budget and cost control; and monitoring of overall plant and individual equipment performance.

From February 1975 to May 1979, I was Chief Technical Engineer of the Shoreham Nuclear Power Station-Unit 1. I was responsible for the activities of the Instrumentation and Control, Health Physics, Radiochemistry and Reactor Engineering Sections of the plant staff. My duties included the development of administrative and technical programs and procedures to meet regulatory, company, and industry requirements, and the training of professional personnel and technicians to satisfy qualification standards.

From August 1974 to January 1975, I was assigned to the plant staff as the Instrumentation and Control Engineer, and then as Acting Chief Engineer-technical. I was responsible for manpower planning and the development of the technical training programs for subordinate personnel. I prepared portions of the Shoreham Safety Analysis Report, and participated in the review and approval of plant operating procedures, lesson plans and system descriptions.

From July 1973 to July 1974, I was the Instrumentation and Control Engineer for Shoreham Nuclear Power Station and was assigned to the General Electric Company Startup, Test and Operations (STP) organization at the Duane Arnold Energy Center in Cedar Rapids, Iowa. I participated in the preoperational test program in the areas of nuclear instrumentation, process radiation and reactor vessel instrumentation. I acted as G.E. shift engineer during fuel loading operations and as assistant to the G.E. shift engineer during startup testing and power ascension program.

From August 1972 to June 1973, I was assigned to the Shoreham Nuclear Power Station Program as the Assistant Project Engineer, and then as the Project Engineer. I was responsible for overall plant design control. I coordinated design efforts between LILCO, Stone & Webster Engineering Corporation, General

Electric Company-Nuclear Energy Division, various major equipment suppliers, and regulatory agencies.

From November 1971 to July 1972, I was directly responsible for the startup of the boiler for the Northport Unit No. 3 (a 380 MW unit), which included the fuel safety system, the combustion control system and associated mechanical equipment.

From November 1969 to October 1971, I was assigned to the Shoreham Nuclear Power Station Project in the Nuclear Engineering Department. I participated in the engineering review of the Shoreham plant design in the following areas: plant equipment layout, equipment specifications, equipment selection, main control board design, plant computers.

From April 1968 to October 1969, I was employed by the LILCO and assigned to the Northport Power Station. During this period, I assisted in the startup of Northport Unit 2, and assisted the station maintenance section, supervising routing and shutdown maintenance activities.

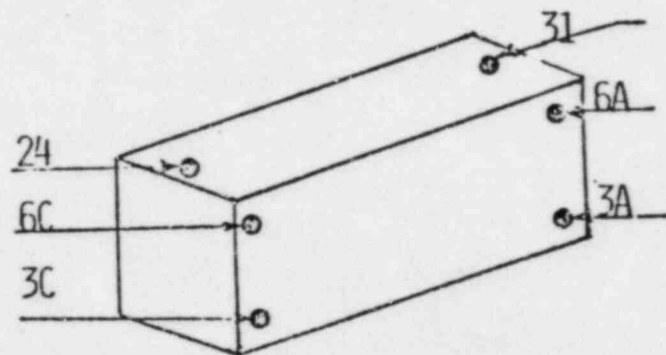
From June 1966 to March 1968, I was employed by the General Electric Company at Knolls Atomic Power Laboratory. I was stationed at the West Milton Site as a Mechanical Test Engineer on the S3G Prototype "USS Triton" submarine.



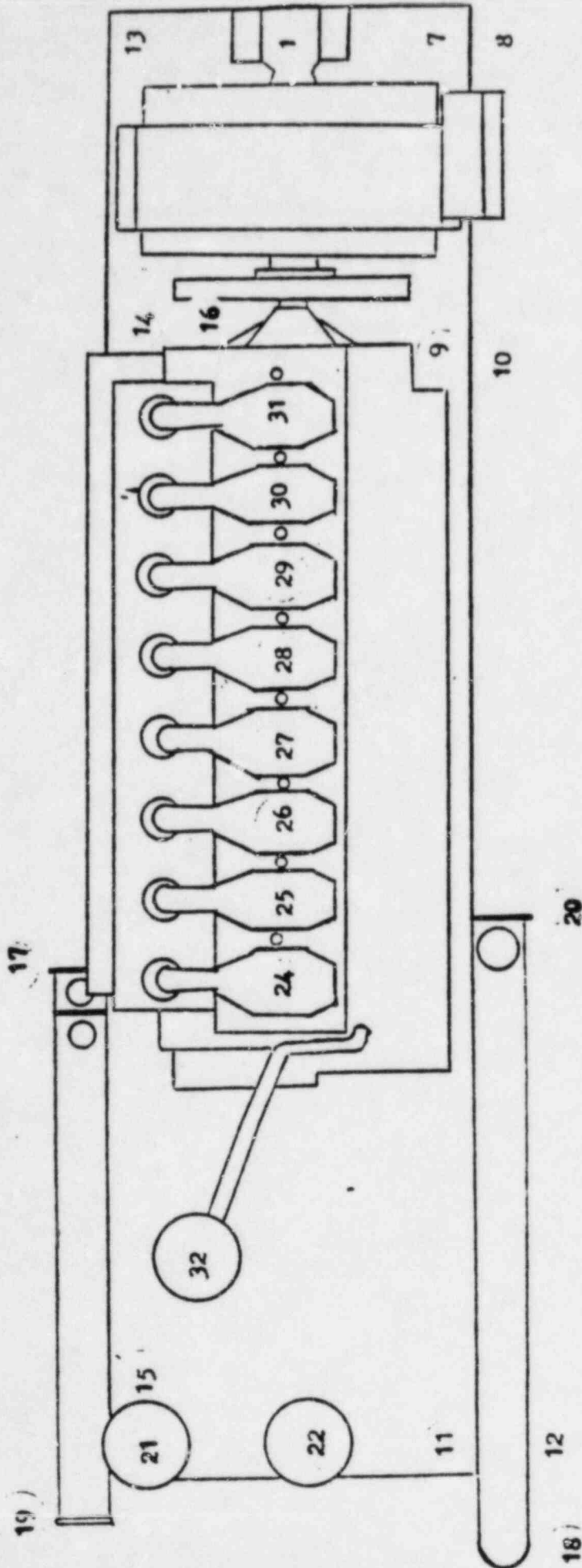
I am a member of the American Nuclear Society. I hold a Guest Associate Engineer appointment in the Reactor Division at Brookhaven National Laboratory. I am a member of Pi Tau Sigma. I hold an Engineer-in-Training Certificate - State of Pennsylvania (State Registration Board for Professional Engineers).

VIBRATION LEVELS  
AT FIRING FREQUENCY OF ALL CYLINDERS AT 75% LOAD  
 (UNITS: MILS PEAK TO PEAK)

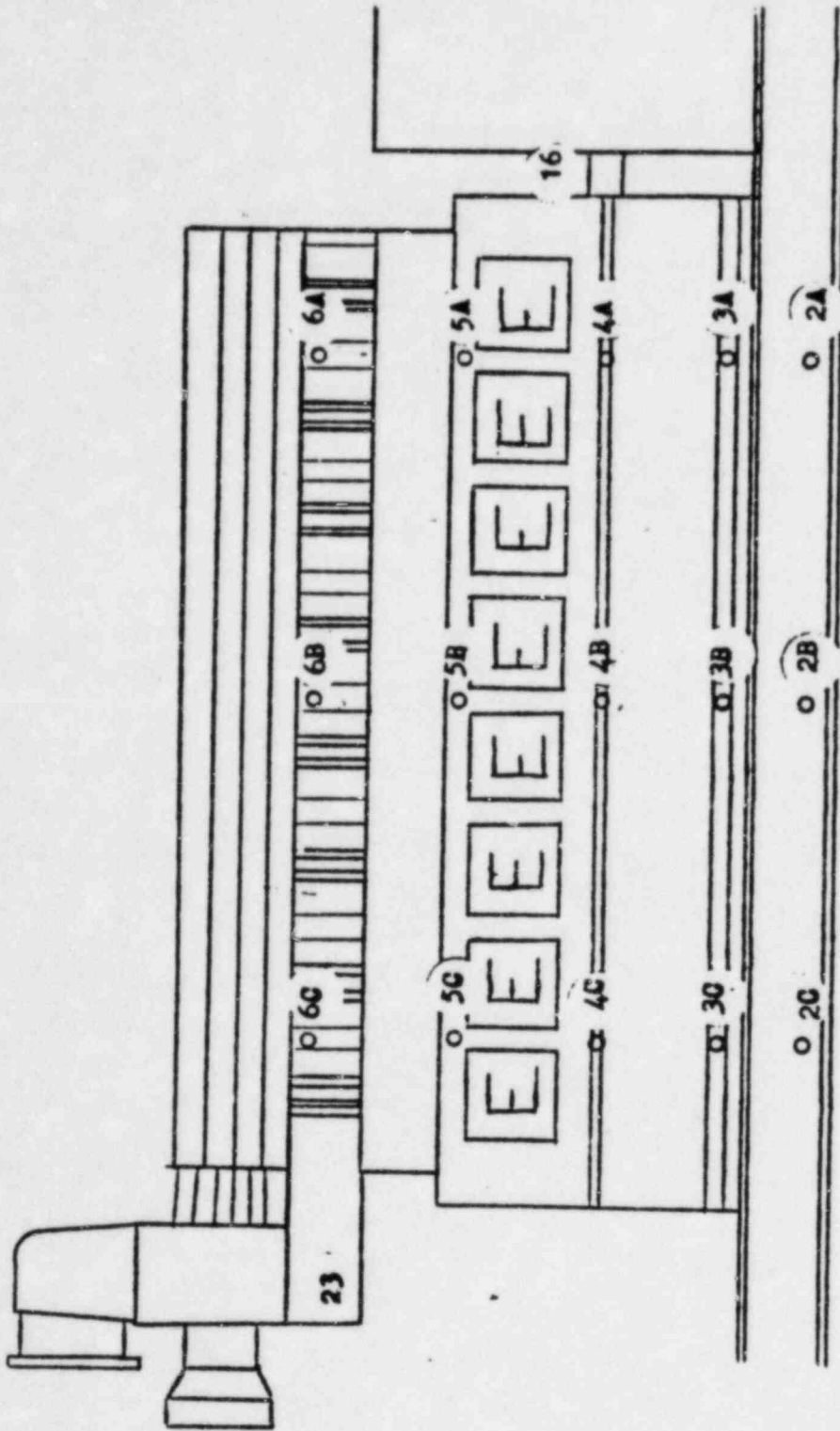
	<u>3C</u> <u>H</u>	<u>6C</u> <u>H</u>	<u>24</u> <u>V</u>	<u>31</u> <u>V</u>	<u>6A</u> <u>H</u>	<u>3A</u> <u>H</u>	
101	-	-	0.12	1.26	3.45	0.67	(SOIL)
102	1.46	0.57	0.55	0.70	1.59	1.39	(SOIL)
103	1.70	1.52	0.44	0.28	4.67	1.65	(SOIL)
SAN	1.03	5.73	0.51	0.63	6.02	1.21	(ROCK)
1 KN	1.89	1.55	1.03	0.63	2.67	1.89	(SOIL)



SAN & LKN MACHINES ADJUSTED FOR POWER LEVEL  
 1 KN MACHINE ADJUSTED FOR ENGINE SPEED

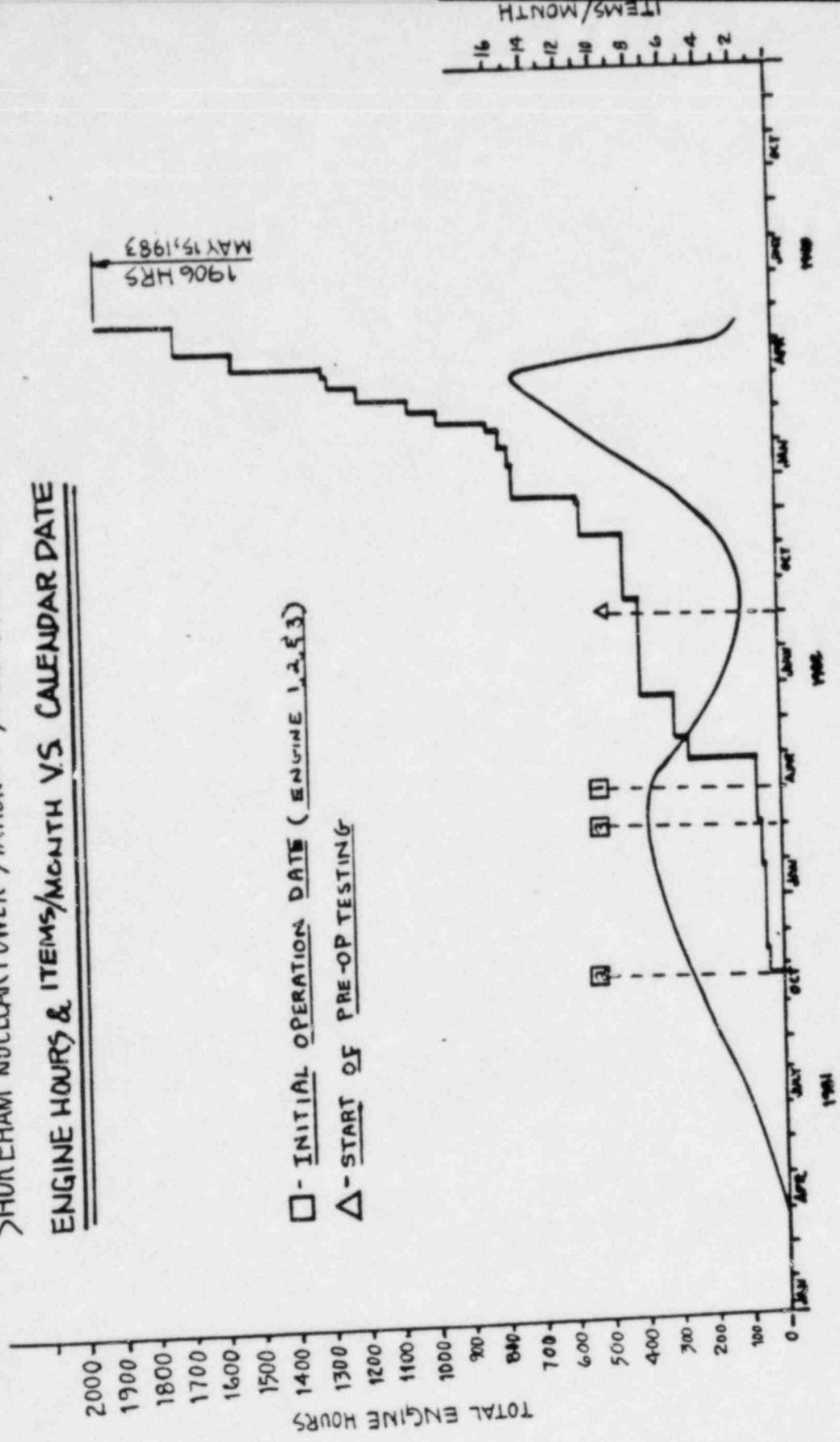


VIBRATION MEASUREMENT LOCATIONS - PLAN VIEW  
SHOREHAM NUCLEAR POWER STATION  
EMERGENCY DIESEL GENERATORS



VIBRATION MEASUREMENT LOCATIONS - SIDE VIEW  
SHOREHAM NUCLEAR POWER STATION  
EMERGENCY DIESEL GENERATORS

SHOREHAM NUCLEAR POWER STATION ~ STAND-BY DIESEL GENERATORS  
ENGINE HOURS & ITEMS/MONTH VS CALENDAR DATE





SHOREHAM NUCLEAR POWER STATION ~ STAND-BY DIESEL GENERATORS

ITEMS RESOLVED PER MONTH  
VS TOTAL ENGINE HOURS

