Cover Sheet
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CALCULATION COVER SHEET INSTRUCTIONS

CALC. NO.: S-C-RC-MDC-1413 REVISION: 0

CALC. TITLE: LTOP EVENTS WITH ONE PCFV

# SHTS.(CALC): 37 ATTACHMENTS: #/TOTAL SHTS.: — TOTAL SHTS.: 35

CHECK ONE:
☐ INTERIM (Proposed Plant Change) ☐ VOID

☒ FINAL (Supports Installed Condition)

DESCRIPTION OF CALCULATION REVISION (IF APPL.): N/A

REASON FOR CALCULATION REVISION (IF APPL.): N/A.

| | | | | | | |
|---|---|---|---|---|---|---|
| HOPE CREEK | ☐Q | ☐Qs | ☐Qsh | ☐F | ☐R | ☒N/A |
| Q - LIST (SALEM) ? | | ☒ YES | | ☐ NO | | |
| IMPORTANT TO SAFETY ? | | ☒ YES | | ☐ NO | | |
| FUTURE CONFIRMATION REQUIRED ? | | ☐ YES | | ☒ NO | If YES list page No(s). | |

OTHER DOCUMENTS AFFECTED? (CBDs, FSAR, etc.): None

ORIGINATOR/COMPANY NAME: VIJAY CHANDRA / PSE&G 16 DEC 1994 Date

PEER REVIEWER/COMPANY NAME: Gita Narasimhan 12/16/94 Date

VERIFIER/COMPANY NAME: Rajendra P. Pande 12/16/94 Date

REVIEWED: N/A Date
Contractor Supervisor (as applicable)

APPROVED: [signature] 12/16/94 Date
PSE&G Supervisor (Req'd)

If the calculation is either Q-List, Q, Qs, Qsh, F, R, or Important to Safety "YES", completion of the Certification for Design Verification (Form NC.DE-AP.ZZ-0010-1) is required.

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PSE&G

CALCULATION CONTINUATION SHEET

| | | | |
|---|---|---|---|
| TITLE LTOP EVENTS WITH ONE PORV | | ID NO S-C-RC-MDC-[illegible] | SHEET 3 OF 35 |
| | | REFERENCE | |
| ORIGINATOR | N. CHANDRA | 0 | |
| DATE | 12 DEC 1994 | | |
| PEER REVIEW | [signature] | | |
| DATE | 12/16/94 | | |

## 1 INTRODUCTION:

VARICUS LTOP EVENTS AND THEIR MITIGATION WAS STUDIED IN PSE&G CALCULATION S-C-RC-MDC-[illegible]3E8 [Ref 1]. FOR EACH EVENT, THE PEAK REACTOR PRESSURE WAS CALCULATED. IN REF [1] TRANSIENTS, EITHER TWO PORVS OR ONE PORV AND RH3 COMBINATION WAS AVAILABLE TO RELIEVE PRESSURE. THE UNAVAILBLE VALVE WAS CONSIDERED TO HAVE FAILED (SINGLE ACTIVE FAILURE CRITERION).

HOWEVER, ACCORDING TO SALEM 1 TECH. SPEC PAGE B 3/4 4-11 AMENDMENT NO. 108 AND SALEM 2 TECH. SPEC. PAGE B 3/4 4-12 AMENDMENT NO 86, EITHER PORS HAS ADEQUATE RELIEVING CAPACITY TO PROTECT THE RCS FROM OVERPRESSURIZATION WHEN THE TRANSIENT IS LIMITED TO EITHER (1) THE START OF AN IDLE RCP WITH THE SECONDARY WATER TEMPERATURE OF THE STEAM GENERATOR LESS THAN OR EQUAL TO 50F ABOVE THE RCS COLD LEG TEMPERATURE, OR (2) THE START OF SAFETY INJECTION PUMP AND ITS INJECTION INTO A WATER SOLID RCS. IN OTHER WORDS, AT THIS TIME, WE ARE NOT PERMITTED TO TAKE CREDIT FOR PRESSURE RELIEVING CAPABILITY OF RH3 VALVE.

THEREFORE CERTAIN TRANSIENTS WILL BE CONSIDERED WITHOUT TAKING CREDIT FOR THE PRESSURE RELIEVING CAPABILITY OF RH3 VALVE.

THE FOLLOWING TWO CASES HAVE BEEN CONSIDERED.

M4. INADVERTANT ACTUATION OF A CHARGING PUMP.

M5. SAFETY INJECTION SIGNAL STARTS ONE CHARGING PUMP, LETDOWN FLOW IS ISOLATED AND THE POSITIVE DISPLACEMENT PUMP CONTINUES TO RUN.

IN EACH OF THESE TRANSIENTS, ONLY ONE PORV IS AVAILABLE TO RELIEVE THE PRESSURE.

THE INITIAL CONDITIONS, GEOMETRICAL DETAILS, SYSTEM DESCRIPTION, METHOD OF ANALYSIS ARE ALL DESCRIBED IN DETAIL IN CALCULATION S-C-RC-MDC-1358 [Ref 1]. THE PRESENT CALCULATION SHOULD BE TREATED AS AN ADDENDUM TO REF [1]. TABLE 1.1 SHOWS THE THE DETAILS OF TRANSIENTS.

TABLE 1.1
DESCRIPTION OF MASS INPUT TRANSIENTS

| CASE I.D. | INITIAL CONDITIONS | | | | INADVERTENT ACTION | RELIEF VALVES AVAILABLE (SET POINT = 375 psig) |
|---|---|---|---|---|---|---|
| | REACTOR PRESSURE (psia) | REACTOR TEMP. (F) | PRESSURIZER TEMP. | PRESSURIZER LIQUID VOL. FRACTION | | |
| M4 | 380 | 70 | SAT. | 1 | START OF A CHARGING PUMP | 1 PORV |
| M5 | 380 | 70 | SAT. | 1 | SI WITH LETDOWN ISOLATION | 1 PORV |

## 2. ANALYSIS

GOTHIC COMPUTER PROGRAM INPUT AND OUTPUT ARE PRESENTED IN THIS SECTION. CASES M4 AND M5 HAVE BEEN ANALYZED.

### 2.1 CASE M4: INADVERTENT START OF A CENTRIFUGAL CHARGING PUMP.

THE MAXIMUM FLOW RATE THROUGH A CHARGING PUMP IS 560 GPM Ref [2] ALTHOUGH ALL THE FLOW DOES NOT GO TO THE RCS, AN INJECTION FLOW OF 560 GPM WILL BE USED. BESIDES 560 GPM IS THE CHARGING PUMP FLOW WHEN THE REACTOR IS AT ATMOSPHERIC PRESSURE. DURING AN LTOP EVENT, THE PEAK REACTOR PRESSURE IS OF THE ORDER OF 450 psia. UNDER THESE CONDITIONS THE INJECTION FLOW RATE WILL BE LESS THAN 560 GPM.

560 GPM OF 70F = 77.78 lbm/S.

THE GOTHIC INPUT AND OUTPUT ARE GIVEN IN THE FOLLOWING PAGES.

THE PRESSURES CALCULATED USING GOTHIC DO NOT ACCOUNT FOR RCP EFFECT. THIS EFFECT HAS BEEN ADDED TO CALCULATED PEAK PRESSURE. THE EFFECT OF ONE RCP OPERATION AND ELEVATION DIFFERENCE BETWEEN TRANSMITTER LOCATION AND CRITICAL WELD = 31 psi. [Ref 1]

S-C-RC-MDC-1L-3 5/25

V1SAT560
08.31.16 15-DEC-94
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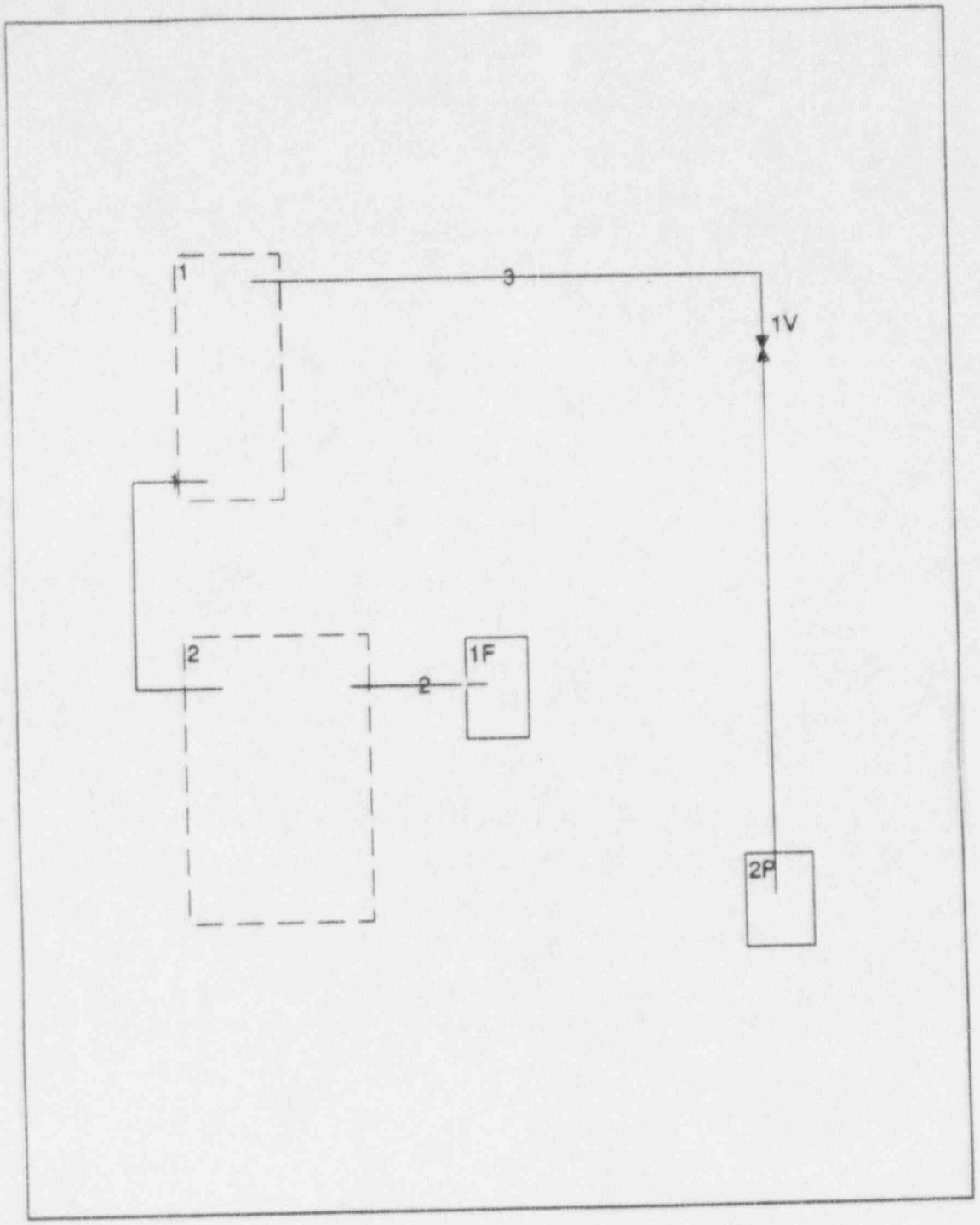
CASE M4



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08:33:40 15-DEC-94
GOTHIC Version 4.0 - August 1993

5-C-PC-MDC-1412 T-3

CASE M4

| Control Volumes | | | | | | |
|---|---|---|---|---|---|---|
| Vol # | Description | Vol (ft3) | Elev (ft) | Ht (ft) | Hyd. D. (ft) | Pl Area (ft2) |
| 1 | PRESSURIZER | 1800. | 104. | 60. | 7. | 40. |
| 2 | RCS | 10812. | 90. | 14. | 10. | 80. |

| Fluid Boundary Conditions - Table 1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| BC# | Description | Press. (psia) | FF | Temp. (F) | FF | Flow (lbm/s) | FF | ON Trip | OFF Trip |
| 1F | SI INJEC. FLOW | 400. | | 70 | | 77.78 | | | |
| 2P | PORV TO PRT | 115. | | 80 | | | | | |

| Fluid Boundary Conditions - Table 2 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BC# | Liq. V Frac. | FF | Stm. P.R. | FF | Drop D (in) | FF | Cpld BC# | Flow Frac. | FF | Heat (Btu/s) | FF |
| 1F | 1. | | 1. | | | | | | | | |
| 2P | 1. | | 0.005 | | | | | | | | |

| Fluid Boundary Conditions - Table 3 Gas Pressure Ratios | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BC# | Air | FF | Ar | FF | He | FF | H2 | FF |
| 1F | 1. | | | | | | | |
| 2P | 1. | | | | | | | |

| Fluid Boundary Conditions - Table 4 Gas Pressure Ratios | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BC# | Kr | FF | N2 | FF | O2 | FF | Xe | FF |
| 1F | | | | | | | | |
| 2P | | | | | | | | |

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CASE M4

| Flow Paths - Table 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| F.P. # | Description | Vol A | Elev (ft) | Ht (ft) | Vol B | Elev (ft) | Ht (ft) |
| 1 | SURGE LINE | 2 | 97. | 1. | 1 | 105. | 1. |
| 2 | SI LINE | 2 | 97. | 0.2 | 1F | 97. | 0.2 |
| 3 | RELIEF LINE | 1 | 155. | 0.5 | 2P | 87. | 0.22 |

| Flow Paths - Table 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Flow Path # | Flow Area (ft2) | Hyd. Diam. (ft) | Inertia Length (ft) | Friction Length (ft) | Critical Flow Model | De-Entrmt Frac. | Mom Trn Opt |
| 1 | 0.75 | 1. | 60. | 100. | NO | | - |
| 2 | 0.1 | 0.2 | 10. | 10. | NO | | - |
| 3 | 0.00843 | 0.22 | 13. | 0.1 | YES | | - |

| Flow Paths - Table 3 | | | |
|---|---|---|---|
| Flow Path # | Fwd. Loss Coeff. | Rev. Loss Coeff. | Comp. Opt. |
| 1 | 1. | 1. | OFF |
| 2 | 1. | 1. | OFF |
| 3 | 0.01 | 0.01 | ON |

| Valves & Doors | | | | | | |
|---|---|---|---|---|---|---|
| Valve # | Description | Flow Path # | Open Trip # | Close Trip # | Valve Type # | Disch. Vol. |
| 1V | PORV | 3 | 1 | 0 | 1 | 2P |

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CASE M4

| Valve/Door Types | | | | |
|---|---|---|---|---|
| Valve Type # | Valve Option | Stem Travel Curve | Loss Coeff. Curve | Flow Area (ft2) |
| 1 | TIME OPEN | 1 | 2 | 0.00843 |
| 2 | TIME OPEN | 3 | 2 | 0.0088 |

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CASE M4

| Component Trips | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Trip # | Sense Var. | Sensor 1 Loc. | Sensor 2 Loc. | Var. Limit | Set Point | Delay Time | Rset Trip | Cond Trip | Cond Type |
| 1 | PRESS | 2 | | UPPER | 390. | 0.5 | 0 | | AND |
| 2 | PRESS | 2 | | UPPER | 390. | 0. | | | AND |

| Functions | | | | |
|---|---|---|---|---|
| FF# | Description | Ind. Var. | Dep. Var. | Points |
| 0 | Constant | - | - | 0 |
| 1 | PORV STEM TRAVE | Time (sec) | Norm. Stem | 3 |
| 2 | PORV LOSS FACTO | Norm. Stem | Loss Facto | 17 |
| 3 | RH3 STEM TRAVEL | TIME (SEC) | RH3 STEM T | 3 |

| Function 1<br>PORV STEM TRAVEL<br>Ind. Var.: Time (sec)<br>Dep. Var.: Norm. Stem Position | | | |
|---|---|---|---|
| Ind. Var. | Dep. Var. | Ind. Var. | Dep. Var. |
| 0. | 0. | 1.5 | 1. |
| 100. | 1. | | |

| Function 2<br>PORV LOSS FACTOR<br>Ind. Var.: Norm. Stem Position<br>Dep. Var.: Loss Factor | | | |
|---|---|---|---|
| Ind. Var. | Dep. Var. | Ind. Var. | Dep. Var. |
| 0. | 1e+10 | 0.01 | 10000. |
| 0.0667 | 225. | 0.1333 | 56. |
| 0.2 | 25. | 0.2667 | 14. |
| 0.337 | 9. | 0.4 | 6.25 |
| 0.4667 | 4.59 | 0.5333 | 3.52 |
| 0.6 | 2.78 | 0.6667 | 2.25 |
| 0.7333 | 1.86 | 0.8 | 1.56 |
| 0.867 | 1.33 | 0.933 | 1.15 |
| 1. | 1. | | |

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CASE M4

| Function 3 RH3 STEM TRAVEL Ind. Var.: TIME (SEC) Dep. Var.: RH3 STEM TRAVEL | | | |
|---|---|---|---|
| Ind. Var. | Dep. Var. | Ind. Var. | Dep. Var. |
| 0.<br>100. | 0.<br>0.586 | 1.2 | 0.586 |

| Volume Initial Conditions | | | | | | |
|---|---|---|---|---|---|---|
| Vol # | Pressure (psia) | Temp. (F) | Relative Humidity (%) | Liquid Volume Fractio | Ice Volume Fract. | Ice Surf. A. (ft2) |
| def | 14.7 | 80. | 60. | 0. | 0. | 0. |
| 1 | 364. | 440. | 100. | 1. | 0. | 0. |
| 2 | 380. | 70. | 100. | 1. | 0. | 0. |

| Initial Gas Pressure Ratios | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vol # | Air | Ar | He | H | Kr | N | O | Xe |
| def | 1. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1 | 1. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 2 | 1. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |

| Run Control Parameters (Seconds) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time Int | DT Min | DT Max | DT Ratio | End Time | Print Int | Graph Int | Max CPU | Dump Int |
| 1 | 0.000 | 0.01 | 1. | 5. | 500. | 0.05 | 10000 | 0. |
| 2 | 0.000 | 0.05 | 1. | 10. | 500. | 0.05 | 10000 | 0. |

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CASE m4

| Control Parameters Menu | |
|---|---|
| Parameter | Value |
| Restart Time (sec) | 0 |
| Restart Time Step # | 0 |
| Restart Time Control | NEW |
| Revap. Fraction | 0 |
| Min. NC HT Coeff. | 0 |
| Reference Pressure | 0 |
| Ice Temperature | 0 |
| Ice Density | 0 |

| Graphs | | | | | | | |
|---|---|---|---|---|---|---|---|
| Graph # | Title | Mon | Curve Number 1 | 2 | 3 | 4 | 5 |
| 1 | SI FLOW = 560 G | | PR2 | PR1 | | | |
| 2 | PORV STEM POSIT | | VT1V | | | | |
| 3 | PRESSURIZER & R | | TL2 | TL1 | | | |
| 4 | RELIEF FLOW RAT | | FL3 | | | | |
| 5 | SI FLOW RATE | | FV2 | FL2 | | | |

S-C-RC-MSC-14.3

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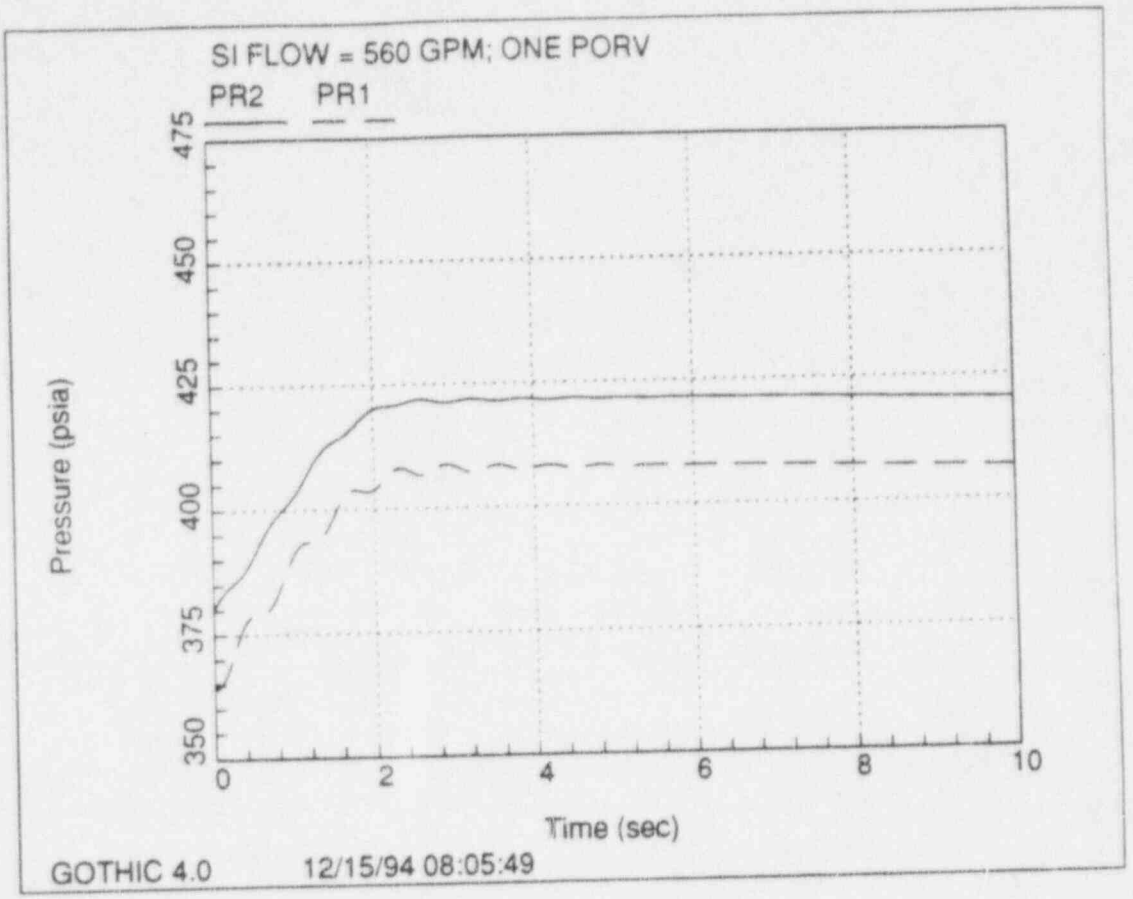
CASE M4



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V1SAT560
08:29:47 15-DEC-94
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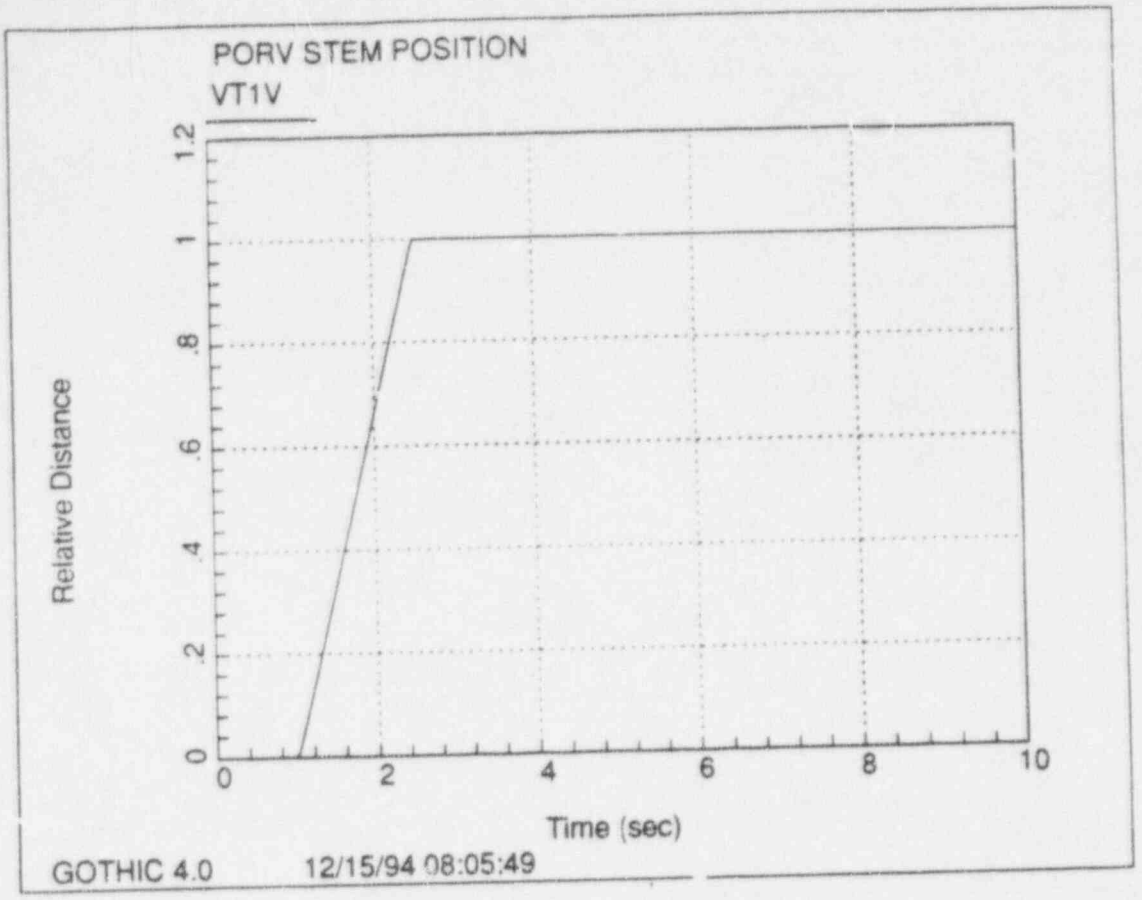
CASE M4



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V1SAT560
08:29:58 15-DEC-94
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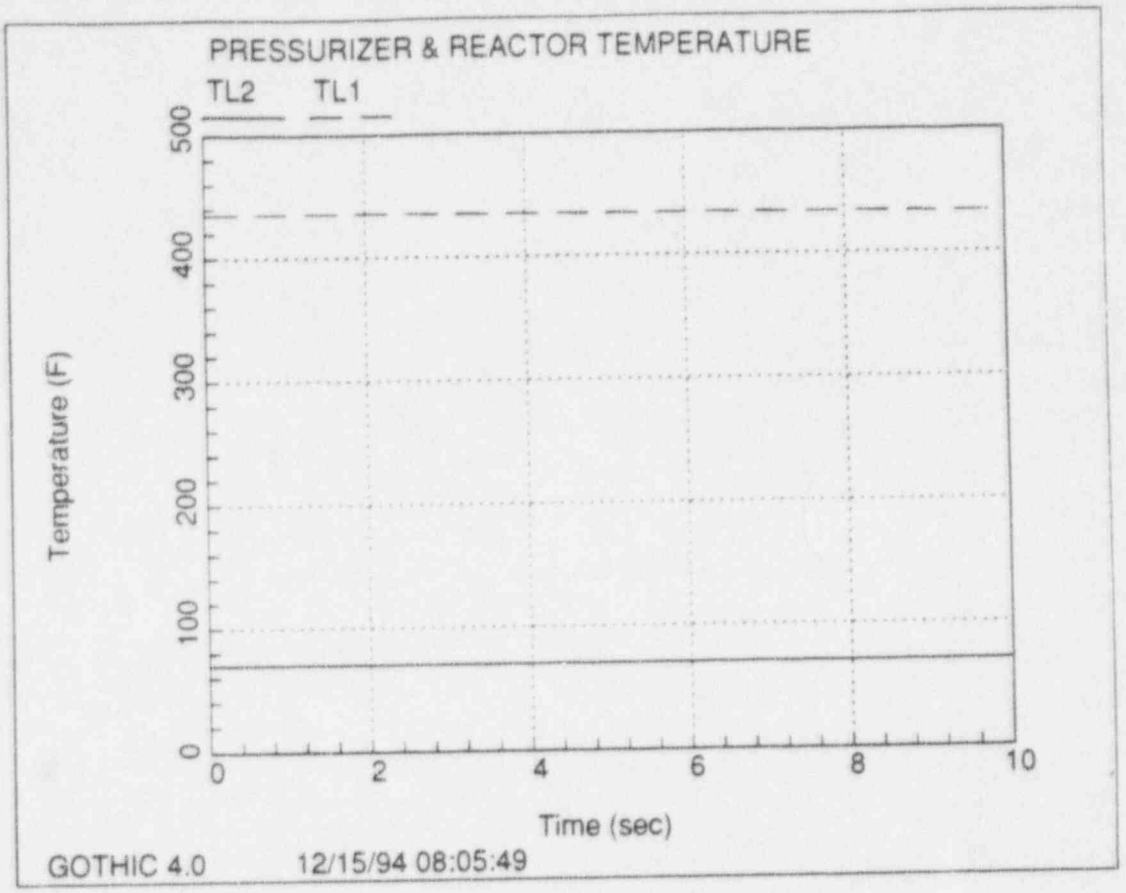
CASE M4



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V1SAT560
08.30.12 15-DEC-94
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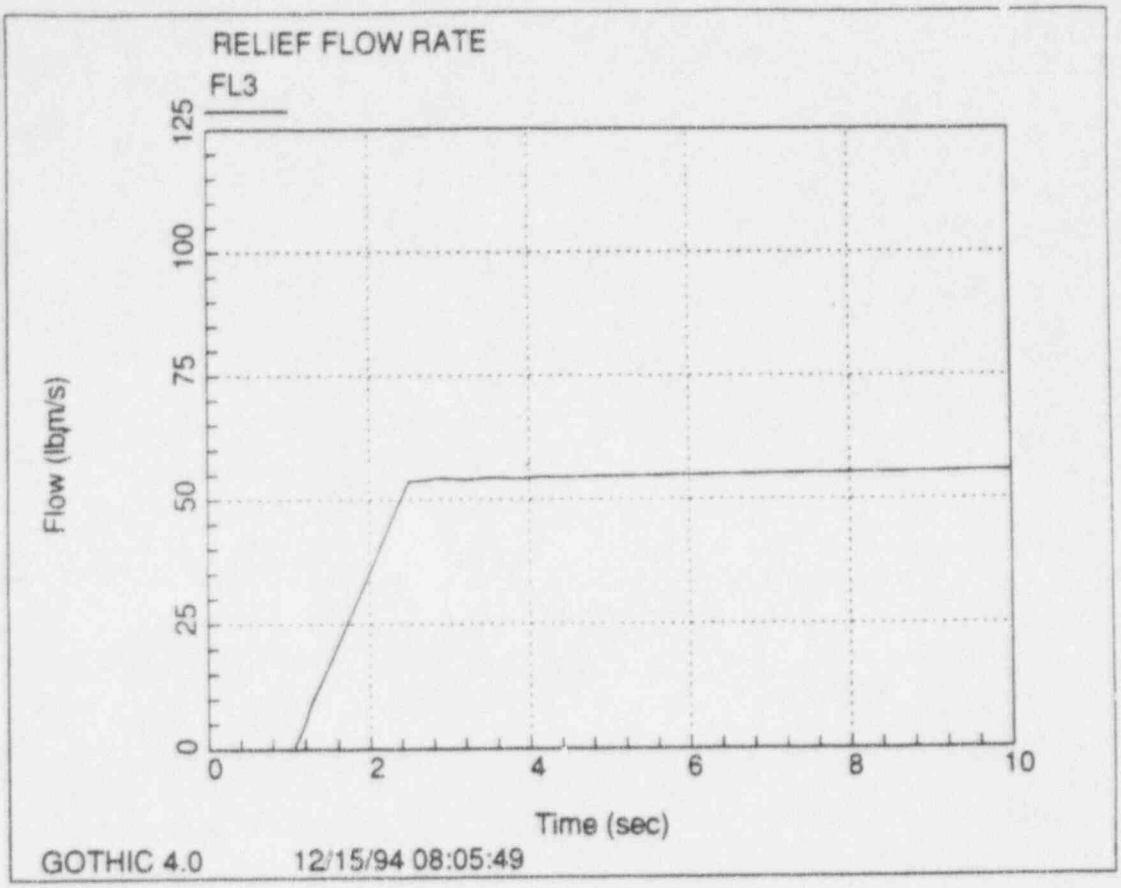
CASE M4



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V1SAT560
08:30:23 15-DEC-94
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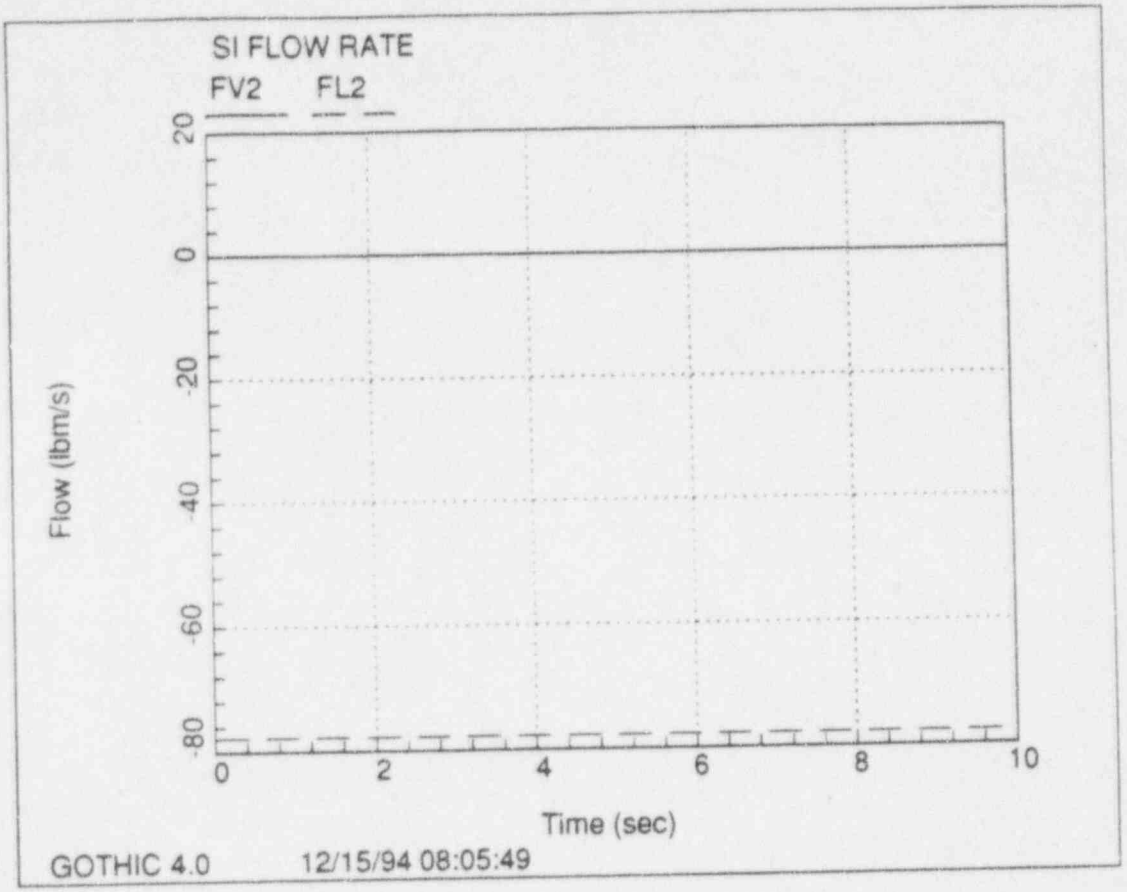
CASE m4



## 2.2 CASE M5: SAFETY INJECTION WITH LET DOWN ISOLATION

IN THIS CASE ONE CHARGING PUMP STARTS WHILE LETDOWN IS ISOLATED. THE POSITIVE DISPLACEMENT PUMP CONTINUES TO RUN.

THE P.D.P DESIGN FLOW RATE = 98 Gpm [Ref. 3]

THE CHARGING PUMP MAXIMUM FLOW = 560 GPM [Ref 2]

WHEN BOTH PUMPS OPERATE SIMULTANEOUSLY, THE INJECTION FLOW WILL BE LESS THAN THE SUM OF THESE TWO FLOWS. THE SUM OF THESE TWO FLOWS = 98+560 GPM = 658 GPM. HOWEVER, TO KEEP THE ANALYSIS CONSERVATIVE 675 GPM FLOW RATE HAS BEEN USED

675 GPM OF 70F WATER = 93.75 lbm/S

THE GOTHIC INPUT AND OUTPUT FOR THIS CASE IS GIVEN IN THE FOLLOWING PAGES

S-C-RC-MDC-1612

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1-5

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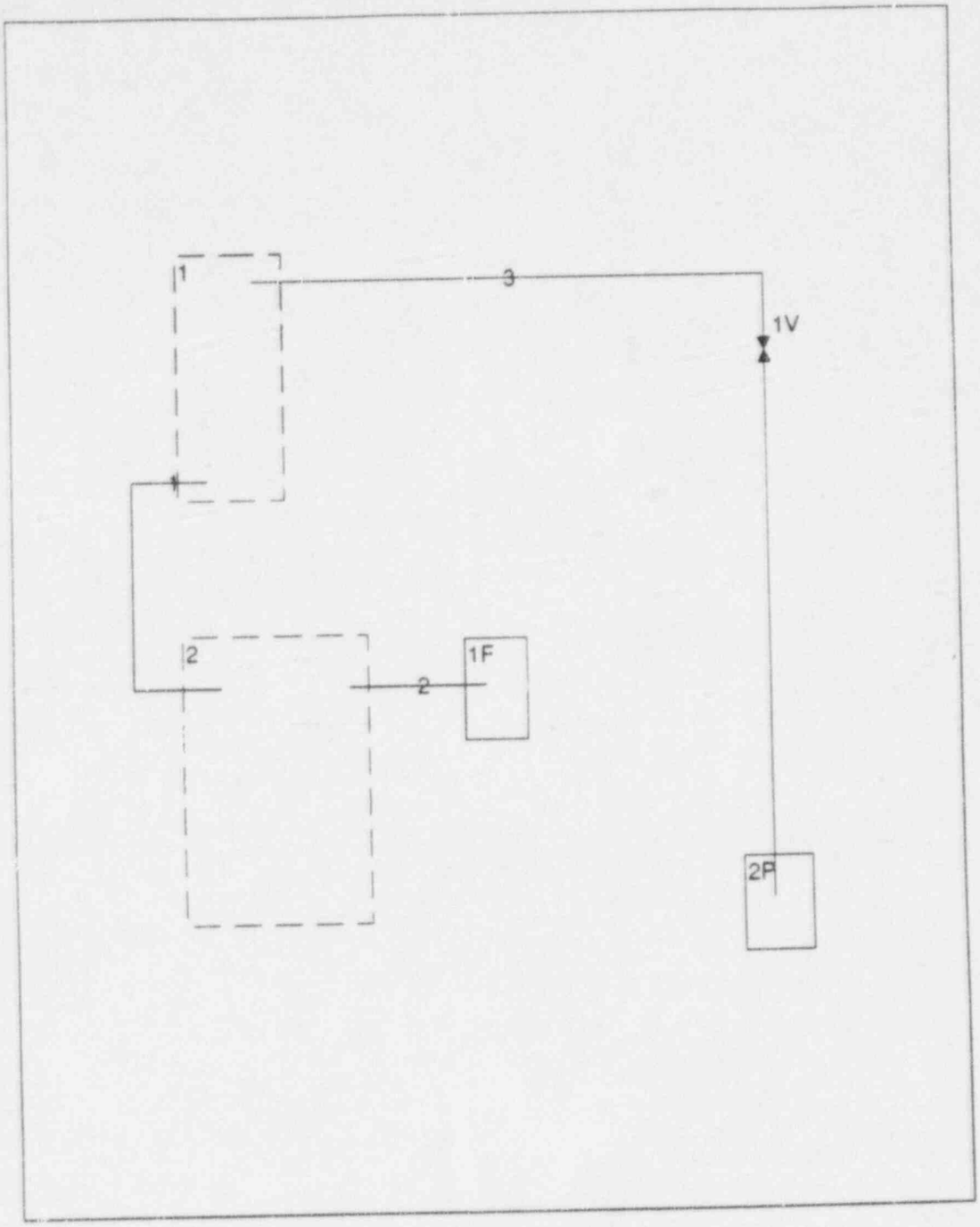
CASE #3



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CASE M5

| Control Volumes | | | | | | |
|---|---|---|---|---|---|---|
| Vol # | Description | Vol (ft3) | Elev (ft) | Ht (ft) | Hyd. D. (ft) | Pl Area (ft2) |
| 1 | PRESSURIZER | 1800. | 104. | 60. | 7. | 40. |
| 2 | RCS | 10812. | 90. | 14. | 10. | 80. |

| Fluid Boundary Conditions - Table 1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| BC# | Description | Press. (psia) | FF | Temp. (F) | FF | Flow (lbm/s) | FF | ON Trip | OFF Trip |
| 1F | SI INJEC. FLOW | 400. | | 70 | | 93.75 | | | |
| 2P | PORV TO PRT | 115. | | 80 | | | | | |

| Fluid Boundary Conditions - Table 2 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BC# | Liq. V Frac. | FF | Stm. P.R. | FF | Drop D (in) | FF | Cpld BC# | Flow Frac. | FF | Heat (Btu/s) | FF |
| 1F | 1. | | 1. | | | | | | | | |
| 2P | 1. | | 0.005 | | | | | | | | |

| Fluid Boundary Conditions - Table 3 Gas Pressure Ratios | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BC# | Air | FF | Ar | FF | He | FF | H2 | FF |
| 1F | 1. | | | | | | | |
| 2P | 1. | | | | | | | |

| Fluid Boundary Conditions - Table 4 Gas Pressure Ratios | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BC# | Kr | FF | N2 | FF | O2 | FF | Xe | FF |
| 1F | | | | | | | | |
| 2P | | | | | | | | |

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CASE M5

| Flow Paths - Table 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| F.P. # | Description | Vol A | Elev (ft) | Ht (ft) | Vol B | Elev (ft) | Ht (ft) |
| 1 | SURGE LINE | 2 | 97. | 1. | 1 | 105. | 1. |
| 2 | SI LINE | 2 | 97. | 0.2 | 1F | 97. | 0.2 |
| 3 | RELIEF LINE | 1 | 155. | 0.5 | 2P | 87. | 0.22 |

| Flow Paths - Table 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Flow Path # | Flow Area (ft2) | Hyd. Diam. (ft) | Inertia Length (ft) | Friction Length (ft) | Critical Flow Model | De-Entrmt Frac. | Mom Trn Opt |
| 1 | 0.75 | 1. | 60. | 100. | NO | | - |
| 2 | 0.1 | 0.2 | 10. | 10. | NO | | - |
| 3 | 0.00843 | 0.22 | 3. | 0.1 | YES | | - |

| Flow Paths - Table 3 | | | |
|---|---|---|---|
| Flow Path # | Fwd. Loss Coeff. | Rev. Loss Coeff. | Comp. Opt. |
| 1 | 1. | 1. | OFF |
| 2 | 1. | 1. | OFF |
| 3 | 0.01 | 0.01 | ON |

| Valves & Doors | | | | | | |
|---|---|---|---|---|---|---|
| Valve # | Description | Flow Path # | Open Trip # | Close Trip # | Valve Type # | Disch. Vol. |
| 1V | PORV | 3 | 1 | 0 | 1 | 2P |

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CASE M 5

| Valve/Door Types | | | | |
|---|---|---|---|---|
| Valve Type # | Valve Option | Stem Travel Curve | Loss Coeff. Curve | Flow Area (ft2) |
| 1 | TIME OPEN | 1 | 2 | 0.00843 |
| 2 | TIME OPEN | 3 | 2 | 0.0088 |

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CASE M5

| Component Trips | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Trip # | Sense Var. | Sensor 1 Loc. | Sensor 2 Loc. | Var. Limit | Set Point | Delay Time | Rset Trip | Cond Trip | Cond Type |
| 1 | PRESS | 2 | | UPPER | 390. | 0.5 | UNDE | | AND |
| 2 | PRESS | 2 | | UPPER | 390. | 0. | | | AND |

| Functions | | | | |
|---|---|---|---|---|
| FF# | Description | Ind. Var. | Dep. Var. | Points |
| 0 | Constant | - | - | 0 |
| 1 | PORV STEM TRAVE | Time (sec) | Norm. Stem | 3 |
| 2 | PORV LOSS FACTO | Norm. Stem | Loss Facto | 17 |
| 3 | RH3 STEM TRAVEL | TIME (SEC) | RH3 STEM T | 3 |

Function
1
PORV STEM TRAVEL
Ind. Var.: Time (sec)
Dep. Var.: Norm. Stem Position

| Ind. Var. | Dep. Var. | Ind. Var. | Dep. Var. |
|---|---|---|---|
| 0. | 0. | 1.5 | 1. |
| 100. | 1. | | |

Function
2
PORV LOSS FACTOR
Ind. Var.: Norm. Stem Position
Dep. Var.: Loss Factor

| Ind. Var. | Dep. Var. | Ind. Var. | Dep. Var. |
|---|---|---|---|
| 0. | 1e+10 | 0.01 | 10000. |
| 0.0667 | 225. | 0.1333 | 56. |
| 0.2 | 25. | 0.2667 | 14. |
| 0.337 | 9. | 0.4 | 6.25 |
| 0.4667 | 4.59 | 0.5333 | 3.52 |
| 0.6 | 2.78 | 0.6667 | 2.25 |
| 0.7333 | 1.86 | 0.8 | 1.56 |
| 0.867 | 1.33 | 0.933 | 1.15 |
| 1. | 1. | | |

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CASE M3

| Function 3<br>RH3 STEM TRAVEL<br>Ind. Var.: TIME (SEC)<br>Dep. Var.: RH3 STEM TRAVEL | | | |
|---|---|---|---|
| Ind. Var. | Dep. Var. | Ind. Var. | Dep. Var. |
| 0.<br>100. | 0.<br>0.586 | 1.2 | 0.586 |

| Volume Initial Conditions | | | | | | |
|---|---|---|---|---|---|---|
| Vol # | Pressure (psia) | Temp. (F) | Relative Humidity (%) | Liquid Volume Fractio | Ice Volume Fract. | Ice Surf. A. (ft2) |
| def | 14.7 | 80. | 60. | 0. | 0. | 0. |
| 1 | 364. | 440. | 100. | 1. | 0. | 0. |
| 2 | 380. | 70. | 100. | 1. | 0. | 0. |

| Initial Gas Pressure Ratios | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vol # | Air | Ar | He | H | Kr | N | O | Xe |
| def | 1. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 1 | 1. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 2 | 1. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |

| Run Control Parameters (Seconds) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time Int | DT Min | DT Max | DT Ratio | End Time | Print Int | Graph Int | Max CPU | Dump Int |
| 1 | 0.000 | 0.01 | 1. | 5. | 500. | 0.05 | 10000 | 0. |
| 2 | 0.000 | 0.1 | 1. | 100. | 500. | 0.5 | 10000 | 0. |

v1sat675
08:55:49 15-DEC-94
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CASE M5

| Control Parameters Menu | |
|---|---|
| Parameter | Value |
| Restart Time (sec) | 0 |
| Restart Time Step # | 0 |
| Restart Time Control | NEW |
| Revap. Fraction | 0 |
| Min. NC HT Coeff. | 0 |
| Reference Pressure | 0 |
| Ice Temperature | 0 |
| Ice Density | 0 |

| Graphs | | | | | | | |
|---|---|---|---|---|---|---|---|
| Graph # | Title | Mon | Curve Number 1 | 2 | 3 | 4 | 5 |
| 1 | SI FLOW = 675 G | | PR2 | PR1 | | | |
| 2 | PORV STEM POSIT | | VT1V | | | | |
| 3 | PRESSURIZER & R | | TL2 | TL1 | | | |
| 4 | RELIEF FLOW RAT | | FL3 | | | | |
| 5 | SI FLOW RATE | | FV2 | FL2 | | | |

v1sat675
08:50:23 15-DEC-94
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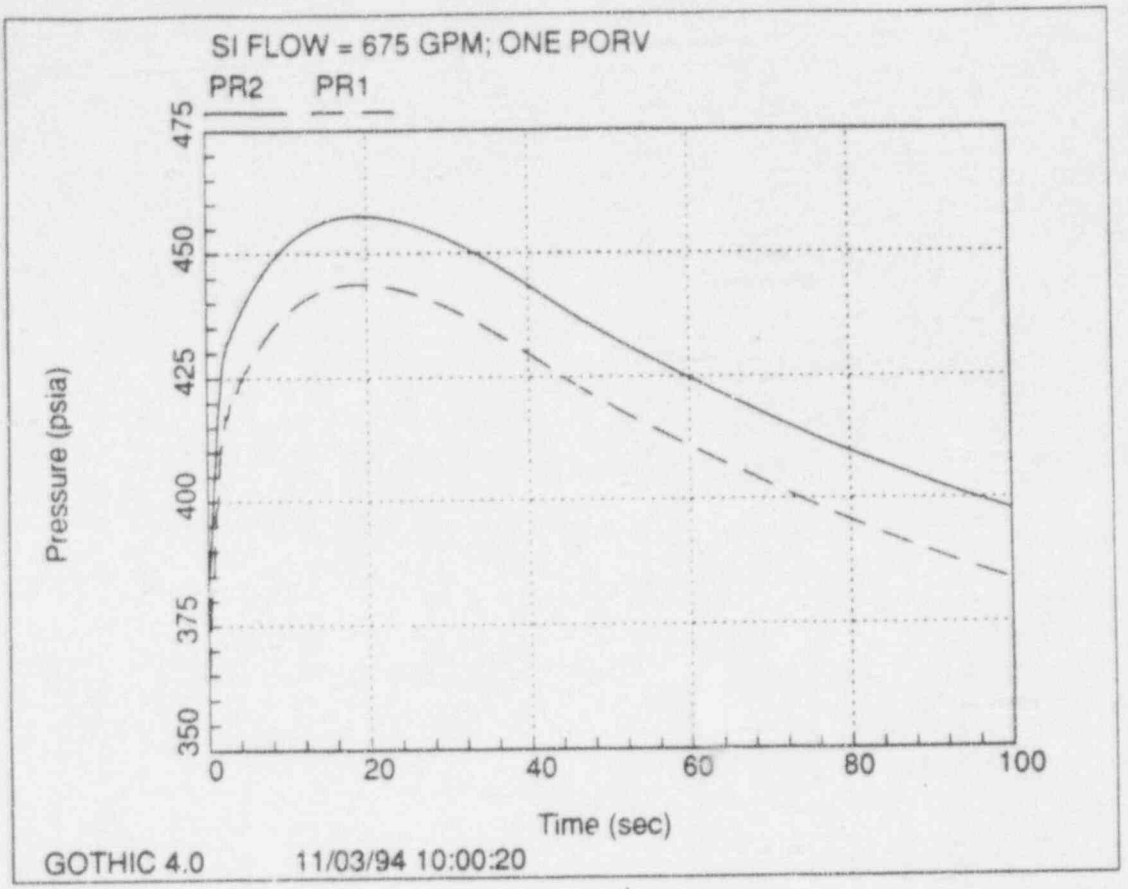
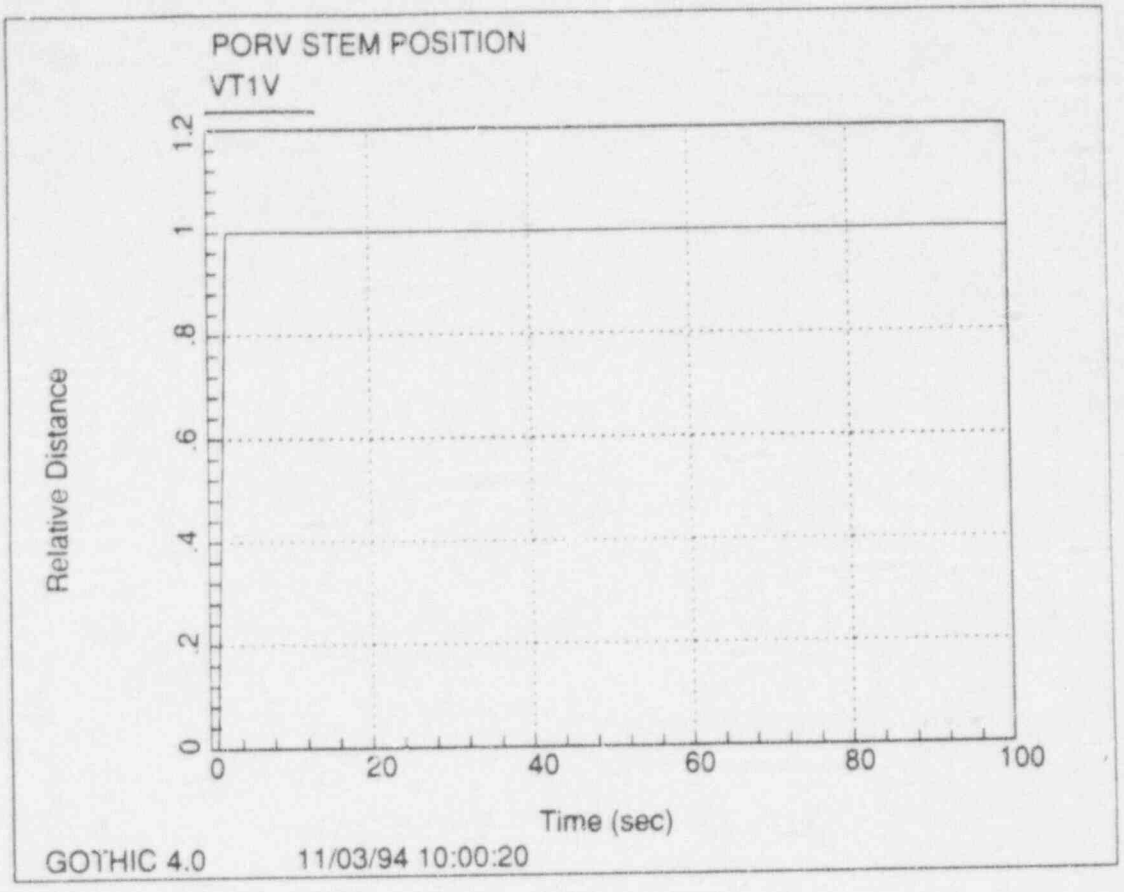
CASE M5



S-C-RC-MDC-1413

CASE M3

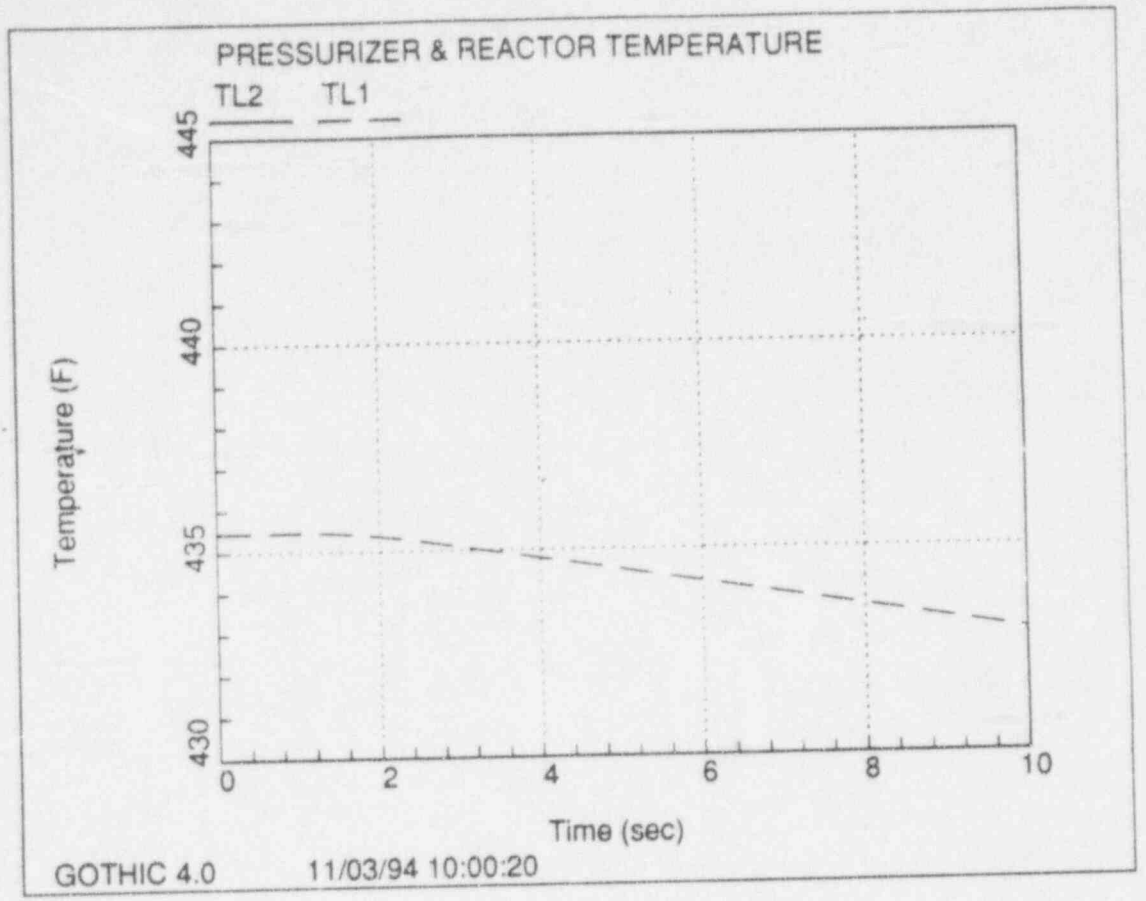
v1sat675
08:50:39 15-DEC-94
GOTHIC Version 4.0 - August 1993



S-C-FR-MDC-413

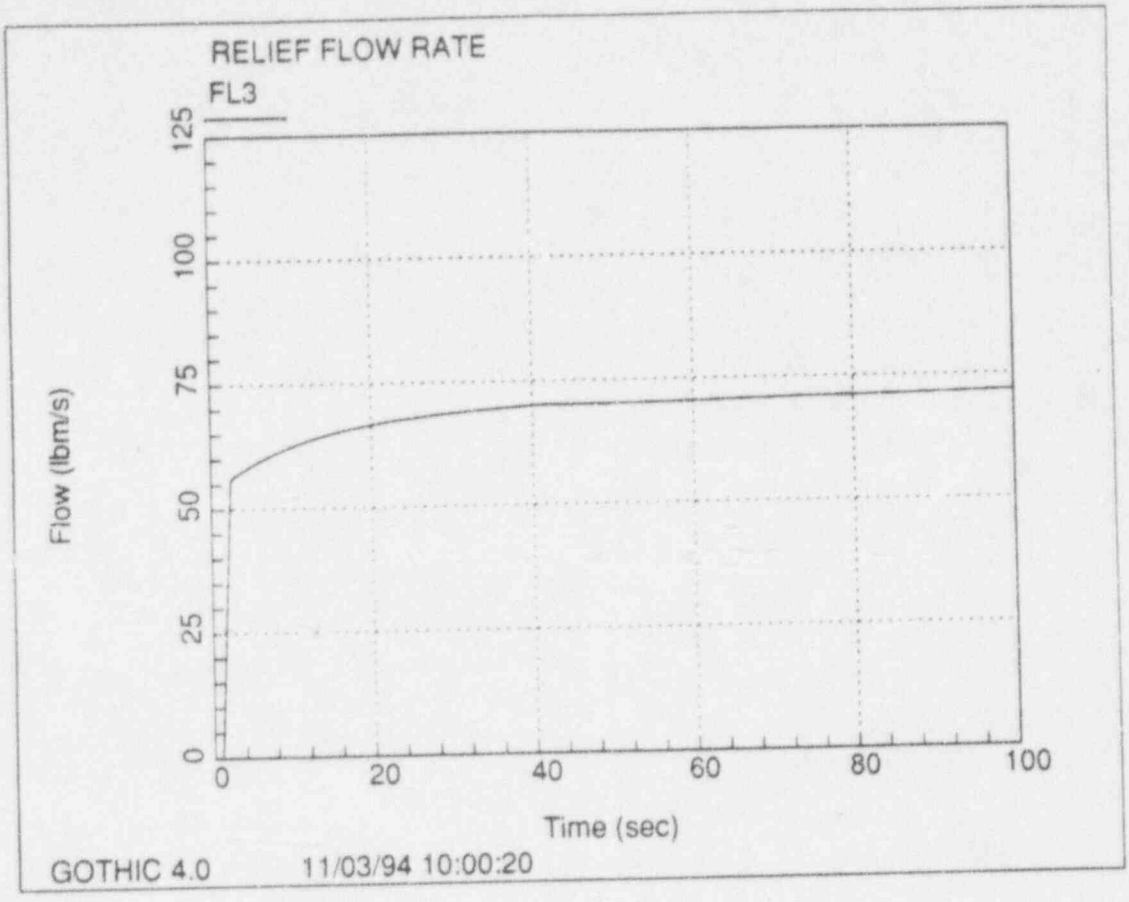
v1sat675
08:50:51 15-DEC-94
GOTHIC Version 4.0 - August 1993

CASE M5



v1sat575
08:51:15 15-DEC-94
GOTHIC Version 4.0 - August 1993

CASE M5

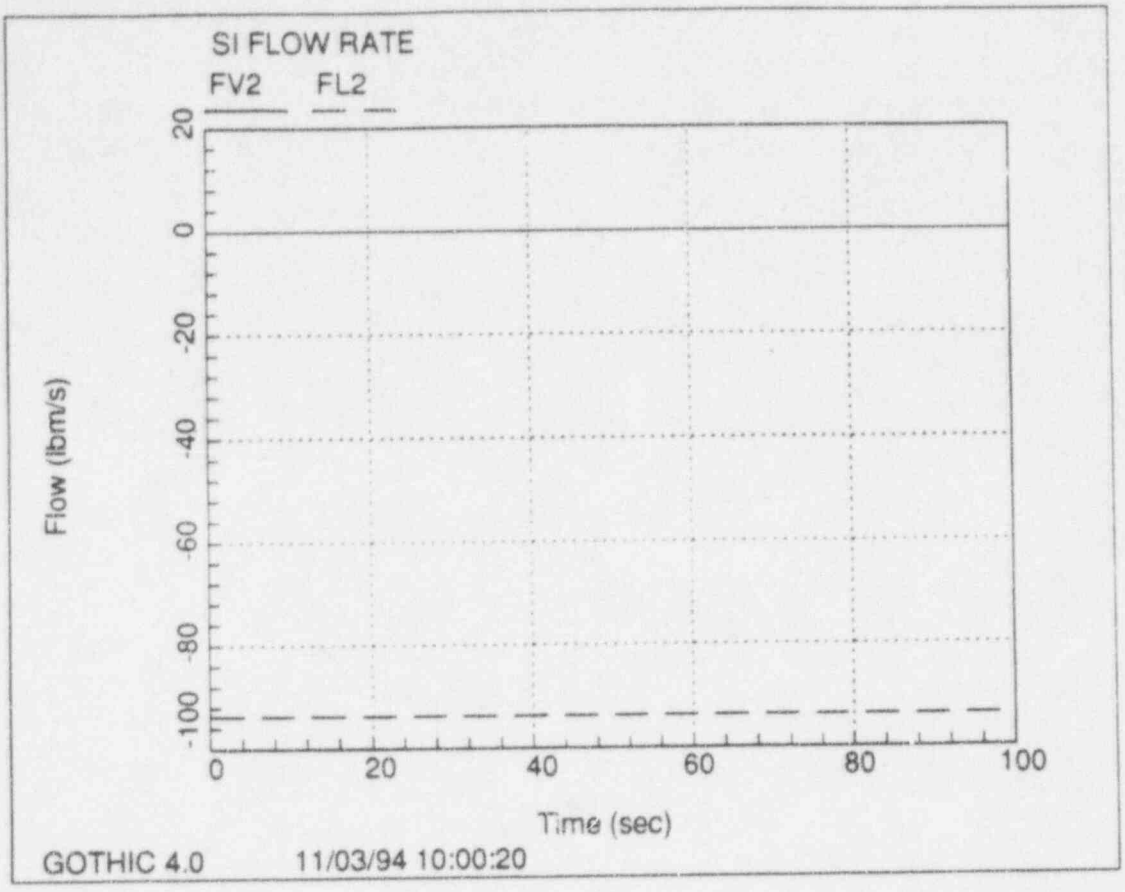


S-C-RC-MDC-1413

-7/35

v1sat575
08:53:03 15-DEC-94
GOTHIC Version 4.0 - August 1993

CASE M5



## 3. RESULTS:

THE PEAK RCS PRESSURES AS CALCULATED IN SECTION 2 ARE SHOWN IN TABLE 3.1.

TABLE 3.1 PEAK RCS PRESSURE WITH ONE PORV

| CASE I.D | LTOP EVENT | NET INJECTION FLOW RATE (GPM) | INITIAL RCS TEMP (F) | INITIAL PRESSURIZER TEMP (F) | PEAK RCS PRESSURE AT PRESSURE TRANSMITTER LOCATION (PSIA) | PEAK RCS PRESSURE AT CRITICAL WELD LOCATION WITH ONE RCP RUNNING | |
|---|---|---|---|---|---|---|---|
| | | | | | | (PSIA) | (PSIG) |
| M4 | MASS INPUT | 560 | 70 | 437 | 422 | 453 | 438 |
| M5 | MASS INPUT | 675 | 70 | 437 | 458 | 489 | 474 |

PSE&G

CALCULATION CONTINUATION SHEET

| | | | | |
|---|---|---|---|---|
| TITLE LTOP EVENTS WITH ONE PORV | | ID NO S-C-RC-MDC-1413 | | SHEET 12 OF 13 |
| | | REFERENCE | | |
| ORIGINATOR | V CHANDRA | 0 | | |
| DATE | 16DEC1994 | | | |
| PEER REVIEW | G Narasimhan | | | |
| DATE | 12/16/94 | | | |

4. REFERENCES:

1. P.S.E & G. CALCULATION S-C-RC-MDC-1358 Rev. 0.
2. SALEM 1 TECH SPEC. SECTION 4.5.2.h.2 (d) PAGE 3/4 5-5b, AMENDMENT 143.

   SALEM 2 TECH. SPEC. SECTION 4.5.2.h.2(d) PAGE 3/4 5-6a, AMENDMENT NO. 118.
3. CVCS CBD DE-CB.CVC-0037(Q) Rev. 1, p 5-60

CERTIFICATION FOR DESIGN VERIFICATION

Reference No. S-C-RC-MDC-1413

SUMMARY STATEMENT

Peak RCS pressure at the transmitter location was calculated using GOTHIC computer model similar to the way it was done in reference 1. Effect of RCP was added to determine RCS pressure at the critical weld location. This analysis was done using charging pump flows. Input to GOTHIC model was checked and found acceptable. Output from GOTHIC model is consistant with the input.

The undersigned hereby certifies (in the right column) that the design verification for the subject document has been completed, the questions from the generic checklist have been reviewed and addressed as appropriate, and all comments have been adequately incorporated.

Howard G Lewis — Rajendra P. Pande / 12/16/94
Design Verifier Assigned By (signature of Manager/Supervisor) — Signature of Design Verifier / Date

Design Verifier Assigned By (signature of Manager/Supervisor) — Signature of Design Verifier / Date

Design Verifier Assigned By (signature of Manager/Supervisor) — Signature of Design Verifier / Date

Design Verifier Assigned By (signature of Manager/Supervisor) — Signature of Design Verifier / Date

*If the Functional Manager/Supervisor acts as the Design Verifier, the signature of the next higher level of technical management is required.

CERTIFICATION FOR DESIGN VERIFICATION

CERTIFICATION FOR DESIGN VERIFICATION

REFERENCE DOCUMENT NO. /REV. J-C-RC-MDC-1413

| COMMENTS | RESOLUTION | |
|---|---|---|
| None | N/A. | |
| R Pandl 12/16/94 | | Acceptance of Resolution |
| SUBMITTED BY DATE | RESOLVED BY DATE | |