AREVA

April 9, 2009
NRC:09:037

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

Response to Fifth Request for Additional Information Regarding ANP-10278P, "U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report" (TAC No. MD4978)

Ref. 1: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Request for Review and Approval of ANP-10278P Revision 0, 'U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report'," NRC:07:010, March 26, 2007.

Ref. 2: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Response to an RAI on the Topical Report ANP-10278P 'U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report'," NRC:07:035, August 17, 2007.

Ref. 3: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Response to Second Request For Additional Information Regarding ANP-10278P, 'U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report' (TAC No. MD4978)," NRC:08:039, June 13, 2008.

Ref. 4: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Response to Third Request For Additional Information Regarding ANP-10278P, 'U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report' (TAC No. MD4978)," NRC:08:105, December 19, 2008.

Ref. 5: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Supplemental Response to Third Request For Additional Information Regarding ANP-10278P, 'U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report' (TAC No. MD4978)," NRC:09:030, March 31, 2009.

Ref. 6: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Response to Fourth Request For Additional Information Regarding ANP-10278P, 'U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report' (TAC No. MD4978)," NRC:09:036, April 2, 2009.

Ref. 7: Letter, Getachew Tesfaye (NRC) to Ronnie L. Gardner (AREVA NP Inc.), "Fifth Request for Additional Information Regarding ANP-10278P, 'U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report,' (TAC No. MD4978)," March 11, 2009.

AREVA NP Inc. (AREVA NP) requested the NRC's review and approval of topical report ANP-10278P Revision 0, "U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report" in Reference 1. In this regard, AREVA NP Inc. provided additional information to the NRC in References 2 through 6. The NRC made a fifth request for additional information in

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Reference 7. A response to the three questions posed in Reference 7 is provided in the attachment to this letter.

If you have any questions related to this submittal, please contact Ms. Sandra M. Sloan, Regulatory Affairs Manager for New Plants, by telephone at 434-832-2369 or by e-mail to sandra.sloan@areva.com.

Sincerely,

Ronnie L. Gardner

Ronnie L. Gardner, Manager
Corporate Regulatory Affairs
AREVA NP Inc.

Enclosures

cc: G. Tesfaye
Docket No. 52-020

Response to Fifth Request for Additional Information—ANP-10278P
"U.S. EPR Realistic Large Break Loss of Coolant Accident Topical Report"
(TAC NO. MD4978)

RAI 38: *Provide a plot of the liquid volume in the lower plenum as a function of time over the time period 0 - 70 seconds only. The figure should also indicate the liquid volume when the lower plenum region is completely full. For this question the lower plenum is defined as all of the fluid space below the core inlet junctions.*

Response to RAI-38:

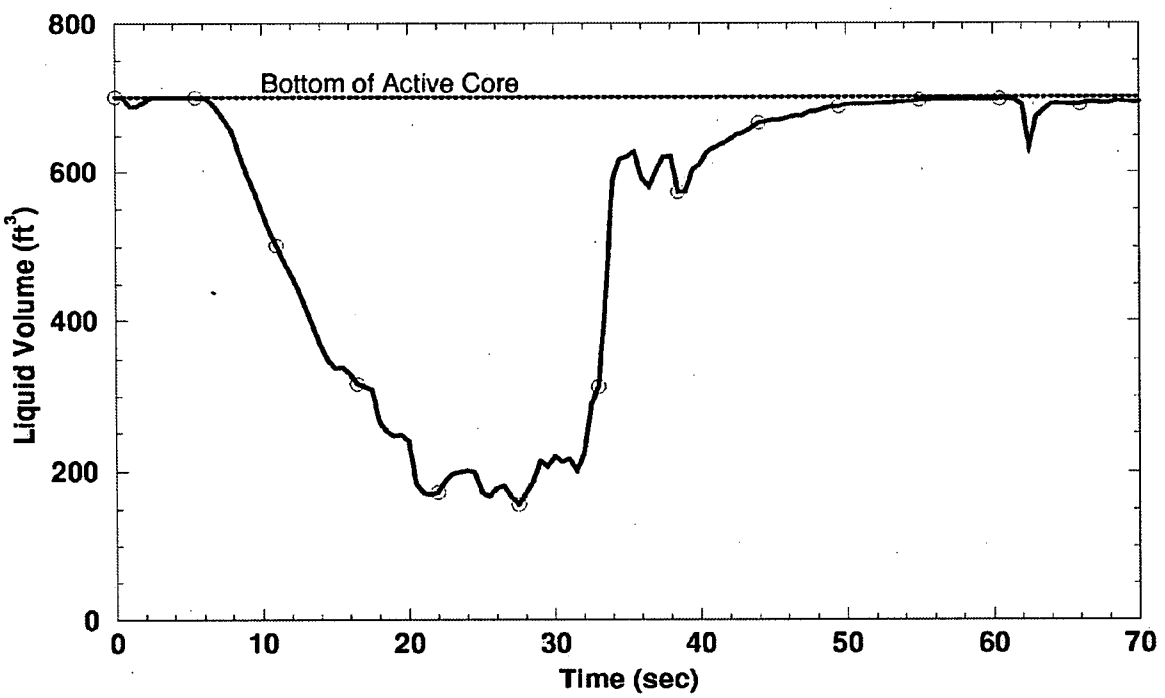
Figure 38-1 shows the lower plenum liquid volume (defined as all of the fluid space below the core inlet junctions) as a function of time over the period 0 – 70 seconds for the realistic large break loss of coolant accident (RLBLOCA) Case 44. This case is the highest peak cladding temperature (PCT) case in the sample problem presented in Appendix A of ANP-10278P (Reference 1).

As shown, blowdown of the primary system ends at about 27 seconds, and the reactor vessel lower plenum fills with a two-phase mixture at about 34 seconds. At about 50 seconds, the void in the lower plenum is either swept out or condensed completely.

References for Question 38:

1. ANP-10278P, Rev. 0, "U.S. EPR Realistic Large Break Loss-of-Coolant Accident Topical Report," AREVA NP Inc., March 2007.

Figure 38-1—RLBLOCA Case 44 Lower Plenum Liquid Volume



RAI 39: *Provide a single plot containing the collapsed liquid level in the core and in the lower plenum over the time period 20 - 70 seconds only. The y-axis scale should range from zero to the depth of the lower plenum.*

Response to RAI-39:

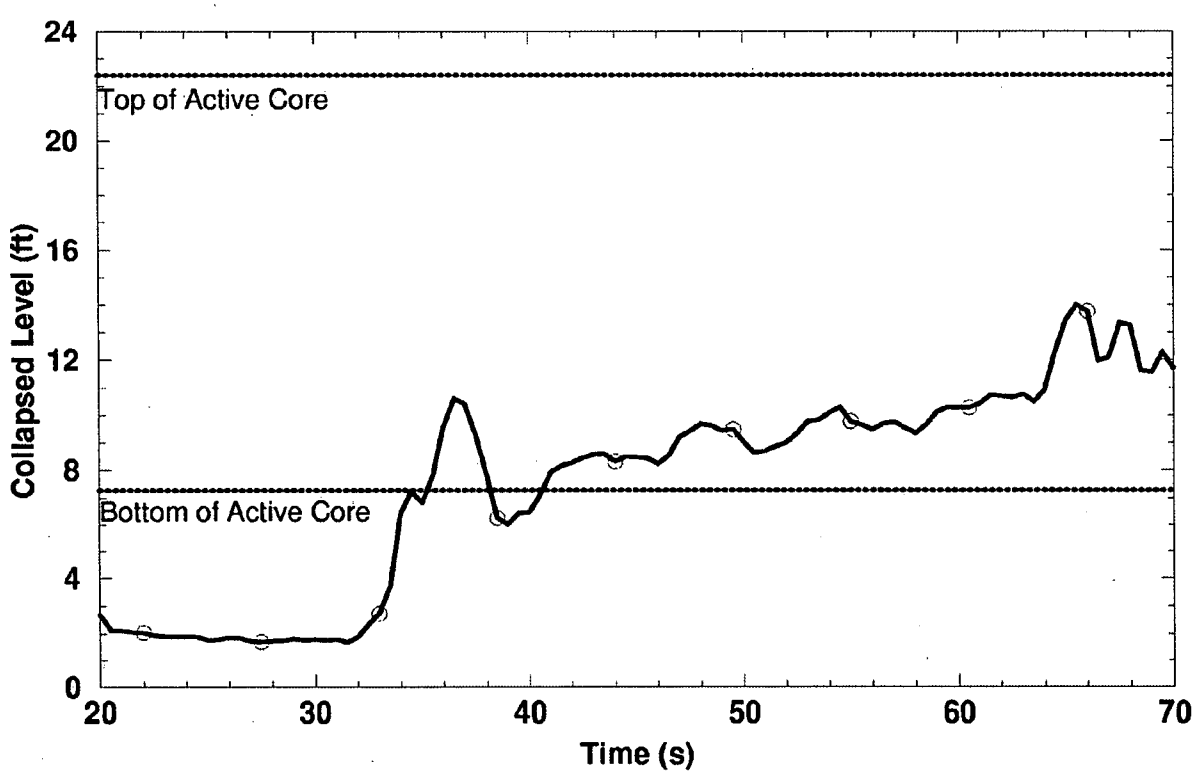
Figure 39-1 shows a single average collapsed liquid level in the core, lower plenum, and lower head regions of the realistic large break loss of coolant accident (RLBLOCA) Case 44. This is the highest peak cladding temperature (PCT) case in the sample problem presented in Appendix A of ANP-10278P (Reference 1). The figure spans 20 – 70 seconds, with the y-axis scale ranging from zero (defined as the bottom of reactor vessel lower head) to the top of the active core.

Over this requested time span, the core region is completely voided until about 34 seconds, when core reflood commences. The peaks and valleys in the collapsed level are due to flow oscillations at the core inlet.

References for Question 39:

1. ANP-10278P, Rev. 0, "U.S. EPR Realistic Large Break Loss-of-Coolant Accident Topical Report," AREVA NP Inc., March 2007.

Figure 39-1—RLBLOCA Case 44 Collapsed Liquid Level in Core and Lower Plenum



RAI 40: *Provide a plot of the mass flow rate into the hot assembly inlet nozzle as a function of time over the time period 20 - 70 seconds only. The y-axis should be scaled only large enough to capture the peak values (positive and negative) of the oscillations which occur during this time period.*

Response to RAI-40:

Figure 40-1 shows the realistic large break loss of coolant accident (RLBLOCA) Case 44 inlet mass flow rate of the hot-assembly (i.e., flow junction at the bottom of the active fuel region of the hot assembly) as a function of time over the time period 20 – 70 seconds. This case is the highest peak cladding temperature (PCT) case in the sample problem presented in Appendix A of ANP-10278P (Reference 1).

As shown in the figure, the inlet mass flow rate of the hot assembly is virtually zero during the time period of 20 – 34 seconds, when the core is completely voided. Flow oscillations start when subcooled liquid in the lower plenum enters the core region, and last through the entire core reflood phase.

References for Question 40:

1. ANP-10278P, Rev. 0, "U.S. EPR Realistic Large Break Loss-of-Coolant Accident Topical Report," AREVA NP Inc., March 2007.

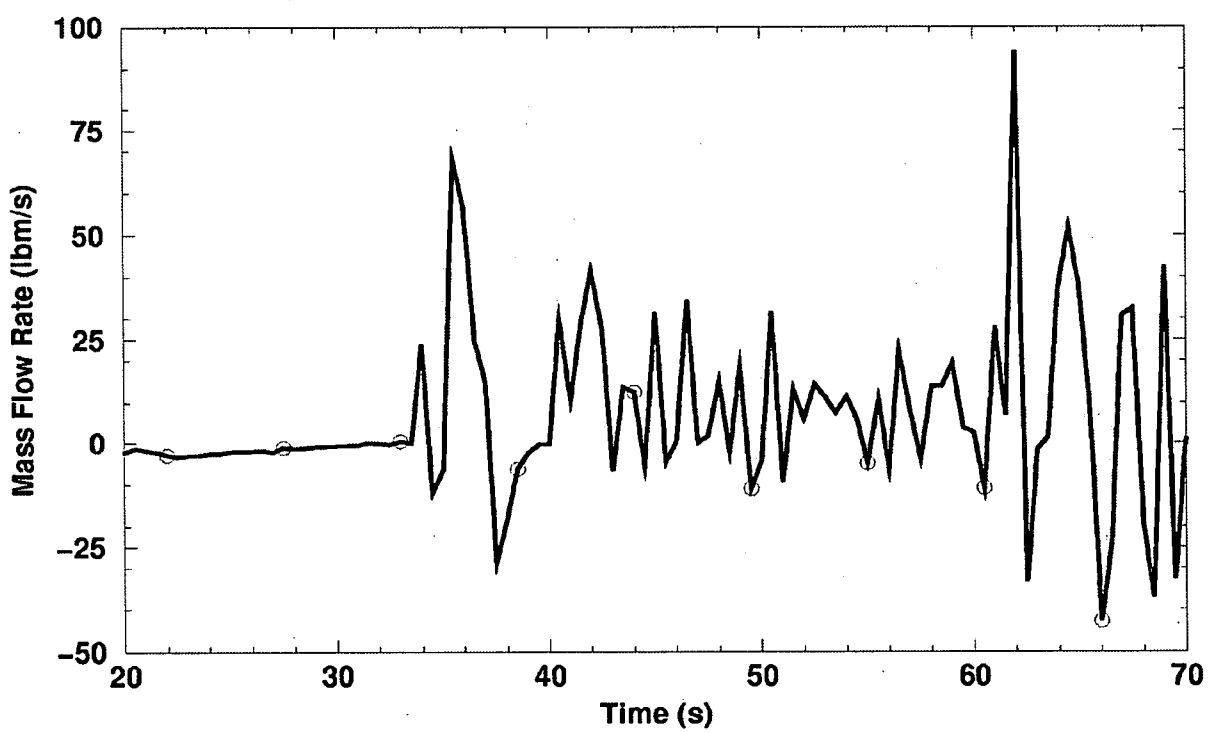



Figure 40-1—RLBLOCA Case 44 Hot Assembly Inlet Mass Flow Rate