



THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

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MURRAY R. EDELMAN

VICE PRESIDENT
NUCLEAR

June 28, 1985
PY-CEI/NRR-0277 L

Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
SER Confirmatory Issue 63
TDI Diesel Generator Reliability

Dear Mr. Youngblood:

Attached is our response to the seven (7) questions, regarding TDI Diesel Generator Reliability, constituting Confirmatory Issue 63 as requested in Safety Evaluation Report Supplement 6 (Attachment 1). An additional item, conformance with the testing guidelines of Regulatory Guide 1.108, is also addressed (Attachment 2).

If you have any questions, please feel free to call.

Very truly yours,

Murray R. Edelman
Vice President
Nuclear Group

MRE:njc

Attachments

cc: Jay Silberg, Esq.
John Stefano (2)
J. Grobe

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Question 1:

Submit the maintenance and surveillance program that CEI intends to use on the Perry engines for staff approval. The staff will review this program to the same extent it has those on other engines (e.g., Comanche Peak, Grand Gulf, and Catawba).

Response:

PNPP will utilize the maintenance and surveillance program developed by the TDI Owners Group. This program is included as Appendix II to the Design Review and Quality Revalidation (DR/QR) report which was submitted to the staff on January 17, 1985 (PY-CEI/NRR-0156 L) and revised March 18, 1985 (PY-CEI/NRR-0203 L).

Question 2:

Perform a torsionograph test that includes both variable speed tests and variable load tests and a subsequent stress analysis that confirms that stresses in the crankshaft are acceptable.

Response:

A torsionograph testing program which included variable speed and variable load tests was performed on each Unit 1 engine. The test report, submitted to the staff on June 14, 1985, concludes that the crankshafts are adequate for their intended use at Perry.

Questions 3:

Address the effects of engine imbalance on crankshaft adequacy as part of the torsionograph test report to be submitted to the staff.

Response:

A special imbalance torsionograph test was conducted on each Unit 1 engine. The test results are addressed in the addendum to the torsionograph test report submitted on June 14, 1985.

Question 4:

Confirm that Owners Group recommendations have been followed regarding:

- (a) random sample testing of pushrods
- (b) proper torquing of the jacket water pump shafts

Response:

- (a) Destructive random sample testing to verify the weld quality of future friction welded pushrods is recommended by the TDI Owners Group. This will be done. The pushrods that are presently installed have been subjected to the inspections required by the DR/QR including:

- Verification that the main and connector pushrods are friction welded.
 - Performance of a liquid penetrant test on all friction welded main and connector pushrods, or, as an alternative, visual inspection. No surface cracks were found along the bond line between the rod end and the tube.
- b. The Owners Group recommends torquing the castle nut on the engine drive jacket water pump shaft to a value between 120 and 660 ft-lbs. The Division 2 pump was dissassembled and reassembled onsite with the castle nut torqued to 120 ft-lbs. A rebuilt jacket water pump assembled at the factory, was installed on the Division 1 engine. Castle nut torque was not verified during the Division 1 engine revalidation effort. It will be verified during the post operation (approx. 100 hrs.) inspection.

Question 5:

Demonstrate the adequacy of control panel assembly/panel system.

Response:

The control panel assembly/panel system for PNPP has been found to be acceptable per the requirements of the DR/QR. Inspection results were submitted to the staff by letter PY-CEI/NRR-0188L dated February 8, 1985. Inspections were performed in accordance with the Component Quality Revalidation Checklist prepared for Perry by the Owners Group. Original issue of the PNPP DR/QR contained the Component Design Review Checklist for the Vogtle Plant. This was in error. Subsequent revision to the DR/QR on March 18, 1985 (PY-CEI/NRR-0203L) corrected this error.

Question 6:

Demonstrate the adequacy of the bearing stresses on the chock plates.

Response:

Minimum load surfaces for the chock plates used on the PNPP engines have been calculated, and in all cases, the actual field measurements of the bearing surfaces exceed the calculated minimum requirements. Additionally, hot and cold crankshaft deflection measurements have also been taken. These measurements show that deflection is well within the acceptable limits established by the manufacturer. This indicates that the engine is properly supported.

Question 7:

Replace the 4R cylinder head with one that does not contain a through-wall weld repair where the repair was performed from one side only, or demonstrate that the present cylinder head does not contain such a repair.

Response:

Cylinder head 4R (serial #A76) does not contain a through-wall weld repair performed from one side only. Details were provided to the staff by letter dated February 21, 1985 (PY-CEI/NRR-0198 L). Transcripts from the ASLB hearing on the PNPP diesel generators (Issue 16), also address this issue (pages 2428 and 2429).

All PNPP TDI engine cylinder heads were returned to Transamerica Delaval, Inc. (TDI) to be reconditioned in accordance with the latest recommendations established by the TDI Owners Group. This included reworking the valve seats, water discharge ports, steam vent hole, and injector hole. Additionally each head was stress relieved and pickled. Upon completion of the rework, cylinder head 4R (serial #A76) was inspected by a CEI representative and rejected because of combustion face (fire deck wall) pitting and weld indications. These indications were excavated (not through wall), and built up with weld material per accepted procedures. The CEI representative reinspected the head and found it acceptable.

Conformance with the Testing Guidelines of Regulatory Guide 1.108

CEI responded to NRC Safety Review question 430.94 in Amendment 8 to the FSAR (August, 1982) by stating that testing would be performed in accordance with R.G. 1.108 except for the provisions in position C.2.a.(3). Position C.2.a.(3) states:

- C.2.a. (3) Demonstrate full-load-carrying capability for an interval of not less than 24 hours, of which 22 hours should be at a load equivalent to the continuous rating of the diesel generator and 2 hours at a load equivalent to the 2-hour rating of the diesel generator. Verify that voltage and frequency requirements are maintained. The test should also verify that the cooling system functions within design limits.

We agreed in our 1982 response to "demonstrate full-load-carrying capability for an interval of not less than 24 hours at a load equivalent to the continuous rating of the diesel generator" (7000KW), but took exception to testing for 2 hours at a load equivalent to the 2-hour rating of the diesel generator. Our position was based upon the fact that the maximum continuous load on the Division 2 diesel generator is only 5634 KW, and Division 1 only 4668 KW. The diesel generators are not expected to operate above the 5634(4668) KW maximum continuous calculated load and therefore testing at the continuous load rating of the diesel generators, (7000 KW = 24% above 5634 KW) is more than adequate to demonstrate their ability to reliably perform their intended safety function. Testing at the 2-hour rating (7700KW) for 2 hours would appear to be unnecessary in this application since the maximum continuous load is so much lower than the rating of the diesel generators (i.e., the diesel generators were purchased oversized so that they would not be forced to operate near their limits).

An additional consideration in taking exception to testing at the 2-hour rating was to limit operating time at or near maximum rated conditions, since operating under these conditions may lead to shortened diesel generator life. This fact has been borne out in other industrial diesel generator applications. Therefore, since it appeared to serve no useful purpose (maximum load much less than the rated load) and in consideration of the above stated industrial experience, we took exception to verbatim compliance with position C.2.a.(3) of R.G. 1.108. Table 1.8 of the FSAR was revised in Amendment 12 (July, 1983) to reflect this exception to R.G. 1.108.

NRC endorsed this exception in Safety Evaluation Report Supplement (SSER) #4 (February, 1984) and subsequently suspended their endorsement in SSER #5 (February, 1985) due to TDI Diesel Generator concerns raised in early 1984, pending review of the TDI Diesel Generator Owners Group recommendations.

SSER #6 (April 1985) summarizes actions taken to date with respect to the TDI Diesel Generators and concludes:

With respect to the TDI diesel generators at Perry Unit 1, the staff concludes that actions already taken by the applicant, and those proposed to be performed before licensing, are adequate to ensure that the TDI diesel generators at Perry Unit 1 can reliably generate emergency onsite power.

This conclusion is based on (1) the TDI Owners Group program and staff review of that program; (2) preliminary findings by PNL on the 16 Phase 1 generic components; (3) staff review of the adequacy of the Phase 1 components at Perry Unit 1, including the results of the recent teardown and inspection; (4) the Phase 2 DR/QR review conducted thus far by PNL for Comanche Peak Unit 1 diesel generators and the similarity of the Perry diesel generators to those at Comanche Peak; (5) previous staff conclusions on similar engines at Comanche Peak, Grand Gulf, and Catawba; (6) the proposed preoperational testing program at Perry; and (7) the applicant's commitment not to use any cylinder heads that have had throughwall weld repairs where the repair was performed from one side only.

Preoperational testing, Item 6 of this conclusion, has been completed with the exception of the Loss of Offsite Power Test. We have performed a continuous rating test for 24 hours at 7000 KW. We still believe it prudent to not test the diesel generators at the 2-hour rating (7700KW) and are proceeding on the assumption that NRC will maintain their conclusions made in SSER #6.

The FSAR, Table 1.8-1 will be further clarified in a future amendment to reflect the above discussion.