Omaha Public Power District
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402/536-4000

September 12, 1990
LIC-90-0740

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

References: 1. Docket No. 50-285
2. Letter from NRC (S. J. Collins) to OPPD (W. G. Gates) dated August 16, 1990

Gentlemen:

SUBJECT: Diesel Generator Electrical Loading Study

As discussed in a telecon between Omaha Public Power District (OPPD) and the NRC on July 6, 1990, and as confirmed in Inspection Report 90-32 (Reference 2), OPPD committed to perform an evaluation of Emergency Diesel Generator (EDG) loading. Specifically, this was to involve an in-depth and comprehensive evaluation of the EDG post accident electrical loading and the effect of elevated temperatures on EDG operability. Per the NRC request this analysis has been completed and is attached.

As a result of room heating problems with the uninsulated exhaust of the Emergency Diesel Generator, retesting of the generator with the insulated exhaust began in June of 1990. During this testing the EDG-1 exciter failed which resulted in a temporary modification to both EDG exciter cabinets (removal of the doors). Further testing was then completed on EDG-1 and EDG-2 to establish temperature characteristics. The results were analyzed to establish an upper ambient air operating limit for each engine. Based on this testing, each engine's output is jacket water outlet temperature and turbocharger (combustion air) intake temperature limited.

The ambient air temperature limits for the engines are 107°F for EDG-1 and 103°F for EDG-2 which are consistent with earlier analyses. These ratings are based on jacket water outlet temperature and turbocharger inlet temperature using the following assumptions: (1) the EDG rooms are at their respective temperature limits, and (2) the engines are warmed by the electric heaters only. This provides an initial high capacity which decreases as the engines and rooms heat up.

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Based on the standard General Motors Electro-Motive Division (EMD) 30 minute and 4 hour ratings, increased stress on the engines would only occur if operated in response to a LOCA occurring just after the monthly surveillance testing, while the tested engine was still hot. The exposure to these conditions would be limited to approximately 6 hours per month (an estimated 3 hour cool down time per engine per month). Per the attachment, EMD has provided OPPD with a letter stating that satisfactory, reliable operation can be expected with short time loadings at the 30 minute and four hour limits.

Engineering Analysis EA-FC-90-062 examines room temperature effects on the generator and the static exciter during operation. As indicated in the analysis, the static exciters are operable up to the engine limits with the cabinet doors removed. This configuration is acceptable only during the short term. OPPD expects to make a modification to the exciter cabinets to restore some type of doors while maintaining proper cooling. This should be completed during the 1991 Outage.

OPPD has reviewed the static exciter cabinet configuration with the doors removed and has determined that it does not degrade operation. The cabinet will not be affected by a seismic event, and the cabinet internals are relatively immune to the effects of dust. General Electric (GE) has indicated that this type of exciter has been supplied for use at coal fired plants, which have relatively dusty environments, and they have not experienced adverse sensitivity to this environment. To provide further assurance that dust does not become a problem, OPPD has implemented a weekly preventive maintenance task to inspect the internals of the static exciter cabinet for dust and to clean as required. Missile hazards from the starting air compressors are not expected to be a problem. The compressors are mounted on a platform above the level of the exciter cabinet with the rotating motor and compressor shafts oriented at an approximately 90° angle to the plane of the cabinet door.

With regards to spray impingements on the static exciter cabinet due to pipe cracks in the room, the loss of one exciter is expected whether the doors are on or off because the doors are not seal tight doors. The available sources of spray are the steam heating system, and the fire protection piping. The failure of these pipes, which simultaneously renders both diesels inoperable, is not considered credible, because each diesel is located in a separate room. One diesel would remain available for safe shutdown. Additionally, failure of the auxiliary steam piping or fire protection piping is not expected to introduce a reactor transient requiring response by the emergency diesel generators.

For the purposes of determining the available capacity for operator manual start of equipment (i.e. additional loading) during operations to enhance plant shutdown, a curve of engine capacity versus outside ambient air temperature measured by the Fort Calhoun weather towers has been established for each engine as per the attachment. The curves of engine capacity versus weather tower temperature will be added to the Technical Data Book by October 17, 1990.

OPPD has reviewed its design control procedures to ensure engine overload does not occur in the future. The modification control procedure presently in place provides direction to evaluate loads. OPPD plans to strengthen this procedure by requiring that the attached engineering analysis and load calculation be reviewed for adequate EDG capacity during design.

To date, EDG-1 has not been tested with the glycol engine coolant. The data presented in the analysis is based on water as the coolant. A change of coolant to glycol in EDG-1 will necessitate a retest of EDG-1 to predict hot ambient temperature operation with the glycol coolant. Based on the experience gained on EDG-2, the glycol may have little, if any, effect; however, OPPD considers the testing necessary and further testing will be done on EDG-1 to determine the effect of glycol in the engine cooling system. This testing will be completed by November 2, 1990.

The results of the analysis also indicate that the diesel generator rooms' ventilation fans VA-52A and VA-52B must be off to ensure the best air circulation patterns in the rooms. VA-52A is load shed in the event of a LOCA and loss of offsite power, which meets the analysis requirement. VA-52B is temporarily administratively controlled to have the fan in the "off" condition when an operator is not present in the room. OPPD is in the process of investigating making a modification which will allow removal of the temporary administrative controls noted above.

To summarize, based on the attached engineering analysis and calculations, both emergency diesel generators are operable and will perform their safety function consistent with the specified ambient air temperature limits.

If you should have any questions please contact me.

Sincerely,

W. G. Gates

W. G. Gates
Division Manager
Nuclear Operations

WGG/sel

Enclosure

c: LeBoeuf, Lamb, Leiby & MacRae
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