ANALYSIS REPORT

Comparison Between TRAC-M Version 3782 and RELAP5 MOD 3.2.2 Gamma Calculations of Selected Pressurized Thermal Shock Scenarios of the Oconee Unit 1 Plant

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March 2002

Office of
Nuclear Regulatory Research

SAFETY MARGINS AND SYSTEM ANALYSIS
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ABSTRACT

RELAP5 MOD 3.2.2 Gamma Version is used to provide thermal hydraulic conditions of the downcomer of the Oconee Unit 1 Plant for fracture mechanics code calculations of the vessel wall for a number of postulated accident scenarios which may pose a significant risk with respect to pressurized thermal shock concerns. As a measure of confirming RELAP5 calculation results, TRAC-M Version 3782 calculations were performed on four scenarios, and the results are compared with those obtained from RELAP5 calculations. The selected scenarios are two on turbine bypass valve "A" stuck open, one on the main steam line break off Steam Generator "A," and one on overfeed to steam generators to 96 percent of their operating ranges. Detailed comparisons between TRAC-M and RELAP5 calculation results show that the two code results are consistent for the same scenarios.

A TRAC-M calculation of a main steam line "A" break scenario suggests that this transient with the continuous emergency feedwater flow to the affected steam generator leads to the condition of pressurized thermal shock concerns (i.e., high pressure and low-temperature). The calculated pressure is 15.3 MPa (2219 psia) while the calculated minimum downcomer temperature is 380K (224 °F) which is less than the pressurized thermal shock screening criteria of 422K (300 °F) for circumferential welds and 405K (270 °F) for axial welds, forgings, and plate materials. However, it should be pointed out that this scenario has a very low probability of actual occurrence because the operator is expected to isolate the affected steam generator (i.e., terminate the emergency feedwater flow to minimize cooldown) as soon as a main steam line break is recognized. When the operator isolates the affected steam generator, the primary system cooldown would be minimal. For example, in RELAP5 Case 61, where the operator isolated the affected steam generator in 10 minutes, the cooldown was only about 10K (18 °F), and the minimum downcomer temperature was 557K (543 °F).

CONTENTS

ABSTRACT iii

EXECUTIVE SUMMARY xiii

ACKNOWLEDGMENTS xv

ABBREVIATIONS xvii

1 INTRODUCTION 1

2 MAIN CHARACTERISTICS OF OCONEE UNIT 1 PLANT 1

3 TRAC-M VERSION V3782 INPUT MODEL AND CALCULATIONS 2

4 RELAP5 MOD 3.2.2 GAMMA INPUT MODEL AND CALCULATIONS 2

5 COMPARISONS BETWEEN TRAC-M VERSION V3782 AND RELAP5 MOD 3.2.2 GAMMA CALCULATION RESULTS 18
- 5.1 Turbine Bypass Valve "A" Stuck Open 18
  - 5.1.1 Sequence of Events 18
  - 5.1.2 Main Pressurized Thermal Shock Parameters 19
  - 5.1.3 Other Plant Parameters 20
  - 5.1.4 Pressurized Thermal Shock Implications 21
- 5.2 Main Steam Line Break in Steam Generator "A" 64
  - 5.2.1 Sequence of Events 64
  - 5.2.2 Main Pressurized Thermal Shock Parameters 65
  - 5.2.3 Other Plant Parameters 65
  - 5.2.4 Comparison Between TRAC-M and RELAP5 Main Steam Line Scenario Case 61 66
  - 5.2.5 Pressurized Thermal Shock Implications 66
- 5.3 Steam Generator Overfeed 99
  - 5.3.1 Sequence of Events 99
  - 5.3.2 Main Pressurized Thermal Shock Parameters 101
  - 5.3.3 Other Plant Parameters 101
  - 5.3.4 Pressurized Thermal Shock Implications 102

6 SUMMARY OF FINDINGS 131
- 6.1 Pressurized Thermal Shock Concerns 131
- 6.2 Code Performance 131
  - 6.2.1 TRAC-M Version 3782 131
  - 6.2.2 RELAP5 MOD 3.2.2 Gamma 134

7 CONCLUSIONS 134

8 REFERENCES 134

APPENDICES

A TRAC-M Version V3782 Input Listing for a Steady State Calculation of the Oconee Unit 1 Plant

B TRAC-M Version V3782 Input Listings for Transient Calculations
- B.1 TRAC-M Version 3782 Input Listing for Transient Calculation – A Turbine Bypass Valve "A" Stuck Open Scenario in the Oconee Unit 1 Plant
- B.2 TRAC-M Version 3782 Input Listing for Transient Calculation – Main Steam Line "A" Break in the Oconee Unit 1 Plant
- B.3 TRAC-M Version 3782 Input Listing for Transient Calculation – Overfeed to Steam Generators to 96 Percent of the Operating Range in the Oconee Unit 1 Plant

FIGURES

3.1 Oconee Primary System Model Overview 3
3.2 Vessel Model Elevation View 4
3.3 Vessel Model Plan Views 5
3.4 Vessel Heat-structure Components 6
3.5 Fuel-rod Component Noding Diagram 6
3.6 Loop "A" Noding Diagram 7
3.7 Loop "B" Noding Diagram 8
3.8 Core Flood Tanks and Low-Pressure Coolant Injection Noding Diagrams 9
3.9 Feedwater-Train Noding Diagram–Hotwell Boundary to High-Pressure-Heater Outlet Header 10
3.10 Feedwater-Train Noding Diagram–Feedwater Valves, Main Feedwater Inlet Lines, and Auxiliary Feedwater Inlet Lines 11
3.11 Pressurizer Surge-line Break Noding Diagram 12
3.12 Hot-Leg Break Noding Diagram 12

4.1 Reactor Vessel RELAP5 Nodalization 13
4.2 Reactor Coolant System RELAP5 Nodalization 14
4.3 Pressurizer System Nodalization 15
4.4 Steam Generator Secondary Side Nodalization 16
4.5 Main Feedwater Train RELAP5 Nodalization (from Hotwell to Startup and Main Feedwater Valves) 17

5.1.1A Core Flood Tank Flow Rates Calculated by TRAC-M for Turbine Bypass Valve Stuck Open Case 1 24
5.1.1B Pressurizer Water Level Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Cases 25
5.1.1C Total Emergency Feedwater Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 1 26
5.1.1D Total Emergency Feedwater Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 2 27

FIGURES (Cont.)

5.1.1D1 Total Integrated Emergency Feedwater Flow Calculated by TRAC-M Case 1 and RELAP5 Case 35 for Turbine Bypass Valve Stock Open Scenario 28
5.1.1D2 Total Emergency Feedwater Delivered Calculated by TRAC-M Case 2 and RELAP5 Case 35 for Turbine Bypass Valve Stock Open Scenario 29
5.1.1D3 Main Steam Line Flow Rates Calculated by TRAC-M Case 1 and RELAP5 Case 35 for Turbine Bypass Valve Stuck Open Scenario 30
5.1.1D4 Total Main Feedwater Flow Delivered Calculated by TRAC-M Case 1 and RELAP5 Case 35 for Turbine Bypass Valve Stuck Open Scenario 31
5.1.1D5 Main Feedwater Flow Rates Calculated by RELAP5 Case 35 for Turbine Bypass Valve Stuck Open Scenario 32
5.1.1D6 Main Feedwater Flow Rates Calculated by TRAC-M Case 1 for Turbine Bypass Valve Stuck Open Scenario 33
5.1.2 Downcomer Liquid Temperatures Calculated by TRAC-M Case 1 and RELAP5 Case 35 for Turbine Bypass Valve Stuck Open Scenario 34
5.1.3 Downcomer Mid-Elevation Pressures Calculated by TRAC-M (Case 1) and RELAP5 (Case 35) for Turbine Bypass Valve Stuck Open Scenario 35
5.1.4 Maximum and Minimum Downcomer Wall Heat Transfer Coefficients Calculated by TRAC-M for Oconee Turbine Bypass Valve Stuck Open Case 1 36
5.1.5 Maximum and Minimum Downcomer Wall Heat Transfer Coefficients Calculated by SV Stuck Open Case 35 37
5.1.6 Downcomer Liquid Temperatures Calculated by TRAC-M Case 2 and RELAP5 Case 35 for Turbine Bypass Valve Stuck Open Scenario 38
5.1.7 Downcomer Mid-Elevation Pressures Calculated by TRAC-M (Case 2) and RELAP5 (Case 35) for Turbine Bypass Valve Stuck Open Scenario 39
5.1.8 Maximum and Minimum Downcomer Wall Heat Transfer Coefficients Calculated by TRAC-M for Turbine Bypass Valve Stuck Open Case 2 40
5.1.8A Total HPI Flow Rates Calculated by TRAC-M and RELAP5 for Oconee Turbine Bypass Valve Stuck Open Case 1 41
5.1.8B Total HPI Flow Delivered Calculated by TRAC-M Case 1 and RELAP5 Case 35 for Turbine Bypass Valve Stuck Open Scenario 42
5.1.9 Heater/Sprayer Power Input to Pressurizer Calculated by TRAC-M for Turbine Bypass Valve Stuck Open Case 2 43
5.1.10 Core Exit and Core Bypass Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 1 44
5.1.11 Hot Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 1 45
5.1.12 Loop A Cold Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 1 46
5.1.13 Loop B Cold Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 1 47
5.1.14 Core Exit and Core Bypass Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 2 48
5.1.15 Hot Leg Mass Flow Rates Calculated by TRAC and RELAP5 for Turbine Bypass Valve Stuck Open Case 2 49
5.1.16 Loop A Cold Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 2 50

FIGURES (Cont.)

5.1.17 Loop B Cold Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 2 51
5.1.17A Heat Transfer Rates in Steam Generators Calculated by TRAC-M Case 1 and RELAP5 Case 35 for Turbine Bypass Valve Stuck Open Scenario 52
5.1.17B Integrated Heat Transfer in Steam Generators Calculated by TRAC-M Case 1 and RELAP5 Case 35 for Turbine Bypass Valve Stuck Open Scenario 53
5.1.18 Hot Leg Temperatures Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 1 54
5.1.19 Cold Leg Temperatures Calculated by TRAC-M for Turbine Bypass Valve Stuck Open Case 1 55
5.1.20 Cold Leg Temperatures Calculated by RELAP5 for Main Steam Line A Safety Valve Stuck Open Case 35 56
5.1.21 Hot Leg Temperatures Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 2 57
5.1.22 Cold Leg Temperatures Calculated by TRAC-M for Turbine Bypass Valve Stuck Open Case 2 58
5.1.23 Cold Leg Temperatures Calculated by RELAP5 for Main Steam Line A Safety Valve Stuck Open Case 35 59
5.1.24 Main Steam Line flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 1 60
5.1.25 Heat Transfer Rates in Steam Generators Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 1 61
5.1.26 Main Steam Flow Rates Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 2 62
5.1.27 Heat Transfer Rates in Steam Generators Calculated by TRAC-M and RELAP5 for Turbine Bypass Valve Stuck Open Case 2 63

5.2.1 Downcomer Mid-Elevation Pressure Calculated by TRAC-M and RELAP5 Case 27 for Main Steam Line "A" Break Scenario 68
5.2.2 Total HPI Flow Rates Calculated by TRAC-M and RELAP5 Case 27 for Oconee Main Steam Line "A" Break Scenario 69
5.2.3 Makeup/Letdown Flow Calculated by TRAC-M and RELAP5 Case 27 for Oconee Main Steam Line "A" Break Scenario 70
5.2.4 Pressurizer Surge Line Flow Calculated by RELAP5 Case 27 for Oconee Main Steam Line Break Scenario 71
5.2.5 Subcooling Margins at Top of Hot Legs Calculated by TRAC-M and RELAP5 Case 27 for Oconee Main Steam Line "A" Break Scenario 72
5.2.5A Makeup/Letdown Flow for First 50 Seconds Calculated by TRAC-M and RELAP5 Case 27 for Oconee Main Steam Line "A" Break Scenario 73
5.2.5B Heat Transfer Rates Through SGs Calculated by TRAC-M and RELAP5 Case 27 for Oconee Main Steam Line "A" Break Scenario 74
5.2.5C SG Secondary System Pressures Calculated by TRAC-M and RELAP5 Case 27 for Main Steam Line "A" Break Scenario 75
5.2.5D Steam Generator Startup Range Levels Calculated by TRAC-M and RELAP5 for Main Steam Line "A" Break Scenario 76
5.2.5E SG–"A" Steam Line Flow Rates Calculated by TRAC-M and RELAP5 Case 27 for Main Steam Line "A" Break 77

FIGURES (Cont.)

5.2.5F Integrated SG–"A" Steam Line Flow Calculated by TRAC-M and RELAP5 Case 27 for Main Steam Line "A" Break 78
5.2.5G Total Emergency Feedwater Flow Rates Calculated by TRAC-M and RELAP5 Case 27 for Main Steam Line "A" Break Scenario 79
5.2.5H Total Emergency Feedwater Delivered Calculated by TRAC-M and RELAP5 Case 27 for Main Steam Line "A" Break Scenario 80
5.2.5I Main Feedwater Flow Rates Calculated by TRAC-M and RELAP Case 27 for Main Steam Line "A" Break Scenario 81
5.2.5J Total Main Feedwater Flow Delivered Calculated by TRAC-M and RELAP Case 27 for Main Steam Line "A" Break Scenario 82
5.2.6 Accumulator Liquid Volume Calculated by TRAC-M and RELAP5 Case 27 for Oconee Main Steam Line "A" Break Scenario 83
5.2.7 Minimum Downcomer Liquid Temperatures Calculated by TRAC-M for Oconee Main Steam Line "A" Break Scenario 84
5.2.8 Downcomer Liquid Temperatures Calculated by TRAC-M and RELAP5 Case 27 for Main Steam Line "A" Break Scenario 85
5.2.9 Minimum and Maximum Downcomer Wall Heat Transfer Coefficients Calculated by TRAC-M for Oconee Main Steam Line "A" Break Scenario 86
5.2.10 Minimum and Maximum Downcomer Wall Heat Transfer Coefficients Calculated by RELAP5 for Oconee Main Steam Line "A" Break Case 27 Scenario . 87
5.2.11 Hot Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 Case 27 for Oconee Main Steam Line "A" Break Scenario 88
5.2.12 Loop "A" Cold Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 Case 27 for Oconee Main Steam Line "A" Break Scenario 89
5.2.12A Loop "B" Cold Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 Case 27 for Oconee Main Steam Line "A" Break Scenario 90
5.2.13 Hot Leg Temperatures Calculated by TRAC-M for Oconee Main Steam Line "A" Break Scenario 91
5.2.13A Hot Leg Temperatures Calculated by RELAP5 for Oconee Main Steam Line "A" Break Scenario Case 27 92
5.2.14 Cold Leg Temperatures Calculated by TRAC-M for Oconee Main Steam Line "A" Break Scenario 93
5.2.15 Cold Leg Temperatures Calculated by RELAP5 for Oconee Main Steam Line "A" Break Scenario Case 27 94
5.2.16 Total Emergency Feedwater Flow Rates Calculated by TRAC-M and RELAP5 Case 61 for Oconee Main Steam Line "A" Break Scenario 95
5.2.17 Downcomer Mid-Elevation Pressure Calculated by TRAC-M and RELAP5 Case 61 for Oconee Main Steam Line "A" Break Scenario 96
5.2.18 Makeup/Letdown Flow Calculated by TRAC-M and RELAP5 Case 61 for Oconee Main Steam Line "A" Break Scenario 97
5.2.19 Downcomer Liquid Temperatures Calculated by RELAP5 for Oconee Main Steam Line "A" Break Scenario Case 61 98

5.3.1 Primary System Pressures Calculated by TRAC-M and RELAP5 for SG Overfeed Scenario 103
5.3.2 Reactor Power Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 104

FIGURES (Cont.)

5.3.3 Heat Transfer Rates Through SGs Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 105
5.3.4 Pressurizer Water Level Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 106
5.3.5 Temperature of Pressurizer Top Region Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 107
5.3.6 Makeup/Letdown Flow Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 108
5.3.7 Turbine Bypass Flow Rates Calculated by TRAC-M for Oconee SG Overfeed Scenario 109
5.3.8 Turbine Bypass Flow Rates Calculated by RELAP5 for Oconee SG Overfeed Scenario 110
5.3.9 Steamline Safety Relief Valve Flow Rages Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 111
5.3.10 Main Feedwater Flow Rates Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 112
5.3.11 Total Emergency Feedwater Flow Rates Calculated by TRAC-M for Oconee SG Overfeed Scenario 113
5.3.12 Total Emergency Feedwater Flow Rates Calculated by RELAP5 for Oconee SG Overfeed Scenario 114
5.3.13 Steam Generator Operating Range Levels Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 115
5.3.13A Total Emergency Feedwater Delivered Calculated by TRAC-M and RELAP5 for SG Overfeed Scenario 116
5.3.13B Integrated SG Exit Flow Calculated by TRAC-M and RELAP5 for SG Overfeed Scenario 117
5.3.14 Minimum Downcomer Liquid Temperatures Calculated by TRAC-M for Oconee SG Overfeed Scenario 118
5.3.15 Downcomer Liquid Temperatures Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 119
5.3.16 Heat Transfer Rates Between Steam Generator Pri. and Sec. Sides Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 120
5.3.17 Secondary System Pressures Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 121
5.3.18 Downcomer Mid-Elevation Pressure Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 122
5.3.19 Minimum and Maximum Downcomer Wall Heat Transfer Coefficients Calculated by TRAC-M for Oconee SG Overfeed Scenario 123
5.3.20 Minimum and Maximum Downcomer Wall Heat Transfer Coefficients Calculated by RELAP5 for Oconee SG Overfeed Scenario 124
5.3.21 Loop "A" Cold Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 125
5.3.22 Loop "B" Cold Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 126
5.3.23 Hot Leg Mass Flow Rates Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 127
5.3.24 Cold Leg Temperatures Calculated by TRAC-M for Oconee PTS SG Overfeed Scenario 128

FIGURES (Cont.)

5.3.25 Cold Leg Temperatures Calculated by RELAP5 for Oconee SG Overfeed Scenario 129
5.3.26 Hot Leg Temperatures Calculated by TRAC-M and RELAP5 for Oconee SG Overfeed Scenario 130

TABLES

5.1.1 Comparison of Sequence of Events between TRAC-M and RELAP5 Calculations for Scenarios of Turbine Bypass Valve Stuck Open 21
5.2.1 Comparison of Sequence of Events Between TRAC-M and RELAP5 Calculations for a Main Steam Line Break Scenario 67
5.3.1 Comparison of Sequence of Events Between TRAC-M and RELAP5 Calculations for a Steam Generator Overfeed Scenario 100
6.1.1 Comparisons Between TRAC-M and RELAP5 Results for Selected Pressurized Thermal Shock Thermal-Hydraulic Calculations 133

EXECUTIVE SUMMARY

The pressurized thermal shock issue was investigated in the early 1980's for three plants; Oconee Unit 1 of Babcock & Wilcox Co. design, Calvert Cliffs Unit 1 of Combustion Engineering, Inc. design, and H.B. Robinson Unit 2 of Westinghouse Electric Corp. design. This investigation led to establishment of pressurized thermal shock screening criteria which are described in Title 10 of the Code of Federal Regulations Section 50.61 and further discussed in Regulatory Guide 1.154. The screening criteria established then may be too restrictive now in view of the developments that have been made since the 1980's in many important areas such as the flaw estimate in the vessel wall, the probabilistic fracture mechanics code, and the prediction of the thermal hydraulic condition in the downcomer. Therefore, the Nuclear Regulatory Commission has decided to re-examine the pressurized thermal shock concerns for selected plants. The Oconee Unit 1 plant was selected again for this re-examination.

The Reactor Leak and Analysis Program (RELAP5) code was chosen for thermal hydraulic calculations which were needed for determining thermal hydraulic conditions in the downcomer for selected scenarios. Transient Reactor Analysis Code – Modernized (TRAC-M) code calculations were used as a confirmation of RELAP5 results.

In this report, RELAP5 and TRAC-M calculations are compared for four different scenarios, namely, two scenarios on turbine bypass valve stuck open, one scenario on main steam line break, and one scenario on steam generator overfeed case. These scenarios were selected by the Probabilistic Risk Analysis Branch based on risk significance.

Generally speaking, TRAC-M results are consistent with RELAP5 results for comparable scenarios, and thus RELAP5 results may be considered to have passed an independent check at least for the selected scenarios.

Out of four scenarios selected for comparisons between TRAC-M and RELAP5 results, a TRAC-M calculation of one scenario of the main steam line "A" break with the continuous emergency feedwater flow to the affected steam generator leads to the minimum downcomer temperature of 380K (224 °F) to be less than the pressurized thermal shock screening criteria of 422K (300 °F) for circumferential welds and 405K (270 °F) for axial welds, forgings, and plate materials while the pressure is high, a nearly normal level of 15.3 MPa (2219 psia). However, it should be pointed out that this scenario has a very low probability of actual occurrence because the operator is expected to isolate the affected steam generator (i.e., terminate the emergency feedwater flow to minimize cooldown) as soon as a main steam line break is recognized. When the operator isolates the affected steam generator, the primary system cooldown would be minimal. For example, in RELAP5 Case 61 where the operator isolated the affected steam generator in 10 minutes, the cooldown was only about 10K (18 °F), and the minimum downcomer temperature was 557K (543 ° F).

ACKNOWLEDGMENTS

The author thanks James F. Lime and Dr. James L. Steiner of the Los Alamos National Laboratory for their assistance in modifying and debugging the TRAC-M input deck which was developed by the Los Alamos National Laboratory but had to be modified to include some comments received from the Oconee Plant and to develop an input model for main steam line break calculations. The author also thanks Robert Beaton and Vesselin Palazov of Information Systems Laboratories for their assistance in modifying a plotting script which was developed by Information Systems Laboratories.

ABBREVIATIONS

B&W	Babcock & Wilcox Co. (now Framatome)
CE	Combustion Engineering, Inc.
CFR	*Code of Federal Register*
EFW	emergency feedwater
HPI	high-pressure injection
ICS	integrated control system
ISL	Information Systems Laboratories, Inc.
LANL	Los Alamos National Laboratory
LOCA	loss-of-coolant accident
LPCI	low-pressure coolant injection
MSLB	main steam line break
MFW	main feedwater
NRC	Nuclear Regulatory Commission, U.S.
OTSG	once-through steam generator
PTS	pressurized thermal shock
PWR	pressurized-water reactor
RCP	reactor coolant pump
RELAP	reactor leak and analysis program (code)
SG	steam generator
SRV	safety-relief valve
TRAC-M	transient reactor analysis code – modernized (code)
W	Westinghouse Electric Corp.

1 INTRODUCTION

The pressurized thermal shock (PTS) issue was investigated in the early 1980's for three plants; Oconee Unit 1 of Babcock & Wilcox Co. (B&W) design, Calvert Cliffs Unit 1 of Combustion Engineering, Inc. (CE) design, and H.B. Robinson Unit 2 of Westinghouse Electric Corp. (W) design. This investigation led to establishment of PTS screening criteria which are described in Title 10 of the Code of Federal Regulations (CFR) Section 50.61 (10 CFR 50.61) and further discussed in Regulatory Guide 1.154. The screening criteria established then may be too restrictive now in view of the developments that have been made since the 1980's in many important areas such as the flaw estimate in the vessel wall, the probabilistic fracture mechanics code, and the prediction of the thermal hydraulic condition in the downcomer. Therefore, the Nuclear Regulatory Commission (NRC) has decided to re-examine the PTS concerns for selected plants. The Oconee Unit 1 plant was selected again for this re-examination.

Reactor Leak and Analysis Program (RELAP5) code Mod 3.2.2 Gamma Version was chosen for thermal hydraulic calculations which were needed for determining thermal hydraulic conditions in the downcomer for selected scenarios. Transient Reactor Analysis Code – Modernized (TRAC-M) code V3782 Version calculations were used as a confirmation of RELAP5 results.

In this report, RELAP5 and TRAC-M calculations are compared for four different scenarios, namely, two scenarios on turbine bypass valve stuck open, one scenario on main steam line break (MSLB), and one scenario on steam generator overfeed case. These scenarios were selected by the Probabilistic Risk Analysis Branch based on risk significance.

Main characteristics of the Oconee Unit 1 plant are briefly discussed in Section 2, and TRAC-M and RELAP5 input decks are briefly described in Section 3 and 4, respectively. Detailed comparisons between TRAC-M and RELAP5 calculations are made in Section 5, and comparisons are summarized in Section 6 followed by conclusions in Section 7. TRAC-M input deck listings are given in Appendix A for steady state calculations and in Appendix B for transient calculations.

2 MAIN CHARACTERISTICS OF OCONEE UNIT 1 PLANT

The Oconee Unit 1 plant uses a B&W pressurized-water reactor (PWR) with a rated power of 2568 MWt. The reactor coolant system consists of two hot legs and four cold legs (2x4 arrangement), two once-through steam generators (SGs), four reactor coolant pumps (RCPs), and a pressurizer. The Oconee plant uses a lower loop design, meaning that the bases of the steam generators lie below the horizontal plane through the top of the reactor core. As a B&W unique feature, the Oconee plant uses eight vent valves which are designed to relieve the upper plenum pressure to the downcomer if it is higher than the downcomer pressure by more than a threshold value. Vent valves may have a mitigating effect with respect to PTS concerns. They allow the cold high-pressure injection (HPI) fluid delivered to the downcomer to be warmed up by the flow coming from the upper plenum when the upper plenum pressure becomes higher than the downcomer pressure under a stagnant or very low loop flow condition.

Another distinguishing feature of a B&W plant is the once-through steam generator (OTSG) which has the capability of producing superheated steam. The primary coolant enters the top on the tube side while the secondary side feedwater enters the midsection of the shell side, flows downward, turns around at the bottom, and flows upward in counter current manner with the downflowing primary coolant. The feedwater boils in the lower part of the SG, the saturated steam is heated up as it flows upward, and steam becomes superheated in the upper part of the SG.

The integrated control system (ICS) is also unique to B&W plants. It is used to generate power to be consistent with demand. It provides control for the main operation of the entire plant and encompasses the reactor, turbine-generator, and the feedwater flow control.

3 TRAC-M VERSION V3782 INPUT MODEL AND CALCULATIONS

An input model used for TRAC-M Version V3782 calculations was developed by the Los Alamos National Laboratory (LANL) and is shown in Figures 3.1 through 3.12 which are taken from "An Updated Oconee Plant Model for Pressurized Thermal Shock Analyses" (Ref. 1). To be consistent with the RELAP5 modeling of the downcomer which is important for PTS evaluations, the TRAC-M input model of the downcomer uses eight axial nodes and six azimuthal nodes. Input decks for steady state calculations and most of the transient calculations were developed by LANL. However, minor modifications to the steady-state deck were necessary to include some comments received from the Oconee plant. In addition, a transient deck for the MSLB simulation was developed by the author.

All of the transient calculations were performed by the author usually by repeatedly reducing the maximum allowed time step size several times whenever the calculations were stopped because of failure in finding an iterative solution. Eventually the calculations were completed to 10,000 seconds. Some of the calculations took about 2 weeks for completing 10,000 seconds of transient time.

4 RELAP5 MOD 3.2.2 GAMMA INPUT MODEL AND CALCULATIONS

An input model used for RELAP5 MOD 3.2.2 Gamma calculations was developed by Information Systems Laboratories (ISL) and is shown in Figures 4.1 through 4.5 which are taken from "RELAP5 Thermal Hydraulic Analysis to Support PTS Evaluations for the Oconee-1 Nuclear Power Plant" (Ref. 2). Since PTS concerns focus on downcomer conditions, the downcomer model is of greatest interest. The downcomer is divided into eight axial nodes including the upper annulus above the accumulator injection port and six azimuthal nodes as shown in Figure 4.1.

All of the RELAP5 calculations were performed by ISL and provided to the author electronically for comparison with TRAC-M. Details on the RELAP5 calculation results of selected parameters of interest are shown in Reference 2.

Text continues on page 18.

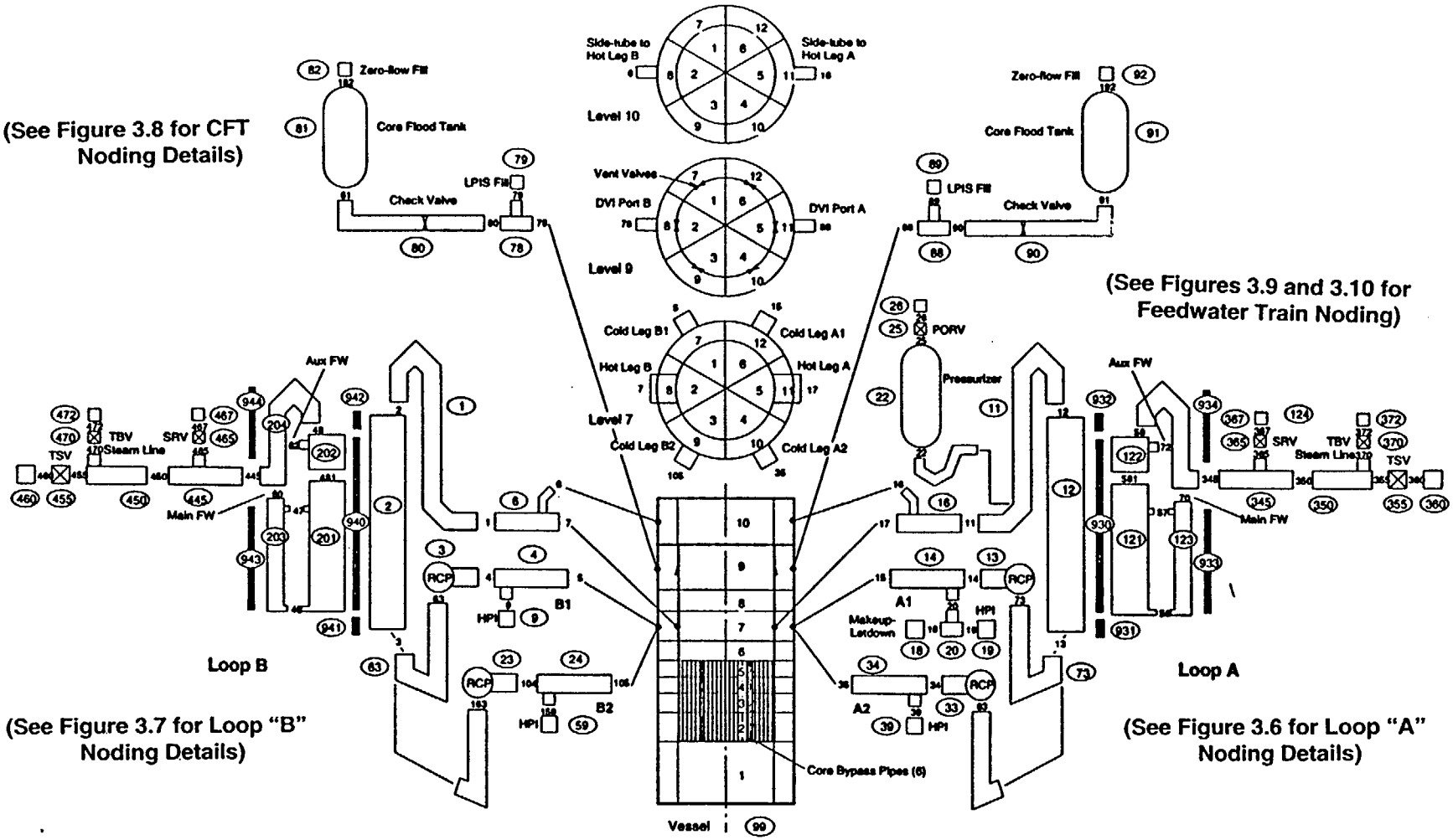


Figure 3.1 Oconee Primary System Model Overview

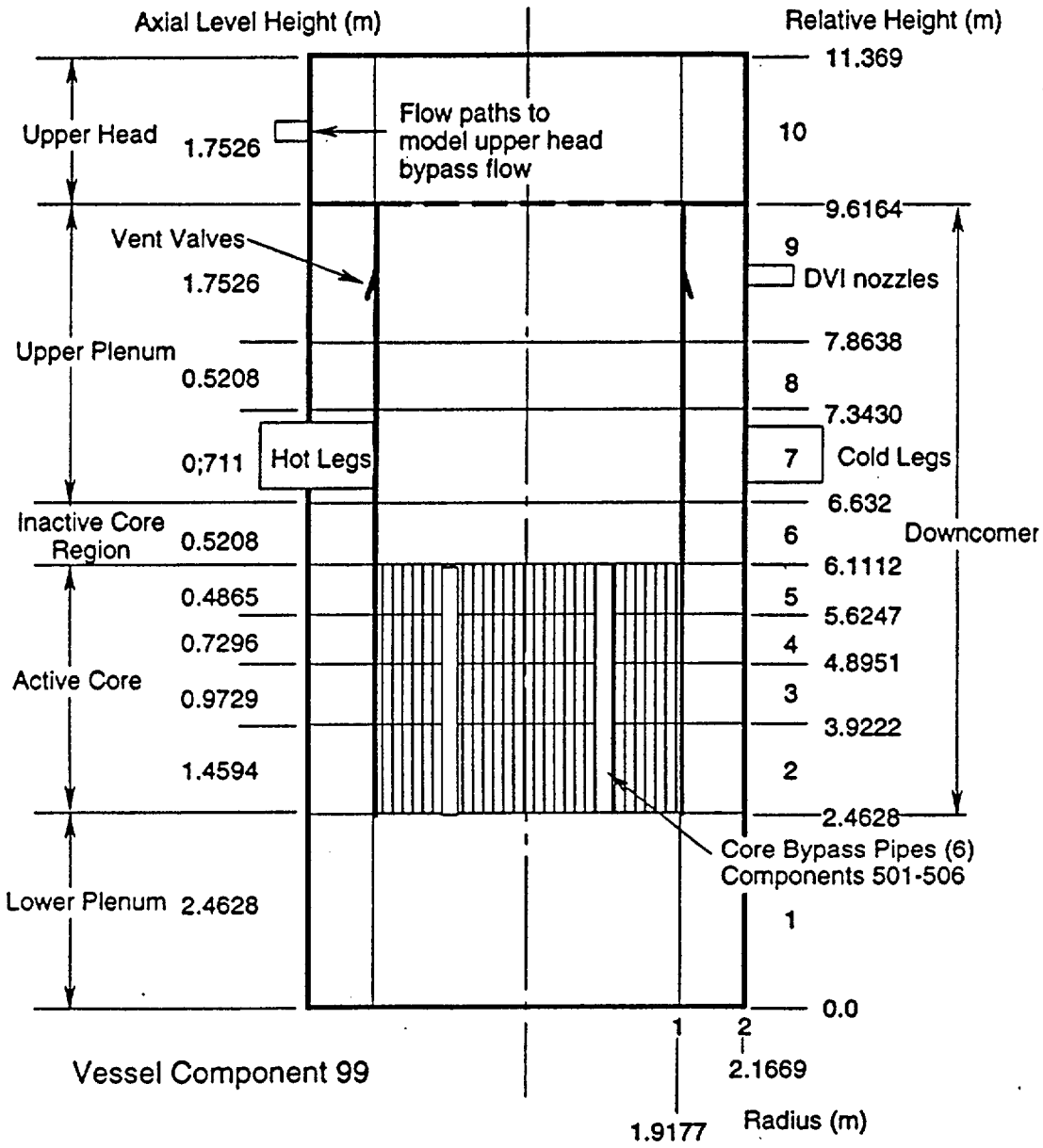


Figure 3.2 Vessel Model Elevation View

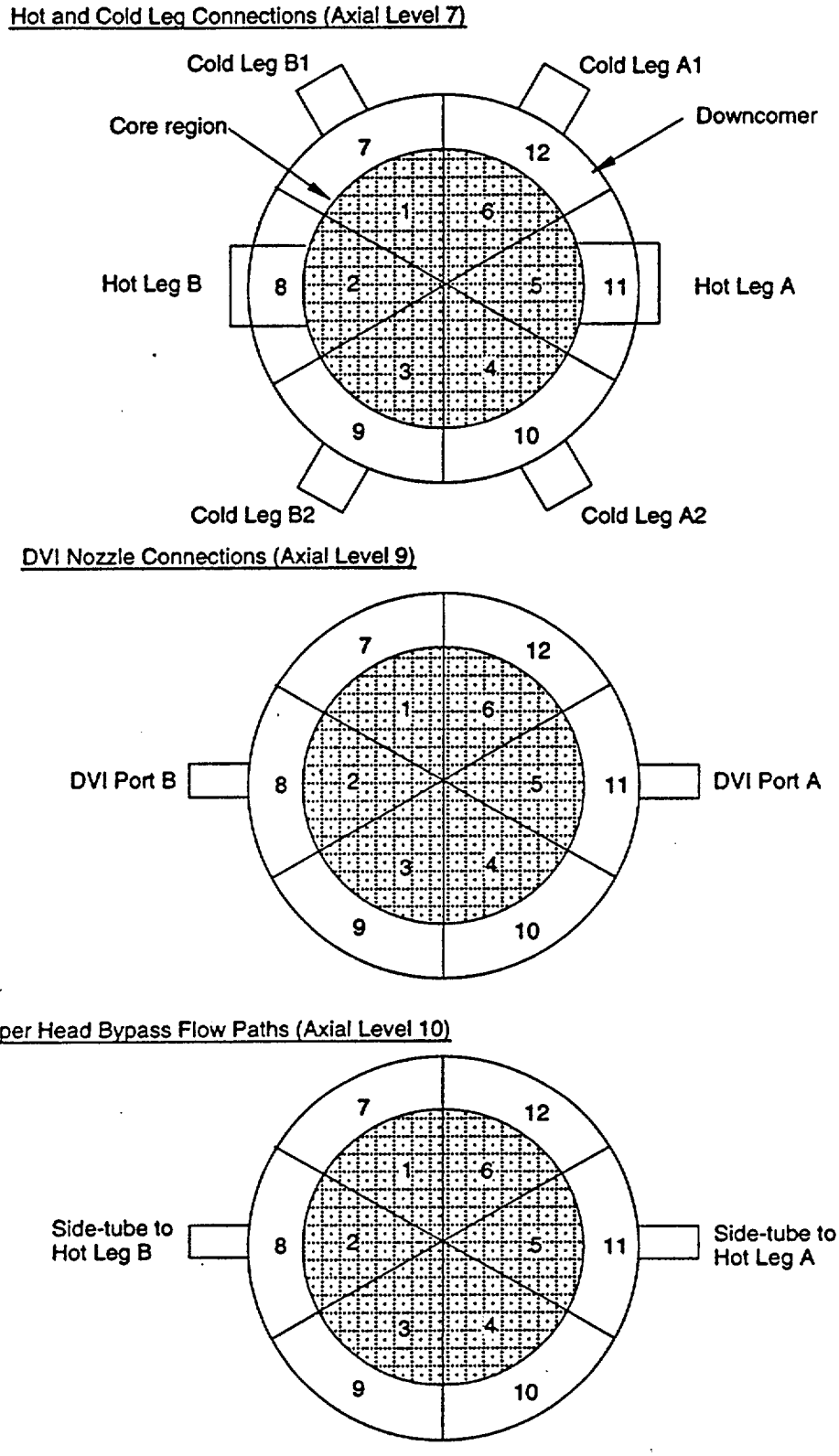


Figure 3.3 Vessel Model Plan Views

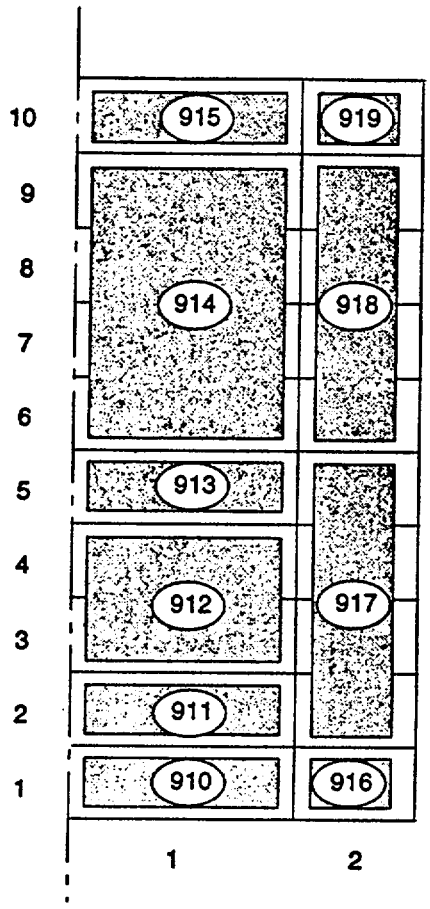


Figure 3.4 Vessel Heat-structure Components

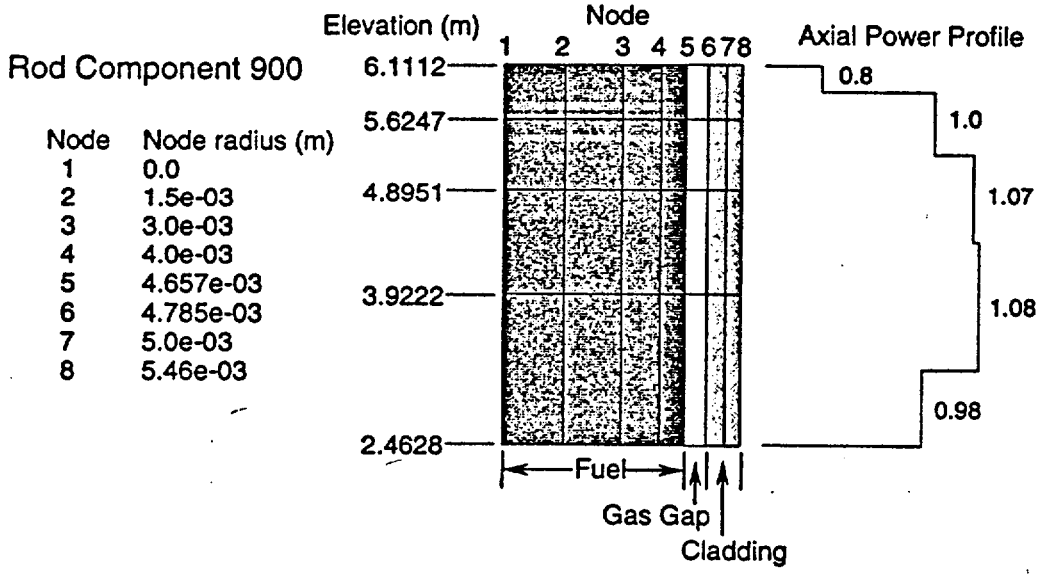


Figure 3.5 Fuel-rod Component Noding Diagram

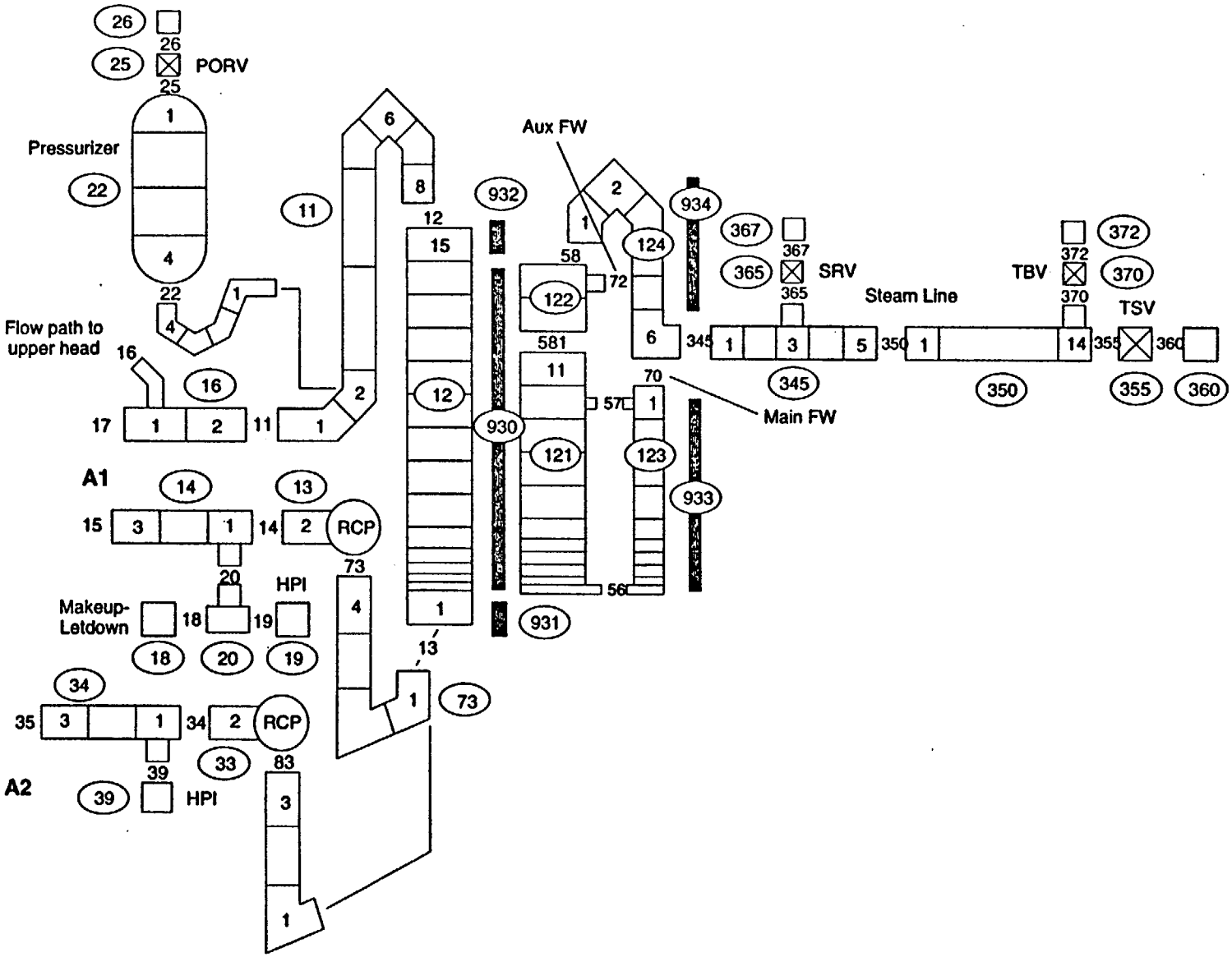


Figure 3.6 Loop "A" Noding Diagram

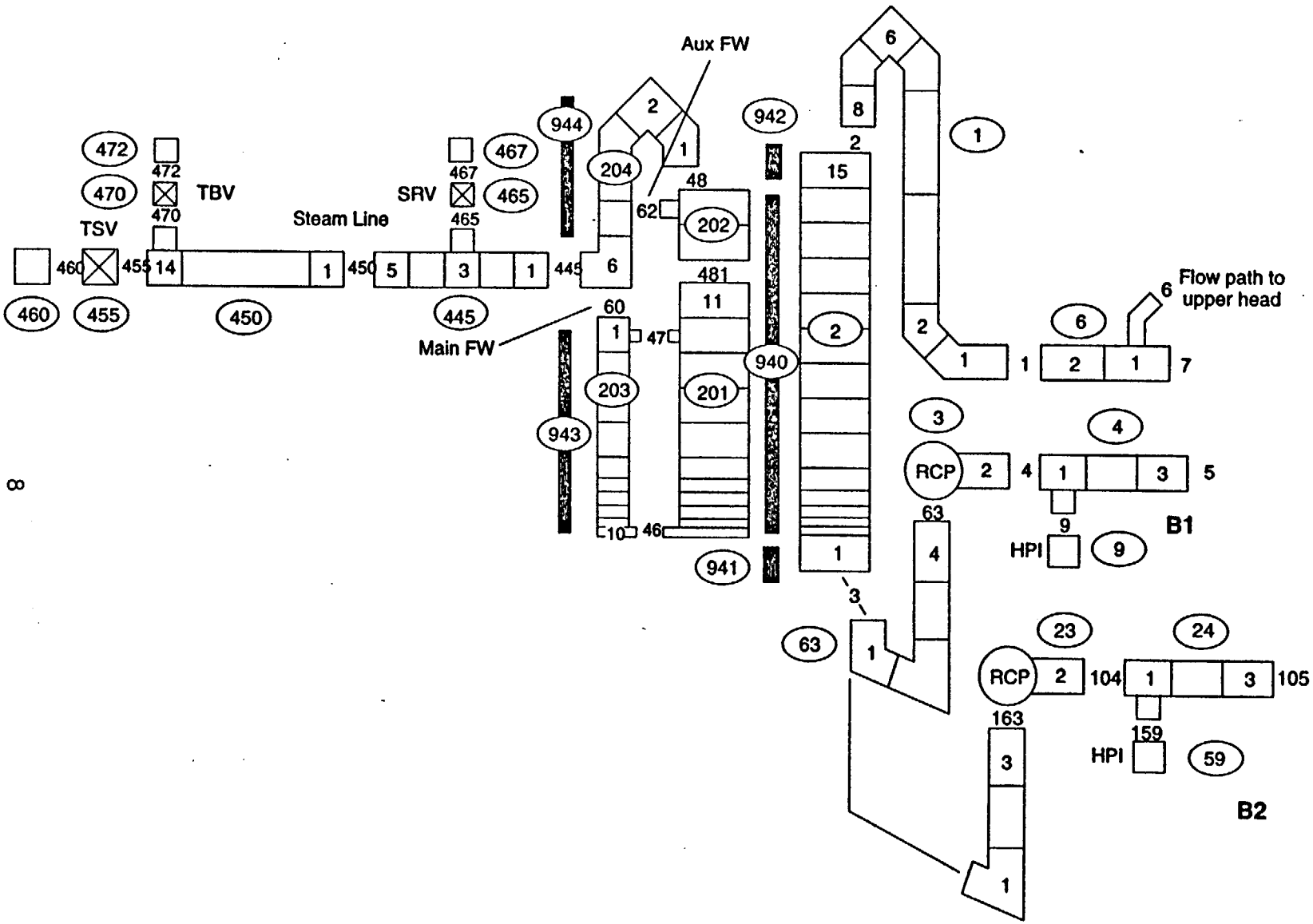


Figure 3.7 Loop "B" Noding Diagram

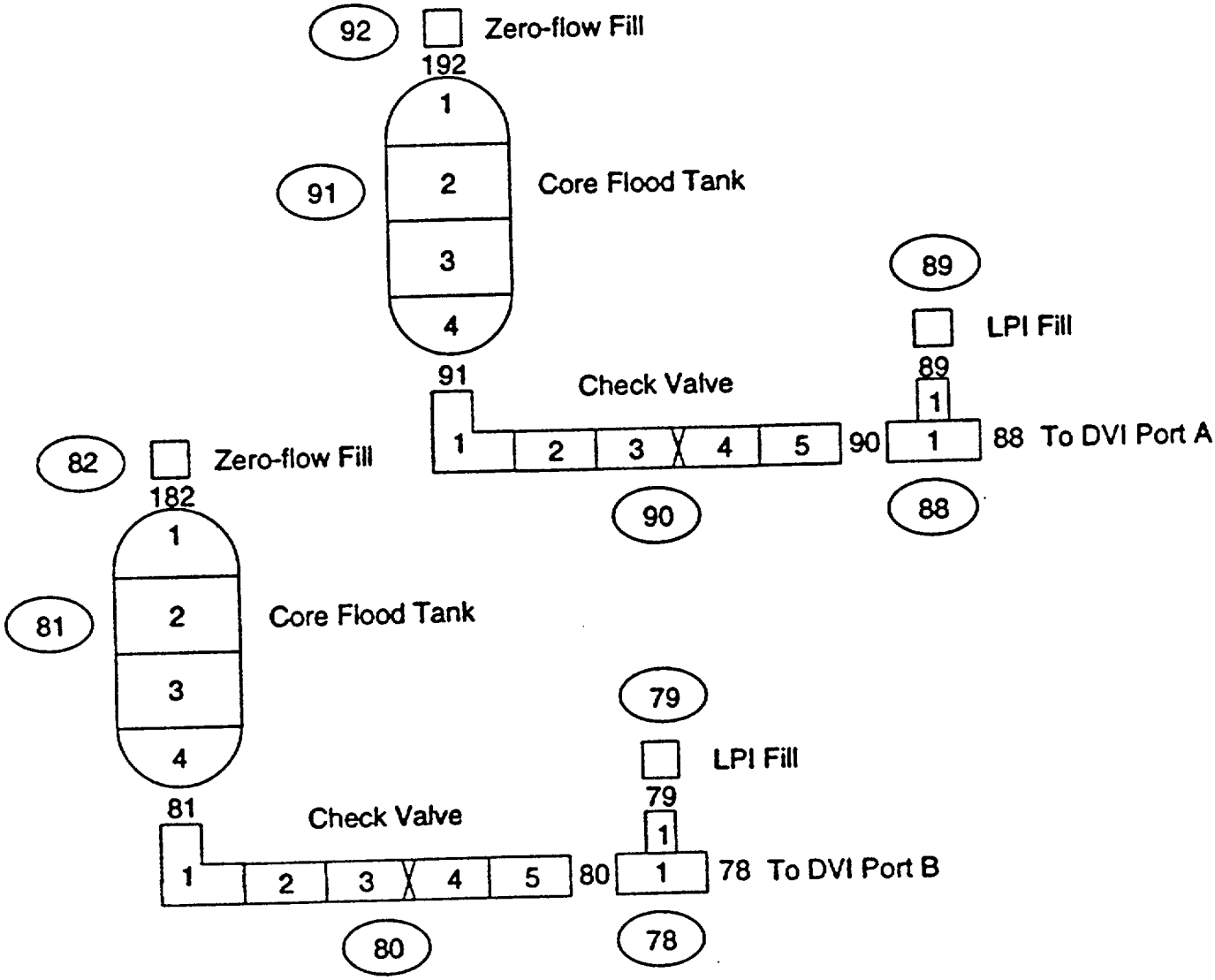


Figure 3.8 Core Flood Tanks and Low-Pressure Coolant Injection Noding Diagrams

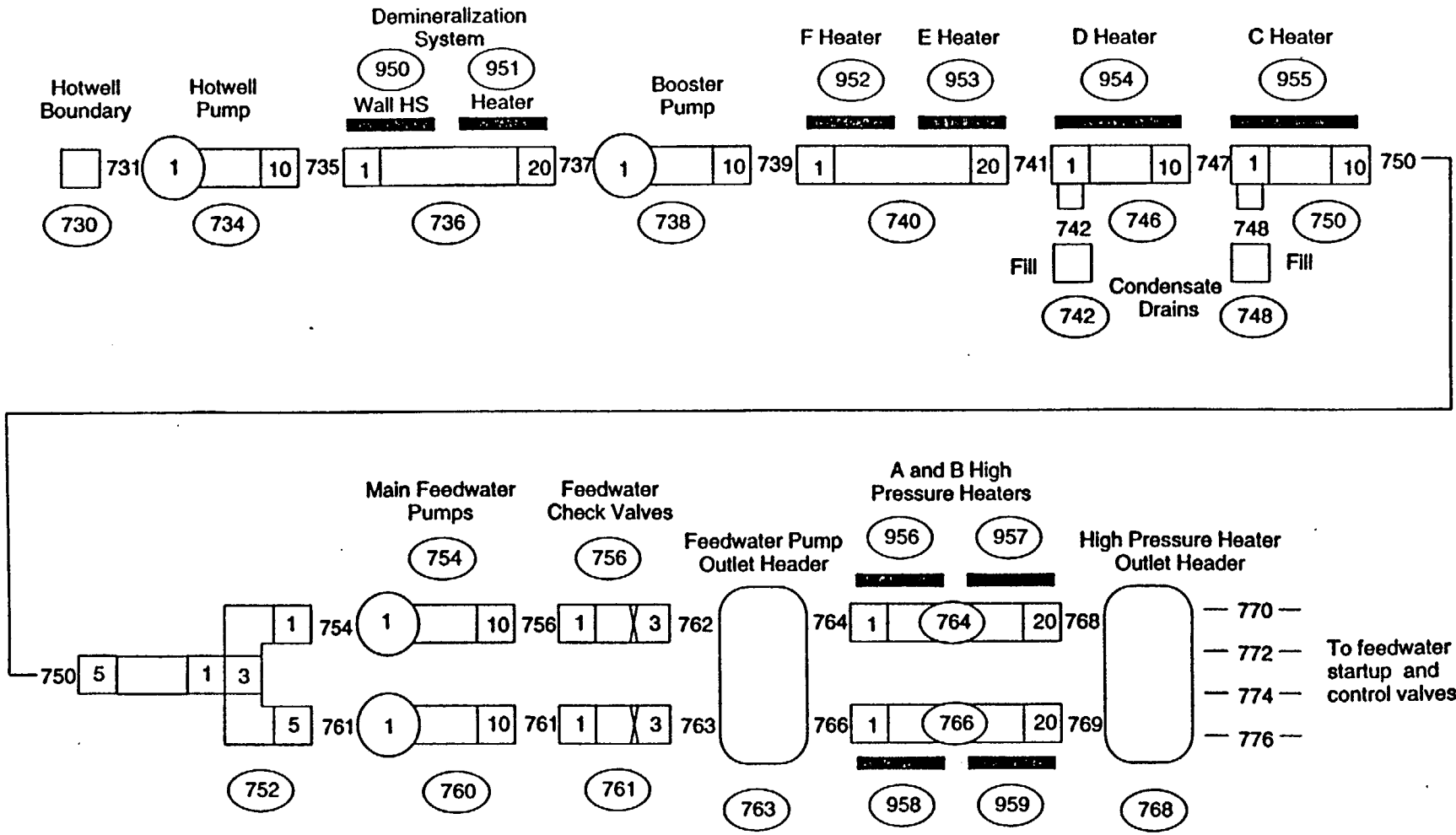


Figure 3.9 Feedwater-Train Noding Diagram–Hotwell Boundary to High-Pressure Heater Outlet Header

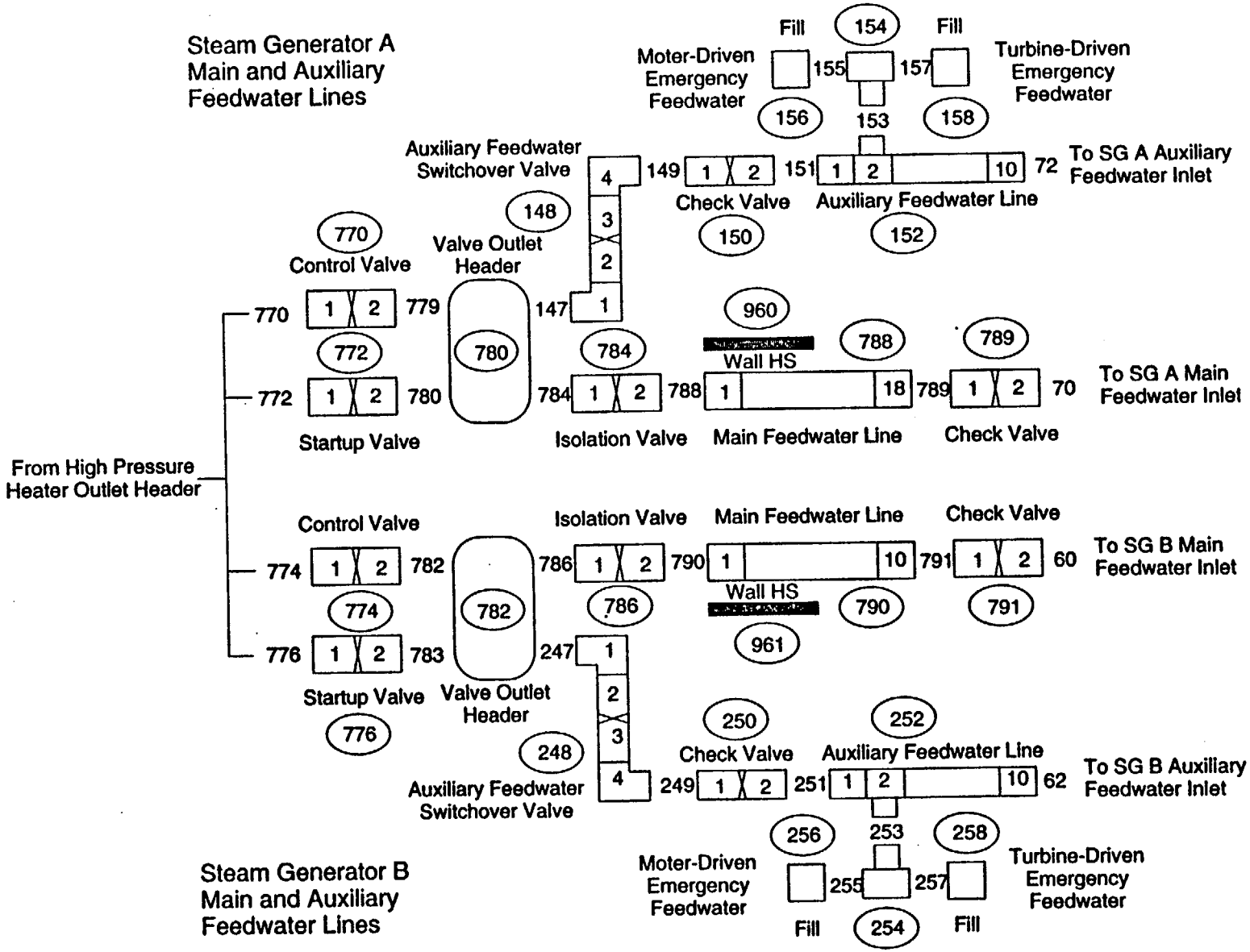


Figure 3.10 Feedwater-Train Noding Diagram–Feedwater Valves, Main Feedwater Inlet Lines, and Auxiliary Feedwater Inlet Valves

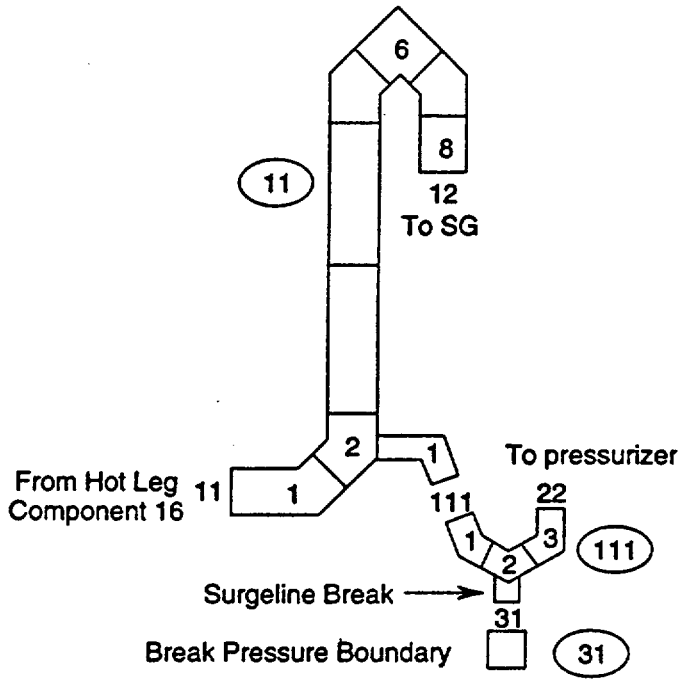


Figure 3.11 Pressurizer Surge-Line Break Noding Diagram

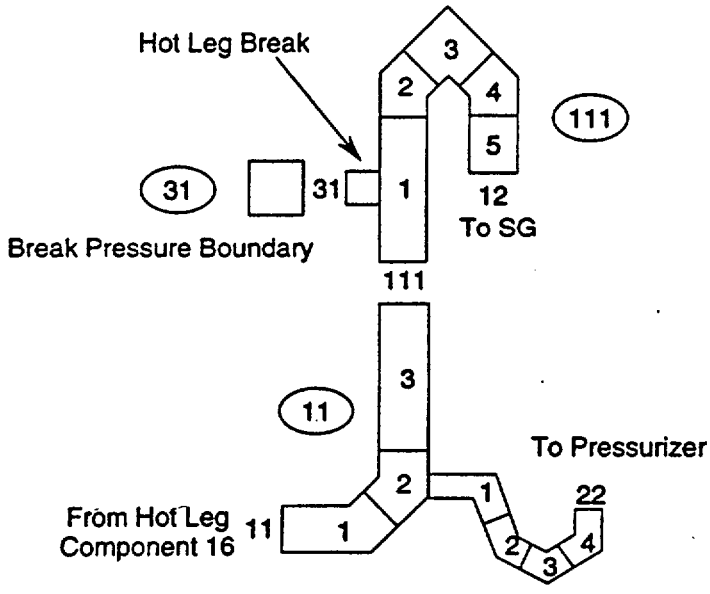


Figure 3.12 Hot-Leg Break Noding Diagram

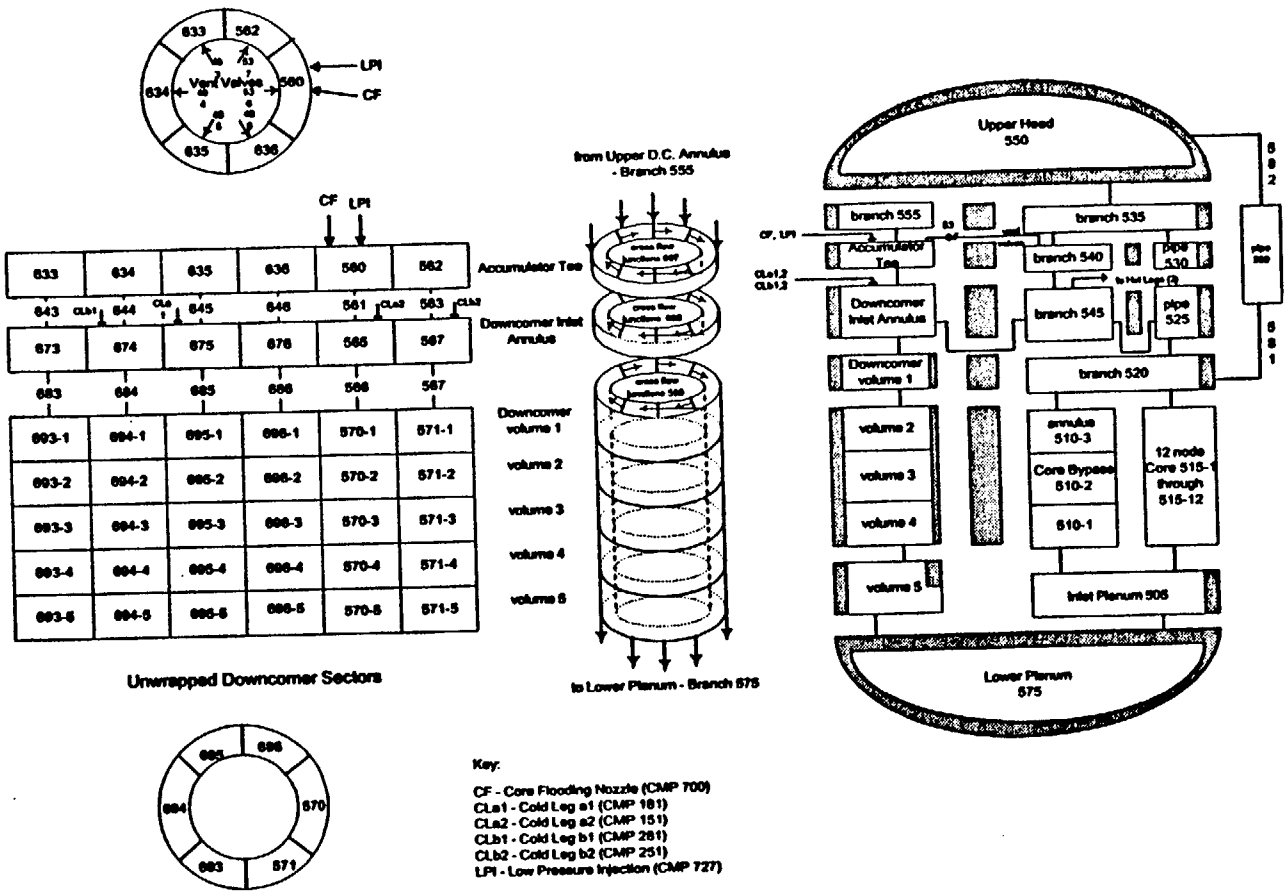


Figure 4.1 Reactor Vessel RELAP5 Nodalization

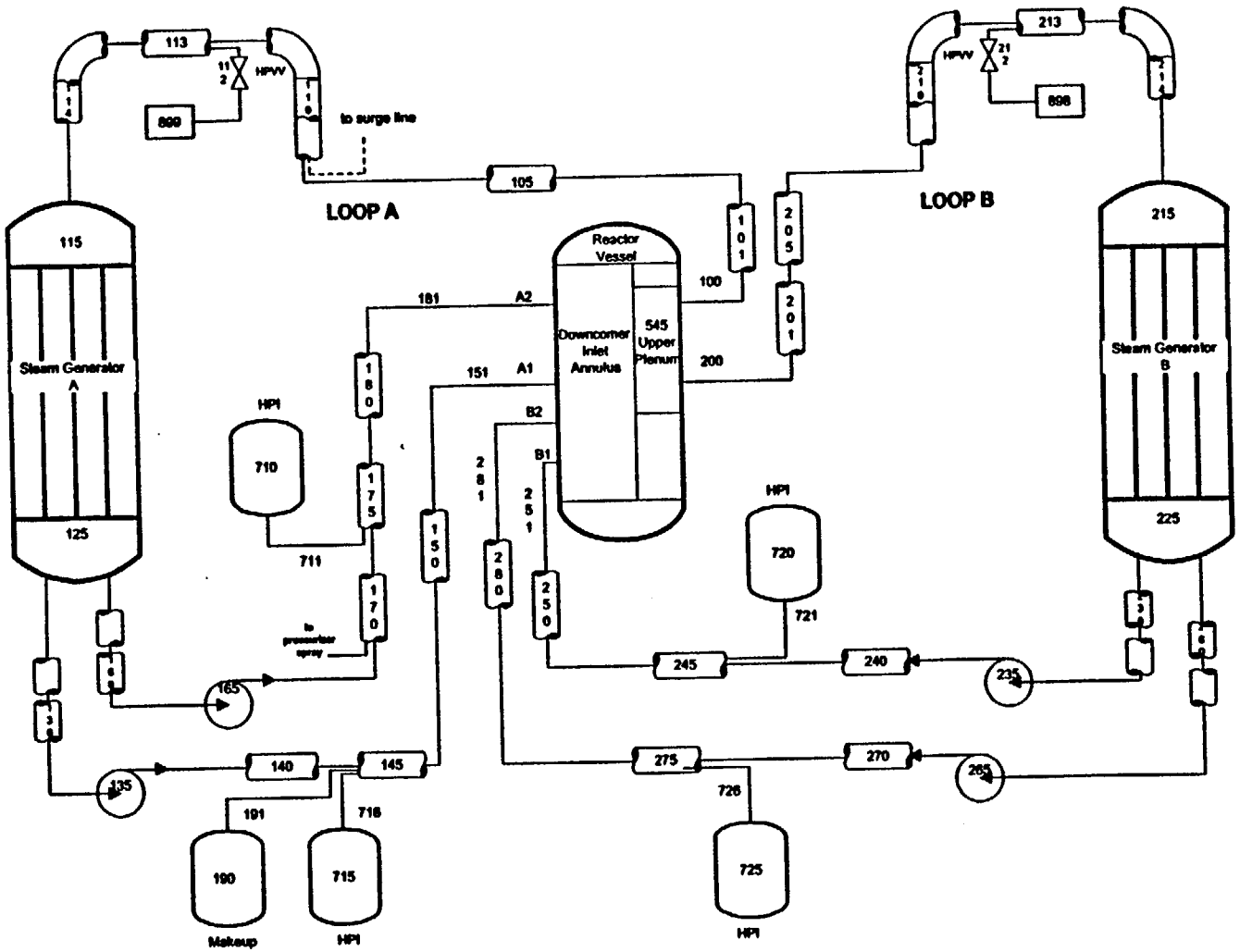


Figure 4.2 Reactor Coolant System RELAP5 Nodalization

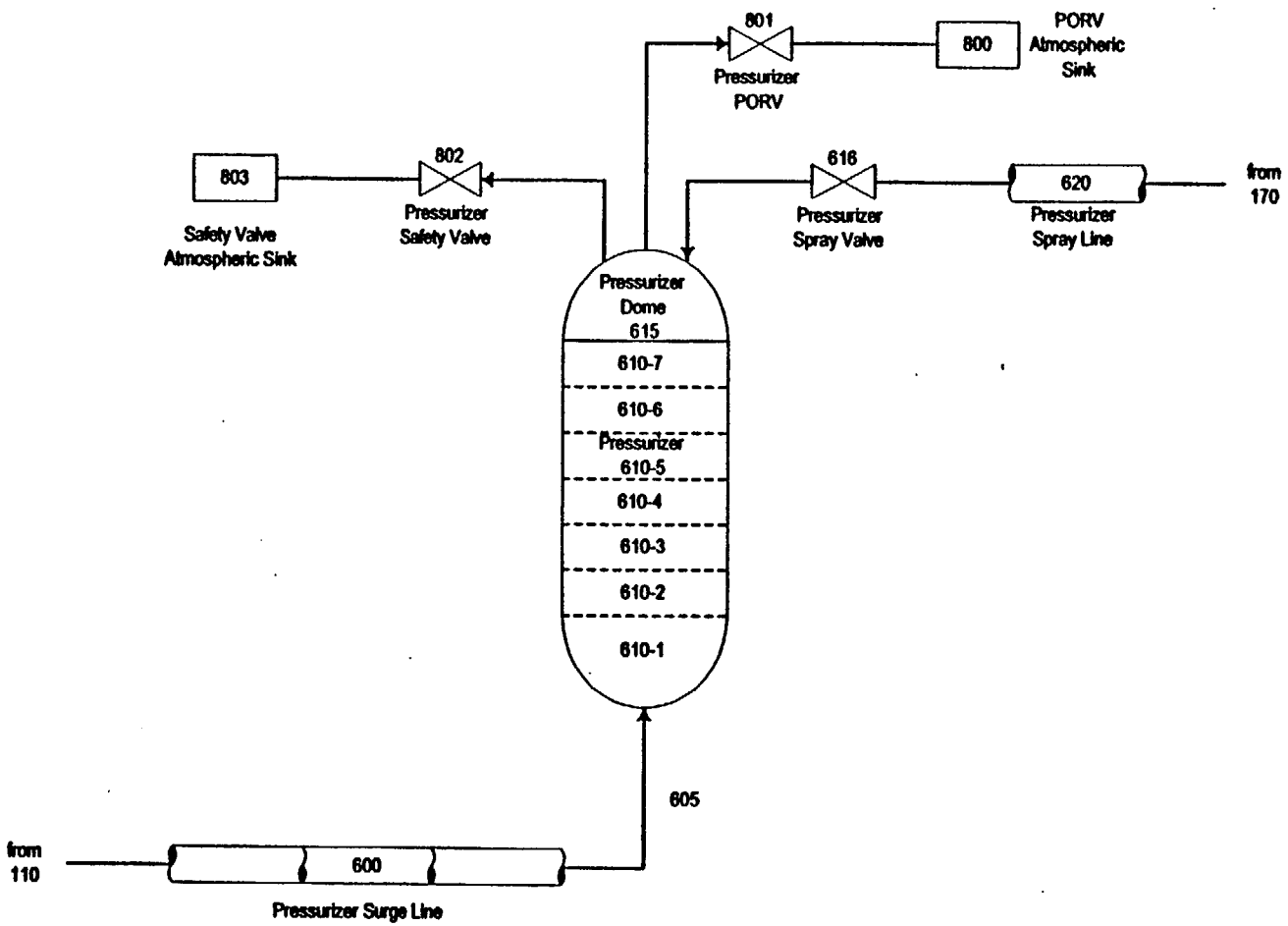


Figure 4.3 Pressurizer System Nodalization

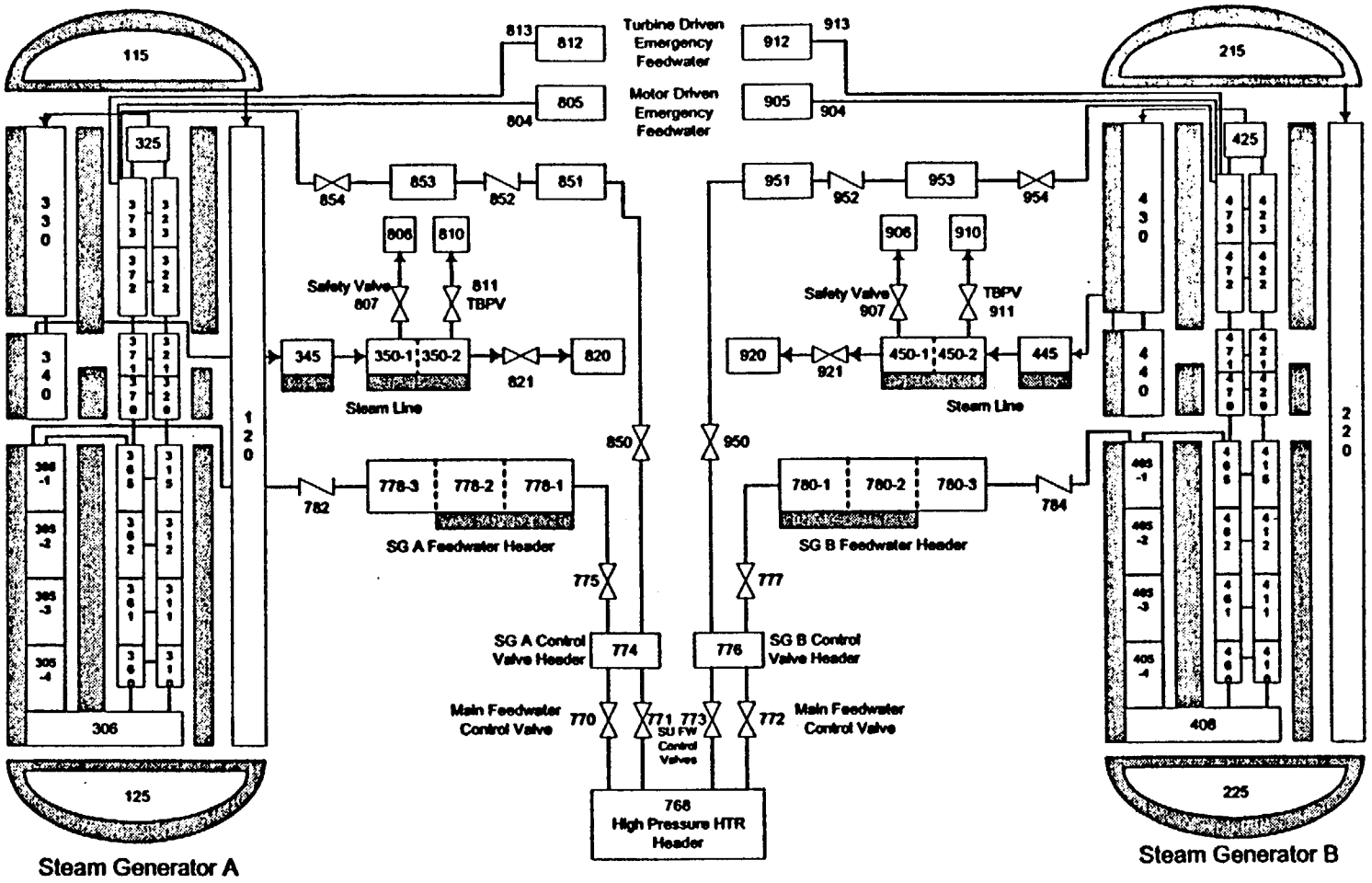


Figure 4.4 Steam Generator Secondary Side Nodalization

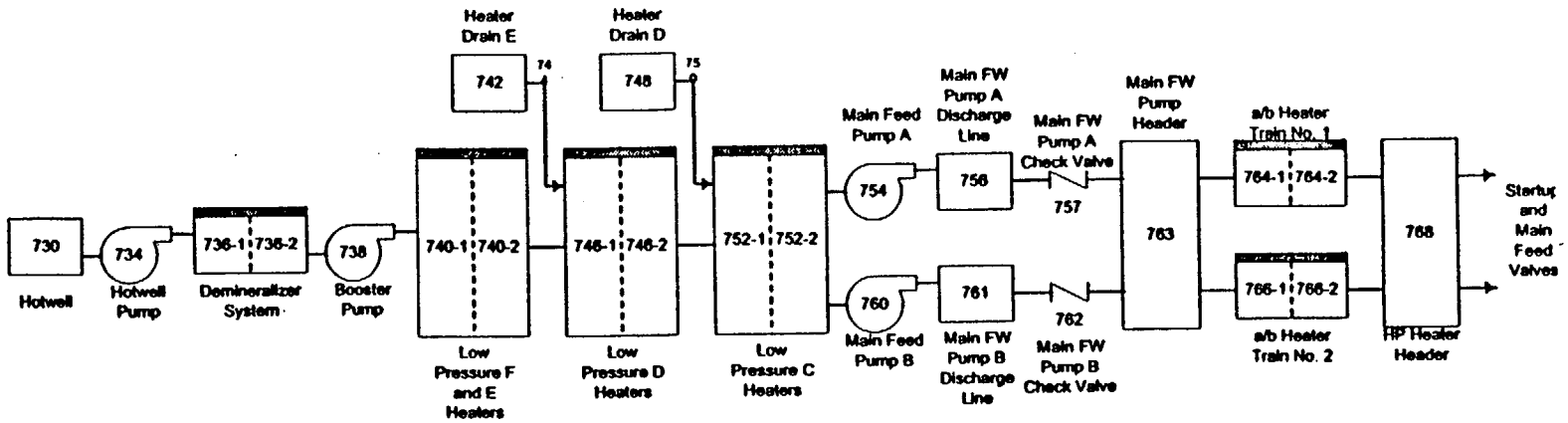


Figure 4.5 Main Feedwater Train RELAP5 Nodalization From Hotwell to Startup and Main Feedwater Valves)

5 COMPARISONS BETWEEN TRAC-M VERSION V3782 AND RELAP5 MOD 3.2.2 GAMMA CALCULATION RESULTS

Three types of scenarios discussed in this report were selected based on input from the Probabilistic Risk Analysis Branch, Division of Risk Analysis and Applications, Office of Nuclear Regulatory Research.

5.1 Turbine Bypass Valve "A" Stuck Open

5.1.1 Sequence of Events

This transient was initiated with reactor scram which caused a turbine trip which in turn caused all four turbine bypass valves to open. The main steam line from each SG has two turbine bypass valves, and one of the two from SG "A" stuck open throughout the transient in TRAC-M cases. In RELAP5 calculation, however, one of the eight safety-relief valves (SRV) in SG "A" main steam line was assumed to stick open instead of a turbine bypass valve sticking open. As discussed later in Section 5.1.3, the steam flow through a turbine bypass valve and that through an SRV were about the same, and thus the effect of the valve malfunction was almost identical even though two different types of valves were involved.

Timing of major events is listed in Table 5.1.1 for two TRAC-M calculations and RELAP5 (Case 35) calculation. TRAC-M Case 1 calculation refers to a case where the HPI flow was throttled even if the pressurizer level was less than 3.05m (120") as long as the subcooling was greater than 27.7K (50°F). TRAC-M Case 2 calculation refers to a case where HPI flow was not throttled unless the pressurizer level was higher than 3.05m (120") and the subcooling was greater than 27.7K (50°F).

The core flood tank, or accumulator, injected coolant at various times in TRAC-M Case 1 but not in TRAC-M Case 2 nor in RELAP5. However, even in TRAC-M Case 1, the accumulator flow was negligible because the system pressure decreased to nearly the same level as the accumulator pressure, resulting in only a few flow spikes as shown in Figure 5.1.1A. In all cases, the low-pressure coolant injection (LPCI) was not actuated, and the vent valves remained shut.

The pressurizer nearly drained but refilled to 0.55m in TRAC-M Case 1, to 6.4m in TRAC-M Case 2, and to 3 m in RELAP5, as shown in Figure 5.1.1B. In TRAC-M Case 1 the pressurizer refilling stopped when the system pressure fell below 11.13 MPa (1600 psig) since no makeup flow was allowed when the system pressure fell below 11.13 MPa (1600 psig). In TRAC-M the makeup flow and the letdown flow were modeled as one component (i.e., if positive, the flow became a makeup, and if negative, the flow became a letdown), and the letdown flow was isolated when the pressure dropped to 11.13 MPa (1600 psig), per information from Oconee (Ref. 3). TRAC-M and RELAP5 used a different set point of the pressurizer level for makeup flow control; 6.4 m for TRAC-M and 3.0 m for RELAP5. The Oconee Plant indicated in Reference 3 that after a reactor trip, the makeup flow should be used to restore the pressurizer level to 5.6m (220") in the level indicator or to 6.4m from the bottom of the pressurizer.

The main feedwater (MFW) was terminated when the reactor tripped, and the emergency feedwater (EFW) was initiated in 120 seconds for TRAC-M Case 1 and Case 2 and in 140 seconds in RELAP5 as shown in Figures 5.1.1C and 5.1.1D. The EFW flows were highly

oscillatory and thus were integrated and plotted in Figures 5.1.1D1 and 5.1.1D2 for comparison in terms of integrated values. The integrated flow plots clearly show that the RELAP5-calculated EFW flows were a half of the TRAC-M values. On the other hand, since the total steam flows leaving SG "A" was about the same between TRAC-M and RELAP5 as shown in Figure 5.1.1.D3, the total feedwater flow to SG "A" should have been approximately the same between TRAC-M and RELAP5. The difference between TRAC-M and RELAP5 in EFW flows was made up by MFW flows as shown in Figure 5.1.1D4. There should not have been much MFW flows since the MFW valves should have been closed very soon after the reactor scram. However, in RELAP5 there were occasional MFW flow spikes throughout the transient as shown in Figure 5.1.1D5. TRAC-M also showed some MFW flow spikes, but the extent was much less as shown in Figure 5.1.1D6. SG "B" was isolated, and thus both EFW flows and steam flows were essentially zero as shown in Figures 5.1.1.D1, 5.1.1D2, and 5.1.1D3. No voids appeared in the upper head of the reactor vessel, nor in the upper downcomer, nor at the highest elevation of the hot legs.

5.1.2 Main Pressurized Thermal Shock Parameters

There are three parameters of greatest interest in PTS evaluations, namely, the minimum liquid temperature in the downcomer as a function of time, the pressure in the downcomer at the time of the minimum temperature, and the heat transfer coefficient between the downcomer liquid and the vessel wall.

Figures 5.1.2 through 5.1.5 show these parameters as a function of time for comparison between RELAP5 Case 35 and TRAC-M Case 1 in which the HPI flow was throttled even though the pressurizer level was less than 3.05m (120") as long as the subcooling was greater than 27.7K (50 °F). In RELAP5 case one SRV in the main steam line off SG "A" stuck open instead of a turbine bypass valve. The minimum downcomer temperature calculated by TRAC-M Case 1 is found at 9,300 seconds to be 474K while that calculated by RELAP5 is 473K at 9,630 seconds. The downcomer pressure at the time of the minimum temperature is 3.5 MPa in TRAC-M Case 1 versus 11.1 MPa in RELAP5. The maximum and the minimum heat transfer coefficients between the downcomer fluid and the vessel wall at the time of the minimum downcomer temperature are 28,000 W/(m*m K) and 22,100 W/(m*m K) , respectively, in TRAC-M Case 1 while those in RELAP5 are 30,400 W/(m*m K) and 24,500 W/(m*m K). In both TRAC-M Case 1 and Case 2, the maximum heat transfer coefficient is found at the bottom of a downcomer sector located between cold leg "B1" and "B2" and the minimum is found at the bottom of a downcomer sector below cold leg "A1". On the other hand, in RELAP5 case, the maximum is found at the bottom of a downcomer sector below cold leg "A1" and the minimum is found at the upper plenum elevation node of a sector between cold leg "A1" and "A2."

Figures 5.1.6 through 5.1.8 show the same parameters for comparison between RELAP5 Case 35 and TRAC-M Case 2 in which the HPI flow was not throttled if the pressurizer level was less than 3.05m (120") even though the subcooling was greater than 27.7K (50 °F). In TRAC-M Case 2, the minimum downcomer temperature is found at 10,000 seconds to be 474K, the downcomer pressure at 10,000 seconds 15.4 MPa, and the maximum and the minimum heat transfer coefficients 28,000 w/(m*m K) and 22,100 W/(m*m K).

All of these parameters show a similar behavior between TRAC-M and RELAP5 predictions except the downcomer pressure. The primary reason for a fairly rapid decrease in downcomer pressure in TRAC-M Case 1 was a rapid cooldown of the primary system caused by the heat

extraction in SG "A" due to a continuous steam flow through a stuck-open turbine bypass valve while the liquid volume shrinkage was not made up for by neither HPI (because of throttling) nor the makeup flow (because of pressure being less than the set point). In contrast, either in RELAP5 or in TRAC-M Case 2, the pressure did not decrease much because the unthrottled HPI flow and the makeup flow prevented the pressure from decreasing too rapidly. In addition, the pressurizer heater was turned on if the pressure fell below the set point as long as the pressurizer liquid level stayed above a set point of 2.033m. Once the pressure fell below 11.13 MPa (1600 psig), the makeup flow could not be turned on and thus the pressure could not be recovered. The reason for a small increase in pressure at about 4000 and 7600 seconds in TRAC-M Case 1 calculation, as shown in Figure 5.1.3, was that the HPI flow had a large spike at about 4000 and 7600 seconds as shown in Figure 5.1.8A. The integrated HPI flows are shown in Figure 5.1.8B.

A primary reason of why TRAC-M Case 2 calculated a higher pressurizer pressure than RELAP5 Case 35 was that TRAC-M used a higher pressurizer level set point; 6.4m versus 3.0m used in RELAP5. Figures 5.1.1B and 5.1.7 show that pressure increases closely reflected the liquid level increases in the pressurizer. The rate of increase in level was controlled by the HPI and the makeup flow rates. The reason of why TRAC-M Case 2 pressure started increasing at 9000 seconds was that the pressurizer heater input finally overcame the heat loss through the SG (Figure 5.1.9).

5.1.3 Other Plant Parameters

PTS concerns arise when the primary system loop flow becomes very low or stagnates since under very low or no loop flow conditions, mixing between the cold HPI fluid and the hot fluid existing in the primary system is not very good and thus the vessel wall would come in contact with the cold HPI plume, and the vessel wall that comes in contact with the cold plume may cool excessively down to below the PTS screening criterion temperature. Therefore, it would be most appropriate to examine the loop flow rates and their temperatures.

Figures 5.1.10 through 5.1.13 show comparisons between TRAC-M Case 1 and RELAP5 Case 35 calculations for core flow, hot leg "A" and "B" mass flows, and cold leg "A" and "B" mass flows. Similarly Figures 5.1.14 through 5.1.17 show comparisons between TRAC-M Case 2 and RELAP5 Case 35 for the same core, hot leg, and cold leg mass flows. In all cases, the differences between TRAC-M and RELAP5 results are less than about 2 percent (200 Kg/s for hot legs and 100 KG/s for cold legs). As shown in Figures 5.1.11 and 5.1.15, TRAC-M calculated hot leg "A" mass flows to be about 2 percent higher than hot leg "B" mass flow rates. The reason for this difference is that the hot leg "A" flow was cooled down significantly in SG "A" while the hot leg "B" flow was not cooled down in SG "B", as shown in Figure 5.1.17A for instantaneous heat exchange rates and in Figure 5.1.17B for integrated heat exchange rates. When flows were cooled down in SGs, the density of liquid and thus the driving force for the flow would increase. RELAP5 showed such a trend also, but the extent was much less.

Hot leg and cold leg temperature comparisons between TRAC-M Case 1 and RELAP5 Case 35 calculations are shown in Figures 5.1.18 through 5.1.20. Differences are less than about 2 percent (10K). Similarly, the same temperature comparisons between TRAC-M Case 2 and RELAP5 Case 35 calculations are shown in Figures 5.1.21 through 5.1.23. The differences for the latter case are also less than 2 percent (10K). TRAC-M calculated about two percent imbalance between the hot leg "A" and "B" temperatures because the hot leg "A" flow was

calculated to be higher than the hot leg "B" flow as a result of cooldown in SG "A" but not in SG "B", as discussed above, and thus the hot leg "A" temperature was lower than the hot leg "B" temperature by about 2 percent because the hot leg "A" and "B" flows would remove approximately the same amount of heat from the core.

Figure 5.1.24 shows steam flow rates through a stuck-open turbine bypass valve "A" as calculated by TRAC-M Case 1 and steam flow rates through a stuck-open main steam SRV "A" as calculated by RELAP5 Case 35. Both steam flow rates are nearly the same, and thus the heat transfer rates in SGs are also nearly the same as shown in Figure 5.1.25 even though the heat transfer rates calculated by RELAP5 are more oscillatory. Similar comparisons between TRAC-M Case 2 and RELAP5 Case 35 are shown in Figures 5.1.26 and 5.1.27. Even though TRAC-M and RELAP5 used slightly different assumptions (i.e., a stuck-open turbine bypass valve "A" for TRAC-M versus a stuck-open main steam SRV "A" for RELAP5), their effects are nearly the same.

5.1.4 Pressurized Thermal Shock Implications

Both TRAC-M and RELAP5 calculations suggest that neither a turbine bypass valve stuck-open malfunction nor an SRV stuck-open malfunction would lead to PTS concerns as the predicted downcomer temperatures of 472–474K are well above the PTS screening temperature of 422K. Since RCPs do not trip under these scenarios, a large flow is maintained in the loop and the HPI fluid mixes well with the existing hot primary liquid, and thus the downcomer wall does not see a cold plume.

Text continues on page 64.

Table 5.1.1 Comparison of Sequence of Events Between TRAC-M and RELAP5 Calculations for Scenarios of Turbine Bypass Valve "A" Stuck Open

	TRAC-M Case 1 Seconds	TRAC-M Case 2 Seconds	RELAP5* Case 35 Seconds
Failed Components	**Turbine Bypass Valve "A"**	**Turbine Bypass Valve "A"**	**One Safety Valve in Steam Generator "A" Steam line**
1. Reactor scram (initiating event)	0	0	0
2. RCP trip on loss of subcooling	Did not trip	Did not trip	Did not trip
3. HPI actuation	260	260	190
4. HPI throttle initiation – if subcooling .GE. 28K (50 °F) – if subcooling .GE. 28K (50 °F) and Pzr level .GE. 3.05m (120")	 340 N/A	 N/A 431	 N/A 710
5. Core flood tank actuation	Actuated at various times but flow negligible because the system pressure stayed nearly the same as the core flood tank pressure	Did not start	Did not start
6. LPCI actuation	Did not start	Did not start	Did not start
7. Vent Valve Opening time	Did not open	Did not open	Did not open

Table 5.1.1 Comparison of Sequence of Events Between TRAC-M and RELAP5 Calculations for Scenarios of Turbine Bypass Valve "A" Stuck Open (Cont.)

	TRAC-M Case 1 Seconds	TRAC-M Case 2 Seconds	RELAP5* Case 35 Seconds
Failed Components	**Turbine Bypass Valve "A"**	**Turbine Bypass Valve "A"**	**One Safety Valve in Steam Generator "A" Steam line**
8. Pressurizer refill initiation	280 Refilled to 0.55m but the level decreased again because the makeup flow terminated as the pressure fell below 11.13 MPa (1600 psig)	280 Refilled to 6.4m	240 Refilled to 3m
9. EFW initiation – flow to SG "A" – flow to SG "B"	 120 Did not start	 120 Did not start	 140 Did not start
10. Upper head voiding initiation	Did not void	Did not void	Did not void
11. Upper downcomer void initiation	Did not void	Did not void	Did not void
12. Hot leg top void initiation	Did not void	Did not void	Did not void

* In RELAP5 Case 35, a main steam line "A" SRV stuck open instead of a turbine bypass valve "A" sticking open as in TRAC-M cases.

Figure 5.1.1A Core Flood Tank Flow Rates

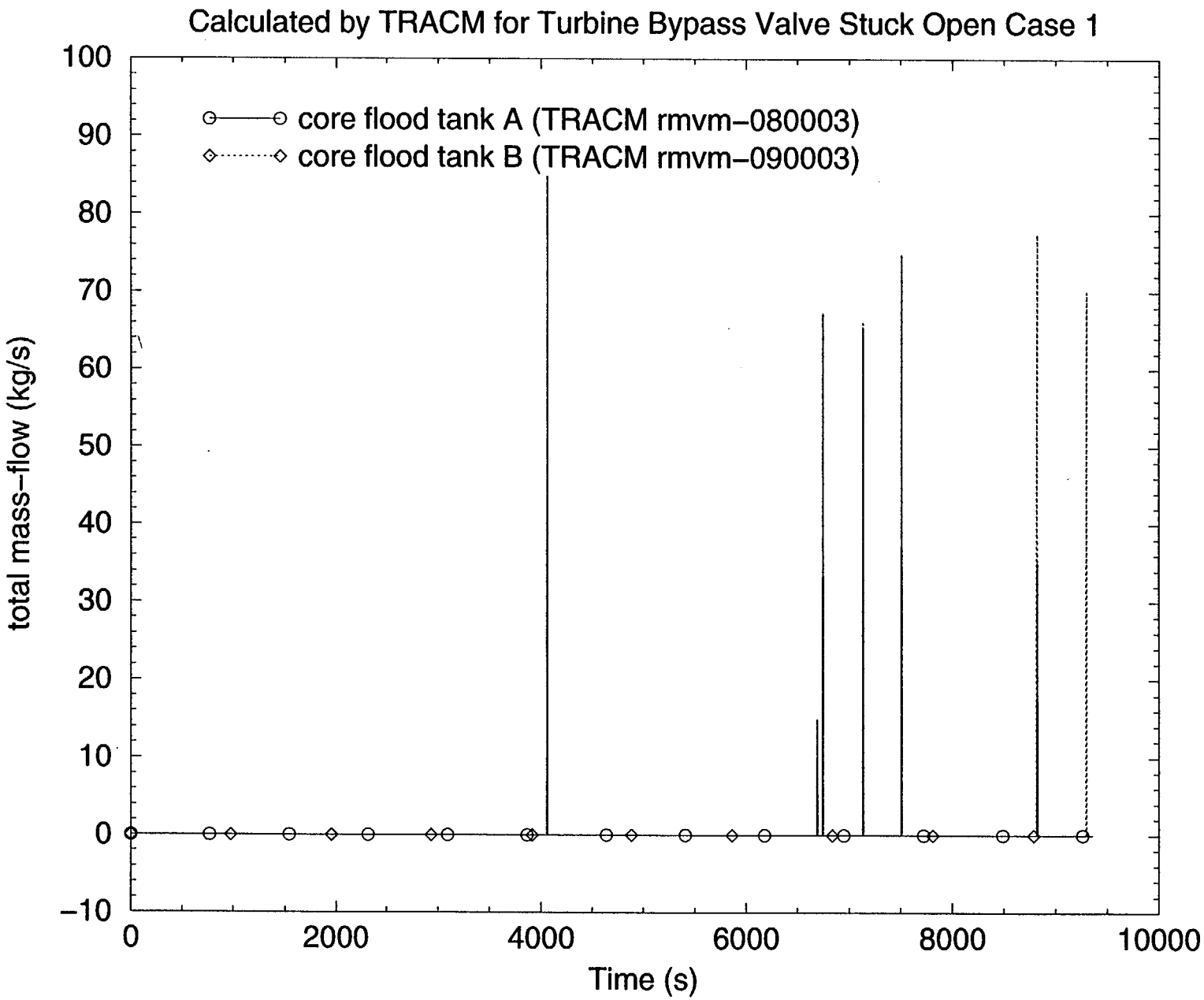


Figure 5.1.1B Pressurizer Water Level

Calculated by TRACM and RELAP5 for Turbine Bypass Valve Stuck Open Cases

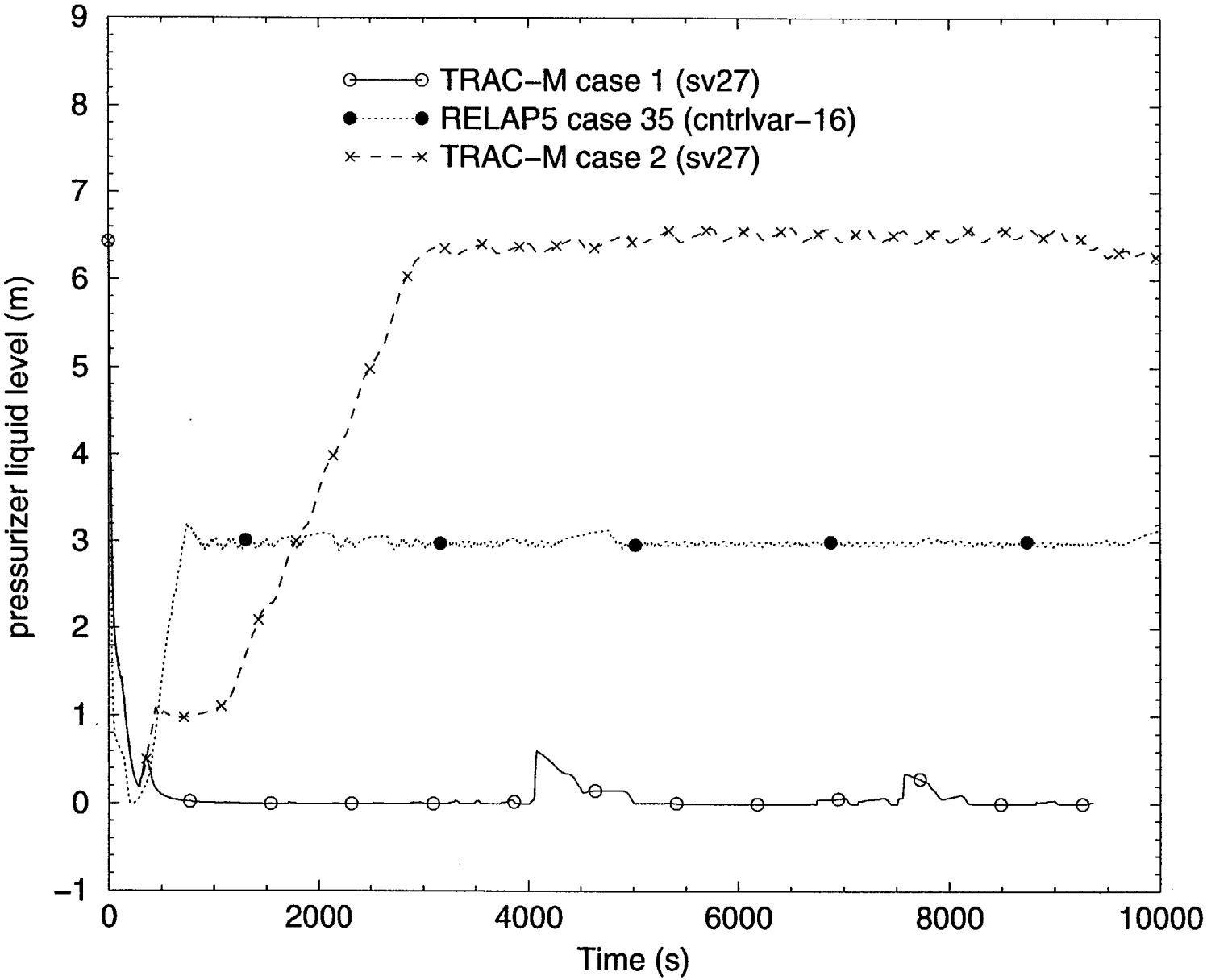


Figure 5.1.1C Total Emergency Feedwater Flow Rates

Calculated by TRACM and RELAP5 for Turbine Bypass Valve Stuck Open Case 1

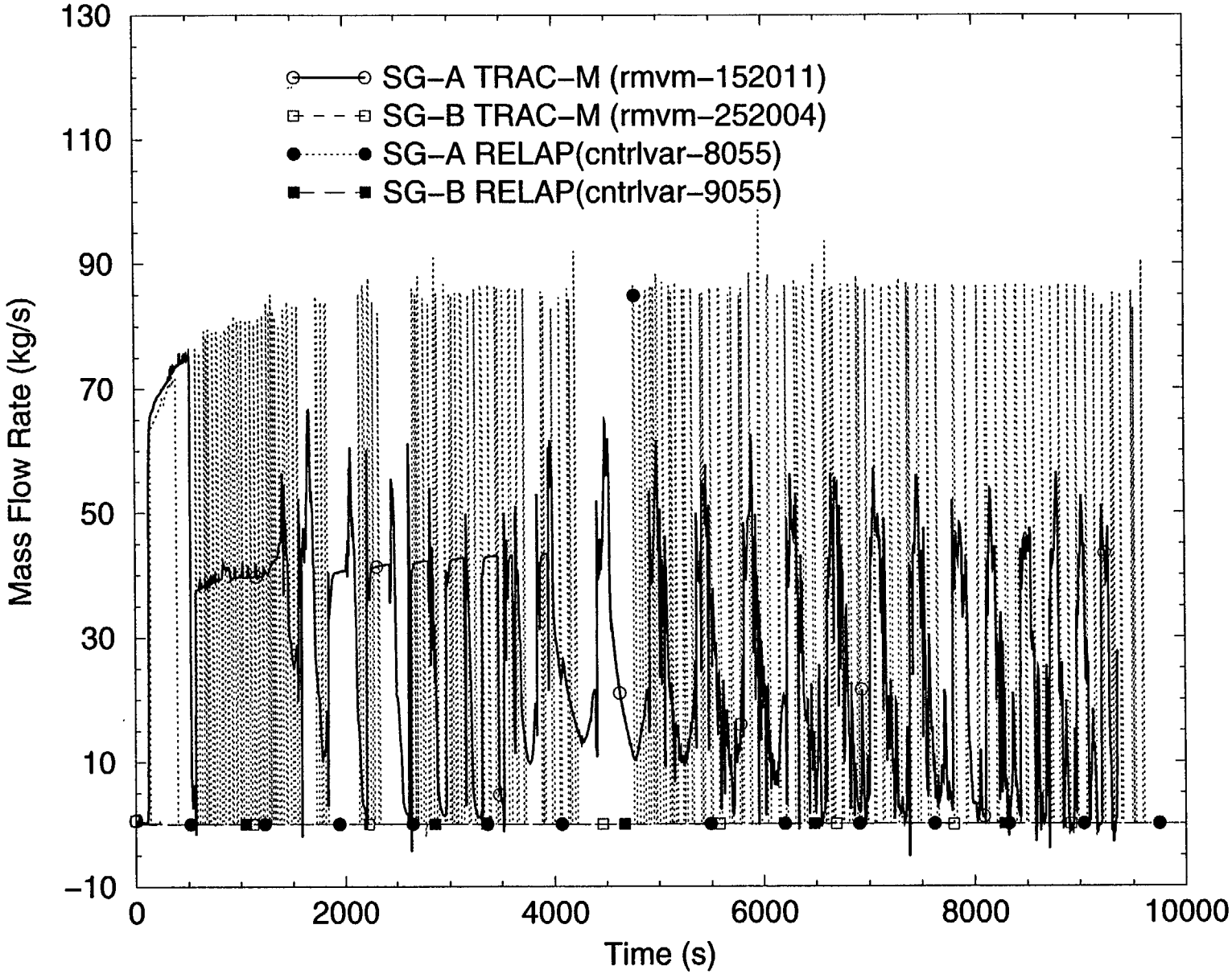


Figure 5.1.1D Total Emergency Feedwater Flow Rates

Calculated by TRACM and RELAP5 for Turbine Bypass Valve Stuck Open Case 2

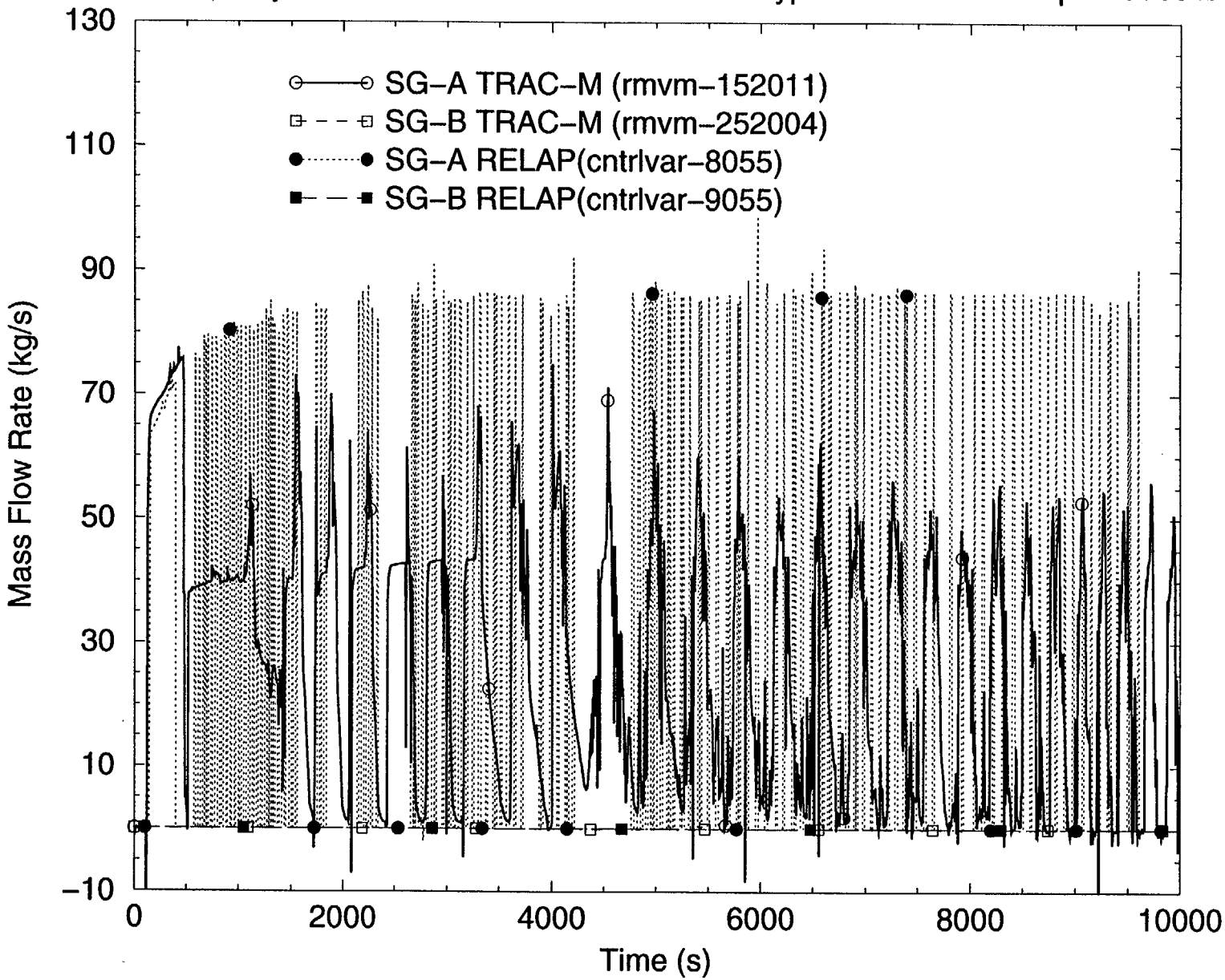


Figure 5.1.1D1 Total Integrated Emergency Feedwater Flow

Calc. by TRACM Case 1 and RELAP5 Case 35 for Turb. Bypass Valve Stuck Open Scenario

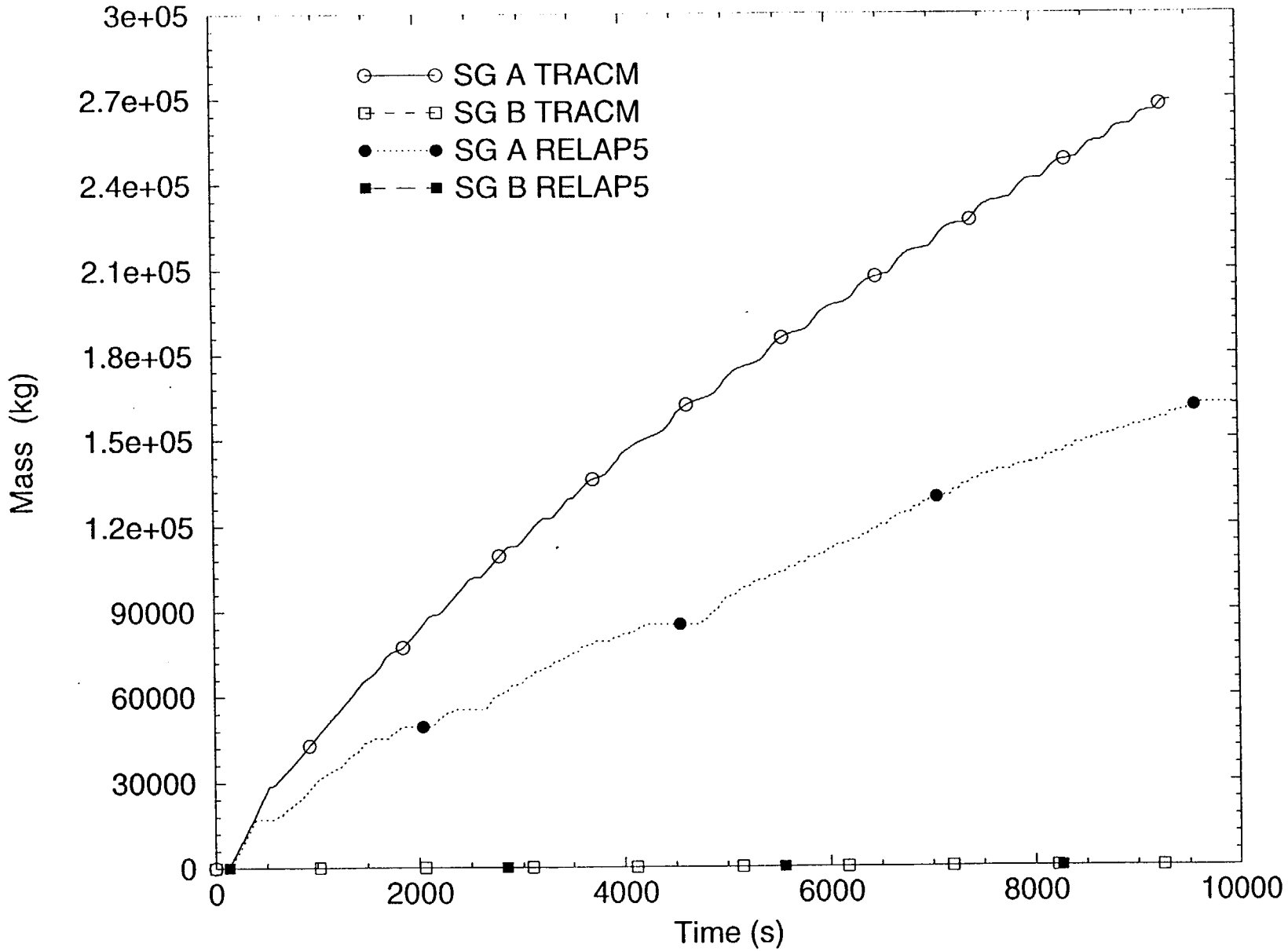


Figure 5.1.1D2 Total Emergency Feedwater Delivered

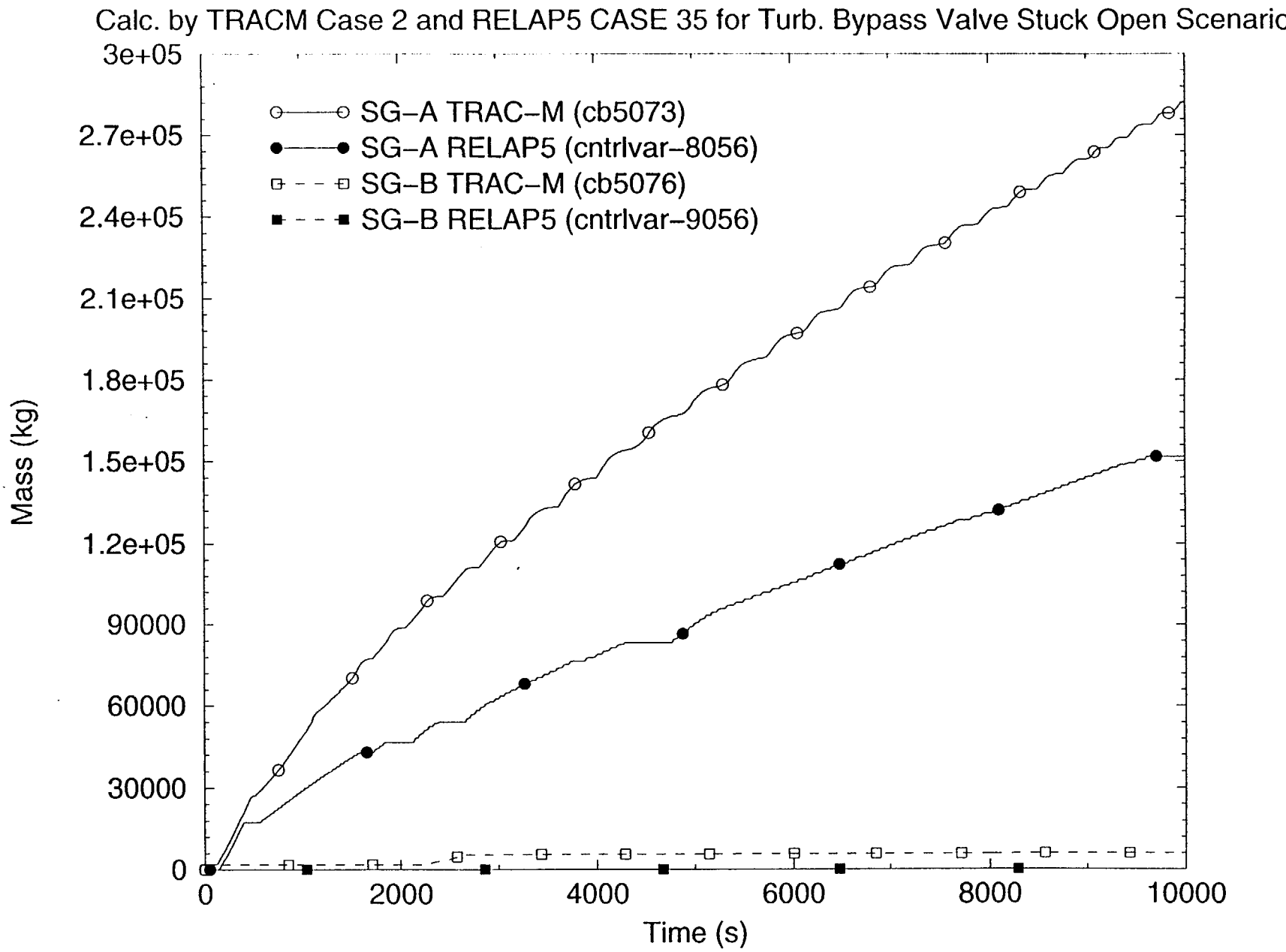


Figure 5.1.1D3 Main Steam Line Flow Rates

Calc. by TRACM Case 1 and RELAP5 Case 35 for Turb. Bypass Valve Stuck Open Scenario

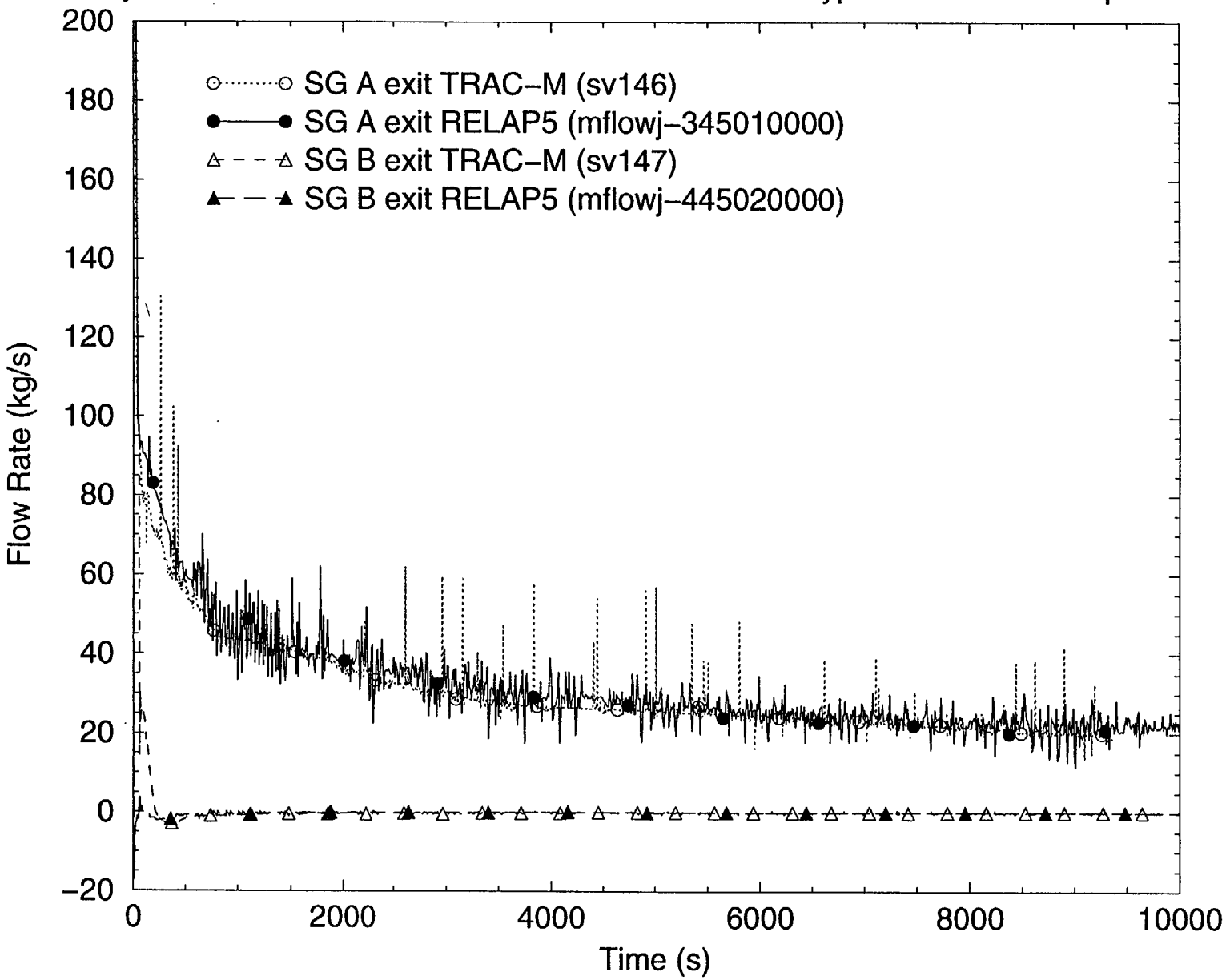


Figure 5.1.1D4 Total Main Feedwater Flow Delivered

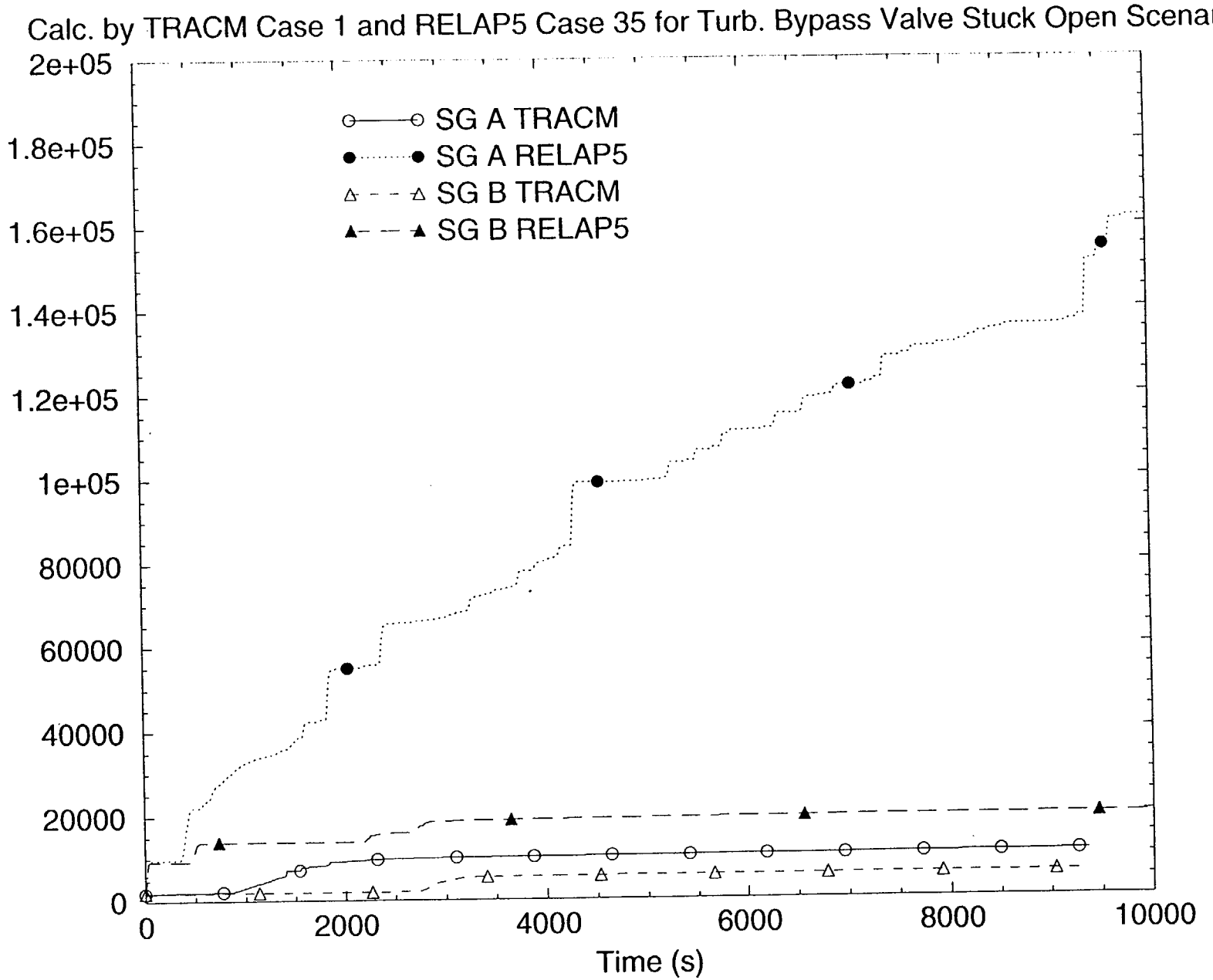


Figure 5.1.1D5 Main Feedwater Flow Rates

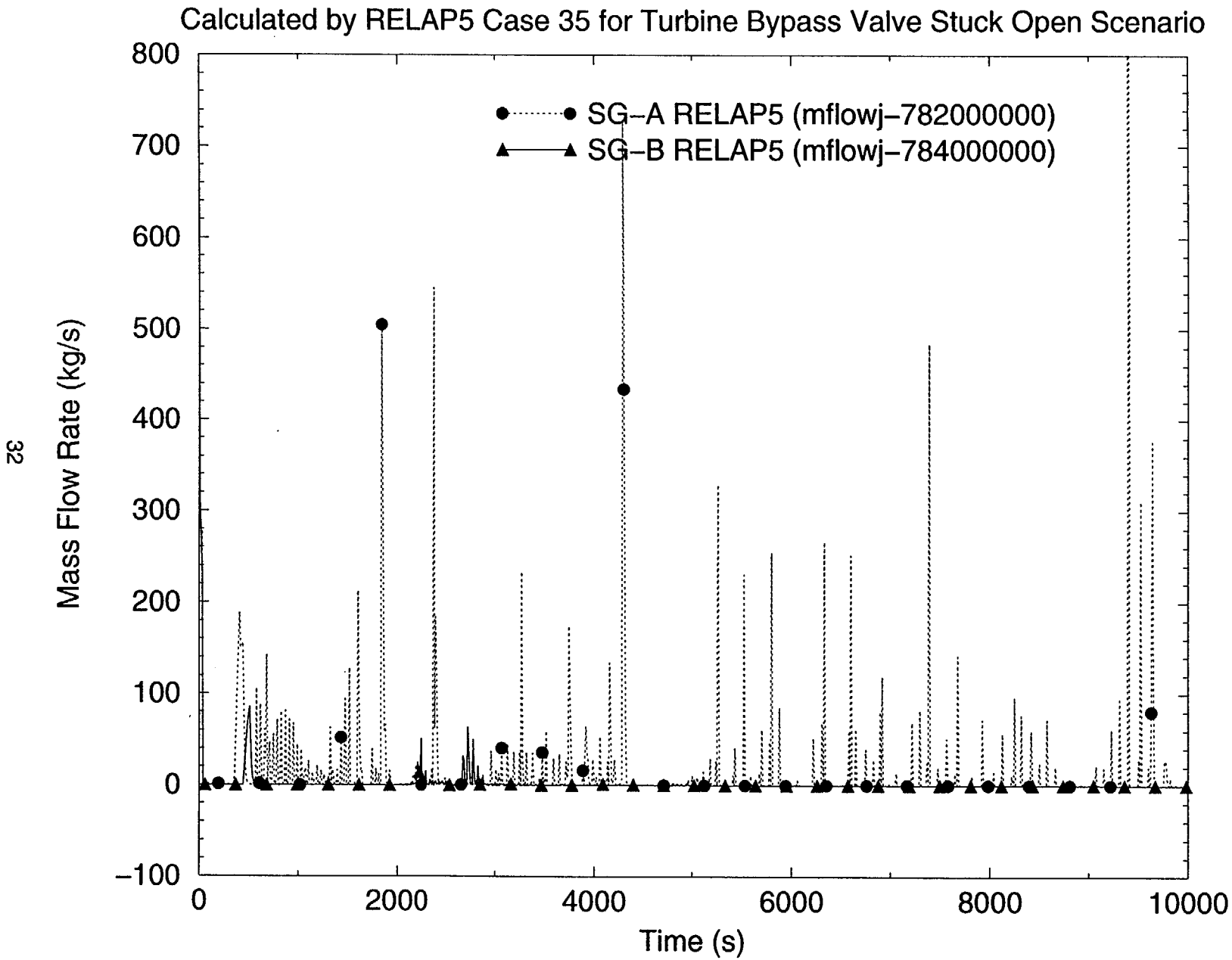


Figure 5.1.1D6 Main Feedwater Flow Rates

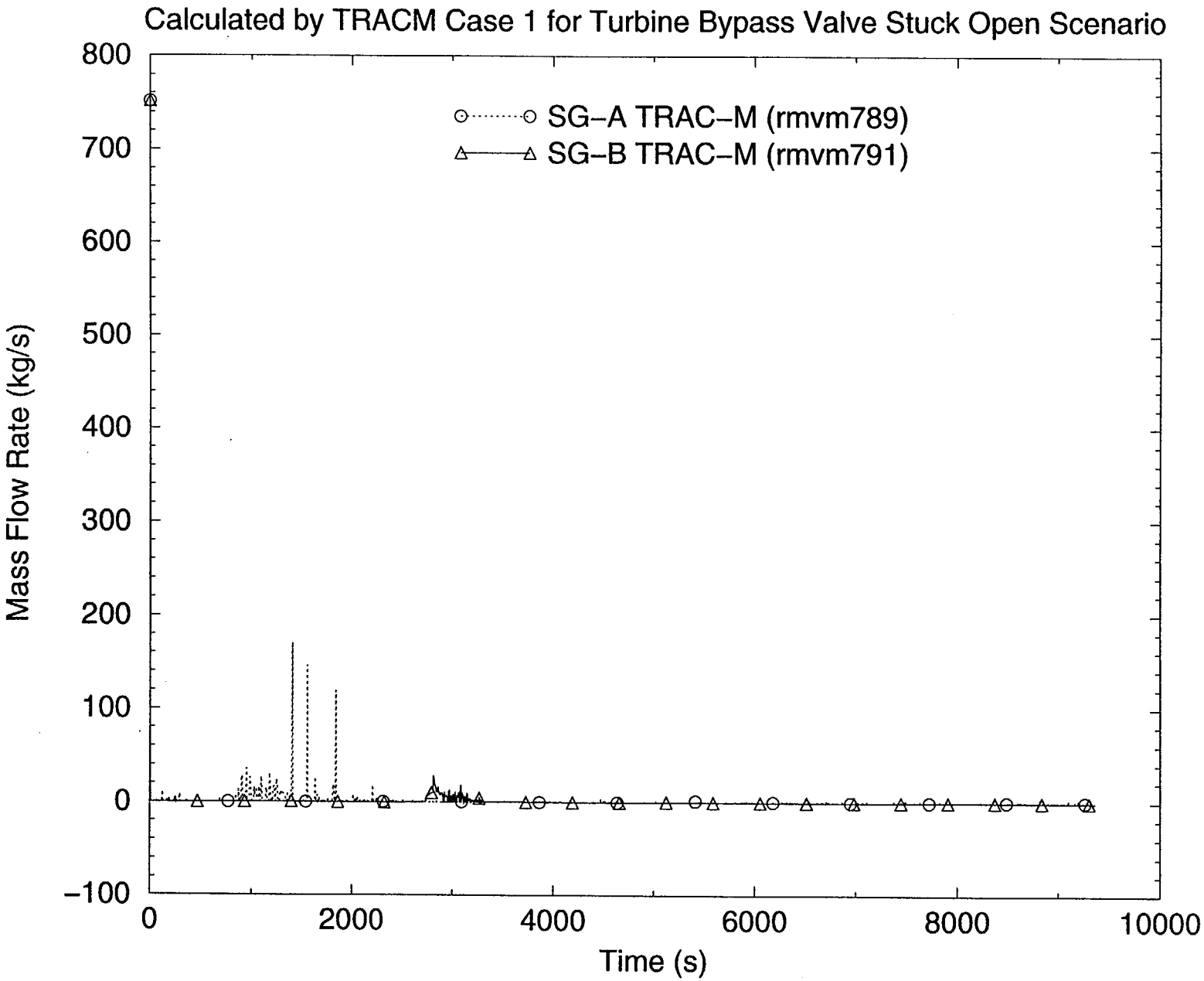


Figure 5.1.2 Downcomer Liquid Temperatures

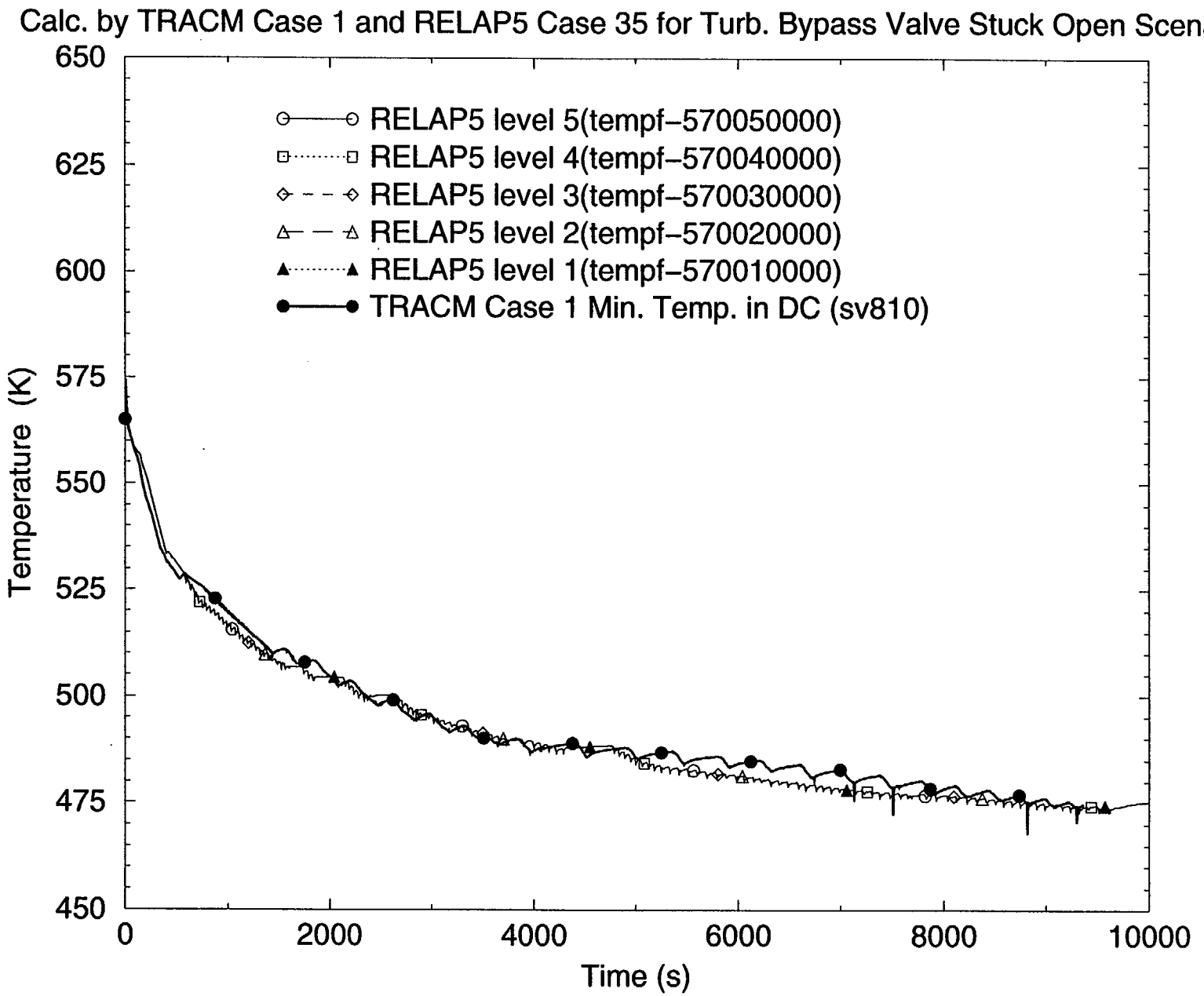


Figure 5.1.3 Downcomer Mid-Elevation Pressure

Calculated by TRAC-M(Case 1) and RELAP5(Case 35) for Turbine Bypass Valve Stuck Open Scenario

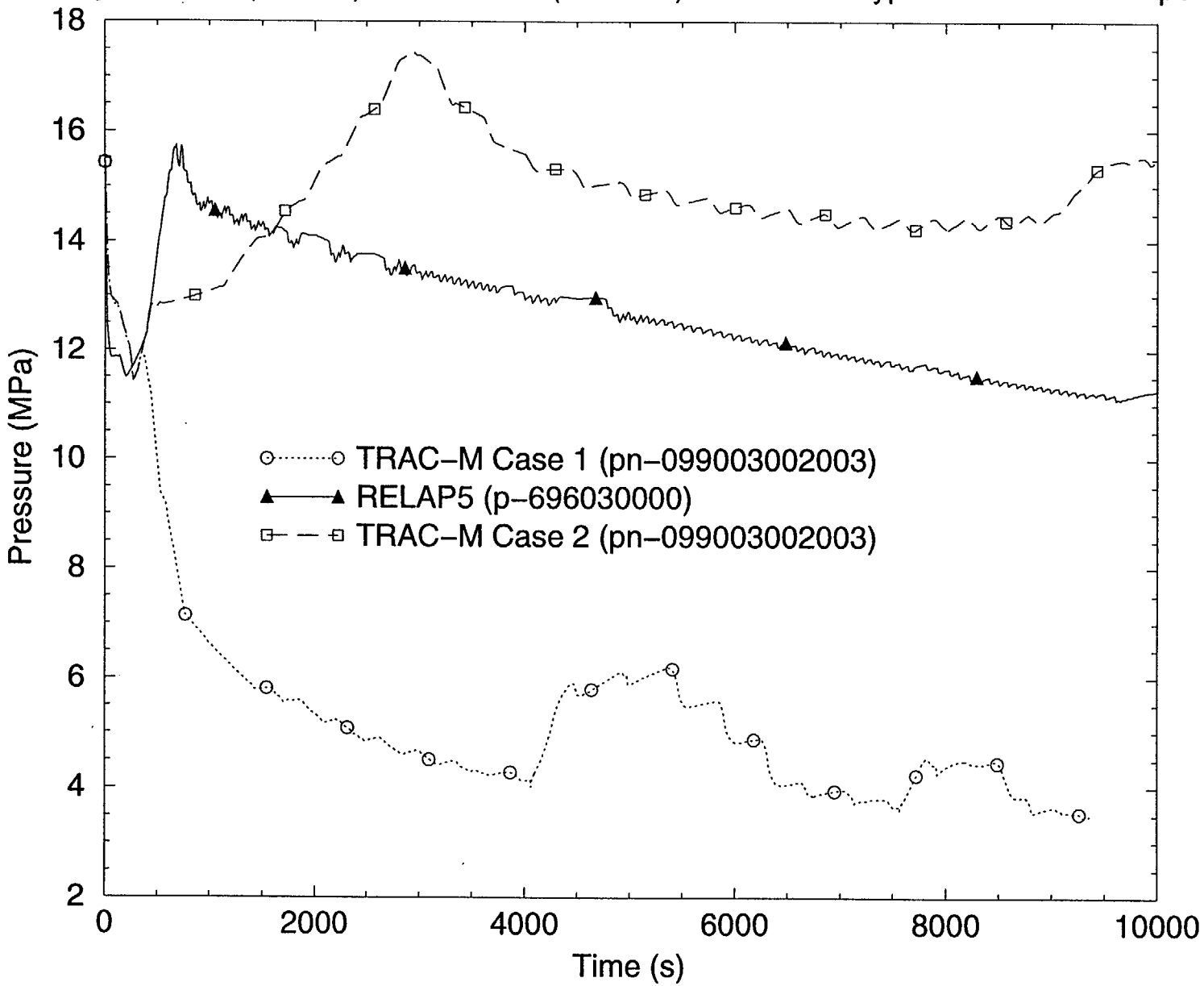


Figure 5.1.4 Max. and Min. Downcomer Wall Heat Transfer Coefficients

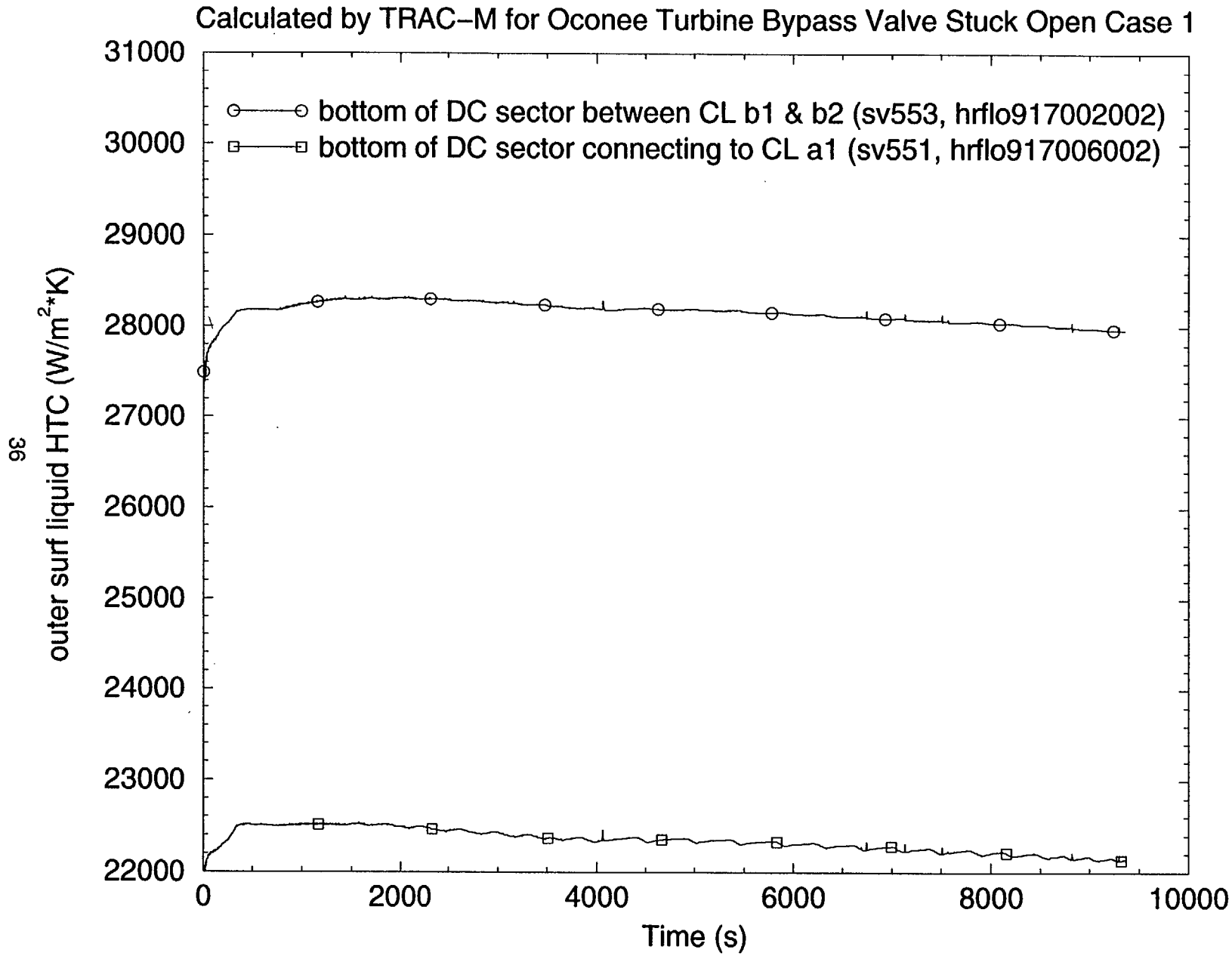


Figure 5.1.5 Max. and Min. Downcomer Wall Heat Transfer Coefficients

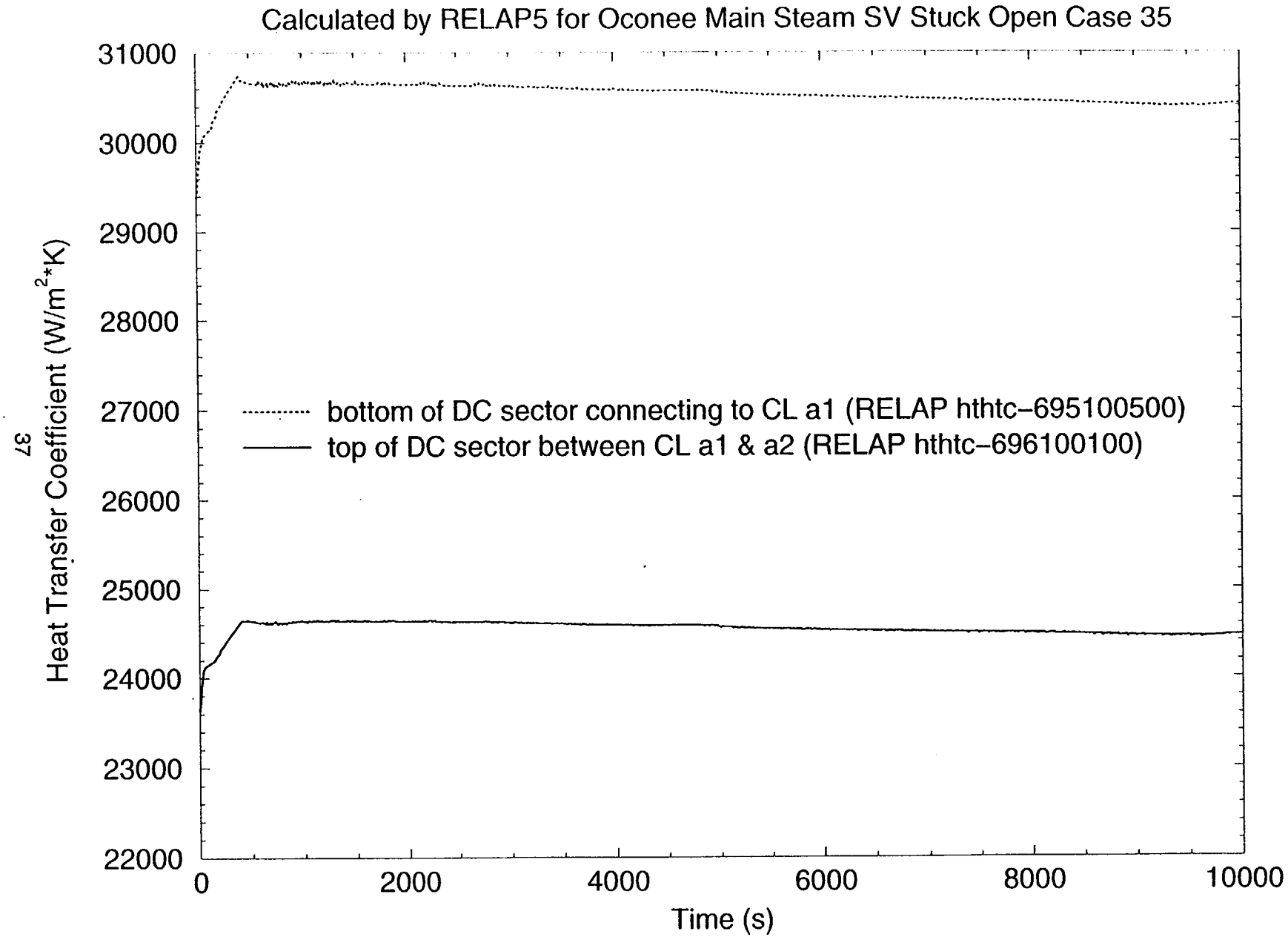


Figure 5.1.6 Downcomer Liquid Temperatures

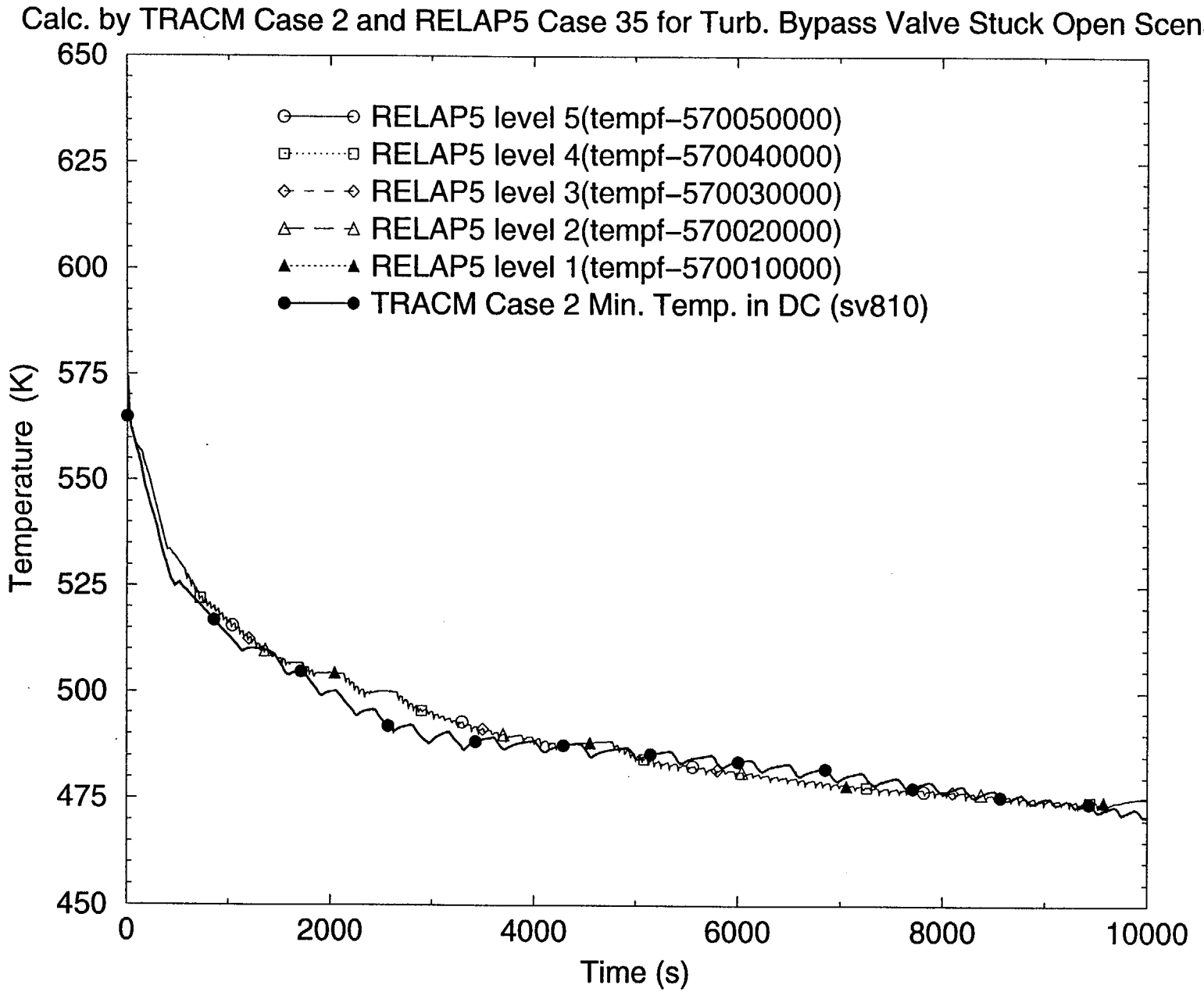


Figure 5.1.7 Downcomer Mid-Elevation Pressure

Calculated by TRAC-M(Case 2) and RELAP5(Case 35) for Turbine Bypass Valve Stuck Open Scenario

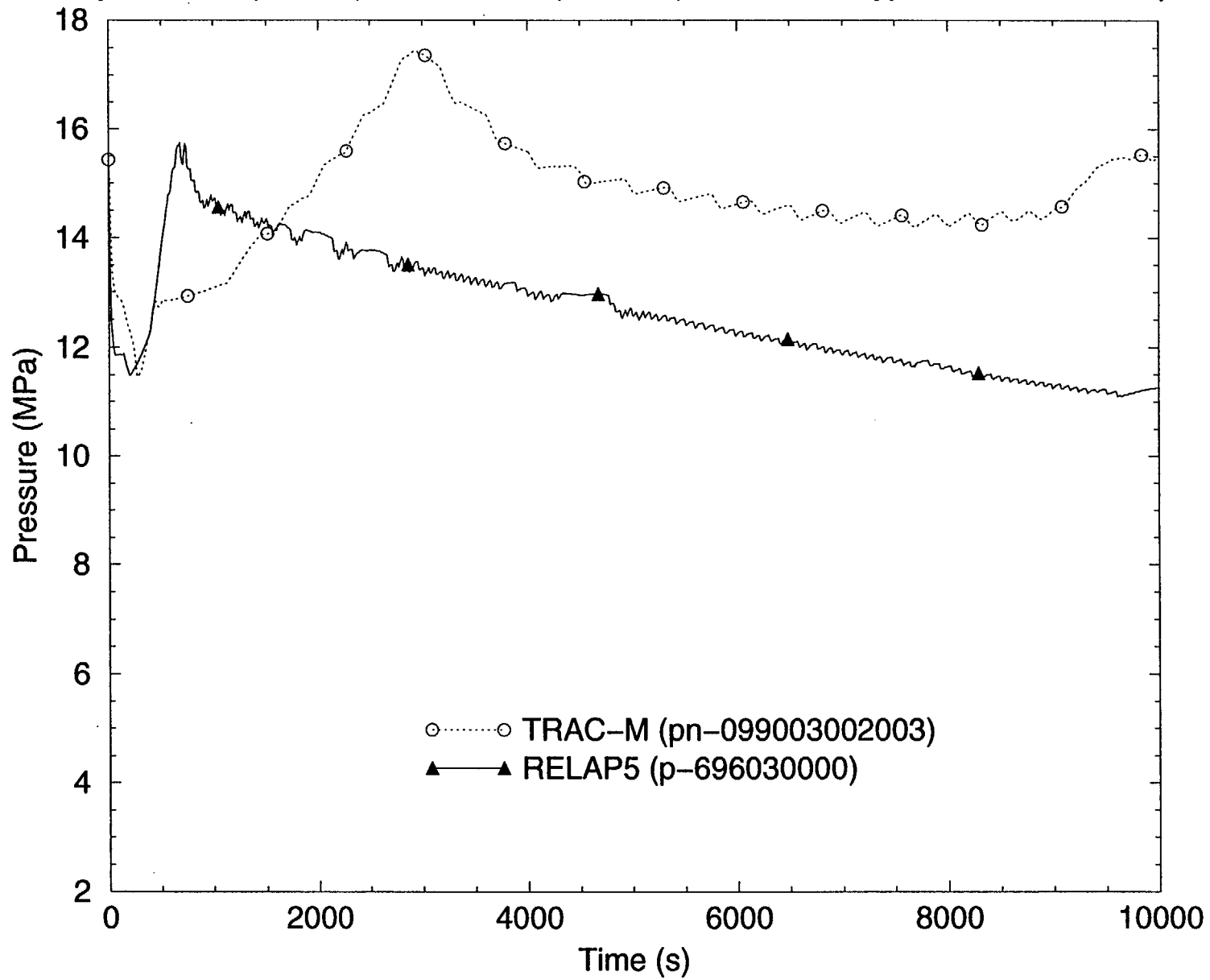


Figure 5.1.8 Max. and Min. Downcomer Wall Heat Transfer Coefficient

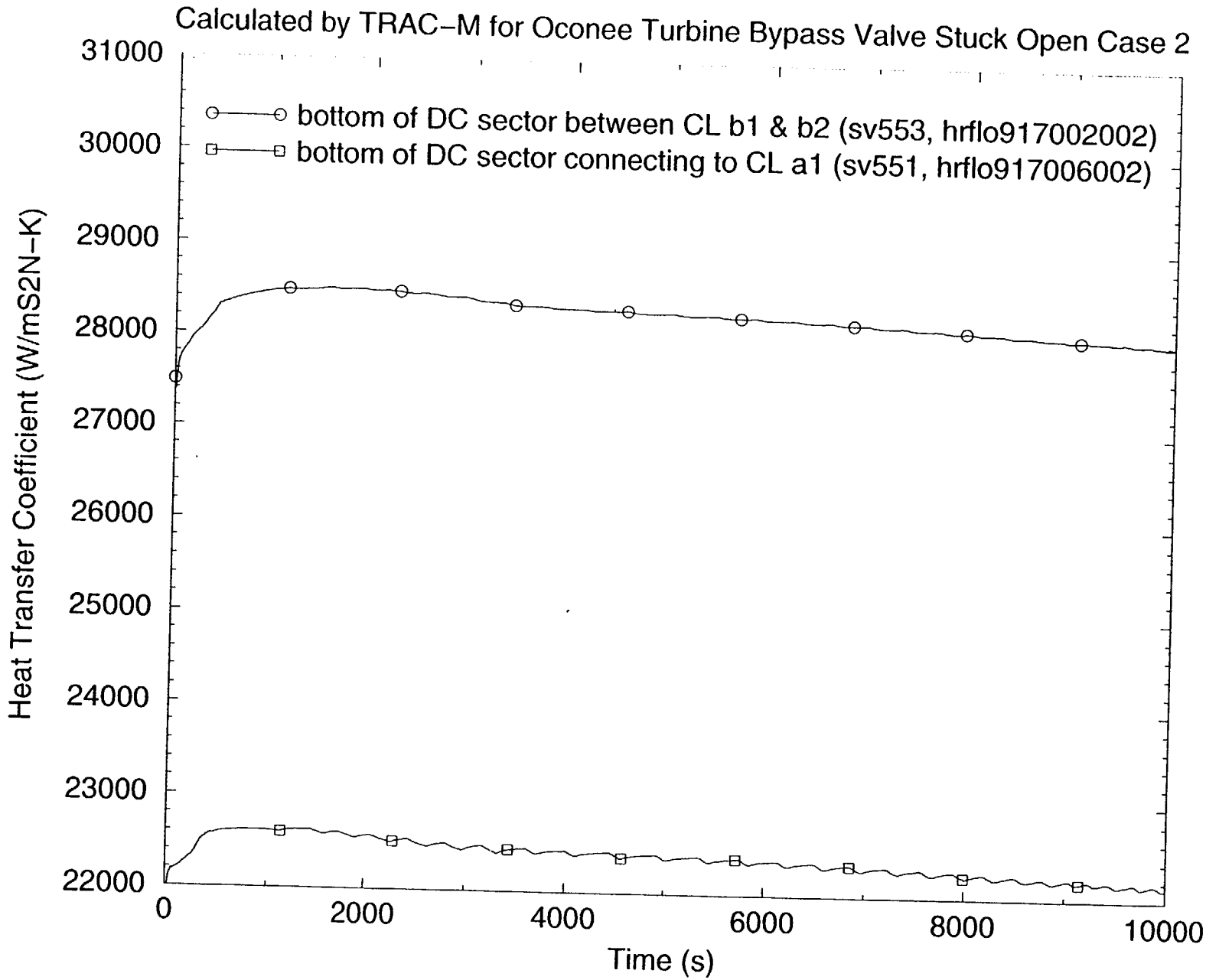


Figure 5.1.8A Total HPI Flow Rates

Calculated by TRACM and RELAP5 for Oconee Turbine Bypass Valve Stuck Open Case 1

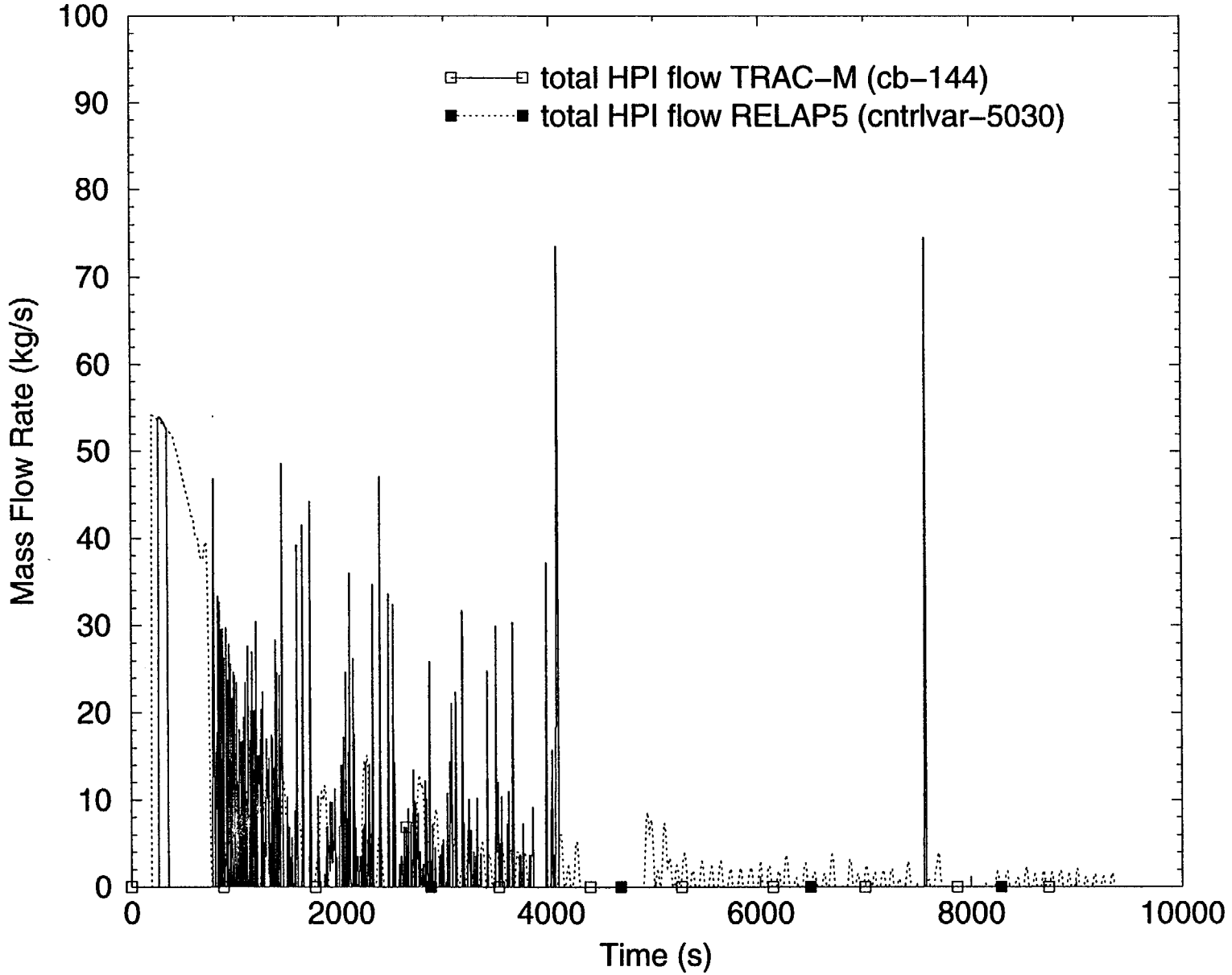


Figure 5.1.8B Total HPI Flow Delivered

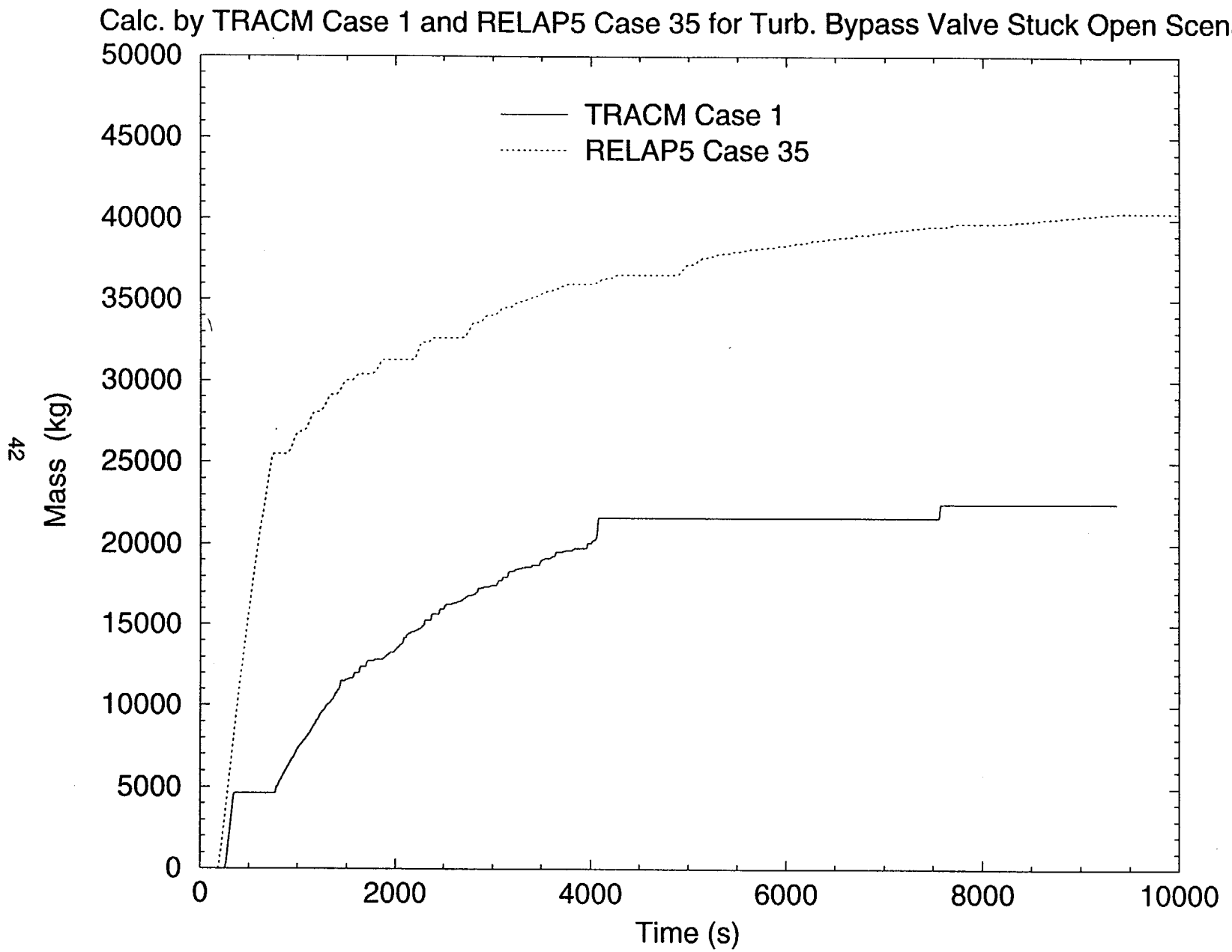


Figure 5.1.9 Heater/Sprayer Power Input to Pressurizer

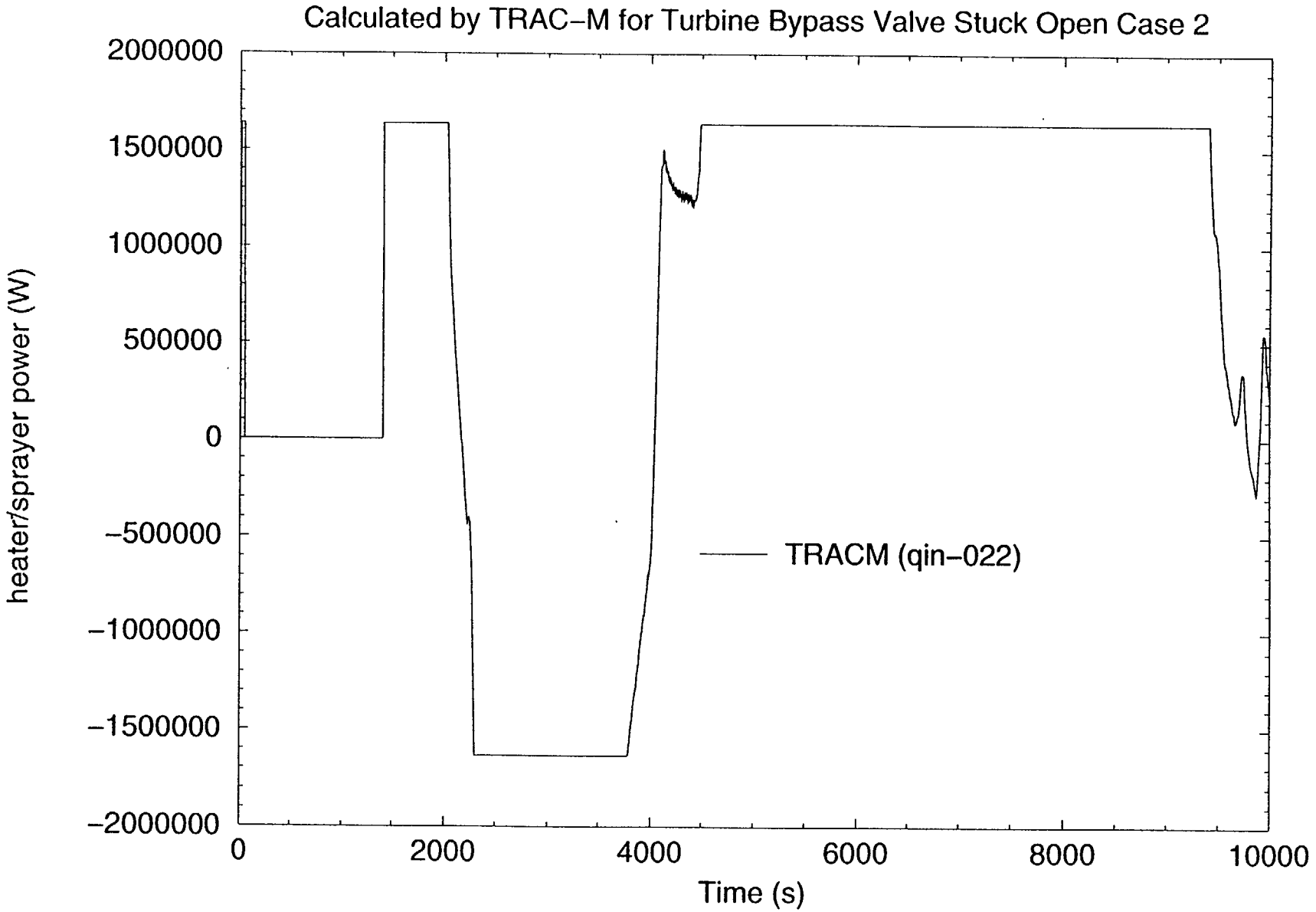


Figure 5.1.10 Core Exit and Core Bypass Flow Rates

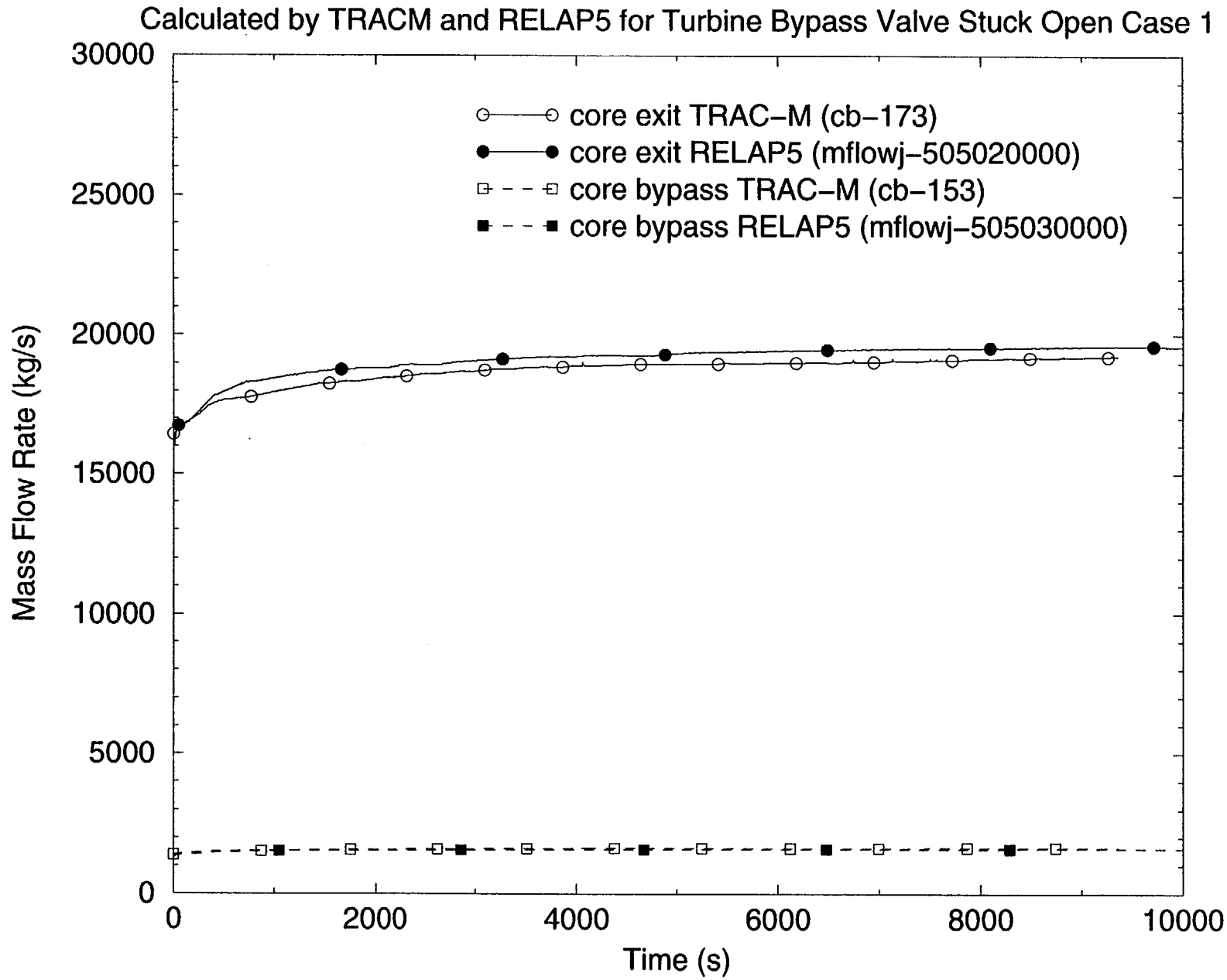


Figure 5.1.11 Hot Leg Mass Flow Rates

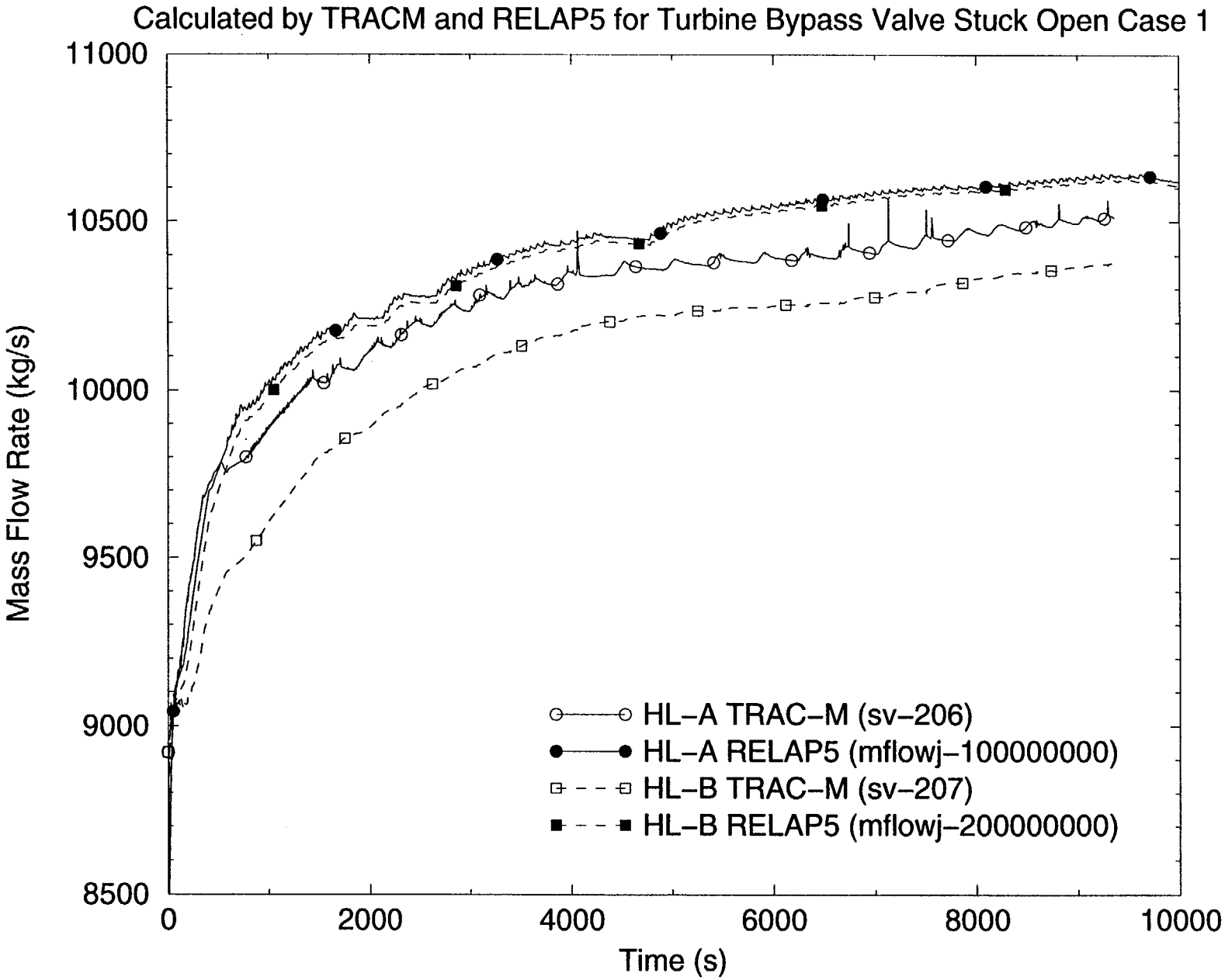


Figure 5.1.12 Loop A Cold Leg Mass Flow Rates

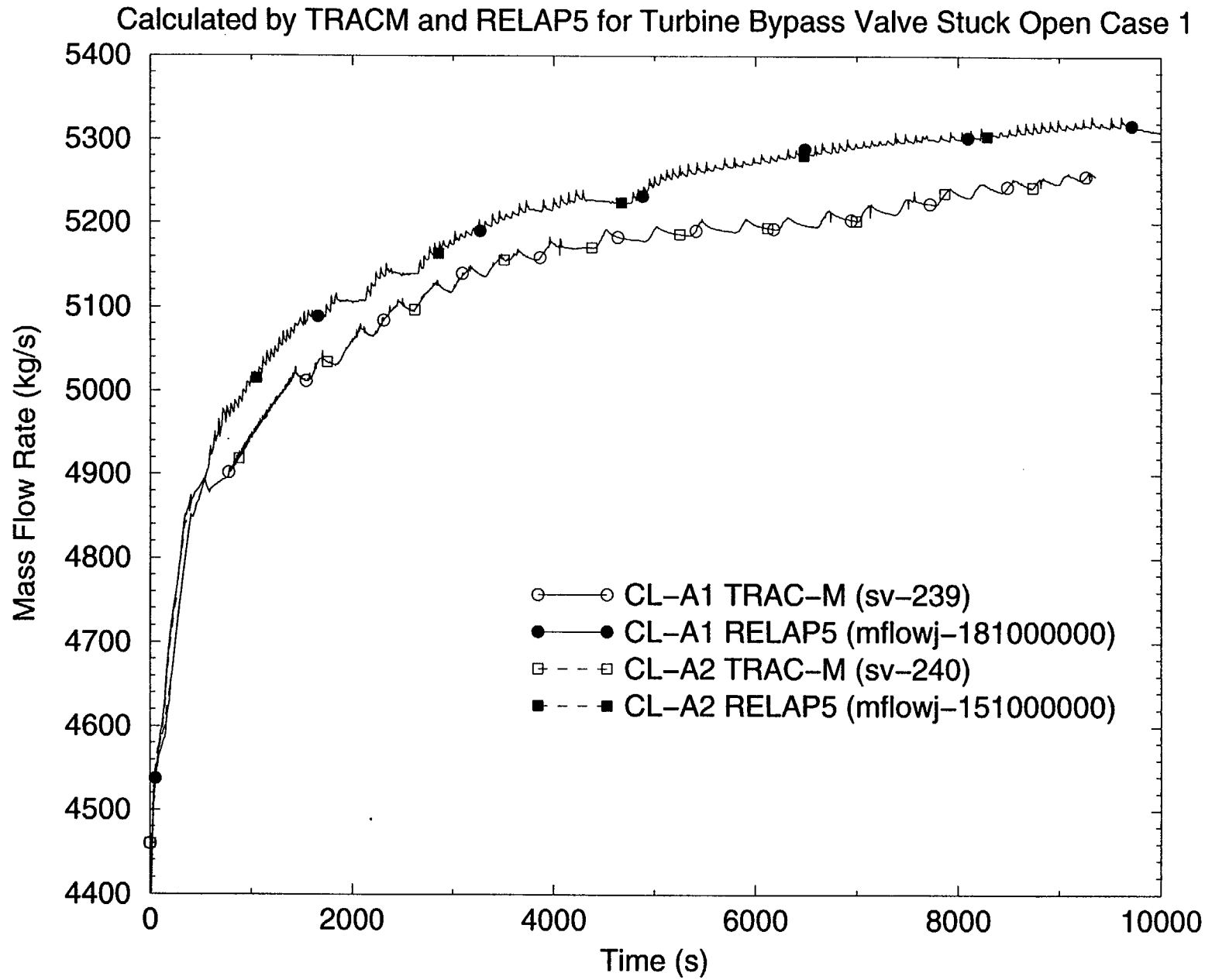


Figure 5.1.13 Loop B Cold Leg Mass Flow Rates

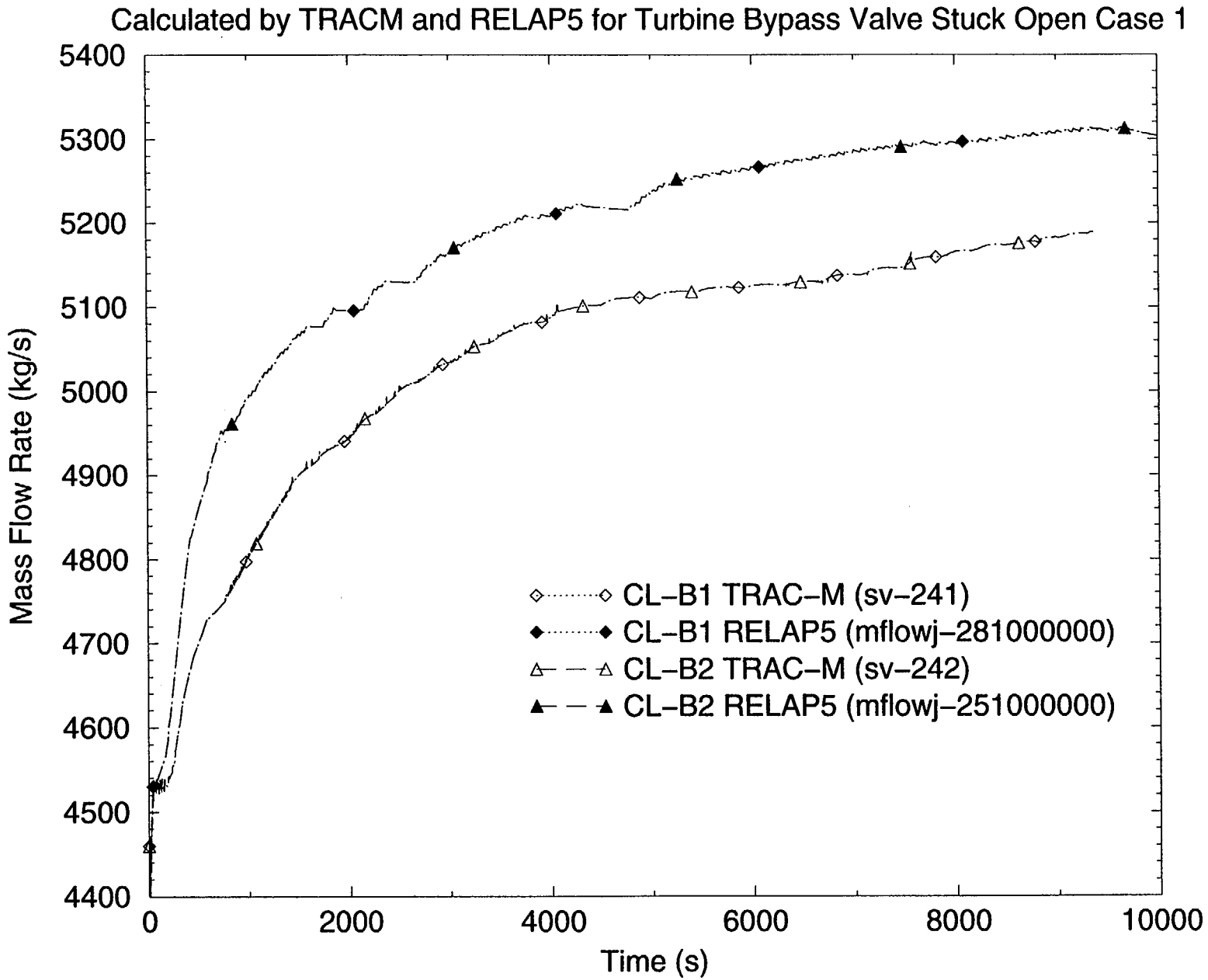


Figure 5.1.14 Core Exit and Core Bypass Flow Rates

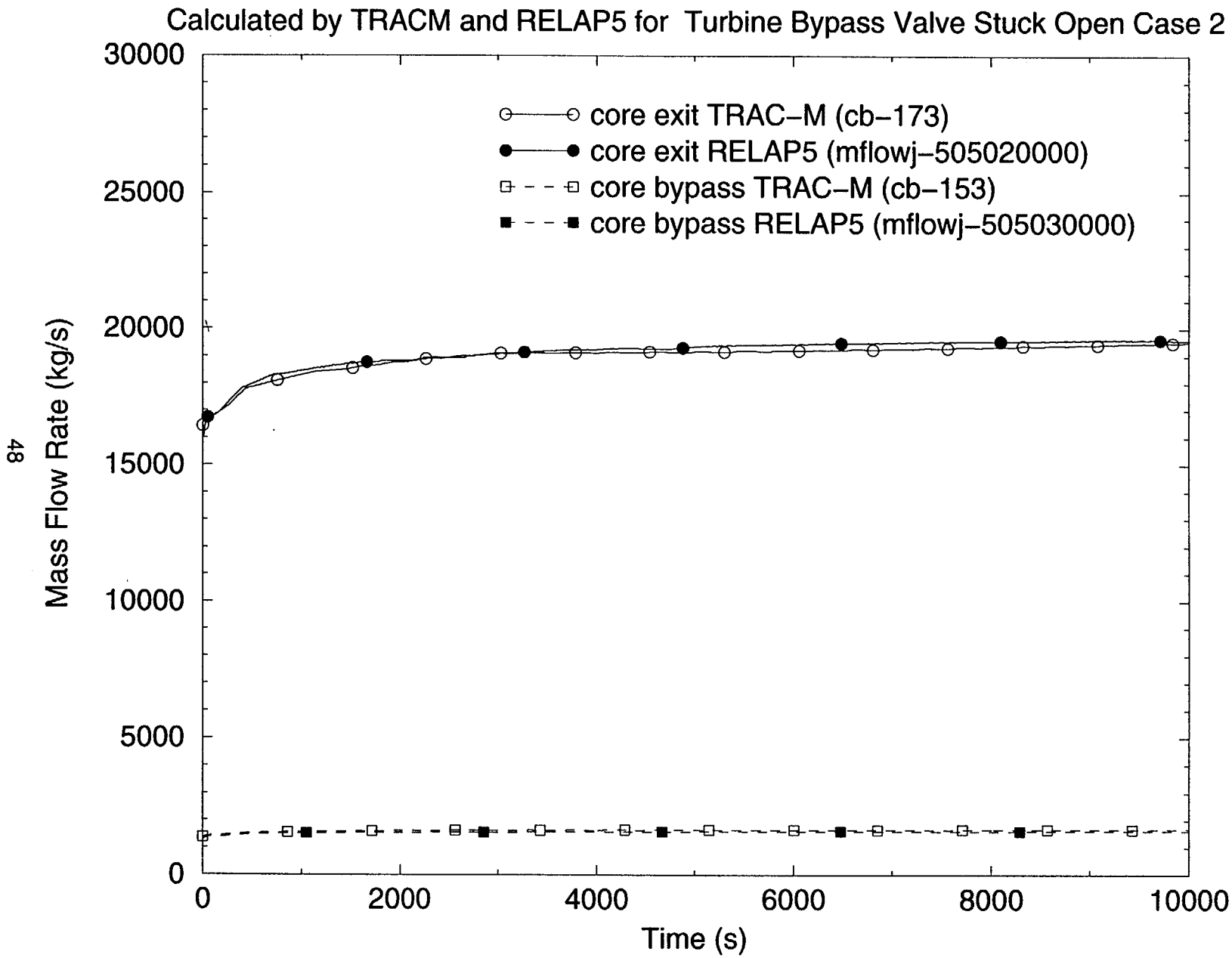


Figure 5.1.15 Hot Leg Mass Flow Rates

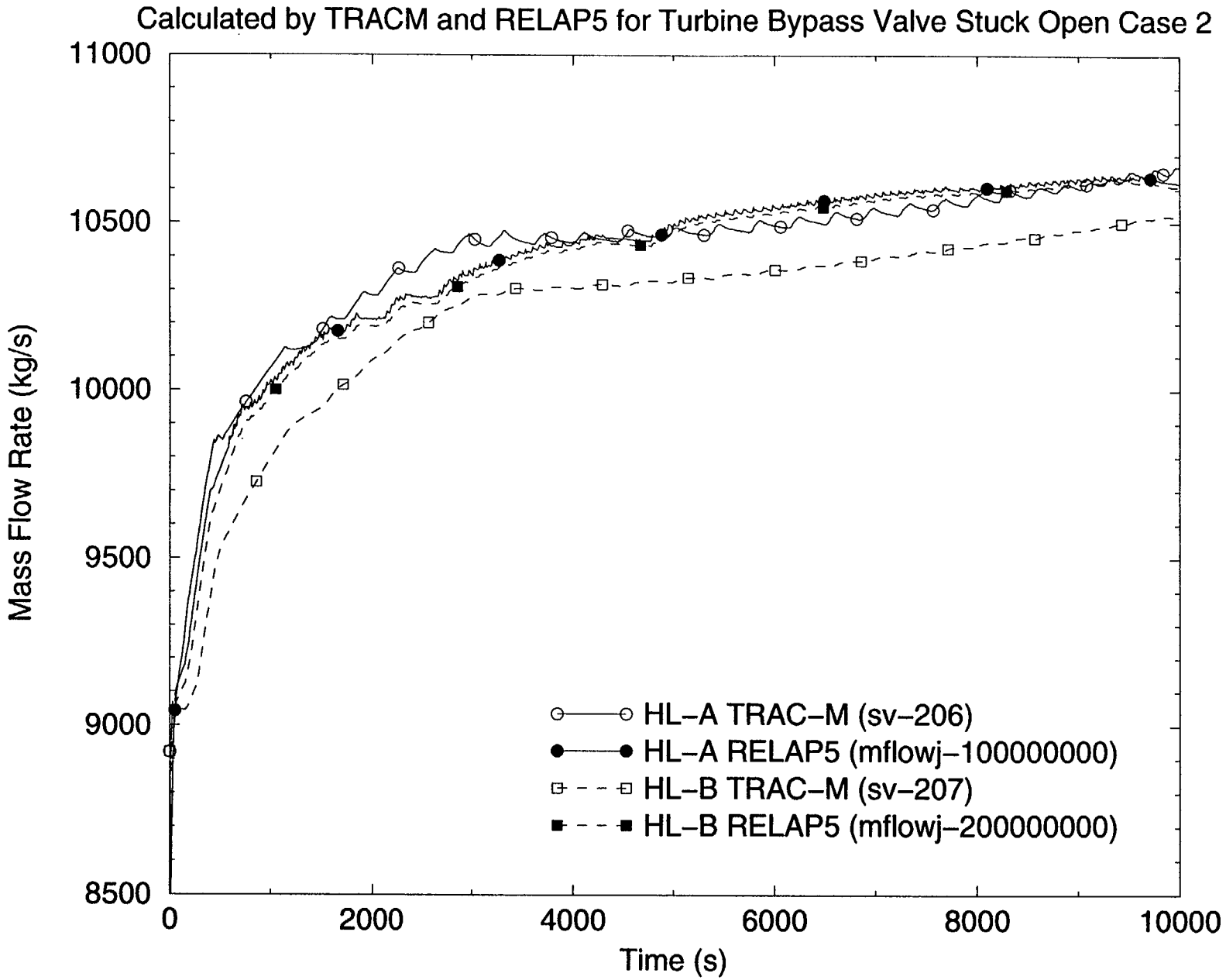


Figure 5.1.16 Loop A Cold Leg Mass Flow Rates

Calculated by TRACM and RELAP5 for Turbine Bypass Valve Stuck Open Case 2

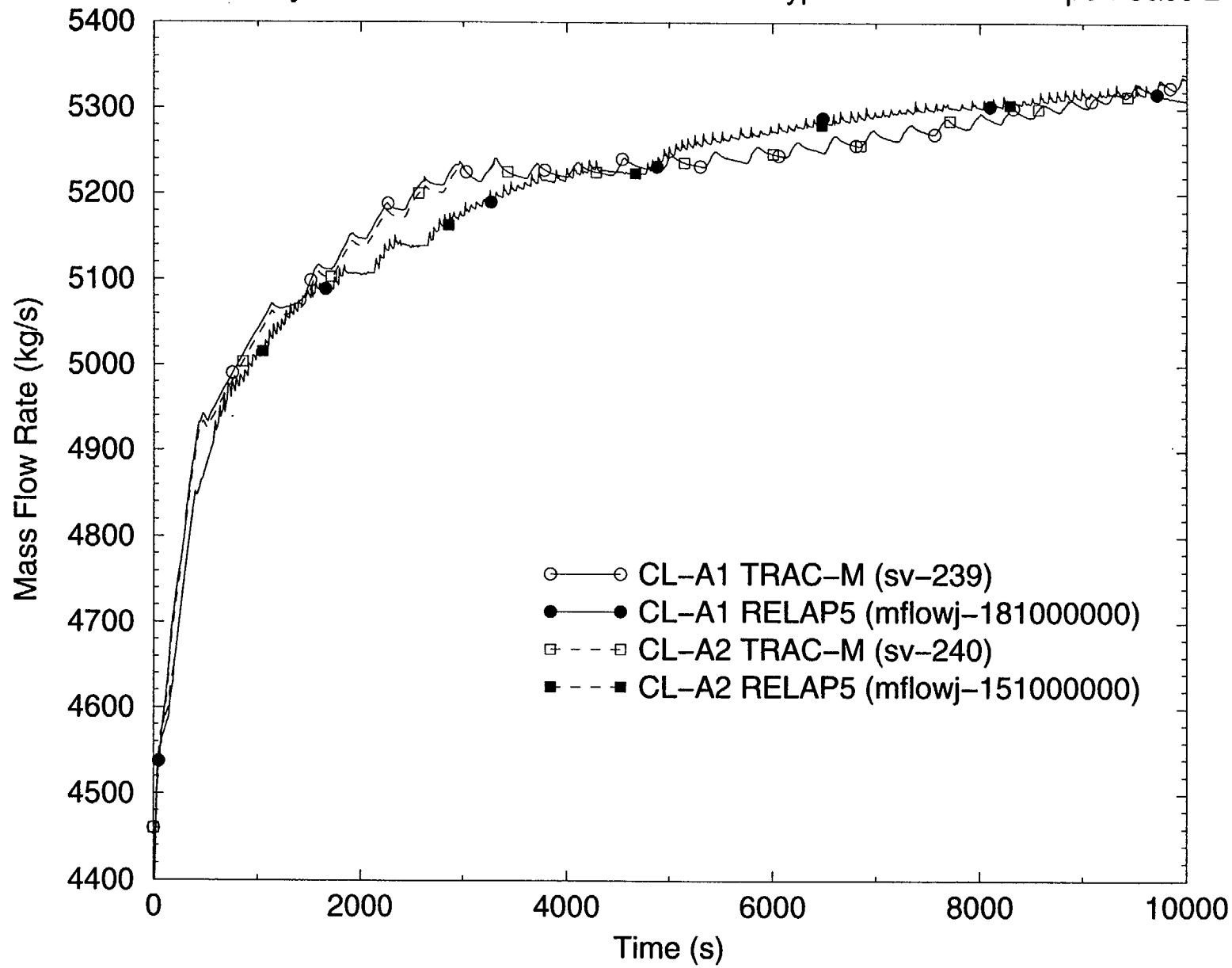


Figure 5.1.17 Loop B Cold Leg Mass Flow Rates

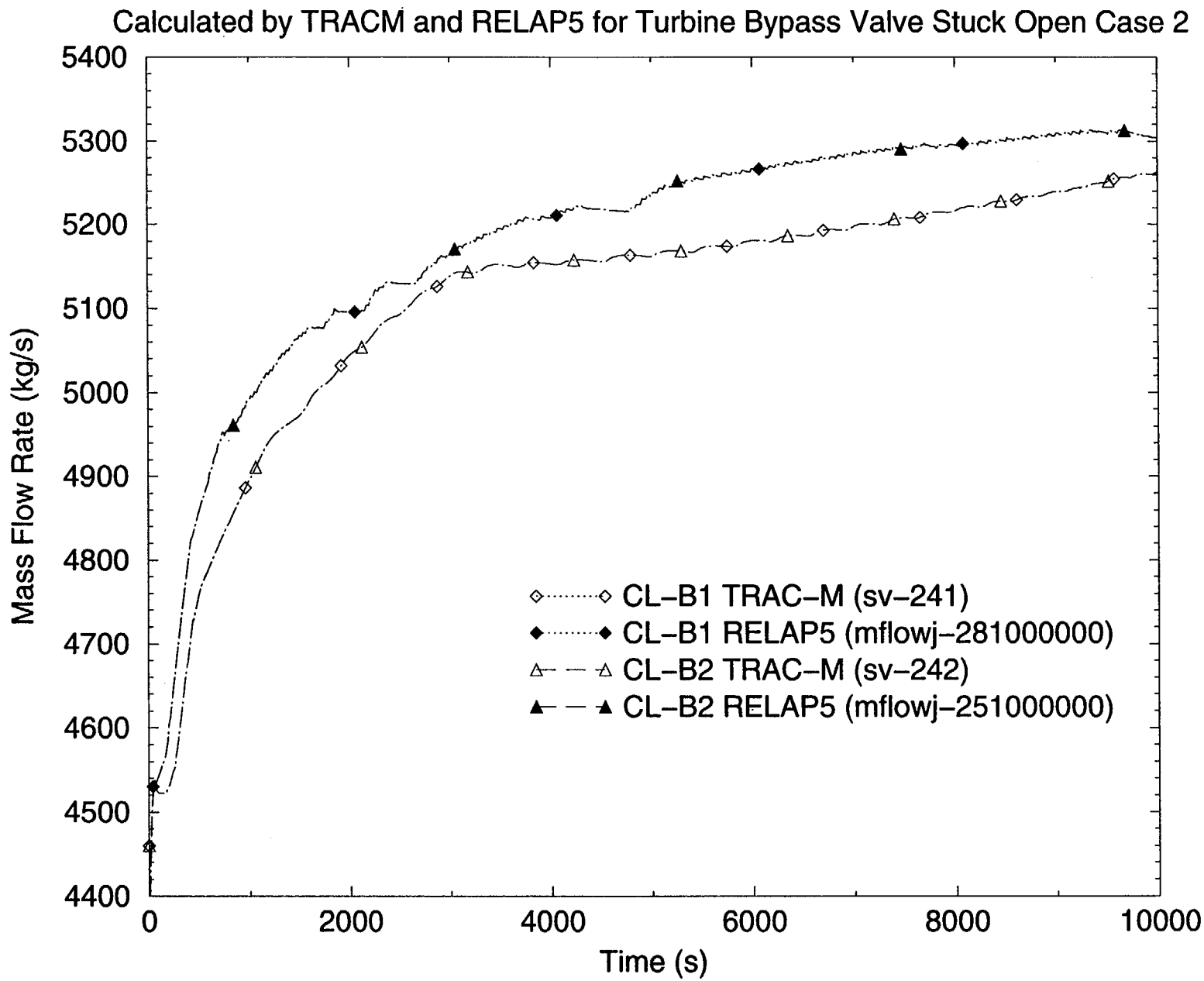


Figure 5.1.17A Heat Transfer Rates in SGs

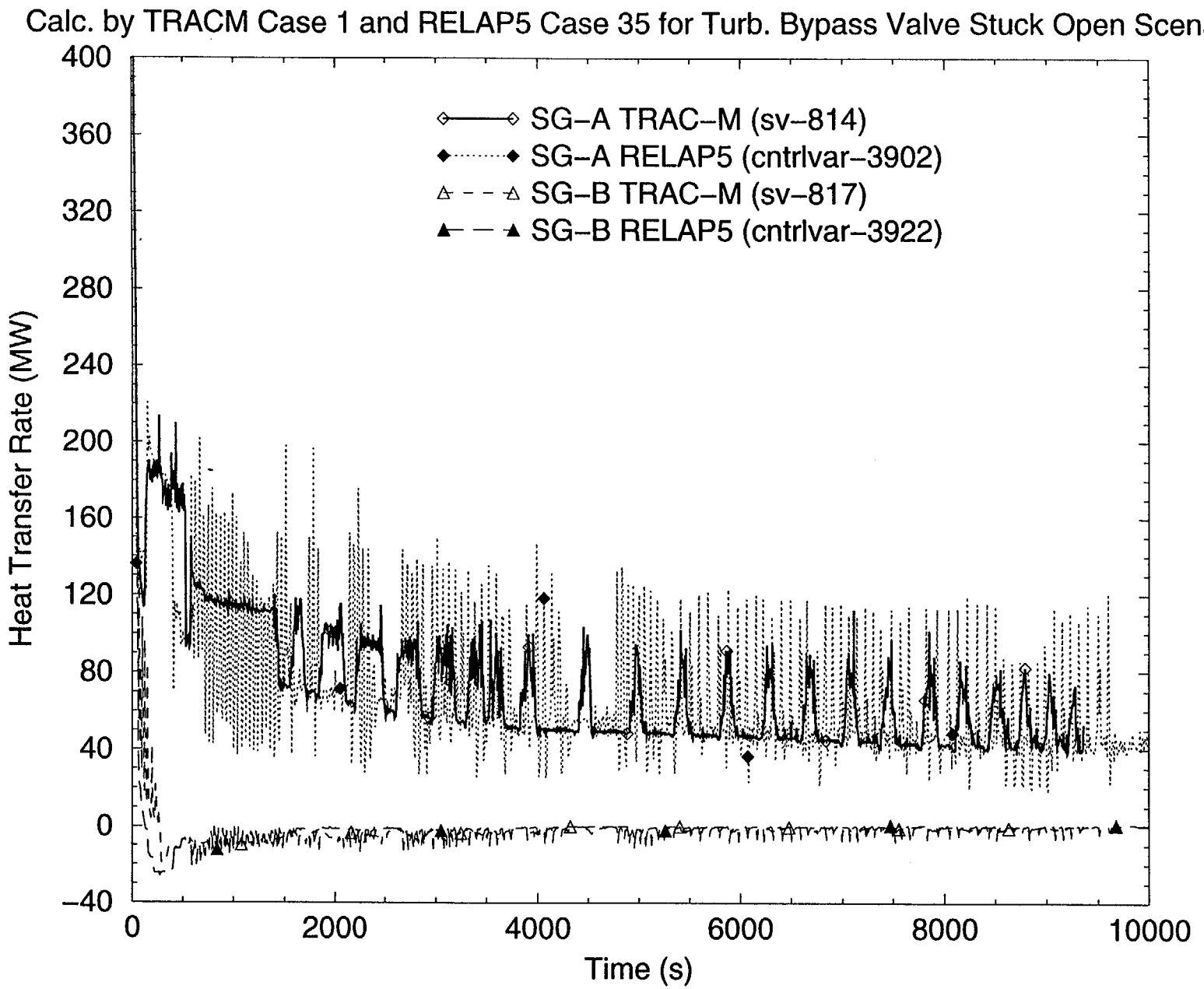


Figure 5.1.17B Integrated Heat Transfer in SGs

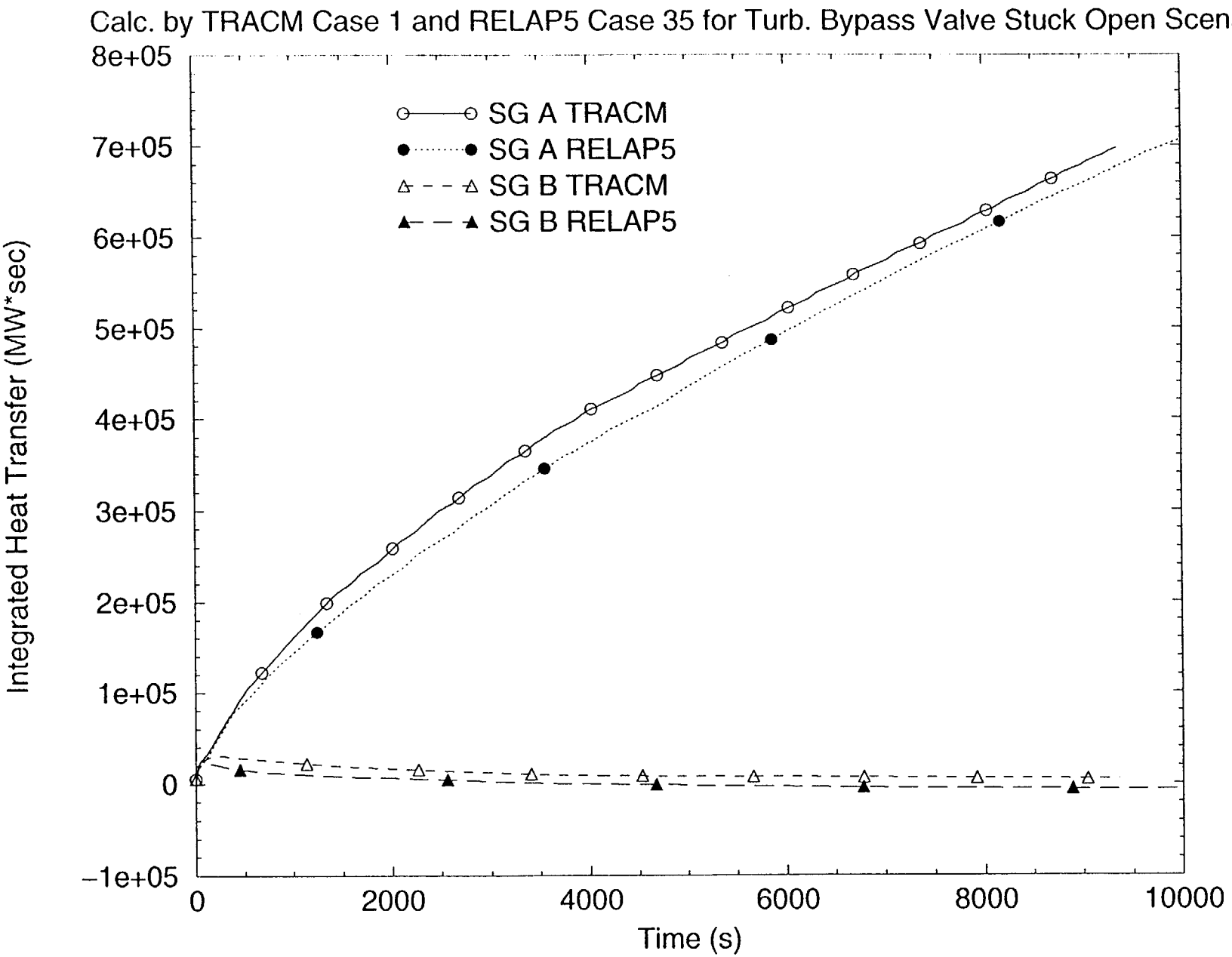


Figure 5.1.18 Hot Leg Temperatures

Calculated by TRACM and RELAP5 for Turbine Bypass Valve Stuck Open Case 1

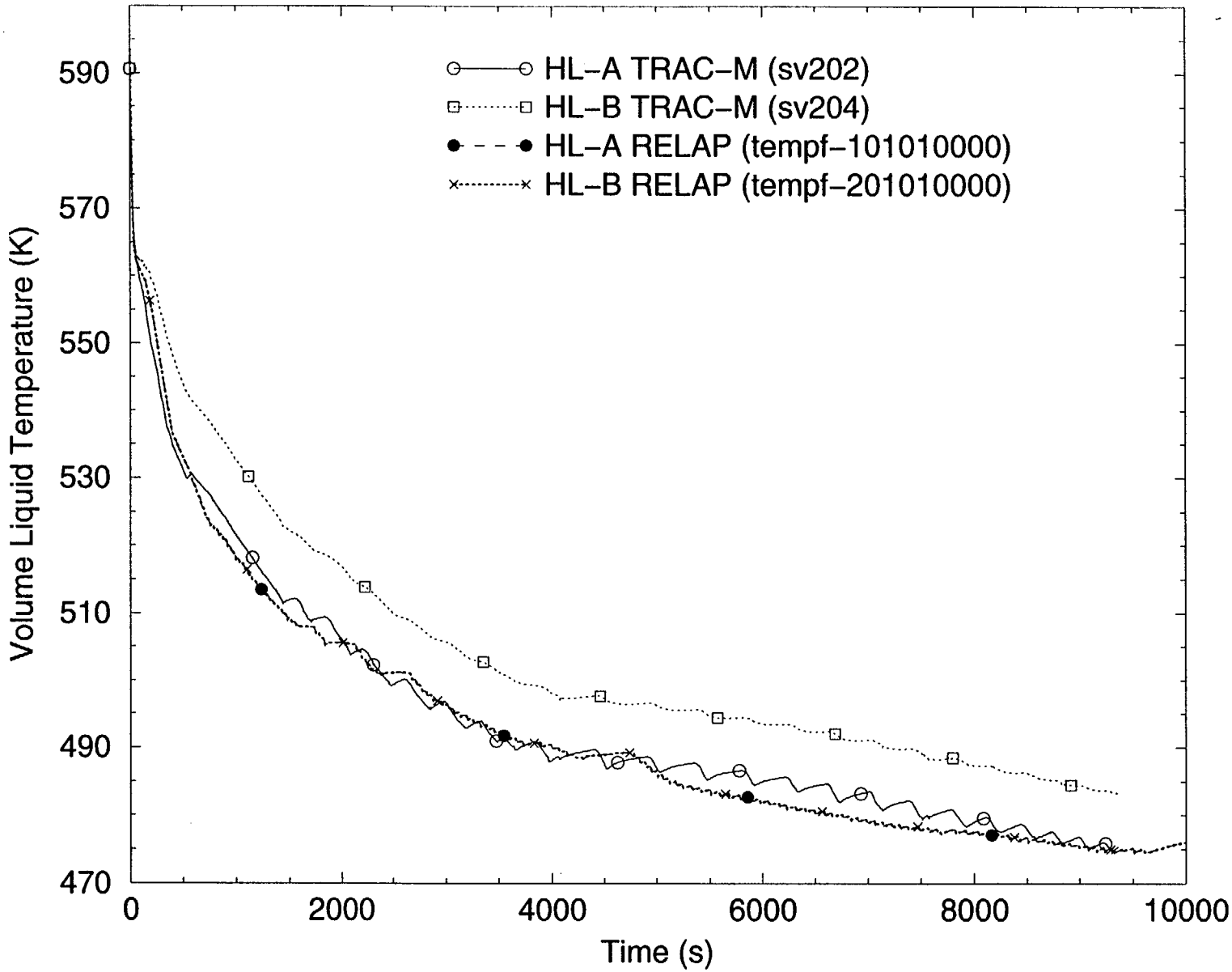


Figure 5.1.19 Cold Leg Temperatures

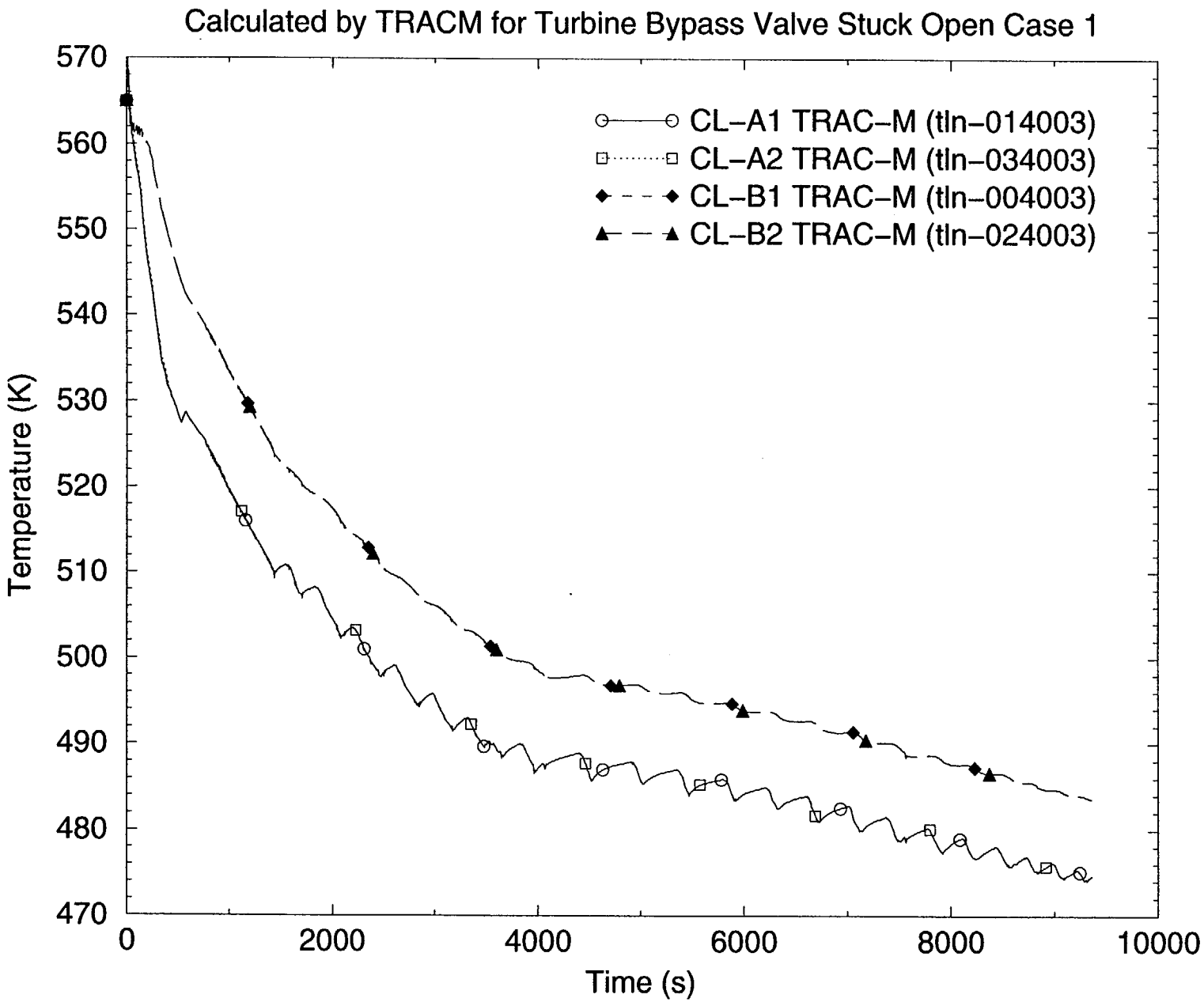


Figure 5.1.20 Cold Leg Temperatures

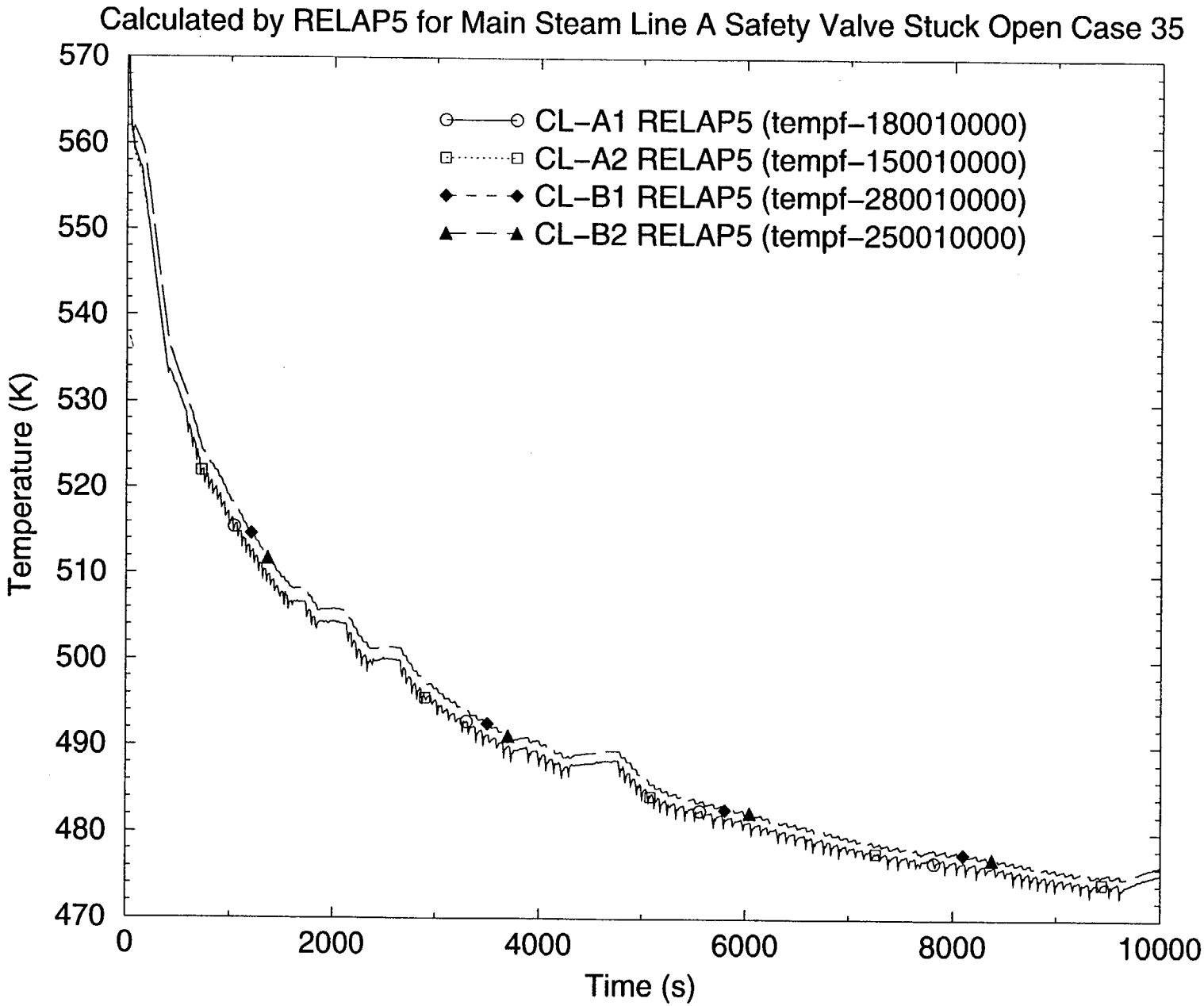


Figure 5.1.21 Hot Leg Temperatures

Calculated by TRACM and RELAP5 for Turbine Bypass Valve Stuck Open Case 2

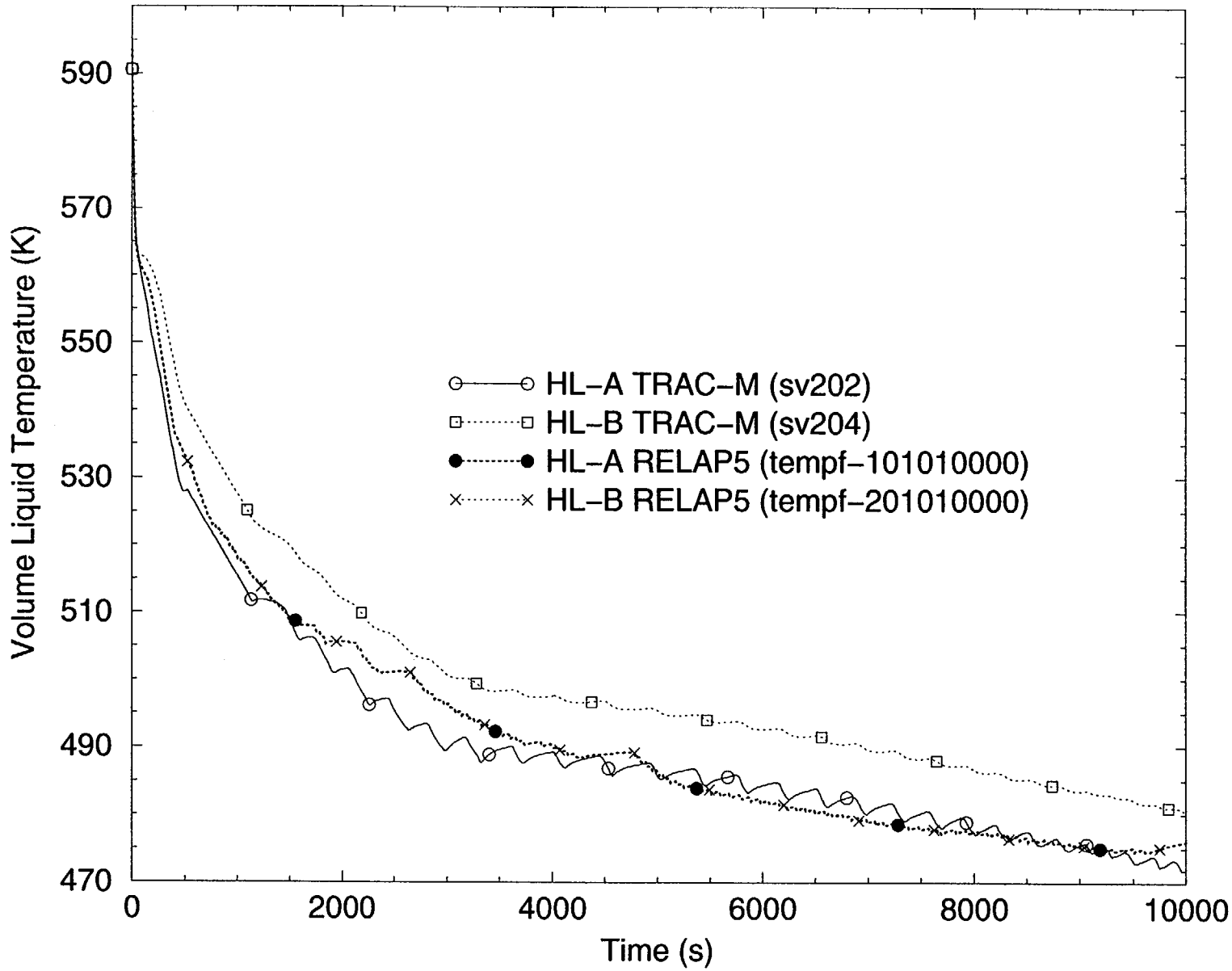


Figure 5.1.22 Cold Leg Temperatures

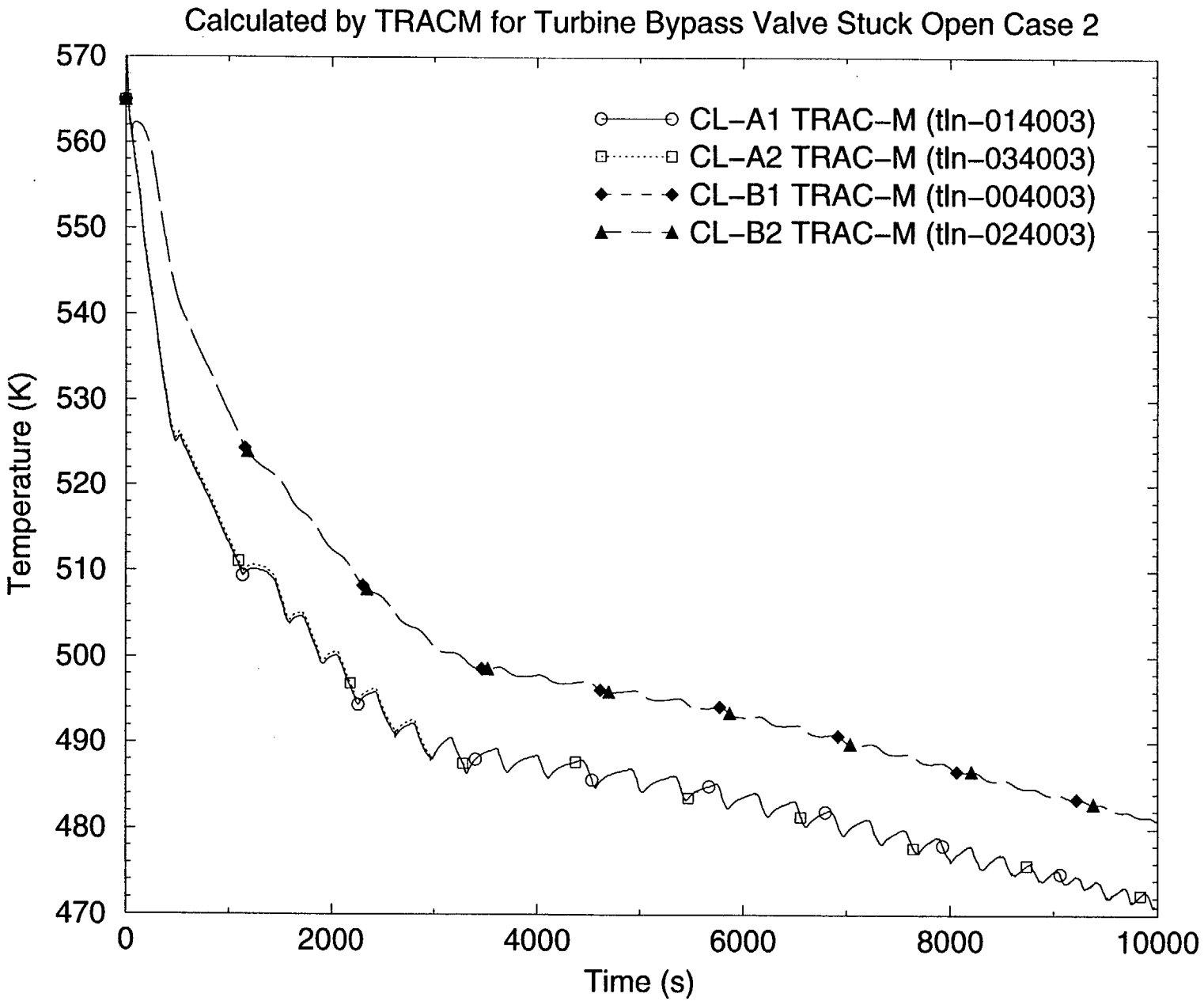


Figure 5.1.23 Cold Leg Temperatures

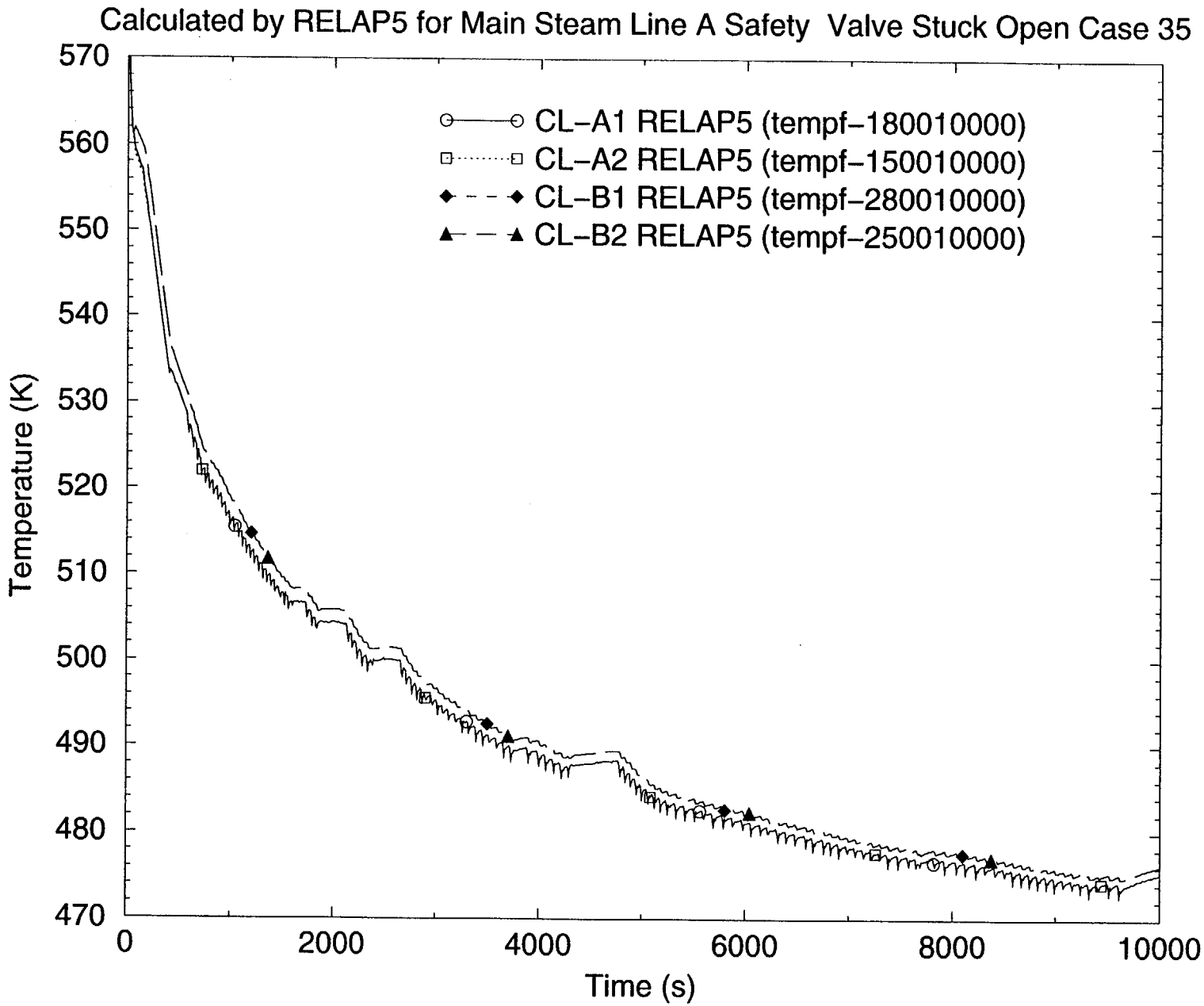


Figure 5.1.24 Main Steam Line Flow Rates

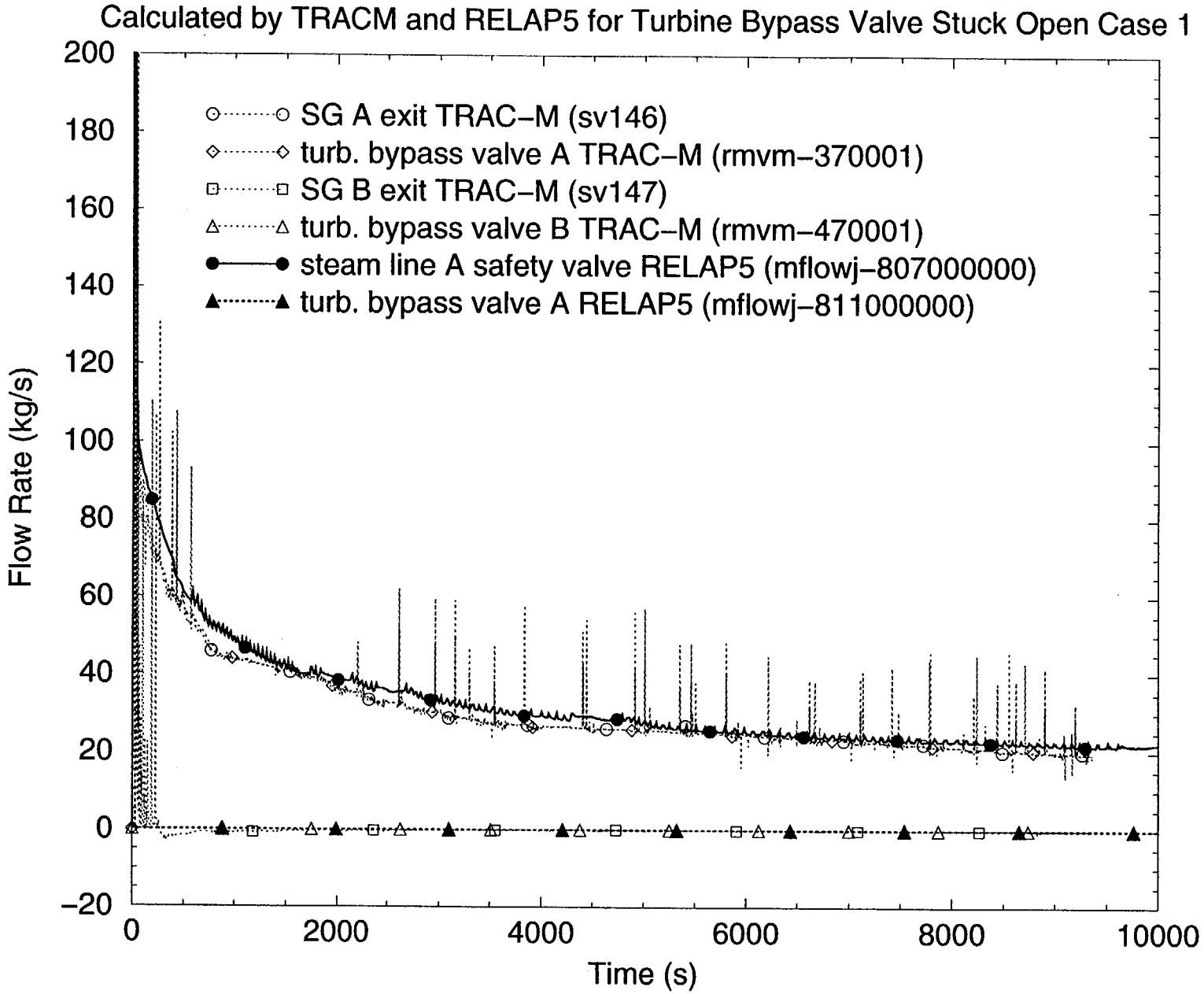


Figure 5.1.25 Heat Transfer Rates in Steam Generators

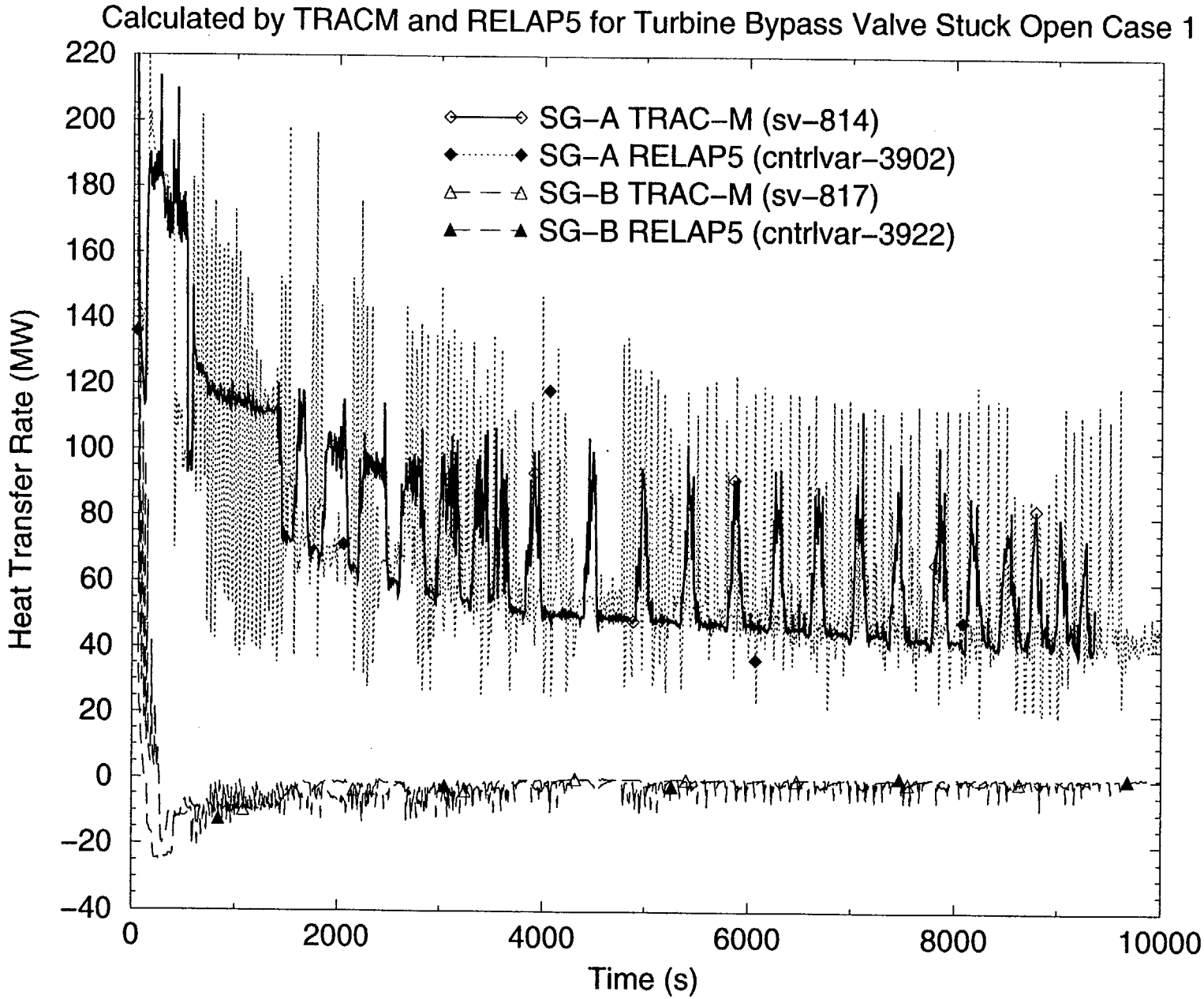


Figure 5.1.26 Main Steam Line Flow Rates

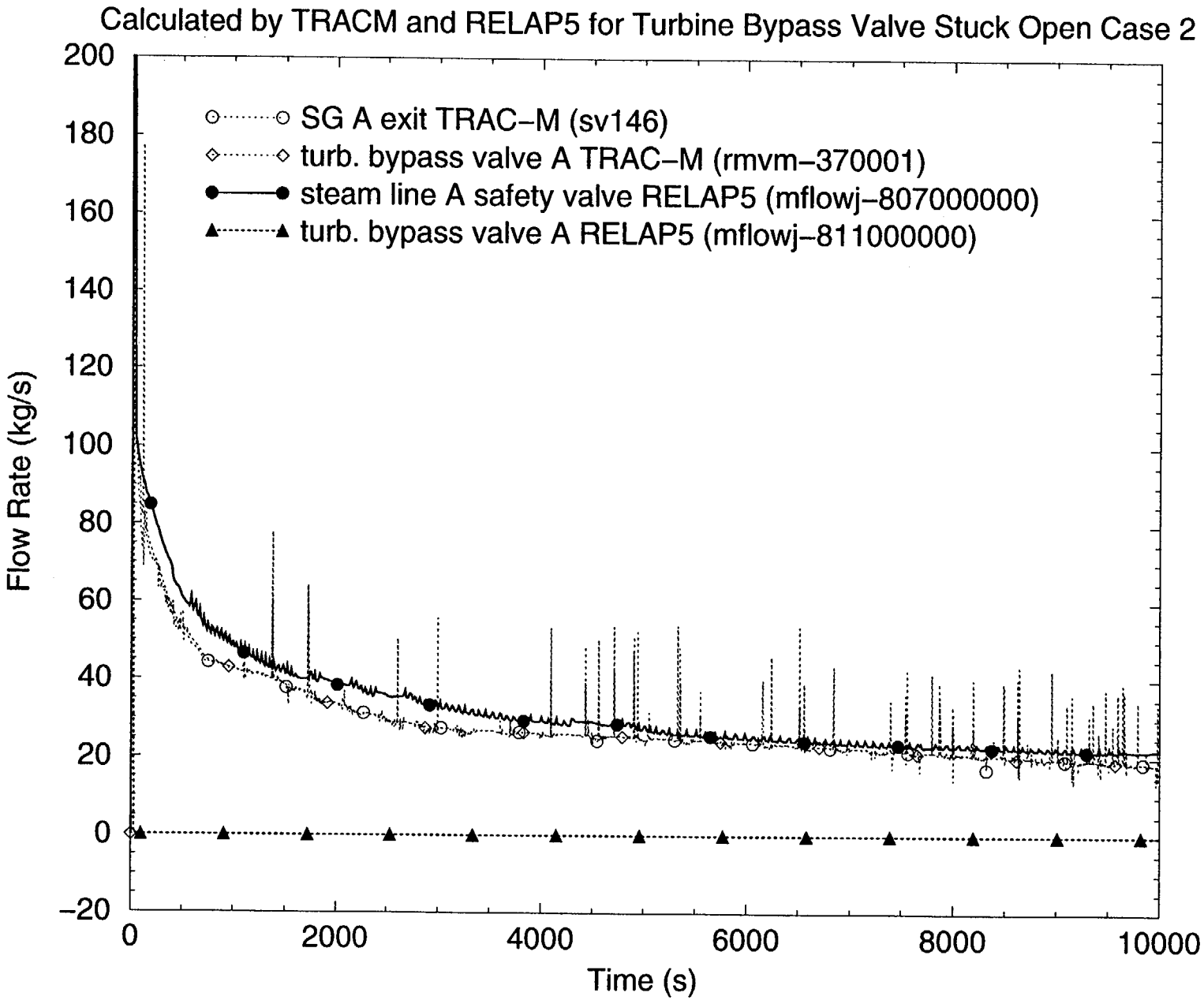
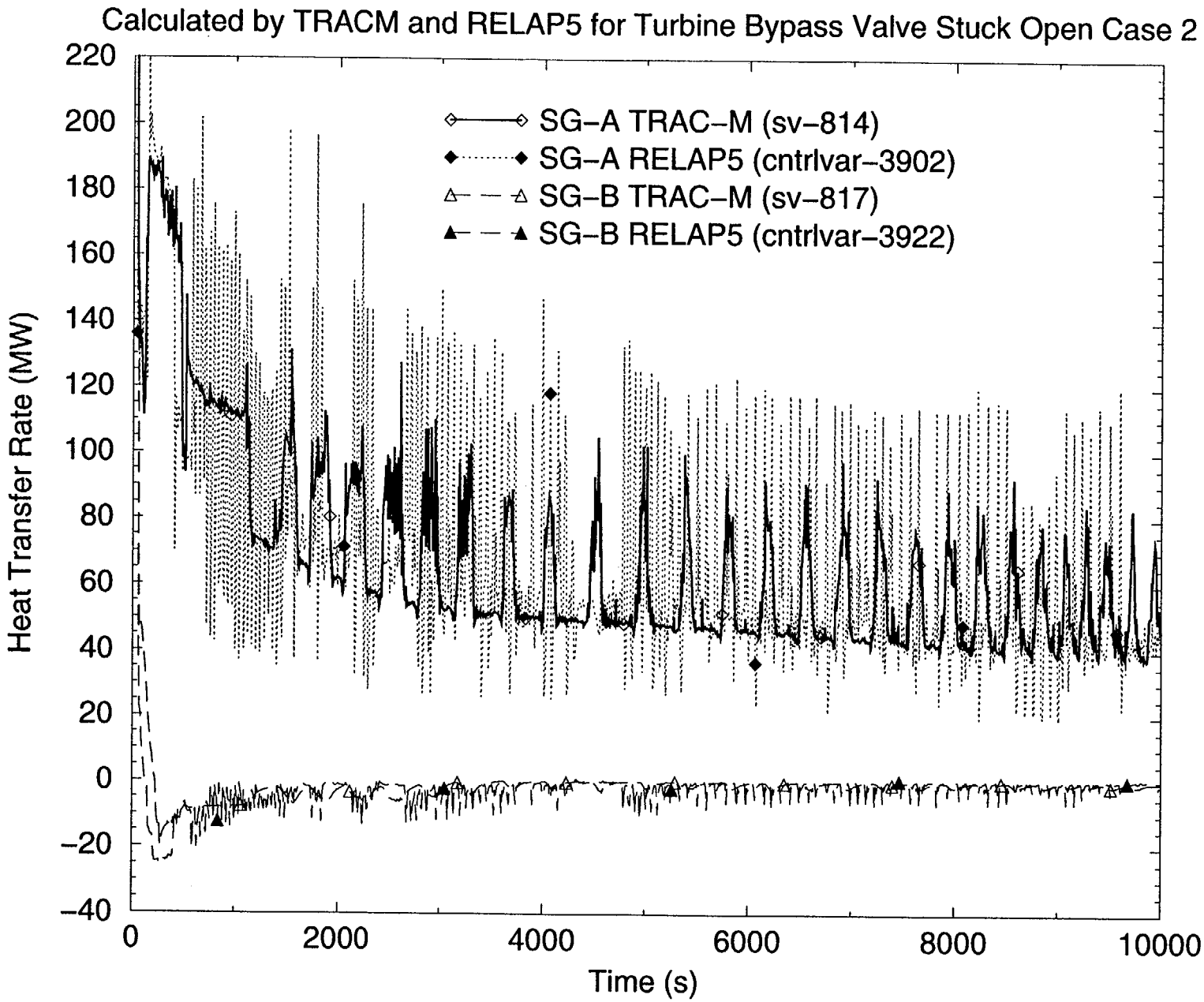


Figure 5.1.27 Heat Transfer Rates in Steam Generators



5.2 Main Steam Line Break in Steam Generator "A"

5.2.1 Sequence of Events

The sequence of major events is compared in Table 5.2.1 between TRAC-M and RELAP5 Case 27 in which the HPI flow was throttled if subcooling was greater than 28K (50 °F) even though the pressurizer liquid level was less than 3.05m (10 ft.). In TRAC-M case the HPI flow quickly raised the primary system pressure, as shown in Figure 5.2.1, to a level above the HPI actuation point, 11.06 MPa (1590 psig), and thus the HPI flow was terminated at 650 seconds and never actuated again as shown in Figure 5.2.2, since the pressure always stayed above the HPI actuation point as a result of influx of a makeup flow as shown in Figure 5.2.3. On the other hand, in RELAP5 Case 27 the primary system pressure steadily decreased to 1.5 MPa after an initial dip followed by a momentary increase between 19 and 280 seconds. This momentary increase in pressure was due to the flow into the pressurizer from the surge line which was probably caused by the dynamic effect of an initial large negative flow (i.e., flow out of the pressurizer [Figure 5.2.4]). In RELAP5 case the HPI flow was quickly terminated as subcooling exceeded 28K (50 °F), and thus could not contribute much toward repressurizing the system for the first 1000 seconds. Afterwards, in RELAP5 the HPI flow came on and off between 1000 and 2200 seconds as subcooling dropped below 28K (50 °F) periodically as shown in Figures 5.2.2 and 5.2.5. However, the system was never repressurized because there was not enough HPI flow nor makeup flow. The makeup flow was terminated at 20 seconds (Figure 5.2.5A) because it was not allowed when the pressure was less than 11.13 MPa (1600 psig), and the pressure steadily decreased to 1.5 MPa. The faster cooldown of the system calculated by RELAP5 is corroborated by the fact that RELAP5 calculated the higher heat transfer rates from the primary side to the secondary side in SG "A" as shown in Figure 5.2.5B.

The SG pressure comparison between TRAC-M and RELAP5 is shown in Figure 5.2.5C. Since a large break occurred in SG line "A", the pressure in SG "A" decreased very rapidly while the pressure in SG "B" decreased gradually as the primary system cooled down. The SG level is shown in Figure 5.2.5D. In both TRAC-M and RELAP5, the level in SG "A" was controlled to be about 1m (3.28 ft.) although the level was very low up to 8000 seconds in TRAC-M because most of the liquid was evaporated and blown out the break as shown in Figures 5.2.5B, 5.2.5E, and 5.2.5F. SG "B" was bottled up, and thus its liquid level was not controlled. The EFW flows to SGs are shown in Figure 5.2.5G for instantaneous values and in Figure 5.2.5H for integrated values. Figure 5.2.5H of integrated EFW flows clearly shows that the EFW flows calculated by RELAP5 were much less than those by TRAC-M even though RELAP5 calculated higher integrated steam flows leaving SG "A" as shown in Figure 5.2.5F. This inconsistency resulted from the fact that RELAP5 calculated a large amount of MFW flows feeding to SG "A", as shown in Figures 5.2.5I and 5.2.5J.

The core flood tank flow was actuated in 2190 seconds in RELAP5 case because of a large reduction in system pressure whereas it was not actuated in TRAC-M since the pressure stayed above the core flood tank flow setpoint. Even in RELAP5 case the core flood tank flow was not substantial, and thus the tank inventory decreased only to about 24 percent of the total tank volume (Figure 5.2.6).

In both TRAC-M and RELAP5, the low-pressure coolant injection was not actuated and the vent valves stayed shut. However, a turbine bypass valve and a steam line SRV off the intact SG "B" were open for a brief period (30 seconds) right after the turbine trip in RELAP5 even though

both valves stayed shut in TRAC-M case. In both TRAC-M and RELAP5, the MFW pumps tripped and the EFW flow was initiated in 40 seconds in TRAC-M and 270 seconds in RELAP5. In both calculations, the upper head, upper downcomer, and the top of the hot legs were all full of liquid and no voids developed.

5.2.2 Main Pressurized Thermal Shock Parameters

The minimum downcomer liquid temperatures are shown in Figures 5.2.7 for TRAC-M along with the saturation temperature and 5.2.8 for TRAC-M and RELAP5 Case 27. Even though the downcomer pressure is quite different between TRAC-M and RELAP5 as previously discussed and as shown in Figure 5.2.1, the minimum temperatures are the same (i.e., 380K [224 °F] for TRAC-M and 380K [224 °F] for RELAP5). This means that the primary system pressure does not affect the minimum temperature very much. The minimum temperature occurs at 9,030 seconds in TRAC-M and at 8,300 seconds in RELAP5. The downcomer pressure at the time of the minimum downcomer temperature is 15.3 MPa in TRAC-M and 1.5 MPa in RELAP5.

The minimum and the maximum heat transfer coefficients between the vessel wall and the fluid in the downcomer are shown in Figures 5.2.9 and 5.2.10, respectively, for TRAC-M and RELAP5 calculations. In both TRAC-M and RELAP5, the maximum heat transfer coefficients are found at the bottom node of the downcomer sector located between the cold leg "B1" and "B2" although the TRAC-M-computed values are a little lower (about 6 percent) than the RELAP5-computed values. At the time of the minimum downcomer temperature occurrence, the maximum heat transfer coefficient is 23,700 W/(m*m K) for TRAC-M and 25,300 W/(m*m K) for RELAP5. The minimum heat transfer coefficients are also different by about the same magnitude between TRAC-M and RELAP5 (i.e., 18,000 W/(m*m K) for TRAC-M and 20,000 W/(m*m K) for RELAP5). The location of the minimum heat transfer coefficient is quite different between TRAC-M and RELAP5 (i.e., the bottom of downcomer sector connected to the cold leg "A1" for TRAC-M versus mid-elevation node of either the downcomer sector located between the cold leg "A1" and "A2" or that between the cold leg "B1" and "B2" for RELAP5).

5.2.3 Other Plant Parameters

Among many different plant parameters, the hot leg and cold leg flow rates and temperatures are of greatest interest since they would have greatest effects on the downcomer temperatures. Figure 5.2.11 shows the hot leg mass flow rates computed by TRAC-M and RELAP5. The initial and the final flow rates after 8000 seconds are fairly close to each other between TRAC-M and RELAP5. However, between 2000 and 8000 seconds RELAP5 showed much higher flow rates than TRAC-M; the largest deviation (about 1000 Kg/seconds or about 10 percent) occurring at about 4000 seconds. The reason for this difference is that in RELAP5 the hot leg liquid had much higher density than in TRAC-M starting at about 2000 seconds because the system cooled down much more quickly in RELAP5 where at about 4000 seconds the hot leg temperatures reached nearly the final temperature of 380K whereas in TRAC-M the same final temperature of 380K was reached in 8000 seconds.

The mass flow rates in cold leg "A1" and "A2" are shown in Figure 5.2.12 and those in cold leg "B1" and "B2" in Figure 5.2.12A. Similar differences between TRAC-M and RELAP5 are shown in the cold leg mass flow rates as in the hot leg mass flow rates. The reasons for the differences are the same as discussed above.

Hot leg temperatures are shown in Figure 5.2.13 for TRAC-M and in Figure 5.2.13A for RELAP5. Again RELAP5 shows much faster cooldown than TRAC-M. Cold leg temperatures are shown in Figure 5.2.14 for TRAC-M and in Figure 5.2.15 for RELAP5. A much faster cooldown in RELAP5 calculations is also manifested in the cold leg temperatures.

5.2.4 Comparison Between TRAC-M and RELAP5 Main Steam Line Scenario Case 61

Since RELAP5 MSLB Case 27 calculation showed a much different pressure behavior as compared to TRAC-M (i.e., the system pressure rapidly came down to 1.5 MPa in RELAP5 as compared to TRAC-M where the system pressure recovered, after an initial decrease, to a normal level of 15.3 MPa), another MSLB scenario (Case 61) which did not have a significant pressure reduction was selected for RELAP5 comparison with TRAC-M. In Case 61, the EFW flow to SG "A" which had a MSLB was terminated at 10 minutes after the MSLB initiation, as shown in Figure 5.2.16, and therefore the pressure did not come down much at all, as shown in Figure 5.2.17. In RELAP5 Case 61, the EFW flow was fed to SG "B" periodically throughout the transient, but the cooling effect was negligible because it was highly oscillatory and not much in terms of average flow.

In TRAC-M Case, the EFW flow was continuously fed to SG "A" as demanded by the level controller. The final pressures computed by TRAC-M and RELAP5 were close to each other. The initial pressure reduction computed by RELAP5 was fairly quickly recovered by the makeup flow as shown in Figure 5.2.18.

Even though the system pressures are close between TRAC-M and RELAP5, the temperatures are quite different as shown in Figure 5.2.7 for TRAC-M and in Figure 5.2.19 for RELAP5. Since the minimum fluid temperature in the downcomer is most important for PTS evaluations, the RELAP5 results obtained from the Case 61 MSLB scenario are not appropriate for comparison with TRAC-M, and thus no additional comparisons are made between TRAC-M and RELAP5 Case 61.

5.2.5 Pressurized Thermal Shock Implications

A TRAC-M calculation suggests that a double-ended MSLB with the continuous EFW flow to the broken loop steam generator would lead to the PTS concerns because the minimum downcomer temperature of 380K (224 °F) falls below the PTS screening criterion of 405K (270 °F) while the pressure remains high, a nearly normal level of 15.3 MPa (2219 psia). However, it should be pointed out that this scenario has a very low probability of actual occurrence because the operator is expected to isolate the affected steam generator (i.e., terminate the emergency feedwater flow to minimize cooldown) as soon as a main steam line break is recognized. When the operator isolates the affected steam generator, the primary system cooldown would be minimal. For example, in RELAP5 Case 61, where the operator isolated the affected steam generator in 10 minutes, the cooldown was only about 10K (18 °F), and the minimum downcomer temperature was 557K (543 °F).

Text continues on page 99.

Table 5.2.1 Comparison of Sequence of Events Between TRAC-M and RELAP5 Calculations for a Main Steam Line Break Scenario

	TRAC-M Seconds	RELAP5 Case 27 Seconds
1. Reactor trip	5	~ 1 second on variable P, T trip
2. RCP trip	Did not trip	Did not trip
3. HPI actuation	20	19
4. Core flood tank discharge	Did not come on	2190
5. LPCI actuation	Did not come on	Did not come on
6. Vent valve opening/closing	Did not open	Did not open
7. Pressurizer refilling	100 – 600 Refilled again in 1900 seconds	70 – 280 Refilled again in 7250 seconds
8. Turbine bypass valve opening	Did not open	Loop "A" closed Loop "B" 1–30 seconds
9. Safety-relief valve opening	Did not open	Loop "A" closed Loop "B" 1–30 seconds
10. MFW "A" and "B" trip time	5	1
11. EFW to loop "A" start time	40	270
12. EFW to loop "B" start time	Did not start	Did not start
13. Upper lead voiding start time	Did not void	Did not void
14. Upper downcomer voiding start time	Did not void	Did not void
15. Hot leg top voiding start time	Did not void	Did not void

Figure 5.2.1 Downcomer Mid–Elevation Pressure

Calculated by TRACM and RELAP5 Case 27 for Main Steam Line A Break Scenario

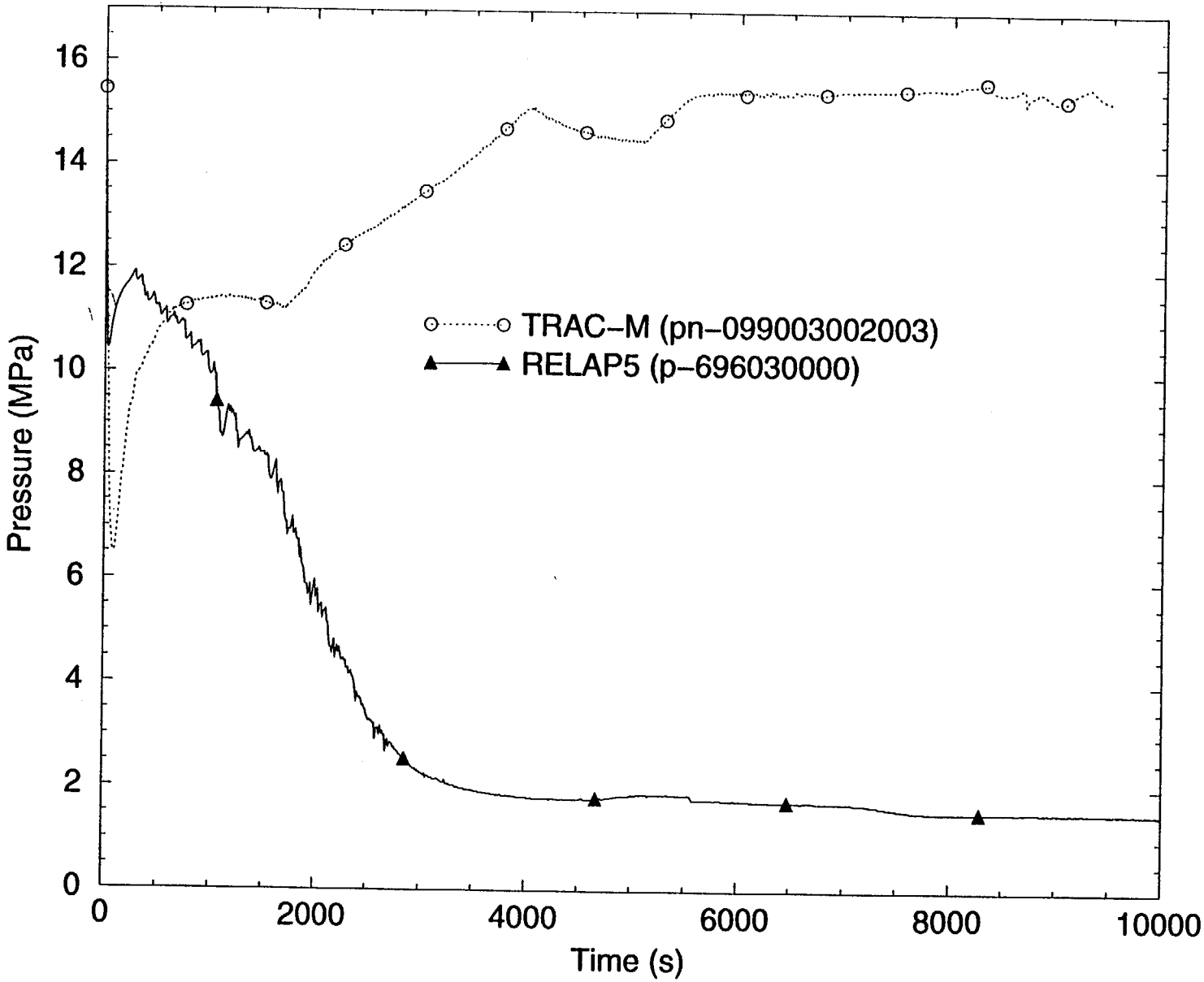


Figure 5.2.2 Total HPI Flow Rates

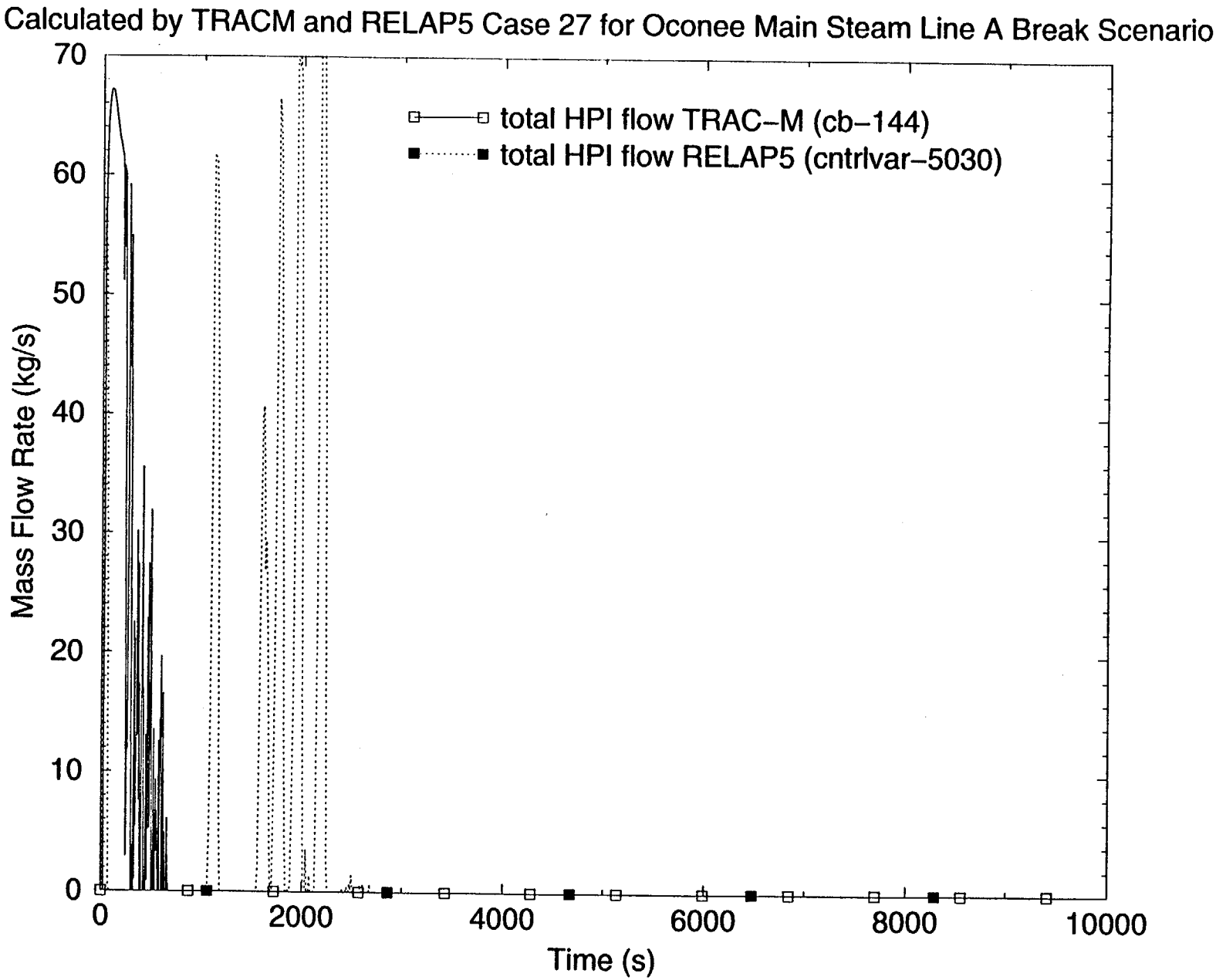


Figure 5.2.3 Makeup/Letdown Flow

Calculated by TRACM and RELAP5 Case 27 for Oconee Main Steam Line A Break Scenario

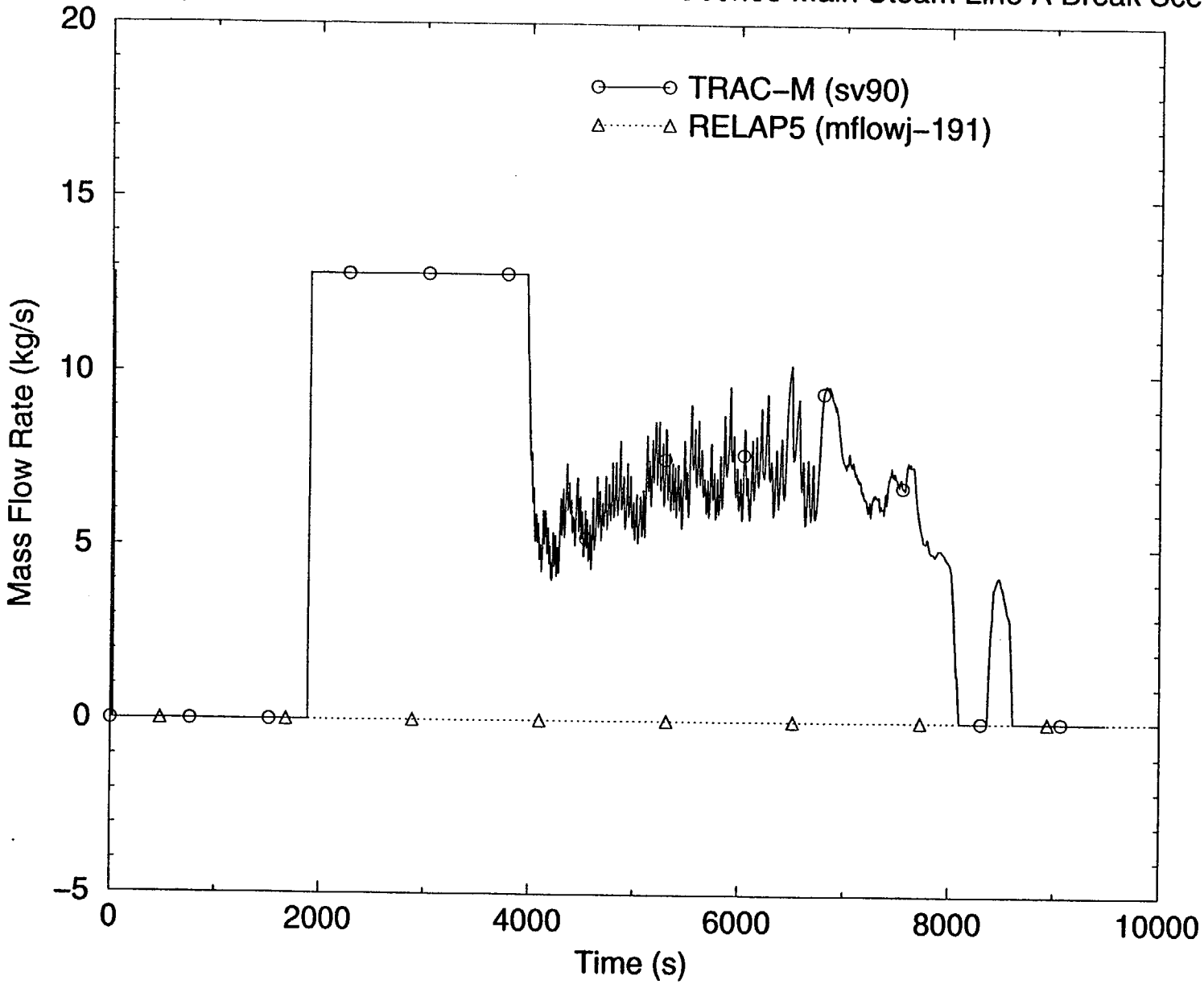


Figure 5.2.4 Pressurizer Surge Line Flow

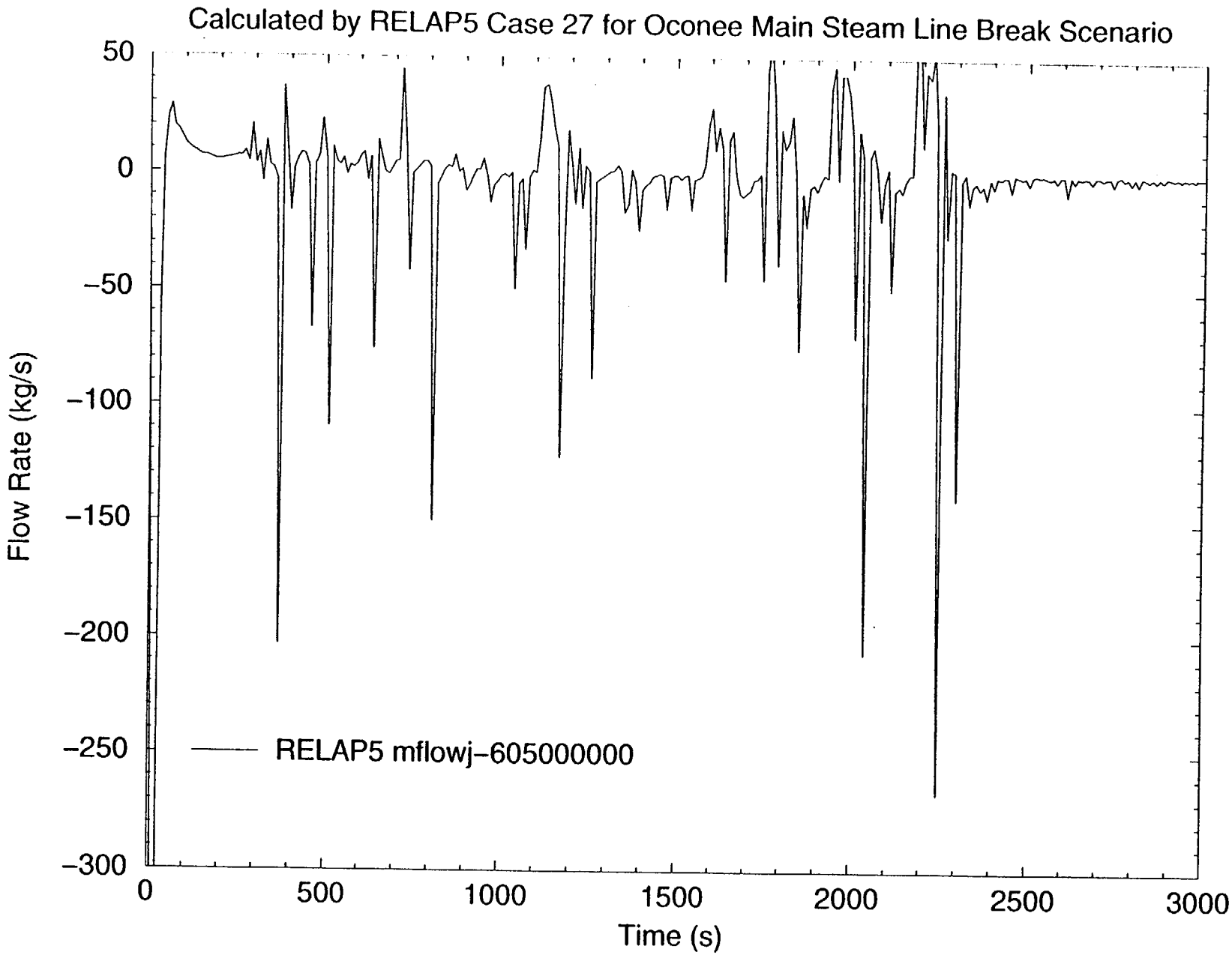


Figure 5.2.5 Subcooling Margins at Top of Hot Legs

Calculated by TRACM and RELAP5 Case 27 for Oconee Main Steam Line A Break Scenario

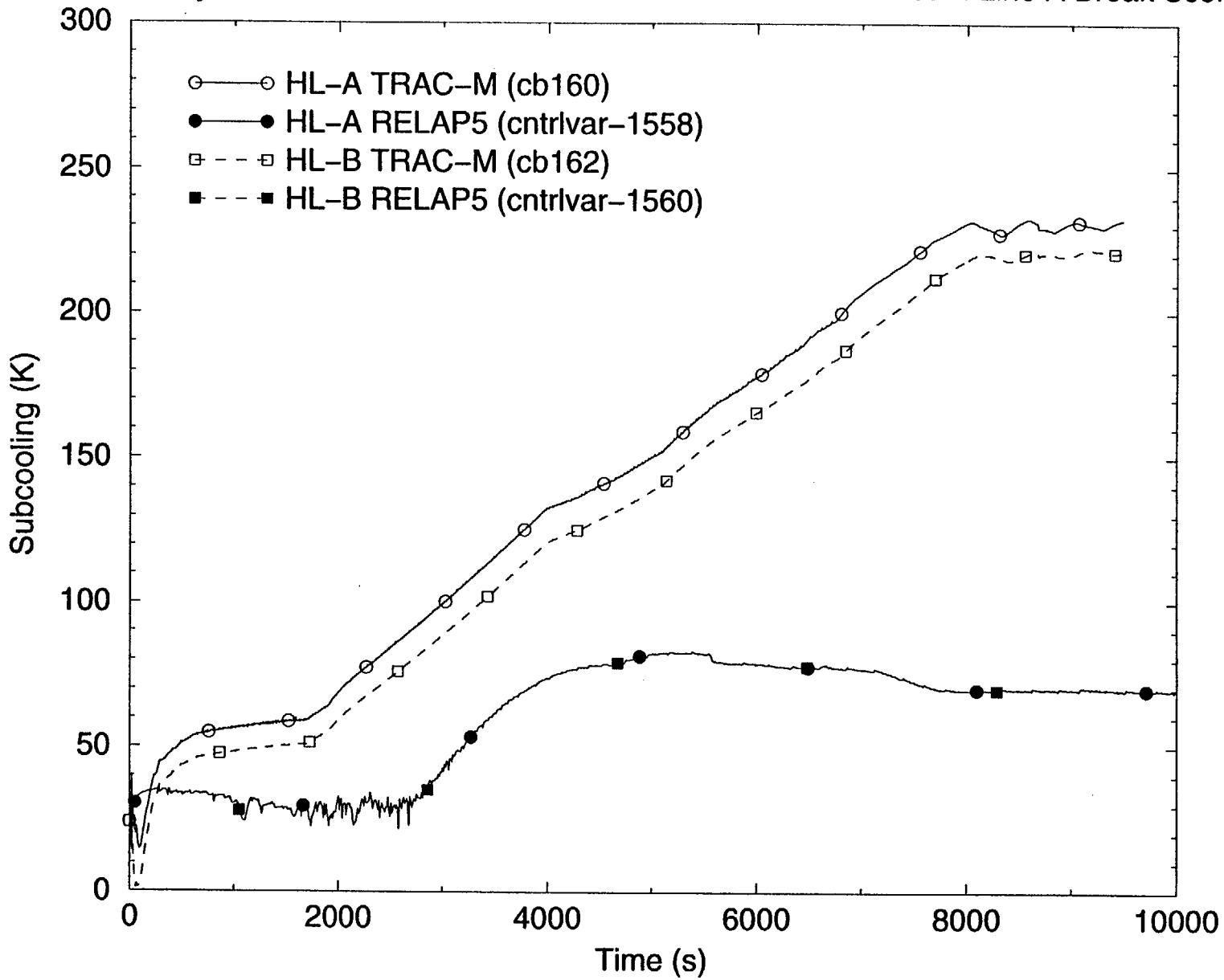


Figure 5.2.5A Makeup/Letdown Flow for First 50 Seconds

Calculated by TRACM and RELAP5 Case 27 for Oconee Main Steam Line A Break Scenario

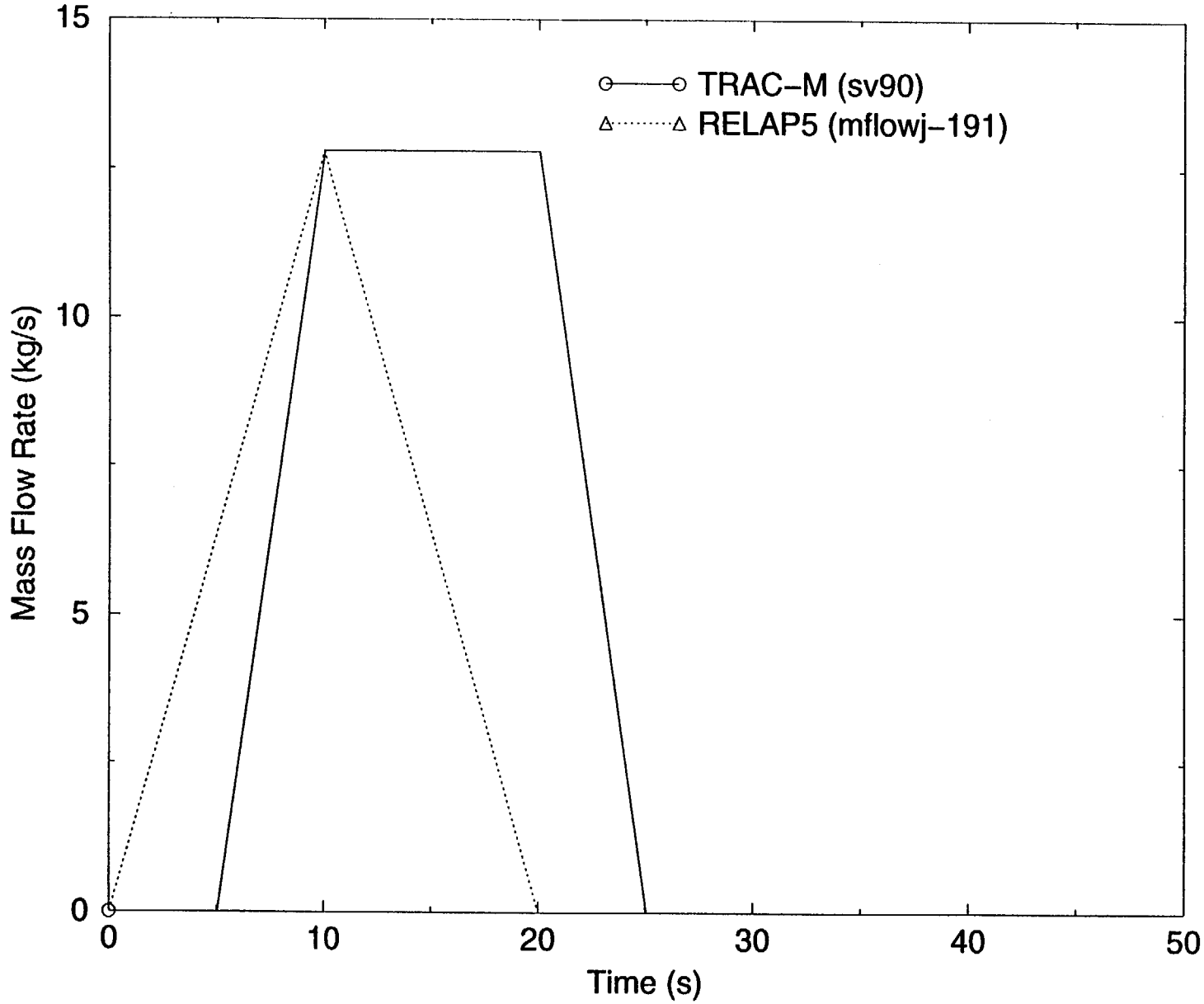


Figure 5.2.5B Heat Transfer Rates Through SGs

Calculated by TRACM and RELAP5 Case 27 for Oconee Main Steam Line A Break Scenario

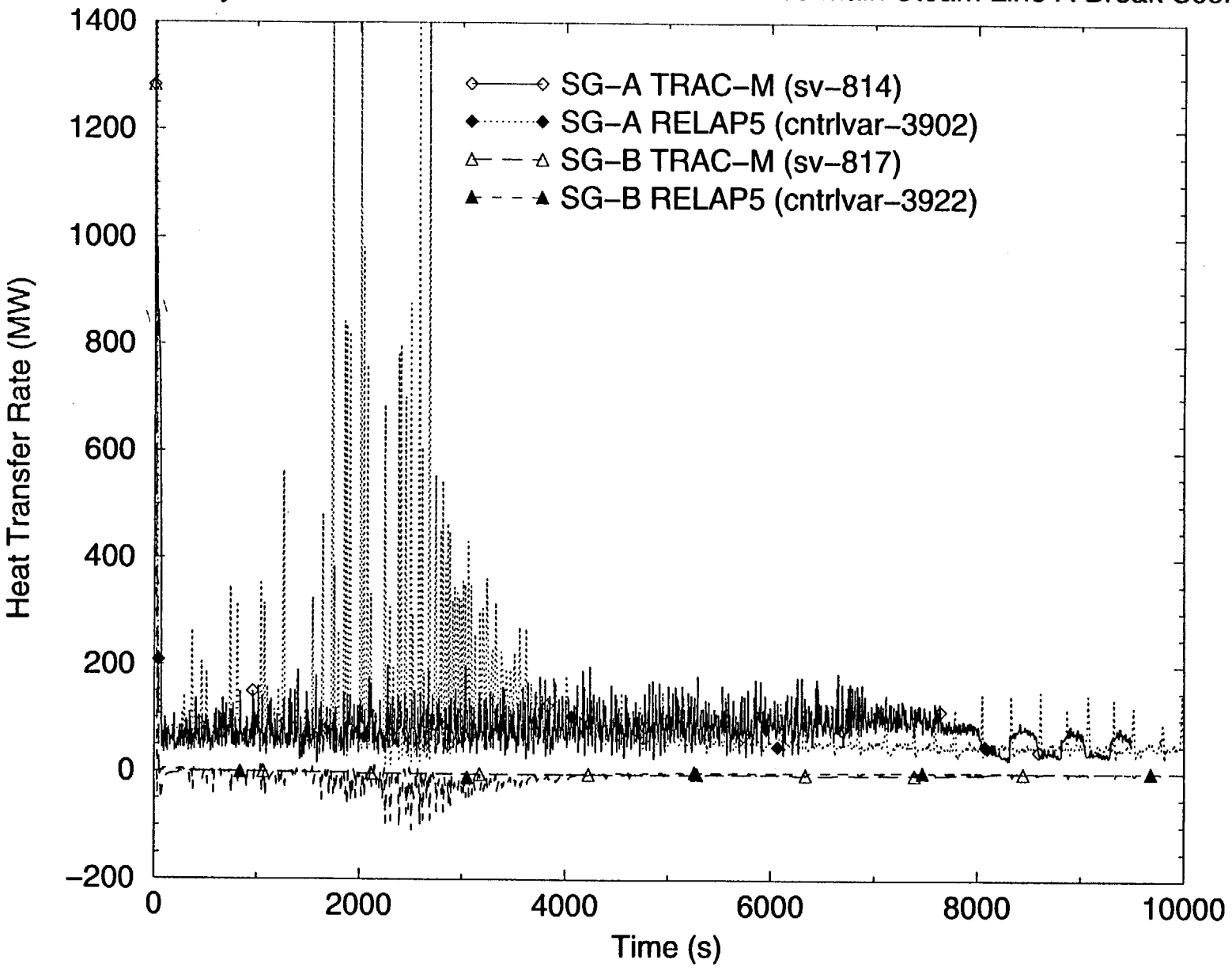


Figure 5.2.5C SG Secondary System Pressures

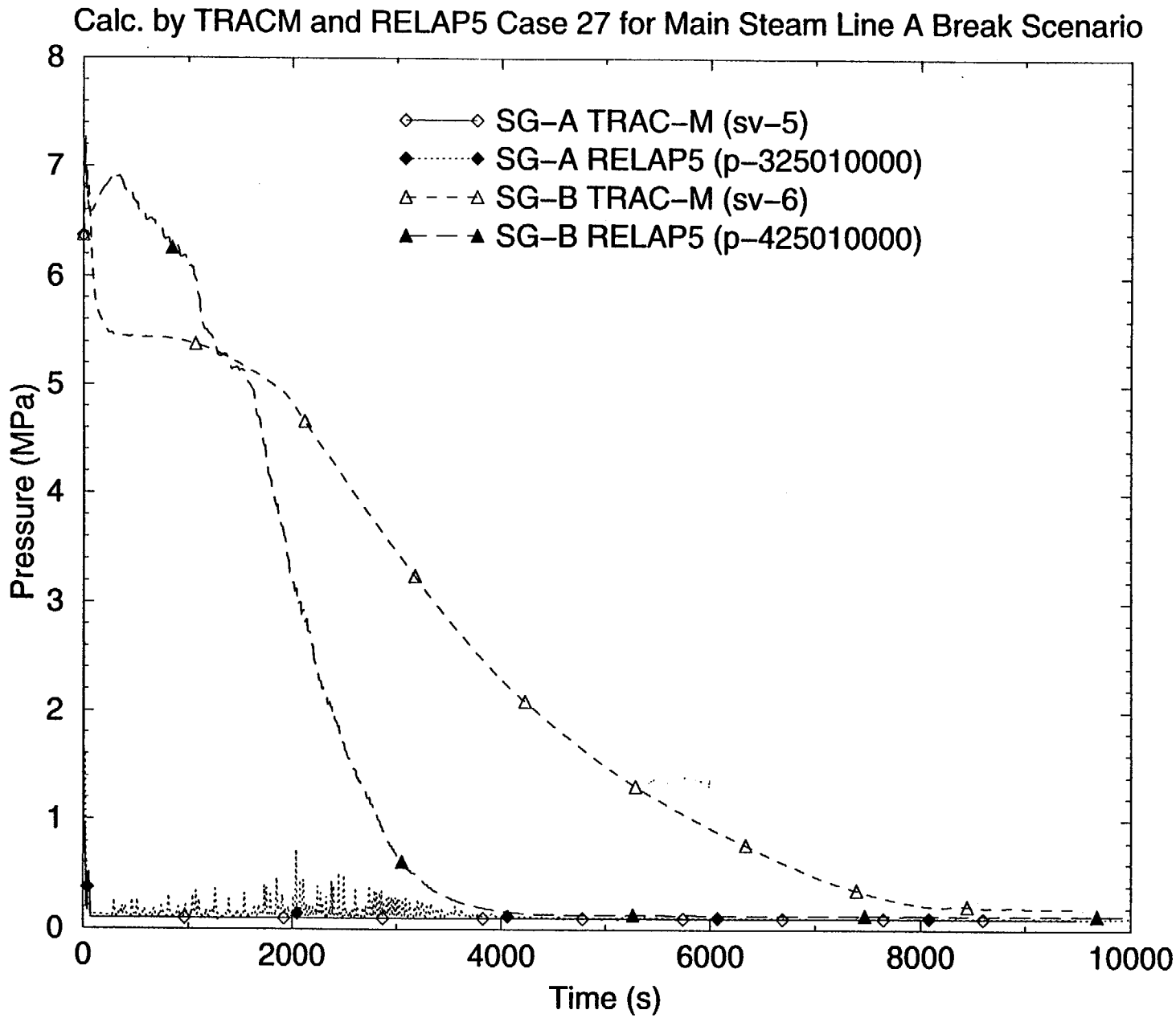


Figure 5.2.5D Steam Generator Startup Range Levels

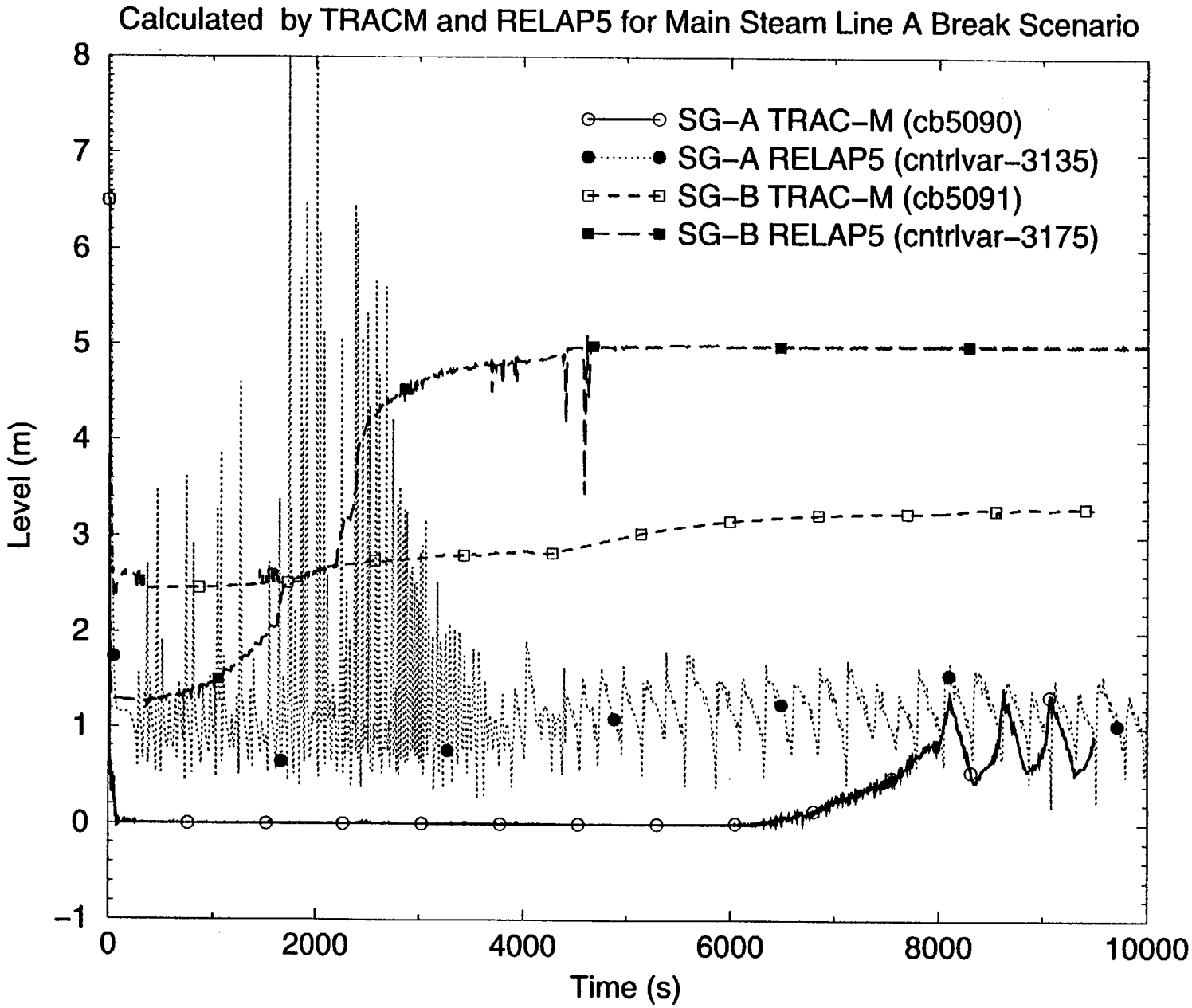


Figure 5.2.5E SG–A Steam Line Flow Rates

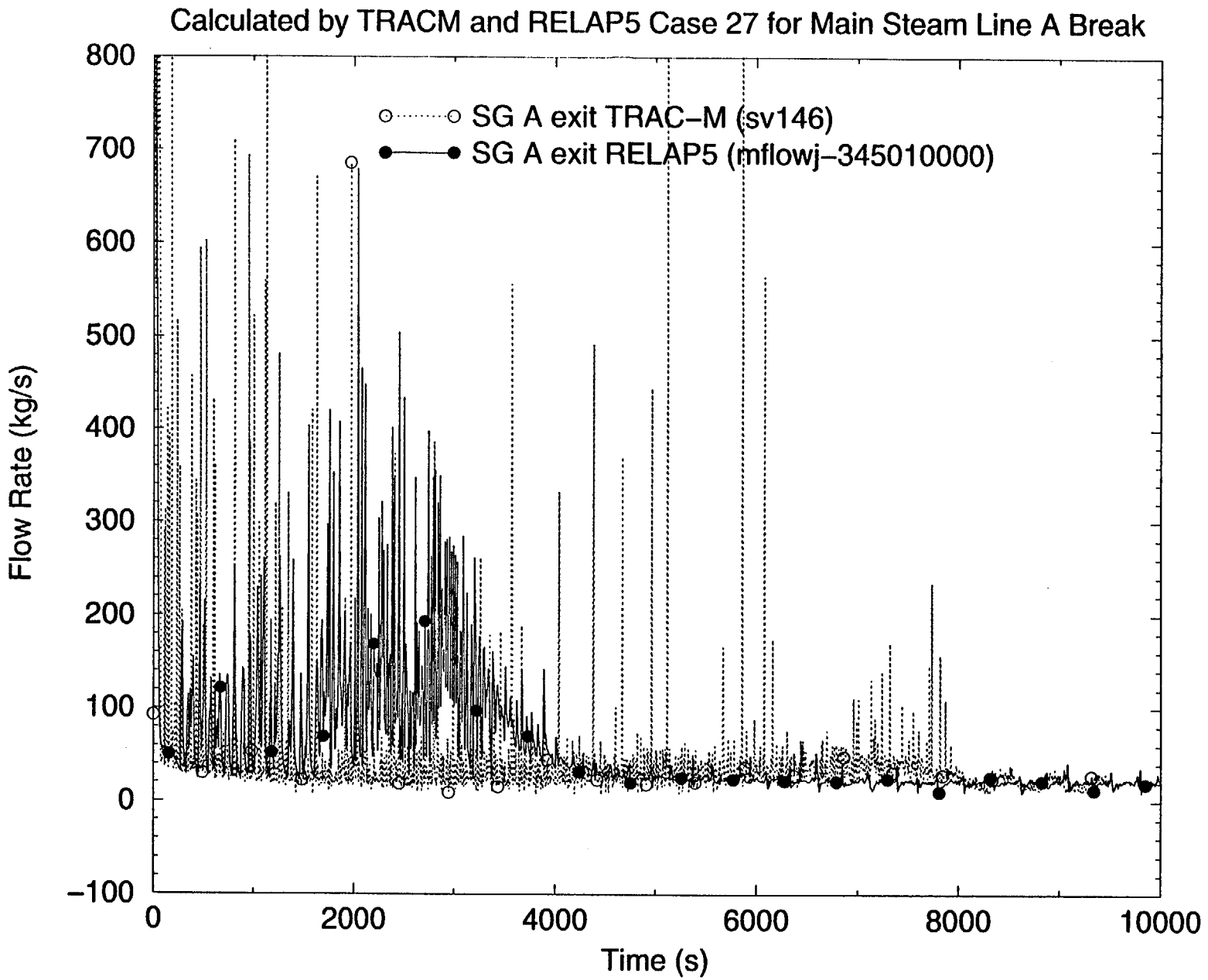


Figure 5.2.5F Integrated SG–A Steam Line Flow

Calculated by TRACM and RELAP5 Case 27 for Main Steam Line A Break

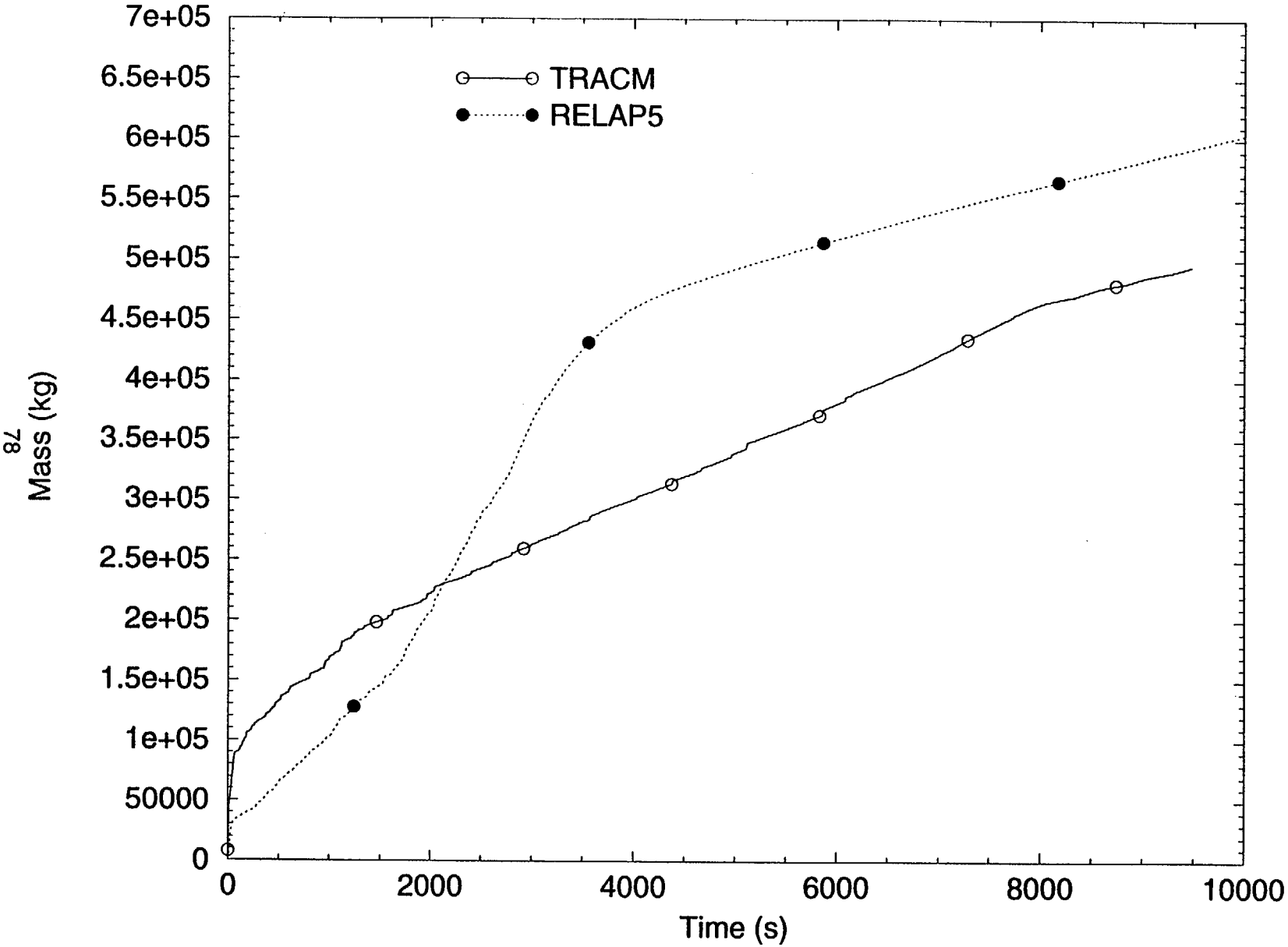


Figure 5.2.5G Total Emergency Feedwater Flow Rates

Calculated by TRACM and RELAP5 Case 27 for Main Steam Line A Break Scenario

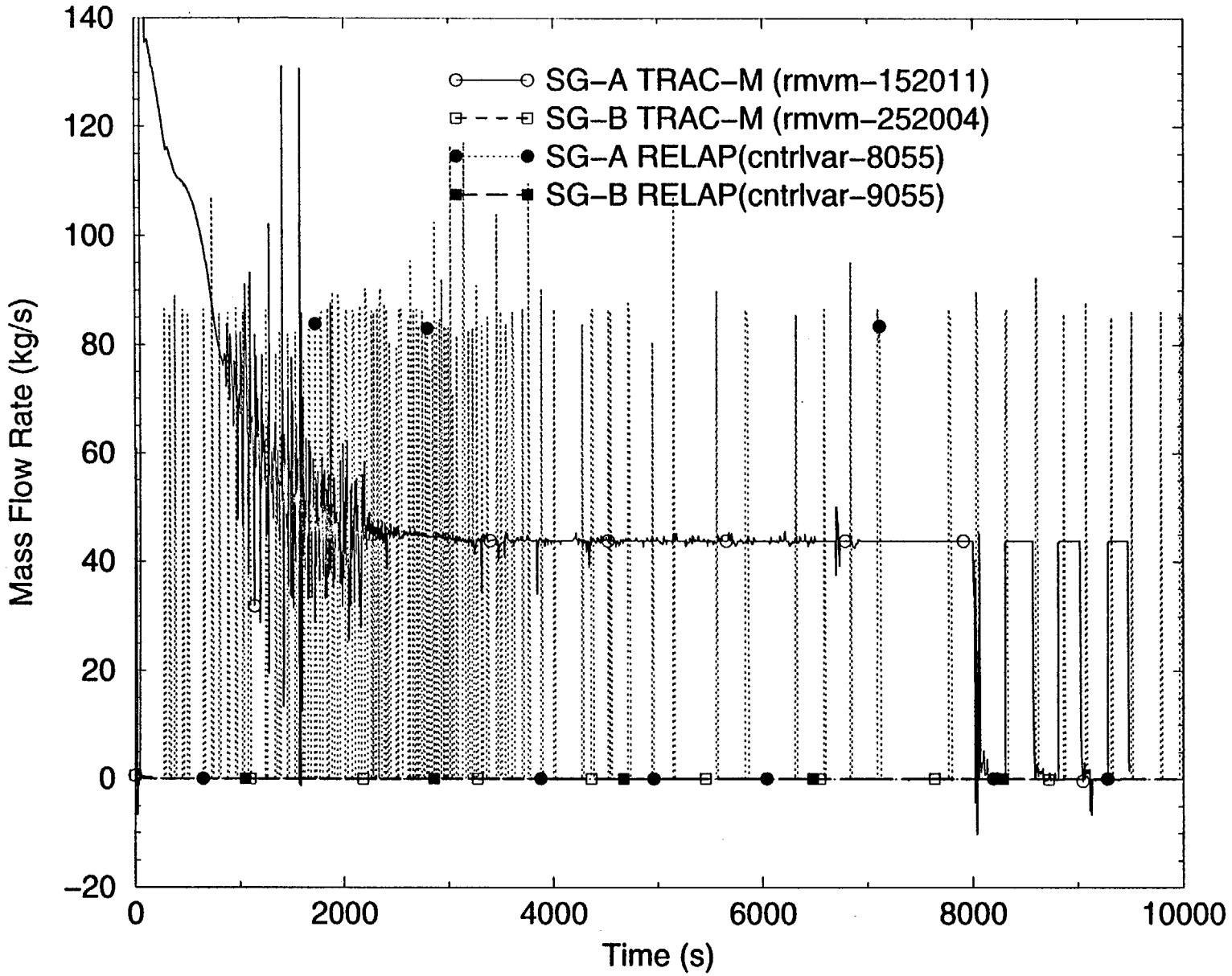


Figure 5.2.5H Total Emergency Feedwater Delivered

Calculated by TRACM and RELAP5 Case 27 for Main Steam Line A Break Scenario

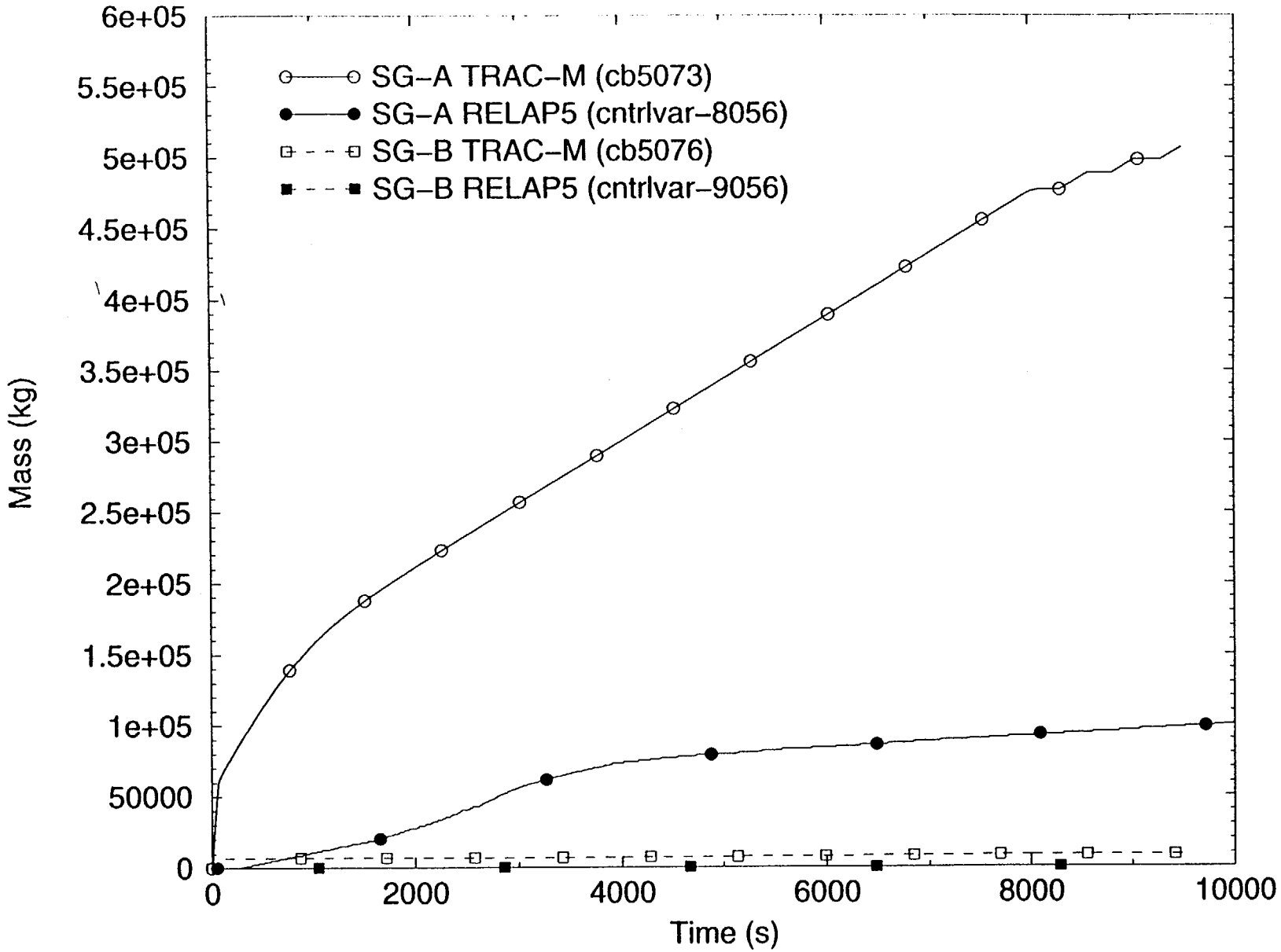


Figure 5.2.5l Main Feedwater Flow Rates

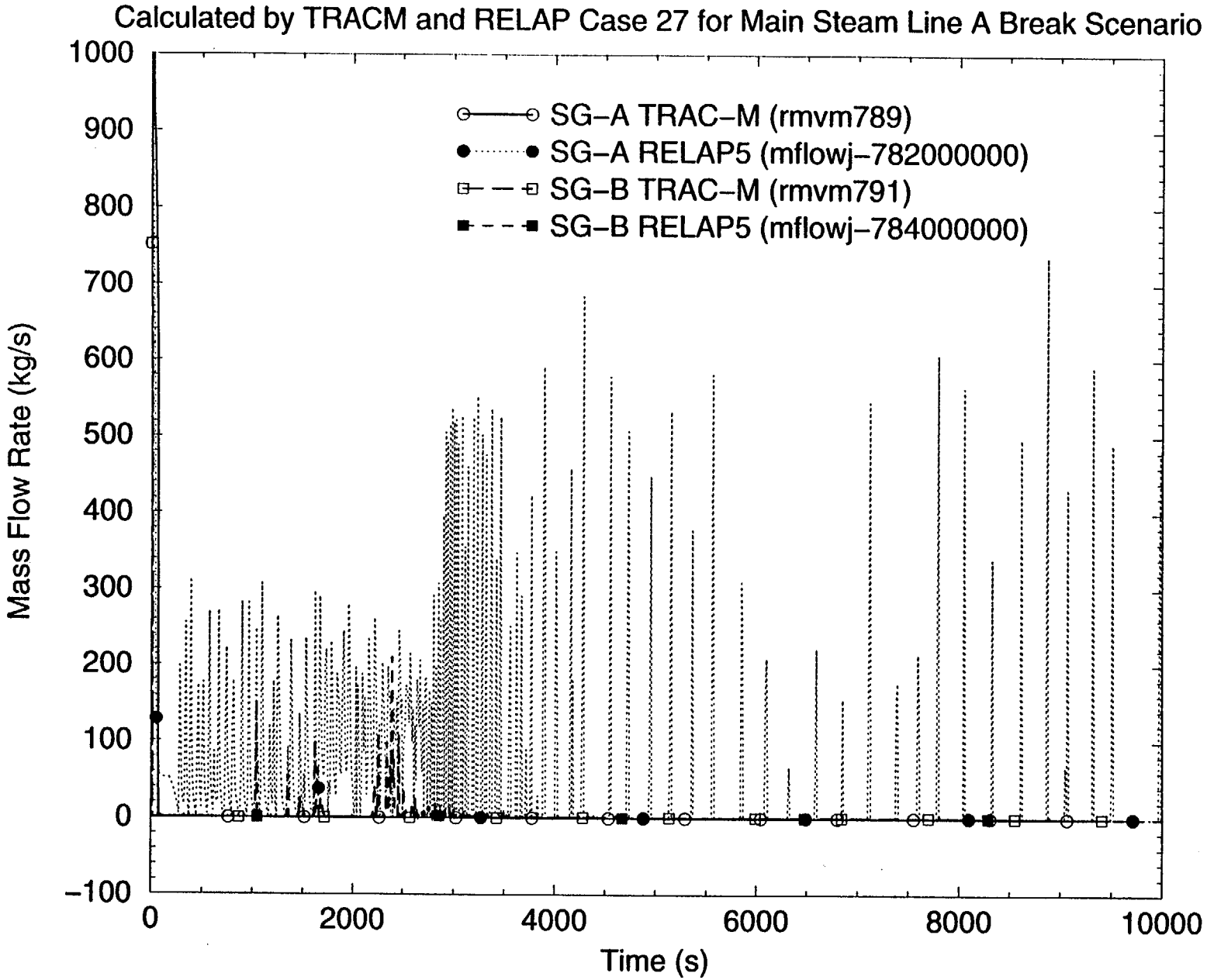


Figure 5.2.5J Total Main Feedwater Flow Delivered

Calculated by TRACM and RELAP Case 27 for Main Steam Line A Break Scenario

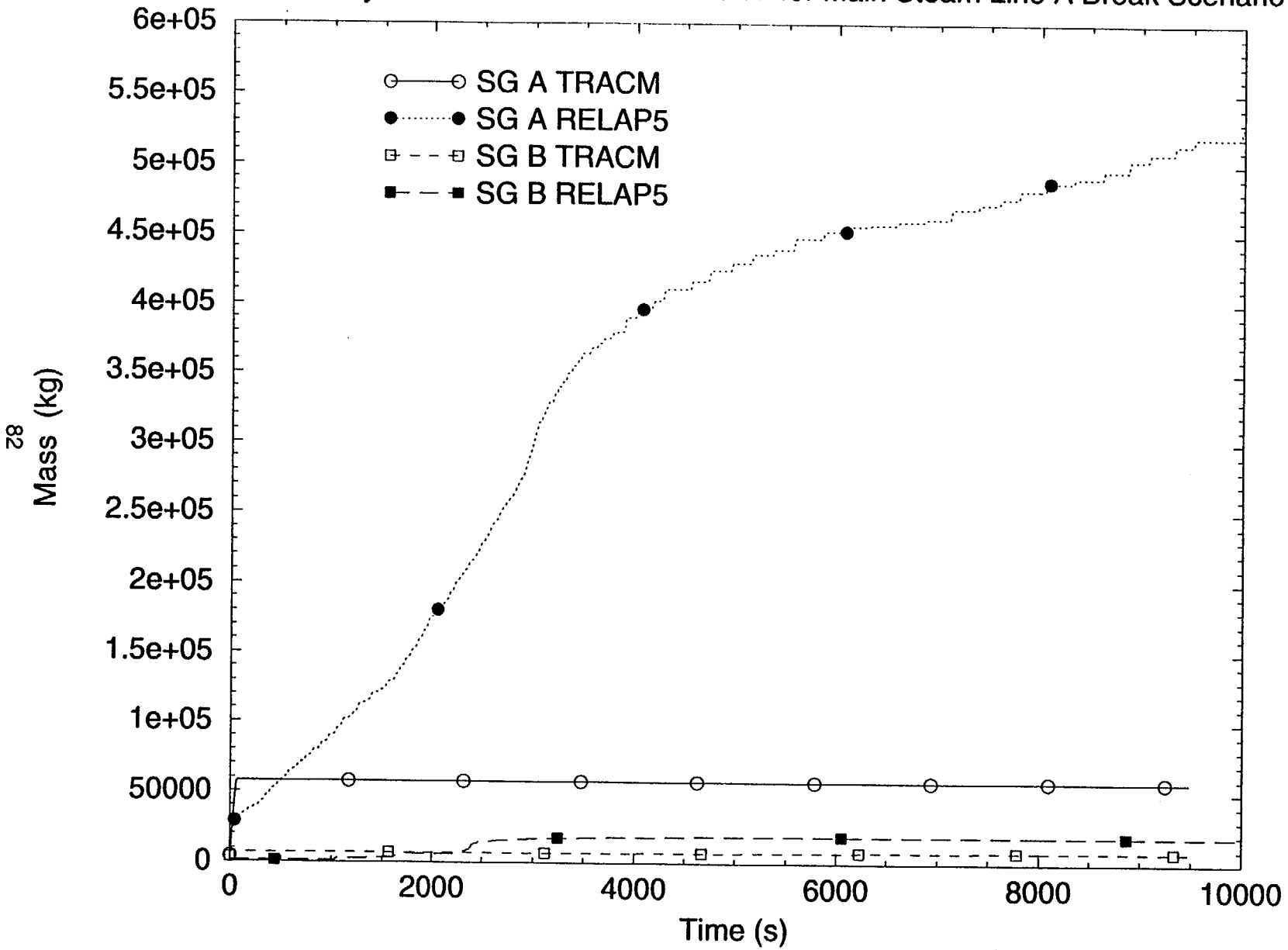


Figure 5.2.6 Accumulator Liquid Volume

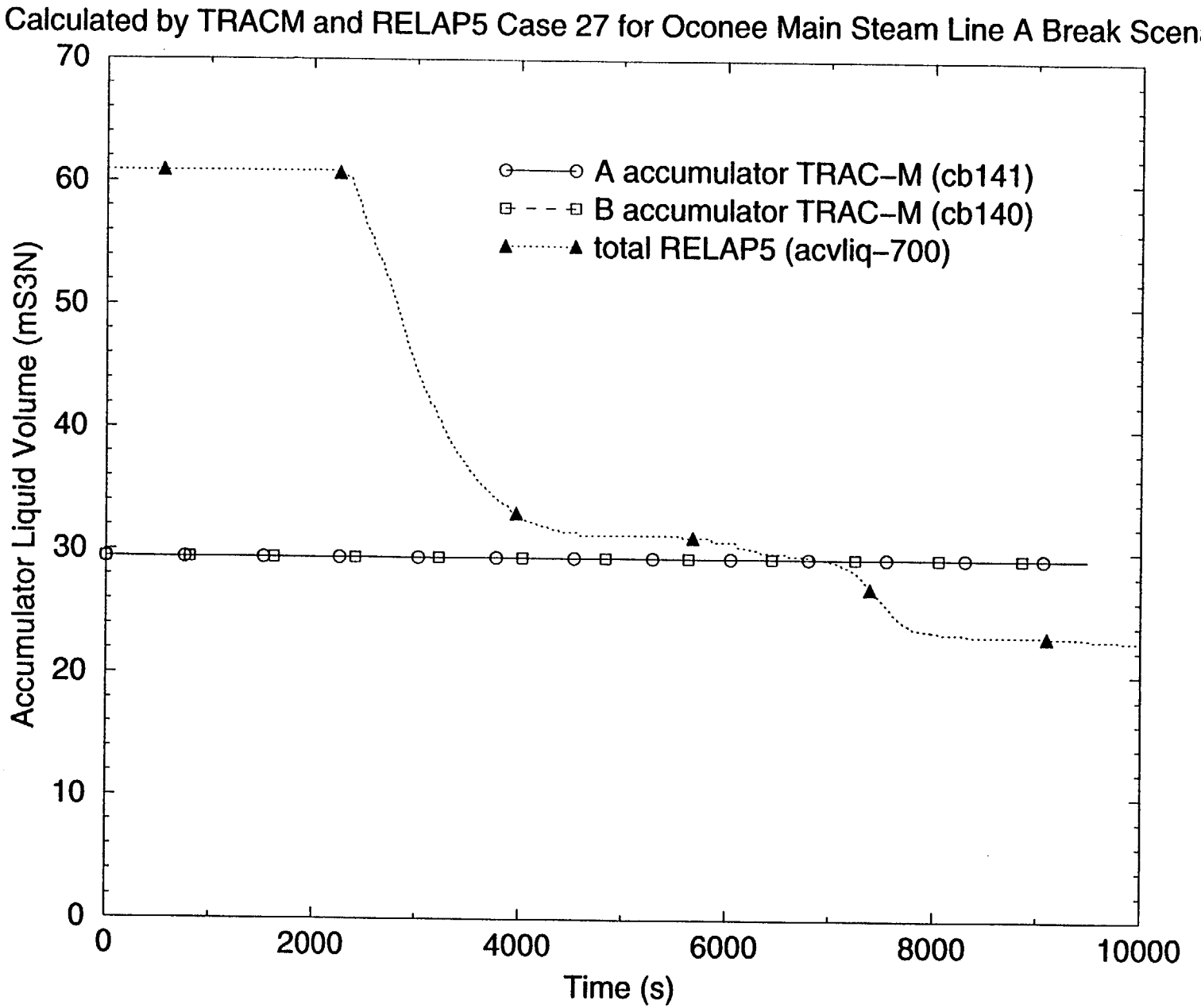


Figure 5.2.7 Minimum Downcomer Liquid Temperatures

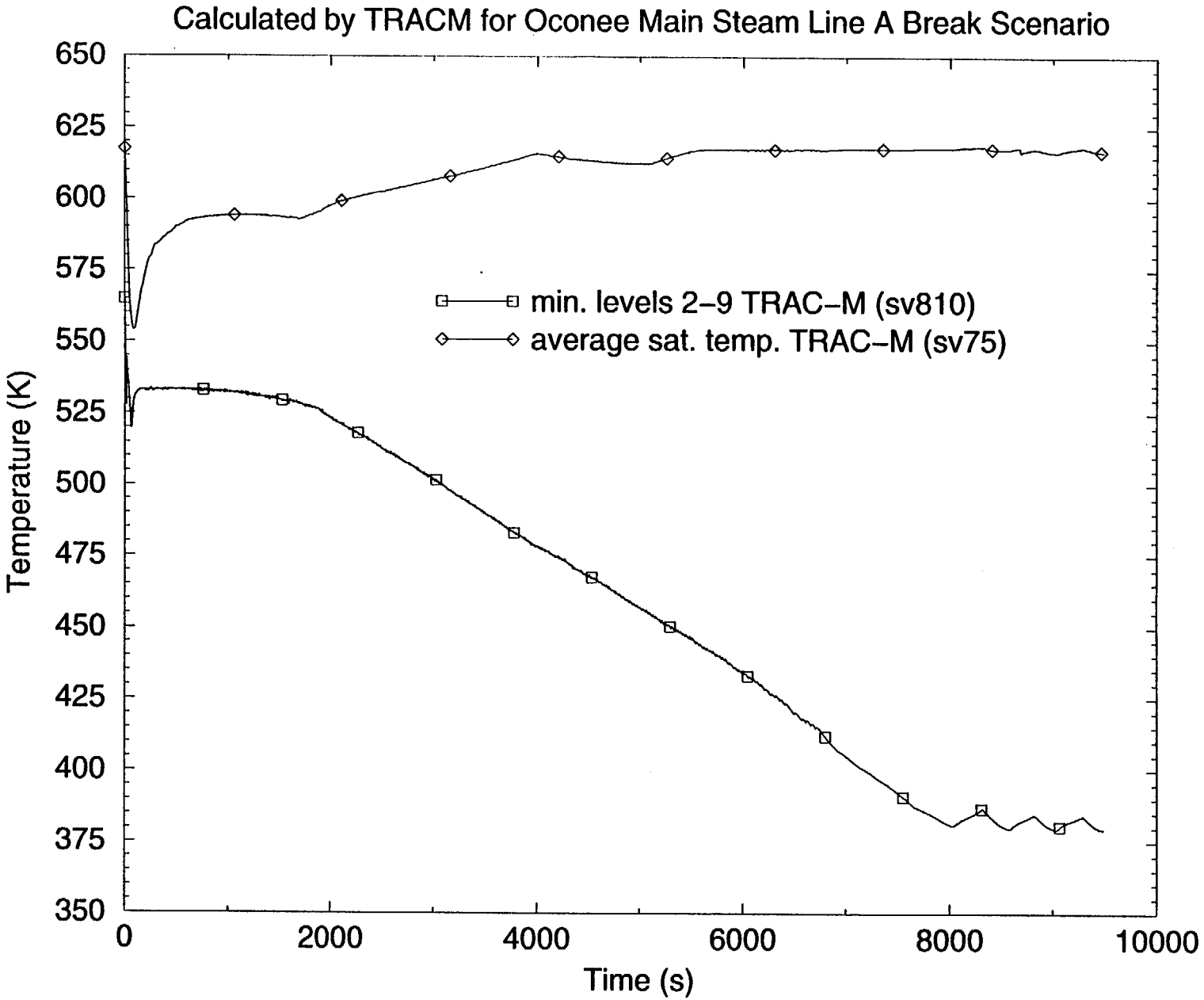


Figure 5.2.8 Downcomer Liquid Temperatures

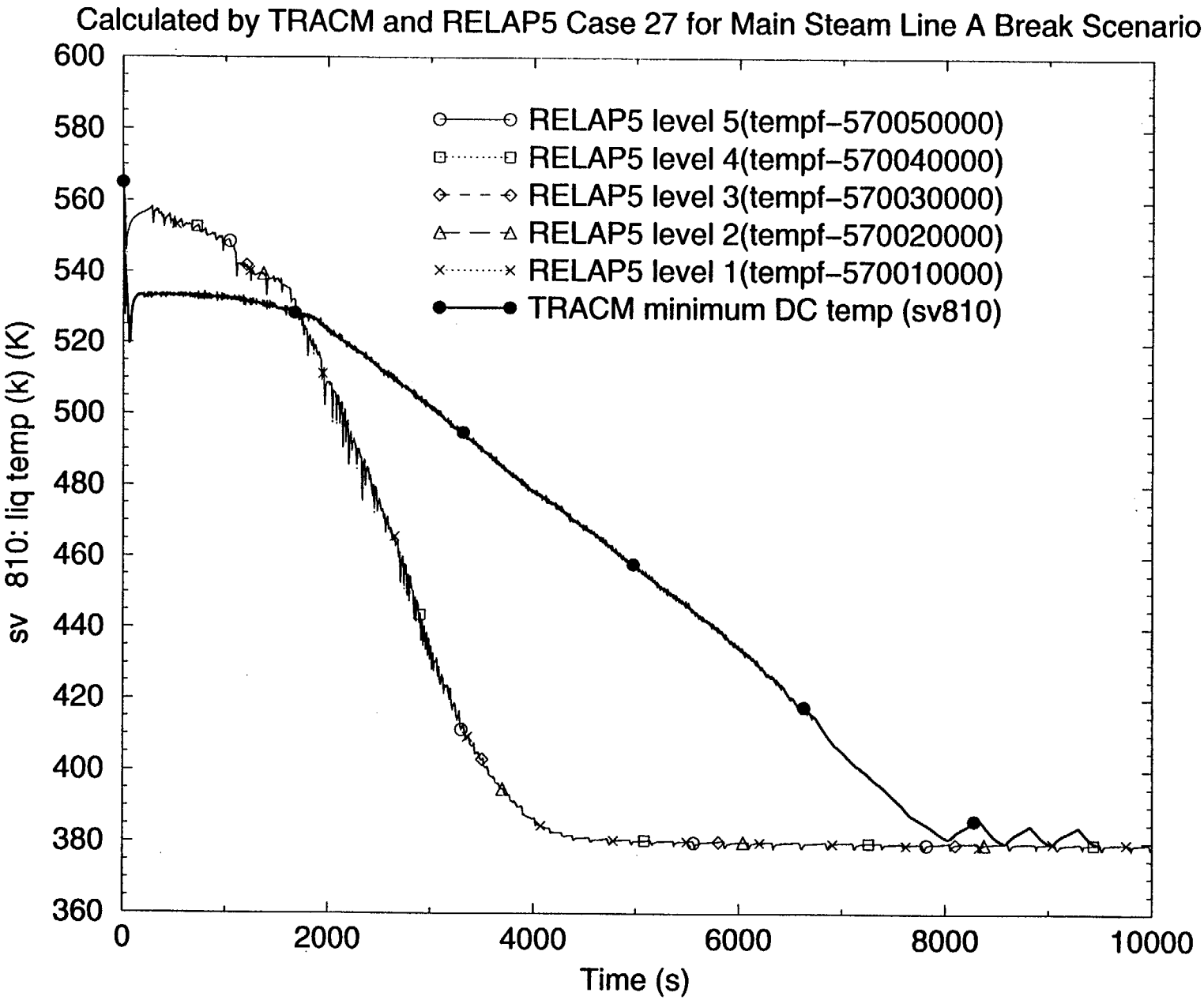


Figure 5.2.9 Min. and Max. DC Wall Heat Transfer Coefficients

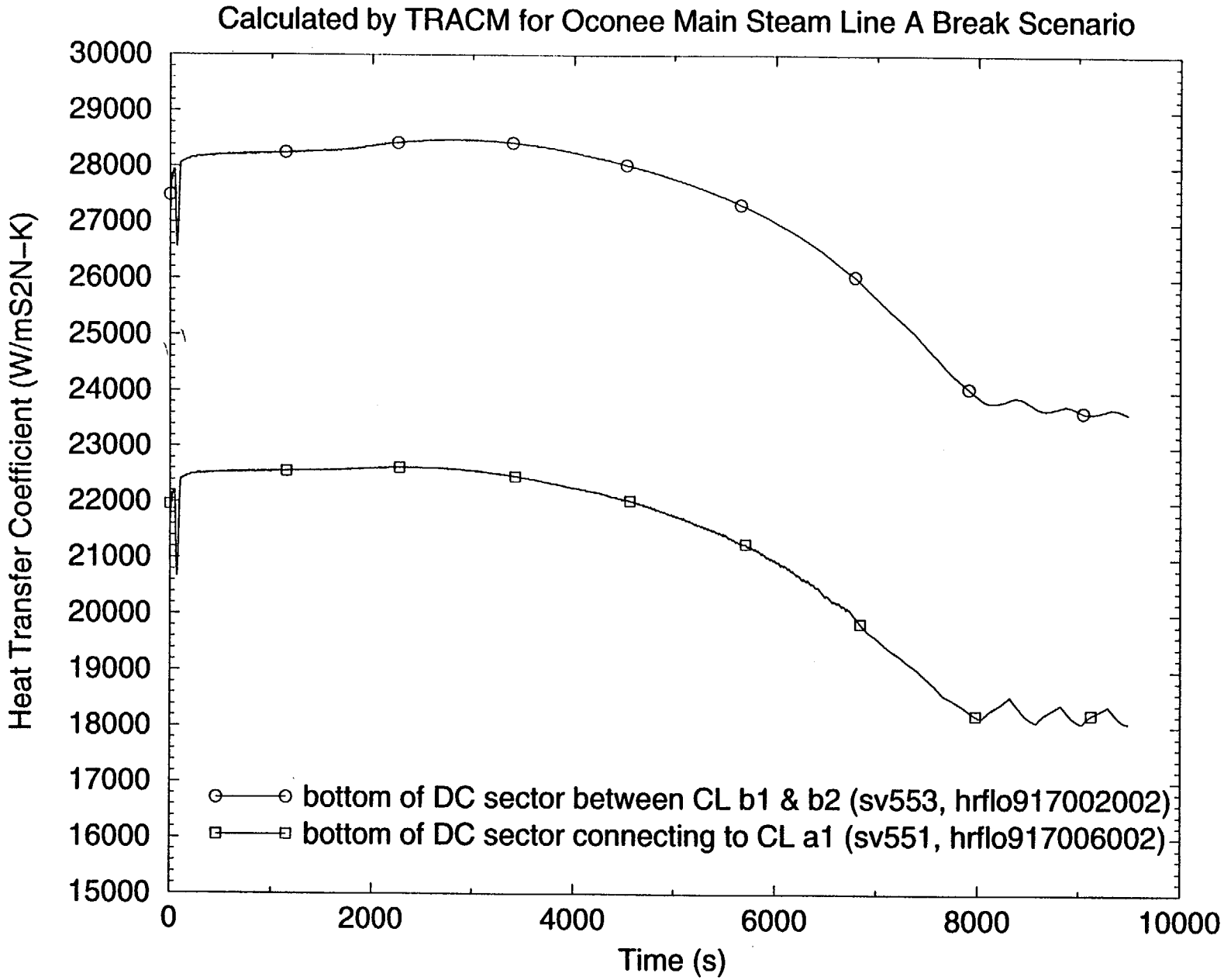


Figure 5.2.10 Min. and Max. DC Wall Heat Transfer Coefficients

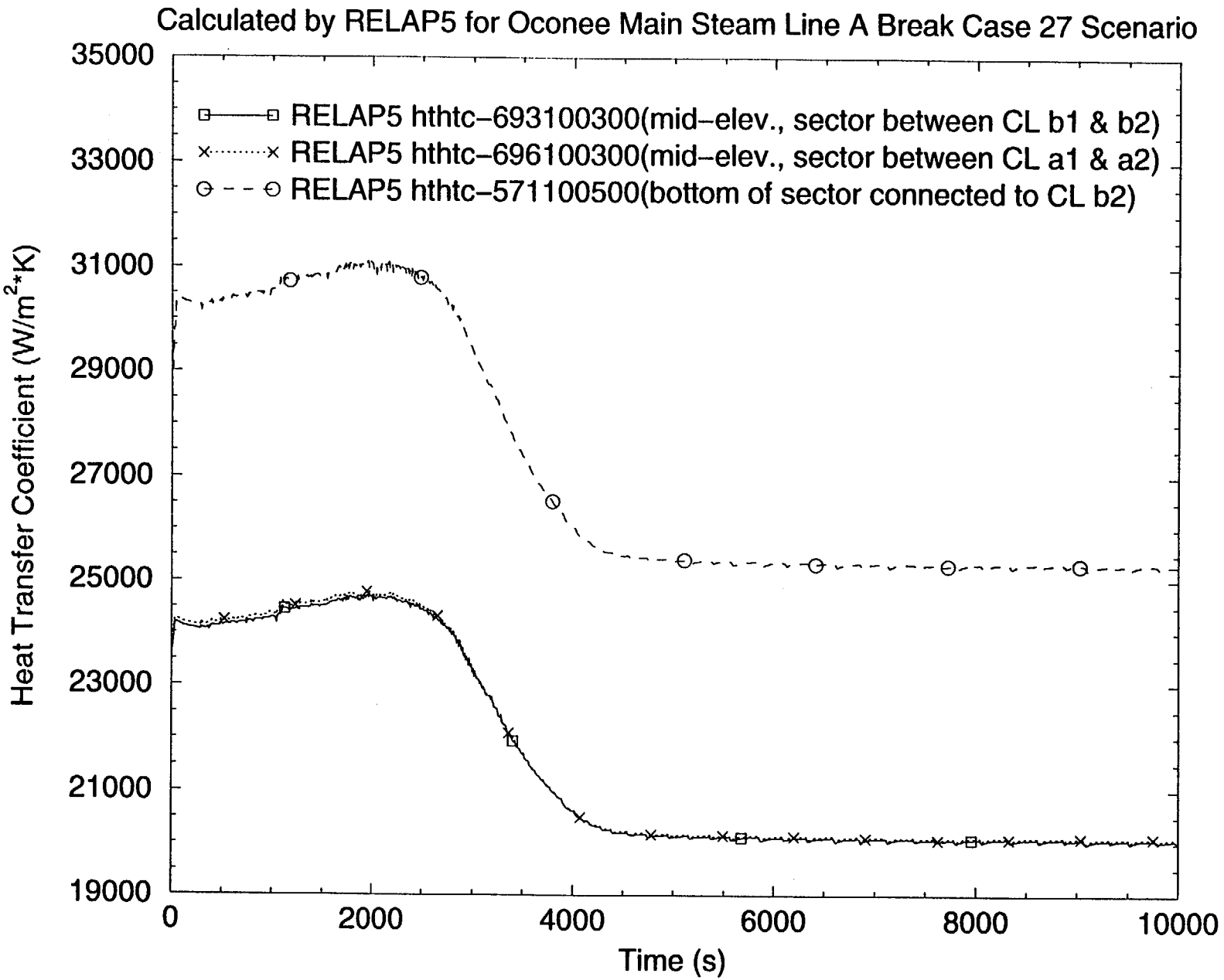


Figure 5.2.11 Hot Leg Mass Flow Rates

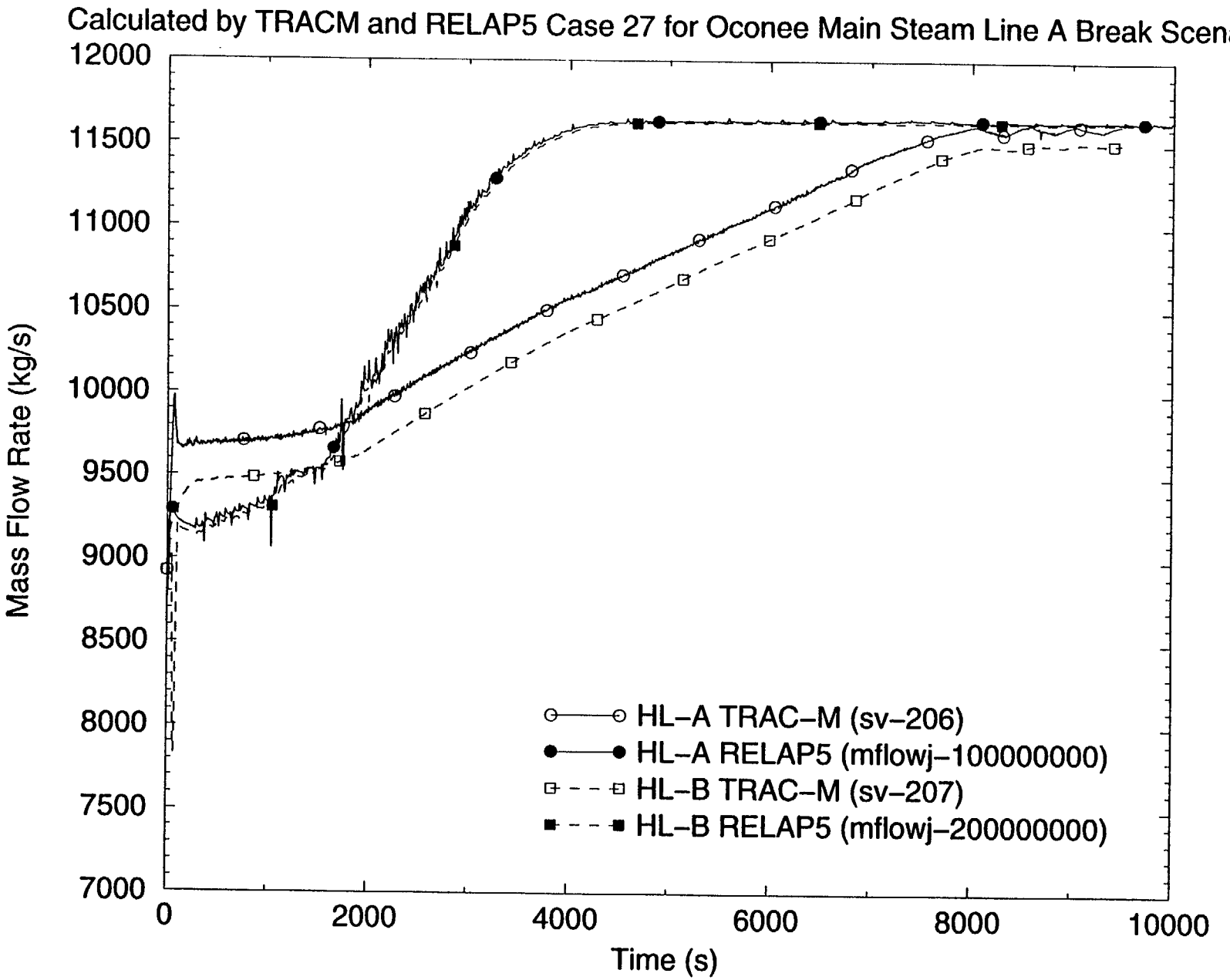


Figure 5.2.12 Loop A Cold Leg Mass Flow Rates

Calculated by TRACM and RELAP5 Case 27 for Oconee Main Steam Line A Break Scenario

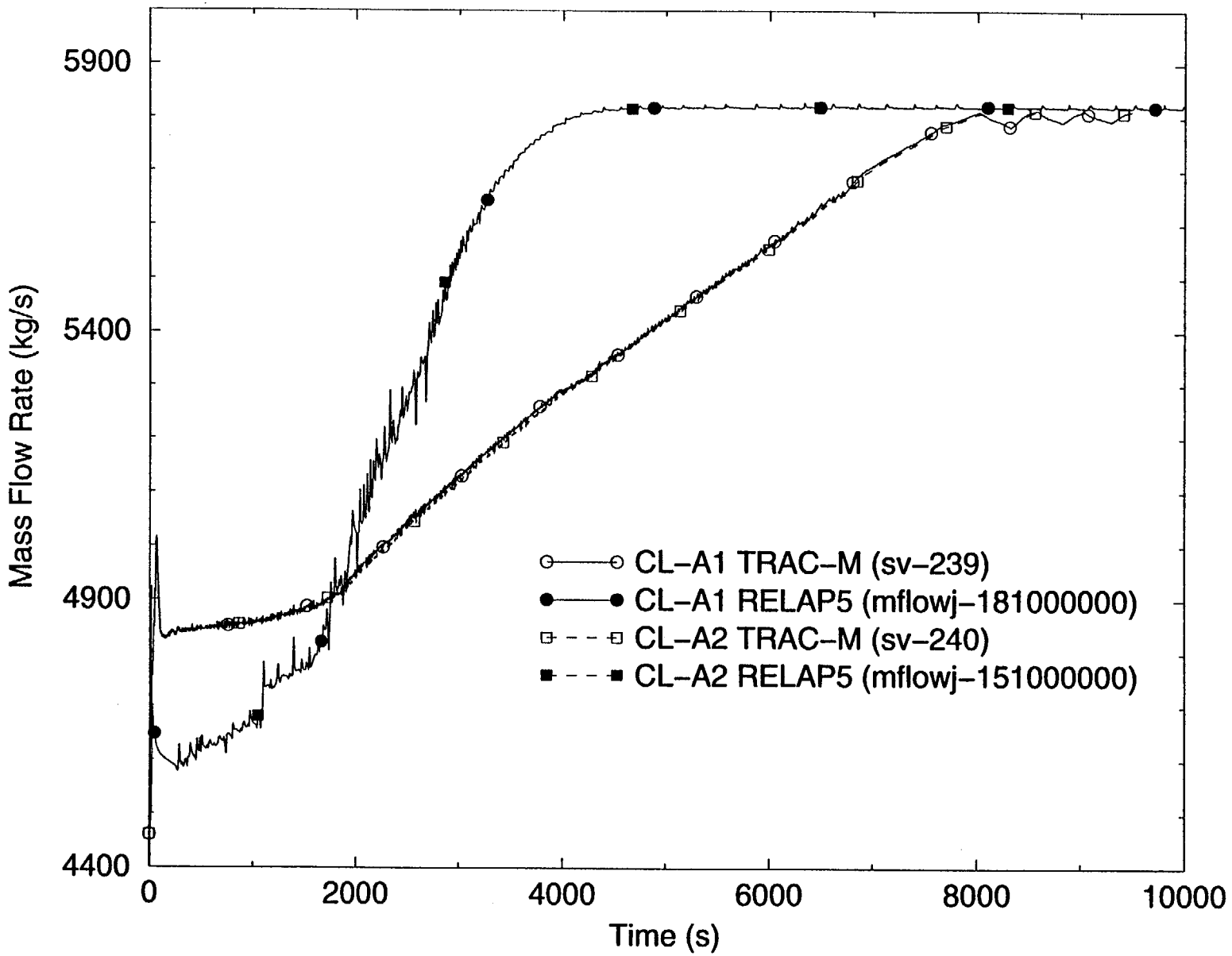


Figure 5.2.12A Loop B Cold Leg Mass Flow Rates

Calculated by TRACM and RELAP5 Case 27 for Oconee Main Steam Line A Break Scenario

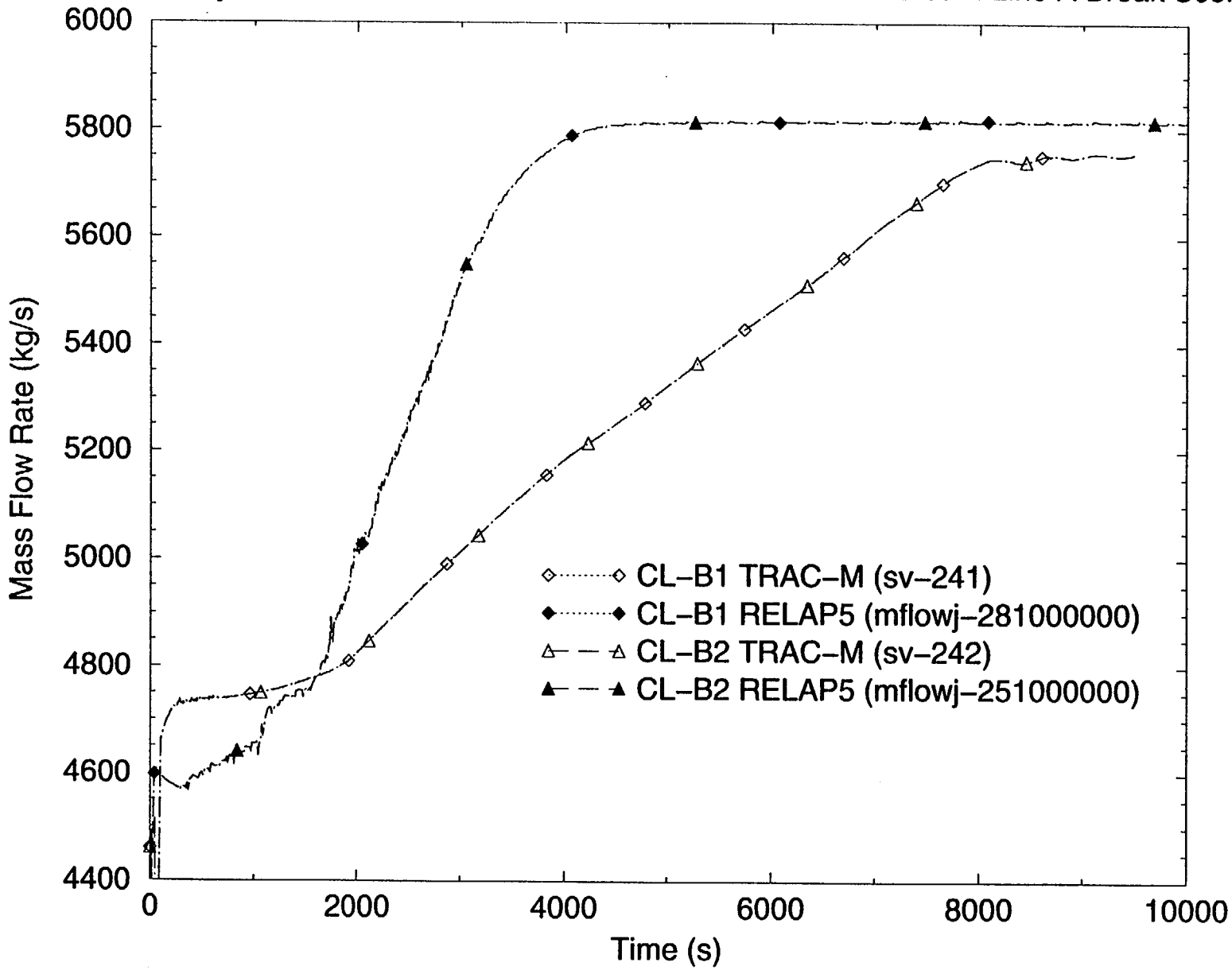


Figure 5.2.13 Hot Leg Temperatures

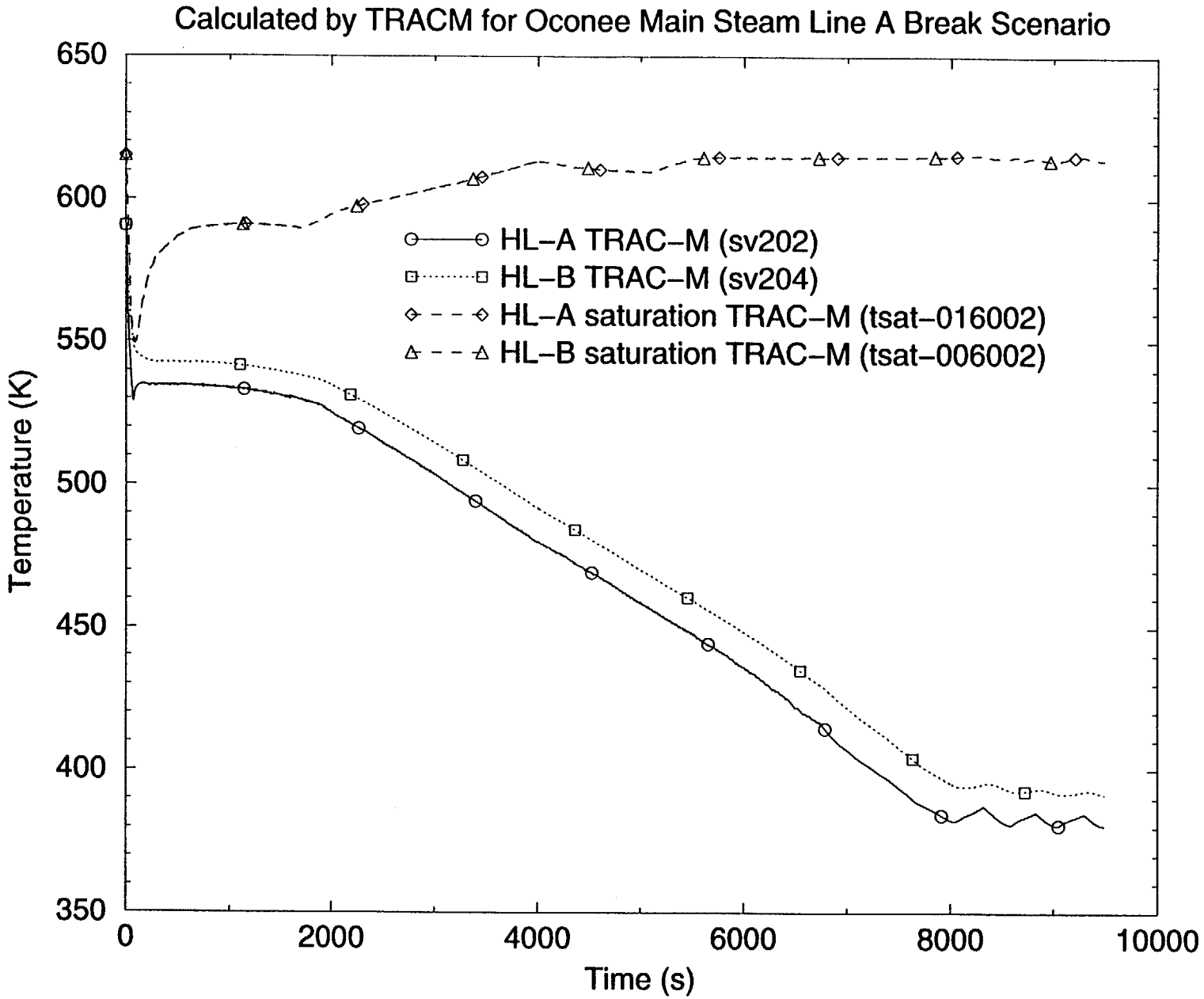


Figure 5.2.13A Hot Leg Temperatures

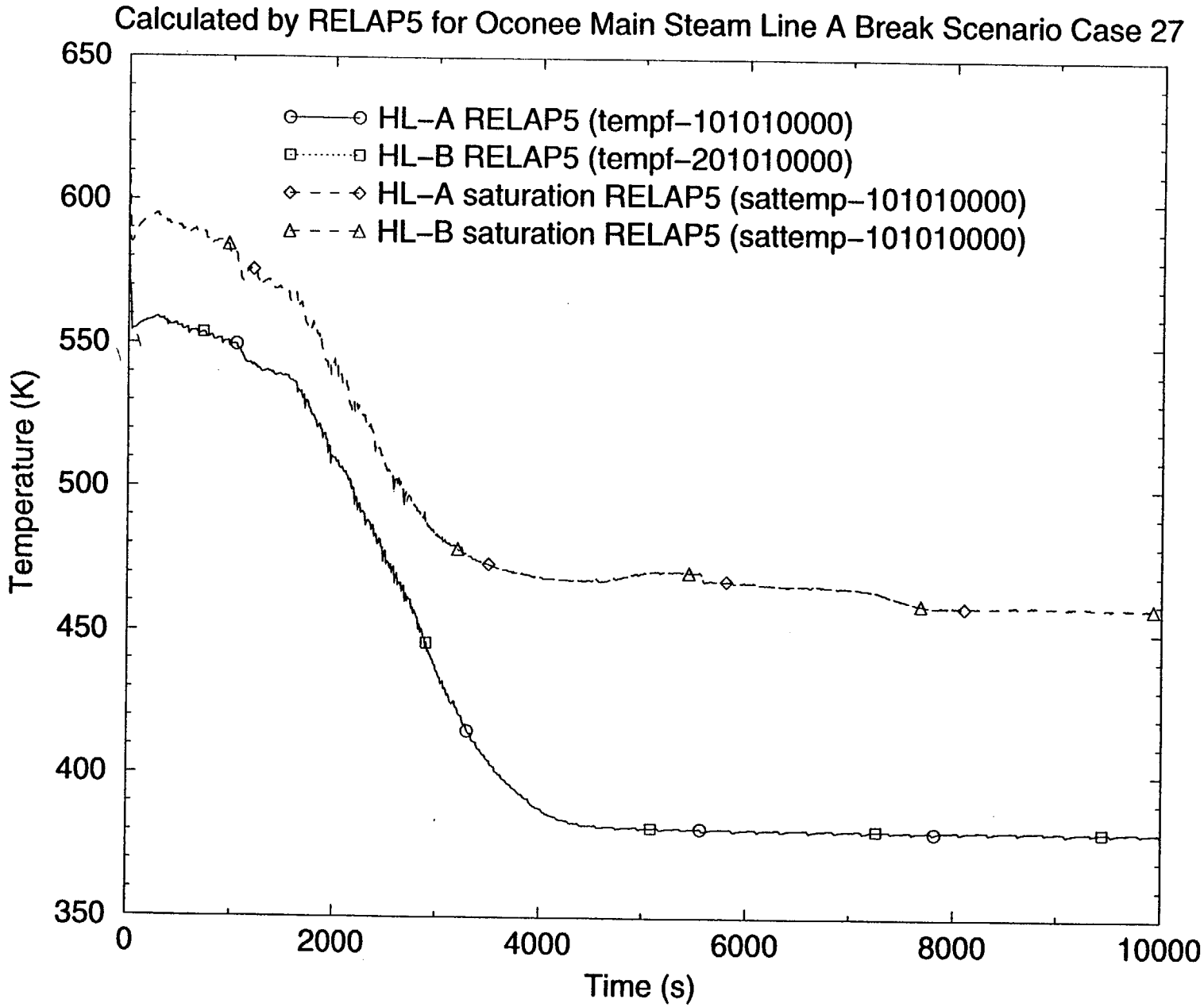


Figure 5.2.14 Cold Leg Temperatures

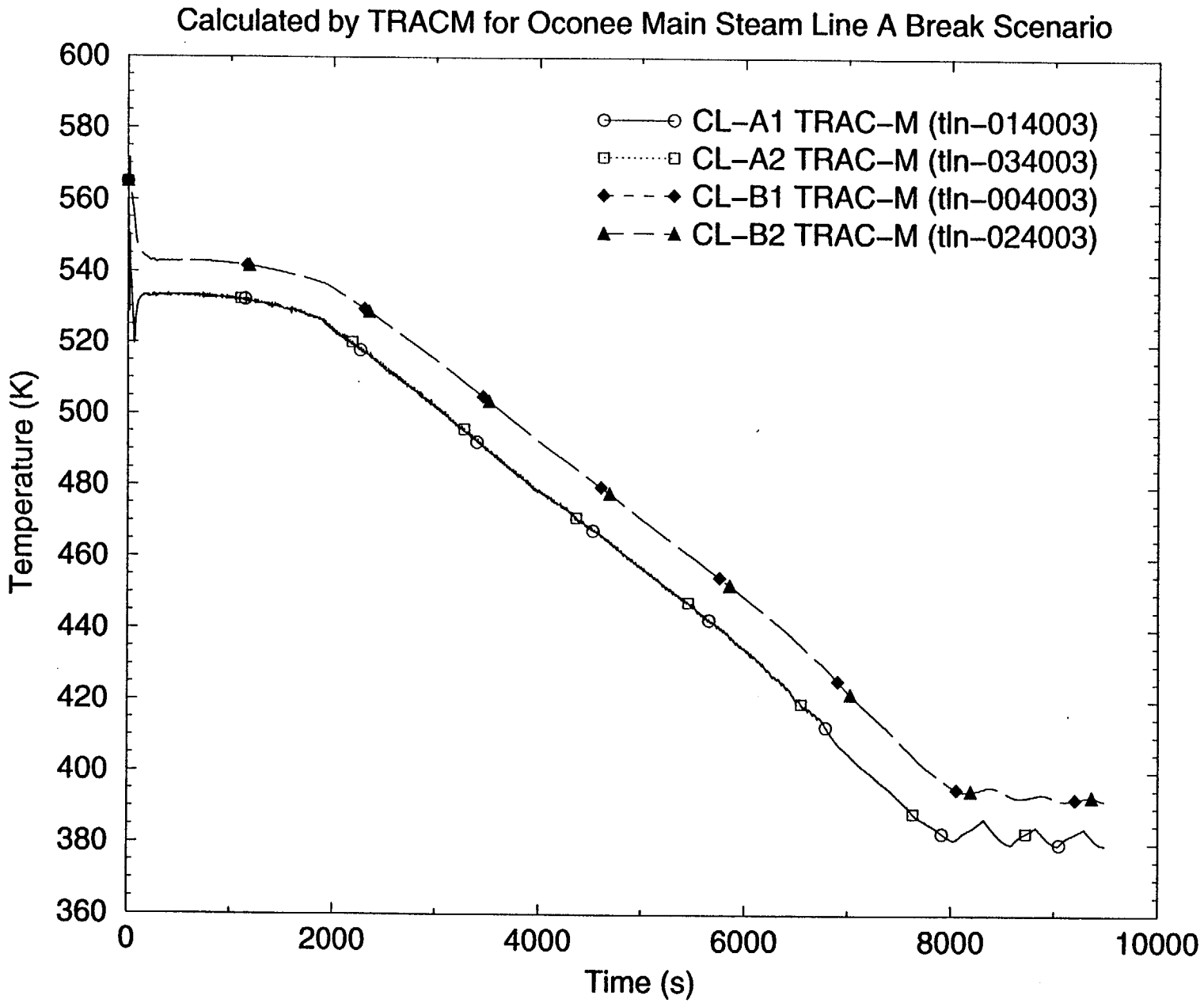


Figure 5.2.15 Cold Leg Temperatures

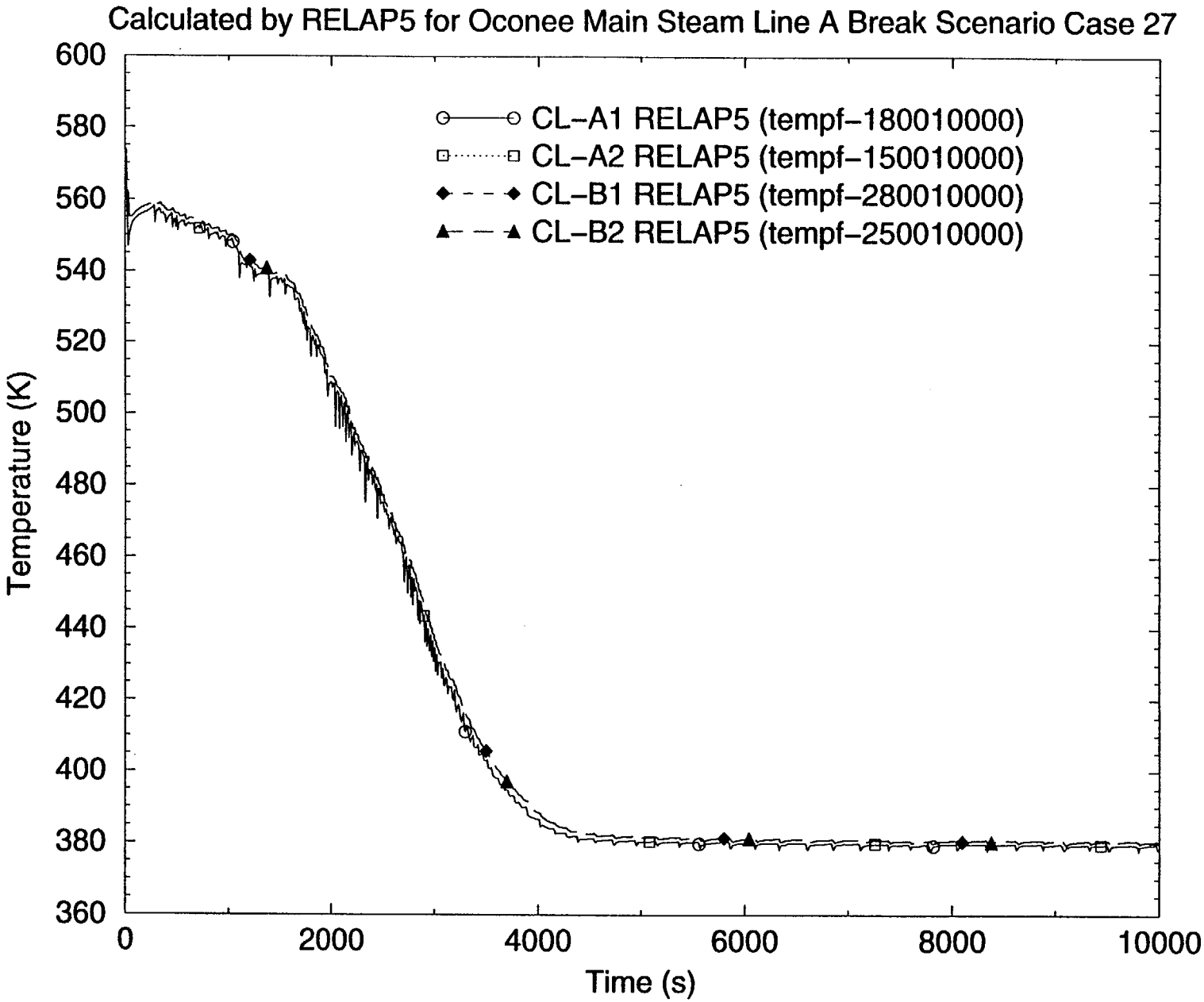


Figure 5.2.16 Total Emergency Feedwater Flow Rates

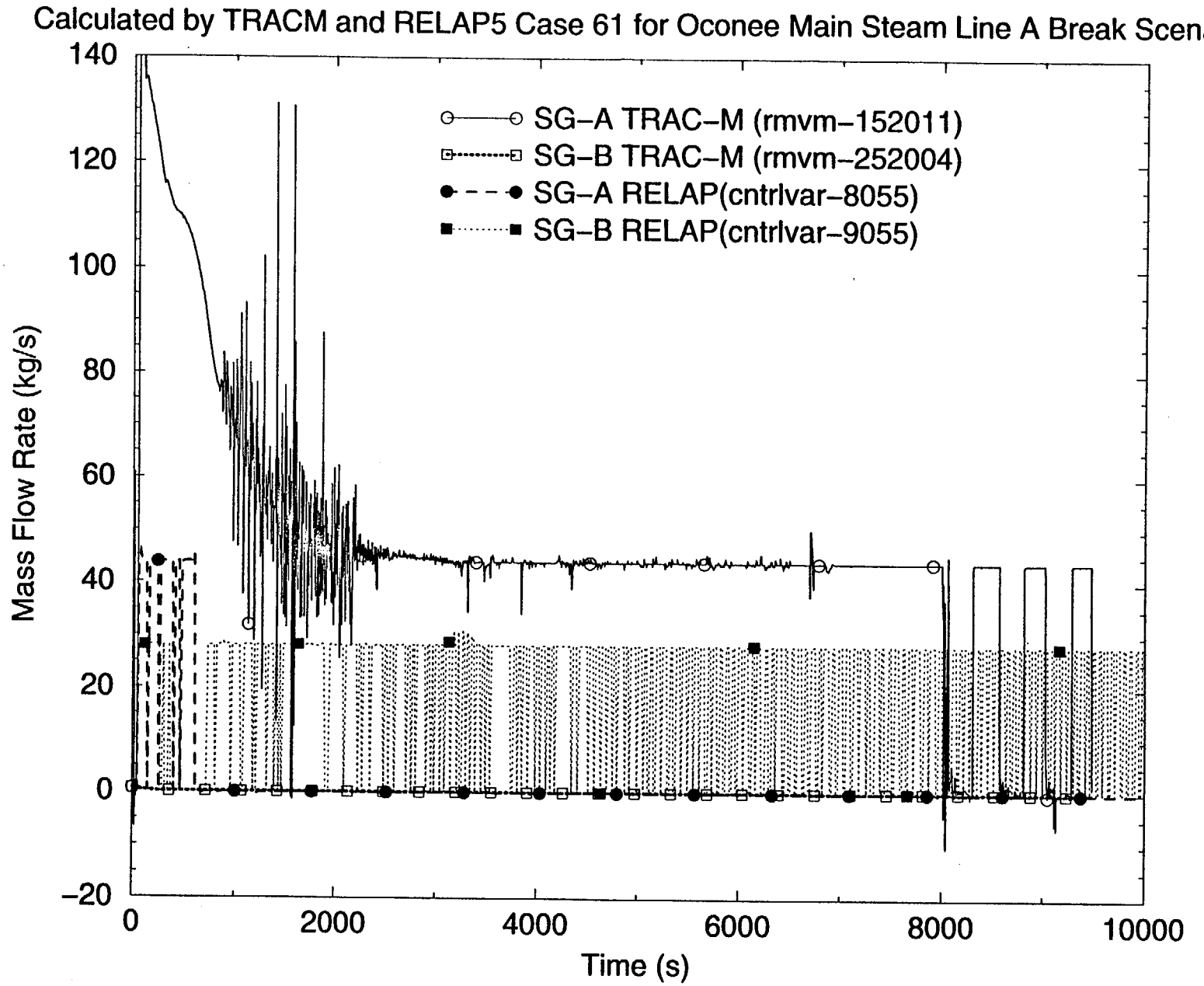


Figure 5.2.17 Downcomer Mid-Elevation Pressure

Calculated by TRACM and RELAP5 Case 61 for Oconee Main Steam Line A Break Scenario

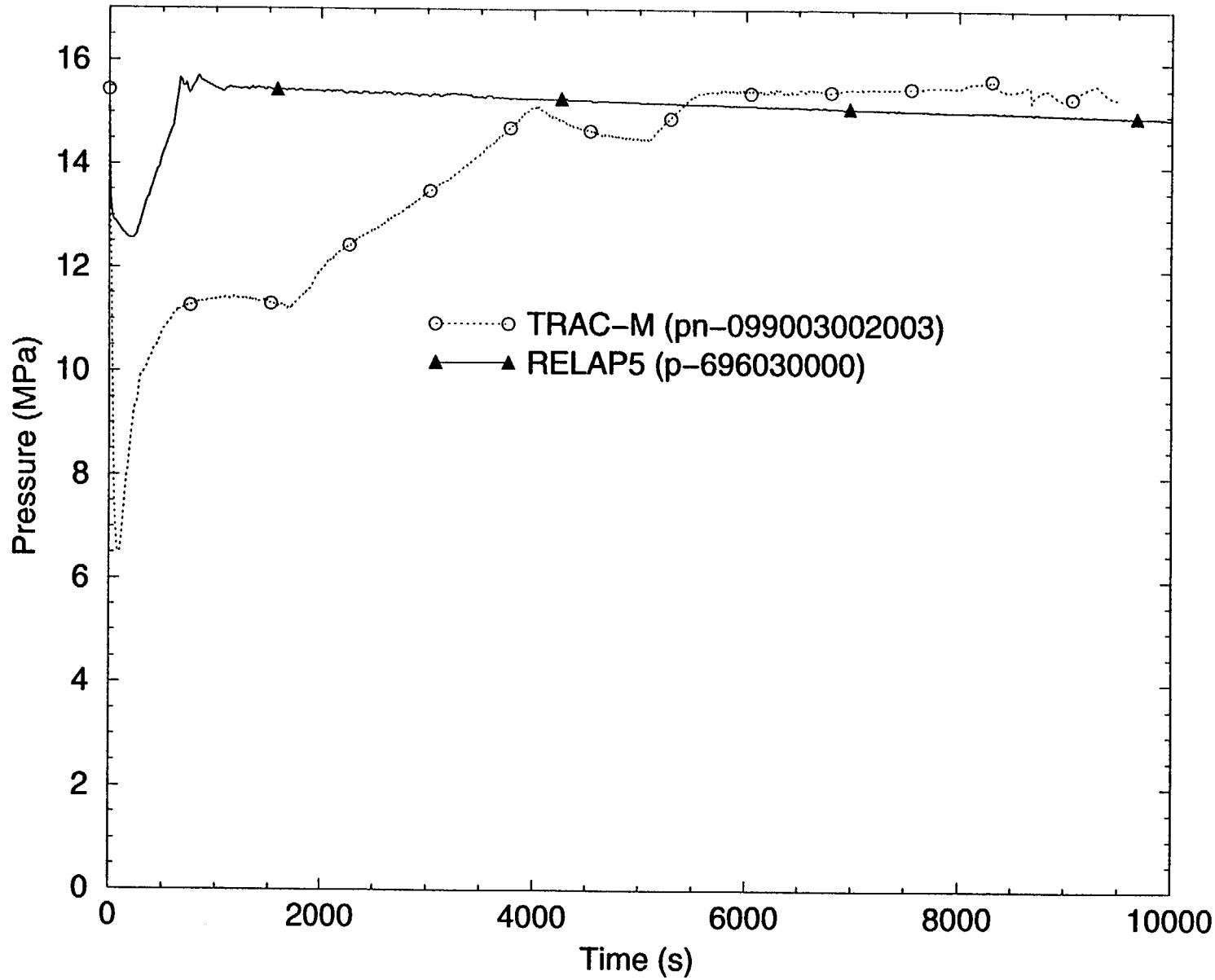


Figure 5.2.18 Makeup/Letdown Flow

Calculated by TRACM and RELAP5 Case 61 for Oconee Main Steam Line A Break Scenario

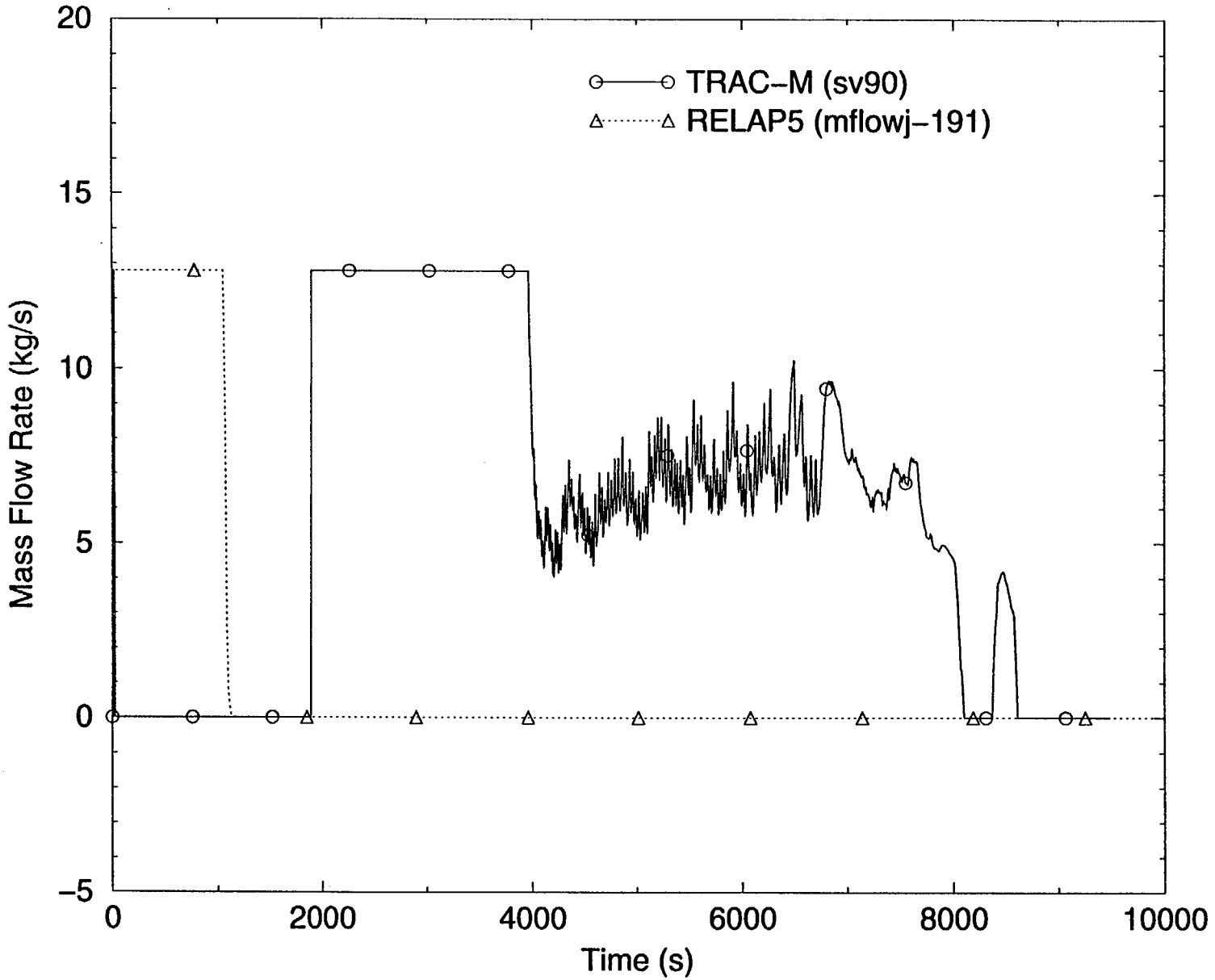
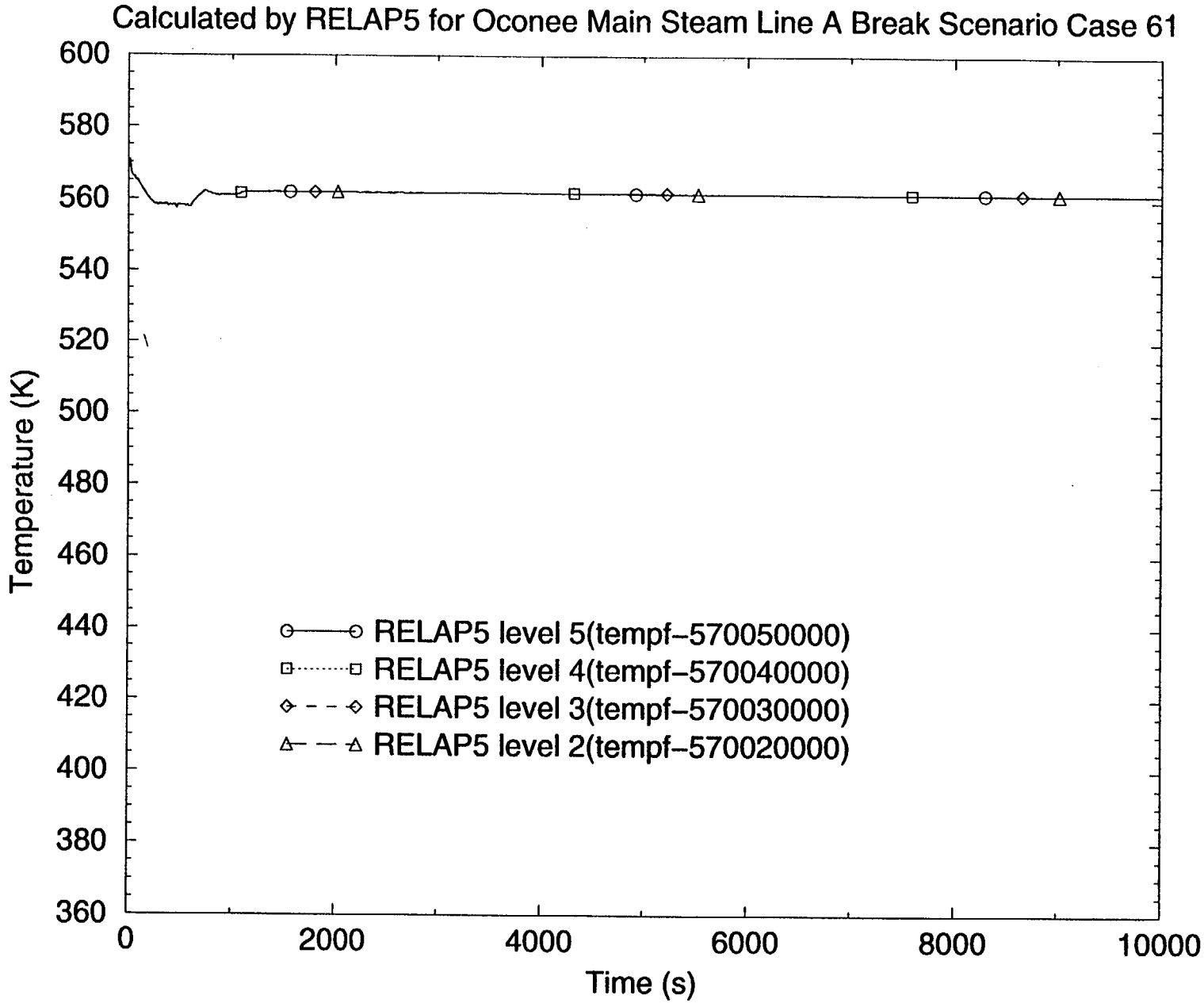


Figure 5.2.19 Downcomer Liquid Temperatures



5.3 Steam Generator Overfeed

RELAP5 SG overfeed Case 19 is compared with a TRAC-M case in this Section.

5.3.1 Sequence of Events

A scenario selected for an overfeed to steam generators started with the reactor scram. Timing of major events is shown in Table 5.3.1. RCPs were not tripped because there was always sufficient subcooling margin. Since the pressure did not decrease much, as shown in Figure 5.3.1, HPI was not actuated, and vent valves stayed shut. The reason for a rapid initial reduction in pressure in Figure 5.3.1 for both TRAC-M and RELAP5 calculations was a rapid reduction of core power while losing heat through steam generators even though the rate of heat removal in SGs is greatly reduced as shown in Figures 5.3.2 and 5.3.3. The pressure calculated by RELAP5 was less than that of TRAC-M because a liquid level control setpoint of 5.7m (224") used by RELAP5 was less than that of TRAC-M (6.4m [252"]) as shown in Figure 5.3.4. Because of this difference, TRAC-M calculated a higher temperature in the pressurizer top region than RELAP5 as shown in Figure 5.3.5 which shows quite similar differences in level as the pressure plots (Figure 5.3.1). The pressure reduction during the first 1000 seconds was recovered quickly by the makeup flow as shown in Figure 5.3.6.

The pressurizer was refilled starting at 900 seconds for TRAC-M versus at 930 seconds for RELAP5 as shown in Figure 5.3.4. In RELAP5 case there was a small temporary refill at 80 seconds, but it lasted only for 100 seconds, and the liquid level was decreasing again until the second and final refilling time of 930 seconds. The pressurizer level was overshot to 7m (276") at 1200 seconds for TRAC-M while it was overshot to 7.3m (287") at 1500 seconds for RELAP5 before it was settled to 6.6m at 2500 seconds and to 6.4m (252") at 7000 seconds for TRAC-M and 5.7m (224") at 4000 seconds for RELAP5.

In TRAC-M, turbine bypass valves opened at 20 seconds and closed at 50 seconds and subsequently opened and closed periodically. In RELAP5, turbine bypass valves opened at 1 second, closed at 110 seconds, reopened at 1750 seconds, and remained open afterwards. Turbine bypass flow rates are shown in Figures 5.3.7 and 5.3.8, respectively, for TRAC-M and RELAP5. Steam line SRVs opened at 20 seconds and closed at 82 seconds in TRAC-M while they opened at 1 second and closed at 60 seconds in RELAP5. The flow rates through steam line SRVs are shown in Figure 5.3.9.

MFW pumps tripped immediately after the reactor scram which occurred at the start of the transient. The MFW flow rates were ramping down in both TRAC-M and RELAP5 cases as shown in Figure 5.3.10.

The EFW flows are shown in Figures 5.3.11 and 5.3.12, respectively, for TRAC-M and RELAP5. The EFW came on immediately after MFW pumps tripped off and stayed on until 914 seconds in TRAC-M and until 970 seconds in RELAP5 after which the EFW pumps were turned off because SGs were flooded as shown in Figure 5.3.13. After 1630 seconds in TRAC-M and after 1760 seconds in RELAP5 the EFW pumps were turned on and off to maintain the SGs to be full of liquid (i.e., 96 percent of the operating range). Since the EFW flows calculated by both TRAC-M and RELAP5 were highly oscillatory, as shown in Figures 5.3.11 and 5.3.12, they were integrated and plotted in Figure 5.3.13A to see how much EFW flows were delivered to SGs. RELAP5 calculated about 50 percent more than what TRAC-M calculated. The reason for the

higher value of RELAP5 was that the RELAP5 calculated steam flows leaving SGs were also higher than the TRAC-M-calculated values by about 50 percent as shown in Figure 5.3.13B. In other words, in RELAP5, more flows were leaving SGs, and thus more EFW flows had to be supplied to maintain the same liquid level in SGs.

The primary liquid volume shrinkages due to SG overfeed was not significant enough to cause any void to occur at the top of hot legs, nor at the top of the downcomer, nor in the vessel upper head.

5.3.1 Comparison of Sequence of Events Between TRAC-M and RELAP5 Calculations for a Steam Generator Overfeed Scenario

	TRAC-M Seconds	RELAP5 Case 19 Seconds
1. Reactor scram	0	0
2. RCP trip	Did not trip	Did not trip
3. HPI actuation	Did not actuate	Did not actuate
4. Vent valve opening	Did not open	Did not open
5. Pressurizer refill	900	First refill at 80 seconds for 100 seconds followed by the second refill at 930 seconds
6. Turbine bypass valve opening and closing	Opened at 20 seconds, Closed at 50 seconds, and then opened and closed periodically	Opened at 1 second, closed at 110 seconds, reopened at 1750 seconds, and remained open afterwards
7. Steam line safety valve opening	20 to 77 seconds	1 to 60 seconds
8. Main feedwater pump trip	0	0
9. Emergency feedwater pump on	2–914 periodically after 1630 seconds	2–970 periodically after 1760 seconds
10. Vessel upper head voiding	Did not occur	Did not occur
11. Upper downcomer voiding	Did not occur	Did not occur
12. Hot leg top voiding	Did not occur	Did not occur

5.3.2 Main Pressurized Thermal Shock Parameters

The minimum downcomer liquid temperatures are shown in Figures 5.3.14 and 5.3.15, respectively, for TRAC-M and RELAP5. In TRAC-M the minimum temperature of 542K occurred at 910 seconds while in RELAP5 the minimum temperature of 537K occurred at 940 seconds. The minimum temperatures occurred relatively early since the core power input was drastically reduced as the reactor scrammed at the start of the transient while the heat extraction through SGs stayed relatively high, as shown in Figure 5.3.16, even though this was also greatly reduced from the steady state value of 100 percent power level. Between about 1000 seconds and about 1750 seconds the heat transfer rates in SGs were drastically reduced because of no steam flows from SGs as shown in Figure 5.3.16, resulting in a heat-up in both the primary and the secondary systems (Figures 5.3.1 and 5.3.17). There were no turbine bypass flows and thus no flows in SGs and consequently no heat transfer in SGs between about 1000 seconds and 1750 seconds. In order to have turbine bypass flows in this time period, the steam line pressure had to be higher than the pressure set point for opening turbine bypass valves.

The downcomer pressure in the downcomer is shown in Figure 5.3.18. It is seen that at the time of the minimum downcomer temperature TRAC-M calculated 13.4 MPa as compared to 12.2 MPa by RELAP5. The behavior of the downcomer pressure was quite similar to the pressurizer pressure as discussed previously in Section 5.3.1.

The minimum and the maximum heat transfer coefficients are shown in Figures 5.3.19 and 5.3.20, respectively, for TRAC-M and RELAP5. The maximum heat transfer coefficient at the time of the minimum downcomer temperature was 28,200 W/(m*m K) in TRAC-M and 30,600 W/(m*m K) in RELAP5 while the minimum heat transfer coefficient at the same minimum downcomer temperature was 22,600 W/(m*m K) in TRAC-M and 24,500 W/(m*m K) in RELAP5. The maximum occurred at the bottom node of downcomer sector beneath hot leg "A" or "B" in TRAC-M and at the bottom node of downcomer sector beneath Cold Leg B2 in RELAP5. The minimum occurred at the bottom node of downcomer sector beneath cold leg "A1", "A2", "B1", or "B2" in TRAC-M and at the upper part (the first node below the cold leg junction) of a sector located between cold leg "A1" and "A2" or between cold leg "B1" and "B2" in RELAP5.

5.3.3 Other Plant Parameters

Besides four parameters of main interest for PTS concerns as discussed in Section 5.3.2, there are four additional plant parameters of next highest interest. They are the cold leg flow rate and temperature and the hot leg flow rate and temperature.

The cold leg flow rates are shown in Figures 5.3.21 and 5.3.22 which show an excellent agreement between TRAC-M and RELAP5 calculation results. Cold leg flow rates peaked at about 910 seconds in TRAC-M and about 930 seconds in RELAP5 as a result of a higher density of liquid due to repressurization by the influx of the makeup flow.

The hot leg flow rates are shown in Figure 5.3.23 which also show an excellent agreement between TRAC-M and RELAP5. As in cold leg flow rates, the hot leg flow rates also peaked at around 900 seconds for the same reason as for the cold leg flow rates (i.e., a higher density).

The cold leg temperatures are shown in Figure 5.3.24 for TRAC-M results and in Figure 5.3.25 for RELAP5 results. TRAC-M results show the minimum cold leg temperature to be 541K in cold leg "A1" and "A2" and 544K in cold leg "B1" and "B2" while RELAP5 results show the minimum temperature to be 537K in all cold legs. Both TRAC-M and RELAP5 show the same final temperature of about 560K which was maintained indefinitely after 2000 seconds.

The hot leg temperatures are shown in Figure 5.3.26 which also shows an excellent agreement between TRAC-M and RELAP5 except for the minimum temperatures which are different up to 7 K. RELAP5 shows a lower minimum temperature of 538K versus the TRAC-M minimum temperature of 542K for hot leg "A" and 545 K for hot leg "B".

5.3.4 Pressurized Thermal Shock Implications

Both TRAC-M and RELAP5 calculation results show that the minimum downcomer temperature is much higher than the PTS screening criterion temperature, and thus the SG overfeed scenario considered here does not lead to any PTS concerns. For this scenario RCPs do not trip, and thus a normal loop flow is maintained, precluding the possibility of a stratified flow in the cold legs. Furthermore, the HPI flow which may cause PTS concerns is not even actuated because the primary system pressure stays above the HPI actuation point.

Text continues on page 131.

Figure 5.3.1 Primary System Pressures

Calculated by TRACM and RELAP5 for SG Overfeed Scenario

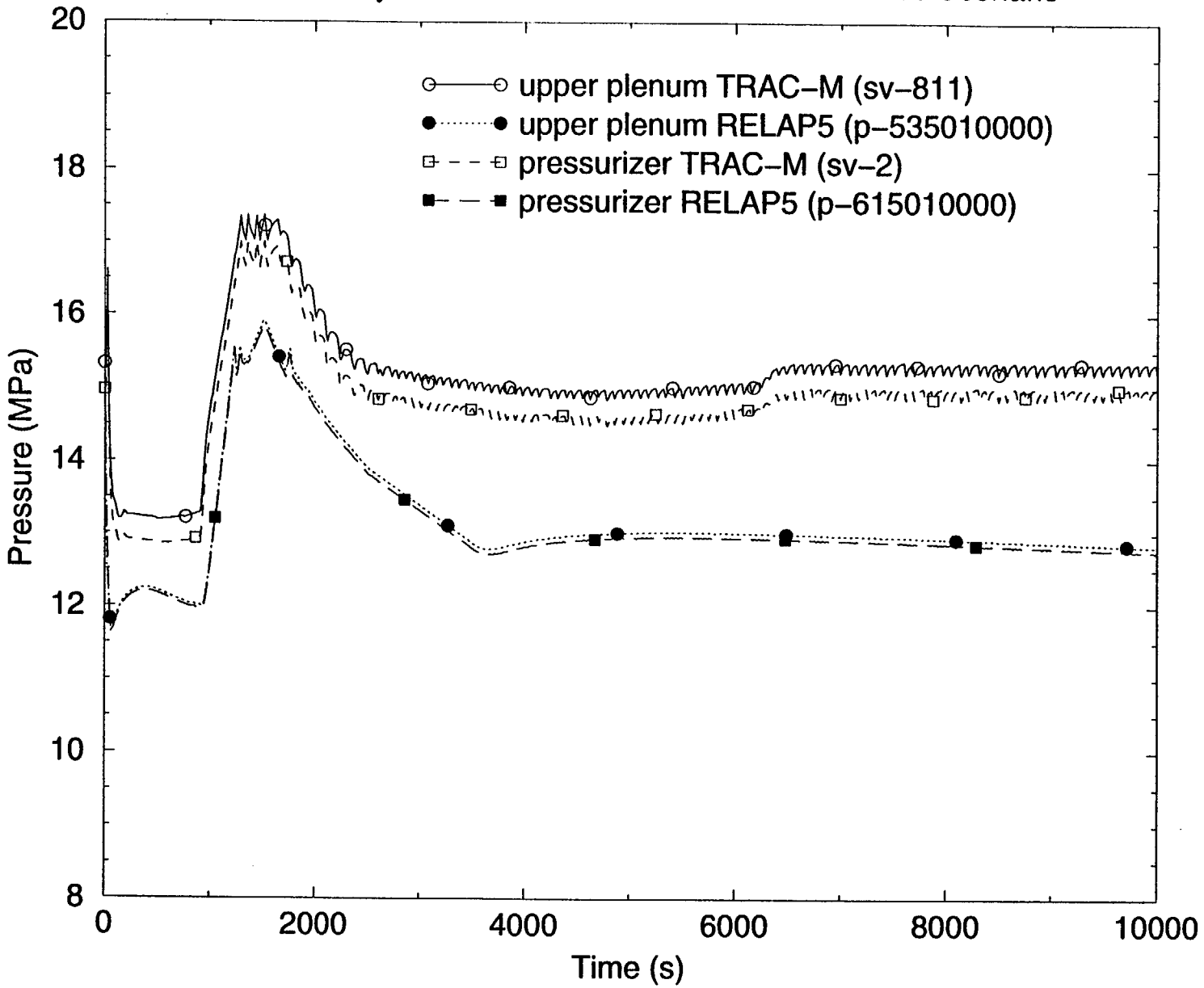


Figure 5.3.2 Reactor Power

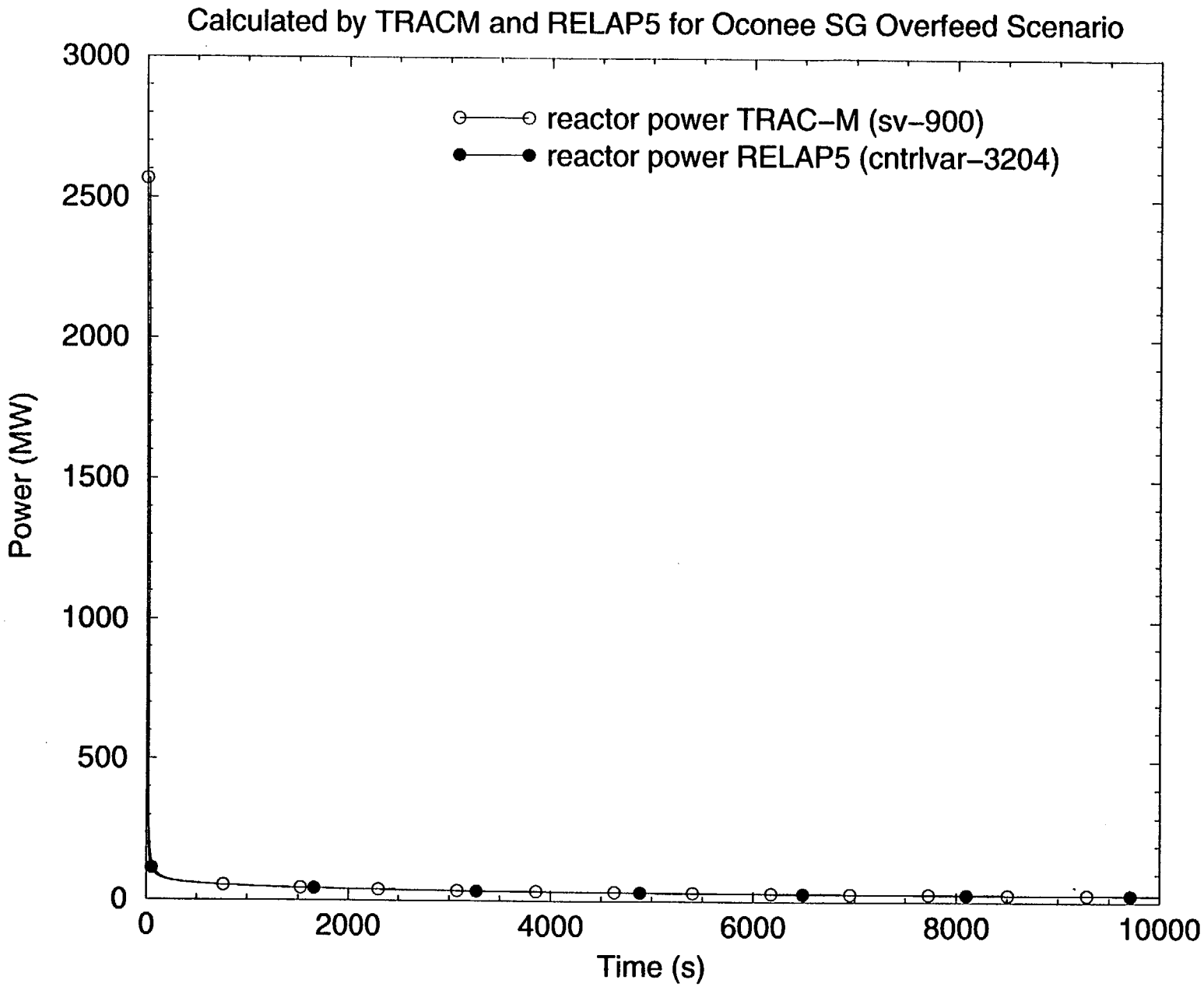


Figure 5.3.3 Heat Transfer Rates Through SGs

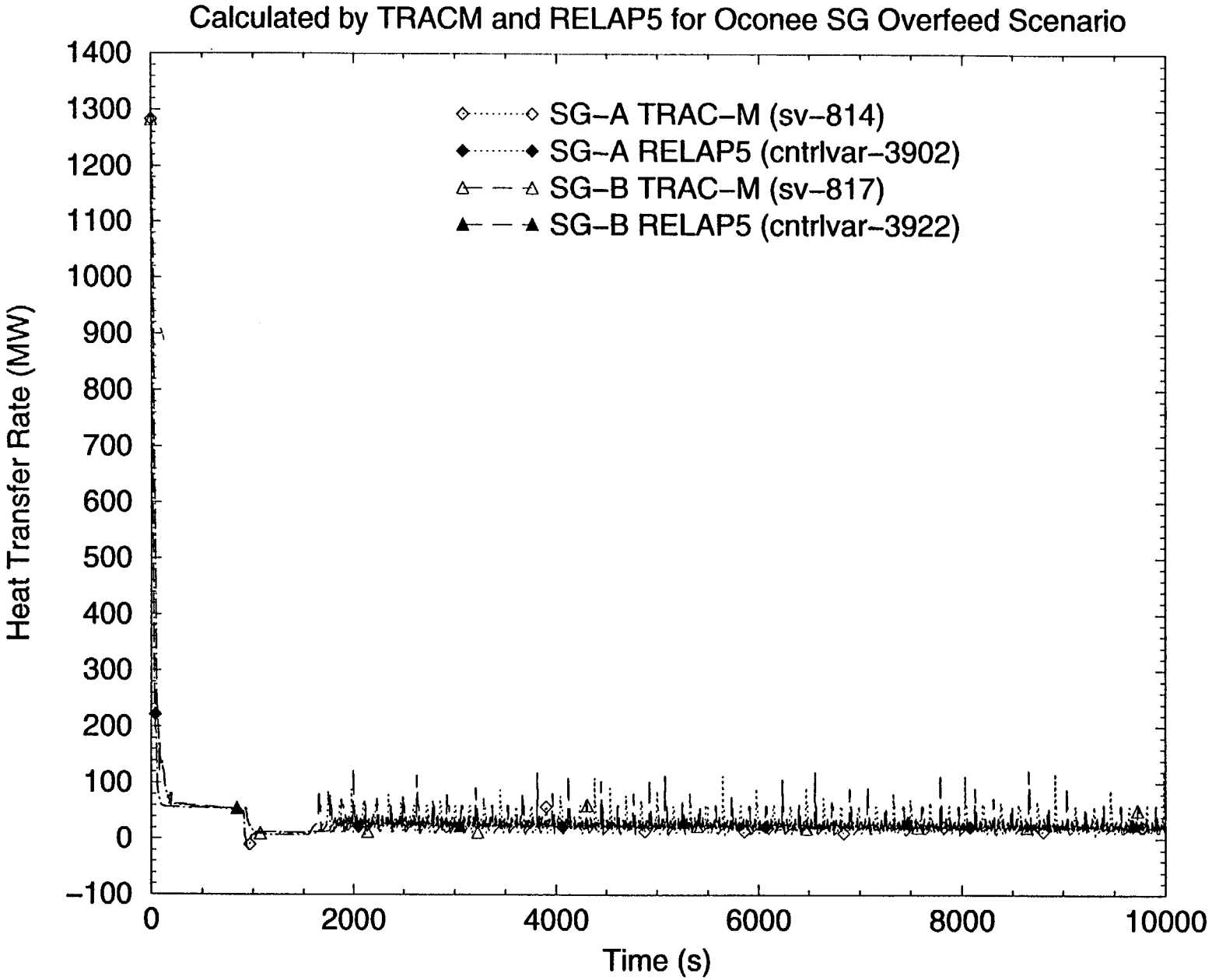


Figure 5.3.4 Pressurizer Water Level

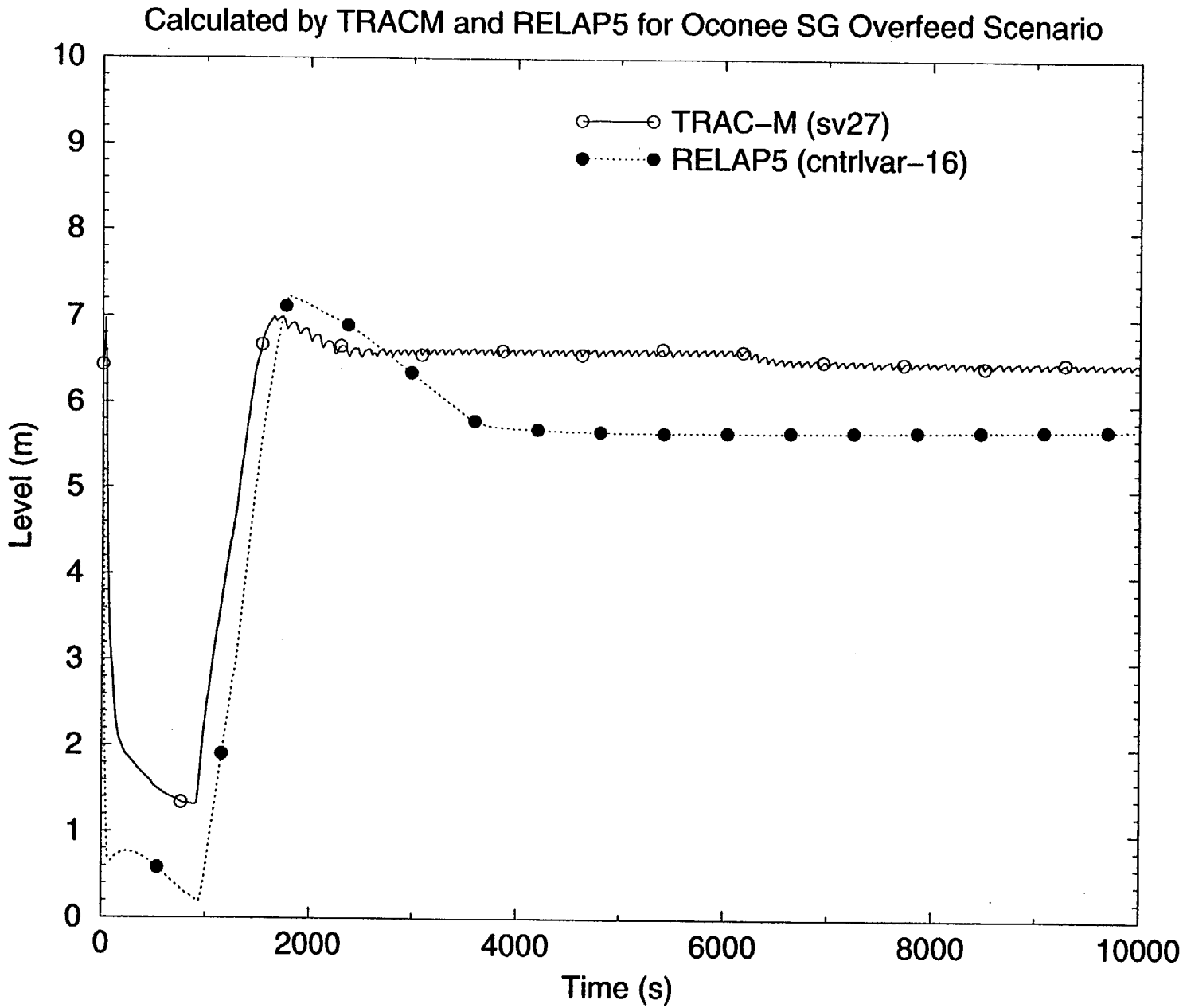


Figure 5.3.5 Temperature of Pressurizer Top Region

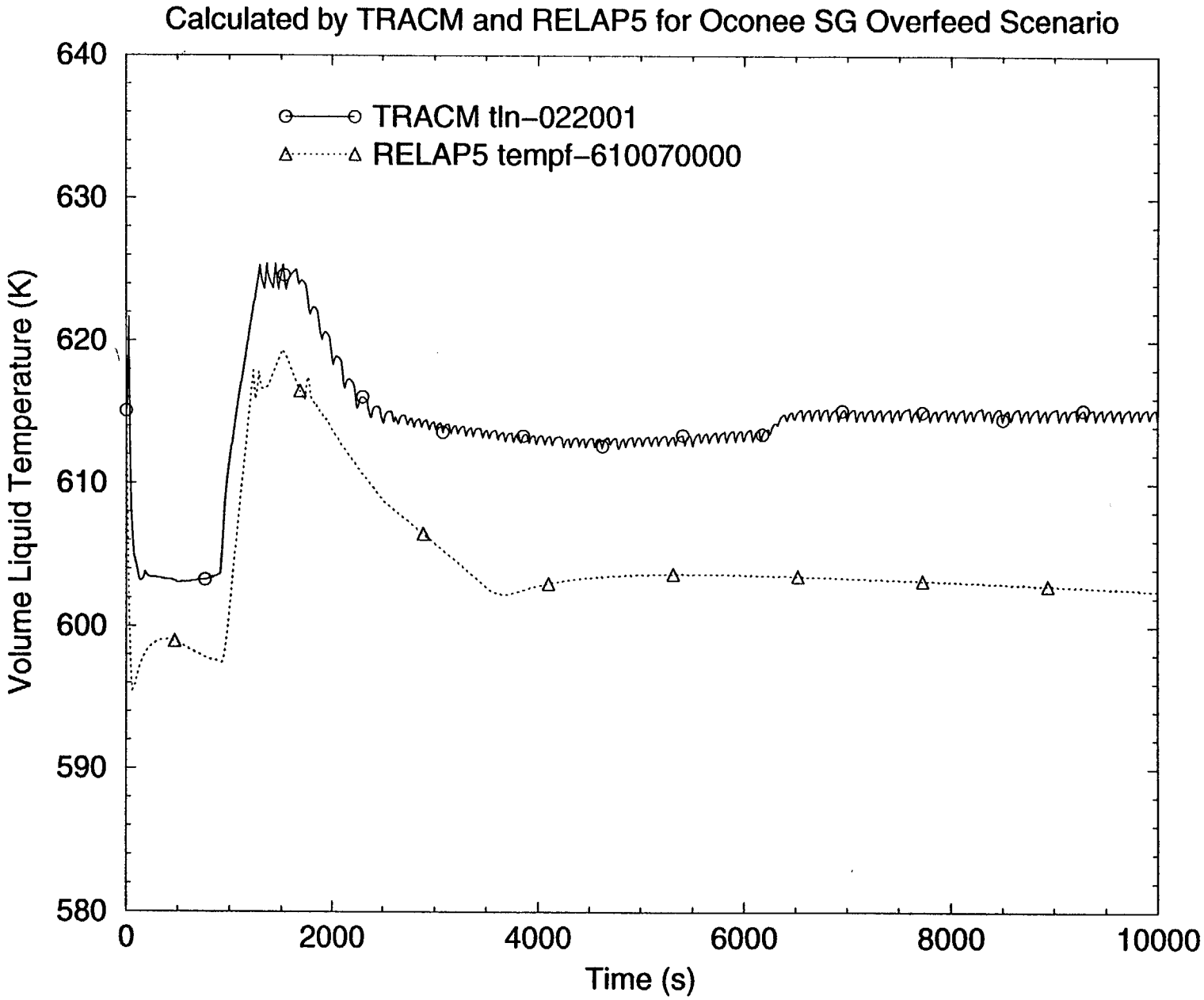


Figure 5.3.6 Makeup/Letdown Flow

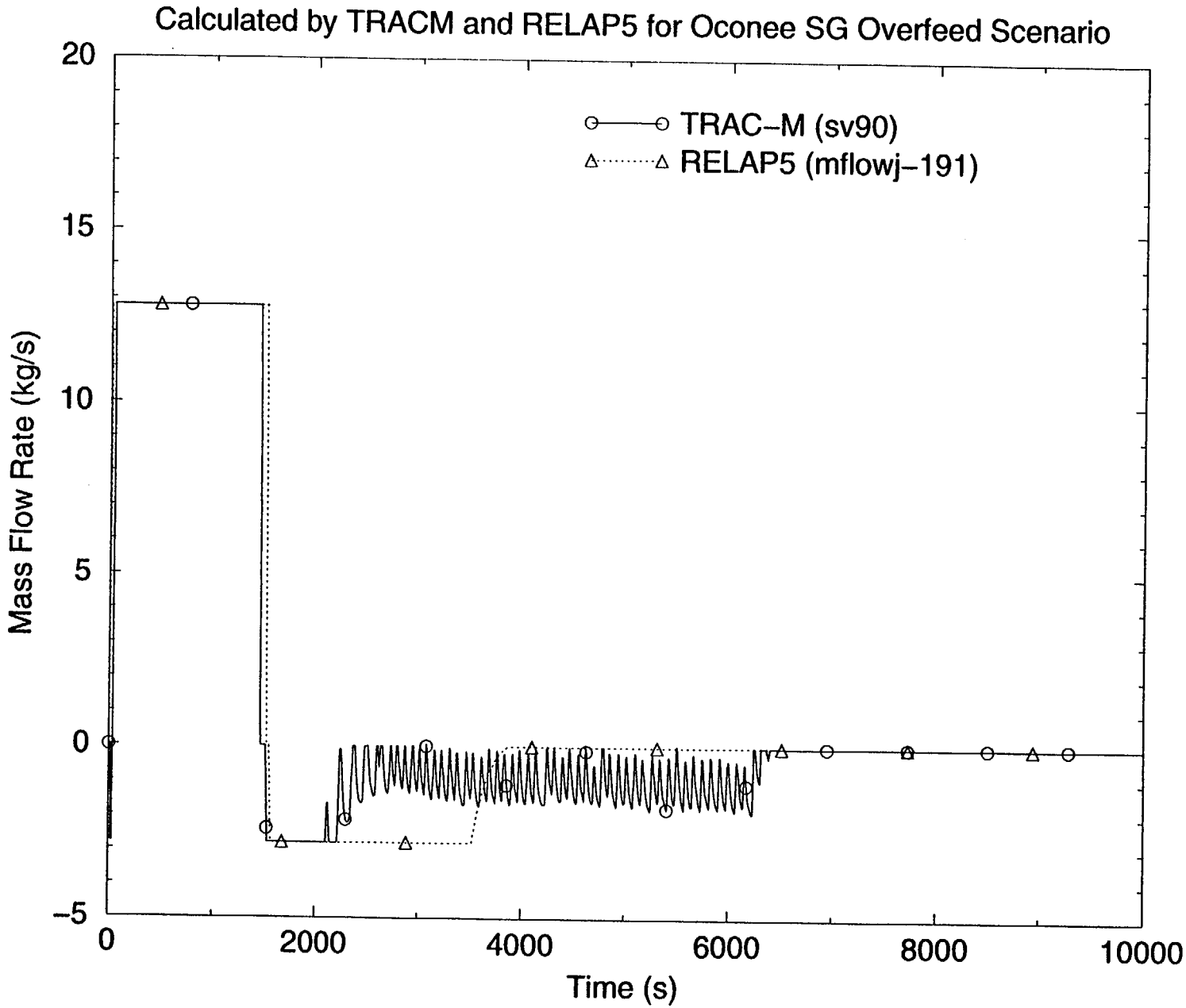


Figure 5.3.7 Turbine Bypass Flow Rates

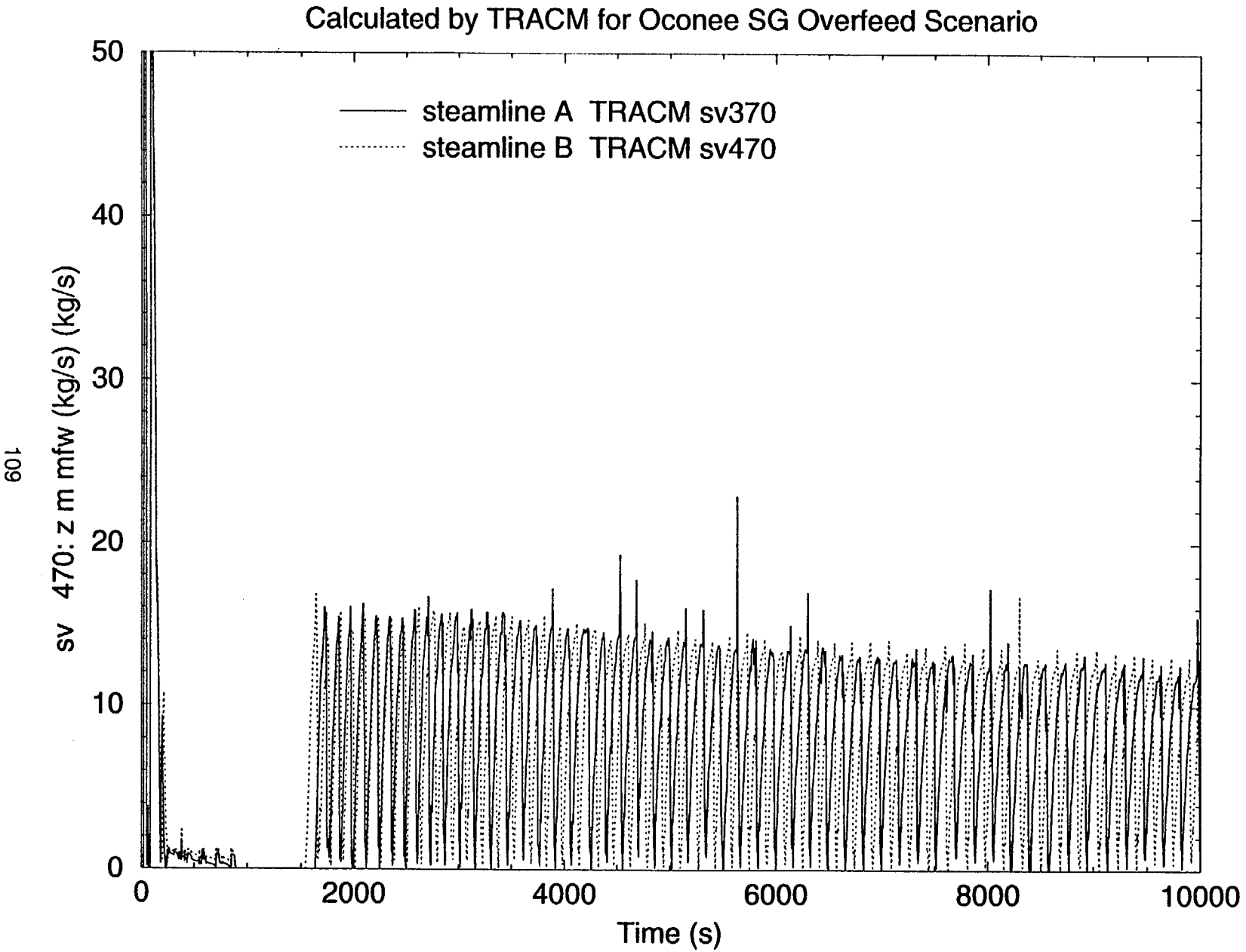


Figure 5.3.8 Turbine Bypass Flow Rates

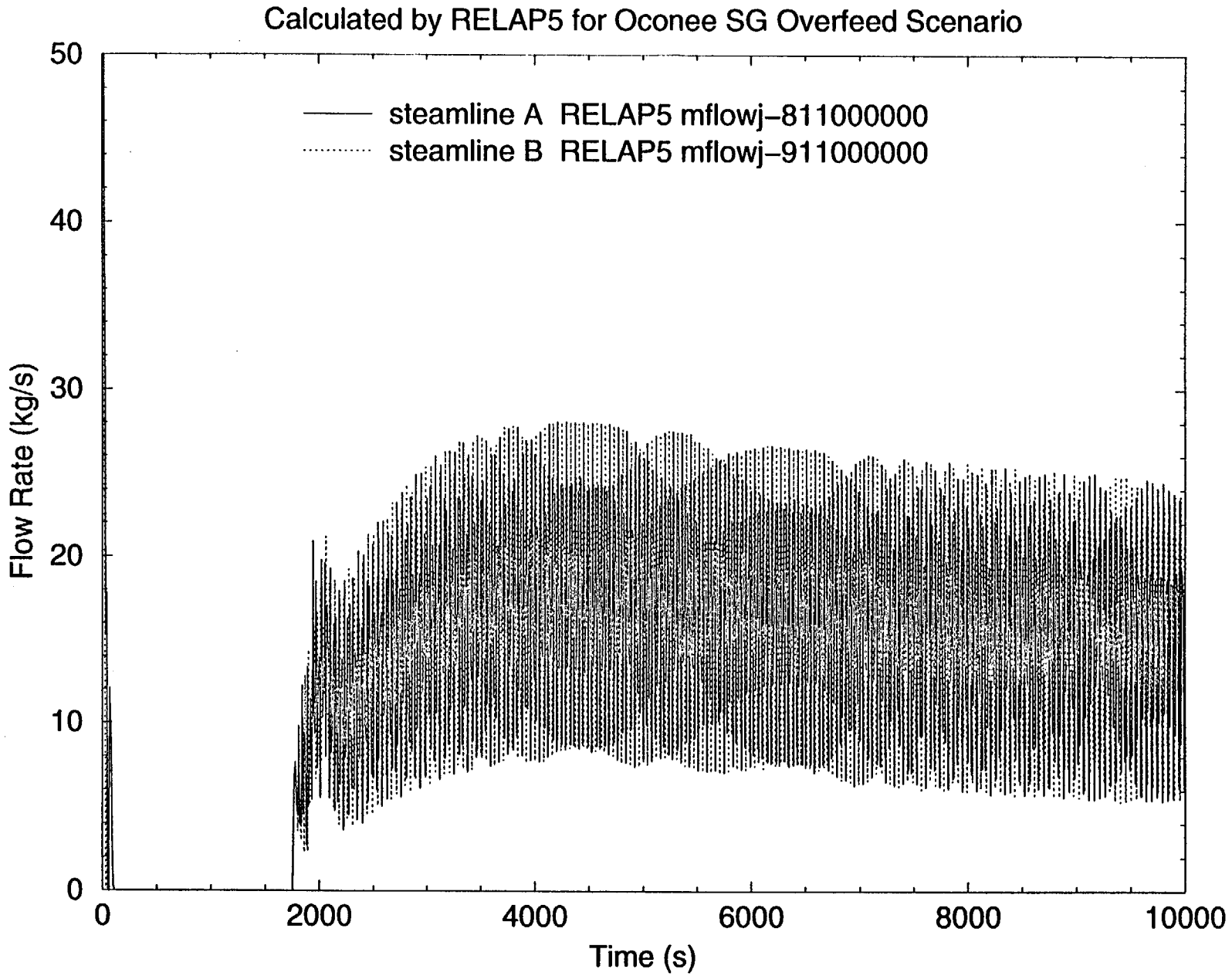


Figure 5.3.9 Steamline Safety Relief Valve Flow Rates

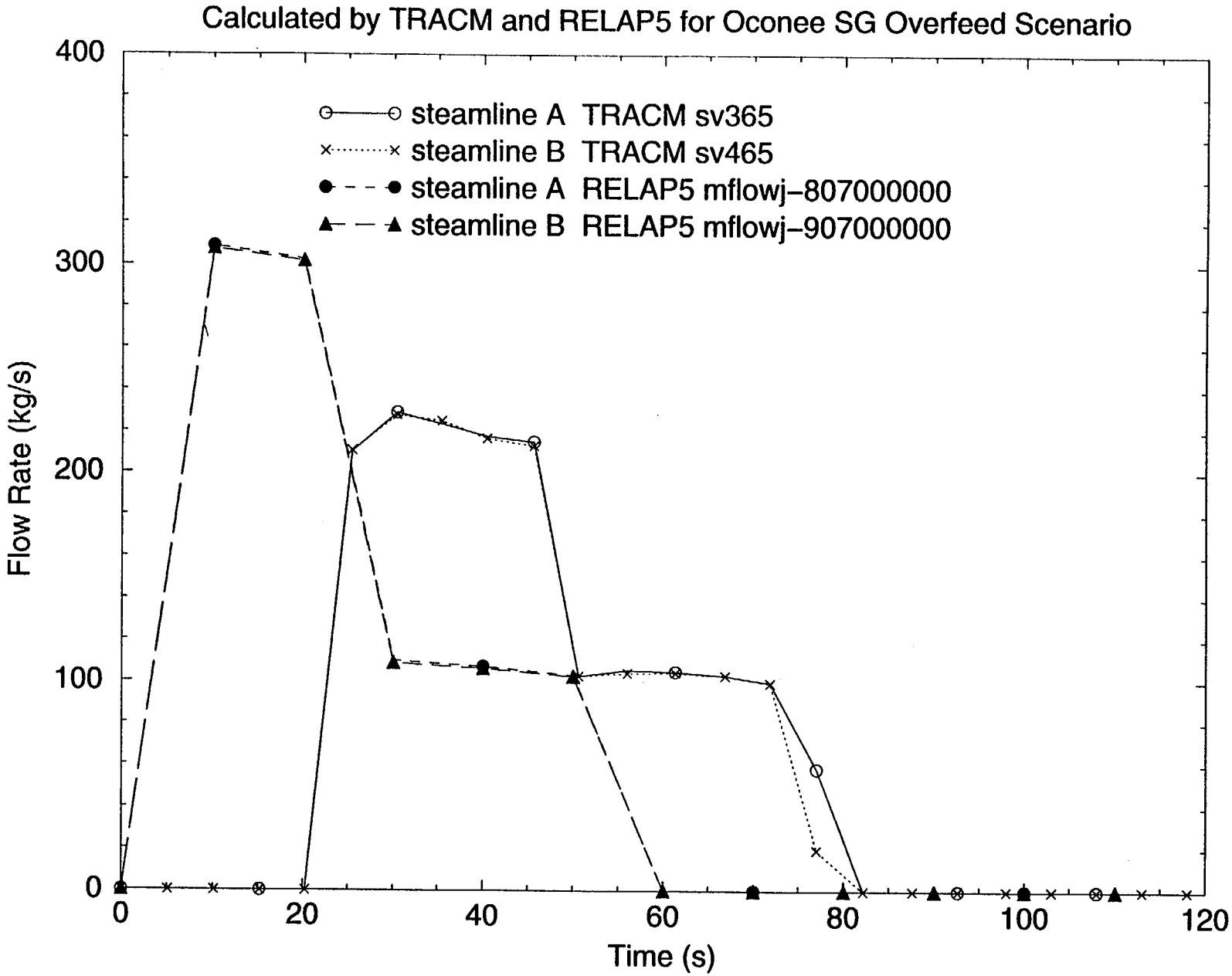


Figure 5.3.10 Main Feedwater Flow Rates

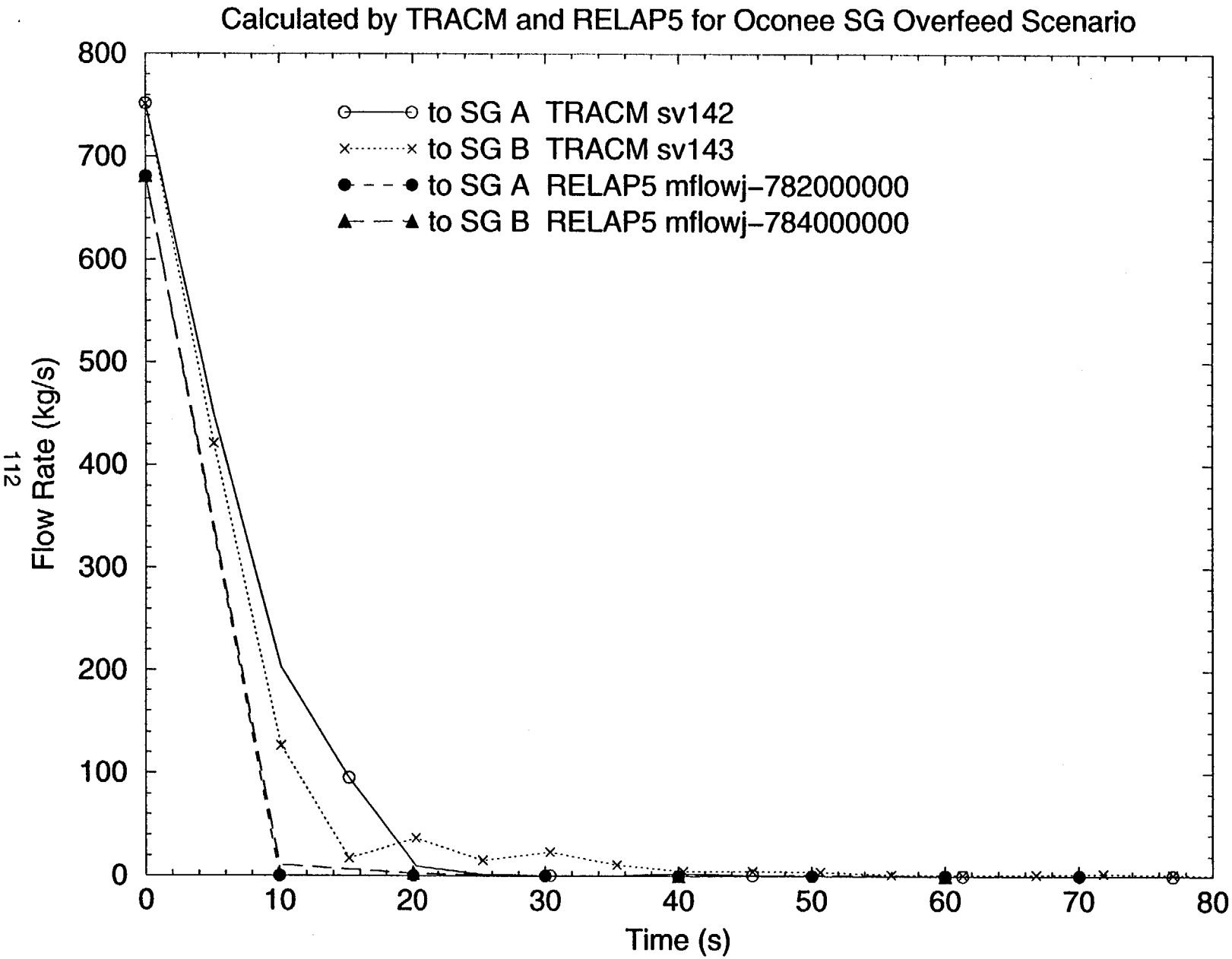


Figure 5.3.11 Total Emergency Feedwater Flow Rates

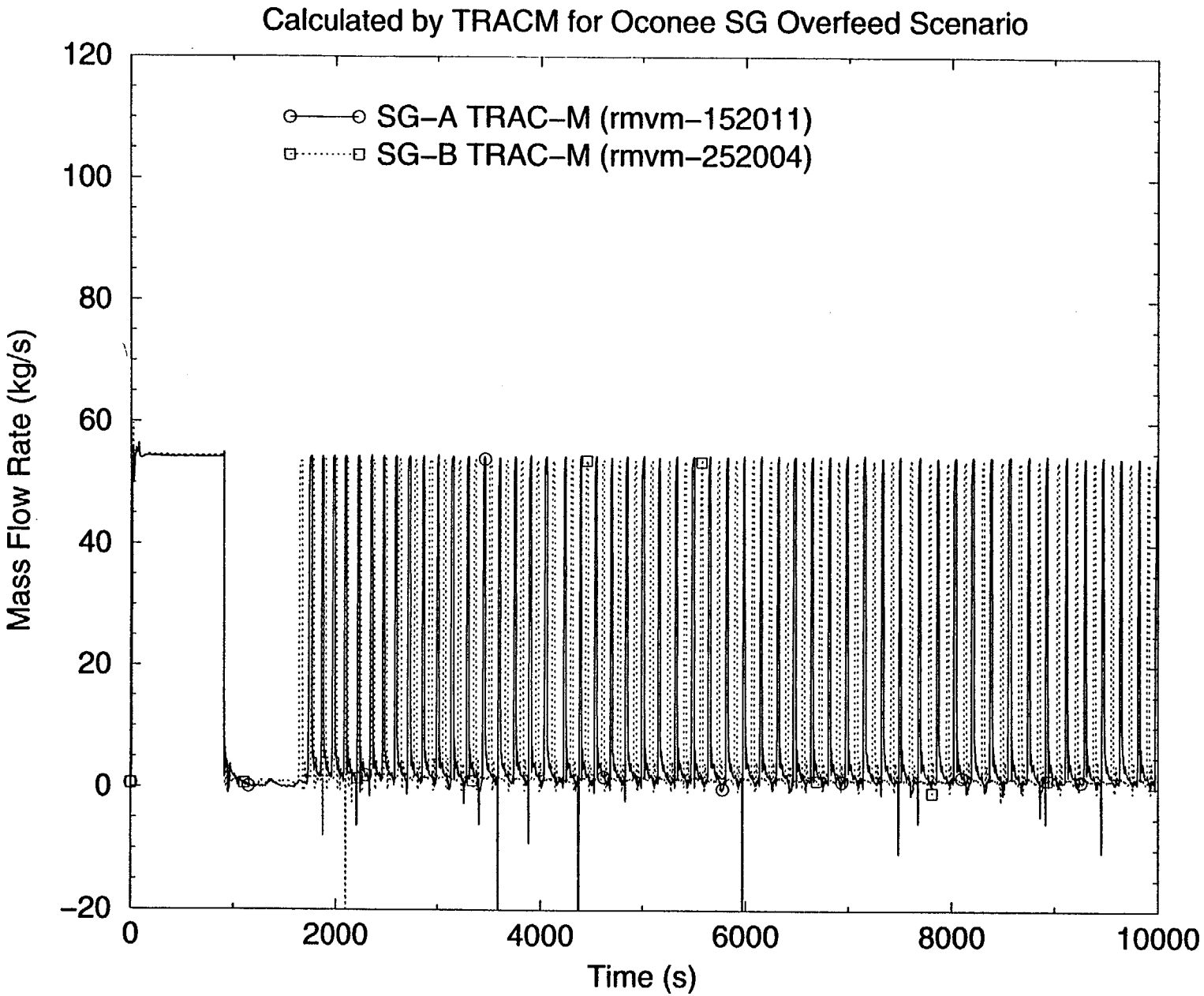


Figure 5.3.12 Total Emergency Feedwater Flow Rates

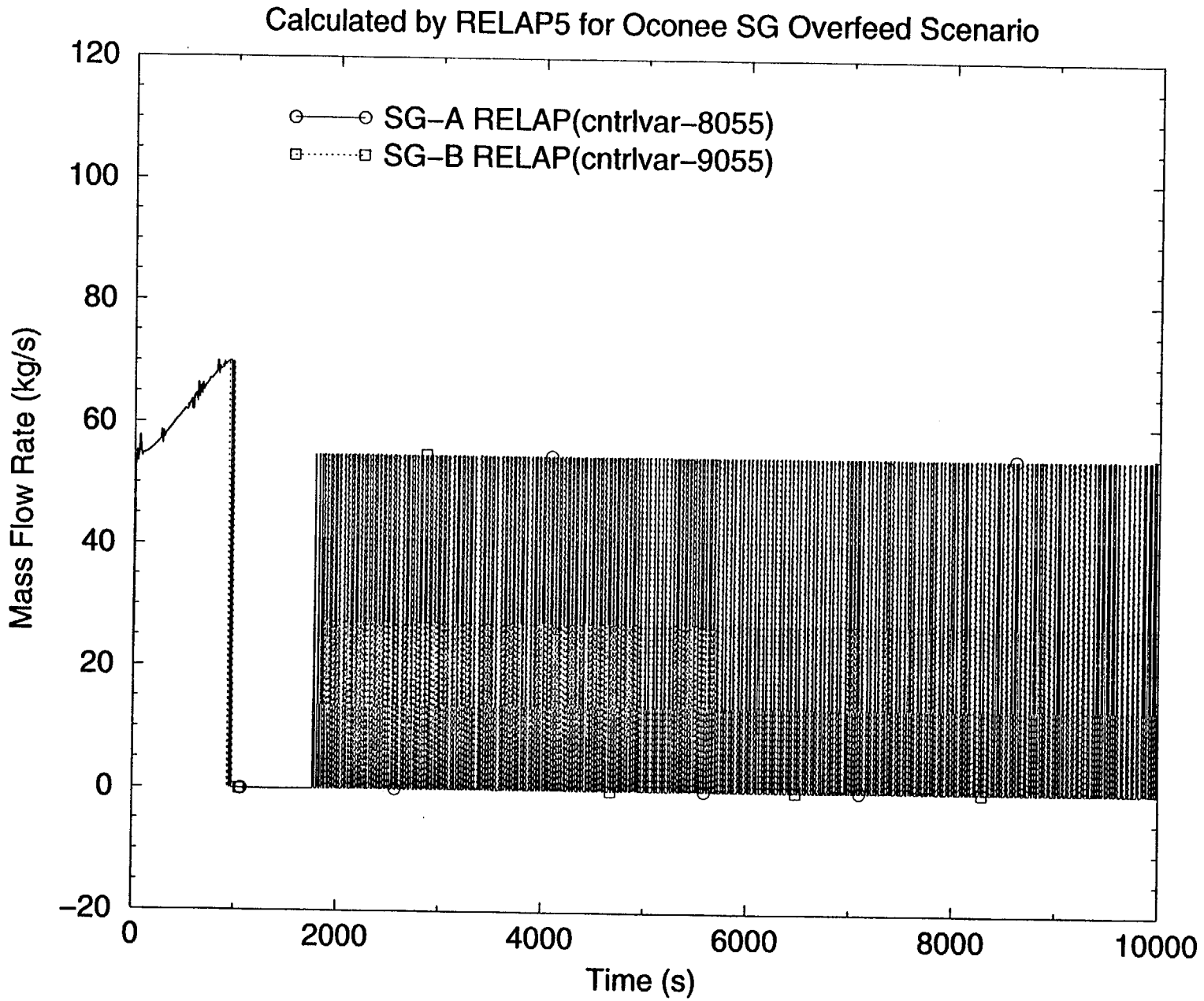


Figure 5.3.13 Steam Generator Operating Range Levels

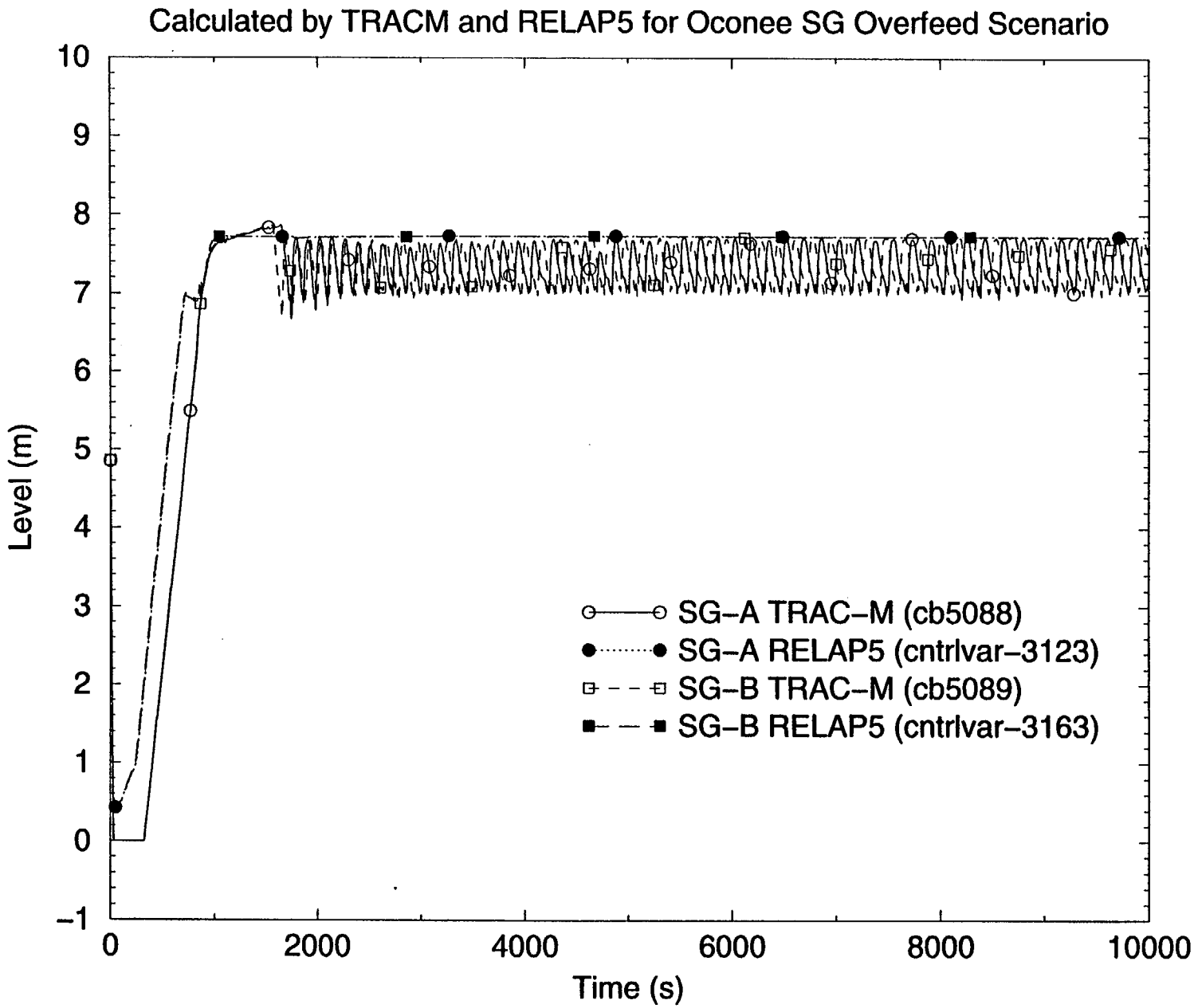


Figure 5.3.13A Total Emergency Feedwater Delivered

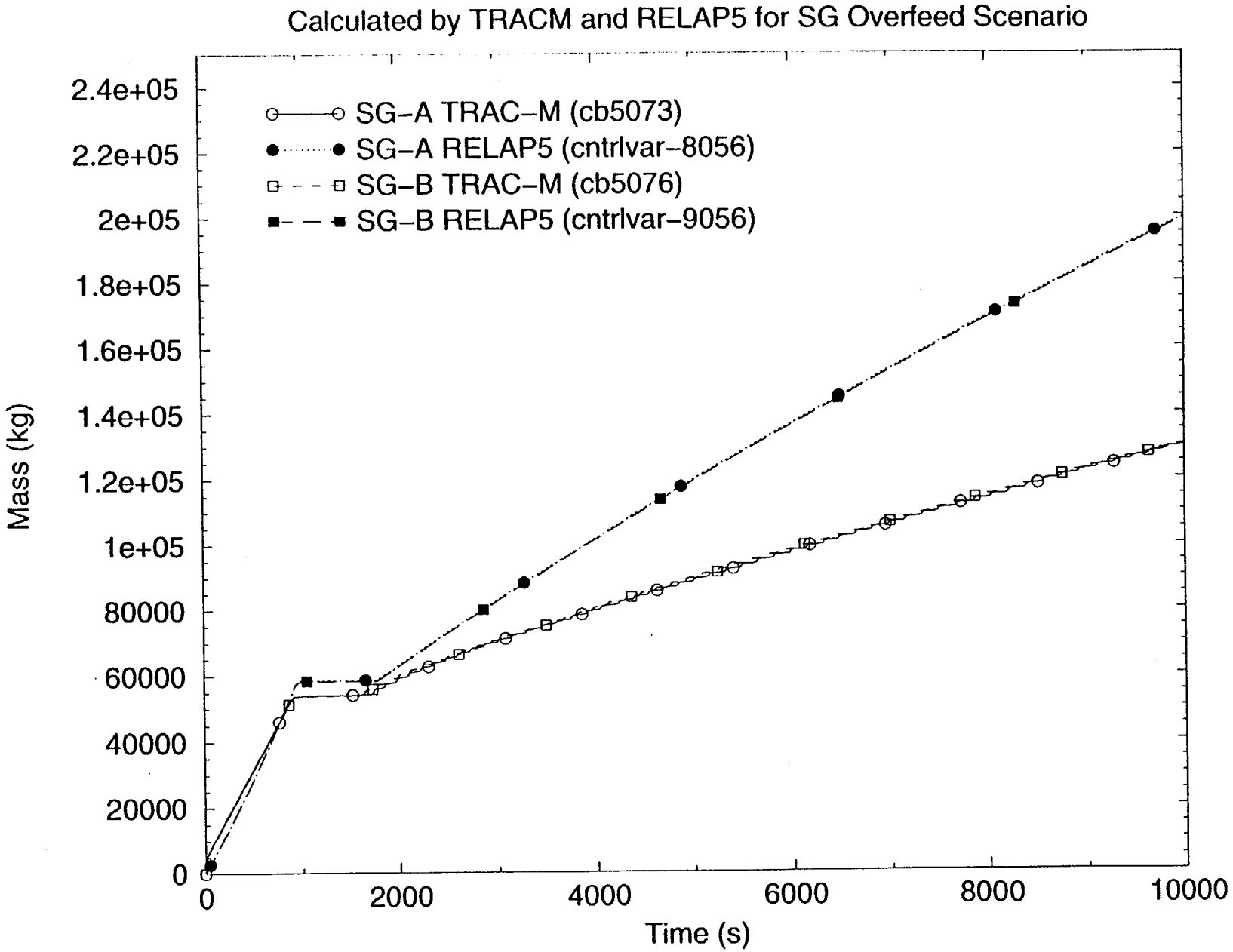


Figure 5.3.13B Integrated SG Exit Flow

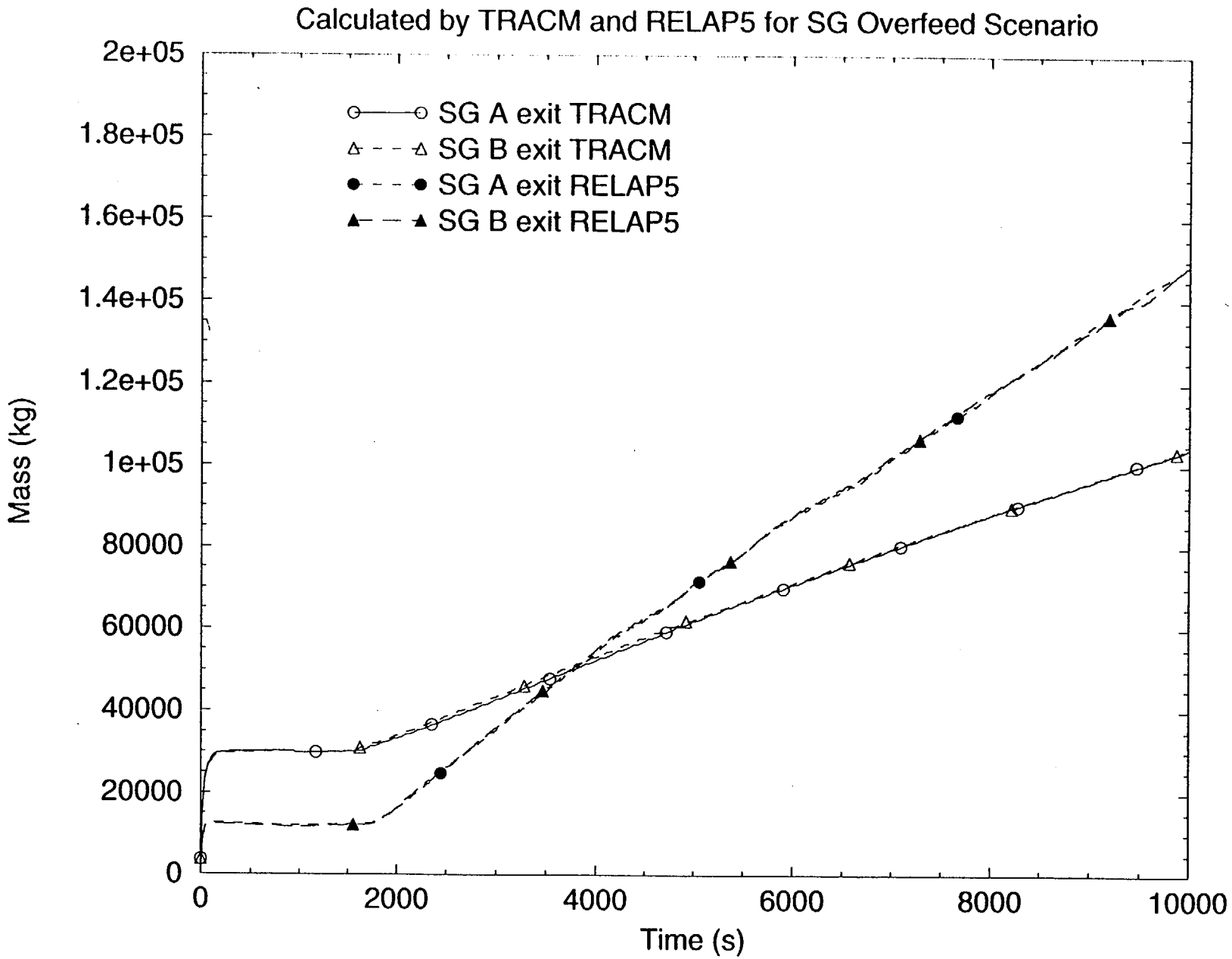


Figure 5.3.14 Minimum Downcomer Liquid Temperatures

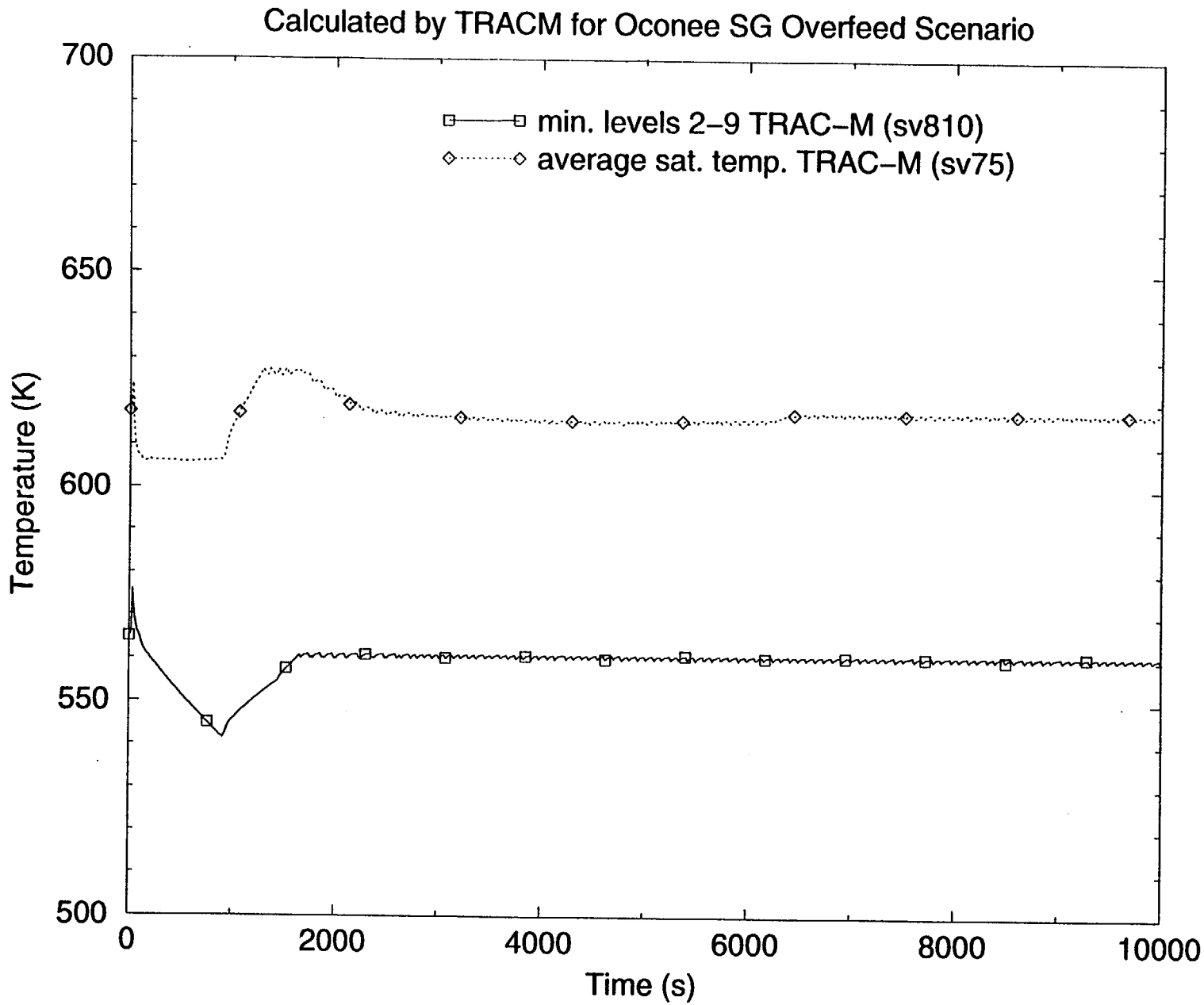


Figure 5.3.15 Downcomer Liquid Temperatures

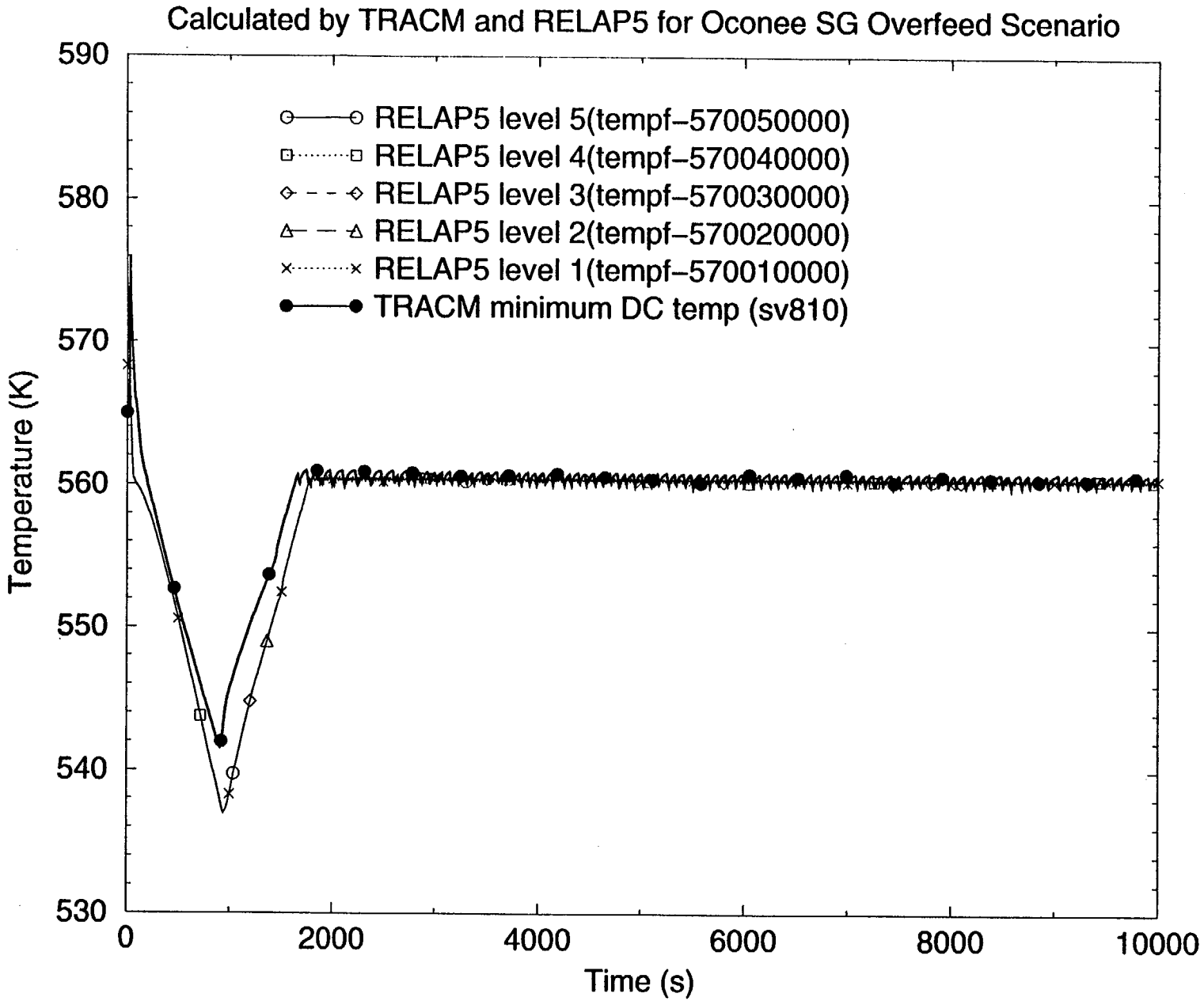


Figure 5.3.16 Heat Transf. Rates between SG Pri. and Sec. Sides

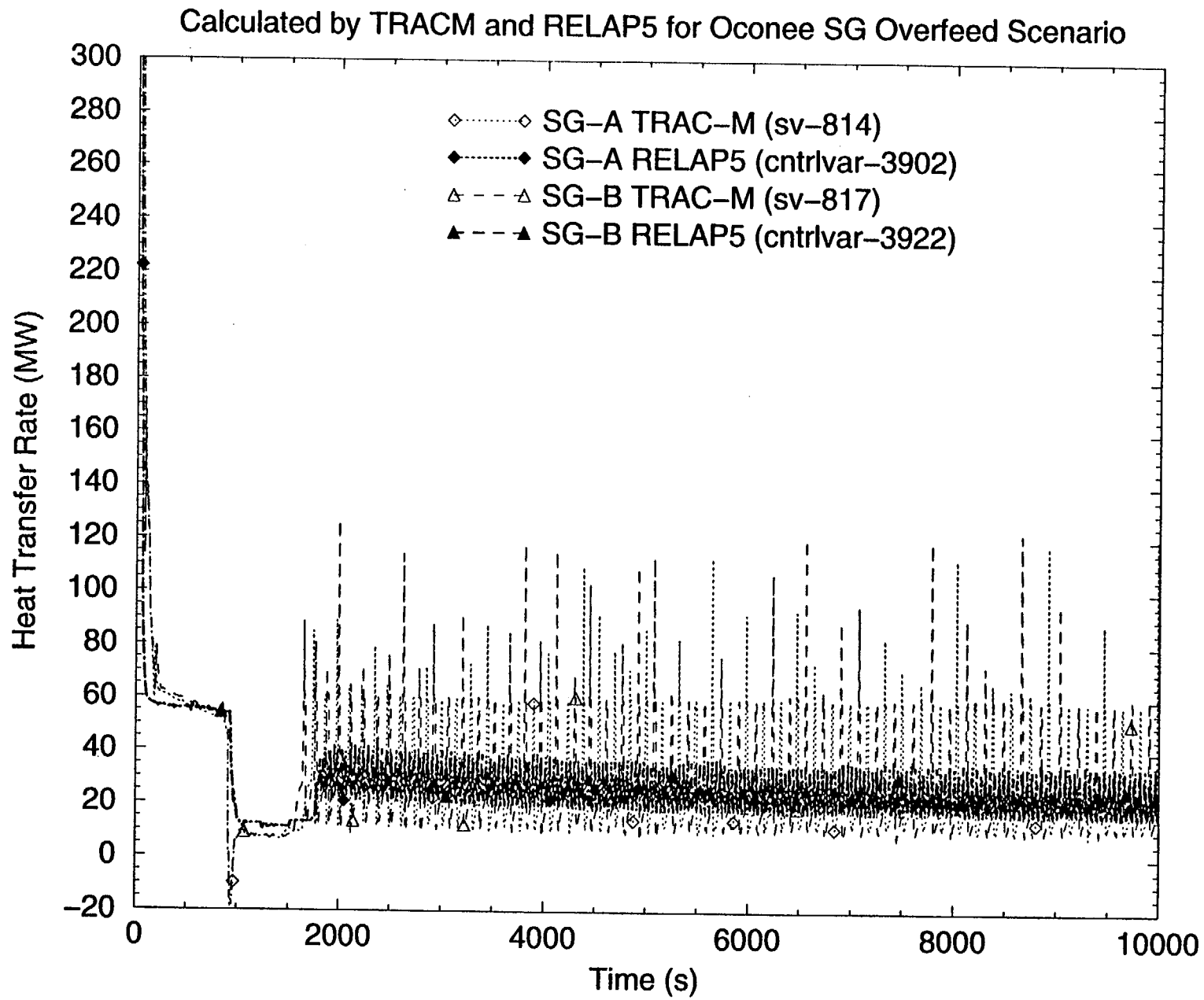


Figure 5.3.17 Secondary System Pressures

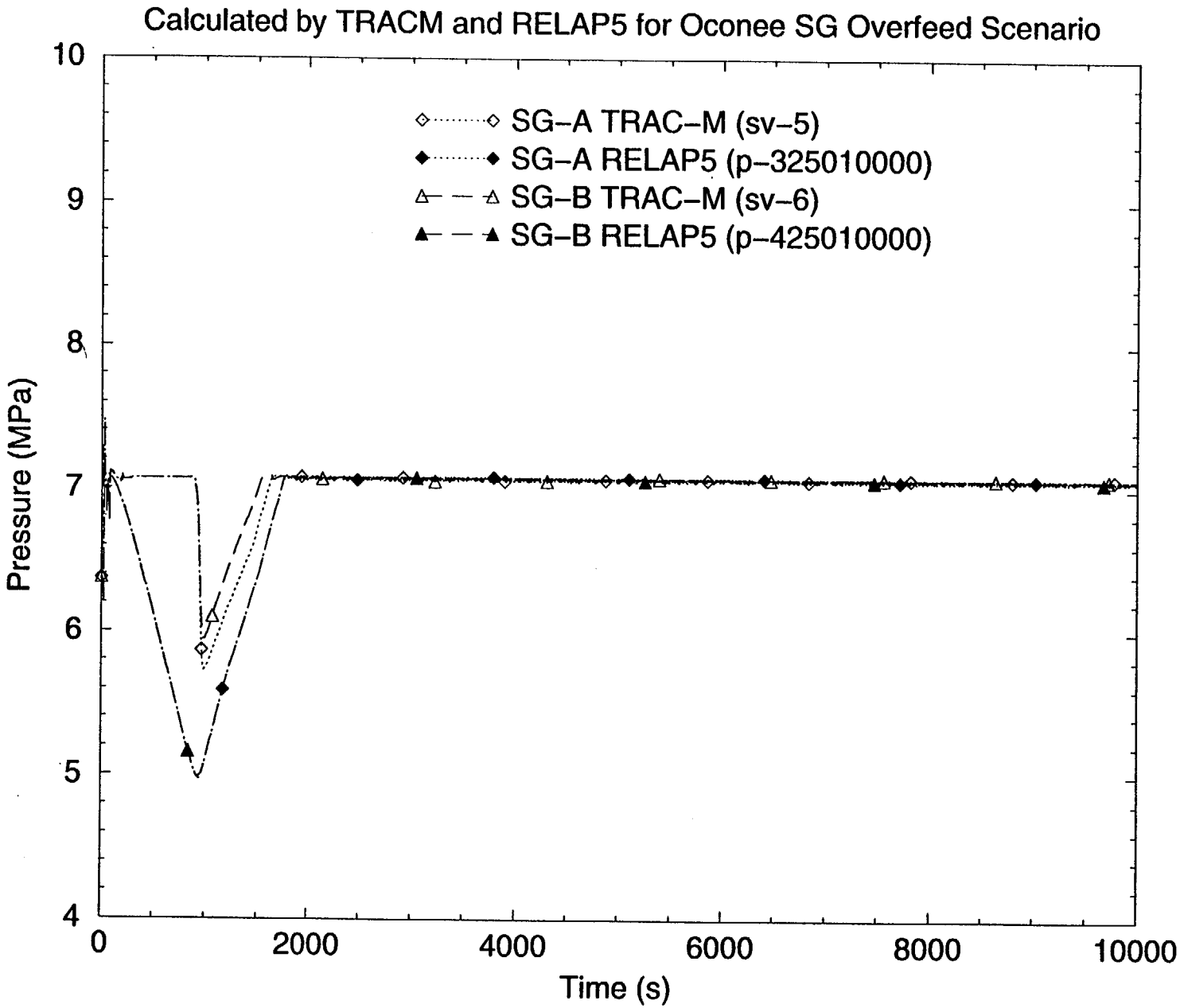


Figure 5.3.18 Downcomer Mid–Elevation Pressure

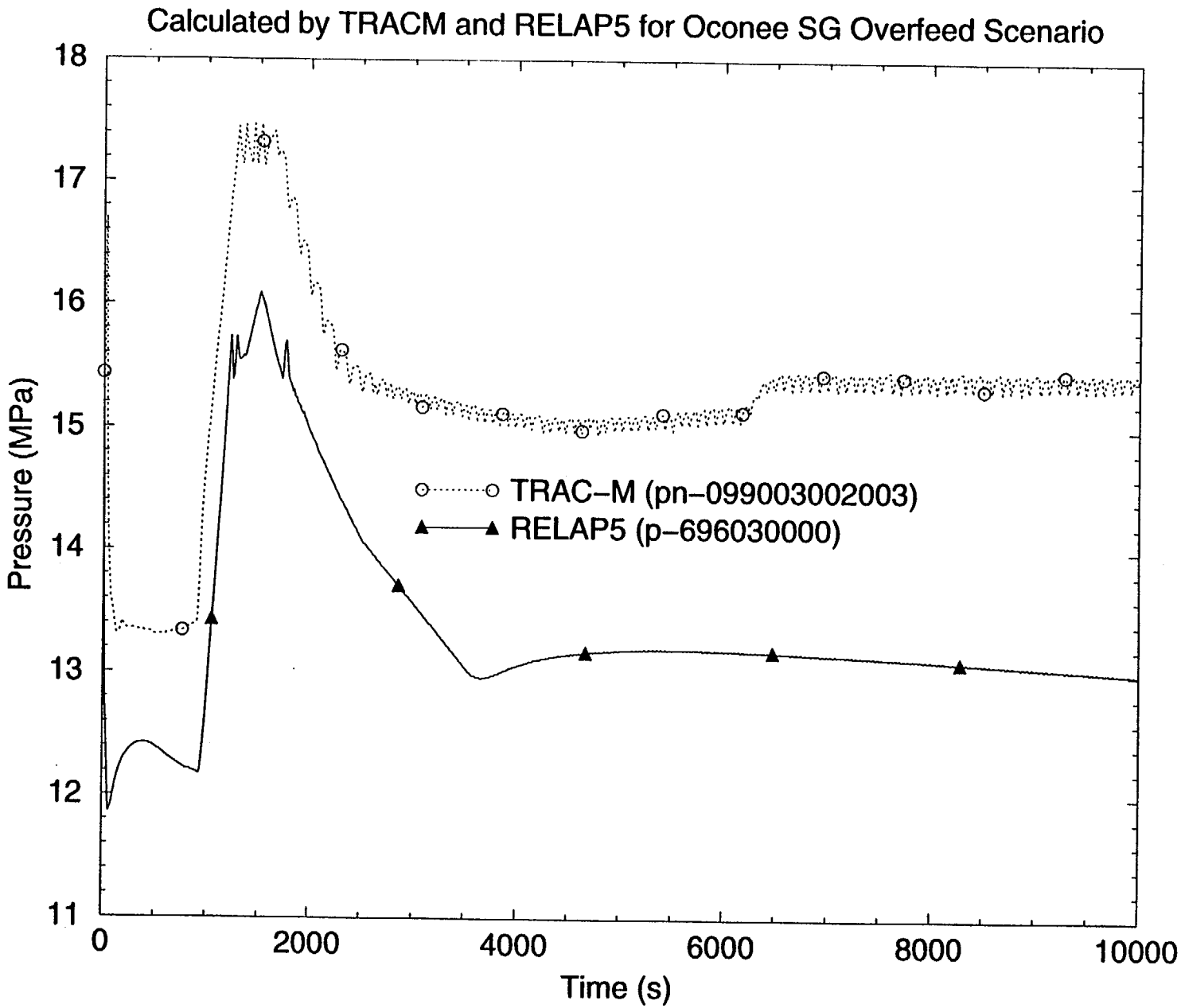


Figure 5.3.19 Min. and Max. DC Wall Heat Transfer Coefficients

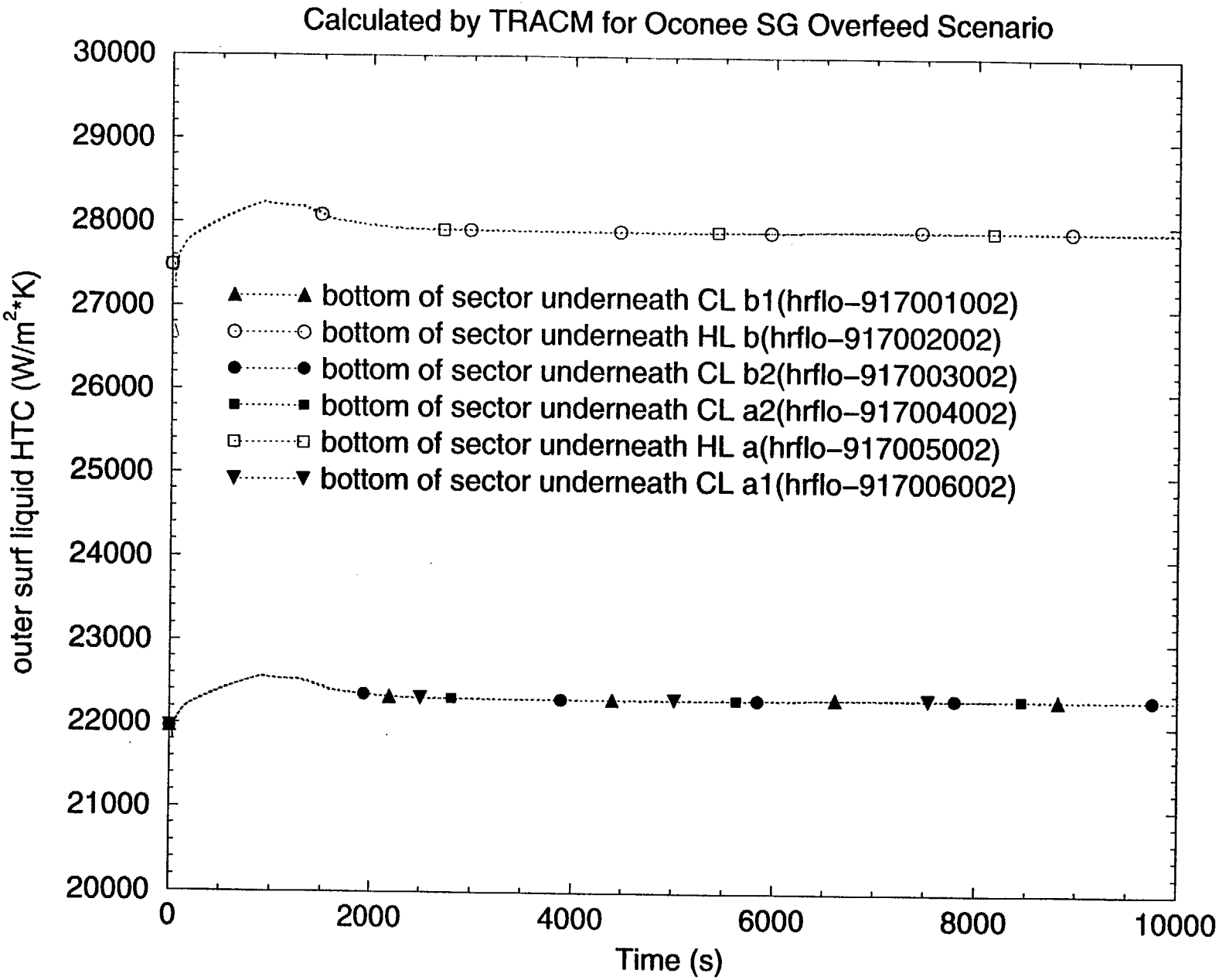


Figure 5.3.20 Min. and Max. DC Wall Heat Trans. Coeff.

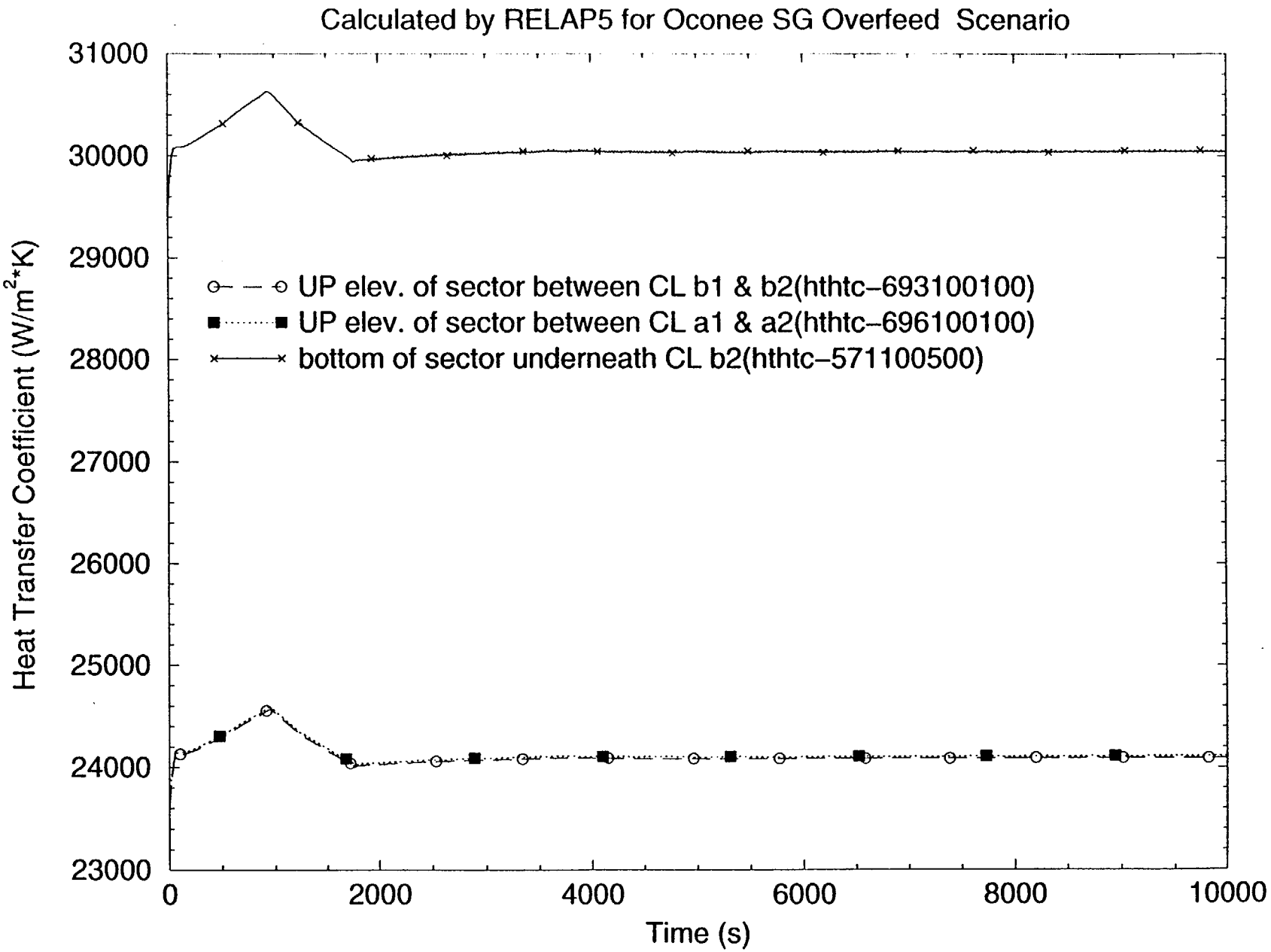


Figure 5.3.21 Loop A Cold Leg Mass Flow Rates

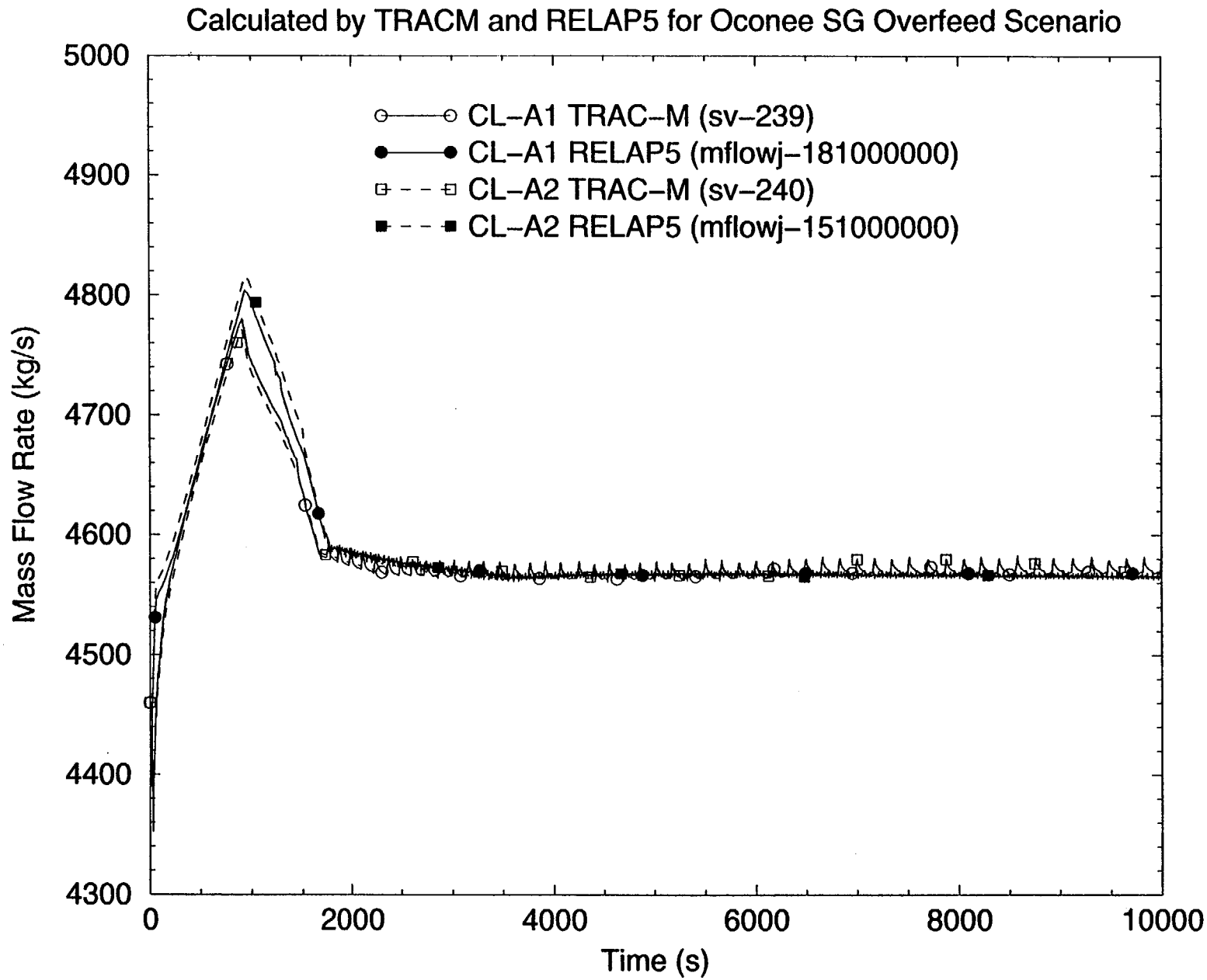


Figure 5.3.22 Loop B Cold Leg Mass Flow Rates

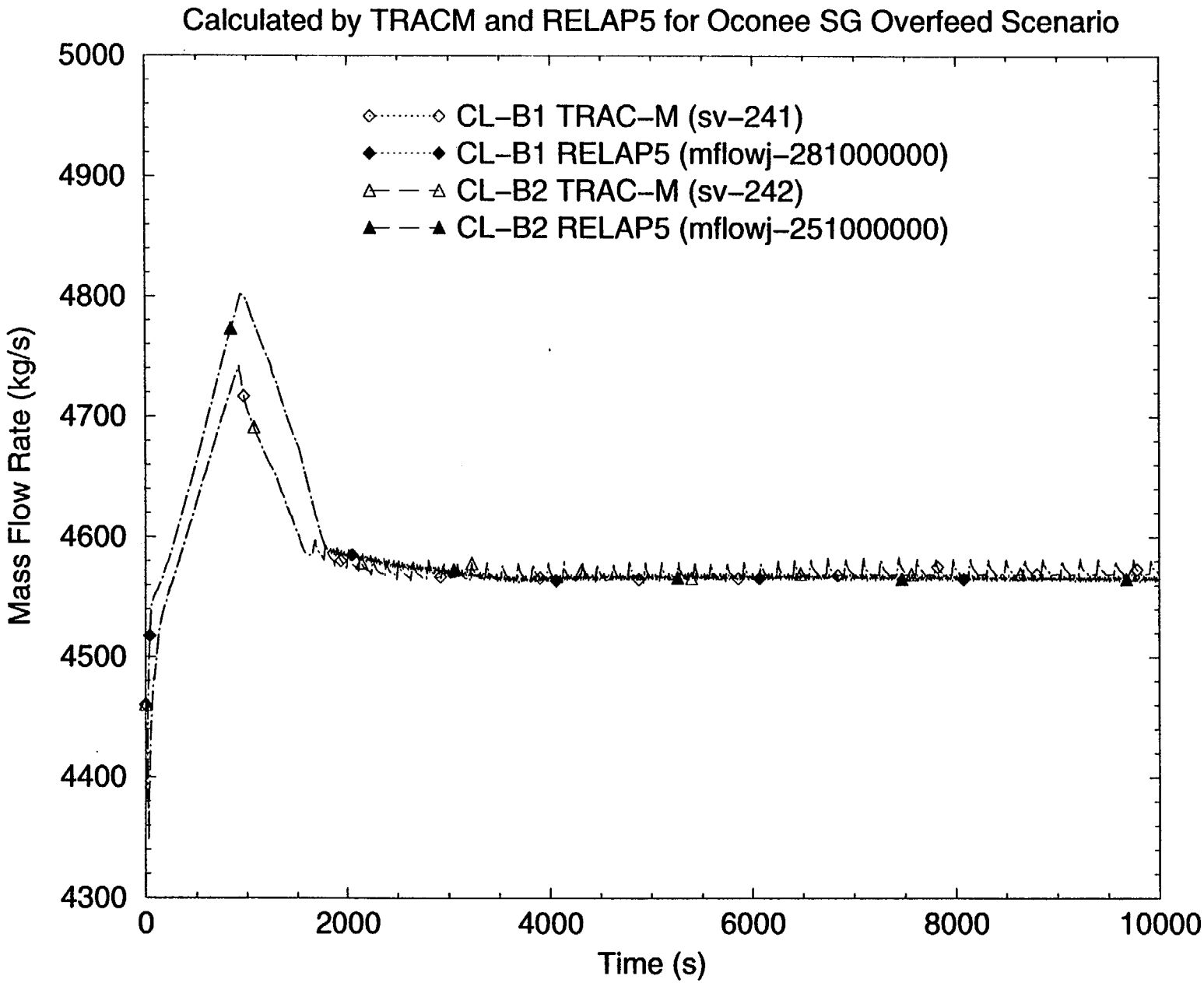


Figure 5.3.23 Hot Leg Mass Flow Rates

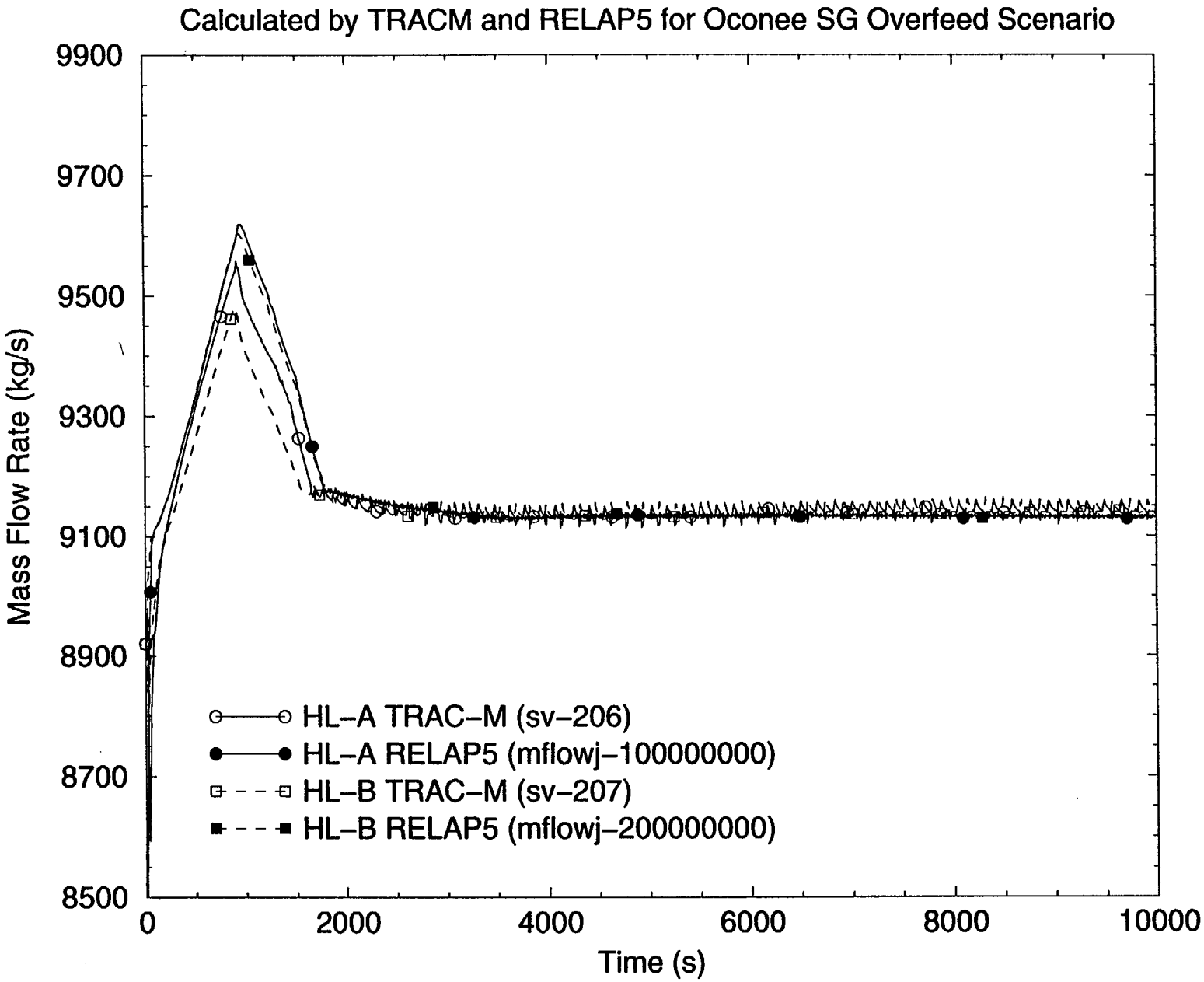


Figure 5.3.24 Cold Leg Temperatures

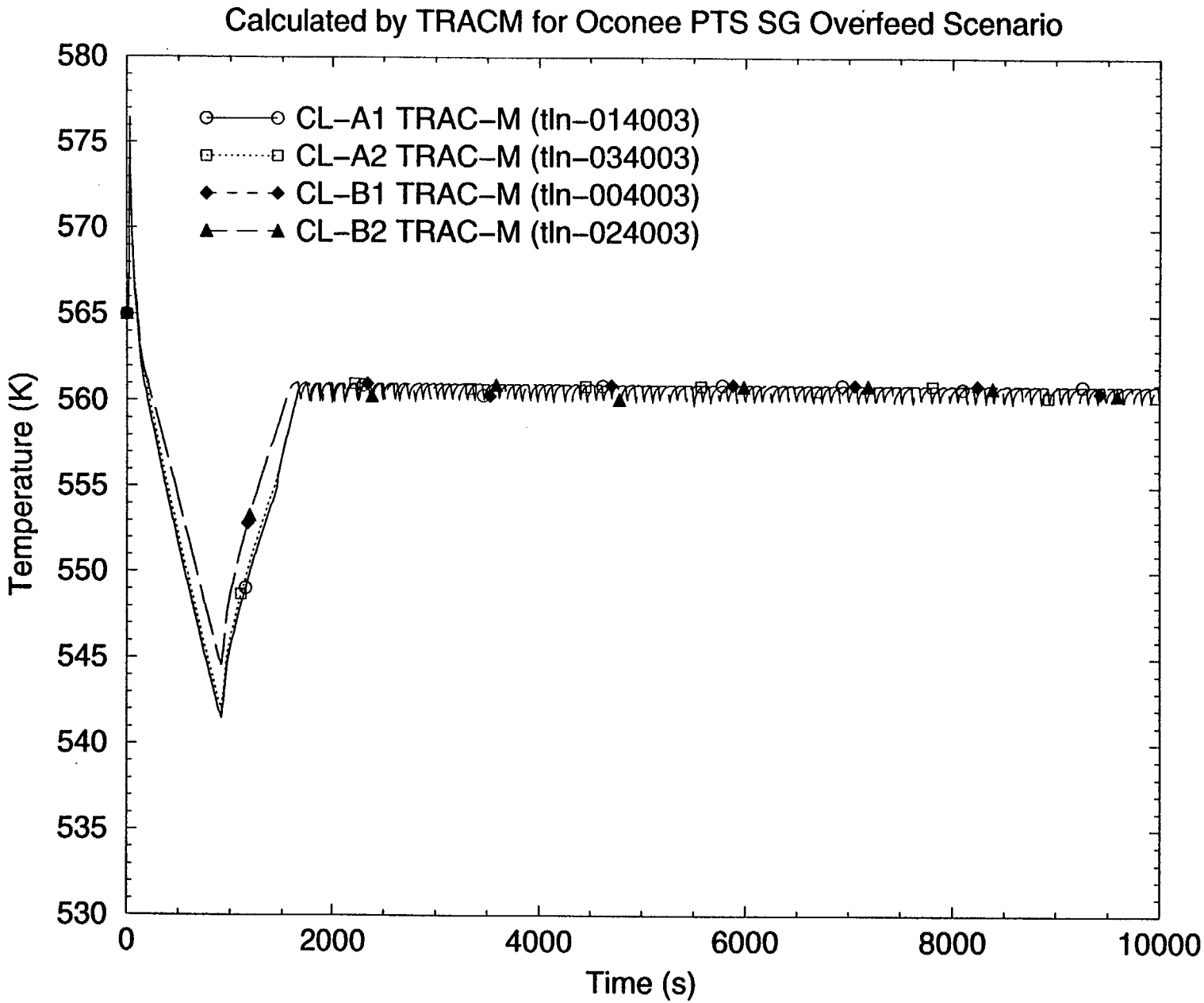


Figure 5.3.25 Cold Leg Temperatures

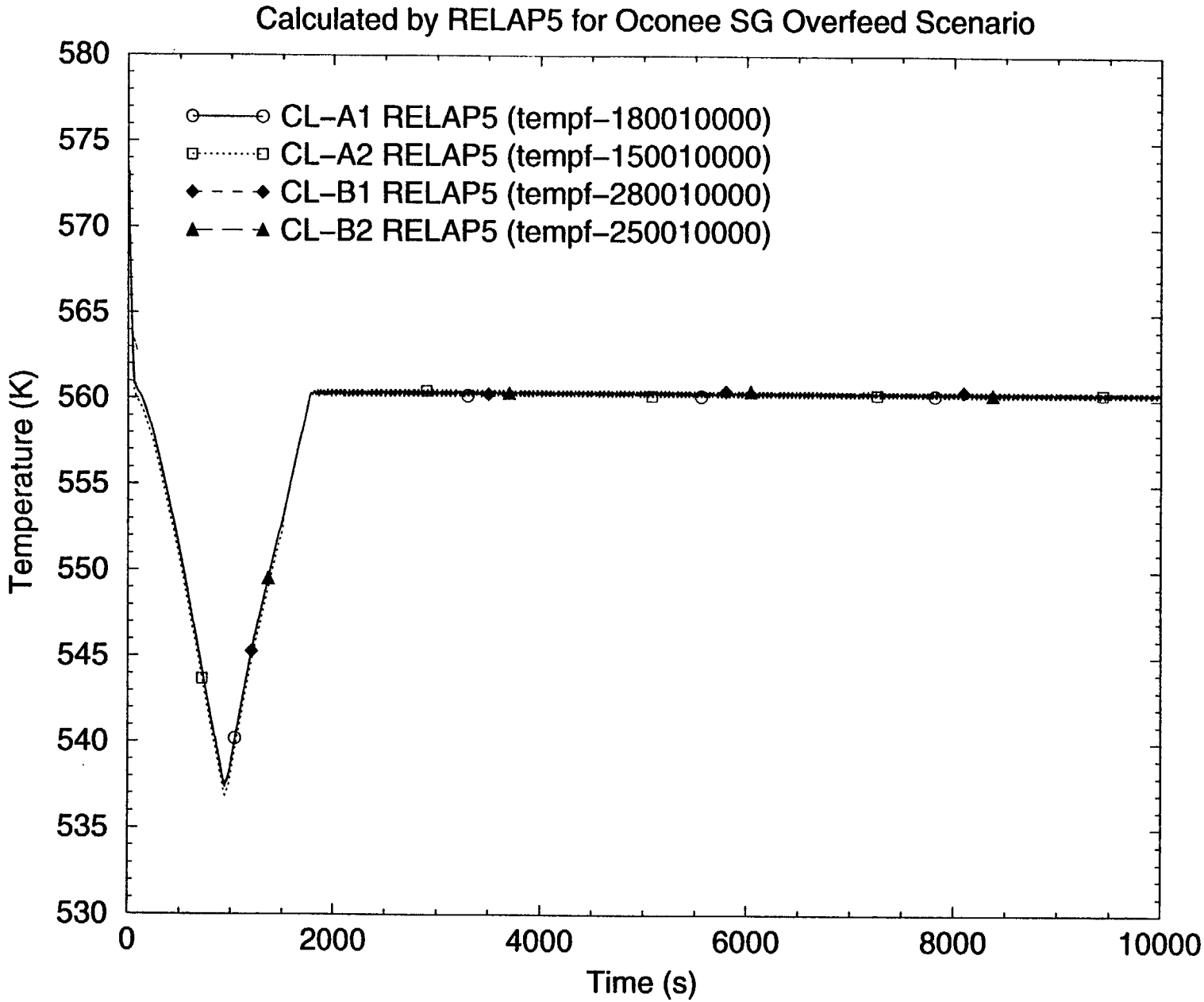
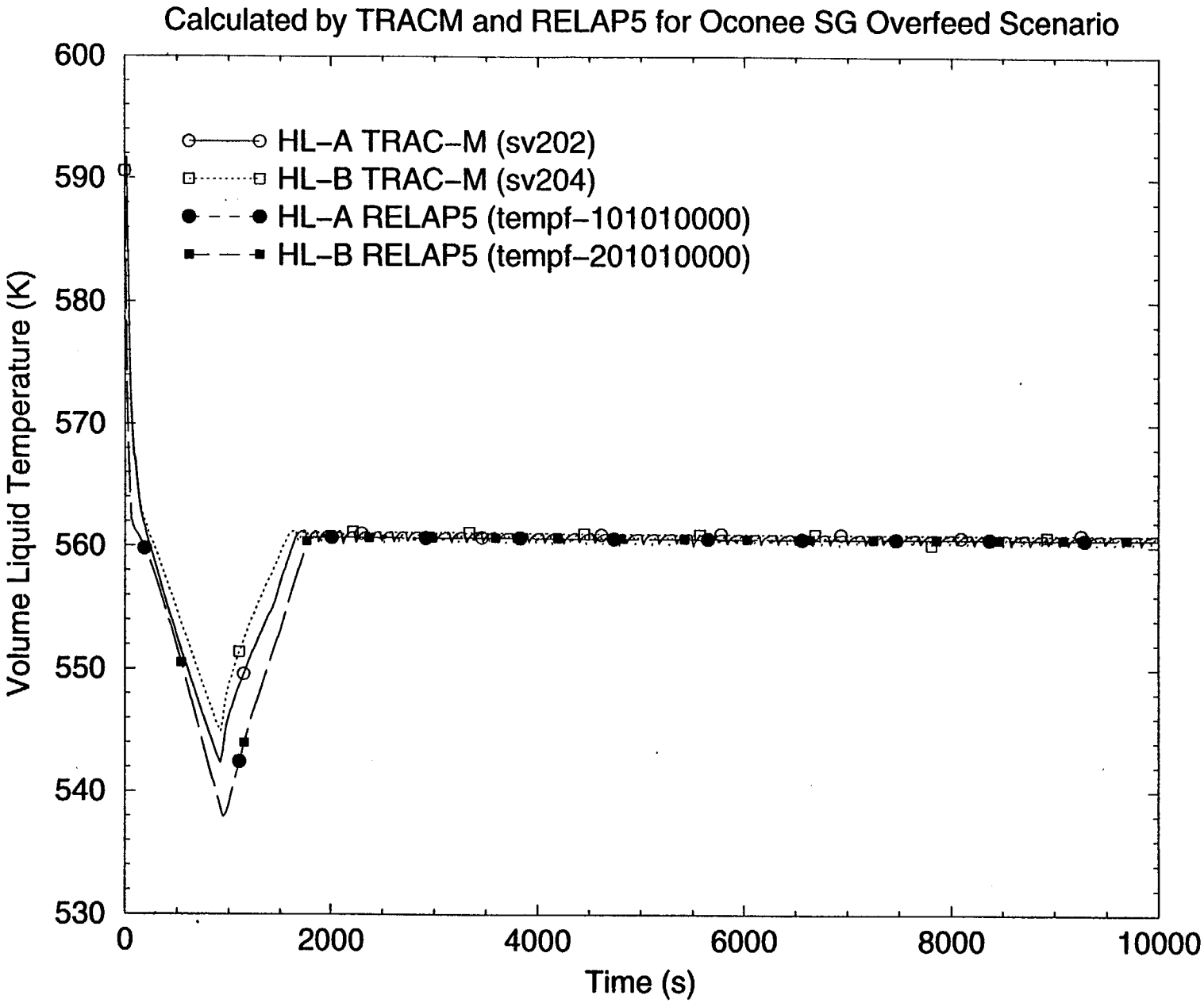


Figure 5.3.26 Hot Leg Temperatures



6 SUMMARY OF FINDINGS

6.1 Pressurized Thermal Shock Concerns

Generally speaking, TRAC-M results are consistent with RELAP5 results for comparable scenarios. The four parameters of main PTS concerns are summarized in Table 6.1.1 which compares TRAC-M results with RELAP5 results. The table also indicates the major reasons why TRAC-M results are different from RELAP5 results. The RELAP5 Case 61 MSLB scenario results show much different minimum downcomer temperatures than the TRAC-M minimum downcomer temperatures since this scenario is quite different from the other MSLB scenario, in the sense that the operator's corrective action of isolating the broken loop SG is considered in Case 61 where as in the other MSLB scenario the operator's corrective action is not considered. Therefore, RELAP Case 61 should not be used for checking TRAC-M results.

Out of five scenarios listed in Table 6.1.1, only one MSLB scenario leads to the condition of the PTS concerns (i.e., high pressure and low temperature) based on TRAC-M calculations. The calculated pressure is 15.3 MPa (2219 psia) while the calculated minimum downcomer temperature is 380K which is less than the PTS threshold value of 422K (300 °F) for circumferential welds and 405K (270 °F) for forgings, axial welds, and plate materials which are stipulated in 10 CFR 50.61. However, it should be pointed out that this scenario has a very low probability of actual occurrence because the operator is expected to isolate the affected steam generator (i.e., terminate the emergency feedwater flow to minimize cooldown) as soon as a main steam line break is recognized. When the operator isolates the affected steam generator, the primary system cooldown would be minimal. For example, in RELAP5 Case 61, where the operator isolated the affected steam generator in 10 minutes, the cooldown was only about 10K (18 °F), and the minimum downcomer temperature was 557K (543 °F).

6.2 Code Performance

6.2.1 TRAC-M Version 3782

Based on calculation results obtained from four different scenarios (i.e., two scenarios on turbine bypass valve stuck open, one scenario on MSLB, and one scenario on overfeed to SGs), TRAC-M Version 3782 performance was reasonable.

Since the comparisons can only be made between TRAC-M and RELAP5 and not between TRAC-M and data, the code performance could not be checked against experimental values. However, there was no code output which would prompt a question on the validity of the code results.

In terms of robustness of the code, (i.e., the ability of moving forward in time without the calculation being terminated), TRAC-M requires a great deal of improvement. In performing calculations on MSLB and some stuck-open turbine bypass valves, the calculations were terminated many times because of inability of finding a converged numerical iterative solution, and the calculations had to be restarted with a smaller maximum time step size. The code should have an improved solution logic such that this time consuming manual restart would not be required.

For better efficiency of the code application, the TRAC-M input deck structure must be completely overhauled since it is very primitive and is much more difficult to use as compared to RELAP5. In addition, variable definitions must be overhauled since they are not consistent and non-intuitive in many cases and are not conforming to the standard engineering nomenclature in many cases.

Table 6.1.1 Comparisons Between TRAC-M and RELAP5 Results for Selected Pressurized Thermal Shock Thermal-Hydraulic Calculations

		Minimum T liquid in downcomer K	Time of minimum T liquid Seconds	P in DC @ minimum T liquid MPa	Minimum h in downcomer @ minimum T liquid W/M**2-K	Maximum h in downcomer @ minimum T liquid W/M**2-K	Main Reasons of Discrepancy Between TRAC-M and RELAP5
1. Turbine Bypass Valve Stuck Open	TRAC-M (Case 1) RELAP5 (Case 35)	474 473	9,300 9,630	3.5 11.1	22,100 24,500	28,000 30,400	HPI throttling logic (not including Pzr level check) was applied in TRAC-M while it was not in RELAP5. In TRAC-M case, a minimum of 50 °F subcooling and other HPI throttling criteria, as described by Oconee, were applied for HPI throttling.
	TRAC-M (Case 2)	472	10,000	15.4	22,100	28,000	HPI not throttled if Pzr level < 10 ft. HPI flow increased the system P to above 11.1 MPa, HPI actuation point, after about 500 seconds. Case 1 and 2 TRAC-M results were close except P which didn't affect minimum T much.
2. Main Steam Line Break	TRAC-M RELAP5 (Case 27)	380 380	9,030 8,300	15.3 1.5	18,000 20,000	23,700 25,300	HPI throttling logic was applied in TRAC-M while not in RELAP5. Other comments same as above in No. 1. Steam line break flow in RELAP5 Case 27 was much higher than that in RELAP5 Case 61, and thus more cooling in Case 27.
	RELAP5 (Case 61)	557	465	13.9	24,000	30,100	HPI actuated in TRAC-M while not in RELAP5 because of a lower P due to a higher steam line break flow in TRAC-M. HPI flow and a continuous EFW flow to SG "A" caused a steady decrease in T in TRAC-M while not in RELAP5 which terminated EFW flow to SG "A" after 10 minutes although EFW flow to SG "B" continued.
3. SG Overfeed to 96 percent	TRAC-M RELAP5 (Case 19)	542 537	910 940	13.4 12.2	22,600 24,500	28,200 30,600	Correct implementation of SG safety valves in TRAC-M. In both TRAC-M and RELAP5, turbine bypass valves were modulating to control the steam line pressure. Decay power in TRAC-M was about 3 percent higher than in RELAP5.

6.2.2 RELAP5 MOD 3.2.2 Gamma

All RELAP5 calculations were performed by ISL., and thus the author does not have the first hand knowledge on the robustness and the efficiency of the code performance. However, the author was informed that RELAP5 completed calculations in real time or faster in many cases. In terms of the validity of the RELAP5 results, all seemed to be reasonable. There was no output which would prompt a question on the validity of the results.

7 CONCLUSIONS

Based on the calculation results obtained from four PTS scenarios, TRAC-M V3782 results support the results obtained from RELAP5 Mod 3.2.2 Gamma calculations. TRAC-M results of a MSLB scenario show that the minimum downcomer temperature would fall below the PTS screening criteria if the corrective action of the operator in isolating the broken loop SG is not considered. However, if the corrective action is considered, the cooldown is insignificant, and the PUT concerns will not arise.

8 REFERENCES

1. Lime, James F. and Steiner, James L., "An Updated Oconee Plant Model for Pressurized Thermal Shock Analyses," LA-CP-01-96, March 2001.

2. Arcieri, W.C., et al., "RELAP5 Thermal Hydraulic Analysis to Support PTS Evaluations for the Oconee-1 Nuclear Power Plant," Draft NUREG/CR Report, 2001.

3. Swindlehurst, Gregg B., "Responses to 13 NRC Questions Dated 2/24/2000 (Oconee PTS)," e-mail, April 2, 2000.

APPENDIX A

TRAC-M Version 3782 Input Listing for a Steady State Calculation of the Oconee Unit 1 Plant

```
free format
*
* This TRAC-M Oconee Unit 1 steady state input deck (Revision 14) was developed
by modifying LANL's Revision 13 deck to change HPI throttling logic so that HPI
won't be throttled if Pzr. liquid level is below 3.048 m (120 inch.). gsr 8/19/0
1.
*
* LANL developed Revision 13 Oconee Unit 1 steady state input deck to perform a
series of PTS (Pressurized Thermal Shock) calculations in 2001.
*
*************
* main data *
*************
*
*       numtcr          ieos          inopt          nmat
            1             0              1             0
Oconee-1 Full-Power PTS Steady-State Plant Model
*
*****************
* namelist data *
*****************
*
 &inopts
  icflow=2, nhtstr=33, noair=0, imfr=3,
  nlt=11, ipowr=-1, tpowr=3.5,
 &end
*
*        dstep         timet
             0    0.0000E+00
*       stdyst         transi         ncomp          njun          ipak
             2              0           141           126             1
*         epso          epss
    1.0000E-03    1.0000E-04
*       oitmax         sitmax        isolut        ncontr
            10             10             0             4
*         ntsv          ntcb          ntcf          ntrp          ntcp
           284           936         64524            42             0
*
************************
* component-number data *
************************
*
* iorder array *
* pipe   *     1 s   * loop b hot leg candy cane
* pipe   *     2 s   * sg-b primary tube bundle
* pump   *     3 s   * loop b1 pump (intact leg)
* tee    *     4 s   * loop b1 intact cold leg
* tee    *     6 s   * loop b upper head tee
* fill   *     9 s   * loop b1 hpis
* tee    *    11 s   * loop a hot leg candy cane
* pipe   *    12 s   * sg-a primary tube bundle
* pump   *    13 s   * loop a1 pump (intact leg)
* tee    *    14 s   * loop a1 intact cold leg
* tee    *    16 s   * loop a upper head tee
* fill   *    18 s   * makeup/letdown flow
* fill   *    19 s   * loop a1 hpis
* tee    *    20 s   * hpi/makeup-letdown header
* prizer *    22 s   * pressurizer
* pump   *    23 s   * loop b2 pump
* tee    *    24 s   * loop b2 intact cold leg
* valve  *    25 s   * pressurizer porv
* break  *    26 s   * porv boundary
* pump   *    33 s   * loop a2 pump (break leg)
* tee    *    34 s   * loop a2 intact cold leg
* fill   *    39 s   * loop a2 hpis
* fill   *    59 s   * loop b2 hpis
* tee    *    63 s   * loop b loop seals
* tee    *    73 s   * loop a loop seals
* tee    *    78 s   * lpis b header
* fill   *    79 s   * lpis b
* valve  *    80 s   * accum valve on loop b side
* pipe   *    81 s   * accumulator b
* fill   *    82 s   * accumulator b zero-flow boundary
```



```
* tee    *    88 s   * lpis a header
* fill   *    89 s   * lpis a
* valve  *    90 s   * accum valve on loop a side
* pipe   *    91 s   * accumulator a
* fill   *    92 s   * accumulator a zero-flow boundary
* vessel *    99 s   * vessel
* tee    *   121 s   * sg-a boiler region
* tee    *   122 s   * sg-a upper boiler region
* tee    *   123 s   * sg-a downcomer region
* pipe   *   124 s   * sg-a steam exit
* valve  *   148 s   * sg a fw switchover valve
* valve  *   150 s   * sg a efw line check valve
* tee    *   152 s   * sg a efw inlet line
* tee    *   154 s   * sg a efw header
* fill   *   156 s   * sg a md efw
* fill   *   158 s   * sg a td efw
* tee    *   201 s   * sg-b boiler region
* tee    *   202 s   * sg-b upper boiler region
* tee    *   203 s   * sg-b downcomer region
* pipe   *   204 s   * sg-b steam exit
* valve  *   248 s   * sg b fw switchover valve
* valve  *   250 s   * sg b efw line check valve
* tee    *   252 s   * sg b efw inlet line
* tee    *   254 s   * sg b efw header
* fill   *   256 s   * sg b md efw
* fill   *   258 s   * sg b td efw
* tee    *   345 s   * sg-a steam line with srv
* tee    *   350 s   * sg-a steam line with tbv
* valve  *   355 s   * sg-a turbine stop valve
* break  *   360 s   * sg-a steam line pressure boundary
* valve  *   365 s   * sg-a steam line srv
* break  *   367 s   * sg-a srv boundary
* valve  *   370 s   * sg-a steam line tbv
* break  *   372 s   * sg-a tbv boundary
* tee    *   445 s   * sg-b steam line with srv
* tee    *   450 s   * sg-b steam line with tbv
* valve  *   455 s   * sg-b turbine stop valve
* break  *   460 s   * sg-b steam line pressure boundary
* valve  *   465 s   * sg-b steam line srv
* break  *   467 s   * sg-b srv boundary
* valve  *   470 s   * sg-b steam line tbv
* break  *   472 s   * sg-b tbv boundary
* pipe   *   501 s   * core bypass pipe 1
* pipe   *   502 s   * core bypass pipe 2
* pipe   *   503 s   * core bypass pipe 3
* pipe   *   504 s   * core bypass pipe 4
* pipe   *   505 s   * core bypass pipe 5
* pipe   *   506 s   * core bypass pipe 6
* break  *   730 s   * condenser hotwell boundary
* pump   *   734 s   * hotwell pump
* pipe   *   736 s   * demineralization system
* pump   *   738 s   * booster pump
* pipe   *   740 s   * feedwater line to lp heaters
* fill   *   742 s   * cond.drain to lp d heater
* tee    *   746 s   * feedwater lp d heater
* fill   *   748 s   * cond.drain to lp c heater
* tee    *   750 s   * feedwater lp c heater
* tee    *   752 s   * feedwater pump inlet header
* pump   *   754 s   * mfw a pump
* valve  *   756 s   * mfw a pump check valve
* pump   *   760 s   * mfw b pump
* valve  *   761 s   * mfw b pump check valve
* plenum *   763 s   * feedwater pump outlet header
* pipe   *   764 s   * a & b hp heater pipe 1
* pipe   *   766 s   * a & b hp heater pipe 2
* plenum *   768 s   * hp heater outlet header
* valve  *   770 s   * sg a mfw control valve
* valve  *   772 s   * sg a mfw startup valve
* valve  *   774 s   * sg b mfw control valve
* valve  *   776 s   * sg b mfw startup valve
* plenum *   780 s   * fw-a cv header
* plenum *   782 s   * fw-b cv header
* valve  *   784 s   * fw-a isolation valve
```

```
* valve   *   786 s   * fw-b isolation valve
* pipe    *   788 s   * sg a feedwater inlet line
* valve   *   789 s   * sg a feedwater line check valve
* pipe    *   790 s   * sb b feedwater inlet line
* valve   *   791 s   * sb b feedwater line check valve
* rod     *   900 s   * reactor-core fuel rods
* slab    *   910 s   * vessel level 1, cells 1-6
* slab    *   911 s   * vessel level 2, cells 1-6
* slab    *   912 s   * vessel levels 3-4, cells 1-6
* slab    *   913 s   * vessel level 5, cells 1-6
* slab    *   914 s   * vessel levels 6-9, cells 1-6
* slab    *   915 s   * vessel level 10, cells 1-6
* slab    *   916 s   * vessel level 1, cells 7-12
* slab    *   917 s   * vessel levels 2-5, cells 7-12
* slab    *   918 s   * vessel levels 6-9, cells 7-12
* slab    *   919 s   * vessel level 10, cells 7-12
* rod     *   930 s   * sg-a tube bundle hs
* slab    *   931 s   * sg-a outlet plenum hs
* slab    *   932 s   * sg-a inlet plenum hs
* rod     *   933 s   * sg-a lower outer shell hs
* rod     *   934 s   * sg-a upper outer shell hs
* rod     *   940 s   * sg-b tube bundle hs
* slab    *   941 s   * sg-b outlet plenum hs
* slab    *   942 s   * sg-b inlet plenum hs
* rod     *   943 s   * sg-b lower outer shell hs
* rod     *   944 s   * sg-b upper outer shell hs
* rod     *   950 s   * c736 pipe wall, cells 1-10
* rod     *   951 s   * c736 power, cells 11-20
* rod     *   952 s   * lp f heater power
* rod     *   953 s   * lp e heater power
* rod     *   954 s   * lp d heater power
* rod     *   955 s   * lp c heater power
* rod     *   956 s   * hp heater a-1 power
* rod     *   957 s   * hp heater b-1 power
* rod     *   958 s   * hp heater a-2 power
* rod     *   959 s   * hp heater b-2 power
* rod     *   960 s   * c788 pipe wall
* rod     *   961 e   * c790 pipe wall
*
* constrained steady-state data
* numcss      amncss      maxcss      nmpcss      napcss
     3         0.0         200.0       -1          0
    13         0.0         200.0       -1          0
    23         0.0         200.0       -1          0
    33         0.0         200.0       -1          0
*
*************************
* control-parameter data *
*************************
*
*
**********************************************************************
*                                                                    *
*                        SIGNAL VARIABLE DATA                        *
*                                                                    *
**********************************************************************
*
* idsv    isvn     ilcn     icn1     icn2
   1       0        0        0        0        * time
   2       21       22       1        0        * prizer pressure
   3       20       203      11       1        * loop b sg downcomer level
   4       20       123      11       1        * loop a sg downcomer level
   5       21      124       6        0        * sg-a steam outlet pressure
   6       21      204       6        0        * sg-b steam outlet pressure
   7       21       14       1        0        * a1 cold leg pressure for hpi
   8       21       34       1        0        * a2 cold leg pressure for hpi
   9       21       4        1        0        * b1 cold leg pressure for hpi
   10      21       24       1        0        * b2 cold leg pressure for hpi
   11      -21      80       3        4        * loop b side accum check valve delta-p
   12      -21      90       3        4        * loop a side accum check valve delta-p
    21      69       9       1         0       * hpi b1 mass flow
    22      69       19      1         0       * hpi a1 mass flow
    23      69       39      1         0       * hpi a2 mass flow
```



```
    24      69       59      1         0       * hpi b2 mass flow
    25      69       80      4         0       * accumulator b mass flow
    26      69       90      4         0       * accumulator a mass flow
    27      20       22      4         1       * pressurizer liquid level
    28      20       81      4         1       * accumulator b liquid level
    29      20       91      4         1       * accumulator a liquid level
    30      69       89      1         0       * lpsi mass flow
    31      56       13      0         0       * dummy sv for break flow
* placeholder for break mass flow signal variable
* replace above signal variable in loca transients
* with signal variable below.
*   31      69       31      1         0       / break mass flow
    32      76       14      3         1       * cold leg a1 mixture density
    33      76       34      3         1       * cold leg a2 mixture density
    34      76       4       3         1       * cold leg b1 mixutre density
    35      76       24      3         1       * cold leg b2 mixture density
    36      27       14      1         0       * cold leg a1 void fraction
    37      27       34      1         0       * cold leg a2 void fraction
    38      27       4       1         0       * cold leg b1 void fraction
    39      27       24      1         0       * cold leg b2 void fraction
    40      84       73      4         0       * cold leg sat temp
    41      70       99      1009      0       * vent valve mass flow, sector 1
    42      70       99      2009      0       * vent valve mass flow, sector 2
    43      70       99      3009      0       * vent valve mass flow, sector 3
    44      70       99      4009      0       * vent valve mass flow, sector 4
    45      70       99      5009      0       * vent valve mass flow, sector 5
    46      70       99      6009      0       * vent valve mass flow, sector 6
    47      42       148     0         0       * fw-a switchover valve flow area fract
ion
    48      42       248     0         0       * fw-b switchover valve flow area fract
ion
    49      42       784     0         0       * fw-a isolation valve flow area fracti
on
    50      42       786     0         0       * fw-b isolation valve flow area fracti
on
    51      23       99      1001     -12001   * lower plenum avg liquid temperature
    52      23       99      1002     -6005    * core average liquid temperature
    53      23       99      1006     -6009    * upper plenum average liquid temperatu
re
    54      23       99      1010     -12010   * upper head average liquid temperature
    55      23       99      7002     -12009   * downcomer average liquid temperature
    56      23       99      1006     -6006    * core exit average liquid temperature
    57      23       99      7006    -12006    * downcomer avg liq temp at core exit e
lev
    61      27       99      1001     -12001   * lower plenum avg void fraction
    62      27       99      1002     -6005    * core average void fraction
    63      27       99      1006     -6009    * upper plenum average void fraction
    64      27       99      1010     -12010   * upper head average void fraction
    65      27       99      7002     -12009   * downcomer average void fraction
    71      84       99      1001     -12001   * lower plenum avg sat temperature
    72      84       99      1002     -6005    * core average sat temperature
    73      84       99      1006     -6009    * upper plenum average sat temperature
    74      84       99      1010     -12010   * upper head average sat temperature
    75      84       99      7002     -12009   * downcomer average sat temperature
    78      21        78     1         0        *  lpis b pressure
    79      69        79     1         0        *  lpis b mass flow
    88      21        88     1         0        *  lpis a pressure
    89      69        89     1         0        *  lpis a mass flow
    90      69        18     1         0        *  makeup/letdown flow
    91      20       122     1         2        * sg-a upper boiler liquid level
    92      20       202     1         2        * sg-b upper boiler liquid level
    93      20       124     1         1        * sg-a boiler exit liquid level
    94      20       204     1         1        * sg-b boiler exit liquid level
    95      69       734     2         0        * hotwell pump mass flow
    99      56       37      0         0        * trip set status for both mfw pumps tr
ipped
   100      56       100     0         0        * trip set status for tbv-a stuck-open
transient
   105      56       105     0         0        * trip set status for tbv-b stuck-open
transient
   110      56       110     0         0        * trip set status for tbv-a open status
   115      56       115     0         0        * trip set status for tbv-b open status
   118      56       118     0         0        * trip set status for efw level control
```

```
    failure
                                            * with operator level control transient
    119    56      119      0       0       * trip set status for efw level control
    failure
                                            * without operator intervention transie
nt
    130    56      130      0       0       * trip set status for low-sg pressure
    135    56      135      0       0       * trip set status for low pzr pressure
    140    27       81      4      -1       * accumulator b vapor fraction
    141    27       91      4      -1       * accumulator a vapor fraction
    142    69      789      3       0       * main feedwater flow at sg a inlet
    143    69      791      3       0       * main feedwater flow at sg b inlet
    144    69      152     11       0       * aux feedwater flow at sg a inlet
    145    69      252      5       0       * aux feedwater flow at sg b inlet
    146    69      124      7       0       * steam flow at sg a exit
    147    69      204      7       0       * steam flow at sg b exit
    151    69      501      1       0       * core bypass flow 1
    152    69      502      1       0       * core bypass flow 2
    153    69      503      1       0       * core bypass flow 3
    154    69      504      1       0       * core bypass flow 4
    155    69      505      1       0       * core bypass flow 5
    156    69      506      1       0       * core bypass flow 6
    160    23       11      6       0       * tliq at top of hot leg a
    161    84       11      6       0       * tsat at top of hot leg a
* note: for hot-leg break in loop a, change signal variables 160 and 161
* in transient restart deck to the signal variables below
*  160    23      111      3       0        / tliq at top of hot leg a
*  161    84      111      3       0        / tsat at top of hot leg a
    162    23      1        6       0       * tliq at top of hot leg b
    163    84      1        6       0       * tsat at top of hot leg b
    171    69      99    1005       0       * core exit total mass flow, sector 1
    172    69      99    2005       0       * core exit total mass flow, sector 2
    173    69      99    3005       0       * core exit total mass flow, sector 3
    174    69      99    4005       0       * core exit total mass flow, sector 4
    175    69      99    5005       0       * core exit total mass flow, sector 5
    176    69      99    6005       0       * core exit total mass flow, sector 6
    201     0      1        0       0       * time step size
    202    23       11      5       0       * loop a hot leg liquid temperature
    203    84       11      5       0       * loop a hot leg sat temperature
* note: for hot-leg break in loop a, change signal variables 202 and 203
* in transient restart deck to the signal variables below
*  202    23      111      2       0        / loop a hot leg liquid temperature
*  203    84      111      2       0        / loop a hot leg sat temperature
    204    23      1        5       0       * loop b hot leg liquid temperature
    205    84      1        5       0       * loop b hot leg sat temperature
    206    69      11       1       0       * loop a hot leg mass flow
    207    69      1        1       0       * loop b hot leg mass flow
    208    20      121      1      11       * sg-a lower boiler liquid level
    209    20      201      1      11       * sg-b lower boiler liquid level
    210    23      768      1       0       * feedwater liquid temperature
    212    56      13       0       0       * trip 13 iset (= 0 steady state, 1 tra
n)
    213    69      788      1       0       * loop a feedwater mass flow
    214    69      790      1       0       * loop b feedwater mass flow
    215   -21      770      1       2       * loop a MFCV delta-p
    216   -21      774      1       2       * loop b MFCV delta-p
    217    21      738      1       0       * condensate booster pump suction press
    218    21      754      1       0       * MFW pump a suction pressure
    219    21      754      2       0       * MFW pump a discharge pressure
    220    56      45       0       0       * turbine trip status
    221    56      20       0       0       * RCP trip status
    222    56      40       0       0       * reactor trip status
    223    21      345      3       0       * sl-a pressure at srv
    224    21      350     14       0       * sl-a pressure at tbv
    225    21      445      3       0       * sl-b pressure at srv
    226    21      450     14       0       * sl-b pressure at tbv
    227    69      360      1       0       * sl-a steam flow
    228    69      460      1       0       * sl-b steam flow
    233    41      754      0       0       * mfw a rotor speed
*  The following 4 SVs are changed to use CL Ts in RCP suction side.  gsr
*  235    23       14      1       0         cold leg a1 liquid temperature
*  236    23       34      1       0         cold leg a2 liquid temperature
*  237    23        4      1       0         cold leg b1 liquid temperature
```



```
*  238    23       24      1       0         cold leg b2 liquid temperature
    235    23      73       4       0       * cold leg a1 liquid temperature
    236    23      73       7       0       * cold leg a2 liquid temperature
    237    23      63       4       0       * cold leg b1 liquid temperature
    238    23      63       7       0       * cold leg b2 liquid temperature
    239    69      14       2       0       * cold leg a1 mass flow
    240    69      34       2       0       * cold leg a2 mass flow
    241    69       4       2       0       * cold leg b1 mass flow
    242    69      24       2       0       * cold leg b2 mass flow
    243    23      788     18       0       * fw line a liquid temperature
    244    23      790     10       0       * fw line b liquid temperature
    245    23      736     20       0       * fw demineralization exit temperature
    246    23      740     10       0       * fw f heater exit temperature
    247    23      740     20       0       * fw e heater exit temperature
    248    23      746     10       0       * fw d heater exit temperature
    249    23      750     10       0       * fw c heater exit temperature
    255    23      768      1       0       * fw valve inlet header temperature
    258    56       117     0       0       * tbv cooldown rate throttling trip sta
tus
    259    56       67      0       0       * hpi cooldown rate throttling trip sta
tus
    260    56      60       0       0       * hpi pressure throttling trip status
    265    56      65       0       0       * hpi subcooling throttling trip status
    266    21       760     1       0       * MFW pump b suction pressure
    267    21       760     2       0       * MFW pump b discharge pressure
    268    56      68       0       0       * hpi low cl temp throttling trip statu
s
    269    21      738      2       0       * condensate booster pump disch pressur
e
    270    56      30       0       0       * condensate booster pump trip set stat
us
    301    41      3        0       0       * rcp b1 rotor speed
    302    62      3        0       0       * rcp b1 torque
*note: sv 1301, 1302, 2301, 2302, 3301, and 3302 define
*rotor speed and torque for other three pumps
    350    27      350      1       0       * steam line a void fraction
    365    69      365      2       0       * steam line a srv mass flow
    366    42      365      0       0       * steam line a srv flow area fraction
    370    69      370      2       0       * steam line a tbv mass flow
    450    27      450      1       0       * steam line b void fraction
    465    69      465      2       0       * steam line b srv mass flow
    466    42      465      0       0       * steam line b srv flow area fraction
    470    69      470      2       0       * steam line b tbv mass flow
    521   -26      917   1001001  5001001   * vessel wall delta T lev 1 rod 1
    522   -26      917   1002001  5002001   * vessel wall delta T lev 1 rod 2
    523   -26      917   1003001  5003001   * vessel wall delta T lev 1 rod 3
    524   -26      917   1004001  5004001   * vessel wall delta T lev 1 rod 4
    525   -26      917   1005001  5005001   * vessel wall delta T lev 1 rod 5
    526   -26      917   1006001  5006001   * vessel wall delta T lev 1 rod 6
    527   -26      917   1001002  5001002   * vessel wall delta T lev 2 rod 1
    528   -26      917   1002002  5002002   * vessel wall delta T lev 2 rod 2
    529   -26      917   1003002  5003002   * vessel wall delta T lev 2 rod 3
    530   -26      917   1004002  5004002   * vessel wall delta T lev 2 rod 4
    531   -26      917   1005002  5005002   * vessel wall delta T lev 2 rod 5
    532   -26      917   1006002  5006002   * vessel wall delta T lev 2 rod 6
    533   -26      917   1001003  5001003   * vessel wall delta T lev 3 rod 1
    534   -26      917   1002003  5002003   * vessel wall delta T lev 3 rod 2
    535   -26      917   1003003  5003003   * vessel wall delta T lev 3 rod 3
    536   -26      917   1004003  5004003   * vessel wall delta T lev 3 rod 4
    537   -26      917   1005003  5005003   * vessel wall delta T lev 3 rod 5
    538   -26      917   1006003  5006003   * vessel wall delta T lev 3 rod 6
    539   -26      917   1001004  5001004   * vessel wall delta T lev 4 rod 1
    540   -26      917   1002004  5002004   * vessel wall delta T lev 4 rod 2
    541   -26      917   1003004  5003004   * vessel wall delta T lev 4 rod 3
    542   -26      917   1004004  5004004   * vessel wall delta T lev 4 rod 4
    543   -26      917   1005004  5005004   * vessel wall delta T lev 4 rod 5
    544   -26      917   1006004  5006004   * vessel wall delta T lev 4 rod 6
    545   -26      917   1001005  5001005   * vessel wall delta T lev 5 rod 1
    546   -26      917   1002005  5002005   * vessel wall delta T lev 5 rod 2
    547   -26      917   1003005  5003005   * vessel wall delta T lev 5 rod 3
    548   -26      917   1004005  5004005   * vessel wall delta T lev 5 rod 4
    549   -26      917   1005005  5005005   * vessel wall delta T lev 5 rod 5
    550   -26      917   1006005  5006005   * vessel wall delta T lev 5 rod 6
```

```
*   The following 4 cards are changed to make compatible to FORTRAN 90 version.
*  551    92      917 -5001001 -5006005   - min downcomer liq htc adj to core
*  552    91      917 -5001001 -5006005   - min downcomer vap htc adj to core
*  553    92      917  5001001  5006005   - max downcomer liq htc adj to core
*  554    91      917  5001001  5006005   - max downcomer vap htc adj to core
   551    92      917 -5001001 -5006004   * min downcomer liq htc adj to core
   552    91      917 -5001001 -5006004   * min downcomer vap htc adj to core
   553    92      917  5001001  5006004   * max downcomer liq htc adj to core
   554    91      917  5001001  5006004   * max downcomer vap htc adj to core
   567    69      154       4        0    * a sg efw mass flow
   568    69      254       4        0    * b sg efw mass flow
   742    69      742       1        0    * condensate drain mass flow to d heate
r
   746    69      746       1        0    * inlet mass flow to d heater
   748    69      748       1        0    * condensate drain mass flow to to c he
ater
   750    69      750       1        0    * inlet mass flow to to c heater
   756   -21      756       2        3    * mfw pump a check valve delta-p
   761   -21      761       2        3    * mfw pump b check valve delta-p
   764    23      764      10        0    * train 1a heater liquid temperature
   766    23      766      10        0    * train 2a heater liquid temperature
   767    69      764       1        0    * train 1a heater mass flow
   768    69      766       1        0    * train 2a heater mass flow
   789   -21      789       1        2    * mfw line a check valve delta-p
   791   -21      791       1        2    * mfw line b check valve delta-p
   800    20       12       2       14    * sg-a tube liquid level
   801    20        2       2       14    * sg-b tube liquid level
   802    23       99   -7002  -12002     * minimum downcomer temp level 2
   803    23       99   -7003  -12003     * minimum downcomer temp level 3
   804    23       99   -7004  -12004     * minimum downcomer temp level 4
   805    23       99   -7005  -12005     * minimum downcomer temp level 5
   806    23       99   -7006  -12006     * minimum downcomer temp level 6
   807    23       99   -7007  -12007     * minimum downcomer temp level 7
   808    23       99   -7008  -12008     * minimum downcomer temp level 8
   809    23       99   -7009  -12009     * minimum downcomer temp level 9
   810    23       99   -7002  -12005     * minimum downcomer temp in core region
   811    21       99    1006   -6009     * vessel upper plenum avg. pressure
   812    25      917 -5001001 -5006005   * minimum inside vessel wall temp level
 2-5
   813    25      918 -5001001 -5006005   * minimum inside vessel wall temp level
 6-9
   814   103      930       0    0        * sg-a tube bundle outer surface heat l
oss (o.s.h.l)
   815   103      931       0    0        * sg-a outlet plenum o.s.h.l
   816   103      932       0    0        * sg-a inlet plenum o.s.h.l
   817   103      940       0    0        * sg-b tube bundle o.s.h.l
   818   103      941       0    0        * sg-b outlet plenum o.s.h.l
   819   103      942       0    0        * sg-b inlet plenum o.s.h.l
*****************************************************************
*   signal vars 822 and 823 must be activated as well as control blocks
*   -3556 and -3557 in order to calculate break energy
*****************************************************************
*  822    86       31       1    0         break liquid specific heat
*  823    23       31       1    0         break liquid temp
   824    26      917 -5001005 -5006005   * min vessel wall temp at top of core e
lev
*  825    92      917  5001005  5006005    vessel wall liquid htc at core elevs
   826    20      121       3   10         * sg-a startup level
   827    20      201       3   10         * sg-b startup level
   828    20      121       7   10         * sg-a op level input to cb
   829    20      201       7   10         * sg-b op level input to cb
   830    27      121       3   10         * sg-a avg void frac
   831    27      201       3   10         * sg-b avg void frac
   832    84       11      -2   -5         * min sat. temp in hl-a riser
   833    84        1      -2   -5         * min sat. temp in hl-b riser
   834    23       11       2    5         * max temp in hl-a riser
   835    23        1       2    5         * max temp in hl-b riser
   836    23       73       4    0         * cl-a1 temp at pump suction
   837    23       73       7    0         * cl-a2 temp at pump suction
   838    23       63       4    0         * cl-b1 temp at pump suction
   839    23       63       7    0         * cl-b2 temp at pump suction
   840    23       99   -1006 -6006        * min temp at core exit
   841    84       11       2    5         * max sat temp in hl-a riser
```



```
   842    84        1       2    5         * max sat temp in hl-b riser
   843    23       11      -2   -5         * min temp in hl-a riser
   844    23        1      -2   -5         * min temp in hl-b riser
   845    26      917 5001001 5006005      * check max inside vessel wall temp, co
re region
   846    26      917 1001001 1006005      * check max inside vessel wall temp. co
re region
*****************************************************************
*   signal variable 847 is activated in a transient to calc break energy
*****************************************************************
   847    56       13       0    0         * dummy break power out
* additional signal variables for the cold leg loop flows
   851    69       13       1    0         * cold leg A1 loop flow
   852    69       33       1    0         * cold leg A2 loop flow
   853    69        3       1    0         * cold leg B1 loop flow
   854    69       23       1    0         * cold leg B2 loop flow
* additional signal variables for the ECC water density
   861    76       19       1    0         * cold leg A1 ECC water density
   862    76       39       1    0         * cold leg A2 ECC water density
   863    76        9       1    0         * cold leg B1 ECC water density
   864    76       59       1    0         * cold leg B2 ECC water density
* additional signal variables for the cold leg loop density
   871    76       13       2    0         * cold leg A1 loop water density
   872    76       33       2    0         * cold leg A2 loop water density
   873    76        3       2    0         * cold leg B1 loop water density
   874    76       23       2    0         * cold leg B2 loop water density
   900    18      900       0        0     * reactor power
   901    59      900       0        0     * max avg rod cladding temperature
   902    60      900       0        0     * max hot rod pct
   903    57      900       0        0     * prompt-fission power
   904    58      900       0        0     * decay-heat power
   905    26      917 -5001005 -5006005    * min vessel inner wall temp @ core exi
t elev
  1301    41       13       0        0     * rcp a1 rotor speed
  1302    62       13       0        0     * rcp a1 torque
  1501   -21      150       1        2     * efw line a check valve delta-p
  1541    21      154       1        0     * efw line a pressure
  2301    41       23       0        0     * rcp b2 rotor speed
  2302    62       23       0        0     * rcp b2 torque
  2501   -21      250       1        2     * efw line b check valve delta-p
  2541    21      254       1        0     * efw line b pressure
  3301    41       33       0        0     * rcp a2 rotor speed
  3302    62       33       0        0     * rcp a2 torque
*
*****************************************************************
*                                                               *
*                      CONTROL BLOCK DATA                       *
*                                                               *
*****************************************************************
*
*     control
*     block
*     numbers   control system
*     -------   ------------------------------------------------
*
*      -100s    RCP power control blocks
*      -700s    HPI, RCP, and MFW realignment trip signals
*      -800s    hotwell, condensate booster and MFW pump trip signals
*      -900s    feedwater condensate drain control
*     -1100s    HPI flowrate signals
*     -1200s    MFW pump trip logic
*     -1300s    reactor and turbine trip logic
*     -1500s    high and low pressure heater control
*     -1600s    motor driven EFW pump flowrate
*     -1700s    steam driven EFW pump flowrate
*     -1800s    ULD control blocks
*     -2000s    ICS feedwater control
*     -3300s    a loop ICS TBV control
*     -3400s    b loop ICS TBV control
*     -4000s    cold leg thermal startification criteria
*
*****************************************************************
*                     constant value control blocks             *
```

```
554 ************************************************************************
555 *
556 *     control
557 *     block id  control block value
558 *     --------  -------------------
559 *
560 *          -14   120 inches = 3.048 m Pzr level below which HPI not throttled
561 *          -15       41.11 m3      sg vf region volume-boiler
562 *          -16      2.5908 m       sg op level min 102 in AUSLTS
563 *          -17      0.1524 m       sg su level min 6 in AUSLTS
564 *          -18       4.345 m       sg fa
565 *          -19     10.0076 m       sg su level max
566 *          -20           0
567 *          -21           1
568 *          -22          -1
569 *          -23        6.29 m2     acc fa
570 *          -24      .27778 K      = .5 F delta T
571 *          -25    138254.5
572 *          -26   6.76519e7
573 *          -27      533.15 K      = 500 F
574 *          -28      55.556 K      = 100 F delta T
575 *          -29     1.0e+20                      /gsr
576 *          -30       7.014 MPa    = 1017.3 PSIA
577 *          -31       7.064 MPa    = 1024.5 PSIA
578 *          -32      11.066 MPa    = 1605 PSIA
579 *          -33          30 sec
580 *          -34          42 K
581 *          -35       .1524 m      = 6 in
582 *          -36       9.711 m      = 96% operating range
583 *          -37         .21 MPa    = 30.5 PSIA
584 *          -38        1.72 MPa    = 249.5 PSIA
585 *          -39       8.651 MPa = 1254.7 psia
586 *          -40           6 m
587 *          -41         6.2 m
588 *          -42       5.271 MPa    = 764.5 PSIA
589 *          -43       .0254 m      = 1 in
590 *          -44         .25 sec-1
591 *          -45         -.5 sec-1
592 *          -46         .05 MPa    = 7.25 PSIA
593 *          -47         .14 MPa    = 20.3 PSIA
594 *          -48       16.65 MPa    = 2414.8 PSIA
595 *          -49       16.99 MPa    = 2464.1 PSIA
596 *          -50       8.892 MPa    = 1289.7 PSIA
597 *          -51       1.724 MPa    = 250 PSIA
598 *          -52      6.1468 m      = 242 in
599 *          -53      2568e6 W      = steady state power
600 *          -54      599.26 K      = 619 F
601 *          -55      15.937 MPa    = 2311.5 PSIA
602 *          -56      12.531 MPa    = 1817.5 PSIA
603 *          -57       1.075
604 *
605 *                                    1.055 x (ss power = 2568e6 W)
606 *          -58      153585 W-s/kg = ---------------------------------
607 *                                    (total ss hl flow = 17640 kg/sec)
608 *
609 *          -59          .3 sec
610 *          -60          .5 sec
611 *          -61           5 sec
612 *          -62         1.5 sec
613 *          -63      6.2053 MPa    = 900 PSI
614 *          -64       68948 Pa     = 10 PSI
615 *          -65      .34474 MPa    = 50 PSI
616 *          -66      .75843 MPa    = 110 PSI
617 *          -67     385.2e6 W      = 15% of steady state power
618 *          -68 4.834561e-6          converts Pa to volts DC
619 *          -69          10
620 *          -70         752 kg/sec = a loop FW flow
621 *          -71         752 kg/sec = b loop FW flow
622 *          -72      2.2046          converts kg to lbm
623 *          -73     2629000
624 *          -74     .008333
625 *          -75     .003333
626 *          -76          18
```



```
627 *          -77      459.67          converts F to R
628 *          -78    2616.915
629 *          -79          .2
630 *          -80   -.0083333 sec-1  = -50% / min
631 *          -81   -.0033333 sec-1  = -20% / min
632 *          -82         .05
633 *          -83         .75
634 *          -84          .7
635 *          -85         .15
636 *          -86       490.4
637 *          -87     15.2699 MPa    = 2200 PSIG
638 *          -88     14.9252 MPa    = 2150 PSIG
639 *          -89      5.588 m       = 220  in = pressurizer reference level
640 *          -90      27.778 K      = 50 F delta T  (changed from 5 F per GSR 10/
    24/00)
641 *          -91   -.015432 K/sec   = -100 F/hr
642 *          -92        .814 m
643 *          -93       1.014 m
644 *          -94       6.148 m
645 *          -95       6.348 m
646 *          -96       9.611 m
647 *          -97       9.811 m
648 *          -98       15.75 m
649 *          -99       15.95 m
650 *
651 *        idcb        icbn        icb1        icb2        icb3 /gsr
652           -14           9           0           0           0
653 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
654           1.       3.048       3.048       3.048       3.048
655 *
656 *        idcb        icbn        icb1        icb2        icb3
657           -15           9           0           0           0
658 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
659           1.       41.11       41.11       41.11       41.11
660 *
661 *        idcb        icbn        icb1        icb2        icb3
662           -16           9           0           0           0
663 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
664           1.       2.5908      2.5908      2.5908      2.5908
665 *
666 *
667 *        idcb        icbn        icb1        icb2        icb3
668           -17           9           0           0           0
669 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
670           1.       0.1524      0.1524      0.1524      0.1524
671 *
672 *        idcb        icbn        icb1        icb2        icb3
673           -18           9           0           0           0
674 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
675           1.       4.345       4.345       4.345       4.345
676 *
677 *        idcb        icbn        icb1        icb2        icb3
678           -19           9           0           0           0
679 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
680           1.      10.0076     10.0076     10.0076     10.0076
681 *
682 *        idcb        icbn        icb1        icb2        icb3
683           -20           9           0           0           0
684 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
685           1.          0.          0.          0.          0.
686 *
687 *        idcb        icbn        icb1        icb2        icb3
688           -21           9           0           0           0
689 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
690           1.          1.          1.          1.          1.
691 *
692 *        idcb        icbn        icb1        icb2        icb3
693           -22           9           0           0           0
694 *      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
695           1.          -1.         -1.         -1.         -1.
696 *
697 *        idcb        icbn        icb1        icb2        icb3
698           -23           9           0           0           0
```

```
699  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
700              1.            6.29            6.29            6.29            6.29
701  *
702  *         idcb            icbn            icb1            icb2            icb3
703              -24               9               0               0               0
704  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
705              1.           .27778          .27778          .27778          .27778
706  *
707  *         idcb            icbn            icb1            icb2            icb3
708              -25               9               0               0               0
709  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
710              1.         138254.5        138254.5        138254.5        138254.5
711  *
712  *         idcb            icbn            icb1            icb2            icb3
713              -26               9               0               0               0
714  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
715              1.      6.76519e+7      6.76519e+7      6.76519e+7      6.76519e+7
716  *
717  *         idcb            icbn            icb1            icb2            icb3
718              -27               9               0               0               0
719  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
720              1.         533.15          533.15          533.15          533.15
721  *
722  *         idcb            icbn            icb1            icb2            icb3
723              -28               9               0               0               0
724  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
725              1.          55.556          55.556          55.556          55.556
726  *
727  *         idcb            icbn            icb1            icb2            icb3  /gsr
728              -29               9               0               0               0
729  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
730              1.          1.0e+20         1.0e+20         1.0e+20         1.0e+20
731  *
732  *         idcb            icbn            icb1            icb2            icb3
733              -30               9               0               0               0
734  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
735              1.       7.014e+6        7.014e+6        7.014e+6        7.014e+6
736  *
737  *         idcb            icbn            icb1            icb2            icb3
738              -31               9               0               0               0
739  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
740              1.       7.064e+6        7.064e+6        7.064e+6        7.064e+6
741  *
742  *         idcb            icbn            icb1            icb2            icb3
743              -32               9               0               0               0
744  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
745              1.      11.066e+6       11.066e+6       11.066e+6       11.066e+6
746  *
747  *         idcb            icbn            icb1            icb2            icb3
748              -33               9               0               0               0
749  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
750              1.             30.             30.             30.             30.
751  *
752  *         idcb            icbn            icb1            icb2            icb3
753              -34               9               0               0               0
754  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
755              1.             42.             42.             42.             42.
756  *
757  *         idcb            icbn            icb1            icb2            icb3
758              -35               9               0               0               0
759  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
760              1.          .1524           .1524           .1524           .1524
761  *
762  *         idcb            icbn            icb1            icb2            icb3
763              -36               9               0               0               0
764  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
765              1.           9.711           9.711           9.711           9.711
766  *
767  *         idcb            icbn            icb1            icb2            icb3
768              -37               9               0               0               0
769  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
770              1.          .21e+6          .21e+6          .21e+6          .21e+6
771  *
```



```
772  *         idcb            icbn            icb1            icb2            icb3
773              -38               9               0               0               0
774  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
775              1.      1.72e+6         1.72e+6         1.72e+6         1.72e+6
776  *
777  *         idcb            icbn            icb1            icb2            icb3
778              -39               9               0               0               0
779  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
780              1.      8.651e+6        8.651e+6        8.651e+6        8.651e+6
781  *
782  *         idcb            icbn            icb1            icb2            icb3
783              -40               9               0               0               0
784  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
785              1.              6.              6.              6.              6.
786  *
787  *         idcb            icbn            icb1            icb2            icb3
788              -41               9               0               0               0
789  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
790              1.             6.2             6.2             6.2             6.2
791  *
792  *         idcb            icbn            icb1            icb2            icb3
793              -42               9               0               0               0
794  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
795              1.      5.271e+6        5.271e+6        5.271e+6        5.271e+6
796  *
797  *         idcb            icbn            icb1            icb2            icb3
798              -43               9               0               0               0
799  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
800              1.           .0254           .0254           .0254           .0254
801  *
802  *         idcb            icbn            icb1            icb2            icb3
803              -44               9               0               0               0
804  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
805              1.             .25             .25             .25             .25
806  *
807  *         idcb            icbn            icb1            icb2            icb3
808              -45               9               0               0               0
809  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
810              1.             -.5             -.5             -.5             -.5
811  *
812  *         idcb            icbn            icb1            icb2            icb3
813              -46               9               0               0               0
814  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
815              1.          .05e+6          .05e+6          .05e+6          .05e+6
816  *
817  *         idcb            icbn            icb1            icb2            icb3
818              -47               9               0               0               0
819  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
820              1.          .14e+6          .14e+6          .14e+6          .14e+6
821  *
822  *         idcb            icbn            icb1            icb2            icb3
823              -48               9               0               0               0
824  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
825              1.      16.65e+6        16.65e+6        16.65e+6        16.65e+6
826  *
827  *         idcb            icbn            icb1            icb2            icb3
828              -49               9               0               0               0
829  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
830              1.      16.99e+6        16.99e+6        16.99e+6        16.99e+6
831  *
832  *         idcb            icbn            icb1            icb2            icb3
833              -50               9               0               0               0
834  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
835              1.      8.892e+6        8.892e+6        8.892e+6        8.892e+6
836  *
837  *         idcb            icbn            icb1            icb2            icb3
838              -51               9               0               0               0
839  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
840              1.      1.724e+6        1.724e+6        1.724e+6        1.724e+6
841  *
842  *         idcb            icbn            icb1            icb2            icb3
843              -52               9               0               0               0
844  *       cbgain          cbxmin          cbxmax          cbcon1          cbcon2
```

```
845            1.        6.1468        6.1468        6.1468        6.1468
846  *
847  *       idcb          icbn          icb1          icb2          icb3
848            -53             9             0             0             0
849  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
850            1.       2568.e+6      2568.e+6      2568.e+6      2568.e+6
851  *          1.     3.894e-10     3.894e-10     3.894e-10     3.894e-10
852  *
853  *       idcb          icbn          icb1          icb2          icb3
854            -54             9             0             0             0
855  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
856            1.         599.26        599.26        599.26        599.26
857  *
858  *       idcb          icbn          icb1          icb2          icb3
859            -55             9             0             0             0
860  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
861            1.      15.937e+6     15.937e+6     15.937e+6     15.937e+6
862  *
863  *       idcb          icbn          icb1          icb2          icb3
864            -56             9             0             0             0
865  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
866            1.      12.531e+6     12.531e+6     12.531e+6     12.531e+6
867  *
868  *       idcb          icbn          icb1          icb2          icb3
869            -57             9             0             0             0
870  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
871            1.          1.075         1.075         1.075         1.075
872  *
873  *       idcb          icbn          icb1          icb2          icb3
874            -58             9             0             0             0
875  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
876            1.         153585.       153585.       153585.       153585.
877  *
878  *       idcb          icbn          icb1          icb2          icb3
879            -59             9             0             0             0
880  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
881            1.             .3            .3            .3            .3
882  *
883  *       idcb          icbn          icb1          icb2          icb3
884            -60             9             0             0             0
885  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
886            1.             .5            .5            .5            .5
887  *
888  *       idcb          icbn          icb1          icb2          icb3
889            -61             9             0             0             0
890  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
891            1.             5.            5.            5.            5.
892  *
893  *       idcb          icbn          icb1          icb2          icb3
894            -62             9             0             0             0
895  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
896            1.           1.5           1.5           1.5           1.5
897  *
898  *       idcb          icbn          icb1          icb2          icb3
899            -63             9             0             0             0
900  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
901            1.      6.2053e+6     6.2053e+6     6.2053e+6     6.2053e+6
902  *
903  *       idcb          icbn          icb1          icb2          icb3
904            -64             9             0             0             0
905  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
906            1.         68948.        68948.        68948.        68948.
907  *
908  *       idcb          icbn          icb1          icb2          icb3
909            -65             9             0             0             0
910  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
911            1.      .34474e+6     .34474e+6     .34474e+6     .34474e+6
912  *
913  *  cb-66 changed to 125 psi bias
914  *       idcb          icbn          icb1          icb2          icb3
915            -66             9             0             0             0
916  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
917            1.      .86184e+6     .86184e+6     .86184e+6     .86184e+6
```



```
918  *          1.      .75843e+6     .75843e+6     .75843e+6     .75843e+6
919  *
920  *       idcb          icbn          icb1          icb2          icb3
921            -67             9             0             0             0
922  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
923            1.       385.2e+6      385.2e+6      385.2e+6      385.2e+6
924  *
925  *       idcb          icbn          icb1          icb2          icb3
926            -68             9             0             0             0
927  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
928            1.     4.834561e-6   4.834561e-6   4.834561e-6   4.834561e-6
929  *
930  *       idcb          icbn          icb1          icb2          icb3
931            -69             9             0             0             0
932  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
933            1.            10.           10.           10.           10.
934  *
935  *       idcb          icbn          icb1          icb2          icb3
936            -70             9             0             0             0
937  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
938            1.           752.          752.          752.          752.
939  *
940  *       idcb          icbn          icb1          icb2          icb3
941            -71             9             0             0             0
942  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
943            1.           752.          752.          752.          752.
944  *
945  *       idcb          icbn          icb1          icb2          icb3
946            -72             9             0             0             0
947  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
948            1.          2.2046        2.2046        2.2046        2.2046
949  *
950  *       idcb          icbn          icb1          icb2          icb3
951            -73             9             0             0             0
952  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
953            1.         2629000.      2629000.      2629000.      2629000.
954  *
955  *       idcb          icbn          icb1          icb2          icb3
956            -74             9             0             0             0
957  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
958            1.         .008333       .008333       .008333       .008333
959  *
960  *       idcb          icbn          icb1          icb2          icb3
961            -75             9             0             0             0
962  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
963            1.         .003333       .003333       .003333       .003333
964  *
965  *       idcb          icbn          icb1          icb2          icb3
966            -76             9             0             0             0
967  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
968            1.            18.           18.           18.           18.
969  *
970  *       idcb          icbn          icb1          icb2          icb3
971            -77             9             0             0             0
972  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
973            1.         459.67        459.67        459.67        459.67
974  *
975  *       idcb          icbn          icb1          icb2          icb3
976            -78             9             0             0             0
977  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
978            1.        2616.915      2616.915      2616.915      2616.915
979  *
980  *       idcb          icbn          icb1          icb2          icb3
981            -79             9             0             0             0
982  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
983            1.             .2            .2            .2            .2
984  *
985  *       idcb          icbn          icb1          icb2          icb3
986            -80             9             0             0             0
987  *      cbgain         cbxmin        cbxmax        cbcon1        cbcon2
988            1.        -.0083333     -.0083333     -.0083333     -.0083333
989  *
990  *       idcb          icbn          icb1          icb2          icb3
```

```
                -81             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.    -.0033333     -.0033333     -.0033333     -.0033333
*
*            idcb          icbn          icb1          icb2          icb3
                -82             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           .05           .05           .05           .05
*
*            idcb          icbn          icb1          icb2          icb3
                -83             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           .75           .75           .75           .75
*
*            idcb          icbn          icb1          icb2          icb3
                -84             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           .7            .7            .7            .7
*
*            idcb          icbn          icb1          icb2          icb3
                -85             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           .15           .15           .15           .15
*
*            idcb          icbn          icb1          icb2          icb3
                -86             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           490.4         490.4         490.4         490.4
*
*            idcb          icbn          icb1          icb2          icb3
                -87             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.    15.2699e+6    15.2699e+6    15.2699e+6    15.2699e+6
*
*            idcb          icbn          icb1          icb2          icb3
                -88             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.    14.9252e+6    14.9252e+6    14.9252e+6    14.9252e+6
*
*            idcb          icbn          icb1          icb2          icb3
                -89             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           5.588         5.588         5.588         5.588
*
*            idcb          icbn          icb1          icb2          icb3
                -90             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           27.778        27.778        27.778        27.778
*            1.           2.7778        2.7778        2.7778        2.7778
*
*            idcb          icbn          icb1          icb2          icb3
                -91             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.       -.015432      -.015432      -.015432      -.015432
*
*            idcb          icbn          icb1          icb2          icb3
                -92             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           .814          .814          .814          .814
*
*            idcb          icbn          icb1          icb2          icb3
                -93             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           1.014         1.014         1.014         1.014
*
*            idcb          icbn          icb1          icb2          icb3
                -94             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           6.148         6.148         6.148         6.148
*
*            idcb          icbn          icb1          icb2          icb3
                -95             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
```



```
                 1.           6.348         6.348         6.348         6.348
*
*            idcb          icbn          icb1          icb2          icb3
                -96             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           9.611         9.611         9.611         9.611
*
*            idcb          icbn          icb1          icb2          icb3
                -97             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           9.811         9.811         9.811         9.811
*
*            idcb          icbn          icb1          icb2          icb3
                -98             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           15.75         15.75         15.75         15.75
*
*            idcb          icbn          icb1          icb2          icb3
                -99             9             0             0             0
*            cbgain        cbxmin        cbxmax        cbcon1        cbcon2
                 1.           15.95         15.95         15.95         15.95
*
*************************************************************************
*                          rcp power calculation                        *
*************************************************************************
*
* rcp b1 power
*  idcb      icbn      icb1      icb2      icb3
   -101      39       *multi* 301       302
*       cbgain   cbxmin   cbxmax   cbcon1   cbcon2
          0.0      0.0      0.0      0.0      0.0
*
* rcp a1 power
*  idcb      icbn      icb1      icb2      icb3
   -102      39       *multi* 1301      1302
*       cbgain   cbxmin   cbxmax   cbcon1   cbcon2
          0.0      0.0      0.0      0.0      0.0
*
* rcp b2 power
*  idcb      icbn      icb1      icb2      icb3
   -103      39       *multi* 2301      2302
*       cbgain   cbxmin   cbxmax   cbcon1   cbcon2
          0.0      0.0      0.0      0.0      0.0
*
* rcp a2 power
*  idcb      icbn      icb1      icb2      icb3
   -104      39       *multi* 3301      3302
*       cbgain   cbxmin   cbxmax   cbcon1   cbcon2
          0.0      0.0      0.0      0.0      0.0
*
* sum b1, a1, and b2 rcp power
*  idcb      icbn      icb1      icb2      icb3
   -105      57       *sum3*   -101      -102      -103
*       cbgain   cbxmin   cbxmax   cbcon1   cbcon2
          0.0      0.0      0.0      0.0      0.0
*
* total rcp power
*  idcb      icbn      icb1      icb2      icb3
   -106       3       *add*    -104      -105
*       cbgain   cbxmin   cbxmax   cbcon1   cbcon2
          0.0      0.0      0.0      0.0      0.0
*
*************************************************************************
*                          rcp coastdown calculation
*************************************************************************
*
*    calculate time after trip
  -110    24    *int.w.mode*    -21    221    221
    0.0    0.0    0.0    0.0    0.0
*
*    coastdown speed fraction vs time
  -112    101    *table*    -110  167    0
    0.0    0.0    0.0    0.0    0.0
```

*	time	coastdown speed fraction
	0.00	1.00000 s
	2.49	0.97220 s
	5.00	0.79968 s
	7.52	0.67504 s
	10.02	0.58276 s
	12.52	0.51091 s
	15.02	0.45368 s
	17.52	0.40724 s
	20.02	0.36905 s
	22.52	0.33713 s
	25.02	0.31000 s
	27.52	0.28668 s
	30.02	0.26642 s
	32.52	0.24868 s
	35.02	0.23300 s
	37.52	0.21905 s
	40.02	0.20656 s
	42.52	0.19531 s
	45.02	0.18514 s
	47.52	0.17589 s
	50.02	0.16745 s
	52.52	0.15971 s
	55.02	0.15260 s
	57.52	0.14604 s
	60.02	0.13996 s
	62.52	0.13432 s
	65.02	0.12907 s
	67.52	0.12417 s
	70.02	0.11958 s
	72.52	0.11528 s
	75.02	0.11123 s
	77.52	0.10741 s
	80.02	0.10381 s
	82.52	0.10040 s
	85.02	0.09717 s
	87.52	0.09412 s
	90.02	0.09122 s
	92.52	0.08846 s
	95.02	0.08585 s
	97.52	0.08337 s
	100.02	0.08101 s
	102.52	0.07877 s
	105.02	0.07664 s
	107.52	0.07461 s
	110.02	0.07269 s
	112.52	0.07085 s
	115.02	0.06911 s
	117.52	0.06744 s
	120.02	0.06585 s
	122.52	0.06433 s
	125.02	0.06287 s
	127.52	0.06148 s
	130.02	0.06014 s
	132.52	0.05885 s
	135.02	0.05760 s
	137.52	0.05640 s
	140.02	0.05523 s
	142.52	0.05411 s
	145.02	0.05302 s
	147.52	0.05196 s
	150.02	0.05094 s
	152.52	0.04996 s
	155.02	0.04903 s
	157.52	0.04812 s
	160.02	0.04724 s
	162.52	0.04637 s
	165.02	0.04550 s
	167.52	0.04464 s
	170.02	0.04380 s
	172.52	0.04303 s
	175.02	0.04234 s
	177.52	0.04174 s

	180.02	0.04121 s
	182.52	0.04070 s
	185.02	0.04018 s
	187.52	0.03964 s
	190.02	0.03910 s
	192.52	0.03858 s
	195.02	0.03809 s
	197.52	0.03762 s
	200.02	0.03713 s
	202.52	0.03661 s
	205.02	0.03605 s
	207.52	0.03547 s
	210.02	0.03488 s
	212.52	0.03431 s
	215.02	0.03377 s
	217.52	0.03326 s
	220.02	0.03273 s
	222.52	0.03206 s
	225.02	0.03121 s
	227.52	0.03051 s
	230.02	0.03003 s
	232.52	0.02959 s
	235.02	0.02916 s
	237.52	0.02870 s
	240.02	0.02819 s
	242.52	0.02773 s
	245.02	0.02732 s
	247.52	0.02693 s
	250.02	0.02654 s
	252.52	0.02614 s
	255.02	0.02574 s
	257.52	0.02537 s
	260.02	0.02502 s
	262.52	0.02468 s
	265.02	0.02435 s
	267.52	0.02401 s
	270.02	0.02369 s
	272.52	0.02337 s
	275.02	0.02307 s
	277.52	0.02277 s
	280.02	0.02247 s
	282.52	0.02217 s
	285.02	0.02188 s
	287.52	0.02159 s
	290.02	0.02131 s
	292.52	0.02103 s
	295.02	0.02076 s
	297.52	0.02050 s
	300.02	0.02024 s
	302.52	0.01998 s
	305.02	0.01973 s
	307.52	0.01949 s
	310.02	0.01925 s
	312.52	0.01901 s
	315.02	0.01878 s
	317.52	0.01855 s
	320.02	0.01833 s
	322.52	0.01811 s
	325.02	0.01789 s
	327.52	0.01767 s
	330.02	0.01746 s
	332.52	0.01725 s
	335.02	0.01705 s
	337.52	0.01685 s
	340.02	0.01665 s
	342.52	0.01646 s
	345.02	0.01628 s
	347.52	0.01609 s
	350.02	0.01591 s
	352.52	0.01573 s
	355.02	0.01556 s
	357.52	0.01537 s
	360.02	0.01518 s

```
    362.52    0.01497 s
    365.02    0.01476 s
    367.52    0.01456 s
    370.04    0.01436 s
    372.50    0.01416 s
    374.99    0.01395 s
    377.51    0.01373 s
    379.99    0.01351 s
    382.52    0.01326 s
    385.02    0.01296 s
    387.50    0.01256 s
    390.02    0.01197 s
    392.52    0.01116 s
    394.99    0.01015 s
    397.52    0.00891 s
    400.01    0.00752 s
    402.53    0.00606 s
    405.03    0.00463 s
    407.53    0.00327 s
    410.03    0.00202 s
    412.53    0.00089 s
    415.03    0.00000 e
*
*   select steady-state pump speed
   -113     61    *zerohold*   301   212
    0.0   0.0   0.0   0.0   0.0
*
*   maximum pump speed for pump b1 (comp. 3)
   -114    36    *maxtrans*   -113
    0.0   0.0   0.0   0.0   0.0
*
*   select steady-state pump speed
   -115     61    *zerohold*   1301   212
    0.0   0.0   0.0   0.0   0.0
*
*   maximum pump speed for pump a1 (comp. 13)
   -116    36    *maxtrans*   -115
    0.0   0.0   0.0   0.0   0.0
*
*   select steady-state pump speed
   -117     61    *zerohold*   2301   212
    0.0   0.0   0.0   0.0   0.0
*
*   maximum pump speed for pump b2 (comp. 23)
   -118    36    *maxtrans*   -117
    0.0   0.0   0.0   0.0   0.0
*
*   select steady-state pump speed
   -119     61    *zerohold*   3301   212
    0.0   0.0   0.0   0.0   0.0
*
*   maximum pump speed for pump a2 (comp. 33)
   -120    36    *maxtrans*   -119
    0.0   0.0   0.0   0.0   0.0
*
*   pump b1 coastdown speed
   -122    39    *multi*   -114   -112
    0.0   0.0   0.0   0.0   0.0
*
*   pump a1 coastdown speed
   -124    39    *multi*   -116   -112
    0.0   0.0   0.0   0.0   0.0
*
*   pump b2 coastdown speed
   -126    39    *multi*   -118   -112
    0.0   0.0   0.0   0.0   0.0
*
*   pump a2 coastdown speed
   -128    39    *multi*   -120   -112
    0.0   0.0   0.0   0.0   0.0
*
************************************************************************
* accumulator liquid volume
************************************************************************
*
*   accumulator b liquid volume
   -140    54    *subtr*  -21   140
       39.93  0.0   39.93  0.0    0.0
*
*   accumulator a liquid volume
   -141    54    *subtr*  -21   141
       39.93  0.0   39.93  0.0    0.0
*
************************************************************************
* total eccs mass flows
************************************************************************
*
*   sum of hpi flow a1 and a2
   -142     3    *add*      22     23
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*   sum of hpi flow b1 and b2
   -143     3    *add*      21     24
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*   total hpi flow
   -144     3    *add*    -142  -143
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*   sum of accumulator flow
   -145     3    *add*      25     26
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*   sum of lpis flow
   -146     3    *add*      79     89
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*   sum of hpi, accumulator, and lpis flows
   -147    57    *sum3*    -144    -145    -146
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*   reserved cb -148 for break flow - total eccs flow
*   to be activated in loca transient calculations
*
*   break flow minus total eccs flow
*   -148    54    /subtr/    31    -147
*         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
************************************************************************
*                        core bypass flow
************************************************************************
*
*  sum core bypass mass flow sectors 1 through 3
  -151    57    *sum3*    151    152    153
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*  sum core bypass mass flow sectors 4 through 6
  -152    57    *sum3*    154    155    156
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*  sum core bypass mass flow sectors 1 through 6
  -153     3    *add*    -151  -152
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*  sum cold leg mass flows a1 and a2
  -154     3    *add*     239    240
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*  sum cold leg mass flows b1 and b2
  -155     3    *add*     241    242
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
*  total cold leg mass flow
  -156     3    *add*    -154  -155
         1.0      -1.0e20   1.0e20   0.0       1.0e-20
*
```

```
*  core bypass flow fraction
  -157   14   *div*   -153  -156
         1.0      -1.0e20   1.0e20   0.0      1.0e-20
*
************************************************************************
*   subcooling margin at top of hot legs                               *
************************************************************************
*
*  subcooling margin at top of hot leg a
  -160   54   *subtr*   161   160
    0.0   0.0   0.0   0.0   0.0
*
*  subcooling margin at top of hot leg b
  -162   54   *subtr*   163   162
    0.0   0.0   0.0   0.0   0.0
*
************************************************************************
*                        core exit mass flows                          *
************************************************************************
*
*  sum core exit mass flow sectors 1 through 3
  -171   57   *sum3*   171   172   173
    0.0   0.0   0.0   0.0   0.0
*
*  sum core exit mass flow sectors 4 through 6
  -172   57   *sum3*   174   175   176
    0.0   0.0   0.0   0.0   0.0
*
*  sum core exit mass flow sectors 1 through 6
  -173    3   *add*   -171   -172
    0.0   0.0   0.0   0.0   0.0
*
************************************************************************
*                        eccs energy inflow                            *
************************************************************************
*
*  hpi energy inflow (j/s) = (hpi flow) x 94473.0,
*  where 94473.0 = hpi average enthalpy at 294.3 k
*  over a pressure range between 10.0e05 and 110.0e05 pa
*
  -181   39   *multi*  -144  -21
         94473.0   0.0   1.0e20   0.0   0.0
*
*  cft energy inflow (j/s) = (cft flow) x 137475.0,
*  where 137475.0 = hpi average enthalpy at 305.4 k
*  over a pressure range between 10.0e05 and 40.0e05 pa
*
  -182   39   *multi*  -145  -21
         137475.0   0.0   1.0e20   0.0   0.0
*
*  lpi energy inflow (j/s) = (lpi flow) x 89637.0,
*  where 89637.0 = hpi average enthalpy at 294.3 k
*  over a pressure range between 7.86e05 and 14.75e05 pa
*
  -183   39   *multi*  -146  -21
         89637.0   0.0   1.0e20   0.0   0.0
*
*  total eccs energy inflow
  -184   57   *sum3*   -181   -182   -183
         0.0   0.0   0.0   0.0   0.0
*
************************************************************************
*                        vent valve flows                              *
************************************************************************
*
*  sum vent valves mass flow sectors 1 through 3
  -201   57   *sum3*   41   42   43
    0.0   0.0   0.0   0.0   0.0
*
*  sum vent valves mass flow sectors 4 through 6
  -202   57   *sum3*   44   45   46
    0.0   0.0   0.0   0.0   0.0
*
```



```
*  sum vent valves mass flow sectors 1 through 6
  -203    3   *add*   -201   -202
    0.0   0.0   0.0   0.0   0.0
*
************************************************************************
*   change in pressurizer water level for makeup/letdown flow control
************************************************************************
*
*  compute pressurizer water level relative to lower tap
  -218   56   *sumconst*  27
    1.0   -1.0e20  1.0e20   -0.844   0.0
*
*  pressurizer water level - reference water level
  -220   54   *subtr*  -218   -89
    0.0   0.0   0.0   0.0   0.0
*
*  lag change in pressurizer water level
  -222   26   *lag*  -220
    1.0  -10.0    10.0   1.0  0.0
*
*  table of makeup/letdown flow as f(change in pzr level)
  -224   101   *table*   -222   4   0
   0.0   0.0   0.0   0.0   0.0
*  delta-z (m)  mass flow (kg/s)
    -0.254    12.787 s
    -0.127     0.0   s
     0.127     0.0   s
     0.254    -2.808 e
*
*  set makeup/letdown flow to zero if pressurizer pressure .le. 1600 psig
   -226   22   *inputswitch*   -20   -224   135
    0.0    0.0    0.0   0.0    0.0
*
************************************************************************
* steam generator total boiler liquid level
************************************************************************
*
* sg-a boiler total liquid level
   -230   57   *sum3*   208   91   93
    0.0    0.0    0.0   0.0    0.0
*
* sg-b boiler total liquid level
   -231   57   *sum3*   209   92   94
    0.0    0.0    0.0   0.0    0.0
*
************************************************************************
*                      a loop SRV area fraction                        *
************************************************************************
*
*     control
*     block id  control block value
*     --------  -------------------
*
*         -302  7.3409 MPa  =  1064.7 PSIA       =  1050 PSIG
*         -304  6.7536 MPa  =  .92(1064.7 PSIA)
*         -306  7.4443 MPa  =  1079.7 PSIA       =  1065 PSIG
*         -308  6.8488 MPa  =  .92(1079.7 PSIA)
*         -310  7.5477 MPa  =  1094.7 PSIA       =  1080 PSIG
*         -312  6.9439 MPa  =  .92(1094.7 PSIA)
*         -314  7.6167 MPa  =  1104.7 PSIA       =  1090 PSIG
*         -316  7.0074 MPa  =  .92(1104.7 PSIA)
*         -318  7.6856 MPa  =  1114.7 PSIA       =  1100 PSIG
*         -320  7.0708 MPa  =  .92(1114.7 PSIA)
*         -322  7.7132 MPa  =  1118.7 PSIA       =  1104 PSIG
*         -324  7.0962 MPa  =  .92(1118.7 PSIA)
*
*         -388  a loop SRV area fraction
*
*
*         idcb          icbn          icb1          icb2          icb3
*         -302             9             0             0             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
*           1.     7.3409e+6     7.3409e+6     7.3409e+6     7.3409e+6
```

```
1575 *
1576 *       idcb          icbn          icb1          icb2          icb3
1577          -304             9             0             0             0
1578 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1579              1.    6.7536e+6     6.7536e+6     6.7536e+6     6.7536e+6
1580 *
1581 *       idcb          icbn          icb1          icb2          icb3
1582          -306             9             0             0             0
1583 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1584              1.    7.4443e+6     7.4443e+6     7.4443e+6     7.4443e+6
1585 *
1586 *       idcb          icbn          icb1          icb2          icb3
1587          -308             9             0             0             0
1588 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1589              1.    6.8488e+6     6.8488e+6     6.8488e+6     6.8488e+6
1590 *
1591 *       idcb          icbn          icb1          icb2          icb3
1592          -310             9             0             0             0
1593 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1594              1.    7.5477e+6     7.5477e+6     7.5477e+6     7.5477e+6
1595 *
1596 *       idcb          icbn          icb1          icb2          icb3
1597          -312             9             0             0             0
1598 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1599              1.    6.9439e+6     6.9439e+6     6.9439e+6     6.9439e+6
1600 *
1601 *       idcb          icbn          icb1          icb2          icb3
1602          -314             9             0             0             0
1603 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1604              1.    7.6167e+6     7.6167e+6     7.6167e+6     7.6167e+6
1605 *
1606 *       idcb          icbn          icb1          icb2          icb3
1607          -316             9             0             0             0
1608 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1609              1.    7.0074e+6     7.0074e+6     7.0074e+6     7.0074e+6
1610 *
1611 *       idcb          icbn          icb1          icb2          icb3
1612          -318             9             0             0             0
1613 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1614              1.    7.6856e+6     7.6856e+6     7.6856e+6     7.6856e+6
1615 *
1616 *       idcb          icbn          icb1          icb2          icb3
1617          -320             9             0             0             0
1618 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1619              1.    7.0708e+6     7.0708e+6     7.0708e+6     7.0708e+6
1620 *
1621 *       idcb          icbn          icb1          icb2          icb3
1622          -322             9             0             0             0
1623 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1624              1.    7.7132e+6     7.7132e+6     7.7132e+6     7.7132e+6
1625 *
1626 *       idcb          icbn          icb1          icb2          icb3
1627          -324             9             0             0             0
1628 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1629              1.    7.0962e+6     7.0962e+6     7.0962e+6     7.0962e+6
1630 *
1631 *       idcb          icbn          icb1          icb2          icb3
1632          -332            20           223          -304             0
1633 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1634              1.            0.            1.            0.      1.0e-20
1635 *
1636 *       idcb          icbn          icb1          icb2          icb3
1637          -334            20           223          -302             0
1638 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1639              1.            0.            1.            0.      1.0e-20
1640 *
1641 *       idcb          icbn          icb1          icb2          icb3
1642          -336            20           223          -308             0
1643 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1644              1.            0.            1.            0.      1.0e-20
1645 *
1646 *       idcb          icbn          icb1          icb2          icb3
1647          -338            20           223          -306             0
```



```
1648 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1649              1.            0.            1.            0.      1.0e-20
1650 *
1651 *       idcb          icbn          icb1          icb2          icb3
1652          -340            20           223          -312             0
1653 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1654              1.            0.            1.            0.      1.0e-20
1655 *
1656 *       idcb          icbn          icb1          icb2          icb3
1657          -342            20           223          -310             0
1658 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1659              1.            0.            1.            0.      1.0e-20
1660 *
1661 *       idcb          icbn          icb1          icb2          icb3
1662          -344            20           223          -316             0
1663 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1664              1.            0.            1.            0.      1.0e-20
1665 *
1666 *       idcb          icbn          icb1          icb2          icb3
1667          -346            20           223          -314             0
1668 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1669              1.            0.            1.            0.      1.0e-20
1670 *
1671 *       idcb          icbn          icb1          icb2          icb3
1672          -348            20           223          -320             0
1673 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1674              1.            0.            1.            0.      1.0e-20
1675 *
1676 *       idcb          icbn          icb1          icb2          icb3
1677          -350            20           223          -318             0
1678 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1679              1.            0.            1.            0.      1.0e-20
1680 *
1681 *       idcb          icbn          icb1          icb2          icb3
1682          -352            20           223          -324             0
1683 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1684              1.            0.            1.            0.      1.0e-20
1685 *
1686 *       idcb          icbn          icb1          icb2          icb3
1687          -354            20           223          -322             0
1688 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1689              1.            0.            1.            0.      1.0e-20
1690 *
1691 *       idcb          icbn          icb1          icb2          icb3
1692          -356             5          -368          -332             0
1693 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1694              1.            0.            1.            0.      1.0e-20
1695 *
1696 *       idcb          icbn          icb1          icb2          icb3
1697          -358             5          -370          -336             0
1698 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1699              1.            0.            1.            0.      1.0e-20
1700 *
1701 *       idcb          icbn          icb1          icb2          icb3
1702          -360             5          -372          -340             0
1703 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1704              1.            0.            1.            0.      1.0e-20
1705 *
1706 *       idcb          icbn          icb1          icb2          icb3
1707          -362             5          -374          -344             0
1708 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1709              1.            0.            1.            0.      1.0e-20
1710 *
1711 *       idcb          icbn          icb1          icb2          icb3
1712          -364             5          -376          -348             0
1713 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1714              1.            0.            1.            0.      1.0e-20
1715 *
1716 *       idcb          icbn          icb1          icb2          icb3
1717          -366             5          -378          -352             0
1718 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1719              1.            0.            1.            0.      1.0e-20
1720 *
```

```
*         idcb          icbn          icb1          icb2          icb3
           -368            25          -356          -334             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -370            25          -358          -338             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -372            25          -360          -342             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -374            25          -362          -346             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -376            25          -364          -350             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -378            25          -366          -354             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -380             3          -368          -370             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            2.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -382             3          -372          -374             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            2.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -384             3          -376          -378             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             2.            0.            4.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -386             3          -380          -382             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            4.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -388             3          -386          -384             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
            .125           0.            1.            0.      1.0e-20
*
**************************************************************************
*                      b loop SRV area fraction                          *
**************************************************************************
*
*     control
*     block id  control block value
*     --------  -------------------
*
*          -488  b loop SRV area fraction
*
*
*         idcb          icbn          icb1          icb2          icb3
           -432            20           225          -304             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -434            20           225          -302             0
```



```
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -436            20           225          -308             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -438            20           225          -306             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -440            20           225          -312             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -442            20           225          -310             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -444            20           225          -316             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -446            20           225          -314             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -448            20           225          -320             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -450            20           225          -318             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -452            20           225          -324             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -454            20           225          -322             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -456             5          -468          -432             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -458             5          -470          -436             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -460             5          -472          -440             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
           -462             5          -474          -444             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.            0.            1.            0.      1.0e-20
*
```

```
1867 *        idcb          icbn          icb1          icb2          icb3
1868           -464             5          -476          -448             0
1869 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1870            1.            0.            1.            0.      1.0e-20
1871 *
1872 *        idcb          icbn          icb1          icb2          icb3
1873           -466             5          -478          -452             0
1874 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1875            1.            0.            1.            0.      1.0e-20
1876 *
1877 *        idcb          icbn          icb1          icb2          icb3
1878           -468            25          -456          -434             0
1879 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1880            1.            0.            1.            0.      1.0e-20
1881 *
1882 *        idcb          icbn          icb1          icb2          icb3
1883           -470            25          -458          -438             0
1884 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1885            1.            0.            1.            0.      1.0e-20
1886 *
1887 *        idcb          icbn          icb1          icb2          icb3
1888           -472            25          -460          -442             0
1889 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1890            1.            0.            1.            0.      1.0e-20
1891 *
1892 *        idcb          icbn          icb1          icb2          icb3
1893           -474            25          -462          -446             0
1894 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1895            1.            0.            1.            0.      1.0e-20
1896 *
1897 *        idcb          icbn          icb1          icb2          icb3
1898           -476            25          -464          -450             0
1899 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1900            1.            0.            1.            0.      1.0e-20
1901 *
1902 *        idcb          icbn          icb1          icb2          icb3
1903           -478            25          -466          -454             0
1904 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1905            1.            0.            1.            0.      1.0e-20
1906 *
1907 *        idcb          icbn          icb1          icb2          icb3
1908           -480             3          -468          -470             0
1909 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1910            1.            0.            2.            0.      1.0e-20
1911 *
1912 *        idcb          icbn          icb1          icb2          icb3
1913           -482             3          -472          -474             0
1914 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1915            1.            0.            2.            0.      1.0e-20
1916 *
1917 *        idcb          icbn          icb1          icb2          icb3
1918           -484             3          -476          -478             0
1919 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1920            2.            0.            4.            0.      1.0e-20
1921 *
1922 *        idcb          icbn          icb1          icb2          icb3
1923           -486             3          -480          -482             0
1924 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1925            1.            0.            4.            0.      1.0e-20
1926 *
1927 *        idcb          icbn          icb1          icb2          icb3
1928           -488             3          -486          -484             0
1929 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1930            .125          0.            1.            0.      1.0e-20
1931 *
1932 ************************************************************************
1933 *              HPI, RCP, and MFW realignment trip signals              *
1934 ************************************************************************
1935 *
1936 *     control
1937 *     block id  control block value
1938 *     --------  -------------------
1939 *
```



```
1940 *        -745  HPI trip signal
1941 *        -725  RCP trip signal used in trip 20
1942 *        -740  MFW realignment trip signal
1943 *
1944 *
1945 *        idcb          icbn          icb1          icb2          icb3
1946           -705            34             2           -32             0
1947 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1948            1.            0.            1.            0.      1.0e-20
1949 *
1950 *        idcb          icbn          icb1          icb2          icb3
1951           -710            54           203           202             0
1952 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1953             0.0           0.0           0.0           0.0           0.0
1954 *          1.            0.            1.            0.      1.0e-20
1955 *
1956 *        idcb          icbn          icb1          icb2          icb3
1957           -715            54           205           204             0
1958 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1959             0.0           0.0           0.0           0.0           0.0
1960 *          1.            0.            1.            0.      1.0e-20
1961 *
1962 *        idcb          icbn          icb1          icb2          icb3
1963           -725            37          -710          -715             0
1964 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1965            1.       -1.e+99       1.e+99            0.      1.0e-20
1966 *
1967 *        idcb          icbn          icb1          icb2          icb3
1968           -720            36          -705             0             0
1969 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1970            1.            0.            1.            0.      1.0e-20
1971 *
1972 *        idcb          icbn          icb1          icb2          icb3
1973           -730            24           -21          -720          -720
1974 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1975            1.            0.       1.e+99            0.      1.0e-20
1976 *
1977 *        idcb          icbn          icb1          icb2          icb3
1978           -735            34          -725           -34             0
1979 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1980            1.            0.            1.            0.      1.0e-20
1981 *
1982 *        idcb          icbn          icb1          icb2          icb3
1983           -740            21          -730           -33             0
1984 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1985            1.            0.            1.            0.      1.0e-20
1986 *
1987 *        idcb          icbn          icb1          icb2          icb3
1988           -745             5          -720          -735             0
1989 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1990            1.            0.            1.            0.      1.0e-20
1991 *
1992 *        idcb          icbn          icb1          icb2          icb3
1993           -750            39          -740           201             0
1994 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
1995            1.            0.          100.            0.      1.0e-20
1996 *
1997 *        idcb          icbn          icb1          icb2          icb3
1998           -755             5          -740          -735             0
1999 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2000            1.            0.            1.            0.      1.0e-20
2001 *
2002 *        idcb          icbn          icb1          icb2          icb3
2003           -760            25          -740           -20             0
2004 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2005            1.            0.            1.            0.      1.0e-20
2006 *
2007 *        idcb          icbn          icb1          icb2          icb3
2008           -765             3          -765          -750             0
2009 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2010            1.            0.            5.            0.      1.0e-20
2011 *
2012 *        idcb          icbn          icb1          icb2          icb3
```

```
2013            -770            39          -760           201             0
2014 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2015              1.            0.          100.            0.      1.0e-20
2016 *
2017 *          idcb           icbn          icb1          icb2          icb3
2018            -775              3          -775          -770             0
2019 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2020              1.            0.            4.            0.      1.0e-20
2021 *
2022 *          idcb           icbn          icb1          icb2          icb3
2023            -780            101          -765             4             0
2024 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2025              1.            0.            1.            0.      1.0e-20
2026 * cftab      +              +             +             +             +
2027            -10.          0.s
2028              0.          0.s
2029              5.          1.s
2030             10.          1.e
2031 *
2032 *          idcb           icbn          icb1          icb2          icb3
2033            -785            101          -765             4             0
2034 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2035              1.            0.            1.            0.      1.0e-20
2036 * cftab      +              +             +             +             +
2037            -10.          1.s
2038              0.          1.s
2039              5.          0.s
2040             10.          0.e
2041 *
2042 *          idcb           icbn          icb1          icb2          icb3
2043            -790            101          -775             4             0
2044 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2045              1.            0.            1.            0.      1.0e-20
2046 * cftab      +              +             +             +             +
2047            -10.          1.s
2048              0.          1.s
2049              4.          0.s
2050             10.          0.e
2051 *
2052 ************************************************************************
2053 *           hotwell and condensate booster pump trip signals           *
2054 ************************************************************************
2055 *
2056 *     control
2057 *     block id  control block value
2058 *     --------  -------------------
2059 *
2060 *         -835  hotwell pump trip signal
2061 *               0 = off, 1 = triped
2062 *         -865  condensate booster pump trip signal
2063 *               0 = off, 1 = triped
2064 *
2065 *       hotwell level defined as a constant, 0.2 m
2066 *          idcb           icbn          icb1          icb2          icb3
2067            -800              9             0             0             0
2068 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2069              1.            0.2           0.2           0.2           0.2
2070 *
2071 *          idcb           icbn          icb1          icb2          icb3
2072            -801              9             0             0             0
2073 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2074              1.           400.          400.          400.          400.
2075 *
2076 *          idcb           icbn          icb1          icb2          icb3
2077            -802             21           212           -21             0
2078 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2079              1.            0.            1.            0.      1.0e-20
2080 *
2081 *          idcb           icbn          icb1          icb2          icb3
2082            -803             21             1          -801             0
2083 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2084              1.            0.            1.            0.      1.0e-20
2085 *
```



```
2086 *          idcb           icbn          icb1          icb2          icb3
2087            -804             25          -802          -803             0
2088 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2089              1.            0.            1.            0.      1.0e-20
2090 *
2091 *          idcb           icbn          icb1          icb2          icb3
2092            -805             34          -800           -35             0
2093 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2094              1.            0.            1.            0.      1.0e-20
2095 *
2096 *          idcb           icbn          icb1          icb2          icb3
2097            -810             34           217           -37             0
2098 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2099              1.            0.            1.            0.      1.0e-20
2100 *
2101 *          idcb           icbn          icb1          icb2          icb3
2102            -820              5          -804          -805             0
2103 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2104              1.            0.            1.            0.      1.0e-20
2105 *
2106 *          idcb           icbn          icb1          icb2          icb3
2107            -825              5          -804          -810             0
2108 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2109              1.            0.            1.            0.      1.0e-20
2110 *
2111 *          idcb           icbn          icb1          icb2          icb3
2112            -835             36          -820             0             0
2113 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2114              1.            0.            1.            0.      1.0e-20
2115 *
2116 *          idcb           icbn          icb1          icb2          icb3
2117            -840             36          -825             0             0
2118 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2119              1.            0.            1.            0.      1.0e-20
2120 *
2121 *          idcb           icbn          icb1          icb2          icb3
2122            -865             25          -835          -840             0
2123 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2124              1.            0.            1.            0.      1.0e-20
2125 *
2126 ************************************************************************
2127 *                    Feedwater heater condensate drain                 *
2128 ************************************************************************
2129 *
2130 * start time integration when turbine trip set status is set to 1
2131 * gain = 0.2 so that output equals 1 after 5 s.  this control block
2132 * serves as a condensate-drain mass-flow reducer after turbine trip.
2133 *          idcb           icbn          icb1          icb2          icb3
2134            -900             23           220             0             0
2135 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2136              0.2            0.            1.            0.          0.0
2137 *
2138 * subtract cb-900 from 1 to calculate mass flow multiplier
2139 *          idcb           icbn          icb1          icb2          icb3
2140            -902             54           -21          -900             0
2141 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2142              1.            0.            1.            0.          1.0
2143 *
2144 * condensate drain into d heater. gain = 0.17306/2.204623 = 0.0785
2145 *          idcb           icbn          icb1          icb2          icb3
2146            -904             39           746          -902             0
2147 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2148          0.0785            0.         1.0e10            0.      1.0e-20
2149 *
2150 * condensate drain into e heater. gain = 1.330652/2.204623 = 0.60357
2151 *          idcb           icbn          icb1          icb2          icb3
2152            -906             39           750          -902             0
2153 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
2154         0.60347            0.         1.0e10            0.      1.0e-20
2155 *
2156 ************************************************************************
2157 *                         HPI flowrate signals                         *
2158 ************************************************************************
```

```
2159 *
2160 *     control
2161 *     block id  control block value
2162 *     --------  -------------------
2163 *
2164 *        -1188  a1 hpi flowrate (kg/sec)
2165 *        -1192  a2 hpi flowrate (kg/sec)
2166 *        -1196  b1 hpi flowrate (kg/sec)
2167 *        -1198  b2 hpi flowrate (kg/sec)
2168 *
2169 *
2170 *         idcb          icbn          icb1          icb2          icb3
2171           -1101            37           235           236             0
2172 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2173             1.       -1.e+99        1.e+99            0.      1.0e-20
2174 *
2175 *         idcb          icbn          icb1          icb2          icb3
2176           -1102            21             2           -87             0
2177 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2178             1.            0.            1.            0.      1.0e-20
2179 *
2180 *         idcb          icbn          icb1          icb2          icb3
2181           -1103            37           237           238             0
2182 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2183             1.       -1.e+99        1.e+99            0.      1.0e-20
2184 *
2185 *         idcb          icbn          icb1          icb2          icb3
2186           -1104            21             2           -88             0
2187 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2188             1.            0.            1.            0.      1.0e-20
2189 *
2190 *         idcb          icbn          icb1          icb2          icb3
2191           -1105            37         -1101         -1103             0
2192 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2193             1.       -1.e+99        1.e+99            0.      1.0e-20
2194 *
2195 *         idcb          icbn          icb1          icb2          icb3
2196           -1106             5          -740           268             0
2197 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2198             1.            0.            1.            0.      1.0e-20
2199 *
2200 *         idcb          icbn          icb1          icb2          icb3
2201           -1108            54           203           202             0
2202 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2203             1.       -1.e+99        1.e+99            0.      1.0e-20
2204 *
2205 *         idcb          icbn          icb1          icb2          icb3
2206           -1112            54           205           204             0
2207 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2208             1.       -1.e+99        1.e+99            0.      1.0e-20
2209 *
2210 *         idcb          icbn          icb1          icb2          icb3
2211           -1116            34             2           -32             0
2212 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2213             1.            0.            1.            0.      1.0e-20
2214 *
2215 *         idcb          icbn          icb1          icb2          icb3
2216           -1117             3           235           236             0
2217 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2218             1.       -1.e+99        1.e+99            0.      1.0e-20
2219 *
2220 *         idcb          icbn          icb1          icb2          icb3
2221           -1118             3           237           238             0
2222 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2223             1.       -1.e+99        1.e+99            0.      1.0e-20
2224 *
2225 *         idcb          icbn          icb1          icb2          icb3
2226           -1120             5         -1104         -1144             0
2227 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2228             1.            0.            1.            0.      1.0e-20
2229 *
2230 *         idcb          icbn          icb1          icb2          icb3
2231           -1122            34         -1105           -27             0
```



```
2232 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2233             1.            0.            1.            0.      1.0e-20
2234 *
2235 *         idcb          icbn          icb1          icb2          icb3
2236           -1124            37         -1108         -1112             0
2237 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2238             1.       -1.e+99        1.e+99            0.      1.0e-20
2239 *
2240 *         idcb          icbn          icb1          icb2          icb3
2241           -1128            36         -1116             0             0
2242 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2243             1.            0.            1.            0.            0.
2244 *
2245 *         idcb          icbn          icb1          icb2          icb3
2246           -1130             3         -1117         -1118             0
2247 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2248              .25      -1.e+99        1.e+99            0.      1.0e-20
2249 *
2250 *         idcb          icbn          icb1          icb2          icb3 /gsr
2251           -1131            21            27           -14             0
2252 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2253             1.            0.            1.            0.      1.0e-20
2254 *
2255 *         idcb          icbn          icb1          icb2          icb3
2256           -1132            25         -1102         -1120             0
2257 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2258             1.            0.            1.            0.      1.0e-20
2259 *
2260 *         idcb          icbn          icb1          icb2          icb3
2261           -1136             5           260         -1128             0
2262 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2263             1.            0.            1.            0.      1.0e-20
2264 *
2265 *         idcb          icbn          icb1          icb2          icb3
2266           -1137            21         -1124           -90             0
2267 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2268             1.            0.            1.            0.      1.0e-20
2269 *
2270 *   Add HPI throttling logic not to throttle if pzr level below 120 inch.
2271 *   by  gsr 7/6/01
2272 *
2273 *         idcb          icbn          icb1          icb2          icb3
2274           -1133             5         -1131         -1137             0
2275 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2276             1.            0.            1.            0.      1.0e-20
2277 *
2278 *         idcb          icbn          icb1          icb2          icb3   /gsr
2279           -1138            21         -1124           -28             0
2280 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2281             1.            0.            1.            0.      1.0e-20
2282 *
2283 *         idcb          icbn          icb1          icb2          icb3 /gsr
2284 *       -1139             5         -1122         -1137             0
2285          -1139             5         -1122         -1133             0
2286 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2287             1.            0.            1.            0.      1.0e-20
2288 *
2289 *         idcb          icbn          icb1          icb2          icb3
2290           -1140             5         -1106         -1139             0
2291 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2292             1.            0.            1.            0.      1.0e-20
2293 *
2294 *         idcb          icbn          icb1          icb2          icb3
2295           -1141             5         -1128         -1140             0
2296 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2297             1.            0.            1.            0.      1.0e-20
2298 *
2299 *         idcb          icbn          icb1          icb2          icb3
2300           -1142            22            56         -1130           221
2301 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2302             1.       -1.e+99        1.e+99            0.      1.0e-20
2303 *
2304 *         idcb          icbn          icb1          icb2          icb3
```

```
2305          -1143          26          -1142          0          0
2306  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2307            1.        -1.e+99       1.e+99         13.     1.0e-20
2308  *
2309  *         idcb         icbn          icb1         icb2       icb3
2310          -1144           5          -1132        -1136          0
2311  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2312            1.           0.            1.           0.     1.0e-20
2313  *
2314  *         idcb         icbn          icb1         icb2       icb3
2315          -1145          100         -1143         1000          0
2316  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2317            1.        -1.e+99       1.e+99         120.         0.
2318  *
2319  *         idcb         icbn          icb1         icb2       icb3 /gsr
2320  *        -1146           5          -1144        -1137          0
2321          -1146           5          -1144        -1133          0
2322  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2323            1.           0.            1.           0.     1.0e-20
2324  *
2325  *         idcb         icbn          icb1         icb2       icb3
2326          -1147           5          -1138          265          0
2327  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2328            1.           0.            1.           0.     1.0e-20
2329  *
2330  *         idcb         icbn          icb1         icb2       icb3
2331          -1148          25          -1147        -1141          0
2332  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2333            1.           0.            1.           0.     1.0e-20
2334  *
2335  *         idcb         icbn          icb1         icb2       icb3
2336          -1149          54          -1143        -1145          0
2337  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2338        .008333     -1.e+99       1.e+99           0.     1.0e-20
2339  *
2340  *         idcb         icbn          icb1         icb2       icb3
2341          -1150          25          -1146        -1148          0
2342  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2343            1.           0.            1.           0.     1.0e-20
2344  *
2345  *         idcb         icbn          icb1         icb2       icb3
2346          -1151          34          -1149          -91          0
2347  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2348            1.        -1.e+99       1.e+99           0.     1.0e-20
2349  *
2350  *         idcb         icbn          icb1         icb2       icb3
2351          -1153          21          -1149          -20          0
2352  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2353            1.           0.            1.           0.     1.0e-20
2354  *
2355  *         idcb         icbn          icb1         icb2       icb3
2356          -1154          38          -1153             0          0
2357  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2358            1.           0.            1.           0.         1.
2359  *
2360  *         idcb         icbn          icb1         icb2       icb3
2361          -1155          61          -1142        -1154          0
2362  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2363            1.        -1.e+99       1.e+99           0.     1.0e-20
2364  *
2365  *         idcb         icbn          icb1         icb2       icb3
2366          -1157          54          -1155          -28          0
2367  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2368            1.        -1.e+99       1.e+99           0.     1.0e-20
2369  *
2370  *         idcb         icbn          icb1         icb2       icb3
2371          -1159          34          -1142        -1157          0
2372  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2373            1.           0.            1.           0.     1.0e-20
2374  *
2375  *         idcb         icbn          icb1         icb2       icb3
2376          -1160           5          -1151        -1159          0
2377  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
```



```
2378            1.           0.            1.           0.     1.0e-20
2379  *
2380  *         idcb         icbn          icb1         icb2       icb3 /gsr
2381  *        -1161           5          -1137        -1160          0
2382          -1161           5          -1133        -1160          0
2383  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2384            1.           0.            1.           0.     1.0e-20
2385  *
2386  *         idcb         icbn          icb1         icb2       icb3
2387          -1162           5          -1161          259          0
2388  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2389            1.           0.            1.           0.     1.0e-20
2390  *
2391  *         idcb         icbn          icb1         icb2       icb3
2392          -1163          25          -1150        -1162          0
2393  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2394            1.           0.            1.           0.     1.0e-20
2395  *
2396  *         idcb         icbn          icb1         icb2       icb3
2397          -1164          22           -21          -22      -1163
2398  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2399            1.        -1.e+99       1.e+99           0.        -1.
2400  *
2401  *         idcb         icbn          icb1         icb2       icb3
2402          -1165          39          -1164          201          0
2403  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2404            1.        -1.e+99       1.e+99           0.     1.0e-20
2405  *
2406  *         idcb         icbn          icb1         icb2       icb3
2407          -1166           3          -1166        -1165          0
2408  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2409            1.           0.           10.           0.     1.0e-20
2410  *
2411  *         idcb         icbn          icb1         icb2       icb3
2412          -1167         101          -1166            4          0
2413  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2414            1.           0.            1.           0.         1.
2415  * cftab      +            +             +            +          +
2416          -1.e+6          1.s
2417             0.           1.s
2418            10.           0.s
2419         1.e+6            0.e
2420  *
2421  *         idcb         icbn          icb1         icb2       icb3
2422          -1168          39          -1167        -1128          0
2423  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2424            1.           0.            1.           0.     1.0e-20
2425  *
2426  * cold leg a1 hpi flow
2427  *         idcb         icbn          icb1         icb2       icb3
2428          -1172          101             7           10          0
2429  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2430             0.0          0.0           0.0          0.0        0.0
2431  * cftab      +            +             +            +          +
2432  *    P (pa)      mass flow (kg/s)
2433     6.89475e+05       23.2171  s
2434     2.06843e+06       22.3339  s
2435     4.13685e+06       21.1982  s
2436     6.20528e+06       19.6841  s
2437     8.27370e+06       18.0437  s
2438     1.03421e+07       16.5296  s
2439     1.24106e+07       14.6369  s
2440     1.44790e+07       12.4918  s
2441     1.72369e+07        8.0755  s
2442     1.86158e+07        3.5961  e
2443  *
2444  * cold leg a2 hpi flow
2445  *         idcb         icbn          icb1         icb2       icb3
2446          -1176          101             8           10          0
2447  *       cbgain       cbxmin        cbxmax       cbcon1     cbcon2
2448             0.0          0.0           0.0          0.0        0.0
2449  * cftab      +            +             +            +          +
2450  *    P (pa)      mass flow (kg/s)
```

```
    6.89475e+05       23.2171  s
    2.06843e+06       22.3339  s
    4.13685e+06       21.1982  s
    6.20528e+06       19.6841  s
    8.27370e+06       18.0437  s
    1.03421e+07       16.5296  s
    1.24106e+07       14.6369  s
    1.44790e+07       12.4918  s
    1.72369e+07        8.0755  s
    1.86158e+07        3.5961  e
*
* cold leg b1 hpi flow
*         idcb          icbn          icb1          icb2          icb3
          -1180           101             9            10             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
            0.0           0.0           0.0           0.0           0.0
* cftab      +             +             +             +             +
*    P (pa)     mass flow (kg/s)
    6.89475e+05       17.2867  s
    2.06843e+06       16.7819  s
    4.13685e+06       15.5201  s
    6.20528e+06       14.3214  s
    8.27370e+06       13.1227  s
    1.03421e+07       12.1133  s
    1.24106e+07       10.8515  s
    1.44790e+07        9.2742  s
    1.72369e+07        6.3090  s
    1.86158e+07        2.2082  e
*
* cold leg b2 hpi flow
*         idcb          icbn          icb1          icb2          icb3
          -1184           101            10            10             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
            0.0           0.0           0.0           0.0           0.0
* cftab      +             +             +             +             +
*    P (pa)     mass flow (kg/s)
    6.89475e+05       17.2867  s
    2.06843e+06       16.7819  s
    4.13685e+06       15.5201  s
    6.20528e+06       14.3214  s
    8.27370e+06       13.1227  s
    1.03421e+07       12.1133  s
    1.24106e+07       10.8515  s
    1.44790e+07        9.2742  s
    1.72369e+07        6.3090  s
    1.86158e+07        2.2082  e
*
*         idcb          icbn          icb1          icb2          icb3
          -1188            39         -1168         -1172             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.       -1.e+99        1.e+99            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1192            39         -1168         -1176             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.       -1.e+99        1.e+99            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1196            39         -1168         -1180             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.       -1.e+99        1.e+99            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1198            39         -1168         -1184             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.       -1.e+99        1.e+99            0.      1.0e-20
*
**********************************************************************
*                          MFW trip signal                           *
**********************************************************************
*
*     control
*     block id  control block value
```



```
*     --------  --------------------
*
*        -1280  MFW trip signal
*
*
*  MFW pump trip due to high discharge P is disabled because this deck doesn't
*  simulate a recirculation line around the pump.  gsr
*         idcb          icbn          icb1          icb2          icb3  /gsr
*        -1202            21           219           -50             0
          -1202            21           219           -29             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1204            34           218           -51             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1209             9             0             0             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.          100.          100.          100.          100.
*
*         idcb          icbn          icb1          icb2          icb3
          -1210            16           212           -21             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1212            21             1         -1209             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1225            25         -1210         -1212             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1230            25         -1202         -1204             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1235             5         -1225         -1230             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1240            21             4           -36             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1250            25         -1235         -1240             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1260            21             3           -36             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.      1.0e-20
*
*         idcb          icbn          icb1          icb2          icb3
          -1270            25         -1250         -1260             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.            0.
*
*         idcb          icbn          icb1          icb2          icb3
          -1280            36         -1270             0             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
              1.            0.            1.            0.            0.
*
```

```
* main feedwater pump b trip logic
*
*   MFW pump trip due to high discaharge P is disabled because this deck doesn't
*   simulate a recirculation line around the pump.  gsr
*        idcb          icbn          icb1          icb2          icb3  /gsr
*       -1282            21           267           -39             0
        -1282            21           267           -29             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1284            34           266           -51             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1286            25         -1282         -1284             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1288             5         -1225         -1286             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1290            25         -1288         -1240             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1292            25         -1290         -1260             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.            0.
*
*        idcb          icbn          icb1          icb2          icb3
        -1294            36         -1292             0             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.            0.
*
*************************************************************************
*                    reactor and turbine trip signals                   *
*************************************************************************
*
*     control
*     block id  control block value
*     --------  -------------------
*
*        -1393  reactor trip signal
*        -1399  turbine trip signal
*
*        idcb          icbn          icb1          icb2          icb3
        -1300             3           206           207             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99       1.e+99            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1301             3           202           204             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           .5       -1.e+99       1.e+99            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1302            14           900           -53             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99       1.e+99            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1304            21           202           -54             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
```



```
        -1306            21           204           -54             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1309            14           900         -1300             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99       1.e+99            0.            0.
*
*        idcb          icbn          icb1          icb2          icb3
        -1312            16         -1280           -21             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1315            16           220           -21             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1316            39         -1301           -25             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99       1.e+99            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1318            21           221           -20             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1321            21           222           -20             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1324            21         -1302           -57             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1327            21             2           -55             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1330            34             2           -56             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1333            25         -1304         -1306             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1336            21         -1309           -58             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1339            25         -1312         -1315             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1340            54         -1316           -26             0
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99       1.e+99            0.      1.0e-20
*
*        idcb          icbn          icb1          icb2          icb3
        -1342            24           -21         -1324         -1324
*      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99       1.e+99            0.      1.0e-20
```

```
2743 *
2744 *        idcb          icbn          icb1          icb2          icb3
2745          -1345           24           -21         -1327         -1327
2746 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2747             1.      -1.e+99        1.e+99            0.      1.0e-20
2748 *
2749 *        idcb          icbn          icb1          icb2          icb3
2750          -1348           24           -21         -1330         -1330
2751 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2752             1.      -1.e+99        1.e+99            0.      1.0e-20
2753 *
2754 *        idcb          icbn          icb1          icb2          icb3
2755          -1351           24           -21         -1333         -1333
2756 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2757             1.      -1.e+99        1.e+99            0.      1.0e-20
2758 *
2759 *        idcb          icbn          icb1          icb2          icb3
2760          -1354           24           -21         -1336         -1336
2761 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2762             1.      -1.e+99        1.e+99            0.      1.0e-20
2763 *
2764 *        idcb          icbn          icb1          icb2          icb3
2765          -1355           34             2         -1340             0
2766 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2767             1.      -1.e+99        1.e+99            0.      1.0e-20
2768 *
2769 *        idcb          icbn          icb1          icb2          icb3
2770          -1357           20         -1342           -59             0
2771 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2772             1.            0.            1.            0.      1.0e-20
2773 *
2774 *        idcb          icbn          icb1          icb2          icb3
2775          -1360           20         -1345           -60             0
2776 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2777             1.            0.            1.            0.      1.0e-20
2778 *
2779 *        idcb          icbn          icb1          icb2          icb3
2780          -1363           20         -1348           -60             0
2781 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2782             1.            0.            1.            0.      1.0e-20
2783 *
2784 *        idcb          icbn          icb1          icb2          icb3
2785          -1366           20         -1351           -61             0
2786 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2787             1.            0.            1.            0.      1.0e-20
2788 *
2789 *        idcb          icbn          icb1          icb2          icb3
2790          -1369           20         -1354           -62             0
2791 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2792             1.            0.            1.            0.      1.0e-20
2793 *
2794 *        idcb          icbn          icb1          icb2          icb3
2795          -1370           25         -1339         -1355             0
2796 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2797             1.            0.            1.            0.      1.0e-20
2798 *
2799 *        idcb          icbn          icb1          icb2          icb3
2800          -1372           25         -1318         -1321             0
2801 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2802             1.            0.            1.            0.      1.0e-20
2803 *
2804 *        idcb          icbn          icb1          icb2          icb3
2805          -1375           25         -1357         -1360             0
2806 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2807             1.            0.            1.            0.      1.0e-20
2808 *
2809 *        idcb          icbn          icb1          icb2          icb3
2810          -1378           25         -1363         -1366             0
2811 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2812             1.            0.            1.            0.      1.0e-20
2813 *
2814 *        idcb          icbn          icb1          icb2          icb3
2815          -1381           25         -1369         -1370             0
```



```
2816 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2817             1.            0.            1.            0.      1.0e-20
2818 *
2819 *        idcb          icbn          icb1          icb2          icb3
2820          -1384           25         -1372         -1375             0
2821 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2822             1.            0.            1.            0.      1.0e-20
2823 *
2824 *        idcb          icbn          icb1          icb2          icb3
2825          -1387           25         -1378         -1381             0
2826 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2827             1.            0.            1.            0.      1.0e-20
2828 *
2829 *        idcb          icbn          icb1          icb2          icb3
2830          -1390           25         -1384         -1387             0
2831 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2832             1.            0.            1.            0.      1.0e-20
2833 *
2834 *        idcb          icbn          icb1          icb2          icb3
2835          -1393           36         -1390             0             0
2836 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2837             1.            0.            1.            0.      1.0e-20
2838 *
2839 *        idcb          icbn          icb1          icb2          icb3
2840          -1396           36         -1339             0             0
2841 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2842             1.            0.            1.            0.      1.0e-20
2843 *
2844 *        idcb          icbn          icb1          icb2          icb3
2845          -1399           25         -1393         -1396             0
2846 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2847             1.            0.            1.            0.      1.0e-20
2848 *
2849 ************************************************************************
2850 *                  high & low pressure heaters control                 *
2851 ************************************************************************
2852 *
2853 *     control
2854 *     block id  control block value
2855 *     --------  -------------------
2856 *
2857 *        -1522  demineralizer heater power (W)
2858 *        -1523  f low pressure heater power (W)
2859 *        -1524  e low pressure heater power (W)
2860 *        -1525  d low pressure heater power (W)
2861 *        -1526  c low pressure heater power (W)
2862 *        -1527  b low pressure heater power (W)
2863 *        -1592  comp 764 high pressure heater power (W)
2864 *        -1596  comp 766 high pressure heater power (W)
2865 *
2866 *
2867 *        idcb          icbn          icb1          icb2          icb3
2868          -1504             3           213           214             0
2869 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2870             1.      -1.e+99        1.e+99            0.      1360.8
2871 *
2872 *        idcb          icbn          icb1          icb2          icb3
2873          -1508            39         -1504           -72             0
2874 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2875             1.      -1.e+99        1.e+99            0.      3000.
2876 *
2877 *        idcb          icbn          icb1          icb2          icb3
2878          -1512           101         -1508             7             0
2879 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2880             1.      -1.e+99        1.e+99            0.      370.
2881 * cftab     +             +             +             +             +
2882             0.         114.s
2883           180.         150.s
2884           600.         230.s
2885           900.         266.s
2886          1560.         312.s
2887          3000.         370.s
2888        3571.4          393.e
```

```
2889 *
2890 *        idcb          icbn          icb1          icb2          icb3
2891          -1516            39         -1512           -73             0
2892 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2893              1.       -1.e+99        1.e+99            0.     9.727e+8
2894 *
2895 *        idcb          icbn          icb1          icb2          icb3
2896          -1520            16         -1393           -20             0
2897 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2898              1.            0.            1.            0.            1.
2899 *
2900 *        idcb          icbn          icb1          icb2          icb3
2901          -1521            39         -1516         -1520             0
2902 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2903              1.       -1.e+99        1.e+99            0.     9.727e+8
2904 *
2905 *        idcb          icbn          icb1          icb2          icb3
2906          -1522            39         -1521           -21             0
2907 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2908         .009556       -1.e+99        1.e+99            0.     9.295e+6
2909 *
2910 *        idcb          icbn          icb1          icb2          icb3
2911          -1523            39         -1521           -21             0
2912 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2913           .1241       -1.e+99        1.e+99            0.     1.207e+8
2914 *
2915 *        idcb          icbn          icb1          icb2          icb3
2916          -1524            39         -1521           -21             0
2917 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2918           .1345       -1.e+99        1.e+99            0.     1.308e+8
2919 *
2920 *        idcb          icbn          icb1          icb2          icb3
2921          -1525            39         -1521           -21             0
2922 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2923           .1505       -1.e+99        1.e+99            0.     1.464e+8
2924 *
2925 *        idcb          icbn          icb1          icb2          icb3
2926          -1526            39         -1521           -21             0
2927 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2928           .2581       -1.e+99        1.e+99            0.     2.511e+8
2929 *
2930 *        idcb          icbn          icb1          icb2          icb3
2931          -1527            39         -1521           -21             0
2932 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2933          .07952       -1.e+99        1.e+99            0.     7.735e+7
2934 *
2935 *        idcb          icbn          icb1          icb2          icb3
2936          -1528            16         -1393           -21             0
2937 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2938              1.            0.            1.            0.       1.e-20
2939 *
2940 *        idcb          icbn          icb1          icb2          icb3
2941          -1532            16         -1399           -21             0
2942 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2943              1.            0.            1.            0.       1.e-20
2944 *
2945 *        idcb          icbn          icb1          icb2          icb3
2946          -1536            39         -1528           -74             0
2947 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2948              1.       -1.e+99        1.e+99            0.       1.e-20
2949 *
2950 *        idcb          icbn          icb1          icb2          icb3
2951          -1540            39         -1532           -75             0
2952 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2953              1.       -1.e+99        1.e+99            0.       1.e-20
2954 *
2955 *        idcb          icbn          icb1          icb2          icb3
2956          -1544            34         -1536         -1540             0
2957 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2958              1.       -1.e+99        1.e+99            0.       1.e-20
2959 *
2960 *        idcb          icbn          icb1          icb2          icb3
2961          -1548            39         -1544           201             0
```



```
2962 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2963              1.       -1.e+99        1.e+99            0.       1.e-20
2964 *
2965 *        idcb          icbn          icb1          icb2          icb3
2966          -1552            54         -1552         -1548             0
2967 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2968              1.       -1.e+99        1.e+99            0.            1.
2969 *
2970 *        idcb          icbn          icb1          icb2          icb3
2971          -1556            39         -1552           -76             0
2972 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2973              1.            0.         21.42            0.           18.
2974 *
2975 *        idcb          icbn          icb1          icb2          icb3
2976          -1560           101         -1556             7             0
2977 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2978              1.       -1.e+99        1.e+99            0.           460.
2979 * cftab      +             +             +             +             +
2980              0.          204.s
2981           .562           240.s
2982           3.60           320.s
2983           5.40           356.s
2984           9.36           402.s
2985           18.0           460.s
2986          21.42           483.e
2987 *
2988 *        idcb          icbn          icb1          icb2          icb3
2989          -1564              3         -1560           -77             0
2990 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2991              1.       -1.e+99        1.e+99            0.         919.67
2992 *
2993 *        idcb          icbn          icb1          icb2          icb3
2994          -1568            59         -1564           764             0
2995 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
2996              1.       -1.e+99        1.e+99            1.          -1.8
2997 *
2998 *        idcb          icbn          icb1          icb2          icb3
2999          -1572            16         -1393           -20             0
3000 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3001              1.            0.            1.            0.            1.
3002 *
3003 *        idcb          icbn          icb1          icb2          icb3
3004          -1576            59         -1564           766             0
3005 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3006              1.       -1.e+99        1.e+99            1.          -1.8
3007 *
3008 *        idcb          icbn          icb1          icb2          icb3
3009          -1580            39         -1568         -1572             0
3010 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3011              1.       -1.e+99        1.e+99            0.            0.
3012 *
3013 *        idcb          icbn          icb1          icb2          icb3
3014          -1584            39         -1572         -1576             0
3015 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3016              1.       -1.e+99        1.e+99            0.            0.
3017 *
3018 *        idcb          icbn          icb1          icb2          icb3
3019          -1588            39         -1580           767             0
3020 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3021              1.       -1.e+99        1.e+99            0.            0.
3022 *
3023 *        idcb          icbn          icb1          icb2          icb3
3024          -1592            39         -1584           768             0
3025 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3026              1.       -1.e+99        1.e+99            0.            0.
3027 *
3028 *        idcb          icbn          icb1          icb2          icb3
3029          -1596            39         -1588           -78             0
3030 *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3031              1.       -1.e+99        1.e+99            0.            0.
3032 *
3033 *        idcb          icbn          icb1          icb2          icb3
3034          -1598            39         -1592           -78             0
```

```
3035 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3036              1.       -1.e+99         1.e+99             0.             0.
3037 *
3038 ************************************************************************
3039 *                      motor driven EFW flowrate                       *
3040 ************************************************************************
3041 *
3042 *     control
3043 *     block id  control block value
3044 *     --------  -------------------
3045 *
3046 *        -1697  sg a motor driven EFW flowrate (kg/sec)
3047 *        -1698  sg b motor driven EFW flowrate (kg/sec)
3048 *
3049 *
3050 *         idcb           icbn           icb1           icb2           icb3
3051           -1601             22            -95            -93            221
3052 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3053              1.       -1.e+99         1.e+99             0.       1.0e-20
3054 *
3055 *         idcb           icbn           icb1           icb2           icb3
3056           -1602             22            -94            -92            221
3057 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3058              1.       -1.e+99         1.e+99             0.       1.0e-20
3059 *
3060 *         idcb           icbn           icb1           icb2           icb3
3061           -1603             22            -97          -1601            118
3062 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3063              1.       -1.e+99         1.e+99             0.       1.0e-20
3064 *
3065 *         idcb           icbn           icb1           icb2           icb3
3066           -1604             22            -96          -1602            118
3067 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3068              1.       -1.e+99         1.e+99             0.       1.0e-20
3069 *
3070 *         idcb           icbn           icb1           icb2           icb3
3071           -1605             22            -99          -1603            119
3072 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3073              1.       -1.e+99         1.e+99             0.       1.0e-20
3074 *
3075 *         idcb           icbn           icb1           icb2           icb3
3076           -1606             22            -98          -1604            119
3077 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3078              1.       -1.e+99         1.e+99             0.       1.0e-20
3079 *
3080 *         idcb           icbn           icb1           icb2           icb3
3081           -1607             22           -230              4            119
3082 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3083              1.       -1.e+99         1.e+99             0.       1.0e-20
3084 *
3085 *         idcb           icbn           icb1           icb2           icb3
3086           -1608             34          -1607          -1605              0
3087 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3088              1.             0.             1.             0.       1.0e-20
3089 *
3090 *         idcb           icbn           icb1           icb2           icb3
3091           -1612             34          -1607          -1606              0
3092 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3093              1.             0.             1.             0.       1.0e-20
3094 *
3095 *         idcb           icbn           icb1           icb2           icb3
3096           -1616             20             99            -21              0
3097 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3098              1.             0.             1.             0.       1.0e-20
3099 *
3100 *         idcb           icbn           icb1           icb2           icb3
3101           -1618             22           -231              3            119
3102 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3103              1.       -1.e+99         1.e+99             0.       1.0e-20
3104 *
3105 *         idcb           icbn           icb1           icb2           icb3
3106           -1620             34          -1618          -1605              0
3107 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
```



```
3108              1.             0.             1.             0.       1.0e-20
3109 *
3110 *         idcb           icbn           icb1           icb2           icb3
3111           -1624             34          -1618          -1606              0
3112 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3113              1.             0.             1.             0.       1.0e-20
3114 *
3115 *         idcb           icbn           icb1           icb2           icb3
3116           -1628              5          -1644          -1608              0
3117 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3118              1.             0.             1.             0.       1.0e-20
3119 *
3120 *         idcb           icbn           icb1           icb2           icb3
3121           -1632              5          -1648          -1620              0
3122 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3123              1.             0.             1.             0.       1.0e-20
3124 *
3125 *         idcb           icbn           icb1           icb2           icb3
3126           -1636             25          -1628          -1612              0
3127 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3128              1.             0.             1.             0.       1.0e-20
3129 *
3130 *         idcb           icbn           icb1           icb2           icb3
3131           -1640             25          -1632          -1624              0
3132 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3133              1.             0.             1.             0.       1.0e-20
3134 *
3135 *         idcb           icbn           icb1           icb2           icb3
3136           -1644              5          -1636          -1616              0
3137 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3138              1.             0.             1.             0.       1.0e-20
3139 *
3140 *         idcb           icbn           icb1           icb2           icb3
3141           -1648              5          -1616          -1640              0
3142 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3143              1.             0.             1.             0.       1.0e-20
3144 *
3145 *         idcb           icbn           icb1           icb2           icb3
3146           -1652             22            -21            -22          -1644
3147 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3148              1.       -1.e+99         1.e+99             0.       1.0e-20
3149 *
3150 *         idcb           icbn           icb1           icb2           icb3
3151           -1656             22            -21            -22          -1648
3152 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3153              1.       -1.e+99         1.e+99             0.       1.0e-20
3154 *
3155 *         idcb           icbn           icb1           icb2           icb3
3156           -1660             39          -1652            201              0
3157 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3158              1.       -1.e+99         1.e+99             0.       1.0e-20
3159 *
3160 *         idcb           icbn           icb1           icb2           icb3
3161           -1664             39          -1656            201              0
3162 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3163              1.       -1.e+99         1.e+99             0.       1.0e-20
3164 *
3165 *         idcb           icbn           icb1           icb2           icb3
3166           -1668              3          -1668          -1660              0
3167 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3168              1.             0.             3.             0.       1.0e-20
3169 *
3170 *         idcb           icbn           icb1           icb2           icb3
3171           -1672              3          -1672          -1664              0
3172 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3173              1.             0.             3.             0.       1.0e-20
3174 *
3175 * sg-a motor-driven efw flow
3176 *         idcb           icbn           icb1           icb2           icb3
3177           -1676            101           1541              9              0
3178 *       cbgain         cbxmin         cbxmax         cbcon1         cbcon2
3179              0.0            0.0            0.0            0.0            0.0
3180 * cftab       +              +              +              +              +
```

```
3181 *       P (pa)   mass flow (kg/s)
3182      1.90985e+06        43.8476  s
3183      2.14427e+06        42.9012  s
3184      2.80616e+06        40.3776  s
3185      3.37153e+06        39.1158  s
3186      4.77117e+06        35.3304  s
3187      6.14322e+06        30.9141  s
3188      7.52907e+06        26.4978  s
3189      9.13554e+06        17.3498  s
3190      9.90776e+06         0.0000  e
3191 *
3192 *         idcb           icbn          icb1          icb2          icb3
3193           -1680            101         -1668             4             0
3194 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3195               1.             0.            1.            0.      1.0e-20
3196 * cftab      +              +             +             +             +
3197           -100.            0.s
3198              0.            0.s
3199              3.            1.s
3200            100.            1.e
3201 *
3202 * sg-b motor-driven efw flow
3203 *         idcb           icbn          icb1          icb2          icb3
3204           -1684            101          2541             9             0
3205 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3206              0.0            0.0           0.0           0.0           0.0
3207 * cftab      +              +             +             +             +
3208 *       P (pa)   mass flow (kg/s)
3209      1.90985e+06        43.8476  s
3210      2.14427e+06        42.9012  s
3211      2.80616e+06        40.3776  s
3212      3.37153e+06        39.1158  s
3213      4.77117e+06        35.3304  s
3214      6.14322e+06        30.9141  s
3215      7.52907e+06        26.4978  s
3216      9.13554e+06        17.3498  s
3217      9.90776e+06         0.0000  e
3218 *
3219 *         idcb           icbn          icb1          icb2          icb3
3220           -1688            101         -1672             4             0
3221 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3222               1.             0.            1.            0.      1.0e-20
3223 * cftab      +              +             +             +             +
3224           -100.            0.s
3225              0.            0.s
3226              3.            1.s
3227            100.            1.e
3228 *
3229 *         idcb           icbn          icb1          icb2          icb3
3230           -1692              39         -1676         -1680             0
3231 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3232               1.         -1.e+99       1.e+99            0.      1.0e-20
3233 *
3234 *         idcb           icbn          icb1          icb2          icb3
3235           -1696              39         -1684         -1688             0
3236 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3237               1.         -1.e+99       1.e+99            0.      1.0e-20
3238 *
3239 *         idcb           icbn          icb1          icb2          icb3
3240           -1697              39           212         -1692             0
3241 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3242               1.         -1.e+99       1.e+99            0.      1.0e-20
3243 *
3244 *         idcb           icbn          icb1          icb2          icb3
3245           -1698              39           212         -1696             0
3246 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3247               1.         -1.e+99       1.e+99            0.      1.0e-20
3248 *
3249 ********************************************************************************
3250 *                      turbine driven EFW flowrate                             *
3251 ********************************************************************************
3252 *
3253 *     control
```



```
3254 *      block id  control block value
3255 *      --------  -------------------
3256 *
3257 *         -1794  sg a steam driven EFW flowrate (kg/sec)
3258 *         -1795  sg b steam driven EFW flowrate (kg/sec)
3259 *
3260 *
3261 *         idcb           icbn          icb1          icb2          icb3
3262           -1701             22           -95           -93           221
3263 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3264               1.         -1.e+99       1.e+99            0.      1.0e-20
3265 *
3266 *         idcb           icbn          icb1          icb2          icb3
3267           -1702             22           -94           -92           221
3268 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3269               1.         -1.e+99       1.e+99            0.      1.0e-20
3270 *
3271 *         idcb           icbn          icb1          icb2          icb3
3272           -1703             22           -97         -1701           118
3273 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3274               1.         -1.e+99       1.e+99            0.      1.0e-20
3275 *
3276 *         idcb           icbn          icb1          icb2          icb3
3277           -1704             22           -96         -1702           118
3278 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3279               1.         -1.e+99       1.e+99            0.      1.0e-20
3280 *
3281 *         idcb           icbn          icb1          icb2          icb3
3282           -1705             22           -99         -1703           119
3283 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3284               1.         -1.e+99       1.e+99            0.      1.0e-20
3285 *
3286 *         idcb           icbn          icb1          icb2          icb3
3287           -1706             22           -98         -1704           119
3288 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3289               1.         -1.e+99       1.e+99            0.      1.0e-20
3290 *
3291 *         idcb           icbn          icb1          icb2          icb3
3292           -1707             22          -230             4           119
3293 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3294               1.         -1.e+99       1.e+99            0.      1.0e-20
3295 *
3296 *         idcb           icbn          icb1          icb2          icb3
3297           -1709             21           350           -79             0
3298 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3299               1.             0.            1.            0.      1.0e-20
3300 *
3301 *         idcb           icbn          icb1          icb2          icb3
3302           -1712             21           450           -79             0
3303 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3304               1.             0.            1.            0.      1.0e-20
3305 *
3306 *         idcb           icbn          icb1          icb2          icb3
3307           -1713             22          -231             3           119
3308 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3309               1.         -1.e+99       1.e+99            0.      1.0e-20
3310 *
3311 *         idcb           icbn          icb1          icb2          icb3
3312           -1715             34         -1707         -1705             0
3313 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3314               1.             0.            1.            0.      1.0e-20
3315 *
3316 *         idcb           icbn          icb1          icb2          icb3
3317           -1718             34         -1707         -1706             0
3318 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3319               1.             0.            1.            0.      1.0e-20
3320 *
3321 *         idcb           icbn          icb1          icb2          icb3
3322           -1721             20            99           -21             0
3323 *        cbgain         cbxmin        cbxmax        cbcon1        cbcon2
3324               1.             0.            1.            0.      1.0e-20
3325 *
3326 *         idcb           icbn          icb1          icb2          icb3
```

```
3327          -1724          5          -1709          -1712          0
3328 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3329             1.          0.            1.             0.    1.0e-20
3330 *
3331 *         idcb          icbn          icb1           icb2        icb3
3332          -1727            34         -1713          -1705          0
3333 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3334             1.          0.            1.             0.    1.0e-20
3335 *
3336 *         idcb          icbn          icb1           icb2        icb3
3337          -1730            34         -1713          -1706          0
3338 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3339             1.          0.            1.             0.    1.0e-20
3340 *
3341 *         idcb          icbn          icb1           icb2        icb3
3342          -1733             5         -1748          -1715          0
3343 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3344             1.          0.            1.             0.    1.0e-20
3345 *
3346 *         idcb          icbn          icb1           icb2        icb3
3347          -1736             5         -1721          -1724          0
3348 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3349             1.          0.            1.             0.    1.0e-20
3350 *
3351 *         idcb          icbn          icb1           icb2        icb3
3352          -1739             5         -1751          -1727          0
3353 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3354             1.          0.            1.             0.    1.0e-20
3355 *
3356 *         idcb          icbn          icb1           icb2        icb3
3357          -1742            25         -1733          -1718          0
3358 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3359             1.          0.            1.             0.    1.0e-20
3360 *
3361 *         idcb          icbn          icb1           icb2        icb3
3362          -1745            25         -1739          -1730          0
3363 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3364             1.          0.            1.             0.    1.0e-20
3365 *
3366 *         idcb          icbn          icb1           icb2        icb3
3367          -1748             5         -1742          -1736          0
3368 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3369             1.          0.            1.             0.    1.0e-20
3370 *
3371 *         idcb          icbn          icb1           icb2        icb3
3372          -1751             5         -1736          -1745          0
3373 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3374             1.          0.            1.             0.    1.0e-20
3375 *
3376 *         idcb          icbn          icb1           icb2        icb3
3377          -1754            22           -21            -22      -1748
3378 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3379             1.     -1.e+99        1.e+99             0.    1.0e-20
3380 *
3381 *         idcb          icbn          icb1           icb2        icb3
3382          -1757            22           -21            -22      -1751
3383 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3384             1.     -1.e+99        1.e+99             0.    1.0e-20
3385 *
3386 *         idcb          icbn          icb1           icb2        icb3
3387          -1760            39         -1754            201          0
3388 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3389             1.     -1.e+99        1.e+99             0.    1.0e-20
3390 *
3391 *         idcb          icbn          icb1           icb2        icb3
3392          -1763            39         -1757            201          0
3393 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3394             1.     -1.e+99        1.e+99             0.    1.0e-20
3395 *
3396 *         idcb          icbn          icb1           icb2        icb3
3397          -1766             3         -1766          -1760          0
3398 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3399             1.          0.            3.             0.    1.0e-20
```



```
3400 *
3401 *         idcb          icbn          icb1           icb2        icb3
3402          -1769             3         -1769          -1763          0
3403 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3404             1.          0.            3.             0.    1.0e-20
3405 *
3406 * sg-a turbine-driven efw flow
3407 *         idcb          icbn          icb1           icb2        icb3
3408          -1772           101          1541              9          0
3409 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3410            0.5          0.0       1.0e10            0.0         0.0
3411 * cftab      +             +             +              +           +
3412 *       P (pa)    mass flow (kg/s)
3413    1.90985e+06       85.1715  s
3414    2.14427e+06       85.1715  s
3415    2.80616e+06       85.1715  s
3416    3.37153e+06       81.3861  s
3417    4.77117e+06       71.9226  s
3418    6.14322e+06       62.4591  s
3419    7.52907e+06       49.2102  s
3420    9.13554e+06       26.4978  s
3421    9.90776e+06        0.0000  e
3422 *
3423 *         idcb          icbn          icb1           icb2        icb3
3424          -1775           101         -1766              4          0
3425 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3426             1.          0.            1.             0.    1.0e-20
3427 * cftab      +             +             +              +           +
3428          -100.          0.s
3429             0.          0.s
3430             3.          1.s
3431           100.          1.e
3432 *
3433 * sg-b turbine-driven efw flow
3434 *         idcb          icbn          icb1           icb2        icb3
3435          -1778           101          2541              9          0
3436 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3437            0.5          0.0       1.0e10            0.0         0.0
3438 * cftab      +             +             +              +           +
3439 *       P (pa)    mass flow (kg/s)
3440    1.90985e+06       85.1715  s
3441    2.14427e+06       85.1715  s
3442    2.80616e+06       85.1715  s
3443    3.37153e+06       81.3861  s
3444    4.77117e+06       71.9226  s
3445    6.14322e+06       62.4591  s
3446    7.52907e+06       49.2102  s
3447    9.13554e+06       26.4978  s
3448    9.90776e+06        0.0000  e
3449 *
3450 *         idcb          icbn          icb1           icb2        icb3
3451          -1781           101         -1769              4          0
3452 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3453             1.          0.            1.             0.    1.0e-20
3454 * cftab      +             +             +              +           +
3455          -100.          0.s
3456             0.          0.s
3457             3.          1.s
3458           100.          1.e
3459 *
3460 *         idcb          icbn          icb1           icb2        icb3
3461          -1784            39         -1772          -1775          0
3462 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3463             1.     -1.e+99        1.e+99             0.    1.0e-20
3464 *
3465 *         idcb          icbn          icb1           icb2        icb3
3466          -1787            39         -1778          -1781          0
3467 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
3468             1.     -1.e+99        1.e+99             0.    1.0e-20
3469 *
3470 *         idcb          icbn          icb1           icb2        icb3
3471          -1790            39          212          -1784          0
3472 *       cbgain      cbxmin        cbxmax         cbcon1      cbcon2
```

```
3473          1.       -1.e+99        1.e+99          0.       1.0e-20
3474 *
3475 *        idcb          icbn          icb1          icb2          icb3
3476         -1793            39           212         -1787             0
3477 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3478          1.       -1.e+99        1.e+99          0.       1.0e-20
3479 *
3480 *  the following control blocks were added to trip the
3481 *  steam-driven emergency feedwater flow to zero whenever
3482 *  the pressure in either steam line falls below 565 psia.
3483 *
3484 *  steam-driven efw to sg a
3485 *        idcb          icbn          icb1          icb2          icb3
3486         -1794            22           -20         -1790           130
3487 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3488            0.0           0.0           0.0           0.0           0.0
3489 *
3490 *  steam-driven efw to sg b
3491 *        idcb          icbn          icb1          icb2          icb3
3492         -1795            22           -20         -1793           130
3493 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3494            0.0           0.0           0.0           0.0           0.0
3495 *
3496 ************************************************************************
3497 *                     unit load demand (ULD)                           *
3498 ************************************************************************
3499 *
3500 *     control
3501 *     block id  control block value
3502 *     --------  -------------------
3503 *
3504 *        -1881  ULD (fractional)
3505 *        -1887  reactor demand (fractional)
3506 *        -1893  reactor demand (W)
3507 *        -1881  feedwater demand (fractional)
3508 *        -1890  feedwater demand (kg/sec)
3509 *
3510 *
3511 *        idcb          icbn          icb1          icb2          icb3
3512         -1801             9             0             0             0
3513 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3514          1.            400.          400.          400.          400.
3515 *
3516 *        idcb          icbn          icb1          icb2          icb3
3517         -1803             3           213           214             0
3518 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3519          1.       -1.e+99        1.e+99          0.       1.0e-20
3520 *
3521 *        idcb          icbn          icb1          icb2          icb3
3522         -1806             3           -70           -71             0
3523 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3524          1.       -1.e+99        1.e+99          0.       1.0e-20
3525 *
3526 *        idcb          icbn          icb1          icb2          icb3
3527         -1807            21         -2350           -20             0
3528 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3529          1.             0.            1.            0.       1.0e-20
3530 *
3531 *        idcb          icbn          icb1          icb2          icb3
3532         -1808            34         -2350           -20             0
3533 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3534          1.             0.            1.            0.       1.0e-20
3535 *
3536 *        idcb          icbn          icb1          icb2          icb3
3537         -1809            16          -740           -21             0
3538 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3539          1.             0.            1.            0.       1.0e-20
3540 *
3541 *        idcb          icbn          icb1          icb2          icb3
3542         -1812            16         -1280           -21             0
3543 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3544          1.             0.            1.            0.       1.0e-20
3545 *
```



```
3546 *        idcb          icbn          icb1          icb2          icb3
3547         -1815            16         -1369           -21             0
3548 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3549          1.             0.            1.            0.       1.0e-20
3550 *
3551 *        idcb          icbn          icb1          icb2          icb3
3552         -1818            16         -1393           -21             0
3553 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3554          1.             0.            1.            0.       1.0e-20
3555 *
3556 *        idcb          icbn          icb1          icb2          icb3
3557         -1821            14         -1803         -1806             0
3558 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3559          1.       -1.e+99        1.e+99          0.       1.0e-20
3560 *
3561 *        idcb          icbn          icb1          icb2          icb3
3562         -1824            25         -1807         -1808             0
3563 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3564          1.             0.            1.            0.       1.0e-20
3565 *
3566 *        idcb          icbn          icb1          icb2          icb3
3567         -1827            22           -80           -20         -1809
3568 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3569          1.       -1.e+99        1.e+99          0.       1.0e-20
3570 *
3571 *        idcb          icbn          icb1          icb2          icb3
3572         -1830            22           -83           -21         -1809
3573 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3574          1.       -1.e+99        1.e+99          0.       1.0e-20
3575 *
3576 *        idcb          icbn          icb1          icb2          icb3
3577         -1833            54         -1881         -1821             0
3578 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3579          1.       -1.e+99        1.e+99          0.       1.0e-20
3580 *
3581 *        idcb          icbn          icb1          icb2          icb3
3582         -1836            54         -1821         -1881             0
3583 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3584          1.       -1.e+99        1.e+99          0.       1.0e-20
3585 *
3586 *        idcb          icbn          icb1          icb2          icb3
3587         -1839            22           -80         -1827         -1812
3588 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3589          1.       -1.e+99        1.e+99          0.       1.0e-20
3590 *
3591 *        idcb          icbn          icb1          icb2          icb3
3592         -1842            22           -84         -1830         -1812
3593 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3594          1.       -1.e+99        1.e+99          0.       1.0e-20
3595 *
3596 *        idcb          icbn          icb1          icb2          icb3
3597         -1845            21         -1833           -82             0
3598 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3599          1.             0.            1.            0.       1.0e-20
3600 *
3601 *        idcb          icbn          icb1          icb2          icb3
3602         -1848            21         -1836           -82             0
3603 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3604          1.             0.            1.            0.       1.0e-20
3605 *
3606 *        idcb          icbn          icb1          icb2          icb3
3607         -1851            22           -81         -1839         -1815
3608 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3609          1.       -1.e+99        1.e+99          0.       1.0e-20
3610 *
3611 *        idcb          icbn          icb1          icb2          icb3
3612         -1854            22           -20         -1842         -1815
3613 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3614          1.       -1.e+99        1.e+99          0.       1.0e-20
3615 *
3616 *        idcb          icbn          icb1          icb2          icb3
3617         -1855            16           212           -21             0
3618 *      cbgain        cbxmin        cbxmax        cbcon1        cbcon2
```

```
                1.          0.          1.          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1856          21           1       -1801            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.          1.          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1857          25       -1818       -1845            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.          1.          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1860          25       -1824       -1848            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.          1.          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1862          25       -1855       -1856            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.          1.          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1863          25       -1857       -1860            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.          1.          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1864           5       -1862       -1863            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.          1.          0.           0.
*
*            idcb        icbn        icb1        icb2         icb3
            -1866          22         -81       -1851        -1864
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.    -1.e+99      1.e+99          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1869          22         -20       -1854        -1864
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.    -1.e+99      1.e+99          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1872          39       -1866         201            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.    -1.e+99      1.e+99          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1875           3       -1881       -1872            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.    -1.e+99      1.e+99          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1878          21       -1881       -1869            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.          1.          0.           1.
*
*            idcb        icbn        icb1        icb2         icb3
            -1881          22       -1875       -1869        -1878
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.          1.          0.           1.
*
*            idcb        icbn        icb1        icb2         icb3
            -1884           3         -70         -71            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               .5    -1.e+99      1.e+99          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1887          35       -1881         -85            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.          1.          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
```



```
            -1890          39       -1881       -1884            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.      1.e+99          0.      1.0e-20
*
*            idcb        icbn        icb1        icb2         icb3
            -1893          39       -1887         -53            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.          0.      1.e+99          0.      1.0e-20
*
*************************************************************************
*                          ICS feedwater control                        *
*************************************************************************
*
*     control
*     block id  control block value
*     --------  -------------------
*
*        -2820  SUFVA signal (area fraction)
*        -2830  MFCVA signal (area fraction)
*        -2920  MFW pump signal (rad/sec)
*        -2670  SUFVB signal (area fraction)
*        -2680  MFCVB signal (area fraction)
*
*
*
* A          idcb        icbn        icb1        icb2         icb3
            -2100          56         206           0            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
        .00204083     -1.e+99      1.e+99          0.      1.0e-20
*
* B          idcb        icbn        icb1        icb2         icb3
            -2110          56         202           0            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
          1.04092       -10.0       9.080   -581.6450      1.0e-20
*
* C          idcb        icbn        icb1        icb2         icb3
            -2120          56           5           0           0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
      -1.16958e-5        -1.0       9.080   -7058003.      1.0e-20
*
* D          idcb        icbn        icb1        icb2         icb3
            -2130          56         210           0            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
          .037260      -1.270       9.080     -296.19      1.0e-20
*
* BA         idcb        icbn        icb1        icb2         icb3
            -2140          56         207           0            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
        .00204083     -1.e+99      1.e+99          0.      1.0e-20
*
* BB         idcb        icbn        icb1        icb2         icb3
            -2150          56         204           0            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
          1.04092       -10.0       9.080   -581.6450      1.0e-20
*
* BC         idcb        icbn        icb1        icb2         icb3
            -2160          56           6           0           0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
      -1.16958e-5        -1.0       9.080   -7058003.      1.0e-20
*
* E          idcb        icbn        icb1        icb2         icb3
            -2169          57       -2110       -2120        -2130
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.        -13.         30.          0.      1.0e-20
*
* E          idcb        icbn        icb1        icb2         icb3
            -2170          56       -2169           0            0
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
               1.       -10.0        12.0       -16.0      1.0e-20
*
* BE         idcb        icbn        icb1        icb2         icb3
            -2179          57       -2150       -2160        -2130
*          cbgain      cbxmin      cbxmax      cbcon1       cbcon2
```

```
3765                1.          -13.           30.            0.       1.0e-20
3766 *
3767 * BE          idcb          icbn          icb1          icb2          icb3
3768              -2180            56         -2179             0             0
3769 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3770                1.         -10.0          12.0         -16.0       1.0e-20
3771 *
3772 * F           idcb          icbn          icb1          icb2          icb3
3773              -2190            56         -2170             0             0
3774 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3775             .055555            0.            2.           10.       1.0e-20
3776 *
3777 * BF          idcb          icbn          icb1          icb2          icb3
3778              -2200            56         -2180             0             0
3779 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3780             .055555            0.            2.           10.       1.0e-20
3781 *
3782 * BH          idcb          icbn          icb1          icb2          icb3
3783              -2209            39         -2140         -2200             0
3784 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3785                1.       -1.e+99        1.e+99            0.       1.0e-20
3786 *
3787 * BH          idcb          icbn          icb1          icb2          icb3
3788 *            -2210            56         -2209             0             0
3789 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3790 *             1.       -1.e+99        1.e+99         -10.0       1.0e-20
3791 *
3792 * BH          idcb          icbn          icb1          icb2          icb3
3793              -2210             9             0             0             0
3794 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3795                1.            8.            8.            8.            8.
3796 *
3797 * H           idcb          icbn          icb1          icb2          icb3
3798              -2219            39         -2100         -2190             0
3799 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3800                1.       -1.e+99        1.e+99            0.       1.0e-20
3801 *
3802 * H           idcb          icbn          icb1          icb2          icb3
3803 *            -2220            56         -2219             0             0
3804 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3805 *             1.       -1.e+99        1.e+99         -10.0       1.0e-20
3806 *
3807 * H           idcb          icbn          icb1          icb2          icb3
3808              -2220             9             0             0             0
3809 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3810                1.            8.            8.            8.            8.
3811 *
3812 * A1          idcb          icbn          icb1          icb2          icb3
3813              -2230            24           -21         -1393         -1393
3814 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3815                1.            0.        1.e+99            0.       1.0e-20
3816 *
3817 * B1          idcb          icbn          icb1          icb2          icb3
3818              -2240            56         -2230             0             0
3819 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3820          -.003333            0.        1.e+99         -300.       1.0e-20
3821 *
3822 * SP          idcb          icbn          icb1          icb2          icb3
3823              -2250            56           900             0             0
3824 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3825                1.       -1.e+99        1.e+99    -2568.0e+6       1.0e-20
3826 *
3827 * C1          idcb          icbn          icb1          icb2          icb3
3828              -2260            39         -2240           -21             0
3829 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3830                18.           0.        1.e+99            0.       1.0e-20
3831 *
3832 * JL          idcb          icbn          icb1          icb2          icb3
3833              -2270            26         -2250             0             0
3834 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3835                1.       -1.e+99        1.e+99           4.5       1.0e-20
3836 *
3837 * D1          idcb          icbn          icb1          icb2          icb3
```



```
3838              -2280           101         -2260             9             0
3839 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3840                1.            0.          500.            0.       1.0e-20
3841 * cftab         +             +             +             +             +
3842             -100.         204.0s
3843                0.         204.0s
3844              .562         240.0s
3845              3.6          320.0s
3846              5.4          356.0s
3847             9.36          402.0s
3848             18.0          460.0s
3849            21.42          483.0s
3850             100.          483.0e
3851 *
3852 * J1          idcb          icbn          icb1          icb2          icb3
3853              -2290            56         -2270             0             0
3854 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3855               -1.       -1.e+99        1.e+99    -2568.0e+6       1.0e-20
3856 *
3857 * H1          idcb          icbn          icb1          icb2          icb3
3858              -2300            56         -2240             0             0
3859 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3860              14.4             0.        1.e+99          .1111       1.0e-20
3861 *
3862 * E1          idcb          icbn          icb1          icb2          icb3
3863              -2309            59         -2280           210             0
3864 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3865                1.       -1.e+99        1.e+99            -1.           1.8
3866 *
3867 * E1          idcb          icbn          icb1          icb2          icb3
3868              -2310            56         -2309             0             0
3869 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3870                1.       -1.e+99        1.e+99          -460.       1.0e-20
3871 *
3872 * I1          idcb          icbn          icb1          icb2          icb3
3873              -2320            59         -2300         -2290             0
3874 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3875                1.           -10.           10.            -1.  6.23053e-9
3876 *
3877 * F1          idcb          icbn          icb1          icb2          icb3
3878              -2330            56         -2310             0             0
3879 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3880              .0013       -1.e+99        1.e+99        769.23       1.0e-20
3881 *
3882 * G1          idcb          icbn          icb1          icb2          icb3
3883              -2340            39         -2330         -2260             0
3884 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3885                1.       -1.e+99        1.e+99            0.       1.0e-20
3886 *
3887 * K1          idcb          icbn          icb1          icb2          icb3
3888              -2350           101         -2320             4             0
3889 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3890                1.           -10.           10.            0.       1.0e-20
3891 * cftab         +             +             +             +             +
3892             -10.5         -10.0s
3893              -.5           0.0s
3894               .5           0.0s
3895             10.5          10.0e
3896 *
3897 * SG          idcb          icbn          icb1          icb2          icb3
3898              -2353             9             0             0             0
3899 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3900                1.          500.          500.          500.          500.
3901 *
3902 * SG          idcb          icbn          icb1          icb2          icb3
3903              -2354             9             0             0             0
3904 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3905                1.            8.            8.            8.            8.
3906 *
3907 * SG          idcb          icbn          icb1          icb2          icb3
3908              -2355             3         -2350         -2340             0
3909 *           cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3910                1.       -1.e+99        1.e+99            0.       1.0e-20
```

```
3911 *
3912 * SG       idcb          icbn          icb1          icb2          icb3
3913             -2356            16           212           -21             0
3914 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3915               1.            0.            1.            0.      1.0e-20
3916 *
3917 * SG       idcb          icbn          icb1          icb2          icb3
3918             -2357            21             1         -2353             0
3919 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3920               1.            0.            1.            0.      1.0e-20
3921 *
3922 * SG       idcb          icbn          icb1          icb2          icb3
3923             -2358            56         -2355             0             0
3924 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3925               1.       -1.e+99       1.e+99           -10.      1.0e-20
3926 *
3927 * SG       idcb          icbn          icb1          icb2          icb3
3928             -2359            25         -2356         -2357             0
3929 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3930               1.            0.            1.            0.      1.0e-20
3931 *
3932 * SG       idcb          icbn          icb1          icb2          icb3
3933             -2360            22         -2358         -2354         -2359
3934 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3935               1.       -1.e+99       1.e+99            0.      1.0e-20
3936 *
3937 *          idcb          icbn          icb1          icb2          icb3
3938             -2365            22           -20           -70           222
3939 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3940               1.           0.0        1.0+10            0.           0.0
3941 *
3942 * FWB      idcb          icbn          icb1          icb2          icb3
3943             -2370            54           213         -2365             0
3944 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3945               1.       -1.e+99       1.e+99            0.      1.0e-20
3946 *
3947 * R        idcb          icbn          icb1          icb2          icb3
3948             -2380            37         -2360         -2220             0
3949 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3950               1.       -1.e+99       1.e+99            0.      1.0e-20
3951 *
3952 * FSL      idcb          icbn          icb1          icb2          icb3
3953             -2390            26         -2370             0             0
3954 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3955               1.       -1.e+99       1.e+99            1.      1.0e-20
3956 *
3957 * SL       idcb          icbn          icb1          icb2          icb3
3958             -2400             3         -2390           -70             0
3959 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3960               1.       -1.e+99       1.e+99            0.      1.0e-20
3961 *
3962 * HL1      idcb          icbn          icb1          icb2          icb3
3963             -2410           101             4             4             0
3964 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3965               1.          -10.           10.           0.      1.0e-20
3966 * cftab       +             +             +             +             +
3967             -100.        -10.0s
3968           7.8352        -10.0s
3969          15.2522         10.0s
3970             100.         10.0e
3971 *
3972 * LL1      idcb          icbn          icb1          icb2          icb3
3973             -2420           101             4             4             0
3974 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3975               1.          -10.           10.           0.      1.0e-20
3976 * cftab       +             +             +             +             +
3977             -100.        -10.0s
3978               0.         -10.0s
3979            6.350         10.0s
3980             100.         10.0e
3981 *
3982 * S1       idcb          icbn          icb1          icb2          icb3
3983             -2427            14           -21           -70             0
```



```
3984 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3985               18.      -1.e+99       1.e+99            0.           0.
3986 *
3987 * S1       idcb          icbn          icb1          icb2          icb3
3988             -2428            39         -2427         -2400             0
3989 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3990               1.       -1.e+99       1.e+99            0.           0.
3991 *
3992 * S1       idcb          icbn          icb1          icb2          icb3
3993             -2429            59         -2380         -2428             0
3994 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
3995               1.       -1.e+99       1.e+99            1.           -1.
3996 *
3997 * S1       idcb          icbn          icb1          icb2          icb3
3998             -2430            56         -2429             0             0
3999 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4000               1.       -1.e+99       1.e+99           10.      1.0e-20
4001 *
4002 * P1       idcb          icbn          icb1          icb2          icb3
4003             -2440            56         -2410             0             0
4004 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4005               -2.       -1.e+99       1.e+99          -7.0      1.0e-20
4006 *
4007 * Q1       idcb          icbn          icb1          icb2          icb3
4008             -2450            37         -2430         -2440             0
4009 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4010               1.       -1.e+99       1.e+99            0.      1.0e-20
4011 *
4012 * STP      idcb          icbn          icb1          icb2          icb3
4013             -2458             9             0             0             0
4014 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4015               1.          9.8394        9.8394        9.8394        9.8394
4016 *
4017 * STP      idcb          icbn          icb1          icb2          icb3
4018             -2459             9             0             0             0
4019 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4020               1.          -7.5200       -7.5200       -7.5200       -7.5200
4021 *
4022 * STP      idcb          icbn          icb1          icb2          icb3
4023             -2460            22         -2458         -2459          -740
4024 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4025               1.       -1.e+99       1.e+99            0.      1.0e-20
4026 *
4027 * P2       idcb          icbn          icb1          icb2          icb3
4028             -2470            59         -2420         -2460             0
4029 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4030               1.       -1.e+99       1.e+99           -2.           2.
4031 *
4032 * T1       idcb          icbn          icb1          icb2          icb3
4033             -2480            35         -2470         -2450             0
4034 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4035               1.       -1.e+99       1.e+99            0.      1.0e-20
4036 *
4037 * BR       idcb          icbn          icb1          icb2          icb3
4038             -2490            37         -2360         -2210             0
4039 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4040               1.       -1.e+99       1.e+99            0.      1.0e-20
4041 *
4042 *          idcb          icbn          icb1          icb2          icb3
4043             -2495            22           -20           -71           222
4044 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4045               1.           0.0        1.0+10            0.           0.0
4046 *
4047 * FWC      idcb          icbn          icb1          icb2          icb3
4048             -2500            54           214         -2495             0
4049 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4050               1.       -1.e+99       1.e+99            0.      1.0e-20
4051 *
4052 * BHL1     idcb          icbn          icb1          icb2          icb3
4053             -2510           101             3             4             0
4054 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4055               1.          -10.           10.           0.      1.0e-20
4056 * cftab       +             +             +             +             +
```

```
4057          -100.        -10.0s
4058          7.8134       -10.0s
4059         15.2304        10.0s
4060           100.         10.0e
4061 *
4062 * BLL1     idcb         icbn         icb1         icb2         icb3
4063           -2520          101            3            4            0
4064 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4065             1.          -10.          10.           0.      1.0e-20
4066 * cftab      +            +            +            +            +
4067          -100.        -10.0s
4068            0.         -10.0s
4069          6.350         10.0s
4070           100.         10.0e
4071 *
4072 * FBL      idcb         icbn         icb1         icb2         icb3
4073           -2530           26        -2500            0            0
4074 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4075             1.       -1.e+99       1.e+99           1.      1.0e-20
4076 *
4077 * BP1      idcb         icbn         icb1         icb2         icb3
4078           -2540           56        -2510            0            0
4079 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4080             -2.      -1.e+99       1.e+99         -7.0      1.0e-20
4081 *
4082 * BSL      idcb         icbn         icb1         icb2         icb3
4083           -2550            3        -2530          -71            0
4084 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4085             1.       -1.e+99       1.e+99           0.      1.0e-20
4086 *
4087 * BS1      idcb         icbn         icb1         icb2         icb3
4088           -2557           14          -21          -71            0
4089 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4090            18.       -1.e+99       1.e+99           0.           0.
4091 *
4092 * BS1      idcb         icbn         icb1         icb2         icb3
4093           -2558           39        -2557        -2550            0
4094 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4095             1.       -1.e+99       1.e+99           0.           0.
4096 *
4097 * BS1      idcb         icbn         icb1         icb2         icb3
4098           -2559           59        -2490        -2558            0
4099 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4100             1.       -1.e+99       1.e+99           1.          -1.
4101 *
4102 * BS1      idcb         icbn         icb1         icb2         icb3
4103           -2560           56        -2559            0            0
4104 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4105             1.       -1.e+99       1.e+99          10.      1.0e-20
4106 *
4107 * BQ1      idcb         icbn         icb1         icb2         icb3
4108           -2570           37        -2560        -2540            0
4109 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4110             1.       -1.e+99       1.e+99           0.      1.0e-20
4111 *
4112 * BP2      idcb         icbn         icb1         icb2         icb3
4113           -2580           59        -2520        -2460            0
4114 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4115             1.       -1.e+99       1.e+99          -2.           2.
4116 *
4117 * BT1      idcb         icbn         icb1         icb2         icb3
4118           -2590           35        -2580        -2570            0
4119 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4120             1.       -1.e+99       1.e+99           0.      1.0e-20
4121 *
4122 * BCNST1   idcb         icbn         icb1         icb2         icb3
4123           -2592            9            0            0            0
4124 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4125             1.           100.         100.         100.         100.
4126 *
4127 * BCNST1   idcb         icbn         icb1         icb2         icb3
4128           -2593            9            0            0            0
4129 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
```



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4130             1.          .12          .12          .12          .12
4131 *
4132 * BCNST1   idcb         icbn         icb1         icb2         icb3
4133           -2594            9            0            0            0
4134 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4135             1.          .1125        .1125        .1125        .1125
4136 *
4137 * BCNST1   idcb         icbn         icb1         icb2         icb3
4138           -2595           20        -2580          -20            0
4139 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4140             1.           0.           1.           0.      1.0e-20
4141 *
4142 *          idcb         icbn         icb1         icb2         icb3
4143           -2596           16          212          -20            0
4144 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4145             1.           0.           1.           0.      1.0e-20
4146 *
4147 *          idcb         icbn         icb1         icb2         icb3
4148           -2597           34            1        -2592            0
4149 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4150             1.           0.           1.           0.      1.0e-20
4151 *
4152 *          idcb         icbn         icb1         icb2         icb3
4153           -2598           22        -2593        -2594        -2595
4154 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4155             1.       -1.e+99       1.e+99           0.      1.0e-20
4156 *
4157 *          idcb         icbn         icb1         icb2         icb3
4158           -2599            5        -2596        -2597            0
4159 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4160             1.           0.           1.           0.      1.0e-20
4161 *
4162 * BCNST1   idcb         icbn         icb1         icb2         icb3
4163           -2600           22          -20        -2598        -2599
4164 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4165             1.       -1.e+99       1.e+99           0.      1.0e-20
4166 *
4167 * BU1      idcb         icbn         icb1         icb2         icb3
4168           -2606            3        -2607        -2590            0
4169 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4170              .5      -1.e+99       1.e+99           0.      1.0e-20
4171 *
4172 * BU1      idcb         icbn         icb1         icb2         icb3
4173           -2607           56        -2590            0            0
4174 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4175             1.       -1.e+99       1.e+99           0.      1.0e-20
4176 *
4177 * BU1      idcb         icbn         icb1         icb2         icb3
4178           -2608           39        -2606        -2600            0
4179 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4180             1.       -1.e+99       1.e+99           0.      1.0e-20
4181 *
4182 * BU1      idcb         icbn         icb1         icb2         icb3
4183           -2609           39        -2608          201            0
4184 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4185             1.       -1.e+99       1.e+99           0.      1.0e-20
4186 *
4187 * BU1      idcb         icbn         icb1         icb2         icb3
4188           -2610            3        -2610        -2609            0
4189 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4190             1.          -18.0          2.0           0.      1.0e-20
4191 *
4192 * BCNST2   idcb         icbn         icb1         icb2         icb3
4193           -2618            9            0            0            0
4194 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4195             1.           2.4          2.4          2.4          2.4
4196 *
4197 * BCNST2   idcb         icbn         icb1         icb2         icb3
4198           -2619            9            0            0            0
4199 *        cbgain       cbxmin       cbxmax       cbcon1       cbcon2
4200             1.           .9           .9           .9           .9
4201 *
4202 * BCNST2   idcb         icbn         icb1         icb2         icb3
```

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4203                -2620          22        -2618        -2619        -2595
4204 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4205                 1.       -1.e+99       1.e+99           0.     1.0e-20
4206 *
4207 * BX11        idcb          icbn         icb1         icb2         icb3
4208                -2629            39        -2620        -2590            0
4209 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4210                 1.       -1.e+99       1.e+99           0.     1.0e-20
4211 *
4212 * BX11        idcb          icbn         icb1         icb2         icb3
4213                -2630            59        -2610        -2629            0
4214 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4215              0.6 *1.*       -1.e+99       1.e+99           1.           1.
4216 *
4217 * BX1         idcb          icbn         icb1         icb2         icb3
4218                -2640            56        -2630            0            0
4219 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4220                 1.          -10.          10.           8.     1.0e-20
4221 *
4222 * SUB         idcb          icbn         icb1         icb2         icb3
4223                -2650            56        -2640            0            0
4224 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4225 *          7.44164          -10.          10.      -6.6562     1.0e-20
4226 *          7.44164          -10.          10.      8.16590     1.0e-20
4227           15.7393          -10.          10.      -5.5651     1.0e-20
4228 *
4229 * MFB         idcb          icbn         icb1         icb2         icb3
4230                -2660            56        -2640            0            0
4231 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4232                .5555          -10.          10.     -8.00072     1.0e-20
4233 *
4234 * SUFVB       idcb          icbn         icb1         icb2         icb3
4235                -2670            56        -2650            0            0
4236 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4237                  .1            0.           1.           0.     1.0e-20
4238 *
4239 * MFCVB       idcb          icbn         icb1         icb2         icb3
4240                -2680            56        -2660            0            0
4241 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4242                  .5            0.           1.           1.     1.0e-20
4243 *
4244 *            idcb          icbn         icb1         icb2         icb3
4245                -2682             9            0            0            0
4246 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4247                 1.          100.         100.         100.         100.
4248 *
4249 * CNST1       idcb          icbn         icb1         icb2         icb3
4250                -2683             9            0            0            0
4251 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4252                 1.            .12          .12          .12          .12
4253 *
4254 * CNST1       idcb          icbn         icb1         icb2         icb3
4255                -2684             9            0            0            0
4256 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4257                 1.           .1125        .1125        .1125        .1125
4258 *
4259 * CNST1       idcb          icbn         icb1         icb2         icb3
4260                -2685            20        -2470          -20            0
4261 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4262                 1.            0.           1.           0.     1.0e-20
4263 *
4264 *            idcb          icbn         icb1         icb2         icb3
4265                -2686            16          212          -20        -2689
4266 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4267                 1.            0.           1.           0.     1.0e-20
4268 *
4269 *            idcb          icbn         icb1         icb2         icb3
4270                -2687            34            1        -2682        -2689
4271 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4272                 1.            0.           1.           0.     1.0e-20
4273 *
4274 * CNST1       idcb          icbn         icb1         icb2         icb3
4275                -2688            22        -2683        -2684        -2685
```



```
4276 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4277                 1.       -1.e+99       1.e+99           0.     1.0e-20
4278 *
4279 *            idcb          icbn         icb1         icb2         icb3
4280                -2689             5        -2686        -2687            0
4281 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4282                 1.            0.           1.           0.     1.0e-20
4283 *
4284 * CNST1       idcb          icbn         icb1         icb2         icb3
4285                -2690            22          -20        -2688        -2689
4286 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4287                 1.       -1.e+99       1.e+99           0.     1.0e-20
4288 *
4289 * U1          idcb          icbn         icb1         icb2         icb3
4290                -2696             3        -2697        -2480            0
4291 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4292                  .5       -1.e+99       1.e+99           0.     1.0e-20
4293 *
4294 * U1          idcb          icbn         icb1         icb2         icb3
4295                -2697            56        -2480            0            0
4296 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4297                 1.       -1.e+99       1.e+99           0.     1.0e-20
4298 *
4299 * U1          idcb          icbn         icb1         icb2         icb3
4300                -2698            39        -2696        -2690            0
4301 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4302                 1.       -1.e+99       1.e+99           0.     1.0e-20
4303 *
4304 * U1          idcb          icbn         icb1         icb2         icb3
4305                -2699            39        -2698          201            0
4306 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4307                 1.       -1.e+99       1.e+99           0.     1.0e-20
4308 *
4309 * U1          idcb          icbn         icb1         icb2         icb3
4310                -2700             3        -2700        -2699            0
4311 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4312                 1.          -18.0           2.0          0.     1.0e-20
4313 *
4314 * DPAB        idcb          icbn         icb1         icb2         icb3
4315                -2710            56          215            0            0
4316 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4317                 1.       -1.e+99       1.e+99     -3.55e+5     1.0e-20
4318 *
4319 * DPBB        idcb          icbn         icb1         icb2         icb3
4320                -2720            56          216            0            0
4321 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4322                 1.       -1.e+99       1.e+99     -3.55e+5     1.0e-20
4323 *
4324 * CNST2       idcb          icbn         icb1         icb2         icb3
4325                -2728             9            0            0            0
4326 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4327                 1.           2.4          2.4          2.4          2.4
4328 *
4329 * CNST2       idcb          icbn         icb1         icb2         icb3
4330                -2729             9            0            0            0
4331 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4332                 1.            .9           .9           .9           .9
4333 *
4334 * CNST2       idcb          icbn         icb1         icb2         icb3
4335                -2730            22        -2728        -2729        -2685
4336 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4337                 1.       -1.e+99       1.e+99           0.     1.0e-20
4338 *
4339 * X11         idcb          icbn         icb1         icb2         icb3
4340                -2739            39        -2730        -2480            0
4341 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4342                 1.       -1.e+99       1.e+99           0.     1.0e-20
4343 *
4344 * X11         idcb          icbn         icb1         icb2         icb3
4345                -2740            59        -2700        -2739            0
4346 *           cbgain        cbxmin       cbxmax       cbcon1       cbcon2
4347              0.6 *1.*       -1.e+99       1.e+99           1.           1.
4348 *
```

```
4349 * DPAL     idcb          icbn          icb1          icb2          icb3
4350           -2750            26         -2710             0             0
4351 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4352              1.        -2.4e+5        2.4e+5            1.      1.0e-20
4353 *
4354 * DPBL     idcb          icbn          icb1          icb2          icb3
4355           -2760            26         -2720             0             0
4356 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4357              1.        -2.4e+5        2.4e+5            1.      1.0e-20
4358 *
4359 * X1       idcb          icbn          icb1          icb2          icb3
4360           -2770            56         -2740             0             0
4361 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4362              1.          -10.           10.            8.      1.0e-20
4363 *
4364 * SUA      idcb          icbn          icb1          icb2          icb3
4365           -2780            56         -2770             0             0
4366 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4367 *       7.44164          -10.           10.       8.16590      1.0e-20
4368         15.7393          -10.           10.      -5.5651      1.0e-20
4369 *
4370 * MFA      idcb          icbn          icb1          icb2          icb3
4371           -2790            56         -2770             0             0
4372 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4373             .5555          -10.           10.      -8.00072      1.0e-20
4374 *
4375 * DPA      idcb          icbn          icb1          icb2          icb3
4376           -2800            56         -2750             0             0
4377 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4378              1.        -1.e+99        1.e+99       3.55e+5      1.0e-20
4379 *
4380 * DPB      idcb          icbn          icb1          icb2          icb3
4381           -2810            56         -2760             0             0
4382 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4383              1.        -1.e+99        1.e+99       3.55e+5      1.0e-20
4384 *
4385 * SUFVA    idcb          icbn          icb1          icb2          icb3
4386           -2820            56         -2780             0             0
4387 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4388                .1            0.            1.            0.      1.0e-20
4389 *
4390 * MFCVA    idcb          icbn          icb1          icb2          icb3
4391           -2830            56         -2790             0             0
4392 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4393                .5            0.            1.            1.      1.0e-20
4394 *
4395 * FA       idcb          icbn          icb1          icb2          icb3
4396           -2840            56         -2800             0             0
4397 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4398     2.90074e-5        -1.e+99        1.e+99   -3.44740e+5      1.0e-20
4399 *
4400 * FB       idcb          icbn          icb1          icb2          icb3
4401           -2850            56         -2810             0             0
4402 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4403     2.90074e-5        -1.e+99        1.e+99   -3.44740e+5      1.0e-20
4404 *
4405 * FC       idcb          icbn          icb1          icb2          icb3
4406           -2860            37         -2840         -2850             0
4407 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4408              1.        -1.e+99        1.e+99            0.      1.0e-20
4409 *
4410 * FD       idcb          icbn          icb1          icb2          icb3
4411           -2870            56         -2860             0             0
4412 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4413              1.        -1.e+99        1.e+99         -.2975      1.0e-20
4414 *
4415 * FE       idcb          icbn          icb1          icb2          icb3
4416           -2879             1         -2870             0             0
4417 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4418              1.        -1.e+99        1.e+99            0.      1.0e-20
4419 *
4420 * FE       idcb          icbn          icb1          icb2          icb3
4421           -2880            39         -2870         -2879             0
```



```
4422 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4423                .2        -10.0          10.0            0.      1.0e-20
4424 *
4425 * FF       idcb          icbn          icb1          icb2          icb3
4426           -2882             9             0             0             0
4427 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4428              1.            400.          400.          400.          400.
4429 *
4430 * FF       idcb          icbn          icb1          icb2          icb3
4431           -2883             3         -2884         -2880             0
4432 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4433             .1167      -1.e+99        1.e+99            0.      1.0e-20
4434 *
4435 * FF       idcb          icbn          icb1          icb2          icb3
4436           -2884            56         -2880             0             0
4437 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4438              1.        -1.e+99        1.e+99            0.      1.0e-20
4439 *
4440 * FF       idcb          icbn          icb1          icb2          icb3
4441           -2885            39         -2883           201             0
4442 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4443              1.        -1.e+99        1.e+99            0.      1.0e-20
4444 *
4445 * FF       idcb          icbn          icb1          icb2          icb3
4446           -2886            16           212           -21             0
4447 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4448              1.            0.            1.            0.      1.0e-20
4449 *
4450 * FF       idcb          icbn          icb1          icb2          icb3
4451           -2887            21             1         -2882             0
4452 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4453              1.        -1.e+99        1.e+99            0.      1.0e-20
4454 *
4455 * FF       idcb          icbn          icb1          icb2          icb3
4456           -2888             3         -2890         -2885             0
4457 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4458              1.          -10.0          10.0            0.      1.0e-20
4459 *
4460 * FF       idcb          icbn          icb1          icb2          icb3
4461           -2889            25         -2886         -2887             0
4462 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4463              1.            0.            1.            0.      1.0e-20
4464 *
4465 * FF       idcb          icbn          icb1          icb2          icb3
4466           -2890            39         -2888         -2889             0
4467 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4468              1.          -10.0          10.0            0.      1.0e-20
4469 *
4470 * FG       idcb          icbn          icb1          icb2          icb3
4471           -2900             3         -2890         -2880             0
4472 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4473        0.5 *1.*          -10.0          10.0            0.      1.0e-20
4474 *
4475 * FI       idcb          icbn          icb1          icb2          icb3
4476           -2909             3         -2380         -2490             0
4477 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4478              1.        -1.e+99        1.e+99            0.      1.0e-20
4479 *
4480 *                   original cb -2910
4481 * FI       idcb          icbn          icb1          icb2          icb3
4482 *         -2910            59         -2909         -2900             0
4483 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4484 *            1.        -1.e+99        1.e+99            .5            -1.
4485 *
4486 * FI       idcb          icbn          icb1          icb2          icb3
4487           -2910            56         -2900             0             0
4488 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4489               -1.          -10.0          10.0          -8.      1.0e-20
4490 *
4491 * FP       idcb          icbn          icb1          icb2          icb3
4492           -2919           101         -2910             6             0
4493 *         cbgain        cbxmin        cbxmax        cbcon1        cbcon2
4494             .93659     -1.e+99        1.e+99            0.      1.0e-20
```

```
* cftab      +           +           +           +           +
          -100.       370.4s
            -2.       370.4s
             0.       392.8s
             6.       460.0s
            10.      586.43s
           100.      586.43e
*
* FI       idcb        icbn        icb1        icb2        icb3
          -2920          22       -2919         -86       -2889
*        cbgain      cbxmin      cbxmax      cbcon1      cbcon2
             1.     -1.e+99      1.e+99          0.    1.0e-20
*
*********************************************************************
*                          a loop TBV control                       *
*********************************************************************
*
*     control
*     block id  control block value
*     --------  -------------------
*
*        -3388  a loop TBV area fraction
*
*
*        idcb        icbn        icb1        icb2        icb3
*       -3305          33       -3381         -20           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.          0.          1.          0.          1.
*
*        idcb        icbn        icb1        icb2        icb3
*       -3310          54         224         -63           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3312           3         235         236           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3314           3         237         238           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3315           1       -3310           0           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3318           3       -3312       -3314           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*          .25     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3320          34       -3315         -64           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.          0.          1.          0.          1.
*
*        idcb        icbn        icb1        icb2        icb3
*       -3322          22          56       -3318         221
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3325           5       -3305       -3320           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.          0.          1.          0.          1.
*
*        idcb        icbn        icb1        icb2        icb3
*       -3330          21       -1881         -85           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.          0.          1.          0.          1.
```



```
*
*        idcb        icbn        icb1        icb2        icb3
*       -3332          12       -3322           0           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3335          25       -3325       -3330           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.          0.          1.          0.          1.
*
*        idcb        icbn        icb1        icb2        icb3
*       -3338          26       -3332           0           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          1.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3340          22         -65         -66       -3335
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.  .34474e+6
*
*        idcb        icbn        icb1        icb2        icb3
*       -3342          34       -3338         -91           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3345          22         -66       -3340       -1399
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.  .34474e+6
*
*        idcb        icbn        icb1        icb2        icb3
*       -3348           5         258       -3342           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.          0.          1.          0.    1.0e-20
*
* bias changed to turbine trip bias
*        idcb        icbn        icb1        icb2        icb3
*       -3350          22      -66 *-20*      -3345       -1393
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.  .34474e+6
*
*        idcb        icbn        icb1        icb2        icb3
*       -3352          22         -21         -22       -3348
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3355          54       -3310       -3350           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.  -.34474e+6
*
*        idcb        icbn        icb1        icb2        icb3
*       -3358          39       -3352         201           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3360          39       -3355         -68           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    -1.6667
*
*        idcb        icbn        icb1        icb2        icb3
*       -3362           3       -3362       -3358           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.          0.         10.          0.    1.0e-20
*
*        idcb        icbn        icb1        icb2        icb3
*       -3365          39         -69       -3360           0
*      cbgain      cbxmin      cbxmax      cbcon1      cbcon2
*           1.     -1.e+99      1.e+99          0.    -16.667
*
*        idcb        icbn        icb1        icb2        icb3
```

```
4641          -3370          24          -3360          212          212
4642  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4643            .15         -10.           10.           0.      1.0e-20
4644  *
4645  *         idcb         icbn          icb1          icb2         icb3
4646          -3372          101          -3362             4            0
4647  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4648            1.            0.            1.            0.           1.
4649  * cftab     +             +             +             +            +
4650          -1.e+6         1.s
4651             0.          1.s
4652            10.          0.s
4653           1.e+6         0.e
4654  *
4655  *         idcb         icbn          icb1          icb2         icb3
4656          -3375            3          -3365         -3370            0
4657  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4658            1.          -10.           10.           0.         -10.
4659  *
4660  *         idcb         icbn          icb1          icb2         icb3
4661          -3380          101          -3375             7            0
4662  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4663            1.            0.            1.            0.      1.0e-20
4664  * cftab     +             +             +             +            +
4665           -10.          0.s
4666            -8.         .12s
4667            -5.         .60s
4668            -2.         .82s
4669             0.         .87s
4670             5.         .97s
4671            10.          1.e
4672  *
4673  *         idcb         icbn          icb1          icb2         icb3
4674          -3381           26          -3380             0            0
4675  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4676            1.            0.            1.            2.      1.0e-20
4677  *
4678  *         idcb         icbn          icb1          icb2         icb3
4679          -3382            3           -21         -3381            0
4680  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4681            .5            0.            2.            0.      1.0e-20
4682  *
4683  *         idcb         icbn          icb1          icb2         icb3
4684          -3385            5           100           110            0
4685  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4686            1.            0.            1.            0.          0.0
4687  *
4688  *         idcb         icbn          icb1          icb2         icb3
4689          -3386           22          -3382         -3381        -3385
4690  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4691            1.            0.            1.            0.      1.0e-20
4692  *
4693  *         idcb         icbn          icb1          icb2         icb3
4694          -3388           39          -3386         -3372            0
4695  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4696            1.            0.            1.            0.      1.0e-20
4697  *
4698  ************************************************************************
4699  *                          b loop TBV control                          *
4700  ************************************************************************
4701  *
4702  *     control
4703  *     block id  control block value
4704  *     --------  -------------------
4705  *
4706  *       -3488  a loop TBV area fraction
4707  *
4708  *
4709  *         idcb         icbn          icb1          icb2         icb3
4710          -3405           33          -3481           -20            0
4711  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4712            1.            0.            1.            0.           1.
4713  *
```



```
4714  *         idcb         icbn          icb1          icb2         icb3
4715          -3410           54           226           -63            0
4716  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4717            1.        -1.e+99       1.e+99            0.      1.0e-20
4718  *
4719  *         idcb         icbn          icb1          icb2         icb3
4720          -3412            3           235           236            0
4721  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4722            1.        -1.e+99       1.e+99            0.      1.0e-20
4723  *
4724  *         idcb         icbn          icb1          icb2         icb3
4725          -3414            3           237           238            0
4726  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4727            1.        -1.e+99       1.e+99            0.      1.0e-20
4728  *
4729  *         idcb         icbn          icb1          icb2         icb3
4730          -3415            1         -3410             0            0
4731  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4732            1.        -1.e+99       1.e+99            0.      1.0e-20
4733  *
4734  *         idcb         icbn          icb1          icb2         icb3
4735          -3418            3         -3412         -3414            0
4736  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4737             .25       -1.e+99       1.e+99            0.      1.0e-20
4738  *
4739  *         idcb         icbn          icb1          icb2         icb3
4740          -3420           34          -3415           -64            0
4741  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4742            1.            0.            1.            0.           1.
4743  *
4744  *         idcb         icbn          icb1          icb2         icb3
4745          -3422           22           56           -3418          221
4746  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4747            1.        -1.e+99       1.e+99            0.      1.0e-20
4748  *
4749  *         idcb         icbn          icb1          icb2         icb3
4750          -3425            5          -3405         -3420            0
4751  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4752            1.            0.            1.            0.           1.
4753  *
4754  *         idcb         icbn          icb1          icb2         icb3
4755          -3430           21          -1881           -85            0
4756  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4757            1.            0.            1.            0.           1.
4758  *
4759  *         idcb         icbn          icb1          icb2         icb3
4760          -3432           12          -3422             0            0
4761  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4762            1.        -1.e+99       1.e+99            0.      1.0e-20
4763  *
4764  *         idcb         icbn          icb1          icb2         icb3
4765          -3435           25          -3425         -3430            0
4766  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4767            1.            0.            1.            0.           1.
4768  *
4769  *         idcb         icbn          icb1          icb2         icb3
4770          -3438           26          -3432             0            0
4771  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4772            1.        -1.e+99       1.e+99            1.      1.0e-20
4773  *
4774  *         idcb         icbn          icb1          icb2         icb3
4775          -3440           22           -65           -66        -3435
4776  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4777            1.        -1.e+99       1.e+99            0.     .34474e+6
4778  *
4779  *         idcb         icbn          icb1          icb2         icb3
4780          -3442           34          -3438           -91            0
4781  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
4782            1.        -1.e+99       1.e+99            0.      1.0e-20
4783  *
4784  *         idcb         icbn          icb1          icb2         icb3
4785          -3445           22           -66         -3440        -1399
4786  *       cbgain       cbxmin        cbxmax        cbcon1       cbcon2
```

```
               1.         -1.e+99        1.e+99           0.       .34474e+6
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3448              5            258         -3442               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.             0.             1.            0.        1.0e-20
 *
 * bias changed to turbine trip bias
 *          idcb           icbn           icb1          icb2            icb3
           -3450             22      -66 *-20*         -3445           -1393
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.        -1.e+99        1.e+99            0.       .34474e+6
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3452             22            -21           -22           -3448
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.        -1.e+99        1.e+99            0.        1.0e-20
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3455             54          -3410         -3450               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.        -1.e+99        1.e+99            0.      -.34474e+6
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3458             39          -3452           201               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.        -1.e+99        1.e+99            0.        1.0e-20
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3460             39          -3455           -68               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.        -1.e+99        1.e+99            0.        -1.6667
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3462              3          -3462         -3458               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.             0.            10.            0.        1.0e-20
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3465             39            -69         -3460               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.        -1.e+99        1.e+99            0.        -16.667
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3470             24          -3460           212             212
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
              .15           -10.            10.            0.        1.0e-20
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3472            101          -3462             4               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.             0.             1.            0.             1.
 * cftab       +              +              +             +               +
          -1.e+6            1.s
              0.            1.s
             10.            0.s
          1.e+6             0.e
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3475              3          -3465         -3470               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.           -10.            10.            0.           -10.
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3480            101          -3475             7               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.             0.             1.            0.        1.0e-20
 * cftab       +              +              +             +               +
             -10.           0.s
              -8.           .12s
              -5.           .60s
              -2.           .82s
               0.           .87s
```



```
               5.           .97s
              10.            1.e
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3481             26          -3480             0               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.             0.             1.            2.        1.0e-20
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3482              3            -21         -3481               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               .5             0.             2.            0.        1.0e-20
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3485              5            105           115               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.             0.             1.            0.             0.0
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3486             22          -3482         -3481           -3485
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.             0.             1.            0.        1.0e-20
 *
 *          idcb           icbn           icb1          icb2            icb3
           -3488             39          -3486         -3472               0
 *        cbgain         cbxmin         cbxmax        cbcon1          cbcon2
               1.             0.             1.            0.        1.0e-20
 *
*************************************************************************
 *        the following are added to produce the requested plots        *
*************************************************************************
 *
 *         idcb           icbn           icb1          icb2            icb3
          -3510             39             29           -23               0
 *       cbgain         cbxmin         cbxmax        cbcon1          cbcon2
 *           1.             0.             0.            0.              0.
             0.             0.             0.            0.         1.0e-20
 *
 *         idcb           icbn           icb1          icb2            icb3
          -3520             39             28           -23               0
 *       cbgain         cbxmin         cbxmax        cbcon1          cbcon2
             0.             0.             0.            0.         1.0e-20
 *
 *         idcb           icbn           icb1          icb2            icb3
          -3530             57             21            22              23
 *       cbgain         cbxmin         cbxmax        cbcon1          cbcon2
 *           1.             0.             0.            0.              0.
             0.             0.             0.            0.         1.0e-20
 *
 *         idcb           icbn           icb1          icb2            icb3
          -3531             57          -3530            24             -20
 *       cbgain         cbxmin         cbxmax        cbcon1          cbcon2
 *           1.             0.             0.            0.              0.
             0.             0.             0.            0.         1.0e-20
 *
 *         idcb           icbn           icb1          icb2            icb3
          -3532             57             25            26             -20
 *       cbgain         cbxmin         cbxmax        cbcon1          cbcon2
 *           1.             0.             0.            0.              0.
             0.             0.             0.            0.         1.0e-20
 *
 *         idcb           icbn           icb1          icb2            icb3
          -3533             57          -3531            30           -3532
 *       cbgain         cbxmin         cbxmax        cbcon1          cbcon2
             0.             0.             0.            0.         1.0e-20
 *
 *         idcb           icbn           icb1          icb2            icb3
          -3534             14            239            32               0
 *       cbgain         cbxmin         cbxmax        cbcon1          cbcon2
 *           1.             0.             0.            0.              0.
             0.             0.             0.            0.         1.0e-20
 *
 *         idcb           icbn           icb1          icb2            icb3
```

```
4933          -3535          14          240          33           0
4934  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4935  *          1.           0.           0.           0.           0.
4936              0.           0.           0.           0.     1.0e-20
4937  *
4938  *        idcb         icbn         icb1         icb2         icb3
4939          -3536           14          241           34           0
4940  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4941  *          1.           0.           0.           0.           0.
4942              0.           0.           0.           0.     1.0e-20
4943  *
4944  *        idcb         icbn         icb1         icb2         icb3
4945          -3537           14          242           35           0
4946  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4947  *          1.           0.           0.           0.           0.
4948              0.           0.           0.           0.     1.0e-20
4949  *
4950  *        idcb         icbn         icb1         icb2         icb3
4951          -3538           57        -1794        -1697          -20
4952  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4953  *          1.           0.           0.           0.           0.
4954              0.           0.           0.           0.     1.0e-20
4955  *
4956  *        idcb         icbn         icb1         icb2         icb3
4957          -3539           57        -1795        -1698          -20
4958  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4959  *          1.           0.           0.           0.           0.
4960              0.           0.           0.           0.     1.0e-20
4961  *
4962  *        idcb         icbn         icb1         icb2         icb3
4963          -3540           57          213          214          -20
4964  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4965  *          1.           0.           0.           0.           0.
4966              0.           0.           0.           0.     1.0e-20
4967  *
4968  *        idcb         icbn         icb1         icb2         icb3
4969          -3541           57        -3538        -3539          -20
4970  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4971  *          1.           0.           0.           0.           0.
4972              0.           0.           0.           0.     1.0e-20
4973  *
4974  *        idcb         icbn         icb1         icb2         icb3
4975          -3542           57        -3540        -3541          -20
4976  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4977  *          1.           0.           0.           0.           0.
4978              0.           0.           0.           0.     1.0e-20
4979  *
4980  *        idcb         icbn         icb1         icb2         icb3
4981          -3543           23        -3542            0            0
4982  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4983  *          1.           0.           0.           0.           0.
4984              0.           0.           0.           0.     1.0e-20
4985  *
4986  *        idcb         icbn         icb1         icb2         icb3
4987          -3544           57          365          370          -20
4988  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4989  *          1.           0.           0.           0.           0.
4990              0.           0.           0.           0.     1.0e-20
4991  *
4992  *        idcb         icbn         icb1         icb2         icb3
4993          -3545           57          465          470          -20
4994  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
4995  *          1.           0.           0.           0.           0.
4996              0.           0.           0.           0.     1.0e-20
4997  *
4998  *        idcb         icbn         icb1         icb2         icb3
4999          -3546           57        -3544        -3545          -20
5000  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5001  *          1.           0.           0.           0.           0.
5002              0.           0.           0.           0.     1.0e-20
5003  *
5004  *        idcb         icbn         icb1         icb2         icb3
5005          -3547           23        -3546            0            0
```



```
5006  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5007  *          1.           0.           0.           0.           0.
5008              0.           0.           0.           0.     1.0e-20
5009  *
5010  *        idcb         icbn         icb1         icb2         icb3
5011          -3548            3          202          204            0
5012  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5013  *         0.5           0.           0.           0.           0.
5014            0.5     -1.0e+20     1.0e+20           0.     1.0e-20
5015  *
5016  *        idcb         icbn         icb1         icb2         icb3
5017          -3549            3          235          236            0
5018  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5019  *         0.5           0.           0.           0.           0.
5020            0.5     -1.0e+20     1.0e+20           0.     1.0e-20
5021  *
5022  *        idcb         icbn         icb1         icb2         icb3
5023          -3550            3          237          238            0
5024  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5025  *         0.5           0.           0.           0.           0.
5026            0.5     -1.0e+20     1.0e+20           0.     1.0e-20
5027  *
5028  *        idcb         icbn         icb1         icb2         icb3
5029          -3551            3        -3549        -3550            0
5030  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5031  *         0.5           0.           0.           0.           0.
5032            0.5     -1.0e+20     1.0e+20           0.     1.0e-20
5033  *
5034  *        idcb         icbn         icb1         icb2         icb3
5035          -3552            3        -3548        -3551            0
5036  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5037  *         0.5           0.           0.           0.           0.
5038            0.5     -1.0e+20     1.0e+20           0.     1.0e-20
5039  *
5040  *        idcb         icbn         icb1         icb2         icb3
5041          -3553           37          812          813            0
5042  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5043  *          1.           0.           0.           0.           0.
5044              0.           0.           0.           0.     1.0e-20
5045  *
5046  *        idcb         icbn         icb1         icb2         icb3
5047          -3554           57          814          815          816
5048  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5049  *          1.           0.           0.           0.           0.
5050              0.           0.           0.           0.     1.0e-20
5051  *
5052  *        idcb         icbn         icb1         icb2         icb3
5053          -3555           57          817          818          819
5054  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5055  *          1.           0.           0.           0.           0.
5056              0.           0.           0.           0.     1.0e-20
5057  *
5058  ************************************************************************
5059  *     dummy control blocks -3556 and -3557 are activated
5060  *     as well as dummy signal variables 822 and 823 during a HL break
5061  *     transient
5062  ************************************************************************
5063  *        idcb         icbn         icb1         icb2         icb3
5064          -3556            9            0            0            0
5065  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5066              1.          17.          17.          17.          17.
5067  *
5068  *        idcb         icbn         icb1         icb2         icb3
5069          -3557            9            0            0            0
5070  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5071              1.          17.          17.          17.          17.
5072  *
5073  *        idcb         icbn         icb1         icb2         icb3
5074          -3558           56          826            0            0
5075  *      cbgain       cbxmin       cbxmax      cbcon1      cbcon2
5076  *          1.           0.           0.       0.1404           0.
5077              1.     -1.0e+20     1.0e+20       0.1404     1.0e-20
5078  *
```

```
5079 *      idcb        icbn        icb1        icb2        icb3
5080        -3559         56         827           0           0
5081 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5082 *         1.          0.          0.      0.1404          0.
5083            1.   -1.0e+20    1.0e+20      0.1404    1.0e-20
5084 *
5085 *      idcb        icbn        icb1        icb2        icb3
5086        -3560         58       -3558         -19         -17
5087 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5088 *         1.          0.          0.          0.          0.
5089            0.          0.          0.          0.    1.0e-20
5090 *
5091 *      idcb        icbn        icb1        icb2        icb3
5092        -3561         58       -3559         -19         -17
5093 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5094 *         1.          0.          0.          0.          0.
5095            0.          0.          0.          0.    1.0e-20
5096 *
5097 *      idcb        icbn        icb1        icb2        icb3
5098        -3562         56         828           0           0
5099 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5100 *         1.          0.          0.       0.482          0.
5101            0.          0.          0.      0.9392    1.0e-20
5102 *
5103 *      idcb        icbn        icb1        icb2        icb3
5104        -3563         56         829           0           0
5105 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5106 *         1.          0.          0.       0.482          0.
5107            0.          0.          0.      0.9392    1.0e-20
5108 *
5109 *      idcb        icbn        icb1        icb2        icb3
5110        -3564         58       -3562         -19         -16
5111 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5112 *         1.          0.          0.          0.          0.
5113            0.          0.          0.          0.    1.0e-20
5114 *
5115 *      idcb        icbn        icb1        icb2        icb3
5116        -3565         58       -3563         -19         -16
5117 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5118 *         1.          0.          0.          0.          0.
5119            0.          0.          0.          0.    1.0e-20
5120 *
5121 *      idcb        icbn        icb1        icb2        icb3
5122        -3566         39         830       -3564           0
5123 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5124 *         1.          0.          0.          0.          0.
5125            0.          0.          0.          0.    1.0e-20
5126 *
5127 *      idcb        icbn        icb1        icb2        icb3
5128        -3567         39         831       -3565           0
5129 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5130 *         1.          0.          0.          0.          0.
5131            0.          0.          0.          0.    1.0e-20
5132 *
5133 *      idcb        icbn        icb1        icb2        icb3
5134        -3568         39         -18       -3564           0
5135 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5136 *         1.          0.          0.          0.          0.
5137            0.          0.          0.          0.    1.0e-20
5138 *
5139 *      idcb        icbn        icb1        icb2        icb3
5140        -3569         39         -18       -3565           0
5141 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5142 *         1.          0.          0.          0.          0.
5143            0.          0.          0.          0.    1.0e-20
5144 *
5145 *      idcb        icbn        icb1        icb2        icb3
5146        -3570         39         830         -15           0
5147 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5148 *         1.          0.          0.          0.          0.
5149            0.          0.          0.          0.    1.0e-20
5150 *
5151 *      idcb        icbn        icb1        icb2        icb3
```



```
5152        -3571         39         831         -15           0
5153 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5154 *         1.          0.          0.          0.          0.
5155            0.          0.          0.          0.    1.0e-20
5156 *
5157 *      idcb        icbn        icb1        icb2        icb3
5158        -3572         57       -3570       -3568         -20
5159 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5160 *         1.          0.          0.          0.          0.
5161            0.          0.          0.          0.    1.0e-20
5162 *
5163 *      idcb        icbn        icb1        icb2        icb3
5164        -3573         57       -3571       -3569         -20
5165 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5166 *         1.          0.          0.          0.          0.
5167            0.          0.          0.          0.    1.0e-20
5168 *
5169 *      idcb        icbn        icb1        icb2        icb3
5170        -3574         14       -3572         -18           0
5171 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5172 *         1.          0.          0.          0.          0.
5173            0.          0.          0.          0.    1.0e-20
5174 *
5175 *      idcb        icbn        icb1        icb2        icb3
5176        -3575         14       -3573         -18           0
5177 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5178 *         1.          0.          0.          0.          0.
5179            0.          0.          0.          0.    1.0e-20
5180 *
5181 *      idcb        icbn        icb1        icb2        icb3
5182        -3576         54         832         834           0
5183 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5184 *         1.          0.          0.          0.          0.
5185            0.          0.          0.          0.    1.0e-20
5186 *
5187 *      idcb        icbn        icb1        icb2        icb3
5188        -3577         54         833         835           0
5189 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5190 *         1.          0.          0.          0.          0.
5191            0.          0.          0.          0.    1.0e-20
5192 *
5193 *      idcb        icbn        icb1        icb2        icb3
5194        -3578        100         836         301           0
5195 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5196 *         1.          0.          0.       300.          0.
5197            0.          0.          0.      300.0    1.0e-20
5198 *
5199 *      idcb        icbn        icb1        icb2        icb3
5200        -3579        100         837         301           0
5201 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5202 *         1.          0.          0.       300.          0.
5203            0.          0.          0.      300.0    1.0e-20
5204 *
5205 *      idcb        icbn        icb1        icb2        icb3
5206        -3580        100         838         301           0
5207 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5208 *         1.          0.          0.       300.          0.
5209            0.          0.          0.      300.0    1.0e-20
5210 *
5211 *      idcb        icbn        icb1        icb2        icb3
5212        -3581        100         839         301           0
5213 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5214 *         1.          0.          0.       300.          0.
5215            0.          0.          0.      300.0    1.0e-20
5216 *
5217 *      idcb        icbn        icb1        icb2        icb3
5218        -3582        100         840         301           0
5219 *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5220 *         1.          0.          0.       300.          0.
5221            0.          0.          0.      300.0    1.0e-20
5222 *
5223 *      idcb        icbn        icb1        icb2        icb3
5224        -3583        100         836        3601           0
```

```
5225 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5226 *          1.              0.              0.          3600.              0.
5227            0.              0.              0.          3600.0      1.0e-20
5228 *
5229 *        idcb            icbn            icb1            icb2            icb3
5230          -3584             100             837            3601               0
5231 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5232 *          1.              0.              0.          3600.              0.
5233            0.              0.              0.          3600.0      1.0e-20
5234 *
5235 *        idcb            icbn            icb1            icb2            icb3
5236          -3585             100             838            3601               0
5237 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5238 *          1.              0.              0.          3600.              0.
5239            0.              0.              0.          3600.0      1.0e-20
5240 *
5241 *        idcb            icbn            icb1            icb2            icb3
5242          -3586             100             839            3601               0
5243 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5244 *          1.              0.              0.          3600.              0.
5245            0.              0.              0.          3600.0      1.0e-20
5246 *
5247 *        idcb            icbn            icb1            icb2            icb3
5248          -3587             100             840            3601               0
5249 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5250 *          1.              0.              0.          3600.              0.
5251            0.              0.              0.          3600.0      1.0e-20
5252 *
5253 *        idcb            icbn            icb1            icb2            icb3
5254          -3588              54           -3578             836               0
5255 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5256 *          1.              0.              0.              0.              0.
5257            0.              0.              0.              0.      1.0e-20
5258 *
5259 *        idcb            icbn            icb1            icb2            icb3
5260          -3589              54           -3579             837               0
5261 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5262 *          1.              0.              0.              0.              0.
5263            0.              0.              0.              0.      1.0e-20
5264 *
5265 *        idcb            icbn            icb1            icb2            icb3
5266          -3590              54           -3580             838               0
5267 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5268 *          1.              0.              0.              0.              0.
5269            0.              0.              0.              0.      1.0e-20
5270 *
5271 *        idcb            icbn            icb1            icb2            icb3
5272          -3591              54           -3581             839               0
5273 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5274 *          1.              0.              0.              0.              0.
5275            0.              0.              0.              0.      1.0e-20
5276 *
5277 *        idcb            icbn            icb1            icb2            icb3
5278          -3592              54           -3582             840               0
5279 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5280 *          1.              0.              0.              0.              0.
5281            0.              0.              0.              0.      1.0e-20
5282 *
5283 *        idcb            icbn            icb1            icb2            icb3
5284          -3593              54           -3583             836               0
5285 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5286 *          1.              0.              0.              0.              0.
5287            0.              0.              0.              0.      1.0e-20
5288 *
5289 *        idcb            icbn            icb1            icb2            icb3
5290          -3594              54           -3584             837               0
5291 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5292 *          1.              0.              0.              0.              0.
5293            0.              0.              0.              0.      1.0e-20
5294 *
5295 *        idcb            icbn            icb1            icb2            icb3
5296          -3595              54           -3585             838               0
5297 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
```



```
5298 *          1.              0.              0.              0.              0.
5299            0.              0.              0.              0.      1.0e-20
5300 *
5301 *        idcb            icbn            icb1            icb2            icb3
5302          -3596              54           -3586             839               0
5303 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5304 *          1.              0.              0.              0.              0.
5305            0.              0.              0.              0.      1.0e-20
5306 *
5307 *        idcb            icbn            icb1            icb2            icb3
5308          -3597              54           -3587             840               0
5309 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5310 *          1.              0.              0.              0.              0.
5311            0.              0.              0.              0.      1.0e-20
5312 *
5313 *        idcb            icbn            icb1            icb2            icb3
5314          -3598             100             806             301               0
5315 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5316 *          1.              0.              0.            300.              0.
5317            0.              0.              0.          300.0       1.0e-20
5318 *
5319 *        idcb            icbn            icb1            icb2            icb3
5320          -3599             100             806            3601               0
5321 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5322 *          1.              0.              0.          3600.              0.
5323            0.              0.              0.          3600.0      1.0e-20
5324 *
5325 *        idcb            icbn            icb1            icb2            icb3
5326          -3600              54           -3598             806               0
5327 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5328 *          1.              0.              0.              0.              0.
5329            0.              0.              0.              0.      1.0e-20
5330 *
5331 *        idcb            icbn            icb1            icb2            icb3
5332          -3601              54           -3599             806               0
5333 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5334 *          1.              0.              0.              0.              0.
5335            0.              0.              0.              0.      1.0e-20
5336 *
5337 *        idcb            icbn            icb1            icb2            icb3
5338          -3602              54             841             843               0
5339 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5340 *          1.              0.              0.              0.              0.
5341            0.              0.              0.              0.      1.0e-20
5342 *
5343 *        idcb            icbn            icb1            icb2            icb3
5344          -3603              54             842             844               0
5345 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5346 *          1.              0.              0.              0.              0.
5347            0.              0.              0.              0.      1.0e-20
5348 *
5349 *        idcb            icbn            icb1            icb2            icb3
5350          -3604              12             836               0               0
5351 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5352 *          1.              0.              0.              0.              0.
5353            0.              0.              0.              0.      1.0e-20
5354 *
5355 *        idcb            icbn            icb1            icb2            icb3
5356          -3605              12             837               0               0
5357 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5358 *          1.              0.              0.              0.              0.
5359            0.              0.              0.              0.      1.0e-20
5360 *
5361 *        idcb            icbn            icb1            icb2            icb3
5362          -3606              12             838               0               0
5363 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5364 *          1.              0.              0.              0.              0.
5365            0.              0.              0.              0.      1.0e-20
5366 *
5367 *        idcb            icbn            icb1            icb2            icb3
5368          -3607              12             839               0               0
5369 *      cbgain          cbxmin          cbxmax          cbcon1          cbcon2
5370 *          1.              0.              0.              0.              0.
```

```
5371            0.          0.          0.          0.      1.0e-20
5372  *
5373  *       idcb        icbn        icb1        icb2        icb3
5374         -3608          12         840           0           0
5375  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5376  *         1.          0.          0.          0.          0.
5377            0.          0.          0.          0.      1.0e-20
5378  *
5379  *       idcb        icbn        icb1        icb2        icb3
5380         -3609          12         806           0           0
5381  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5382  *         1.          0.          0.          0.          0.
5383            0.          0.          0.          0.      1.0e-20
5384  *
5385  *       idcb        icbn        icb1        icb2        icb3
5386         -3610          54         845         846           0
5387  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5388  *         1.          0.          0.          0.          0.
5389            0.          0.          0.          0.      1.0e-20
5390  *
5391  *       idcb        icbn        icb1        icb2        icb3
5392         -3611          14         826         -19           0
5393  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5394            0.          0.          0.          0.      1.0e-20
5395  *
5396  *       idcb        icbn        icb1        icb2        icb3
5397         -3612          14         827         -19           0
5398  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5399            0.          0.          0.          0.      1.0e-20
5400  *
5401  *       idcb        icbn        icb1        icb2        icb3
5402         -3613          14       -3562         -19           0
5403  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5404            0.          0.          0.          0.      1.0e-20
5405  *
5406  *       idcb        icbn        icb1        icb2        icb3
5407         -3614          14       -3563         -19           0
5408  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5409            0.          0.          0.          0.      1.0e-20
5410  *
5411  ************************************************************************
5412  * control blocks for detection of thermal stratification in cold leg
5413  ************************************************************************
5414  *                      constant value control blocks
5415  ************************************************************************
5416  *     cb id       cb value          note
5417  *     =====       ========      ===============
5418  *       -21        1.0          already defined
5419  *     -4000        1.0e-6
5420  *     -4001       -1.4
5421  *
5422  *       idcb        icbn        icb1        icb2        icb3
5423         -4000           9           0           0           0
5424  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5425            1.       1.0e-6      1.0e-6      1.0e-6      1.0e-6
5426  *
5427  *       idcb        icbn        icb1        icb2        icb3
5428         -4001           9           0           0           0
5429  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5430            1.         -1.4        -1.4        -1.4        -1.4
5431  *
5432  ************************************************************************
5433  * Froude number for CL A1
5434  ************************************************************************
5435  *       idcb        icbn        icb1        icb2        icb3
5436         -4101          14         871         861           0
5437  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5438            -1.     -1.e+99      1.e+99          0.      1.0e-20
5439  *
5440  *       idcb        icbn        icb1        icb2        icb3
5441         -4102           3       -4101         -21           0
5442  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5443            1.      -1.e+99      1.e+99          0.      1.0e-20
```



```
5444  *
5445  *       idcb        icbn        icb1        icb2        icb3
5446         -4103           1       -4102           0           0
5447  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5448            1.      -1.e+99      1.e+99          0.      1.0e-20
5449  *
5450  *       idcb        icbn        icb1        icb2        icb3
5451         -4104          52       -4103           0           0
5452  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5453            1.      -1.e+99      1.e+99          0.      1.0e-20
5454  *
5455  *       idcb        icbn        icb1        icb2        icb3
5456         -4105          39       -4104         861           0
5457  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5458            1.      -1.e+99      1.e+99          0.      1.0e-20
5459  *
5460  *       idcb        icbn        icb1        icb2        icb3
5461         -4106           3       -4105       -4000           0
5462  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5463            1.      -1.e+99      1.e+99          0.      1.0e-20
5464  *
5465  *       idcb        icbn        icb1        icb2        icb3
5466         -4107          14          22       -4106           0
5467  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5468        0.953      -1.e+99      1.e+99          0.      1.0e-20
5469  ************************************************************************
5470  * Stratification criterion for CL A1
5471  ************************************************************************
5472  *
5473  *       idcb        icbn        icb1        icb2        icb3
5474         -4111          39         851         861           0
5475  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5476            1.      -1.e+99      1.e+99          0.      1.0e-20
5477  *
5478  *       idcb        icbn        icb1        icb2        icb3
5479         -4112          39          22         871           0
5480  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5481            1.      -1.e+99      1.e+99          0.      1.0e-20
5482  *
5483  *       idcb        icbn        icb1        icb2        icb3
5484         -4113           3       -4112       -4000           0
5485  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5486            1.      -1.e+99      1.e+99          0.      1.0e-20
5487  *
5488  *       idcb        icbn        icb1        icb2        icb3
5489         -4114          14       -4111       -4113           0
5490  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5491            1.      -1.e+99      1.e+99          0.      1.0e-20
5492  *
5493  *       idcb        icbn        icb1        icb2        icb3
5494         -4115           1       -4114           0           0
5495  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5496            1.      -1.e+99      1.e+99          0.      1.0e-20
5497  *
5498  *       idcb        icbn        icb1        icb2        icb3
5499         -4116           3       -4115         -21           0
5500  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5501            1.      -1.e+99      1.e+99          0.      1.0e-20
5502  *
5503  *       idcb        icbn        icb1        icb2        icb3
5504         -4117          60       -4116       -4001           0
5505  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5506            1.      -1.e+99      1.e+99          0.      1.0e-20
5507  *
5508  ************************************************************************
5509  * Froude number for CL A2
5510  ************************************************************************
5511  *       idcb        icbn        icb1        icb2        icb3
5512         -4201          14         872         862           0
5513  *     cbgain      cbxmin      cbxmax      cbcon1      cbcon2
5514            -1.     -1.e+99      1.e+99          0.      1.0e-20
5515  *
5516  *       idcb        icbn        icb1        icb2        icb3
```

```
      -4202          3         -4201        -21          0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4203             1         -4202             0             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4204            52         -4203             0             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4205            39         -4204           862             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4206             3         -4205         -4000             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4207            14            22         -4206             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
       0.953       -1.e+99      1.e+99         0.       1.0e-20
*****************************************************************
* Stratification criterion for CL A2
*****************************************************************
*
*       idcb          icbn          icb1          icb2          icb3
       -4211            39           852           862             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4212            39            23           872             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4213             3         -4212         -4000             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4214            14         -4211         -4213             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4215             1         -4214             0             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4216             3         -4215           -21             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4217            60         -4216         -4001             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*****************************************************************
* Froude number for CL B1
*****************************************************************
*       idcb          icbn          icb1          icb2          icb3
       -4301            14           873           863             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
```



```
         -1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4302             3         -4301           -21             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4303             1         -4302             0             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4304            52         -4303             0             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4305            39         -4304           863             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4306             3         -4305         -4000             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4307            14            21         -4306             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
       0.953       -1.e+99      1.e+99         0.       1.0e-20
*****************************************************************
* Stratification criterion for CL B1
*****************************************************************
*
*       idcb          icbn          icb1          icb2          icb3
       -4311            39           853           863             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4312            39            21           873             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4313             3         -4312         -4000             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4314            14         -4311         -4313             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4315             1         -4314             0             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4316             3         -4315           -21             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
       -4317            60         -4316         -4001             0
*     cbgain       cbxmin      cbxmax       cbcon1       cbcon2
         1.       -1.e+99      1.e+99         0.       1.0e-20
*
*****************************************************************
* Froude number for CL B2
*****************************************************************
```

```
*       idcb          icbn          icb1          icb2          icb3
        -4401            14           874           864             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
          -1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4402             3         -4401           -21             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4403             1         -4402             0             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4404            52         -4403             0             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4405            39         -4404           864             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4406             3         -4405         -4000             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4407            14            24         -4406             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
        0.953       -1.e+99        1.e+99            0.      1.0e-20
*****************************************************************
* Stratification criterion for CL B2
*****************************************************************
*
*       idcb          icbn          icb1          icb2          icb3
        -4411            39           854           864             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4412            39            24           874             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4413             3         -4412         -4000             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4414            14         -4411         -4413             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4415             1         -4414             0             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4416             3         -4415           -21             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4417            60         -4416         -4001             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.       -1.e+99        1.e+99            0.      1.0e-20
*
```



```
*****************************************************************
* stratification indicators: 1 for stratified and 0 for mixed
*****************************************************************
*                       CL A1
*****************************************************************
*       idcb          icbn          icb1          icb2          icb3
        -4100            34         -4107         -4117             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*****************************************************************
*                       CL A2
*****************************************************************
*       idcb          icbn          icb1          icb2          icb3
        -4200            34         -4207         -4217             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*****************************************************************
*                       CL B1
*****************************************************************
*       idcb          icbn          icb1          icb2          icb3
        -4300            34         -4307         -4317             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*****************************************************************
*                       CL B2
*****************************************************************
*       idcb          icbn          icb1          icb2          icb3
        -4400            34         -4407         -4417             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*****************************************************************
*           CLs A1 and A2 and B1 and B2
*****************************************************************
*       idcb          icbn          icb1          icb2          icb3
        -4498            39         -4100         -4200             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4499            39         -4300         -4400             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*       idcb          icbn          icb1          icb2          icb3
        -4500            39         -4498         -4499             0
*     cbgain        cbxmin        cbxmax        cbcon1        cbcon2
           1.            0.            1.            0.      1.0e-20
*
*****************************************************************
*                       plot parameter control blocks                  *
*****************************************************************
*
*     control
*     block id  control block value
*     --------  -------------------
*
*        -5053  maximum vessel wall dT/dx (K/m)
*        -5054  minimum downcomer wall htc (W/m2-K)
*        -5055  maximum downcomer wall htc (W/m2-K)
*        -5056  volumetric flow rate in a1 cl (m3/sec)
*        -5057  volumetric flow rate in a2 cl (m3/sec)
*        -5058  volumetric flow rate in b1 cl (m3/sec)
*        -5059  volumetric flow rate in b2 cl (m3/sec)
*        -5073  integrated mass flow into a sg (kg)
*        -5074  integrated mass flow out of a sg (kg)
*        -5076  integrated mass flow into b sg (kg)
*        -5077  integrated mass flow out of b sg (kg)
*        -5078  total efw delivered to a sg (kg)
*        -5079  total efw delivered to b sg (kg)
*        -5084  avg cl temperature cooldown rate, 5 min interval (K/sec)
*        -5087  core exit temp cooldown rate, 5 min interval (K/sec)
*        -5088  a sg operating range level (m)
*        -5089  b sg operating range level (m)
```

```
*         -5090  a sg startup range level (m)
*         -5091  a sg startup range level (m)
*         -5092  average hot leg temperature (K)
*         -5105  avg cl temperature cooldown rate, 60 min interval (K/sec)
*         -5108  core exit temp cooldown rate, 60 min interval (K/sec)
*         -5111  dncmr cooldown rate @ top of core elev, 5 min interval (K/sec)
*         -5114  dncmr cooldown rate @ top of core elev, 60 min interval (K/sec)
*
*
**********************************************************************
*
*     maximum vessel wall dT/dx   (delta x = .2299 m = vess wall thickness)
*
*          idcb          icbn          icb1          icb2          icb3
          -5025            35           521           522             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5026            35         -5025           523             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5027            35         -5026           524             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5028            35         -5027           525             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5029            35         -5028           526             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5030            35         -5029           527             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5031            35         -5030           528             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5032            35         -5031           529             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5033            35         -5032           530             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5034            35         -5033           531             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5035            35         -5034           532             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5036            35         -5035           533             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
```



```
*          idcb          icbn          icb1          icb2          icb3
          -5037            35         -5036           534             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5038            35         -5037           535             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5039            35         -5038           536             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5040            35         -5039           537             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5041            35         -5040           538             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5042            35         -5041           539             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5043            35         -5042           540             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5044            35         -5043           541             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5045            35         -5044           542             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5046            35         -5045           543             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5047            35         -5046           544             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5048            35         -5047           545             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5049            35         -5048           546             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5050            35         -5049           547             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
             1.      -1.e+99        1.e+99            0.      1.0e-20
*
*          idcb          icbn          icb1          icb2          icb3
          -5051            35         -5050           548             0
*       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
```

```
5955                1.       -1.e+99        1.e+99          0.       1.0e-20
5956  *
5957  *           idcb           icbn           icb1           icb2           icb3
5958             -5052             35          -5051            549              0
5959  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
5960                1.       -1.e+99        1.e+99          0.       1.0e-20
5961  *
5962  *           idcb           icbn           icb1           icb2           icb3
5963             -5053             35          -5052            550              0
5964  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
5965             4.3497       -1.e+99        1.e+99          0.       1.0e-20
5966  *
5967  ***********************************************************************
5968  *
5969  *      minimum and maximum downcomer wall htc
5970  *
5971  *           idcb           icbn           icb1           icb2           icb3
5972             -5054             37            551            552              0
5973  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
5974                1.       -1.e+99        1.e+99          0.       1.0e-20
5975  *
5976  *           idcb           icbn           icb1           icb2           icb3
5977             -5055             35            553            554              0
5978  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
5979                1.       -1.e+99        1.e+99          0.       1.0e-20
5980  *
5981  ***********************************************************************
5982  *
5983  *      cl a1 volumetric flow rate
5984  *
5985  *           idcb           icbn           icb1           icb2           icb3
5986             -5056             14            239             32              0
5987  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
5988                1.       -1.e+99        1.e+99          0.       1.0e-20
5989  *
5990  ***********************************************************************
5991  *
5992  *      cl a2 volumetric flow rate
5993  *
5994  *           idcb           icbn           icb1           icb2           icb3
5995             -5057             14            240             33              0
5996  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
5997                1.       -1.e+99        1.e+99          0.       1.0e-20
5998  *
5999  ***********************************************************************
6000  *
6001  *      cl b1 volumetric flow rate
6002  *
6003  *           idcb           icbn           icb1           icb2           icb3
6004             -5058             14            241             34              0
6005  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6006                1.       -1.e+99        1.e+99          0.       1.0e-20
6007  *
6008  ***********************************************************************
6009  *
6010  *      cl b2 volumetric flow rate
6011  *
6012  *           idcb           icbn           icb1           icb2           icb3
6013             -5059             14            242             35              0
6014  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6015                1.       -1.e+99        1.e+99          0.       1.0e-20
6016  *
6017  ***********************************************************************
6018  *
6019  *      integrated mass flow into / out of a sg
6020  *
6021  *           idcb           icbn           icb1           icb2           icb3
6022             -5072              3            142            144              0
6023  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6024                1.       -1.e+99        1.e+99          0.       1.0e-20
6025  *
6026  *           idcb           icbn           icb1           icb2           icb3
6027             -5073             24          -5072            212            212
```



```
6028  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6029                1.       -1.e+99        1.e+99              1.       1.0e-20
6030  *
6031  *           idcb           icbn           icb1           icb2           icb3
6032             -5074             24            146            212            212
6033  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6034                1.       -1.e+99        1.e+99              1.       1.0e-20
6035  *
6036  ***********************************************************************
6037  *
6038  *      integrated mass flow into / out of b sg
6039  *
6040  *           idcb           icbn           icb1           icb2           icb3
6041             -5075              3            143            145              0
6042  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6043                1.       -1.e+99        1.e+99              0.       1.0e-20
6044  *
6045  *           idcb           icbn           icb1           icb2           icb3
6046             -5076             24          -5075            212            212
6047  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6048                1.       -1.e+99        1.e+99              1.       1.0e-20
6049  *
6050  *           idcb           icbn           icb1           icb2           icb3
6051             -5077             24            147            212            212
6052  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6053                1.       -1.e+99        1.e+99              1.       1.0e-20
6054  *
6055  ***********************************************************************
6056  *
6057  *      total efw delivered to a and b sg
6058  *
6059  *           idcb           icbn           icb1           icb2           icb3
6060             -5078             23            567              0              0
6061  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6062                1.       -1.e+99        1.e+99              0.       1.0e-20
6063  *
6064  *           idcb           icbn           icb1           icb2           icb3
6065             -5079             23            568              0              0
6066  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6067                1.       -1.e+99        1.e+99              0.       1.0e-20
6068  *
6069  ***********************************************************************
6070  *
6071  *      average cl temperature cooldown rate
6072  *
6073  *           idcb           icbn           icb1           icb2           icb3
6074             -5080            100          -1130           1000              0
6075  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6076                1.       -1.e+99        1.e+99             300.       1.0e-20
6077  *
6078  *           idcb           icbn           icb1           icb2           icb3
6079             -5081             54          -1130          -5080              0
6080  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6081                -1.       -1.e+99        1.e+99              0.       1.0e-20
6082  *
6083  *           idcb           icbn           icb1           icb2           icb3
6084             -5082              9              0              0              0
6085  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6086                1.           300.           300.           300.           300.
6087  *
6088  *           idcb           icbn           icb1           icb2           icb3
6089             -5083             37              1          -5082              0
6090  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6091                1.              1.       1.e+99              0.       1.0e-20
6092  *
6093  *           idcb           icbn           icb1           icb2           icb3
6094             -5084             14          -5081          -5083              0
6095  *         cbgain         cbxmin         cbxmax         cbcon1         cbcon2
6096                1.       -1.e+99        1.e+99              0.       1.0e-20
6097  *
6098  ***********************************************************************
6099  *
6100  *      core exit temperature cooldown rate
```

```
6101  *
6102  *         idcb          icbn          icb1          icb2          icb3
6103           -5085           100            56          1000             0
6104  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6105               1.      -1.e+99        1.e+99          300.      1.0e-20
6106  *
6107  *         idcb          icbn          icb1          icb2          icb3
6108           -5086            54            56         -5085             0
6109  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6110              -1.      -1.e+99        1.e+99            0.      1.0e-20
6111  *
6112  *         idcb          icbn          icb1          icb2          icb3
6113           -5087            14         -5086         -5083             0
6114  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6115               1.      -1.e+99        1.e+99            0.      1.0e-20
6116  *
6117  ***************************************************************************
6118  *
6119  *     a and b sg operating range levels
6120  *
6121  *     operating range = 102 - 394 inches above lower tube sheet
6122  *
6123  *         idcb          icbn          icb1          icb2          icb3
6124           -5088            56             4             0             0
6125  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6126               1.            0.       10.008       -2.5908      1.0e-20
6127  *
6128  *         idcb          icbn          icb1          icb2          icb3
6129           -5089            56             3             0             0
6130  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6131               1.            0.       10.008       -2.5908      1.0e-20
6132  *
6133  ***************************************************************************
6134  *
6135  *     a and b sg startup range levels
6136  *
6137  *     startup range = 6 - 256 inches above lower tube sheet
6138  *
6139  *         idcb          icbn          icb1          icb2          icb3
6140           -5090            56             4             0             0
6141  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6142               1.            0.       6.5024        -.1524      1.0e-20
6143  *
6144  *         idcb          icbn          icb1          icb2          icb3
6145           -5091            56             3             0             0
6146  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6147               1.            0.       6.5024        -.1524      1.0e-20
6148  *
6149  ***************************************************************************
6150  *
6151  *     average hot leg temperature
6152  *
6153  *         idcb          icbn          icb1          icb2          icb3
6154           -5092             3           202           204             0
6155  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6156               .5      -1.e+99        1.e+99            0.      1.0e-20
6157  *
6158  ***************************************************************************
6159  *
6160  *     average cl temperature cooldown rate, 60 min interval
6161  *
6162  *         idcb          icbn          icb1          icb2          icb3
6163           -5101           100         -1130          1500             0
6164  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6165               1.      -1.e+99        1.e+99         3600.      1.0e-20
6166  *
6167  *         idcb          icbn          icb1          icb2          icb3
6168           -5102            54         -1130         -5101             0
6169  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6170              -1.      -1.e+99        1.e+99            0.      1.0e-20
6171  *
6172  *         idcb          icbn          icb1          icb2          icb3
6173           -5103             9             0             0             0
```



```
6174  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6175               1.         3600.         3600.         3600.         3600.
6176  *
6177  *         idcb          icbn          icb1          icb2          icb3
6178           -5104            37             1         -5103             0
6179  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6180               1.            1.       1.e+99            0.      1.0e-20
6181  *
6182  *         idcb          icbn          icb1          icb2          icb3
6183           -5105            14         -5102         -5104             0
6184  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6185               1.      -1.e+99        1.e+99            0.      1.0e-20
6186  *
6187  ***************************************************************************
6188  *
6189  *     core exit temperature cooldown rate, 60 min interval
6190  *
6191  *         idcb          icbn          icb1          icb2          icb3
6192           -5106           100            56          1500             0
6193  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6194               1.      -1.e+99        1.e+99         3600.      1.0e-20
6195  *
6196  *         idcb          icbn          icb1          icb2          icb3
6197           -5107            54            56         -5106             0
6198  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6199              -1.      -1.e+99        1.e+99            0.      1.0e-20
6200  *
6201  *         idcb          icbn          icb1          icb2          icb3
6202           -5108            14         -5107         -5104             0
6203  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6204               1.      -1.e+99        1.e+99            0.      1.0e-20
6205  *
6206  ***************************************************************************
6207  *
6208  *     downcomer cooldown rate at top of core elev, 5 min interval
6209  *
6210  *         idcb          icbn          icb1          icb2          icb3
6211           -5109           100            57          1000             0
6212  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6213               1.      -1.e+99        1.e+99          300.      1.0e-20
6214  *
6215  *         idcb          icbn          icb1          icb2          icb3
6216           -5110            54            57         -5109             0
6217  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6218              -1.      -1.e+99        1.e+99            0.      1.0e-20
6219  *
6220  *         idcb          icbn          icb1          icb2          icb3
6221           -5111            14         -5110         -5083             0
6222  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6223               1.      -1.e+99        1.e+99            0.      1.0e-20
6224  *
6225  ***************************************************************************
6226  *
6227  *     downcomer cooldown rate at top of core elev, 60 min interval
6228  *
6229  *         idcb          icbn          icb1          icb2          icb3
6230           -5112           100            57          1500             0
6231  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6232               1.      -1.e+99        1.e+99         3600.      1.0e-20
6233  *
6234  *         idcb          icbn          icb1          icb2          icb3
6235           -5113            54            57         -5112             0
6236  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6237              -1.      -1.e+99        1.e+99            0.      1.0e-20
6238  *
6239  *         idcb          icbn          icb1          icb2          icb3
6240           -5114            14         -5113         -5104             0
6241  *       cbgain        cbxmin        cbxmax        cbcon1        cbcon2
6242               1.      -1.e+99        1.e+99            0.      1.0e-20
6243  *
6244  ***************************************************************************
6245  *                                                                         *
6246  *                                TRIP DATA                                *
```

```
*                                                                      *
************************************************************************
*
*      trip id  trip used for
*      -------  -------------
*
*           11  null trip
*           12  always on trip
*           13  transient trip
*           20  RCP trip
*           25  hotwell pump trip
*           30  condensate booster pump trip
*           31  feedwater a startup valve closed trip signal
*           32  feedwater b startup valve closed trip signal
*           35  MFW pump a trip
*           36  MFW pump b trip
*           37  trip to indicate both MFW pumps tripped
*           40  reactor trip  (can be manual)
*           45  turbine trip  (can be manual)
*           50  mfw realignment and isolation trip
*           55  hpi trip
*           60  permits throttling of hpi based on pressure
*           65  permits throttling of hpi based on subcooling
*           67  permits throttling of hpi based on cooldown rate
*           68  permits throttling of hpi based on low cl temperature
*           70  turbine trip with 0.5-s delay for fw heaters and drain
*           77  pressurizer porv trip
*           80  loop b accumulator check valve trap
*           90  loop a accumulator check valve trap
*          100  trip signal to model sl-a stuck-open tbv transient
*          105  trip signal to model sl-b stuck-open tbv transient
*          110  trip signal to indicate sl-a tbv has opened
*          115  trip signal to indicate sl-b tbv has opened
*          117  permits throttling of tbvs based on cooldown rate
*          118  trip signal to model efw failure with operator level control
*          119  trip signal to model efw failure without operator level control
*          756  mfw pump a check valve trip
*          761  mfw pump b check valve trip
*          789  mfw line a check valve trip
*          791  mfw line b check valve trip
*          150  efw line a check valve trip
*          250  efw line b check valve trip
*
*       signal     trip cntr      setpoint      dump and     trip cntr
*     exp trip         trip        factor   termination     time step
*    data sets     data sets        tables         trips     data sets
*
*         ntse          ntct          ntsf          ntdp          ntsd
*            0             5             0             0             0
*
************************************************************************
* null trip   (ISET always = 0)                                        *
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
*           11             1             0             1             1
*      setp(1)       setp(2)       setp(3)       setp(4)
*           -2.           -1.
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
*           0.0           0.0
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
*            0             0
*
************************************************************************
* always on trip   (ISET always = 1)                                   *
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
*           12             2             1             1             1
*      setp(1)       setp(2)       setp(3)       setp(4)
*           -2.           -1.
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
*           0.0           0.0
```



```
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
*            0             0
*
************************************************************************
* transient trip   (ISET = 0 steady state, ISET = 1 transient)         *
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
*           13             2             0             1             1
*      setp(1)       setp(2)       setp(3)       setp(4)
*           -1.           0.
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
*           0.0           0.0
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
*            0             0
*
************************************************************************
* RCP trip - changed to trip on subcooling margin of 0.28 c            *
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
*           20             1             0             1          -725
*      setp(1)       setp(2)       setp(3)       setp(4)
*          0.28        1000.0  * 0.28 deg subcooling
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
*           0.0           0.0    * 0 s delay
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
*            0             0
*
************************************************************************
* hotwell pump trip - changed to trip on closed startup valve          *
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
*           25             2             0             1          -835
*           25             2             0             3           840
*      setp(1)       setp(2)       setp(3)       setp(4)
*           -1.5          1.5
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
*           0.0           0.0
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
*            0             0
*
************************************************************************
* condensate booster pump trip - changed to trip on closed suv         *
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
*           30             2             0             1          -865
*           30             2             0             3           840
*      setp(1)       setp(2)       setp(3)       setp(4)
*           -1.5          1.5
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
*           0.0           0.0
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
*            0             0
*
************************************************************************
* trip signal for closed startup valve a                               *
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
*           31             1             0             1         -2820
*      setp(1)       setp(2)       setp(3)       setp(4)
*          0.01           1.1
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
*           0.0           0.0
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
*            0             0
*
************************************************************************
* trip signal for closed startup valve b                               *
************************************************************************
```

```
6393 *
6394 *         idtp          isrt          iset          itst          idsg
6395              32             1             0             1         -2670
6396 *       setp(1)       setp(2)       setp(3)       setp(4)
6397             0.01           1.1
6398 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6399              0.0           0.0
6400 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6401                0             0
6402 *
6403 ************************************************************************
6404 * MFW pump a trip for high and low pressure and for sg level           *
6405 ************************************************************************
6406 *
6407 *         idtp          isrt          iset          itst          idsg
6408              33             2             0             1         -1280
6409 *       setp(1)       setp(2)       setp(3)       setp(4)
6410              -.5            .5
6411 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6412              0.0           0.0
6413 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6414                0             0
6415 *
6416 ************************************************************************
6417 * MFW pump b trip for high and low pressure and for sg level           *
6418 ************************************************************************
6419 *
6420 *         idtp          isrt          iset          itst          idsg
6421              34             2             0             1         -1294
6422 *       setp(1)       setp(2)       setp(3)       setp(4)
6423              -.5            .5
6424 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6425              0.0           0.0
6426 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6427                0             0
6428 *
6429 ************************************************************************
6430 * main feedwater pump a trip
6431 ************************************************************************
6432 *
6433 *         idtp          isrt          iset          itst          idsg
6434              35             2             0             3          810
6435 *       setp(1)       setp(2)       setp(3)       setp(4)
6436             -0.5           0.5
6437 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6438              0.0           0.0
6439 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6440                0             0
6441 *
6442 ************************************************************************
6443 * main feedwater pump b trip
6444 ************************************************************************
6445 *
6446 *         idtp          isrt          iset          itst          idsg
6447              36             2             0             3          820
6448 *       setp(1)       setp(2)       setp(3)       setp(4)
6449             -0.5           0.5
6450 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6451              0.0           0.0
6452 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6453                0             0
6454 *
6455 ************************************************************************
6456 * both feedwater pumps tripped
6457 ************************************************************************
6458 *
6459 *         idtp          isrt          iset          itst          idsg
6460              37             2             0             3          830
6461 *       setp(1)       setp(2)       setp(3)       setp(4)
6462             -0.5           0.5
6463 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6464              0.0           0.0
6465 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
```



```
6466                0             0
6467 *
6468 ************************************************************************
6469 * reactor trip                                                         *
6470 ************************************************************************
6471 *
6472 *         idtp          isrt          iset          itst          idsg
6473              40             2             0             1         -1393
6474 *       setp(1)       setp(2)       setp(3)       setp(4)
6475              -.5            .5
6476 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6477              0.0           0.0
6478 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6479                0             0
6480 *
6481 ************************************************************************
6482 * turbine trip                                                         *
6483 ************************************************************************
6484 *
6485 *         idtp          isrt          iset          itst          idsg
6486              45             2             0             1         -1399
6487 *       setp(1)       setp(2)       setp(3)       setp(4)
6488              -.5            .5
6489 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6490              0.0           0.0
6491 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6492                0             0
6493 *
6494 ************************************************************************
6495 * mfw realignment and mfw isolation valve trip                         *
6496 ************************************************************************
6497 *
6498 *         idtp          isrt          iset          itst          idsg
6499              50             2             0             1         -740
6500 *       setp(1)       setp(2)       setp(3)       setp(4)
6501              -.5            .5
6502 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6503              0.0           0.0
6504 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6505                0             0
6506 *
6507 ************************************************************************
6508 * hpi trip                                                             *
6509 ************************************************************************
6510 *
6511 *         idtp          isrt          iset          itst          idsg
6512              55             2             0             1         -745
6513 *       setp(1)       setp(2)       setp(3)       setp(4)
6514              -.5            .5
6515 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6516              0.0           0.0
6517 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6518                0             0
6519 *
6520 ************************************************************************
6521 * trip to permit hpi throttling by operator based on high pressure     *
6522 * currently ISET always = 1, i.e. pressure throttling is turned on.    *
6523 * per deb 11/3/00, disable high pressure throttling - idsg set to -20
6524 ************************************************************************
6525 *
6526 *         idtp          isrt          iset          itst          idsg
6527              60             2             0             1          -20
6528 *       setp(1)       setp(2)       setp(3)       setp(4)
6529              -.5            .5
6530 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6531              0.0           0.0
6532 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6533                0             0
6534 *
6535 ************************************************************************
6536 * trip to permit hpi throttling by operator based on subcooling        *
6537 * currently ISET always = 1, i.e. subcooling throttling is turned on   *
6538 ************************************************************************
```

```
6539 *
6540 *          idtp          isrt          iset          itst          idsg
6541               65             2             1             1           -21
6542 *       setp(1)       setp(2)       setp(3)       setp(4)
6543               -.5            .5
6544 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6545               0.0           0.0
6546 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6547                 0             0
6548 *
6549 ************************************************************************
6550 * trip to permit hpi throttling by operator based on cooldown rate     *
6551 * currently ISET always = 1, i.e. cooldown throttling is turned on      *
6552 ************************************************************************
6553 *
6554 *          idtp          isrt          iset          itst          idsg
6555               67             2             1             1           -21
6556 *       setp(1)       setp(2)       setp(3)       setp(4)
6557               -.5            .5
6558 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6559               0.0           0.0
6560 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6561                 0             0
6562 *
6563 ************************************************************************
6564 * trip to permit hpi throttling by operator based low cold leg temp    *
6565 * currently ISET always = 1, i.e. cooldown throttling is turned on      *
6566 ************************************************************************
6567 *
6568 *          idtp          isrt          iset          itst          idsg
6569               68             2             1             1           -21
6570 *       setp(1)       setp(2)       setp(3)       setp(4)
6571               -.5            .5
6572 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6573               0.0           0.0
6574 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6575                 0             0
6576 *
6577 ************************************************************************
6578 * turbine trip with 0.5 s delay for feedwater heaters and drain flow   *
6579 ************************************************************************
6580 *
6581 *          idtp          isrt          iset          itst          idsg
6582               70             2             0             1         -1399
6583 *       setp(1)       setp(2)       setp(3)       setp(4)
6584               -.5            .5
6585 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6586               0.5           0.5
6587 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6588                 0             0
6589 *
6590 ************************************************************************
6591 * 77 ,    porv  trip
6592 ************************************************************************
6593 *
6594 *          idtp          isrt          iset          itst          idsg
6595               77            -3             0             1             2
6596 *       setp(1)       setp(2)       setp(3)       setp(4)
6597     1.6650E+07    1.6700E+07    1.6950E+07    1.7000E+07
6598 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6599               0.0           0.0           0.0           0.0
6600 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6601                 0             0             0             0
6602 *
6603 ************************************************************************
6604 * 80 ,  loop b accum check valve
6605 ************************************************************************
6606 *
6607 *          idtp          isrt          iset          itst          idsg
6608               80            -3             0            -1            11
6609 *       setp(1)       setp(2)       setp(3)       setp(4)
6610     5.0000E+04    7.0000E+04    1.2000E+05    1.4000E+05
6611 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
```



```
6612               0.0           0.0           0.0           0.0
6613 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6614                 0             0             0             0
6615 *
6616 ************************************************************************
6617 * 90 ,  loop a accum check valve
6618 ************************************************************************
6619 *
6620 *          idtp          isrt          iset          itst          idsg
6621               90            -3             0            -1            12
6622 *       setp(1)       setp(2)       setp(3)       setp(4)
6623     5.0000E+04    7.0000E+04    1.2000E+05    1.4000E+05
6624 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6625               0.0           0.0           0.0           0.0
6626 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6627                 0             0             0             0
6628 *
6629 ************************************************************************
6630 * trip to initiate a sl-a tbv stuck-open transient
6631 * one of two turbine bypass valves of steam line a assumed
6632 * to stay open after both open.
6633 * currently set to not initiate a tbv stuck-open transient
6634 * set idsg to -21 to model a tbv stuck-open transient in sl a
6635 ************************************************************************
6636 *
6637 *          idtp          isrt          iset          itst          idsg
6638              100             2             0             1           -20
6639 *       setp(1)       setp(2)       setp(3)       setp(4)
6640               -.5            .5
6641 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6642               0.0           0.0
6643 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6644                 0             0
6645 *
6646 ************************************************************************
6647 * trip to initiate a sl-b tbv stuck-open transient signal
6648 * one of two turbine bypass valves of steam line b assumed
6649 * to stay open after both open.
6650 * currently set to not initiate a tbv stuck-open transient
6651 * set idsg to -21 to model a tbv stuck-open transient in sl b
6652 ************************************************************************
6653 *
6654 *          idtp          isrt          iset          itst          idsg
6655              105             2             0             1           -20
6656 *       setp(1)       setp(2)       setp(3)       setp(4)
6657               -.5            .5
6658 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6659               0.0           0.0
6660 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6661                 0             0
6662 *
6663 ************************************************************************
6664 * trip to indicate that sl-a tbv has opened
6665 ************************************************************************
6666 *
6667 *          idtp          isrt          iset          itst          idsg
6668              110             2             0             1         -3381
6669 *       setp(1)       setp(2)       setp(3)       setp(4)
6670               -.5            .5
6671 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
6672               0.0           0.0
6673 *       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
6674                 0             0
6675 *
6676 ************************************************************************
6677 * trip to indicate that sl-b tbv has opened
6678 ************************************************************************
6679 *
6680 *          idtp          isrt          iset          itst          idsg
6681              115             2             0             1         -3481
6682 *       setp(1)       setp(2)       setp(3)       setp(4)
6683               -.5            .5
6684 *       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
```

```
            0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0
*
*********************************************************************
* trip to permit tbv throttling by operator based on cooldown rate   *
* currently ISET always = 0, i.e. cooldown throttling is turned off  *
* to turn this option on, change idsg from -20 to -21
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
              117               2               0               1             -20
*       setp(1)         setp(2)         setp(3)         setp(4)
              -.5              .5
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0
*
*********************************************************************
* trip to model efw level control failure followed by operator level *
* control to 96% OR; currently ISET always = 0, i.e. efw failure is  *
* turned off; to turn this option on, change idsg from -20 to -21    *
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
              118               2               0               1             -20
*       setp(1)         setp(2)         setp(3)         setp(4)
              -.5              .5
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0
*
*********************************************************************
* trip to model efw level control failure with no operator           *
* intervention; efw will stay on until the boiler section level is   *
* 52 ft; currently ISET always = 0, i.e. efw failure is turned off;  *
* to turn this option on, change idsg from -20 to -21                *
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
              119               2               0               1             -20
*       setp(1)         setp(2)         setp(3)         setp(4)
              -.5              .5
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0
*
*********************************************************************
* low sg-a pressure trip signal
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
              120               1               0               1               5
*       setp(1)         setp(2)         setp(3)         setp(4)
         3.8955e06        7.0e06
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0
*
*********************************************************************
* low sg-b pressure trip signal
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
              125               1               0               1               6
*       setp(1)         setp(2)         setp(3)         setp(4)
         3.8955e06        7.0e06
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0
```



```
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0
*
*********************************************************************
* mfw and sd-efw trip on low sg pressure
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
              130               2               0               3             800
*       setp(1)         setp(2)         setp(3)         setp(4)
              -0.5             0.5
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0
*
*********************************************************************
* low pressurizer pressure trip signal
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
              135               1               0               1               2
*       setp(1)         setp(2)         setp(3)         setp(4)
        11.133e06       11.134e06
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0
*
*********************************************************************
* 150, efw line a check valve trip
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
             -150              -3               1              -1            1501
*       setp(1)         setp(2)         setp(3)         setp(4)
              0.0          1000.0          6895.0         10342.0
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0             0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0               0               0
*
*********************************************************************
* 250, efw line b check valve trip
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
             -250              -3               1              -1            2501
*       setp(1)         setp(2)         setp(3)         setp(4)
              0.0          1000.0          6895.0         10342.0
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0             0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0               0               0
*
*********************************************************************
* 756, mfw pump a check valve trip
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
             -756              -3               1              -1             756
*       setp(1)         setp(2)         setp(3)         setp(4)
              0.0          1000.0          6895.0         10342.0
*       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
              0.0             0.0             0.0             0.0
*       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
              0               0               0               0
*
*********************************************************************
* 761, mfw pump b check valve trip
*********************************************************************
*
*           idtp            isrt            iset            itst            idsg
```

```
6831            -761            -3              1              -1             761
6832 *       setp(1)         setp(2)         setp(3)         setp(4)
6833             0.0          1000.0           6895.0         10342.0
6834 *       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
6835             0.0             0.0             0.0             0.0
6836 *       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
6837                0               0               0               0
6838 *
6839 ************************************************************************
6840 * 789, mfw line a check valve trip
6841 ************************************************************************
6842 *
6843 *           idtp            isrt            iset            itst            idsg
6844             -789              -3               1              -1             789
6845 *       setp(1)         setp(2)         setp(3)         setp(4)
6846             0.0          1000.0           6895.0         10342.0
6847 *       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
6848             0.0             0.0             0.0             0.0
6849 *       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
6850                0               0               0               0
6851 *
6852 ************************************************************************
6853 * 791, mfw line b check valve trip
6854 ************************************************************************
6855 *
6856 *           idtp            isrt            iset            itst            idsg
6857             -791              -3               1              -1             791
6858 *       setp(1)         setp(2)         setp(3)         setp(4)
6859             0.0          1000.0           6895.0         10342.0
6860 *       dtsp(1)         dtsp(2)         dtsp(3)         dtsp(4)
6861             0.0             0.0             0.0             0.0
6862 *       ifsp(1)         ifsp(2)         ifsp(3)         ifsp(4)
6863                0               0               0               0
6864 *
6865 * tct trips
6866 *
6867 *  trip-control-trip signal for low steam line pressure
6868 *
6869      800    2
6870        120      125
6871 *
6872 *  trip-control-trip signal to trip main feedwater pump a
6873      810  2
6874      130    33
6875 *
6876 *  trip-control-trip signal to trip main feedwater pump b
6877      820  2
6878      130    34
6879 *
6880 *  trip-control-trip signal to indicate both mfw pumps tripped
6881      830  2
6882     35   36
6883 *
6884 *  trip-control-trip signal to indicate both startup valves closed
6885      840  2
6886     31   32
6887 *
6888 ************************************************************************
6889 *                                                                      *
6890 *                            COMPONENT DATA                            *
6891 *                                                                      *
6892 ************************************************************************
6893 *
6894 *******   type             num             id        ctitle
6895 pipe             1       1 $1$ loop b hot leg candy cane
6896 *         ncells          nodes           jun1            jun2            epsw
6897                8              1              1               2    0.0000E+00
6898 *          ichf          iconc           iacc            ipow
6899                1              0              0               0
6900 *        iqp3tr        iqp3sv        nqp3tb          nqp3sv          nqp3rf
6901                0              0              0               0               0
6902 *         radin             th          houtl           houtv           toutl
6903      4.5720E-01     7.3000E-02     0.0000E+00     5.6800E+00     2.9500E+02
```



```
6904 *         toutv
6905      2.9500E+02
6906 *          qp3in          qp3off          rqp3mx          qp3scl
6907      0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
6908 *
6909 * dx    *      1.1700E+00     2.5400E+00r02 3.8700E+00     2.3900E+00     2.2600E+00
6910 * dx    *      1.1300E+00     9.0000E-01e
6911 * vol   *      7.7000E-01     1.6700E+00r02 2.5400E+00     1.5700E+00     1.4800E+00
6912 * vol   *      7.4000E-01     5.9000E-01e
6913 * fa    * f    6.5670E-01e
6914 * fric  * r08 1.0e-06      8.0000E-02e
6915 * grav  *      0.0000E+00     9.9240E-01r03 1.0000E+00     9.4240E-01    -6.2180E-01
6916 * grav  *     -8.6010E-01    -1.0000E+00e
6917 * hd    * f    9.1440E-01e
6918 * icflg * f              0e
6919 * nff   * f              1e
6920 * alp   * f    0.0000E+00e
6921 * vl    * f    0.0000E+00e
6922 * vv    * f    0.0000E+00e
6923 * tl    * f    5.7900E+02e
6924 * tv    * f    5.7900E+02e
6925 * p     * f    1.5000E+07e
6926 * pa    * f    0.0000E+00e
6927 * qppp  * f    0.0000E+00e
6928 * matid *  f             7e
6929 * tw    * f    5.7900E+02e
6930 *
6931 ************************************************************************
6932 *******   type             num             id        ctitle
6933 pipe             2       2 $2$ sg-b primary tube bundle
6934 *
6935 *  ncells     nodes          jun1            jun2            epsw            cd 2
6936    15           0              3               2         1.0e-05
6937 *  ichf       iconc          iacc            ipow                            cd 3
6938    1            0              0               0
6939 *  radin      th             houtl           houtv           toutl           cd 6
6940      0.0        0.0            0.0             0.0             0.0
6941 *  toutv      powin          powoff          rpowmx          powscl          cd 7
6942    0.0          0.0            0.0             1.0e20          1.0
6943 *   cell arrays
6944 * dx    *      2.4200E+00     5.0000E-02     1.0000E-01     2.0000E-01     4.0000E-01
6945 * dx    *      1.0150E+00r08 1.7650E+00     2.4200E+00e
6946 * vol   *      9.3000E+00     1.2200E-01     2.4400E-01     4.8800E-01     9.7700E-01
6947 * vol   *      2.4790E+00r08 4.3100E+00     9.4000E+00e
6948 * fa    *      1.70       r14 2.4400E+00     6.5670E-01e
6949 * fric  *     1.0e-06     2.5000E-03r12 1.0e-06     2.5000E-03    8.0000E-02 e
6950 * grav  *      4.1900E-01r15 1.0000E+00e
6951 * hd    *      1.47       r14 1.4140E-02     9.1440E-01e
6952 * icflg * f              0e
6953 * nff   * f              1e
6954 * alp   * f    0.0000E+00e
6955 * vl    * f    0.0000E+00e
6956 * vv    * f    0.0000E+00e
6957 * tl    * f    5.5280E+02e
6958 * tv    * f    5.5280E+02e
6959 * p     * f    1.5000E+07e
6960 * pa    * f    0.0000E+00e
6961 ************************************************************************
6962 *  type       num          id          ctitle                          cd 1
6963 pump             3       3 $3$ loop b1 pump (intact leg)
6964 *         ncells          nodes           jun1            jun2            epsw
6965                2              1             63               4    0.0000E+00
6966 *          ichf          iconc         ipmpty             irp            ipm
6967                1              0              1               0              1
6968 *        ipmptr         ipmpsv         npmptb          npmpsv          npmprf
6969               20           -122              0               0              0
6970 *        iqp3tr         iqp3sv         nqp3tb          nqp3sv          nqp3rf
6971                0              0              0               0              0
6972 *         radin             th          houtl           houtv           toutl
6973     3.5550E-01     5.7000E-02     0.0000E+00     5.6800E+00     2.9500E+02
6974 *         toutv          effmi
6975     2.9500E+02     2.9513E+03
6976 *          tfr0           tfr1           tfr2           tfr3           tfrb
```

```
6977         0.0   0.0000E+00   0.0000E+00        0.0        0.0
6978 *         tfrl0          tfrl1          tfrl2          tfrl3
6979         0.0        0.0        0.0        0.0
6980 *          rhead          rtork          rflow           rrho         romega
6981     1.0165E+03     4.4140E+04     5.9100E+00     7.4600E+02     1.2460E+02
6982 *         omegan         omgoff         romgmx         omgscl         npmpsd
6983     1.2320E+02    -1.2320E+02     5.0000E+01     1.0000E+00              0
6984 *         qp3in          qp3off         rqp3mx         qp3scl
6985     0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
6986 *        option
6987             2
6988 *
6989 * dx     * f    1.1400E+00e
6990 * vol    * f    1.3900E+00e
6991 * fa     * f    3.9700E-01e
6992 * fric   * 1.0e-06   0.0      2.0000E-01e
6993 * grav   *       1.0000E+00     0.0000E+00    -5.5060E-01e
6994 * hd     * f    7.1100E-01e
6995 * icflg  * f             0e
6996 * nff    * f             1e
6997 * alp    * f    0.0000E+00e
6998 * vl     *   0.0   4460.0   0.0 e
6999 * vv     * f    0.0000E+00e
7000 * tl     * f    5.7900E+02e
7001 * tv     * f    5.7900E+02e
7002 * p      * f    1.5000E+07e
7003 * pa     * f    0.0000E+00e
7004 * qppp   * f    0.0000E+00e
7005 * matid *  f             7e
7006 * tw     * f    5.7900E+02e
7007 *
7008 ************************************************************************
7009 *******   type           num            id         ctitle
7010 tee              4       4 $4$ loop b1 intact cold leg
7011 *
7012 *  pump power added to fluid
7013 *
7014 *         jcell         nodes          ichf          cost          epsw
7015                1             1             1    0.0000E+00    0.0000E+00
7016 *        iconc1        ncell1          jun1          jun2          ipow1
7017                0             3             4             5              1
7018 *        ipwtr1        ipwsv1        npwtb1        npwsv1        npwrf1
7019                0            -101           0             0              0
7020 *        iqptr1        iqpsv1        nqptb1        nqpsv1        nqprf1
7021                0             0             0             0              0
7022 *        radin1           th1         houtl1        houtv1        toutl1
7023     3.5550E-01    5.7000E-02    0.0000E+00    5.6800E+00    2.9500E+02
7024 *        toutv1       pwin1       pwoff1       rpwmx1       pwscl1
7025     2.9500E+02       0.0           0.0          1.0e20          1.0
7026 *         qpin1         qpoff1        rqpmx1        qpscl1
7027     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7028 *        iconc2        ncell2          jun3          ipow2
7029                0             1             9             0
7030 *        iqptr2        iqpsv2        nqptb2        nqpsv2        nqprf2
7031                0             0             0             0              0
7032 *        radin2           th2         houtl2        houtv2        toutl2
7033     1.2150E-01    9.5000E-03    0.0000E+00    5.6800E+00    2.9500E+02
7034 *        toutv2
7035     2.9500E+02
7036 *         qpin2         qpoff2        rqpmx2        qpscl2
7037     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7038 *
7039 * dx     * f    2.7370E+00e
7040 * vol    * f    1.0870E+00e
7041 * fa     * f    3.9700E-01e
7042 * fric   *      2.0000E-01r02 1.0e-06     1.2400E-01e
7043 * grav   *     -5.5060E-01r03 0.0000E+00e
7044 * hd     * f    7.1100E-01e
7045 * icflg  * f             0e
7046 * nff    * f             1e
7047 * alp    * f    0.0000E+00e
7048 * vl     * f    0.0000E+00e
7049 * vv     * f    0.0000E+00e
```



```
7050 * tl     * f    5.7900E+02e
7051 * tv     * f    5.7900E+02e
7052 * p      * f    1.5000E+07e
7053 * pa     * f    0.0000E+00e
7054 * qppp   * f    0.0000E+00e
7055 * matid *  f             7e
7056 * tw     * f    5.7900E+02e
7057 *
7058 * dx     *      1.0000E-01e
7059 * vol    *      2.3000E-04e
7060 * fa     * f    2.3000E-03e
7061 * fric   * f    1.0e-06 e
7062 * grav   * f    0.0000E+00e
7063 * hd     * f    5.4100E-02e
7064 * icflg  * f             0e
7065 * nff    * f             1e
7066 * alp    *      0.0000E+00e
7067 * vl     * f    0.0000E+00e
7068 * vv     * f    0.0000E+00e
7069 * tl     *      5.7900E+02e
7070 * tv     *      5.7900E+02e
7071 * p      *      1.5000E+07e
7072 * pa     *      0.0000E+00e
7073 * qppp   *      0.0000E+00e
7074 * matid *  f             7e
7075 * tw     *      5.7900E+02e
7076 *
7077 ************************************************************************
7078 *******   type           num            id         ctitle
7079 tee              6       6 $6$ loop b upper head tee
7080 *         jcell         nodes          ichf          cost          epsw
7081                1             1             1    1.0000E+00    0.0000E+00
7082 *        iconc1        ncell1          jun1          jun2          ipow1
7083                0             2             7             1              0
7084 *        iqptr1        iqpsv1        nqptb1        nqpsv1        nqprf1
7085                0             0             0             0              0
7086 *        radin1           th1         houtl1        houtv1        toutl1
7087     4.5720E-01    7.3000E-02    0.0000E+00    5.6800E+00    2.9500E+02
7088 *        toutv1
7089     2.9500E+02
7090 *         qpin1         qpoff1        rqpmx1        qpscl1
7091     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7092 *        iconc2        ncell2          jun3          ipow2
7093                0             1             6             0
7094 *        iqptr2        iqpsv2        nqptb2        nqpsv2        nqprf2
7095                0             0             0             0              0
7096 *        radin2           th2         houtl2        houtv2        toutl2
7097     2.8960E-01    5.0000E-02    0.0000E+00    5.6800E+00    2.9500E+02
7098 *        toutv2
7099     2.9500E+02
7100 *         qpin2         qpoff2        rqpmx2        qpscl2
7101     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7102 *
7103 * dx     * f    1.4950E+00e
7104 * vol    *      5.7000E-01    9.8200E-01e
7105 * fa     * f    6.5670E-01e
7106 * fric   *      4.0000E-01r02 1.0e-06 e
7107 * grav   * f    0.0000E+00e
7108 * hd     * f    9.1440E-01e
7109 * icflg  * f             0e
7110 * nff    * f             1e
7111 * alp    * f    0.0000E+00e
7112 * vl     * f    0.0000E+00e
7113 * vv     * f    0.0000E+00e
7114 * tl     * f    5.7900E+02e
7115 * tv     * f    5.7900E+02e
7116 * p      * f    1.5000E+07e
7117 * pa     * f    0.0000E+00e
7118 * qppp   * f    0.0000E+00e
7119 * matid *  f             7e
7120 * tw     * f    5.7900E+02e
7121 *
7122 * dx     *      3.5052E+00e
```

```
7123 * vol    *      4.1200E-01
7124 * fa     * f    2.6200E-01
7125 * fric   * f    1.0e-06 e
7126 * grav   *      1.0000E+00     5.3550E-01e
7127 * hd     * f    4.0800E-01e
7128 * icflg  * f             0e
7129 * nff    * f            -1e
7130 * alp    *      0.0000E+00
7131 * vl     * f    0.0000E+00e
7132 * vv     * f    0.0000E+00e
7133 * tl     *      5.7900E+02e
7134 * tv     *      5.7900E+02e
7135 * p      *      1.5000E+07e
7136 * pa     *      0.0000E+00e
7137 * qppp   *      0.0000E+00e
7138 * matid *  f               7e
7139 * tw     *      5.7900E+02e
7140 *
7141 ************************************************************************
7142 *******   type            num           id        ctitle
7143 tee             11      11 $11$ loop a hot leg candy cane
7144 *          jcell          nodes         ichf          cost          epsw
7145                2              1            1    0.0000E+00    0.0000E+00
7146 *        iconc1         ncell1         jun1          jun2          ipow1
7147                0              8           11            12              0
7148 *        iqptr1         iqpsv1       nqptb1        nqpsv1        nqprf1
7149                0              0            0             0              0
7150 *        radin1            th1        houtl1        houtv1        toutl1
7151     4.5720E-01    7.3000E-02    0.0000E+00    5.6800E+00    2.9500E+02
7152 *        toutv1
7153     2.9500E+02
7154 *         qpin1         qpoff1        rqpmx1        qpscl1
7155     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7156 *        iconc2         ncell2          jun3          ipow2
7157                0              4           22              0
7158 *        iqptr2         iqpsv2       nqptb2        nqpsv2        nqprf2
7159                0              0            0             0              0
7160 *        radin2            th2        houtl2        houtv2        toutl2
7161     1.1110E-01    2.5400E-02    0.0000E+00    0.0000E+00    5.9000E+02
7162 *        toutv2
7163     5.9000E+02
7164 *         qpin2         qpoff2        rqpmx2        qpscl2
7165     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7166 *
7167 * dx     *      1.1700E+00    2.5400E+00r02 3.8700E+00    2.3900E+00    2.2600E+00
7168 * dx     *      1.1300E+00    9.0000E-01e
7169 * vol    *      7.7000E-01    1.6700E+00r02 2.5400E+00    1.5700E+00    1.4800E+00
7170 * vol    *      7.4000E-01    5.9000E-01e
7171 * fa     * f    6.5670E-01e
7172 * fric   * r08 1.0e-06      8.0000E-02e
7173 * grav   *      0.0000E+00    9.9240E-01r03 1.0000E+00    9.4240E-01   -6.2180E-01
7174 * grav   *     -8.6010E-01   -1.0000E+00e
7175 * hd     * f    9.1440E-01e
7176 * icflg  * f             0e
7177 * nff    * f             1e
7178 * alp    * f    0.0000E+00e
7179 * vl     * f    0.0000E+00e
7180 * vv     * f    0.0000E+00e
7181 * tl     * f    5.7900E+02e
7182 * tv     * f    5.7900E+02e
7183 * p      * f    1.5000E+07e
7184 * pa     * f    0.0000E+00e
7185 * qppp   * f    0.0000E+00e
7186 * matid *  f               7e
7187 * tw     * f    5.7900E+02e
7188 *
7189 * dx     *      5.0000E-01r02 4.9530E+00    7.7500E-01e
7190 * vol    *      2.5340E-02r02 2.5110E-01    3.9270E-02e
7191 * fa     * f    5.0670E-02e
7192 * fric   * f    1.0e-06 e
7193 * grav   *      0.0000E+00   -6.8710E-01   -3.7820E-01    1.3530E-01    1.0000E+00
7194 e
7195 * hd     * f    2.5400E-01e
```



```
7196 * icflg * f             0e
7197 * nff    * f             1e
7198 * alp    * f    0.0000E+00e
7199 * vl     * f    0.0000E+00e
7200 * vv     * f    0.0000E+00e
7201 * tl     * f    5.7900E+02e
7202 * tv     * f    5.7900E+02e
7203 * p      * f    1.5000E+07e
7204 * pa     * f    0.0000E+00e
7205 * qppp   * f    0.0000E+00e
7206 * matid *  f               7e
7207 * tw     * f    5.7900E+02e
7208 *
7209 ************************************************************************
7210 *******   type            num           id        ctitle
7211 pipe            12      12 $12$ sg-a primary tube bundle
7212 *
7213 *  ncells     nodes        jun1        jun2        epsw             cd 2
7214    15          0           13          12        1.0e-05
7215 *  ichf       iconc        iacc        ipow                         cd 3
7216    1           0            0           0
7217 *  radin      th           houtl       houtv       toutl            cd 6
7218       0.0        0.0       0.0         0.0         0.0
7219 *  toutv      powin        powoff      rpowmx      powscl           cd 7
7220    0.0         0.0          0.0         1.0e20      1.0
7221 *   cell arrays
7222 * dx     *      2.4200E+00    5.0000E-02    1.0000E-01    2.0000E-01    4.0000E-01
7223 * dx     *      1.0150E+00r08 1.7650E+00    2.4200E+00e
7224 * vol    *      9.3000E+00    1.2200E-01    2.4400E-01    4.8800E-01    9.7700E-01
7225 * vol    *      2.4790E+00r08 4.3100E+00    9.4000E+00e
7226 * fa     *      1.70      r14 2.4400E+00    6.5670E-01e
7227 * fric   *     1.0e-06    2.5000E-03r12 1.0e-06    2.5000E-03    8.0000E-02 e
7228 * grav   *      4.1900E-01r15 1.0000E+00e
7229 * hd     *      1.47      r14 1.4140E-02    9.1440E-01e
7230 * icflg  * f             0e
7231 * nff    * f             1e
7232 * alp    * f    0.0000E+00e
7233 * vl     * f    0.0000E+00e
7234 * vv     * f    0.0000E+00e
7235 * tl     * f    5.5280E+02e
7236 * tv     * f    5.5280E+02e
7237 * p      * f    1.5000E+07e
7238 * pa     * f    0.0000E+00e
7239 ************************************************************************
7240 *  type       num          id          ctitle                        cd 1
7241 pump             13      13 $13$ loop a1 pump (intact leg)
7242 *         ncells          nodes          jun1          jun2          epsw
7243                2              1            73            14    0.0000E+00
7244 *          ichf          iconc        ipmpty           irp           ipm
7245                1              0             1             0             1
7246 *        ipmptr         ipmpsv       npmptb        npmpsv        npmprf
7247               20           -124            0             0             0
7248 *        iqp3tr         iqp3sv       nqp3tb        nqp3sv        nqp3rf
7249                0              0            0             0             0
7250 *         radin             th        houtl         houtv         toutl
7251     3.5550E-01    5.7000E-02    0.0000E+00    5.6800E+00    2.9500E+02
7252 *         toutv          effmi
7253     2.9500E+02    2.9513E+03
7254 *          tfr0          tfr1          tfr2          tfr3          tfrb
7255        0.0  0.0000E+00  0.0000E+00       0.0       0.0
7256 *         tfrl0         tfrl1         tfrl2         tfrl3
7257        0.0       0.0           0.0       0.0
7258 *         rhead         rtork         rflow          rho         romega
7259     1.0165E+03    4.4140E+04    5.9100E+00    7.4600E+02    1.2460E+02
7260 *        omegan        omgoff        romgmx        omgscl        npmpsd
7261     1.2320E+02   -1.2320E+02    5.0000E+01    1.0000E+00             0
7262 *         qp3in         qp3off        rqp3mx        qp3scl
7263    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7264 *         option
7265                2
7266 *
7267 * dx     * f    1.1400E+00e
7268 * vol    * f    1.3900E+00e
```

```
* fa    * f   3.9700E-01e
* fric  * 1.0e-06  0.0     2.0000E-01e
* grav  *     1.0000E+00    0.0000E+00   -5.5060E-01e
* hd    * f   7.1100E-01e
* icflg * f            0e
* nff   * f            1e
* alp   * f   0.0000E+00e
* vl    *  0.0  4460.0  0.0 e
* vv    * f   0.0000E+00e
* tl    * f   5.7900E+02e
* tv    * f   5.7900E+02e
* p     * f   1.5000E+07e
* pa    * f   0.0000E+00e
* qppp  * f   0.0000E+00e
* matid *  f            7e
* tw    * f   5.7900E+02e
*
************************************************************************
*******   type          num          id       ctitle
tee           14      14 $14$ loop a1 intact cold leg
*
*  pump power added to fluid
*
*        jcell         nodes          ichf          cost          epsw
               1             1             1    0.0000E+00    0.0000E+00
*       iconc1        ncell1          jun1          jun2          ipow1
               0             3            14            15              1
*       ipwtr1        ipwsv1        npwtb1        npwsv1        npwrf1
               0          -102             0             0             0
*       iqptr1        iqpsv1        nqptb1        nqpsv1        nqprf1
               0             0             0             0             0
*       radin1          th1        houtl1        houtv1        toutl1
    3.5550E-01    5.7000E-02    0.0000E+00    5.6800E+00    2.9500E+02
*       toutv1       pwin1       pwoff1      rpwmx1      pwscl1
    2.9500E+02       0.0         0.0         1.0e20        1.0
*        qpin1        qpoff1        rqpmx1        qpscl1
    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*       iconc2        ncell2          jun3          ipow2
               0             1            20             0
*       iqptr2        iqpsv2        nqptb2        nqpsv2        nqprf2
               0             0             0             0             0
*       radin2          th2        houtl2        houtv2        toutl2
    1.2150E-01    9.5000E-03    0.0000E+00    5.6800E+00    2.9500E+02
*       toutv2
    2.9500E+02
*        qpin2        qpoff2        rqpmx2        qpscl2
    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*
* dx    * f   2.7370E+00e
* vol   * f   1.0870E+00e
* fa    * f   3.9700E-01e
* fric  *     2.0000E-01r02 1.0e-06     1.2400E-01e
* grav  *    -5.5060E-01r03 0.0000E+00e
* hd    * f   7.1100E-01e
* icflg * f            0e
* nff   * f            1e
* alp   * f   0.0000E+00e
* vl    * f   0.0000E+00e
* vv    * f   0.0000E+00e
* tl    * f   5.7900E+02e
* tv    * f   5.7900E+02e
* p     * f   1.5000E+07e
* pa    * f   0.0000E+00e
* qppp  * f   0.0000E+00e
* matid *  f            7e
* tw    * f   5.7900E+02e
*
* dx    *     1.0000E-01e
* vol   *     2.3000E-04e
* fa    * f   2.3000E-03e
* fric  * f   1.0e-06 e
* grav  * f   0.0000E+00e
* hd    * f   5.4100E-02e
```



```
* icflg * f            0e
* nff   * f            1e
* alp   *     0.0000E+00e
* vl    * f   0.0000E+00e
* vv    * f   0.0000E+00e
* tl    *     5.7900E+02e
* tv    *     5.7900E+02e
* p     *     1.5000E+07e
* pa    *     0.0000E+00e
* qppp  *     0.0000E+00e
* matid *  f            7e
* tw    *     5.7900E+02e
*
************************************************************************
*******   type          num          id       ctitle
tee           16      16 $16$ loop a upper head tee
*        jcell         nodes          ichf          cost          epsw
               1             1             1    1.0000E+00    0.0000E+00
*       iconc1        ncell1          jun1          jun2          ipow1
               0             2            17            11             0
*       iqptr1        iqpsv1        nqptb1        nqpsv1        nqprf1
               0             0             0             0             0
*       radin1          th1        houtl1        houtv1        toutl1
    4.5720E-01    7.3000E-02    0.0000E+00    5.6800E+00    2.9500E+02
*       toutv1
    2.9500E+02
*        qpin1        qpoff1        rqpmx1        qpscl1
    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*       iconc2        ncell2          jun3          ipow2
               0             1            16             0
*       iqptr2        iqpsv2        nqptb2        nqpsv2        nqprf2
               0             0             0             0             0
*       radin2          th2        houtl2        houtv2        toutl2
    2.8960E-01    5.0000E-02    0.0000E+00    5.6800E+00    2.9500E+02
*       toutv2
    2.9500E+02
*        qpin2        qpoff2        rqpmx2        qpscl2
    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*
* dx    * f   1.4950E+00e
* vol   *     5.7000E-01    9.8200E-01e
* fa    * f   6.5670E-01e
* fric  *     4.0000E-01r02 1.0e-06 e
* grav  * f   0.0000E+00e
* hd    * f   9.1440E-01e
* icflg * f            0e
* nff   * f            1e
* alp   * f   0.0000E+00e
* vl    * f   0.0000E+00e
* vv    * f   0.0000E+00e
* tl    * f   5.7900E+02e
* tv    * f   5.7900E+02e
* p     * f   1.5000E+07e
* pa    * f   0.0000E+00e
* qppp  * f   0.0000E+00e
* matid *  f            7e
* tw    * f   5.7900E+02e
*
* dx    *     3.5052E+00e
* vol   *     4.1200E-01e
* fa    * f   2.6200E-01e
* fric  * f   1.0e-06 e
* grav  *     1.0000E+00    5.3550E-01e
* hd    * f   4.0800E-01e
* icflg * f            0e
* nff   * f           -1e
* alp   *     0.0000E+00e
* vl    * f   0.0000E+00e
* vv    * f   0.0000E+00e
* tl    *     5.7900E+02e
* tv    *     5.7900E+02e
* p     *     1.5000E+07e
* pa    *     0.0000E+00e
```

```
7415 * qppp  *      0.0000E+00
7416 * matid *  f              7e
7417 * tw    *      5.7900E+02e
7418 *
7419 ************************************************************************
7420 *******   type            num            id        ctitle
7421 prizer         22       22 $22$ pressurizer
7422 *         ncells          nodes          jun1          jun2
7423                4              3            25            22
7424 *           ichf          iconc         qp3in
7425                1              0    0.0000E+00
7426 *          radin             th         houtl         houtv         toutl
7427      1.0671E+00    1.5700E-01    0.0000E+00    0.0000E+00    2.9500E+02
7428 *          toutv         qheat          pset          dpmax          zhtr
7429      2.9500E+02    1.6380E+06    1.4962E+07    2.4130E+05    2.0330E+00
7430 *
7431 * dx    *      1.0000E-01    9.0000E-01    1.1700E+01    1.0000E-01e
7432 * vol   *      3.5770E-01    3.2196E+00    3.8574E+01    3.5770E-01e
7433 * fa    *      3.1670E-03r03 3.5773E+00    5.0670E-02e
7434 * fric  * f    1.0e-06 e
7435 * grav  * f   -1.0000E+00e
7436 * hd    *      6.3500E-02r03 2.1342E+00    2.5400E-01e
7437 * icflg * f              0e
7438 * nff   * f              1e
7439 * alp   * r02 1.0000E+00     4.5820E-01    0.0000E+00e
7440 * vl    * f    0.0000E+00e
7441 * vv    * f    0.0000E+00e
7442 * tl    * f    6.1520E+02e
7443 * tv    * f    6.1520E+02e
7444 * p     * f    1.4962E+07e
7445 * pa    * f    0.0000E+00e
7446 * qppp  * f    0.0000E+00e
7447 * matid *  f              9e
7448 * tw    * f    6.1550E+02e
7449 *
7450 ************************************************************************
7451 *******   type            num            id        ctitle
7452 pump          23       23 $23$ loop b2 pump
7453 *         ncells          nodes          jun1          jun2          epsw
7454                2              1           163           104    0.0000E+00
7455 *           ichf          iconc         ipmpty           irp           ipm
7456                1              0             1             0             1
7457 *         ipmptr         ipmpsv         npmptb        npmpsv        npmprf
7458               20           -126              0             0             0
7459 *         iqp3tr         iqp3sv         nqp3tb        nqp3sv        nqp3rf
7460                0              0              0             0             0
7461 *          radin             th         houtl         houtv         toutl
7462      3.5550E-01    5.7000E-02    0.0000E+00    5.6800E+00    2.9500E+02
7463 *          toutv         effmi
7464      2.9500E+02    2.9513E+03
7465 *           tfr0          tfr1          tfr2          tfr3          tfrb
7466         0.0  0.0000E+00  0.0000E+00       0.0       0.0
7467 *          tfr10         tfr11         tfr12         tfr13
7468         0.0       0.0       0.0       0.0
7469 *          rhead         rtork         rflow          rho         romega
7470      1.0165E+03    4.4140E+04    5.9100E+00    7.4600E+02    1.2460E+02
7471 *         omegan        omgoff        romgmx        omgscl        npmpsd
7472      1.2320E+02   -1.2320E+02    5.0000E+01    1.0000E+00             0
7473 *          qp3in         qp3off         rqp3mx        qp3scl
7474      0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7475 *         option
7476                2
7477 *
7478 * dx    * f    1.1400E+00e
7479 * vol   * f    1.3900E+00e
7480 * fa    * f    3.9700E-01e
7481 * fric  * 1.0e-06  0.0      2.0000E-01e
7482 * grav  *      1.0000E+00     0.0000E+00   -5.5060E-01e
7483 * hd    * f    7.1100E-01e
7484 * icflg * f              0e
7485 * nff   * f              1e
7486 * alp   * f    0.0000E+00e
7487 * vl    *  0.0  4460.0  0.0 e
```



```
7488 * vv    * f    0.0000E+00e
7489 * tl    * f    5.7900E+02e
7490 * tv    * f    5.7900E+02e
7491 * p     * f    1.5000E+07e
7492 * pa    * f    0.0000E+00e
7493 * qppp  * f    0.0000E+00e
7494 * matid *  f              7e
7495 * tw    * f    5.7900E+02e
7496 *
7497 ************************************************************************
7498 *******   type            num            id        ctitle
7499 tee             24       24 $24$ loop b2 intact cold leg
7500 *
7501 *  pump power added to fluid
7502 *
7503 *          jcell          nodes          ichf          cost          epsw
7504                1              1             1    0.0000E+00    0.0000E+00
7505 *         iconc1         ncell1          jun1          jun2          ipow1
7506                0              3           104           105             1
7507 *         ipwtr1         ipwsv1        npwtb1        npwsv1        npwrf1
7508                0           -103             0             0             0
7509 *         iqptr1         iqpsv1        nqptb1        nqpsv1        nqprf1
7510                0              0             0             0             0
7511 *          radin1            th1         houtl1        houtv1        toutl1
7512      3.5550E-01    5.7000E-02    0.0000E+00    5.6800E+00    2.9500E+02
7513 *          toutv1         pwin1        pwoff1        rpwmx1        pwscl1
7514      2.9500E+02       0.0             0.0          1.0e20           1.0
7515 *          qpin1         qpoff1        rqpmx1        qpscl1
7516      0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7517 *         iconc2         ncell2          jun3          ipow2
7518                0              1           159             0
7519 *         iqptr2         iqpsv2        nqptb2        nqpsv2        nqprf2
7520                0              0             0             0             0
7521 *          radin2            th2         houtl2        houtv2        toutl2
7522      1.2150E-01    9.5000E-03    0.0000E+00    5.6800E+00    2.9500E+02
7523 *          toutv2
7524      2.9500E+02
7525 *          qpin2         qpoff2        rqpmx2        qpscl2
7526      0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7527 *
7528 * dx    * f    2.7370E+00e
7529 * vol   * f    1.0870E+00e
7530 * fa    * f    3.9700E-01e
7531 * fric  *      2.0000E-01r02 1.0e-06     1.2400E-01e
7532 * grav  *     -5.5060E-01r03 0.0000E+00e
7533 * hd    * f    7.1100E-01e
7534 * icflg * f              0e
7535 * nff   * f              1e
7536 * alp   * f    0.0000E+00e
7537 * vl    * f    0.0000E+00e
7538 * vv    * f    0.0000E+00e
7539 * tl    * f    5.7900E+02e
7540 * tv    * f    5.7900E+02e
7541 * p     * f    1.5000E+07e
7542 * pa    * f    0.0000E+00e
7543 * qppp  * f    0.0000E+00e
7544 * matid *  f              7e
7545 * tw    * f    5.7900E+02e
7546 *
7547 * dx    *      1.0000E-01e
7548 * vol   *      2.3000E-04e
7549 * fa    * f    2.3000E-03e
7550 * fric  * f    1.0e-06 e
7551 * grav  * f    0.0000E+00e
7552 * hd    * f    5.4100E-02e
7553 * icflg * f              0e
7554 * nff   * f              1e
7555 * alp   *      0.0000E+00e
7556 * vl    * f    0.0000E+00e
7557 * vv    * f    0.0000E+00e
7558 * tl    *      5.7900E+02e
7559 * tv    *      5.7900E+02e
7560 * p     *      1.5000E+07e
```

```
* pa     *      0.0000E+00
* qppp   *      0.0000E+00
* matid *  f                7e
* tw     *      5.7900E+02
*
**********************************************************************
*******   type            num            id         ctitle
valve           25      25 $25$ pressurizer porv
*       ncells          nodes          jun1          jun2          epsw
                1              0            25            26    0.0000E+00
*         ichf          iconc          ivty          ivps         nvtb2
                0              0             4             2            -2
*         ivtr           ivsv         nvtb1          nvsv          nvrf
               77              1            -2             0             0
*       ivtrov         ivtyov
                0              0
*         rvmx           rvov         fminov        fmaxov
    1.0000E+00     0.0000E+00     0.0000E+00    0.0000E+00
*        radin             th          houtl         houtv         toutl
    3.1750E-02     5.0000E-01     0.0000E+00    0.0000E+00    0.0000E+00
*        toutv          avlve          hvlve         favlve         xpos
    0.0000E+00     6.0620E-04     2.7780E-02    0.0000E+00    0.0000E+00
*
* dx     *      1.0000E+00e
* vol    *      3.1670E-03e
* fa     * f    3.1670E-03e
* fric   * f    1.0e-06 e
* grav   * f    1.0000E+00e
* hd     *      6.3500E-02     1.0000E-05e
* icflg  * f              0e
* nff    * f              1e
* alp    *      1.0000E+00e
* vl     *      0.0000E+00     1.0000E-10e
* vv     *      0.0000E+00     1.0000E-10e
* tl     *      6.1476E+02e
* tv     *      6.1510E+02e
* p      *      1.5020E+07e
* pa     *      0.0000E+00e
* vtb1   * r02 0.0000E+00r02 1.0000E+00e
* vtb2   * r02 0.0000E+00     2.0000E+00     1.0000E+00e
*
**********************************************************************
*******   type            num            id         ctitle
break           26      26 $26$ porv boundary
*         jun1           ibty          isat          ioff
               26              0             0
*         dxin          volin         alpin           tin           pin
    1.0000E+00     3.1680E-03     1.0000E+00    4.0570E+02    3.0000E+05
*         pain          concin         rbmx          poff          belv
    0.0000E+00     0.0000E+00     0.0000E+00    0.0000E+00    0.0000E+00
*
**********************************************************************
*******   type            num            id         ctitle
pump            33      33 $33$ loop a2 pump (break leg)
*       ncells          nodes          jun1          jun2          epsw
                2              1            83            34    0.0000E+00
*         ichf          iconc         ipmpty           irp           ipm
                1              0             1             0             1
*       ipmptr         ipmpsv         npmptb        npmpsv        npmprf
               20           -128             0             0             0
*       iqp3tr         iqp3sv         nqp3tb        nqp3sv        nqp3rf
                0              0             0             0             0
*        radin             th          houtl         houtv         toutl
    3.5550E-01     5.7000E-02     0.0000E+00    5.6800E+00    2.9500E+02
*        toutv          effmi
    2.9500E+02     2.9513E+03
*         tfr0           tfrl          tfr2          tfr3          tfrb
        0.0  0.0000E+00  0.0000E+00       0.0       0.0
*        tfrl0          tfrl1         tfrl2         tfrl3
        0.0       0.0       0.0       0.0
*        rhead          rtork         rflow          rrho         romega
    1.0165E+03     4.4140E+04     5.9100E+00    7.4600E+02    1.2460E+02
*       omegan         omgoff        romgmx        omgscl        npmpsd
```



```
    1.2320E+02    -1.2320E+02     5.0000E+01     1.0000E+00             0
*        qp3in          qp3off         rqp3mx         qp3scl
    0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
*       option
                2
*
* dx     * f    1.1400E+00e
* vol    * f    1.3900E+00e
* fa     * f    3.9700E-01e
* fric   * 1.0e-06  0.0      2.0000E-01e
* grav   *      1.0000E+00     0.0000E+00    -5.5060E-01e
* hd     * f    7.1100E-01e
* icflg  * f              0e
* nff    * f              1e
* alp    * f    0.0000E+00e
* vl     *  0.0  4460.0  0.0 e
* vv     * f    0.0000E+00e
* tl     * f    5.7900E+02e
* tv     * f    5.7900E+02e
* p      * f    1.5000E+07e
* pa     * f    0.0000E+00e
* qppp   * f    0.0000E+00e
* matid *  f                7e
* tw     * f    5.7900E+02e
*
**********************************************************************
*******   type            num            id         ctitle
tee             34      34 $34$ loop a2 intact cold leg
*
*  pump power added to fluid
*
*         jcell          nodes          ichf          cost          epsw
                1              1             1    0.0000E+00    0.0000E+00
*       iconc1         ncell1         jun1          jun2         ipow1
                0              3            34            35             1
*       ipwtr1         ipwsv1        npwtb1        npwsv1        npwrf1
                0           -104             0             0             0
*       iqptr1         iqpsv1        nqptb1        nqpsv1        nqprf1
                0              0             0             0             0
*       radin1            th1         houtl1        houtv1        toutl1
    3.5550E-01     5.7000E-02     0.0000E+00    5.6800E+00    2.9500E+02
*       toutv1         pwin1        pwoff1        rpwmx1        pwscl1
    2.9500E+02      0.0             0.0          1.0e20         1.0
*        qpin1          qpoff1         rqpmx1         qpscl1
    0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
*       iconc2         ncell2         jun3          ipow2
                0              1            39             0
*       iqptr2         iqpsv2        nqptb2        nqpsv2        nqprf2
                0              0             0             0             0
*       radin2            th2         hout12        houtv2        tout12
    1.2150E-01     9.5000E-03     0.0000E+00    5.6800E+00    2.9500E+02
*       toutv2
    2.9500E+02
*        qpin2          qpoff2         rqpmx2         qpscl2
    0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
*
* dx     * f    2.7370E+00e
* vol    * f    1.0870E+00e
* fa     * f    3.9700E-01e
* fric   *      2.0000E-01r02 1.0e-06     1.2400E-01e
* grav   *     -5.5060E-01r03 0.0000E+00e
* hd     * f    7.1100E-01e
* icflg  * f              0e
* nff    * f              1e
* alp    * f    0.0000E+00e
* vl     * f    0.0000E+00e
* vv     * f    0.0000E+00e
* tl     * f    5.7900E+02e
* tv     * f    5.7900E+02e
* p      * f    1.5000E+07e
* pa     * f    0.0000E+00e
* qppp   * f    0.0000E+00e
* matid *  f                7e
```

```
7707 * tw    * f   5.7900E+02e
7708 *
7709 * dx    *     1.0000E-01e
7710 * vol   *     2.3000E-04e
7711 * fa    * f   2.3000E-03e
7712 * fric  * f   1.0e-06 e
7713 * grav  * f   0.0000E+00e
7714 * hd    * f   5.4100E-02e
7715 * icflg * f           0e
7716 * nff   * f           1e
7717 * alp   *     0.0000E+00e
7718 * vl    * f   0.0000E+00e
7719 * vv    * f   0.0000E+00e
7720 * tl    *     5.7900E+02e
7721 * tv    *     5.7900E+02e
7722 * p     *     1.5000E+07e
7723 * pa    *     0.0000E+00e
7724 * qppp  *     0.0000E+00e
7725 * matid *  f          7e
7726 * tw    *     5.7900E+02e
7727 *
7728 ********************************************************************************
7729 *******   type          num           id        ctitle
7730 tee           63      63 $63$ loop b loop seals
7731 *        jcell         nodes         ichf         cost         epsw
7732              1             1            1   -1.0000E+00    0.0000E+00
7733 *       iconc1        ncell1         jun1         jun2         ipow1
7734              0             4            3           63             0
7735 *       iqptr1        iqpsv1       nqptb1       nqpsv1       nqprf1
7736              0             0            0            0            0
7737 *       radin1           th1       houtl1       houtv1       toutl1
7738    3.5550E-01    5.7000E-02    0.0000E+00    5.8600E+00    2.9500E+02
7739 *       toutv1
7740    2.9500E+02
7741 *        qpin1        qpoff1       rqpmx1        qpscl1
7742    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7743 *       iconc2        ncell2         jun3         ipow2
7744              0             3          163             0
7745 *       iqptr2        iqpsv2       nqptb2       nqpsv2       nqprf2
7746              0             0            0            0            0
7747 *       radin2           th2       houtl2       houtv2       toutl2
7748    3.5550E-01    5.7000E-02    0.0000E+00    5.8600E+00    2.9500E+02
7749 *       toutv2
7750    2.9500E+02
7751 *        qpin2        qpoff2       rqpmx2        qpscl2
7752    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7753 *
7754 * dx    *     5.9000E-01    2.0000E+00    4.0000E+00    4.5690E+00e
7755 * vol   *  0.4685  0.794  1.588  1.814 e
7756 * fa    *     1.70      r04 3.9700E-01e
7757 * fric  *  1.0e-06  0.1  f 1.0e-06 e
7758 * grav  *    -4.1900E-01   -6.0700E-01r03 1.0000E+00e
7759 * hd    * 1.47 f   7.1100E-01e
7760 * icflg * f           0e
7761 * nff   * f           1e
7762 * alp   * f   0.0000E+00e
7763 * vl    * f   0.0000E+00e
7764 * vv    * f   0.0000E+00e
7765 * tl    * f   5.7900E+02e
7766 * tv    * f   5.7900E+02e
7767 * p     * f   1.5000E+07e
7768 * pa    * f   0.0000E+00e
7769 * qppp  * f   0.0000E+00e
7770 * matid *  f          7e
7771 * tw    * f   5.7900E+02e
7772 *
7773 * dx    *     2.0000E+00    4.0000E+00    4.5690E+00e
7774 * vol   *  0.794  1.588  1.814 e
7775 * fa    * f   3.9700E-01e
7776 * fric  *  0.1  f   1.0e-06 e
7777 * grav  *    -6.0700E-01r03 1.0000E+00e
7778 * hd    * f   7.1100E-01e
7779 * icflg * f           0e
```



```
7780 * nff   * f           1e
7781 * alp   * f   0.0000E+00e
7782 * vl    * f   0.0000E+00e
7783 * vv    * f   0.0000E+00e
7784 * tl    * f   5.7900E+02e
7785 * tv    * f   5.7900E+02e
7786 * p     * f   1.5000E+07e
7787 * pa    * f   0.0000E+00e
7788 * qppp  * f   0.0000E+00e
7789 * matid *  f          7e
7790 * tw    * f   5.7900E+02e
7791 *
7792 ********************************************************************************
7793 *******   type          num           id        ctitle
7794 tee           73      73 $73$ loop a loop seals
7795 *        jcell         nodes         ichf         cost         epsw
7796              1             1            1   -1.0000E+00    0.0000E+00
7797 *       iconc1        ncell1         jun1         jun2         ipow1
7798              0             4           13           73             0
7799 *       iqptr1        iqpsv1       nqptb1       nqpsv1       nqprf1
7800              0             0            0            0            0
7801 *       radin1           th1       houtl1       houtv1       toutl1
7802    3.5550E-01    5.7000E-02    0.0000E+00    5.8600E+00    2.9500E+02
7803 *       toutv1
7804    2.9500E+02
7805 *        qpin1        qpoff1       rqpmx1        qpscl1
7806    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7807 *       iconc2        ncell2         jun3         ipow2
7808              0             3           83             0
7809 *       iqptr2        iqpsv2       nqptb2       nqpsv2       nqprf2
7810              0             0            0            0            0
7811 *       radin2           th2       houtl2       houtv2       toutl2
7812    3.5550E-01    5.7000E-02    0.0000E+00    5.8600E+00    2.9500E+02
7813 *       toutv2
7814    2.9500E+02
7815 *        qpin2        qpoff2       rqpmx2        qpscl2
7816    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
7817 *
7818 * dx    *     5.9000E-01    2.0000E+00    4.0000E+00    4.5690E+00e
7819 * vol   *  0.4685  0.794  1.588  1.814 e
7820 * fa    *     1.70      r04 3.9700E-01e
7821 * fric  *  1.0e-06  0.1  f 1.0e-06 e
7822 * grav  *    -4.1900E-01   -6.0700E-01r03 1.0000E+00e
7823 * hd    * 1.47 f   7.1100E-01e
7824 * icflg * f           0e
7825 * nff   * f           1e
7826 * alp   * f   0.0000E+00e
7827 * vl    * f   0.0000E+00e
7828 * vv    * f   0.0000E+00e
7829 * tl    * f   5.7900E+02e
7830 * tv    * f   5.7900E+02e
7831 * p     * f   1.5000E+07e
7832 * pa    * f   0.0000E+00e
7833 * qppp  * f   0.0000E+00e
7834 * matid *  f          7e
7835 * tw    * f   5.7900E+02e
7836 *
7837 * dx    *     2.0000E+00    4.0000E+00    4.5690E+00e
7838 * vol   *  0.794  1.588  1.814 e
7839 * fa    * f   3.9700E-01e
7840 * fric  *  0.1  f   1.0e-06 e
7841 * grav  *    -6.0700E-01r03 1.0000E+00e
7842 * hd    * f   7.1100E-01e
7843 * icflg * f           0e
7844 * nff   * f           1e
7845 * alp   * f   0.0000E+00e
7846 * vl    * f   0.0000E+00e
7847 * vv    * f   0.0000E+00e
7848 * tl    * f   5.7900E+02e
7849 * tv    * f   5.7900E+02e
7850 * p     * f   1.5000E+07e
7851 * pa    * f   0.0000E+00e
7852 * qppp  * f   0.0000E+00e
```

```
* matid *  f             7e
* tw    * f   5.7900E+02e
*
*********************************************************************
*******   type            num            id        ctitle
fill            9       9 $9$ loop b1 hpis
*          jun1           ifty          ioff
              9              8             0
*          iftr           ifsv          nftb          nfsv          nfrf
              55          -1196             0             0             0
*        twtold           rfmx         concin          felv
    0.0000E+00    1.0000E+03    0.0000E+00    0.0000E+00
*          dxin           volin          alpin          vlin          tlin
    1.0000E-01    3.1670E-04    0.0000E+00    0.0000E+00    2.9430E+02
*           pin           pain         flowin          vvin          tvin
    1.5169E+07    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*
*********************************************************************
*******   type            num            id        ctitle
fill           18      18 $18$ makeup/letdown flow
*          jun1           ifty          ioff
              18             8             0
*          iftr           ifsv          nftb          nfsv          nfrf
              13           -226             0             0             0
*        twtold           rfmx         concin          felv
    0.0000E+00    1.0000E+03    0.0000E+00    0.0000E+00
*          dxin           volin          alpin          vlin          tlin
    1.0000E-01    3.1670E-04    0.0000E+00    0.0000E+00    3.1100E+02
*           pin           pain         flowin          vvin          tvin
    1.5169E+07    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*
*********************************************************************
*******   type            num            id        ctitle
fill           19      19 $19$ loop a1 hpis
*          jun1           ifty          ioff
              19             8             0
*          iftr           ifsv          nftb          nfsv          nfrf
              55          -1188             0             0             0
*        twtold           rfmx         concin          felv
    0.0000E+00    1.0000E+03    0.0000E+00    0.0000E+00
*          dxin           volin          alpin          vlin          tlin
    1.0000E-01    3.1670E-04    0.0000E+00    0.0000E+00    2.9430E+02
*           pin           pain         flowin          vvin          tvin
    1.5169E+07    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*
*********************************************************************
*******   type            num            id        ctitle
tee            20         20 $20$ hpi/makeup-letdown header
*
* jcell      nodes       ichf        cost        epsw            cd 2
    1          0           1         0.0       1.0e-05
* iconc1     ncell1      jun1        jun2        ipow1           cd 3
    0          1          18          19          0
* radin1     th1         houtl1      houtv1      toutl1          cd 6
  0.0         0.0         0.0         0.0         0.0
* toutv1     pwin1       pwoff1      rpwmx1      pwscl1          cd 7
   0.0        0.0         0.0        1.0e20       1.0
* iconc2     ncell2      jun3        ipow2                       cd 9
    0          1          20          0
* radin2     th2         houtl2      houtv2      toutl2          cd 12
  0.0         0.0         0.0         0.0         0.0
* toutv2     pwin2       pwoff2      rpwmx2      pwscl2          cd 13
   0.0        0.0         0.0        1.0e20       1.0
*    main-cell arrays
* dx    *     1.0000E-01e
* vol   *     2.3000E-04e
* fa    * f   2.3000E-03e
* fric  * f   1.0e-06 e
* grav  * f   0.0000E+00e
* hd    * f   5.4100E-02e
* icflg * f             0e
* nff   * f             1e
* alp   *     0.0000E+00e
```



```
* vl    * f   0.0000E+00e
* vv    * f   0.0000E+00e
* tl    *     5.7900E+02e
* tv    *     5.7900E+02e
* p     *     1.5000E+07e
* pa    *     0.0000E+00e
*
*    side-cell arrays
* dx    *     1.0000E-01e
* vol   *     2.3000E-04e
* fa    * f   2.3000E-03e
* fric  * f   1.0e-06 e
* grav  * f   0.0000E+00e
* hd    * f   5.4100E-02e
* icflg * f             0e
* nff   * f             1e
* alp   *     0.0000E+00e
* vl    * f   0.0000E+00e
* vv    * f   0.0000E+00e
* tl    *     5.7900E+02e
* tv    *     5.7900E+02e
* p     *     1.5000E+07e
* pa    *     0.0000E+00e
*
*********************************************************************
*******   type            num            id        ctitle
fill           39      39 $39$ loop a2 hpis
*          jun1           ifty          ioff
              39             8             0
*          iftr           ifsv          nftb          nfsv          nfrf
              55          -1192             0             0             0
*        twtold           rfmx         concin          felv
    0.0000E+00    1.0000E+03    0.0000E+00    0.0000E+00
*          dxin           volin          alpin          vlin          tlin
    1.0000E-01    3.1670E-04    0.0000E+00    0.0000E+00    2.9430E+02
*           pin           pain         flowin          vvin          tvin
    1.5169E+07    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*
*********************************************************************
*******   type            num            id        ctitle
fill           59      59 $59$ loop b2 hpis
*          jun1           ifty          ioff
             159             8             0
*          iftr           ifsv          nftb          nfsv          nfrf
              55          -1198             0             0             0
*        twtold           rfmx         concin          felv
    0.0000E+00    1.0000E+03    0.0000E+00    0.0000E+00
*          dxin           volin          alpin          vlin          tlin
    1.0000E-01    3.1670E-04    0.0000E+00    0.0000E+00    2.9430E+02
*           pin           pain         flowin          vvin          tvin
    1.5169E+07    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*
*********************************************************************
*******   type            num            id        ctitle
tee            78         78 $78$ lpis b header
*
* jcell      nodes       ichf        cost        epsw            cd 2
    1          0           1         0.0       1.0e-05
* iconc1     ncell1      jun1        jun2        ipow1           cd 3
    0          1          80          78          0
* radin1     th1         houtl1      houtv1      toutl1          cd 6
  0.0         0.0         0.0         0.0         0.0
* toutv1     pwin1       pwoff1      rpwmx1      pwscl1          cd 7
   0.0        0.0         0.0        1.0e20       1.0
* iconc2     ncell2      jun3        ipow2                       cd 9
    0          1          79          0
* radin2     th2         houtl2      houtv2      toutl2          cd 12
  0.0         0.0         0.0         0.0         0.0
* toutv2     pwin2       pwoff2      rpwmx2      pwscl2          cd 13
   0.0        0.0         0.0        1.0e20       1.0
*    main-cell arrays
* dx    *   f 1.0 e
* vol   *   f 0.067 e
```

```
7999 * fa     *  f 0.067 e
8000 * fric   * f   1.0e-06 e
8001 * grav   * f   0.0000E+00e
8002 * hd     *  f 0.292 e
8003 * icflg  * f            0e
8004 * nff    * f            1e
8005 * alp    *     0.0000E+00e
8006 * vl     * f   0.0000E+00e
8007 * vv     * f   0.0000E+00e
8008 * tl     *     5.6500E+02e
8009 * tv     *     5.6500E+02e
8010 * p      *     1.5000E+07e
8011 * pa     *     0.0000E+00e
8012 *    side-cell arrays
8013 * dx     *  f 1.0 e
8014 * vol    *  f 0.067 e
8015 * fa     *  f 0.067 e
8016 * fric   * f   1.0e-06 e
8017 * grav   * f   0.0000E+00e
8018 * hd     *  f 0.292 e
8019 * icflg  * f            0e
8020 * nff    * f            1e
8021 * alp    *     0.0000E+00e
8022 * vl     * f   0.0000E+00e
8023 * vv     * f   0.0000E+00e
8024 * tl     *     5.6500E+02e
8025 * tv     *     5.6500E+02e
8026 * p      *     1.5000E+07e
8027 * pa     *     0.0000E+00e
8028 *
8029 ************************************************************************
8030 *******   type          num          id        ctitle
8031 fill            79      79 $79$ loop b lpis
8032 *          jun1          ifty          ioff
8033              79             8             0
8034 *          iftr          ifsv          nftb          nfsv          nfrf
8035              13            78             6             0             0
8036 *        twtold          rfmx        concin          felv
8037     0.0000E+00    1.0000E+03    0.0000E+00    0.0000E+00
8038 *          dxin          volin          alpin          vlin          tlin
8039     1.0000E-01    3.1670E-04    0.0000E+00    0.0000E+00    2.9430E+02
8040 *           pin          pain         flowin          vvin          tvin
8041     1.5000E+06    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
8042 *         vmscl         vvscl
8043     1.0000E+00    0.0000E+00
8044 *
8045 * vmtb  *     0.0000E+00    2.5146E+02    7.8600E+05    1.8860E+02    1.1030E+06
8046 * vmtb  *     1.2573E+02    1.2000E+06    9.4300E+01    1.3500E+06    6.2860E+01
8047 * vmtb  *     1.4750E+06    0.0000E+00e
8048 *
8049 ************************************************************************
8050 *******   type          num          id        ctitle
8051 valve           80      80 $80$ accum valve on loop b side
8052 *        ncells         nodes          jun1          jun2          epsw
8053              5             0            81            80    0.0000E+00
8054 *          ichf         iconc          ivty          ivps         nvtb2
8055              0             0             3             4            -2
8056 *          ivtr          ivsv         nvtb1          nvsv          nvrf
8057             80             1            -2             0             0
8058 *        ivtrov        ivtyov
8059              0             0
8060 *          rvmx          rvov        fminov        fmaxov
8061     4.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
8062 *         radin            th         houtl         houtv         toutl
8063     1.4600E-01    2.0000E-02    0.0000E+00    0.0000E+00    0.0000E+00
8064 *         toutv         avlve         hvlve         favlve          xpos
8065     0.0000E+00    6.7000E-02    2.9200E-01    0.0000E+00    0.0000E+00
8066 *
8067 * dx     *     1.0000E+00    2.0000E+00    4.0000E+00    5.0000E+00    4.8600E+00
8068 e
8069 * vol    *     6.7000E-02    1.3400E-01    2.6800E-01    3.3500E-01    3.2560E-01
8070 e
8071 * fa     * f   6.7000E-02e
```



```
8072 * fric   * f   1.0e-06 e
8073 * grav   *    -1.0000E+00    5.3650E-01r04 0.0000E+00e
8074 * hd     * f   2.9200E-01e
8075 * icflg  * f            0e
8076 * nff    * f            1e
8077 * alp    * f   0.0000E+00e
8078 * vl     * f   0.0000E+00e
8079 * vv     * f   0.0000E+00e
8080 * tl     * r03 3.0540E+02r02 5.6500E+02e
8081 * tv     * r03 3.0540E+02r02 5.6500E+02e
8082 * p      * r03 4.1680E+06r02 1.5000E+07e
8083 * pa     * f   0.0000E+00e
8084 * vtb1   * r02 0.0000E+00r02 1.0000E+00e
8085 * vtb2   * r02 0.0000E+00    2.0000E+00    1.0000E+00e
8086 *
8087 ************************************************************************
8088 * type        num          id          ctitle                        cd 1
8089 pipe           81      81 $81$ accumulator b
8090 *
8091 *  ncells     nodes        jun1        jun2        epsw              cd 2
8092     4          0          182          81          1.0e-04
8093 *  ichf       iconc        iacc        ipow                          cd 3
8094     0          0            1          0
8095 *  radin      th           houtl       houtv       toutl             cd 6
8096     0.100      0.0100       0.0         0.0         0.0
8097 *  toutv      powin        powoff      rpowmx      powscl            cd 7
8098     0.0        0.0          0.0         1.0e20      1.0
8099 *       cell arrays
8100 * dx     *     1.6670E+00r02 2.2950E+00    2.5000E-01e
8101 * vol    *     1.0480E+01r02 1.4433E+01    5.8400E-01e
8102 * fa     * r04 6.2900E+00    6.7000E-02e
8103 * fric   * f   1.0e-06 e
8104 * grav   * f  -1.0000E+00e
8105 * hd     * r04 2.8300E+00    2.9200E-01e
8106 * icflg  * f            0e
8107 * nff    * f            1e
8108 * alp    *     1.0000E+00r03 0.0000E+00e
8109 * vl     * f   0.0000E+00e
8110 * vv     * f   0.0000E+00e
8111 * tl     * f   3.0540E+02e
8112 * tv     * f   3.0540E+02e
8113 * p      * f   4.1680E+06e
8114 * pa     * f   4.1680E+06e
8115 ************************************************************************
8116 * type        num          id          ctitle                        cd 1
8117 fill           82      82 $82$ accumulator b zero-flow boundary
8118 *
8119 *  jun1       ifty         ioff                                      cd 2
8120     182        2            0
8121 *  twold      rfmx         concin      felv                          cd 4
8122     0.0        1.0e20       0.0         0.0
8123 *  dxin       volin        alpin       vlin        tlin              cd 5
8124     0.1        0.1          0.0         0.0         548.0
8125 *  pin        pain         flowin      vvin        tvin              cd 6
8126     50.0e05    0.0          0.0         0.0         548.0
8127 *
8128 ************************************************************************
8129 *******   type          num          id        ctitle
8130 tee            88         88 $88$ lpis a header
8131 *
8132 * jcell      nodes        ichf        cost        epsw              cd 2
8133     1          0            1          0.0       1.0e-05
8134 * iconc1     ncell1       jun1        jun2        ipow1             cd 3
8135     0          1            90          88          0
8136 * radin1     th1          houtl1      houtv1      toutl1            cd 6
8137   0.0          0.0          0.0         0.0         0.0
8138 * toutv1     pwin1        pwoff1      rpwmx1      pwscl1            cd 7
8139   0.0          0.0          0.0         1.0e20      1.0
8140 * iconc2     ncell2       jun3        ipow2                         cd 9
8141     0          1            89          0
8142 * radin2     th2          houtl2      houtv2      toutl2            cd 12
8143   0.0          0.0          0.0         0.0         0.0
8144 * toutv2     pwin2        pwoff2      rpwmx2      pwscl2            cd 13
```

```
8145    0.0         0.0         0.0         1.0e20       1.0
8146 *    main-cell arrays
8147 * dx     *   f 1.0 e
8148 * vol    *   f 0.067 e
8149 * fa     *   f 0.067 e
8150 * fric   * f   1.0e-06 e
8151 * grav   * f   0.0000E+00e
8152 * hd     *   f 0.292 e
8153 * icflg * f             0e
8154 * nff    * f             1e
8155 * alp    *      0.0000E+00e
8156 * vl     * f    0.0000E+00e
8157 * vv     * f    0.0000E+00e
8158 * tl     *      5.6500E+02e
8159 * tv     *      5.6500E+02e
8160 * p      *      1.5000E+07e
8161 * pa     *      0.0000E+00e
8162 *    side-cell arrays
8163 * dx     *   f 1.0 e
8164 * vol    *   f 0.067 e
8165 * fa     *   f 0.067 e
8166 * fric   * f   1.0e-06 e
8167 * grav   * f   0.0000E+00e
8168 * hd     *   f 0.292 e
8169 * icflg * f             0e
8170 * nff    * f             1e
8171 * alp    *      0.0000E+00e
8172 * vl     * f    0.0000E+00e
8173 * vv     * f    0.0000E+00e
8174 * tl     *      5.6500E+02e
8175 * tv     *      5.6500E+02e
8176 * p      *      1.5000E+07e
8177 * pa     *      0.0000E+00e
8178 *
8179 ************************************************************************
8180 *******   type           num           id        ctitle
8181 fill             89      89 $89$ loop a lpis
8182 *          jun1          ifty          ioff
8183               89             8             0
8184 *          iftr          ifsv          nftb          nfsv          nfrf
8185               13            88             6             0             0
8186 *        twtold          rfmx        concin          felv
8187     0.0000E+00    1.0000E+03    0.0000E+00    0.0000E+00
8188 *          dxin          volin          alpin          vlin          tlin
8189     1.0000E-01    3.1670E-04    0.0000E+00    0.0000E+00    2.9430E+02
8190 *           pin          pain         flowin          vvin          tvin
8191     1.5000E+06    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
8192 *         vmscl         vvscl
8193     1.0000E+00    0.0000E+00
8194 *
8195 * vmtb  *      0.0000E+00    2.5146E+02    7.8600E+05    1.8860E+02    1.1030E+06
8196 * vmtb  *      1.2573E+02    1.2000E+06    9.4300E+01    1.3500E+06    6.2860E+01
8197 * vmtb  *      1.4750E+06    0.0000E+00e
8198 *
8199 ************************************************************************
8200 *******   type           num           id        ctitle
8201 valve          90      90 $90$ accum valve on loop a side
8202 *        ncells          nodes          jun1          jun2          epsw
8203                5              0             91             90    0.0000E+00
8204 *          ichf          iconc          ivty          ivps         nvtb2
8205                0              0             3             4            -2
8206 *          ivtr          ivsv         nvtb1          nvsv          nvrf
8207              90              1            -2             0             0
8208 *        ivtrov        ivtyov
8209                0              0
8210 *          rvmx          rvov        fminov        fmaxov
8211     4.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
8212 *          radin           th         houtl         houtv         toutl
8213     1.4600E-01    2.0000E-02    0.0000E+00    0.0000E+00    0.0000E+00
8214 *          toutv         avlve         hvlve         favlve         xpos
8215     0.0000E+00    6.7000E-02    2.9200E-01    0.0000E+00    0.0000E+00
8216 *
8217 * dx     *      1.0000E+00    2.0000E+00    4.0000E+00    5.0000E+00    4.8600E+00
```



```
8218 e
8219 * vol    *      6.7000E-02    1.3400E-01    2.6800E-01    3.3500E-01    3.2560E-01
8220 e
8221 * fa     * f    6.7000E-02e
8222 * fric   * f    1.0e-06 e
8223 * grav   *     -1.0000E+00    5.3650E-01r04 0.0000E+00e
8224 * hd     * f    2.9200E-01e
8225 * icflg * f             0e
8226 * nff    * f             1e
8227 * alp    * f    0.0000E+00e
8228 * vl     * f    0.0000E+00e
8229 * vv     * f    0.0000E+00e
8230 * tl     * r03 3.0540E+02r02 5.6500E+02e
8231 * tv     * r03 3.0540E+02r02 5.6500E+02e
8232 * p      * r03 4.1680E+06r02 1.5000E+07e
8233 * pa     * f    0.0000E+00e
8234 * vtb1   * r02 0.0000E+00r02 1.0000E+00e
8235 * vtb2   * r02 0.0000E+00    2.0000E+00    1.0000E+00e
8236 *
8237 ************************************************************************
8238 * type        num          id          ctitle                        cd 1
8239 pipe          91       91 $91$ accumulator a
8240 *
8241 *  ncells     nodes        jun1        jun2        epsw              cd 2
8242    4          0           192          91          1.0e-04
8243 *  ichf       iconc        iacc        ipow                          cd 3
8244    0          0            1           0
8245 *  radin      th           houtl       houtv       toutl             cd 6
8246    0.100      0.0100       0.0         0.0         0.0
8247 *  toutv      powin        powoff      rpowmx      powscl            cd 7
8248    0.0        0.0          0.0         1.0e20      1.0
8249 *       cell arrays
8250 * dx     *      1.6670E+00r02 2.2950E+00    2.5000E-01e
8251 * vol    *      1.0480E+01r02 1.4433E+01    5.8400E-01e
8252 * fa     * r04 6.2900E+00    6.7000E-02e
8253 * fric   * f    1.0e-06 e
8254 * grav   * f   -1.0000E+00e
8255 * hd     * r04 2.8300E+00    2.9200E-01e
8256 * icflg * f             0e
8257 * nff    * f             1e
8258 * alp    *      1.0000E+00r03 0.0000E+00e
8259 * vl     * f    0.0000E+00e
8260 * vv     * f    0.0000E+00e
8261 * tl     * f    3.0540E+02e
8262 * tv     * f    3.0540E+02e
8263 * p      * f    4.1680E+06e
8264 * pa     * f    4.1680E+06e
8265 ************************************************************************
8266 * type        num          id          ctitle                        cd 1
8267 fill          92       92 $92$ accumulator a zero-flow boundary
8268 *
8269 *  jun1       ifty         ioff                                       cd 2
8270    192         2            0
8271 *  twold      rfmx         concin      felv                          cd 4
8272    0.0        1.0e20       0.0         0.0
8273 *  dxin       volin        alpin       vlin        tlin              cd 5
8274    0.1        0.1          0.0         0.0         548.0
8275 *  pin        pain         flowin      vvin        tvin              cd 6
8276    50.0e05    0.0          0.0         0.0         548.0
8277 ************************************************************************
8278 *******   type           num           id        ctitle
8279 vessel         99      99 $99$ 6-theta vessel
8280 *         nasx          nrsx          ntsx          ncsr        ivssbf
8281              10             2             6            22             0
8282 *         idcu          idcl          idcr          icru          icrl
8283               9             1             1             5             1
8284 *         icrr         ilcsp         iucsp         iuhp          iconc
8285               1             0             0             0             0
8286 *        igeom         nvent         nvvtb
8287               0             6             0
8288 *        shelv          epsw
8289     0.0000E+00    0.0000E+00
8290 * z      *      2.4628E+00    3.9222E+00    4.8951E+00    5.6247E+00    6.1112E+00
```

```
 * z     *     6.6320E+00    7.3430E+00    7.8638E+00    9.6164E+00    1.1369E+01
e
 * rad   *     1.9177E+00    2.1669E+00e
 * th    *  60.0  120.0  180.0 s
 * th    *  240.0  300.0  360.0 e
 *           izv            kv          avent
                9             1    1.3243E-01
                9             2    1.3243E-01
                9             3    1.3243E-01
                9             4    1.3243E-01
                9             5    1.3243E-01
                9             6    1.3243E-01
 *
 *         dpcvn         dpovn         frcvn         frovn
      8.6200E+02    17.2400E+02    15.000E+04    0.3877E+00
      8.6200E+02    17.2400E+02    15.000E+04    0.3877E+00
      8.6200E+02    17.2400E+02    15.000E+04    0.3877E+00
      8.6200E+02    17.2400E+02    15.000E+04    0.3877E+00
      8.6200E+02    17.2400E+02    15.000E+04    0.3877E+00
      8.6200E+02    17.2400E+02    15.000E+04    0.3877E+00
 *
 *        lisrl         lisrc         lisrf         ljuns
                7             2             3             7
                7             5             3            17
                7             7             3             5
                7             9             3           105
                7            10             3            35
                7            12             3            15
                9             8             3            78
                9            11             3            88
               10             8             3             6
               10            11             3            16
                1             1             2           501
                1             2             2           502
                1             3             2           503
                1             4             2           504
                1             5             2           505
                1             6             2           506
                6             1            -2           511
                6             2            -2           512
                6             3            -2           513
                6             4            -2           514
                6             5            -2           515
                6             6            -2           516
 *
 * level   1
 *
 * cfzl-t* f   0.0000E+00e
 * cfzl-z* f   0.0000E+00e
 * cfzl-r* f   0.0000E+00e
 * cfzv-t* f   0.0000E+00e
 * cfzv-z* f   0.0000E+00e
 * cfzv-r* f   0.0000E+00e
 * vol   * r06 7.0000E-01r06 5.7500E-01e
 * fa-t  * r06 5.0000E-01r06 3.0000E-01e
 * fa-z  * r06 3.0000E-01r06 1.0000E+00e
 * fa-r  * r06 1.1000E-01r06 0.0000E+00e
 * hd-t  * r06 1.6400E+00r06 8.2000E-01e
 * hd-z  * r06 1.4400E+00r06 8.2000E-01e
 * hd-r  * r06 1.6400E+00r06 8.2000E-01e
 * alpn  * f   0.0000E+00e
 * vvn-t * f   0.0000E+00e
 * vvn-z * f   0.0000E+00e
 * vvn-r * f   0.0000E+00e
 * vln-t * f   0.0000E+00e
 * vln-z * f   0.0000E+00e
 * vln-r * f   0.0000E+00e
 * tvn   * f   5.7900E+02e
 * tln   * f   5.7900E+02e
 * pn    * f   1.5000E+07e
 * pan   * f   0.0000E+00e
 *
 * level   2
```



```
 *
 * cfzl-t* f   0.0000E+00e
 * cfzl-z* f   0.0000E+00e
 * cfzl-r* f   0.0000E+00e
 * cfzv-t* f   0.0000E+00e
 * cfzv-z* f   0.0000E+00e
 * cfzv-r* f   0.0000E+00e
 * vol   * r06 5.2820E-01r06 1.0000E+00e
 * fa-t  * r06 4.0000E-01r06 1.0000E+00e
 * fa-z  * r06 3.6700E-01r06 1.0000E+00e
 * fa-r  * f   0.0000E+00e
 * hd-t  * r06 1.3380E-02r06 5.0000E-01e
 * hd-z  * r06 1.5380E-02r06 5.0000E-01e
 * hd-r  * r06 1.3380E-02r06 5.0000E-01e
 * alpn  * f   0.0000E+00e
 * vvn-t * f   0.0000E+00e
 * vvn-z * f   0.0000E+00e
 * vvn-r * f   0.0000E+00e
 * vln-t * f   0.0000E+00e
 * vln-z * f   0.0000E+00e
 * vln-r * f   0.0000E+00e
 * tvn   * f   5.7900E+02e
 * tln   * f   5.7900E+02e
 * pn    * f   1.5000E+07e
 * pan   * f   0.0000E+00e
 *
 * level   3
 *
 * cfzl-t* f   0.0000E+00e
 * cfzl-z* f   0.0000E+00e
 * cfzl-r* f   0.0000E+00e
 * cfzv-t* f   0.0000E+00e
 * cfzv-z* f   0.0000E+00e
 * cfzv-r* f   0.0000E+00e
 * vol   * r06 5.2820E-01r06 1.0000E+00e
 * fa-t  * r06 4.0000E-01r06 1.0000E+00e
 * fa-z  * r06 3.6700E-01r06 1.0000E+00e
 * fa-r  * f   0.0000E+00e
 * hd-t  * r06 1.3380E-02r06 5.0000E-01e
 * hd-z  * r06 1.5380E-02r06 5.0000E-01e
 * hd-r  * r06 1.3380E-02r06 5.0000E-01e
 * alpn  * f   0.0000E+00e
 * vvn-t * f   0.0000E+00e
 * vvn-z * f   0.0000E+00e
 * vvn-r * f   0.0000E+00e
 * vln-t * f   0.0000E+00e
 * vln-z * f   0.0000E+00e
 * vln-r * f   0.0000E+00e
 * tvn   * f   5.7900E+02e
 * tln   * f   5.7900E+02e
 * pn    * f   1.5000E+07e
 * pan   * f   0.0000E+00e
 *
 * level   4
 *
 * cfzl-t* f   0.0000E+00e
 * cfzl-z* f   0.0000E+00e
 * cfzl-r* f   0.0000E+00e
 * cfzv-t* f   0.0000E+00e
 * cfzv-z* f   0.0000E+00e
 * cfzv-r* f   0.0000E+00e
 * vol   * r06 5.2820E-01r06 1.0000E+00e
 * fa-t  * r06 4.0000E-01r06 1.0000E+00e
 * fa-z  * r06 3.6700E-01r06 1.0000E+00e
 * fa-r  * f   0.0000E+00e
 * hd-t  * r06 1.3380E-02r06 5.0000E-01e
 * hd-z  * r06 1.5380E-02r06 5.0000E-01e
 * hd-r  * r06 1.3380E-02r06 5.0000E-01e
 * alpn  * f   0.0000E+00e
 * vvn-t * f   0.0000E+00e
 * vvn-z * f   0.0000E+00e
 * vvn-r * f   0.0000E+00e
 * vln-t * f   0.0000E+00e
```

```
8437 * vln-z * f   0.0000E+00e
8438 * vln-r * f   0.0000E+00e
8439 * tvn   * f   5.7900E+02e
8440 * tln   * f   5.7900E+02e
8441 * pn    * f   1.5000E+07e
8442 * pan   * f   0.0000E+00e
8443 *
8444 * level   5
8445 *
8446 * cfzl-t* f   0.0000E+00e
8447 * cfzl-z* f   0.0000E+00e
8448 * cfzl-r* f   0.0000E+00e
8449 * cfzv-t* f   0.0000E+00e
8450 * cfzv-z* f   0.0000E+00e
8451 * cfzv-r* f   0.0000E+00e
8452 * vol   * r06 5.2820E-01r06 1.0000E+00e
8453 * fa-t  * r06 4.0000E-01r06 1.0000E+00e
8454 * fa-z  * r06 2.5000E-01r06 1.0000E+00e
8455 * fa-r  * f   0.0000E+00e
8456 * hd-t  * r06 1.3380E-02r06 5.0000E-01e
8457 * hd-z  * r06 1.5380E-02r06 5.0000E-01e
8458 * hd-r  * r06 1.3380E-02r06 5.0000E-01e
8459 * alpn  * f   0.0000E+00e
8460 * vvn-t * f   0.0000E+00e
8461 * vvn-z * f   0.0000E+00e
8462 * vvn-r * f   0.0000E+00e
8463 * vln-t * f   0.0000E+00e
8464 * vln-z * f   0.0000E+00e
8465 * vln-r * f   0.0000E+00e
8466 * tvn   * f   5.7900E+02e
8467 * tln   * f   5.7900E+02e
8468 * pn    * f   1.5000E+07e
8469 * pan   * f   0.0000E+00e
8470 *
8471 * level   6
8472 *
8473 * cfzl-t* f   0.0000E+00e
8474 * cfzl-z* f   0.0000E+00e
8475 * cfzl-r* f   0.0000E+00e
8476 * cfzv-t* f   0.0000E+00e
8477 * cfzv-z* f   0.0000E+00e
8478 * cfzv-r* f   0.0000E+00e
8479 * vol   * r06 7.7510E-01r06 9.1248E-01e
8480 * fa-t  * r06 6.0000E-01r06 8.0000E-01e
8481 * fa-z  * r06 7.5000E-01r06 1.0000E+00e
8482 * fa-r  * f   0.0000E+00e
8483 * hd-t  * r06 2.7420E-01r06 5.0000E-01e
8484 * hd-z  * r06 2.7420E-01r06 5.0000E-01e
8485 * hd-r  * r06 2.7420E-01r06 5.0000E-01e
8486 * alpn  * f   0.0000E+00e
8487 * vvn-t * f   0.0000E+00e
8488 * vvn-z * f   0.0000E+00e
8489 * vvn-r * f   0.0000E+00e
8490 * vln-t * f   0.0000E+00e
8491 * vln-z * f   0.0000E+00e
8492 * vln-r * f   0.0000E+00e
8493 * tvn   * f   5.7900E+02e
8494 * tln   * f   5.7900E+02e
8495 * pn    * f   1.5000E+07e
8496 * pan   * f   0.0000E+00e
8497 *
8498 * level   7
8499 *
8500 * cfzl-t* f   0.0000E+00e
8501 * cfzl-z* f   0.0000E+00e
8502 * cfzl-r* f   0.0000E+00e
8503 * cfzv-t* f   0.0000E+00e
8504 * cfzv-z* f   0.0000E+00e
8505 * cfzv-r* f   0.0000E+00e
8506 * vol   * r06 7.7510E-01r06 9.1248E-01e
8507 * fa-t  * r06 6.0000E-01r06 8.0000E-01e
8508 * fa-z  * r06 7.5000E-01r06 1.0000E+00e
8509 * fa-r  * f   0.0000E+00e
```



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8510 * hd-t  * r06 2.7420E-01r06 5.0000E-01e
8511 * hd-z  * r06 2.7420E-01r06 5.0000E-01e
8512 * hd-r  * r06 2.7420E-01r06 5.0000E-01e
8513 * alpn  * f   0.0000E+00e
8514 * vvn-t * f   0.0000E+00e
8515 * vvn-z * f   0.0000E+00e
8516 * vvn-r * f   0.0000E+00e
8517 * vln-t * f   0.0000E+00e
8518 * vln-z * f   0.0000E+00e
8519 * vln-r * f   0.0000E+00e
8520 * tvn   * f   5.7900E+02e
8521 * tln   * f   5.7900E+02e
8522 * pn    * f   1.5000E+07e
8523 * pan   * f   0.0000E+00e
8524 *
8525 * level   8
8526 *
8527 * cfzl-t* f   0.0000E+00e
8528 * cfzl-z* f   0.0000E+00e
8529 * cfzl-r* f   0.0000E+00e
8530 * cfzv-t* f   0.0000E+00e
8531 * cfzv-z* f   0.0000E+00e
8532 * cfzv-r* f   0.0000E+00e
8533 * vol   * r06 7.7510E-01r06 9.1248E-01e
8534 * fa-t  * r06 6.0000E-01r06 8.0000E-01e
8535 * fa-z  * r06 7.5000E-01r06 1.0000E+00e
8536 * fa-r  * f   0.0000E+00e
8537 * hd-t  * r06 2.7420E-01r06 1.9316E+00e
8538 * hd-z  * r06 2.7420E-01r06 1.9316E+00e
8539 * hd-r  * r06 2.7420E-01r06 1.9316E+00e
8540 * alpn  * f   0.0000E+00e
8541 * vvn-t * f   0.0000E+00e
8542 * vvn-z * f   0.0000E+00e
8543 * vvn-r * f   0.0000E+00e
8544 * vln-t * f   0.0000E+00e
8545 * vln-z * f   0.0000E+00e
8546 * vln-r * f   0.0000E+00e
8547 * tvn   * f   5.7900E+02e
8548 * tln   * f   5.7900E+02e
8549 * pn    * f   1.5000E+07e
8550 * pan   * f   0.0000E+00e
8551 *
8552 * level   9
8553 *
8554 * cfzl-t* f   0.0000E+00e
8555 * cfzl-z* f   21.0000E+00e
8556 * cfzl-r* f   0.0000E+00e
8557 * cfzv-t* f   0.0000E+00e
8558 * cfzv-z* f   21.0000E+00e
8559 * cfzv-r* f   0.0000E+00e
8560 * vol   * r06 7.7510E-01r06 9.1248E-01e
8561 * fa-t  * r06 6.0000E-01r06 8.0000E-01e
8562 * fa-z  * r06 1.3950E-01r06 0.0000E+00e
8563 * fa-r  * f   0.0000E+00e
8564 * hd-t  * r06 2.0000E-01r06 5.0000E-01e
8565 * hd-z  * r06 2.0000E-01r06 5.0000E-01e
8566 * hd-r  * r06 2.0000E-01r06 5.0000E-01e
8567 * alpn  * f   0.0000E+00e
8568 * vvn-t * f   0.0000E+00e
8569 * vvn-z * f   0.0000E+00e
8570 * vvn-r * f   0.0000E+00e
8571 * vln-t * f   0.0000E+00e
8572 * vln-z * f   0.0000E+00e
8573 * vln-r * f   0.0000E+00e
8574 * tvn   * f   5.7900E+02e
8575 * tln   * f   5.7900E+02e
8576 * pn    * f   1.5000E+07e
8577 * pan   * f   0.0000E+00e
8578 *
8579 * level  10
8580 *
8581 * cfzl-t* f   0.0000E+00e
8582 * cfzl-z* f   0.0000E+00e
```

```
8583 * cfzl-r* f   0.0000E+00e
8584 * cfzv-t* f   0.0000E+00e
8585 * cfzv-z* f   0.0000E+00e
8586 * cfzv-r* f   0.0000E+00e
8587 * vol   * r06 6.5000E-01r06 4.7600E-01e
8588 * fa-t  * r06 6.0000E-01r06 3.0000E-01e
8589 * fa-z  * f   0.0000E+00e
8590 * fa-r  * r06 5.0000E-01r06 0.0000E+00e
8591 * hd-t  * r06 3.8000E-01r06 1.0000E-04e
8592 * hd-z  * r06 3.8000E-01r06 1.0000E-04e
8593 * hd-r  * r06 3.8000E-01r06 1.0000E-04e
8594 * alpn  * f   0.0000E+00e
8595 * vvn-t * f   0.0000E+00e
8596 * vvn-z * f   0.0000E+00e
8597 * vvn-r * f   0.0000E+00e
8598 * vln-t * f   0.0000E+00e
8599 * vln-z * f   0.0000E+00e
8600 * vln-r * f   0.0000E+00e
8601 * tvn   * f   5.9200E+02e
8602 * tln   * f   5.9200E+02e
8603 * pn    * f   1.5000E+07e
8604 * pan   * f   0.0000E+00e
8605 ************************************************************************
8606 *  type       num          id          ctitle                      cd 1
8607 tee           121      121 $121$ sg-a boiler region
8608 *
8609 * jcell       nodes        ichf        cost        epsw            cd 2
8610   10           0           1           0.0         1.0e-05
8611 * iconc1      ncell1       jun1        jun2        ipow1           cd 3
8612   0           11           56          581         0
8613 * radin1      th1          houtl1      houtv1      toutl1          cd 6
8614     0.0         0.0         0.0         0.0         0.0
8615 * toutv1      pwin1        pwoff1      rpwmx1      pwscl1          cd 7
8616   0.0         0.0         0.0         1.0e20      1.0
8617 * iconc2      ncell2       jun3        ipow2                       cd 9
8618   0           1           57          0
8619 * radin2      th2          houtl2      houtv2      toutl2          cd 12
8620     0.0         0.0         0.0         0.0         0.0
8621 * toutv2      pwin2        pwoff2      rpwmx2      pwscl2          cd 13
8622   0.0         0.0         0.0         1.0e20      1.0
8623 *    main-cell arrays
8624 * dx    *      5.0000E-02    1.0000E-01    2.0000E-01    4.0000E-01    1.0150E+00
8625 * dx    * r06 1.7650E+00e
8626 * vol   *      1.9700E-01    3.9400E-01    7.8800E-01    1.5750E+00    3.9970E+00
8627 * vol   * r06 6.9500E+00e
8628 * fa    * f   4.3450E+00e
8629 * fric  *      1.0000E-02    5.0000E-04    1.0000E-03    2.0000E-03    4.0000E-03
8630 * fric  * r06 1.0000E-02    1.0e-06 e
8631 * grav  *      0.0000E+00r11 1.0000E+00e
8632 * hd    *      6.0000E-03r09 4.0000E-03r02 5.0000E-03e
8633 * icflg * f             0e
8634 * nff   * f             1e
8635 * alp   * r05 0.0000E+00r06 1.0000E+00e
8636 * vl    * f   0.0000E+00e
8637 * vv    * f   0.0000E+00e
8638 * tl    * f   5.5280E+02e
8639 * tv    * f   5.5280E+02e
8640 * p     * f   6.2800E+06e
8641 * pa    * f   0.0000E+00e
8642 *    side-cell arrays
8643 * dx    *      2.5000E-01e
8644 * vol   *      2.5000E-01e
8645 * fa    * f   5.0000E-01e
8646 * fric  * f   1.0e-06 e
8647 * grav  * f   0.0000E+00e
8648 * hd    * f   1.0000E-01e
8649 * icflg * f             0e
8650 * nff   * f             1e
8651 * alp   *      0.0000E+00e
8652 * vl    * f   0.0000E+00e
8653 * vv    * f   0.0000E+00e
8654 * tl    *      5.5280E+02e
8655 * tv    *      5.5280E+02e
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8656 * p     *      6.2800E+06e
8657 * pa    *      0.0000E+00e
8658 ************************************************************************
8659 *  type       num          id          ctitle                      cd 1
8660 tee           122      122 $122$ sg-a upper boiler region
8661 *
8662 * jcell       nodes        ichf        cost        epsw            cd 2
8663   2            0           1           0.0         1.0e-05
8664 * iconc1      ncell1       jun1        jun2        ipow1           cd 3
8665   0            2           581         58          0
8666 * radin1      th1          houtl1      houtv1      toutl1          cd 6
8667     0.0         0.0         0.0         0.0         0.0
8668 * toutv1      pwin1        pwoff1      rpwmx1      pwscl1          cd 7
8669   0.0         0.0         0.0         1.0e20      1.0
8670 * iconc2      ncell2       jun3        ipow2                       cd 9
8671   0           1           72          0
8672 * radin2      th2          houtl2      houtv2      toutl2          cd 12
8673     0.0         0.0         0.0         0.0         0.0
8674 * toutv2      pwin2        pwoff2      rpwmx2      pwscl2          cd 13
8675   0.0         0.0         0.0         1.0e20      1.0
8676 *    main-cell arrays
8677 * dx    * f   1.7650E+00e
8678 * vol   * f   6.9500E+00e
8679 * fa    * f   4.3450E+00e
8680 * fric  * f   1.0e-06 e
8681 * grav  * f   1.0000E+00e
8682 * hd    * r02 5.0000E-03    6.0000E-03e
8683 * icflg * f             0e
8684 * nff   * f             1e
8685 * alp   * f   1.0000E+00e
8686 * vl    * f   0.0000E+00e
8687 * vv    * f   0.0000E+00e
8688 * tl    * f   5.5250E+02e
8689 * tv    * f   5.5280E+02e
8690 * p     * f   6.2800E+06e
8691 * pa    * f   0.0000E+00e
8692 *    side-cell arrays
8693 * dx    *      1.0000E+00e
8694 * vol   *      1.6815E-02e
8695 * fa    * f   1.6815E-02e
8696 * fric  * f   1.0e-06 e
8697 * grav  * f   0.0000E+00e
8698 * hd    * f   1.4630E-01e
8699 * icflg * f             0e
8700 * nff   * f             1e
8701 * alp   *      0.0000E+00e
8702 * vl    * f   0.0000E+00e
8703 * vv    * f   0.0000E+00e
8704 * tl    *      5.5280E+02e
8705 * tv    *      5.5280E+02e
8706 * p     *      6.2800E+06e
8707 * pa    *      0.0000E+00e
8708 ************************************************************************
8709 *  type       num          id          ctitle                      cd 1
8710 tee           123      123 $123$ sg-a downcomer region
8711 *
8712 * jcell       nodes        ichf        cost        epsw            cd 2
8713   1            0           1           0.0         1.0e-05
8714 * iconc1      ncell1       jun1        jun2        ipow1           cd 3
8715   0           11           70          56          0
8716 * radin1      th1          houtl1      houtv1      toutl1          cd 6
8717     0.0         0.0         0.0         0.0         0.0
8718 * toutv1      pwin1        pwoff1      rpwmx1      pwscl1          cd 7
8719   0.0         0.0         0.0         1.0e20      1.0
8720 * iconc2      ncell2       jun3        ipow2                       cd 9
8721   0           1           57          0
8722 * radin2      th2          houtl2      houtv2      toutl2          cd 12
8723     0.0         0.0         0.0         0.0         0.0
8724 * toutv2      pwin2        pwoff2      rpwmx2      pwscl2          cd 13
8725   0.0         0.0         0.0         1.0e20      1.0
8726 *    main-cell arrays
8727 * dx    *      1.7650E+00r02 8.8250E-01r03 1.7650E+00    1.0150E+00    4.0000E-01
8728 * dx    *      2.0000E-01    1.0000E-01    5.0000E-02
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8729 * vol    *      3.5270E+00r02 1.7635E+00r03 3.5270E+00    2.0280E+00    7.9900E-01
8730 * vol    *      4.0000E-01    2.0000E-01    1.0000E-01e
8731 * fa     *      1.5000E-01r09 2.1670E+00    4.7000E-01    4.3450E+00e
8732 * fric   * r10 1.0e-06      1.4000E+01    1.0000E-02e
8733 * grav   *      0.0000E+00r10-1.0000E+00    0.0000E+00e
8734 * hd     *      1.0000E-01r09 6.0600E-01    1.8000E-01    6.0000E-03e
8735 * icflg  * f             0e
8736 * nff    * f             1e
8737 * alp    * r06 1.0000E+00r05 0.0000E+00e
8738 * vl     * f   0.0000E+00e
8739 * vv     * f   0.0000E+00e
8740 * tl     * f   5.1090E+02e
8741 * tv     * f   5.1090E+02e
8742 * p      * f   6.2800E+06e
8743 * pa     * f   0.0000E+00e
8744 *     side-cell arrays
8745 * dx     *      2.5000E-01e
8746 * vol    *      2.5000E-01e
8747 * fa     * f   5.0000E-01e
8748 * fric   * f   1.0e-06 e
8749 * grav   * f   0.0000E+00e
8750 * hd     * f   1.0000E-01e
8751 * icflg  * f             0e
8752 * nff    * f             1e
8753 * alp    *      0.0000E+00e
8754 * vl     * f   0.0000E+00e
8755 * vv     * f   0.0000E+00e
8756 * tl     *      5.5280E+02e
8757 * tv     *      5.5280E+02e
8758 * p      *      6.2800E+06e
8759 * pa     *      0.0000E+00e
8760 ************************************************************************
8761 *  type       num          id           ctitle                          cd 1
8762 pipe          124      124 $124$ sg-a steam exit
8763 *
8764 *  ncells     nodes        jun1         jun2         epsw               cd 2
8765    6           0            58           345          1.0e-05
8766 *  ichf       iconc        iacc         ipow                            cd 3
8767    1           0            0            0
8768 *  radin      th           houtl        houtv        toutl              cd 6
8769       0.0        0.0          0.0          0.0          0.0
8770 *  toutv      powin        powoff       rpowmx       powscl             cd 7
8771    0.0         0.0          0.0          1.0e20       1.0
8772 *    cell arrays
8773 * dx     * r03 7.0000E-01r03 1.7650E+00e
8774 * vol    *      2.0000E+00    1.6000E+00    1.2000E+00r03 2.9400E+00e
8775 * fa     *    4.3450E+00   3.6800E+00   3.0000E+00r03 2.1670E+00   5.8580E-01 e
8776 * fric   * f   1.0e-06 e
8777 * grav   *    1.0000E+00   7.0700E-01  -7.0700E-01r03-1.0000E+00   0.0000E+00 e
8778 * hd     *      6.0000E-03r05 6.0960E-01  0.8636 e
8779 * icflg  * f             0e
8780 * nff    * r6  1       1e
8781 * alp    * f   1.0000E+00e
8782 * vl     * f   0.0000E+00e
8783 * vv     * f   0.0000E+00e
8784 * tl     * f   5.5280E+02e
8785 * tv     * f   5.5280E+02e
8786 * p      * f   6.2800E+06e
8787 * pa     * f   0.0000E+00e
8788 ************************************************************************
8789 * type       num          id           ctitle                          cd 1
8790 valve         148          148 $148$  sg a fw switchover valve
8791 *
8792 * ncells     nodes        jun1         jun2         epsw               cd 2
8793    4           0            147          149          1.0e-05
8794 * ichf       iconc        ivty         ivps         nvtb2              cd 3
8795    1           0            3            3            0
8796 * ivtr       ivsv         nvtb1        nvsv         nvrf               cd 4
8797    50          1            -2           0            0
8798 * ivtrov     ivtyov                                                    cd 6
8799    0           0
8800 * rvmx       rvov         fminov       fmaxov                          cd 7
8801    1.0      1.0          0.0          1.0
```



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8802 * radin      th           houtl        houtv        toutl              cd 8
8803       0.0        0.0          0.0          0.0          0.0
8804 * toutv      avlve        hvlve        favlve       xpos               cd 9
8805       0.0        0.016815     0.1463       0.0          0.0
8806 *
8807 *    cell arrays
8808 * dx     *  f 6.795 e
8809 * vol    *  f 0.114258 e
8810 * fa     *  f 0.016815 e
8811 * fric   *  f 1.0e-06
8812 * grav   *  0.0  r3 1.0  0.0 e
8813 * hd     *  f 0.1463 e
8814 * icflg  *  f 0 e
8815 * nff    *  r2 1  -1  f 1 e
8816 * alp    *  f 0.0 e
8817 * vl     *  f 0.0 e
8818 * vv     *  f 0.0 e
8819 * tl     *  f 510.9 e
8820 * tv     *  f 510.9 e
8821 * p      *  f 6.3e06 e
8822 * pa     *  f 0.0 e
8823 *
8824 * vtb1   *  0.0  0.0  5.0  1.0 e
8825 *
8826 ************************************************************************
8827 * type       num          id           ctitle                          cd 1
8828 valve           150      150 $150$ efw line a check valve
8829 *       ncells          nodes          jun1          jun2          epsw
8830                 2              0            149           151    0.0000E+00
8831 *         ichf           iconc          ivty          ivps          nvtb2
8832                 0              0             3             2              0
8833 *         ivtr           ivsv          nvtb1          nvsv          nvrf
8834              -150              1            -2             0             0
8835 *       ivtrov         ivtyov
8836                 0              0
8837 *         rvmx           rvov         fminov        fmaxov
8838     4.0000E+00     4.0000E+00    0.0000E+00    0.0000E+00
8839 *        radin             th          houtl         houtv         toutl
8840     0.0            0.0           0.0000E+00    0.0000E+00    0.0000E+00
8841 *        toutv          avlve         hvlve         favlve        xpos
8842     0.0000E+00     0.016815      0.1463        0.0000E+00    0.0000E+00
8843 *
8844 * dx     *  f 6.795 e
8845 * vol    *  f 0.114258 e
8846 * fa     *  f 0.016815 e
8847 * fric   *  1.0e-06  0.02222  1.0e-06 e
8848 * grav   *  f 0.0 e
8849 * hd     *  f 0.1463 e
8850 * icflg  *  f 0 e
8851 * nff    *  1  -1  1 e
8852 * alp    *  f 0.0 e
8853 * vl     *  f 0.0 e
8854 * vv     *  f 0.0 e
8855 * tl     *  f 510.9 e
8856 * tv     *  f 510.9 e
8857 * p      *  f 6.3e06 e
8858 * pa     *  f 0.0 e
8859 *
8860 * vtb1   *  0.0  0.0  0.5  1.0 e
8861 *
8862 ************************************************************************
8863 *  type       num          id           ctitle                          cd 1
8864 tee            152          152 $152$ sg a efw inlet line
8865 *
8866 * jcell      nodes        ichf         cost          epsw               cd 2
8867    2           0            1            0.0          1.0e-05
8868 * iconc1     ncell1       jun1         jun2          ipow1              cd 3
8869    0           10           151          72            0
8870 * radin1     th1          houtl1       houtv1        toutl1             cd 6
8871    0.0         0.0          0.0          0.0           0.0
8872 * toutv1     pwin1        pwoff1       rpwmx1        pwscl1             cd 7
8873      0.0         0.0          0.0          1.0e20        1.0
8874 * iconc2     ncell2       jun3         ipow2                            cd 9
```

```
8875      0          1          153          0
8876  * radin2      th2        houtl2       houtv2       toutl2          cd 12
8877    0.0          0.0        0.0          0.0          0.0
8878  * toutv2      pwin2      pwoff2       rpwmx2       pwscl2          cd 13
8879     0.0          0.0        0.0          1.0e20       1.0
8880  *     main-cell arrays
8881  * dx     *   f 7.798 e
8882  * vol    *   f 0.131123 e
8883  * fa     *   f 0.016815 e
8884  * fric   *   f 1.e-6 e
8885  * grav   *   f 0.0 e
8886  * hd     *   f 0.1463 e
8887  * icflg  *   f 0 e
8888  * nff    *   f 1 e
8889  * alp    *   f 0.0 e
8890  * vl     *   f 0.0 e
8891  * vv     *   f 0.0 e
8892  * tl     *   f 380.0 e
8893  * tv     *   f 380.0 e
8894  * p      *   f 6.3e06 e
8895  * pa     *   f 0.0 e
8896  *     side-cell arrays
8897  * dx     *   f 7.798 e
8898  * vol    *   f 0.1311 e
8899  * fa     *   f 0.016815 e
8900  * fric   *   f 1.0e-06 e
8901  * grav   *   f 0.0 e
8902  * hd     *   f 0.1463 e
8903  * icflg  *   f 0 e
8904  * nff    *   f 1 e
8905  * alp    *   f 0.0 e
8906  * vl     *   f 0.0 e
8907  * vv     *   f 0.0 e
8908  * tl     *   f 372.03 e
8909  * tv     *   f 372.03 e
8910  * p      *   f 6.3e06 e
8911  * pa     *   f 0.0 e
8912  *
8913  ********************************************************************************
8914  *  type       num          id           ctitle                          cd 1
8915  tee          154          154 $154$ sg a efw header
8916  *
8917  * jcell      nodes        ichf         cost         epsw            cd 2
8918     1            0          1            0.0        1.0e-05
8919  * iconc1     ncell1       jun1         jun2         ipow1           cd 3
8920     0            1          157          155          0
8921  * radin1     th1          houtl1       houtv1       toutl1          cd 6
8922    0.0          0.0        0.0          0.0          0.0
8923  * toutv1     pwin1        pwoff1       rpwmx1       pwscl1          cd 7
8924     0.0          0.0        0.0          1.0e20       1.0
8925  * iconc2     ncell2       jun3         ipow2                        cd 9
8926     0            1          153          0
8927  * radin2     th2          houtl2       houtv2       toutl2          cd 12
8928    0.0          0.0        0.0          0.0          0.0
8929  * toutv2     pwin2        pwoff2       rpwmx2       pwscl2          cd 13
8930     0.0          0.0        0.0          1.0e20       1.0
8931  *     main-cell arrays
8932  * dx     *   f 7.798 e
8933  * vol    *   f 0.1311 e
8934  * fa     *   f 0.016815 e
8935  * fric   *   f 1.e-6 e
8936  * grav   *   f 0.0 e
8937  * hd     *   f 0.1463 e
8938  * icflg  *   f 0 e
8939  * nff    *   f 1 e
8940  * alp    *   f 0.0 e
8941  * vl     *   f 0.0 e
8942  * vv     *   f 0.0 e
8943  * tl     *   f 380.0 e
8944  * tv     *   f 380.0 e
8945  * p      *   f 6.3e06 e
8946  * pa     *   f 0.0 e
8947  *     side-cell arrays
```



```
8948  * dx     *   f 7.798 e
8949  * vol    *   f 0.1311 e
8950  * fa     *   f 0.016815 e
8951  * fric   *   f 1.0e-06 e
8952  * grav   *   f 0.0 e
8953  * hd     *   f 0.1463 e
8954  * icflg  *   f 0 e
8955  * nff    *   f 1 e
8956  * alp    *   f 0.0 e
8957  * vl     *   f 0.0 e
8958  * vv     *   f 0.0 e
8959  * tl     *   f 372.03 e
8960  * tv     *   f 372.03 e
8961  * p      *   f 6.3e06 e
8962  * pa     *   f 0.0 e
8963  *
8964  ********************************************************************************
8965  *******   type           num            id          ctitle
8966  fill          156      156 $156$ sg a md efw
8967  *          jun1           ifty          ioff
8968               155            5             0
8969  *          iftr           ifsv          nftb          nfsv          nfrf
8970               0           -1697            0             0             0
8971  *        twtold           rfmx         concin          felv
8972       9.0000E-01     1.0000E+03     0.0000E+00     0.0000E+00
8973  *          dxin           volin          alpin          vlin          tlin
8974       1.0000E+00     1.8200E-02     0.0000E+00     0.0000E+00     2.9430E+02
8975  *           pin           pain         flowin          vvin          tvin
8976       6.5000E+06     0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
8977  *
8978  ********************************************************************************
8979  *******   type           num            id          ctitle
8980  fill          158      158 $158$ sg a td efw
8981  *          jun1           ifty          ioff
8982               157            5             0
8983  *          iftr           ifsv          nftb          nfsv          nfrf
8984               0           -1794            0             0             0
8985  *        twtold           rfmx         concin          felv
8986       9.0000E-01     1.0000E+03     0.0000E+00     0.0000E+00
8987  *          dxin           volin          alpin          vlin          tlin
8988       1.0000E+00     1.8200E-02     0.0000E+00     0.0000E+00     2.9430E+02
8989  *           pin           pain         flowin          vvin          tvin
8990       6.5000E+06     0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
8991  *
8992  ********************************************************************************
8993  *  type       num          id           ctitle                          cd 1
8994  tee          201      201 $201$ sg-b boiler region
8995  *
8996  * jcell      nodes        ichf         cost         epsw            cd 2
8997     10           0          1            0.0          1.0e-05
8998  * iconc1     ncell1       jun1         jun2         ipow1           cd 3
8999    0            11          46           481          0
9000  * radin1     th1          houtl1       houtv1       toutl1          cd 6
9001     0.0          0.0        0.0          0.0          0.0
9002  * toutv1     pwin1        pwoff1       rpwmx1       pwscl1          cd 7
9003    0.0          0.0        0.0          1.0e20       1.0
9004  * iconc2     ncell2       jun3         ipow2                        cd 9
9005    0            1          47           0
9006  * radin2     th2          houtl2       houtv2       toutl2          cd 12
9007     0.0          0.0        0.0          0.0          0.0
9008  * toutv2     pwin2        pwoff2       rpwmx2       pwscl2          cd 13
9009    0.0          0.0        0.0          1.0e20       1.0
9010  *     main-cell arrays
9011  * dx     *       5.0000E-02     1.0000E-01     2.0000E-01     4.0000E-01     1.0150E+00
9012  * dx     * r06 1.7650E+00e
9013  * vol    *       1.9700E-01     3.9400E-01     7.8800E-01     1.5750E+00     3.9970E+00
9014  * vol    * r06 6.9500E+00e
9015  * fa     * f   4.3450E+00e
9016  * fric   *       1.0000E-02     5.0000E-04     1.0000E-03     2.0000E-03     4.0000E-03
9017  * fric   * r06 1.0000E-02     1.0e-06 e
9018  * grav   *       0.0000E+00r11 1.0000E+00e
9019  * hd     *       6.0000E-03r09 4.0000E-03r02 5.0000E-03e
9020  * icflg  * f              0e
```

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9021 * nff    * f            1e
9022 * alp    * r05 0.0000E+00r06 1.0000E+00e
9023 * vl     * f   0.0000E+00e
9024 * vv     * f   0.0000E+00e
9025 * tl     * f   5.5280E+02e
9026 * tv     * f   5.5280E+02e
9027 * p      * f   6.2800E+06e
9028 * pa     * f   0.0000E+00e
9029 *    side-cell arrays
9030 * dx     *     2.5000E-01e
9031 * vol    *     2.5000E-01e
9032 * fa     * f   5.0000E-01e
9033 * fric   * f   1.0e-06 e
9034 * grav   * f   0.0000E+00e
9035 * hd     * f   1.0000E-01e
9036 * icflg  * f            0e
9037 * nff    * f            1e
9038 * alp    *     0.0000E+00e
9039 * vl     * f   0.0000E+00e
9040 * vv     * f   0.0000E+00e
9041 * tl     *     5.5280E+02e
9042 * tv     *     5.5280E+02e
9043 * p      *     6.2800E+06e
9044 * pa     *     0.0000E+00e
9045 ************************************************************************
9046 *  type       num          id          ctitle                        cd 1
9047 tee           202       202 $202$ sg-b upper boiler region
9048 *
9049 * jcell      nodes        ichf        cost        epsw              cd 2
9050     2           0           1         0.0         1.0e-05
9051 * iconc1     ncell1       jun1        jun2        ipow1             cd 3
9052   0            2           481         48          0
9053 * radin1     th1          houtl1      houtv1      toutl1            cd 6
9054     0.0         0.0         0.0         0.0         0.0
9055 * toutv1     pwin1        pwoff1      rpwmx1      pwscl1            cd 7
9056   0.0         0.0         0.0         1.0e20      1.0
9057 * iconc2     ncell2       jun3        ipow2                         cd 9
9058   0           1           62          0
9059 * radin2     th2          houtl2      houtv2      toutl2            cd 12
9060     0.0         0.0         0.0         0.0         0.0
9061 * toutv2     pwin2        pwoff2      rpwmx2      pwscl2            cd 13
9062   0.0         0.0         0.0         1.0e20      1.0
9063 *    main-cell arrays
9064 * dx     * f   1.7650E+00e
9065 * vol    * f   6.9500E+00e
9066 * fa     * f   4.3450E+00e
9067 * fric   * f   1.0e-06 e
9068 * grav   * f   1.0000E+00e
9069 * hd     * r02 5.0000E-03    6.0000E-03e
9070 * icflg  * f            0e
9071 * nff    * f            1e
9072 * alp    * f   1.0000E+00e
9073 * vl     * f   0.0000E+00e
9074 * vv     * f   0.0000E+00e
9075 * tl     * f   5.5250E+02e
9076 * tv     * f   5.5280E+02e
9077 * p      * f   6.2800E+06e
9078 * pa     * f   0.0000E+00e
9079 *    side-cell arrays
9080 * dx     *     1.0000E+00e
9081 * vol    *     1.6815E-02e
9082 * fa     * f   1.6815E-02e
9083 * fric   * f   1.0e-06 e
9084 * grav   * f   0.0000E+00e
9085 * hd     * f   1.4630E-01e
9086 * icflg  * f            0e
9087 * nff    * f            1e
9088 * alp    *     0.0000E+00e
9089 * vl     * f   0.0000E+00e
9090 * vv     * f   0.0000E+00e
9091 * tl     *     5.5280E+02e
9092 * tv     *     5.5280E+02e
9093 * p      *     6.2800E+06e
```



```
9094 * pa     *     0.0000E+00e
9095 ************************************************************************
9096 *  type       num          id          ctitle                        cd 1
9097 tee           203       203 $203$ sg-b downcomer region
9098 *
9099 * jcell      nodes        ichf        cost        epsw              cd 2
9100     1           0           1         0.0         1.0e-05
9101 * iconc1     ncell1       jun1        jun2        ipow1             cd 3
9102   0            11          60          46          0
9103 * radin1     th1          houtl1      houtv1      toutl1            cd 6
9104     0.0         0.0         0.0         0.0         0.0
9105 * toutv1     pwin1        pwoff1      rpwmx1      pwscl1            cd 7
9106   0.0         0.0         0.0         1.0e20      1.0
9107 * iconc2     ncell2       jun3        ipow2                         cd 9
9108   0           1           47          0
9109 * radin2     th2          houtl2      houtv2      toutl2            cd 12
9110     0.0         0.0         0.0         0.0         0.0
9111 * toutv2     pwin2        pwoff2      rpwmx2      pwscl2            cd 13
9112   0.0         0.0         0.0         1.0e20      1.0
9113 *    main-cell arrays
9114 * dx     *     1.7650E+00r02 8.8250E-01r03 1.7650E+00    1.0150E+00    4.0000E-01
9115 * dx     *     2.0000E-01    1.0000E-01    5.0000E-02e
9116 * vol    *     3.5270E+00r02 1.7635E+00r03 3.5270E+00    2.0280E+00    7.9900E-01
9117 * vol    *     4.0000E-01    2.0000E-01    1.0000E-01e
9118 * fa     *     1.5000E-01r09 2.1670E+00    4.7000E-01    4.3450E+00e
9119 * fric   * r10 1.0e-06     1.4000E+01    1.0000E-02e
9120 * grav   *     0.0000E+00r10-1.0000E+00    0.0000E+00e
9121 * hd     *     1.0000E-01r09 6.0600E-01    1.8000E-01    6.0000E-03e
9122 * icflg  * f            0e
9123 * nff    * f            1e
9124 * alp    * r06 1.0000E+00r05 0.0000E+00e
9125 * vl     * f   0.0000E+00e
9126 * vv     * f   0.0000E+00e
9127 * tl     * f   5.1090E+02e
9128 * tv     * f   5.1090E+02e
9129 * p      * f   6.2800E+06e
9130 * pa     * f   0.0000E+00e
9131 *    side-cell arrays
9132 * dx     *     2.5000E-01e
9133 * vol    *     2.5000E-01e
9134 * fa     * f   5.0000E-01e
9135 * fric   * f   1.0e-06 e
9136 * grav   * f   0.0000E+00e
9137 * hd     * f   1.0000E-01e
9138 * icflg  * f            0e
9139 * nff    * f            1e
9140 * alp    *     0.0000E+00e
9141 * vl     * f   0.0000E+00e
9142 * vv     * f   0.0000E+00e
9143 * tl     *     5.5280E+02e
9144 * tv     *     5.5280E+02e
9145 * p      *     6.2800E+06e
9146 * pa     *     0.0000E+00e
9147 ************************************************************************
9148 *  type       num          id          ctitle                        cd 1
9149 pipe          204       204 $204$ sg-b steam exit
9150 *
9151 *  ncells     nodes        jun1        jun2        epsw              cd 2
9152     6           0           48          445         1.0e-05
9153 *  ichf       iconc        iacc        ipow                          cd 3
9154     1           0           0           0
9155 *  radin      th           houtl       houtv       toutl             cd 6
9156       0.0         0.0         0.0         0.0         0.0
9157 *  toutv      powin        powoff      rpowmx      powscl            cd 7
9158     0.0         0.0         0.0         1.0e20      1.0
9159 *   cell arrays
9160 * dx     * r03 7.0000E-01r03 1.7650E+00e
9161 * vol    *     2.0000E+00    1.6000E+00    1.2000E+00r03 2.9400E+00e
9162 * fa     *    4.3450E+00   3.6800E+00   3.0000E+00r03 2.1670E+00   5.8580E-01 e
9163 * fric   * f   1.0e-06 e
9164 * grav   *    1.0000E+00   7.0700E-01  -7.0700E-01r03-1.0000E+00   0.0000E+00 e
9165 * hd     *     6.0000E-03r05 6.0960E-01   0.8636 e
9166 * icflg  * f            0e
```

```
* nff    * r6  1       1e
* alp    * f   1.0000E+00e
* vl     * f   0.0000E+00e
* vv     * f   0.0000E+00e
* tl     * f   5.5280E+02e
* tv     * f   5.5280E+02e
* p      * f   6.2800E+06e
* pa     * f   0.0000E+00e
*
************************************************************************
* type        num         id          ctitle                      cd 1
valve         248         248 $248$  sg b fw switchover valve
*
* ncells      nodes       jun1        jun2        epsw            cd 2
   4          0           247         249         1.0e-05
* ichf        iconc       ivty        ivps        nvtb2           cd 3
  1           0           3           3           0
* ivtr        ivsv        nvtb1       nvsv        nvrf            cd 4
  50          1           -2          0           0
* ivtrov      ivtyov                                              cd 6
  0           0
* rvmx        rvov        fminov      fmaxov                      cd 7
  1.0     1.0       0.0         1.0
* radin       th          houtl       houtv       toutl           cd 8
    0.0         0.0         0.0         0.0         0.0
* toutv       avlve       hvlve       favlve      xpos            cd 9
    0.0       0.016815      0.1463      0.0       0.0
*
*    cell arrays
* dx     *  f 6.795 e
* vol    *  f 0.114258 e
* fa     *  f 0.016815 e
* fric   *  f 1.0e-06
* grav   *  0.0  r3 1.0  0.0 e
* hd     *  f 0.1463 e
* icflg  *  f 0 e
* nff    *  r2 1  -1  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 510.9 e
* tv     *  f 510.9 e
* p      *  f 6.3e06 e
* pa     *  f 0.0 e
*
* vtb1   *  0.0  0.0  5.0  1.0 e
*
************************************************************************
* type        num         id          ctitle                      cd 1
valve          250       250 $250$ efw line b check valve
*       ncells          nodes          jun1          jun2          epsw
                2              0           249           251    0.0000E+00
*         ichf          iconc          ivty          ivps          nvtb2
                0              0             3             2              0
*         ivtr           ivsv         nvtb1          nvsv          nvrf
             -250              1            -2             0             0
*       ivtrov         ivtyov
                0              0
*         rvmx           rvov        fminov        fmaxov
     4.0000E+00     4.0000E+00    0.0000E+00    0.0000E+00
*        radin             th          houtl         houtv         toutl
     0.0               0.0           0.0000E+00    0.0000E+00    0.0000E+00
*        toutv          avlve          hvlve         favlve          xpos
     0.0000E+00     0.016815       0.1463        0.0000E+00    0.0000E+00
*
* dx     *  f 6.795 e
* vol    *  f 0.114258 e
* fa     *  f 0.016815 e
* fric   *  1.0e-06  0.02222  1.0e-06 e
* grav   *  f 0.0 e
* hd     *  f 0.1463 e
* icflg  *  f 0 e
* nff    *  1  -1  1 e
```



```
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 510.9 e
* tv     *  f 510.9 e
* p      *  f 6.3e06 e
* pa     *  f 0.0 e
*
* vtb1   *  0.0  0.0  0.5  1.0 e
*
************************************************************************
*  type       num         id          ctitle                      cd 1
tee           252         252 $252$ sg b efw inlet line
*
* jcell       nodes       ichf        cost        epsw            cd 2
    1           0           1          0.0       1.0e-05
* iconc1      ncell1      jun1        jun2        ipow1           cd 3
    0           4         251         62            0
* radin1      th1         houtl1      houtv1      toutl1          cd 6
  0.0         0.0         0.0         0.0         0.0
* toutv1      pwin1       pwoff1      rpwmx1      pwscl1          cd 7
   0.0         0.0         0.0         1.0e20      1.0
* iconc2      ncell2      jun3        ipow2                       cd 9
    0           1         253           0
* radin2      th2         houtl2      houtv2      toutl2          cd 12
  0.0         0.0         0.0         0.0         0.0
* toutv2      pwin2       pwoff2      rpwmx2      pwscl2          cd 13
   0.0         0.0         0.0         1.0e20      1.0
*    main-cell arrays
* dx     *  f 6.27 e
* vol    *  f 0.10543 e
* fa     *  f 0.016815 e
* fric   *  f 1.e-6 e
* grav   *  f 0.0 e
* hd     *  f 0.1463 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 380.0 e
* tv     *  f 380.0 e
* p      *  f 6.3e06 e
* pa     *  f 0.0 e
*    side-cell arrays
* dx     *  f 6.27 e
* vol    *  f 0.10543 e
* fa     *  f 0.016815 e
* fric   *  f 1.0e-06 e
* grav   *  f 0.0 e
* hd     *  f 0.1463 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 372.03 e
* tv     *  f 372.03 e
* p      *  f 6.3e06 e
* pa     *  f 0.0 e
*
************************************************************************
*  type       num         id          ctitle                      cd 1
tee           254         254 $254$ sg b efw header
*
* jcell       nodes       ichf        cost        epsw            cd 2
    1           0           1          0.0       1.0e-05
* iconc1      ncell1      jun1        jun2        ipow1           cd 3
    0           1         257         255           0
* radin1      th1         houtl1      houtv1      toutl1          cd 6
  0.0         0.0         0.0         0.0         0.0
* toutv1      pwin1       pwoff1      rpwmx1      pwscl1          cd 7
   0.0         0.0         0.0         1.0e20      1.0
```

```
9313 * iconc2     ncell2      jun3        ipow2                    cd 9
9314     0          1          253          0
9315 * radin2     th2         houtl2      houtv2      toutl2       cd 12
9316   0.0          0.0         0.0         0.0         0.0
9317 * toutv2     pwin2       pwoff2      rpwmx2      pwscl2       cd 13
9318    0.0         0.0         0.0         1.0e20      1.0
9319 *    main-cell arrays
9320 * dx     *  f 6.27 e
9321 * vol    *  f 0.10543 e
9322 * fa     *  f 0.016815 e
9323 * fric   *  f 1.e-6 e
9324 * grav   *  f 0.0 e
9325 * hd     *  f 0.1463 e
9326 * icflg  *  f 0 e
9327 * nff    *  f 1 e
9328 * alp    *  f 0.0 e
9329 * vl     *  f 0.0 e
9330 * vv     *  f 0.0 e
9331 * tl     *  f 380.0 e
9332 * tv     *  f 380.0 e
9333 * p      *  f 6.3e06 e
9334 * pa     *  f 0.0 e
9335 *    side-cell arrays
9336 * dx     *  f 6.27 e
9337 * vol    *  f 0.10543 e
9338 * fa     *  f 0.016815 e
9339 * fric   *  f 1.0e-06 e
9340 * grav   *  f 0.0 e
9341 * hd     *  f 0.1463 e
9342 * icflg  *  f 0 e
9343 * nff    *  f 1 e
9344 * alp    *  f 0.0 e
9345 * vl     *  f 0.0 e
9346 * vv     *  f 0.0 e
9347 * tl     *  f 372.03 e
9348 * tv     *  f 372.03 e
9349 * p      *  f 6.3e06 e
9350 * pa     *  f 0.0 e
9351 *
9352 ************************************************************************
9353 *******   type          num           id        ctitle
9354 fill          256      256 $256$ sg b md efw
9355 *          jun1          ifty          ioff
9356             255             5             0
9357 *          iftr          ifsv          nftb          nfsv          nfrf
9358              0         -1698             0             0             0
9359 *        twtold          rfmx        concin          felv
9360      9.0000E-01    1.0000E+03    0.0000E+00    0.0000E+00
9361 *          dxin          volin         alpin          vlin          tlin
9362      1.0000E+00    1.8200E-02    0.0000E+00    0.0000E+00    2.9430E+02
9363 *           pin          pain         flowin          vvin          tvin
9364      6.5000E+06    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
9365 *
9366 ************************************************************************
9367 *******   type          num           id        ctitle
9368 fill          258      258 $258$ sg b td efw
9369 *          jun1          ifty          ioff
9370             257             5             0
9371 *          iftr          ifsv          nftb          nfsv          nfrf
9372              0         -1795             0             0             0
9373 *        twtold          rfmx        concin          felv
9374      9.0000E-01    1.0000E+03    0.0000E+00    0.0000E+00
9375 *          dxin          volin         alpin          vlin          tlin
9376      1.0000E+00    1.8200E-02    0.0000E+00    0.0000E+00    2.9430E+02
9377 *           pin          pain         flowin          vvin          tvin
9378      6.5000E+06    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
9379 *
9380 ************************************************************************
9381 *  type      num          id          ctitle                      cd 1
9382 tee      345     345     $345$ main steam line a to safety valves
9383 *
9384 *         jcell         nodes          ichf          cost          epsw
9385               3             1             0    0.0000e+00    4.5720e-05
```



```
9386 *        iconc1        ncell1         jun1         jun2         ipow1
9387             0             5          345          350             0
9388 *        iqptr1        iqpsv1       nqptb1       nqpsv1       nqprf1
9389             0             0            0            0            0
9390 *        radin1           th1       houtl1       houtv1       toutl1
9391       0.4318        0.0175       0.0000e+00   0.0000e+00   295.0
9392 *        toutv1
9393          295.0
9394 *         qpin1        qpoff1       rqpmx1       qpscl1
9395     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
9396 *        iconc2        ncell2         jun3         ipow2
9397             0             1          365            0
9398 *        iqptr2        iqpsv2       nqptb2       nqpsv2       nqprf2
9399             0             0            0            0            0
9400 *        radin2           th2       houtl2       houtv2       toutl2
9401          0.05          0.01       0.0000e+00   0.0000e+00   295.0
9402 *        toutv2
9403          295.0
9404 *         qpin2        qpoff2       rqpmx2       qpscl2
9405     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
9406 *
9407 * dx     * f   6.096  e
9408 * vol    * f   3.571 e
9409 * fa     * f   0.5858 e
9410 * fric   * f   1.0000e-06e
9411 * grav   * f   0.0 e
9412 * hd     * f   0.8636 e
9413 * icflg  * f   0 e
9414 * nff    *  f 1 e
9415 * alp    * f   1.0 e
9416 * vl     * f  0.0 e
9417 * vv     * f  0.0 e
9418 * tl     * f   610.0 e
9419 * tv     * f   610.0 e
9420 * p      * f   6.274e+06 e
9421 * pa     * f   0.0000e+00e
9422 * qppp   * f   0.0000E+00e
9423 * matid  *  f             7e
9424 * tw     * f   610.0 e
9425 *
9426 * dx     *       f 1.0 e
9427 * vol    *      f 0.3728 e
9428 * fa     *    f 0.3728 e
9429 * fric   * f   1.0000e-06e
9430 * grav   * f   1.0000e+00e
9431 * hd     * f   1.0893e-01e
9432 * icflg  * f   0e
9433 * nff    * f   1e
9434 * alp    *     1.0000e+00e
9435 * vl     * f   0.0000e+00e
9436 * vv     * f   0.0000e+00e
9437 * tl     * f   610.0 e
9438 * tv     * f   610.0 e
9439 * p      * f   6.274e+06 e
9440 * pa     *     0.0000e+00e
9441 * qppp   * f   0.0000E+00e
9442 * matid  *  f             7e
9443 * tw     * f   610.0 e
9444 *
9445 ************************************************************************
9446 *  type      num          id          ctitle                      cd 1
9447 tee          350         350  $350$  loop a main steam line
9448 *         jcell         nodes          ichf          cost          epsw
9449              14             1             0    0.0000e+00    4.5720e-05
9450 *        iconc1        ncell1         jun1         jun2         ipow1
9451             0             14          350          355            0
9452 *        iqptr1        iqpsv1       nqptb1       nqpsv1       nqprf1
9453             0             0            0            0            0
9454 *        radin1           th1       houtl1       houtv1       toutl1
9455       0.4318        0.0175          0.0          0.0          295.0
9456 *        toutv1
9457          295.0
9458 *         qpin1        qpoff1       rqpmx1       qpscl1
```

```
9459      0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
9460  *        iconc2         ncell2          jun3          ipow2
9461               0              1           370              0
9462  *        iqptr2         iqpsv2        nqptb2        nqpsv2        nqprf2
9463               0              0             0             0             0
9464  *        radin2            th2         houtl2        houtv2        toutl2
9465            0.05           0.01            0.0           0.0         295.0
9466  *        toutv2
9467            295.0
9468  *         qpin2         qpoff2        rqpmx2        qpscl2
9469      0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
9470  *
9471  * dx     * f   7.088 e
9472  * vol    * f   4.1522 e
9473  * fa     * f   0.5858 e
9474  * fric   *  1.0e-06  r13 0.0190  1.0e-06 e
9475  * grav   * f   0.0 e
9476  * hd     * f   0.8636 e
9477  * icflg  * f             0e
9478  * nff    * f   1 e
9479  * alp    * f   1.0000e+00e
9480  * vl     *   f 0.0 e
9481  * vv     *   f 0.0 e
9482  * tl     *   f 610.0 e
9483  * tv     *   f 610.0 e
9484  * p      *   f 6.274e06 e
9485  * pa     * f   0.0 e
9486  * qppp   * f   0.0000E+00e
9487  * matid  *  f               7e
9488  * tw     * f   6.1000E+02e
9489  *
9490  * dx     *        f 1.0 e
9491  * vol    *      f 0.0932 e
9492  * fa     *    f 0.0932 e
9493  * fric   * f   1.0000e-06e
9494  * grav   * f   0.0000e+00e
9495  * hd     * f   1.0893e-01e
9496  * icflg  * f             0e
9497  * nff    * f             1e
9498  * alp    * f   1.0000e+00e
9499  * vl     * f   0.0000e+00e
9500  * vv     * f   0.0000e+00e
9501  * tl     *  f 610.0 e
9502  * tv     *   f 610.0 e
9503  * p      *   f 6.274e06 e
9504  * pa     * f   0.0000e+00e
9505  * qppp   * f   0.0000E+00e
9506  * matid  *  f               7e
9507  * tw     * f   6.1000E+02e
9508  *
9509  ************************************************************************
9510  *******   type           num           id        ctitle
9511  valve          355      355 $355$  sg a turbine stop valve
9512  *        ncells         nodes          jun1          jun2          epsw
9513               1             0           355           360    0.0000E+00
9514  *          ichf         iconc          ivty          ivps         nvtb2
9515               0             0             4             2             0
9516  *          ivtr          ivsv         nvtb1          nvsv          nvrf
9517              45             1            -2             0             0
9518  *        ivtrov        ivtyov
9519               0             0
9520  *          rvmx          rvov        fminov        fmaxov
9521     1.0000         1.0000        0.0000E+00    0.0000E+00
9522  *         radin            th         houtl         houtv         toutl
9523     0.0            0.0000        0.0000E+00    0.0000E+00    0.0000E+00
9524  *         toutv         avlve         hvlve         favlve          xpos
9525     0.0000E+00    0.15675       0.44674       1.0000E+00    1.0000E+00
9526  *
9527  * dx     * f   7.088 e
9528  * vol    * f   4.1522 e
9529  * fa     * f   0.5858 e
9530  * fric   * f   1.0000e-06e
9531  * grav   * f   0.0 e
```



```
9532  * hd     * f   0.8636 e
9533  * icflg  * f             0e
9534  * nff    *  1  -1 e
9535  * alp    * f   1.0000e+00e
9536  * vl     *  f 0.0 e
9537  * vv     *  f 0.0 e
9538  * tl     *  f 610.0 e
9539  * tv     *  f 610.0 e
9540  * p      *  f 6.274e06 e
9541  * pa     * f   0.0 e
9542  *
9543  * vtbl   * 0.0    1.0     1.0     0.0 e
9544  *
9545  ************************************************************************
9546  *******   type           num           id        ctitle
9547  break          360      360 $360$ loop a steam exit boundary
9548  *          jun1          ibty          isat          ioff
9549               360             0             0             0
9550  *          dxin          volin         alpin           tin           pin
9551         7.0880     4.1522        1.0000E+00    5.5200E+02    5.8641E+06
9552  *          pain         concin          rbmx          poff          belv
9553      0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
9554  *
9555  ************************************************************************
9556  *******   type           num           id        ctitle
9557  valve          365      365 $365$ sl-a safety relief valves
9558  *        ncells         nodes          jun1          jun2          epsw
9559               1             0           365           367    0.0000E+00
9560  *          ichf         iconc          ivty          ivps         nvtb2
9561               0             0             3             2             0
9562  *          ivtr          ivsv         nvtb1          nvsv          nvrf
9563              13          -388             0             0             0
9564  *        ivtrov        ivtyov
9565               0             0
9566  *          rvmx          rvov        fminov        fmaxov
9567     1.0000E+02    0.0000E+00    0.0000E+00    0.0000E+00
9568  *         radin            th         houtl         houtv         toutl
9569     3.1750E-02    5.0000E-01    0.0000E+00    0.0000E+00    0.0000E+00
9570  *         toutv         avlve         hvlve         favlve          xpos
9571     0.0000E+00    0.07456       0.10893    0.0        -1.0
9572  *
9573  * dx     *        f 1.0 e
9574  * vol    *      f 0.3728 e
9575  * fa     *    f 0.3728 e
9576  * fric   * f   1.0000e-06e
9577  * grav   * f   1.0000e+00e
9578  * hd     * f   1.0893e-01e
9579  * icflg  * 0   1e
9580  * nff    * 1  -1e
9581  * alp    *      1.0000e+00e
9582  * vl     * f   0.0000e+00e
9583  * vv     * f   0.0000e+00e
9584  * tl     * f   565.7 e
9585  * tv     * f   565.7 e
9586  * p      * f   6.274e+06 e
9587  * pa     *     0.0000e+00e
9588  *
9589  ************************************************************************
9590  *******   type           num           id        ctitle
9591  break          367      367 $367$ sl-a srv boundary
9592  *          jun1          ibty          isat          ioff
9593               367             0             0             0
9594  *          dxin          volin         alpin           tin           pin
9595     0.1000E+00    0.3728        1.0000E+00    3.0540E+02    1.01323+05
9596  *          pain         concin          rbmx          poff          belv
9597     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
9598  *
9599  ************************************************************************
9600  *******   type           num           id        ctitle
9601  valve          370      370 $370$ sl-a turbine bypass valves
9602  *        ncells         nodes          jun1          jun2          epsw
9603               1             0           370           372    0.0000E+00
9604  *          ichf         iconc          ivty          ivps         nvtb2
```

```
9605              0            0            3            2            0
9606 *          ivtr         ivsv        nvtb1         nvsv        nvrf
9607              12        -3388            0            0            0
9608 *        ivtrov       ivtyov
9609              0            0
9610 *          rvmx         rvov       fminov       fmaxov
9611     1.0000E+00   1.0000E+00   0.0000E+00   0.0000E+00
9612 *          radin           th        houtl        houtv        toutl
9613     3.1750E-02   5.0000E-01   0.0000E+00   0.0000E+00   0.0000E+00
9614 *          toutv        avlve        hvlve        favlve         xpos
9615     0.0000E+00   0.01864      0.10893    0.0          -1.0
9616 *
9617 * dx     *       f 1.0 e
9618 * vol    *      f 0.0932 e
9619 * fa     *    f 0.0932 e
9620 * fric   * f    1.0000e-06e
9621 * grav   * f    0.0000e+00e
9622 * hd     * f    1.0893e-01e
9623 * icflg * 0    1e
9624 * nff    * 1   -1e
9625 * alp    *      1.0000e+00e
9626 * vl     * f    0.0000e+00e
9627 * vv     * f    0.0000e+00e
9628 * tl     * f    565.7 e
9629 * tv     * f    565.7 e
9630 * p      * f    6.274e+06 e
9631 * pa     *      0.0000e+00e
9632 *
9633 ********************************************************************
9634 *******   type           num           id        ctitle
9635 break          372      372 $372$ sl-a tbv boundary
9636 *          jun1          ibty          isat          ioff
9637              372             0             0             0
9638 *          dxin         volin         alpin          tin          pin
9639     0.1000E+00   0.0932        1.0000E+00   3.0540E+02   1.01323+05
9640 *          pain         concin        rbmx          poff         belv
9641     0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
9642 *
9643 ********************************************************************
9644 *******   type           num           id        ctitle
9645 tee      445     445     $445$ main steam line a to safety valves
9646 *
9647 *         jcell         nodes         ichf          cost          epsw
9648               3             1            0    0.0000e+00    4.5720e-05
9649 *        iconc1        ncell1         jun1          jun2         ipow1
9650               0             5          445           450             0
9651 *        iqptr1        iqpsv1       nqptb1        nqpsv1        nqprf1
9652               0             0            0             0             0
9653 *        radin1           th1       houtl1        houtv1        toutl1
9654       0.4318       0.0175       0.0000e+00    0.0000e+00         295.0
9655 *        toutv1
9656          295.0
9657 *         qpin1        qpoff1        rqpmx1        qpscl1
9658     0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
9659 *        iconc2        ncell2         jun3         ipow2
9660               0             1          465             0
9661 *        iqptr2        iqpsv2       nqptb2        nqpsv2        nqprf2
9662               0             0            0             0             0
9663 *        radin2           th2       houtl2        houtv2        toutl2
9664          0.05         0.01         0.0000e+00    0.0000e+00         295.0
9665 *        toutv2
9666          295.0
9667 *         qpin2        qpoff2        rqpmx2        qpscl2
9668     0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
9669 *
9670 * dx     * f    6.096  e
9671 * vol    * f    3.571 e
9672 * fa     * f    0.5858 e
9673 * fric   * f    1.0000e-06e
9674 * grav   * f    0.0 e
9675 * hd     * f    0.8636 e
9676 * icflg * f    0 e
9677 * nff    *  f 1 e
```



```
9678 * alp    * f    1.0 e
9679 * vl     * f   0.0 e
9680 * vv     * f   0.0 e
9681 * tl     * f    610.0 e
9682 * tv     * f    610.0 e
9683 * p      * f    6.274e+06 e
9684 * pa     * f    0.0000e+00e
9685 * qppp   * f    0.0000E+00e
9686 * matid *  f              7e
9687 * tw     * f    610.0 e
9688 *
9689 * dx     *       f 1.0 e
9690 * vol    *      f 0.3728 e
9691 * fa     *    f 0.3728 e
9692 * fric   * f    1.0000e-06e
9693 * grav   * f    1.0000e+00e
9694 * hd     * f    1.0893e-01e
9695 * icflg * f    0e
9696 * nff    * f    1e
9697 * alp    *      1.0000e+00e
9698 * vl     * f    0.0000e+00e
9699 * vv     * f    0.0000e+00e
9700 * tl     * f    610.0 e
9701 * tv     * f    610.0 e
9702 * p      * f    6.274e+06 e
9703 * pa     *      0.0000e+00e
9704 * qppp   * f    0.0000E+00e
9705 * matid *  f              7e
9706 * tw     * f    610.0 e
9707 *
9708 ********************************************************************
9709 *  type       num          id          ctitle                    cd 1
9710 tee           450         450  $450$  loop a main steam line
9711 *         jcell1         nodes          ichf          cost          epsw
9712              14             1             0    0.0000e+00    4.5720e-05
9713 *        iconc1        ncell1         jun1          jun2         ipow1
9714               0            14           450           455             0
9715 *        iqptr1        iqpsv1       nqptb1        nqpsv1        nqprf1
9716               0             0            0             0             0
9717 *        radin1           th1       houtl1        houtv1        toutl1
9718       0.4318         0.0175          0.0           0.0          295.0
9719 *        toutv1
9720          295.0
9721 *         qpin1        qpoff1        rqpmx1        qpscl1
9722     0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
9723 *        iconc2        ncell2         jun3         ipow2
9724               0             1          470             0
9725 *        iqptr2        iqpsv2       nqptb2        nqpsv2        nqprf2
9726               0             0            0             0             0
9727 *        radin2           th2       houtl2        houtv2        toutl2
9728             0.05          0.01          0.0           0.0          295.0
9729 *        toutv2
9730          295.0
9731 *         qpin2        qpoff2        rqpmx2        qpscl2
9732     0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
9733 *
9734 * dx     * f    7.088 e
9735 * vol    * f    4.1522 e
9736 * fa     * f    0.5858 e
9737 * fric   *  1.0e-06  r13 0.0190  1.0e-06 e
9738 * grav   * f    0.0 e
9739 * hd     * f    0.8636 e
9740 * icflg * f            0e
9741 * nff    * f    1 e
9742 * alp    * f    1.0000e+00e
9743 * vl     *  f 0.0 e
9744 * vv     *  f 0.0 e
9745 * tl     *  f 610.0 e
9746 * tv     *  f 610.0 e
9747 * p      *  f 6.274e06 e
9748 * pa     * f    0.0 e
9749 * qppp   * f    0.0000E+00e
9750 * matid *  f              7e
```

```
* tw    * f   6.1000E+02e
*
* dx    *        f 1.0 e
* vol   *      f 0.0932 e
* fa    *    f 0.0932 e
* fric  * f   1.0000e-06e
* grav  * f   0.0000e+00e
* hd    * f   1.0893e-01e
* icflg * f            0e
* nff   * f            1e
* alp   * f   1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    *  f 610.0 e
* tv    *  f 610.0 e
* p     *  f 6.274e06 e
* pa    * f   0.0000e+00e
* qppp  * f   0.0000E+00e
* matid *  f           7e
* tw    * f   6.1000E+02e
*
*********************************************************************
*******   type            num            id        ctitle
valve          455      455 $455$  sg b turbine stop valve
*       ncells          nodes          jun1          jun2          epsw
                1              0           455           460    0.0000E+00
*         ichf          iconc          ivty          ivps          nvtb2
                0              0             4             2              0
*         ivtr           ivsv         nvtb1          nvsv          nvrf
               45              1            -2             0              0
*       ivtrov        ivtyov
                0              0
*         rvmx           rvov        fminov        fmaxov
      1.0000          1.0000     0.0000E+00    0.0000E+00
*        radin             th         houtl         houtv         toutl
      0.0             0.0000     0.0000E+00    0.0000E+00    0.0000E+00
*        toutv          avlve         hvlve         favlve          xpos
      0.0000E+00      0.15675       0.44674       1.0000E+00    1.0000E+00
*
* dx    * f   7.088 e
* vol   * f   4.1522 e
* fa    * f   0.5858 e
* fric  * f   1.0000e-06e
* grav  * f   0.0 e
* hd    * f   0.8636 e
* icflg * f            0e
* nff   *  1  -1 e
* alp   * f   1.0000e+00e
* vl    *  f 0.0 e
* vv    *  f 0.0 e
* tl    *  f 610.0 e
* tv    *  f 610.0 e
* p     *  f 6.274e06 e
* pa    * f   0.0 e
*
* vtbl  * 0.0    1.0     1.0     0.0 e
*
*********************************************************************
*******   type            num            id        ctitle
break          460      460 $460$ loop a steam exit boundary
*         jun1           ibty          isat          ioff
                460            0             0             0
*         dxin          volin         alpin           tin           pin
        7.0880     4.1522        1.0000E+00    5.5200E+02    5.8681E+06
*         pain          concin        rbmx          poff          belv
      0.0000E+00     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*
*********************************************************************
*******   type            num            id        ctitle
valve          465      465 $465$ sl-b safety relief valves
*       ncells          nodes          jun1          jun2          epsw
                1              0           465           467    0.0000E+00
*         ichf          iconc          ivty          ivps          nvtb2
```



```
                0              0             3             2             0
*         ivtr           ivsv         nvtb1          nvsv          nvrf
               13           -488             0             0             0
*       ivtrov        ivtyov
                0              0
*         rvmx           rvov        fminov        fmaxov
      1.0000E+02     0.0000E+00    0.0000E+00    0.0000E+00
*        radin             th         houtl         houtv         toutl
      3.1750E-02     5.0000E-01    0.0000E+00    0.0000E+00    0.0000E+00
*        toutv          avlve         hvlve         favlve          xpos
      0.0000E+00      0.07456       0.10893     0.0          -1.0
*
* dx    *        f 1.0 e
* vol   *      f 0.3728 e
* fa    *    f 0.3728 e
* fric  * f   1.0000e-06e
* grav  * f   1.0000e+00e
* hd    * f   1.0893e-01e
* icflg * 0   1e
* nff   * 1  -1e
* alp   *      1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   565.7 e
* tv    * f   565.7 e
* p     * f   6.274e06 e
* pa    *      0.0000e+00e
*
*********************************************************************
*******   type            num            id        ctitle
break          467      467 $467$ sl-b srv boundary
*         jun1           ibty          isat          ioff
                467            0             0             0
*         dxin          volin         alpin           tin           pin
      0.1000E+00     0.3728        1.0000E+00    3.0540E+02    1.01323+05
*         pain          concin        rbmx          poff          belv
      0.0000E+00     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
*
*********************************************************************
*******   type            num            id        ctitle
valve          470      470 $470$ sl-b turbine bypass valves
*       ncells          nodes          jun1          jun2          epsw
                1              0           470           472    0.0000E+00
*         ichf          iconc          ivty          ivps          nvtb2
                0              0             3             2             0
*         ivtr           ivsv         nvtb1          nvsv          nvrf
               12          -3488             0             0             0
*       ivtrov        ivtyov
                0              0
*         rvmx           rvov        fminov        fmaxov
      1.0000E+00     1.0000E+00    0.0000E+00    0.0000E+00
*        radin             th         houtl         houtv         toutl
      3.1750E-02     5.0000E-01    0.0000E+00    0.0000E+00    0.0000E+00
*        toutv          avlve         hvlve         favlve          xpos
      0.0000E+00      0.01864       0.10893     0.0          -1.0
*
* dx    *        f 1.0 e
* vol   *      f 0.0932 e
* fa    *    f 0.0932 e
* fric  * f   1.0000e-06e
* grav  * f   0.0000e+00e
* hd    * f   1.0893e-01e
* icflg * 0   1e
* nff   * 1  -1e
* alp   *      1.0000e+00e
* vl    * f   0.0000e+00e
* vv    * f   0.0000e+00e
* tl    * f   565.7 e
* tv    * f   565.7 e
* p     * f   6.274e06 e
* pa    *      0.0000e+00e
*
*********************************************************************
```

```
*******   type            num             id        ctitle
break           472      472 $472$ sl-b tbv boundary
*          jun1           ibty          isat          ioff
             472              0             0             0
*          dxin          volin         alpin          tin          pin
     0.1000E+00     0.0932          1.0000E+00    3.0540E+02    1.01323+05
*          pain         concin          rbmx          poff          belv
     0.0000E+00     0.0000E+00     0.0000E+00    0.0000E+00    0.0000E+00
*
************************************************************************
* type        num          id          ctitle                    cd 1
pipe          501     501 $501$ core bypass pipe 1
*
*  ncells     nodes        jun1        jun2        epsw          cd 2
    4           0           501         511        1.0e-05
*  ichf       iconc        iacc        ipow                      cd 3
    0           0           0           0
*  radin      th           houtl       houtv       toutl         cd 6
      0.0         0.0       0.0         0.0         0.0
*  toutv      powin        powoff      rpowmx      powscl        cd 7
    0.0         0.0         0.0         1.0e20      1.0
*    cell arrays
* dx     *  1.4594   0.9729   0.7296   0.4865 e
* vol    *  0.0766   0.0511   0.0383   0.0255 e
* fa     *  f 0.0525 e
* fric   *  f 0.00123 e
* grav   *  f 1.0 e
* hd     *  f 0.049 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 579.0 e
* tv     *  f 579.0 e
* p      *  f 150.0e05 e
* pa     *  f 0.0 e
*
************************************************************************
* type        num          id          ctitle                    cd 1
pipe          502     502 $502$ core bypass pipe 2
*
*  ncells     nodes        jun1        jun2        epsw          cd 2
    4           0           502         512        1.0e-05
*  ichf       iconc        iacc        ipow                      cd 3
    0           0           0           0
*  radin      th           houtl       houtv       toutl         cd 6
      0.0         0.0       0.0         0.0         0.0
*  toutv      powin        powoff      rpowmx      powscl        cd 7
    0.0         0.0         0.0         1.0e20      1.0
*    cell arrays
* dx     *  1.4594   0.9729   0.7296   0.4865 e
* vol    *  0.0766   0.0511   0.0383   0.0255 e
* fa     *  f 0.0525 e
* fric   *  f 0.00123 e
* grav   *  f 1.0 e
* hd     *  f 0.049 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 579.0 e
* tv     *  f 579.0 e
* p      *  f 150.0e05 e
* pa     *  f 0.0 e
*
************************************************************************
* type        num          id          ctitle                    cd 1
pipe          503     503 $503$ core bypass pipe 3
*
*  ncells     nodes        jun1        jun2        epsw          cd 2
    4           0           503         513        1.0e-05
```



```
*  ichf       iconc        iacc        ipow                      cd 3
    0           0           0           0
*  radin      th           houtl       houtv       toutl         cd 6
      0.0         0.0       0.0         0.0         0.0
*  toutv      powin        powoff      rpowmx      powscl        cd 7
    0.0         0.0         0.0         1.0e20      1.0
*    cell arrays
* dx     *  1.4594   0.9729   0.7296   0.4865 e
* vol    *  0.0766   0.0511   0.0383   0.0255 e
* fa     *  f 0.0525 e
* fric   *  f 0.00123 e
* grav   *  f 1.0 e
* hd     *  f 0.049 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 579.0 e
* tv     *  f 579.0 e
* p      *  f 150.0e05 e
* pa     *  f 0.0 e
*
************************************************************************
* type        num          id          ctitle                    cd 1
pipe          504     504 $504$ core bypass pipe 4
*
*  ncells     nodes        jun1        jun2        epsw          cd 2
    4           0           504         514        1.0e-05
*  ichf       iconc        iacc        ipow                      cd 3
    0           0           0           0
*  radin      th           houtl       houtv       toutl         cd 6
      0.0         0.0       0.0         0.0         0.0
*  toutv      powin        powoff      rpowmx      powscl        cd 7
    0.0         0.0         0.0         1.0e20      1.0
*    cell arrays
* dx     *  1.4594   0.9729   0.7296   0.4865 e
* vol    *  0.0766   0.0511   0.0383   0.0255 e
* fa     *  f 0.0525 e
* fric   *  f 0.00123 e
* grav   *  f 1.0 e
* hd     *  f 0.049 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 579.0 e
* tv     *  f 579.0 e
* p      *  f 150.0e05 e
* pa     *  f 0.0 e
*
************************************************************************
* type        num          id          ctitle                    cd 1
pipe          505     505 $505$ core bypass pipe 5
*
*  ncells     nodes        jun1        jun2        epsw          cd 2
    4           0           505         515        1.0e-05
*  ichf       iconc        iacc        ipow                      cd 3
    0           0           0           0
*  radin      th           houtl       houtv       toutl         cd 6
      0.0         0.0       0.0         0.0         0.0
*  toutv      powin        powoff      rpowmx      powscl        cd 7
    0.0         0.0         0.0         1.0e20      1.0
*    cell arrays
* dx     *  1.4594   0.9729   0.7296   0.4865 e
* vol    *  0.0766   0.0511   0.0383   0.0255 e
* fa     *  f 0.0525 e
* fric   *  f 0.00123 e
* grav   *  f 1.0 e
* hd     *  f 0.049 e
* icflg  *  f 0 e
* nff    *  f 1 e
```

```
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 579.0 e
* tv     *  f 579.0 e
* p      *  f 150.0e05 e
* pa     *  f 0.0 e
*
*********************************************************************
* type        num         id          ctitle                        cd 1
pipe          506     506 $506$ core bypass pipe 6
*
*  ncells     nodes       jun1        jun2        epsw              cd 2
   4           0           506         516         1.0e-05
*  ichf       iconc       iacc        ipow                          cd 3
   0          0           0           0
*  radin      th          houtl       houtv       toutl             cd 6
     0.0        0.0         0.0         0.0         0.0
*  toutv      powin       powoff      rpowmx      powscl            cd 7
   0.0        0.0         0.0         1.0e20      1.0
*   cell arrays
* dx     *  1.4594   0.9729   0.7296   0.4865 e
* vol    *  0.0766   0.0511   0.0383   0.0255 e
* fa     *  f 0.0525 e
* fric   *  f 0.00123 e
* grav   *  f 1.0 e
* hd     *  f 0.049 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 579.0 e
* tv     *  f 579.0 e
* p      *  f 150.0e05 e
* pa     *  f 0.0 e
*
*********************************************************************
*******   type          num           id        ctitle
break     730         730 $730$ condenser hotwell boundary
*
*  pressure boundary at 10342.1 Pa
*
*  jun1       ibty        isat        ioff                          cd 2
   731        0           0           0
*  dxin       volin       alpin       tin         pin               cd 5
  0.1909    2.12376      0.0         305.372     10342.1
*  pain       concin      rbmx        poff        belv              cd 6
   0.0        0.0         1.0e20      0.0         0.0
*
*********************************************************************
* type        num         id          ctitle                        cd 1
pump          734         734 $734$ hotwell pump
*
*   oconee pump curves input from relap deck
*
*   ncells     nodes      jun1       jun2       epsw                cd 2
    10         0          731        735        1.0e-05
*   ichf       iconc      ipmpty     irp        ipm                 cd 3
    0          0          2          0          1
*   ipmptr     ipmpsv     npmptx     npmpsv     npmprf              cd 4
    25         0          0          0          0
*   radin      th         houtl      houtv      toutl               cd 6
    0.0          0.0      0.0          0.0        0.0
*   toutv      effmi                                                cd 7
    0.0        77.6731
*   tfr0       tfr1       tfr2       tfr3       tfrb                cd 8
    0.0        153.343    0.0        0.0        0.0
*   tfrl0      tfrl1      tfrl2      tfrl3
    0.0        0.0        0.0        0.0
*   rhead      rtork      rflow      rrho       romega              cd 12
    1494.53    5111.43    0.804691   999.552    123.569
*   omegan     omgoff     romgmx     omgscl     npmpsd              cd 13
```



```
      123.569   0.0   50.0  0.0
*   option                                                          cd 15
    0
*   ndata(1)  ndata(2)  ndata(3)  ndata(4)  ndata(5)
        7         6         2         2         7
*   ndata(6)  ndata(7)  ndata(8)  ndata(9)  ndata(10)
        6         2         2         2         6
*   ndata(11) ndata(12) ndata(13) ndata(14) ndata(15)
      2         2         2         6         2
*   ndata(16) nhdm      ntdm
      2         11        11
* hsp1  *  -1.000  1.236   0.0    1.236  s
* hsp1  *   0.2    1.225   0.4    1.202 s
* hsp1  *   0.6    1.157   0.8    1.056  s
* hsp1  *   1.0    1.0  e
* hsp2  *  0.0 -0.3     0.5 0.0 s
* hsp2  *   0.625 0.277  0.714 0.424 s
* hsp2  *  0.833 0.648  1.0 1.0 e
* hsp3  *   -1.0  1.236  0.0  0.75 e
* hsp4  *  -1.0  0.0  1.0  0.0 e
* repeat hsp1 - hsp4 for htp1 - htp4
* htp1  *  -1.000  1.236   0.0    1.236  s
* htp1  *   0.2    1.225   0.4    1.202 s
* htp1  *   0.6    1.157   0.8    1.056  s
* htp1  *   1.0    1.0  e
* htp2  *  0.0 -0.3     0.5 0.0 s
* htp2  *   0.625 0.277  0.714 0.424 s
* htp2  *  0.833 0.648  1.0 1.0 e
* htp3  *   -1.0  1.236  0.0  0.75 e
* htp4  *  -1.0  0.0  1.0  0.0 e
* tsp1  *  -1.0 1.0         1.0 1.0 e
* tsp2  *  0.0 -0.150   0.5 0.25  s
* tsp2  *   0.625 0.391  0.714 0.510 s
* tsp2  *  0.833 0.694  1.0 1.0  e
* tsp3  *  -1.0 1.0      0.0 0.75    e
* tsp4  *  -1.0  0.0  1.0  0.0 e
* repeat tsp1 - tps4 for ttp1 - ttp4
* ttp1  *  -1.0 1.0         1.0 1.0 e
* ttp2  *  0.0 -0.150   0.5 0.25  s
* ttp2  *   0.625 0.391  0.714 0.510 s
* ttp2  *  0.833 0.694  1.0 1.0  e
* ttp3  *  -1.0 1.0      0.0 0.75    e
* ttp4  *  -1.0  0.0  1.0  0.0 e
* hdm   *  0.0 0.0       0.100 0.000 s
* hdm   *    0.150 0.050  0.240 0.800 s
* hdm   *  0.300 0.960  0.400 0.980 s
* hdm   *   0.600 0.970  0.800 0.900 s
* hdm   *  0.900 0.800  0.960 0.500  s
* hdm   *   1.000 0.000 e
* tdm   *  0.0 0.0       0.100 0.000 s
* tdm   *    0.150 0.050  0.240 0.800 s
* tdm   *  0.300 0.960  0.400 0.980 s
* tdm   *  0.600 0.970  0.800 0.900 s
* tdm   *  0.900 0.800  0.960 0.500 s
* tdm   *    1.000 0.000 e
*
* dx    * 1.909  f 9.0142 e
* vol   * f 2.12376 e
* fa    * 2.356  f 0.2356 e
* fric  *  1.0e-06  r2 0.0  f  0.12999 e
* grav  * f 0.0 e
* hd    * 1.732  f 0.5477 e
* icflg * f 0 e
* nff   * 0 f 1 e
* alp   * f 0.0 e
* vl    * f 0.0 e
* vv    * f 0.0 e
* tl    * f 305.223 e
* tv    * f 305.223 e
* p     *   f 7.5e05 e
* pa    * f 0.0 e
*
*********************************************************************
```

```
10189 *  type       num          id          ctitle                          cd 1
10190 pipe       736          736 $736$ demineralization system
10191 *
10192 *  ncells     nodes        jun1        jun2        epsw                cd 2
10193    20         0            735         737         1.0e-05
10194 *  ichf       iconc        iacc        ipow                            cd 3
10195    0          0            0           0
10196 *  radin      th           houtl       houtv       toutl               cd 6
10197    0.0        0.0          0.0         0.0         0.0
10198 *  toutv      powin        powoff      rpowmx      powscl              cd 7
10199    0.0        0.0          0.0         1.0e20      1.0
10200 *           cell arrays
10201 * dx     * f 9.014 e
10202 * vol    * f 2.124 e
10203 * fa     * f 0.2356 e
10204 * fric   *  f 0.12999 e
10205 * grav   * f 0.0 e
10206 * hd     * f 0.5477 e
10207 * icflg * f 0 e
10208 * nff    * f 1 e
10209 * alp    * f 0.0 e
10210 * vl     * f 0.0 e
10211 * vv     * f 0.0 e
10212 * tl     * r10 305.233 r10 307.98 e
10213 * tv     * r10 305.233 r10 307.98 e
10214 * p      * r10 1.0e06    r10 6.2e05   e
10215 * pa     * f 0.0 e
10216 *
10217 ************************************************************************
10218 *  type         num          id          ctitle                          cd 1
10219 pump       738          738 $738$  booster pump
10220 *
10221 *   oconee pump curves from relap deck
10222 *
10223 *   ncells     nodes      jun1       jun2       epsw                    cd 2
10224     10         0          737        739        1.0e-05
10225 *   ichf       iconc      ipmpty     irp        ipm                     cd 3
10226     0          0          2          0          1
10227 *   ipmptr     ipmpsv     npmptx     npmpsv     npmprf                  cd 4
10228     30         0          0          0          0
10229 *   radin      th         houtl      houtv      toutl                   cd 6
10230     0.0       0.0        0.0         0.0         0.0
10231 *   toutv      effmi                                                   cd 7
10232     0.0        77.6731
10233 *   tfr0       tfr1       tfr2      tfr3       tfrb                    cd 8
10234     0.0        95.5852    0.0       0.0        0.0
10235 *   tfrl0      tfrl1     tfrl2      tfrl3
10236     0.0        0.0       0.0        0.0
10237 *   rhead      rtork      rflow      rrho       romega                  cd 12
10238     2938.25    3186.17    0.805448   999.552    374.897
10239 *   omegan     omgoff     romgmx     omgscl     npmpsd                  cd 13
10240    374.897     0.0     50.0     1.0     0
10241 *   option                                                            cd 15
10242     0
10243 *   ndata(1)  ndata(2)  ndata(3)  ndata(4)  ndata(5)
10244     7         6         2         2         7
10245 *   ndata(6)  ndata(7)  ndata(8)  ndata(9)  ndata(10)
10246       6         2         2         2         6
10247 *   ndata(11) ndata(12) ndata(13) ndata(14) ndata(15)
10248       2         2         2         6         2
10249 *   ndata(16) nhdm       ntdm
10250       2         11        11
10251 * hsp1  * -1.000  1.068  s
10252 * hsp1  *   0.000  1.068   0.200  1.063 s
10253 * hsp1  *  0.400  1.058   0.600  1.047 s
10254 * hsp1  *   0.800  1.031   1.000  1.000 e
10255 * hsp2  *  0.000 -0.300   0.500  0.000 s
10256 * hsp2  *    0.625  0.288   0.714  0.430 s
10257 * hsp2  *  0.833  0.658   1.0    1.0  e
10258 * hsp3  * -1.0    1.236   0.0    0.750 e
10259 * hsp4  *  -1.0  0.0  1.0  0.0 e
10260 * repeat hsp1 - hsp4 for htp1 - htp4
10261 * htp1  * -1.000  1.068  s
```



```
10262 * htp1  *   0.000  1.068   0.200  1.063 s
10263 * htp1  *  0.400  1.058   0.600  1.047 s
10264 * htp1  *   0.800  1.031   1.000  1.000 e
10265 * htp2  *  0.000 -0.300   0.500  0.000 s
10266 * htp2  *    0.625  0.288   0.714  0.430 s
10267 * htp2  *  0.833  0.658   1.0    1.0  e
10268 * htp3  * -1.0    1.236   0.0    0.750 e
10269 * htp4  *  -1.0  0.0  1.0  0.0 e
10270 * tsp1  * -1.000  1.000   1.000  1.0 e
10271 * tsp2  *  0.000 -0.150   0.500  0.250 s
10272 * tsp2  *   0.625  0.391   0.714  0.510 s
10273 * tsp2  *  0.833  0.694   1.0    1.0 e
10274 * tsp3  * -1.0    1.0     0.0    0.75  e
10275 * tsp4  *  -1.0  0.0  1.0  0.0 e
10276 * repeat tsp1 - tsp4 for ttp1 - ttp4
10277 * ttp1  * -1.000  1.000   1.000  1.0 e
10278 * ttp2  *  0.000 -0.150   0.500  0.250 s
10279 * ttp2  *   0.625  0.391   0.714  0.510 s
10280 * ttp2  *  0.833  0.694   1.0    1.0 e
10281 * ttp3  * -1.0    1.0     0.0    0.75  e
10282 * ttp4  *  -1.0  0.0  1.0  0.0 e
10283 * hdm   *  0.000  0.000   0.100  0.000 s
10284 * hdm   *    0.150  0.050   0.240  0.800 s
10285 * hdm   *  0.300  0.960   0.400  0.980 s
10286 * hdm   *   0.600  0.970   0.800  0.900 s
10287 * hdm   *  0.900  0.800   0.960  0.500 s
10288 * hdm   *    1.000  0.000 e
10289 * tdm   *  0.000  0.000   0.100  0.000 s
10290 * tdm   *   0.150  0.050   0.240  0.800 s
10291 * tdm   *  0.300  0.960   0.400  0.980 s
10292 * tdm   *    0.600  0.970   0.800  0.900 s
10293 * tdm   *  0.900  0.800   0.960  0.500 s
10294 * tdm   *    1.000  0.000 e
10295 *
10296 * dx     * f 9.0142 e
10297 * vol    * f 2.12376 e
10298 * fa     * f 0.2356 e
10299 * fric   *  0.12999  r9 0.0  1.0e-06 e
10300 * grav   *  f 0.0 e
10301 * hd     * f 0.5477 e
10302 * icflg * f 0 e
10303 * nff    * f 1 e
10304 * alp    * f 0.0 e
10305 * vl     * f 0.0 e
10306 * vv     * f 0.0 e
10307 * tl     * f 307.674 e
10308 * tv     * f 307.674 e
10309 * p      *  6.2e05  f 2.1e06 e
10310 * pa     * f 0.0 e
10311 *
10312 ************************************************************************
10313 *  type       num          id          ctitle                          cd 1
10314 pipe         740          740 $740$ feedwater e and f lp heaters
10315 *
10316 *  ncells     nodes        jun1        jun2        epsw                cd 2
10317     20         0          739         741        1.0e-05
10318 *  ichf       iconc        iacc        ipow                            cd 3
10319     0          0            0           0
10320 *  radin      th           houtl       houtv       toutl               cd 6
10321   0.0        0.0          0.0         0.0         0.0
10322 *  toutv      powin        powoff      rpowmx      powscl              cd 7
10323     0.0        0.0          0.0         0.0         0.0
10324 *           cell arrays
10325 * dx     *    r10 17.02 r10 28.98 e
10326 * vol    *    r10 4.01  r10 3.007 e
10327 * fa     *    r11 0.2356 r09 0.1038 0.2356 e
10328 * fric   *  r20 1.0e-06  0.0478 e
10329 * grav   *    f 0.0 e
10330 * hd     *    r11 0.5477 r09 0.3635 0.5477 e
10331 * icflg *    f 0 e
10332 * nff    *    f 1 e
10333 * alp    *    f 0.0 e
10334 * vl     *    f 0.0 e
```

```
* vv     *     f 0.0 e
* tl     *  r10 320.0  r10 350.0 e
* tv     *  r10 320.0  r10 350.0 e
* p      *     r10 3.5e6 r10 3.3e6 e
* pa     *     f 0.0 e
*
*******************************************************************************
*  type       num          id          ctitle                          cd 1
fill          742          742 $742$ cond.drain to lp d heater
*
*  jun1       ifty         ioff                                         cd 2
    743         8            0
*  iftr       ifsv         nftb         nfsv         nfrf
   70           1           -3            0            0
*  twold      rfmx         concin       felv                          cd 4
    0.0      1.0e20        0.0          0.0
*  dxin       volin        alpin        vlin         tlin             cd 5
    10.0     2.35602       0.0          0.0           372.03
*  pin        pain         flowin       vvin         tvin             cd 6
 3.24053e6    0.0          64.42        0.0         372.03
*
* vmscl  vvscl
   1.0  1.0
* vmtb *  0.0  64.42  5.0  0.000 s
* vmtb *  10.0  0.000 e
*
*******************************************************************************
*  type         num          id          ctitle                          cd 1
tee             746          746 $746$ feedwater lp d heater
*
* jcell      nodes        ichf         cost         epsw             cd 2
    1           0            1          0.0         1.0e-05
* iconc1     ncell1       jun1         jun2         ipow1            cd 3
    0           10           741          747          0
* radin1     th1          houtl1       houtv1       toutl1           cd 6
  0.0          0.0          0.0          0.0          0.0
* toutv1     pwin1        pwoff1       rpwmx1       pwscl1           cd 7
   0.0         0.0          0.0         1.0e20        1.0
* iconc2     ncell2       jun3         ipow2                         cd 9
    0           1            743          0
* radin2     th2          houtl2       houtv2       toutl2           cd 12
  0.0          0.0          0.0          0.0          0.0
* toutv2     pwin2        pwoff2       rpwmx2       pwscl2           cd 13
   0.0         0.0          0.0         1.0e20        1.0
*    main-cell arrays
* dx     *  f 12.76 e
* vol    *  f 3.00626 e
* fa     *  f 0.2356 e
* fric   *  f 0.0478 e
* grav   *  f 0.0 e
* hd     *  f 0.5477 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 400.0 e
* tv     *  f 400.0 e
* p      *  f 3.0e06 e
* pa     *  f 0.0 e
*    side-cell arrays
* dx     *  f 1.0 e
* vol    *  f 0.2356 e
* fa     *  f 0.2356 e
* fric   *  f 1.0e-06 e
* grav   *  f -1.0 e
* hd     *  f 0.5477 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 400.0 e
```



```
* tv     *  f 400.0 e
* p      *  f 3.0e06 e
* pa     *  f 0.0 e
*
*******************************************************************************
*  type       num          id          ctitle                          cd 1
fill          748          748 $748$ cond.drain to lp c heater
*
*  jun1       ifty         ioff                                         cd 2
    749         8            0
*  iftr       ifsv         nftb         nfsv         nfrf
   70           1           -3            0            0
*  twold      rfmx         concin       felv                          cd 4
    0.0      1.0e20        0.0          0.0
*  dxin       volin        alpin        vlin         tlin             cd 5
    10.0     3.86662       0.0          0.0           430.49
*  pin        pain         flowin       vvin         tvin             cd 6
 2.99922e6    0.0          534.18       0.0         430.49
*
* vmscl  vvscl
   1.0  1.0
* vmtb *  0.0  534.18  5.0  0.0000 s
* vmtb *  10.0  0.0000 e
*
*******************************************************************************
*  type         num          id          ctitle                          cd 1
tee             750          750 $750$ feedwater lp c heater
*
*       models volume 1 of RELAP5 component 752
*
* jcell      nodes        ichf         cost         epsw             cd 2
    1           0            1          0.0         1.0e-05
* iconc1     ncell1       jun1         jun2         ipow1            cd 3
    0           10           747          750          0
* radin1     th1          houtl1       houtv1       toutl1           cd 6
  0.0          0.0          0.0          0.0          0.0
* toutv1     pwin1        pwoff1       rpwmx1       pwscl1           cd 7
   0.0         0.0          0.0         1.0e20        1.0
* iconc2     ncell2       jun3         ipow2                         cd 9
    0           1            749          0
* radin2     th2          houtl2       houtv2       toutl2           cd 12
  0.0          0.0          0.0          0.0          0.0
* toutv2     pwin2        pwoff2       rpwmx2       pwscl2           cd 13
   0.0         0.0          0.0         1.0e20        1.0
*    main-cell arrays
* dx     *  f 9.074 e
* vol    *  f 3.50892 e
* fa     *  0.2356  f 0.3867 e
* fric   *  0.0478  f 0.0872 e
* grav   *  f 0.0 e
* hd     *  0.5477  f 0.7017 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 440.0 e
* tv     *  f 440.0 e
* p      *  f 2.8e6 e
* pa     *  f 0.0 e
*    side-cell arrays
* dx     *  f 1.0 e
* vol    *  f 0.3867 e
* fa     *  f 0.3867 e
* fric   *  f 1.0e-06 e
* grav   *  f -1.0 e
* hd     *  f 0.7017 e
* icflg  *  f 0 e
* nff    *  f 1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 430.5 e
```

```
10481 * tv     *  f 430.5 e
10482 * p      *  f 2.8e6 e
10483 * pa     *  f 0.0 e
10484 *
10485 ************************************************************************
10486 *  type        num          id          ctitle                    cd 1
10487 tee           752         752 $752$ feedwater pump inlet header
10488 *
10489 *         models volume 2 of RELAP5 component 752
10490 *
10491 * jcell      nodes       ichf        cost        epsw             cd 2
10492    3          1           1          0.0         1.0e-05
10493 * iconc1     ncell1      jun1        jun2        ipow1            cd 3
10494   0          5           754         760         0
10495 * iqptr1        iqpsv1         nqptb1        nqpsv1        nqprf1
10496     0              0              0             0             0
10497 * radin1      th1         houtl1      houtv1      toutl1           cd 6
10498   0.3508    0.0831      0.0         0.0         0.0
10499 * toutv1      pwin1       pwoff1      rpwmx1      pwscl1           cd 7
10500   0.0         0.0         0.0         1.0e20      1.0
10501 *        qpin1        qpoff1        rqpmx1        qpscl1
10502     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
10503 * iconc2     ncell2      jun3        ipow2                        cd 9
10504   0          5           750         0
10505 *       iqptr2        iqpsv2        nqptb2        nqpsv2        nqprf2
10506               0             0             0             0             0
10507 * radin2      th2         houtl2      houtv2      toutl2           cd 12
10508   0.3508    0.0831      0.0         0.0         0.0
10509 * toutv2      pwin2       pwoff2      rpwmx2      pwscl2           cd 13
10510   0.0         0.0         0.0         1.0e20      1.0
10511 *        qpin2        qpoff2        rqpmx2        qpscl2
10512     0.0000E+00    0.0000E+00    0.0000E+00    0.0000E+00
10513 *    main-cell arrays
10514 * dx     *  f 8.565e
10515 * vol    *  f 3.312e
10516 * fa     *  0.3867  r4 0.3867  0.3867 e
10517 * fric   *  f 1.0e-6 e
10518 * grav   *  f 0.0 e
10519 * hd     *  0.7017  r4 0.7017  0.7017 e
10520 * icflg  *  f 0 e
10521 * nff    *  f 1 e
10522 * alp    *  f 0.0 e
10523 * vl     *  f 0.0 e
10524 * vv     *  f 0.0 e
10525 * tl     *  f 460.0 e
10526 * tv     *  f 460.0 e
10527 * p      *  f 2.6e06 e
10528 * pa     *  f 0.0 e
10529 * qppp   * f   0.0000E+00e
10530 * matid  *  f              7e
10531 * tw     * f   465.0 e
10532 *    side-cell arrays
10533 * dx     *  f 8.565 e
10534 * vol    *  f 3.312 e
10535 * fa     *  f 0.3867  e
10536 * fric   *  r5 1.0e-06  0.0872 e
10537 * grav   *  f 0.0 e
10538 * hd     *  f 0.7017 e
10539 * icflg  *  f 0 e
10540 * nff    *  f 1 e
10541 * alp    *  f 0.0 e
10542 * vl     *  f 0.0 e
10543 * vv     *  f 0.0 e
10544 * tl     *  f 460.0 e
10545 * tv     *  f 460.0 e
10546 * p      *  f 2.6e06 e
10547 * pa     *  f 0.0 e
10548 * qppp   * f   0.0000E+00e
10549 * matid  *  f              7e
10550 * tw     * f   460.0 e
10551 *
10552 ************************************************************************
10553 *  type        num          id          ctitle                    cd 1
```



```
10554 pump        754          754 $754$  mfw a pump
10555 *
10556 *    oconee pump curves input from relap deck
10557 *
10558 *    ncells     nodes      jun1       jun2       epsw              cd 2
10559      10         0          754        756        1.0e-05
10560 *    ichf       iconc      ipmpty     irp        ipm               cd 3
10561      0          0          2          0          1
10562 *    ipmptr     ipmpsv     npmptx     npmpsv     npmprf            cd 4
10563      35         0          0          0          0
10564 *    radin      th         houtl      houtv      toutl             cd 6
10565      0.0        0.0        0.0         0.0         0.0
10566 *    toutv      effmi                                             cd 7
10567      0.0        77.6731
10568 *    tfr0       tfr1       tfr2       tfr3       tfrb              cd 8
10569      0.0        298.958    0.0        0.0        0.0
10570 *    tfr10      tfr11      tfr12      tfr13
10571      0.0        0.0        0.0        0.0
10572 *    rhead      rtork      rflow      rrho       romega            cd 12
10573      6934.64    9965.26    0.785955   999.552    523.599
10574 *    omegan     omgoff     romgmx     omgscl     npmpsd            cd 13
10575      490.4       0.0        50.0       0.0        -2920
10576 *    option                                                       cd 15
10577      0
10578 *    ndata(1)   ndata(2)   ndata(3)   ndata(4)   ndata(5)
10579         7          6          2          2          7
10580 *    ndata(6)   ndata(7)   ndata(8)   ndata(9)   ndata(10)
10581         6          2          2          2          6
10582 *    ndata(11)  ndata(12)  ndata(13)  ndata(14)  ndata(15)
10583        2          2          2          6          2
10584 *    ndata(16)  nhdm       ntdm
10585          2          11         11
10586 * hsp1   *  -1.0  1.207  0.0  1.207 s
10587 * hsp1   *  0.2  1.099  0.4  1.052 s
10588 * hsp1   *  0.6  1.043  0.8  1.030 s
10589 * hsp1   *  1.0  1.0 e
10590 * hsp2   *  0.0  -0.3  0.5  0.0 s
10591 * hsp2   *  0.625  0.286  0.714  0.422 s
10592 * hsp2   *  0.833  0.638  1.0  1.0  e
10593 * hsp3   *  -1.0  1.236  0.0  0.75 e
10594 * hsp4   *  -1.0  0.0  1.0  0.0 e
10595 * repeat hsp1 - hsp4 for htp1 - htp4
10596 * htp1   *  -1.0  1.207  0.0  1.207 s
10597 * htp1   *  0.2  1.099  0.4  1.052 s
10598 * htp1   *  0.6  1.043  0.8  1.030 s
10599 * htp1   *  1.0  1.0 e
10600 * htp2   *  0.0  -0.3  0.5  0.0 s
10601 * htp2   *  0.625  0.286  0.714  0.422 s
10602 * htp2   *  0.833  0.638  1.0  1.0  e
10603 * htp3   *  -1.0  1.236  0.0  0.75 e
10604 * htp4   *  -1.0  0.0  1.0  0.0 e
10605 * tsp1   *  -1.0  1.0  1.0  1.0 e
10606 * tsp2   *  0.0  -0.5  0.5  0.25 s
10607 * tsp2   *  0.625  0.391  0.714  0.510 s
10608 * tsp2   *  0.833  0.694  1.0  1.0 e
10609 * tsp3   *  -1.0  1.0  0.0  0.75 e
10610 * tsp4   *  -1.0  0.0  1.0  0.0 e
10611 * repeat tsp1 - tps4 for ttp1 - ttp4
10612 * ttp1   *  -1.0  1.0  1.0  1.0 e
10613 * ttp2   *  0.0  -0.5  0.5  0.25 s
10614 * ttp2   *  0.625  0.391  0.714  0.510 s
10615 * ttp2   *  0.833  0.694  1.0  1.0 e
10616 * ttp3   *  -1.0  1.0  0.0  0.75 e
10617 * ttp4   *  -1.0  0.0  1.0  0.0 e
10618 * hdm    *  0.0 0.0       0.100 0.000 s
10619 * hdm    *    0.150 0.050  0.240 0.800 s
10620 * hdm    *  0.300 0.960  0.400 0.980 s
10621 * hdm    *   0.600 0.970  0.800 0.900 s
10622 * hdm    *  0.900 0.800  0.960 0.500  s
10623 * hdm    *   1.000 0.000 e
10624 * tdm    *  0.0 0.0       0.100 0.000 s
10625 * tdm    *    0.150 0.050  0.240 0.800 s
10626 * tdm    *  0.300 0.960  0.400 0.980 s
```

```
* tdm    *  0.600 0.970  0.800 0.900 s
* tdm    *  0.900 0.800  0.960 0.500 s
* tdm    *    1.000 0.000 e
*
* dx     * 6.9857  f 16.5089  e
* vol    * r10 1.71317 e
* fa     *  0.3867  f 0.103773 e
* fric   *  1.0e-06  r2 0.0  f 0.01234 e
* grav   * f 0.0 e
* hd     * 0.7017  f 0.3635 e
* icflg  * f 0 e
* nff    *  1  r9 -1  1 e
* alp    * f 0.0 e
* vl     * f 0.0 e
* vv     * f 0.0 e
* tl     * f 470.0 e
* tv     * f 470.0 e
* p      *  2.6e06  f 7.6e06 e
* pa     * f 0.0 e
*
*********************************************************************
* type       num         id          ctitle                    cd 1
valve         756      756 $756$ mfw pump a check valve
*       ncells          nodes          jun1          jun2          epsw
              3              0           756           763    0.0000E+00
*         ichf          iconc          ivty          ivps          nvtb2
              0              0             3             3              0
*         ivtr           ivsv         nvtbl          nvsv          nvrf
           -756              1            -2             0              0
*       ivtrov         ivtyov
              0              0
*         rvmx           rvov         fminov        fmaxov
    4.0000E+00     4.0000E+00     0.0000E+00    0.0000E+00
*        radin             th          houtl         houtv         toutl
    0.0            0.0            0.0000E+00    0.0000E+00    0.0000E+00
*        toutv          avlve          hvlve         favlve          xpos
    0.0000E+00     0.2356         0.5477        0.0           0.0
*
* dx     *  r3 12.7 e
* vol    *  r3 2.992 e
* fa     *  0.103773  f 0.2356 e
* fric   * r2 0.01234  0.06  0.01234 e
* grav   *  f 0.0 e
* hd     *  0.3635   f 0.5477 e
* icflg  *  f 0 e
* nff    *  1  r2 -1  1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 470.0 e
* tv     *  f 470.0 e
* p      *  f 7.3e06 e
* pa     *  f 0.0 e
*
* vtbl   *  0.0  0.0  0.5  1.0 e
*
*********************************************************************
*  type       num         id          ctitle                    cd 1
pump          760         760 $760$  mfw b pump
*
*   oconee pump curves input from relap deck
*
*   ncells     nodes      jun1       jun2       epsw                cd 2
    10         0          760        761        1.0e-05
*   ichf       iconc      ipmpty     irp        ipm                 cd 3
    0          0          2          0          1
*   ipmptr     ipmpsv     npmptx     npmpsv     npmprf              cd 4
    36         0          0          0          0
*   radin      th         houtl      houtv      toutl               cd 6
    0.0        0.0        0.0         0.0         0.0
*   toutv      effmi                                               cd 7
    0.0        77.6731
*   tfr0       tfr1       tfr2       tfr3       tfrb                cd 8
```



```
    0.0        298.958    0.0        0.0        0.0
*   tfrl0      tfrl1      tfrl2      tfrl3
    0.0        0.0        0.0        0.0
*   rhead      rtork      rflow      rrho       romega              cd 12
    6934.64    9965.26    0.785955   999.552    523.599
*   omegan     omgoff     romgmx     omgscl     npmpsd              cd 13
    490.4       0.0        50.0       0.0        -2920
*   option                                                         cd 15
    0
*   ndata(1)   ndata(2)   ndata(3)   ndata(4)   ndata(5)
          7          6          2          2          7
*   ndata(6)   ndata(7)   ndata(8)   ndata(9)   ndata(10)
          6          2          2          2          6
*   ndata(11)  ndata(12)  ndata(13)  ndata(14)  ndata(15)
            2          2          2          6          2
*   ndata(16)  nhdm       ntdm
          2          11         11
* hsp1   *  -1.0  1.207  0.0  1.207 s
* hsp1   *  0.2  1.099  0.4  1.052 s
* hsp1   *  0.6  1.043  0.8  1.030 s
* hsp1   *  1.0  1.0 e
* hsp2   *  0.0  -0.3  0.5  0.0 s
* hsp2   *  0.625  0.286  0.714  0.422 s
* hsp2   *  0.833  0.638  1.0  1.0  e
* hsp3   *  -1.0  1.236  0.0  0.75 e
* hsp4   *  -1.0  0.0  1.0  0.0 e
* repeat hsp1 - hsp4 for htp1 - htp4
* htp1   *  -1.0  1.207  0.0  1.207 s
* htp1   *  0.2  1.099  0.4  1.052 s
* htp1   *  0.6  1.043  0.8  1.030 s
* htp1   *  1.0  1.0 e
* htp2   *  0.0  -0.3  0.5  0.0 s
* htp2   *  0.625  0.286  0.714  0.422 s
* htp2   *  0.833  0.638  1.0  1.0  e
* htp3   *  -1.0  1.236  0.0  0.75 e
* htp4   *  -1.0  0.0  1.0  0.0 e
* tsp1   *  -1.0  1.0  1.0  1.0 e
* tsp2   *  0.0  -0.5  0.5  0.25 s
* tsp2   *  0.625  0.391  0.714  0.510 s
* tsp2   *  0.833  0.694  1.0  1.0 e
* tsp3   *  -1.0  1.0  0.0  0.75 e
* tsp4   *  -1.0  0.0  1.0  0.0 e
* repeat tsp1 - tps4 for ttp1 - ttp4
* ttp1   *  -1.0  1.0  1.0  1.0 e
* ttp2   *  0.0  -0.5  0.5  0.25 s
* ttp2   *  0.625  0.391  0.714  0.510 s
* ttp2   *  0.833  0.694  1.0  1.0 e
* ttp3   *  -1.0  1.0  0.0  0.75 e
* ttp4   *  -1.0  0.0  1.0  0.0 e
* hdm    *  0.0 0.0       0.100 0.000 s
* hdm    *    0.150 0.050  0.240 0.800 s
* hdm    *  0.300 0.960  0.400 0.980 s
* hdm    *   0.600 0.970  0.800 0.900 s
* hdm    *  0.900 0.800  0.960 0.500  s
* hdm    *   1.000 0.000 e
* tdm    *  0.0 0.0       0.100 0.000 s
* tdm    *    0.150 0.050  0.240 0.800 s
* tdm    *  0.300 0.960  0.400 0.980 s
* tdm    *  0.600 0.970  0.800 0.900 s
* tdm    *  0.900 0.800  0.960 0.500 s
* tdm    *    1.000 0.000 e
*
* dx     * 6.9857  f 16.5089  e
* vol    * r10 1.71317 e
* fa     *  0.3867  f 0.103773 e
* fric   *  1.0e-06  r2 0.0  f 0.01234 e
* grav   * f 0.0 e
* hd     * 0.7017  f 0.3635 e
* icflg  * f 0 e
* nff    *  1  r9 -1  1 e
* alp    * f 0.0 e
* vl     * f 0.0 e
* vv     * f 0.0 e
```

```
* tl     * f 470.0 e
* tv     * f 470.0 e
* p      *  2.6e06  f 7.6e06 e
* pa     * f 0.0 e
*
*************************************************************************
* type       num         id          ctitle                        cd 1
valve         761       761 $761$ mfw pump b check valve
*       ncells         nodes          jun1          jun2          epsw
             3             0           761           762    0.0000E+00
*         ichf         iconc          ivty          ivps         nvtb2
             0             0             3             3             0
*         ivtr          ivsv         nvtb1          nvsv          nvrf
          -761             1            -2             0             0
*       ivtrov        ivtyov
             0             0
*         rvmx          rvov        fminov        fmaxov
    4.0000E+00    4.0000E+00    0.0000E+00    0.0000E+00
*        radin            th         houtl         houtv         toutl
    0.0           0.0           0.0000E+00    0.0000E+00    0.0000E+00
*        toutv         avlve         hvlve        favlve          xpos
    0.0000E+00    0.2356        0.5477        0.0           0.0
*
* dx     *  r3 12.7 e
* vol    *  r3 2.992 e
* fa     *  0.103773  f 0.2356 e
* fric   * r2 0.01234  0.06  0.01234 e
* grav   *  f 0.0 e
* hd     *  0.3635   f 0.5477 e
* icflg  *  f 0 e
* nff    *  1  r2 -1  1 e
* alp    *  f 0.0 e
* vl     *  f 0.0 e
* vv     *  f 0.0 e
* tl     *  f 470.0 e
* tv     *  f 470.0 e
* p      *  f 7.3e06 e
* pa     *  f 0.0 e
*
* vtbl   *  0.0  0.0  0.5  1.0 e
*
*************************************************************************
* type       num         id          ctitle                        cd 1
plenum       763         763 $763$ feedwater pump outlet header
*
*  add more model information here
*
* npljn      iconc       juns1       juns2                         cd 2
4             0           2           2
*  array cards  *
* junj   *  763  762 764  766 e
* dx     *  f 15.54 e
* vol    *  f 15.54 e
* grav   *  f 0.0 e
* alp    *  f 0.0 e
* tl     *  f 470.0 e
* tv     *  f 470.0 e
* p      *  f 7.2e06 e
* pa     *  f 0.0 e
*
*************************************************************************
*  type      num         id          ctitle                        cd 1
pipe         764         764 $764$  a & b hp heater pipe 1
*
*  add more model information here
*
*  ncells    nodes       jun1        jun2        epsw              cd 2
     20        0          764          768       1.0e-05
*  ichf      iconc       iacc        ipow                          cd 3
   1         0           0           0
*  radin     th          houtl       houtv       toutl             cd 6
    0.0      0.0          0.0         0.0         0.0
*  toutv     powin       powoff      rpowmx      powscl            cd 7
```



```
   0.0       0.0         0.0         1.0e20      1.0
*          cell arrays
* dx     *    r10 7.293 r10 5.979 e
* vol    *    r10 1.718 r10 1.409 e
* fa     *    f 0.2356 e
* fric   *    f 0.072 e
* grav   *    f 0.0 e
* hd     *    f 0.5477 e
* icflg  *    f 0 e
* nff    *    f 1 e
* alp    *    f 0. e
* vl     *    f 0. e
* vv     *    f 0. e
* tl     *    f 480.0 e
* tv     *    f 480.0 e
* p      *    f 7.2e06 e
* pa     *    f 0.0 e
*************************************************************************
*  type      num         id          ctitle                        cd 1
pipe         766         766 $766$  a & b hp heater pipe 2
*
*  add more model information here
*
*  ncells    nodes       jun1        jun2        epsw              cd 2
     20        0          766          769       1.0e-05
*  ichf      iconc       iacc        ipow                          cd 3
   1         0           0           0
*  radin     th          houtl       houtv       toutl             cd 6
    0.0      0.0          0.0         0.0         0.0
*  toutv     powin       powoff      rpowmx      powscl            cd 7
   0.0       0.0         0.0         1.0e20      1.0
*          cell arrays
* dx     *    r10 7.378 r10 6.243 e
* vol    *    r10 1.738 r10 1.471 e
* fa     *    f 0.2356 e
* fric   *    f 0.072 e
* grav   *    f 0.0 e
* hd     *    f 0.5477 e
* icflg  *    f 0 e
* nff    *    f 1 e
* alp    *    f 0. e
* vl     *    f 0. e
* vv     *    f 0. e
* tl     *    f 480.0 e
* tv     *    f 480.0 e
* p      *    f 7.2e06 e
* pa     *    f 0.0 e
*************************************************************************
* type       num         id          ctitle                        cd 1
plenum       768         768 $768$ hp heater outlet header
*
*  add more model information here
*
* npljn      iconc       juns1       juns2                         cd 2
  6           0           2           4
*  array cards  *
* junj   *  768  769 s
* junj   *   770  772 774 776  e
* dx     *  f 7.8516 e
* vol    *  f 7.8516 e
* grav   *  f 0.0 e
* alp    *  f 0.0 e
* tl     *  f 510.9 e
* tv     *  f 510.9 e
* p      *  f 7.0e06 e
* pa     *  f 0.0 e
*
*************************************************************************
* type       num         id          ctitle                        cd 1
valve        770         770 $770$  sg a mfw control valve
*
*  add more model information here
*
```

```
10919 * ncells     nodes       jun1        jun2        epsw          cd 2
10920    2         0           770         779         1.0e-05
10921 * ichf       iconc       ivty        ivps        nvtb2         cd 3
10922   1          0           3           2            0
10923 * ivtr       ivsv        nvtb1       nvsv        nvrf          cd 4
10924   12        -2830        0             0          0
10925 * ivtrov     ivtyov                                           cd 6
10926   0          0
10927 * rvmx       rvov        fminov      fmaxov                    cd 7
10928   0.25        0.25         0.0         1.0
10929 * radin      th          houtl       houtv       toutl         cd 8
10930     0.0         0.0       0.0         0.0         0.0
10931 * toutv      avlve       hvlve       favlve      xpos          cd 9
10932   0.0      0.1649     0.4582     0.0     0.0
10933 *
10934 *    cell arrays
10935 * dx     *  f 5.0 e
10936 * vol    *  f 1.178 e
10937 * fa     *  f 0.2356 e
10938 * fric   *  1.0e-06  0.849  1.0e-06 e
10939 * grav   *  f 0.0 e
10940 * hd     *  f 0.5477 e
10941 * icflg  *  f 0 e
10942 * nff    *  1  1  1 e
10943 * alp    *  f 0.0 e
10944 * vl     *  f 0.0 e
10945 * vv     *  f 0.0 e
10946 * tl     *  f 510.9 e
10947 * tv     *  f 510.9 e
10948 * p      *  f 7.0e06 e
10949 * pa     *  f 0.0 e
10950 *
10951 *
10952 ************************************************************************
10953 * type       num         id          ctitle                    cd 1
10954 valve        772         772 $772$  sg a mfw startup valve
10955 *
10956 *  add more model information here
10957 *
10958 * ncells     nodes       jun1        jun2        epsw          cd 2
10959    2         0           772         780         1.0e-05
10960 * ichf       iconc       ivty        ivps        nvtb2         cd 3
10961   1          0           3           2            0
10962 * ivtr       ivsv        nvtb1       nvsv        nvrf          cd 4
10963    12       -2820        0             0          0
10964 * ivtrov     ivtyov                                           cd 6
10965   0          0
10966 * rvmx       rvov        fminov      fmaxov                    cd 7
10967   0.25        0.25         0.0         1.0
10968 * radin      th          houtl       houtv       toutl         cd 8
10969     0.0         0.0       0.0         0.0         0.0
10970 * toutv      avlve       hvlve       favlve      xpos          cd 9
10971   0.0      0.07267    0.3042    1.0     1.0
10972 *
10973 *    cell arrays
10974 * dx     *  f 5.0 e
10975 * vol    *  f 0.5191 e
10976 * fa     *  f 0.10382 e
10977 * fric   *  1.0e-06  7.007  1.0e-06 e
10978 * grav   *  f 0.0 e
10979 * hd     *  f 0.3636 e
10980 * icflg  *  f 0 e
10981 * nff    *  1  1  1 e
10982 * alp    *  f 0.0 e
10983 * vl     *  f 0.0 e
10984 * vv     *  f 0.0 e
10985 * tl     *  f 510.9 e
10986 * tv     *  f 510.9 e
10987 * p      *  f 7.0e06 e
10988 * pa     *  f 0.0 e
10989 *
10990 ************************************************************************
10991 * type       num         id          ctitle                    cd 1
```



```
10992 valve        774         774 $774$  sg b mfw control valve
10993 *
10994 *  add more model information here
10995 *
10996 * ncells     nodes       jun1        jun2        epsw          cd 2
10997    2         0           774         782         1.0e-05
10998 * ichf       iconc       ivty        ivps        nvtb2         cd 3
10999   1          0           3           2            0
11000 * ivtr       ivsv        nvtb1       nvsv        nvrf          cd 4
11001   12       -2680        0             0          0
11002 * ivtrov     ivtyov                                           cd 6
11003   0          0
11004 * rvmx       rvov        fminov      fmaxov                    cd 7
11005   0.25        0.25         0.0         1.0
11006 * radin      th          houtl       houtv       toutl         cd 8
11007     0.0         0.0       0.0         0.0         0.0
11008 * toutv      avlve       hvlve       favlve      xpos          cd 9
11009   0.0      0.1649     0.4582     0.0     0.0
11010 *
11011 *    cell arrays
11012 * dx     *  f 5.0 e
11013 * vol    *  f 1.178 e
11014 * fa     *  f 0.2356 e
11015 * fric   *  1.0e-06  0.849  1.0e-06 e
11016 * grav   *  f 0.0 e
11017 * hd     *  f 0.5477 e
11018 * icflg  *  f 0 e
11019 * nff    *  1  1  1 e
11020 * alp    *  f 0.0 e
11021 * vl     *  f 0.0 e
11022 * vv     *  f 0.0 e
11023 * tl     *  f 510.9 e
11024 * tv     *  f 510.9 e
11025 * p      *  f 7.0e06 e
11026 * pa     *  f 0.0 e
11027 *
11028 ************************************************************************
11029 * type       num         id          ctitle                    cd 1
11030 valve        776         776 $776$  sg b mfw startup valve
11031 *
11032 *  add more model information here
11033 *
11034 * ncells     nodes       jun1        jun2        epsw          cd 2
11035    2         0           776         783         1.0e-05
11036 * ichf       iconc       ivty        ivps        nvtb2         cd 3
11037   1          0           3           2            0
11038 * ivtr       ivsv        nvtb1       nvsv        nvrf          cd 4
11039    12       -2670        0             0          0
11040 * ivtrov     ivtyov                                           cd 6
11041   0          0
11042 * rvmx       rvov        fminov      fmaxov                    cd 7
11043   0.25        0.25         0.0         1.0
11044 * radin      th          houtl       houtv       toutl         cd 8
11045     0.0         0.0       0.0         0.0         0.0
11046 * toutv      avlve       hvlve       favlve      xpos          cd 9
11047   0.0      0.07267    0.3042    1.0     1.0
11048 *
11049 *    cell arrays
11050 * dx     *  f 5.0 e
11051 * vol    *  f 0.5191 e
11052 * fa     *  f 0.10382 e
11053 * fric   *  1.0e-06  7.007  1.0e-06 e
11054 * grav   *  f 0.0 e
11055 * hd     *  f 0.3636 e
11056 * icflg  *  f 0 e
11057 * nff    *  1  1  1 e
11058 * alp    *  f 0.0 e
11059 * vl     *  f 0.0 e
11060 * vv     *  f 0.0 e
11061 * tl     *  f 510.9 e
11062 * tv     *  f 510.9 e
11063 * p      *  f 7.0e06 e
11064 * pa     *  f 0.0 e
```

```
11065 *
11066 ************************************************************************
11067 * type       num          id          ctitle                        cd 1
11068 plenum       780          780 $780$ fw-a cv header
11069 *
11070 *   Plenum component 780 for Oconee was prepared by James Han on 4/27/00.
11071 *
11072 * npljn      iconc        juns1       juns2                         cd 2
11073     4            0           2           2
11074 *  array cards  *
11075 * junj   *  779  780  784  147 e
11076 * dx     *  f 11.804 e
11077 * vol    *  f 11.804 e
11078 * grav   *  f 0.0 e
11079 * alp    *  f 0.0 e
11080 * tl     *  f 510.9 e
11081 * tv     *  f 510.9 e
11082 * p      *  f 6.6e06 e
11083 * pa     *  f 0.0 e
11084 *
11085 ************************************************************************
11086 * type       num          id          ctitle                        cd 1
11087 plenum       782          782 $782$ fw-b cv header
11088 *
11089 *   Plenum component 782 for Oconee was prepared by James Han on 4/27/00.
11090 *
11091 * npljn      iconc        juns1       juns2                         cd 2
11092     4            0           2           2
11093 *  array cards  *
11094 * junj   *  782 783 786 247 e
11095 * dx     *  f 6.62 e
11096 * vol    *  f 6.62 e
11097 * grav   *  f 0.0 e
11098 * alp    *  f 0.0 e
11099 * tl     *  f 510.9 e
11100 * tv     *  f 510.9 e
11101 * p      *  f 6.6e06 e
11102 * pa     *  f 0.0 e
11103 *
11104 ************************************************************************
11105 * type       num          id          ctitle                        cd 1
11106 valve        784          784 $784$ fw-a isolation valve
11107 *
11108 *   This Valve Component 784 for Oconee was prepared by James Han on 4/27/00.
11109 *
11110 * ncells     nodes        jun1        jun2        epsw              cd 2
11111   2            0         784         788         1.0e-05
11112 * ichf       iconc        ivty        ivps        nvtb2             cd 3
11113   1            0           4           2           0
11114 * ivtr       ivsv         nvtb1       nvsv        nvrf              cd 4
11115   50           1          -2          0           0
11116 * ivtrov     ivtyov                                                 cd 6
11117   0            0
11118 * rvmx       rvov         fminov      fmaxov                        cd 7
11119   1.0          1.0          0.0         1.0
11120 * radin      th           houtl       houtv       toutl             cd 8
11121   0.0          0.0          0.0         0.0         0.0
11122 * toutv      avlve        hvlve       favlve      xpos              cd 9
11123   0.0          0.2356       0.5477      1.0         1.0
11124 *
11125 *    cell arrays
11126 * dx     *  f 5.0 e
11127 * vol    *  f 1.178 e
11128 * fa     *  f 0.2356 e
11129 * fric   *  f 1.0e-06
11130 * grav   *  f 0.0 e
11131 * hd     *  f 0.5477 e
11132 * icflg  *  f 0 e
11133 * nff    *  1  -1  1 e
11134 * alp    *  f 0.0 e
11135 * vl     *  f 0.0 e
11136 * vv     *  f 0.0 e
11137 * tl     *  f 510.9 e
```



```
11138 * tv     *  f 510.9 e
11139 * p      *  f 6.6e06 e
11140 * pa     *  f 0.0 e
11141 *
11142 * vtb1   *  0.0  1.0  10.0  0.0 e
11143 *
11144 ************************************************************************
11145 * type       num          id          ctitle                        cd 1
11146 valve        786          786 $786$ fw-b isolation valve
11147 *
11148 *   This Valve Component 786 for Oconee was prepared by James Han on 4/27/00.
11149 *
11150 * ncells     nodes        jun1        jun2        epsw              cd 2
11151   2            0         786         790         1.0e-05
11152 * ichf       iconc        ivty        ivps        nvtb2             cd 3
11153   1            0           4           2           0
11154 * ivtr       ivsv         nvtb1       nvsv        nvrf              cd 4
11155   50           1          -2          0           0
11156 * ivtrov     ivtyov                                                 cd 6
11157   0            0
11158 * rvmx       rvov         fminov      fmaxov                        cd 7
11159   1.0          1.0          0.0         1.0
11160 * radin      th           houtl       houtv       toutl             cd 8
11161   0.0          0.0          0.0         0.0         0.0
11162 * toutv      avlve        hvlve       favlve      xpos              cd 9
11163   0.0          0.2356       0.5477      1.0         1.0
11164 *
11165 *    cell arrays
11166 * dx     *  f 5.0 e
11167 * vol    *  f 1.178 e
11168 * fa     *  f 0.2356 e
11169 * fric   *  f 1.0e-06
11170 * grav   *  f 0.0 e
11171 * hd     *  f 0.5477 e
11172 * icflg  *  f 0 e
11173 * nff    *  1  -1  1 e
11174 * alp    *  f 0.0 e
11175 * vl     *  f 0.0 e
11176 * vv     *  f 0.0 e
11177 * tl     *  f 510.9 e
11178 * tv     *  f 510.9 e
11179 * p      *  f 6.6e06 e
11180 * pa     *  f 0.0 e
11181 *
11182 * vtb1   *  0.0  1.0  10.0  0.0 e
11183 *
11184 ************************************************************************
11185 *  type      num          id          ctitle                        cd 1
11186 pipe         788          788 $788$ sg a feedwater inlet line
11187 *
11188 *   Pipe Component 788 for Oconee was prepared by James Han on 4/27/00.
11189 *
11190 *  ncells    nodes        jun1        jun2        epsw              cd 2
11191     18           0         788         789         1.0e-05
11192 *  ichf      iconc        iacc        ipow                          cd 3
11193     1            0           0           0
11194 *  radin     th           houtl       houtv       toutl             cd 6
11195        0.0          0.0         0.0         0.0         0.0
11196 *  toutv     powin        powoff      rpowmx      powscl            cd 7
11197     0.0          0.0         0.0         1.0e20      1.0
11198 *           cell arrays
11199 * dx     *  r6 6.01  r4 6.01 s
11200 * dx     *  r4 5.81  2.37  r2 6.36  2.37 e
11201 * vol    *  r6 1.416  r4 1.416 s
11202 * vol    *  r4 0.4599  0.1876  r2 0.5034  0.1876 e
11203 * fa     *  r6 0.2356  r4 0.2356  r8 0.079153  0.1500 e
11204 * fric   *  f 1.e-6 e
11205 * grav   *  r15 0.0  r3 1.0  0.0 e
11206 * hd     *  r6 0.5477  r4 0.5477  r8 0.3175  0.100 e
11207 * icflg  *  f 0 e
11208 * nff    *  f 1 e
11209 * alp    *  f 0.0 e
11210 * vl     *  f 0.0 e
```

```
11211 * vv     *  f 0.0 e
11212 * tl     *  f 510.9 e
11213 * tv     *  f 510.9 e
11214 * p      *  f 6.6e06 e
11215 * pa     *  f 0.0 e
11216 *
11217 ************************************************************************
11218 * type       num         id          ctitle                        cd 1
11219 valve          789      789 $789$ mfw line a check valve
11220 *        ncells          nodes          jun1          jun2          epsw
11221                2              0           789            70    0.0000E+00
11222 *          ichf          iconc          ivty          ivps          nvtb2
11223                0              0             3             2              0
11224 *          ivtr           ivsv         nvtb1          nvsv          nvrf
11225              -789              1            -2             0              0
11226 *        ivtrov         ivtyov
11227                0              0
11228 *          rvmx           rvov         fminov        fmaxov
11229     4.0000E+00     4.0000E+00     0.0000E+00    0.0000E+00
11230 *          radin            th          houtl         houtv         toutl
11231     0.0            0.0            0.0000E+00    0.0000E+00    0.0000E+00
11232 *          toutv          avlve          hvlve         favlve          xpos
11233     0.0000E+00     0.1500         0.1000        0.0000E+00    0.0000E+00
11234 *
11235 * dx     *  f 2.50 e
11236 * vol    *  f 0.375 e
11237 * fa     *  f 0.1500 e
11238 * fric   *  1.0e-06  0.025  1.0e-06 e
11239 * grav   *  f 0.0 e
11240 * hd     *  f 0.100 e
11241 * icflg *  f 0 e
11242 * nff    *  1  -1  1 e
11243 * alp    *  f 0.0 e
11244 * vl     *  f 0.0 e
11245 * vv     *  f 0.0 e
11246 * tl     *  f 510.9 e
11247 * tv     *  f 510.9 e
11248 * p      *  f 6.6e06 e
11249 * pa     *  f 0.0 e
11250 *
11251 * vtbl   *  0.0  0.0  0.5  1.0 e
11252 *
11253 ************************************************************************
11254 *  type       num         id          ctitle                        cd 1
11255 pipe          790         790 $790$ sb b feedwater inlet line
11256 *
11257 *  Pipe Component 790 was prepared for Oconee by James Han on 4/27/00.
11258 *
11259 *  ncells     nodes       jun1        jun2        epsw              cd 2
11260     10          0          790         791          1.0e-05
11261 *  ichf       iconc       iacc        ipow                          cd 3
11262     1          0           0           0
11263 *  radin      th          houtl       houtv       toutl             cd 6
11264     0.0        0.0          0.0         0.0         0.0
11265 *  toutv      powin       powoff      rpowmx      powscl            cd 7
11266     0.0        0.0         0.0         1.0e20      1.0
11267 *            cell arrays
11268 * dx     *  r4 4.955  r2 5.335  2.37  r2 6.36  2.37 e
11269 * vol    *  r4 1.1674  r2 1.2569  0.1876  r2 0.5034  0.1876 e
11270 * fa     *  r4 0.2356  r2 0.2356  r4 0.079153  0.1500 e
11271 * fric   * f 1.e-6 e
11272 * grav   *  r7 0.0  r3 1.0  0.0 e
11273 * hd     * r4 0.5477  r2 0.5477  r4 0.3175  0.100 e
11274 * icflg * f 0 e
11275 * nff    * f 1 e
11276 * alp    * f 0.0 e
11277 * vl     * f 0.0 e
11278 * vv     * f 0.0 e
11279 * tl     *  f 510.9 e
11280 * tv     *  f 510.9 e
11281 * p      *  f 6.6e06 e
11282 * pa     * f 0.0 e
11283 *
```



```
11284 ************************************************************************
11285 * type       num         id          ctitle                        cd 1
11286 valve          791      791 $791$ mfw line b check valve
11287 *        ncells          nodes          jun1          jun2          epsw
11288                2              0           791            60    0.0000E+00
11289 *          ichf          iconc          ivty          ivps          nvtb2
11290                0              0             3             2              0
11291 *          ivtr           ivsv         nvtb1          nvsv          nvrf
11292              -791              1            -2             0              0
11293 *        ivtrov         ivtyov
11294                0              0
11295 *          rvmx           rvov         fminov        fmaxov
11296     4.0000E+00     4.0000E+00     0.0000E+00    0.0000E+00
11297 *          radin            th          houtl         houtv         toutl
11298     0.0            0.0            0.0000E+00    0.0000E+00    0.0000E+00
11299 *          toutv          avlve          hvlve         favlve          xpos
11300     0.0000E+00     0.1500         0.1000        0.0000E+00    0.0000E+00
11301 *
11302 * dx     *  f 2.50 e
11303 * vol    *  f 0.375 e
11304 * fa     *  f 0.1500 e
11305 * fric   *  1.0e-06  0.025  1.0e-06 e
11306 * grav   *  f 0.0 e
11307 * hd     *  f 0.100 e
11308 * icflg *  f 0 e
11309 * nff    *  1  -1  1 e
11310 * alp    *  f 0.0 e
11311 * vl     *  f 0.0 e
11312 * vv     *  f 0.0 e
11313 * tl     *  f 510.9 e
11314 * tv     *  f 510.9 e
11315 * p      *  f 6.6e06 e
11316 * pa     *  f 0.0 e
11317 *
11318 * vtbl   *  0.0  0.0  0.5  1.0 e
11319 *
11320 ************************************************************************
11321 * type       num         id          ctitle                        cd 1
11322 rod           900      900 $900$ reactor-core fuel rods
11323 *          ncrx          ncrz          ittc          iext           m1d
11324                6             4             0             0             0
11325 *         nopowr         nridr         modez         liqlev        iaxcnd
11326                0             0             0             1             1
11327 *          idbci         idbco          hdri          hdro
11328                0             2     0.0000e+00    0.0000e+00
11329 *          nrods         nodes         irftr         nzmax        irftr2
11330               12             8             0            50             0
11331 *      dtxht(1)      dtxht(2)         dznht         hgapo         shelv
11332     1.0000e+01    7.5000e+01    5.0000e-03    6.0000e+03    0.0000e+00
11333 *         irpwty         ndgx          ndhx          nrts          nhist
11334                4             6           *11* 69            10          *0* 1
11335 *           q235          q239          q238          qavg         r239pf
11336          192.9         198.5         193.9         200.37           0.6   *from updated tm
    i-mslb deck
11337 *         fisphi          rans         fp235         fp238
11338              1.0           1.0          0.98          0.01   * from updated tmi-mslb
    deck
11339 *         irpwtr         irpwsv        nrpwtb        nrpwsv        nrpwrf
11340                1              1            -3             0             0
11341 *         izpwtr         izpwsv        nzpwtb        nzpwsv        nzpwrf
11342                0              1             1             0             0
11343 *          nmwrx          nfci          nfcil
11344                1              1             1
11345 *          nzpwz          nzpwi         nfbpwt
11346                0              0             0
11347 *          react          tneut         rpwoff        rrpwmx        rpwscl
11348     0.0000e+00    1.6250e-05   -1.0000e+20    1.0000e+10    1.0000e+00
11349 *         rpowri          zpwin         zpwoff         rzpwmx
11350     2.5680e+09    1.0000e+00   -1.0000e+20    1.0000e+10
11351 *         extsou          pldr          pdrat         fucrac
11352     0.0000e+00    0.0000e+00    1.3000e+00    7.0000e-01
11353 *
11354 * nhcomo* f            99e
```

```
11355 * nhcelo*  -2  2  3  4  5 s
11356 * nhcelo*  6 e
11357 *    z   *  2.4628E+00  3.9222E+00  4.8951E+00  5.6247E+00  6.1112E+00e
11358 * grav  * f   1.0000e+00e
11359 * idrod   *  1  2  3  4  5 s
11360 * idrod   *  6 e
11361 * rdx   * f   6.1360e+03e
11362 * radrd *     0.0000E+00    1.5000E-03    3.0000E-03    4.0000E-03    4.6570E-03
11363 * radrd *     4.7850E-03    5.0000E-03    5.4600E-03e
11364 * matrd * r04          1             3r02          2e
11365 * nfax  * f            4e
11366 * rftn  * f   5.7900e+02e
11367 * rftn  * f   5.7900e+02e
11368 * rftn  * f   5.7900e+02e
11369 * rftn  * f   5.7900e+02e
11370 * rftn  * f   5.7900e+02e
11371 * rftn  * f   5.7900e+02e
11372 * rftn  * f   5.7900e+02e
11373 * rftn  * f   5.7900e+02e
11374 * rftn  * f   5.7900e+02e
11375 * rftn  * f   5.7900e+02e
11376 * rftn  * f   5.7900e+02e
11377 * rftn  * f   5.7900e+02e
11378 * rdpwr * r05 1.0000e+00r03 0.0000e+00e
11379 * cpowr * f   1.0000e+00e
11380 * rpkf    *   f 2.260 e
11381 * zpwtb *     1.0000E+00    9.8000E-01    1.0900E+00    1.0700E+00    1.0000E+00
11382 * zpwtb *     8.0000E-01e
11383 * rpwtb * r02 0.0000E+00  1.0000E+00 -5.3600E-02  1.0000E+04 -5.3600E-02 e
11384 * beta  *     1.6900E-04    8.3200E-04    2.6400E-03    1.2200E-03    1.3800E-03
11385 * beta  *     2.4700E-04e
11386 * lamda *     3.8700E+00    1.4000E+00    3.1100E-01    1.1500E-01    3.1700E-02
11387 * lamda *     1.2700E-02e
11388 * cdgn  /     6.9011E+09    9.3915E+10    1.3415E+12    1.6765E+12    6.8796E+12
11389 * cdgn  /     3.0735E+12e
11390 * lamdh /     1.7720E+00    5.7740E-01    6.7430E-02    6.2140E-03    4.7390E-04
11391 * lamdh /     4.8100E-05    5.3440E-06    5.7260E-07    1.0360E-07    2.9590E-08
11392 * lamdh /     7.5850E-10e
11393 * edh   /     2.9900E-03    8.2500E-03    1.5500E-02    1.9350E-02    1.1650E-02
11394 * edh   /     6.4500E-03    2.3100E-03    1.6400E-03    8.5000E-04    4.3000E-04
11395 * edh   /     5.7000E-04e
11396 * cdhn  /     4.3331E+06    3.6692E+07    5.9030E+08    7.9966E+09    6.3130E+10
11397 * cdhn  /     3.4436E+11    1.1100E+12    7.3551E+12    2.1069E+13    3.7318E+13
11398 * cdhn  /     1.9298E+15e
11399 * fpuo2 * f   0.0000E+00e
11400 * ftd   * f   9.2500E-01e
11401 * gmix  *     1.0000E+00r06 0.0000E+00    1.0000E+00r06 0.0000E+00    1.0000E+00
11402 * gmix  * r06 0.0000E+00    1.0000E+00r06 0.0000E+00    1.0000E+00r06 0.0000E+00
11403 * gmix  *     1.0000E+00r06 0.0000E+00e
11404 * gmles * f   2.0000E-02e
11405 * pgapt * f   5.1670E+06e
11406 * plvol * f   2.0860E-05e
11407 * pslen * f   3.6576E+00e
11408 * clenn * f   3.9576E+00e
11409 * burn  * f 2662.0 e
11410 * burn  * f 2662.0 e
11411 * burn  * f 2662.0 e
11412 * burn  * f 2662.0 e
11413 * burn  * f 2662.0 e
11414 * burn  * f 2662.0 e
11415 * burn  * f 2662.0 e
11416 * burn  * f 2662.0 e
11417 * burn  * f 2662.0 e
11418 * burn  * f 2662.0 e
11419 * burn  * f 2662.0 e
11420 * burn  * f 2662.0 e
11421 ************************************************************************
11422 *******   type          num          id       ctitle
11423 slab        910        910 $910$ vessel level 1, cells 1-6
11424 *          ncrx         ncrz         ittc         iext          mld
11425              6            1            0            0            0
11426 *        nopowr        nridr        modez        liqlev       iaxcnd
11427              1            1            1            0            0
```



```
11428 *         idbci         idbco         hdri         hdro
11429               0             2    0.0000e+00    0.0000e+00
11430 *         width        ipatch
11431        4.0604             0
11432 *         nrods         nodes        irftr         nzmax        irftr2
11433               6             1            0             5            0
11434 *      dtxht(1)      dtxht(2)       dznht        hgapo         shelv
11435     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11436 *
11437 * nhcomo*  f          99e
11438 * nhcelo*  -1  1  2 e
11439 * dz    *  f 2.4628 e
11440 * grav  *  f 1.0000e+00e
11441 * idrod *  1  2  3  4  5 s
11442 * idrod *  6 e
11443 * rdx   *  f  1.0000e+00e
11444 * radrd *  f 0.0762 e
11445 * matrd *  f            6e
11446 * nfax  *  f            0e
11447 * rftn  *  f  565.0 e
11448 * rftn  *  f  565.0 e
11449 * rftn  *  f  565.0 e
11450 * rftn  *  f  565.0 e
11451 * rftn  *  f  565.0 e
11452 * rftn  *  f  565.0 e
11453 ************************************************************************
11454 *******   type          num          id       ctitle
11455 slab        911        911 $911$ vessel level 2, cells 1-6
11456 *          ncrx         ncrz         ittc         iext          mld
11457               6            1            0            0            0
11458 *        nopowr        nridr        modez        liqlev       iaxcnd
11459               1            1            1            0            0
11460 *         idbci         idbco         hdri         hdro
11461               0             2    0.0000e+00    0.0000e+00
11462 *         width        ipatch
11463        3.3301             0
11464 *         nrods         nodes        irftr         nzmax        irftr2
11465               6             1            0             5            0
11466 *      dtxht(1)      dtxht(2)       dznht        hgapo         shelv
11467     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11468 *
11469 * nhcomo*  f          99e
11470 * nhcelo*  -2  2  3 e
11471 * dz    *  f 1.4594 e
11472 * grav  *  f 1.0000e+00e
11473 * idrod *  1  2  3  4  5 s
11474 * idrod *  6 e
11475 * rdx   *  f  1.0000e+00e
11476 * radrd *  f 0.0381 e
11477 * matrd *  f            6e
11478 * nfax  *  f            0e
11479 * rftn  *  f  565.0 e
11480 * rftn  *  f  565.0 e
11481 * rftn  *  f  565.0 e
11482 * rftn  *  f  565.0 e
11483 * rftn  *  f  565.0 e
11484 * rftn  *  f  565.0 e
11485 ************************************************************************
11486 *******   type          num          id       ctitle
11487 slab        912        912 $912$ vessel levels 3-4, cells 1-6
11488 *          ncrx         ncrz         ittc         iext          mld
11489               6            2            0            0            0
11490 *        nopowr        nridr        modez        liqlev       iaxcnd
11491               1            1            1            0            1
11492 *         idbci         idbco         hdri         hdro
11493               0             2    0.0000e+00    0.0000e+00
11494 *         width        ipatch
11495        2.0147             0
11496 *         nrods         nodes        irftr         nzmax        irftr2
11497               6             1            0             5            0
11498 *      dtxht(1)      dtxht(2)       dznht        hgapo         shelv
11499     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11500 *
```

```
11501 * nhcomo*  f          99e
11502 * nhcelo*  -3  3  4  5 e
11503 * dz    *  0.9729  0.7296 e
11504 * grav  *  f 1.0000e+00e
11505 * idrod *  1  2  3  4  5 s
11506 * idrod *  6 e
11507 * rdx   *  f  1.0000e+00e
11508 * radrd *  f 0.0381 e
11509 * matrd *  f           6e
11510 * nfax  *  f           0e
11511 * rftn  *  f  565.0 e
11512 * rftn  *  f  565.0 e
11513 * rftn  *  f  565.0 e
11514 * rftn  *  f  565.0 e
11515 * rftn  *  f  565.0 e
11516 * rftn  *  f  565.0 e
11517 ************************************************************************
11518 *******   type          num           id       ctitle
11519 slab        913        913 $913$ vessel level 5, cells 1-6
11520 *          ncrx          ncrz          ittc          iext          mld
11521               6             1             0             0            0
11522 *        nopowr         nridr         modez        liqlev        iaxcnd
11523               1             1             1             0            0
11524 *         idbci         idbco          hdri          hdro
11525               0             2    0.0000e+00    0.0000e+00
11526 *         width        ipatch
11527        5.9815             0
11528 *         nrods         nodes         irftr         nzmax        irftr2
11529               6             1             0             5            0
11530 *     dtxht(1)      dtxht(2)        dznht         hgapo         shelv
11531     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11532 *
11533 * nhcomo*  f          99e
11534 * nhcelo*  -5  5  6 e
11535 * dz    *  f 0.4865 e
11536 * grav  *  f 1.0000e+00e
11537 * idrod *  1  2  3  4  5 s
11538 * idrod *  6 e
11539 * rdx   *  f  1.0000e+00e
11540 * radrd *  f 0.0381 e
11541 * matrd *  f           6e
11542 * nfax  *  f           0e
11543 * rftn  *  f  565.0 e
11544 * rftn  *  f  565.0 e
11545 * rftn  *  f  565.0 e
11546 * rftn  *  f  565.0 e
11547 * rftn  *  f  565.0 e
11548 * rftn  *  f  565.0 e
11549 ************************************************************************
11550 *******   type          num           id       ctitle
11551 slab        914        914 $914$ vessel levels 6-9, cells 1-6
11552 *          ncrx          ncrz          ittc          iext          mld
11553               6             4             0             0            0
11554 *        nopowr         nridr         modez        liqlev        iaxcnd
11555               1             1             1             0            1
11556 *         idbci         idbco          hdri          hdro
11557               0             2    0.0000e+00    0.0000e+00
11558 *         width        ipatch
11559       10.9430             0
11560 *         nrods         nodes         irftr         nzmax        irftr2
11561               6             1             0             9            0
11562 *     dtxht(1)      dtxht(2)        dznht         hgapo         shelv
11563     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11564 *
11565 * nhcomo*  f          99e
11566 * nhcelo*  -6  6  7  8  9 s
11567 * nhcelo*  10 e
11568 * dz    *  0.5208  0.7110  0.5208  1.7526 e
11569 * grav  *  f 1.0000e+00e
11570 * idrod *  1  2  3  4  5 s
11571 * idrod *  6 e
11572 * rdx   *  f  1.0000e+00e
11573 * radrd *  f 0.0180 e
```



```
11574 * matrd *  f           6e
11575 * nfax  *  f           0e
11576 * rftn  *  f  565.0 e
11577 * rftn  *  f  565.0 e
11578 * rftn  *  f  565.0 e
11579 * rftn  *  f  565.0 e
11580 * rftn  *  f  565.0 e
11581 * rftn  *  f  565.0 e
11582 ************************************************************************
11583 *******   type          num           id       ctitle
11584 slab        915        915 $915$ vessel level 10, cells 1-6
11585 *          ncrx          ncrz          ittc          iext          mld
11586               6             1             0             0            0
11587 *        nopowr         nridr         modez        liqlev        iaxcnd
11588               1             1             1             0            0
11589 *         idbci         idbco          hdri          hdro
11590               0             2    0.0000e+00    0.0000e+00
11591 *         width        ipatch
11592       12.5530             0
11593 *         nrods         nodes         irftr         nzmax        irftr2
11594               6             1             0             5            0
11595 *     dtxht(1)      dtxht(2)        dznht         hgapo         shelv
11596     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11597 *
11598 * nhcomo*  f          99e
11599 * nhcelo*  -10  10  10 e
11600 * dz    *  f 1.7526 e
11601 * grav  *  f 1.0000e+00e
11602 * idrod *  1  2  3  4  5 s
11603 * idrod *  6 e
11604 * rdx   *  f  1.0000e+00e
11605 * radrd *  f 0.0264 e
11606 * matrd *  f           6e
11607 * nfax  *  f           0e
11608 * rftn  *  f  585.0 e
11609 * rftn  *  f  585.0 e
11610 * rftn  *  f  585.0 e
11611 * rftn  *  f  585.0 e
11612 * rftn  *  f  585.0 e
11613 * rftn  *  f  585.0 e
11614 ************************************************************************
11615 *******   type          num           id       ctitle
11616 slab        916        916 $916$ vessel level 1, cells 7-12
11617 *          ncrx          ncrz          ittc          iext          mld
11618               6             1             0             0            0
11619 *        nopowr         nridr         modez        liqlev        iaxcnd
11620               1             1             1             0            0
11621 *         idbci         idbco          hdri          hdro
11622               0             2    0.0000e+00    0.0000e+00
11623 *         width        ipatch
11624       2.6108             0
11625 *         nrods         nodes         irftr         nzmax        irftr2
11626               6             5             0             5            0
11627 *     dtxht(1)      dtxht(2)        dznht         hgapo         shelv
11628     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11629 *
11630 * nhcomo*  f          99e
11631 * nhcelo*  -1  1  2 e
11632 * dz    *  f 2.4628 e
11633 * grav  *  f 1.0000e+00e
11634 * idrod *  7  8  9  10  11 s
11635 * idrod *  12 e
11636 * rdx   *  f  1.0000e+00e
11637 * radrd *  i2 0.0  0.127  0.1426 e
11638 * matrd *  r3 9        6e
11639 * nfax  *  f           0e
11640 * rftn  *  f  565.0 e
11641 * rftn  *  f  565.0 e
11642 * rftn  *  f  565.0 e
11643 * rftn  *  f  565.0 e
11644 * rftn  *  f  565.0 e
11645 * rftn  *  f  565.0 e
11646 ************************************************************************
```

```
11647 *******   type           num           id        ctitle
11648 slab        917        917 $917$ vessel levels 2-5, cells 7-12
11649 *          ncrx          ncrz          ittc          iext           m1d
11650               6             4             0             0             0
11651 *        nopowr         nridr         modez         liqlev        iaxcnd
11652               1             1             1             0             1
11653 *         idbci         idbco          hdri          hdro
11654               0             2    0.0000e+00    0.0000e+00
11655 *         width        ipatch
11656         4.290             0
11657 *         nrods         nodes         irftr         nzmax        irftr2
11658               6             5             0             9             0
11659 *      dtxht(1)      dtxht(2)         dznht         hgapo         shelv
11660     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11661 *
11662 * nhcomo*  f          99e
11663 * nhcelo*  -2  2  3  4  5 s
11664 * nhcelo*  6 e
11665 * dz    *  1.4594  0.9729  0.7296  0.4865 e
11666 * grav  *  f 1.0000e+00e
11667 * idrod *  7  8  9  10  11 s
11668 * idrod *  12 e
11669 * rdx   *  f  1.0000e+00e
11670 * radrd *  i2 0.0  0.2143  0.2299 e
11671 * matrd *  r3 9       6e
11672 * nfax  *  f          0e
11673 * rftn  *  f  565.0 e
11674 * rftn  *  f  565.0 e
11675 * rftn  *  f  565.0 e
11676 * rftn  *  f  565.0 e
11677 * rftn  *  f  565.0 e
11678 * rftn  *  f  565.0 e
11679 ************************************************************************
11680 *******   type           num           id        ctitle
11681 slab        918        918 $918$ vessel levels 6-9, cells 7-12
11682 *          ncrx          ncrz          ittc          iext           m1d
11683               6             4             0             0             0
11684 *        nopowr         nridr         modez         liqlev        iaxcnd
11685               1             1             1             0             1
11686 *         idbci         idbco          hdri          hdro
11687               0             2    0.0000e+00    0.0000e+00
11688 *         width        ipatch
11689         2.0710             0
11690 *         nrods         nodes         irftr         nzmax        irftr2
11691               6             5             0             9             0
11692 *      dtxht(1)      dtxht(2)         dznht         hgapo         shelv
11693     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11694 *
11695 * nhcomo*  f          99e
11696 * nhcelo*  -6  6  7  8  9 s
11697 * nhcelo*  10 e
11698 * dz    *  0.5208  0.7110  0.5208  1.7526 e
11699 * grav  *  f 1.0000e+00e
11700 * idrod *  7  8  9  10  11 s
11701 * idrod *  12 e
11702 * rdx   *  f  1.0000e+00e
11703 * radrd *  i2 0.0  0.294  0.3096 e
11704 * matrd *  r3 9       6e
11705 * nfax  *  f          0e
11706 * rftn  *  f  565.0 e
11707 * rftn  *  f  565.0 e
11708 * rftn  *  f  565.0 e
11709 * rftn  *  f  565.0 e
11710 * rftn  *  f  565.0 e
11711 * rftn  *  f  565.0 e
11712 ************************************************************************
11713 *******   type           num           id        ctitle
11714 slab        919        919 $919$ vessel level 10, cells 7-12
11715 *          ncrx          ncrz          ittc          iext           m1d
11716               6             1             0             0             0
11717 *        nopowr         nridr         modez         liqlev        iaxcnd
11718               1             1             1             0             0
11719 *         idbci         idbco          hdri          hdro
```



```
11720               0             2    0.0000e+00    0.0000e+00
11721 *         width        ipatch
11722         2.2823             0
11723 *         nrods         nodes         irftr         nzmax        irftr2
11724               6             5             0             5             0
11725 *      dtxht(1)      dtxht(2)         dznht         hgapo         shelv
11726     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11727 *
11728 * nhcomo*  f          99e
11729 * nhcelo*  -10  10  10 e
11730 * dz    *  f 1.7526 e
11731 * grav  *  f 1.0000e+00e
11732 * idrod *  7  8  9  10  11 s
11733 * idrod *  12 e
11734 * rdx   *  f  1.0000e+00e
11735 * radrd *  i2 0.0  0.127  0.1426 e
11736 * matrd *  r3 9       6e
11737 * nfax  *  f          0e
11738 * rftn  *  f  585.0 e
11739 * rftn  *  f  585.0 e
11740 * rftn  *  f  585.0 e
11741 * rftn  *  f  585.0 e
11742 * rftn  *  f  585.0 e
11743 * rftn  *  f  585.0 e
11744 ************************************************************************
11745 *  type       num          id          ctitle                      cd 1
11746 rod          930        930 $930$ sg-a tube bundle hs
11747 *          ncrx          ncrz          ittc          iext           m1d
11748               1            13             0             0             0
11749 *        nopowr         nridr         modez         liqlev        iaxcnd
11750               1             0             1             0             1
11751 *         idbci         idbco          hdri          hdro
11752               2             2       0.00000       0.00000
11753 *         nrods         nodes         irftr         nzmax        irftr2
11754               1             4             0            18             0
11755 *      dtxht(1)      dtxht(2)         dznht         hgapo         shelv
11756     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11757 *
11758 * nhcomi* f          12e
11759 * nhceli*  -2  2  3  4  5 s
11760 * nhceli*  6  7  8  9  10 s
11761 * nhceli*  11  12  13  14  15 e
11762 * nhcomo*  r12 121  r3 122 e
11763 * nhcelo*  -1  1  2  3  4 s
11764 * nhcelo*  5  6  7  8  9 s
11765 * nhcelo*  10  11  1  2  2 e
11766 * dz    *  0.05  0.10  0.20  0.40  1.015 s
11767 * dz    *  f 1.765 e
11768 * grav  *  f 1.0 e
11769 * rdx   *  16478.0 e
11770 * radrd *  i2  0.00707  0.00793 e
11771 * matrd *  f          10 e
11772 * nfax  *  f          0e
11773 * rftn  *  f   5.4211e+02e
11774 ************************************************************************
11775 *  type        num         id      ctitle
11776 slab          931       931 $931$ sg-a outlet plenum hs
11777 *          ncrx          ncrz          ittc          iext           m1d
11778               1             1             0             0             0
11779 *        nopowr         nridr         modez         liqlev        iaxcnd
11780               1             0             1             0             0
11781 *         idbci         idbco          hdri          hdro
11782               2             1    0.0000e+00    0.0000e+00
11783 *         width        ipatch
11784         6.3074             0
11785 *           tlo           tvo           hlo           hvo
11786     2.9500e+02    2.9500e+02    0.0000e+00    5.8600e+00
11787 *         nrods         nodes         irftr         nzmax        irftr2
11788               1             4             0             3             0
11789 *      dtxht(1)      dtxht(2)         dznht         hgapo         shelv
11790     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11791 *
11792 * nhcomi* f          12e
```

```
11793 * nhceli*  -1  1  2 e
11794 * dz     * f 2.42 e
11795 * grav   * f   1.0000e+00e
11796 * rdx    * f   1.0000e+00e
11797 * radrd *  i2  0.0  0.2079 e
11798 * matrd * f            9e
11799 * nfax   * f            0e
11800 * rftn   * f   5.4211e+02e
11801 ************************************************************************
11802 *  type         num         id      ctitle
11803 slab          932       932 $932$ sg-a inlet plenum hs
11804 *          ncrx          ncrz          ittc          iext          m1d
11805              1             1             0             0            0
11806 *        nopowr         nridr         modez        liqlev        iaxcnd
11807              1             0             1             0            0
11808 *         idbci         idbco          hdri          hdro
11809              2             1    0.0000e+00    0.0000e+00
11810 *         width        ipatch
11811        6.2273             0
11812 *           tlo           tvo           hlo           hvo
11813     2.9500e+02    2.9500e+02    0.0000e+00    5.8600e+00
11814 *         nrods         nodes         irftr         nzmax        irftr2
11815              1             4             0             3            0
11816 *      dtxht(1)      dtxht(2)      dznht         hgapo         shelv
11817     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11818 *
11819 * nhcomi* f           12e
11820 * nhceli*  -15  15  15 e
11821 * dz     * f 2.42 e
11822 * grav   * f   1.0000e+00e
11823 * rdx    * f   1.0000e+00e
11824 * radrd *  i2  0.0  0.2079 e
11825 * matrd * f            9e
11826 * nfax   * f            0e
11827 * rftn   * f   5.4211e+02e
11828 ************************************************************************
11829 *******   type          num         id       ctitle
11830 rod           933       933 $933$ sg-a lower outer shell hs
11831 *          ncrx          ncrz          ittc          iext          m1d
11832              1             9             0             0            0
11833 *        nopowr         nridr         modez        liqlev        iaxcnd
11834              1             0             1             0            1
11835 *         idbci         idbco          hdri          hdro
11836              2             1    0.0000e+00    0.0000e+00
11837 *           tlo           tvo           hlo           hvo
11838     2.9500e+02    2.9500e+02    0.0000e+00    5.8600e+00
11839 *         nrods         nodes         irftr         nzmax        irftr2
11840              1             4             0            10            0
11841 *      dtxht(1)      dtxht(2)      dznht         hgapo         shelv
11842     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11843 *
11844 * nhcomi*  f 123 e
11845 * nhceli*  -2  2  3  4  5 s
11846 * nhceli*  6  7  8  9  10 s
11847 * nhceli*  11 e
11848 * dz     *  r2 0.8825  r3 1.765 s
11849 * dz     *  1.015  0.4  0.2  0.1 e
11850 * grav   * f  -1.0000e+00e
11851 * rdx    * f   1.0000e+00e
11852 * radrd *  i2  1.751  1.85737 e
11853 * matrd * f            9e
11854 * nfax   * f            0e
11855 * rftn   * f   5.4211e+02e
11856 ************************************************************************
11857 *******   type          num         id       ctitle
11858 rod           934       934 $934$ sg-a upper outer shell hs
11859 *          ncrx          ncrz          ittc          iext          m1d
11860              1             5             0             0            0
11861 *        nopowr         nridr         modez        liqlev        iaxcnd
11862              1             0             1             0            1
11863 *         idbci         idbco          hdri          hdro
11864              2             1    0.0000e+00    0.0000e+00
11865 *           tlo           tvo           hlo           hvo
```



```
11866     2.9500e+02    2.9500e+02    0.0000e+00    5.8600e+00
11867 *         nrods         nodes         irftr         nzmax        irftr2
11868              1             4             0             6            0
11869 *      dtxht(1)      dtxht(2)      dznht         hgapo         shelv
11870     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11871 *
11872 * nhcomi*  f 124 e
11873 * nhceli*  -1  1  2  3  4 s
11874 * nhceli*  5  6 e
11875 * dz     *  r3  0.7  r2 1.765 e
11876 * grav   * f  -1.0000e+00e
11877 * rdx    * f   1.0000e+00e
11878 * radrd *  i2  1.751  1.85737 e
11879 * matrd * f            9e
11880 * nfax   * f            0e
11881 * rftn   * f   5.4211e+02e
11882 ************************************************************************
11883 *  type       num         id          ctitle                        cd 1
11884 rod          940        940 $940$ sg-b tube bundle hs
11885 *          ncrx          ncrz          ittc          iext          m1d
11886              1            13             0             0            0
11887 *        nopowr         nridr         modez        liqlev        iaxcnd
11888              1             0             1             0            1
11889 *         idbci         idbco          hdri          hdro
11890              2             2       0.00000       0.00000
11891 *         nrods         nodes         irftr         nzmax        irftr2
11892              1             4             0            18            0
11893 *      dtxht(1)      dtxht(2)      dznht         hgapo         shelv
11894     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11895 *
11896 * nhcomi* f           2e
11897 * nhceli*  -2  2  3  4  5 s
11898 * nhceli*  6  7  8  9  10 s
11899 * nhceli*  11  12  13  14  15 e
11900 * nhcomo*  r12 201  r3 202 e
11901 * nhcelo*  -1  1  2  3  4 s
11902 * nhcelo*  5  6  7  8  9 s
11903 * nhcelo*  10  11  1  2  2 e
11904 * dz     *  0.05  0.10  0.20  0.40  1.015 s
11905 * dz     *  f 1.765 e
11906 * grav   *  f 1.0 e
11907 * rdx    *  16478.0 e
11908 * radrd *  i2  0.00707  0.00793 e
11909 * matrd * f           10 e
11910 * nfax   * f            0e
11911 * rftn   * f   5.4211e+02e
11912 ************************************************************************
11913 *  type         num         id      ctitle
11914 slab          941       941 $941$ sg-b outlet plenum hs
11915 *          ncrx          ncrz          ittc          iext          m1d
11916              1             1             0             0            0
11917 *        nopowr         nridr         modez        liqlev        iaxcnd
11918              1             0             1             0            0
11919 *         idbci         idbco          hdri          hdro
11920              2             1    0.0000e+00    0.0000e+00
11921 *         width        ipatch
11922        6.3074             0
11923 *           tlo           tvo           hlo           hvo
11924     2.9500e+02    2.9500e+02    0.0000e+00    5.8600e+00
11925 *         nrods         nodes         irftr         nzmax        irftr2
11926              1             4             0             3            0
11927 *      dtxht(1)      dtxht(2)      dznht         hgapo         shelv
11928     3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11929 *
11930 * nhcomi* f           2e
11931 * nhceli*  -1  1  2 e
11932 * dz     * f 2.42 e
11933 * grav   * f   1.0000e+00e
11934 * rdx    * f   1.0000e+00e
11935 * radrd *  i2  0.0  0.2079 e
11936 * matrd * f            9e
11937 * nfax   * f            0e
11938 * rftn   * f   5.4211e+02e
```

```
11939 ************************************************************************
11940 *  type        num         id      ctitle
11941 slab          942       942 $942$ sg-b inlet plenum hs
11942 *          ncrx          ncrz          ittc          iext          m1d
11943               1             1             0             0            0
11944 *       nopowr         nridr         modez         liqlev       iaxcnd
11945               1             0             1             0            0
11946 *        idbci         idbco         hdri          hdro
11947               2             1    0.0000e+00    0.0000e+00
11948 *        width        ipatch
11949         6.2273             0
11950 *          tlo           tvo           hlo           hvo
11951      2.9500e+02    2.9500e+02    0.0000e+00    5.8600e+00
11952 *        nrods         nodes         irftr         nzmax        irftr2
11953               1             4             0             3            0
11954 *     dtxht(1)      dtxht(2)      dznht         hgapo         shelv
11955      3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11956 *
11957 * nhcomi* f           2e
11958 * nhceli*  -15  15  15 e
11959 * dz    * f 2.42 e
11960 * grav  * f   1.0000e+00
11961 * rdx   * f   1.0000e+00
11962 * radrd *  i2  0.0  0.2079 e
11963 * matrd * f           9e
11964 * nfax  * f           0e
11965 * rftn  * f   5.4211e+02e
11966 ************************************************************************
11967 *******   type          num           id        ctitle
11968 rod           943       943 $943$ sg-b lower outer shell hs
11969 *          ncrx          ncrz          ittc          iext          m1d
11970               1             9             0             0            0
11971 *       nopowr         nridr         modez         liqlev       iaxcnd
11972               1             0             1             0            1
11973 *        idbci         idbco         hdri          hdro
11974               2             1    0.0000e+00    0.0000e+00
11975 *          tlo           tvo           hlo           hvo
11976      2.9500e+02    2.9500e+02    0.0000e+00    5.8600e+00
11977 *        nrods         nodes         irftr         nzmax        irftr2
11978               1             4             0            10            0
11979 *     dtxht(1)      dtxht(2)      dznht         hgapo         shelv
11980      3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
11981 *
11982 * nhcomi*  f 203 e
11983 * nhceli*  -2  2  3  4  5 s
11984 * nhceli*  6  7  8  9  10 s
11985 * nhceli*  11 e
11986 * dz    *  r2 0.8825  r3 1.765 s
11987 * dz    *  1.015  0.4  0.2  0.1 e
11988 * grav  * f  -1.0000e+00e
11989 * rdx   * f   1.0000e+00e
11990 * radrd *  i2  1.751  1.85737 e
11991 * matrd * f           9e
11992 * nfax  * f           0e
11993 * rftn  * f   5.4211e+02e
11994 ************************************************************************
11995 *******   type          num           id        ctitle
11996 rod           944       944 $944$ sg-b upper outer shell hs
11997 *          ncrx          ncrz          ittc          iext          m1d
11998               1             5             0             0            0
11999 *       nopowr         nridr         modez         liqlev       iaxcnd
12000               1             0             1             0            1
12001 *        idbci         idbco         hdri          hdro
12002               2             1    0.0000e+00    0.0000e+00
12003 *          tlo           tvo           hlo           hvo
12004      2.9500e+02    2.9500e+02    0.0000e+00    5.8600e+00
12005 *        nrods         nodes         irftr         nzmax        irftr2
12006               1             4             0             6            0
12007 *     dtxht(1)      dtxht(2)      dznht         hgapo         shelv
12008      3.0000e+00    1.0000e+01    5.0000e-03    0.0000e+00    0.0000e+00
12009 *
12010 * nhcomi*  f 204 e
12011 * nhceli*  -1  1  2  3  4 s
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12012 * nhceli*  5  6 e
12013 * dz    *  r3  0.7  r2 1.765 e
12014 * grav  * f  -1.0000e+00e
12015 * rdx   * f   1.0000e+00e
12016 * radrd *  i2  1.751  1.85737 e
12017 * matrd * f           9e
12018 * nfax  * f           0e
12019 * rftn  * f   5.4211e+02e
12020 *
12021 ************************************************************************
12022 *  type        num         id          ctitle                        cd 1
12023 rod           950       950 $950$ c736 pipe wall, cells 1-10
12024 *
12025 *  models zero power into demineralization system
12026 *
12027 *  ncrx        ncrz        ittc        iext        m1d           cd 2
12028    1           10          0           0           0
12029 *  nopowr      nridr       modez       liqlev      iaxcnd        cd 3
12030    1           0           1           0           1
12031 *  idbci       idbco       hdri        hdro                      cd 4
12032    2           0           0.5477      0.0
12033 *  nrods       nodes       irftr       nzmax       irftr2        cd 12
12034    1           5             0         21          0
12035 *  dtxht(1)    dtxht(2)    dznht       hgapo       shelv         cd 13
12036    3.0         10.0        0.01        6000.0
12037 * nhcomi *   f 736 e
12038 * nhceli *  -1  1  2  3  4 s
12039 * nhceli *   5  6  7  8  9 s
12040 * nhceli *   10  10 e
12041 * dz    *   f 9.014 e
12042 * grav  *   f 0.0 e
12043 * rdx   *   f 1.0 e
12044 * radrd *  i3  0.2738628  0.3328416 e
12045 * matrd *   f 9 e
12046 * nfax  *   f 1 e
12047 * rftn  *   f 305.233 e
12048 *
12049 ************************************************************************
12050 *  type      num         id          ctitle                        cd 1
12051 rod           951       951 $951$ c736 power, cells 11-20
12052 *
12053 *  models power into demineralization system
12054 *
12055 *  ncrx        ncrz        ittc        iext        m1d           cd 2
12056    1           10          0           0           0
12057 *  nopowr      nridr       modez       liqlev      iaxcnd        cd 3
12058    0           0           1           0           1
12059 *  idbci       idbco       hdri        hdro                      cd 4
12060    2           0           0.0         0.0
12061 *  nrods       nodes       irftr       nzmax       irftr2        cd 12
12062    1           5             0         21          0
12063 *  dtxht(1)    dtxht(2)    dznht       hgapo       shelv         cd 13
12064    3.0         10.0        0.01        6000.0
12065 *  irpwty      ndgx        ndhx        nrts        nhist         cd 14
12066    7           0           0           10          0
12067 *  irpwtr      irpwsv      nrpwtb      nrpwsv      nrpwrf        cd 17
12068      70            1        -2           0           0
12069 *  izpwtr      izpwsv      nzpwtb      nzpwsv      nzpwrf        cd 18
12070    0           1           1           0           0
12071 *  nmwrz       nfci        nfcil       ipwrad      ipwdep        cd 19
12072    0           0           0           0           0
12073 *  nzpwz       nzpwi       nfbpwt      nrpwr       nrpwi         cd 20
12074    0           0           0           0           0
12075 *  react       tneut       rpwoff      rrpwmx      rpwscl        cd 21
12076    0.0         0.0         -1.0e20     1.0e20      1.0
12077 *  rpowri      zpwin       zpwoff      rzpwmx                    cd 22
12078   11.1665e06  0.0         0.0         1.0e20
12079 *  extsou      pldr        pdrat       fucrac                    cd 23
12080    0.0         0.0         0.0         0.0
12081 * nhcomi *   f 736 e
12082 * nhceli *  -11 11 12 13 14 s
12083 * nhceli *   15 16 17 18 19 s
12084 * nhceli *   20 20 e
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12085 * dz     *   f 9.014 e
12086 * grav   *   f 0.0 e
12087 * rdx    *   f 10.83865 e
12088 * radrd  *  i3  0.2738628  0.3191256 e
12089 * matrd  *   f 9 e
12090 * nfax   *   f 1 e
12091 * rftn   *   f 307.98 e
12092 * rdpwr  *   f 1.0 e
12093 * cpowr  *   f 1.0 e
12094 * zpwtb  *  0.0  f 1.0 e
12095 * rpwtb  *  0.0  11.1665e06  0.5  0.0 e
12096 * fpuo2  *  f 0.0 e
12097 * ftd    *  f 1.0 e
12098 * gmix   *  f 0.0 e
12099 * gmles  *  f 0.0 e
12100 * pgapt  *  f 0.0 e
12101 * plvol  *  f 0.0 e
12102 * pslen  *  f 0.0 e
12103 * clenn  *  f 0.0 e
12104 * burn   *  f 0.0 e
12105 *
12106 ************************************************************************
12107 * type       num         id          ctitle                      cd 1
12108 rod            952         952 $952$ lp f heater power
12109 *
12110 * couples to component 740, cells 1-10
12111 *
12112 *  ncrx       ncrz        ittc        iext        m1d           cd 2
12113      1          10           0           0          0
12114 *  nopowr     nridr       modez       liqlev      iaxcnd        cd 3
12115      0          0            1           0          1
12116 *  idbci      idbco       hdri        hdro                      cd 4
12117      2          0          0.0         0.0
12118 *  nrods      nodes       irftr       nzmax       irftr2        cd 12
12119      1          5            0          21          0
12120 *  dtxht(1)   dtxht(2)    dznht       hgapo       shelv         cd 13
12121     3.0        10.0        0.01        6000.0      0.0
12122 *  irpwty     ndgx        ndhx        nrts        nhist         cd 14
12123      7          0           0           10          0
12124 *  irpwtr     irpwsv      nrpwtb      nrpwsv      nrpwrf        cd 17
12125       70          1          -2           0           0
12126 *  izpwtr     izpwsv      nzpwtb      nzpwsv      nzpwrf        cd 18
12127      0          1           1           0           0
12128 *  nmwrz      nfci        nfcil       ipwrad      ipwdep        cd 19
12129      0          0           0           0           0
12130 *  nzpwz      nzpwi       nfbpwt      nrpwr       nrpwi         cd 20
12131      0          0           0           0           0
12132 *  react      tneut       rpwoff      rrpwmx      rpwscl        cd 21
12133     0.0        0.0         0.0         1.0e20      1.0
12134 *  rpowri     zpwin       zpwoff      rzpwmx                    cd 22
12135    1.3834e08   0.0         0.0        1.0e20
12136 *  extsou     pldr        pdrat       fucrac                    cd 23
12137     0.0        0.0         0.0         0.0
12138 *  array input
12139 * nhcomi *  f 740 e
12140 * nhceli *  -1     1     2     3     4 s
12141 * nhceli *   5     6     7     8     9 s
12142 * nhceli *  10    10 e
12143 * dz     *  r10 17.02 e
12144 * grav   *  f 0.0 e
12145 * rdx    *  19.9847 e
12146 * radrd  *  i3  0.2738628  0.2759354 e
12147 * matrd  *  f 9 e
12148 * nfax   *  f 1 e
12149 * rftn   *  f 320.0 e
12150 * rdpwr  *  f 1.0 e
12151 * cpowr  *  f 1.0 e
12152 * zpwtb  *  0.0 f 1.0 e
12153 * rpwtb  *  0.0  1.3834e08  0.5  0.0 e
12154 * fpuo2  *  f 0.0 e
12155 * ftd    *  f 1.0 e
12156 * gmix   *  f 0.0 e
12157 * gmles  *  f 0.0 e
```



```
12158 * pgapt  *  f 0.0 e
12159 * plvol  *  f 0.0 e
12160 * pslen  *  f 0.0 e
12161 * clenn  *  f 0.0 e
12162 * burn   *  f 0.0 e
12163 *
12164 ************************************************************************
12165 *  type       num         id          ctitle                      cd 1
12166 rod            953       953 $953$ lp e heater power
12167 *
12168 * couples to component 740, cells 11-20
12169 *
12170 *  ncrx       ncrz        ittc        iext        m1d           cd 2
12171      1          10           0           0          0
12172 *  nopowr     nridr       modez       liqlev      iaxcnd        cd 3
12173      0          0            1           0          1
12174 *  idbci      idbco       hdri        hdro                      cd 4
12175      2          0          0.0         0.0
12176 *  nrods      nodes       irftr       nzmax       irftr2        cd 12
12177      1          5            0          21          0
12178 *  dtxht(1)   dtxht(2)    dznht       hgapo       shelv         cd 13
12179     3.0        10.0        0.01        6000.0      0.0
12180 *  irpwty     ndgx        ndhx        nrts        nhist         cd 14
12181      7          0           0           10          0
12182 *  irpwtr     irpwsv      nrpwtb      nrpwsv      nrpwrf        cd 17
12183       70          1          -2           0           0
12184 *  izpwtr     izpwsv      nzpwtb      nzpwsv      nzpwrf        cd 18
12185      0          1           1           0           0
12186 *  nmwrz      nfci        nfcil       ipwrad      ipwdep        cd 19
12187      0          0           0           0           0
12188 *  nzpwz      nzpwi       nfbpwt      nrpwr       nrpwi         cd 20
12189      0          0           0           0           0
12190 *  react      tneut       rpwoff      rrpwmx      rpwscl        cd 21
12191     0.0        0.0         0.0         1.0e20      1.0
12192 *  rpowri     zpwin       zpwoff      rzpwmx                    cd 22
12193    1.4994e08   0.0         0.0        1.0e20
12194 *  extsou     pldr        pdrat       fucrac                    cd 23
12195     0.0        0.0         0.0         0.0
12196 *  array input
12197 * nhcomi *  f 740 e
12198 * nhceli *  -11    11    12    13    14 s
12199 * nhceli *  15    16    17    18    19 s
12200 * nhceli *  20    20 e
12201 * dz     *  r10 28.98 e
12202 * grav   *  f 0.0 e
12203 * rdx    *  11.790 e
12204 * radrd  *  i3  0.1817522  0.1836725 e
12205 * matrd  *  f 9 e
12206 * nfax   *  f 1 e
12207 * rftn   *  f 350.0 e
12208 * rdpwr  *  f 1.0 e
12209 * cpowr  *  f 1.0 e
12210 * zpwtb  *  0.0 f 1.0 e
12211 * rpwtb  *   0.0  1.4994e08  0.5  0.0 e
12212 * fpuo2  *  f 0.0 e
12213 * ftd    *  f 1.0 e
12214 * gmix   *  f 0.0 e
12215 * gmles  *  f 0.0 e
12216 * pgapt  *  f 0.0 e
12217 * plvol  *  f 0.0 e
12218 * pslen  *  f 0.0 e
12219 * clenn  *  f 0.0 e
12220 * burn   *  f 0.0 e
12221 *
12222 ************************************************************************
12223 *  type       num         id          ctitle                      cd 1
12224 rod            954         954 $954$ lp d heater power
12225 *
12226 *          couples to component 746
12227 *
12228 *  ncrx       ncrz        ittc        iext        m1d           cd 2
12229      1          10           0           0          0
12230 *  nopowr     nridr       modez       liqlev      iaxcnd        cd 3
```

```
12231      0          0          1          0          1
12232 *  idbci      idbco      hdri       hdro                  cd 4
12233      2          0        0.0        0.0
12234 *  nrods      nodes      irftr      nzmax      irftr2     cd 12
12235      1          5          0         21          0
12236 *  dtxht(1)   dtxht(2)   dznht      hgapo      shelv      cd 13
12237     3.0        10.0       0.01    6000.0        0.0
12238 *  irpwty     ndgx       ndhx       nrts       nhist      cd 14
12239      7          0          0         10          0
12240 *  irpwtr     irpwsv     nrpwtb     nrpwsv     nrpwrf     cd 17
12241       70         1         -2          0          0
12242 *  izpwtr     izpwsv     nzpwtb     nzpwsv     nzpwrf     cd 18
12243      0          1          1          0          0
12244 *  nmwrz      nfci       nfcil      ipwrad     ipwdep     cd 19
12245      0          0          0          0          0
12246 *  nzpwz      nzpwi      nfbpwt     nrpwr      nrpwi      cd 20
12247      0          0          0          0          0
12248 *  react      tneut      rpwoff     rrpwmx     rpwscl     cd 21
12249      0.0        0.0        0.0      1.0e20       1.0
12250 *  rpowri     zpwin      zpwoff     rzpwmx                cd 22
12251    1.6579e08  0.0        0.0      1.0e20
12252 *  extsou     pldr       pdrat      fucrac                cd 23
12253      0.0        0.0        0.0        0.0
12254 *  array input
12255 * nhcomi *  f 746 e
12256 * nhceli *  -1     1     2     3     4 s
12257 * nhceli *   5     6     7     8     9 s
12258 * nhceli *  10    10 e
12259 * dz     *  r10 12.76 e
12260 * grav   *  f 0.0 e
12261 * rdx    *  17.771 e
12262 * radrd  *  i3  0.2738628  0.2756916 e
12263 * matrd  *  f 9 e
12264 * nfax   *  f 1 e
12265 * rftn   *  f 400.0 e
12266 * rdpwr  *  f 1.0 e
12267 * cpowr  *  f 1.0 e
12268 * zpwtb  *  0.0 f 1.0 e
12269 * rpwtb  *   0.0  1.6579e08  0.5  0.0 e
12270 * fpuo2  *  f 0.0 e
12271 * ftd    *  f 1.0 e
12272 * gmix   *  f 0.0 e
12273 * gmles  *  f 0.0 e
12274 * pgapt  *  f 0.0 e
12275 * plvol  *  f 0.0 e
12276 * pslen  *  f 0.0 e
12277 * clenn  *  f 0.0 e
12278 * burn   *  f 0.0 e
12279 *
12280 ********************************************************************************
12281 *  type       num          id           ctitle                    cd 1
12282 rod             955          955 $955$ lp c heater power
12283 *
12284 *          couples to component 750, which is
12285 *          volume 1 of RELAP5 component 752
12286 *
12287 *  ncrx       ncrz       ittc       iext       m1d        cd 2
12288      1         10          0          0          0
12289 *  nopowr     nridr      modez      liqlev     iaxcnd     cd 3
12290      0          0          1          0          1
12291 *  idbci      idbco      hdri       hdro                  cd 4
12292      2          0        0.0        0.0
12293 *  nrods      nodes      irftr      nzmax      irftr2     cd 12
12294      1          5          0         21          0
12295 *  dtxht(1)   dtxht(2)   dznht      hgapo      shelv      cd 13
12296     3.0        10.0       0.01    6000.0        0.0
12297 *  irpwty     ndgx       ndhx       nrts       nhist      cd 14
12298      7          0          0         10          0
12299 *  irpwtr     irpwsv     nrpwtb     nrpwsv     nrpwrf     cd 17
12300       70         1         -2          0          0
12301 *  izpwtr     izpwsv     nzpwtb     nzpwsv     nzpwrf     cd 18
12302      0          1          1          0          0
12303 *  nmwrz      nfci       nfcil      ipwrad     ipwdep     cd 19
```



```
12304      0          0          0          0          0
12305 *  nzpwz      nzpwi      nfbpwt     nrpwr      nrpwi      cd 20
12306      0          0          0          0          0
12307 *  react      tneut      rpwoff     rrpwmx     rpwscl     cd 21
12308      0.0        0.0        0.0      1.0e20       1.0
12309 *  rpowri     zpwin      zpwoff     rzpwmx                cd 22
12310    2.6805e08  0.0        0.0      1.0e20
12311 *  extsou     pldr       pdrat      fucrac                cd 23
12312      0.0        0.0        0.0        0.0
12313 *  array input
12314 * nhcomi *  f 750 e
12315 * nhceli *  -1     1     2     3     4 s
12316 * nhceli *   5     6     7     8     9 s
12317 * nhceli *  10    10 e
12318 * dz     *  r10 9.074 e
12319 * grav   *  f 0.0 e
12320 * rdx    *  19.50 e
12321 * radrd  *  i3  0.3508248  0.3529584 e
12322 * matrd  *  f 9 e
12323 * nfax   *  f 1 e
12324 * rftn   *  f 440.0 e
12325 * rdpwr  *  f 1.0 e
12326 * cpowr  *  f 1.0 e
12327 * zpwtb  *  0.0 f 1.0 e
12328 * rpwtb  *   0.0  2.6805e08  0.5  0.0 e
12329 * fpuo2  *  f 0.0 e
12330 * ftd    *  f 1.0 e
12331 * gmix   *  f 0.0 e
12332 * gmles  *  f 0.0 e
12333 * pgapt  *  f 0.0 e
12334 * plvol  *  f 0.0 e
12335 * pslen  *  f 0.0 e
12336 * clenn  *  f 0.0 e
12337 * burn   *  f 0.0 e
12338 *
12339 ********************************************************************************
12340 *  type       num          id           ctitle                    cd 1
12341 rod             956          956 $956$ hp heater a-1 power
12342 *
12343 *          couples to component 764, cells 1-10
12344 *
12345 *  ncrx       ncrz       ittc       iext       m1d        cd 2
12346      1         10          0          0          0
12347 *  nopowr     nridr      modez      liqlev     iaxcnd     cd 3
12348      0          0          1          0          1
12349 *  idbci      idbco      hdri       hdro                  cd 4
12350      2          0        0.0        0.0
12351 *  nrods      nodes      irftr      nzmax      irftr2     cd 12
12352      1          5          0         21          0
12353 *  dtxht(1)   dtxht(2)   dznht      hgapo      shelv      cd 13
12354     3.0        10.0       0.01    6000.0        0.0
12355 *  irpwty     ndgx       ndhx       nrts       nhist      cd 14
12356      7          0          0         10          0
12357 *  irpwtr     irpwsv     nrpwtb     nrpwsv     nrpwrf     cd 17
12358       70         1         -2          0          0
12359 *  izpwtr     izpwsv     nzpwtb     nzpwsv     nzpwrf     cd 18
12360      0          1          1          0          0
12361 *  nmwrz      nfci       nfcil      ipwrad     ipwdep     cd 19
12362      0          0          0          0          0
12363 *  nzpwz      nzpwi      nfbpwt     nrpwr      nrpwi      cd 20
12364      0          0          0          0          0
12365 *  react      tneut      rpwoff     rrpwmx     rpwscl     cd 21
12366      0.0        0.0        0.0      1.0e20       1.0
12367 *  rpowri     zpwin      zpwoff     rzpwmx                cd 22
12368    8.1163e07    0.0        0.0      1.0e20
12369 *  extsou     pldr       pdrat      fucrac                cd 23
12370      0.0        0.0        0.0        0.0
12371 *  array input
12372 * nhcomi *  f 764 e
12373 * nhceli *  -1     1     2     3     4 s
12374 * nhceli *   5     6     7     8     9 s
12375 * nhceli *  10    10 e
12376 * dz     *  r10 7.293 e
```

```
12377 * grav    *  f 0.0 e
12378 * rdx     *  16.2759 e
12379 * radrd   *  i3  0.2738628  0.2781943 e
12380 * matrd   *  f 9 e
12381 * nfax    *  f 1 e
12382 * rftn    *  f 480.0 e
12383 * rdpwr   *  f 1.0 e
12384 * cpowr   *  f 1.0 e
12385 * zpwtb   *  0.0 f 1.0 e
12386 * rpwtb   *   0.0  8.1163e07  0.5  0.0 e
12387 * fpuo2   *  f 0.0 e
12388 * ftd     *  f 1.0 e
12389 * gmix    *  f 0.0 e
12390 * gmles   *  f 0.0 e
12391 * pgapt   *  f 0.0 e
12392 * plvol   *  f 0.0 e
12393 * pslen   *  f 0.0 e
12394 * clenn   *  f 0.0 e
12395 * burn    *  f 0.0 e
12396 *
12397 ********************************************************************************
12398 *  type      num         id          ctitle                          cd 1
12399 rod             957         957 $957$ hp heater b-1 power
12400 *
12401 *          couples to component 764, cells 11-20
12402 *
12403 *  ncrx        ncrz        ittc        iext        m1d             cd 2
12404       1          10           0           0           0
12405 *  nopowr      nridr       modez       liqlev      iaxcnd          cd 3
12406       0           0           1           0           1
12407 *  idbci       idbco       hdri        hdro                        cd 4
12408       2           0         0.0         0.0
12409 *  nrods       nodes       irftr       nzmax       irftr2          cd 12
12410       1           5           0          21           0
12411 *  dtxht(1)    dtxht(2)    dznht       hgapo       shelv           cd 13
12412     3.0        10.0        0.01       6000.0        0.0
12413 *  irpwty      ndgx        ndhx        nrts        nhist           cd 14
12414       7           0           0          10           0
12415 *  irpwtr      irpwsv      nrpwtb      nrpwsv      nrpwrf          cd 17
12416         70          1          -2           0           0
12417 *  izpwtr      izpwsv      nzpwtb      nzpwsv      nzpwrf          cd 18
12418       0           1           1           0           0
12419 *  nmwrz       nfci        nfcil       ipwrad      ipwdep          cd 19
12420       0           0           0           0           0
12421 *  nzpwz       nzpwi       nfbpwt      nrpwr       nrpwi           cd 20
12422       0           0           0           0           0
12423 *  react       tneut       rpwoff      rrpwmx      rpwscl          cd 21
12424     0.0         0.0         0.0        1.0e20       1.0
12425 *  rpowri      zpwin       zpwoff      rzpwmx                      cd 22
12426    6.9533e07      0.0         0.0         1.0e20
12427 *  extsou      pldr        pdrat       fucrac                      cd 23
12428     0.0         0.0         0.0         0.0
12429 *  array input
12430 * nhcomi *  f 764 e
12431 * nhceli *  -11    11   12    13    14 s
12432 * nhceli *  15    16   17    18    19 s
12433 * nhceli *  20    20 e
12434 * dz     *  r10 5.979 e
12435 * grav   *  f 0.0 e
12436 * rdx    *  18.2067 e
12437 * radrd  *  i3  0.2738628  0.2781943 e
12438 * matrd  *  f 9 e
12439 * nfax   *  f 1 e
12440 * rftn   *  f 480.0 e
12441 * rdpwr  *  f 1.0 e
12442 * cpowr  *  f 1.0 e
12443 * zpwtb  *  0.0 f 1.0 e
12444 * rpwtb  *   0.0  6.9533e07  0.5  0.0 e
12445 * fpuo2  *  f 0.0 e
12446 * ftd    *  f 1.0 e
12447 * gmix   *  f 0.0 e
12448 * gmles  *  f 0.0 e
12449 * pgapt  *  f 0.0 e
```



```
12450 * plvol   *  f 0.0 e
12451 * pslen   *  f 0.0 e
12452 * clenn   *  f 0.0 e
12453 * burn    *  f 0.0 e
12454 *
12455 ********************************************************************************
12456 *  type      num         id          ctitle                          cd 1
12457 rod             958         958 $958$ hp heater a-2 power
12458 *
12459 *          couples to component 766, cells 1-10
12460 *
12461 *  ncrx        ncrz        ittc        iext        m1d             cd 2
12462       1          10           0           0           0
12463 *  nopowr      nridr       modez       liqlev      iaxcnd          cd 3
12464       0           0           1           0           1
12465 *  idbci       idbco       hdri        hdro                        cd 4
12466       2           0         0.0         0.0
12467 *  nrods       nodes       irftr       nzmax       irftr2          cd 12
12468       1           5           0          21           0
12469 *  dtxht(1)    dtxht(2)    dznht       hgapo       shelv           cd 13
12470     3.0        10.0        0.01       6000.0        0.0
12471 *  irpwty      ndgx        ndhx        nrts        nhist           cd 14
12472       7           0           0          10           0
12473 *  irpwtr      irpwsv      nrpwtb      nrpwsv      nrpwrf          cd 17
12474         70          1          -2           0           0
12475 *  izpwtr      izpwsv      nzpwtb      nzpwsv      nzpwrf          cd 18
12476       0           1           1           0           0
12477 *  nmwrz       nfci        nfcil       ipwrad      ipwdep          cd 19
12478       0           0           0           0           0
12479 *  nzpwz       nzpwi       nfbpwt      nrpwr       nrpwi           cd 20
12480       0           0           0           0           0
12481 *  react       tneut       rpwoff      rrpwmx      rpwscl          cd 21
12482     0.0         0.0         0.0        1.0e20       1.0
12483 *  rpowri      zpwin       zpwoff      rzpwmx                      cd 22
12484    8.1163e07      0.0         0.0         1.0e20
12485 *  extsou      pldr        pdrat       fucrac                      cd 23
12486     0.0         0.0         0.0         0.0
12487 *  array input
12488 * nhcomi *  f 766 e
12489 * nhceli *  -1     1     2     3     4 s
12490 * nhceli *   5     6     7     8     9 s
12491 * nhceli *  10    10 e
12492 * dz     *  r10 7.378 e
12493 * grav   *  f 0.0 e
12494 * rdx    *  16.1736 e
12495 * radrd  *  i3  0.2738628  0.2781943 e
12496 * matrd  *  f 9 e
12497 * nfax   *  f 1 e
12498 * rftn   *  f 480.0 e
12499 * rdpwr  *  f 1.0 e
12500 * cpowr  *  f 1.0 e
12501 * zpwtb  *  0.0 f 1.0 e
12502 * rpwtb  *   0.0  8.1163e07  0.5  0.0 e
12503 * fpuo2  *  f 0.0 e
12504 * ftd    *  f 1.0 e
12505 * gmix   *  f 0.0 e
12506 * gmles  *  f 0.0 e
12507 * pgapt  *  f 0.0 e
12508 * plvol  *  f 0.0 e
12509 * pslen  *  f 0.0 e
12510 * clenn  *  f 0.0 e
12511 * burn   *  f 0.0 e
12512 *
12513 ********************************************************************************
12514 *  type      num         id          ctitle                          cd 1
12515 rod             959         959 $959$ hp heater b-2 power
12516 *
12517 *          couples to component 766, cells 11-20
12518 *
12519 *  ncrx        ncrz        ittc        iext        m1d             cd 2
12520       1          10           0           0           0
12521 *  nopowr      nridr       modez       liqlev      iaxcnd          cd 3
12522       0           0           1           0           1
```

```
12523 *  idbci        idbco        hdri         hdro                      cd 4
12524       2            0         0.0          0.0
12525 *  nrods        nodes        irftr        nzmax        irftr2       cd 12
12526       1            5           0           21             0
12527 *  dtxht(1)     dtxht(2)     dznht        hgapo        shelv        cd 13
12528     3.0          10.0         0.01        6000.0         0.0
12529 *  irpwty       ndgx         ndhx         nrts         nhist        cd 14
12530       7            0           0           10             0
12531 *  irpwtr       irpwsv       nrpwtb       nrpwsv       nrpwrf       cd 17
12532         70            1          -2            0             0
12533 *  izpwtr       izpwsv       nzpwtb       nzpwsv       nzpwrf       cd 18
12534       0            1           1            0             0
12535 *  nmwrz        nfci         nfcil        ipwrad       ipwdep       cd 19
12536       0            0           0            0             0
12537 *  nzpwz        nzpwi        nfbpwt       nrpwr        nrpwi        cd 20
12538       0            0           0            0             0
12539 *  react        tneut        rpwoff       rrpwmx       rpwscl       cd 21
12540      0.0          0.0          0.0         1.0e20        1.0
12541 *  rpowri       zpwin        zpwoff       rzpwmx                    cd 22
12542    6.9533e07        0.0          0.0         1.0e20
12543 *  extsou       pldr         pdrat        fucrac                    cd 23
12544      0.0          0.0          0.0          0.0
12545 *  array input
12546 * nhcomi *   f 766 e
12547 * nhceli *  -11    11    12    13    14 s
12548 * nhceli *  15    16    17    18    19 s
12549 * nhceli *  20    20 e
12550 * dz     *  r10 6.243 e
12551 * grav   *  f 0.0 e
12552 * rdx    *  17.7540 e
12553 * radrd  *  i3  0.2738628  0.2781943 e
12554 * matrd  *  f 9 e
12555 * nfax   *  f 1 e
12556 * rftn   *  f 480.0 e
12557 * rdpwr  *  f 1.0 e
12558 * cpowr  *  f 1.0 e
12559 * zpwtb  *  0.0 f 1.0 e
12560 * rpwtb  *   0.0  6.9533e07  0.5  0.0 e
12561 * fpuo2  *  f 0.0 e
12562 * ftd    *  f 1.0 e
12563 * gmix   *  f 0.0 e
12564 * gmles  *  f 0.0 e
12565 * pgapt  *  f 0.0 e
12566 * plvol  *  f 0.0 e
12567 * pslen  *  f 0.0 e
12568 * clenn  *  f 0.0 e
12569 * burn   *  f 0.0 e
12570 *
12571 ************************************************************************
12572 *  type        num          id          ctitle                    cd 1
12573 rod           960       960 $960$ c788 pipe wall
12574 *
12575 *  models pipe wall
12576 *
12577 *  ncrx        ncrz         ittc         iext         m1d          cd 2
12578    1           10           0            0            0
12579 *  nopowr      nridr        modez        liqlev       iaxcnd       cd 3
12580    1           0            1            0            1              .
12581 *  idbci       idbco        hdri         hdro                      cd 4
12582    2           0            0.0          0.0
12583 *  nrods       nodes        irftr        nzmax        irftr2       cd 12
12584    1           5              0          21           0
12585 *  dtxht(1)    dtxht(2)     dznht        hgapo        shelv        cd 13
12586    3.0         10.0         0.01         6000.0
12587 * nhcomi *   f 788 e
12588 * nhceli *  -1  1  2  3  4 s
12589 * nhceli *   5  6  7  8  9 s
12590 * nhceli *  10  10  e
12591 * dz     *   f 6.01 e
12592 * grav   *   f 0.0 e
12593 * rdx    *   f 1.0 e
12594 * radrd  *  i3  0.2738628  0.3502152 e
12595 * matrd  *   f 9 e
```



```
12596 * nfax   *   f 1 e
12597 * rftn   *   f 510.9 e
12598 *
12599 ************************************************************************
12600 *  type        num          id          ctitle                    cd 1
12601 rod           961       961 $961$ c790 pipe wall
12602 *
12603 *  models pipe wall
12604 *
12605 *  ncrx        ncrz         ittc         iext         m1d          cd 2
12606    1           6           0            0            0
12607 *  nopowr      nridr        modez        liqlev       iaxcnd       cd 3
12608    1           0            1            0            1
12609 *  idbci       idbco        hdri         hdro                      cd 4
12610    2           0            0.0          0.0
12611 *  nrods       nodes        irftr        nzmax        irftr2       cd 12
12612    1           5              0          21           0
12613 *  dtxht(1)    dtxht(2)     dznht        hgapo        shelv        cd 13
12614    3.0         10.0         0.01         6000.0
12615 * nhcomi *   f 790 e
12616 * nhceli *  -1  1  2  3  4 s
12617 * nhceli *   5  6  6 e
12618 * dz     *   r4 4.955  r2 5.335 e
12619 * grav   *   f 0.0 e
12620 * rdx    *   f 1.0 e
12621 * radrd  *  i3  0.2738628  0.3502152 e
12622 * matrd  *   f 9 e
12623 * nfax   *   f 1 e
12624 * rftn   *   f 510.9 e
12625 *
12626 end
12627 *
12628 ******************
12629 * time-step data *
12630 ******************
12631 *
12632 *         dtmin          dtmax          tend          rtwfp
12633      1.0000E-05           1.0        1000.0     1.0000E+01
12634 *         edint          gfint         dmpint         sedint
12635      10.000E+01     1.0000E+00     10.000E+01     10.000E+01
12636 *
12637 ******************
12638 * time-step data *
12639 ******************
12640 *
12641 *       endflag
12642     -1.0000E+00
```

APPENDIX B

TRAC-M Version 3782 Input Listings for Transient Calculations

Appendix B-1

TRAC-M Version 3782 Input Listing for Transient Calculation – A Turbine Bypass Valve "A" Stuck Open Scenario in the Oconee Unit 1 Plant

```
free format
*
*  This is a Rev. 15 input deck for transient calc. of turbine bypass valve A st
uck open scenario in the Oconee Unit 1 Plant. 6/2001.
*
*************
* main data *
*************
*
*       numtcr          ieos          inopt          nmat
            1             0              1             0
Transient input rev. 15 for reactor trip with stuck-open turbine bypass valve
*
*****************
* namelist data *
*****************
*
 &inopts
  icflow=2, nhtstr=33, noair=0, dtstrt=0.1,
 imfr=3, nlt=11,
 &end
*
*        dstep         timet
            -1            0.
*       stdyst        transi         ncomp          njun          ipak
             0             1           141           126             1
*         epso          epss
    1.0000E-03    1.0000E-04
*       oitmax        sitmax        isolut        ncontr
            10            10             0             0
*         ntsv          ntcb          ntcf          ntrp          ntcp
           284           936         64524            42             0
*
************************
* component-number data *
************************
*
* iorder array *
* pipe   *     1 s   * loop b hot leg candy cane
* pipe   *     2 s   * sg-b primary tube bundle
* pump   *     3 s   * loop b1 pump (intact leg)
* tee    *     4 s   * loop b1 intact cold leg
* tee    *     6 s   * loop b upper head tee
* fill   *     9 s   * loop b1 hpis
* tee    *    11 s   * loop a hot leg candy cane
* pipe   *    12 s   * sg-a primary tube bundle
* pump   *    13 s   * loop a1 pump (intact leg)
* tee    *    14 s   * loop a1 intact cold leg
* tee    *    16 s   * loop a upper head tee
* fill   *    18 s   * makeup/letdown flow
* fill   *    19 s   * loop a1 hpis
* tee    *    20 s   * hpi/makeup-letdown header
* prizer *    22 s   * pressurizer
* pump   *    23 s   * loop b2 pump
* tee    *    24 s   * loop b2 intact cold leg
* valve  *    25 s   * pressurizer porv
* break  *    26 s   * porv boundary
* pump   *    33 s   * loop a2 pump (break leg)
* tee    *    34 s   * loop a2 intact cold leg
* fill   *    39 s   * loop a2 hpis
* fill   *    59 s   * loop b2 hpis
* tee    *    63 s   * loop b loop seals
* tee    *    73 s   * loop a loop seals
* tee    *    78 s   * lpis b header
* fill   *    79 s   * lpis b
* valve  *    80 s   * accum valve on loop b side
* pipe   *    81 s   * accumulator b
* fill   *    82 s   * accumulator b zero-flow boundary
* tee    *    88 s   * lpis a header
* fill   *    89 s   * lpis a
* valve  *    90 s   * accum valve on loop a side
* pipe   *    91 s   * accumulator a
* fill   *    92 s   * accumulator a zero-flow boundary
```



```
* vessel *    99 s   * vessel
* tee    *   121 s   * sg-a boiler region
* tee    *   122 s   * sg-a upper boiler region
* tee    *   123 s   * sg-a downcomer region
* pipe   *   124 s   * sg-a steam exit
* valve  *   148 s   * sg a fw switchover valve
* valve  *   150 s   * sg a efw line check valve
* tee    *   152 s   * sg a efw inlet line
* tee    *   154 s   * sg a efw header
* fill   *   156 s   * sg a md efw
* fill   *   158 s   * sg a td efw
* tee    *   201 s   * sg-b boiler region
* tee    *   202 s   * sg-b upper boiler region
* tee    *   203 s   * sg-b downcomer region
* pipe   *   204 s   * sg-b steam exit
* valve  *   248 s   * sg b fw switchover valve
* valve  *   250 s   * sg b efw line check valve
* tee    *   252 s   * sg b efw inlet line
* tee    *   254 s   * sg b efw header
* fill   *   256 s   * sg b md efw
* fill   *   258 s   * sg b td efw
* tee    *   345 s   * sg-a steam line with srv
* tee    *   350 s   * sg-a steam line with tbv
* valve  *   355 s   * sg-a turbine stop valve
* break  *   360 s   * sg-a steam line pressure boundary
* valve  *   365 s   * sg-a steam line srv
* break  *   367 s   * sg-a srv boundary
* valve  *   370 s   * sg-a steam line tbv
* break  *   372 s   * sg-a tbv boundary
* tee    *   445 s   * sg-b steam line with srv
* tee    *   450 s   * sg-b steam line with tbv
* valve  *   455 s   * sg-b turbine stop valve
* break  *   460 s   * sg-b steam line pressure boundary
* valve  *   465 s   * sg-b steam line srv
* break  *   467 s   * sg-b srv boundary
* valve  *   470 s   * sg-b steam line tbv
* break  *   472 s   * sg-b tbv boundary
* pipe   *   501 s   * core bypass pipe 1
* pipe   *   502 s   * core bypass pipe 2
* pipe   *   503 s   * core bypass pipe 3
* pipe   *   504 s   * core bypass pipe 4
* pipe   *   505 s   * core bypass pipe 5
* pipe   *   506 s   * core bypass pipe 6
* break  *   730 s   * condenser hotwell boundary
* pump   *   734 s   * hotwell pump
* pipe   *   736 s   * demineralization system
* pump   *   738 s   * booster pump
* pipe   *   740 s   * feedwater line to lp heaters
* fill   *   742 s   * cond.drain to lp d heater
* tee    *   746 s   * feedwater lp d heater
* fill   *   748 s   * cond.drain to lp c heater
* tee    *   750 s   * feedwater lp c heater
* tee    *   752 s   * feedwater pump inlet header
* pump   *   754 s   * mfw a pump
* valve  *   756 s   * mfw a pump check valve
* pump   *   760 s   * mfw b pump
* valve  *   761 s   * mfw b pump check valve
* plenum *   763 s   * feedwater pump outlet header
* pipe   *   764 s   * a & b hp heater pipe 1
* pipe   *   766 s   * a & b hp heater pipe 2
* plenum *   768 s   * hp heater outlet header
* valve  *   770 s   * sg a mfw control valve
* valve  *   772 s   * sg a mfw startup valve
* valve  *   774 s   * sg b mfw control valve
* valve  *   776 s   * sg b mfw startup valve
* plenum *   780 s   * fw-a cv header
* plenum *   782 s   * fw-b cv header
* valve  *   784 s   * fw-a isolation valve
* valve  *   786 s   * fw-b isolation valve
* pipe   *   788 s   * sg a feedwater inlet line
* valve  *   789 s   * sg a feedwater line check valve
* pipe   *   790 s   * sb b feedwater inlet line
* valve  *   791 s   * sb b feedwater line check valve
```

```
* rod    *   900 s   * reactor-core fuel rods
* slab   *   910 s   * vessel level 1, cells 1-6
* slab   *   911 s   * vessel level 2, cells 1-6
* slab   *   912 s   * vessel levels 3-4, cells 1-6
* slab   *   913 s   * vessel level 5, cells 1-6
* slab   *   914 s   * vessel levels 6-9, cells 1-6
* slab   *   915 s   * vessel level 10, cells 1-6
* slab   *   916 s   * vessel level 1, cells 7-12
* slab   *   917 s   * vessel levels 2-5, cells 7-12
* slab   *   918 s   * vessel levels 6-9, cells 7-12
* slab   *   919 s   * vessel level 10, cells 7-12
* rod    *   930 s   * sg-a tube bundle hs
* slab   *   931 s   * sg-a outlet plenum hs
* slab   *   932 s   * sg-a inlet plenum hs
* rod    *   933 s   * sg-a lower outer shell hs
* rod    *   934 s   * sg-a upper outer shell hs
* rod    *   940 s   * sg-b tube bundle hs
* slab   *   941 s   * sg-b outlet plenum hs
* slab   *   942 s   * sg-b inlet plenum hs
* rod    *   943 s   * sg-b lower outer shell hs
* rod    *   944 s   * sg-b upper outer shell hs
* rod    *   950 s   * c736 pipe wall, cells 1-10
* rod    *   951 s   * c736 power, cells 11-20
* rod    *   952 s   * lp f heater power
* rod    *   953 s   * lp e heater power
* rod    *   954 s   * lp d heater power
* rod    *   955 s   * lp c heater power
* rod    *   956 s   * hp heater a-1 power
* rod    *   957 s   * hp heater b-1 power
* rod    *   958 s   * hp heater a-2 power
* rod    *   959 s   * hp heater b-2 power
* rod    *   960 s   * c788 pipe wall
* rod    *   961 e   * c790 pipe wall
*
*************************
* control-parameter data *
*************************
*
* signal variables
  0
*
* control blocks
*
  0
*
* trips
*  ntse  ntct  ntsf  ntdp  ntsd
   0     5     0     0     0
*
************************************************************************
* reactor trip at time zero                                            *
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
             40             2             0             1           -21
*      setp(1)       setp(2)       setp(3)       setp(4)
             .5            .5
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
            0.0           0.0
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
             0             0
*
************************************************************************
* trip to initiate a sl-a tbv stuck-open transient
  *
* one of two turbine bypass valves of steam line a assumed
* to stay open after both open.
* currently set to not initiate a tbv stuck-open transient
* set idsg to -21 to model a tbv stuck-open transient in sl a
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
            100             2             0             1           -21
```



```
*      setp(1)       setp(2)       setp(3)       setp(4)
             .5            .5
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
            0.0           0.0
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
             0             0
*
************************************************************************
* trip to initiate a sl-b tbv stuck-open transient signal
  *
* one of two turbine bypass valves of steam line b assumed
* to stay open after both open.
* currently set to not initiate a tbv stuck-open transient
* set idsg to -21 to model a tbv stuck-open transient in sl b
************************************************************************
*
*         idtp          isrt          iset          itst          idsg
            105             2             0             1           -20
*      setp(1)       setp(2)       setp(3)       setp(4)
             .5            .5
*      dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
            0.0           0.0
*      ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
             0             0
*
  0
*
* component data *
*
end
*
******************
* time-step data *
******************
*
*         dtmin         dtmax         tend          rtwfp
    1.0000E-06           0.5        10000.0      1.0000E+01
*         edint         gfint         dmpint        sedint
          1000.0           5.0        1000.0        1000.0
*
******************
* time-step data *
******************
*
*       endflag
   -1.0000E+00
```

Appendix B-2

TRAC-M Version 3782 Input Listing for Transient Calculation – A Main Steam Line "A" Break in the Oconee Unit 1 Plant

```
free format
*
*  This is an input deck for transient calc. of Oconee Unit 1 SG A main steam li
ne break. 7/2001 gsr.
*
*************
* main data *
*************
*
*       numtcr          ieos          inopt          nmat
            1             0              1             0
Transient restart file for a double-ended guillotine break of a 34" steam line j
ust outside of SG A.
*
*****************
* namelist data *
*****************
*
 &inopts
  icflow=2, nhtstr=33, noair=0, imfr=3,
  nlt=12,
 &end
*
*        dstep         timet
              -1    0.0000E+00
*       stdyst         transi         ncomp          njun          ipak
               0              1           143           127             1
*         epso          epss
    1.0000E-03    1.0000E-04
*       oitmax         sitmax        isolut        ncontr
              10             10             0             0
*         ntsv          ntcb          ntcf          ntrp          ntcp
             286           867         64524            44             0
*
*************************
* component-number data *
*************************
*
* iorder array *
* pipe   *     1 s   * loop b hot leg candy cane
* pipe   *     2 s   * sg-b primary tube bundle
* pump   *     3 s   * loop b1 pump (intact leg)
* tee    *     4 s   * loop b1 intact cold leg
* tee    *     6 s   * loop b upper head tee
* fill   *     9 s   * loop b1 hpis
* tee    *    11 s   * loop a hot leg candy cane
* pipe   *    12 s   * sg-a primary tube bundle
* pump   *    13 s   * loop a1 pump (intact leg)
* tee    *    14 s   * loop a1 intact cold leg
* tee    *    16 s   * loop a upper head tee
* fill   *    18 s   * makeup/letdown flow
* fill   *    19 s   * loop a1 hpis
* tee    *    20 s   * hpi/makeup-letdown header
* prizer *    22 s   * pressurizer
* pump   *    23 s   * loop b2 pump
* tee    *    24 s   * loop b2 intact cold leg
* valve  *    25 s   * pressurizer porv
* break  *    26 s   * porv boundary
* pump   *    33 s   * loop a2 pump (break leg)
* tee    *    34 s   * loop a2 intact cold leg
* fill   *    39 s   * loop a2 hpis
* fill   *    59 s   * loop b2 hpis
* tee    *    63 s   * loop b loop seals
* tee    *    73 s   * loop a loop seals
* tee    *    78 s   * lpis b header
* fill   *    79 s   * lpis b
* valve  *    80 s   * accum valve on loop b side
* pipe   *    81 s   * accumulator b
* fill   *    82 s   * accumulator b zero-flow boundary
* tee    *    88 s   * lpis a header
* fill   *    89 s   * lpis a
* valve  *    90 s   * accum valve on loop a side
* pipe   *    91 s   * accumulator a
```



```
* fill   *    92 s   * accumulator a zero-flow boundary
* vessel *    99 s   * vessel
* tee    *   121 s   * sg-a boiler region
* tee    *   122 s   * sg-a upper boiler region
* tee    *   123 s   * sg-a downcomer region
* pipe   *   124 s   * sg-a steam exit
* valve  *   148 s   * sg a fw switchover valve
* valve  *   150 s   * sg a efw line check valve
* tee    *   152 s   * sg a efw inlet line
* tee    *   154 s   * sg a efw header
* fill   *   156 s   * sg a md efw
* fill   *   158 s   * sg a td efw
* tee    *   201 s   * sg-b boiler region
* tee    *   202 s   * sg-b upper boiler region
* tee    *   203 s   * sg-b downcomer region
* pipe   *   204 s   * sg-b steam exit
* valve  *   248 s   * sg b fw switchover valve
* valve  *   250 s   * sg b efw line check valve
* tee    *   252 s   * sg b efw inlet line
* tee    *   254 s   * sg b efw header
* fill   *   256 s   * sg b md efw
* fill   *   258 s   * sg b td efw
* tee    *   345 s   * sg-a steam line with srv
* break  *   346 s   * sg-a steam line break sg side
* break  *   347 s   * sg-a steam line break turbine side
* tee    *   350 s   * sg-a steam line with tbv
* valve  *   355 s   * sg-a turbine stop valve
* break  *   360 s   * sg-a steam line pressure boundary
* valve  *   365 s   * sg-a steam line srv
* break  *   367 s   * sg-a srv boundary
* valve  *   370 s   * sg-a steam line tbv
* break  *   372 s   * sg-a tbv boundary
* tee    *   445 s   * sg-b steam line with srv
* tee    *   450 s   * sg-b steam line with tbv
* valve  *   455 s   * sg-b turbine stop valve
* break  *   460 s   * sg-b steam line pressure boundary
* valve  *   465 s   * sg-b steam line srv
* break  *   467 s   * sg-b srv boundary
* valve  *   470 s   * sg-b steam line tbv
* break  *   472 s   * sg-b tbv boundary
* pipe   *   501 s   * core bypass pipe 1
* pipe   *   502 s   * core bypass pipe 2
* pipe   *   503 s   * core bypass pipe 3
* pipe   *   504 s   * core bypass pipe 4
* pipe   *   505 s   * core bypass pipe 5
* pipe   *   506 s   * core bypass pipe 6
* break  *   730 s   * condenser hotwell boundary
* pump   *   734 s   * hotwell pump
* pipe   *   736 s   * demineralization system
* pump   *   738 s   * booster pump
* pipe   *   740 s   * feedwater line to lp heaters
* fill   *   742 s   * cond.drain to lp d heater
* tee    *   746 s   * feedwater lp d heater
* fill   *   748 s   * cond.drain to lp c heater
* tee    *   750 s   * feedwater lp c heater
* tee    *   752 s   * feedwater pump inlet header
* pump   *   754 s   * mfw a pump
* valve  *   756 s   * mfw a pump check valve
* pump   *   760 s   * mfw b pump
* valve  *   761 s   * mfw b pump check valve
* plenum *   763 s   * feedwater pump outlet header
* pipe   *   764 s   * a & b hp heater pipe 1
* pipe   *   766 s   * a & b hp heater pipe 2
* plenum *   768 s   * hp heater outlet header
* valve  *   770 s   * sg a mfw control valve
* valve  *   772 s   * sg a mfw startup valve
* valve  *   774 s   * sg b mfw control valve
* valve  *   776 s   * sg b mfw startup valve
* plenum *   780 s   * fw-a cv header
* plenum *   782 s   * fw-b cv header
* valve  *   784 s   * fw-a isolation valve
* valve  *   786 s   * fw-b isolation valve
* pipe   *   788 s   * sg a feedwater inlet line
```

```
145 * valve  *   789 s   * sg a feedwater line check valve
146 * pipe   *   790 s   * sb b feedwater inlet line
147 * valve  *   791 s   * sb b feedwater line check valve
148 * rod    *   900 s   * reactor-core fuel rods
149 * slab   *   910 s   * vessel level 1, cells 1-6
150 * slab   *   911 s   * vessel level 2, cells 1-6
151 * slab   *   912 s   * vessel levels 3-4, cells 1-6
152 * slab   *   913 s   * vessel level 5, cells 1-6
153 * slab   *   914 s   * vessel levels 6-9, cells 1-6
154 * slab   *   915 s   * vessel level 10, cells 1-6
155 * slab   *   916 s   * vessel level 1, cells 7-12
156 * slab   *   917 s   * vessel levels 2-5, cells 7-12
157 * slab   *   918 s   * vessel levels 6-9, cells 7-12
158 * slab   *   919 s   * vessel level 10, cells 7-12
159 * rod    *   930 s   * sg-a tube bundle hs
160 * slab   *   931 s   * sg-a outlet plenum hs
161 * slab   *   932 s   * sg-a inlet plenum hs
162 * rod    *   933 s   * sg-a lower outer shell hs
163 * rod    *   934 s   * sg-a upper outer shell hs
164 * rod    *   940 s   * sg-b tube bundle hs
165 * slab   *   941 s   * sg-b outlet plenum hs
166 * slab   *   942 s   * sg-b inlet plenum hs
167 * rod    *   943 s   * sg-b lower outer shell hs
168 * rod    *   944 s   * sg-b upper outer shell hs
169 * rod    *   950 s   * c736 pipe wall, cells 1-10
170 * rod    *   951 s   * c736 power, cells 11-20
171 * rod    *   952 s   * lp f heater power
172 * rod    *   953 s   * lp e heater power
173 * rod    *   954 s   * lp d heater power
174 * rod    *   955 s   * lp c heater power
175 * rod    *   956 s   * hp heater a-1 power
176 * rod    *   957 s   * hp heater b-1 power
177 * rod    *   958 s   * hp heater a-2 power
178 * rod    *   959 s   * hp heater b-2 power
179 * rod    *   960 s   * c788 pipe wall
180 * rod    *   961 e   * c790 pipe wall
181 *
182 ***************************
183 * control-parameter data *
184 ***************************
185 *
186 * signal variables
187 *
188   0
189 *
190 * control blocks
191 *
192   0
193 *
194 * trips
195 *  ntse  ntct  ntsf  ntdp  ntsd
196    0     5     0     0     0
197 *
198 *
199   0
200 *
201 * component data *
202 *
203 ********************************************************************************
204 *  type      num         id          ctitle                          cd 1
205 pipe         124      124 $124$ sg-a steam exit
206 *
207 *  ncells    nodes       jun1        jun2        epsw                cd 2
208    6          0           58          346       1.0e-05
209 *  ichf      iconc       iacc        ipow                            cd 3
210    1         0           0           0
211 *  radin     th          houtl       houtv       toutl               cd 6
212      0.0       0.0       0.0         0.0         0.0
213 *  toutv     powin       powoff      rpowmx      powscl              cd 7
214    0.0       0.0         0.0         1.0e20      1.0
215 *   cell arrays
216 * dx    * r03 7.0000E-01r03 1.7650E+00e
217 * vol   *     2.0000E+00    1.6000E+00    1.2000E+00r03 2.9400E+00e
```



```
218 * fa   *    4.3450E+00   3.6800E+00   3.0000E+00r03 2.1670E+00   5.8580E-01 e
219 * fric  * f   1.0e-06 e
220 * grav  *    1.0000E+00   7.0700E-01  -7.0700E-01r03-1.0000E+00   0.0000E+00 e
221 * hd    *     6.0000E-03r05 6.0960E-01  0.8636 e
222 * icflg * r6  0       1e
223 * nff   * r6  1      -1e
224 * alp   * f   1.0000E+00e
225 * vl    * f   3.9983E+00e
226 * vv    * f   5.4138E+00e
227 * tl    * f   5.5280E+02e
228 * tv    * f   5.8000E+02e
229 * p     * f   6.3700E+06e
230 * pa    * f   0.0000E+00e
231 ********************************************************************************
232 *******   type          num           id          ctitle
233 break      346       346 $346$ mslb break sg side
234 *          jun1          ibty          isat          ioff
235            346             1             3             0
236 *          ibtr          ibsv          nbtb          nbsf          nbrf
237              0             1             4             0             0
238 *          dxin          volin         alpin         tin           pin
239         0.08237       0.48253     1.0000E+00    5.5400E+02    6.28E+06
240 *          pain          concin        rbmx          poff          belv
241     0.0000E+00    0.0000E+00    1.0000E+10    0.0000E+00    0.0000E+00
242 * pscl *   1.0
243              0.0    6.28e06 s
244            0.001    6.28e06 s
245            0.011      1.01325e05 s
246         10000.0       1.01325e05 e
247 *
248 ********************************************************************************
249 *
250 ********************************************************************************
251 *******   type          num           id          ctitle
252 break      347       347 $347$ mslb break turbine side
253 *          jun1          ibty          isat          ioff
254            345             1             3             0
255 *          ibtr          ibsv          nbtb          nbsf          nbrf
256              0             1             4             0             0
257 *          dxin          volin         alpin         tin           pin
258              2.8       0.48253     1.0000E+00    5.5400E+02    6.28E+06
259 *          pain          concin        rbmx          poff          belv
260     0.0000E+00    0.0000E+00    1.0000E+10    0.0000E+00    0.0000E+00
261 * pscl *   1.0
262              0.0    6.28e06 s
263            0.001    6.28e06 s
264            0.011      1.01325e05 s
265         10000.0       1.01325e05 e
266 *
267 ********************************************************************************
268 *
269 end
270 *
271 ******************
272 * time-step data *
273 ******************
274 *
275 *         dtmin         dtmax         tend          rtwfp
276      1.0000E-05    0.5         10000.0       1.0000E+01
277 *         edint         gfint         dmpint        sedint
278     1000.0   5.0   1000.0   1000.0
279 *
280 ******************
281 * time-step data *
282 ******************
283 *
284 *       endflag
285     -1.0000E+00
```

Appendix B-3

TRAC-M Version 3782 Input Listing for Transient Calculation – Overfeed to Steam Generators to 96 Percent of the Operating Range in the Oconee Unit 1 Plant

```
free format
*
*  This is an input deck for transient calc. of SG overfeed to 96 % of operating
 range in the Oconee Unit 1 Plant. 5/2001.
*
*************
* main data *
*************
*
*       numtcr          ieos          inopt          nmat
             2             0              1             0
Transient restart file for overfeed transient scenario 1
efw level control failure with operator action control to 96% or.
*
*****************
* namelist data *
*****************
*
 &inopts
  icflow=2, nhtstr=33, noair=0, imfr=3,
  nlt=11,
 &end
*
*        dstep          timet
              -1    0.0000E+00
*       stdyst          transi          ncomp          njun          ipak
                0               1            141           126             1
*         epso            epss
    1.0000E-03    1.0000E-04
*       oitmax          sitmax         isolut         ncontr
            10              10              0              0
*         ntsv            ntcb           ntcf           ntrp          ntcp
           284             933          64524             42             0
*
*************************
* component-number data *
*************************
*
* iorder array *
* pipe   *     1 s   * loop b hot leg candy cane
* pipe   *     2 s   * sg-b primary tube bundle
* pump   *     3 s   * loop b1 pump (intact leg)
* tee    *     4 s   * loop b1 intact cold leg
* tee    *     6 s   * loop b upper head tee
* fill   *     9 s   * loop b1 hpis
* tee    *    11 s   * loop a hot leg candy cane
* pipe   *    12 s   * sg-a primary tube bundle
* pump   *    13 s   * loop a1 pump (intact leg)
* tee    *    14 s   * loop a1 intact cold leg
* tee    *    16 s   * loop a upper head tee
* fill   *    18 s   * makeup/letdown flow
* fill   *    19 s   * loop a1 hpis
* tee    *    20 s   * hpi/makeup-letdown header
* prizer *    22 s   * pressurizer
* pump   *    23 s   * loop b2 pump
* tee    *    24 s   * loop b2 intact cold leg
* valve  *    25 s   * pressurizer porv
* break  *    26 s   * porv boundary
* pump   *    33 s   * loop a2 pump (break leg)
* tee    *    34 s   * loop a2 intact cold leg
* fill   *    39 s   * loop a2 hpis
* fill   *    59 s   * loop b2 hpis
* tee    *    63 s   * loop b loop seals
* tee    *    73 s   * loop a loop seals
* tee    *    78 s   * lpis b header
* fill   *    79 s   * lpis b
* valve  *    80 s   * accum valve on loop b side
* pipe   *    81 s   * accumulator b
* fill   *    82 s   * accumulator b zero-flow boundary
* tee    *    88 s   * lpis a header
* fill   *    89 s   * lpis a
* valve  *    90 s   * accum valve on loop a side
* pipe   *    91 s   * accumulator a
```



```
* fill   *    92 s   * accumulator a zero-flow boundary
* vessel *    99 s   * vessel
* tee    *   121 s   * sg-a boiler region
* tee    *   122 s   * sg-a upper boiler region
* tee    *   123 s   * sg-a downcomer region
* pipe   *   124 s   * sg-a steam exit
* valve  *   148 s   * sg a fw switchover valve
* valve  *   150 s   * sg a efw line check valve
* tee    *   152 s   * sg a efw inlet line
* tee    *   154 s   * sg a efw header
* fill   *   156 s   * sg a md efw
* fill   *   158 s   * sg a td efw
* tee    *   201 s   * sg-b boiler region
* tee    *   202 s   * sg-b upper boiler region
* tee    *   203 s   * sg-b downcomer region
* pipe   *   204 s   * sg-b steam exit
* valve  *   248 s   * sg b fw switchover valve
* valve  *   250 s   * sg b efw line check valve
* tee    *   252 s   * sg b efw inlet line
* tee    *   254 s   * sg b efw header
* fill   *   256 s   * sg b md efw
* fill   *   258 s   * sg b td efw
* tee    *   345 s   * sg-a steam line with srv
* tee    *   350 s   * sg-a steam line with tbv
* valve  *   355 s   * sg-a turbine stop valve
* break  *   360 s   * sg-a steam line pressure boundary
* valve  *   365 s   * sg-a steam line srv
* break  *   367 s   * sg-a srv boundary
* valve  *   370 s   * sg-a steam line tbv
* break  *   372 s   * sg-a tbv boundary
* tee    *   445 s   * sg-b steam line with srv
* tee    *   450 s   * sg-b steam line with tbv
* valve  *   455 s   * sg-b turbine stop valve
* break  *   460 s   * sg-b steam line pressure boundary
* valve  *   465 s   * sg-b steam line srv
* break  *   467 s   * sg-b srv boundary
* valve  *   470 s   * sg-b steam line tbv
* break  *   472 s   * sg-b tbv boundary
* pipe   *   501 s   * core bypass pipe 1
* pipe   *   502 s   * core bypass pipe 2
* pipe   *   503 s   * core bypass pipe 3
* pipe   *   504 s   * core bypass pipe 4
* pipe   *   505 s   * core bypass pipe 5
* pipe   *   506 s   * core bypass pipe 6
* break  *   730 s   * condenser hotwell boundary
* pump   *   734 s   * hotwell pump
* pipe   *   736 s   * demineralization system
* pump   *   738 s   * booster pump
* pipe   *   740 s   * feedwater line to lp heaters
* fill   *   742 s   * cond.drain to lp d heater
* tee    *   746 s   * feedwater lp d heater
* fill   *   748 s   * cond.drain to lp c heater
* tee    *   750 s   * feedwater lp c heater
* tee    *   752 s   * feedwater pump inlet header
* pump   *   754 s   * mfw a pump
* valve  *   756 s   * mfw a pump check valve
* pump   *   760 s   * mfw b pump
* valve  *   761 s   * mfw b pump check valve
* plenum *   763 s   * feedwater pump outlet header
* pipe   *   764 s   * a & b hp heater pipe 1
* pipe   *   766 s   * a & b hp heater pipe 2
* plenum *   768 s   * hp heater outlet header
* valve  *   770 s   * sg a mfw control valve
* valve  *   772 s   * sg a mfw startup valve
* valve  *   774 s   * sg b mfw control valve
* valve  *   776 s   * sg b mfw startup valve
* plenum *   780 s   * fw-a cv header
* plenum *   782 s   * fw-b cv header
* valve  *   784 s   * fw-a isolation valve
* valve  *   786 s   * fw-b isolation valve
* pipe   *   788 s   * sg a feedwater inlet line
* valve  *   789 s   * sg a feedwater line check valve
* pipe   *   790 s   * sb b feedwater inlet line
```

```
* valve   *   791 s   * sb b feedwater line check valve
* rod     *   900 s   * reactor-core fuel rods
* slab    *   910 s   * vessel level 1, cells 1-6
* slab    *   911 s   * vessel level 2, cells 1-6
* slab    *   912 s   * vessel levels 3-4, cells 1-6
* slab    *   913 s   * vessel level 5, cells 1-6
* slab    *   914 s   * vessel levels 6-9, cells 1-6
* slab    *   915 s   * vessel level 10, cells 1-6
* slab    *   916 s   * vessel level 1, cells 7-12
* slab    *   917 s   * vessel levels 2-5, cells 7-12
* slab    *   918 s   * vessel levels 6-9, cells 7-12
* slab    *   919 s   * vessel level 10, cells 7-12
* rod     *   930 s   * sg-a tube bundle hs
* slab    *   931 s   * sg-a outlet plenum hs
* slab    *   932 s   * sg-a inlet plenum hs
* rod     *   933 s   * sg-a lower outer shell hs
* rod     *   934 s   * sg-a upper outer shell hs
* rod     *   940 s   * sg-b tube bundle hs
* slab    *   941 s   * sg-b outlet plenum hs
* slab    *   942 s   * sg-b inlet plenum hs
* rod     *   943 s   * sg-b lower outer shell hs
* rod     *   944 s   * sg-b upper outer shell hs
* rod     *   950 s   * c736 pipe wall, cells 1-10
* rod     *   951 s   * c736 power, cells 11-20
* rod     *   952 s   * lp f heater power
* rod     *   953 s   * lp e heater power
* rod     *   954 s   * lp d heater power
* rod     *   955 s   * lp c heater power
* rod     *   956 s   * hp heater a-1 power
* rod     *   957 s   * hp heater b-1 power
* rod     *   958 s   * hp heater a-2 power
* rod     *   959 s   * hp heater b-2 power
* rod     *   960 s   * c788 pipe wall
* rod     *   961 e   * c790 pipe wall
*
*************************
* control-parameter data *
*************************
*
* signal variables
*
  0
*
* control blocks
*
  0
*
* trips
*  ntse  ntct  ntsf  ntdp  ntsd
    0     5     0     0     0
*
*********************************************************************
* MFW pump a trip                                                   *
*********************************************************************
*
*         idtp          isrt          iset          itst          idsg
            35             2             0             1         -21
*       setp(1)       setp(2)       setp(3)       setp(4)
             .5            .5
*       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
            0.0           0.0
*       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
              0             0
*
*********************************************************************
* MFW pump b trip                                                   *
*********************************************************************
*
*         idtp          isrt          iset          itst          idsg
            36             2             0             1         -21
*       setp(1)       setp(2)       setp(3)       setp(4)
             .5            .5
*       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
```



```
            0.0           0.0
*       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
              0             0
*
*********************************************************************
* trip to model efw level control failure followed by operator level *
* control to 96% OR; currently ISET always = 0, i.e. efw failure is  *
* turned off; to turn this option on, change idsg from -20 to -21    *
*********************************************************************
*
*         idtp          isrt          iset          itst          idsg
            118            2             0             1         -21
*       setp(1)       setp(2)       setp(3)       setp(4)
             -.5            .5
*       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
              0.0           0.0
*       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
              0             0
*
*********************************************************************
* trip to model efw level control failure with no operator          *
* intervention; efw will stay on until the boiler section level is  *
* 52 ft; currently ISET always = 0, i.e. efw failure is turned off; *
* to turn this option on, change idsg from -20 to -21               *
*********************************************************************
*
*         idtp          isrt          iset          itst          idsg
            119            2             0             1         -20
*       setp(1)       setp(2)       setp(3)       setp(4)
             -.5            .5
*       dtsp(1)       dtsp(2)       dtsp(3)       dtsp(4)
              0.0           0.0
*       ifsp(1)       ifsp(2)       ifsp(3)       ifsp(4)
              0             0
*
  0
*
* component data *
*
end
*
******************
* time-step data *
******************
*
*        dtmin         dtmax         tend          rtwfp
    1.0000E-05    0.5           10000.0       1.0000E+01
*        edint         gfint         dmpint        sedint
   1000.0   5.0   1000.0   1000.0
*
******************
* time-step data *
******************
*
*       endflag
   -1.0000E+00
```