



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 12 TO FACILITY OPERATING LICENSE NO. NPF-58

CLEVELAND ELECTRIC ILLUMINATING COMPANY, ET AL.

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET NO. 50-440

1.0 INTRODUCTION

By letter dated February 9, 1988, The Cleveland Electric Illuminating Company, Duquesne Light Company, Ohio Edison Company, Pennsylvania Power Company and Toledo Edison Company (the licensees) requested an amendment to Facility Operating License No. NPF-58 for the Perry Nuclear Power Plant, Unit No. 1. The proposed amendment would revise the criteria contained in the footnote to Table 4.8.1.1.2-1 of the Technical Specifications (TS) for rezeroing the failure count on previous tests of the diesel generators. It would also clarify the footnote concerning test frequency for the diesel generators in Table 4.8.1.1.2-1 and would modify the reporting requirements of TS 4.8.1.1.3 to be on a per-diesel-generator basis rather than a per-nuclear-unit basis.

As the basis for their rezeroing the failure count, the licensees have referenced a January 18, 1988 letter from the diesel generator manufacturer, IMO Delaval Inc., to Mr. Tony Pusateri of the Cleveland Electric Illuminating Company. The letter certifies that the Control Air Panel 1H51P0548 has been restored to like-new condition following reconditioning and/or replacing of control components in conjunction with the panel modification (as described in as-built drawings submitted by the licensees to the manufacturer on January 13, 1988).

2.0 DISCUSSION

TS Table 4.8.1.1.2-1, "Diesel Generator Test Schedule," is a table which defines test frequency of the individual diesel generators based on the number of valid failures in the last 20 and last 100 valid tests. A note to the table explains the criteria for determining the number of failures and number of valid tests. The note also discusses how the previous test failure count can be reduced. The present wording indicates that the failure count may be reduced to zero if a complete diesel overhaul to like-new conditions is completed provided that the overhaul, including appropriate post-maintenance operation and testing, is specifically approved by the manufacturer and if acceptable reliability has been demonstrated. The reliability criterion shall be the successful completion of 14 consecutive tests in a single series. Ten of these tests shall be in accordance with TS 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5, and four tests in accordance with the 184-day testing requirements of TS 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5.

If this criterion is not satisfied during the first series of tests, any alternate criterion to be used to transvalue the failure count to zero requires NRC approval.

The proposed revision would allow the failure count to be reduced if an appropriate overhaul/redesign is completed. This overhaul/redesign must be approved by the manufacturer.

The requirements for post-maintenance operation and testing and for demonstration of reliability would still apply. The failure count would then be reduced by the number eliminated by the approved overhaul.

On July 2, 1984, the staff issued Generic Letter 84-15 (G.L. 84-15) to all licensees of operating reactors, applicants for an operating license, and holders of construction permits. The intent of G.L. 84-15 was to provide licensees with guidance on improving diesel generator reliability by reducing the number of cold fast starts for diesel generators, obtaining diesel generator reliability data and attaining and maintaining a diesel generator reliability goal. Enclosure 1 to G.L. 84-15 described the basis for reducing cold fast starts and its resultant improvement in diesel generator reliability and also discussed the correlation between excessive diesel generator testing (other than cold fast starts) and its resultant degradation of diesel engines. This was primarily aimed at some older plants whose TS required testing of diesel generators each time subsystems of the emergency core cooling system became inoperable.

Enclosure 3 to G.L. 84-15 described an acceptable example of a performance program for attaining and maintaining diesel generator reliability above the threshold level of concern. It included increased surveillance frequency where previous testing indicated failure counts in excess of a specified value until restored reliability was demonstrated. It also considered disqualification and subsequent requalification of the diesel generator in accordance with a prescriptive testing program, including 7 consecutive successful demands without a failure within 30 days, and 14 successful consecutive demands within 75 days of the diesel generator being restored to operable status. Certain more restrictive criteria applied should a failure occur during the above testing.

While increased testing frequency was and still is determined by the staff to be an acceptable method to demonstrate restored reliability of the diesel generator, the discussions in Enclosure 1 to G.L. 84-15 regarding reduction of unnecessary testing and changes to the Standard TS as described in Appendix A of G.L. 84-15, such as changing the previous 3-day test frequency to 7 days, clearly indicate that unnecessary diesel generator testing should be avoided if other methods of demonstrating and/or restoring diesel generator reliability exist.

In this regard, the licensees' proposal has merit in that performance of an overhaul to restore components to like-new condition to eliminate failures, followed by an acceptable demonstration of reliability, would be sufficient to rezero the previous testing failure count. In fact, this thought process

formulated the basis for staff approval of the existing TS allowing rezeroing all failures following a complete overhaul of the diesel generator and subsequent demonstration of reliability. However, the staff takes exception to the wording "appropriate overhaul" as contained in the licensees' proposed TS. Without adequate specificity or bounding criteria for the components affected by previous valid failures, or the acceptance criteria employed for determining when an "appropriate overhaul" has been completed, other than "as approved by the manufacturer," the staff has no basis for approval of the proposed TS or subsequent inspection for compliance were it to be approved. On this basis, the staff must deny the licensees' proposed request.

However, as discussed earlier, it is desirable to reduce unnecessary diesel generator testing where restored reliability can be demonstrated by other means. The licensees have provided evidence as to both the scope of work and degree of restoration to like-new condition of certain diesel generator components and root cause analyses which links four previous diesel generator failures which are under consideration for rezeroing to these components. This information is contained in the January 18, 1988 letter from the manufacturer, IMO Delaval Inc., to Mr. Tony Pusateri of the licensees' staff. The failures under consideration (#3 through #6) were all control air related failures as documented in the manufacturer's letter. These involved failure of the air shuttle valve, a defective control air solenoid valve, a failed control air regulator and failure of the field flashing circuitry due to lack of control air to the associated pressure switches.

The scope of the work for restoration/overhaul of the control air components to like-new condition included control panel overhaul with replacement of the pneumatic logic board; cleaning of pneumatic tubing; replacement of engine pneumatic sensors; adding a redundant control air filter and regulator; removing various pneumatic solenoid valves and pressure switches and adding electro/mechanical relays; replacing control air regulators with heavier duty regulators; improvements to the speed sensing circuitry and improvements to the generator field flashing circuitry. The manufacturer has certified that overhaul has restored the engine control panel to the like-new condition. Additionally, the licensees have demonstrated that reliability of the diesel generator has been restored by the successful completion of 14 valid consecutive tests as required by the TS (to date over 20 successful valid consecutive tests have been completed). Based upon the licensees' corrective action to date and the demonstration that diesel generator reliability has been restored, the staff has determined that a complete overhaul of the diesel generator is unnecessary with respect to the failures under consideration. Therefore, the staff partially grants the requested amendment and approves a one-time waiver of the requirement for conducting a complete diesel generator overhaul for the purpose of rezeroing previous diesel generator failures. By their corrective actions to date, the licensees are allowed to rezero the valid diesel generator failures #3 through 6 which occurred on or about August 11, 1986, and February 28, March 17, and October 15, 1987, respectively.

The licensees' request to modify the reporting requirements of TS 4.8.1.1.3 from a per-nuclear-unit basis to a per-diesel-generator basis is in keeping with the guidance of G.L. 84-15 for determining failure rates on each diesel generator at a site. The test failures are determined on a per-diesel-generator basis to avoid excessive testing on otherwise reliable diesel generators because of failures on one generator at a site. The change in reporting criteria to a per-diesel-generator requirement would be consistent with the testing criteria and would avoid the need for a dual counting system, one for failures and one for reports. The staff considers this change acceptable.

The licensees' request to modify the remedial action footnote to Table 4.8.1.1.2-1 for returning to the normal testing frequency (once per 31 days) after having been in the accelerated testing frequency (once per 7 days) would make the footnote applicable to both the case where entrance into the accelerated frequency occurred as a result of having greater than or equal to 5 failures in the last 100 tests as well as the present case of having greater than or equal to 2 failures in the last 20 tests. The licensees' basis for the proposed change was that it would re-establish the acceptance of diesel generator performance (to the 95% reliability goal) without requiring excessive testing. The licensees indicated that they believed this change had been approved for numerous other operating nuclear facilities.

The staff's April 25, 1985 Safety Evaluation (SE) supporting issuance of Amendment No. 48 to the North Anna Unit 2 operating license discusses the reliability goals, the accelerated testing frequency and the incentives for engine overhaul and their relation to improvement in reliability. As stated in the SE, the original accelerated testing frequency for North Anna was based upon number of failures in the last 100 starts. The expansion of the accelerated test frequency table to include the number of failures in the last 20 starts was to provide early indication (of 2 or more failures in the last 20 starts) of a .90 or lower reliability.

To enter accelerated testing at this point would provide a better sensitivity to the possibility of abrupt diesel generator degradation and provide a timely response. Increasing the test frequency would provide a faster accumulation of test data upon which to judge the reliability of the diesel. This additional data could then be used to distinguish between failures which occur close together simply due to random chance and such failures that are indicative of an abrupt decline in the actual reliability. The weekly test schedule would be continued until two conditions have been satisfied. First, seven consecutive successful tests have been accumulated. Second, the failures in the most recent 20 tests have been reduced to one. Seven successful tests indicate a reliability of at least 0.90/demand but at only the 50% confidence level. Continuing the accelerated testing until the number of failures is 1 out of 20 adds further assurance that the diesel generator has not degraded below the 0.90/demand level.

This relaxation to the normal testing interval of once per 31 days upon satisfying the two conditions above was only applicable to the case where 2 or more failures occurred in the last 20 starts, not the case where 5 or more failures occurred in the last 100 starts. Instead, the licensee for North Anna Unit 2 proposed an explicit direct incentive for the utility to take major corrective action on the diesel generator. If the licensee performs a thorough and comprehensive complete overhaul of the diesel that is approved by the manufacturer, the diesel would be rebuilt to like-new conditions. Following such an overhaul, the diesel would become operable after it successfully passed the appropriate surveillance tests one time. However, in return for the overhaul, the utility would receive the benefit of wiping the slate clean of all previous failures on that diesel generator if an acceptable reliability could be demonstrated. With "no previous failures" in the past 20 or 100 tests, the diesel generator would re-enter the test schedule at the monthly test frequency. Accelerated testing (weekly) would not become required until either 2 failures in 20 tests or 5 failures in 100 tests occur. In contrast, when one considers how long it could take to work back up the table after having a series of failures (i.e., many months and possibly years), the magnitude of this incentive becomes more obvious. An engine overhaul would focus on the internal components and therefore not necessarily address the statistically most prevalent failures. Nonetheless, this overhaul is considered worthwhile. In that major repair action for a diesel that has experienced excessive failures has long been the goal, this concept has merit.

The question that remained was how does one demonstrate that the rebuilt diesel generator actually has an improved and acceptable reliability. Statistically, the probability that a diesel with an actual reliability of less than 0.90/demand will satisfy the 14-test criterion is no greater than 20% and decreases rapidly with the actual reliability. The probability that a diesel generator with an actual reliability of less than 0.95 will satisfy the 14-test criterion is 42% or less. Said in the converse, if the rebuilt diesel passes the 14-test criterion, the statistics say that the probability that the actual reliability of the diesel generator is 0.95 or better is about 50% and that the probability that the actual reliability is 0.90 or better is about 90%.

Thus was developed the incentive plan for performance of a major overhaul of a diesel generator that has had excessive failures and subsequent demonstration of reliability. This concept has been incorporated into the TS for a number of plants including Perry, Clinton, River Bend and others. As stated in the North Anna SE "when one considers how long it takes to work back up the table after having a series of failures (i.e., many months and possibly years), the magnitude of the incentive (for overhaul) becomes obvious." In the converse, if it did not take as long to work up the table (i.e., the change requested for Perry were approved), the incentive for overhaul may be diminished. The staff is unable at this time to weigh the relative benefits of reducing what may be unnecessary diesel generator tests against the reduction in incentive for overhaul of a diesel that has experienced excessive failure rates. This is especially true in light of the one-time waiver of the requirement to conduct

a complete overhaul of the diesel generator approved elsewhere in this Safety Evaluation. As it is unlikely that the licensees would experience a return to the accelerated test frequency in the near future, and as additional guidance regarding diesel generator TS is anticipated in the near future with resolution of generic diesel generator reliability issues, the staff chooses to hold in abeyance the licensees' request for modification of the footnote to Table 4.8.1.1.2-1 until such time as it has been able to consider the request in light of pending guidance.

### 3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or a change to a surveillance requirement. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). This amendment also involves changes in record-keeping, reporting or administrative procedures or requirements. Accordingly, with respect to these items, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR §51.22(c)(10). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

### 4.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Dated: May 18, 1988