WOLF CREEK
NUCLEAR OPERATING CORPORATION

Terry J. Garrett
Vice President Engineering

November 22, 2010
ET 10-0031

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

Reference: Letter ET 10-0026, dated September 22, 2010, from T. J. Garrett, WCNOC, to USNRC

Subject: Docket No. 50-482: Response to Supplemental Information Request for License Amendment Request Deviation from Fire Protection Requirements – Reactor Coolant System Subcooling During Alternative Shutdown (TAC NO. ME4757)

Gentlemen:

The Reference provided Wolf Creek Nuclear Operating Corporation's (WCNOC) License Amendment Request (LAR) to make changes to the approved fire protection program as described in the Wolf Creek Generating Station (WCGS) Updated Safety Analysis Report (USAR). Specifically, a revision to USAR Table 9.5E-1 was proposed to include information on Reactor Coolant System process variables not maintained within those predicted for a loss of normal ac power as evaluated in Evaluation SA-08-006 Rev.1, "RETRAN-3D Post–Fire Safe Shutdown (PFSSD) Consequence Evaluation for a Postulated Control Room Fire."

The Nuclear Regulatory Commission (NRC) staff initiated an acceptance review of the Reference and concluded that supplemental information is necessary to enable the NRC staff to make an independent assessment regarding the acceptability of the proposed amendment request in terms of regulatory requirements and the protection of public health and safety and the environment. A phone call between WCNOC and the NRC staff was held on October 26, 2010, to discuss the information required to supplement the amendment request. The requested supplemental information was provided by electronic mail from the NRC Project Manager on November 3, 2010 with the supplemental information to be submitted by November 22, 2010.

A006
NRR

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4084, or Mr. Richard D. Flannigan at (620) 364-4117.

The Attachment provides a copy of the supplemental information needed with WCNOC's response following each requested item. The information provided in the Attachment does not impact the conclusions of the No Significant Hazards Consideration provided in the Reference.

In accordance with 10 CFR 50.91, a copy of this submittal is being provided to the designated Kansas State official.

Sincerely,

Terry J. Garrett

TJG/rlt

Attachment I - Response to Supplemental Information Request for License Amendment Request Deviation from Fire Protection Requirements – Reactor Coolant System Subcooling During Alternative Shutdown
II - Results for Scenarios 1, 1A , 2, and 2A With PORV Open Greater Than 3 Minutes

cc: E. E. Collins Jr (NRC), w/a
T. A. Conley (KDHE), w/a
G. B. Miller (NRC), w/a
B. K. Singal (NRC), w/a
Senior Resident Inspector (NRC), w/a

STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

Terry J. Garrett, of lawful age, being first duly sworn upon oath says that he is Vice President Engineering of Wolf Creek Nuclear Operating Corporation; that he has read the foregoing document and knows the contents thereof; that he has executed the same for and on behalf of said Corporation with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By _____
Terry J. Garrett
Vice President Engineering

SUBSCRIBED and sworn to before me this 22nd day of November, 2010.

RHONDA L. TIEMEYER
NOTARY PUBLIC
OFFICIAL SEAL
STATE OF KANSAS
MY COMMISSION EXPIRES
January 11, 2014

Rhonda L. Tiemeyer
Notary Public

Expiration Date January 11, 2014

Response to Supplemental Information Request for License Amendment Request Deviation from Fire Protection Requirements – Reactor Coolant System Subcooling During Alternative Shutdown

The Nuclear Regulatory Commission (NRC) staff initiated an acceptance review of Reference 1 and concluded that supplemental information is necessary to enable the NRC staff to make an independent assessment regarding the acceptability of the proposed amendment request in terms of regulatory requirements and the protection of public health and safety and the environment. A phone call between Wolf Creek Nuclear Operating Corporation (WCNOC) and the NRC staff was held on October 26, 2010, to discuss the information required to supplement the amendment request. The requested supplemental information was provided by electronic mail from the NRC Project Manager on November 3, 2010. The specific NRC staff request for information is provided in italics.

1. *Please describe what happens if the PORVs are not closed in 3 minutes. Since the current licensing basis may allow five minutes, without having considered loss of subcooling, If NRC staff approves this amendment, staff may need to unapprove the five minutes in their program.*

Response: Four of the Evaluation SA-08-006 Rev.1 Post-Fire Safe Shutdown (PFSSD) scenarios (1, 1A, 2, and 2A) pertaining to inside control room fires have been analyzed considering an open pressurizer power operated relief valve (PORV) for three minutes. The scenario descriptions are:

Scenario 1	-	Loss of off-site power, PORV open
Scenario 1A	-	Loss of off-site power, PORV open, auxiliary feedwater (AFW) pumps auto start for unplanned cooldown
Scenario 2	-	No loss of off-site power, PORV open
Scenario 2A	-	No loss of off-site power, PORV open, AFW pumps auto start for unplanned cooldown

Results of the analysis for an open PORV for greater than 3 minutes determined that two-phase flow developed in the Reactor Coolant System (RCS) pumps for Scenarios 2 and 2A. Since the RETRAN reactor coolant pump (RCP) model has only been benchmarked for single-phase flow, once two-phase flow develops, the model cannot accurately predict the results for Scenarios 2 and 2A with a PORV open for five minutes. However, through a sensitivity study, it was determined that Scenarios 2 and 2A could be analyzed with the PORV open for 3.5 minutes without achieving two-phase flow in the RCP model. Therefore, Scenarios 2 and 2A were analyzed with the PORV open for 3.5 minutes.

As shown in the Figures in Attachment II, the thermal-hydraulic process variables (Core Power, Core Mass Flowrate, Steam Generator Pressure, Pressurizer Pressure, and Pressurizer Level) for all four cases, are maintained within those predicted for a loss of normal ac power, with the exception that some voiding occurs in the upper core and upper head in Scenarios 1 and 1A. Those results show that natural circulation can be sustained and adequate core cooling is maintained, as sufficient core flow continues and the core exit temperature is less than 712°F.

In the Scenario 1 and 1A cases with the PORV open for 5 minutes, the peak upper core void fraction is less than 19% and occurs approximately 5 minutes after the PORV opens. The maximum upper head void fraction is less than 60%. The core mass flowrates are slightly higher with a higher pressurizer level and lower pressurizer pressure than the 3 minute cases. The continued positive core mass flowrates and the core exit temperatures below 712°F demonstrate that unrestorable conditions will not be reached.

For Scenarios 2 and 2A, no voiding occurs in the upper core or the upper head with the PORV open for 3.5 minutes. Comparing with the original case (PORV open for 3 minutes), core mass flowrates are essentially unchanged and pressurizer pressure is very similar to the 3 minute case. The continued positive core mass flow rate and the core exit temperature below 712°F demonstrate that unrestorable conditions will not be reached.

2. *With the apparent sensitivity of 3 minutes, what indications are available to the operators, unaffected by the postulated fire, the make the decision to close the power operated relief valves (PORVs).*

Response: For a control room fire prompting control room evacuation, WCNOC does not credit diagnostic instrumentation to determine the need to close the pressurizer power operated relief valves (PORVs). Isolation of the PORVs is an immediate action step in procedure OFN RP-017,"Control Room Evacuation," and is one of the first steps performed upon evacuation of the control room during a fire. This is a preemptive action that is performed regardless of the actual PORV position and, while it will close an open PORV, it is intended to prevent the PORV from opening due to potential fire-induced cable damage.

Prior to the 2008 Triennial Fire Protection Inspection (Inspection Report 05000482/2008010), the immediate action step to isolate the PORVs was timed in preparation for a revision to procedure OFN RP-017. Three operators were timed with times of 1 minute 35 seconds, 2 minutes, and 1 minute 50 seconds. Procedure AI 21-017, "Timed Fire Protection Actions Validation," was developed in September 2010. This procedure requires validation of the immediate action step on a 3 year frequency.

References:

1. WCNOC Letter ET 10-0026, "License Amendment Request (LAR) for Deviation from Fire Protection Requirements – Reactor Coolant System Subcooling During Alternative Shutdown," September 22, 2010.

Results for Scenarios 1, 1A , 2, and 2A With PORV Open Greater Than 3 Minutes

1: Scenario 1 Results (PORV Open 3 vs. 5 minutes)

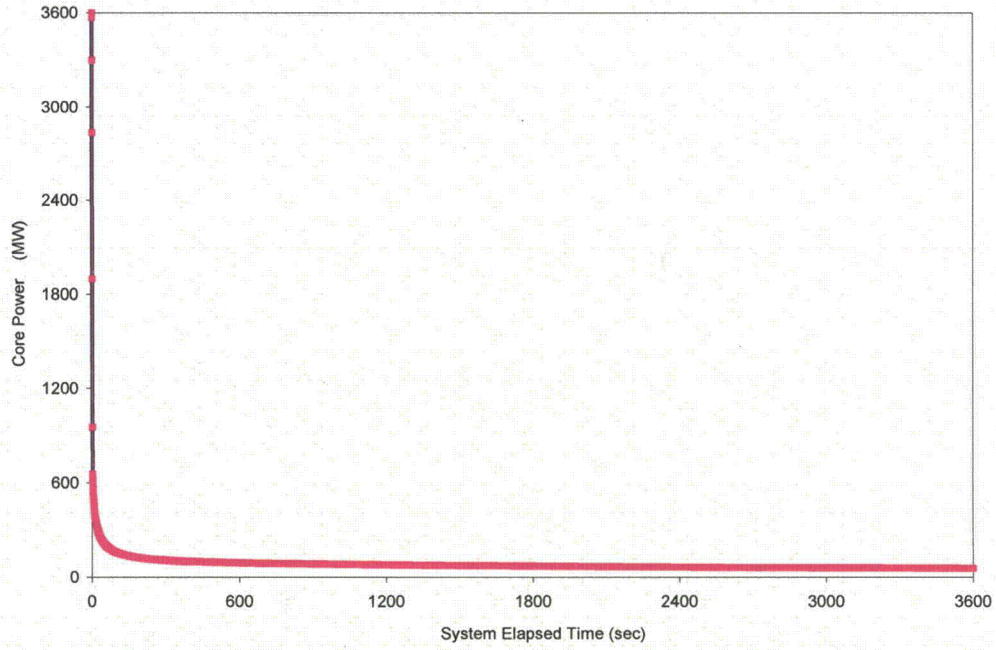

Figure 1-1 Core Power

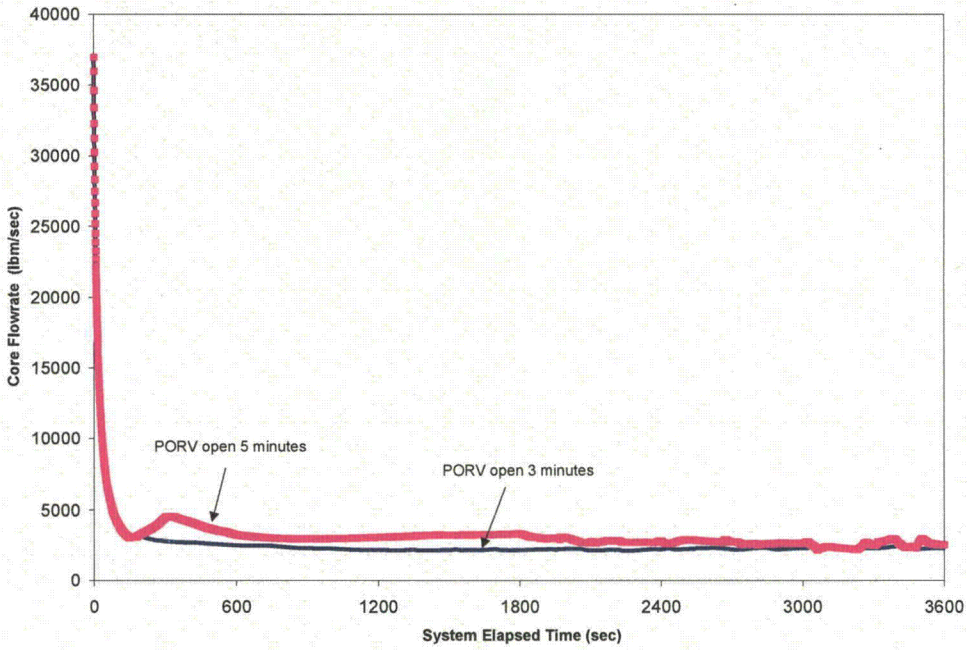

Figure 1-2 Core Mass Flowrate

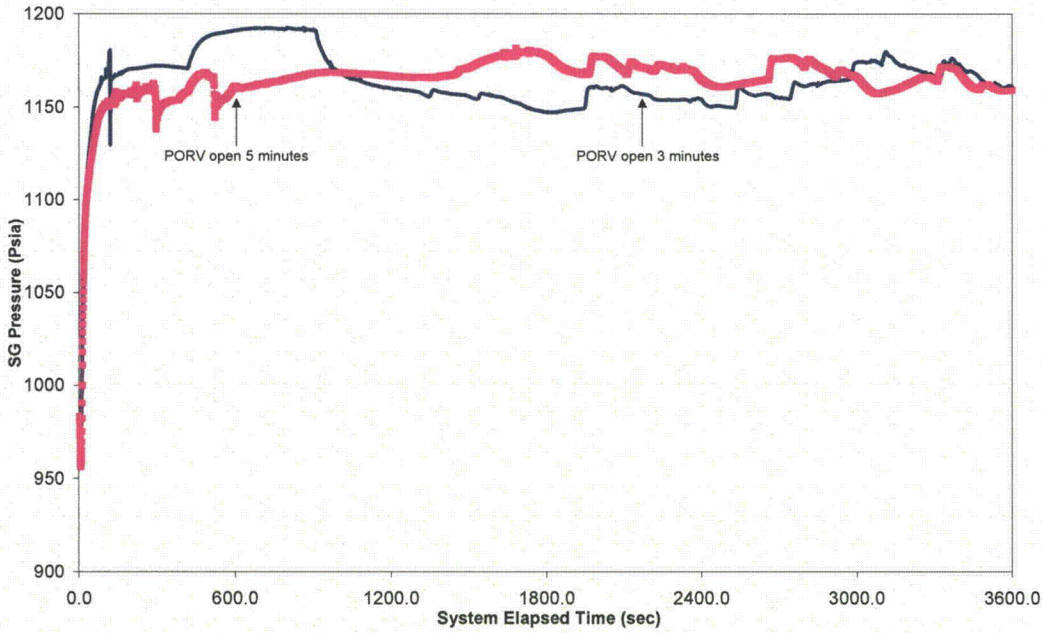

Figure 1-3 Steam Generator Pressure

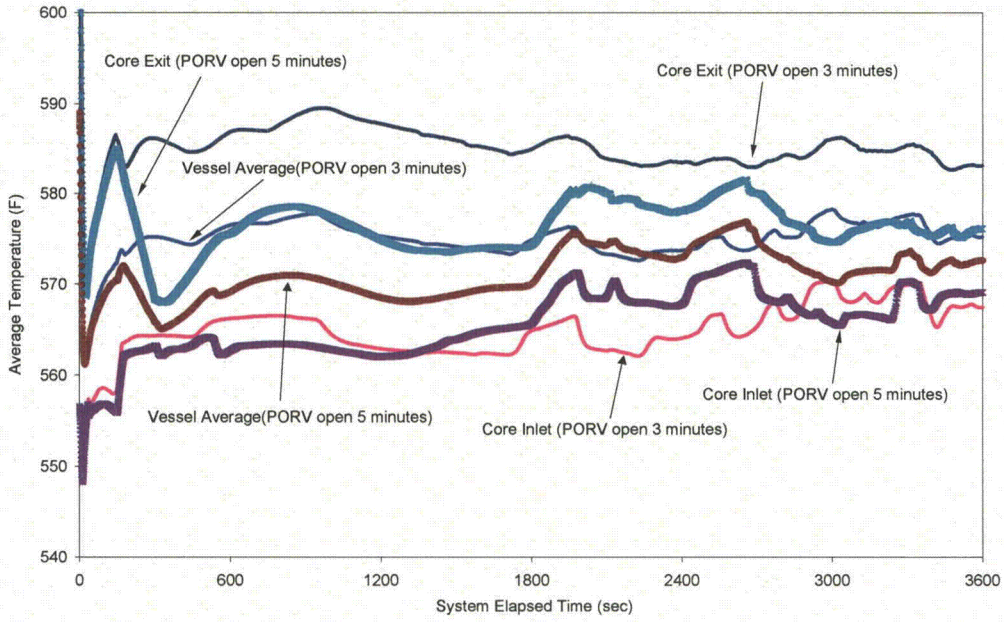

Figure 1-4 RCS Temperature

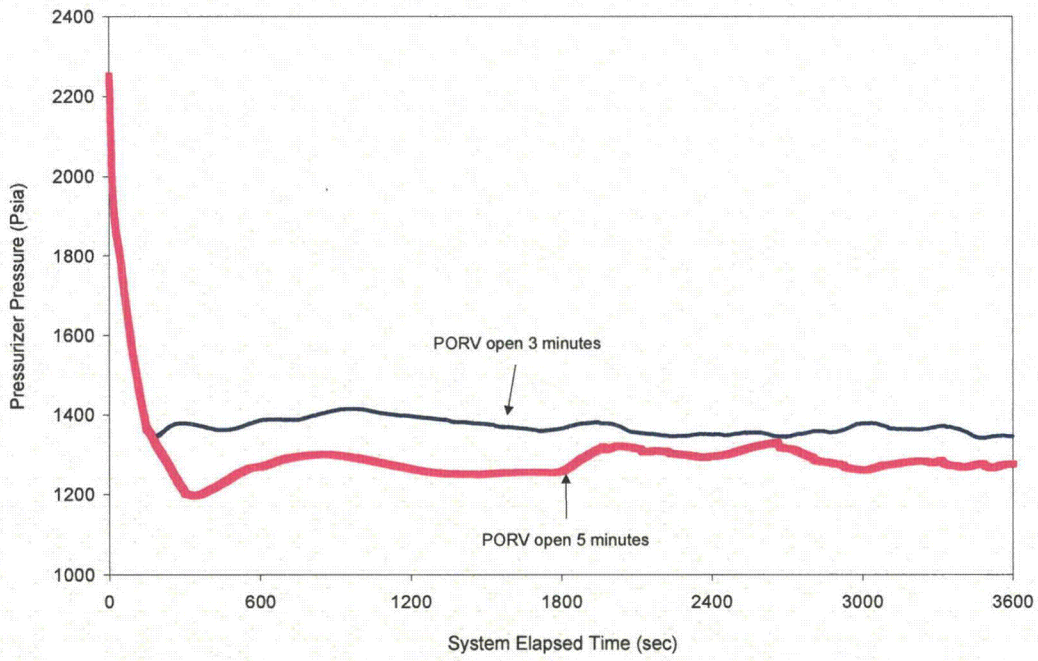

Figure 1-5 Pressurizer Pressure

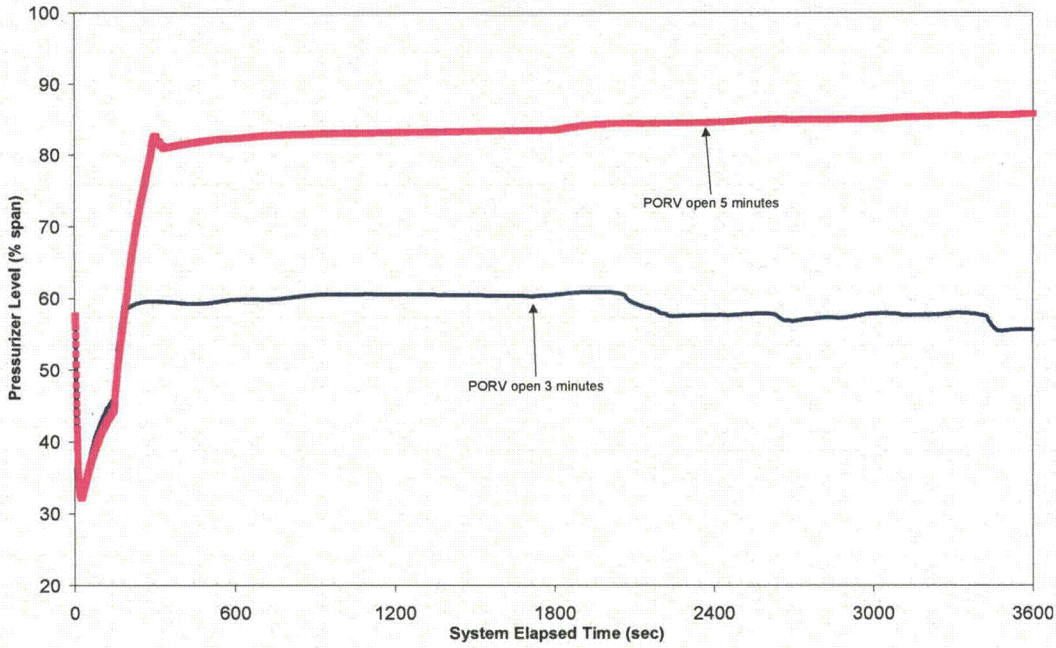

Figure 1-6 Pressurizer Level

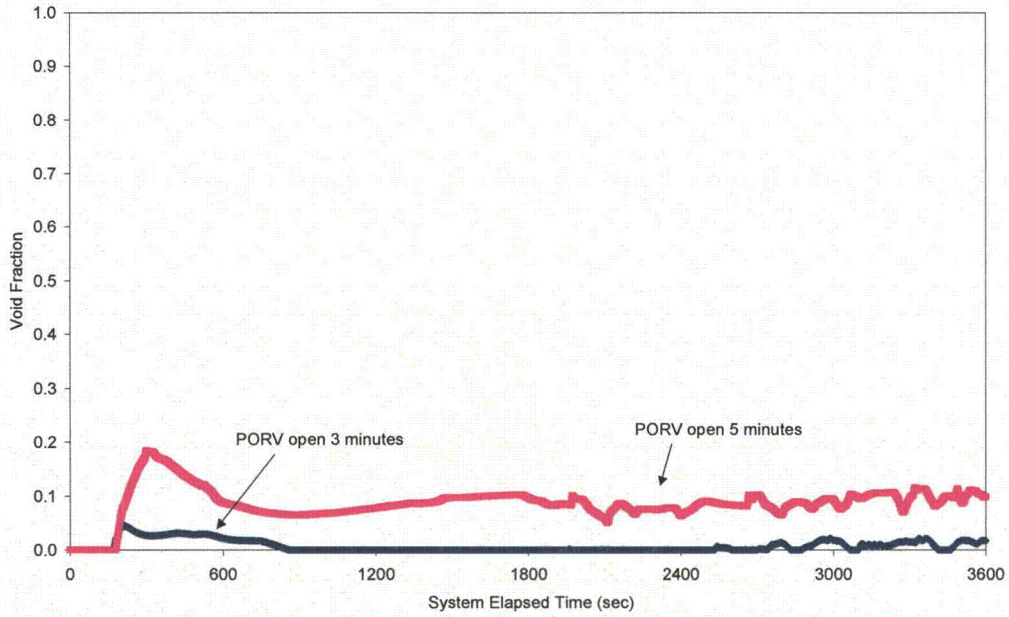

Figure 1-7 Upper core void fraction

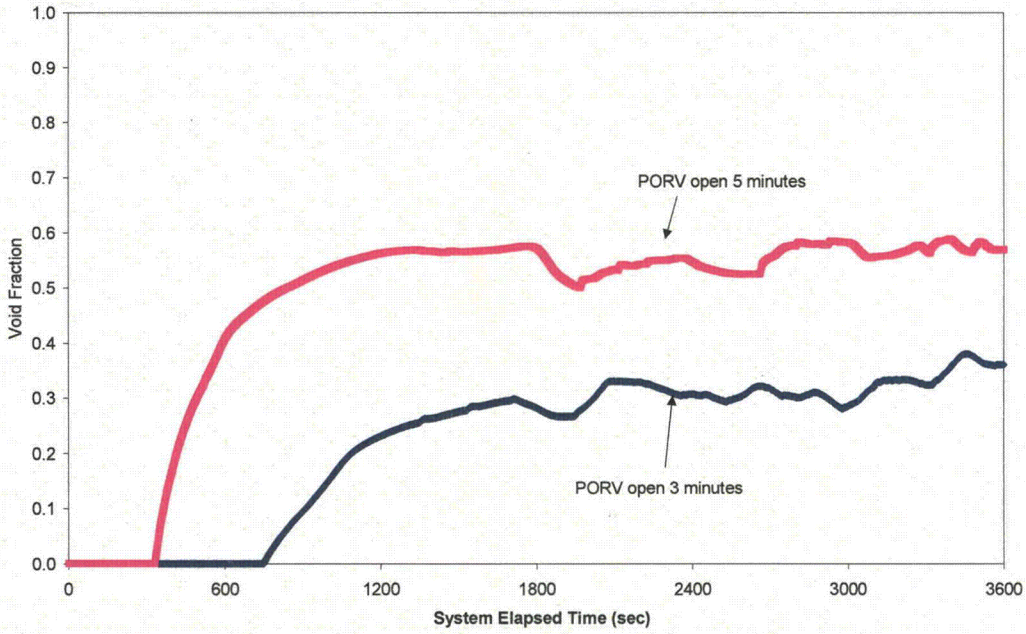

Figure 1-8 Upper head void fraction

2: Scenario 1A Results (PORV Open 3 vs. 5 minutes)

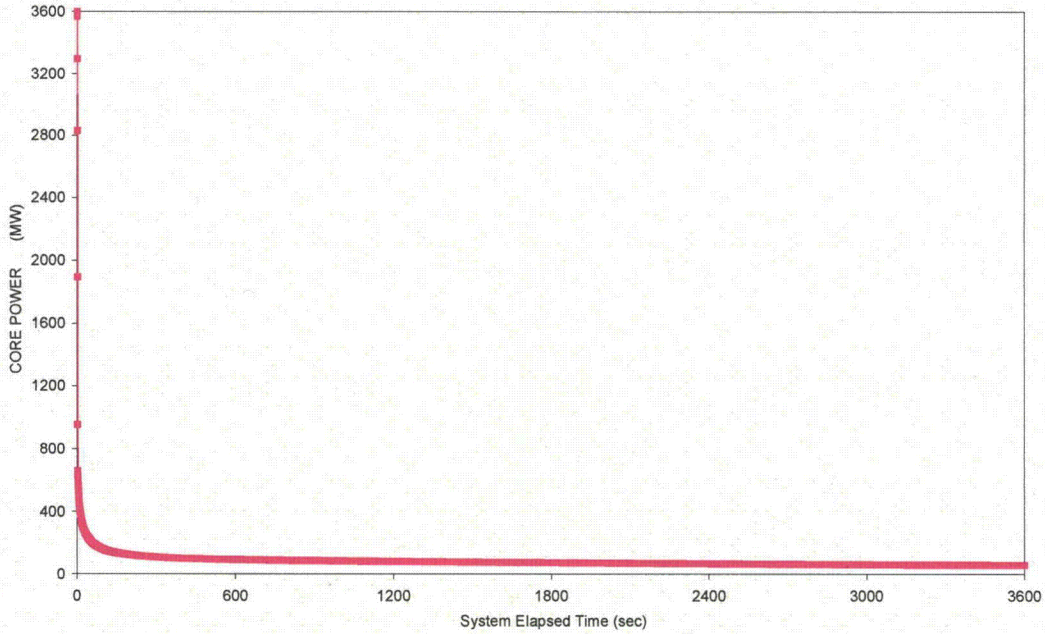

Figure 1A-1 Core Power

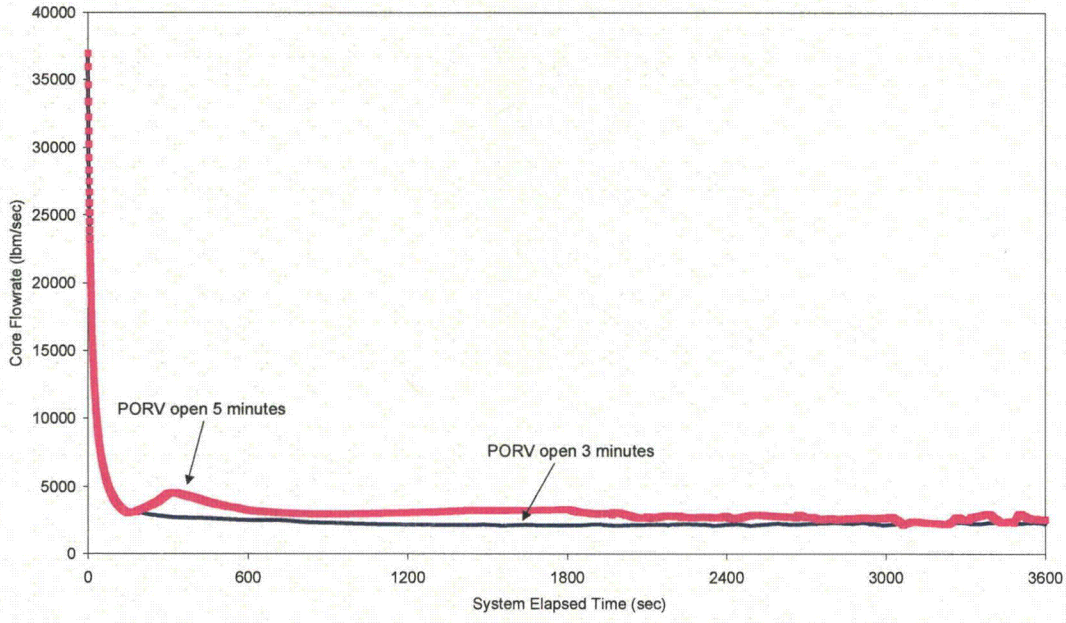

Figure 1A-2 Core Mass Flowrate

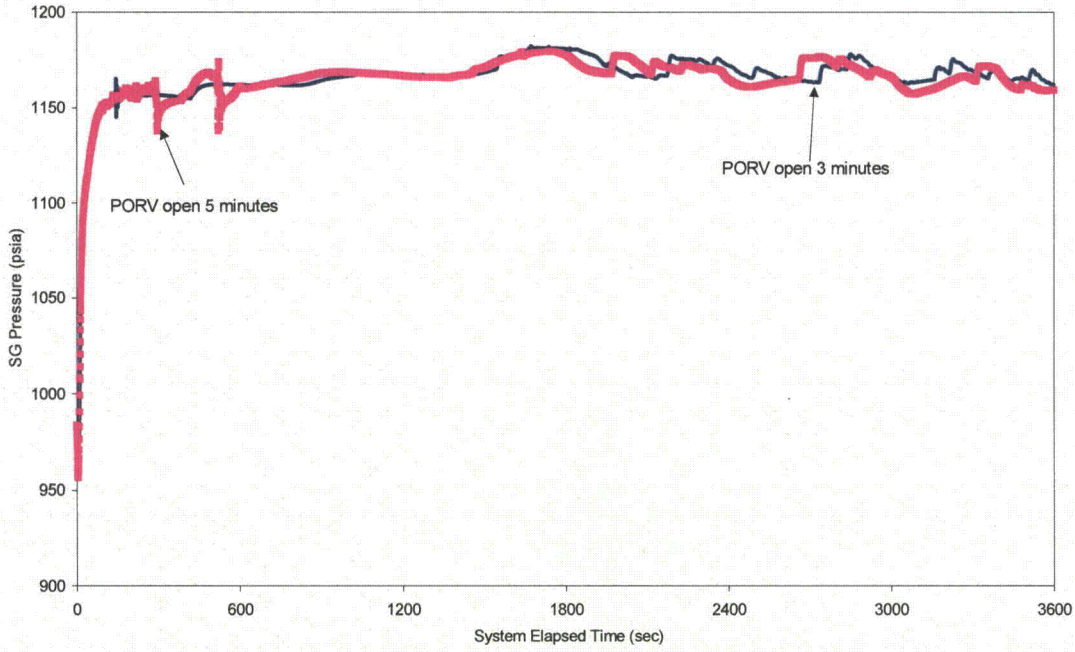

Figure 1A-3 Steam Generator Pressure

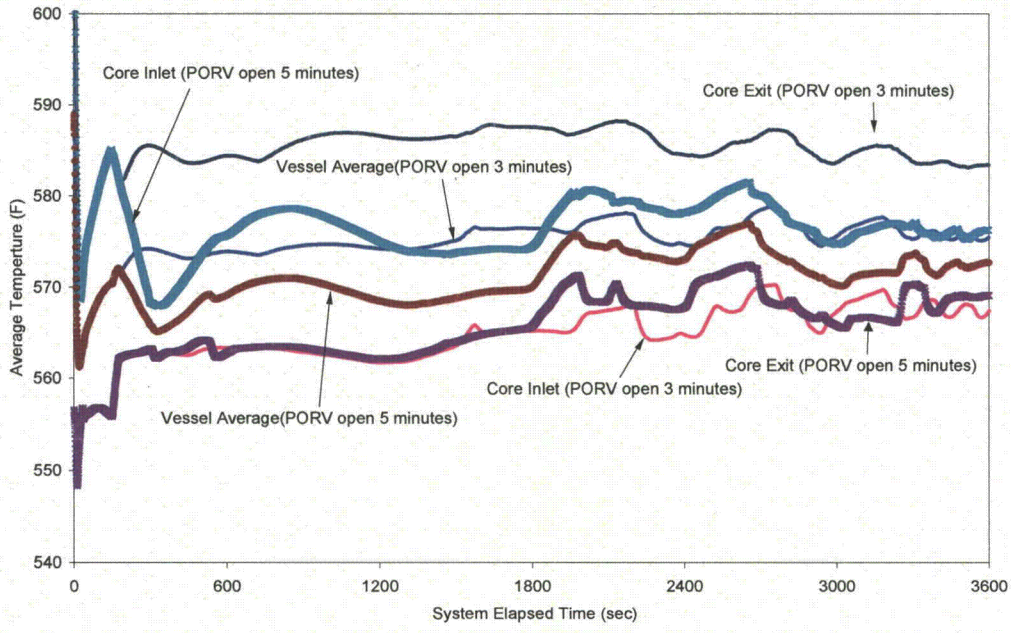

Figure 1A-4 RCS Temperature

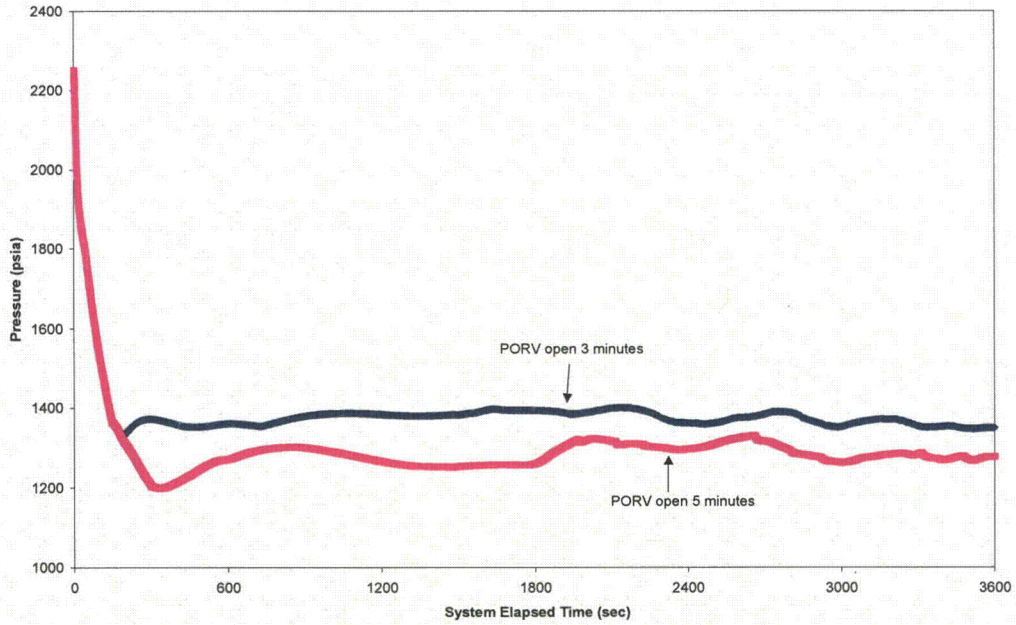

Figure 1A-5 Pressurizer Pressure

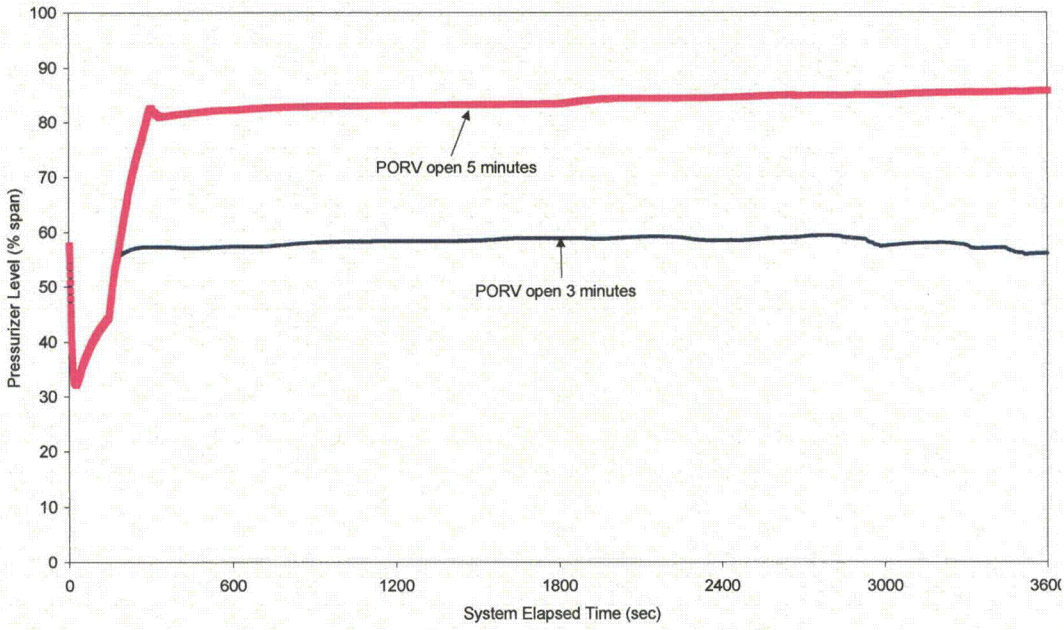

Figure 1A-6 Pressurizer Level

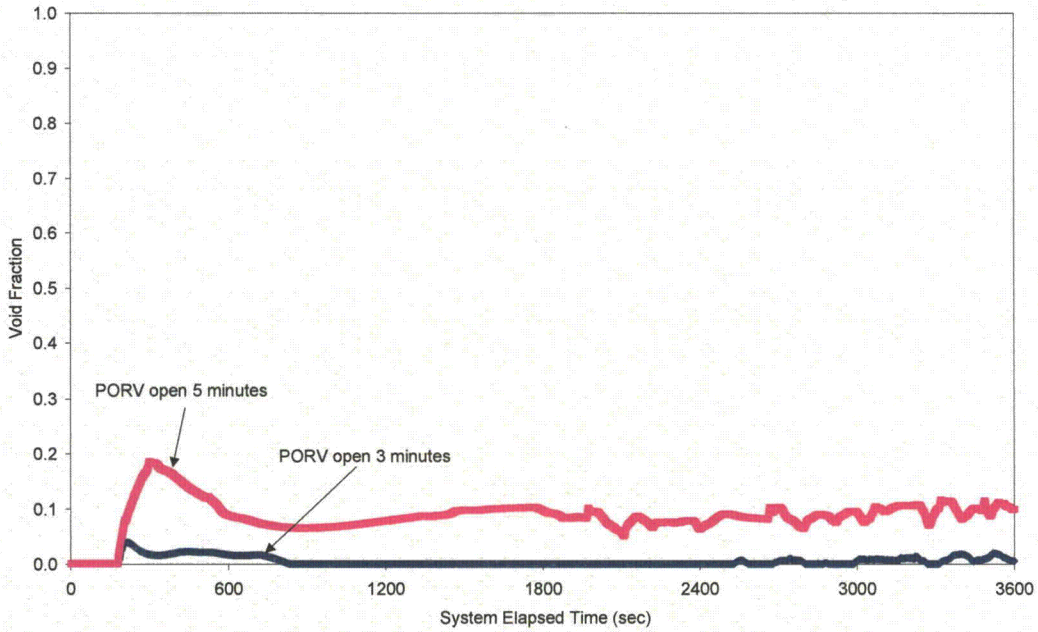

Figure 1A-7 Upper core void fraction

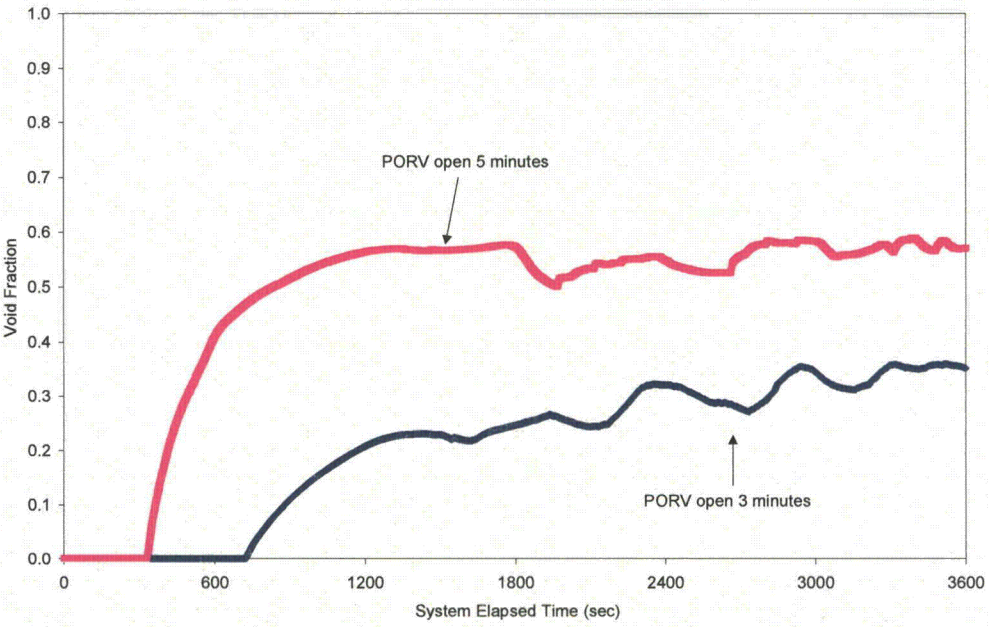

Figure 1A-8 Upper head void fraction

3: Scenario 2 Results (PORV Open 3 vs. 3.5 minutes)

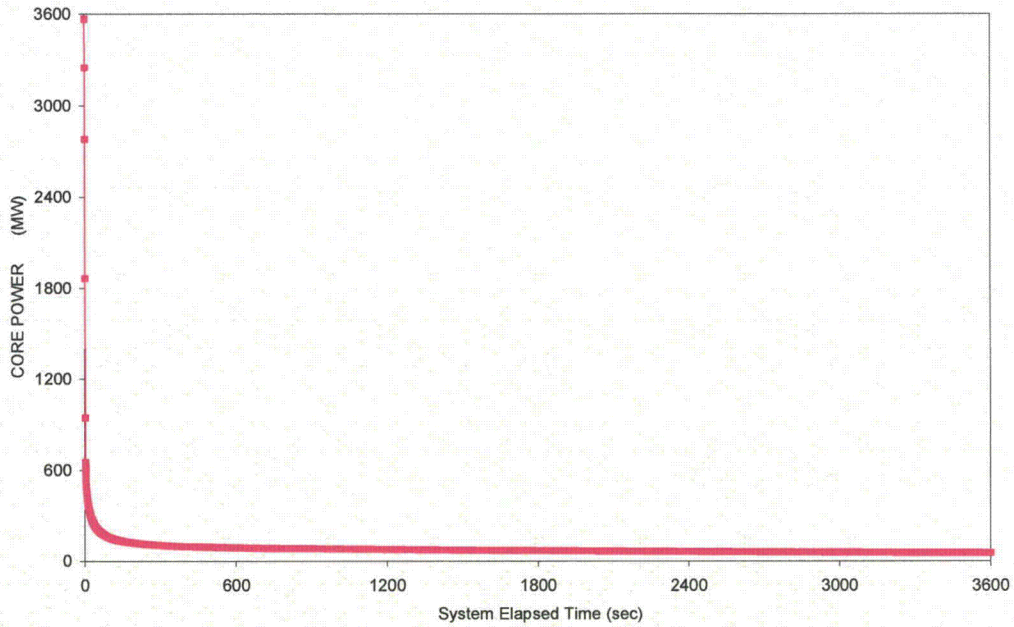

Figure 2-1 Core Power

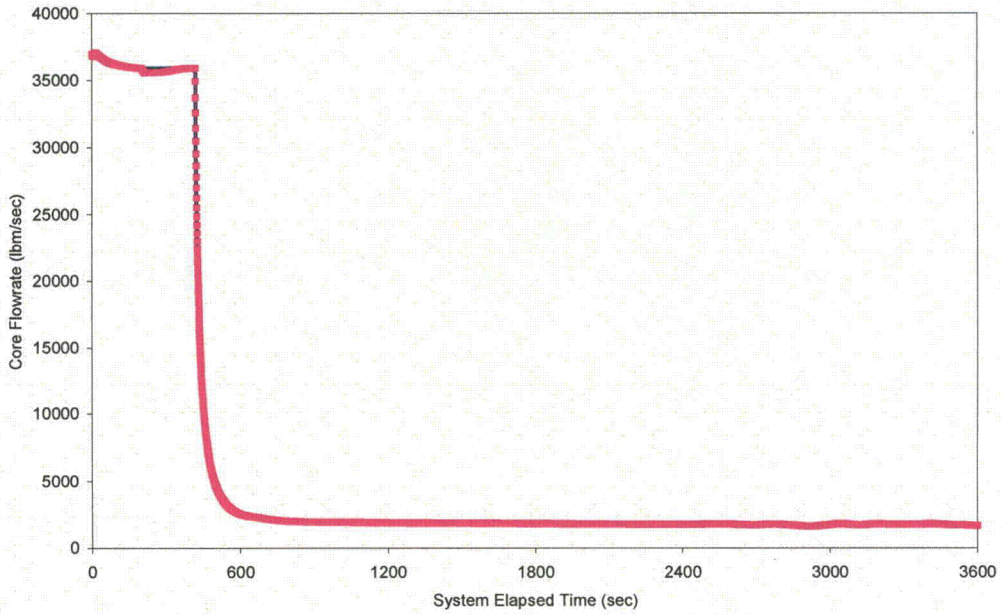

Figure 2-2 Core Mass Flowrate

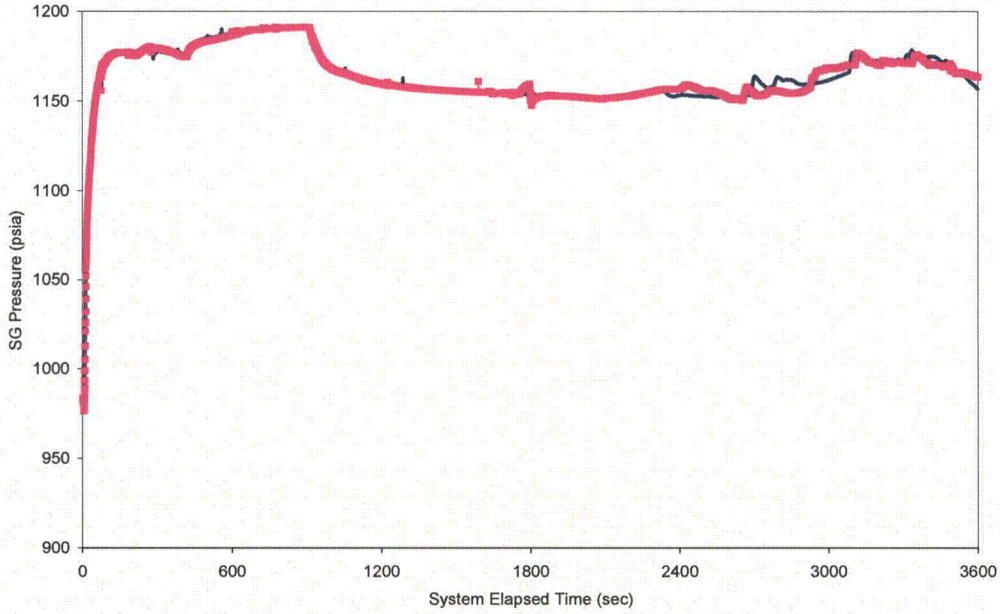

Figure 2-3 Steam Generator Pressure

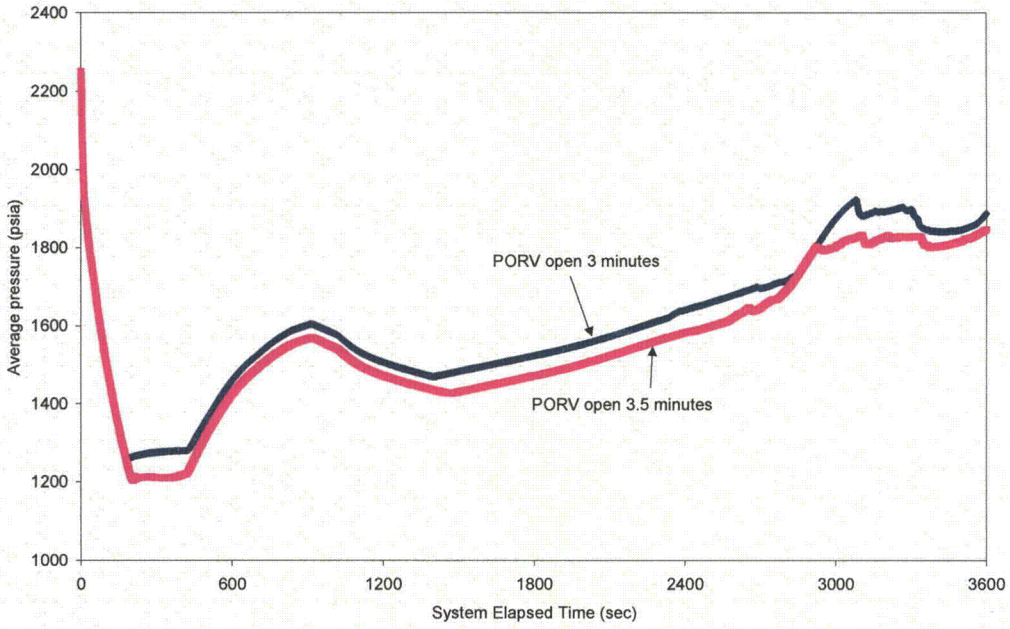

Figure 2-4 Pressurizer Pressure

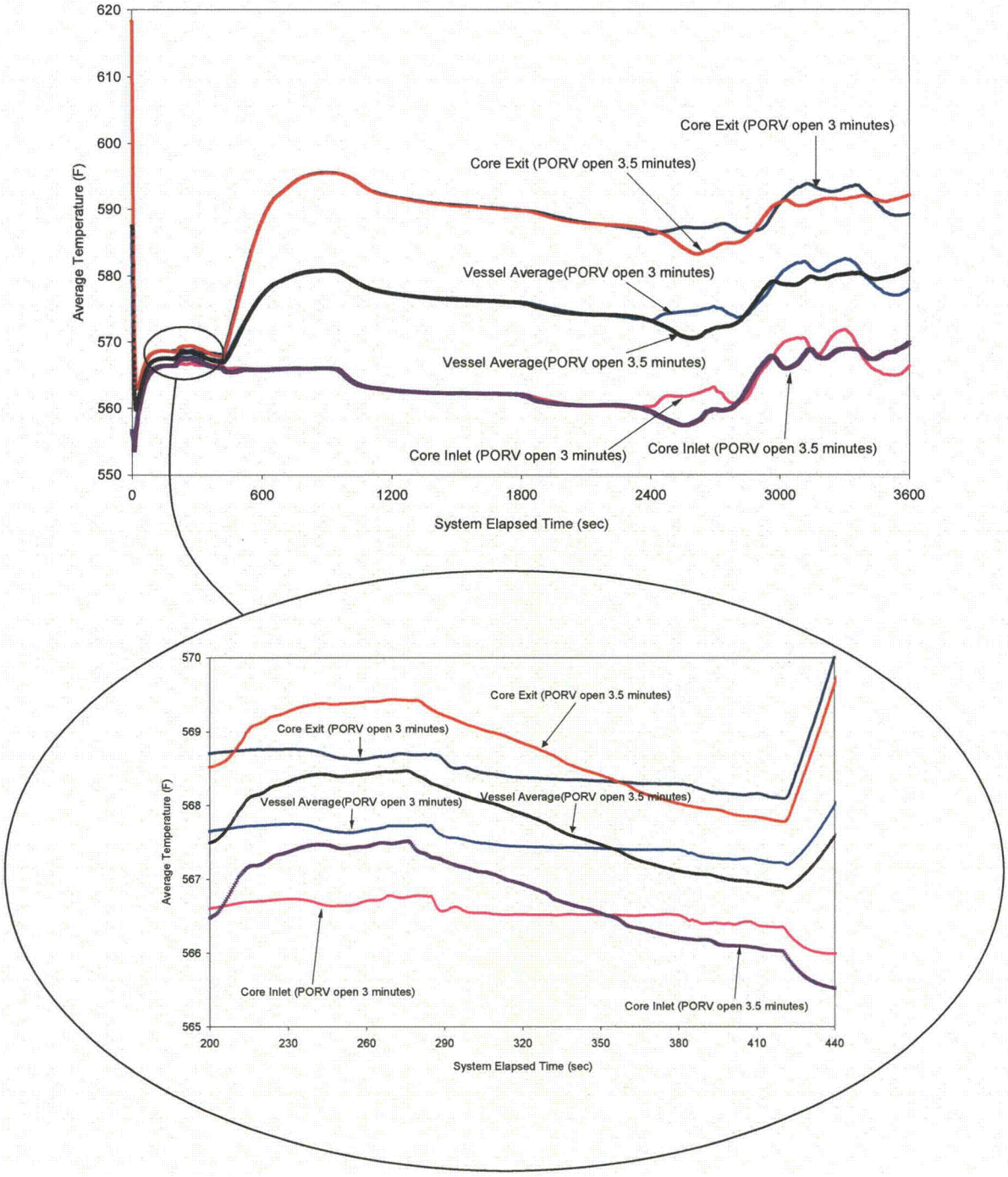

Figure 2-5 RCS Temperature

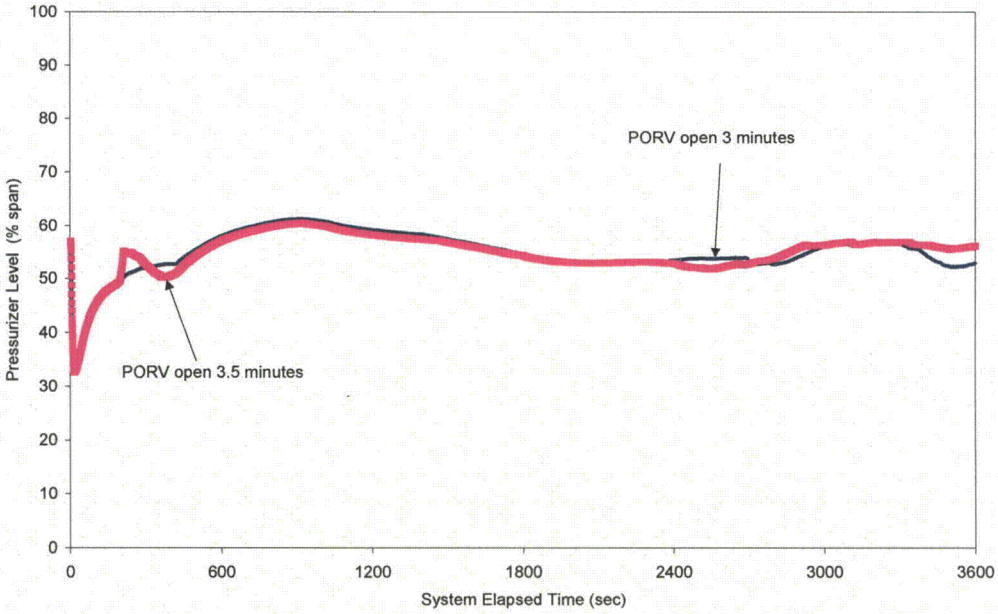

Figure 2-6 Pressurizer Level

4: Scenario 2A Results (PORV Open 3 VS. 3.5 minutes)

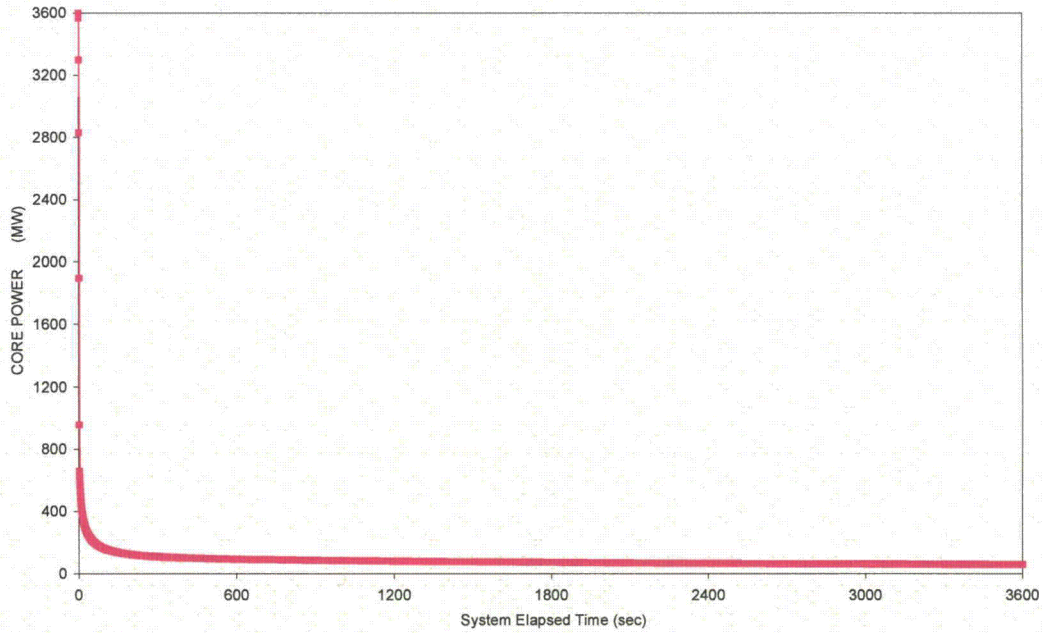

Figure 2A-1 Core Power

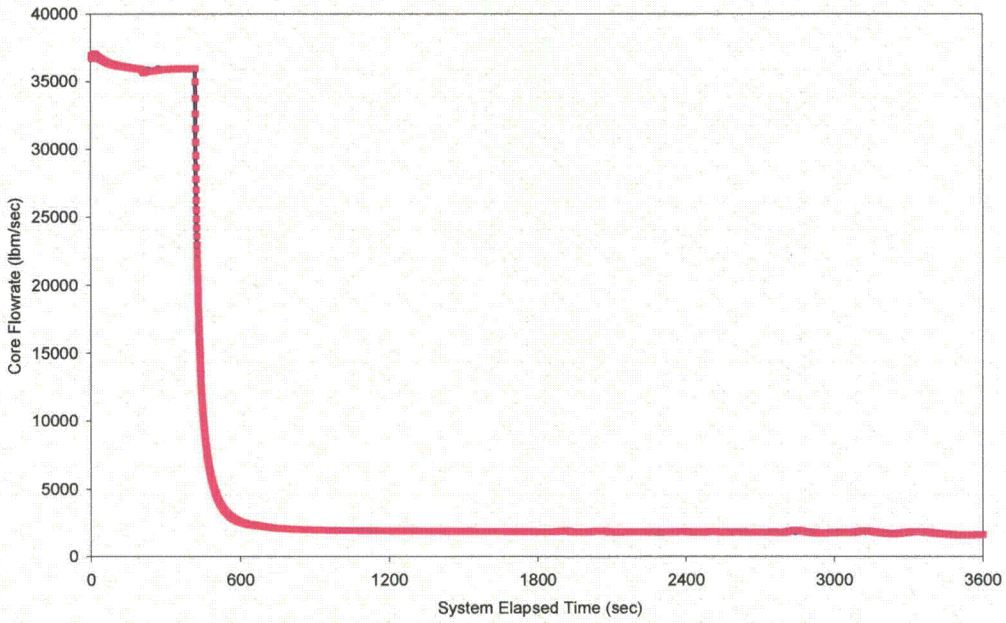

Figure 2A-2 Core Mass Flowrate

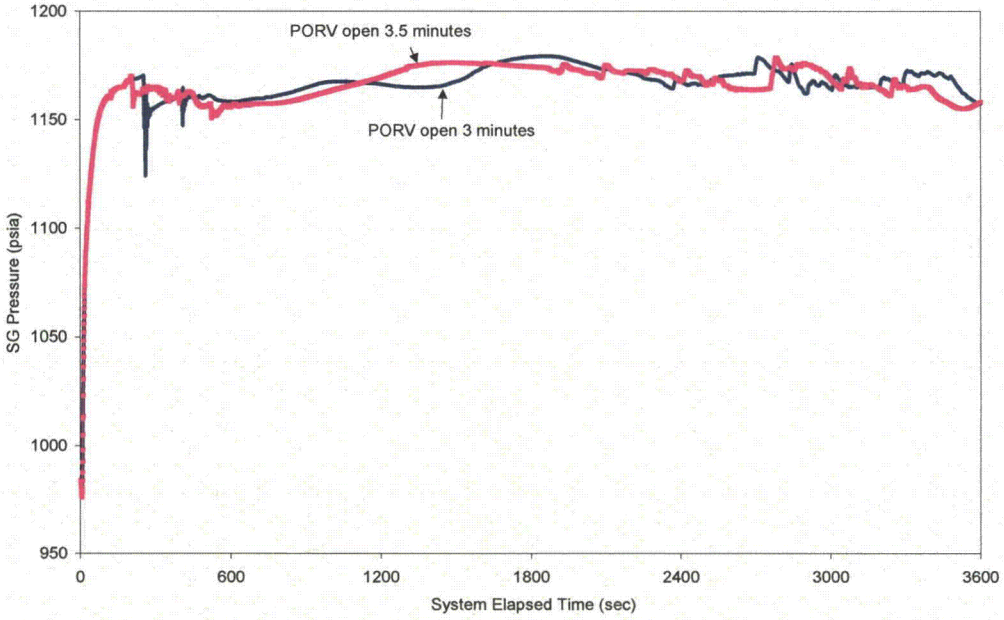

Figure 2A-3 Steam Generator Pressure

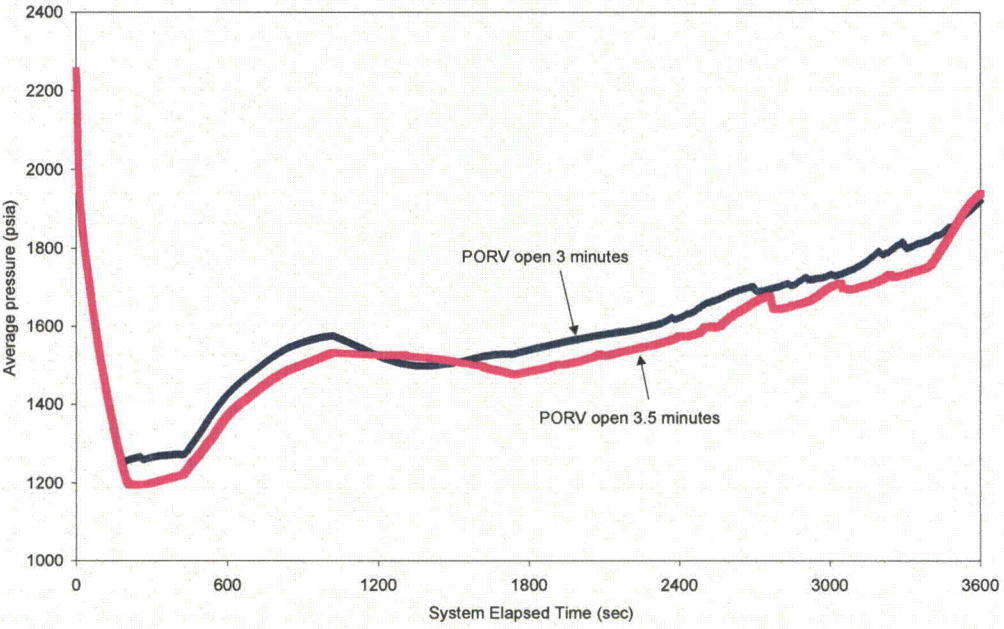

Figure 2A-4 Pressurizer Pressure

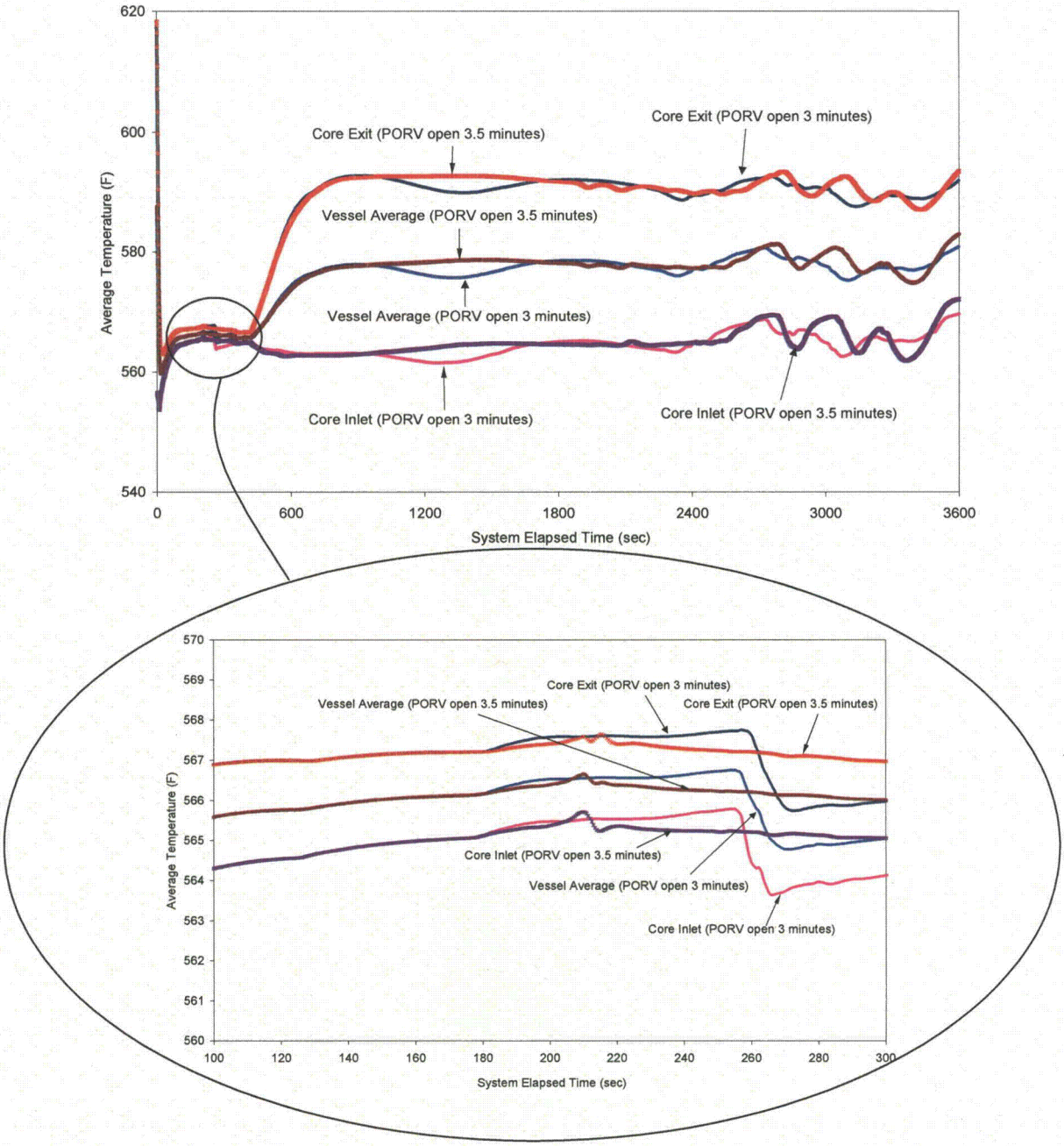

Figure 2A-5 RCS Temperature

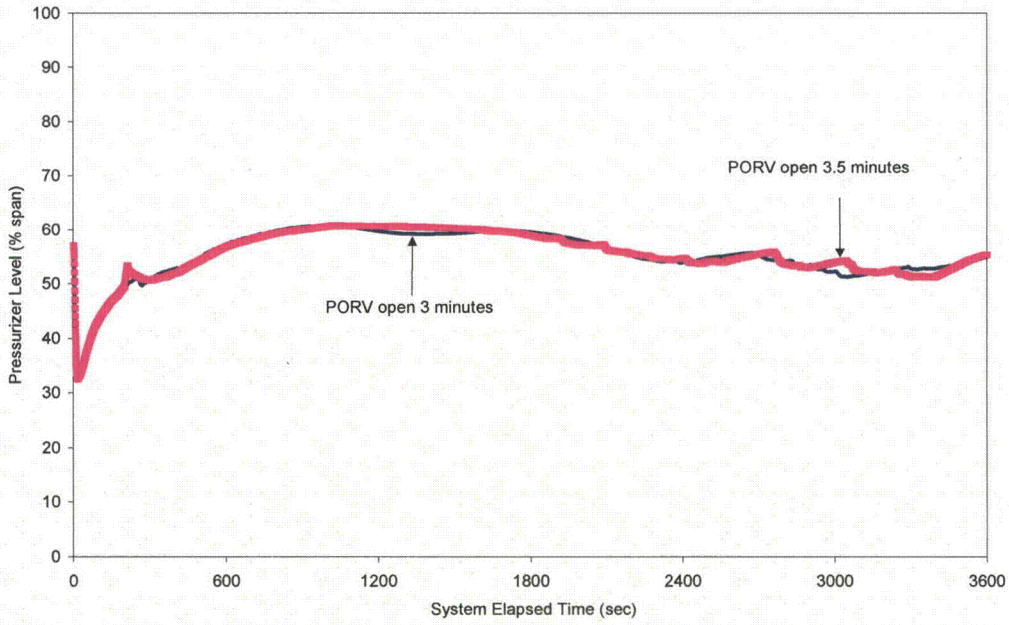

Figure 2A-6 Pressurizer Level