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SUBJECT: Forwards response to NRC request for addl info to clarify questions re "Room Heatup Calculation for Station Blackout" (OSC-4747), consisting of detailed explanation of development of equation for calculation.

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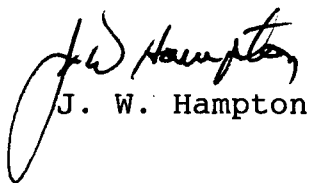
October 13, 1992

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

Subject: Oconee Nuclear Site, Units 1, 2, and 3
Docket Nos. 50-269, 270, and 287
Requirements for Station Blackout
Request for Additional Information

Attached is the additional information requested for clarification of questions related to the "Room Heat-up Calculation for Station Blackout," OSC-4747. Included is a more detailed explanation of the development of the equation found at the bottom of page 5 of the subject calculations. If there are any further questions or concerns regarding this or any other information related to Oconee's response to Station Blackout, please contact Mark E. Patrick, Oconee Regulatory Compliance Manager at (803) 885-3292.

Very truly yours,


J. W. Hampton

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The equation in step 1 of the design method is:

$$Q_{air} = Q_{gen} - Q_{out} - Q_{conc}$$

Assume for now that $Q_{conc} = 0$. This term will be dealt with later.

$$\frac{dQ_{air}}{dt} = \frac{dQ_{gen}}{dt} - \frac{dQ_{out}}{dt}$$

At steady state conditions,

$$\frac{dQ_{air}}{dt} = 0$$

and therefore

$$\frac{dQ_{gen}}{dt} = \frac{dQ_{out}}{dt} = UA(T_{air,ss} - T_{surr})$$

Prior to steady state conditions

$$\frac{dQ_{air}}{dt} = UA(T_{air,ss} - T_{surr}) - UA(T_{air} - T_{surr})$$

$$\frac{dQ_{air}}{dt} = UA(T_{air,ss} - T_{air})$$

Set $c_a = UA$ with units $Btu/^\circ F \cdot hr$

From the equation in step 6 of the design method the following equation can be formed.

$$\frac{dQ_{air}}{dt} = \rho V C_p \frac{dT_{air}}{dt}$$

Set $c_b = \rho V C_p$ with units $Btu/^\circ F$.

$$c_1 = \frac{c_b}{c_a} = \text{time constant } (\tau) \text{ with units of hrs}$$

The equation at the bottom of page 5 of 43 is the standard form of a Thermal first order system.

Taking into account Q_{conc} will decrease the rate at which the air temperature rises. This is taken care of by adjusting the value of the time constant c_1 until the assumed value of $T_{air,avg}$ equals the calculated value of $T_{air,avg}$.