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LIC-92-299

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Washington, DC 20555

References: 1. Docket No. 50-285
2. Letter from OPPD (W. G. Gates) to NRC (Document Control Desk) dated June 30, 1992 (LIC-92-207R)
3. Letter from OPPD (W. G. Gates) to NRC (Document Control Desk) dated August 14, 1992 (LIC-92-289R)

Gentlemen:

SUBJECT: OPPD Proposed Actions Regarding Diesel Generator Ambient Air Temperature Operating Limits

In a telephone conference call on September 3, 1992, Omaha Public Power District (OPPD) and the NRC discussed OPPD's plans for hot weather testing of the Emergency Diesel Generators (DG) at Fort Calhoun Station (FCS) with an ethylene glycol/water mixture coolant. This discussion was based on information submitted to the NRC by OPPD in References 2 and 3. In this call, the NRC requested that OPPD submit responses to the following questions:

1. What type of testing does OPPD intend to perform on DG-1?

2. What contingency actions are planned should the ambient air temperature approach the operating limits for DG-1 established in Reference 2?

3. What does OPPD intend to supply the NRC upon completion of testing?

Subsequent to this call, significant new information was recently received and verified by OPPD to be relevant to these questions and the information supplied by References 2 and 3. Therefore, this letter transmits the information requested by NRC and updates the information in References 2 and 3.

OPPD's goal is to maintain an ambient air temperature upper limit of 110°F for both DG-1 and DG-2. OPPD implemented several actions during the 1992 refueling outage to enhance DG performance, including fan replacement on both DGs and reduction of equipment loads on DG-2. Based on these actions, an engineering calculation (FC 05916) and 10 CFR 50.59 Safety Evaluation were completed. They demonstrated the acceptability of using a 50% ethylene glycol/water mixture as coolant in all seasons, with resulting ambient air upper temperature limits of 104°F for DG-1 and 110°F for DG-2. The calculation and safety evaluation were provided by the Reference 3 submittal.

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Due to lower than predicted jacket water temperatures measured during testing in 1991, Calculation FC 05916 is conservative relative to jacket water temperature. Actual data from hot weather testing (with the ethylene glycol/water mixture) is needed to refine and validate the calculation using system performance, and to establish more accurate operating limits.

In Reference 2, OPPD discussed plans for hot weather testing of the DGs. In an effort to improve DG availability, OPPD wishes to maintain an ethylene glycol/water mixture coolant throughout the summer months. When OPPD completes testing of the DGs with the ethylene glycol/water mixture during hot weather, empirical data will be available for evaluation in an effort to maintain the DGs with the same coolant type throughout the year while preserving the 110°F temperature limit for both DGs.

OPPD had originally planned to do this hot weather testing in the Summer of 1992. However, this summer was unusually mild and the highest temperature recorded in the area was 91°F. As discussed in Reference 2 and in response to NRC Question 1, OPPD plans to do the hot weather testing when the ambient air temperature reaches 95°F. This minimum air temperature is necessary to ensure that the jacket water temperature control valve is closed, directing full coolant flow through the DG radiator. The diesel load will be maintained as close as reasonably achievable to the calculated post-LOCA loads, and the parameters of jacket water temperature, turbocharger inlet temperature, jacket water flow, KW load, and radiator fan inlet air temperature will be measured. These conditions are similar to those expected during a worst case run at elevated temperatures.

OPPD considers this to be the most valid method of confirming the calculated turbocharger inlet air and jacket water temperatures, which are required to determine the 2000 hour deration values. Following completion of the planned hot weather testing, the test data will be analyzed. The time required to perform this analysis is approximately two working days.

In October 1992, OPPD determined that the Velocicalc Portable Air Velocity Meter (hot wire anemometer MT-00401) was reading approximately 12 percent low. This test instrument was used for measuring DG-1 radiator air flow during the March 1992 testing; therefore, the results of this test were suspected to be overly conservative. When factored into Calculation FC 05916, this information substantially changed the previously established DG-1 ambient air temperature limit of 104°F. The results of the testing for DG-2 were not affected, because a different test instrument was used.

The DG-1 air flow test was performed again during scheduled surveillance on October 13, 1992. Results of that test indicated air flows were 12 percent higher than those noted in the previous test. In order to assure the reliability of the test instrument, it was shipped for calibration verification immediately after that test. This verification indicated that the instrument was reading within its acceptance criteria. Calculation FC 05916 has therefore been revised to reflect the higher radiator cooling air flows, with much more favorable results. This revised calculation establishes the upper ambient air temperature limit for DG-1 at 107°F with an ethylene glycol/water coolant mixture. A copy of Calculation FC 05916, Rev. C is enclosed.

If DG-1 was operated at an ambient air condition of 110°F (with an ethylene glycol/water mixture), the 2000 hour rating would be exceeded only for a minimal time (approximately 40 minutes). During this time, the jacket water temperature would remain well below its maximum value of 208°F and the diesel would continue to produce power at the required demand rate. A vendor representative has stated that brief excursions could be made above the 2000 hour deration limit without detriment to the engine or generator.

The calculation for determining electrical loads on the Diesel Generators assumes that all safety related equipment sequenced onto the diesel is immediately brought to maximum rated load and individual load changes occur only due to changes in DBA conditions such as containment pressure reduction. No credit is given for operator directed load reduction. Removal of a small load would bring the demand below that of the 2000 hr rating. The difference between the 2000 hr deration values at 110°F and the calculated demand is less than 50 Kw.

NRC Question 2 concerned planned contingency actions, should the ambient air temperature approach the DG-1 operating limit. The ambient air temperature of 95°F necessary to do the hot weather testing is typically reached during the summer months at FCS. With the DG-1 ambient air upper temperature limit now at 107°F, it is unlikely that this limit will be reached prior to completion of testing and the actions necessary to achieve the 110°F goal. Based on past weather data, Omaha area temperatures exceeded 107°F only one time between 1971 and 1989. This occurred on July 21, 1974 and was preceded by four days of temperatures above 100°F. This history strengthens OPPD's assumption that a challenge to the DG temperature limit could be adequately anticipated, allowing timely implementation of compensatory measures.

For the above reasons, OPPD concludes that contingency actions will not be urgently required. If the ambient air temperature approached the present operating limit, or any new limit established by the testing that is less than 110°F, the Plant Review Committee (PRC) would evaluate all options available. The daily temperature is monitored and recorded in the Control Room Log on Form FC-75. The PRC would then determine a conservative course of action which would maximize DG-1 availability. Action options include:

1. The ethylene glycol coolant could be replaced with a treated water mixture for DG-1, which would raise the DG-1 limit to greater than 110°F. This coolant replacement is expected to require less than 8 hours to complete.

2. Temporary modifications, such as a flow enhancer in the square elbow of the fan exhaust stack, could be installed. Test results for such a device indicated slightly more than 2% cooling air flow increase for this configuration. This would increase the calculated limit by approximately 1°F. Installation of such a device is expected to require less than eight hours to perform.

3. Portable high volume fans could be positioned near the generator cooling air discharge, which is the major source of the turbocharger air warming. Less than 5°F warming of the air to the turbocharger inlet would likely occur with forced ventilation in this area; thus, the 2000 hr deration criteria at 110°F would be met, according to Calculation FC 05916. Installation of these fans is expected to take less than two hours to perform.

OPPD now plans to perform the hot weather testing (as described previously) during the summer of 1993, assuming 95°F is reached. In response to NRC Question 3, OPPD will supply the NRC with an Engineering Analysis (EA) based on the previously mentioned hot weather test results that includes:

- a revised "As-Built" Calculation FC 05916,
- empirical test data, and
- justification of acceptability of the achieved temperature limits and/or any recommended DG enhancements.

The EA described above will be provided to the NRC within 90 days following completion of the hot weather testing, but no later than November 1, 1993.

OPPD considers the plan detailed in this letter to be a conservative approach that maximizes diesel generator availability while preserving an acceptable level of safety. If you should have any questions, please contact me.

Sincerely,

W. G. Gates

W. G. Gates
Vice President -
Nuclear

WGG/tcm

Enclosure

c: LeBoeuf, Lamb, Leiby & MacRae
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