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SOUTHERN COMPANY
Energy to Serve Your World[SM]

April 10, 2003

NL-03-0753

Docket Nos.: 50-424
50-425

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

VOGTLE ELECTRIC GENERATING PLANT
REQUEST TO REVISE TECHNICAL SPECIFICATIONS
REACTOR TRIP SYSTEM INSTRUMENTATION OVER TEMPERATURE DELTA TEMPERATURE (OTΔT) AND OVER POWER DELTA TEMPERATURE (OPΔT) REACTOR TRIP FUNCTIONS
REQUEST FOR ADDITIONAL INFORMATION
(REFERENCE: TAC NOS. MB 5046 and 5047)

Ladies and Gentlemen:

By way of letter LCV-1617 dated May 8, 2002, Southern Nuclear Operating Company (SNC) requested to amend Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications (TS) Figure 2.1.1-1, "Reactor Core Safety Limits;" Table 3.3.1-1, "Reactor Trip System Instrumentation;" and the associated Bases B2.1.1 and B 3.3.1. The amendment to the Technical Specifications and associated Bases is to revise the Over Temperature Delta Temperature (OTΔT) and the Over Power Delta Temperature (OPΔT) setpoints to increase operating margin.

SNC letter LCV-1617-A dated November 26, 2002, provided SNC's response to the request for additional information (RAI) dated July 12, 2002, and additional clarifications to the RAI requested on August 19, 2002, and September 5, 2002.

This letter provides SNC's responses to a further RAI forwarded to SNC on February 3, 2003. Enclosure 1 of this letter contains the responses to the RAI.

SNC has reviewed the previously submitted 10 CFR 50.92 evaluation and has determined that the conclusion that no significant hazards will result from the proposed license amendment remains valid.

This letter contains no NRC commitments. If you have any questions, please advise.

A001

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

Sincerely,

Jeffrey T. Gasser

Sworn to and subscribed before me this 10th day of April 2003.

Notary Public

My commission expires: 11/10/06

JTG/RJF

Enclosure 1: Responses to Request for Additional Information

cc: <u>Southern Nuclear Operating Company</u>
Mr. J. D. Woodard, Executive Vice President
Mr. G. R. Frederick, General Manager – Plant Vogtle
Mr. M. Sheibani, Engineering Supervisor – Plant Vogtle
Document Services RTYPE: CVC7000

<u>U. S. Nuclear Regulatory Commission</u>
Mr. L. A. Reyes, Regional Administrator
Mr. F. Rinaldi, NRR Project Manager – Vogtle
Mr. J. Zeiler, Senior Resident Inspector – Vogtle

ENCLOSURE 1

RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION

In the request for additional information of February 3, 2003, SNC was asked to provide:

Question 1

Please confirm that only one break outside containment is being reanalyzed, the main steam isolation valve compartment.

Response to Question 1

Only the analysis of the main steam isolation valve (MSIV) area temperatures for equipment qualification is being revised, though a spectrum of breaks in this area was analyzed.

Question 2

The following questions assume that the high energy line break (HELB) analysis outside containment is for the purpose of determining pressure and pressure difference across walls as well as temperature. If this is not the case, please respond only to those questions which are relevant and provide a reference for the HELB analyses which are unchanged.

Response to Question 2

Only the temperature transients in the MSIV area, due to superheated blowdown, are being revised. These analyses generate only low pressures, approximately 15 psia, which are well below the structural design pressure (18 psia) and the maximum equipment qualification pressure (15 psig). Area pressures and differential pressures used in the structural design of the MSIV area are described in FSAR section 3F and shown in Table 3F-3A. The remainder of the responses will address only the temperature effects of the revised analysis.

Question 3

Provide curves of pressure and temperature as a function of time for the HELB outside containment.

Response to Question 3

Eighty five cases were run to construct a composite temperature profile. The composite profile is shown in Figure 1 below.

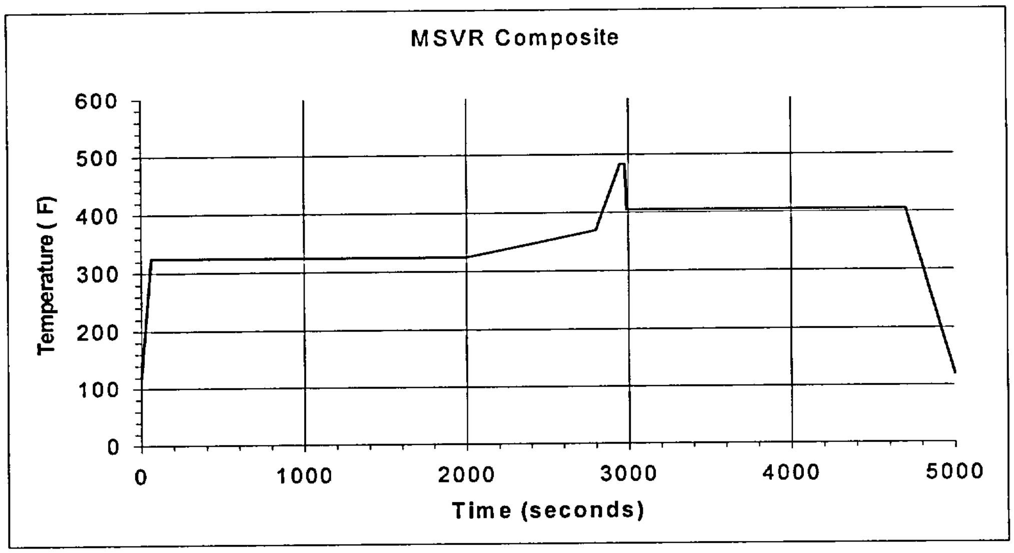
MSVR Composite
600
500
400
300
200
100
0
Temperature (F)
0
1000
2000
3000
4000
5000
Time (seconds)

Figure 1

This composite curve was constructed from each GOTHIC curve with an offset in time so that the peak of the spikes aligned as shown below in Figure 2 for case 14 with a 2350 second offset as an example. A visual inspection of the curves in Figure 2 demonstrates that the composite bounds the break node vapor temperature.

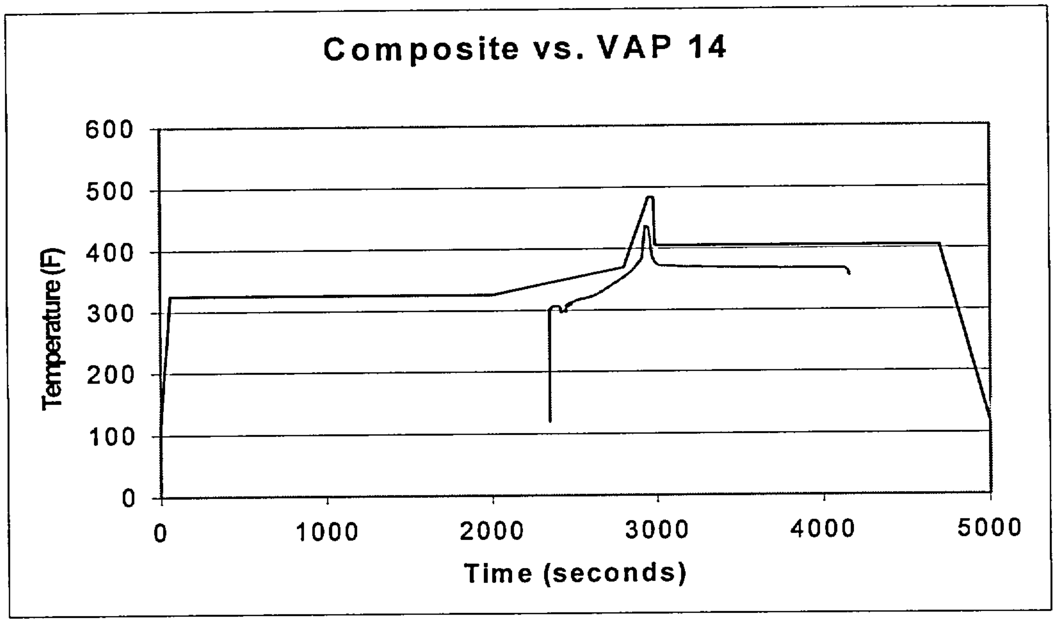

Figure 2

In some cases, the pre-spike plateau is of a sufficiently long duration that the spike peak occurs after the composite spike peak or the initial ramp-up is faster than the composite. The initial ramp rate is not critical to the equipment response so long as it is reasonably rapid. From Figure 3 below, a review of the equipment responses for the heat conductors for GOTHIC case 69 shows that the most responsive component (TA 54 – ARV potentiometer) reaches the vapor temperature 300-400 seconds into the transient, thus the equipment initial ramp temperature response is bounded. The equipment then closely follows the pre-spike plateau and lags the spike vapor temperature. The peak equipment temperature is 363°F, which is 70°F less than the vapor temperature peak and 42°F less than the composite vapor temperature post-peak plateau. Since the equipment initial ramp temperature matches the vapor pre-spike plateau temperature within 300-400 seconds, the equipment post-spike temperature ramp would be expected to approach the composite vapor temperature plateau. Therefore, the final equipment temperature resulting from the composite is expected to be well in excess of the calculated value. Since all of the late peak cases have temperature curves which decrease to less than the composite post-spike plateau temperature, this discussion applies in general and the composite curve will produce bounding equipment responses.

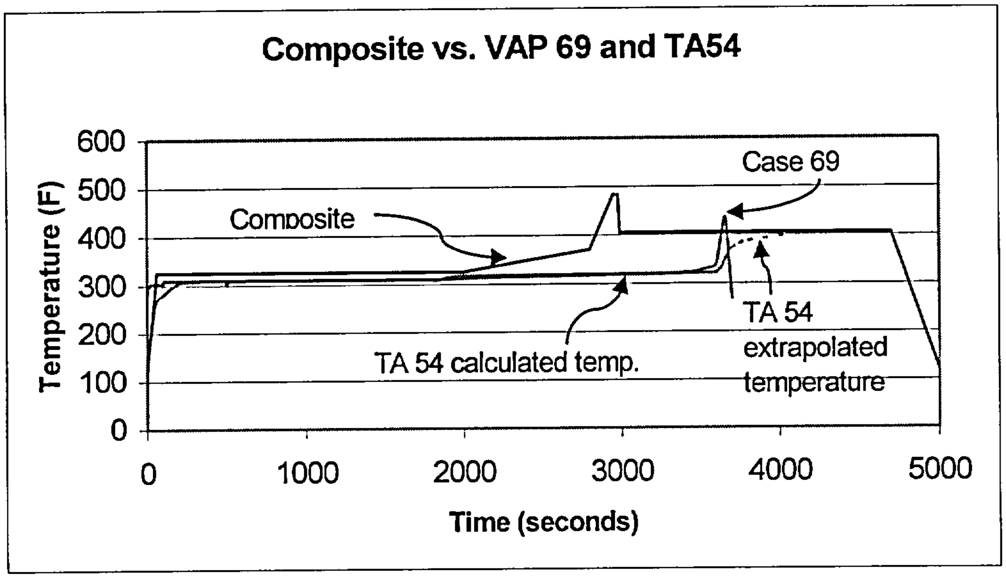

Figure 3

Question 4

Specify which version of GOTHIC is used for these calculations.

Response to Question 4

GOTHIC version 6.0 is used.

Question 5

Provide an explanation of how each of the criteria in Standard Review Plan Sections below is satisfied or what alternate approach is used:

6.2.1.2 II.B.1: Provide the initial values assumed, the reasons for selecting these values, including sensitivity studies performed.

Response

The MSIV area was assumed to be at 120°F based on two standard deviations of the measured temperature. External air pressure was approximately atmospheric, but adjusted as a function of height to minimize unforced air currents within the MSIV structure. Remaining parameters were unchanged from previous analyses with MSIV area at 60% RH, outside air at the design temperature of 95°F, and 60% RH.

6.2.1.2 II.B.2(a): Provide a noding diagram.

Response

The noding is as shown in FSAR Figure 3F-2, except node 1 is divided in two to match adjacent nodes 3 and 9.

6.2.1.2 II.B.2(b): For calculations of delta P, is atmospheric pressure or a calculated pressure used for the pressure on the other side of the break compartment wall?

Response

Refer to Response to Question 2.

6.2.1.2 II.B.3(a): Provide a description of how vent flow paths are modeled including assumptions about vent collapse due to increased pressure.

Response

Flow paths are modeled as the open area bounded by concrete walls and slabs and major structural steel. No HVAC ducts are modeled as vent pathways, though they may be modeled as flow obstructions. No vent collapse is modeled.

6.1.2.1 II.B.3(b): Situations have arisen recently in which discrepancies have been discovered between the measured vent path flow areas and those assumed in the analyses. Please discuss the degree of confidence you have in the value(s) used in the analyses.

Response

Vent areas are based on pre-modification walkdowns of the entire MSIV structure last performed in 1991 and partial walkdowns performed in 1995. Corporate procedures for design changes require that personnel familiar with these analyses review design change packages for potential impact on the analyses. Thus, we have a high degree of confidence in the vent areas modeled.

6.2.1.2 II.B.4(a): Specify which critical flow correlation is used for the break and which correlation is used for the vent flow.

Response

For the break flow, the Moody correlation for critical mass velocities was used. This correlation is used in the break flow model incorporated into the LOFTRAN code ("LOFTRAN Code Description," WCAP-7907-P-A (Proprietary), WCAP-7907-A (Nonproprietary), April 1984), which has been reviewed and approved for safety analyses.

Pressures developed in the GOTHIC models of superheated blowdown are very low (see the response to Question 2 above) so the critical flow and compressibility options in GOTHIC are turned OFF.

6.2.1.1 II.B.4(b): Is credit taken for friction in the blowdown flow? If so, please describe or reference the method used.

Response

No credit was taken for any piping discharge resistances (friction) in the blowdown mass flowrates calculated using the Moody correlation. This correlation is used in the break flow model incorporated into the LOFTRAN code, which has been reviewed and approved for safety analyses as noted in WCAP-7907-P-A. The NRC's SER in the fore part of WCAP-7907-P-A specifically indicates the use of the Moody correlation with $f(\ell/D)$ set to zero (i.e., no friction).

6.2.1.2 II.B(c): If other than 100% entrainment has been assumed please specify how entrainment was treated in the calculations.

Response

No entrainment (100% steam quality) is assumed for the steam mass releases from a steamline break outside containment.

GOTHIC models de-entrainment, which was set to 0%.

6.2.1.2 II.B.4(d): In calculating the vent flow, is credit taken for the GOTHIC drop-liquid conversion model.

Response

The drop-liquid conversion model is INCLUDED. The model for a case similar to that shown in Figure 2 above was re-run with the drop-liquid conversion model IGNORED. The graphical output showed no discernable difference with the drop-liquid conversion model INCLUDED or IGNORED. Examination of the numerical output showed small differences, typically in the fourth significant digit.

Question 6

Is heat transfer to the break compartment walls assumed? If so, please specify the GOTHIC models used. Is credit taken for heat transfer to structures in the subcompartment other than walls?

Response to Question 6

Heat transfer to compartment walls and structural steel is modeled. Walls and floors/ceilings are vertical or horizontal slabs, respectively, with UCHIDA condensation heat transfer and MAX combination with radiant and convective heat transfer. External surface heat transfer is zero. Internal structures are similar except they are exposed on both sides. Heat sinks models for temperature responses for components of interest use four times UCHIDA heat transfer.

Question 7

GOTHIC is a mechanistic, best estimate code. However, in using the code for subcompartment pressure and temperature calculations, because of the degree of uncertainty in these analyses, it is important to maintain a degree of conservatism. Discuss the conservatisms used in the HELB subcompartment analyses, both for peak pressure, peak pressure difference, and temperature.

Response to Question 7

Peak pressure and differential pressure calculations were not revised (see also the response to Question 2 above). For the temperature analysis, the steam line blowdown is conservatively calculated as described in the response to Question 5 above. When calculating blowdown, if trip setpoints are not reached, manual trips are assumed after 1800 seconds. The individual subcompartment volumes and vent areas use pre-modification as-built walkdown information which is then typically reduced by about 5% for conservatism. Revaporization is set to the GOTHIC default, which resulted in slightly higher calculated equipment temperatures as compared to a constant 8%. This combination results in a conservatively calculated equipment temperature. In addition, when the equipment temperature requirement is established, a further 15°F margin is included. Finally, if new equipment is required to be qualified to the revised composite curve, the large number of cases run (and which are included in the envelope) forces significant conservatism in the duration of the transient as shown in the response to Question 3 above.

Question 8

Provide a comparison of the proposed GOTHIC calculation with the current licensing basis calculation of subcompartment pressure and temperature and explain any significant differences in trends or values.

Response to Question 8

The GOTHIC model was developed directly from the previous COMPACT model and then the results of the two codes were compared. Two differences were identified which impacted the comparison. The first was in treatment of small gaps internal to equipment modeled to determine its response to the HELB environment. COMPACT treated conductive/convective heat transfer across these small gaps in series with radiant heat transfer. Since air in the gap has a low emissivity, this tends to insulate the surface of the component and results in an unrealistically high surface temperature. GOTHIC models these two in parallel. The second difference involves the maximum value assumed for the convective heat transfer coefficient. COMPACT uses a value of 10,000 Btu/ft^2/°F, while GOTHIC uses a more reasonable value of 278 Btu/ft^2/°F. Modifying the GOTHIC model to account for these differences resulted in all but a few components having increased temperature requirements. These few had variations of less than 3°F between the previous calculated temperatures and the GOTHIC results.