February 1, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY	)	Docket Nos. 50-440 50-441
	)	
(Perry Nuclear Power Plant, Units 1 and 2)	)	

AFFIDAVIT OF GARY R. LEIDICH

CITY OF WASHINGTON)
) ss:
DISTRICT OF COLUMBIA)

I, Gary R. Leidich, being duly sworn, state as follows:

1. I am employed by The Cleveland Electric Illuminating Company ("CEI") as General Supervising Engineer of the Nuclear Construction Engineering Section ("NCES") of the Perry Nuclear Power Plant ("PNPP") Nuclear Construction Department. My business address is Perry Nuclear Power Plant, 10 Center Road, Perry, Ohio 44081.

2. NCES is a multi-discipline engineering section that contains electrical, mechanical, chemical, piping, civil, structural, and administrative units. NCES is responsible for providing the engineering support for construction and start-up

at PNPP. Because I supervise the NCES Electrical Unit, I am responsible for activities relating to the standby power supplies (the Transamerica Delaval, Inc. ("TDI") diesel generators and associated equipment) at PNPP. I am also familiar with the TDI Owners Group, having attended several Owners Group meetings, including the executive meeting in December 1983 which formalized and approved the group. I have personal knowledge of each of the matters set forth herein, and believe them to be true and correct.

3. I have been employed by CEI since January of 1974. My initial assignment with the company was as an Associate Engineer involved with modification work at existing fossil fuel plants. In 1975 I was transferred to PNPP where I was given the responsibility for several electrical equipment specifications. My responsibilities included supervising our engineering consultant's preparation of the standby diesel generator specifications, with an overall responsibility for all technical aspects for the PNPP diesel generators.

4. I have served on several committees and subcommittees within the Nuclear Power Engineering Committee ("NPEC") of the Institute of Electrical and Electronic Engineers ("IEEE") Society. My service has included appointments as Subcommittee Chairman and as Executive Committee Member of NPEC. Among the working groups in which I have participated was the group responsible for IEEE Standard 387, "IEEE Standard Criteria for

Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations".

5. Since 1978, I have been actively involved as an instructor and lecturer in seminars and technical sessions sponsored by IEEE regarding diesel generators and the requirements of IEEE Std. 387. I have been an instructor in several seminars on the qualification and testing requirements for diesel generators in both the United States and Europe. Most recently I have lectured at IEEE sessions on the 1983 revision to IEEE Std. 387 and participated as an industry panel member on the subject of diesel generator reliability.

6. I received a Bachelor of Science degree in electrical engineering and a Master of Science degree in engineering sciences from the University of Toledo. I am a registered professional engineer in the State of Ohio. A statement of my professional qualifications is attached hereto as Exhibit A.

I. TDI DIESEL GENERATOR TESTING AND INSPECTION

7. A major element of the TDI Diesel Generator Owners Group Program (described in the Affidavit of John C. Kammeyer) involves an enhanced engine testing program, coupled with specific component inspections. The Owners Group technical staff, in evaluating specific engine components, provided recommendations to the owners regarding special or expanded engine tests and component inspections which would provide additional assurance of the adequacy of both the engines and the

components to perform their safety-related functions. This testing is being conducted in addition to that described in the PNPP FSAR (Table 1.8).

A. Testing Program Development

8. The testing program for the standby diesel generators at PNPP is based on IEEE Std. 387-1977 and Regulatory Guide 1.108 (as described in Table 1.8 of the PNPP FSAR). IEEE Std. 387-1977 was developed by the Nuclear Power Engineering Committee of IEEE to provide design criteria, design features, qualification considerations and testing criteria for diesel engine generator units applied as standby power supplies for nuclear power plants. The testing categories and criteria are established in Section 6 of the Standard. Regulatory Guide 1.108, Revision 1, August 1977, provides additional specific guidance on criteria for periodic and pre-operational testing of diesel generator units. The PNPP testing program also includes the recommendations developed by the TDI Diesel Generator Owners Group Program. The Owners Group preparation of testing and inspection recommendations for the PNPP test program was based on the results of the analytical studies performed by the Owners Group and a recognition that tests conducted on the "lead" DSRV-16-4 engines were successfully performed prior to the PNPP tests.

B. The "Lead" Engine Concept

9. The "lead" engines for the model DSRV-16-4 engines installed at PNPP were the DSRV-16-4 engines located at the

Comanche Peak Steam Electric Station of the Texas Utilities Generating Company. A full pre-operational test program was conducted on the Comanche Peak engines in accordance with the Texas Utilities' program based on NRC Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electrical Power Systems at Nuclear Power Plants" (Revision 1, August 1977) and IEEE Std. 387-1977, cited above. In excess of 100 hours of operation were logged on these engines. The Comanche Peak test program included starting and load acceptance tests, auxiliary system tests, load capability tests, and control circuit tests. Specific tests, in addition to those described in Commanche Peak's FSAR were required by the Owners Group to be performed on the Comanche Peak engines. Tests required by the Owners Group included a torsiograph test, which confirms the adequacy of the crankshaft, and engine vibration tests. The lead engines at Comanche Peak were successfully tested using a program based on IEEE Std. 387, Regulatory Guide 1.108 and the additional Owners Group recommendations.

10. In addition to the Comanche Peak testing, more than 1600 hours of operation have been accumulated on the DSRV-16-4 engines at Duke Power's Catawba Plant. This has further substantiated the Comanche Peak test results. The results of the Comanche and Catawba engine tests have provided additional assurance regarding the capabilities of the DSRV-16-4 engine design. The results of the testing at Comanche Peak, as well as supplemental information from the Catawba Plant, are referenced in the PNPP DR/QR Report.

11. Information from pre-operational and lead engine testing at other plants was obtained through the Owners Group and from site visits. For example, CEI representatives from the Nuclear Testing Section and Quality Assurance Departments visited the Comanche Peak Plant after the pre-operational testing of their first TDI engine to review their methods and results. The PNPP test program was reviewed in detail with Comanche Peak personnel to assure that the test program completely and consistently incorporated the Owners Group recommendations and operating experiences on the engines to date. The test program also included applicable input from routine reporting and surveillance programs, such as INPO reporting, TDI Service Information Memos, 10 C.F.R. Part 21 and 10 C.F.R. Part 50.55(e) reports. Resolution of potential problem areas for particular components on the engines or on auxiliary equipment identified by these programs were included, as required, in the test program.

C. PNPP Pre-Operational Testing and Inspections

12. The purpose of the diesel generator testing program at PNPP is to provide additional assurance that the TDI diesel generators are reliable, prior to plant licensing and operation. The program consists of a comprehensive pre-operational engine test program and includes testing recommended by the TDI Diesel Generator Owners Group.

13. The PNPP test program includes a rigorous group of tests which demonstrate the capability of a diesel generator unit

to perform its intended function. These tests are described in Section 6.4 of IEEE Std. 387-1977 and Regulatory Guide 1.108 (as described in Table 1.8 of the PNPP FSAR). The tests include diesel generator auxiliary systems tests for electrical and pneumatic controls, diesel generator control circuit functional and start tests, diesel generator load tests, diesel generator load acceptance tests, and diesel generator reliabiity tests, as discussed below. At PNPP, an additional measure of the performance of each cylinder on each engine will be obtained by logging cylinder exhaust temperature sensor readings under load. This data will be taken throughout the pre-operational tests.

14. The diesel generator auxiliary systems tests will demonstrate the proper functioning of the electrical and pneumatic controls for the diesel generator auxiliary systems. Auxiliary systems include the starting air, jacket water, lube oil and fuel oil systems.

15. The diesel generator control circuit functional and start tests will demonstrate electrical and pneumatic control circuit operability in the "Manual" mode of operation for both Unit 1 diesel generators. Each diesel generator will be tested to demonstrate that it is capable of starting, achieving rated voltage and frequency within acceptable limits and time, and accepting load in the various modes of operation.

16. The diesel generator load tests will demonstrate the capability of both Unit 1 diesel generators to start, load to 100

percent of full rated load and achieve steady-state temperature equilibrium. Each diesel generator will demonstrate operation at 100 percent load for 24 hours within the manufacturer's design and operational parameters. Each diesel generator's capability to reject 100 percent rated load without tripping due to overspeed will be tested.

17. The diesel generator load acceptance tests will demonstrate the capability of the diesel generator to start upon receipt of a start signal, and to independently accept design loads without exceeding manufacturer specifications and design criteria.

18. The diesel generator reliability tests will confirm the starting performance of the Unit 1 diesel generators by the performance of a minimum of 69 total valid tests with no failures, in accordance with the criteria specified in Reg. Guide 1.108, Rev. 1, Sections C.2.a(9) and C.2.e. PNPP will also perform 20 additional tests, 10 on each Unit 1 diesel generator. The 20 additional start-and-load tests will be conducted in accordance with Reg. Guide 1.108 and IEEE-387-1977, Section 6.3.2, with one exception. Since a single step load of 50 percent of the generator nameplate continuous KW rating is not available, the generator will be loaded with the available bus loads once it has attained the necessary speed and voltage. The bus will then be synchronized with offsite power and loaded to 50 percent of rating. This exception is necessary due to

differences between the actual field configuration and the factory testing capability.

19. One test per diesel will be performed with the engine initially at "normal operating temperature equilibrium", as defined by IEEE Std. 387-1977. The remaining start-and-loads will be done with the diesel generators initially at warm standby, their normal condition when PNPP is operating. Including the 69 tests required by Reg. Guide 1.108, this accounts for a total of a minimum of 89 start-and-load tests. Each start will be documented in accordance with Section 3.0 of Regulatory Guide 1.108 on a chronological test log.

20. Additional engine tests beyond the industry standards and Regulatory Guides have been recommended by the Owners Group. As noted above, an example of such an additional test is a torsiograph test, which confirms the adequacy of the crankshaft to withstand operating torsional stresses. This test will be performed at 0%, 25%, 50%, 75% and 100% of engine generator nameplate full-load rating prior to pre-operational testing. This test will provide additional assurance that the PNPP engine crankshaft design is adequate. Hot and cold crankshaft deflection measurements, as recommended by TDI, will also be performed prior to pre-operational testing to verify the adequacy of the crankshaft. An engine baseline vibration survey will also be taken to determine the initial vibration characteristics. A visual survey will be performed while the engines are running at

full load to identify any individual component with unusually high vibration levels.

21. In addition, the Owners Group has recommended inspection of selected engine components following approximately 100 hours of engine operation. These component inspections will be conducted at PNPP following established site procedures.

22. As described above, the PNPP test program meets or exceeds both the testing described in IEEE Std. 387-1977 and the testing described in PNPP FSAR Table 1.8 pertaining to Regulatory Guide 1.108, and implements the Owners Group recommendations. Fulfillment of the testing program provides assurance that the TDI diesel generator units meet their design requirements and will perform with a high degree of reliability. Beyond the standards, regulatory guides and Owners Group recommendations, the program includes additional start-and-load acceptance tests to provide further assurance regarding engine performance. This comprehensive testing program, other DSRV-16-4 successful test programs, the PNPP DR/QR effort (discussed in the Affidavit of Edward C. Christiansen), and the Owners Group results, all provide an unprecedented level of assurance regarding the

reliability of the TDI diesel generator units in nuclear plant applications.

Gary R. Leidich

Gary R. Leidich

Subscribed and sworn to before me this 1st day of February, 1985.

Katherine A. Warman

Notary Public

My Commission expires:

3/31/85

RESUME OF
GARY R. LEIDICH

Exhibit A

EDUCATION AND TRAINING:

- Bachelor of Science, Electrical Engineering, University of Toledo, 1972
- Master of Science Degree in Engineering Sciences, University of Toledo, 1974

EXPERIENCE:

1974-Present - The Cleveland Electric Illuminating Company

Joined CEI in 1974 as an Associate Engineer in various fossil plant electrical engineering responsibilities in Plant and Substation Engineering Department. Responsible Engineer for precipitator retrofit.

In 1975, was assigned to the Perry Project and was Responsible Engineer for procurement of plant electrical equipment. Also responsible for Perry electrical system design calculations, voltage and short circuit studies and transmission system interface criteria.

In 1978, served as Lead Electrical Engineer and was responsible for supervision of personnel involved in all electrical engineering aspects.

In 1980, was Senior Engineer on assignment as Supervisor of Construction Quality Engineering. Responsibilities included supervision of personnel involved in monitoring contractors' QA/QC performance during construction.

In 1982, was Senior Engineer in Nuclear Construction Engineering Section. Responsibilities included supervision of engineering personnel, providing construction support for electrical, civil, structural and chemical disciplines. Was also responsible for cost and schedule control of all primary engineering consultants.

In 1984, was named to present position of General Supervising Engineer, Nuclear Construction Engineering Section and responsible for the on-site engineering to support the construction and startup program for the Perry Plant.

PROFESSIONAL MEMBERSHIPS:

- Secretary, Nuclear Power Engineering Committee of Power Engineering
- Society of Institute of Electrical and Electronic Engineers
- Registered Professional Engineer, State of Ohio

February 5, 1985

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CERTIFICATE OF SERVICE

This is to certify that copies of the foregoing APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF ISSUE 16, APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE TO BE HEARD ON ISSUE 16, AFFIDAVIT OF JOHN C. KAMMEYER, AFFIDAVIT OF EDWARD C. CHRISTIANSEN, AFFIDAVIT OF GARY R. LEIDICH, AND AFFIDAVIT OF CHARLES D. WOOD III, were served by deposit in the United States Mail, first class, postage prepaid, this 5th day of February, 1985, to all those on the attached Service List, except for those parties identified by asterisk, who were served by hand-delivery.

Rose Ann Sullivan

ROSE ANN SULLIVAN

DATED: February 5, 1985

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