HFEB SER Input on Proposed Change
to Grand Gulf Technical Specification
Regarding Control Room High Temperature Limit

Position

Reliable human performance is degraded by extreme environmental conditions. NUREG-0700 establishes a set of environmental comfort guidelines for control rooms to minimize the potential for operator error during long-term operations. It provides normal comfort ranges for environmental parameters and addresses extreme conditions only to a limited extent. In order to evaluate human performance in extreme environmental conditions the staff must rely on studies supported by the Department of Defense (See reference).

Discussion

By letter dated September 9, 1983, Mississippi Power & Light Company has proposed a change in the technical specifications for Grand Gulf Nuclear Station to, (1) delete the "Equipment Not Operating" column from the Area Temperature Monitoring Table 3.7.8-1, (2) delete the column heading "Equipment Operating" from Table 3.7.8-1, and (3) change the 77°F limiting temperature for the control room to 90°F.

The HFEB agrees with the proposed changes and justification by the Applicant to delete the "Equipment Not Operating" column and the column heading "Equipment Operating" from Table 3.7.8-1.

With regard to the proposed change in the limiting temperature for the control room, the staff agrees that the 77°F dry bulb temperature limit of NUREG-0700 was established as a comfort limit for long-term operation to minimize the potential for operator error due to fatigue or discomfort. This temperature limit also assumes a relative humidity below 60%.

Studies supported by the Department of Defense indicate that, for short periods of time (up to 8 hours), human operators can be expected to perform reliably in an "effective temperature" environment up to 85°F, wearing conventional light clothing, doing light, manual, seated work. Effective temperature takes into account dry bulb temperature, relative humidity, and air flow. In the control room environment, an 85°F effective temperature can be composed of the following conditions:

Dry Bulb Temperature		Relative Humidity	Air Flow
°F	°C	%	ft/min
85	29.5	100	0-30
90	32.2	72	0-30
95	35.0	48	0-30

Since the technical specification is considering only dry bulb temperature and the staff cannot be assured that relative humidity will be below 72%, nor that it will not approach 100%, it is the staff position that the limiting condition for operation in the control room relative to high dry bulb temperature should be 85°F. This value is also consistent with the maximum effective temperature allowed in the Grand Gulf remote shutdown panel area when it is manned in any mode of operation.

Conclusion

The staff agrees with the proposed deletion of the "Equipment Not Operating" column and "Equipment Operating" heading from Table 3.7.8-1 of the Grand Gulf technical specifications.

The staff does not agree with the proposed change of the control room eight-hour dry bulb temperature limit from 77°F to 90°F, but does support a change in this limit to 85°F dry bulb temperature.

References:

MIL-STD-1472C, Human Engineering Design Criteria for Military Systems, Equipment and Facilities, May 2, 1981.

MIL-HDBK-759A (Proposed), Human Factors Engineering Design for Army Materiel, January 7, 1981.