Responses to Additional NRC Questions on River Bend Station Plant Transient Analysis Methodology, EA-PT-91-0003-M

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1.0 Summary

Gulf States Utilities (GSU) submitted topical report EA-PT-91-0003-M[1], entitled "River Bend Station Plant Transient Analysis Methodology," to the U. S. Nuclear Regulatory Commission (NRC) in May, 1991. This report describes GSU's computer programs, system models, and methods used for plant transient analysis at River Bend Station (RBS). The report also provides comparisons to Peach Bottom 2 transients and selected River Bend transients.

A topical report supplement, EA-PT-91-0003-SP[2], entitled "River Bend Station Plant Transient Analysis Methodology, Supplement 1," was submitted to the NRC in October, 1991. The supplementary report describes GSU's ΔCPR methodology, hot channel model, and uncertainty analysis methodology. The supplement also presents applications of the RBS methodology to calculation of thermal limits. Additional comparisons with RBS transients and revised Peach Bottom 2 transient comparisons were provided.

In October, 1992, the NRC requested[3] additional information on the transient methodology topical report EA-PT-91-0003-M. GSU's responses to the NRC questions are documented in EA-PT-0003-S1[4] which was submitted to the NRC in December, 1992.

In December, 1992, the NRC requested[5] additional information on the transient methodology topical report EA-PT-91-0003-SP. GSU's responses to the NRC questions are documented in EA-PT-0003-S2[6] which was submitted to the NRC in February, 1993.

A teleconference between members of the GSU and NRC staffs was held on March 22, 1993 at which time the NRC requested additional information on the topical report, EA-PT-91-0003-M. Section 2.0 of this report provides responses to those questions. The format for Section 2.0 consists of a restatement of the NRC question followed by the GSU response. References are provided in Section 3.0.

2.0 Responses to NRC Questions on River Bend Station Plant Transient Analysis Methodology, Supplement 1, EA-PT-91-0003-M

Question 1:

In the development of the cross section data for River Bend Station, the cross section fuel temperature dependence was fitted using a power weighting function. This procedure results in effectively a square of the power polynomial fit which would tend to over estimate the doppler feedback. Provide justification for the selection of this weighting function for this independent variable.

Response:

The cross section development was discussed in the original report (Reference 1, Page 48). During NRC review of the original report, a question was raised regarding the weighting functions (Reference 3). The response given in the supplemental report (Reference 4, Page 19) incorrectly stated that the power distribution was used as the temperature weighting function, and the inverse distribution - uniform deltas was used as the density weighting function. The density weighting function is the power distribution and the temperature weighting function is the inverse distribution - uniform deltas. The statement in Reference 1 correctly describes the GSU method for performing the fitting of the cross section dependence on fuel temperature and moderator density.

Question 2:

The first round of responses to questions on the report "River Bend Station Plant Transient Analysis Methodology", states that the RBS methodology would be applied to all the anticipated operational transients and abnormal operational transients listed in Chapter 15 of the River Bend Station Updated Safety Analysis Report. However, only information on four of the transients listed in Chapter 15 is provided. Justify the extension of the results provided to the remaining transient events.

Response:

The methodology described in References 1 and 2 are applicable to all abnormal operational occurences described in Chapter 15 of the Standard Review Plan. The four transients provided represent the limiting abnormal operating events within their respective Standard Review Plan Chapter 15 categories. The load rejection without bypass, the pressure regulator failure - downscale, and the feedwater controller failure - maximum demand events represent the limiting fast transients for CPR performance. The MSIV closure - indirect scram event is the limiting event for ASME pressure

vessel code compliance. GSU will evaluate the four limiting events discussed above for each cycle. Should a plant modification or operational change increase the severity of a non-limiting transient such that it becomes a limiting or near limiting transient, then that event will be evaluated as described in References 1 and 2.

Question 3:

The hot bundle calculations use a fixed axial power shape. Please justify the adequacy of this approach relative to using a time varying power shape.

Response:

The methods employed by the GSU staff are consistent with methods employed by our fuel vendor and other BWR utilities for performing reload safety analyses. By remaining consistent with the vendor methods, GSU remains consistent with the current licensing basis for RBS.

GSU has discussed this issue with the fuel vendor, and has been informed that the vendor uses a constant axial power shape for fuel designs developed prior to GE11 (pre-GE11). The vendor has performed detailed 3-D analyses, including comparisons to experimental data, to justify the adequacy of using the constant axial power shape assumption for pre-GE11 fuel designs. The only fuel types presently loaded in the RBS core are pre-GE11 designs. Therefore, GSU believes that the fuel vendors work to justify the use of the constant axial power shape assumption for pre-GE11 fuel types also justifies the use of a constant axial power shape for RBS.

GSU proposes to use the standard vendor approach as this is consistent with the current licensing basis methodology. However, GSU will monitor the ongoing activities in this area, and will modify the methodology as appropriate.

3.0 References

1. "River Bend Station Plant Transient Analysis Methodology," **EA-PT-91-0003-M**, April 1991, transmitted to the NRC by RBG-34,939 dated May 2, 1991.

2. "River Bend Station Plant Transient Analysis Methodology; Supplement 1 Delta CPR Methodology and Additional Benchmarks", **EA-PT-91-0003-SP**, October 1991, transmitted to the NRC by RBG-35876 dated October 31, 1991.

3. Letter from D. V. Pickett (NRC) to J. C. Deddens (GSU) dated October 30, 1992, River Bend Station, Unit 1 - Request for Additional Information Re Topical Report EA-PT-91-0003-M, "River Bend Station Plant Transient Analysis Methodology," (TAC No. M80315), RBC-42927.

4. "Responses to NRC Questions on River Bend Station Plant Transient Analysis Methodology EA-PT-91-0003-M," **EA-PT-91-0003-S1**, December 1992, transmitted to the NRC by RBG-37,930 dated December 18, 1992.

5. Letter from E. T. Baker (NRC) to P. D. Graham (GSU) dated December 22, 1992, River Bend Station, Unit 1 - Request for Additional Information Regarding Topical Report EA-PT-91-0003-M, Supplement 1, "River Bend Station Plant Transient Analysis Methodology" (TAC No. M80315), RBC-43190.

6. "Responses to NRC Questions on River Bend Station Plant Transient Analysis Methodology, Supplement 1, EA-PT-91-0003-SP," **EA-PT-91-0003-S2**, February 1993, transmitted to the NRC by RBG-38,150 dated February 17, 1993.