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SOUTHERN COMPANY
Energy to Serve Your World℠

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Edwin I. Hatch Nuclear Plant
Response to Request for Additional Information on the Turbine Building Area
Temperature High Primary Containment Isolation Allowable Value Change Request

Ladies and Gentlemen:

On July 22, 2003, NRC forwarded to SNC, via electronic correspondence, several questions pertaining to our Request for a Technical Specifications (TS) change on the turbine building area temperature high primary containment isolation allowable value. The original TS change request was submitted on December 4, 2002, and supplemented with a response to a previous request for additional information on June 24, 2003.

Enclosed are the responses, with a transcription of the NRC question preceding each response. Also attached is calculation SMNH-94051, which was requested.

Mr. H. L. Sumner, Jr. states he is a Vice President of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

This letter contains no NRC commitments.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Lewis Sumner

H. L. Sumner, Jr.

Sworn to and subscribed before me this 23 *day of* October, *2003.*

Valerie O'Brien
Notary Public
My commission expires: 4-28-07

HLS/OCV/daj

A001

Enclosure: Responses to NRC questions
Attachment: Calculation SMNH 94-051

cc: Southern Nuclear Operating Company
Mr. J. D. Woodard, Executive Vice President
Mr. G. R. Frederick, General Manager – Plant Hatch
Document Services RTYPE: CHA02.004

U. S. Nuclear Regulatory Commission
Mr. L. A. Reyes, Regional Administrator
Mr. S. D. Bloom, NRR Project Manager – Hatch
Mr. D. S. Simpkins, Senior Resident Inspector – Hatch

State of Georgia
Mr. L. C. Barrett, Commissioner – Department of Natural Resources

Enclosure
Edwin I. Hatch
Response to Request For Additional Information on
Turbine Building Area Temperature Allowable Value
Technical Specification Change Request

NRC Question #1

The staff would like to get more information on Calculation SMNH 94-051, dated 1/18/95. For example, was the calculation performed as a transient or steady state? Does the plant allow a time limit for detecting a steam leak based on off-site dose limits, specifically a 1% rated steam flow that was assumed in the calculation? How does the time to reach 200 F as calculated compare with such allowable time?

Response

The calculation was performed assuming the plant was at a steady state power level, with a steady state temperature profile for the steam line area. A 1% of main steam flow leak was then introduced. At that point, a transient response to the leak was modeled.

The turbine building temperature instruments are in place to detect small leaks and to provide "...diversity to the high flow instrumentation" per the Technical Specifications Bases. No credit is taken for these instruments in any transient or accident analysis in the FSAR. Therefore, there is no time response requirement (from leak occurrence to detection) for these instruments with respect to offsite dose criteria.

NRC Question #2

Section 9.4.4.2 of Hatch Nuclear Plant – Unit 2 FSAR states that fan coil cooling units are provided to remove heat dissipated from the equipment and piping in the turbine building.

Was the operation of fan coil cooling units modeled? If not, explain reasons for not modeling such operation.

Response

The effects of the fan coil units were not modeled in the calculation because there is no fan coil unit on Unit 2 to provide air flow or cooling to the steam line area. This is noted at the bottom of page 5 of 145 of the attached calculation in the model description section. Here the author compares the Unit 1 worst case model to the Unit 2 worst case model and notes the difference in the HVAC registers.

NRC Question #3a

The following refers to your response to the staff request for additional information Question #1, June 24, 2003:

The response states that the detection of the postulated steam leak was insensitive to the initial conditions. The transient temperature of a calculation node is dependent on the initial conditions but not the steady state temperature. Please explain.

Response

The model begins with a steady state temperature profile for the steam line area, then introduces a 1% steam leak. The model provides a transient response to the steam leak. The steam leak results in a very rapid temperature rise to a new end state condition, at which time the model is terminated. The end state is a function of the steam conditions and the space is dominated by the steam properties (most of the air would be displaced). Thus, the initial conditions have a minimal effect on the end state conditions. Relative to detection, it would be expected that instrument response time would be slightly increased since the leak detection trip setpoints will be increased by 6 degrees F. The temperature detectors are Type T thermocouples with a grounded junction, which provide a fast response time. The time to detect a 6 degree increase in temperature would be insignificant. Relative to the initial temperature, if it is lower than what is assumed in the analysis, the actual end state will not be affected, because, again, the space will be a function of the steam properties. If the temperature were lowered several degrees, the increase in response time of the thermocouple and associated circuits will be insignificant.

NRC Question #3b

The response shows a heat load of 33,229 Btu/sec from a steam leak of 1% of rated flow compared to 793 Btu/sec cooling effect from ventilation fan operating at 25,000 ft^3/min. Based on these values you concluded that heat load from steam leak dominates the cooling from the ventilation.

Instead of using the change in enthalpy of expansion and cooling of steam to the ambient conditions, you have used a saturation steam enthalpy at 540 F of 1193 Btu/lb to calculate heat load from the steam leak. The enthalpy value of 1193 Btu/lb is based on a reference enthalpy of water at 32 F of "zero". Therefore, using 1193 Btu/lb to calculate steam heat load assumes condensing of steam and cooling the condensate water to 32 F, which is inconsistent with the problem being modeled. Please explain.

Did you use cooling effect from ventilation in the calculation model?

Response

The above is correct. The answer given in the previous request for additional information provided an order of magnitude for the heat input for the steam leak vs. the heat removal capability of the ventilation. The answer should have used the saturated vapor enthalpy at 540 degrees F (1193 Btu/lbm) minus the saturated liquid enthalpy at 200 degrees F (168 Btu/lbm), which is 1025 Btu/lbm. The heat input would thus be the mass flow from the leak times the enthalpy change (27.9 lbm/sec x 1025 Btu/lbm = 28,597 Btu/sec). This still overwhelms the capability of the normal ventilation and cooling systems.

As stated in the response to question #2, the effects of the fan coil units were not modeled because there is no fan coil unit on Unit 2 to provide air flow or cooling to the steam line area.

NRC Question #4

Assumption #5 in calculation SMNH 94 051, dated 1/18/95, notes that "[a] set of boundary temperatures was then selected to yield equilibrium temperature prior to the leak which was consistent with the projected winter average in the cells containing the instrumentation."

Please explain how you selected the set of boundary temperatures.

Response

The temperatures were determined as follows:

A reading of turbine building inside temperatures was taken on four summer days, and two autumn days. The outside temperatures for those days were noted. At the time of the calculation, there was no winter temperature available and so a projected winter outside temperature of 20 F was assumed and the average inside temperatures were obtained by extrapolation with the previous data for fall and summer. The actual temperature values used in the extrapolation and the individual cell temperatures assumed can be found on pages 58 through 61 of the attached calculation.

The individual cell temperatures were obtained from GOTHIC model runs and were based on specific energy releases into the cells (Re: page 40 of the attached calculation). For example, the length of pipe in cell 109 is 25 ft, which is 4.4.% of the total length of pipe (561.3 ft). The energy release into the cell was therefore assumed to be 4.4 % of the total energy release (82.819 Btu/sec). The individual cell temperatures ultimately obtained from the GOTHIC model runs are listed on page 61 of the calculation. The average of these temperatures (142 F) was in reasonable agreement with the extrapolated winter average (142.5 F) obtained from the above referenced measured temperatures.

NRC Question #5

Did you model the condensation of steam in the turbine building? If so, what models were used?

Response

Steam condensation was modeled for all interior concrete surfaces using UCHIDA, (Re: pages 96-98 of the attached calculation).

NRC Question #6

Assumption no. 3 in Calculation SMNH 94-051, dated 1/18/95, states the following:

Heat sinks in the model are limited to the building concrete. Omission of other heat sink materials (such as structural steel) will have little effect on a flow driven problem such as this one. In any event, the inclusion of the other materials would only affect the rate of temperature rise and would not affect the total temperature increase for a given steam leak.

Explain the validity of this assumption if temperature detectors have allowable time for detection.

Response

As mentioned in the response to question #1, the temperature instruments do not have required response times.

NRC Question #7

Model Description in Calculation SMNH 94 051, dated 1/18/95, states the following (Page 2 of 145):

Areas of the turbine building adjacent to the model space are approximated through the use of pressure boundary conditions. Pressures associated with the boundary conditions are adjusted for the static head of air to avoid excessive induced flows at the boundary of the problem. The pressure boundary conditions were developed in an early version of the problem model which used 120 F boundary condition temperatures. This is not significant in the problem because the relative pressure of the boundary conditions are not significantly affected by the temperature.

Please explain how you developed the pressure boundary conditions.

Response

The specific calculation for the pressure boundary conditions is provided starting on page 52 of 145 of the above referenced, and attached, calculation.

Briefly, a 120 F boundary temperature, under moist air (100 % relative humidity) conditions was assumed. From a standard psychrometric chart, this corresponds to a specific volume of the air water mixture of roughly 16.5 ft^3/lb_m. From this, the density of the air mixture was obtained (1/16.5 ft^3/lb_m).

Assuming an atmospheric pressure of 14.7 pounds per square inch at the 112 ft. elevation, the density of the air mixture was used to adjust the pressure conditions at the

130, 147, 151, 155 and 159 elevations accordingly. (See pages 52 and 53 of SMNH 94-051 for the exact calculations and the final pressures).

NRC Question #8

Did you model the heat conduction through the walls to the outside?

Response

As mentioned in assumption #3 (page 2 of 145) of the calculation, the heat sink of the building concrete was included in the model. The outer surface of the concrete walls is modeled at a constant 120 F. While heat transfer to the outside is modeled, a 60 inch thick concrete wall would not be expected to show an increased temperature deep within the wall in the leak time frame modeled. Thus, while the conduction to the outside walls is modeled, it has no significant impact.

NRC Question #9

Of Calculation SMNH 94-051, dated 1/18/95, only pages 1 through 12 of 145 were available to the staff. Please provide other pages, which contain information useful to the staff review.

Response

The entire calculation is being forwarded to NRC as an attachment to this letter.