ENCLOSURE 1

WCAP-16503-NP, Revision 3

WESTINGHOUSE NON-PROPRIETARY CLASS 3

WCAP-16503-NP
Revision 3

Salem Unit 1 and Unit 2 Containment Response to LOCA and MSLB for Containment Fan Cooler Margin Recovery Project

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February 2007

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EXECUTIVE SUMMARY

Containment Integrity Analyses have been performed for design-basis LOCA and MSLB transients to determine the acceptability of reducing the accident CFCU heat removal capacity. The proposed change will affect the post-accident operation of the containment heat removal systems. These analyses can be used to update the licensing-basis safety analyses to support the CFCU Margin Recovery Project. The methods used for the analyses conducted here are consistent with current licensed methodology for LOCA and MSLB containment response (References 1, 9, and 11).

The containment integrity analyses consider the containment response to both long-term MSLB and LOCA mass and energy releases. The results of the analyses demonstrate the acceptability of the containment safeguards systems to mitigate the containment consequences of a hypothetical design-basis pipe break. The analyses ensure that the containment heat removal capability is sufficient to remove the maximum possible discharge of mass and energy release to containment from the Nuclear Steam Supply System without exceeding the containment design pressure and temperature limits and as required by GDC 38, rapidly reducing and maintaining the containment pressure and temperature at acceptably low levels following a design-basis LOCA transient. It is noted that the analyses also meet the requirements of the Standard Review Plan (i.e., NUREG-0800), Section 6.2.1.1.A for a dry containment to be less than 50% of the peak pressure within 24 hours after the initiation of the accident even though the Standard Review Plan is not part of the Salem Unit 1 or Unit 2 licensing basis.

The peak calculated pressure for the DEPS minimum safeguards LOCA case for Salem Unit 1 with Model F steam generators was 40.9 psig. The peak calculated pressure for the DEPS minimum safeguards LOCA case for Salem Unit 2 with Model 51 steam generators was 42.4 psig. Two analyses were done. The more conservative analysis fully complies with Salem's design basis and furthermore assumes no containment recirculation spray. This conservatively bounds a potential revision to Salem's operating procedures to initiate hot leg recirculation at 6.5 hours following a LOCA, which terminates recirculation spray. This imposes a harsher, longer-term containment temperature and pressure transient in comparison with the current analysis of record in the UFSAR. The second analysis assumes initiating containment recirculation spray and either maintaining it throughout the remaining duration of the transient, or crediting the condensation of steam in the reactor vessel when hot leg recirculation is commenced. This latter analysis does not conform to Salem's design basis but it provides a more realistic pressure and temperature transient following the limiting LOCA. Several LOCA analyses were also performed for Salem Unit 2 with Framatome ANP Model 61/19T replacement steam generators. The limiting case for Unit 2 with the replacement steam generators was a DEPS minimum safeguards case without any credit for recirculation spray with a peak calculated containment pressure of 43.5 psig.

For MSLB, the limiting containment pressure case is the Unit 2 4.6 ft^2 DER with the Westinghouse Model 51 steam generators initiated at 30% power with a feedwater regulator valve failure. The limiting containment temperature case is the Unit 1 0.88 ft^2 split rupture initiated at 30% power with a MSIV failure. For Unit 1 with Model F steam generators, the peak pressure is 41.0 psig and the peak temperature is 348.2°F. For Unit 2 with Model 51 steam generators, the peak pressure is 42.8 psig and the peak temperature is 348.2°F. While this is less than 351.3°F and the long-term temperature is less than the current profile, there is a period from approximately 100 seconds to 300 seconds where the new composite exceeds the envelope as much as 19°F. Once the steam generators in Salem Unit 2 are replaced with the Framatome Model 61/19T generator, the overall limiting case for pressure occurs for a

1.4 ft^2 DER initiated from 30% power with an assumed containment safeguards failure with a peak pressure of 45.6 psig. The overall maximum containment temperature of 349.6°F occurs for a 0.88 ft^2 split rupture initiated from 30% power with a failure of the MSIV.

In general, these results show that the CFCU heat removal rate credited during accidents can be significantly reduced without crediting recirculation spray if PSEG reevaluates individual equipment qualification against the revised 120 day composite accident temperature profile. These results show that Unit 2 with the Model 61/19T steam generators would be the most limiting plant and configuration once those generators are installed. The noted EQ temperature limit issues are addressed by PSEG Nuclear outside of this report.

PSEG letters EA-CFCU-03-004 (Reference 20), EA-CFCU-03-005 (Reference 21), SGR-06-0064, Rev. 1 (Reference 22), and SDE-2007-0001 (Reference 23) contain many of the input assumptions that were used for this program.

1 INTRODUCTION

The long-term containment integrity analyses demonstrate the acceptability of the containment safeguards systems to mitigate the consequences of a hypothetical loss-of-coolant accident or main steamline break. The calculations conservatively predict the containment pressure and temperature response subsequent to a postulated pipe break. These analyses demonstrate that the containment fan cooler units (CFCUs) heat removal capacity can be significantly reduced while still providing adequate cooling to maintain the post-accident containment pressure and temperature within the allowable limits.

This evaluation identifies the most limiting loss-of-coolant accident (LOCA) and the most limiting main steamline break (MSLB) configuration(s) for the containment for Salem Unit 1 and Salem Unit 2 with the revised containment heat removal systems. The impact of the most limiting single failure is applied to each scenario. This evaluation determined the limiting transients based on the containment analysis methodology described in the following sections.

Note that this analysis is performed specifically in terms of maximizing the global containment pressure and temperature response to design-basis mass and energy release events; any specific requirements for the service water system, the containment ventilation system, any subcompartment regions or structures for localized stress, and the spray coverage for dose-related analyses are outside the scope of this report.

Revision 1 of this report addresses changes to the time delay associated with the main feedwater pump trip, which is credited in the feedwater regulator valve (FRV) failure cases in the main steamline break analysis.

Revision 2 of this report addresses the impact of increased paint coating thickness and a heat sink change on the passive containment heat sinks on the overall containment pressure and temperature response.

Revision 3 contains the LOCA and MSLB mass and energy releases and containment response results with the CFCU margin recovery heat removal parameters and the revised heat sink data introduced in Revision 2 for Salem Unit 2 with Framatome ANP Model 61/19T replacement steam generators.

2 BACKGROUND

PSEG is proposing to demonstrate reduced reliance on CFCU cooling during accident conditions. This effort will be referred to as the CFCU Margin Recovery Project. The purpose is to allow, as a separate future effort, reduced service water (SW) flows during an accident, permit higher fouling, and/or allow increased plugging of the CFCU heat exchanger tubes.

The overall purpose of this analytical effort is for Westinghouse to execute a sufficient number of containment mass and energy (M&E) release scenarios so that PSEG can be assured that the proposed CFCU Margin Recovery Project will result in sufficient cooling under postulated M&E release accidents. The design-basis containment pressure and temperature limits are to be maintained. This includes rapidly reducing the containment pressure and temperature and maintaining the containment conditions at acceptably low levels as required by GDC 38. The reduced reliance on CFCU cooling will result in a harsher long-term temperature and pressure transient, which will require PSEG to review the equipment qualification (EQ) transients for all components inside containment. Containment work that was recently performed by Westinghouse for PSEG included an increased CFCU delay time and Generic Letter 96-06 (1996-1997), the Salem Unit 1 replacement steam generator assessment (1997), and the phase 1 and phase 2 containment capability studies (2001/2002). These were all documented in References 1 through 4.

The purpose of the 2001/2002 capability study was to determine whether the CFCUs did not need to be credited for the containment integrity events. Based on the LOCA results showing high second pressure rise exceeding the containment design limit after about 2.5 hours and peaking around 95 psig twelve hours later, it was clear that relying solely on containment sprays was not adequate for the LOCA event. The project then considered the change to limited CFCU heat removal via a manual operator action to occur at about 1 hour. While this was shown under the phase 2 analyses to sufficiently reduce the peak containment pressure for the LOCA event, it effectively removes any CFCU heat removal for the steamline break events. Thus, to ensure that pressure and temperature limits would not be exceeded for the MSLB events, several iterations occurred to regain margin through some modeling changes and taking less restrictive input assumptions.

The limiting phase 2 cases for the main steamline breaks were close to the limits, so an appropriate spectrum of cases (break size, limiting single-failure scenario, and power level) was considered. With respect to the EQ temperature profile, under the proposed manual CFCU initiation scenario, the LOCA event in the phase 2 study resulted in exceeding the current established EQ basis for a considerable amount of time. Since the critical equipment needs to be qualified out through 1×10^7 seconds (approximately 120 days), the new LOCA runs will need to cover through this time period.

The existing CFCU/SW configuration ensures that even with the delays imposed by a loss-of-offsite power, CFCU cooling will be initiated within the Technical Specifications requirements of 60 seconds. The design will retain this requirement. However, as part of the analysis performed in 1996 and 1997, the plant design change required to meet Generic Letter 96-06 (head tanks connected to the service water lines used a nitrogen gas cover to ensure the system remained pressurized) results in 10% degraded heat removal (due to gas entrainment) until the gas was purged out of the CFCUs by the SW flow in the accident mode. To bound this reduced heat transfer, the revised analyses assume zero (0) CFCU heat removal during the first 40 seconds of CFCU SW flow. This time is sufficient to purge out essentially all the gases. This effort is documented by PSEG outside of this report. The set of containment response cases performed with COCO (Reference 5) will provide the necessary information for both the LOCA and MSLB scenarios.

The CFCU heat removal rate as a function of containment temperature was determined by PSEG as part of the input specification. The reduced heat removal rate will allow increased plugging, justify increased fouling factor, and/or allow for reduced SW accident flow rates. There is no reduction in the number of CFCUs which will be retained OPERABLE. For those cases where the single failure is the loss of a safeguards train, three CFCUs and one containment spray pump are available for containment cooling. For other single-failure scenarios, the maximum number of CFCUs could be five and the maximum number of spray pumps could be two.

3 ANALYSES DESCRIPTION

3.1 OBJECTIVE

The objective of this program is to demonstrate through analyses and evaluations that the containment pressure and temperature for Salem Unit 1 and Unit 2 resulting from a design-basis large-break LOCA or main steamline break will remain within the acceptable design limits for the proposed reduction in the CFCU heat removal.

3.2 ANALYSES APPROACH

Consistent with the methodology reported in References 1 through 4, the LOCA and MSLB cases for Salem Unit 1 and Unit 2 will be analyzed with the current licensing-basis methods and analysis tools that have been reviewed and approved for the Salem units many times over the duration of plant operation.

3.3 ACCEPTANCE CRITERIA

This analysis is considered acceptable if the current design limits are maintained. The containment design limits are defined in Section 5.2.2 of the Salem Technical Specifications: maximum internal pressure of 47 psig; air temperature up to 351.3°F (providing the containment pressure is in accordance with that described in the UFSAR).

It is also desirable to limit the containment temperature transient increases above the EQ temperature profile in Table 3.3-1. However, it is recognized that the temperature transient will increase due to the assumed delayed start of the fan coolers from 60 seconds to 100 seconds, and the reduced fan cooler heat removal rate compared to the performance employed in the current licensing-basis containment integrity analyses.

Table 3.3-1 Equipment Qualification Temperature Profile

Time (seconds)	Temperature (°F)
0	120
1	165
3	217
6	240
20	265
60	351
80	351
150	325
240	270
1,000	265
4,000	237
4,800	224
18,000	224
180,000	172
518,400	160
1,000,000	140
4,406,400	132
8,640,000	119
10,368,000	113.2

4 STEAMLINE BREAK MASS/ENERGY RELEASE ANALYSIS

Steamline ruptures occurring inside a reactor containment structure may result in significant releases of high-energy fluid to the containment environment and elevated containment temperatures and pressures. The magnitude of the releases following a steamline rupture is dependent upon the plant initial operating conditions and the size of the rupture as well as the configuration of the plant steam system and the containment design. These variations make it difficult to determine the absolute worst cases for either containment pressure or temperature evaluation following a steamline break. The analysis considers a variety of postulated pipe breaks encompassing wide variations in plant operation, safety system performance, and break size in determining the main steamline break (MSLB) mass and energy releases for use in containment analysis.

This section discusses the analysis that is done to generate the mass and energy releases from the steamline break. The containment pressure and temperature response analysis is documented in Section 6.2.

4.1 ANALYSIS METHOD

The steamline break mass and energy releases are generated using the NRC-approved LOFTRAN code (Reference 6). LOFTRAN is used for studies of the transient response of a PWR system to specified perturbations in process parameters. The code simulates a multi-loop system including the reactor vessel, hot and cold leg piping, steam generator (shell and tube sides), and the pressurizer. A neutron point kinetics model is used and the reactivity effects of the moderator, fuel, boron, and rods are included. The secondary side of the steam generator is modeled as a homogeneous saturated mixture. Protection and control systems are simulated, as well as the Emergency Core Cooling System. The calculation of secondary-side break flow is based on the Moody critical flow correlation (Reference 7) with fL/D = 0.

The Westinghouse steamline break mass and energy release methodology was approved by the NRC (Reference 8) and is documented in WCAP-8822, "Mass and Energy Releases Following a Steam Line Rupture" (Reference 9). WCAP-8822 forms the basis for the assumptions and models used in the calculation of the mass and energy releases resulting from a steamline rupture.

4.2 CASE DEFINITIONS AND SINGLE FAILURES

There are many factors that influence the quantity and rate of the mass and energy release from the steamline. To encompass these factors, a spectrum of cases is analyzed that vary the initial power level, the break type, the break area, and the single failure. This section summarizes the basis of the cases that have been defined for the Salem plant.

The power level at which the plant is operating when the steamline break is postulated can cause different competing effects that make it difficult to pre-determine a single limiting case. For example, at higher power levels there is less initial water/steam in the steam generator, which is a benefit. However, at a higher power level there is a higher initial feedwater flowrate, higher feedwater temperature, higher decay heat, and there is a higher rate of heat transfer from the primary side, which are all penalties. Therefore, cases consider initial power levels varying from full power to zero power.

There are two types of pipe ruptures that are considered. First is a double-ended guillotine rupture in which the steam pipe is completely severed and the ends of the break displace from each other. Guillotine ruptures are characterized by two distinct break locations, each of equal area but being fed by different steam generators. The other postulated break type is a split rupture in which a hole opens at some point on the side of the steam pipe but does not result in a complete severance of the pipe. A single, distinct break area is fed uniformly by all steam generators until steamline isolation occurs. Following MSIV closure, the split break is unisolable from one faulted steam generator.

The break area is also important when evaluating steamline breaks. It controls the rate of releases to the containment as well as influencing the amount of entrained water in the blowdown and the steamline depressurization. There are a total of 5 break types/areas that are analyzed.

1. A 4.6 ft^2 double-ended rupture (DER) upstream of the in-line flow restrictor. This break size/location only applies to Unit 2 with Model 51 steam generators, since the Model F steam generators in Unit 1 and the proposed Framatome ANP replacement steam generators for Unit 2 have an integral flow restrictor. The reverse flow area for these cases is limited to 1.4 ft^2, the cross-sectional area of the in-line flow restrictor.

2. A 1.4 ft^2 DER downstream of the flow restrictor. The reverse flow area for theses cases is limited to 3.2 ft^2, the cross-sectional area of the MSIV.

3. Small DERs having the smallest area that gets water entrainment.

4. Small DERs having the largest area that does not get water entrainment.

5. Split ruptures that are the largest break area that will neither generate a steamline isolation signal from the primary protection equipment nor result in moisture entrainment. The safety injection signal is also generated by a high containment pressure signal for these cases.

Several single failures can be postulated that would impair the performance of various steamline break protection systems. The single failures either reduce the heat removal capacity of the containment safeguards, or increase the energy release from steamline break. The single failures that have been postulated for Salem are summarized below.

Containment Safeguards Failure (CSF)

A containment safeguards train is one of the single failures considered in the analysis. This failure causes a reduction in the number of containment spray pumps and the CFCU heat removal rate as defined in Table 6.1-3 and Table 6.1-4 in Section 6.1. The total reduction in the containment heat removal capacity is approximately 70,000 Btu/sec due to the failure.

AFW Runout Protection Failure

This failure increases the auxiliary feedwater flowrate to the faulted SG. Figure 4.2-1 shows an example of the increase in AFW flowrate as a function of SG pressure, with either the intact SGs fully pressurized or the faulted SG fully depressurized. The penalty of this failure depends on the SG pressure, but in the long term will usually be between about 150 to 350 gpm extra AFW to the faulted SG.

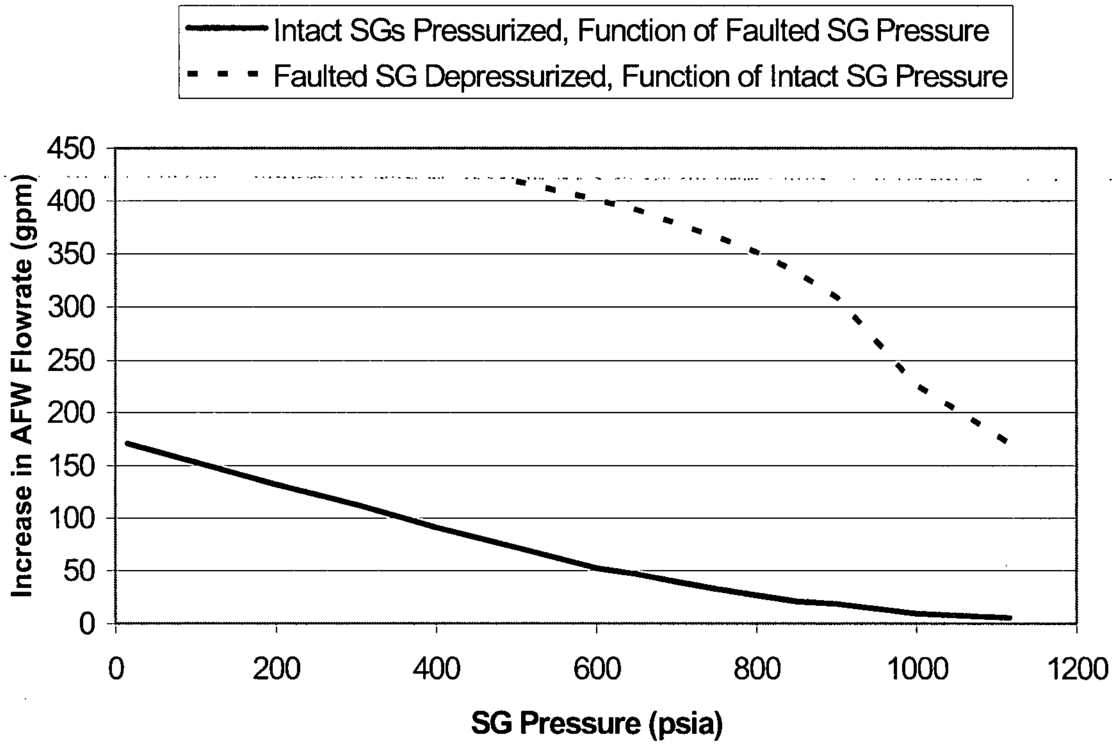

Figure 4.2-1 Increase in AFW to the Faulted SG Due to AFW Runout Protection Failure

Feedwater Regulator Valve Failure

The feedwater regulator valve (FRV) is a fast-closing valve (10 second delay) in the feedwater system that is the preferred method for terminating feedwater addition to the faulted SG during a steamline break. If the FRV on the faulted loop fails open, the back-up feedwater isolation valve (FIV, valve BF-13), with a 32 second delay, is credited to close. The slower closure time creates the possibility of additional pumped feedwater entering the faulted SG. Although the main feedwater pumps trip on a SI signal, the condensate pumps do not trip and can continue to provide pumped flow when the faulted SG depressurizes. There is also a slight increase in the unisolable feedline volume if the FRV is postulated to fail open, which increases the mass of hot feedwater that may flash as the SG depressurizes.

Feedwater addition assumptions include a delay of 7 seconds after the SI setpoint is reached to account for MFW pump signal processing and mechanical delays. The MFW pumps are then assumed to coastdown over the following 7 seconds. The closure of the BF-13 valve terminates the remaining pumped flow from the condensate system. The valve closure modeling includes a 2 second electronic delay, 20 seconds of valve closure that have no impact on the MFW flowrate, and a linear flowrate reduction during the final 10 seconds of the valve stroke.

This failure is the most severe for the largest breaks which depressurize the SG the fastest and thus allow a higher pumped feedwater flowrate to continue for the extra 22 seconds. The extra pumped feedwater can be on the order of 20,000 lbm to 30,000 lbm, and the extra unisolable feedline volume adds another 2000 to 3000 lbm of water.

MSIV Failure

When the MSIVs close, the intact loop SGs are isolated from the break. Even if the faulted loop MSIV fails open, the isolation of the intact SGs is accomplished by the closure of the MSIVs on each of those loops. However, the unisolable steamline volume increases from 542 ft^3 to 10,083 ft^3 if the MSIV on the faulted loop fails open. This causes approximately an extra 20,000 lbm of steam to be released out the break.

The full spectrum of steamline break cases that has been analyzed for Salem is summarized in Table 4.2-1. However, a subset of cases was selected for this analysis to evaluate the acceptability of the CFCU margin recovery program. The selected cases are indicated in Table 4.2-1, and represent the most limiting containment pressure scenarios, the most limiting containment temperature scenarios, and cases that might experience the largest impact from the reduction in CFCU heat removal capability. Cases are separately analyzed for Unit 1 and Unit 2. Note that the 4.6 ft^2 DER cases only apply to Unit 2 with Model 51 SGs.

Table 4.2-1 Spectrum of Salem SLB/Containment Cases

		Single Failure			
Break	**Power**	**CSF**	**AFW**	**FRV**	**MSIV**
4.6 ft^2 DER	100	Case 1	Case 5	**CASE 9**	Case 13
	70	Case 2	Case 6	Case 10	Case 14
	30	Case 3	Case 7	**CASE 11**	Case 15
	0	Case 4	Case 8	Case 12	Case 16
1.4 ft^2 DER	100	Case 17	Case 21	**CASE 25**	Case 29
	70	Case 18	Case 22	Case 26	Case 30
	30	**CASE 19**	**CASE 23**	Case 27	Case 31
	0	Case 20	Case 24	Case 28	Case 32
Small DER With Entrainment	100	Case 33	Case 37	Case 41	Case 45
	70	Case 34	Case 38	Case 42	Case 46
	30	Case 35	Case 39	Case 43	Case 47
	0	Case 36	Case 40	Case 44	Case 48
Small DER Without Entrainment	100	Case 49	Case 53	Case 57	**CASE 61**
	70	Case 50	Case 54	Case 58	Case 62
	30	Case 51	Case 55	Case 59	Case 63
	0	Case 52	Case 56	Case 60	Case 64
Split Break	100	Case 65	Case 69	Case 73	Case 77
	70	Case 66	Case 70	Case 74	Case 78
	30	**CASE 67**	Case 71	Case 75	**CASE 79**
	0	Case 68	Case 72	Case 76	Case 80

Note that cases in **BOLD** were selected for this CFCU margin recovery program analysis.

4.3 ANALYSIS ASSUMPTIONS

4.3.1 Protection Logic and Setpoints

Salem Unit 1 and Unit 2 steamline break protection, in terms of the pertinent signals and setpoints that are actuated in these analyses, is summarized below.

The first SI signal comes from either:

- Low steamline pressure (514.7 psia) in at least 2 loops coincident with high steam flow in at least 2 loops, or
- High steamline differential pressure (200 psid), or
- High-1 containment pressure (5.5 psig).

An SI signal starts the SI pumps and will also result in:

- Reactor trip (2 sec delay)
- Start of auxiliary feedwater (no delay)
- Closure of feedwater regulator valve (10 sec delay) and feedwater isolation valve (32 sec delay, only credited if FRV fails open)
- Trip of MFW pumps (7 sec delay and 7 sec coastdown, only credited if FRV fails open)
- Start of containment fan coolers (100 sec delay)

Steamline isolation (closure of main steam isolation valves, MSIVs) will also occur on the low steamline pressure coincident with high steam flow signal, after a 12.0 second delay. However, if this signal is not generated, MSIVs will close on a high-2 containment pressure (17.0 psig) signal. The high-2 containment pressure signal also causes the start of containment spray pumps, after an 85 second delay.

4.3.2 Secondary-Side Assumptions

This section summarizes the input assumptions associated with the steam generator and the piping attached to it.

Initial Steam Generator Inventory

A high initial steam generator mass is assumed. The initial level corresponds to 44% NRS + 5% uncertainty for at-power cases. At zero power, the nominal initial water level decreases to 33%.

Main Feedwater System

Key assumptions and methods regarding the main feedwater system are summarized below.

1. The initial flow to each SG is based on the initial power.

2. The FRV on each of the intact SGs is assumed to close at the time of the SI signal. This terminates the main feedwater addition to the intact SGs. Since they are isolated from the break long before their inventory is depleted, the overall results are insensitive to the details of this modeling.

3. The FRV on the faulted loop is assumed to quickly open in response to the steamline break. Starting at 0.2 seconds, the main feedwater flowrate modeling is based on the faulted loop FRV fully open (and the intact FRVs fully closed).

4. Main feedwater is added to the faulted SG until the FRV closes, 10 seconds after the SI setpoint is reached.

5. If the FRV on the faulted loop fails open, the main feedwater pump trip is credited with a 7 second delay after the SI setpoint is reached and a 7 second coastdown. However, the condensate pumps are not tripped from an SI signal, and pumped flow continues until the feedwater isolation valve is fully closed 32 seconds after the SI setpoint is reached.

6. All cases model the flashing of the feedwater in the unisolable section of the feedline between the faulted steam generator and the FRV or FIV, whichever is credited to close. Only the cases initiated from hot zero power do not experience feedwater flashing due to the low temperature of the feedwater.

Auxiliary Feedwater

Generally within the first minute following a steamline break, the auxiliary feedwater system will be initiated due to an SI signal. Addition of auxiliary feedwater to the steam generators will increase the secondary mass available for release to containment. Maximum auxiliary feedwater flowrates are assumed, and are input as a function of the steam generator pressure. In addition, the full auxiliary feedwater flowrate is assumed at the time the SI setpoint is reached, with no electronic delay or pump start-up time. Operator action is credited to terminate the auxiliary feedwater flow to the faulted steam generator after 10 minutes.

Quality of the Break Effluent

The quality of the break effluent is generally assumed to be 1.0, corresponding to saturated steam that is all vapor with no liquid. However, when a large double-ended break first occurs, it is expected that there will be a significant quantity of liquid in the break effluent. Modeling entrainment is a benefit to the analysis, since it allows a portion of the initial steam generator inventory to be released at the lower enthalpy of saturated liquid rather than saturated vapor. The break quality for the DERs is from

WCAP-8822 (Reference 9) for Model 51 steam generators, and similar information was generated with the same methodology for Model F steam generators.

Heat Transfer to Faulted Steam Generator

The ability of the steam generator feeding the broken steamline to transfer heat from the primary coolant to the secondary water inventory can have an important influence on the mass and energy that is released through the break. As discussed in Reference 8, the film coefficient on the outside of the tubes and the forced convection from the reactor coolant pumps will typically maintain a large secondary-side heat transfer coefficient. The only mechanism for reducing the heat transfer capability to the steam generator is to lower the effective heat transfer area. Such a reduction occurs when sufficient mass is lost from the steam generator to lower the water level below the top of the tube bundle. To conservatively force a high heat transfer rate to the faulted steam generator, the SG tubes are assumed to be fully covered until the water volume on the secondary side decreases below 100 ft^3.

4.3.3 Reactor Coolant System Assumptions

While the mass and energy released from the break is determined from assumptions that have been discussed in the previous section, the long-term rate at which the release occurs is largely controlled by the conditions in the reactor coolant system. The major features of the primary-side analysis model are summarized below.

- Continued operation of the reactor coolant pumps maintains a high heat transfer rate to the steam generators.
- The model includes consideration of the heat that is stored in the RCS metal.
- Reverse heat transfer from the intact steam generators to the RCS coolant is modeled as the temperature in the RCS falls below the steam generator fluid temperature.
- Minimum flowrates are modeled from ECCS injection, to conservatively minimize the amount of boron that provides negative reactivity feedback.
- The core power is 3459 MWt, with a maximum pump heat of 20 MWt, resulting in NSSS power of 3479 MWt. This bounds the current NSSS power of 3471 MWt.
- Maximum reactor power calorimetric uncertainty of +0.6% is used for full-power cases.
- RCS average temperature is the full-power nominal (high-end) value of 577.9°F plus an uncertainty of +5.0°F.
- Core residual heat generation is assumed based on the 1979 ANS decay heat plus 2σ model (Reference 10).

- Conservative core reactivity coefficients corresponding to end-of-cycle conditions were chosen to maximize the reactivity feedback effects as the RCS cools down as a result of the steamline break.
- All cases have credited a shutdown margin of 1.3% $\Delta k/k$.

4.4 STEAMLINE BREAK MASS/ENERGY RELEASES

Steamline break mass and energy release rates are provided in Table 4.4-1 to Table 4.4-6 for Unit 1 and Table 4.4-7 to Table 4.4-14 for Unit 2.

Table 4.4-1 Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 19-1 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
0.00	0.00	0.00
0.20	8942.87	1192.12
0.60	8661.79	1193.06
1.40	8238.00	1194.68
1.60	8372.83	1171.01
1.80	8895.22	1113.38
2.00	9750.99	1037.08
2.20	10428.28	984.20
3.00	10702.66	942.99
3.40	11080.12	924.17
5.80	9752.09	951.33
7.00	9186.64	965.12
12.20	7364.74	1014.53
13.00	7131.55	1023.20
13.40	7074.20	1028.83
13.60	4767.34	950.07
13.80	2970.55	805.66
16.20	2578.19	849.36
17.20	2377.70	879.17
19.00	2059.68	933.35
20.80	1791.92	988.38
22.40	1591.91	1038.08
24.20	1404.15	1094.85
26.00	1248.57	1152.47
27.60	1131.91	1204.31
31.40	1046.09	1204.03
35.40	980.54	1203.72
39.40	933.52	1203.43
43.20	901.42	1203.19
51.00	860.07	1202.85

Table 4.4-1 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 19-1 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
59.00	837.88	1202.64
74.60	820.17	1202.46
173.40	806.77	1202.32
174.60	801.59	1202.25
175.80	787.75	1202.09
178.40	743.68	1201.52
180.80	682.84	1200.56
183.40	593.92	1198.77
185.80	499.49	1196.27
188.40	402.46	1192.66
189.60	364.40	1190.89
190.80	332.08	1189.22
192.80	290.47	1186.86
193.40	283.92	1186.56
193.80	284.85	1186.68
195.20	301.94	1187.67
195.60	303.56	1187.74
196.80	299.68	1187.47
198.20	289.42	1186.90
200.00	298.66	1187.44
201.80	290.28	1186.95
202.20	290.62	1187.00
203.40	297.49	1187.38
204.20	296.10	1187.26
205.20	290.45	1186.96
207.00	297.25	1187.36
208.60	290.33	1186.95
210.40	296.92	1187.34
212.00	289.97	1186.93
213.60	296.50	1187.32

Table 4.4-1 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 19-1 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
214.40	295.06	1187.20
215.40	289.76	1186.92
217.00	295.38	1187.25
218.60	289.28	1186.89
220.20	295.17	1187.24
221.80	288.95	1186.87
223.40	294.78	1187.22
225.00	288.71	1186.85
226.80	294.64	1187.20
228.40	287.96	1186.81
230.00	294.32	1187.19
231.60	287.92	1186.80
233.40	293.85	1187.16
235.00	287.29	1186.77
236.60	293.30	1187.14
238.40	287.08	1186.76
240.00	292.87	1187.10
241.60	286.75	1186.73
243.40	292.57	1187.08
245.00	286.46	1186.71
246.60	291.77	1187.04
248.40	286.06	1186.69
250.00	291.39	1187.02
251.60	285.69	1186.66
253.40	290.98	1186.99
255.00	285.40	1186.64
256.80	290.37	1186.95
258.40	285.03	1186.62
260.20	289.80	1186.91
261.80	284.54	1186.59

Table 4.4-1 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 19-1 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
263.60	289.25	1186.88
265.20	284.20	1186.57
267.00	288.57	1186.84
268.60	283.90	1186.55
270.40	287.84	1186.79
272.00	283.80	1186.54
273.80	286.88	1186.73
275.60	283.67	1186.53
277.40	285.92	1186.67
279.40	283.38	1186.51
281.20	284.97	1186.61
326.60	272.24	1185.76
357.40	258.59	1184.78
388.20	238.44	1183.20
434.40	203.20	1180.03
449.80	194.95	1179.21
465.20	189.32	1178.64
480.60	185.84	1178.28
511.40	182.56	1177.93
600.00	180.84	1177.75
600.40	182.11	1177.83
601.00	178.30	1177.33
602.80	151.84	1174.24
604.00	136.65	1172.22
604.40	132.62	1171.65
612.00	84.13	1162.43
612.40	80.74	1161.68
616.00	54.84	1154.63
617.20	44.79	1152.61
617.80	39.24	1151.77

Table 4.4-1 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 19-1 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
618.40	33.17	1151.17
618.60	32.60	1150.85
618.80	27.71	1150.76
619.00	27.91	1150.51
619.20	21.60	1150.44
619.40	22.00	1150.35
619.60	0.00	0.00
621.40	0.00	0.00
621.60	20.93	1150.35
621.80	0.00	0.00
700.00	0.00	0.00

Table 4.4-2 Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 23-1 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	8942.87	1192.12
0.60	8661.79	1193.06
1.40	8238.00	1194.68
1.60	8372.75	1171.01
1.80	8895.08	1113.38
2.00	9750.75	1037.08
2.20	10427.94	984.20
3.00	10701.65	942.99
3.40	11078.88	924.16
5.80	9749.80	951.32
7.00	9183.92	965.10
12.20	7360.66	1014.51
13.00	7127.33	1023.19
13.40	7069.94	1028.82
13.60	4764.32	950.04
13.80	2968.60	805.62
16.20	2576.06	849.31
17.20	2375.55	879.12
19.00	2057.52	933.31
20.80	1789.80	988.34
22.40	1589.87	1038.05
24.20	1402.19	1094.83
26.00	1246.67	1152.46
27.60	1130.06	1204.30
31.40	1044.13	1204.03
35.40	978.46	1203.70
39.40	931.33	1203.41
43.40	897.69	1203.16
51.40	856.11	1202.81

Table 4.4-2 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 23-1 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
59.20	834.89	1202.61
75.00	817.19	1202.43
178.60	803.74	1202.29
179.80	797.43	1202.20
181.20	780.89	1202.01
183.80	736.34	1201.42
186.40	670.30	1200.34
189.20	576.07	1198.35
193.20	430.94	1193.88
194.40	393.17	1192.25
195.80	355.59	1190.47
197.20	325.21	1188.87
199.20	293.00	1187.04
199.80	287.95	1186.81
200.20	288.71	1186.91
201.60	301.54	1187.63
203.20	298.62	1187.41
204.80	291.61	1187.06
206.20	298.88	1187.46
208.20	291.68	1187.04
209.80	297.99	1187.41
211.60	291.82	1187.05
213.20	297.60	1187.39
215.00	291.72	1187.04
216.60	297.33	1187.37
218.40	291.55	1187.03
220.00	297.09	1187.36
221.80	291.42	1187.02
223.40	296.86	1187.34
225.20	291.29	1187.01

Table 4.4-2 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 23-1 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
226.80	296.66	1187.33
228.60	291.06	1187.00
230.20	296.52	1187.32
232.00	290.81	1186.99
233.60	296.37	1187.31
235.40	290.62	1186.98
237.00	296.16	1187.30
238.80	290.45	1186.96
240.40	295.92	1187.28
242.20	290.27	1186.95
243.80	295.69	1187.27
245.60	290.10	1186.94
247.20	295.45	1187.26
249.00	289.90	1186.93
250.60	295.22	1187.24
252.40	289.71	1186.92
254.00	294.98	1187.23
255.80	289.50	1186.91
257.40	294.75	1187.21
259.20	289.31	1186.89
260.80	294.50	1187.20
262.60	289.10	1186.88
264.20	294.25	1187.18
266.00	288.89	1186.87
267.60	293.94	1187.17
269.40	288.67	1186.85
271.00	293.69	1187.15
272.80	288.46	1186.84
274.40	293.41	1187.14
276.20	288.23	1186.83

Table 4.4-2 (cont.)	Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 23-1 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure	
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
277.80	293.17	1187.12
279.60	288.00	1186.81
281.20	292.91	1187.11
283.00	287.77	1186.80
284.60	292.64	1187.09
286.40	287.53	1186.78
288.00	292.36	1187.07
289.80	287.28	1186.77
291.40	292.11	1187.06
293.20	287.05	1186.75
294.80	291.79	1187.04
296.60	286.78	1186.73
298.20	291.53	1187.02
300.00	286.60	1186.72
301.60	291.20	1187.00
303.40	286.49	1186.72
305.00	290.83	1186.98
306.60	286.38	1186.70
308.20	290.42	1186.95
310.00	286.00	1186.68
311.60	290.17	1186.94
313.20	285.90	1186.67
314.80	289.81	1186.92
316.60	285.52	1186.65
318.20	289.53	1186.90
319.80	285.31	1186.64
321.40	289.22	1186.88
323.20	285.03	1186.62
324.80	288.89	1186.85
326.40	284.71	1186.60

Table 4.4-2 (cont.)	Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 23-1 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure	
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
328.00	288.52	1186.83
329.60	284.47	1186.58
331.20	288.27	1186.82
333.00	284.19	1186.57
334.60	287.91	1186.79
336.20	283.96	1186.55
337.80	287.47	1186.77
339.40	283.74	1186.54
340.80	286.97	1186.74
342.60	283.44	1186.52
344.00	286.73	1186.72
345.80	283.10	1186.50
347.20	286.40	1186.70
349.00	282.78	1186.48
350.40	286.06	1186.68
352.20	282.47	1186.46
353.60	285.69	1186.66
355.40	282.15	1186.44
356.80	285.35	1186.64
358.60	281.81	1186.42
360.00	284.98	1186.61
361.80	281.48	1186.39
363.20	284.61	1186.59
365.00	281.14	1186.37
366.40	284.23	1186.56
368.20	280.78	1186.35
369.60	283.86	1186.54
371.40	280.42	1186.32
372.80	283.47	1186.51
374.60	280.08	1186.30

Table 4.4-2 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 23-1 – 1.4 ft² DER, 30% Power, AFW Runout Protection Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
376.00	283.06	1186.49
377.60	279.83	1186.28
379.20	282.67	1186.46
380.80	279.43	1186.25
382.40	282.27	1186.44
384.00	279.05	1186.23
385.60	281.86	1186.41
387.20	278.66	1186.20
388.80	281.44	1186.38
390.40	278.26	1186.17
392.00	281.01	1186.35
393.60	277.87	1186.15
395.20	280.56	1186.32
396.80	277.54	1186.13
398.40	280.08	1186.29
400.00	277.19	1186.10
401.60	279.51	1186.25
403.20	276.74	1186.08
404.60	278.96	1186.22
406.20	276.28	1186.04
407.80	278.59	1186.19
409.40	275.85	1186.02
410.80	278.01	1186.16
412.40	275.39	1185.98
414.00	277.62	1186.12
415.60	274.95	1185.95
417.00	277.00	1186.09
418.60	274.46	1185.92
420.20	276.59	1186.06
421.80	274.03	1185.89

Table 4.4-2 (cont.)	Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 23-1 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure	
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
423.20	275.97	1186.02
424.80	273.54	1185.86
426.20	275.37	1185.98
427.80	273.11	1185.82
429.40	274.95	1185.95
431.00	272.59	1185.79
432.40	274.33	1185.91
434.00	272.07	1185.76
435.60	273.89	1185.87
437.00	271.61	1185.72
438.60	273.32	1185.84
440.20	271.09	1185.69
441.60	272.70	1185.80
443.20	270.61	1185.66
444.60	272.06	1185.75
446.20	270.14	1185.62
447.80	271.54	1185.71
449.20	269.64	1185.59
453.60	270.29	1185.63
600.00	240.63	1183.38
600.40	242.61	1183.50
601.00	238.15	1183.04
602.40	213.77	1180.90
603.40	201.08	1179.75
604.40	194.67	1179.15
608.40	184.51	1178.09
610.40	174.96	1177.05
618.40	126.11	1170.43
624.40	85.51	1162.75
625.20	79.28	1161.32

Table 4.4-2 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 23-1 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
628.40	56.55	1155.06
629.40	48.60	1153.31
630.40	39.63	1151.82
631.00	33.60	1151.21
631.20	33.03	1150.87
631.40	27.87	1150.78
631.60	28.21	1150.54
631.80	22.68	1150.47
632.00	22.72	1150.35
632.20	0.00	0.00
633.80	0.00	0.00
634.00	20.97	1150.35
634.20	0.00	0.00
700.00	0.00	0.00

Table 4.4-3 Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 25-1 – 1.4 ft[2] DER, 100% Power, Feedwater Regulator Valve Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	7953.26	1194.91
1.40	7435.06	1196.70
2.00	7745.61	1141.24
2.40	8087.20	1094.99
2.80	8604.34	1038.46
3.00	8963.23	1005.26
3.20	9542.77	993.06
4.00	9670.45	977.33
6.40	8602.32	1034.22
8.00	8008.43	1069.50
9.80	7661.23	1078.18
13.00	6792.86	1105.14
13.40	6737.38	1109.18
13.60	4330.90	1061.58
13.80	2443.30	959.92
16.20	2103.60	1010.58
18.80	1767.45	1076.20
21.40	1498.12	1143.56
23.40	1330.31	1196.46
24.00	1297.43	1204.47
27.40	1196.48	1204.42
30.20	1131.49	1204.31
36.00	1029.87	1203.96
41.60	963.10	1203.62
47.20	918.32	1203.32
53.00	887.20	1203.08
58.60	866.62	1202.91
70.00	840.31	1202.66
92.80	817.47	1202.43

Table 4.4-3 (cont.)	Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 25-1 – 1.4 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure	
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
211.40	799.84	1202.24
214.80	771.35	1201.90
218.40	726.35	1201.28
225.60	615.66	1199.30
236.40	434.53	1194.09
239.80	383.62	1191.88
243.40	338.15	1189.62
247.00	300.75	1187.52
250.60	268.44	1185.45
254.20	245.43	1183.73
257.80	229.01	1182.38
261.20	218.03	1181.41
264.80	210.00	1180.67
268.40	204.40	1180.14
275.60	197.81	1179.50
282.80	194.34	1179.15
297.00	190.86	1178.80
382.80	182.54	1177.93
502.00	179.34	1177.59
599.80	179.13	1177.56
600.40	180.38	1177.65
600.80	178.60	1177.39
601.20	174.34	1176.89
602.00	161.73	1175.41
603.20	132.61	1171.47
605.00	102.27	1166.03
605.80	91.16	1163.92
609.00	55.94	1154.80
610.00	43.54	1152.34
610.40	37.89	1151.54

Table 4.4-3 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 25-1 – 1.4 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
610.80	31.82	1150.89
611.00	28.28	1150.62
611.20	24.18	1150.42
611.40	0.00	0.00
612.00	16.28	1150.35
612.20	0.00	0.00
700.00	0.00	0.00

Table 4.4-4 Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 61-1 – 0.33 ft² Small DER, 100% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	1244.14	1194.67
2.60	1201.12	1195.61
10.40	1129.87	1197.23
20.60	1076.29	1198.36
20.80	1099.63	1198.16
23.00	1169.22	1196.69
25.20	1225.51	1195.33
27.40	1263.58	1194.39
29.80	1273.41	1194.16
66.00	1073.05	1198.31
75.00	1031.02	1199.10
102.40	656.58	1201.35
124.80	369.43	1203.97
138.60	360.14	1204.11
188.60	342.16	1204.31
229.20	337.41	1204.34
599.80	335.17	1204.36
603.20	337.75	1204.34
605.60	335.47	1204.36
608.00	329.79	1204.40
610.40	320.46	1204.44
613.80	300.53	1204.47
616.00	283.02	1204.42
618.00	264.23	1204.27
621.00	230.71	1203.69
621.60	226.49	1203.60
622.20	225.06	1203.57
625.40	234.01	1203.79
628.60	228.45	1203.66

Table 4.4-4 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 61-1 – 0.33 ft^2 Small DER, 100% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
631.00	229.95	1203.70
656.00	215.34	1203.29
666.00	207.17	1203.01
675.80	196.96	1202.61
685.60	184.12	1202.02
695.60	167.79	1201.07
705.40	148.46	1199.61
715.40	125.65	1197.31
725.40	101.43	1193.94
735.40	78.64	1189.39
740.40	68.22	1186.84
745.40	58.66	1183.98
754.00	44.38	1178.50
760.00	36.31	1174.63
763.80	31.54	1171.89
769.80	25.66	1167.32
770.00	25.28	1167.24
772.20	23.38	1165.56
772.40	23.03	1165.49
773.00	22.68	1164.99
775.00	20.97	1163.65
780.00	17.45	1160.04
787.60	12.53	1154.20
789.20	11.27	1153.10
789.80	10.52	1152.81
790.00	10.59	1152.59
790.20	10.17	1152.56
790.40	10.24	1152.35
790.60	9.81	1152.31
790.80	9.89	1152.11

Table 4.4-4 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 61-1 – 0.33 ft^2 Small DER, 100% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
791.00	9.43	1152.08
791.20	9.52	1151.88
791.40	9.05	1151.85
791.60	9.14	1151.66
791.80	8.65	1151.63
792.00	8.75	1151.45
792.20	8.24	1151.42
792.40	8.34	1151.25
792.60	7.81	1151.22
792.80	7.92	1151.06
793.00	7.36	1151.04
793.60	7.00	1150.71
793.80	6.34	1150.69
794.00	6.48	1150.56
794.20	5.71	1150.54
794.40	5.89	1150.42
794.60	4.68	1150.40
794.80	5.11	1150.35
795.00	0.00	0.00
1000.00	0.00	0.00

Table 4.4-5 Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 67-1 – 0.88 ft^2 Split Break, 30% Power, Containment Safeguards Failure		
Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	1813.89	1191.72
3.80	1722.86	1193.52
7.40	1654.03	1194.84
14.80	1547.79	1196.74
22.60	1546.84	1196.91
60.00	1249.46	1201.39
64.60	1088.30	1203.21
68.40	990.61	1203.95
72.00	919.73	1204.29
75.80	859.96	1204.43
80.80	800.50	1204.47
87.60	744.71	1204.41
94.60	707.89	1204.30
101.40	684.87	1204.19
108.40	669.59	1204.11
122.20	653.57	1204.01
148.60	643.99	1203.95
332.00	639.11	1203.91
335.40	623.24	1203.78
338.80	591.21	1203.47
342.00	545.34	1202.89
345.40	481.48	1201.80
348.80	409.56	1199.99
352.00	346.27	1197.74
353.80	316.35	1196.43
355.40	293.88	1195.30
357.00	275.09	1194.21
358.80	257.97	1193.10
360.40	245.85	1192.24

Table 4.4-5 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 67-1 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
362.00	236.23	1191.54
365.40	221.86	1190.43
368.80	213.12	1189.71
372.00	208.01	1189.28
378.80	202.61	1188.81
385.40	200.72	1188.65
393.00	191.49	1187.79
400.80	185.87	1187.27
403.20	187.08	1187.39
407.40	185.78	1187.27
409.60	186.98	1187.38
413.20	185.75	1187.27
415.20	187.00	1187.38
418.80	185.75	1187.26
420.80	186.89	1187.37
424.00	185.73	1187.26
426.00	186.86	1187.37
429.00	185.70	1187.26
431.00	186.82	1187.36
433.80	185.69	1187.26
435.80	186.96	1187.38
439.00	185.57	1187.25
441.00	187.10	1187.39
444.20	185.59	1187.25
446.20	186.98	1187.38
449.20	185.57	1187.25
451.20	187.00	1187.38
454.20	185.55	1187.24
456.20	187.03	1187.39
459.20	185.55	1187.24

Table 4.4-5 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 67-1 – 0.88 ft² Split Break, 30% Power, Cont. Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
461.20	187.05	1187.39
464.40	185.43	1187.24
466.40	186.98	1187.38
469.40	185.41	1187.24
471.40	187.04	1187.39
474.40	185.35	1187.23
476.40	187.02	1187.38
479.40	185.33	1187.23
481.40	187.05	1187.39
484.40	185.36	1187.23
486.40	187.05	1187.39
489.40	185.38	1187.23
491.40	186.98	1187.38
494.40	185.32	1187.22
496.40	187.00	1187.38
499.40	185.30	1187.22
501.40	186.99	1187.38
504.40	185.27	1187.22
506.40	186.96	1187.38
509.40	185.23	1187.21
511.40	186.97	1187.38
514.40	185.21	1187.21
516.40	186.92	1187.38
519.40	185.16	1187.21
521.40	186.94	1187.38
524.40	185.16	1187.21
526.40	186.88	1187.37
529.40	185.10	1187.20
531.40	186.91	1187.37
534.40	185.10	1187.20

Table 4.4-5 (cont.)	Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 67-1 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure	
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
536.40	186.83	1187.37
539.40	185.03	1187.20
541.40	186.89	1187.37
544.40	185.08	1187.20
546.40	186.73	1187.36
549.40	184.94	1187.19
551.40	186.89	1187.37
554.60	184.93	1187.19
556.40	186.62	1187.35
559.40	184.92	1187.19
561.20	186.58	1187.34
564.00	184.96	1187.19
566.00	186.63	1187.35
569.00	184.82	1187.19
570.80	186.51	1187.34
573.60	184.85	1187.18
575.60	186.60	1187.34
578.60	184.76	1187.18
580.40	186.45	1187.33
583.20	184.81	1187.18
585.20	186.51	1187.34
588.00	184.82	1187.18
590.00	186.43	1187.33
592.80	184.76	1187.17
594.80	186.46	1187.33
597.60	184.78	1187.17
600.40	187.29	1187.39
600.80	186.35	1187.26
601.80	178.67	1186.52
602.40	176.69	1186.38

Table 4.4-5 (cont.)	Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 67-1 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure	
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
602.80	177.38	1186.48
604.40	185.29	1187.21
604.80	184.60	1187.10
606.20	177.50	1186.45
606.60	177.75	1186.51
608.40	184.10	1187.09
610.20	178.27	1186.53
612.40	182.71	1186.96
614.40	178.69	1186.57
616.40	181.29	1186.83
618.80	178.71	1186.57
620.80	180.12	1186.71
623.20	178.42	1186.54
629.00	177.90	1186.49
656.00	170.00	1185.64
669.40	163.28	1184.87
683.00	152.59	1183.54
689.80	144.79	1182.51
696.40	134.89	1181.09
703.20	121.59	1179.03
710.00	104.40	1176.08
721.60	68.74	1167.49
728.80	45.38	1159.49
732.00	35.78	1155.19
733.80	29.25	1153.09
734.00	29.12	1152.72
734.20	27.32	1152.62
734.40	27.45	1152.28
735.00	23.74	1151.78
735.20	23.90	1151.46

Table 4.4-5 (cont.)	Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 67-1 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure	
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
735.80	19.81	1151.06
736.00	19.97	1150.82
736.20	17.45	1150.76
736.40	17.72	1150.55
736.60	14.48	1150.50
736.80	14.96	1150.35
737.00	0.00	0.00
1000.00	0.00	0.00

Table 4.4-6 Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 79-1 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	1813.90	1191.72
3.80	1724.70	1193.48
7.40	1656.89	1194.79
14.80	1551.63	1196.67
19.40	1558.10	1196.71
23.20	1545.76	1196.93
60.40	1246.31	1201.52
62.80	1159.63	1202.52
65.20	1088.29	1203.21
68.00	1019.49	1203.76
71.20	955.12	1204.15
76.00	878.30	1204.40
82.60	801.89	1204.47
89.80	746.71	1204.41
97.00	710.79	1204.31
104.20	687.27	1204.21
111.40	671.81	1204.13
125.80	654.88	1204.02
153.20	644.28	1203.95
376.00	639.51	1203.92
379.40	624.22	1203.79
382.80	592.51	1203.48
386.20	543.59	1202.87
389.60	479.14	1201.75
393.00	407.04	1199.91
396.40	340.55	1197.50
398.00	314.48	1196.34
399.80	289.77	1195.07
401.40	271.69	1194.00

Table 4.4-6 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 79-1 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure		
Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
403.20	255.27	1192.91
405.00	242.43	1192.00
406.60	233.51	1191.34
410.00	220.19	1190.30
413.40	212.10	1189.63
416.80	207.15	1189.21
423.60	202.28	1188.79
430.40	200.56	1188.63
438.20	191.31	1187.78
446.20	185.83	1187.27
448.40	186.93	1187.38
452.40	185.79	1187.27
454.40	186.96	1187.38
458.20	185.78	1187.27
460.20	186.89	1187.37
463.60	185.78	1187.27
465.80	186.97	1187.38
469.20	185.69	1187.26
471.20	187.02	1187.39
474.60	185.68	1187.26
476.60	186.93	1187.38
479.80	185.61	1187.25
481.80	187.12	1187.39
485.20	185.57	1187.25
487.20	187.08	1187.39
490.40	185.59	1187.25
492.40	186.90	1187.37
495.20	185.61	1187.25
497.20	187.02	1187.39
500.40	185.49	1187.24

Table 4.4-6 (cont.)	Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 79-1 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure	
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
502.40	187.04	1187.39
505.40	185.53	1187.24
507.40	187.05	1187.39
510.60	185.41	1187.23
512.60	187.07	1187.39
515.60	185.48	1187.24
517.60	187.04	1187.39
520.80	185.34	1187.23
522.80	187.06	1187.39
525.80	185.40	1187.23
527.80	187.04	1187.39
530.80	185.42	1187.23
532.80	186.98	1187.38
535.80	185.38	1187.23
537.80	186.98	1187.38
540.80	185.33	1187.22
542.80	186.99	1187.38
545.80	185.31	1187.22
547.80	186.97	1187.38
550.80	185.28	1187.22
552.80	186.95	1187.38
555.80	185.24	1187.21
557.80	186.95	1187.38
560.80	185.22	1187.21
562.80	186.92	1187.38
565.80	185.18	1187.21
567.80	186.91	1187.37
570.80	185.16	1187.21
572.80	186.89	1187.37
575.80	185.13	1187.20

Table 4.4-6 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 79-1 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
577.80	186.86	1187.37
580.80	185.09	1187.20
582.80	186.87	1187.37
585.80	185.09	1187.20
587.80	186.79	1187.36
590.80	185.02	1187.19
592.80	186.84	1187.37
595.80	185.04	1187.19
597.80	186.75	1187.36
600.40	186.40	1187.30
601.00	184.02	1187.02
601.60	179.77	1186.63
602.20	177.94	1186.51
602.60	178.48	1186.59
604.20	185.23	1187.20
606.00	178.41	1186.55
608.00	184.13	1187.11
610.00	178.97	1186.60
612.00	182.90	1186.99
614.20	179.26	1186.63
616.20	181.73	1186.87
618.40	179.26	1186.63
620.40	180.60	1186.76
655.40	171.26	1185.78
669.40	164.86	1185.05
683.40	154.75	1183.82
690.40	147.37	1182.86
697.40	137.61	1181.49
704.40	124.71	1179.53
708.00	116.62	1178.20

Table 4.4-6 (cont.) Salem Unit 1 (Model F SG) Steamline Break Mass/Energy Release, Case 79-1 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
716.00	94.27	1174.12
723.60	70.91	1168.10
729.00	53.03	1162.61
734.40	36.63	1155.53
736.80	28.51	1152.56
737.00	26.72	1152.46
737.20	26.84	1152.13
737.40	24.97	1152.04
737.60	25.11	1151.72
737.80	22.99	1151.63
738.00	23.20	1151.34
738.20	21.03	1151.27
738.40	21.23	1151.01
738.60	18.89	1150.94
738.80	19.13	1150.72
739.00	16.69	1150.67
739.20	16.90	1150.46
739.40	12.58	1150.42
739.60	12.61	1150.35
739.80	0.00	0.00
1000.00	0.00	0.00

Table 4.4-7 Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 9-2 – 4.6 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
0.00	0.00	0.00
0.20	10588.94	1197.23
0.40	11053.40	1116.88
0.60	13236.74	964.56
0.80	14765.06	881.42
1.20	15479.01	827.21
1.60	16596.77	770.18
2.20	14858.31	790.84
2.80	13303.06	813.96
3.40	11953.49	837.62
4.80	9855.61	904.59
5.40	9122.29	930.21
6.00	8515.20	955.11
7.00	7694.23	995.00
8.60	6689.98	1059.25
9.20	6172.28	1110.07
9.80	5749.14	1156.50
10.40	5386.88	1200.26
13.40	4963.16	1199.80
13.80	4935.08	1199.68
14.60	2507.04	1201.41
14.80	2424.12	1201.42
16.40	2271.83	1200.71
18.20	2126.66	1199.93
21.60	1919.95	1198.60
25.00	1774.13	1197.49
28.40	1652.59	1196.46
35.20	1458.02	1194.48
38.80	1391.57	1193.69
42.20	1348.94	1193.15

Table 4.4-7 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 9-2 – 4.6 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
49.00	1296.91	1192.45
55.80	1270.45	1192.08
69.40	1248.52	1191.78
125.80	1229.33	1191.45
126.60	1196.96	1190.94
128.80	1046.79	1188.47
130.40	912.62	1185.95
133.40	632.23	1178.69
134.20	566.52	1176.58
135.00	506.58	1174.44
135.80	452.62	1172.26
137.40	372.56	1168.05
138.20	337.93	1166.20
139.00	309.80	1164.61
139.80	287.69	1163.27
140.60	270.06	1162.09
141.40	256.43	1161.05
142.80	238.35	1159.64
144.40	226.26	1158.62
145.80	220.67	1158.14
148.80	217.33	1157.86
156.00	218.73	1157.99
180.00	217.56	1157.89
192.80	206.81	1156.94
306.80	188.66	1155.44
381.40	181.82	1154.93
460.60	178.90	1154.72
600.00	178.70	1154.71
600.40	180.27	1154.72
600.80	175.10	1154.26

Table 4.4-7 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 9-2 – 4.6 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
601.00	170.11	1153.89
601.40	155.15	1152.92
601.60	142.30	1151.01
601.80	0.00	0.00
700.00	0.00	0.00

Table 4.4-8 Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 11-2 – 4.6 ft^2 DER, 30% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
0.00	0.00	0.00
0.20	12164.09	1193.59
0.40	13449.94	1070.58
0.60	18717.61	843.67
1.00	19795.23	789.81
1.40	21394.13	732.95
2.40	17606.61	766.05
3.00	15641.03	787.78
3.60	14001.28	811.26
4.60	11695.96	851.92
5.20	10500.44	880.87
5.80	9515.84	909.50
6.40	8698.10	937.46
7.00	8006.65	964.70
7.60	7421.86	991.01
8.20	6707.06	1040.03
8.60	6310.96	1070.80
9.80	5347.40	1163.28
10.20	5093.85	1192.58
10.40	5016.18	1199.56
12.60	4654.89	1199.19
14.60	4390.25	1198.98
15.00	4366.11	1198.89
15.80	2050.25	1199.05
16.00	1975.72	1198.97
18.40	1810.84	1197.77
21.00	1666.48	1196.57
23.80	1547.74	1195.45
26.40	1468.11	1194.59
29.00	1410.99	1193.93

Table 4.4-8 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 11-2 – 4.6 ft^2 DER, 30% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
31.80	1367.19	1193.38
37.00	1316.81	1192.72
47.40	1270.03	1192.08
58.00	1253.59	1191.85
123.80	1234.93	1191.58
124.80	1225.53	1191.38
126.00	1155.81	1190.28
127.20	1062.55	1188.73
129.00	899.76	1185.72
129.40	871.32	1185.14
130.00	840.65	1184.50
130.60	822.17	1184.10
131.80	807.80	1183.80
137.80	799.58	1183.60
141.80	780.75	1183.12
149.80	727.10	1181.71
157.80	659.88	1179.77
161.80	617.54	1178.46
165.80	568.58	1176.86
169.80	511.98	1174.86
175.80	420.27	1170.76
181.80	318.03	1165.20
183.80	291.84	1163.61
186.80	259.68	1161.38
188.80	242.80	1160.02
191.80	224.69	1158.49
193.80	217.04	1157.81
195.80	212.06	1157.38
202.60	206.56	1156.91
293.40	189.51	1155.51

Table 4.4-8 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 11-2 – 4.6 ft^2 DER, 30% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
422.60	180.77	1154.85
600.00	180.22	1154.81
600.40	181.79	1154.83
600.80	176.58	1154.36
601.20	164.82	1153.52
601.40	156.55	1152.99
601.60	144.02	1151.20
601.80	74.84	1150.35
602.00	0.00	0.00
603.60	0.00	0.00
603.80	70.11	1150.35
604.00	0.00	0.00
604.40	0.00	0.00
604.60	68.78	1150.35
604.80	0.00	0.00
700.00	0.00	0.00

Table 4.4-9 Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	8832.47	1192.65
0.60	8569.10	1193.52
1.00	9010.75	1132.60
1.20	9358.46	1094.28
1.40	9843.55	1048.76
1.60	10541.16	993.91
2.60	11019.50	934.86
3.00	10906.59	930.08
3.20	10999.66	931.24
4.60	10697.44	918.12
7.80	9070.59	957.43
9.00	8352.95	988.24
11.20	7297.65	1038.19
13.20	6609.68	1075.72
13.40	6609.68	1080.33
13.60	4280.23	1020.98
13.80	2471.75	900.15
15.00	2246.57	940.90
16.20	2045.71	981.98
17.40	1874.16	1020.34
18.80	1719.96	1054.64
22.40	1377.53	1151.45
23.60	1254.94	1204.47
28.20	1121.83	1204.28
32.80	1025.53	1203.94
37.40	956.04	1203.57
42.00	906.68	1203.23
46.60	872.07	1202.95
51.20	847.75	1202.73

Table 4.4-9 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
60.40	818.44	1202.44
78.80	796.03	1202.20
204.60	782.38	1202.04
205.80	776.67	1201.96
207.20	758.79	1201.73
209.80	710.84	1201.03
212.40	643.70	1199.84
214.80	566.62	1198.12
219.80	395.36	1192.34
221.20	354.37	1190.39
222.40	324.00	1188.78
224.20	286.84	1186.66
224.80	281.95	1186.44
225.60	287.37	1186.85
226.80	302.13	1187.68
227.80	302.96	1187.68
230.00	288.60	1186.85
232.40	297.54	1187.36
234.00	289.65	1186.92
235.80	296.82	1187.33
237.60	289.78	1186.93
239.40	296.10	1187.29
241.20	289.75	1186.93
242.80	295.44	1187.26
244.60	289.56	1186.91
246.40	295.10	1187.23
248.20	289.12	1186.89
249.80	294.52	1187.20
251.60	288.91	1186.87
253.40	294.09	1187.18

Table 4.4-9 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
255.20	288.42	1186.84
257.00	293.75	1187.15
258.60	288.20	1186.82
260.40	293.05	1187.12
262.20	287.74	1186.79
264.00	292.63	1187.09
265.80	287.38	1186.77
267.60	292.09	1187.05
269.20	287.14	1186.75
271.20	291.52	1187.02
272.80	286.66	1186.72
274.60	290.76	1186.98
276.40	286.31	1186.70
278.20	290.09	1186.94
280.00	285.93	1186.68
282.00	289.54	1186.90
283.80	285.68	1186.66
285.60	288.60	1186.84
287.60	285.51	1186.65
289.40	287.61	1186.78
291.40	285.27	1186.63
293.40	286.64	1186.72
335.00	275.32	1185.97
365.00	262.44	1185.06
394.80	242.77	1183.55
439.80	205.59	1180.26
454.80	196.45	1179.36
469.80	190.16	1178.72
484.60	186.34	1178.33
514.60	182.71	1177.95

Table 4.4-9 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
600.00	180.78	1177.74
600.60	181.82	1177.78
601.20	177.26	1177.23
603.60	144.52	1173.30
604.20	137.41	1172.33
604.80	131.72	1171.42
607.00	115.36	1168.52
609.40	99.06	1165.58
611.60	85.08	1162.60
611.80	82.94	1162.20
613.00	73.14	1159.67
615.40	54.84	1154.64
616.00	49.72	1153.50
617.20	37.99	1151.59
617.80	31.41	1150.89
618.20	26.08	1150.60
618.40	25.39	1150.37
618.60	0.00	0.00
618.80	21.29	1150.35
619.00	0.00	0.00
700.00	0.00	0.00

Table 4.4-10 Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	8832.47	1192.65
0.60	8569.10	1193.52
1.00	9010.75	1132.60
1.20	9358.46	1094.28
1.40	9843.55	1048.76
1.60	10541.07	993.91
2.60	11018.69	934.85
3.00	10905.61	930.07
3.20	10998.57	931.23
4.60	10695.67	918.11
7.80	9067.64	957.41
9.00	8349.65	988.23
11.20	7294.00	1038.17
13.20	6605.70	1075.72
13.40	6605.70	1080.33
13.60	4277.49	1020.97
13.80	2470.07	900.11
15.00	2244.85	940.86
16.20	2043.97	981.95
17.40	1872.41	1020.31
18.80	1718.18	1054.62
22.40	1375.76	1151.44
23.60	1253.23	1204.47
28.20	1119.96	1204.28
32.80	1023.52	1203.94
37.40	953.91	1203.56
42.00	904.42	1203.21
46.60	869.71	1202.93
51.20	845.30	1202.71

Table 4.4-10 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
60.40	815.85	1202.42
78.80	793.26	1202.17
211.00	779.40	1202.01
212.40	771.79	1201.90
213.60	756.56	1201.70
216.40	706.50	1200.97
219.20	636.06	1199.69
224.60	464.71	1195.16
227.40	383.67	1191.83
228.80	350.67	1190.23
230.20	323.37	1188.78
232.20	293.42	1187.07
232.80	288.32	1186.83
233.60	290.98	1187.06
234.60	300.41	1187.58
235.20	302.25	1187.66
236.60	298.67	1187.42
238.00	291.43	1187.03
239.80	298.70	1187.45
240.60	297.71	1187.37
242.00	291.83	1187.05
243.80	297.79	1187.40
245.80	291.96	1187.06
247.40	297.27	1187.37
249.40	291.74	1187.05
251.00	297.00	1187.35
253.00	291.60	1187.03
254.80	296.76	1187.33
256.60	291.36	1187.02
258.40	296.57	1187.32

Table 4.4-10 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
260.20	291.15	1187.01
262.00	296.32	1187.31
263.80	290.93	1186.99
265.60	296.06	1187.29
267.40	290.85	1186.99
269.00	295.61	1187.27
271.00	290.76	1186.99
272.60	295.38	1187.25
274.40	290.57	1186.97
276.20	295.22	1187.24
278.00	290.22	1186.95
279.80	295.02	1187.23
281.60	289.96	1186.93
283.40	294.79	1187.21
285.20	289.78	1186.92
287.00	294.50	1187.20
288.80	289.61	1186.91
290.60	294.11	1187.18
292.40	289.38	1186.89
294.20	293.81	1187.16
296.00	289.13	1186.88
297.80	293.53	1187.14
299.60	288.88	1186.86
301.40	293.23	1187.13
303.20	288.61	1186.84
305.00	292.93	1187.11
306.80	288.33	1186.83
308.60	292.62	1187.09
310.40	288.06	1186.81
312.20	292.31	1187.07

Table 4.4-10 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
314.00	287.78	1186.79
315.80	291.99	1187.05
317.60	287.56	1186.78
319.40	291.63	1187.03
321.20	287.40	1186.77
323.00	291.20	1187.00
324.80	287.08	1186.75
326.40	290.73	1186.97
328.20	286.90	1186.74
329.80	290.40	1186.95
331.60	286.67	1186.72
333.20	290.03	1186.93
335.00	286.41	1186.71
336.80	289.73	1186.91
338.40	286.14	1186.69
340.20	289.35	1186.88
341.80	285.86	1186.67
343.60	288.99	1186.86
345.20	285.55	1186.65
346.80	288.55	1186.84
348.60	285.22	1186.63
350.20	288.22	1186.82
352.00	284.87	1186.61
353.60	287.86	1186.80
355.40	284.53	1186.59
357.00	287.50	1186.77
358.80	284.17	1186.56
360.40	287.14	1186.75
362.20	283.81	1186.54
363.80	286.73	1186.72

Table 4.4-10 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
365.60	283.47	1186.52
367.20	286.34	1186.70
369.00	283.10	1186.49
370.60	285.93	1186.67
372.40	282.71	1186.47
374.00	285.54	1186.65
375.80	282.32	1186.44
377.40	285.13	1186.62
379.20	281.92	1186.42
380.80	284.70	1186.59
382.60	281.53	1186.39
384.20	284.25	1186.56
386.00	281.12	1186.37
387.60	283.81	1186.54
389.40	280.80	1186.34
391.00	283.32	1186.50
392.80	280.46	1186.32
394.40	282.82	1186.47
396.00	280.07	1186.30
397.60	282.29	1186.44
399.40	279.68	1186.27
401.00	281.82	1186.40
402.60	279.23	1186.24
404.20	281.22	1186.37
406.00	278.73	1186.21
407.60	280.78	1186.33
409.20	278.32	1186.18
410.80	280.20	1186.30
412.40	277.91	1186.15
414.00	279.60	1186.27

Table 4.4-10 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
415.80	277.33	1186.11
417.20	279.04	1186.23
419.00	276.87	1186.08
420.60	278.62	1186.19
422.20	276.42	1186.05
423.80	277.99	1186.16
425.40	275.98	1186.02
427.00	277.37	1186.11
428.80	275.44	1185.99
430.40	276.85	1186.08
432.00	274.94	1185.95
436.80	275.64	1186.00
562.20	247.23	1183.91
600.00	240.30	1183.36
600.40	242.32	1183.49
600.80	241.03	1183.33
601.60	230.48	1182.39
603.00	208.21	1180.40
604.20	196.24	1179.28
605.00	191.92	1178.87
608.00	183.23	1177.96
610.00	174.55	1177.01
611.80	163.93	1175.81
619.20	113.63	1168.20
623.00	85.95	1162.85
623.60	80.71	1161.68
626.80	56.48	1155.00
627.60	49.65	1153.49
628.60	40.06	1151.87
629.20	33.52	1151.10

Table 4.4-10 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
629.60	28.72	1150.68
629.80	25.97	1150.59
630.00	25.28	1150.37
630.20	0.00	0.00
700.00	0.00	0.00

Table 4.4-11 Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 25-2 – 1.4 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
0.00	0.00	0.00
0.20	7576.97	1196.45
0.60	7399.48	1196.97
0.80	7415.77	1187.29
1.20	7688.07	1142.83
1.60	8115.31	1087.76
2.60	8813.53	1003.91
3.00	8851.51	992.50
3.20	9204.82	994.16
3.60	9311.72	983.45
4.40	9180.45	985.44
5.20	8902.35	998.82
13.20	6668.16	1105.66
13.40	6668.16	1108.45
13.60	4283.91	1060.91
13.80	2417.56	959.80
16.40	2058.89	1019.25
19.20	1733.69	1085.21
21.20	1533.44	1137.11
22.20	1388.67	1198.28
22.60	1363.57	1204.44
25.20	1275.43	1204.47
28.20	1192.75	1204.42
31.40	1121.20	1204.28
37.40	1018.72	1203.91
43.40	948.68	1203.53
49.60	900.49	1203.19
55.60	868.00	1202.92
61.80	844.81	1202.71
74.00	815.98	1202.42

Table 4.4-11 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 25-2 – 1.4 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
98.40	792.67	1202.16
179.60	778.40	1202.00
239.80	776.12	1201.97
241.60	764.33	1201.81
246.80	699.11	1200.86
254.00	584.24	1198.59
264.60	402.89	1192.76
268.20	350.72	1190.27
271.80	307.76	1187.92
275.20	275.30	1185.92
278.80	249.87	1184.07
282.40	231.75	1182.61
286.00	219.09	1181.50
289.60	210.48	1180.71
296.80	200.44	1179.76
303.80	195.67	1179.28
325.20	190.21	1178.73
410.80	182.55	1177.93
494.80	179.52	1177.61
600.00	179.00	1177.55
600.40	180.29	1177.66
600.80	179.06	1177.46
601.40	173.34	1176.79
602.80	150.90	1173.92
603.80	127.80	1170.51
605.20	102.96	1166.15
606.00	91.35	1163.94
607.40	74.83	1160.01
609.00	57.07	1155.06
609.80	46.87	1152.89

Table 4.4-11 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 25-2 – 1.4 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
610.20	41.34	1152.00
610.60	35.20	1151.22
611.00	28.66	1150.63
611.20	24.30	1150.42
611.40	0.00	0.00
612.00	13.80	1150.35
612.20	0.00	0.00
700.00	0.00	0.00

Table 4.4-12 Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 61-2 – 0.6 ft^2 Small DER, 100% Power, MSIV Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
0.00	0.00	0.00
0.20	2134.90	1196.34
1.80	2041.95	1197.32
6.60	1890.10	1199.02
6.80	1938.24	1198.87
10.40	2046.56	1197.58
12.40	2088.37	1197.02
14.40	2103.74	1196.80
16.40	2098.01	1196.84
17.40	2075.66	1197.49
31.00	1419.55	1199.54
39.20	1045.21	1201.12
47.40	688.29	1203.81
47.80	678.40	1203.92
55.80	639.17	1204.22
64.00	608.19	1204.37
85.80	555.11	1204.47
104.80	528.56	1204.46
136.60	504.49	1204.40
162.60	496.36	1204.36
198.20	492.55	1204.35
345.00	492.14	1204.35
349.00	483.12	1204.30
353.00	465.07	1204.18
360.40	418.32	1203.70
365.00	421.23	1203.74
394.40	390.63	1203.27
409.00	367.93	1202.83
423.80	338.40	1202.12
453.00	267.96	1199.52

Table 4.4-12 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 61-2 – 0.6 ft^2 Small DER, 100% Power, MSIV Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
467.80	235.64	1197.77
482.40	211.84	1196.22
497.00	196.51	1195.04
511.80	187.28	1194.24
526.40	182.04	1193.76
541.20	178.99	1193.46
600.00	174.84	1193.05
600.60	175.90	1193.14
601.80	172.03	1192.70
610.00	114.43	1185.29
612.40	99.86	1182.64
614.80	86.75	1179.78
617.00	75.59	1177.16
621.20	57.11	1171.74
624.00	47.69	1167.78
626.40	40.10	1164.52
628.80	34.04	1161.41
633.40	23.66	1154.76
635.40	18.30	1152.30
636.40	15.04	1151.29
637.00	12.78	1150.78
637.40	10.96	1150.50
637.60	9.77	1150.38
637.80	0.00	0.00
638.00	9.11	1150.35
638.20	0.00	0.00
700.00	0.00	0.00

Table 4.4-13 Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 67-2 – 0.88 ft^2 Split Break, 30% Power, Containment Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	1786.91	1192.29
3.80	1701.18	1193.96
7.60	1631.68	1195.27
15.00	1528.45	1197.08
19.60	1533.96	1197.13
27.20	1503.56	1197.65
60.20	1258.52	1201.41
61.20	1214.14	1201.91
64.80	1093.18	1203.17
68.60	996.94	1203.91
72.40	922.50	1204.28
76.20	862.84	1204.43
81.20	801.79	1204.47
88.80	737.56	1204.39
96.40	696.73	1204.25
103.80	671.32	1204.12
111.40	654.59	1204.02
126.40	637.19	1203.90
154.80	627.05	1203.82
369.20	623.05	1203.78
370.60	619.18	1203.74
372.60	606.08	1203.62
376.00	572.59	1203.26
379.20	527.97	1202.64
382.60	469.37	1201.55
389.20	346.57	1197.76
391.00	317.48	1196.48
392.60	294.78	1195.34
394.20	275.10	1194.20

Table 4.4-13 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 67-2 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
396.00	256.48	1192.99
397.80	241.36	1191.91
399.40	230.54	1191.10
402.80	213.84	1189.76
406.00	203.68	1188.89
409.40	196.71	1188.27
416.20	189.30	1187.59
423.00	186.01	1187.29
449.40	187.00	1187.38
453.00	185.84	1187.27
455.00	186.89	1187.37
458.40	185.83	1187.27
460.60	186.89	1187.37
463.80	185.74	1187.27
466.00	187.04	1187.39
469.40	185.70	1187.26
471.60	187.04	1187.39
474.80	185.71	1187.26
477.00	187.07	1187.39
480.40	185.65	1187.26
482.40	187.00	1187.38
485.60	185.66	1187.26
487.80	187.05	1187.39
491.00	185.62	1187.25
493.20	187.05	1187.39
496.40	185.59	1187.25
498.60	187.05	1187.39
501.80	185.55	1187.24
504.00	187.05	1187.39
507.20	185.51	1187.24

Table 4.4-13 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 67-2 – 0.88 ft² Split Break, 30% Power, Cont. Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
509.40	187.05	1187.39
512.60	185.48	1187.24
514.80	187.05	1187.39
518.00	185.45	1187.23
520.20	187.02	1187.38
523.40	185.39	1187.23
525.60	187.08	1187.39
528.80	185.43	1187.23
531.00	186.86	1187.37
534.00	185.34	1187.22
536.20	186.99	1187.38
539.40	185.29	1187.22
541.60	187.03	1187.39
544.80	185.32	1187.22
547.00	186.81	1187.36
550.00	185.24	1187.22
552.20	186.93	1187.38
555.40	185.18	1187.21
557.60	186.99	1187.38
561.00	185.16	1187.21
563.00	186.68	1187.35
565.80	185.23	1187.21
568.00	186.59	1187.34
570.80	185.11	1187.20
573.00	186.82	1187.36
576.20	185.08	1187.20
578.20	186.51	1187.34
581.00	185.07	1187.20
583.00	186.59	1187.34
586.00	185.02	1187.19

Table 4.4-13 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 67-2 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
588.20	186.72	1187.36
591.40	184.99	1187.20
593.40	186.47	1187.33
596.20	184.97	1187.19
598.40	186.64	1187.35
600.80	186.25	1187.26
602.40	177.52	1186.45
603.20	178.80	1186.63
604.80	185.20	1187.19
606.20	179.28	1186.60
606.80	178.10	1186.52
609.00	183.78	1187.07
611.20	178.74	1186.58
613.40	182.22	1186.92
615.80	178.93	1186.59
618.00	180.77	1186.78
620.60	178.66	1186.56
623.20	179.40	1186.64
652.40	170.02	1185.64
665.00	163.09	1184.84
677.40	152.30	1183.51
683.80	144.19	1182.42
690.00	133.92	1180.94
696.20	120.61	1178.86
702.40	103.63	1175.93
713.00	69.05	1167.57
716.40	56.71	1163.88
722.80	35.99	1155.26
723.60	33.12	1154.19
724.60	29.02	1153.03

Table 4.4-13 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 67-2 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
724.80	28.90	1152.63
725.00	26.91	1152.53
725.20	27.09	1152.18
725.80	23.08	1151.66
726.00	23.31	1151.37
726.60	20.25	1150.83
726.80	17.35	1150.76
727.00	17.75	1150.53
727.20	14.09	1150.48
727.40	14.76	1150.35
727.60	0.00	0.00
1000.00	0.00	0.00

Table 4.4-14 Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 79-2 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
0.00	0.00	0.00
0.20	1786.92	1192.28
3.80	1702.84	1193.93
7.60	1634.35	1195.22
15.00	1532.09	1197.02
15.40	1540.01	1197.03
23.80	1527.32	1197.25
60.00	1261.43	1201.24
65.20	1098.08	1203.12
69.40	999.41	1203.90
73.40	926.13	1204.27
77.60	864.14	1204.43
83.20	800.55	1204.47
91.40	736.79	1204.39
99.40	697.14	1204.25
107.40	671.63	1204.12
115.60	654.83	1204.02
131.80	637.26	1203.90
204.20	624.16	1203.79
414.20	623.58	1203.79
417.60	606.18	1203.62
421.00	572.39	1203.25
424.40	524.25	1202.58
428.00	461.07	1201.36
433.20	363.14	1198.41
436.40	310.81	1196.16
438.20	286.47	1194.88
440.00	265.95	1193.63
441.60	250.78	1192.59
443.20	238.29	1191.68

Table 4.4-14 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 79-2 – 0.88 ft² Split Break, 30% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
445.00	226.97	1190.82
448.40	211.70	1189.58
451.80	201.96	1188.74
455.20	195.75	1188.19
462.00	189.10	1187.57
469.00	186.00	1187.29
501.40	186.97	1187.38
504.80	185.80	1187.28
506.80	186.90	1187.37
510.00	185.80	1187.27
512.00	186.89	1187.37
515.20	185.81	1187.27
517.40	186.99	1187.38
520.80	185.68	1187.26
522.80	186.98	1187.38
526.20	185.65	1187.26
528.20	186.99	1187.38
531.40	185.70	1187.26
533.60	187.00	1187.38
536.80	185.61	1187.25
539.00	187.09	1187.39
542.20	185.65	1187.25
544.40	186.97	1187.38
547.60	185.51	1187.24
549.80	187.15	1187.40
553.20	185.48	1187.24
555.40	187.17	1187.40
558.80	185.48	1187.24
561.00	187.07	1187.39
564.20	185.50	1187.24

Table 4.4-14 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 79-2 – 0.88 ft² Split Break, 30% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
566.40	186.91	1187.37
569.40	185.46	1187.23
571.60	186.92	1187.38
574.60	185.43	1187.23
576.80	186.90	1187.37
579.80	185.39	1187.23
582.00	186.90	1187.37
585.00	185.37	1187.23
587.20	186.84	1187.37
590.20	185.29	1187.22
592.40	186.96	1187.38
595.60	185.24	1187.22
597.80	186.99	1187.38
600.60	186.76	1187.32
601.80	179.84	1186.64
602.40	177.93	1186.50
603.20	179.53	1186.70
604.60	185.45	1187.23
605.00	185.08	1187.15
606.60	178.36	1186.54
608.80	184.30	1187.13
611.00	178.95	1186.60
613.20	182.88	1186.99
615.60	179.20	1186.63
617.80	181.49	1186.85
620.20	179.09	1186.61
622.40	180.17	1186.72
656.20	169.51	1185.58
668.60	162.43	1184.76
681.00	151.23	1183.37

Table 4.4-14 (cont.) Salem Unit 2 (Model 51 SG) Steamline Break Mass/Energy Release, Case 79-2 – 0.88 ft² Split Break, 30% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
687.20	143.13	1182.27
693.40	132.55	1180.74
699.60	118.79	1178.56
705.80	101.41	1175.52
718.00	61.00	1165.11
721.40	49.05	1161.03
726.00	34.11	1154.56
726.80	31.05	1153.49
727.40	28.47	1152.87
728.00	26.53	1152.04
728.80	22.65	1151.24
729.00	20.45	1151.17
729.20	20.64	1150.89
729.40	17.96	1150.83
729.60	18.28	1150.59
729.80	14.89	1150.53
730.00	15.44	1150.36
730.20	0.00	0.00
1000.00	0.00	0.00

5 LOCA MASS AND ENERGY RELEASES

The uncontrolled release of pressurized high-temperature reactor coolant, termed a loss-of-coolant accident (LOCA), will result in release of steam and water into the containment. This, in turn, will result in increases in the local subcompartment pressures, and an increase in the global containment pressure and temperature. Therefore, there are typically both long- and short-term issues reviewed relative to a postulated LOCA that must be considered for a complete containment integrity analysis. Since none of the major components of the RCS are changing (i.e., pressurizer or steam generators) and the licensed power level will remain the same, the short-term issues will not need to be reviewed or reanalyzed. Only the long-term LOCA transients will be analyzed.

The long-term LOCA mass and energy releases are analyzed to approximately $1x10^7$ seconds and are utilized as input to the containment integrity analysis. This demonstrates the acceptability of the containment safeguards systems to mitigate the consequences of a hypothetical large-break LOCA. The containment safeguards systems must be capable of limiting the peak containment pressure to less than the design pressure and to limit the temperature excursion to less than the acceptance limits. For this CFCU margin recovery program, Westinghouse generated Salem Unit 1 and Unit 2 specific LOCA mass and energy releases for containment design using the flexible multi-nodal model (hereafter referred to as "the March 1979 model") described in Reference 11. (Please note that these transients for Salem Unit 2 were performed with the original Model 51 steam generators installed.) The Nuclear Regulatory Commission (NRC) review and approval letter is included with Reference 11. This section discusses the long-term LOCA mass and energy releases generated for this program. The results of this analysis were provided for use in the containment response analysis (see Section 6.3).

5.1 LONG-TERM LOCA MASS AND ENERGY RELEASES

The mass and energy release rates described in this section form the basis of further computations to evaluate the containment following the postulated accident. Discussed in this section are the long-term LOCA mass and energy releases for the hypothetical double-ended pump suction (DEPS) rupture with minimum safeguards. The maximum safeguards case for the DEPS break and the blowdown portion of the double-ended hot leg (DEHL) rupture break that are typically performed for a full spectrum of design-basis cases are not needed for this program. The DEPS maximum safeguards case would not yield a limiting set of mass and energy releases for the changes to the service water system and the containment fan coolers and the DEHL case is only performed for the initial blowdown (approximately 30 seconds in duration) and none of the safety systems actuate that quickly. The mass and energy releases for the DEPS minimum safeguards case for Salem Unit 1 and Salem Unit 2 are used for the long-term containment response analyses in Section 6.3. The basis for using these cases is discussed in Section 5.1.5 and Section 5.1.6.

5.1.1 Input Parameters and Assumptions

The mass and energy release analysis is sensitive to the assumed characteristics of various plant systems, in addition to other key modeling assumptions. Where appropriate, bounding inputs are utilized and instrumentation uncertainties are included. For example, the RCS operating temperatures are chosen to bound the highest average coolant temperature range of all operating cases and a temperature uncertainty allowance (+5.0°F) is then added. Nominal parameters are used in certain instances. For example, the

RCS pressure in this analysis is based on a nominal value of 2250 psia plus an uncertainty allowance (+50.0 psi). All input parameters are chosen consistent with accepted analysis methodology.

Some of the most critical items are the RCS initial conditions, core decay heat, safety injection flow, and primary and secondary metal mass and steam generator heat release modeling. Specific assumptions concerning each of these items are discussed in the following paragraphs. Tables 5.1-1 through 5.1-3 present key data assumed in the analysis.

The core rated power of 3459 MWt, adjusted for calorimetric error (i.e., 100.6% or 3479.75 MWt) was used in the analysis. As previously noted, the use of RCS operating temperatures to bound the highest average coolant temperature range were used as bounding analysis conditions. The use of higher temperatures is conservative because the initial fluid energy is based on coolant temperatures that are at the maximum levels attained in steady-state operation. Additionally, an allowance to account for instrument error and deadband is reflected in the initial RCS temperatures. The selection of 2250 psia as the limiting pressure is considered to affect the blowdown phase results only, since this represents the initial pressure of the RCS. The RCS rapidly depressurizes from this value until the point at which it equilibrates with containment pressure.

The rate at which the RCS blows down is initially more severe at the higher RCS pressure. Additionally, the RCS has a higher fluid density at the higher pressure (assuming a constant temperature) and subsequently has a higher RCS mass available for releases. Thus, 2250 psia plus uncertainty was selected for the initial pressure as the limiting case for the long-term mass and energy release calculations.

The selection of the fuel design features for the long-term mass and energy release calculation is based on the need to conservatively maximize the energy stored in the fuel at the beginning of the postulated accident (i.e., to maximize the core stored energy). The core stored energy that was selected to bound the Westinghouse 17 x 17 RFA fuel product that will be used at Salem Unit 1 and Unit 2 was 4.23 full-power seconds (FPS). The margins in the core stored energy include +15 percent in order to address the thermal fuel model and associated manufacturing uncertainties and the time in the fuel cycle for maximum fuel densification. Thus, the analysis very conservatively accounts for the stored energy in the core.

Margin in RCS volume of 3 percent (which is composed of 1.6-percent allowance for thermal expansion and 1.4-percent allowance for uncertainty) was modeled.

A uniform steam generator tube plugging level of 0 percent was modeled. This assumption maximizes the reactor coolant volume and fluid release by virtue of consideration of the RCS fluid in all steam generator tubes. During the post-blowdown period, the steam generators are active heat sources since significant energy remains in the secondary metal and secondary mass that has the potential to be transferred to the primary side. The 0-percent tube plugging assumption maximizes the heat transfer area and, therefore, the transfer of secondary heat across the steam generator tubes. Additionally, this assumption reduces the reactor coolant loop resistance, which reduces the ΔP upstream of the break for the pump suction breaks and increases break flow. Thus, the analysis conservatively accounts for the level of steam generator tube plugging.

The secondary-to-primary heat transfer is maximized by assuming conservative heat transfer coefficients. This conservative energy transfer is ensured by maximizing the initial internal energy of the inventory in the steam generator secondary side. This internal energy is based on full-power operation plus uncertainties.

Regarding safety injection flow, the mass and energy release calculation considered configurations, component failures, and offsite power assumptions to conservatively bound respective alignments. The cases include a minimum safeguards assumption (1 charging/safety injection (CHG/SI) pump, 1 intermediate-head safety injection (IHSI) pump, and 1 low-head safety injection (LHSI) pump) (see Table 5.1-3). In addition, the containment backpressure is assumed to be equal to the containment design pressure. This assumption was shown in Reference 11 to be conservative for the generation of mass and energy releases. Another aspect of the safety injection system that is considered is the recirculation flow that would occur if the operators did or did not initiate recirculation spray.

In summary, the following assumptions were employed to ensure that the mass and energy releases are conservatively calculated, thereby maximizing energy release to containment.

1. Maximum expected operating temperature of the RCS (100-percent full-power conditions)

2. Allowance for RCS temperature uncertainty (+5.0°F)

3. Margin in RCS volume of 3 percent (which is composed of 1.6-percent allowance for thermal expansion, and 1.4-percent allowance for uncertainty)

4. Core rated power of 3459 MWt

5. Allowance for calorimetric error (+0.6 percent of power)

6. Conservative heat transfer coefficients (i.e., steam generator primary/secondary heat transfer, and RCS metal heat transfer)

7. Allowance in core stored energy for effect of fuel densification

8. A margin in core stored energy (+15 percent to account for manufacturing tolerances)

9. An allowance for RCS initial pressure uncertainty (+50 psi)

10. A maximum containment backpressure equal to design pressure (47.0 psig)

11. Steam generator tube plugging leveling (0-percent uniform)

    a. Maximizes reactor coolant volume and fluid release

    b. Maximizes heat transfer area across the steam generator tubes

c. Reduces coolant loop resistance, which reduces the ΔP upstream of the break for the pump suction breaks and increases break flow

Thus, based on the previously discussed conditions and assumptions, an analysis of Salem Unit 1 and Salem Unit 2 was made for the release of mass and energy from the RCS in the event of a large-break LOCA at 3479.75 MWt.

5.1.2 Description of Analyses

The evaluation model used for the long-term LOCA mass and energy release calculations is the March 1979 model described in Reference 11.

This report section presents the long-term LOCA mass and energy releases generated in support of the Salem CFCU Margin Recovery Program. These mass and energy releases are then subsequently used in the containment integrity analysis and qualification temperature evaluation.

5.1.3 LOCA Mass and Energy Release Phases

The containment system receives mass and energy releases following a postulated rupture in the RCS. These releases continue over a time period, which, for the LOCA mass and energy analysis, is typically divided into four phases.

1. Blowdown – the period of time from accident initiation (when the reactor is at steady-state operation) to the time that the RCS and containment reach an equilibrium state.

2. Refill – the period of time when the lower plenum is being filled by accumulator and emergency core cooling system (ECCS) water. At the end of blowdown, a large amount of water remains in the cold legs, downcomer, and lower plenum. To conservatively consider the refill period for the purpose of containment mass and energy releases, it is assumed that this water is instantaneously transferred to the lower plenum along with sufficient accumulator water to completely fill the lower plenum. This allows an uninterrupted release of mass and energy to containment. Thus, the refill period is conservatively neglected in the mass and energy release calculation.

3. Reflood – begins when the water from the lower plenum enters the core and ends when the core is completely quenched.

4. Post-reflood (Froth) – describes the period following the reflood phase. For the pump suction break, a two-phase mixture exits the core, passes through the hot legs, and is superheated in the steam generators prior to exiting the break as steam. After the broken loop steam generator cools, the break flow becomes two phase.

5.1.4 Computer Codes

The Reference 11 mass and energy release evaluation model is comprised of mass and energy release versions of the following codes: SATAN VI, WREFLOOD, FROTH, and EPITOME. These codes were used to calculate the long-term LOCA mass and energy releases for Salem Unit 1 and Salem Unit 2.

SATAN VI calculates blowdown, the first portion of the thermal-hydraulic transient following break initiation, including pressure, enthalpy, density, mass and energy flow rates, and energy transfer between primary and secondary systems as a function of time.

The WREFLOOD code addresses the portion of the LOCA transient where the core reflooding phase occurs after the primary coolant system has depressurized (blowdown) due to the loss of water through the break and when water supplied by the ECCS refills the reactor vessel and provides cooling to the core. The most important feature of WREFLOOD is the steam/water mixing model (see Subsection 5.2.2).

FROTH models the post-reflood portion of the transient. The FROTH code is used for the steam generator heat addition calculation from the broken and intact loop steam generators.

EPITOME continues the FROTH post-reflood portion of the transient from the time at which the secondary equilibrates to containment design pressure to the end of the transient. It also compiles a summary of data on the entire transient, including formal instantaneous mass and energy release tables and mass and energy balance tables with data at critical times.

5.1.5 Break Size and Location

Generic studies have been performed and documented in Reference 11 with respect to the effect of postulated break size on the LOCA mass and energy releases. The double-ended guillotine break has been found to be limiting due to larger mass flow rates during the blowdown phase of the transient. During the reflood and froth phases, the break size has little effect on the releases.

Three distinct locations in the RCS loop can be postulated for a pipe rupture for mass and energy release purposes:

- Hot leg (between vessel and steam generator)
- Cold leg (between pump and vessel)
- Pump suction (between steam generator and pump)

The break location analyzed for this program is the DEPS rupture (10.48 ft^2). Break mass and energy releases have been calculated for the blowdown, reflood, and post-reflood phases of the LOCA for the DEPS cases. The following information provides a discussion on the three possible break locations and why the DEPS break is limiting for the long term.

The DEHL rupture has been shown in previous studies to result in the highest blowdown mass and energy release rates. Although the core flooding rate would be the highest for this break location, the amount of energy released from the steam generator secondary is minimal because the majority of the fluid that exits the core vents directly to containment bypassing the steam generators. As a result, the reflood mass and energy releases are reduced significantly as compared to either the pump suction or cold leg break locations where the core exit mixture must pass through the steam generators before venting through the break. For the hot leg break, generic studies have confirmed that there is no reflood peak (i.e., from the end of the blowdown period the containment pressure would continually decrease). Therefore, only the mass and energy releases for the hot leg break blowdown phase are calculated. Since none of the powered safety systems are assumed to be operational during initial blowdown phase, the CFCU margin recovery program would not impact the DEHL break.

The cold leg break location has also been found in previous studies to be much less limiting in terms of the overall containment energy releases. The cold leg blowdown is faster than that of the pump suction break, and more mass is released into the containment. However, the core heat transfer is greatly reduced, and this results in a considerably lower energy release into containment. Studies have determined that the blowdown transient for the cold leg is, in general, less limiting than that for the pump suction break. During reflood, the flooding rate is greatly reduced and the energy release rate into the containment is reduced. Therefore, the cold leg break is bounded by other breaks and no further evaluation is necessary.

The pump suction break combines the effects of the relatively high core flooding rate, as in the hot leg break, and the addition of the stored energy in the steam generators. As a result, the pump suction break yields the highest energy flow rates during the post-blowdown period by including all of the available energy of the RCS in calculating the releases to containment. Thus, only the DEHL and DEPS cases are used to analyze long-term LOCA containment integrity for full scope programs. For this CFCU Margin Recovery Program, the DEHL break would not be impacted from the current design-basis cases so it is not reanalyzed here.

5.1.6 Application of Single-Failure Criterion

An analysis of the effects of the single-failure criterion has been performed on the mass and energy release rates for each break analyzed. An inherent assumption in the generation of the mass and energy release is that offsite power is lost coincident with the pipe rupture. This results in the actuation of the emergency diesel generators. Operation of the diesel generators delays the operation of the safety injection system that is required to mitigate the transient.

The single failure that is analyzed for the LOCA mass and energy releases for the CFCU Margin Recovery Program is the postulated failure of an entire train of safeguards equipment. Typically, this is synonymous with the failure of an emergency diesel generator to start. However, the Salem plants have a three diesel generator system, so the loss of one diesel would be less limiting than the loss of one complete train of safeguards equipment. The loss of one entire train of safety injection pumps results in only one CHG/SI pump, one IHSI pump, and one LHSI pump available for accident mitigation. The containment heat removal equipment that is assumed to operate for this train-failure scenario is discussed in Section 6.3.3.

5.1.7 Acceptance Criteria for LOCA M&E Analyses

A large-break loss-of-coolant accident is classified as an American Nuclear Society (ANS) Condition IV event, an infrequent fault. To satisfy the NRC acceptance criteria presented in the Standard Review Plan, Section 6.2.1.3, the relevant requirements are the following:

- 10 CFR 50, Appendix A
- 10 CFR 50, Appendix K, paragraph I.A

To meet these requirements, the following must be addressed:

- Break size and location
- Calculation of each phase of the accident
- Sources of energy

The description of the modeling of each phase of the transient with the March 1979 model (Reference 11) and the individual sources of energy are provided in the following section. The break size and location was discussed in Section 5.1.5.

Table 5.1-1 System Parameters Initial Conditions for Salem Unit 1

Parameters	Value
Core Thermal Power (MWt)	3479.75
Reactor Coolant System Total Flowrate (lbm/sec)	34805.56
Vessel Outlet Temperature (°F)	618.1
Core Inlet Temperature (°F)	547.7
Initial Steam Generator Steam Pressure (psia)	888
Steam Generator Design	Model F
Steam Generator Tube Plugging (%)	0 (bounding)
Initial Steam Generator Secondary-Side Mass (lbm)	112850.0
Assumed Maximum Containment Backpressure (psia)	61.7[(1)]
Accumulator Water Volume (ft^3) per accumulator N_2 Cover Gas Pressure (psia) Temperature (°F)	 850.0 592.2 120
Safety Injection Delay, total (sec) (from beginning of event)	35.6

Note:

1. Bounding assumption for mass and energy release calculation per Reference 11.
   Core Thermal Power, RCS Total Flowrate, RCS Coolant Temperatures, and Steam Generator Secondary-Side Mass include appropriate uncertainty and/or allowance.

Table 5.1-2 System Parameters Initial Conditions for Salem Unit 2	
Parameters	**Value**
Core Thermal Power (MWt)	3479.75
Reactor Coolant System Total Flowrate (lbm/sec)	34805.56
Vessel Outlet Temperature (°F)	618.1
Core Inlet Temperature (°F)	547.7
Initial Steam Generator Steam Pressure (psia)	842
Steam Generator Design	Model 51
Steam Generator Tube Plugging (%)	0
Initial Steam Generator Secondary-Side Mass (lbm)	127041.0
Assumed Maximum Containment Backpressure (psia)	61.7[(1)]
Accumulator Water Volume (ft^3) per accumulator N_2 Cover Gas Pressure (psia) Temperature (°F)	 850 592.2 120
Safety Injection Delay, total (sec) (from beginning of event)	35.6

Note:

1. Bounding assumption for mass and energy release calculation per Reference 11.

Core Thermal Power, RCS Total Flowrate, RCS Coolant Temperatures, and Steam Generator Secondary-Side Mass include appropriate uncertainty and/or allowance.

Table 5.1-3 Safety Injection Flow Minimum Safeguards	
RCS Pressure (psig)	**Total Flow (ft^3/sec)**
Injection Mode (Reflood Phase)	
0	10.92
20	10.37
40	9.79
47	9.57
60	9.16
80	8.47
100	7.70
120	6.78
140	5.56
160	3.30
180	1.95
200	1.93
RCS Pressure (psig)	**Total Flow (lbm/sec)**
Cold Leg Recirculation Mode	
Without Recirculation Spray at 0 psig	427.32
WITH Recirculation Spray at 0 psig	165.22

5.2 MASS AND ENERGY RELEASE DATA

5.2.1 Blowdown Mass and Energy Release Data

The SATAN-VI code is used for computing the blowdown transient. The code utilizes the control volume (element or nodal) approach with the capability for modeling a large variety of plant-specific thermal fluid system configurations. The fluid properties are considered uniform and thermodynamic equilibrium is assumed in each element. A point kinetics model is used with weighted feedback effects. The major feedback effects include moderator density, moderator temperature, and Doppler broadening. A critical flow calculation for subcooled (modified Zaloudek), two-phase (Moody), or superheated break flow is incorporated into the analysis. The methodology for the use of this model is described in Reference 11. A comparison of these two critical flow correlations is shown in Section III-1 of Reference 12.

Table 5.2-1 presents the calculated mass and energy release for the blowdown phase of the DEPS break for Salem Unit 1. Table 5.2-2 presents the calculated mass and energy release for the blowdown phase of the DEPS break for Salem Unit 2. Break path 1 for the pump suction break in the mass and energy release tables refers to the mass and energy exiting from the steam generator side of the break. Break path 2 refers to the mass and energy exiting from the pump side of the break.

5.2.2 Reflood Mass and Energy Release Data

The WREFLOOD code is used for computing the reflood transient. The WREFLOOD code consists of two basic hydraulic models – one for the contents of the reactor vessel and one for the coolant loops. The two models are coupled through the interchange of the boundary conditions applied at the vessel outlet nozzles and at the top of the downcomer. Additional transient phenomena such as pumped safety injection and accumulators, reactor coolant pump performance, and steam generator release are included as auxiliary equations that interact with the basic models as required. The WREFLOOD code permits the capability to calculate variations during the core reflooding transient of basic parameters such as core flooding rate, core and downcomer water levels, fluid thermodynamic conditions (pressure, enthalpy, density) throughout the primary system, and mass flow rates through the primary system. The code permits hydraulic modeling of the two flow paths available for discharging steam and entrained water from the core to the break, i.e., the path through the broken loop and the path through the unbroken loops.

A complete thermal equilibrium mixing condition for the steam and ECCS injection water during the reflood phase has been assumed for each loop receiving ECCS water. This is consistent with the usage and application of the Reference 11 mass and energy release evaluation model in recent analyses, e.g., Salem Unit 1 Docket (Reference 13). Even though the Reference 11 model credits steam/water mixing only in the intact loop and not in the broken loop, the justification, applicability, and NRC approval for using the mixing model in the broken loop has been documented (Reference 13). Moreover, this assumption is supported by test data and is further discussed below. Please note that the steam/water mixing inside the RCS is not impacted by the containment design.

The model assumes a complete mixing condition (i.e., thermal equilibrium) for the steam/water interaction. The complete mixing process, however, is made up of two distinct physical processes. The first is a two-phase interaction with condensation of steam by cold ECCS water. The second is a single-phase mixing of condensate and ECCS water. Since the steam release is the most important influence to the containment pressure transient, the steam condensation part of the mixing process is the only part that need be considered. (Any spillage directly heats only the sump and not the atmosphere.)

The most applicable steam/water mixing test data have been reviewed for validation of the containment integrity reflood steam/water mixing model. This data was generated in 1/3-scale tests (Reference 14), which are the largest scale data available and thus most clearly simulates the flow regimes and gravitational effects that would occur in a pressurized water reactor (PWR). These tests were designed specifically to study the steam/water interaction for PWR reflood conditions.

A group of 1/3-scale steam/water mixing tests discussed in Reference 14 corresponds directly to containment integrity reflood conditions. The injection flow rates for this group cover all phases and mixing conditions calculated during the reflood transient. The data from these tests were reviewed and discussed in detail in Reference 11. For all of these tests, the data clearly indicate the occurrence of very effective mixing with rapid steam condensation. The mixing model used in the containment integrity reflood calculation is, therefore, wholly supported by the 1/3-scale steam/water mixing data.

Additionally, the following justification is also noted. The post-blowdown limiting break for the containment integrity peak pressure analysis is the pump suction double-ended rupture. For this break, there are two flow paths available in the RCS by which mass and energy may be released to containment. One is through the outlet of the steam generator, the other via reverse flow through the reactor coolant pump. Steam that is not condensed by ECCS injection in the intact RCS loops passes around the downcomer and through the broken loop cold leg and pump in venting to containment. This steam also encounters ECCS injection water as it passes through the broken loop cold leg, complete mixing occurs and a portion of it is condensed. It is this portion of steam that is condensed that is taken credit for in this analysis. This assumption is justified based upon the postulated break location, and the actual physical presence of the ECCS injection nozzle. A description of the test and test results are contained in References 11 and 13.

Tables 5.2-3 and 5.2-4 present the calculated mass and energy releases for the reflood phase of the pump suction double-ended rupture, minimum safeguards cases for Salem Unit 1 and Salem Unit 2, respectively.

The principal parameters during reflood are given in Tables 5.2-5 and 5.2-6 for the DEPS cases.

5.2.3 Post-Reflood Mass and Energy Release Data

The FROTH code (Reference 12) is used for computing the post-reflood transient. The FROTH code calculates the heat release rates resulting from a two-phase mixture present in the steam generator tubes. The mass and energy releases that occur during this phase are typically superheated (Reference 19) due to the depressurization and equilibration of the broken loop and intact loop steam generators. During this phase of the transient, the RCS has equilibrated with the containment pressure. However, the steam generators contain a secondary inventory at an enthalpy that is much higher than the primary side. Therefore, there is a significant amount of reverse heat transfer that occurs. Steam is produced in the core due to core decay heat. For a pump suction break, a two-phase fluid exits the core, flows through the hot legs, and becomes superheated as it passes through the steam generator. Once the broken loop cools, the break flow becomes two phase. During the FROTH calculation, ECCS injection is addressed for both the injection phase and the recirculation phase. The FROTH code calculation stops when the secondary side equilibrates to the saturation temperature (T_{sat}) at the containment design pressure, after this point the EPITOME code completes the steam generator depressurization (see Subsection 5.2.5 for additional information).

The methodology for the use of this model is described in Reference 11. The mass and energy release rates are calculated by FROTH and EPITOME until the time of containment depressurization. After containment depressurization (14.7 psia), the mass and energy release available to containment is generated directly from core boil-off/decay heat.

Tables 5.2-7 and 5.2-8 present the two-phase post-reflood mass and energy release data for the pump suction double-ended break cases for Salem Unit 1 and Unit 2. Table 5.2-14 and Table 5.2-15 provide the variation in the Unit 1 and Unit 2 mass and energy releases when recirculation spray is modeled beginning at 4441.6 seconds into a large-break LOCA with a diesel failure. Refer to Section 6.1, "Containment Recirculation Spray Assumptions" for the description of the modeling of recirculation spray during cold leg and hot leg recirculation alignments.

5.2.4 Decay Heat Model

On November 2, 1978, the Nuclear Power Plant Standards Committee (NUPPSCO) of the ANS approved ANS Standard 5.1 (Reference 10) for the determination of decay heat. This standard was used in the mass and energy release model for Salem. Table 5.2-9 lists the decay heat curve used in the Salem Unit 1 and Unit 2 mass and energy release analysis.

Significant assumptions in the generation of the decay heat curve for use in the LOCA mass and energy releases analysis include the following.

1. The decay heat sources considered are fission product decay and heavy element decay of U-239 and Np-239.

2. The decay heat power from fissioning isotopes other than U-235 is assumed to be identical to that of U-235.

3. The fission rate is constant over the operating history of maximum power level.

4. The factor accounting for neutron capture in fission products has been taken from Reference 10.

5. The fuel has been assumed to be at full power for 1×10^8 seconds.

6. The total recoverable energy associated with one fission has been assumed to be 200 MeV/fission.

7. Two sigma uncertainty (two times the standard deviation) has been applied to the fission product decay.

Based upon NRC staff review, (Safety Evaluation Report [SER] of the March 1979 evaluation model [Reference 11]), use of the ANS Standard-5.1, November 1979 decay heat model (Reference 10) was approved for the calculation of mass and energy releases to the containment following a LOCA.

5.2.5 Steam Generator Equilibration and Depressurization

Steam generator equilibration and depressurization is the process by which secondary-side energy is removed from the steam generators in stages. The FROTH computer code calculates the heat removal from the secondary mass until the secondary temperature is the saturation temperature (T_{sat}) at the containment design pressure. After the FROTH calculations, the EPITOME code continues the FROTH calculation for steam generator cooldown removing steam generator secondary energy at different rates (i.e., first- and second-stage rates). The first-stage rate is applied until the steam generator reaches T_{sat} at the user-specified intermediate equilibration pressure, when the secondary pressure is assumed to reach the actual containment pressure. Then the second-stage rate is used until the final depressurization, when the secondary reaches the reference temperature of T_{sat} at 14.7 psia, or 212°F. The heat removal of the broken loop and intact loop steam generators are calculated separately.

During the FROTH calculations, steam generator heat removal rates are calculated using the secondary-side temperature, primary-side temperature and a secondary-side heat transfer coefficient determined using a modified McAdams correlation. Steam generator energy is removed during the FROTH transient until the secondary-side temperature reaches saturation temperature at the containment design pressure. The constant heat removal rate used during the first heat removal stage is based on the final heat removal rate calculated by FROTH. The steam generator energy available to be released during the first-stage interval is determined by calculating the difference in secondary energy available at the containment design pressure and that at the (lower) user-specified intermediate equilibration pressure, assuming saturated conditions. This energy is then divided by the first-stage energy removal rate, resulting in an intermediate equilibration time. At this time, the rate of energy release drops substantially to the second-stage rate. The second-stage rate is determined as the fraction of the difference in secondary energy available between the intermediate equilibration and final depressurization at 212°F, and the time difference from the time of the intermediate equilibration to the user-specified time of the final depressurization at 212°F. With current methodology, all of the secondary energy remaining after the intermediate equilibration is conservatively assumed to be released by imposing a mandatory cooldown and subsequent depressurization down to atmospheric pressure at 3600 seconds, i.e., 14.7 psia and 212°F (the mass and energy balance tables have this point labeled as "Available Energy").

5.2.6 Sources of Mass and Energy

The sources of mass considered in the LOCA mass and energy release analysis are given in Tables 5.2-10 and 5.2-11. These sources are the RCS, accumulators, and pumped safety injection.

The analysis used the following energy reference points:

- Available energy: 212°F; 14.7 psia [energy that could be released] (as discussed in 5.2.5)
- Total energy content: 32°F; 14.7 psia [total internal energy of the RCS]

The energy inventories considered in the LOCA mass and energy release analysis are given in Tables 5.2-12 and 5.2-13. The energy sources are the following.

- Reactor coolant system water
- Accumulator water (all four inject)
- Pumped safety injection water
- Decay heat
- Core-stored energy
- Reactor coolant system metal (includes steam generator tubes)
- Steam generator metal (includes transition cone, shell, wrapper, and other internals)
- Steam generator secondary energy (includes fluid mass and steam mass)
- Secondary transfer of energy (feedwater into and steam out of the steam generator secondary)

The mass and energy inventories are presented at the following times, as appropriate.

- Time zero (initial conditions)
- End of blowdown time
- End of refill time
- End of reflood time
- Time of broken loop steam generator equilibration to pressure setpoint
- Time of intact loop steam generator equilibration to pressure setpoint
- Time of full depressurization (3600 seconds)

The energy release from the metal-water reaction rate is considered as part of the WCAP-10325-P-A (Reference 11) methodology. Based on the way that the energy in the fuel is conservatively releases to the vessel fluid, the fuel cladding temperature does not increase to the point where the metal-water reaction is significant. This is in contrast to the 10 CFR 50.46 analyses, which are based to calculate high fuel rod cladding temperatures and, therefore, a non-significant metal-water reaction. For the LOCA mass and energy release calculation, the energy created by the metal-water reaction value is small and is not explicitly provided in the energy balance tables. The energy that is determined is part of the mass and energy releases and is therefore already included in the overall mass and energy releases for the Salem units.

The sequence of events for each LOCA transient is shown in Table 6.3-1 and Table 6.3-2 of Section 6.3.

5.3 CONCLUSIONS

The consideration of the various energy sources listed in Section 5.2.6 for the long-term mass and energy release analysis provides assurance that all available sources of energy have been included in this analysis. By addressing all available sources of energy as well as the limiting break size and location and the specific modeling of each phase of the long-term LOCA transient, the review guidelines presented in Standard Review Plan Section 6.2.1.3 have been satisfied. The results of this analysis were provided for use in the containment response analysis documented in Section 6.3.

Table 5.2-1 Unit 1 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases

TIME	BREAK PATH NO.1 FLOW*		BREAK PATH NO.2 FLOW**	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
.00000	.0	.0	.0	.0
.00111	85650.6	46265.2	40440.7	21798.7
.101	40197.5	21734.4	21025.9	11328.2
.202	40835.4	22228.9	22904.7	12348.3
.302	41643.7	22877.3	23142.8	12487.1
.402	42545.4	23638.3	22826.5	12329.7
.502	43403.3	24424.4	22202.3	12002.3
.602	43853.2	24994.0	21551.5	11657.5
.702	43668.4	25177.7	21018.9	11374.1
.801	42739.5	24894.4	20548.3	11122.3
.902	41534.4	24427.3	20189.5	10930.2
1.00	40377.0	23966.7	19961.0	10809.0
1.10	39258.8	23523.5	19826.3	10737.9
1.20	38109.0	23064.4	19755.9	10701.1
1.30	36919.2	22576.3	19727.4	10686.3
1.40	35737.0	22074.9	19731.9	10688.9
1.50	34705.4	21636.8	19751.6	10699.5
1.60	33840.5	21277.9	19782.1	10715.8
1.70	33070.9	20966.8	19811.7	10731.7
1.80	32324.7	20664.7	19822.7	10737.5
1.90	31583.4	20356.7	19799.6	10724.8
2.00	30790.6	20007.7	19762.0	10704.6
2.10	30068.0	19695.7	19712.5	10678.2
2.20	29333.4	19365.7	19533.5	10581.2
2.30	28571.7	19007.4	19294.6	10452.5
2.40	27772.0	18614.6	19126.0	10362.2
2.50	26847.6	18125.1	18975.6	10281.8
2.60	25592.8	17393.4	18820.5	10199.0
2.70	23756.7	16237.3	18650.7	10108.4
2.80	21537.6	14793.1	18460.3	10006.7
2.90	20776.8	14359.5	18258.6	9899.0
3.00	20866.4	14477.6	18054.1	9789.8
3.10	20033.5	13914.4	17861.4	9687.2
3.20	19601.3	13641.3	17669.8	9585.3
3.30	19278.3	13431.8	17468.0	9477.8
3.40	18636.7	12993.0	17257.4	9365.4
3.50	18128.9	12652.5	17064.0	9262.6
3.60	17643.3	12322.1	16890.9	9170.9
3.70	17159.6	11987.9	16719.2	9079.9
3.80	16663.7	11643.7	16541.6	8985.6
3.90	16162.5	11297.3	16372.9	8896.3
4.00	15712.1	10988.0	16223.9	8817.7
4.20	14969.4	10472.6	15939.5	8667.7
4.40	14322.9	10018.3	15666.4	8523.7
4.60	13830.2	9667.7	15420.8	8394.5
4.80	13412.8	9360.5	15178.9	8267.1
5.00	13086.1	9113.1	14959.2	8151.7
5.20	12812.6	8896.0	14740.0	8036.6
5.40	12608.4	8721.5	14538.9	7931.2

Table 5.2-1 Unit 1 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)

TIME	BREAK PATH NO.1 FLOW*		BREAK PATH NO.2 FLOW**	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
5.60	12450.6	8573.2	14333.6	7823.5
5.80	12358.4	8465.7	14130.6	7717.1
6.00	12316.1	8384.8	13927.0	7610.4
6.20	13317.6	9013.7	13454.7	7355.9
6.40	12396.6	8335.4	13348.4	7303.8
6.60	11373.7	8022.1	13190.1	7221.8
6.80	9740.8	7371.7	14645.6	8026.2
7.00	9288.9	7099.8	14464.3	7930.9
7.20	9444.5	7114.1	14409.5	7907.2
7.40	9641.4	7149.2	14193.3	7793.7
7.60	9823.3	7194.1	14031.0	7710.6
7.80	9941.2	7205.5	13790.9	7583.8
8.00	9985.3	7176.4	13579.2	7471.9
8.20	9999.9	7141.9	13402.5	7377.9
8.40	9916.3	7052.8	13217.7	7277.6
8.60	9699.0	6893.3	13110.1	7219.4
8.80	9427.9	6726.6	13059.1	7190.7
9.00	9142.9	6578.0	12936.4	7120.2
9.20	8867.7	6449.7	12798.1	7041.2
9.40	8612.8	6333.0	12687.7	6978.9
9.60	8399.6	6232.1	12570.5	6913.1
9.80	8217.8	6131.9	12430.9	6834.8
10.0	8082.2	6043.2	12290.7	6756.4
10.2	7972.1	5957.7	12158.6	6682.9
10.4	7873.0	5873.5	12026.9	6609.5
10.6	7777.2	5791.0	11892.1	6534.1
10.8	7681.1	5711.5	11762.5	6461.8
11.0	7579.9	5633.7	11636.3	6391.4
11.2	7472.7	5558.1	11509.1	6320.4
11.4	7361.7	5485.7	11383.4	6250.4
11.6	7246.2	5415.3	11258.9	6181.2
11.8	7127.0	5347.0	11133.8	6111.8
12.0	7004.5	5280.5	11008.2	6042.2
12.2	6880.2	5216.6	10883.6	5973.4
12.4	6752.4	5153.8	10759.4	5904.9
12.6	6623.4	5094.9	10634.6	5836.3
12.8	6492.4	5037.9	10507.8	5766.7
13.0	6361.9	4981.8	10381.8	5697.6
13.2	6234.9	4926.3	10253.4	5627.4
13.4	6111.0	4871.9	10126.8	5558.1
13.6	5989.8	4819.0	9999.3	5488.4
13.8	5870.4	4767.2	9873.2	5419.5
14.0	5752.8	4717.0	9746.2	5350.1
14.2	5636.9	4667.1	9621.5	5282.1
14.4	5523.7	4618.0	9495.4	5213.4
14.6	5413.7	4570.4	9372.4	5146.4
14.8	5305.4	4524.3	9247.7	5078.7
15.0	5199.1	4479.2	9125.2	5012.2

Table 5.2-1 Unit 1 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)

TIME	BREAK PATH NO.1 FLOW*		BREAK PATH NO.2 FLOW**	
SECONDS	LBM/SEC	THOUSAND BTU/SEC	LBM/SEC	THOUSAND BTU/SEC
15.2	5094.2	4435.5	9002.2	4945.5
15.4	4988.6	4391.4	8878.1	4878.4
15.6	4876.1	4344.1	8742.7	4805.3
15.8	4758.0	4290.0	8606.9	4732.8
16.0	4642.2	4232.2	8474.4	4662.2
16.2	4530.5	4174.1	8335.9	4588.1
16.4	4420.1	4113.9	8192.2	4511.2
16.6	4313.7	4055.8	7919.2	4362.4
16.8	4213.7	4001.6	7801.7	4292.3
17.0	4109.1	3950.0	7608.5	4154.0
17.2	4000.1	3894.0	7436.7	4003.4
17.4	3893.5	3848.3	7513.3	3969.7
17.6	3778.3	3800.8	7286.7	3772.1
17.8	3665.6	3767.3	7444.3	3771.5
18.0	3492.9	3692.0	6763.0	3361.8
18.2	3288.2	3597.6	6376.4	3085.8
18.4	3056.6	3473.9	6009.6	2842.7
18.6	2840.7	3331.0	5591.6	2584.0
18.8	2693.6	3235.6	5287.8	2386.7
19.0	2481.3	3022.2	4973.5	2197.8
19.2	2324.3	2852.1	4719.7	2043.6
19.4	2188.3	2697.9	4530.8	1924.8
19.6	2071.6	2562.5	4282.4	1786.7
19.8	1955.6	2425.4	4080.2	1669.6
20.0	1847.5	2296.6	4028.0	1614.6
20.2	1726.3	2150.0	5672.2	2233.5
20.4	1565.5	1953.7	7168.5	2833.2
20.6	1456.8	1822.9	5132.6	2045.4
20.8	1381.4	1731.4	4200.5	1684.6
21.0	1318.1	1654.2	2941.6	1179.1
21.2	1240.5	1558.3	2227.0	866.3
21.4	1154.4	1452.1	3310.0	1162.3
21.6	1076.8	1355.9	5459.1	1838.2
21.8	989.4	1247.5	5504.7	1826.8
22.0	909.7	1148.8	4712.0	1554.3
22.2	833.7	1053.8	4128.7	1353.4
22.4	766.6	969.9	3677.0	1193.2
22.6	704.1	891.5	3412.0	1089.8
22.8	638.8	809.3	3190.1	998.7
23.0	585.0	741.8	2918.4	895.2
23.2	521.8	662.0	2652.1	797.9
23.4	496.7	630.7	2364.0	698.1
23.6	465.5	591.3	2054.8	596.2
23.8	434.0	551.5	1707.7	487.5
24.0	398.4	506.5	1314.2	369.9
24.2	358.5	456.1	872.7	243.1
24.4	316.6	402.9	434.0	120.2
24.6	273.8	348.6	110.7	30.6

Table 5.2-1 Unit 1 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)

TIME	BREAK PATH NO.1 FLOW*		BREAK PATH NO.2 FLOW**	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
24.8	230.6	293.7	.0	.0
25.0	189.0	240.9	.0	.0
25.2	143.3	182.9	.0	.0
25.4	96.3	123.0	135.5	38.0
25.6	54.1	69.2	122.4	34.3
25.8	15.4	19.8	98.1	27.6
26.0	.0	.0	65.0	18.3
26.2	.0	.0	.0	.0

* Mass and energy release from the steam generator side of the break
** Mass and energy release from the pump side of the break

Table 5.2-2 Unit 2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases

TIME	BREAK PATH NO.1 FLOW*		BREAK PATH NO.2 FLOW**	
SECONDS	LBM/SEC	THOUSAND BTU/SEC	LBM/SEC	THOUSAND BTU/SEC
.00000	.0	.0	.0	.0
.00111	87155.8	47083.7	40441.1	21798.9
.101	40172.8	21718.5	21070.4	11352.2
.201	40815.6	22204.2	22973.4	12385.1
.302	41645.9	22845.2	23181.1	12507.9
.402	43718.0	24219.2	22860.6	12348.4
.501	43542.2	24394.1	22216.8	12010.5
.601	43920.3	24897.1	21558.1	11661.2
.701	44174.3	25320.3	21020.5	11375.0
.802	43870.1	25405.5	20541.2	11118.6
.902	42977.4	25118.5	20185.2	10927.9
1.00	41918.1	24715.1	19954.8	10805.6
1.10	40862.6	24302.0	19819.0	10733.8
1.20	39833.2	23898.7	19747.4	10696.4
1.30	38792.7	23488.6	19718.1	10681.2
1.40	37720.0	23054.9	19723.0	10684.1
1.50	36637.8	22603.6	19745.9	10696.4
1.60	35618.9	22171.6	19782.1	10715.9
1.70	34727.8	21800.6	19816.1	10734.4
1.80	33913.9	21464.4	19830.8	10742.3
1.90	33114.6	21129.4	19812.2	10732.1
2.00	32318.3	20791.6	19781.7	10715.9
2.10	31476.2	20417.1	19740.3	10694.1
2.20	30716.3	20088.6	19563.5	10598.3
2.30	29920.3	19723.5	19331.6	10473.4
2.40	29077.8	19316.3	19166.7	10385.1
2.50	28234.7	18895.7	19019.5	10306.5
2.60	27389.8	18460.2	18871.0	10227.2
2.70	26291.5	17836.0	18702.3	10137.1
2.80	24749.5	16885.5	18511.6	10035.2
2.90	22255.1	15251.8	18315.1	9930.2
3.00	20607.4	14204.9	18120.8	9826.5
3.10	20775.3	14405.1	17933.6	9726.8
3.20	20371.6	14149.2	17744.7	9626.1
3.30	19514.8	13569.0	17549.1	9521.8
3.40	19154.2	13344.6	17349.1	9415.1
3.50	18740.2	13069.3	17149.4	9308.5
3.60	18218.0	12712.0	16969.8	9213.0
3.70	17800.2	12426.6	16798.6	9122.0
3.80	17368.9	12127.1	16625.7	9030.1
3.90	16909.8	11806.6	16451.8	8937.5
4.00	16474.4	11503.8	16292.0	8852.6
4.20	15725.5	10979.4	16001.7	8698.9
4.40	15054.6	10503.1	15717.1	8547.9
4.60	14499.6	10106.5	15463.5	8413.8
4.80	14062.9	9784.1	15215.8	8282.6
5.00	13682.2	9496.5	14981.4	8158.5
5.20	13400.3	9273.4	14762.0	8042.6
5.40	13161.2	9072.3	14542.0	7926.1

Table 5.2-2 Unit 2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)

TIME	BREAK PATH NO.1 FLOW*		BREAK PATH NO.2 FLOW**	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
5.60	12996.3	8918.3	14340.9	7820.0
5.80	12886.1	8795.2	14114.8	7700.2
6.00	12831.6	8705.2	13887.0	7579.5
6.20	13839.7	9332.2	13411.3	7323.2
6.40	12813.8	8578.5	13308.8	7271.6
6.60	11890.4	8237.8	13603.1	7442.4
6.80	10288.2	7613.9	14649.6	8013.4
7.00	9549.6	7235.0	14395.2	7877.8
7.20	9605.7	7203.9	14337.3	7850.9
7.40	9859.1	7272.9	14139.3	7746.4
7.60	10146.4	7372.7	13959.9	7652.8
7.80	10422.7	7473.3	13749.2	7541.5
8.00	10641.1	7539.7	13523.2	7421.0
8.20	10802.4	7577.5	13325.2	7315.0
8.40	10844.9	7547.2	13192.1	7243.9
8.60	10645.0	7373.2	13128.5	7209.6
8.80	10315.1	7145.3	13015.9	7146.1
9.00	9972.0	6932.1	12878.3	7068.1
9.20	9605.4	6717.6	12776.6	7010.6
9.40	9328.5	6582.6	12681.4	6956.9
9.60	9098.0	6482.9	12556.7	6886.9
9.80	8863.8	6362.6	12422.4	6812.1
10.0	8696.3	6269.8	12297.4	6743.1
10.2	8551.0	6180.6	12173.0	6674.5
10.2	8550.1	6180.0	12172.3	6674.1
10.4	8399.4	6083.3	12046.3	6604.1
10.6	8253.5	5990.2	11911.9	6529.5
10.8	8104.6	5897.4	11787.4	6460.6
11.0	7953.4	5807.1	11667.2	6393.8
11.2	7803.6	5722.1	11539.9	6323.1
11.4	7654.7	5640.0	11415.5	6254.1
11.6	7510.5	5562.1	11291.8	6185.6
11.8	7369.9	5486.4	11166.2	6116.0
12.0	7233.3	5413.1	11040.4	6046.4
12.2	7100.3	5342.4	10915.6	5977.5
12.4	6967.7	5272.0	10790.3	5908.3
12.6	6838.7	5205.4	10668.5	5841.2
12.8	6710.3	5141.2	10541.9	5771.5
13.0	6582.9	5077.0	10418.5	5703.8
13.2	6458.9	5013.3	10293.8	5635.3
13.4	6339.2	4950.8	10170.6	5567.7
13.6	6222.9	4889.7	10047.4	5500.1
13.8	6109.4	4830.4	9926.2	5433.7
14.0	5998.4	4771.8	9805.3	5367.4
14.2	5889.6	4714.1	9686.4	5302.3
14.4	5783.2	4657.6	9568.2	5237.6
14.6	5679.1	4602.1	9451.8	5174.0
14.8	5577.3	4547.8	9335.9	5110.7

Table 5.2-2 Unit 2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)

TIME	BREAK PATH NO.1 FLOW*		BREAK PATH NO.2 FLOW**	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
15.0	5477.9	4494.7	9221.8	5048.5
15.2	5380.9	4443.7	9108.9	4987.1
15.4	5282.7	4391.7	8994.7	4924.9
15.6	5177.4	4334.4	8866.5	4855.3
15.8	5064.8	4270.2	8739.7	4787.0
16.0	4950.6	4199.5	8615.6	4720.6
16.2	4841.8	4125.6	8487.1	4651.6
16.4	4740.1	4051.9	8363.2	4585.2
16.6	4641.9	3977.9	8236.1	4517.2
16.8	4547.2	3905.0	8060.6	4421.9
17.0	4461.2	3837.6	7918.4	4345.0
17.2	4380.6	3774.0	7673.2	4191.5
17.4	4308.5	3721.8	7804.5	4225.8
17.6	4234.7	3672.0	7386.6	3944.1
17.8	4164.2	3631.0	7958.3	4187.8
18.0	4085.6	3591.2	7133.8	3687.6
18.2	4006.4	3559.3	8622.0	4402.9
18.4	3909.7	3523.1	6428.3	3245.2
18.6	3829.3	3509.0	9368.6	4636.0
18.8	3698.7	3460.1	12134.1	6113.5
19.0	3531.0	3400.5	11373.1	5781.2
19.2	3477.8	3463.6	4787.5	2412.1
19.4	3359.6	3451.6	11705.6	5658.1
19.6	3096.6	3333.0	9570.5	4755.8
19.8	2897.8	3276.8	4288.9	2121.9
20.0	2691.1	3157.3	4947.9	2240.9
20.2	2520.0	3041.6	4771.9	2111.4
20.4	2317.5	2832.3	4606.5	2000.7
20.6	2168.7	2666.3	4308.7	1836.5
20.8	2024.9	2499.2	4021.5	1674.8
21.0	1898.5	2350.1	3792.3	1538.8
21.2	1782.2	2211.3	3559.4	1411.4
21.4	1670.0	2076.0	3497.9	1357.7
21.6	1564.7	1948.8	3566.5	1357.6
21.8	1459.7	1820.9	3650.2	1367.9
22.0	1363.5	1703.7	3644.2	1348.1
22.2	1269.5	1588.5	3618.5	1320.5
22.4	1183.8	1483.3	3777.1	1352.1
22.6	1093.4	1371.4	4044.1	1413.1
22.8	1008.7	1267.4	4291.7	1461.3
23.0	920.3	1157.8	4109.0	1372.2
23.2	838.4	1055.8	3924.3	1289.7
23.4	759.5	957.3	3731.5	1207.9
23.6	683.9	862.6	3510.4	1119.5
23.8	603.7	762.0	3241.1	1017.7
24.0	527.3	666.2	2923.7	903.5
24.2	459.0	580.3	2633.9	801.0
24.4	400.8	507.0	2333.2	698.3

Table 5.2-2 Unit 2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)

TIME	BREAK PATH NO.1 FLOW*		BREAK PATH NO.2 FLOW**	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
24.6	362.7	459.2	2017.2	594.4
24.8	316.8	401.2	1679.8	487.9
25.0	281.5	356.7	1324.4	379.9
25.2	255.7	324.2	933.7	265.2
25.4	227.0	288.0	510.1	144.0
25.6	195.0	247.5	109.5	30.9
25.8	160.7	204.1	.0	.0
26.0	121.8	154.9	.0	.0
26.2	76.4	97.3	.0	.0
26.4	20.0	25.5	.0	.0
26.6	.0	.0	.0	.0

* Mass and energy release from the steam generator side of the break
** Mass and energy release from the pump side of the break

Table 5.2-3 Unit 1 Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

TIME SECONDS	BREAK PATH NO.1 FLOW LBM/SEC	BREAK PATH NO.1 FLOW THOUSAND BTU/SEC	BREAK PATH NO.2 FLOW LBM/SEC	BREAK PATH NO.2 FLOW THOUSAND BTU/SEC
26.2	.0	.0	.0	.0
26.7	.0	.0	.0	.0
26.9	.0	.0	.0	.0
27.0	.0	.0	.0	.0
27.1	.0	.0	.0	.0
27.2	.0	.0	.0	.0
27.2	.0	.0	.0	.0
27.3	36.8	43.3	.0	.0
27.4	15.4	18.2	.0	.0
27.5	15.0	17.7	.0	.0
27.6	20.9	24.6	.0	.0
27.7	27.6	32.5	.0	.0
27.8	32.0	37.7	.0	.0
27.9	36.0	42.4	.0	.0
28.1	40.5	47.7	.0	.0
28.2	45.0	53.0	.0	.0
28.3	48.0	56.6	.0	.0
28.4	51.1	60.2	.0	.0
28.5	54.1	63.7	.0	.0
28.6	56.9	67.0	.0	.0
28.6	58.3	68.7	.0	.0
28.7	59.6	70.3	.0	.0
28.8	62.3	73.4	.0	.0
28.9	64.8	76.4	.0	.0
29.0	67.3	79.3	.0	.0
29.1	69.8	82.2	.0	.0
29.2	72.1	85.0	.0	.0
29.3	74.4	87.7	.0	.0
30.3	94.8	111.7	.0	.0
31.3	111.9	131.9	.0	.0
32.3	126.8	149.5	.0	.0
33.3	140.1	165.3	.0	.0
33.7	148.3	175.0	14.4	2.0
34.3	303.6	359.1	3053.2	439.5
35.3	406.4	481.6	4210.5	637.4
36.3	441.0	522.9	4580.5	672.9
37.3	434.7	515.4	4520.5	666.1
38.3	428.2	507.6	4458.0	658.7
38.4	427.5	506.9	4451.7	657.9
39.3	421.8	500.0	4395.6	651.2
40.3	415.5	492.5	4334.2	643.7
41.3	409.5	485.3	4274.0	636.4
42.3	403.6	478.2	4215.2	629.3
43.3	397.9	471.5	4158.0	622.3
43.9	394.6	467.5	4124.4	618.2
44.3	392.4	464.9	4102.3	615.5
45.3	387.1	458.6	4048.2	608.9
46.3	382.0	452.5	3995.5	602.5

Table 5.2-3 (cont.) Unit 1 Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
47.3	377.1	446.6	3944.3	596.3
48.3	372.3	440.9	3894.4	590.2
49.3	367.7	435.4	3845.9	584.3
50.2	363.6	430.6	3803.4	579.1
50.3	363.2	430.0	3798.7	578.5
51.3	358.9	424.9	3752.8	572.9
52.3	354.7	419.9	3708.0	567.4
53.3	350.6	415.0	3664.3	562.1
54.4	288.1	340.7	2937.9	481.5
55.4	285.2	337.2	2902.6	477.4
56.4	390.0	461.8	313.4	217.8
57.2	408.7	484.4	321.6	229.7
57.4	407.7	483.2	321.1	229.1
58.4	401.0	475.1	318.0	224.9
59.4	394.1	467.0	314.8	220.6
60.4	387.5	459.0	311.7	216.5
61.4	381.0	451.2	308.7	212.5
62.4	374.6	443.6	305.7	208.5
63.4	368.1	435.9	302.7	204.6
64.4	362.1	428.8	300.0	200.9
65.4	356.5	422.0	297.4	197.5
66.4	351.0	415.4	294.8	194.1
67.4	345.6	409.0	292.4	190.8
68.4	340.3	402.7	290.0	187.7
69.4	335.2	396.6	287.6	184.6
70.4	330.2	390.7	285.3	181.6
71.4	325.3	384.9	283.1	178.6
72.4	320.5	379.2	280.9	175.8
73.4	315.9	373.7	278.8	173.0
74.4	311.3	368.3	276.8	170.3
75.4	306.9	363.0	274.8	167.7
76.4	302.6	357.9	272.8	165.1
77.4	298.4	352.8	270.9	162.7
78.4	294.3	348.0	269.1	160.3
79.4	290.3	343.2	267.3	157.9
80.4	286.4	338.6	265.6	155.7
81.4	282.6	334.1	263.8	153.5
82.4	278.9	329.7	262.2	151.3
83.4	275.4	325.5	260.6	149.3
84.4	271.9	321.3	259.0	147.2
85.4	268.5	317.3	257.5	145.3
86.4	265.2	313.4	256.1	143.4
87.4	262.0	309.6	254.6	141.6
88.7	258.0	304.8	252.9	139.3
89.4	255.9	302.3	251.9	138.1
91.4	250.1	295.5	249.4	134.8
93.4	244.7	289.0	247.0	131.8
95.4	239.5	282.9	244.7	128.9

Table 5.2-3 (cont.) Unit 1 Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

TIME SECONDS	BREAK PATH NO.1 FLOW LBM/SEC	BREAK PATH NO.1 FLOW THOUSAND BTU/SEC	BREAK PATH NO.2 FLOW LBM/SEC	BREAK PATH NO.2 FLOW THOUSAND BTU/SEC
97.4	234.7	277.2	242.6	126.2
99.4	230.2	271.9	240.7	123.7
101.4	226.0	266.8	238.8	121.3
103.4	222.0	262.1	237.1	119.2
105.4	218.3	257.7	235.5	117.1
107.4	214.8	253.6	234.0	115.2
109.4	211.6	249.8	232.6	113.5
109.5	211.4	249.6	232.6	113.4
111.4	208.5	246.2	231.4	111.8
113.4	205.7	242.9	230.2	110.3
115.4	203.1	239.8	229.1	108.9
117.4	200.7	236.9	228.0	107.6
119.4	198.5	234.3	227.1	106.4
121.4	196.4	231.8	226.2	105.3
123.4	194.5	229.6	225.4	104.2
125.4	192.8	227.5	224.6	103.3
127.4	191.2	225.6	224.0	102.4
129.4	189.7	223.9	223.3	101.6
131.4	188.3	222.3	222.8	100.9
133.4	187.1	220.8	222.2	100.2
133.5	187.1	220.8	222.2	100.2
135.4	186.0	219.5	221.8	99.6
137.4	185.0	218.3	221.3	99.1
139.4	184.1	217.3	220.9	98.6
141.4	183.3	216.3	220.6	98.1
143.4	182.6	215.4	220.3	97.7
145.4	181.9	214.7	220.0	97.4
147.4	181.3	214.0	219.7	97.1
149.4	180.8	213.4	219.5	96.8
151.4	180.4	212.9	219.3	96.5
153.4	180.0	212.4	219.1	96.3
155.4	179.7	212.0	218.9	96.1
157.4	179.4	211.6	218.8	95.9
159.4	179.1	211.4	218.7	95.7
159.7	179.1	211.3	218.7	95.7
161.4	178.9	211.1	218.6	95.6
163.4	178.8	210.9	218.5	95.5
165.4	178.7	210.8	218.4	95.4
167.4	178.6	210.7	218.4	95.4
169.4	178.5	210.7	218.3	95.3
171.4	178.5	210.6	218.3	95.3
173.4	178.8	210.9	218.4	95.4
175.4	179.5	211.8	219.4	95.8
177.4	180.4	212.9	221.4	96.4
179.4	181.6	214.3	224.2	97.2
181.4	182.8	215.8	227.7	98.2
183.4	184.1	217.3	231.6	99.2
185.4	185.4	218.8	235.7	100.2
187.3	186.4	220.0	239.8	101.1

Table 5.2-4 Unit 2 Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
26.6	.0	.0	.0	.0
27.2	.0	.0	.0	.0
27.3	.0	.0	.0	.0
27.4	.0	.0	.0	.0
27.5	.0	.0	.0	.0
27.6	.0	.0	.0	.0
27.6	.0	.0	.0	.0
27.7	45.4	53.4	.0	.0
27.8	17.4	20.5	.0	.0
27.9	12.9	15.2	.0	.0
28.0	14.6	17.2	.0	.0
28.1	25.3	29.9	.0	.0
28.2	29.9	35.2	.0	.0
28.3	34.1	40.1	.0	.0
28.4	38.9	45.9	.0	.0
28.5	41.3	48.7	.0	.0
28.6	45.6	53.8	.0	.0
28.7	48.8	57.5	.0	.0
28.8	51.9	61.1	.0	.0
28.9	54.8	64.6	.0	.0
29.0	57.6	67.9	.0	.0
29.1	58.3	68.7	.0	.0
29.1	60.3	71.1	.0	.0
29.2	63.0	74.2	.0	.0
29.3	65.5	77.2	.0	.0
29.4	68.0	80.1	.0	.0
29.5	70.4	82.9	.0	.0
29.6	72.7	85.7	.0	.0
30.6	93.4	110.0	.0	.0
31.6	110.6	130.4	.0	.0
32.6	125.7	148.2	.0	.0
33.6	139.1	164.1	.0	.0
34.2	146.0	172.2	.0	.0
34.6	153.9	181.5	225.1	31.4
35.7	419.5	496.7	4367.1	590.5
36.7	435.8	516.6	4418.1	655.3
37.7	430.8	510.6	4371.0	650.7
38.7	424.8	503.5	4314.1	644.0
39.0	423.0	501.4	4296.9	642.0
39.7	418.9	496.4	4256.7	637.1
40.7	413.0	489.4	4199.8	630.3
41.7	407.3	482.6	4143.8	623.5
42.7	401.8	476.0	4089.0	616.8
43.7	396.5	469.6	4035.5	610.3
44.5	392.3	464.6	3993.7	605.1
44.7	391.3	463.4	3983.4	603.9
45.7	386.3	457.4	3932.6	597.7
46.7	381.4	451.6	3883.1	591.6

Table 5.2-4 (cont.) Unit 2 Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC.	BTU/SEC.	LBM/SEC	BTU/SEC.
47.7	376.7	446.0	3834.9	585.7
48.7	372.2	440.6	3788.0	579.9
49.7	367.8	435.4	3742.3	574.3
50.7	363.5	430.3	3697.8	568.9
50.9	362.7	429.3	3689.0	567.8
51.7	359.4	425.4	3654.4	563.6
52.7	355.4	420.6	3612.1	558.4
53.7	351.5	416.0	3570.8	553.3
54.7	347.7	411.5	3530.6	548.3
55.8	286.6	338.8	2821.9	469.8
56.8	283.9	335.6	2790.6	465.9
57.8	387.9	459.2	308.5	210.7
58.0	411.7	487.8	318.8	225.3
58.8	424.3	502.9	324.2	233.1
59.8	417.3	494.5	320.9	228.8
60.8	409.9	485.6	317.6	224.3
61.8	402.6	477.0	314.3	219.9
62.8	395.6	468.6	311.0	215.6
63.8	388.6	460.2	307.9	211.4
64.8	381.6	451.8	304.7	207.1
65.8	375.2	444.3	301.8	203.3
66.8	369.1	436.9	299.0	199.6
67.8	363.0	429.8	296.3	196.0
68.8	357.2	422.8	293.7	192.5
69.8	351.5	415.9	291.1	189.1
70.8	345.9	409.3	288.6	185.8
71.7	340.9	403.4	286.4	182.9
71.8	340.4	402.8	286.1	182.6
72.8	335.1	396.4	283.8	179.5
73.8	329.9	390.3	281.4	176.5
74.8	324.8	384.2	279.2	173.5
75.8	319.9	378.4	277.0	170.6
76.8	315.1	372.6	274.9	167.8
77.8	310.4	367.0	272.8	165.1
78.8	305.8	361.6	270.8	162.5
79.8	301.4	356.3	268.8	159.9
80.8	297.0	351.2	266.9	157.5
81.8	292.8	346.1	265.1	155.1
82.8	288.7	341.2	263.3	152.7
83.8	284.7	336.5	261.5	150.5
84.8	280.8	331.9	259.8	148.3
85.8	277.1	327.4	258.2	146.2
86.8	273.4	323.1	256.6	144.1
87.8	269.8	318.8	255.1	142.1
88.6	267.1	315.6	253.9	140.6
89.8	263.0	310.8	252.1	138.3
91.8	256.6	303.2	249.4	134.8
93.8	250.6	296.0	246.8	131.5

Table 5.2-4 (cont.) Unit 2 Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
95.8	244.9	289.3	244.4	128.4
97.8	239.6	283.0	242.1	125.5
99.8	234.6	277.1	240.0	122.8
101.8	230.0	271.6	238.0	120.3
103.8	225.6	266.4	236.2	118.0
105.8	221.6	261.6	234.5	115.8
107.8	217.8	257.1	232.9	113.8
109.0	215.6	254.6	232.0	112.7
109.8	214.3	252.9	231.5	111.9
111.8	211.0	249.0	230.1	110.2
113.8	207.9	245.4	228.8	108.6
115.8	205.1	242.1	227.7	107.1
117.8	202.5	239.0	226.6	105.8
119.8	200.1	236.2	225.6	104.5
121.8	197.9	233.6	224.7	103.4
123.8	195.9	231.2	223.9	102.3
125.8	194.0	229.0	223.1	101.3
127.8	192.3	226.9	222.4	100.4
129.8	190.8	225.1	221.7	99.6
131.8	189.3	223.4	221.2	98.9
132.7	188.8	222.7	220.9	98.6
133.8	188.1	221.9	220.6	98.2
135.8	186.9	220.5	220.1	97.6
137.8	185.9	219.3	219.7	97.1
139.8	184.9	218.2	219.3	96.6
141.8	184.1	217.2	219.0	96.1
143.8	183.3	216.3	218.6	95.7
145.8	182.7	215.5	218.4	95.3
147.8	182.1	214.8	218.1	95.0
149.8	181.6	214.2	217.9	94.7
151.8	181.1	213.7	217.7	94.5
153.8	180.7	213.2	217.5	94.3
155.8	180.4	212.8	217.4	94.1
157.8	180.1	212.5	217.2	93.9
158.8	180.0	212.4	217.2	93.8
159.8	179.9	212.2	217.1	93.8
161.8	179.7	212.0	217.0	93.6
163.8	179.6	211.8	216.9	93.5
165.8	179.5	211.7	216.9	93.5
167.8	179.4	211.7	216.8	93.4
169.8	179.4	211.6	216.8	93.4
171.8	179.4	211.6	216.8	93.3
173.8	179.4	211.7	216.8	93.3
175.8	179.5	211.7	216.8	93.3
177.8	179.8	212.2	216.9	93.5
179.8	180.7	213.2	218.1	94.0
181.8	181.7	214.4	220.2	94.6

Table 5.2-4 (cont.) Unit 2 Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
183.8	182.9	215.9	223.1	95.5
185.8	184.3	217.5	226.7	96.5
186.4	184.7	217.9	227.8	96.8

Table 5.2-5 Unit 1 Double-Ended Pump Suction Break Principal Parameters During Reflood (Minimum Safeguards)

TIME SECONDS	FLOODING TEMP DEGREE F	FLOODING RATE IN/SEC	CARRYOVER FRACTION	CORE HEIGHT FT	DOWNCOMER HEIGHT FT	FLOW FRACTION	INJECTION TOTAL (POUNDS MASS PER SECOND)	INJECTION ACCUMULATOR (POUNDS MASS PER SECOND)	INJECTION SPILL (POUNDS MASS PER SECOND)	ENTHALPY BTU/LBM
26.2	183.6	.000	.000	.00	.00	.250	.0	.0	.0	.00
26.9	182.1	20.934	.000	.50	1.16	.000	6835.6	6835.6	.0	89.48
27.2	180.6	24.747	.000	1.09	1.23	.000	6775.7	6775.7	.0	89.48
27.5	180.2	2.715	.111	1.32	1.84	.198	6688.5	6688.5	.0	89.48
27.6	180.2	2.815	.130	1.34	2.06	.226	6669.6	6669.6	.0	89.48
28.6	180.4	2.360	.301	1.50	4.26	.321	6483.1	6483.1	.0	89.48
29.3	180.6	2.287	.380	1.58	5.72	.335	6371.8	6371.8	.0	89.48
33.7	181.9	2.565	.618	2.00	15.18	.364	5723.1	5723.1	.0	89.48
36.3	182.6	4.293	.684	2.29	16.12	.587	5382.1	4849.2	.0	87.35
37.3	182.9	4.169	.696	2.40	16.12	.585	5289.4	4754.9	.0	87.31
38.4	183.2	4.058	.706	2.51	16.12	.583	5194.0	4657.7	.0	87.26
43.9	185.4	3.692	.728	3.00	16.12	.574	4783.0	4238.3	.0	87.03
50.2	188.4	3.428	.737	3.50	16.12	.563	4403.7	3851.3	.0	86.79
55.4	191.1	2.919	.738	3.87	16.12	.518	3384.9	2814.7	.0	85.86
56.4	191.7	3.577	.742	3.94	16.07	.586	547.8	.0	.0	68.00
57.2	192.2	3.658	.742	4.00	15.95	.589	540.1	.0	.0	68.00
64.4	197.1	3.278	.743	4.53	14.98	.581	551.1	.0	.0	68.00
71.4	202.7	2.984	.743	5.00	14.30	.574	559.2	.0	.0	68.00
80.4	210.5	2.676	.743	5.55	13.70	.563	567.1	.0	.0	68.00
88.7	217.9	2.452	.743	6.00	13.37	.554	572.0	.0	.0	68.00
99.4	227.2	2.233	.743	6.54	13.20	.543	576.3	.0	.0	68.00
109.5	234.6	2.084	.744	7.00	13.22	.533	579.0	.0	.0	68.00
121.4	242.1	1.964	.746	7.51	13.41	.525	581.1	.0	.0	68.00
133.5	248.6	1.886	.748	8.00	13.72	.519	582.3	.0	.0	68.00
147.4	255.1	1.834	.751	8.54	14.18	.515	583.1	.0	.0	68.00
159.7	260.2	1.808	.755	9.00	14.62	.514	583.4	.0	.0	68.00
171.4	264.4	1.794	.759	9.43	15.07	.514	583.5	.0	.0	68.00
173.4	265.1	1.794	.759	9.50	15.15	.514	583.5	.0	.0	68.00
187.3	269.6	1.822	.764	10.00	15.62	.524	582.4	.0	.0	68.00

Table 5.2-6 Unit 2 Double-Ended Pump Suction Break Principal Parameters During Reflood (Minimum Safeguards)

TIME SECONDS	FLOODING TEMP DEGREE F	FLOODING RATE IN/SEC	CARRYOVER FRACTION	CORE HEIGHT FT	DOWNCOMER HEIGHT FT	FLOW FRACTION	INJECTION TOTAL (POUNDS MASS PER SECOND)	INJECTION ACCUMULATOR (POUNDS MASS PER SECOND)	INJECTION SPILL (POUNDS MASS PER SECOND)	ENTHALPY BTU/LBM
26.6	176.6	.000	.000	.00	.00	.250	.0	.0	.0	.00
27.4	175.0	22.231	.000	.65	1.13	.000	6463.8	6463.8	.0	89.48
27.6	174.1	23.689	.000	1.04	1.16	.000	6428.2	6428.2	.0	89.48
27.9	173.8	2.578	.104	1.31	1.70	.188	6347.7	6347.7	.0	89.48
28.1	173.8	2.770	.141	1.35	2.13	.250	6313.8	6313.8	.0	89.48
29.1	174.0	2.341	.299	1.50	4.10	.325	6154.9	6154.9	.0	89.48
30.6	174.5	2.270	.459	1.69	7.41	.351	5919.2	5919.2	.0	89.48
34.2	175.9	2.526	.615	2.00	14.50	.369	5463.2	5463.2	.0	89.48
36.7	176.8	4.285	.680	2.26	16.12	.584	5227.9	4690.5	.0	87.27
37.7	177.2	4.163	.693	2.37	16.12	.583	5138.3	4599.8	.0	87.23
39.0	177.8	4.035	.705	2.51	16.12	.581	5033.0	4492.6	.0	87.17
44.5	180.5	3.684	.728	3.00	16.12	.572	4649.3	4101.4	.0	86.95
50.9	184.2	3.427	.737	3.51	16.12	.562	4288.0	3733.1	.0	86.70
56.8	187.6	2.915	.738	3.92	16.12	.517	3270.6	2698.7	.0	85.72
57.8	188.2	3.586	.743	3.99	16.09	.589	552.8	.0	.0	68.00
58.0	188.4	3.704	.743	4.00	16.06	.593	544.0	.0	.0	68.00
58.8	188.9	3.752	.743	4.07	15.93	.595	538.7	.0	.0	68.00
64.8	193.5	3.406	.744	4.52	15.05	.589	548.8	.0	.0	68.00
71.7	199.4	3.083	.744	5.00	14.30	.581	557.7	.0	.0	68.00
79.8	206.8	2.773	.743	5.51	13.67	.572	565.7	.0	.0	68.00
88.6	215.0	2.505	.743	6.00	13.26	.561	571.6	.0	.0	68.00
99.8	225.1	2.253	.743	6.57	13.04	.548	576.5	.0	.0	68.00
109.0	232.1	2.105	.744	7.00	13.05	.539	579.2	.0	.0	68.00
121.8	240.4	1.965	.745	7.56	13.24	.529	581.5	.0	.0	68.00
132.7	246.4	1.891	.747	8.00	13.52	.523	582.7	.0	.0	68.00
145.8	252.8	1.837	.750	8.51	13.94	.519	583.5	.0	.0	68.00
158.8	258.3	1.807	.754	9.00	14.41	.518	583.8	.0	.0	68.00
173.8	263.9	1.791	.758	9.55	14.99	.517	583.9	.0	.0	68.00
175.8	264.6	1.790	.759	9.62	15.07	.517	583.9	.0	.0	68.00
186.4	268.1	1.810	.763	10.00	15.47	.524	583.3	.0	.0	68.00

Table 5.2-7 Unit 1 Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Minimum Safeguards) without Recirculation Sprays

TIME SECONDS	BREAK PATH NO.1 FLOW LBM/SEC	BREAK PATH NO.1 FLOW THOUSAND BTU/SEC	BREAK PATH NO.2 FLOW LBM/SEC	BREAK PATH NO.2 FLOW THOUSAND BTU/SEC
187.4	217.6	271.3	375.7	134.4
192.4	217.3	271.0	376.0	134.3
197.4	217.1	270.7	376.2	134.1
202.4	215.9	269.2	377.4	134.1
207.4	215.9	269.2	377.4	133.9
212.4	214.9	267.9	378.4	133.9
217.4	214.8	267.9	378.5	133.7
222.4	214.8	267.8	378.5	133.5
227.4	213.7	266.5	379.6	133.6
232.4	213.6	266.3	379.7	133.3
237.4	213.5	266.2	379.9	133.1
242.4	212.3	264.8	381.0	133.2
247.4	212.2	264.5	381.2	133.0
252.4	211.9	264.3	381.4	132.8
257.4	210.8	262.8	382.5	132.9
262.4	210.5	262.5	382.8	132.7
267.4	210.2	262.1	383.1	132.6
272.4	209.9	261.7	383.4	132.4
277.4	209.6	261.3	383.7	132.3
282.4	209.2	260.9	384.1	132.1
287.4	207.9	259.2	385.4	132.2
292.4	207.5	258.7	385.9	132.1
297.4	207.0	258.1	386.3	132.0
302.4	206.5	257.5	386.8	131.9
307.4	205.9	256.8	387.4	131.8
312.4	205.4	256.1	388.0	131.7
317.4	205.6	256.3	387.7	131.4
322.4	204.9	255.5	388.4	131.3
327.4	204.2	254.6	389.1	131.2
332.4	203.4	253.6	389.9	131.2
337.4	203.4	253.6	389.9	131.0
342.4	202.5	252.5	390.8	130.9
347.4	202.3	252.3	391.0	130.7
352.4	201.3	251.0	392.0	130.8
357.4	201.0	250.6	392.3	130.6
362.4	200.6	250.1	392.7	130.4
367.4	200.1	249.5	393.2	130.3
372.4	199.5	248.8	393.8	130.2
377.4	198.8	247.9	394.5	130.2
382.4	198.0	246.8	395.3	130.1
387.4	197.7	246.5	395.6	129.9
392.4	197.3	246.0	396.0	129.8
397.4	196.7	245.3	396.6	129.7
402.4	196.0	244.4	397.3	129.6
407.4	195.1	243.3	398.2	129.6
412.4	194.7	242.7	398.7	129.5
417.4	194.5	242.5	398.8	129.3
422.4	204.3	254.7	389.0	131.8

Table 5.2-7 (cont.) Unit 1 Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Minimum Safeguards) without Recirculation Sprays

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
427.4	203.7	254.0	389.6	131.7
432.4	203.4	253.6	389.9	131.5
437.4	202.7	252.7	390.6	131.5
442.4	202.2	252.1	391.1	131.3
447.4	201.7	251.5	391.6	131.2
452.4	200.8	250.4	392.5	131.1
457.4	200.2	249.7	393.1	131.0
462.4	90.6	113.0	502.7	159.7
647.6	90.6	113.0	502.7	159.7
647.7	92.9	115.1	500.4	153.9
652.4	92.8	114.9	500.5	153.6
1411.1	92.8	114.9	500.5	153.6
1411.2	77.7	89.4	515.6	43.5
1748.3	73.7	84.8	519.6	44.2
1748.4	73.7	84.8	353.7	78.7
3000.0	64.9	74.7	362.4	80.2
3000.1	64.9	74.7	366.6	68.0
3600.0	61.3	70.5	370.2	68.7
3600.1	50.8	58.5	380.7	55.2
7000.0	41.1	47.3	390.5	56.6
7000.1	40.5	46.7	391.5	51.7
10000.0	36.5	42.0	395.5	52.2
10000.1	36.2	41.6	395.8	49.1
50000.0	23.7	27.2	408.3	50.6
50000.1	23.1	26.6	408.9	40.9
100000.0	18.9	21.8	413.1	41.3
100000.1	18.7	21.5	413.3	35.5
500000.0	10.8	12.4	421.2	36.2
500000.1	10.7	12.4	421.3	33.7
800000.0	8.7	10.0	423.3	33.9
800000.1	8.7	10.0	423.3	32.2
1000000.0	7.9	9.1	424.1	32.2
1000000.1	7.9	9.1	424.1	31.8
5000000.0	3.8	4.3	428.2	32.1
5000000.1	3.7	4.3	428.3	30.0
10000000.0	2.5	2.8	429.5	30.1

Table 5.2-8 Unit 2 Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Minimum Safeguards) without Recirculation Sprays

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
186.4	227.9	284.0	365.4	135.2
191.4	227.3	283.3	366.0	135.1
196.4	226.7	282.5	366.6	135.0
201.4	226.2	281.9	367.1	134.9
206.4	225.8	281.4	367.5	134.7
211.4	225.5	280.9	367.8	134.6
216.4	225.1	280.4	368.2	134.4
221.4	224.6	279.9	368.7	134.3
226.4	224.2	279.4	369.1	134.2
231.4	223.7	278.8	369.6	134.1
236.4	223.2	278.2	370.1	133.9
241.4	222.7	277.5	370.6	133.8
246.4	222.2	276.8	371.2	133.7
251.4	221.6	276.1	371.7	133.6
256.4	221.0	275.4	372.3	133.5
261.4	220.4	274.6	373.0	133.5
266.4	220.4	274.6	372.9	133.2
271.4	219.7	273.8	373.6	133.1
276.4	219.0	272.9	374.3	133.1
281.4	218.9	272.8	374.4	132.9
286.4	218.1	271.7	375.2	132.8
291.4	217.9	271.5	375.4	132.6
296.4	217.0	270.4	376.3	132.6
301.4	216.8	270.1	376.6	132.4
306.4	216.4	269.7	376.9	132.3
311.4	216.0	269.2	377.3	132.1
316.4	214.9	267.8	378.4	132.1
321.4	214.4	267.2	378.9	132.0
326.4	214.5	267.3	378.8	131.8
331.4	213.8	266.4	379.5	131.7
336.4	213.1	265.5	380.2	131.6
341.4	212.9	265.3	380.4	131.4
346.4	212.0	264.1	381.3	131.4
351.4	211.6	263.6	381.8	131.2
356.4	211.0	263.0	382.3	131.1
361.4	210.4	262.1	382.9	131.0
366.4	210.1	261.8	383.2	130.8
371.4	209.2	260.7	384.1	130.8
376.4	208.6	260.0	384.7	130.7
381.4	208.4	259.6	384.9	130.5
386.4	207.9	259.1	385.4	130.4
391.4	207.2	258.1	386.2	130.3
396.4	206.6	257.5	386.7	130.2
401.4	206.2	257.0	387.1	130.0
406.4	205.5	256.1	387.8	130.0
411.4	204.8	255.2	388.5	129.9
416.4	204.3	254.6	389.0	129.8
421.4	203.9	254.1	389.4	129.6

Table 5.2-8 (cont.) Unit 2 Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Minimum Safeguards) without Recirculation Sprays

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
426.4	203.2	253.2	390.1	129.6
431.4	202.6	252.4	390.7	129.5
436.4	202.0	251.7	391.3	129.4
441.4	201.7	251.3	391.7	129.2
446.4	200.8	250.2	392.5	129.2
451.4	91.0	113.4	502.3	157.9
638.8	91.0	113.4	502.3	157.9
638.9	93.4	115.6	499.9	154.8
641.4	93.4	115.5	500.0	154.7
1429.2	93.4	115.5	500.0	154.7
1429.3	77.7	89.4	515.6	44.5
1748.3	73.9	85.0	519.4	45.2
1748.4	73.9	85.0	353.4	79.6
3000.0	65.2	75.0	362.2	81.2
3000.1	65.2	75.0	366.4	69.0
3600.0	61.6	70.8	370.0	69.6
3600.1	50.8	58.5	380.7	55.2
7000.0	41.1	47.3	390.5	56.6
7000.1	40.5	46.7	391.5	51.7
10000.0	36.5	42.0	395.5	52.2
10000.1	36.2	41.6	395.8	49.1
50000.0	23.7	27.2	408.3	50.6
50000.1	23.1	26.6	408.9	40.9
100000.0	18.9	21.8	413.1	41.3
100000.1	18.7	21.5	413.3	35.5
500000.0	10.8	12.4	421.2	36.2
500000.1	10.7	12.3	421.3	32.9
800000.0	8.7	10.0	423.3	33.0
800000.1	8.7	10.0	423.3	31.3
1000000.0	7.9	9.1	424.1	31.4
1000000.1	7.9	9.1	424.1	30.5
5000000.0	3.7	4.3	428.3	30.8
5000000.1	3.7	4.3	428.3	30.0
10000000.0	2.5	2.8	429.5	30.1

Table 5.2-9 LOCA Mass and Energy Release Analysis Core Decay Heat Fraction	
Time (sec)	**Decay Heat Generation Rate (Btu/Btu)**
10	0.053876
15	0.050401
20	0.048018
40	0.042401
60	0.039244
80	0.037065
100	0.035466
150	0.032724
200	0.030936
400	0.027078
600	0.024931
800	0.023389
1000	0.022156
1500	0.019921
2000	0.018315
4000	0.014781
6000	0.013040
8000	0.012000
10000	0.011262
15000	0.010097
20000	0.009350
40000	0.007778
60000	0.006958
80000	0.006424
100000	0.006021
150000	0.005323

Table 5.2-9 LOCA Mass and Energy Release Analysis Core Decay Heat Fraction (cont.)

Time (sec)	Decay Heat Generation Rate (Btu/Btu)
200000	0.004847
400000	0.003770
600000	0.003201
800000	0.002834
1000000	0.002580
2000000	0.001909
4000000	0.001355
6000000	0.001091
8000000	0.000927
10000000	0.000808

Table 5.2-10 Unit 1 Double-Ended Pump Suction Break Mass Balance (Minimum Safeguards)

	TIME (SECONDS)	.00	26.20	26.20	187.31	647.69	1411.09	3600.00
		MASS (THOUSAND LBM)						
INITIAL	IN RCS AND ACC	728.06	728.06	728.06	728.06	728.06	728.06	728.06
ADDED MASS	PUMPED INJECTION	.00	.00	.00	86.71	359.81	812.74	1806.61
	TOTAL ADDED	.00	.00	.00	86.71	359.81	812.74	1806.61
*** TOTAL AVAILABLE ***		728.06	728.06	728.06	814.78	1087.88	1540.81	2534.68
DISTRIBUTION	REACTOR COOLANT	509.07	55.52	79.78	148.67	148.67	148.67	148.67
	ACCUMULATOR	219.00	163.79	139.52	.00	.00	.00	.00
	TOTAL CONTENTS	728.06	219.30	219.30	148.67	148.67	148.67	148.67
EFFLUENT	BREAK FLOW	.00	508.74	508.74	666.09	939.19	1392.12	2386.00
	ECCS SPILL	.00	.00	.00	.00	.00	.00	.00
	TOTAL EFFLUENT	.00	508.74	508.74	666.09	939.19	1392.12	2386.00
*** TOTAL ACCOUNTABLE ***		728.06	728.05	728.05	814.76	1087.86	1540.79	2534.67

Table 5.2-11 Unit 2 Double-Ended Pump Suction Break Mass Balance (Minimum Safeguards)

	TIME (SECONDS)	.00	26.60	26.60	186.36	638.89	1429.18	3600.00
		MASS (THOUSAND LBM)						
INITIAL	IN RCS AND ACC	748.99	748.99	748.99	748.99	748.99	748.99	748.99
ADDED MASS	PUMPED INJECTION	.00	.00	.00	86.26	354.73	823.62	1806.75
	TOTAL ADDED	.00	.00	.00	86.26	354.73	823.62	1806.75
*** TOTAL AVAILABLE ***		748.99	748.99	748.99	835.25	1103.72	1572.61	2555.74
DISTRIBUTION	REACTOR COOLANT	530.29	46.25	77.49	145.99	145.99	145.99	145.99
	ACCUMULATOR	218.70	169.11	137.87	.00	.00	.00	.00
	TOTAL CONTENTS	748.99	215.36	215.36	145.99	145.99	145.99	145.99
EFFLUENT	BREAK FLOW	.00	533.62	533.62	689.24	957.71	1426.60	2409.74
	ECCS SPILL	.00	.00	.00	.00	.00	.00	.00
	TOTAL EFFLUENT	.00	533.62	533.62	689.24	957.71	1426.60	2409.74
*** TOTAL ACCOUNTABLE ***		748.99	748.98	748.98	835.23	1103.70	1572.59	2555.73

Table 5.2-12 Unit 1 Double-Ended Pump Suction Break Energy Balance (Minimum Safeguards)

	TIME (SECONDS)	.00	26.20	26.20	187.31	647.69	1411.09	3600.00
		ENERGY (MILLION BTU)						
INITIAL ENERGY	IN RCS,ACC,S GEN	853.70	853.70	853.70	853.70	853.70	853.70	853.70
ADDED ENERGY	PUMPED INJECTION	.00	.00	.00	5.90	24.47	55.27	200.02
	DECAY HEAT	.00	8.01	8.01	27.21	68.79	124.74	250.57
	HEAT FROM SECONDARY	.00	8.68	8.68	8.68	16.73	27.80	27.80
	TOTAL ADDED	.00	16.69	16.69	41.79	109.99	207.80	478.39
*** TOTAL	AVAILABLE ***	853.70	870.40	870.40	895.49	963.69	1061.51	1332.09
DISTRIBUTION	REACTOR COOLANT	299.35	12.06	14.23	38.61	38.61	38.61	38.61
	ACCUMULATOR	19.60	14.66	12.48	.00	.00	.00	.00
	CORE STORED	25.60	13.30	13.30	4.85	4.64	4.30	3.33
	PRIMARY METAL	153.38	145.78	145.78	119.57	84.56	64.78	50.05
	SECONDARY METAL	102.67	102.65	102.65	93.89	73.13	50.77	39.18
	STEAM GENERATOR	253.11	268.48	268.48	241.69	189.88	140.75	112.11
	TOTAL CONTENTS	853.70	556.92	556.92	498.62	390.82	299.22	243.28
EFFLUENT	BREAK FLOW	.00	312.89	312.89	388.23	564.23	750.24	1078.22
	ECCS SPILL	.00	.00	.00	.00	.00	.00	.00
	TOTAL EFFLUENT	.00	312.89	312.89	388.23	564.23	750.24	1078.22
*** TOTAL	ACCOUNTABLE ***	853.70	869.81	869.81	886.85	955.05	1049.45	1321.51

Table 5.2-13 Unit 2 Double-Ended Pump Suction Break Energy Balance (Minimum Safeguards)

	TIME (SECONDS)	.00	26.60	26.60	186.36	638.89	1429.18	3600.00
		ENERGY (MILLION BTU)						
INITIAL ENERGY	IN RCS,ACC,S GEN	881.82	881.82	881.82	881.82	881.82	881.82	881.82
ADDED ENERGY	PUMPED INJECTION	.00	.00	.00	5.87	24.12	56.01	200.03
	DECAY HEAT	.00	8.09	8.09	27.13	68.10	125.97	250.61
	HEAT FROM SECONDARY	.00	8.97	8.97	8.97	16.89	28.32	28.32
	TOTAL ADDED	.00	17.06	17.06	41.96	109.11	210.30	478.95
*** TOTAL	AVAILABLE ***	881.82	898.88	898.88	923.78	990.92	1092.12	1360.77
DISTRIBUTION	REACTOR COOLANT	311.53	10.52	13.32	37.98	37.98	37.98	37.98
	ACCUMULATOR	19.57	15.13	12.34	.00	.00	.00	.00
	CORE STORED	25.60	12.98	12.98	4.85	4.64	4.29	3.33
	PRIMARY METAL	156.23	147.74	147.74	121.42	86.22	65.88	50.95
	SECONDARY METAL	92.82	93.10	93.10	85.24	66.74	46.36	35.77
	STEAM GENERATOR	276.06	292.38	292.38	264.21	209.04	154.48	122.77
	TOTAL CONTENTS	881.82	571.85	571.85	513.70	404.63	308.99	250.81
EFFLUENT	BREAK FLOW	.00	326.45	326.45	401.46	577.67	771.44	1099.73
	ECCS SPILL	.00	.00	.00	.00	.00	.00	.00
	TOTAL EFFLUENT	.00	326.45	326.45	401.46	577.67	771.44	1099.73
*** TOTAL	ACCOUNTABLE ***	881.82	898.30	898.30	915.16	982.30	1080.44	1350.54

Table 5.2-14 Unit 1 Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Minimum Safeguards) with Recirculation Spray Actuated

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
3600.1	50.8	58.5	380.7	55.2
4441.6	47.2	54.3	384.3	55.7
4441.7	47.1	54.2	118.1	16.9
7000.0	41.0	47.2	124.2	17.8
7000.1	40.8	46.9	124.4	17.2
10000.0	36.7	42.2	128.5	17.7
10000.1	36.5	42.0	128.7	17.1
50000.0	23.9	27.5	141.3	18.8
50000.1	23.4	26.9	141.9	15.6
100000.0	19.1	22.0	146.1	16.1
100000.1	18.9	21.7	146.3	14.3
500000.0	10.9	12.6	154.3	15.1
500000.1	10.8	12.4	154.4	13.3
1000000.0	8.0	9.2	157.2	13.5
1000000.1	7.9	9.1	157.3	12.3
5000000.0	3.8	4.3	161.5	12.6
5000000.1	3.7	4.3	161.5	11.6
10000000.0	2.5	2.8	162.7	11.7

Table 5.2-15 Unit 2 Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Minimum Safeguards) with Recirculation Spray Actuated

TIME	BREAK PATH NO.1 FLOW		BREAK PATH NO.2 FLOW	
		THOUSAND		THOUSAND
SECONDS	LBM/SEC	BTU/SEC	LBM/SEC	BTU/SEC
3600.1	50.8	58.5	380.7	55.2
4441.6	47.2	54.3	384.3	55.7
4441.7	47.1	54.2	118.1	16.9
7000.0	41.0	47.2	124.2	17.8
7000.1	40.8	46.9	124.4	17.2
10000.0	36.7	42.2	128.5	17.7
10000.1	36.5	42.0	128.7	17.1
50000.0	23.9	27.5	141.3	18.8
50000.1	23.4	26.9	141.9	15.6
100000.0	19.1	22.0	146.1	16.1
100000.1	18.9	21.7	146.3	14.3
500000.0	10.9	12.6	154.3	15.1
500000.1	10.8	12.4	154.4	13.3
1000000.0	8.0	9.2	157.2	13.5
1000000.1	7.9	9.1	157.3	12.3
5000000.0	3.8	4.3	161.5	12.6
5000000.1	3.7	4.3	161.5	11.6
10000000.0	2.5	2.8	162.7	11.7

6 CONTAINMENT RESPONSE ANALYSES

6.1 DESCRIPTION OF COCO MODEL

Calculation of containment pressure and temperature is accomplished by use of the digital computer code COCO (Reference 5). COCO is a mathematical model of a generalized containment; the proper selection of various options in the code allows the creation of a specific model for a particular containment design. The values used in the specific model for different aspects of the containment are derived from plant-specific input data. Transient phenomena within the reactor coolant system affect containment conditions by means of convective mass and energy transport through the pipe break.

For analytical rigor and convenience, the containment air-steam-water mixture is separated into a water (pool) phase and a steam-air phase. Sufficient relationships to describe the transient are provided by the equations of conservation of mass and energy as applied to each system, together with appropriate boundary conditions. As thermodynamic equations of state and conditions may vary during the transient, the equations have been derived for all possible cases of superheated or saturated steam and subcooled or saturated water. Switching between states is handled automatically by the code.

Passive Heat Removal

The significant heat removal source during the early portion of the transient is the containment structural heat sinks. Provision is made in the containment pressure response analysis for heat transfer through, and heat storage in, both interior and exterior walls. Every wall is divided into a large number of nodes. A conservation of energy equation expressed in finite-difference form accounts for heat conduction into and out of the wall nodes and the temperature rise within the wall nodes. Table 6.1-1 is the summary of the containment structural heat sink surface area, thickness, and paint thickness data used in the analysis. The thermal properties of each heat sink material are shown in Table 6.1-2.

The heat transfer coefficient to the containment structure for the early part of the event is calculated based primarily on the work of Tagami (Reference 15). From this work, it was determined that the value of the heat transfer coefficient can be assumed to increase parabolically to a peak value. In COCO, the value then decreases exponentially to a stagnant heat transfer coefficient which is a function of steam-to-air-weight ratio.

The heat transfer coefficient, “h”, for stagnant conditions is based upon Tagami’s steady-state results.

Tagami presents a plot of the maximum value of “h”, as function of “coolant energy transfer speed,” defined as follows:

$$h = \frac{\text{total coolant energy transferred into containment}}{\text{(containment volume) (time interval to peak pressure)}}$$

From this, the maximum heat transfer coefficient of steel is calculated:

$$h_{max} = 75\left(\frac{E}{t_p V}\right)^{0.60} \qquad \text{(Equation 1)}$$

where:

h_{max} = maximum value of h (Btu/hr-ft^2-°F)

t_p = time from start of accident to end of blowdown for LOCA and steamline isolation for secondary breaks (sec)

V = containment net free volume (ft^3)

E = total coolant energy discharge from time zero to t_p (Btu)

75 = material coefficient for steel

(Note: Paint is accounted for by the thermal conductivity of the material (paint) on the heat sink structure, not by an adjustment on the heat transfer coefficient.)

The basis for the equations is a Westinghouse curve fit to the Tagami data.

The parabolic increase to the peak value is calculated by COCO according to the following equation:

$$h_s = h_{max}\left(\frac{t}{t_p}\right)^{0.5}, 0 \le t \le t_p \qquad \text{(Equation 2)}$$

where:

h_s = heat transfer coefficient between steel and air/steam mixture (Btu/hr-ft^2-°F)
t = time from start of event (sec)

For concrete, the heat transfer coefficient is taken as 40 percent of the value calculated for steel during the blowdown phase.

The exponential decrease of the heat transfer coefficient to the stagnant heat transfer coefficient is given by:

$$h_s = h_{stag} + \left(h_{max} - h_{stag}\right)e^{-0.05\left(t - t_p\right)} \qquad \text{(Equation 3)}$$

where:

$t > t_p$
h_{stag} = $2 + 50X, 0 < X < 1.4$
h_{stag} = h for stagnant conditions (Btu/hr-ft^2-°F)
X = steam-to-air weight ratio in containment.

Active Heat Removal

For a large break, the engineered safety features are quickly brought into operation. Because of the brief period of time required to depressurize the reactor coolant system or the main steam system, the containment safeguards are not a major influence on the blowdown peak pressure; however, they reduce the containment pressure after the blowdown and maintain a low long-term pressure and a low long-term temperature.

Safety Injection – RWST

During the injection phase of post-accident operation, the emergency core cooling system pumps water from the refueling water storage tank (RWST) into the reactor vessel. Since this water enters the vessel at RWST temperature, which is less than the temperature of the water in the vessel, it is modeled as absorbing heat from the core until the saturation temperature is reached. Safety injection and containment spray can be operated for a limited time, depending on the RWST capacity.

Safety Injection – RHR/Sump Recirculation

After the supply of refueling water is exhausted, the recirculation system is operated to provide long-term cooling of the core. In this operation, water is drawn from the sump, cooled in a residual heat removal (RHR) exchanger, and then pumped back into the reactor vessel to remove core residual heat and energy stored in the vessel metal. The heat is removed from the RHR heat exchanger by the component cooling water (CCW). The RHR heat exchangers and CCW heat exchangers are coupled in a closed loop system, where the ultimate heat sink is the service water cooling the CCW heat exchanger.

Containment Spray

Containment spray (CS) is an active removal mechanism which is used for rapid pressure reduction and for containment iodine removal. During the injection phase of operation, the containment spray pumps draw water from the RWST and spray it into the containment through nozzles mounted high above the operating deck. As the spray droplets fall, they absorb heat from the containment atmosphere. Since the water comes from the RWST, the entire heat capacity of the spray from the RWST temperature to the temperature of the containment atmosphere is available for energy absorption. During the cold leg recirculation phase, the analysis credits available spray flow. Once in the hot leg recirculation alignment, the current procedures at both Salem units instruct the operators to isolate the spray header from the ECCS and terminate the recirculation spray.

When a spray droplet enters the hot, saturated, steam-air containment environment, the vapor pressure of the water at its surface is much less than the partial pressure of the steam in the atmosphere. Hence, there will be diffusion of steam to the drop surface and condensation on the droplet. This mass flow will carry energy to the droplet. Simultaneously, the temperature difference between the atmosphere and the droplet will cause the droplet temperature and vapor pressure to rise. The vapor pressure of the droplet will eventually become equal to the partial pressure of the steam, and the condensation will cease. The temperature of the droplet will essentially equal the temperature of the steam-air mixture.

The equations describing the temperature rise of a falling droplet are as follows.

$$\frac{d}{dt}(Mu) = mh_g + q \qquad \text{(Equation 4)}$$

where:

- M = droplet mass
- u = internal energy
- m = diffusion rate
- h_g = steam enthalpy
- q = heat flow rate
- t = time

$$\frac{d}{dt}(Mu) = m \qquad \text{(Equation 5)}$$

where:

- $q = h_c A * (T_s - T)$
- $m = k_g A * (P_s - Pv)$
- A = area
- h_c = coefficient of heat transfer
- k_g = coefficient of mass transfer
- T = droplet temperature
- T_s = steam temperature
- P_s = steam partial pressure
- P_v = droplet vapor pressure

The coefficients of heat transfer (h_c) and mass transfer (k_g) are calculated from the Nusselt number for heat transfer, Nu, and the Nusselt number for mass transfer, Nu'.

Both Nu and Nu' may be calculated from the equations of Ranz and Marshall (Reference 16).

$$Nu = 2 + 0.6(Re)^{1/2}(Pr)^{1/3} \qquad \text{(Equation 6)}$$

where:

- Nu = Nusselt number for heat transfer
- Pr = Prandtl number
- Re = Reynolds number

$$Nu' = 2 + 0.6(Re)^{1/2}(Sc)^{1/3} \qquad \text{(Equation 7)}$$

where:

- Nu' = Nusselt number for mass transfer
- Sc = Schmidt number

Thus, Equations 4 and 5 can be integrated numerically to find the internal energy and mass of the droplet as a function of time as it falls through the atmosphere. Analysis shows that the temperature of the (mass) mean droplet produced by the spray nozzles rises to a value within 99 percent of the bulk containment temperature in less than 2 seconds. Detailed calculations of the heatup of spray droplets in post-accident containment atmospheres by Parsly (Reference 17) show that droplets of all sizes encountered in the containment spray reach equilibrium in a fraction of their residence time in a typical pressurized water reactor containment. These results confirm the assumption that the containment spray will be 100 percent effective in removing heat from the atmosphere.

Containment Recirculation Spray Assumptions

Two sets of LOCA analyses were performed for each Salem unit. The revised design-basis analysis assumes no containment recirculation spray. This conservatively bounds a potential revision to Salem's operating procedures to initiate hot leg recirculation at 6.5 hours following a LOCA, which terminates recirculation spray. In addition, to comply with Salem's containment cooling systems design basis, it does not credit subcooling during the cold leg or hot leg recirculation alignments for terminating steam releases into the containment. This imposes a harsher, long-term containment temperature and pressure transient in comparison with the present transient.

The second analysis assumes containment recirculation spray is initiated as part of the cold leg recirculation alignment and that it is maintained throughout the remaining duration of the transient. This analysis does not conform to Salem's design basis, but it provides a more realistic, but still conservative long-term pressure and temperature transient, as explained below, and it also bounds potential changes in the initiation time for hot leg recirculation.

- During cold leg recirculation, the subcooled flow from the RHR heat exchanger (3200 gpm) is split with 1974.8 gpm diverted to spray and the remaining 1225.2 gpm going to the vessel to cool the core. The analysis assumes that all the core residual heat is released to the containment as steam, and it accurately models containment heat removal by the containment recirculation spray and CFCUs.

- During hot leg recirculation, containment recirculation spray is terminated but all the subcooled ECCS flow is directed into the reactor vessel through a combination of cold and hot legs to terminate boiling in the vessel and prevent the boric acid concentration from increasing. The increased vessel flow, with the combination of cold and hot leg injection points, is intended to subcool the fluid in the reactor core; therefore, it is expected that hot leg recirculation also eliminates the steam released into the containment. Reference 18 concluded that eliminating steam releases into the containment more than offsets the loss of containment recirculation spray provided that the hot leg recirculation is not aligned any earlier than 6.5 hours into the LOCA.

As described in Reference 18, even with the limiting safeguards equipment failure during hot leg recirculation, one RHR/LHSI pump is taking suction from the containment sump, subcooling the entire flow through the RHR heat exchanger, and injecting directly to two cold legs and to the suction of one IHSI pump and one CHG/SI pump. The IHSI pump is injecting to two hot legs, and the CHG/SI pump is injecting into all four cold legs. The total flow injected to the RCS is expected to be approximately 3200 gpm, but greater than 600 gpm would be injected to the hot legs, which would condense a significant amount of the steam rising from the top of the core that is generated from the decay model described in Section 5.2.4. In summary, for the purpose of providing a more realistic long-term pressure and temperature transient, assuming continuous cold leg recirculation provides a conservative transient and it also bounds never initiating hot leg recirculation or starting it as early as 6.5 hours into the accident.

CFCU

The containment fan cooler units (CFCUs) are an additional means of heat removal. The main aspects of a fan cooler from the heat removal standpoint are the fan and the banks of cooling coils. The fans draw the dense containment atmosphere (steam/air mixture) through banks of finned cooling coils and discharge the cooled steam/air mixture through the containment ventilation ducting to mix with the rest of the containment atmosphere. The coils are kept at a low temperature by a constant flow of cooling water. Under accident conditions, the cooling water is provided by the Service Water System. Since this system does not use water from the RWST, the mode of operation remains the same both before and after the spray system and emergency core cooling system change to recirculation mode. See Table 6.1-3 for the CFCU heat removal capability assumed for the containment response analyses.

Table 6.1-1 Containment Heat Sinks

No.	Material	Heat Transfer Area, ft^2	Thickness, ft
1	Paint Coating #1 = 18.3 mils Carbon Steel Concrete	45,169	0.001525 0.03125 4.5
2	Insulation Carbon Steel Concrete	14,206	0.2083 0.03125 4.5
3	Paint Coating #1 Carbon Steel Concrete	29,249	0.001525 0.04167 3.5
4	In contact with the sump Paint Coating #2 = 25.06 mils Concrete	11,611	 0.0020883 3.5
5	Paint Coating #2 Concrete	6,806	0.0020883 1.5
6	Paint Coating #2 Concrete	9,424	0.0020883 1.71
7	Paint Coating #3 = 14 mils Concrete	31,660	0.00117 1.5
8	Stainless Steel Concrete	13,592.27	0.01733 1.9
9	Paint Coating #4 = 17.97 mils Carbon Steel	47,589.8	0.0014975 0.011
10	Paint Coating #4 Carbon Steel	76,741.2	0.0014975 0.02102
11	Paint Coating #4 Carbon Steel	19,348	0.0014975 0.0437
12	Paint Coating #4 Carbon Steel	9,330	0.0014975 0.0611
13	Paint Coating #4 Carbon Steel	7,451.5	0.0014975 0.086
14	Paint Coating #4 Carbon Steel	3,217.7	0.0014975 0.11124
15	Paint Coating #4 Carbon Steel	1,553.18	0.0014975 0.217
16	Paint Coating #4 Carbon Steel	43,740	0.0014975 0.0052
17	Stainless Steel	4,272	0.0329
18	Paint Coating #4 Carbon Steel	53,745	0.0014975 0.0211
19	Paint Coating #4 Carbon Steel	11,243.59	0.0014975 0.0379
20	Paint Coating #4 Carbon Steel	2,989.4	0.0014975 0.15806

Table 6.1-2 Thermophysical Properties of Containment Heat Sinks		
Material	Thermal Conductivity (Btu/hr-ft-°F)	Volumetric Heat Capacity (Btu/ft^3-°F)
Carbon Steel	27.0	58.8
Stainless Steel	8.0	53.6
Concrete	0.92	22.6
Insulation	0.024	3.94
Paint Coating #1	0.083	39.6
Paint Coating #2	0.083	39.6
Paint Coating #3	0.083	39.6
Paint Coating #4	0.083	39.6

Table 6.1-3 Minimum Containment Fan Cooler Performance		
Containment Temperature (°F)	Total Heat Removal Rate With Limiting Single Failure [Btu/sec]	Total Heat Removal Rate When All CFCUs Operating [Btu/sec]
105	1297.2	1945.8
120	3241.6	4862.4
140	6397.4	9596.1
160	9965.2	14947.8
180	13817.6	20726.4
200	17712.8	26569.2
220	21634.0	32451.0
240	25413.0	38119.5
260	29251.2	43876.8
271	31325.0	46987.5
280	33000.2	49500.3

Note:

Input provided by PSEG. PSEG shall ensure that any changes to any CFCU parameters (such as flow, fouling, service water temperature) do not invalidate the minimum heat transfer requirements.

Table 6.1-4 Containment Response Analysis Parameters	
Service water temperature (°F)	93
RWST water temperature (°F)	100
Initial containment temperature (°F)	120
Initial containment pressure (psia)	15.0
Initial relative humidity (%)	20
Net free volume (ft^3)	2.62×10^6
Containment Fan Coolers	
Total	5
Heat Removal with all CFCUs operating (bounding configuration following AST(1) implementation)	Table 6.1-3
Heat Removal with limiting single train failure (bounding configuration following AST(1) implementation)	Table 6.1-3
Containment High setpoint (psig)	5.5
Delay time (sec) With Offsite Power Without Offsite Power	 100.0 100.0
Containment Spray Pumps	
Total	2
With all spray pumps operating	2
With spray pump as part of single failure	1
Flowrate (gpm) Injection phase (per pump) Recirculation phase (total)	 Variable, see Table 6.1-5
Containment Hi-2 setpoint (psig)	17.0
Delay time (sec) With Offsite Power (delay after Hi-2 setpoint) Without Offsite Power (delay after Hi-2 setpoint)	 85.0 85.0
ECCS Recirculation Switchover, sec Minimum Safeguards	1748.3(2)
Containment Spray Termination (injection phase) time (sec) Minimum Safeguards	4141.6(2)
Containment Spray – During Cold Leg Recirculation (gpm) For minimum safeguards, with recirculation spray, only 1225.2 gpm goes to the core from the total RHR flow of 3200 gpm; a delay of 5 minutes (i.e., 300 seconds) will be assumed for operator action to start spray.	1974.8
Containment Spray – During Hot Leg Recirculation (gpm) For minimum safeguards, the spray header is isolated from the RHR flow.	0.0

Table 6.1-4 Containment Response Analysis Parameters (cont.)	
Residual Heat Removal System	
RHR Heat Exchangers	
Modeled in analysis(3)	1
Minimum Safeguards Recirculation switchover time (sec)	1748.3
UA (10^6 Btu/hr-°F)(3)	1.75
Flows – Tube Side and Shell Side (gpm)	
Tube Side CCW Flow (Minimum Safeguards)	4000.0
Shell Side RHR Flow (Minimum Safeguards)	3200.0
Component Cooling Water Heat Exchangers	
Modeled in analysis	1
UA (10^6 Btu/hr-°F)(3)	4.013
Flows – Shell Side and Tube Side (gpm)	
Shellside(3)	4140.0
Tubeside (service water)(3)	8000.0
Additional heat loads (Btu/hr)	2.0×10^6

Notes:

1. PSEG is performing an alternate source term (AST) dose analysis
2. these values were determined by Westinghouse using conservative flow assumptions and PSEG supplied RWST inventory data
3. Minimum safeguards data representing the loss of a safeguards train

Table 6.1-5 Containment Spray Performance (Injection Phase)

Containment Pressure (psig)	with 1 Pump (gpm)	with 2 Pumps (gpm)
0	3117.0	6234.0
10	3017.0	6034.0
20	2913.0	5826.0
30	2720.0	5440.0
40	2687.0	5374.0
47	2600.0	5200.0

6.2 CONTAINMENT RESPONSE TO STEAMLINE BREAK

The containment response to a steamline break was calculated with the COCO model described in Section 6.1 and the mass and energy releases from Section 4.4. The peak containment pressures and temperatures are summarized in Table 6.2-1. The limiting containment pressure case is the Unit 2 4.6 ft^2 DER initiated at 30% power with a feedwater regulator valve failure. The limiting containment temperature case is the Unit 1 0.88 ft^2 split rupture initiated at 30% power with a MSIV failure. For Unit 1, the peak pressure is 41.0 psig and the peak temperature is 348.2°F. For Unit 2, the peak pressure is 42.8 psig and the peak temperature is 348.2°F.

The containment air temperature composite profile from all the cases is in Table 6.2-2. The composite temperature transient is compared to the EQ temperature limit from Section 3.3 in Figure 6.2-1. Table 6.2-2 also contains the containment pressure that corresponds to each of the composite air temperature values.

Table 6.2-1 Summary of Steamline Break Peak Containment Pressures and Temperatures

Case Description			Unit 1 Model F SGs			Unit 2 Model 51 SGs		
Break (ft^2)	**Power (%)**	**Failure**	**Case**	**Peak Press (psig @ sec)**	**Peak Temp (°F @ sec)**	**Case**	**Peak Press (psig @ sec)**	**Peak Temp (°F @ sec)**
4.6 DER	100	FRV	–	–	–	9-2	40.9 @ 136	263.0 @ 136
4.6 DER	30	FRV	–	–	–	11-2	42.8 @ 177	265.9 @ 177
1.4 DER	30	CSF	19-1	40.8 @ 602	262.8 @ 602	19-2	42.8 @ 602	265.8 @ 602
1.4 DER	30	AFW	23-1	38.1 @ 602	258.4 @ 602	23-2	39.9 @ 602	261.4 @ 602
1.4 DER	100	FRV	25-1	41.0 @ 243	263.1 @ 243	25-2	42.3 @ 269	265.1 @ 269
Small DER	100	MSIV	61-1	30.6 @ 659	334.1 @ 119	61-2	32.2 @ 462	330.8 @ 111
Split	30	CSF	67-1	40.6 @ 682	347.4 @ 113	67-2	42.6 @ 399	347.4 @ 113
Split	30	MSIV	79-1	40.9 @ 399	348.2 @ 113	79-2	42.5 @ 437	348.2 @ 113

Table 6.2-2 Composite of Maximum Containment Air Temperature and Corresponding Containment Pressure from SLB Analyses

Time (sec)	Maximum Containment Temperature (°F)		Corresponding Containment Pressure (psig)	
	Unit 1	Unit 2	Unit 1	Unit 2
0.00	120.0	120.0	0.3	0.3
0.10	122.3	123.1	0.4	0.5
0.25	125.9	127.8	0.6	0.7
0.50	135.3	135.2	1.2	1.2
0.75	144.2	143.7	1.7	1.7
1.00	152.7	149.9	2.2	2.2
2.00	176.0	163.2	4.1	3.8
3.00	185.2	174.7	5.7	6.7
4.00	192.5	183.4	7.1	8.3
5.00	198.3	189.6	8.6	9.7
6.00	203.0	194.0	9.9	11.0
7.00	206.6	197.4	11.2	10.9
8.00	209.4	200.8	12.4	12.1
9.00	211.6	203.3	13.5	13.3
10.00	213.2	205.3	14.6	14.4
12.00	215.6	211.7	16.3	16.7
13.00	216.4	214.5	17.4	6.7
14.00	215.8	220.2	18.3	7.2
16.00	217.3	231.0	18.8	8.2
17.00	218.0	236.1	19.0	8.7
18.00	221.7	241.0	7.5	9.2
20.00	229.5	250.0	8.2	10.1
22.00	236.9	257.9	8.9	11.0
25.00	247.1	268.2	10.0	12.2
27.00	253.5	274.2	10.7	12.9
29.00	259.4	279.5	11.3	13.6
32.00	267.7	286.3	12.3	14.6
36.00	277.6	293.7	13.6	15.7
39.00	284.4	298.2	14.6	16.4
43.00	292.6	302.9	15.8	17.2

Table 6.2-2 (cont.) Composite of Maximum Containment Air Temperature and Corresponding Containment Pressure from SLB Analyses

Time (sec)	Maximum Containment Temperature (°F)		Corresponding Containment Pressure (psig)	
	Unit 1	Unit 2	Unit 1	Unit 2
46.00	298.2	305.5	16.6	17.6
53.00	309.7	309.9	18.6	18.5
57.00	315.4	315.1	19.6	19.5
64.00	324.0	323.8	21.3	21.3
71.00	330.3	330.2	22.7	22.7
78.00	335.0	335.0	23.9	23.8
85.00	338.6	338.7	24.9	24.8
99.00	344.1	344.1	26.5	26.5
113.00	348.2	348.2	28.0	28.0
119.00	347.1	346.9	28.3	28.3
132.00	346.3	346.0	29.4	29.3
133.00	346.2	345.9	29.5	29.4
151.00	333.9	333.3	30.3	30.1
164.00	325.9	325.1	30.9	30.6
190.00	311.5	310.3	32.1	31.8
216.00	299.1	297.7	33.3	32.9
242.00	288.5	286.7	34.6	34.1
268.00	279.2	277.2	36.0	35.4
294.00	271.2	269.0	37.3	36.7
320.00	264.2	263.7	38.7	41.3
331.00	261.5	263.8	39.3	41.4
354.00	262.4	264.2	40.5	41.7
378.00	262.3	264.8	40.5	42.1
403.00	262.9	265.6	40.9	42.6
415.00	262.7	265.5	40.7	42.5
429.00	262.3	265.3	40.5	42.4
500.00	262.2	265.4	40.4	42.5
603.00	262.8	265.8	40.8	42.8
615.00	262.6	265.6	40.6	42.6

Table 6.2-2 (cont.) Composite of Maximum Containment Air Temperature and Corresponding Containment Pressure from SLB Analyses

Time (sec)	Maximum Containment Temperature (°F)		Corresponding Containment Pressure (psig)	
	Unit 1	Unit 2	Unit 1	Unit 2
627.00	262.4	265.3	40.5	42.4
680.00	262.6	265.4	40.6	42.5
720.00	262.2	264.8	40.4	42.1
1000.00	251.6	254.2	34.0	35.5

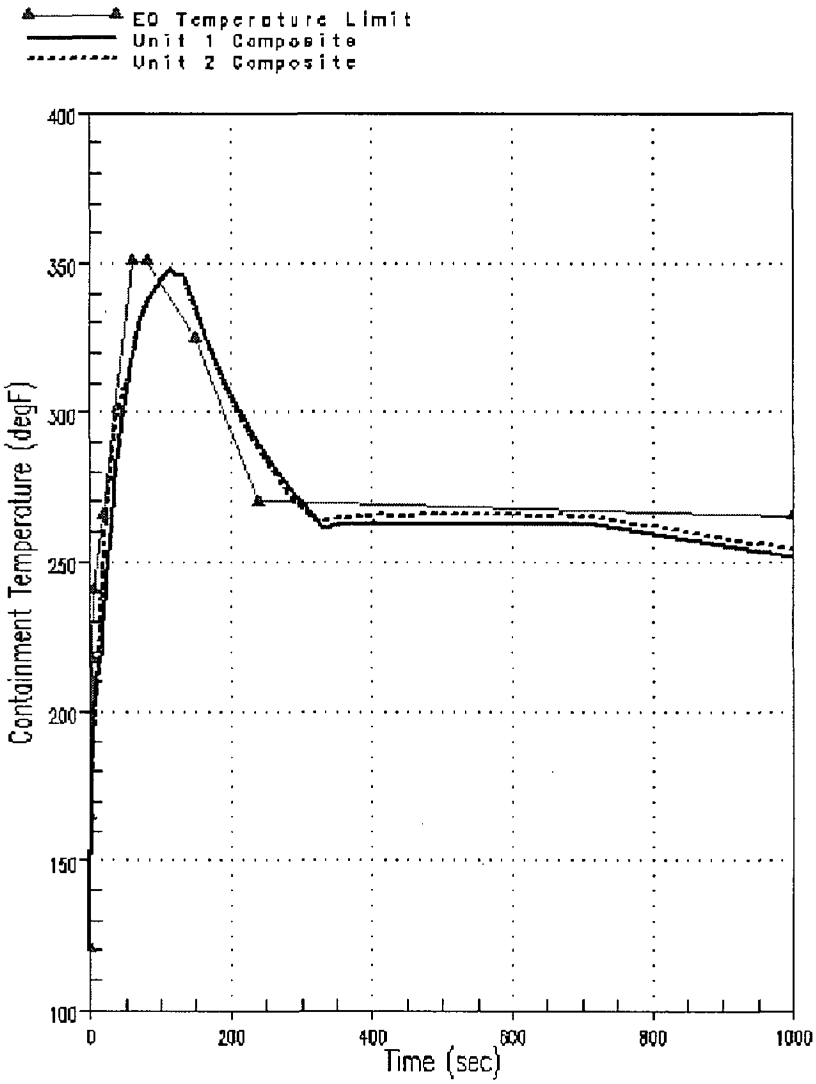

Figure 6.2-1 Containment Temperature Composite Results for Steamline Break

6.3 CONTAINMENT RESPONSE TO LOCA

The Salem containment system is designed such that for all loss-of-coolant accident (LOCA) break sizes, up to and including the double-ended severance of a reactor coolant pipe, the containment peak pressure remains below the design pressure. This section details the containment response subsequent to a hypothetical LOCA. The containment response analysis uses the long-term mass and energy release data from Section 5.

The containment response analysis demonstrates the acceptability of the containment safeguards systems to mitigate the consequences of a LOCA inside containment. The impact of LOCA mass and energy releases on the containment pressure is addressed to assure that the containment pressure remains below its design pressure at the licensed core power conditions. In support of equipment design and licensing criteria (e.g., qualified operating life), with respect to post-accident environmental conditions, long-term containment pressure and temperature transients are generated to conservatively bound the potential post-LOCA containment conditions.

6.3.1 Input Parameters and Assumptions

An analysis of containment response to the rupture of the RCS must start with knowledge of the initial conditions in the containment. The pressure, temperature, and humidity of the containment atmosphere prior to the postulated accident are specified in the analysis as shown in Table 6.1-4.

Also, values for the initial temperature of the service water (SW) and refueling water storage tank (RWST) are assumed, along with containment spray (CS) pump flowrate and containment fan cooler unit (CFCU) heat removal performance. All of these values are chosen conservatively, as shown in Table 6.1-4. Long-term sump recirculation is addressed via Residual Heat Removal System (RHR) heat exchanger performance. The primary function of the RHR system is to remove heat from the core by way of Emergency Core Cooling System (ECCS). Table 6.1-4 provides the RHR system parameters assumed in the analysis.

Several cases were performed for the LOCA containment response. Section 5 documented the LOCA M&E releases for the minimum safeguards cases for the DEPS break for Salem Unit 1 and Unit 2. Table 6.1-5 provides the performance data for the containment spray pumps. Emergency safeguards equipment data is given in Table 6.1-4. The minimum safeguards case was based upon a diesel train failure (which leaves available as active heat removal systems one containment spray pump and 3 CFCUs).

Refer to Section 6.1, "Containment Recirculation Spray Assumptions" for the description of the modeling of recirculation spray during cold leg and hot leg recirculation alignments.

The calculations for all of the DEPS cases were performed for 10 million seconds (approximately 116 days). The sequence of events for each of these cases is shown in Tables 6.3-1 and 6.3-2.

The following are the major assumptions made in the analysis.

1. The mass and energy released to the containment are described in Section 5 for LOCA.

2. Homogeneous mixing is assumed. The steam-air mixture and the water phases each have uniform properties. More specifically, thermal equilibrium between the air and the steam is assumed. However, this does not imply thermal equilibrium between the steam-air mixture and the water phase.

3. Air is taken as an ideal gas, while compressed water and steam tables are employed for water and steam thermodynamic properties.

4. For the blowdown portion of the LOCA analysis, the discharge flow separates into steam and water phases at the breakpoint. The saturated water phase is at the total containment pressure, while the steam phase is at the partial pressure of the steam in the containment. For the post-blowdown portion of the LOCA analysis, steam and water releases are input separately.

5. The saturation temperature at the partial pressure of the steam is used for heat transfer to the heat sinks, the fan coolers, and the spray droplets.

6.3.2 Acceptance Criteria

The containment response for design-basis containment integrity is an ANS Condition IV event, an infrequent fault. The relevant requirements to satisfy Nuclear Regulatory Commission acceptance criteria are as follows.

1. GDC 16 and GDC 50: In order to satisfy the requirements of GDC 16 and 50, the peak calculated containment pressure should be less than the containment design pressure of 47 psig;

2. GDC 38: In order to satisfy the requirements of GDC 38, the calculated containment pressure and temperature need to be rapidly reduced and maintained at a low level.

Note that the Salem UFSAR does not reference the general design criteria (GDCs), but lists the draft/interim general design criteria that were proposed by the Atomic Energy Commission (AEC). These do not provide specific system requirements and refer back to the various sections of the UFSAR for the design bases. In addition to the GDCs, the analyses also comply with a requirement from the Standard Review Plan (i.e., NUREG-0800) Section 6.2.1.1.A which states that the containment pressure at 24 hours should be less than 50% of the peak calculated value. (This is related to the criteria for doses at 24 hours.) Meeting the above GDC requirements along with the Technical Specifications design features for pressure and temperature and equipment qualifications temperature limits will ensure all containment design limits remain bounded under the CFCU margin recovery program.

6.3.3 Analysis Results

The containment pressure, steam temperature and water (sump) temperature profiles from each of the LOCA cases are shown in Figures 6.3-1 through 6.3-6 for the DEPS break cases without recirculation spray actuated. The long-term containment response for Unit 1 and Unit 2 with recirculation spray modeled at 1974.8 gpm for approximately 116 days is shown in Figures 6.3-7 through 6.3-12. The "without recirculation spray" case is conservative with respect to Salem's design basis since it bounds any assumption on the time to initiate hot leg recirculation, and it assumes that all core residual heat is released into the containment as steam. The "with recirculation spray" case is a more realistic estimate of the limiting containment transients; however, it requires either assuming continuous recirculation spray throughout the duration of the transient or crediting steam condensation in the reactor vessel when hot leg recirculation is initiated. Salem's design basis does not allow crediting steam condensation in the reactor vessel during recirculation. Table 6.3-3 provides the peak pressure and temperature and the times of occurrence along with the containment conditions at 24 hours after the accident initiation.

6.3.3.1 Unit 1 – Double-Ended Pump Suction Break with Minimum Safeguards

This analysis assumes a loss-of-offsite power coincidence with a double-ended rupture of the RCS piping between the steam generator outlet and the RCS pump inlet (suction). The associated single-failure assumption is the failure of a complete train of safeguards equipment. As discussed in Section 5.1.6 for the safety injection pumps, this single-failure assumption is conservative because both Salem units have three emergency diesel generators. The loss of a single diesel generator would result in the loss of only a few components. This combination results in a conservative minimum set of safeguards being available. The containment heat removal systems that are assumed to be available are one RHR heat exchanger, one containment spray pump, and CFCUs with the limiting single-failure performance that is presented in Table 6.1-3. Further, loss-of-offsite power delays the actuation times of the safeguards equipment due to the required diesel startup time after receipt of the safety injection signal.

The postulated RCS break results in a rapid release of mass and energy to the containment with a resulting rapid rise in both the containment pressure and temperature. This rapid rise in containment pressure results in the generation of a containment Hi-1 signal at 1.1 seconds and a containment Hi-2 signal at 4.6 seconds. The containment pressure continues to rise rapidly in response to the release of mass and energy until the end of blowdown at 26.2 seconds. The end of blowdown marks a time when the initial inventory in the RCS has been exhausted and a slow process of filling the RCS downcomer in preparation for reflood has begun. Since the mass and energy release during this period is low, pressure decreases slightly and then increases in response to the reflood mass and energy release out to a second peak which occurred at 100 seconds.

The turn around in containment pressure at 100 seconds is a result of the initiation of the containment spray pump at 89.6 seconds and the containment fan cooler units (CFCUs) at 101.1 seconds. Reflood continues at a reduced flooding rate due to the buildup of mass in the RCS core which offsets the downcomer head. This reduction in flooding rate and the continued action of the CFCUs and spray leads to a slowly decreasing pressure out to the end of reflood, which occurs at 187.3 seconds.

At this juncture, by design of the Reference 2 model, energy removal from the SG secondary side begins at a very high rate, resulting in a rise in containment pressure from 187.4 seconds out to 460.7 seconds when the ultimate peak pressure of 40.9 psig is reached. Energy continues to be removed from the secondary side of the faulted loop and intact loop steam generators until 1411.1 seconds. The containment pressure at the end of this steam generator energy release period is similar to the peak pressure that occurred at 460.7 seconds. After 1411.1 seconds, the containment pressure decreases through the initiation of cold leg recirculation at 1748.3 seconds. At this time, the ECCS is realigned for cold leg recirculation resulting in an increase in the SI temperature due to delivery from the hot sump. At 4141.6 seconds, the containment spray is terminated from the RWST. Without crediting recirculation spray, the containment pressure and temperature will begin to increase out to approximately 30,000 seconds. At this time, the energy removal from the operating CFCUs exceeds the energy release and the pressure and temperature turn around. This trend continues to the end of the transient at $1x10^7$ seconds. This can be seen in Figures 6.3-1 through 6.3-3 and in Table 6.3-4. This transient satisfies GDC 38 and Standard Review Plan Section 6.2.1.1.A since the containment pressure is reduced below one half of the peak containment pressure within 24 hours, but it requires PSEG to verify that the equipment qualifications remain acceptable since it imposes a harsher long-term containment transient.

When 1974.8 gpm of recirculation sprays are modeled for Salem Unit 1 beginning at 4441.6 seconds (which is a 5 minute delay from the time that the injection spray was terminated to allow the operators enough time to reposition the necessary valves), the containment pressure and temperature do not increase and the containment conditions at 24 hours are significantly lower. The detailed containment conditions can be seen in Table 6.3-5 and Figures 6.3-7 through 6.3-9 for the containment pressure, steam temperature and sump temperature. Figure 6.3-8 shows that there are only two periods of time where the steam temperature exceeds the present temperature profile. The first is from about 1500 seconds to about 3500 seconds and the other is from about 4500 seconds to 10,000 seconds. Therefore, the steam temperature transient with recirculation spray exceeds the profile for about 7500 seconds (i.e., approximately 2 hours 5 minutes), which is relatively short during a 120 day transient.

6.3.3.2 Unit 2 – Double-Ended Pump Suction Break with Minimum Safeguards

This analysis assumes a loss-of-offsite power coincidence with a double-ended rupture of the RCS piping between the steam generator outlet and the RCS pump inlet (suction). The associated single-failure assumption is the same as the Unit 1 description in Section 6.3.3.1. The associated single-failure assumption is the failure of a complete train of safeguards equipment. As discussed in Section 5.1.6 for the safety injection pumps, this single-failure assumption is conservative because both Salem units have three emergency diesel generators. The loss of a single diesel generator would result in the loss of only a few components. This combination results in a conservative minimum set of safeguards being available. The containment heat removal systems that are assumed to be available are one RHR heat exchanger, one containment spray pump, and CFCUs with the limiting single-failure performance that is presented in Table 6.1-3. Further, loss-of-offsite power delays the actuation times of the safeguards equipment due to the required diesel startup time after receipt of the safety injection signal.

The postulated RCS break results in a rapid release of mass and energy to the containment with a resulting rapid rise in both the containment pressure and temperature. This rapid rise in containment pressure results in the generation of a containment Hi-1 signal at 1.1 seconds and a containment Hi-2 signal at 4.4 seconds. The containment pressure continues to rise rapidly in response to the release of mass and energy until the end of blowdown at 26.6 seconds. The end of blowdown marks a time when the initial inventory in the RCS has been exhausted and a slow process of filling the RCS downcomer in preparation for reflood has begun. Since the mass and energy release during this period is low, pressure decreases slightly and then increases in response to the reflood mass and energy release out to a second peak which occurred at 100 seconds.

The turn around in containment pressure at 100 seconds is a result of the initiation of the containment spray pump at 89.4 seconds and the containment fan cooler units (CFCUs) at 101.1 seconds. Reflood continues at a reduced flooding rate due to the buildup of mass in the RCS core which offsets the downcomer head. This reduction in flooding rate and the continued action of the CFCUs and spray leads to a slowly decreasing pressure out to the end of reflood, which occurs at 186.4 seconds.

At this juncture, by design of the Reference 2 model, energy removal from the SG secondary side begins at a very high rate, resulting in a rise in containment pressure from 186.4 seconds out to 449.8 seconds when the ultimate peak pressure of 42.4 psig is reached. Energy continues to be removed from the secondary side of the faulted loop and intact loop steam generators until 1429.2 seconds. The containment pressure at the end of this steam generator energy release period is similar to the peak pressure that occurred at 449.8 seconds. After 1429.2 seconds, the containment pressure decreases through the initiation of cold leg recirculation at 1748.3 seconds out to 4141.6 seconds when the containment spray is terminated from the RWST. Without crediting recirculation spray, the containment pressure and temperature will begin to increase out to approximately 30,000 seconds. At this time, the energy removal from the operating CFCUs exceeds the energy release and the pressure and temperature turn around. This trend continues to the end of the transient at $1x10^7$ seconds. This can be seen in Figures 6.3-4 through 6.3-6 and in Table 6.3-6. As with Unit 1 and the "no recirculation spray" assumption, this is acceptable from the aspect of GDC 38 and Standard Review Plan 6.2.1.1.A, but it requires a reevaluation of the equipment qualifications.

When 1974.8 gpm of recirculation spray flow is modeled for Salem Unit 2 beginning at 4441.6 seconds (which is a 5 minute delay from the time that the injection spray was terminated to allow the operators enough time to reposition the necessary valves), the containment pressure and temperature do not increase and the containment conditions at 24 hours are significantly lower. The detailed containment conditions can be seen in Table 6.3-7 and Figures 6.3-10 through 6.3-12 for the containment pressure, steam temperature and sump temperature. Figure 6.3-11 shows that there are two periods of time where the steam temperature exceeds the temperature profile. The first is from about 1500 seconds to about 3500 seconds and the other is from about 5000 seconds to 10,000 seconds. Therefore, the steam temperature transient with recirculation spray exceeds the profile for about 7000 seconds (i.e., approximately 1 hour 57 minutes).

Table 6.3-1	Double-Ended Pump Suction Break Sequence of Events (Salem Unit 1)
Time (sec)	**Event Description**
0.0	Break Occurs, Reactor Trip and Loss-of-Offsite Power are assumed
1.1	Containment Hi-1 Pressure Setpoint Reached
3.6	Low Pressurizer Pressure SI Setpoint = 1715 psia Reached (Safety Injection Begins coincident with Low Pressurizer Pressure SI Setpoint)
4.6	Containment Hi-2 Pressure Setpoint Reached
16.5	Broken Loop Accumulator Begins Injecting Water
16.8	Intact Loop Accumulator Begins Injecting Water
26.2	End of Blowdown Phase
35.6	Pumped Safety Injection Begins (after a 32 second delay from the setpoint)
54.0	Broken Loop Accumulator Water Injection Ends
55.9	Intact Loop Accumulator Water Injection Ends
89.6	Containment Spray (RWST) Begins Pumps
101.1	Containment Fan Coolers Actuate
187.3	End of Reflood for MIN SI Case
460.6	Peak Temperature Occurs
460.7	Peak Pressure Occurs
647.7	Mass and Energy Release Assumption: Broken Loop SG Equilibration to 51.7 psia
1411.1	Mass and Energy Release Assumption: Intact Loop SG Equilibration to 41.7 psia
1748.3	Cold Leg Recirc Begins
4141.6	Containment Spray from RWST is Terminated
4441.6	Recirculation Spray Begins
1.0E+7	Transient Modeling Terminated

Table 6.3-2	Double-Ended Pump Suction Break Sequence of Events (Salem Unit 2)
Time (sec)	**Event Description**
0.0	Break Occurs, Reactor Trip and Loss-of-Offsite Power are assumed
1.1	Containment Hi-1 Pressure Setpoint Reached
3.6	Low Pressurizer Pressure SI Setpoint = 1715 psia Reached (Safety Injection Begins co-incident with Low Pressurizer Pressure SI Setpoint)
4.4	Containment Hi-2 Pressure Setpoint Reached
16.8	Broken Loop Accumulator Begins Injecting Water
17.1	Intact Loop Accumulator Begins Injecting Water
26.6	End of Blowdown Phase
35.6	Pumped Safety Injection Begins (after a 32 second delay from the setpoint)
54.9	Broken Loop Accumulator Water Injection Ends
57.4	Intact Loop Accumulator Water Injection Ends
89.4	Containment Spray Pump (RWST) Begins
101.1	Containment Fan Coolers Actuate
186.4	End of Reflood for MIN SI Case
449.8	Peak Pressure and Temperature Occur
638.9	Mass and Energy Release Assumption: Broken Loop SG Equilibration to 51.7 psia
1429.2	Mass and Energy Release Assumption: Intact Loop SG Equilibration to 41.7 psia
1748.3	Cold Leg Recirc Begins
4141.6	Containment Spray from RWST is Terminated
4441.6	Recirculation Spray Begins
1.0E+7	Transient Modeling Terminated

Table 6.3-3 LOCA Containment Response Results (Loss-of-Offsite Power Assumed)

Case	Peak Pressure (psig)	Peak Temperature (°F)	Pressure (psig) @ 24 hours	Temperature (°F) @ 24 hours
Unit 1 DEPS Break Minimum Safeguards Model F SGs	40.9 @ 460.7	262.1 @ 460.6	16.7	208.4
Unit 1 DEPS Break Minimum Safeguards with Recirculation Spray Model F SGs	40.9 @ 460.7	262.1 @ 460.6	7.3	164.9
Unit 2 DEPS Break Minimum Safeguards Model 51 SGs	42.4 @ 449.8	264.4 @ 449.8	16.8	208.4
Unit 2 DEPS Break Minimum Safeguards with Recirculation Spray Model 51 SGs	42.4 @ 449.8	264.4 @ 449.8	7.3	164.9

Table 6.3-4 Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.0000000E-03	3.0000001E-01	1.2000000E+02	1.2000000E+02
5.0000101E-01	2.7259750E+00	1.4165091E+02	1.8136972E+02
1.0000020E+00	5.1064482E+00	1.6174347E+02	1.9665619E+02
2.0000031E+00	9.4478273E+00	1.9176770E+02	2.1014177E+02
3.0000041E+00	1.3136816E+01	2.1128329E+02	2.1743503E+02
4.0000048E+00	1.5963875E+01	2.2270206E+02	2.2218005E+02
5.0000062E+00	1.8241364E+01	2.2983440E+02	2.2577377E+02
6.0000072E+00	2.0224936E+01	2.3481953E+02	2.2877925E+02
7.0000081E+00	2.2068689E+01	2.3872961E+02	2.3137126E+02
8.0000086E+00	2.3811337E+01	2.4189592E+02	2.3361658E+02
9.0000095E+00	2.5435917E+01	2.4434668E+02	2.3570700E+02
1.0000011E+01	2.6924232E+01	2.4610625E+02	2.3753062E+02
1.1000012E+01	2.8294289E+01	2.4733090E+02	2.3915814E+02
1.2000013E+01	2.9555788E+01	2.4811652E+02	2.4063754E+02
1.3000014E+01	3.0728701E+01	2.4858443E+02	2.4196089E+02
1.4000015E+01	3.1828262E+01	2.4881909E+02	2.4313036E+02
1.5000016E+01	3.2895752E+01	2.4956989E+02	2.4416154E+02
1.6000017E+01	3.3975349E+01	2.5152676E+02	2.4507660E+02
1.7000017E+01	3.4982925E+01	2.5330739E+02	2.4587413E+02
1.8000019E+01	3.5882488E+01	2.5486186E+02	2.4657770E+02
1.9000019E+01	3.6586349E+01	2.5605603E+02	2.4712788E+02
2.0000021E+01	3.7062397E+01	2.5685297E+02	2.4754878E+02
2.1000023E+01	3.7439083E+01	2.5747720E+02	2.4809048E+02
2.2000023E+01	3.7642933E+01	2.5781265E+02	2.4848106E+02
2.3000025E+01	3.7735474E+01	2.5796402E+02	2.4886588E+02
2.4000025E+01	3.7742683E+01	2.5797534E+02	2.4909178E+02
2.5000027E+01	3.7701805E+01	2.5790796E+02	2.4914116E+02
2.6000027E+01	3.7618435E+01	2.5777066E+02	2.4913640E+02
2.7000029E+01	3.7509117E+01	2.5759030E+02	2.4912988E+02
2.8000029E+01	3.7405556E+01	2.5741904E+02	2.4912103E+02
2.9000031E+01	3.7311523E+01	2.5726318E+02	2.4911003E+02
3.0000031E+01	3.7224941E+01	2.5711938E+02	2.4910016E+02
3.1000032E+01	3.7144550E+01	2.5698563E+02	2.4908852E+02
3.2000034E+01	3.7069527E+01	2.5686060E+02	2.4907799E+02
3.3000034E+01	3.6999500E+01	2.5674365E+02	2.4906589E+02
3.4000034E+01	3.6934036E+01	2.5663419E+02	2.4905408E+02
3.5000034E+01	3.6897301E+01	2.5657220E+02	2.4851263E+02
3.6000038E+01	3.6886356E+01	2.5655301E+02	2.4766951E+02
3.7000038E+01	3.6884113E+01	2.5654831E+02	2.4673946E+02
3.8000038E+01	3.6883457E+01	2.5654623E+02	2.4583224E+02
3.9000038E+01	3.6883194E+01	2.5654486E+02	2.4496684E+02
4.0000042E+01	3.6883049E+01	2.5654370E+02	2.4415968E+02
4.1000042E+01	3.6882710E+01	2.5654221E+02	2.4336629E+02
4.2000042E+01	3.6882999E+01	2.5654181E+02	2.4262862E+02
4.3000046E+01	3.6883041E+01	2.5654099E+02	2.4191882E+02
4.4000046E+01	3.6883072E+01	2.5654016E+02	2.4123851E+02
4.5000046E+01	3.6883297E+01	2.5653967E+02	2.4058745E+02
4.6000046E+01	3.6883709E+01	2.5653952E+02	2.3996411E+02
4.7000050E+01	3.6884308E+01	2.5653967E+02	2.3936713E+02
4.8000050E+01	3.6885075E+01	2.5654013E+02	2.3879480E+02

Table 6.3-4 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
4.9000050E+01	3.6886036E+01	2.5654092E+02	2.3824565E+02
5.0000050E+01	3.6887188E+01	2.5654202E+02	2.3771765E+02
5.1000053E+01	3.6888554E+01	2.5654352E+02	2.3720889E+02
5.2000053E+01	3.6890018E+01	2.5654517E+02	2.3672409E+02
5.3000053E+01	3.6891624E+01	2.5654709E+02	2.3625661E+02
5.4000053E+01	3.6891205E+01	2.5654562E+02	2.3583260E+02
5.5000057E+01	3.6889595E+01	2.5653235E+02	2.3552893E+02
5.6000057E+01	3.6888245E+01	2.5651813E+02	2.3526105E+02
5.7000057E+01	3.6936546E+01	2.5655350E+02	2.3535867E+02
5.8000057E+01	3.7011860E+01	2.5663416E+02	2.3537367E+02
5.9000061E+01	3.7086433E+01	2.5671347E+02	2.3539345E+02
6.0000061E+01	3.7159649E+01	2.5679044E+02	2.3541574E+02
6.1000061E+01	3.7231579E+01	2.5686517E+02	2.3543439E+02
6.2000065E+01	3.7302422E+01	2.5693802E+02	2.3545251E+02
6.3000065E+01	3.7372063E+01	2.5700876E+02	2.3547327E+02
6.4000069E+01	3.7440434E+01	2.5707733E+02	2.3549387E+02
6.5000069E+01	3.7507629E+01	2.5714389E+02	2.3551462E+02
6.6000069E+01	3.7573734E+01	2.5720859E+02	2.3553520E+02
6.7000069E+01	3.7638783E+01	2.5727145E+02	2.3555594E+02
6.8000069E+01	3.7702808E+01	2.5733255E+02	2.3557651E+02
6.9000069E+01	3.7765827E+01	2.5739194E+02	2.3559723E+02
7.0000069E+01	3.7827869E+01	2.5744968E+02	2.3561778E+02
7.1000069E+01	3.7888962E+01	2.5750577E+02	2.3563849E+02
7.2000076E+01	3.7949123E+01	2.5756030E+02	2.3565904E+02
7.3000076E+01	3.8008377E+01	2.5761328E+02	2.3567972E+02
7.4000076E+01	3.8066753E+01	2.5766476E+02	2.3570026E+02
7.5000076E+01	3.8120419E+01	2.5771414E+02	2.3572766E+02
7.6000076E+01	3.8169277E+01	2.5776102E+02	2.3574525E+02
7.7000076E+01	3.8195381E+01	2.5780280E+02	2.3576724E+02
7.8000076E+01	3.8219978E+01	2.5784314E+02	2.3578716E+02
7.9000076E+01	3.8243881E+01	2.5788229E+02	2.3580733E+02
8.0000084E+01	3.8266960E+01	2.5792010E+02	2.3583145E+02
8.1000084E+01	3.8289265E+01	2.5795663E+02	2.3585130E+02
8.2000084E+01	3.8310932E+01	2.5799207E+02	2.3587141E+02
8.3000084E+01	3.8331841E+01	2.5802628E+02	2.3589539E+02
8.4000084E+01	3.8352051E+01	2.5805930E+02	2.3591527E+02
8.5000084E+01	3.8371670E+01	2.5809134E+02	2.3593556E+02
8.6000084E+01	3.8390652E+01	2.5812234E+02	2.3595955E+02
8.7000092E+01	3.8408970E+01	2.5815222E+02	2.3597887E+02
8.8000092E+01	3.8426712E+01	2.5818118E+02	2.3600116E+02
8.9000092E+01	3.8443939E+01	2.5820926E+02	2.3601901E+02
9.0000092E+01	3.8456432E+01	2.5822958E+02	2.3605576E+02
9.1000092E+01	3.8460842E+01	2.5823660E+02	2.3609306E+02
9.2000092E+01	3.8464794E+01	2.5824289E+02	2.3613850E+02
9.3000092E+01	3.8468315E+01	2.5824847E+02	2.3617924E+02
9.4000092E+01	3.8471325E+01	2.5825323E+02	2.3622546E+02
9.5000099E+01	3.8473911E+01	2.5825729E+02	2.3627263E+02
9.6000099E+01	3.8476048E+01	2.5826059E+02	2.3631070E+02
9.7000099E+01	3.8477783E+01	2.5826328E+02	2.3635616E+02
9.8000099E+01	3.8479115E+01	2.5826529E+02	2.3640100E+02

Table 6.3-4 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
9.9000099E+01	3.8480076E+01	2.5826666E+02	2.3644333E+02
1.0000010E+02	3.8480667E+01	2.5826749E+02	2.3648564E+02
1.0100010E+02	3.8480904E+01	2.5826770E+02	2.3652753E+02
1.0200011E+02	3.8475891E+01	2.5825934E+02	2.3656456E+02
1.0300011E+02	3.8469864E+01	2.5824930E+02	2.3660593E+02
1.0400011E+02	3.8463570E+01	2.5823883E+02	2.3664885E+02
1.0500011E+02	3.8457058E+01	2.5822803E+02	2.3668800E+02
1.0600011E+02	3.8450321E+01	2.5821683E+02	2.3673024E+02
1.0700011E+02	3.8443340E+01	2.5820526E+02	2.3677284E+02
1.0800011E+02	3.8436138E+01	2.5819330E+02	2.3681468E+02
1.0900011E+02	3.8428719E+01	2.5818100E+02	2.3685684E+02
1.1000011E+02	3.8421108E+01	2.5816837E+02	2.3689827E+02
1.1100011E+02	3.8413307E+01	2.5815546E+02	2.3694002E+02
1.1200011E+02	3.8405338E+01	2.5814224E+02	2.3698102E+02
1.1300011E+02	3.8397205E+01	2.5812875E+02	2.3702235E+02
1.1400011E+02	3.8388927E+01	2.5811502E+02	2.3706296E+02
1.1500011E+02	3.8380508E+01	2.5810107E+02	2.3710387E+02
1.1600011E+02	3.8371964E+01	2.5808691E+02	2.3714407E+02
1.1700011E+02	3.8363297E+01	2.5807254E+02	2.3718457E+02
1.1800012E+02	3.8354527E+01	2.5805801E+02	2.3722437E+02
1.1900012E+02	3.8345657E+01	2.5804330E+02	2.3726447E+02
1.2000012E+02	3.8336704E+01	2.5802844E+02	2.3730388E+02
1.2100012E+02	3.8327671E+01	2.5801349E+02	2.3734358E+02
1.2200012E+02	3.8318573E+01	2.5799838E+02	2.3738260E+02
1.2300012E+02	3.8309414E+01	2.5798322E+02	2.3742191E+02
1.2400012E+02	3.8300209E+01	2.5796793E+02	2.3746053E+02
1.2500013E+02	3.8290958E+01	2.5795261E+02	2.3749945E+02
1.2600013E+02	3.8281681E+01	2.5793719E+02	2.3753770E+02
1.2700013E+02	3.8272373E+01	2.5792175E+02	2.3757623E+02
1.2800012E+02	3.8263050E+01	2.5790628E+02	2.3761412E+02
1.2900014E+02	3.8253716E+01	2.5789078E+02	2.3765227E+02
1.3000014E+02	3.8244381E+01	2.5787527E+02	2.3768979E+02
1.3100014E+02	3.8235046E+01	2.5785980E+02	2.3772757E+02
1.3200014E+02	3.8225727E+01	2.5784430E+02	2.3776471E+02
1.3300014E+02	3.8216419E+01	2.5782886E+02	2.3780212E+02
1.3400014E+02	3.8207138E+01	2.5781342E+02	2.3783891E+02
1.3500014E+02	3.8197884E+01	2.5779803E+02	2.3787598E+02
1.3600014E+02	3.8188667E+01	2.5778271E+02	2.3791241E+02
1.3700014E+02	3.8179489E+01	2.5776746E+02	2.3794911E+02
1.3800014E+02	3.8170361E+01	2.5775229E+02	2.3798520E+02
1.3900014E+02	3.8161278E+01	2.5773718E+02	2.3802155E+02
1.4000014E+02	3.8152252E+01	2.5772217E+02	2.3805730E+02
1.4100014E+02	3.8143288E+01	2.5770724E+02	2.3809329E+02
1.4200014E+02	3.8134388E+01	2.5769241E+02	2.3812871E+02
1.4300014E+02	3.8125557E+01	2.5767770E+02	2.3816437E+02
1.4400015E+02	3.8116802E+01	2.5766312E+02	2.3819945E+02
1.4500015E+02	3.8108120E+01	2.5764865E+02	2.3823479E+02
1.4600015E+02	3.8099522E+01	2.5763434E+02	2.3826953E+02
1.4700015E+02	3.8091003E+01	2.5762012E+02	2.3830453E+02
1.4800015E+02	3.8082581E+01	2.5760608E+02	2.3833897E+02

Table 6.3-4 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.4900015E+02	3.8074242E+01	2.5759216E+02	2.3837366E+02
1.5000015E+02	3.8066002E+01	2.5757843E+02	2.3840778E+02
1.5100015E+02	3.8057858E+01	2.5756482E+02	2.3844214E+02
1.5200015E+02	3.8049812E+01	2.5755139E+02	2.3847595E+02
1.5300015E+02	3.8041866E+01	2.5753812E+02	2.3851001E+02
1.5400015E+02	3.8034023E+01	2.5752502E+02	2.3854352E+02
1.5500015E+02	3.8026283E+01	2.5751208E+02	2.3857727E+02
1.5600015E+02	3.8018658E+01	2.5749933E+02	2.3861049E+02
1.5700015E+02	3.8011131E+01	2.5748676E+02	2.3864394E+02
1.5800015E+02	3.8003727E+01	2.5747433E+02	2.3867685E+02
1.5900015E+02	3.7996429E+01	2.5746213E+02	2.3871001E+02
1.6000017E+02	3.7989254E+01	2.5745013E+02	2.3874265E+02
1.6100017E+02	3.7982189E+01	2.5743829E+02	2.3877550E+02
1.6200017E+02	3.7975250E+01	2.5742667E+02	2.3880786E+02
1.6300017E+02	3.7968426E+01	2.5741522E+02	2.3884044E+02
1.6400017E+02	3.7961731E+01	2.5740399E+02	2.3887251E+02
1.6500017E+02	3.7955154E+01	2.5739294E+02	2.3890482E+02
1.6600017E+02	3.7948708E+01	2.5738214E+02	2.3893661E+02
1.6700017E+02	3.7942379E+01	2.5737152E+02	2.3896864E+02
1.6800017E+02	3.7936188E+01	2.5736111E+02	2.3900018E+02
1.6900017E+02	3.7930119E+01	2.5735092E+02	2.3903194E+02
1.7000017E+02	3.7924187E+01	2.5734094E+02	2.3906322E+02
1.7100017E+02	3.7918377E+01	2.5733118E+02	2.3909471E+02
1.7200017E+02	3.7912708E+01	2.5732162E+02	2.3912573E+02
1.7300017E+02	3.7907188E+01	2.5731235E+02	2.3915697E+02
1.7400017E+02	3.7901844E+01	2.5730334E+02	2.3918773E+02
1.7500018E+02	3.7896702E+01	2.5729465E+02	2.3921875E+02
1.7600018E+02	3.7891785E+01	2.5728635E+02	2.3924934E+02
1.7700018E+02	3.7887089E+01	2.5727841E+02	2.3928023E+02
1.7800018E+02	3.7882629E+01	2.5727087E+02	2.3931073E+02
1.7900018E+02	3.7878407E+01	2.5726373E+02	2.3934157E+02
1.8000018E+02	3.7874435E+01	2.5725699E+02	2.3937207E+02
1.8100018E+02	3.7870708E+01	2.5725064E+02	2.3940292E+02
1.8200018E+02	3.7867237E+01	2.5724475E+02	2.3943350E+02
1.8300018E+02	3.7864010E+01	2.5723923E+02	2.3946443E+02
1.8400018E+02	3.7861031E+01	2.5723413E+02	2.3949510E+02
1.8500018E+02	3.7858284E+01	2.5722943E+02	2.3952617E+02
1.8600018E+02	3.7855774E+01	2.5722510E+02	2.3955698E+02
1.8700018E+02	3.7853474E+01	2.5722113E+02	2.3958817E+02
1.8800018E+02	3.7855434E+01	2.5722418E+02	2.3962476E+02
1.8900018E+02	3.7862083E+01	2.5723502E+02	2.3966750E+02
1.9000020E+02	3.7868805E+01	2.5724597E+02	2.3970966E+02
1.9100020E+02	3.7875599E+01	2.5725702E+02	2.3975195E+02
1.9200020E+02	3.7882477E+01	2.5726822E+02	2.3979384E+02
1.9300020E+02	3.7889427E+01	2.5727954E+02	2.3983589E+02
1.9400020E+02	3.7896454E+01	2.5729099E+02	2.3987750E+02
1.9500020E+02	3.7903553E+01	2.5730255E+02	2.3991930E+02
1.9600020E+02	3.7910732E+01	2.5731424E+02	2.3996066E+02
1.9700020E+02	3.7917980E+01	2.5732602E+02	2.4000218E+02
1.9800020E+02	3.7925301E+01	2.5733795E+02	2.4004329E+02

Table 6.3-4 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.9900020E+02	3.7932659E+01	2.5734995E+02	2.4008458E+02
2.0900020E+02	3.8009079E+01	2.5747433E+02	2.4045963E+02
2.1900020E+02	3.8091900E+01	2.5760907E+02	2.4086160E+02
2.2900020E+02	3.8180843E+01	2.5775366E+02	2.4124614E+02
2.3900020E+02	3.8274036E+01	2.5790494E+02	2.4161472E+02
2.4900020E+02	3.8371609E+01	2.5806308E+02	2.4197987E+02
2.5900021E+02	3.8472904E+01	2.5822699E+02	2.4233693E+02
2.6900021E+02	3.8577099E+01	2.5839529E+02	2.4268721E+02
2.7900021E+02	3.8684376E+01	2.5856821E+02	2.4302841E+02
2.8900021E+02	3.8795101E+01	2.5874634E+02	2.4336432E+02
2.9900021E+02	3.8905815E+01	2.5892404E+02	2.4369461E+02
3.0900021E+02	3.9018578E+01	2.5910464E+02	2.4400473E+02
3.1900021E+02	3.9134609E+01	2.5929004E+02	2.4432492E+02
3.2900021E+02	3.9251446E+01	2.5947632E+02	2.4463148E+02
3.3900021E+02	3.9369381E+01	2.5966388E+02	2.4493408E+02
3.4900021E+02	3.9487820E+01	2.5985181E+02	2.4523708E+02
3.5900021E+02	3.9607052E+01	2.6004050E+02	2.4552989E+02
3.6900021E+02	3.9726425E+01	2.6022897E+02	2.4582324E+02
3.7900021E+02	3.9846169E+01	2.6041754E+02	2.4610707E+02
3.8900021E+02	3.9964859E+01	2.6060400E+02	2.4639183E+02
3.9900021E+02	4.0084106E+01	2.6079086E+02	2.4666751E+02
4.0900021E+02	4.0202446E+01	2.6097583E+02	2.4694402E+02
4.1900021E+02	4.0320190E+01	2.6115942E+02	2.4721219E+02
4.2900021E+02	4.0463802E+01	2.6138318E+02	2.4748523E+02
4.3900021E+02	4.0611877E+01	2.6161325E+02	2.4773135E+02
4.4900021E+02	4.0758644E+01	2.6184058E+02	2.4798947E+02
4.5900021E+02	4.0903423E+01	2.6206415E+02	2.4823581E+02
4.6900021E+02	4.0855705E+01	2.6198804E+02	2.4853607E+02
4.7900021E+02	4.0784180E+01	2.6187476E+02	2.4882587E+02
4.8900024E+02	4.0717564E+01	2.6176898E+02	2.4910974E+02
4.9900024E+02	4.0655788E+01	2.6167059E+02	2.4938687E+02
5.9900024E+02	4.0210228E+01	2.6095203E+02	2.5176253E+02
6.9900024E+02	3.9997326E+01	2.6059634E+02	2.5365137E+02
7.9900024E+02	3.9843792E+01	2.6033340E+02	2.5519882E+02
8.9900024E+02	3.9785816E+01	2.6022195E+02	2.5647763E+02
9.9900024E+02	3.9784744E+01	2.6020099E+02	2.5756793E+02
1.0990002E+03	3.9836559E+01	2.6026422E+02	2.5851880E+02
1.1990002E+03	3.9919155E+01	2.6037631E+02	2.5934625E+02
1.2990002E+03	4.0030609E+01	2.6053400E+02	2.6008484E+02
1.3990002E+03	4.0164940E+01	2.6072751E+02	2.6075259E+02
1.4990002E+03	3.9545483E+01	2.5972226E+02	2.5732816E+02
1.5990002E+03	3.8827183E+01	2.5854282E+02	2.5341745E+02
1.6990002E+03	3.8153610E+01	2.5741858E+02	2.4989677E+02
1.7990002E+03	3.7497337E+01	2.5631168E+02	2.4829616E+02
1.8990002E+03	3.6853054E+01	2.5521483E+02	2.4851939E+02
1.9990002E+03	3.6234596E+01	2.5414629E+02	2.4869055E+02
2.0990002E+03	3.5633091E+01	2.5309190E+02	2.4882796E+02
2.1990002E+03	3.5049839E+01	2.5205478E+02	2.4893356E+02
2.2990002E+03	3.4479385E+01	2.5102602E+02	2.4901140E+02
2.3990002E+03	3.3923363E+01	2.5000906E+02	2.4906281E+02

Table 6.3-4 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
2.4990002E+03	3.3377586E+01	2.4899687E+02	2.4909100E+02
2.5990002E+03	3.2843769E+01	2.4799298E+02	2.4909686E+02
2.6990002E+03	3.2318466E+01	2.4699135E+02	2.4908307E+02
2.7990002E+03	3.1803389E+01	2.4599551E+02	2.4905019E+02
2.8990002E+03	3.1295584E+01	2.4500011E+02	2.4900047E+02
2.9990002E+03	3.0796738E+01	2.4400864E+02	2.4893428E+02
3.0990002E+03	3.0304644E+01	2.4301700E+02	2.4857990E+02
3.1990002E+03	2.9822195E+01	2.4203123E+02	2.4800256E+02
3.2990002E+03	2.9345169E+01	2.4104298E+02	2.4743547E+02
3.3990002E+03	2.8874315E+01	2.4005385E+02	2.4687761E+02
3.4990002E+03	2.8407648E+01	2.3905972E+02	2.4632837E+02
3.5990002E+03	2.7946894E+01	2.3806429E+02	2.4578712E+02
3.6990002E+03	2.7388962E+01	2.3684224E+02	2.4495486E+02
3.7990002E+03	2.6770893E+01	2.3546463E+02	2.4389301E+02
3.8990002E+03	2.6174141E+01	2.3410812E+02	2.4285658E+02
3.9990002E+03	2.5596317E+01	2.3276886E+02	2.4184474E+02
4.9990005E+03	2.6731323E+01	2.3533328E+02	2.3367369E+02
5.9990005E+03	2.8283241E+01	2.3872231E+02	2.2678754E+02
6.9990005E+03	2.9280546E+01	2.4081827E+02	2.2082774E+02
7.9990005E+03	2.9874649E+01	2.4203879E+02	2.1411319E+02
8.9990000E+03	3.0281132E+01	2.4286227E+02	2.0832599E+02
9.9990000E+03	3.0510735E+01	2.4332350E+02	2.0327859E+02
1.9999000E+04	3.0991505E+01	2.4428529E+02	1.7131384E+02
2.9999000E+04	2.9918633E+01	2.4214134E+02	1.6435440E+02
3.9999000E+04	2.7012762E+01	2.3597810E+02	1.6252016E+02
4.9999000E+04	2.3462894E+01	2.2763481E+02	1.6105611E+02
5.9999000E+04	2.0355247E+01	2.1941168E+02	1.4244733E+02
6.9999000E+04	1.8630136E+01	2.1438547E+02	1.3764233E+02
7.9999000E+04	1.7395466E+01	2.1054732E+02	1.3628737E+02
8.9999000E+04	1.6355797E+01	2.0713664E+02	1.3578183E+02
9.9999000E+04	1.5409000E+01	2.0387074E+02	1.3548926E+02
1.0999900E+05	1.4575835E+01	2.0086436E+02	1.2383788E+02
1.1999900E+05	1.4157986E+01	1.9931883E+02	1.2140385E+02
1.2999900E+05	1.3875995E+01	1.9826535E+02	1.2080106E+02
1.3999900E+05	1.3636283E+01	1.9736124E+02	1.2006810E+02
1.4999900E+05	1.3711776E+01	1.9707439E+02	1.2008527E+02
1.5999900E+05	1.3395853E+01	1.9584515E+02	1.2043624E+02
1.6999900E+05	1.3194674E+01	1.9506467E+02	1.2040498E+02
1.7999900E+05	1.3027385E+01	1.9441422E+02	1.2062014E+02
1.8999900E+05	1.2799355E+01	1.9350348E+02	1.2178851E+02
1.9999900E+05	1.2606583E+01	1.9272925E+02	1.2004936E+02
2.0999900E+05	1.2408403E+01	1.9192191E+02	1.2008909E+02
2.1999900E+05	1.2563031E+01	1.9170526E+02	1.2018294E+02
2.2999900E+05	1.2265558E+01	1.9045314E+02	1.2070047E+02
2.3999900E+05	1.2073222E+01	1.8964398E+02	1.2039727E+02
2.4999900E+05	1.1873279E+01	1.8879008E+02	1.2023159E+02
2.5999900E+05	1.1733620E+01	1.8819835E+02	1.2053763E+02
2.6999900E+05	1.1496369E+01	1.8715273E+02	1.2018410E+02
2.7999900E+05	1.1319306E+01	1.8637091E+02	1.2008718E+02
2.8999900E+05	1.1113085E+01	1.8544101E+02	1.1997289E+02

Table 6.3-4 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
2.9999900E+05	1.0936292E+01	1.8463806E+02	1.2102894E+02
3.0999900E+05	1.0756902E+01	1.8381285E+02	1.1984742E+02
3.1999900E+05	1.0578548E+01	1.8298117E+02	1.1986362E+02
3.2999900E+05	1.0387058E+01	1.8207239E+02	1.1991714E+02
3.3999900E+05	1.0214164E+01	1.8124399E+02	1.2050457E+02
3.4999900E+05	1.0038447E+01	1.8039085E+02	1.1959095E+02
3.5999900E+05	9.8812323E+00	1.7962161E+02	1.1979398E+02
3.6999900E+05	9.6883554E+00	1.7865413E+02	1.2013674E+02
3.7999900E+05	9.5161686E+00	1.7778291E+02	1.1934048E+02
3.8999900E+05	9.3822050E+00	1.7710606E+02	1.1968526E+02
3.9999900E+05	9.1725273E+00	1.7600586E+02	1.1938493E+02
4.0999900E+05	9.0107679E+00	1.7515396E+02	1.1942473E+02
4.1999900E+05	8.8317318E+00	1.7419176E+02	1.1945287E+02
4.2999900E+05	8.6695099E+00	1.7331149E+02	1.1925799E+02
4.3999900E+05	8.5086336E+00	1.7242601E+02	1.1932946E+02
4.4999900E+05	8.3520765E+00	1.7155316E+02	1.1929256E+02
4.5999900E+05	8.1801653E+00	1.7057469E+02	1.1968427E+02
4.6999900E+05	8.0246010E+00	1.6968143E+02	1.1896213E+02
4.7999900E+05	7.8504615E+00	1.6865881E+02	1.1893427E+02
4.8999900E+05	7.7095027E+00	1.6782802E+02	1.1923802E+02
4.9999900E+05	7.5644450E+00	1.6695998E+02	1.1901489E+02
5.0999900E+05	7.4145904E+00	1.6605005E+02	1.1513844E+02
5.1999900E+05	7.3250523E+00	1.6552533E+02	1.1318491E+02
5.2999900E+05	7.4135361E+00	1.6513792E+02	1.1372987E+02
5.3999900E+05	7.3445134E+00	1.6474352E+02	1.1299928E+02
5.4999900E+05	7.3350887E+00	1.6474159E+02	1.1310741E+02
5.5999900E+05	7.2048583E+00	1.6393417E+02	1.1313199E+02
5.6999900E+05	7.1414332E+00	1.6356935E+02	1.1290891E+02
5.7999900E+05	7.0847344E+00	1.6324780E+02	1.1287725E+02
5.8999900E+05	7.0780478E+00	1.6326422E+02	1.1298372E+02
5.9999900E+05	6.9576774E+00	1.6250418E+02	1.1304053E+02
6.0999900E+05	6.8991990E+00	1.6216443E+02	1.1281588E+02
6.1999900E+05	6.8640966E+00	1.6198476E+02	1.1278277E+02
6.2999900E+05	6.7801723E+00	1.6146387E+02	1.1284113E+02
6.3999900E+05	6.8772030E+00	1.6146536E+02	1.1278131E+02
6.4999900E+05	6.7737813E+00	1.6079875E+02	1.1288092E+02
6.5999900E+05	6.7141695E+00	1.6044185E+02	1.1281158E+02
6.6999900E+05	6.6667514E+00	1.6016974E+02	1.1279598E+02
6.7999900E+05	6.6013613E+00	1.5976509E+02	1.1340829E+02
6.8999900E+05	6.5413675E+00	1.5939909E+02	1.1281779E+02
6.9999900E+05	6.5044913E+00	1.5919832E+02	1.1275397E+02
7.0999900E+05	6.4261932E+00	1.5869464E+02	1.1281796E+02
7.1999900E+05	6.3710561E+00	1.5835733E+02	1.1270325E+02
7.2999900E+05	6.3359337E+00	1.5816573E+02	1.1261736E+02
7.3999900E+05	6.2538500E+00	1.5762456E+02	1.1274461E+02
7.4999900E+05	6.3590932E+00	1.5764282E+02	1.1266793E+02
7.5999900E+05	6.2556863E+00	1.5693195E+02	1.1275700E+02
7.6999900E+05	6.1973724E+00	1.5656137E+02	1.1269332E+02
7.7999900E+05	6.1482363E+00	1.5625815E+02	1.1269490E+02
7.8999900E+05	6.0826154E+00	1.5582503E+02	1.1319188E+02

Table 6.3-4 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
7.9999900E+05	6.0302129E+00	1.5549301E+02	1.1266648E+02
8.0999900E+05	5.9970832E+00	1.5531015E+02	1.0988739E+02
8.1999900E+05	5.9225383E+00	1.5480522E+02	1.0905207E+02
8.2999900E+05	5.8784518E+00	1.5453542E+02	1.0875264E+02
8.3999900E+05	5.8574309E+00	1.5444495E+02	1.0871828E+02
8.4999900E+05	5.8027558E+00	1.5408963E+02	1.0871295E+02
8.5999900E+05	5.7637353E+00	1.5385637E+02	1.0863526E+02
8.6999900E+05	5.7315960E+00	1.5367671E+02	1.0860297E+02
8.7999900E+05	5.6773305E+00	1.5331772E+02	1.0945831E+02
8.8999900E+05	5.6526656E+00	1.5319632E+02	1.0867512E+02
8.9999900E+05	5.7376699E+00	1.5325520E+02	1.0858781E+02
9.0999900E+05	5.6678782E+00	1.5276738E+02	1.0866623E+02
9.1999900E+05	5.6292572E+00	1.5253253E+02	1.0861149E+02
9.2999900E+05	5.6051469E+00	1.5241420E+02	1.0861056E+02
9.3999900E+05	5.5570145E+00	1.5210025E+02	1.0866235E+02
9.4999900E+05	5.5226674E+00	1.5189737E+02	1.0856947E+02
9.5999900E+05	5.5020733E+00	1.5180624E+02	1.0850454E+02
9.6999900E+05	5.4493427E+00	1.5145027E+02	1.0863085E+02
9.7999900E+05	5.5554399E+00	1.5122403E+02	1.0899117E+02
9.8999900E+05	5.5238147E+00	1.5104211E+02	1.0861115E+02
9.9999900E+05	5.4867892E+00	1.5081450E+02	1.0856695E+02
1.9999990E+06	4.7242990E+00	1.4446336E+02	1.0758627E+02
2.9999990E+06	4.0752678E+00	1.3842998E+02	1.0743359E+02
3.9999990E+06	3.5567999E+00	1.3185898E+02	1.0719913E+02
4.9999990E+06	2.9229672E+00	1.2508495E+02	1.0714156E+02
5.9999990E+06	3.0993993E+00	1.2314389E+02	1.0213157E+02
6.9999990E+06	2.8701427E+00	1.2141211E+02	1.0210502E+02
7.9999990E+06	2.8019798E+00	1.1987931E+02	1.0203412E+02
8.9999990E+06	2.5613763E+00	1.1755611E+02	1.0205886E+02
9.9999990E+06	2.4830027E+00	1.1564577E+02	1.0203885E+02
1.0000000E+07	2.4829514E+00	1.1564504E+02	1.0203885E+02

Table 6.3-5 Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.0000000E-03	3.0000001E-01	1.2000000E+02	1.2000000E+02
5.0000101E-01	2.7259750E+00	1.4165091E+02	1.8136972E+02
1.0000020E+00	5.1064482E+00	1.6174347E+02	1.9665619E+02
2.0000031E+00	9.4478273E+00	1.9176770E+02	2.1014177E+02
3.0000041E+00	1.3136816E+01	2.1128329E+02	2.1743503E+02
4.0000048E+00	1.5963875E+01	2.2270206E+02	2.2218005E+02
5.0000062E+00	1.8241364E+01	2.2983440E+02	2.2577377E+02
6.0000072E+00	2.0224936E+01	2.3481953E+02	2.2877925E+02
7.0000081E+00	2.2068689E+01	2.3872961E+02	2.3137126E+02
8.0000086E+00	2.3811337E+01	2.4189592E+02	2.3361658E+02
9.0000095E+00	2.5435917E+01	2.4434668E+02	2.3570700E+02
1.0000011E+01	2.6924232E+01	2.4610625E+02	2.3753062E+02
1.1000012E+01	2.8294289E+01	2.4733090E+02	2.3915814E+02
1.2000013E+01	2.9555788E+01	2.4811652E+02	2.4063754E+02
1.3000014E+01	3.0728701E+01	2.4858443E+02	2.4196089E+02
1.4000015E+01	3.1828262E+01	2.4881909E+02	2.4313036E+02
1.5000016E+01	3.2895752E+01	2.4956989E+02	2.4416154E+02
1.6000017E+01	3.3975349E+01	2.5152676E+02	2.4507660E+02
1.7000017E+01	3.4982925E+01	2.5330739E+02	2.4587413E+02
1.8000019E+01	3.5882488E+01	2.5486186E+02	2.4657770E+02
1.9000019E+01	3.6586349E+01	2.5605603E+02	2.4712788E+02
2.0000021E+01	3.7062397E+01	2.5685297E+02	2.4754878E+02
2.1000023E+01	3.7439083E+01	2.5747720E+02	2.4809048E+02
2.2000023E+01	3.7642933E+01	2.5781265E+02	2.4848106E+02
2.3000025E+01	3.7735474E+01	2.5796402E+02	2.4886588E+02
2.4000025E+01	3.7742683E+01	2.5797534E+02	2.4909178E+02
2.5000027E+01	3.7701805E+01	2.5790796E+02	2.4914116E+02
2.6000027E+01	3.7618435E+01	2.5777066E+02	2.4913640E+02
2.7000029E+01	3.7509117E+01	2.5759030E+02	2.4912988E+02
2.8000029E+01	3.7405556E+01	2.5741904E+02	2.4912103E+02
2.9000031E+01	3.7311523E+01	2.5726318E+02	2.4911003E+02
3.0000031E+01	3.7224941E+01	2.5711938E+02	2.4910016E+02
3.1000032E+01	3.7144550E+01	2.5698563E+02	2.4908852E+02
3.2000034E+01	3.7069527E+01	2.5686060E+02	2.4907799E+02
3.3000034E+01	3.6999500E+01	2.5674365E+02	2.4906589E+02
3.4000034E+01	3.6934036E+01	2.5663419E+02	2.4905408E+02
3.5000034E+01	3.6897301E+01	2.5657220E+02	2.4851263E+02
3.6000038E+01	3.6886356E+01	2.5655301E+02	2.4766951E+02
3.7000038E+01	3.6884113E+01	2.5654831E+02	2.4673946E+02
3.8000038E+01	3.6883457E+01	2.5654623E+02	2.4583224E+02
3.9000038E+01	3.6883194E+01	2.5654486E+02	2.4496684E+02
4.0000042E+01	3.6883049E+01	2.5654370E+02	2.4415968E+02
4.1000042E+01	3.6882710E+01	2.5654221E+02	2.4336629E+02
4.2000042E+01	3.6882999E+01	2.5654181E+02	2.4262862E+02
4.3000046E+01	3.6883041E+01	2.5654099E+02	2.4191882E+02
4.4000046E+01	3.6883072E+01	2.5654016E+02	2.4123851E+02
4.5000046E+01	3.6883297E+01	2.5653967E+02	2.4058745E+02
4.6000046E+01	3.6883709E+01	2.5653952E+02	2.3996411E+02
4.7000050E+01	3.6884308E+01	2.5653967E+02	2.3936713E+02
4.8000050E+01	3.6885075E+01	2.5654013E+02	2.3879480E+02

Table 6.3-5 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
4.9000050E+01	3.6886036E+01	2.5654092E+02	2.3824565E+02
5.0000050E+01	3.6887188E+01	2.5654202E+02	2.3771765E+02
5.1000053E+01	3.6888554E+01	2.5654352E+02	2.3720889E+02
5.2000053E+01	3.6890018E+01	2.5654517E+02	2.3672409E+02
5.3000053E+01	3.6891624E+01	2.5654709E+02	2.3625661E+02
5.4000053E+01	3.6891205E+01	2.5654562E+02	2.3583260E+02
5.5000057E+01	3.6889595E+01	2.5653235E+02	2.3552893E+02
5.6000057E+01	3.6888245E+01	2.5651813E+02	2.3526105E+02
5.7000057E+01	3.6936546E+01	2.5655350E+02	2.3535867E+02
5.8000057E+01	3.7011860E+01	2.5663416E+02	2.3537367E+02
5.9000061E+01	3.7086433E+01	2.5671347E+02	2.3539345E+02
6.0000061E+01	3.7159649E+01	2.5679044E+02	2.3541574E+02
6.1000061E+01	3.7231579E+01	2.5686517E+02	2.3543439E+02
6.2000065E+01	3.7302422E+01	2.5693802E+02	2.3545251E+02
6.3000065E+01	3.7372063E+01	2.5700876E+02	2.3547327E+02
6.4000069E+01	3.7440434E+01	2.5707733E+02	2.3549387E+02
6.5000069E+01	3.7507629E+01	2.5714389E+02	2.3551462E+02
6.6000069E+01	3.7573734E+01	2.5720859E+02	2.3553520E+02
6.7000069E+01	3.7638783E+01	2.5727145E+02	2.3555594E+02
6.8000069E+01	3.7702808E+01	2.5733255E+02	2.3557651E+02
6.9000069E+01	3.7765827E+01	2.5739194E+02	2.3559723E+02
7.0000069E+01	3.7827869E+01	2.5744968E+02	2.3561778E+02
7.1000069E+01	3.7888962E+01	2.5750577E+02	2.3563849E+02
7.2000076E+01	3.7949123E+01	2.5756030E+02	2.3565904E+02
7.3000076E+01	3.8008377E+01	2.5761328E+02	2.3567972E+02
7.4000076E+01	3.8066753E+01	2.5766476E+02	2.3570026E+02
7.5000076E+01	3.8120419E+01	2.5771414E+02	2.3572766E+02
7.6000076E+01	3.8169277E+01	2.5776102E+02	2.3574525E+02
7.7000076E+01	3.8195381E+01	2.5780280E+02	2.3576724E+02
7.8000076E+01	3.8219978E+01	2.5784314E+02	2.3578716E+02
7.9000076E+01	3.8243881E+01	2.5788229E+02	2.3580733E+02
8.0000084E+01	3.8266960E+01	2.5792010E+02	2.3583145E+02
8.1000084E+01	3.8289265E+01	2.5795663E+02	2.3585130E+02
8.2000084E+01	3.8310932E+01	2.5799207E+02	2.3587141E+02
8.3000084E+01	3.8331841E+01	2.5802628E+02	2.3589539E+02
8.4000084E+01	3.8352051E+01	2.5805930E+02	2.3591527E+02
8.5000084E+01	3.8371670E+01	2.5809134E+02	2.3593556E+02
8.6000084E+01	3.8390652E+01	2.5812234E+02	2.3595955E+02
8.7000092E+01	3.8408970E+01	2.5815222E+02	2.3597887E+02
8.8000092E+01	3.8426712E+01	2.5818118E+02	2.3600116E+02
8.9000092E+01	3.8443939E+01	2.5820926E+02	2.3601901E+02
9.0000092E+01	3.8456432E+01	2.5822958E+02	2.3605576E+02
9.1000092E+01	3.8460842E+01	2.5823660E+02	2.3609306E+02
9.2000092E+01	3.8464794E+01	2.5824289E+02	2.3613850E+02
9.3000092E+01	3.8468315E+01	2.5824847E+02	2.3617924E+02
9.4000092E+01	3.8471325E+01	2.5825323E+02	2.3622546E+02
9.5000099E+01	3.8473911E+01	2.5825729E+02	2.3627263E+02
9.6000099E+01	3.8476048E+01	2.5826059E+02	2.3631070E+02
9.7000099E+01	3.8477783E+01	2.5826328E+02	2.3635616E+02
9.8000099E+01	3.8479115E+01	2.5826529E+02	2.3640100E+02

Table 6.3-5 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
9.9000099E+01	3.8480076E+01	2.5826666E+02	2.3644333E+02
1.0000010E+02	3.8480667E+01	2.5826749E+02	2.3648564E+02
1.0100010E+02	3.8480904E+01	2.5826770E+02	2.3652753E+02
1.0200011E+02	3.8475891E+01	2.5825934E+02	2.3656456E+02
1.0300011E+02	3.8469864E+01	2.5824930E+02	2.3660593E+02
1.0400011E+02	3.8463570E+01	2.5823883E+02	2.3664885E+02
1.0500011E+02	3.8457058E+01	2.5822803E+02	2.3668800E+02
1.0600011E+02	3.8450321E+01	2.5821683E+02	2.3673024E+02
1.0700011E+02	3.8443340E+01	2.5820526E+02	2.3677284E+02
1.0800011E+02	3.8436138E+01	2.5819330E+02	2.3681468E+02
1.0900011E+02	3.8428719E+01	2.5818100E+02	2.3685684E+02
1.1000011E+02	3.8421108E+01	2.5816837E+02	2.3689827E+02
1.1100011E+02	3.8413307E+01	2.5815546E+02	2.3694002E+02
1.1200011E+02	3.8405338E+01	2.5814224E+02	2.3698102E+02
1.1300011E+02	3.8397205E+01	2.5812875E+02	2.3702235E+02
1.1400011E+02	3.8388927E+01	2.5811502E+02	2.3706296E+02
1.1500011E+02	3.8380508E+01	2.5810107E+02	2.3710387E+02
1.1600011E+02	3.8371964E+01	2.5808691E+02	2.3714407E+02
1.1700011E+02	3.8363297E+01	2.5807254E+02	2.3718457E+02
1.1800012E+02	3.8354527E+01	2.5805801E+02	2.3722437E+02
1.1900012E+02	3.8345657E+01	2.5804330E+02	2.3726447E+02
1.2000012E+02	3.8336704E+01	2.5802844E+02	2.3730388E+02
1.2100012E+02	3.8327671E+01	2.5801349E+02	2.3734358E+02
1.2200012E+02	3.8318573E+01	2.5799838E+02	2.3738260E+02
1.2300012E+02	3.8309414E+01	2.5798322E+02	2.3742191E+02
1.2400012E+02	3.8300209E+01	2.5796793E+02	2.3746053E+02
1.2500013E+02	3.8290958E+01	2.5795261E+02	2.3749945E+02
1.2600013E+02	3.8281681E+01	2.5793719E+02	2.3753770E+02
1.2700013E+02	3.8272373E+01	2.5792175E+02	2.3757623E+02
1.2800012E+02	3.8263050E+01	2.5790628E+02	2.3761412E+02
1.2900014E+02	3.8253716E+01	2.5789078E+02	2.3765227E+02
1.3000014E+02	3.8244381E+01	2.5787527E+02	2.3768979E+02
1.3100014E+02	3.8235046E+01	2.5785980E+02	2.3772757E+02
1.3200014E+02	3.8225727E+01	2.5784430E+02	2.3776471E+02
1.3300014E+02	3.8216419E+01	2.5782886E+02	2.3780212E+02
1.3400014E+02	3.8207138E+01	2.5781342E+02	2.3783891E+02
1.3500014E+02	3.8197884E+01	2.5779803E+02	2.3787598E+02
1.3600014E+02	3.8188667E+01	2.5778271E+02	2.3791241E+02
1.3700014E+02	3.8179489E+01	2.5776746E+02	2.3794911E+02
1.3800014E+02	3.8170361E+01	2.5775229E+02	2.3798520E+02
1.3900014E+02	3.8161278E+01	2.5773718E+02	2.3802155E+02
1.4000014E+02	3.8152252E+01	2.5772217E+02	2.3805730E+02
1.4100014E+02	3.8143288E+01	2.5770724E+02	2.3809329E+02
1.4200014E+02	3.8134388E+01	2.5769241E+02	2.3812871E+02
1.4300014E+02	3.8125557E+01	2.5767770E+02	2.3816437E+02
1.4400015E+02	3.8116802E+01	2.5766312E+02	2.3819945E+02
1.4500015E+02	3.8108120E+01	2.5764865E+02	2.3823479E+02
1.4600015E+02	3.8099522E+01	2.5763434E+02	2.3826953E+02
1.4700015E+02	3.8091003E+01	2.5762012E+02	2.3830453E+02
1.4800015E+02	3.8082581E+01	2.5760608E+02	2.3833897E+02

Table 6.3-5 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.4900015E+02	3.8074242E+01	2.5759216E+02	2.3837366E+02
1.5000015E+02	3.8066002E+01	2.5757843E+02	2.3840778E+02
1.5100015E+02	3.8057858E+01	2.5756482E+02	2.3844214E+02
1.5200015E+02	3.8049812E+01	2.5755139E+02	2.3847595E+02
1.5300015E+02	3.8041866E+01	2.5753812E+02	2.3851001E+02
1.5400015E+02	3.8034023E+01	2.5752502E+02	2.3854352E+02
1.5500015E+02	3.8026283E+01	2.5751208E+02	2.3857727E+02
1.5600015E+02	3.8018658E+01	2.5749933E+02	2.3861049E+02
1.5700015E+02	3.8011131E+01	2.5748676E+02	2.3864394E+02
1.5800015E+02	3.8003727E+01	2.5747433E+02	2.3867685E+02
1.5900015E+02	3.7996429E+01	2.5746213E+02	2.3871001E+02
1.6000017E+02	3.7989254E+01	2.5745013E+02	2.3874265E+02
1.6100017E+02	3.7982189E+01	2.5743829E+02	2.3877550E+02
1.6200017E+02	3.7975250E+01	2.5742667E+02	2.3880786E+02
1.6300017E+02	3.7968426E+01	2.5741522E+02	2.3884044E+02
1.6400017E+02	3.7961731E+01	2.5740399E+02	2.3887251E+02
1.6500017E+02	3.7955154E+01	2.5739294E+02	2.3890482E+02
1.6600017E+02	3.7948708E+01	2.5738214E+02	2.3893661E+02
1.6700017E+02	3.7942379E+01	2.5737152E+02	2.3896864E+02
1.6800017E+02	3.7936188E+01	2.5736111E+02	2.3900018E+02
1.6900017E+02	3.7930119E+01	2.5735092E+02	2.3903194E+02
1.7000017E+02	3.7924187E+01	2.5734094E+02	2.3906322E+02
1.7100017E+02	3.7918377E+01	2.5733118E+02	2.3909471E+02
1.7200017E+02	3.7912708E+01	2.5732162E+02	2.3912573E+02
1.7300017E+02	3.7907188E+01	2.5731235E+02	2.3915697E+02
1.7400017E+02	3.7901844E+01	2.5730334E+02	2.3918773E+02
1.7500018E+02	3.7896702E+01	2.5729465E+02	2.3921875E+02
1.7600018E+02	3.7891785E+01	2.5728635E+02	2.3924934E+02
1.7700018E+02	3.7887089E+01	2.5727841E+02	2.3928023E+02
1.7800018E+02	3.7882629E+01	2.5727087E+02	2.3931073E+02
1.7900018E+02	3.7878407E+01	2.5726373E+02	2.3934157E+02
1.8000018E+02	3.7874435E+01	2.5725699E+02	2.3937207E+02
1.8100018E+02	3.7870708E+01	2.5725064E+02	2.3940292E+02
1.8200018E+02	3.7867237E+01	2.5724475E+02	2.3943350E+02
1.8300018E+02	3.7864010E+01	2.5723923E+02	2.3946443E+02
1.8400018E+02	3.7861031E+01	2.5723413E+02	2.3949510E+02
1.8500018E+02	3.7858284E+01	2.5722943E+02	2.3952617E+02
1.8600018E+02	3.7855774E+01	2.5722510E+02	2.3955698E+02
1.8700018E+02	3.7853474E+01	2.5722113E+02	2.3958817E+02
1.8800018E+02	3.7855434E+01	2.5722418E+02	2.3962476E+02
1.8900018E+02	3.7862083E+01	2.5723502E+02	2.3966750E+02
1.9000020E+02	3.7868805E+01	2.5724597E+02	2.3970966E+02
1.9100020E+02	3.7875599E+01	2.5725702E+02	2.3975195E+02
1.9200020E+02	3.7882477E+01	2.5726822E+02	2.3979384E+02
1.9300020E+02	3.7889427E+01	2.5727954E+02	2.3983589E+02
1.9400020E+02	3.7896454E+01	2.5729099E+02	2.3987750E+02
1.9500020E+02	3.7903553E+01	2.5730255E+02	2.3991930E+02
1.9600020E+02	3.7910732E+01	2.5731424E+02	2.3996066E+02
1.9700020E+02	3.7917980E+01	2.5732602E+02	2.4000218E+02
1.9800020E+02	3.7925301E+01	2.5733795E+02	2.4004329E+02

Table 6.3-5 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.9900020E+02	3.7932659E+01	2.5734995E+02	2.4008458E+02
2.0900020E+02	3.8009079E+01	2.5747433E+02	2.4045963E+02
2.1900020E+02	3.8091900E+01	2.5760907E+02	2.4086160E+02
2.2900020E+02	3.8180843E+01	2.5775366E+02	2.4124614E+02
2.3900020E+02	3.8274036E+01	2.5790494E+02	2.4161472E+02
2.4900020E+02	3.8371609E+01	2.5806308E+02	2.4197987E+02
2.5900021E+02	3.8472904E+01	2.5822699E+02	2.4233693E+02
2.6900021E+02	3.8577099E+01	2.5839529E+02	2.4268721E+02
2.7900021E+02	3.8684376E+01	2.5856821E+02	2.4302841E+02
2.8900021E+02	3.8795101E+01	2.5874634E+02	2.4336432E+02
2.9900021E+02	3.8905815E+01	2.5892404E+02	2.4369461E+02
3.0900021E+02	3.9018578E+01	2.5910464E+02	2.4400473E+02
3.1900021E+02	3.9134609E+01	2.5929004E+02	2.4432492E+02
3.2900021E+02	3.9251446E+01	2.5947632E+02	2.4463148E+02
3.3900021E+02	3.9369381E+01	2.5966388E+02	2.4493408E+02
3.4900021E+02	3.9487820E+01	2.5985181E+02	2.4523708E+02
3.5900021E+02	3.9607052E+01	2.6004050E+02	2.4552989E+02
3.6900021E+02	3.9726425E+01	2.6022897E+02	2.4582324E+02
3.7900021E+02	3.9846169E+01	2.6041754E+02	2.4610707E+02
3.8900021E+02	3.9964859E+01	2.6060400E+02	2.4639183E+02
3.9900021E+02	4.0084106E+01	2.6079086E+02	2.4666751E+02
4.0900021E+02	4.0202446E+01	2.6097583E+02	2.4694402E+02
4.1900021E+02	4.0320190E+01	2.6115942E+02	2.4721219E+02
4.2900021E+02	4.0463802E+01	2.6138318E+02	2.4748523E+02
4.3900021E+02	4.0611877E+01	2.6161325E+02	2.4773135E+02
4.4900021E+02	4.0758644E+01	2.6184058E+02	2.4798947E+02
4.5900021E+02	4.0903423E+01	2.6206415E+02	2.4823581E+02
4.6900021E+02	4.0855705E+01	2.6198804E+02	2.4853607E+02
4.7900021E+02	4.0784180E+01	2.6187476E+02	2.4882587E+02
4.8900024E+02	4.0717564E+01	2.6176898E+02	2.4910974E+02
4.9900024E+02	4.0655788E+01	2.6167059E+02	2.4938687E+02
5.9900024E+02	4.0210228E+01	2.6095203E+02	2.5176253E+02
6.9900024E+02	3.9997326E+01	2.6059634E+02	2.5365137E+02
7.9900024E+02	3.9843792E+01	2.6033340E+02	2.5519882E+02
8.9900024E+02	3.9785816E+01	2.6022195E+02	2.5647763E+02
9.9900024E+02	3.9784744E+01	2.6020099E+02	2.5756793E+02
1.0990002E+03	3.9836559E+01	2.6026422E+02	2.5851880E+02
1.1990002E+03	3.9919155E+01	2.6037631E+02	2.5934625E+02
1.2990002E+03	4.0030609E+01	2.6053400E+02	2.6008484E+02
1.3990002E+03	4.0164940E+01	2.6072751E+02	2.6075259E+02
1.4990002E+03	3.9545483E+01	2.5972226E+02	2.5732816E+02
1.5990002E+03	3.8827183E+01	2.5854282E+02	2.5341745E+02
1.6990002E+03	3.8153610E+01	2.5741858E+02	2.4989677E+02
1.7990002E+03	3.7497337E+01	2.5631168E+02	2.4829616E+02
1.8990002E+03	3.6853054E+01	2.5521483E+02	2.4851939E+02
1.9990002E+03	3.6234596E+01	2.5414629E+02	2.4869055E+02
2.0990002E+03	3.5633091E+01	2.5309190E+02	2.4882796E+02
2.1990002E+03	3.5049839E+01	2.5205478E+02	2.4893356E+02
2.2990002E+03	3.4479385E+01	2.5102602E+02	2.4901140E+02
2.3990002E+03	3.3923363E+01	2.5000906E+02	2.4906281E+02

Table 6.3-5 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
2.4990002E+03	3.3377586E+01	2.4899687E+02	2.4909100E+02
2.5990002E+03	3.2843769E+01	2.4799298E+02	2.4909686E+02
2.6990002E+03	3.2318466E+01	2.4699135E+02	2.4908307E+02
2.7990002E+03	3.1803389E+01	2.4599551E+02	2.4905019E+02
2.8990002E+03	3.1295584E+01	2.4500011E+02	2.4900047E+02
2.9990002E+03	3.0796738E+01	2.4400864E+02	2.4893428E+02
3.0990002E+03	3.0304644E+01	2.4301700E+02	2.4857990E+02
3.1990002E+03	2.9822195E+01	2.4203123E+02	2.4800256E+02
3.2990002E+03	2.9345169E+01	2.4104298E+02	2.4743547E+02
3.3990002E+03	2.8874315E+01	2.4005385E+02	2.4687761E+02
3.4990002E+03	2.8407648E+01	2.3905972E+02	2.4632837E+02
3.5990002E+03	2.7946894E+01	2.3806429E+02	2.4578712E+02
3.6990002E+03	2.7388226E+01	2.3684062E+02	2.4495476E+02
3.7990002E+03	2.6766949E+01	2.3545581E+02	2.4389238E+02
3.8990002E+03	2.6164898E+01	2.3408707E+02	2.4285503E+02
3.9990002E+03	2.5579802E+01	2.3273050E+02	2.4184184E+02
4.9990005E+03	2.5126232E+01	2.3164806E+02	2.3614439E+02
5.9990005E+03	2.4441301E+01	2.3001370E+02	2.3316080E+02
6.9990005E+03	2.3562939E+01	2.2785973E+02	2.3039064E+02
7.9990005E+03	2.2593464E+01	2.2540161E+02	2.2761166E+02
8.9990000E+03	2.1643618E+01	2.2290501E+02	2.2492903E+02
9.9990000E+03	2.0714348E+01	2.2037080E+02	2.2236482E+02
1.9999000E+04	1.5522656E+01	2.0412270E+02	2.0200508E+02
2.9999000E+04	1.3078362E+01	1.9481079E+02	1.9117068E+02
3.9999000E+04	1.1281648E+01	1.8698360E+02	1.8418089E+02
4.9999000E+04	9.7593222E+00	1.7949516E+02	1.7852824E+02
5.9999000E+04	8.5514469E+00	1.7284598E+02	1.6773746E+02
6.9999000E+04	7.9278684E+00	1.6911533E+02	1.6266452E+02
7.9999000E+04	7.5029039E+00	1.6643956E+02	1.5989267E+02
8.9999000E+04	7.1288581E+00	1.6398575E+02	1.5792799E+02
9.9999000E+04	6.8203111E+00	1.6188696E+02	1.5626491E+02
1.0999900E+05	6.4902821E+00	1.5956201E+02	1.5163063E+02
1.1999900E+05	6.2986951E+00	1.5817734E+02	1.4950952E+02
1.2999900E+05	6.1959090E+00	1.5742770E+02	1.4855832E+02
1.3999900E+05	6.1026297E+00	1.5674130E+02	1.4786124E+02
1.4999900E+05	6.0179300E+00	1.5611131E+02	1.4768338E+02
1.5999900E+05	5.9495687E+00	1.5560295E+02	1.4705296E+02
1.6999900E+05	5.9077773E+00	1.5528943E+02	1.4691705E+02
1.7999900E+05	5.8104248E+00	1.5454741E+02	1.4631186E+02
1.8999900E+05	5.7070394E+00	1.5374570E+02	1.4622502E+02
1.9999900E+05	5.6687794E+00	1.5345813E+02	1.4560851E+02
2.0999900E+05	5.6096835E+00	1.5299527E+02	1.4538156E+02
2.1999900E+05	5.5299273E+00	1.5236559E+02	1.4506044E+02
2.2999900E+05	5.4637604E+00	1.5184381E+02	1.4449553E+02
2.3999900E+05	5.4024181E+00	1.5135074E+02	1.4421178E+02
2.4999900E+05	5.3355322E+00	1.5081195E+02	1.4392197E+02
2.5999900E+05	5.2701526E+00	1.5028358E+02	1.4340343E+02
2.6999900E+05	5.2012386E+00	1.4971817E+02	1.4316252E+02
2.7999900E+05	5.1268816E+00	1.4910349E+02	1.4269228E+02
2.8999900E+05	5.0738177E+00	1.4865871E+02	1.4244559E+02

Table 6.3-5 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
2.9999900E+05	4.9924512E+00	1.4797192E+02	1.4207687E+02
3.0999900E+05	4.9411631E+00	1.4754211E+02	1.4163690E+02
3.1999900E+05	4.8821626E+00	1.4703461E+02	1.4136589E+02
3.2999900E+05	4.8195915E+00	1.4649147E+02	1.4099471E+02
3.3999900E+05	4.7541332E+00	1.4592165E+02	1.4064369E+02
3.4999900E+05	4.6899018E+00	1.4536078E+02	1.4017957E+02
3.5999900E+05	4.6354589E+00	1.4487695E+02	1.3990294E+02
3.6999900E+05	4.5700002E+00	1.4429239E+02	1.3952531E+02
3.7999900E+05	4.5112910E+00	1.4376103E+02	1.3917979E+02
3.8999900E+05	4.4498029E+00	1.4320383E+02	1.3881587E+02
3.9999900E+05	4.3916211E+00	1.4266841E+02	1.3844449E+02
4.0999900E+05	4.3294392E+00	1.4209485E+02	1.3807848E+02
4.1999900E+05	4.2772985E+00	1.4161519E+02	1.3765805E+02
4.2999900E+05	4.2125955E+00	1.4100162E+02	1.3736749E+02
4.3999900E+05	4.1545954E+00	1.4044872E+02	1.3700693E+02
4.4999900E+05	4.0972404E+00	1.3989734E+02	1.3664516E+02
4.5999900E+05	4.0379868E+00	1.3932201E+02	1.3627745E+02
4.6999900E+05	3.9788275E+00	1.3874232E+02	1.3590012E+02
4.7999900E+05	3.9195409E+00	1.3815598E+02	1.3552039E+02
4.8999900E+05	3.8610177E+00	1.3757202E+02	1.3513890E+02
4.9999900E+05	3.8024936E+00	1.3698262E+02	1.3475754E+02
5.0999900E+05	3.6398799E+00	1.3528873E+02	1.3025952E+02
5.1999900E+05	3.5779231E+00	1.3464352E+02	1.2909552E+02
5.2999900E+05	3.5660815E+00	1.3453726E+02	1.2873476E+02
5.3999900E+05	3.5192559E+00	1.3404955E+02	1.2849324E+02
5.4999900E+05	3.4979582E+00	1.3383942E+02	1.2834511E+02
5.5999900E+05	3.4766135E+00	1.3363374E+02	1.2821803E+02
5.6999900E+05	3.4539657E+00	1.3340773E+02	1.2802127E+02
5.7999900E+05	3.4314930E+00	1.3318286E+02	1.2789842E+02
5.8999900E+05	3.4126191E+00	1.3299722E+02	1.2776844E+02
5.9999900E+05	3.3934429E+00	1.3280768E+02	1.2764182E+02
6.0999900E+05	3.3745036E+00	1.3262025E+02	1.2751698E+02
6.1999900E+05	3.3557701E+00	1.3243462E+02	1.2739361E+02
6.2999900E+05	3.3372183E+00	1.3225049E+02	1.2727150E+02
6.3999900E+05	3.3188291E+00	1.3206767E+02	1.2715047E+02
6.4999900E+05	3.3005865E+00	1.3188603E+02	1.2703036E+02
6.5999900E+05	3.2824771E+00	1.3170538E+02	1.2691108E+02
6.6999900E+05	3.2644897E+00	1.3152563E+02	1.2679251E+02
6.7999900E+05	3.2466147E+00	1.3134668E+02	1.2667458E+02
6.8999900E+05	3.2288437E+00	1.3116843E+02	1.2655721E+02
6.9999900E+05	3.2111692E+00	1.3099080E+02	1.2644034E+02
7.0999900E+05	3.1935849E+00	1.3081372E+02	1.2632393E+02
7.1999900E+05	3.1760850E+00	1.3063716E+02	1.2620792E+02
7.2999900E+05	3.1586647E+00	1.3046103E+02	1.2609228E+02
7.3999900E+05	3.1413195E+00	1.3028531E+02	1.2597697E+02
7.4999900E+05	3.1240451E+00	1.3010994E+02	1.2586195E+02
7.5999900E+05	3.1068382E+00	1.2993488E+02	1.2574722E+02
7.6999900E+05	3.0896957E+00	1.2976012E+02	1.2563272E+02
7.7999900E+05	3.0726142E+00	1.2958560E+02	1.2551846E+02
7.8999900E+05	3.0555916E+00	1.2941132E+02	1.2540439E+02

Table 6.3-5 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 1 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
7.9999900E+05	3.0386252E+00	1.2923723E+02	1.2529050E+02
8.0999900E+05	3.0217130E+00	1.2906332E+02	1.2517680E+02
8.1999900E+05	3.0048532E+00	1.2888957E+02	1.2506324E+02
8.2999900E+05	2.9880440E+00	1.2871597E+02	1.2494983E+02
8.3999900E+05	2.9712839E+00	1.2854250E+02	1.2483654E+02
8.4999900E+05	2.9545712E+00	1.2836913E+02	1.2472338E+02
8.5999900E+05	2.9379051E+00	1.2819585E+02	1.2461033E+02
8.6999900E+05	2.9212837E+00	1.2802264E+02	1.2449738E+02
8.7999900E+05	2.9047065E+00	1.2784953E+02	1.2438451E+02
8.8999900E+05	2.8881724E+00	1.2767647E+02	1.2427174E+02
8.9999900E+05	2.8716803E+00	1.2750346E+02	1.2415905E+02
9.0999900E+05	2.8563960E+00	1.2733647E+02	1.2405566E+02
9.1999900E+05	2.8407967E+00	1.2716518E+02	1.2394515E+02
9.2999900E+05	2.8251565E+00	1.2699291E+02	1.2383348E+02
9.3999900E+05	2.8095317E+00	1.2682037E+02	1.2372156E+02
9.4999900E+05	2.7939363E+00	1.2664772E+02	1.2360957E+02
9.5999900E+05	2.7783742E+00	1.2647502E+02	1.2349757E+02
9.6999900E+05	2.7628474E+00	1.2630228E+02	1.2338560E+02
9.7999900E+05	2.7473564E+00	1.2612952E+02	1.2327364E+02
9.8999900E+05	2.7319016E+00	1.2595675E+02	1.2316170E+02
9.9999900E+05	2.7212059E+00	1.2585126E+02	1.2304398E+02
1.9999990E+06	2.4759715E+00	1.2107099E+02	1.1696932E+02
2.9999990E+06	2.4193802E+00	1.1740604E+02	1.1476814E+02
3.9999990E+06	2.3865757E+00	1.1408575E+02	1.1239078E+02
4.9999990E+06	2.4168630E+00	1.1044049E+02	1.1020733E+02
5.9999990E+06	2.4502521E+00	1.0839265E+02	1.0672770E+02
6.9999990E+06	2.6637418E+00	1.0736152E+02	1.0591682E+02
7.9999990E+06	2.8920259E+00	1.0626134E+02	1.0557551E+02
8.9999990E+06	3.1335168E+00	1.0544693E+02	1.0492934E+02
9.9999990E+06	3.4042578E+00	1.0505737E+02	1.0456925E+02
1.0000000E+07	3.4043219E+00	1.0505846E+02	1.0456951E+02

Table 6.3-6 Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.0000000E-03	3.0000001E-01	1.2000000E+02	1.2000000E+02
5.0000101E-01	2.7377284E+00	1.4175549E+02	1.8153743E+02
1.0000020E+00	5.1345654E+00	1.6196773E+02	1.9689815E+02
2.0000031E+00	9.5797243E+00	1.9262892E+02	2.1060631E+02
3.0000041E+00	1.3399606E+01	2.1274068E+02	2.1801213E+02
4.0000048E+00	1.6279745E+01	2.2422743E+02	2.2273044E+02
5.0000062E+00	1.8620804E+01	2.3149895E+02	2.2633885E+02
6.0000072E+00	2.0646685E+01	2.3652054E+02	2.2935184E+02
7.0000081E+00	2.2518993E+01	2.4041167E+02	2.3196750E+02
8.0000086E+00	2.4268911E+01	2.4347572E+02	2.3420142E+02
9.0000095E+00	2.5933958E+01	2.4598363E+02	2.3634618E+02
1.0000011E+01	2.7431313E+01	2.4767444E+02	2.3822281E+02
1.1000012E+01	2.8811859E+01	2.4885071E+02	2.3987616E+02
1.2000013E+01	3.0085241E+01	2.4960413E+02	2.4135287E+02
1.3000014E+01	3.1266411E+01	2.5003322E+02	2.4266878E+02
1.4000015E+01	3.2365700E+01	2.5020378E+02	2.4384215E+02
1.5000016E+01	3.3406082E+01	2.5050041E+02	2.4489136E+02
1.6000017E+01	3.4473175E+01	2.5241086E+02	2.4583766E+02
1.7000017E+01	3.5459274E+01	2.5413344E+02	2.4668573E+02
1.8000019E+01	3.6344593E+01	2.5564661E+02	2.4745491E+02
1.9000019E+01	3.7222340E+01	2.5711725E+02	2.4833369E+02
2.0000021E+01	3.8029339E+01	2.5844452E+02	2.4904790E+02
2.1000023E+01	3.8538815E+01	2.5927057E+02	2.4944116E+02
2.2000023E+01	3.8855831E+01	2.5977988E+02	2.4976942E+02
2.3000025E+01	3.9055569E+01	2.6009869E+02	2.5014749E+02
2.4000025E+01	3.9140823E+01	2.6023395E+02	2.5050238E+02
2.5000027E+01	3.9131054E+01	2.6021786E+02	2.5072020E+02
2.6000027E+01	3.9070011E+01	2.6012024E+02	2.5077641E+02
2.7000029E+01	3.8970367E+01	2.5996091E+02	2.5076450E+02
2.8000029E+01	3.8861237E+01	2.5978604E+02	2.5075642E+02
2.9000031E+01	3.8760437E+01	2.5962415E+02	2.5074838E+02
3.0000031E+01	3.8668808E+01	2.5947665E+02	2.5073950E+02
3.1000032E+01	3.8583733E+01	2.5933945E+02	2.5073061E+02
3.2000034E+01	3.8504440E+01	2.5921136E+02	2.5072105E+02
3.3000034E+01	3.8430283E+01	2.5909137E+02	2.5071155E+02
3.4000034E+01	3.8360863E+01	2.5897885E+02	2.5070146E+02
3.5000034E+01	3.8296001E+01	2.5887357E+02	2.5067378E+02
3.6000038E+01	3.8265759E+01	2.5882388E+02	2.4999951E+02
3.7000038E+01	3.8259903E+01	2.5881345E+02	2.4903307E+02
3.8000038E+01	3.8256500E+01	2.5880704E+02	2.4817137E+02
3.9000038E+01	3.8253555E+01	2.5880133E+02	2.4734923E+02
4.0000042E+01	3.8250999E+01	2.5879630E+02	2.4656363E+02
4.1000042E+01	3.8248722E+01	2.5879175E+02	2.4581348E+02
4.2000042E+01	3.8246769E+01	2.5878769E+02	2.4509569E+02
4.3000046E+01	3.8245052E+01	2.5878406E+02	2.4440939E+02
4.4000046E+01	3.8243626E+01	2.5878091E+02	2.4375174E+02
4.5000046E+01	3.8242413E+01	2.5877811E+02	2.4312216E+02
4.6000046E+01	3.8241467E+01	2.5877576E+02	2.4251797E+02
4.7000050E+01	3.8240719E+01	2.5877374E+02	2.4193883E+02
4.8000050E+01	3.8240219E+01	2.5877213E+02	2.4138231E+02

Table 6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
4.9000050E+01	3.8239902E+01	2.5877081E+02	2.4084825E+02
5.0000050E+01	3.8239868E+01	2.5876999E+02	2.4034883E+02
5.1000053E+01	3.8239658E+01	2.5876889E+02	2.3984592E+02
5.2000053E+01	3.8239990E+01	2.5876868E+02	2.3938129E+02
5.3000053E+01	3.8240044E+01	2.5876801E+02	2.3892741E+02
5.4000053E+01	3.8240284E+01	2.5876767E+02	2.3848843E+02
5.5000057E+01	3.8240509E+01	2.5876706E+02	2.3806902E+02
5.6000057E+01	3.8240849E+01	2.5875598E+02	2.3776193E+02
5.7000057E+01	3.8238335E+01	2.5874030E+02	2.3751085E+02
5.8000057E+01	3.8273766E+01	2.5876782E+02	2.3754596E+02
5.9000061E+01	3.8350327E+01	2.5884802E+02	2.3755873E+02
6.0000061E+01	3.8428566E+01	2.5893082E+02	2.3757584E+02
6.1000061E+01	3.8505527E+01	2.5901147E+02	2.3759453E+02
6.2000065E+01	3.8580959E+01	2.5908957E+02	2.3761528E+02
6.3000065E+01	3.8654980E+01	2.5916528E+02	2.3763402E+02
6.4000069E+01	3.8727531E+01	2.5923853E+02	2.3765477E+02
6.5000069E+01	3.8798687E+01	2.5930945E+02	2.3767355E+02
6.6000069E+01	3.8868439E+01	2.5937805E+02	2.3769431E+02
6.7000069E+01	3.8936985E+01	2.5944461E+02	2.3771312E+02
6.8000069E+01	3.9004284E+01	2.5950912E+02	2.3773387E+02
6.9000069E+01	3.9070438E+01	2.5957175E+02	2.3775272E+02
7.0000069E+01	3.9135414E+01	2.5963239E+02	2.3777345E+02
7.1000069E+01	3.9199295E+01	2.5969122E+02	2.3779231E+02
7.2000076E+01	3.9262054E+01	2.5974823E+02	2.3781305E+02
7.3000076E+01	3.9323784E+01	2.5980350E+02	2.3783194E+02
7.4000076E+01	3.9384445E+01	2.5985706E+02	2.3785266E+02
7.5000076E+01	3.9444126E+01	2.5990897E+02	2.3787155E+02
7.6000076E+01	3.9498062E+01	2.5995834E+02	2.3789746E+02
7.7000076E+01	3.9547989E+01	2.6000543E+02	2.3791376E+02
7.8000076E+01	3.9596176E+01	2.6005112E+02	2.3793298E+02
7.9000076E+01	3.9621590E+01	2.6009155E+02	2.3795599E+02
8.0000084E+01	3.9646076E+01	2.6013052E+02	2.3797476E+02
8.1000084E+01	3.9669815E+01	2.6016824E+02	2.3799300E+02
8.2000084E+01	3.9692730E+01	2.6020465E+02	2.3801376E+02
8.3000084E+01	3.9714828E+01	2.6023975E+02	2.3803416E+02
8.4000084E+01	3.9736130E+01	2.6027356E+02	2.3805489E+02
8.5000084E+01	3.9756668E+01	2.6030615E+02	2.3807526E+02
8.6000084E+01	3.9776463E+01	2.6033755E+02	2.3809592E+02
8.7000092E+01	3.9795547E+01	2.6036780E+02	2.3811623E+02
8.8000092E+01	3.9813938E+01	2.6039691E+02	2.3813684E+02
8.9000092E+01	3.9831665E+01	2.6042499E+02	2.3815709E+02
9.0000092E+01	3.9842495E+01	2.6044205E+02	2.3819580E+02
9.1000092E+01	3.9847008E+01	2.6044907E+02	2.3823470E+02
9.2000092E+01	3.9850971E+01	2.6045517E+02	2.3827756E+02
9.3000092E+01	3.9854359E+01	2.6046039E+02	2.3831822E+02
9.4000092E+01	3.9857235E+01	2.6046478E+02	2.3836557E+02
9.5000099E+01	3.9859577E+01	2.6046832E+02	2.3840152E+02
9.6000099E+01	3.9861420E+01	2.6047110E+02	2.3844385E+02
9.7000099E+01	3.9862808E+01	2.6047311E+02	2.3848824E+02
9.8000099E+01	3.9863701E+01	2.6047437E+02	2.3853171E+02

Table 6.3-6 (cont.)	Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray		
TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
9.9000099E+01	3.9864151E+01	2.6047491E+02	2.3857263E+02
1.0000010E+02	3.9864197E+01	2.6047482E+02	2.3861111E+02
1.0100010E+02	3.9863960E+01	2.6047427E+02	2.3864566E+02
1.0200010E+02	3.9859905E+01	2.6046768E+02	2.3868457E+02
1.0300011E+02	3.9853218E+01	2.6045691E+02	2.3872525E+02
1.0400011E+02	3.9846176E+01	2.6044556E+02	2.3876790E+02
1.0500011E+02	3.9838852E+01	2.6043375E+02	2.3880835E+02
1.0600011E+02	3.9831207E+01	2.6042145E+02	2.3885059E+02
1.0700011E+02	3.9823315E+01	2.6040875E+02	2.3889064E+02
1.0800011E+02	3.9815136E+01	2.6039557E+02	2.3893245E+02
1.0900011E+02	3.9806732E+01	2.6038205E+02	2.3897212E+02
1.1000011E+02	3.9798077E+01	2.6036813E+02	2.3901350E+02
1.1100011E+02	3.9789234E+01	2.6035391E+02	2.3905278E+02
1.1200011E+02	3.9780167E+01	2.6033932E+02	2.3909373E+02
1.1300011E+02	3.9770931E+01	2.6032449E+02	2.3913263E+02
1.1400011E+02	3.9761501E+01	2.6030933E+02	2.3917319E+02
1.1500011E+02	3.9751930E+01	2.6029395E+02	2.3921169E+02
1.1600011E+02	3.9742191E+01	2.6027826E+02	2.3925183E+02
1.1700011E+02	3.9732338E+01	2.6026242E+02	2.3928996E+02
1.1800011E+02	3.9722336E+01	2.6024634E+02	2.3932970E+02
1.1900012E+02	3.9712246E+01	2.6023010E+02	2.3936745E+02
1.2000012E+02	3.9702034E+01	2.6021368E+02	2.3940678E+02
1.2100012E+02	3.9691750E+01	2.6019714E+02	2.3944417E+02
1.2200012E+02	3.9681366E+01	2.6018045E+02	2.3948311E+02
1.2300012E+02	3.9670937E+01	2.6016367E+02	2.3952013E+02
1.2400012E+02	3.9660423E+01	2.6014673E+02	2.3955867E+02
1.2500012E+02	3.9649883E+01	2.6012976E+02	2.3959534E+02
1.2600013E+02	3.9639278E+01	2.6011270E+02	2.3963350E+02
1.2700013E+02	3.9628666E+01	2.6009561E+02	2.3966980E+02
1.2800012E+02	3.9618008E+01	2.6007843E+02	2.3970758E+02
1.2900012E+02	3.9607357E+01	2.6006128E+02	2.3974353E+02
1.3000014E+02	3.9596676E+01	2.6004407E+02	2.3978093E+02
1.3100014E+02	3.9586018E+01	2.6002692E+02	2.3981653E+02
1.3200014E+02	3.9575348E+01	2.6000970E+02	2.3985356E+02
1.3300014E+02	3.9564713E+01	2.5999255E+02	2.3988882E+02
1.3400014E+02	3.9554077E+01	2.5997540E+02	2.3992549E+02
1.3500014E+02	3.9543495E+01	2.5995834E+02	2.3996042E+02
1.3600014E+02	3.9532925E+01	2.5994128E+02	2.3999673E+02
1.3700014E+02	3.9522419E+01	2.5992432E+02	2.4003131E+02
1.3800014E+02	3.9511940E+01	2.5990741E+02	2.4006728E+02
1.3900014E+02	3.9501530E+01	2.5989059E+02	2.4010153E+02
1.4000014E+02	3.9491161E+01	2.5987387E+02	2.4013715E+02
1.4100014E+02	3.9480877E+01	2.5985724E+02	2.4017108E+02
1.4200014E+02	3.9470638E+01	2.5984070E+02	2.4020636E+02
1.4300014E+02	3.9460491E+01	2.5982431E+02	2.4023997E+02
1.4400014E+02	3.9450405E+01	2.5980798E+02	2.4027492E+02
1.4500015E+02	3.9440418E+01	2.5979184E+02	2.4030821E+02
1.4600015E+02	3.9430496E+01	2.5977579E+02	2.4034282E+02
1.4700015E+02	3.9420685E+01	2.5975992E+02	2.4037582E+02
1.4800015E+02	3.9410946E+01	2.5974414E+02	2.4041010E+02

Table 6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.4900015E+02	3.9401325E+01	2.5972858E+02	2.4044281E+02
1.5000015E+02	3.9391785E+01	2.5971310E+02	2.4047676E+02
1.5100015E+02	3.9382366E+01	2.5969785E+02	2.4050917E+02
1.5200015E+02	3.9373032E+01	2.5968274E+02	2.4054282E+02
1.5300015E+02	3.9363823E+01	2.5966782E+02	2.4057492E+02
1.5400015E+02	3.9354706E+01	2.5965302E+02	2.4060826E+02
1.5500015E+02	3.9345718E+01	2.5963843E+02	2.4064009E+02
1.5600015E+02	3.9336826E+01	2.5962402E+02	2.4067313E+02
1.5700015E+02	3.9328068E+01	2.5960980E+02	2.4070467E+02
1.5800015E+02	3.9319412E+01	2.5959573E+02	2.4073741E+02
1.5900015E+02	3.9310894E+01	2.5958191E+02	2.4076868E+02
1.6000015E+02	3.9302483E+01	2.5956824E+02	2.4080112E+02
1.6100017E+02	3.9294212E+01	2.5955478E+02	2.4083212E+02
1.6200017E+02	3.9286053E+01	2.5954153E+02	2.4086429E+02
1.6300017E+02	3.9278038E+01	2.5952847E+02	2.4089502E+02
1.6400017E+02	3.9270138E+01	2.5951563E+02	2.4092690E+02
1.6500017E+02	3.9262383E+01	2.5950302E+02	2.4095737E+02
1.6600017E+02	3.9254745E+01	2.5949057E+02	2.4098897E+02
1.6700017E+02	3.9247257E+01	2.5947836E+02	2.4101918E+02
1.6800017E+02	3.9239891E+01	2.5946637E+02	2.4105052E+02
1.6900017E+02	3.9232677E+01	2.5945462E+02	2.4108049E+02
1.7000017E+02	3.9225582E+01	2.5944302E+02	2.4111156E+02
1.7100017E+02	3.9218643E+01	2.5943170E+02	2.4114127E+02
1.7200017E+02	3.9211826E+01	2.5942059E+02	2.4117207E+02
1.7300017E+02	3.9205166E+01	2.5940970E+02	2.4120155E+02
1.7400017E+02	3.9198631E+01	2.5939905E+02	2.4123210E+02
1.7500017E+02	3.9192253E+01	2.5938861E+02	2.4126134E+02
1.7600018E+02	3.9186001E+01	2.5937839E+02	2.4129164E+02
1.7700018E+02	3.9179928E+01	2.5936844E+02	2.4132065E+02
1.7800018E+02	3.9174015E+01	2.5935876E+02	2.4135071E+02
1.7900018E+02	3.9168327E+01	2.5934946E+02	2.4137950E+02
1.8000018E+02	3.9162853E+01	2.5934048E+02	2.4140938E+02
1.8100018E+02	3.9157635E+01	2.5933191E+02	2.4143805E+02
1.8200018E+02	3.9152641E+01	2.5932370E+02	2.4146783E+02
1.8300018E+02	3.9147911E+01	2.5931592E+02	2.4149646E+02
1.8400018E+02	3.9143425E+01	2.5930853E+02	2.4152623E+02
1.8500018E+02	3.9139214E+01	2.5930161E+02	2.4155490E+02
1.8600018E+02	3.9135242E+01	2.5929504E+02	2.4158473E+02
1.8700018E+02	3.9136330E+01	2.5929663E+02	2.4161800E+02
1.8800018E+02	3.9144684E+01	2.5930991E+02	2.4165858E+02
1.8900018E+02	3.9153111E+01	2.5932330E+02	2.4169783E+02
1.9000018E+02	3.9161587E+01	2.5933676E+02	2.4173799E+02
1.9100020E+02	3.9170143E+01	2.5935037E+02	2.4177701E+02
1.9200020E+02	3.9178745E+01	2.5936401E+02	2.4181694E+02
1.9300020E+02	3.9187424E+01	2.5937781E+02	2.4185576E+02
1.9400020E+02	3.9196152E+01	2.5939169E+02	2.4189546E+02
1.9500020E+02	3.9204956E+01	2.5940567E+02	2.4193408E+02
1.9600020E+02	3.9213802E+01	2.5941974E+02	2.4197357E+02
1.9700020E+02	3.9222729E+01	2.5943390E+02	2.4201198E+02
1.9800020E+02	3.9231697E+01	2.5944815E+02	2.4205127E+02

Table 6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.9900020E+02	3.9240742E+01	2.5946249E+02	2.4208948E+02
2.0900020E+02	3.9334408E+01	2.5961115E+02	2.4243906E+02
2.1900020E+02	3.9436222E+01	2.5977258E+02	2.4281976E+02
2.2900020E+02	3.9542141E+01	2.5994022E+02	2.4317062E+02
2.3900020E+02	3.9654232E+01	2.6011731E+02	2.4353412E+02
2.4900020E+02	3.9768967E+01	2.6029822E+02	2.4388228E+02
2.5900021E+02	3.9887028E+01	2.6048395E+02	2.4422295E+02
2.6900021E+02	4.0008198E+01	2.6067419E+02	2.4455684E+02
2.7900021E+02	4.0132275E+01	2.6086850E+02	2.4487732E+02
2.8900021E+02	4.0259922E+01	2.6106796E+02	2.4520494E+02
2.9900021E+02	4.0388817E+01	2.6126886E+02	2.4551483E+02
3.0900021E+02	4.0519791E+01	2.6147247E+02	2.4582115E+02
3.1900021E+02	4.0654053E+01	2.6168069E+02	2.4612721E+02
3.2900021E+02	4.0787758E+01	2.6188748E+02	2.4642648E+02
3.3900021E+02	4.0924244E+01	2.6209799E+02	2.4672299E+02
3.4900021E+02	4.1060360E+01	2.6230740E+02	2.4701314E+02
3.5900021E+02	4.1197376E+01	2.6251758E+02	2.4729610E+02
3.6900021E+02	4.1334229E+01	2.6272696E+02	2.4758324E+02
3.7900021E+02	4.1471497E+01	2.6293637E+02	2.4785861E+02
3.8900021E+02	4.1608536E+01	2.6314490E+02	2.4813797E+02
3.9900021E+02	4.1745678E+01	2.6335300E+02	2.4840620E+02
4.0900021E+02	4.1882187E+01	2.6355957E+02	2.4867841E+02
4.1900021E+02	4.2018162E+01	2.6376477E+02	2.4894012E+02
4.2900021E+02	4.2153282E+01	2.6396811E+02	2.4920572E+02
4.3900021E+02	4.2287731E+01	2.6416992E+02	2.4946130E+02
4.4900021E+02	4.2421150E+01	2.6436963E+02	2.4972066E+02
4.5900021E+02	4.2348583E+01	2.6425824E+02	2.5003354E+02
4.6900021E+02	4.2265461E+01	2.6413074E+02	2.5033035E+02
4.7900021E+02	4.2187634E+01	2.6401105E+02	2.5062308E+02
4.8900021E+02	4.2114338E+01	2.6389804E+02	2.5090150E+02
4.9900024E+02	4.2045532E+01	2.6379169E+02	2.5117657E+02
5.9900024E+02	4.1535240E+01	2.6299350E+02	2.5351466E+02
6.9900024E+02	4.1265327E+01	2.6255917E+02	2.5538727E+02
7.9900024E+02	4.1113510E+01	2.6230560E+02	2.5690091E+02
8.9900024E+02	4.1047581E+01	2.6218460E+02	2.5816599E+02
9.9900024E+02	4.1045757E+01	2.6216296E+02	2.5923889E+02
1.0990002E+03	4.1089920E+01	2.6221268E+02	2.6018176E+02
1.1990002E+03	4.1167606E+01	2.6231427E+02	2.6100116E+02
1.2990002E+03	4.1275776E+01	2.6246289E+02	2.6173227E+02
1.3990002E+03	4.1407425E+01	2.6264737E+02	2.6239362E+02
1.4990002E+03	4.1020630E+01	2.6202982E+02	2.6032425E+02
1.5990002E+03	4.0264687E+01	2.6082651E+02	2.5638773E+02
1.6990002E+03	3.9555981E+01	2.5967963E+02	2.5285913E+02
1.7990002E+03	3.8869164E+01	2.5855362E+02	2.5049675E+02
1.8990002E+03	3.8194138E+01	2.5743857E+02	2.5073938E+02
1.9990002E+03	3.7544598E+01	2.5634949E+02	2.5091693E+02
2.0990002E+03	3.6915249E+01	2.5527872E+02	2.5105942E+02
2.1990002E+03	3.6303257E+01	2.5422235E+02	2.5117026E+02
2.2990002E+03	3.5706490E+01	2.5317744E+02	2.5125233E+02
2.3990002E+03	3.5123337E+01	2.5214180E+02	2.5130815E+02

Table 6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
2.4990002E+03	3.4552345E+01	2.5111337E+02	2.5133987E+02
2.5990002E+03	3.3992702E+01	2.5009114E+02	2.5134935E+02
2.6990002E+03	3.3442593E+01	2.4907213E+02	2.5133937E+02
2.7990002E+03	3.2902794E+01	2.4805815E+02	2.5130960E+02
2.8990002E+03	3.2372986E+01	2.4704890E+02	2.5126270E+02
2.9990002E+03	3.1850832E+01	2.4604025E+02	2.5119974E+02
3.0990002E+03	3.1336998E+01	2.4503374E+02	2.5087431E+02
3.1990002E+03	3.0831961E+01	2.4403053E+02	2.5030305E+02
3.2990002E+03	3.0335613E+01	2.4303072E+02	2.4974176E+02
3.3990002E+03	2.9847193E+01	2.4203302E+02	2.4918939E+02
3.4990002E+03	2.9365044E+01	2.4103424E+02	2.4864528E+02
3.5990002E+03	2.8887573E+01	2.4003116E+02	2.4810866E+02
3.6990002E+03	2.8319651E+01	2.3882144E+02	2.4729141E+02
3.7990002E+03	2.7679928E+01	2.3743512E+02	2.4620236E+02
3.8990002E+03	2.7061829E+01	2.3606915E+02	2.4514095E+02
3.9990002E+03	2.6462860E+01	2.3471948E+02	2.4410399E+02
4.9990005E+03	2.7717714E+01	2.3747922E+02	2.3573552E+02
5.9990005E+03	2.9179426E+01	2.4058270E+02	2.2864629E+02
6.9990005E+03	3.0107466E+01	2.4248564E+02	2.2248573E+02
7.9990005E+03	3.0640917E+01	2.4355759E+02	2.1553044E+02
8.9990000E+03	3.0992430E+01	2.4425552E+02	2.0962993E+02
9.9990000E+03	3.1168619E+01	2.4460307E+02	2.0446275E+02
1.9999000E+04	3.1342058E+01	2.4494939E+02	1.7129494E+02
2.9999000E+04	2.9996357E+01	2.4227354E+02	1.6453737E+02
3.9999000E+04	2.7075392E+01	2.3608899E+02	1.6245210E+02
4.9999000E+04	2.3513235E+01	2.2772939E+02	1.6104552E+02
5.9999000E+04	2.0397768E+01	2.1949641E+02	1.4263896E+02
6.9999000E+04	1.8663374E+01	2.1444868E+02	1.3771161E+02
7.9999000E+04	1.7421991E+01	2.1059273E+02	1.3631923E+02
8.9999000E+04	1.6382538E+01	2.0718542E+02	1.3582411E+02
9.9999000E+04	1.5424266E+01	2.0388133E+02	1.3539322E+02
1.0999900E+05	1.4598387E+01	2.0090237E+02	1.2408269E+02
1.1999900E+05	1.4164813E+01	1.9929756E+02	1.2126481E+02
1.2999900E+05	1.3892073E+01	1.9827962E+02	1.2056611E+02
1.3999900E+05	1.3743026E+01	1.9754755E+02	1.2041878E+02
1.4999900E+05	1.3497474E+01	1.9660997E+02	1.2041843E+02
1.5999900E+05	1.3303262E+01	1.9586594E+02	1.2050181E+02
1.6999900E+05	1.3249805E+01	1.9533540E+02	1.2047013E+02
1.7999900E+05	1.2991333E+01	1.9431233E+02	1.2034081E+02
1.8999900E+05	1.2792338E+01	1.9352139E+02	1.2015611E+02
1.9999900E+05	1.2601436E+01	1.9275479E+02	1.2018667E+02
2.0999900E+05	1.2408780E+01	1.9197110E+02	1.2012907E+02
2.1999900E+05	1.2575617E+01	1.9181253E+02	1.2040362E+02
2.2999900E+05	1.2256954E+01	1.9046559E+02	1.2065799E+02
2.3999900E+05	1.2062431E+01	1.8964653E+02	1.2035135E+02
2.4999900E+05	1.1867160E+01	1.8881326E+02	1.2027908E+02
2.5999900E+05	1.1682931E+01	1.8801898E+02	1.2028544E+02
2.6999900E+05	1.1487286E+01	1.8716190E+02	1.2015181E+02
2.7999900E+05	1.1304326E+01	1.8635210E+02	1.2021255E+02
2.8999900E+05	1.1118506E+01	1.8551822E+02	1.2016360E+02

Table 6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
2.9999900E+05	1.0936718E+01	1.8469258E+02	1.1990718E+02
3.0999900E+05	1.0762655E+01	1.8389336E+02	1.1982802E+02
3.1999900E+05	1.0565091E+01	1.8296730E+02	1.2086046E+02
3.2999900E+05	1.0386455E+01	1.8212279E+02	1.1970253E+02
3.3999900E+05	1.0209218E+01	1.8127318E+02	1.1974535E+02
3.4999900E+05	1.0022609E+01	1.8036333E+02	1.1986905E+02
3.5999900E+05	9.8536787E+00	1.7953259E+02	1.1955230E+02
3.6999900E+05	9.6835251E+00	1.7868376E+02	1.1961946E+02
3.7999900E+05	9.5202541E+00	1.7785995E+02	1.1960546E+02
3.8999900E+05	9.3613672E+00	1.7704872E+02	1.1964230E+02
3.9999900E+05	9.1629276E+00	1.7600914E+02	1.1936029E+02
4.0999900E+05	8.9982462E+00	1.7514049E+02	1.1940195E+02
4.1999900E+05	8.8238258E+00	1.7420395E+02	1.1936016E+02
4.2999900E+05	8.6879501E+00	1.7347466E+02	1.1972916E+02
4.3999900E+05	8.4950695E+00	1.7240367E+02	1.1948920E+02
4.4999900E+05	8.3412323E+00	1.7154646E+02	1.1921635E+02
4.5999900E+05	8.1745129E+00	1.7059866E+02	1.1954876E+02
4.6999900E+05	8.0149851E+00	1.6968080E+02	1.1906025E+02
4.7999900E+05	7.8575053E+00	1.6876115E+02	1.1913313E+02
4.8999900E+05	7.6886759E+00	1.6775562E+02	1.1911426E+02
4.9999900E+05	7.5465336E+00	1.6690468E+02	1.1901166E+02
5.0999900E+05	7.3880291E+00	1.6593916E+02	1.1329977E+02
5.1999900E+05	7.3022213E+00	1.6543922E+02	1.1103799E+02
5.2999900E+05	7.4128547E+00	1.6503368E+02	1.1196912E+02
5.3999900E+05	7.3414936E+00	1.6462433E+02	1.1107490E+02
5.4999900E+05	7.4580050E+00	1.6421364E+02	1.1173632E+02
5.5999900E+05	7.3982940E+00	1.6387898E+02	1.1116930E+02
5.6999900E+05	7.3329949E+00	1.6350447E+02	1.1104663E+02
5.7999900E+05	7.2670240E+00	1.6312296E+02	1.1120600E+02
5.8999900E+05	7.2080112E+00	1.6278658E+02	1.1100114E+02
5.9999900E+05	7.1440487E+00	1.6241418E+02	1.1099667E+02
6.0999900E+05	7.0838618E+00	1.6206543E+02	1.1091009E+02
6.1999900E+05	7.0257416E+00	1.6172876E+02	1.1101594E+02
6.2999900E+05	6.9472461E+00	1.6124768E+02	1.1092177E+02
6.3999900E+05	6.9065957E+00	1.6102788E+02	1.1128493E+02
6.4999900E+05	6.8491216E+00	1.6068991E+02	1.1089066E+02
6.5999900E+05	6.7882676E+00	1.6032568E+02	1.1084022E+02
6.6999900E+05	6.7243686E+00	1.5993687E+02	1.1101897E+02
6.7999900E+05	6.6759419E+00	1.5965671E+02	1.1095936E+02
6.8999900E+05	6.6061883E+00	1.5922142E+02	1.1078835E+02
6.9999900E+05	6.5563846E+00	1.5892673E+02	1.1150037E+02
7.0999900E+05	6.5020480E+00	1.5859909E+02	1.1085889E+02
7.1999900E+05	6.4372563E+00	1.5819232E+02	1.1073996E+02
7.2999900E+05	6.4171276E+00	1.5789850E+02	1.1131873E+02
7.3999900E+05	6.3605652E+00	1.5754861E+02	1.1082607E+02
7.4999900E+05	6.2996836E+00	1.5716405E+02	1.1077788E+02
7.5999900E+05	6.2830391E+00	1.5710915E+02	1.1076069E+02
7.6999900E+05	6.1887660E+00	1.5646826E+02	1.1081792E+02
7.7999900E+05	6.1379495E+00	1.5615318E+02	1.1066826E+02
7.8999900E+05	6.1374941E+00	1.5621988E+02	1.1076813E+02

Table 6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
7.9999900E+05	6.0218925E+00	1.5540443E+02	1.1081437E+02
8.0999900E+05	5.9482851E+00	1.5490778E+02	1.0830676E+02
8.1999900E+05	5.9144821E+00	1.5472021E+02	1.0705099E+02
8.2999900E+05	5.8722639E+00	1.5446587E+02	1.0676791E+02
8.3999900E+05	5.8393292E+00	1.5428322E+02	1.0673864E+02
8.4999900E+05	5.7943625E+00	1.5400507E+02	1.0673962E+02
8.5999900E+05	5.7558646E+00	1.5377682E+02	1.0666086E+02
8.6999900E+05	5.8699560E+00	1.5355313E+02	1.0719634E+02
8.7999900E+05	5.8350172E+00	1.5335329E+02	1.0673846E+02
8.8999900E+05	5.7963710E+00	1.5312285E+02	1.0666997E+02
8.9999900E+05	5.7883587E+00	1.5313655E+02	1.0669344E+02
9.0999900E+05	5.7212391E+00	1.5267520E+02	1.0675203E+02
9.1999900E+05	5.6879315E+00	1.5248502E+02	1.0662287E+02
9.2999900E+05	5.6884999E+00	1.5256772E+02	1.0663675E+02
9.3999900E+05	5.6117501E+00	1.5202310E+02	1.0677416E+02
9.4999900E+05	5.5808291E+00	1.5184998E+02	1.0658545E+02
9.5999900E+05	5.5339866E+00	1.5154301E+02	1.0729433E+02
9.6999900E+05	5.5042520E+00	1.5137814E+02	1.0667541E+02
9.7999900E+05	5.4679728E+00	1.5115843E+02	1.0658395E+02
9.8999900E+05	5.4276175E+00	1.5090381E+02	1.0662132E+02
9.9999900E+05	5.3960223E+00	1.5072104E+02	1.0687196E+02
1.9999990E+06	4.7180324E+00	1.4436385E+02	1.0460152E+02
2.9999990E+06	4.2257996E+00	1.3836749E+02	1.0444157E+02
3.9999990E+06	3.4869442E+00	1.3177142E+02	1.0418960E+02
4.9999990E+06	3.0848615E+00	1.2506311E+02	1.0418932E+02
5.9999990E+06	2.7562509E+00	1.2319067E+02	1.0213279E+02
6.9999990E+06	2.7992384E+00	1.2121689E+02	1.0210430E+02
7.9999990E+06	2.5685618E+00	1.1954135E+02	1.0208150E+02
8.9999990E+06	2.7132649E+00	1.1751700E+02	1.0205795E+02
9.9999990E+06	2.6829116E+00	1.1560336E+02	1.0203772E+02
1.0000000E+07	2.6828723E+00	1.1560281E+02	1.0203773E+02

Table 6.3-7 Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.0000000E-03	3.0000001E-01	1.2000000E+02	1.2000000E+02
5.0000101E-01	2.7377284E+00	1.4175549E+02	1.8153743E+02
1.0000020E+00	5.1345654E+00	1.6196773E+02	1.9689815E+02
2.0000031E+00	9.5797243E+00	1.9262892E+02	2.1060631E+02
3.0000041E+00	1.3399606E+01	2.1274068E+02	2.1801213E+02
4.0000048E+00	1.6279745E+01	2.2422743E+02	2.2273044E+02
5.0000062E+00	1.8620804E+01	2.3149895E+02	2.2633885E+02
6.0000072E+00	2.0646685E+01	2.3652054E+02	2.2935184E+02
7.0000081E+00	2.2518993E+01	2.4041167E+02	2.3196750E+02
8.0000086E+00	2.4268911E+01	2.4347572E+02	2.3420142E+02
9.0000095E+00	2.5933958E+01	2.4598363E+02	2.3634618E+02
1.0000011E+01	2.7431313E+01	2.4767444E+02	2.3822281E+02
1.1000012E+01	2.8811859E+01	2.4885071E+02	2.3987616E+02
1.2000013E+01	3.0085241E+01	2.4960413E+02	2.4135287E+02
1.3000014E+01	3.1266411E+01	2.5003322E+02	2.4266878E+02
1.4000015E+01	3.2365700E+01	2.5020378E+02	2.4384215E+02
1.5000016E+01	3.3406082E+01	2.5050041E+02	2.4489136E+02
1.6000017E+01	3.4473175E+01	2.5241086E+02	2.4583766E+02
1.7000017E+01	3.5459274E+01	2.5413344E+02	2.4668573E+02
1.8000019E+01	3.6344593E+01	2.5564661E+02	2.4745491E+02
1.9000019E+01	3.7222340E+01	2.5711725E+02	2.4833369E+02
2.0000021E+01	3.8029339E+01	2.5844452E+02	2.4904790E+02
2.1000023E+01	3.8538815E+01	2.5927057E+02	2.4944116E+02
2.2000023E+01	3.8855831E+01	2.5977988E+02	2.4976942E+02
2.3000025E+01	3.9055569E+01	2.6009869E+02	2.5014749E+02
2.4000025E+01	3.9140823E+01	2.6023395E+02	2.5050238E+02
2.5000027E+01	3.9131054E+01	2.6021786E+02	2.5072020E+02
2.6000027E+01	3.9070011E+01	2.6012024E+02	2.5077641E+02
2.7000029E+01	3.8970367E+01	2.5996091E+02	2.5076450E+02
2.8000029E+01	3.8861237E+01	2.5978604E+02	2.5075642E+02
2.9000031E+01	3.8760437E+01	2.5962415E+02	2.5074838E+02
3.0000031E+01	3.8668808E+01	2.5947665E+02	2.5073950E+02
3.1000032E+01	3.8583733E+01	2.5933945E+02	2.5073061E+02
3.2000034E+01	3.8504440E+01	2.5921136E+02	2.5072105E+02
3.3000034E+01	3.8430283E+01	2.5909137E+02	2.5071155E+02
3.4000034E+01	3.8360863E+01	2.5897885E+02	2.5070146E+02
3.5000034E+01	3.8296001E+01	2.5887357E+02	2.5067378E+02
3.6000038E+01	3.8265759E+01	2.5882388E+02	2.4999951E+02
3.7000038E+01	3.8259903E+01	2.5881345E+02	2.4903307E+02
3.8000038E+01	3.8256500E+01	2.5880704E+02	2.4817137E+02
3.9000038E+01	3.8253555E+01	2.5880133E+02	2.4734923E+02
4.0000042E+01	3.8250999E+01	2.5879630E+02	2.4656363E+02
4.1000042E+01	3.8248722E+01	2.5879175E+02	2.4581348E+02
4.2000042E+01	3.8246769E+01	2.5878769E+02	2.4509569E+02
4.3000046E+01	3.8245052E+01	2.5878406E+02	2.4440939E+02
4.4000046E+01	3.8243626E+01	2.5878091E+02	2.4375174E+02
4.5000046E+01	3.8242413E+01	2.5877811E+02	2.4312216E+02
4.6000046E+01	3.8241467E+01	2.5877576E+02	2.4251797E+02
4.7000050E+01	3.8240719E+01	2.5877374E+02	2.4193883E+02
4.8000050E+01	3.8240219E+01	2.5877213E+02	2.4138231E+02

Table 6.3-7 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
4.9000050E+01	3.8239902E+01	2.5877081E+02	2.4084825E+02
5.0000050E+01	3.8239868E+01	2.5876999E+02	2.4034883E+02
5.1000053E+01	3.8239658E+01	2.5876889E+02	2.3984592E+02
5.2000053E+01	3.8239990E+01	2.5876868E+02	2.3938129E+02
5.3000053E+01	3.8240044E+01	2.5876801E+02	2.3892741E+02
5.4000053E+01	3.8240284E+01	2.5876767E+02	2.3848843E+02
5.5000057E+01	3.8240509E+01	2.5876706E+02	2.3806902E+02
5.6000057E+01	3.8240849E+01	2.5875598E+02	2.3776193E+02
5.7000057E+01	3.8238335E+01	2.5874030E+02	2.3751085E+02
5.8000057E+01	3.8273766E+01	2.5876782E+02	2.3754596E+02
5.9000061E+01	3.8350327E+01	2.5884802E+02	2.3755873E+02
6.0000061E+01	3.8428566E+01	2.5893082E+02	2.3757584E+02
6.1000061E+01	3.8505527E+01	2.5901147E+02	2.3759453E+02
6.2000065E+01	3.8580959E+01	2.5908957E+02	2.3761528E+02
6.3000065E+01	3.8654980E+01	2.5916528E+02	2.3763402E+02
6.4000069E+01	3.8727531E+01	2.5923853E+02	2.3765477E+02
6.5000069E+01	3.8798687E+01	2.5930945E+02	2.3767355E+02
6.6000069E+01	3.8868439E+01	2.5937805E+02	2.3769431E+02
6.7000069E+01	3.8936985E+01	2.5944461E+02	2.3771312E+02
6.8000069E+01	3.9004284E+01	2.5950912E+02	2.3773387E+02
6.9000069E+01	3.9070438E+01	2.5957175E+02	2.3775272E+02
7.0000069E+01	3.9135414E+01	2.5963239E+02	2.3777345E+02
7.1000069E+01	3.9199295E+01	2.5969122E+02	2.3779231E+02
7.2000076E+01	3.9262054E+01	2.5974823E+02	2.3781305E+02
7.3000076E+01	3.9323784E+01	2.5980350E+02	2.3783194E+02
7.4000076E+01	3.9384445E+01	2.5985706E+02	2.3785266E+02
7.5000076E+01	3.9444126E+01	2.5990897E+02	2.3787155E+02
7.6000076E+01	3.9498062E+01	2.5995834E+02	2.3789746E+02
7.7000076E+01	3.9547989E+01	2.6000543E+02	2.3791376E+02
7.8000076E+01	3.9596176E+01	2.6005112E+02	2.3793298E+02
7.9000076E+01	3.9621590E+01	2.6009155E+02	2.3795599E+02
8.0000084E+01	3.9646076E+01	2.6013052E+02	2.3797476E+02
8.1000084E+01	3.9669815E+01	2.6016824E+02	2.3799300E+02
8.2000084E+01	3.9692730E+01	2.6020465E+02	2.3801376E+02
8.3000084E+01	3.9714828E+01	2.6023975E+02	2.3803416E+02
8.4000084E+01	3.9736130E+01	2.6027356E+02	2.3805489E+02
8.5000084E+01	3.9756668E+01	2.6030615E+02	2.3807526E+02
8.6000084E+01	3.9776463E+01	2.6033755E+02	2.3809592E+02
8.7000092E+01	3.9795547E+01	2.6036780E+02	2.3811623E+02
8.8000092E+01	3.9813938E+01	2.6039691E+02	2.3813684E+02
8.9000092E+01	3.9831665E+01	2.6042499E+02	2.3815709E+02
9.0000092E+01	3.9842495E+01	2.6044205E+02	2.3819580E+02
9.1000092E+01	3.9847008E+01	2.6044907E+02	2.3823470E+02
9.2000092E+01	3.9850971E+01	2.6045517E+02	2.3827756E+02
9.3000092E+01	3.9854359E+01	2.6046039E+02	2.3831822E+02
9.4000092E+01	3.9857235E+01	2.6046478E+02	2.3836557E+02
9.5000099E+01	3.9859577E+01	2.6046832E+02	2.3840152E+02
9.6000099E+01	3.9861420E+01	2.6047110E+02	2.3844385E+02
9.7000099E+01	3.9862808E+01	2.6047311E+02	2.3848824E+02
9.8000099E+01	3.9863701E+01	2.6047437E+02	2.3853171E+02

Table 6.3-7 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
9.9000099E+01	3.9864151E+01	2.6047491E+02	2.3857263E+02
1.0000010E+02	3.9864197E+01	2.6047482E+02	2.3861111E+02
1.0100010E+02	3.9863960E+01	2.6047427E+02	2.3864566E+02
1.0200010E+02	3.9859905E+01	2.6046768E+02	2.3868457E+02
1.0300011E+02	3.9853218E+01	2.6045691E+02	2.3872525E+02
1.0400011E+02	3.9846176E+01	2.6044556E+02	2.3876790E+02
1.0500011E+02	3.9838852E+01	2.6043375E+02	2.3880835E+02
1.0600011E+02	3.9831207E+01	2.6042145E+02	2.3885059E+02
1.0700011E+02	3.9823315E+01	2.6040875E+02	2.3889064E+02
1.0800011E+02	3.9815136E+01	2.6039557E+02	2.3893245E+02
1.0900011E+02	3.9806732E+01	2.6038205E+02	2.3897212E+02
1.1000011E+02	3.9798077E+01	2.6036813E+02	2.3901350E+02
1.1100011E+02	3.9789234E+01	2.6035391E+02	2.3905278E+02
1.1200011E+02	3.9780167E+01	2.6033932E+02	2.3909373E+02
1.1300011E+02	3.9770931E+01	2.6032449E+02	2.3913263E+02
1.1400011E+02	3.9761501E+01	2.6030933E+02	2.3917319E+02
1.1500011E+02	3.9751930E+01	2.6029395E+02	2.3921169E+02
1.1600011E+02	3.9742191E+01	2.6027826E+02	2.3925183E+02
1.1700011E+02	3.9732338E+01	2.6026242E+02	2.3928996E+02
1.1800011E+02	3.9722336E+01	2.6024634E+02	2.3932970E+02
1.1900012E+02	3.9712246E+01	2.6023010E+02	2.3936745E+02
1.2000012E+02	3.9702034E+01	2.6021368E+02	2.3940678E+02
1.2100012E+02	3.9691750E+01	2.6019714E+02	2.3944417E+02
1.2200012E+02	3.9681366E+01	2.6018045E+02	2.3948311E+02
1.2300012E+02	3.9670937E+01	2.6016367E+02	2.3952013E+02
1.2400012E+02	3.9660423E+01	2.6014673E+02	2.3955867E+02
1.2500012E+02	3.9649883E+01	2.6012976E+02	2.3959534E+02
1.2600013E+02	3.9639278E+01	2.6011270E+02	2.3963350E+02
1.2700013E+02	3.9628666E+01	2.6009561E+02	2.3966980E+02
1.2800012E+02	3.9618008E+01	2.6007843E+02	2.3970758E+02
1.2900012E+02	3.9607357E+01	2.6006128E+02	2.3974353E+02
1.3000014E+02	3.9596676E+01	2.6004407E+02	2.3978093E+02
1.3100014E+02	3.9586018E+01	2.6002692E+02	2.3981653E+02
1.3200014E+02	3.9575348E+01	2.6000970E+02	2.3985356E+02
1.3300014E+02	3.9564713E+01	2.5999255E+02	2.3988882E+02
1.3400014E+02	3.9554077E+01	2.5997540E+02	2.3992549E+02
1.3500014E+02	3.9543495E+01	2.5995834E+02	2.3996042E+02
1.3600014E+02	3.9532925E+01	2.5994128E+02	2.3999673E+02
1.3700014E+02	3.9522419E+01	2.5992432E+02	2.4003131E+02
1.3800014E+02	3.9511940E+01	2.5990741E+02	2.4006728E+02
1.3900014E+02	3.9501530E+01	2.5989059E+02	2.4010153E+02
1.4000014E+02	3.9491161E+01	2.5987387E+02	2.4013715E+02
1.4100014E+02	3.9480877E+01	2.5985724E+02	2.4017108E+02
1.4200014E+02	3.9470638E+01	2.5984070E+02	2.4020636E+02
1.4300014E+02	3.9460491E+01	2.5982431E+02	2.4023997E+02
1.4400014E+02	3.9450405E+01	2.5980798E+02	2.4027492E+02
1.4500015E+02	3.9440418E+01	2.5979184E+02	2.4030821E+02
1.4600015E+02	3.9430496E+01	2.5977579E+02	2.4034282E+02
1.4700015E+02	3.9420685E+01	2.5975992E+02	2.4037582E+02
1.4800015E+02	3.9410946E+01	2.5974414E+02	2.4041010E+02

Table 6.3-7 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.4900015E+02	3.9401325E+01	2.5972858E+02	2.4044281E+02
1.5000015E+02	3.9391785E+01	2.5971310E+02	2.4047676E+02
1.5100015E+02	3.9382366E+01	2.5969785E+02	2.4050917E+02
1.5200015E+02	3.9373032E+01	2.5968274E+02	2.4054282E+02
1.5300015E+02	3.9363823E+01	2.5966782E+02	2.4057492E+02
1.5400015E+02	3.9354706E+01	2.5965302E+02	2.4060826E+02
1.5500015E+02	3.9345718E+01	2.5963843E+02	2.4064009E+02
1.5600015E+02	3.9336826E+01	2.5962402E+02	2.4067313E+02
1.5700015E+02	3.9328068E+01	2.5960980E+02	2.4070467E+02
1.5800015E+02	3.9319412E+01	2.5959573E+02	2.4073741E+02
1.5900015E+02	3.9310894E+01	2.5958191E+02	2.4076868E+02
1.6000015E+02	3.9302483E+01	2.5956824E+02	2.4080112E+02
1.6100017E+02	3.9294212E+01	2.5955478E+02	2.4083212E+02
1.6200017E+02	3.9286053E+01	2.5954153E+02	2.4086429E+02
1.6300017E+02	3.9278038E+01	2.5952847E+02	2.4089502E+02
1.6400017E+02	3.9270138E+01	2.5951563E+02	2.4092690E+02
1.6500017E+02	3.9262383E+01	2.5950302E+02	2.4095737E+02
1.6600017E+02	3.9254745E+01	2.5949057E+02	2.4098897E+02
1.6700017E+02	3.9247257E+01	2.5947836E+02	2.4101918E+02
1.6800017E+02	3.9239891E+01	2.5946637E+02	2.4105052E+02
1.6900017E+02	3.9232677E+01	2.5945462E+02	2.4108049E+02
1.7000017E+02	3.9225582E+01	2.5944302E+02	2.4111156E+02
1.7100017E+02	3.9218643E+01	2.5943170E+02	2.4114127E+02
1.7200017E+02	3.9211826E+01	2.5942059E+02	2.4117207E+02
1.7300017E+02	3.9205166E+01	2.5940970E+02	2.4120155E+02
1.7400017E+02	3.9198631E+01	2.5939905E+02	2.4123210E+02
1.7500017E+02	3.9192253E+01	2.5938861E+02	2.4126134E+02
1.7600018E+02	3.9186001E+01	2.5937839E+02	2.4129164E+02
1.7700018E+02	3.9179928E+01	2.5936844E+02	2.4132065E+02
1.7800018E+02	3.9174015E+01	2.5935876E+02	2.4135071E+02
1.7900018E+02	3.9168327E+01	2.5934946E+02	2.4137950E+02
1.8000018E+02	3.9162853E+01	2.5934048E+02	2.4140938E+02
1.8100018E+02	3.9157635E+01	2.5933191E+02	2.4143805E+02
1.8200018E+02	3.9152641E+01	2.5932370E+02	2.4146783E+02
1.8300018E+02	3.9147911E+01	2.5931592E+02	2.4149646E+02
1.8400018E+02	3.9143425E+01	2.5930853E+02	2.4152623E+02
1.8500018E+02	3.9139214E+01	2.5930161E+02	2.4155490E+02
1.8600018E+02	3.9135242E+01	2.5929504E+02	2.4158473E+02
1.8700018E+02	3.9136330E+01	2.5929663E+02	2.4161800E+02
1.8800018E+02	3.9144684E+01	2.5930991E+02	2.4165858E+02
1.8900018E+02	3.9153111E+01	2.5932330E+02	2.4169783E+02
1.9000018E+02	3.9161587E+01	2.5933676E+02	2.4173799E+02
1.9100020E+02	3.9170143E+01	2.5935037E+02	2.4177701E+02
1.9200020E+02	3.9178745E+01	2.5936401E+02	2.4181694E+02
1.9300020E+02	3.9187424E+01	2.5937781E+02	2.4185576E+02
1.9400020E+02	3.9196152E+01	2.5939169E+02	2.4189546E+02
1.9500020E+02	3.9204956E+01	2.5940567E+02	2.4193408E+02
1.9600020E+02	3.9213802E+01	2.5941974E+02	2.4197357E+02
1.9700020E+02	3.9222729E+01	2.5943390E+02	2.4201198E+02
1.9800020E+02	3.9231697E+01	2.5944815E+02	2.4205127E+02

Table 6.3-7 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
1.9900020E+02	3.9240742E+01	2.5946249E+02	2.4208948E+02
2.0900020E+02	3.9334408E+01	2.5961115E+02	2.4243906E+02
2.1900020E+02	3.9436222E+01	2.5977258E+02	2.4281976E+02
2.2900020E+02	3.9542141E+01	2.5994022E+02	2.4317062E+02
2.3900020E+02	3.9654232E+01	2.6011731E+02	2.4353412E+02
2.4900020E+02	3.9768967E+01	2.6029822E+02	2.4388228E+02
2.5900021E+02	3.9887028E+01	2.6048395E+02	2.4422295E+02
2.6900021E+02	4.0008198E+01	2.6067419E+02	2.4455684E+02
2.7900021E+02	4.0132275E+01	2.6086850E+02	2.4487732E+02
2.8900021E+02	4.0259922E+01	2.6106796E+02	2.4520494E+02
2.9900021E+02	4.0388817E+01	2.6126886E+02	2.4551483E+02
3.0900021E+02	4.0519791E+01	2.6147247E+02	2.4582115E+02
3.1900021E+02	4.0654053E+01	2.6168069E+02	2.4612721E+02
3.2900021E+02	4.0787758E+01	2.6188748E+02	2.4642648E+02
3.3900021E+02	4.0924244E+01	2.6209799E+02	2.4672299E+02
3.4900021E+02	4.1060360E+01	2.6230740E+02	2.4701314E+02
3.5900021E+02	4.1197376E+01	2.6251758E+02	2.4729610E+02
3.6900021E+02	4.1334229E+01	2.6272696E+02	2.4758324E+02
3.7900021E+02	4.1471497E+01	2.6293637E+02	2.4785861E+02
3.8900021E+02	4.1608536E+01	2.6314490E+02	2.4813797E+02
3.9900021E+02	4.1745678E+01	2.6335300E+02	2.4840620E+02
4.0900021E+02	4.1882187E+01	2.6355957E+02	2.4867841E+02
4.1900021E+02	4.2018162E+01	2.6376477E+02	2.4894012E+02
4.2900021E+02	4.2153282E+01	2.6396811E+02	2.4920572E+02
4.3900021E+02	4.2287731E+01	2.6416992E+02	2.4946130E+02
4.4900021E+02	4.2421150E+01	2.6436963E+02	2.4972066E+02
4.5900021E+02	4.2348583E+01	2.6425824E+02	2.5003354E+02
4.6900021E+02	4.2265461E+01	2.6413074E+02	2.5033035E+02
4.7900021E+02	4.2187634E+01	2.6401105E+02	2.5062308E+02
4.8900021E+02	4.2114338E+01	2.6389804E+02	2.5090150E+02
4.9900024E+02	4.2045532E+01	2.6379169E+02	2.5117657E+02
5.9900024E+02	4.1535240E+01	2.6299350E+02	2.5351466E+02
6.9900024E+02	4.1265327E+01	2.6255917E+02	2.5538727E+02
7.9900024E+02	4.1113510E+01	2.6230560E+02	2.5690091E+02
8.9900024E+02	4.1047581E+01	2.6218460E+02	2.5816599E+02
9.9900024E+02	4.1045757E+01	2.6216296E+02	2.5923889E+02
1.0990002E+03	4.1089920E+01	2.6221268E+02	2.6018176E+02
1.1990002E+03	4.1167606E+01	2.6231427E+02	2.6100116E+02
1.2990002E+03	4.1275776E+01	2.6246289E+02	2.6173227E+02
1.3990002E+03	4.1407425E+01	2.6264737E+02	2.6239362E+02
1.4990002E+03	4.1020630E+01	2.6202982E+02	2.6032425E+02
1.5990002E+03	4.0264687E+01	2.6082651E+02	2.5638773E+02
1.6990002E+03	3.9555981E+01	2.5967963E+02	2.5285913E+02
1.7990002E+03	3.8869164E+01	2.5855362E+02	2.5049680E+02
1.8990002E+03	3.8194138E+01	2.5743857E+02	2.5073956E+02
1.9990002E+03	3.7544598E+01	2.5634949E+02	2.5091725E+02
2.0990002E+03	3.6915245E+01	2.5527872E+02	2.5105986E+02
2.1990002E+03	3.6303253E+01	2.5422235E+02	2.5117084E+02
2.2990002E+03	3.5706482E+01	2.5317743E+02	2.5125302E+02
2.3990002E+03	3.5123329E+01	2.5214180E+02	2.5130893E+02

Table 6.3-7 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
2.4990002E+03	3.4552338E+01	2.5111337E+02	2.5134076E+02
2.5990002E+03	3.3992695E+01	2.5009114E+02	2.5135034E+02
2.6990002E+03	3.3442581E+01	2.4907211E+02	2.5134044E+02
2.7990002E+03	3.2902782E+01	2.4805815E+02	2.5131078E+02
2.8990002E+03	3.2372974E+01	2.4704889E+02	2.5126395E+02
2.9990002E+03	3.1850819E+01	2.4604024E+02	2.5120105E+02
3.0990002E+03	3.1336985E+01	2.4503372E+02	2.5087570E+02
3.1990002E+03	3.0831945E+01	2.4403052E+02	2.5030450E+02
3.2990002E+03	3.0335598E+01	2.4303070E+02	2.4974326E+02
3.3990002E+03	2.9847178E+01	2.4203299E+02	2.4919095E+02
3.4990002E+03	2.9365026E+01	2.4103421E+02	2.4864688E+02
3.5990002E+03	2.8887556E+01	2.4003114E+02	2.4811031E+02
3.6990002E+03	2.8318939E+01	2.3881995E+02	2.4729298E+02
3.7990002E+03	2.7676003E+01	2.3742662E+02	2.4620341E+02
3.8990002E+03	2.7052681E+01	2.3604892E+02	2.4514134E+02
3.9990002E+03	2.6445822E+01	2.3468100E+02	2.4410223E+02
4.9990005E+03	2.6010435E+01	2.3367143E+02	2.3815216E+02
5.9990005E+03	2.5190937E+01	2.3176813E+02	2.3510631E+02
6.9990005E+03	2.4209536E+01	2.2941820E+02	2.3225452E+02
7.9990005E+03	2.3147394E+01	2.2678212E+02	2.2936269E+02
8.9990000E+03	2.2127243E+01	2.2415166E+02	2.2659100E+02
9.9990000E+03	2.1137447E+01	2.2149921E+02	2.2393829E+02
1.9999000E+04	1.5666229E+01	2.0458354E+02	2.0283716E+02
2.9999000E+04	1.3145845E+01	1.9503387E+02	1.9158734E+02
3.9999000E+04	1.1321094E+01	1.8710709E+02	1.8440137E+02
4.9999000E+04	9.7856579E+00	1.7956705E+02	1.7865862E+02
5.9999000E+04	8.5707664E+00	1.7288597E+02	1.6781694E+02
6.9999000E+04	7.9513941E+00	1.6918407E+02	1.6271141E+02
7.9999000E+04	7.5146294E+00	1.6643544E+02	1.5992332E+02
8.9999000E+04	7.1646786E+00	1.6414319E+02	1.5797127E+02
9.9999000E+04	6.8345962E+00	1.6190096E+02	1.5632130E+02
1.0999900E+05	6.5052247E+00	1.5958202E+02	1.5166980E+02
1.1999900E+05	6.3315315E+00	1.5832948E+02	1.4953888E+02
1.2999900E+05	6.2123976E+00	1.5745839E+02	1.4863336E+02
1.3999900E+05	6.1383910E+00	1.5691782E+02	1.4794325E+02
1.4999900E+05	6.0392981E+00	1.5618172E+02	1.4748448E+02
1.5999900E+05	5.9801936E+00	1.5573819E+02	1.4726671E+02
1.6999900E+05	5.8922186E+00	1.5507420E+02	1.4671288E+02
1.7999900E+05	5.8171177E+00	1.5450392E+02	1.4631741E+02
1.8999900E+05	5.7560415E+00	1.5403342E+02	1.4603412E+02
1.9999900E+05	5.6690583E+00	1.5335895E+02	1.4558952E+02
2.0999900E+05	5.6057305E+00	1.5286731E+02	1.4522162E+02
2.1999900E+05	5.5490303E+00	1.5241957E+02	1.4494069E+02
2.2999900E+05	5.4678717E+00	1.5177505E+02	1.4450847E+02
2.3999900E+05	5.4026198E+00	1.5125493E+02	1.4414294E+02
2.4999900E+05	5.3466473E+00	1.5080147E+02	1.4386581E+02
2.5999900E+05	5.2793040E+00	1.5025632E+02	1.4348106E+02
2.6999900E+05	5.2114491E+00	1.4970186E+02	1.4307654E+02
2.7999900E+05	5.1541781E+00	1.4922627E+02	1.4283505E+02
2.8999900E+05	5.0888162E+00	1.4867738E+02	1.4245184E+02

Table 6.3-7 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
2.9999900E+05	5.0191350E+00	1.4809309E+02	1.4199657E+02
3.0999900E+05	4.9586577E+00	1.4757722E+02	1.4172163E+02
3.1999900E+05	4.8953476E+00	1.4703238E+02	1.4135997E+02
3.2999900E+05	4.8329463E+00	1.4649089E+02	1.4099789E+02
3.3999900E+05	4.7704635E+00	1.4594398E+02	1.4063721E+02
3.4999900E+05	4.7089376E+00	1.4540097E+02	1.4027504E+02
3.5999900E+05	4.6472859E+00	1.4485210E+02	1.3991411E+02
3.6999900E+05	4.5866394E+00	1.4430769E+02	1.3955171E+02
3.7999900E+05	4.5258169E+00	1.4375693E+02	1.3919057E+02
3.8999900E+05	4.4660487E+00	1.4321121E+02	1.3882802E+02
3.9999900E+05	4.4060507E+00	1.4265858E+02	1.3846671E+02
4.0999900E+05	4.3471565E+00	1.4211165E+02	1.3810400E+02
4.1999900E+05	4.2879772E+00	1.4155717E+02	1.3774257E+02
4.2999900E+05	4.2299533E+00	1.4100908E+02	1.3737978E+02
4.3999900E+05	4.1715860E+00	1.4045280E+02	1.3701825E+02
4.4999900E+05	4.1143374E+00	1.3990271E+02	1.3665536E+02
4.5999900E+05	4.0548444E+00	1.3932524E+02	1.3628781E+02
4.6999900E+05	3.9958549E+00	1.3874750E+02	1.3591014E+02
4.7999900E+05	3.9363225E+00	1.3815889E+02	1.3553070E+02
4.8999900E+05	3.8779910E+00	1.3757715E+02	1.3514883E+02
4.9999900E+05	3.8192091E+00	1.3698532E+02	1.3476776E+02
5.0999900E+05	3.6570385E+00	1.3529689E+02	1.3031641E+02
5.1999900E+05	3.5956340E+00	1.3466589E+02	1.2903851E+02
5.2999900E+05	3.5560489E+00	1.3426378E+02	1.2867618E+02
5.3999900E+05	3.5318244E+00	1.3402232E+02	1.2848978E+02
5.4999900E+05	3.5086663E+00	1.3379707E+02	1.2831567E+02
5.5999900E+05	3.4918025E+00	1.3363419E+02	1.2819008E+02
5.6999900E+05	3.4709980E+00	1.3342839E+02	1.2806154E+02
5.7999900E+05	3.4481833E+00	1.3319987E+02	1.2790644E+02
5.8999900E+05	3.4281952E+00	1.3300200E+02	1.2777494E+02
5.9999900E+05	3.4089122E+00	1.3281137E+02	1.2764705E+02
6.0999900E+05	3.3899124E+00	1.3262337E+02	1.2752164E+02
6.1999900E+05	3.3711393E+00	1.3243738E+02	1.2739796E+02
6.2999900E+05	3.3525586E+00	1.3225304E+02	1.2727564E+02
6.3999900E+05	3.3341460E+00	1.3207007E+02	1.2715446E+02
6.4999900E+05	3.3158834E+00	1.3188829E+02	1.2703425E+02
6.5999900E+05	3.2977562E+00	1.3170753E+02	1.2691487E+02
6.6999900E+05	3.2797525E+00	1.3152771E+02	1.2679623E+02
6.7999900E+05	3.2618623E+00	1.3134868E+02	1.2667823E+02
6.8999900E+05	3.2440770E+00	1.3117035E+02	1.2656081E+02
6.9999900E+05	3.2263889E+00	1.3099266E+02	1.2644389E+02
7.0999900E+05	3.2087915E+00	1.3081555E+02	1.2632743E+02
7.1999900E+05	3.1912789E+00	1.3063893E+02	1.2621139E+02
7.2999900E+05	3.1738465E+00	1.3046275E+02	1.2609571E+02
7.3999900E+05	3.1564891E+00	1.3028699E+02	1.2598037E+02
7.4999900E+05	3.1392033E+00	1.3011159E+02	1.2586533E+02
7.5999900E+05	3.1219850E+00	1.2993649E+02	1.2575056E+02
7.6999900E+05	3.1048312E+00	1.2976170E+02	1.2563604E+02
7.7999900E+05	3.0877388E+00	1.2958716E+02	1.2552174E+02
7.8999900E+05	3.0707054E+00	1.2941284E+02	1.2540766E+02

Table 6.3-7 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 with Recirculation Spray

TIME, SECONDS	PRESSURE, PSIG	STEAM TEMP, °F	WATER TEMP, °F
7.9999900E+05	3.0537283E+00	1.2923872E+02	1.2529376E+02
8.0999900E+05	3.0368059E+00	1.2906480E+02	1.2518003E+02
8.1999900E+05	3.0199358E+00	1.2889102E+02	1.2506646E+02
8.2999900E+05	3.0031164E+00	1.2871741E+02	1.2495303E+02
8.3999900E+05	2.9863460E+00	1.2854390E+02	1.2483974E+02
8.4999900E+05	2.9696236E+00	1.2837051E+02	1.2472656E+02
8.5999900E+05	2.9529474E+00	1.2819722E+02	1.2461350E+02
8.6999900E+05	2.9363163E+00	1.2802400E+02	1.2450054E+02
8.7999900E+05	2.9197292E+00	1.2785087E+02	1.2438767E+02
8.8999900E+05	2.9031854E+00	1.2767779E+02	1.2427489E+02
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9.7999900E+05	2.7609131E+00	1.2613045E+02	1.2327650E+02
9.8999900E+05	2.7454541E+00	1.2595770E+02	1.2316460E+02
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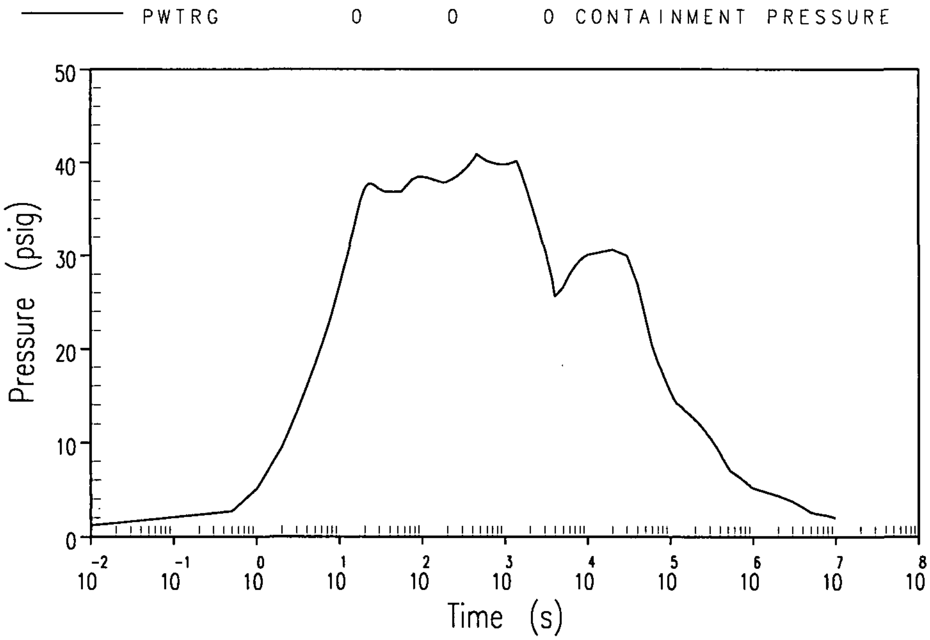

Figure 6.3-1 Containment Pressure – Double-ended Pump Suction Break at Salem Unit 1 WITHOUT Recirculation Spray

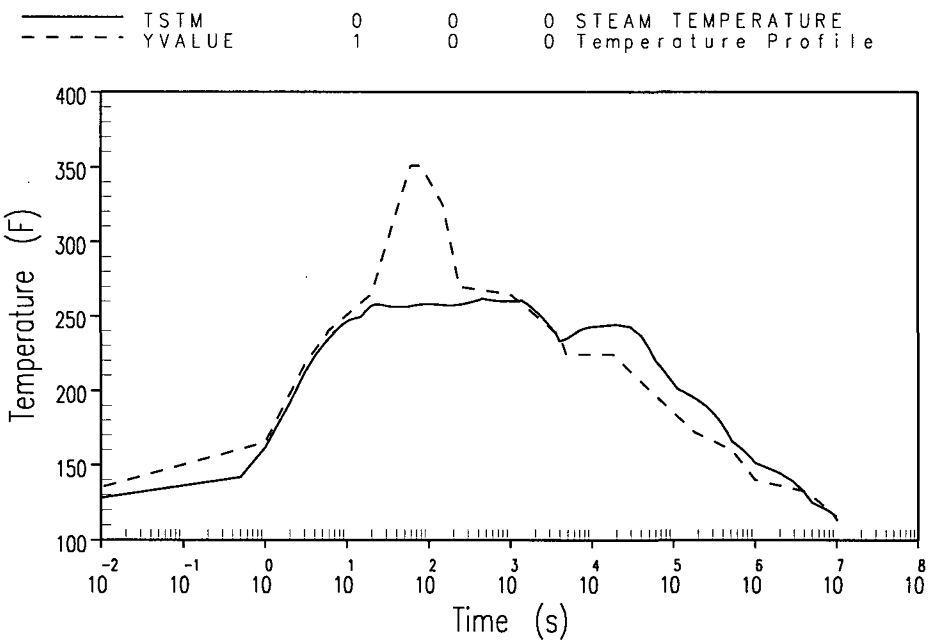

Figure 6.3-2 Containment Temperature – Double-ended Pump Suction Break at Salem Unit 1 WITHOUT Recirculation Spray

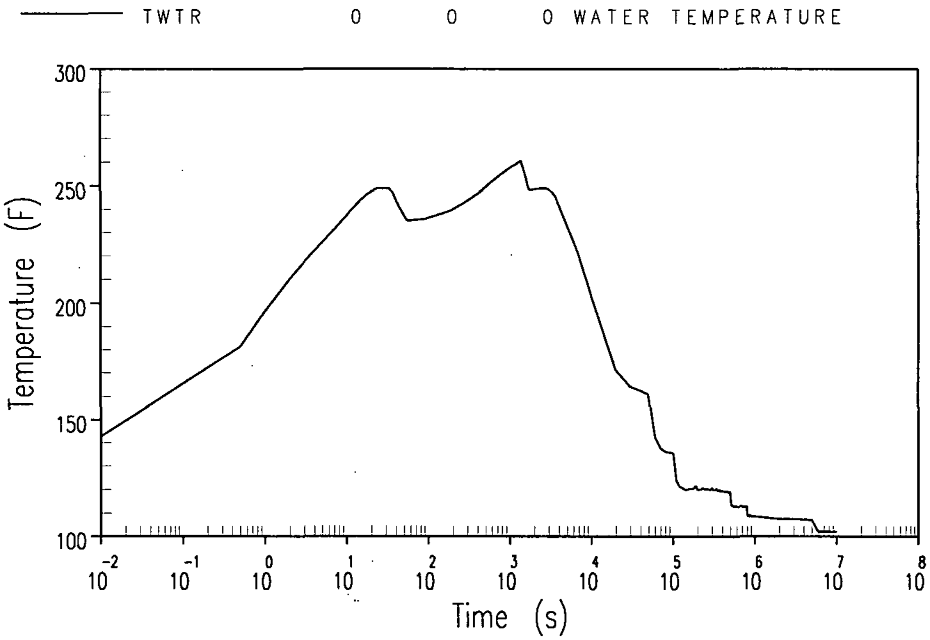

Figure 6.3-3 Containment Sump Temperature – Double-ended Pump Suction Break at Salem Unit 1 WITHOUT Recirculation Spray

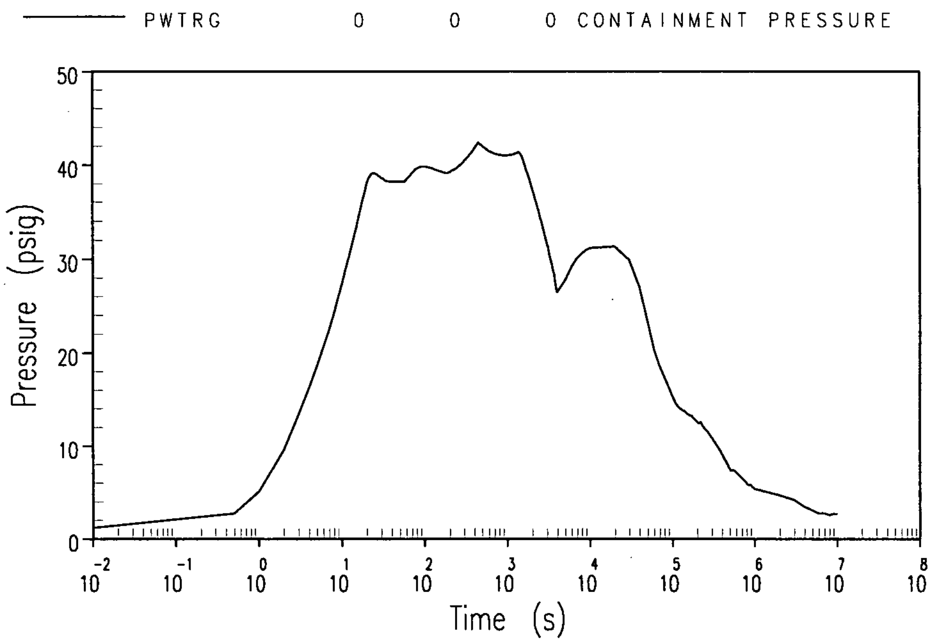

Figure 6.3-4 Containment Pressure – Double-ended Pump Suction Break at Salem Unit 2 WITHOUT Recirculation Spray

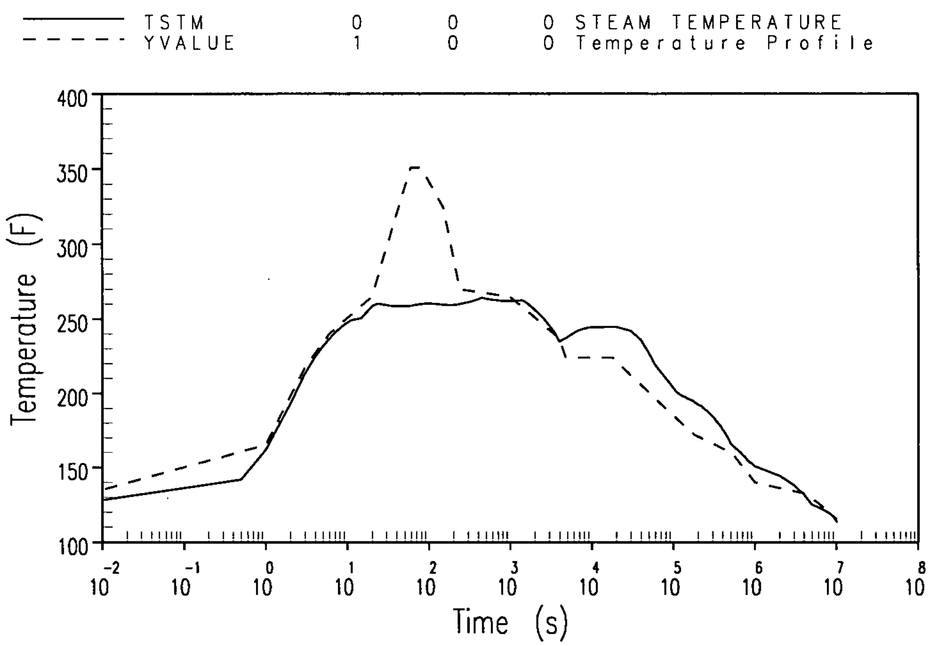

Figure 6.3-5 Containment Temperature – Double-ended Pump Suction Break at Salem Unit 2 WITHOUT Recirculation Spray

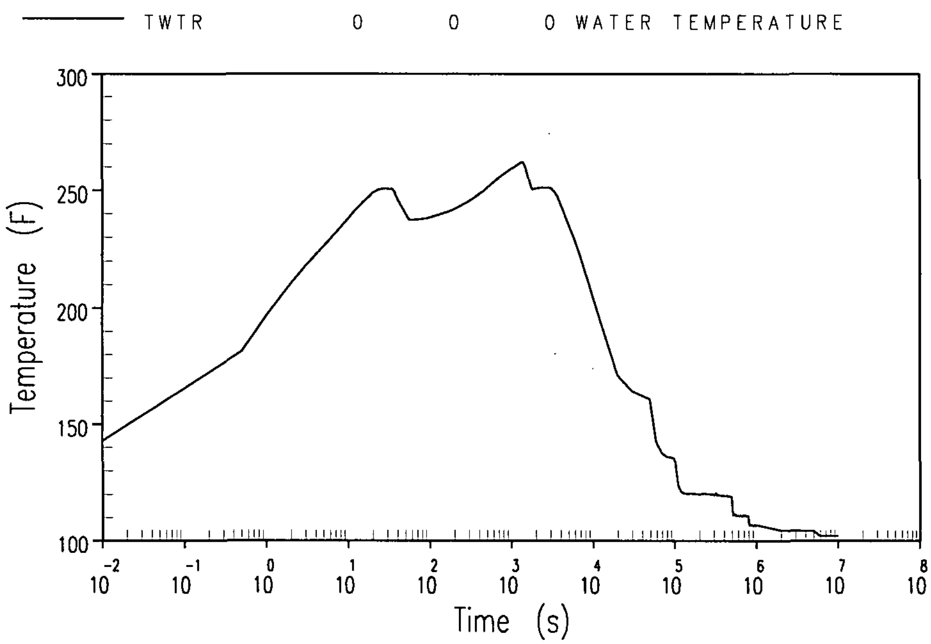

Figure 6.3-6 Containment Sump Temperature – Double-ended Pump Suction Break at Salem Unit 2 WITHOUT Recirculation Spray

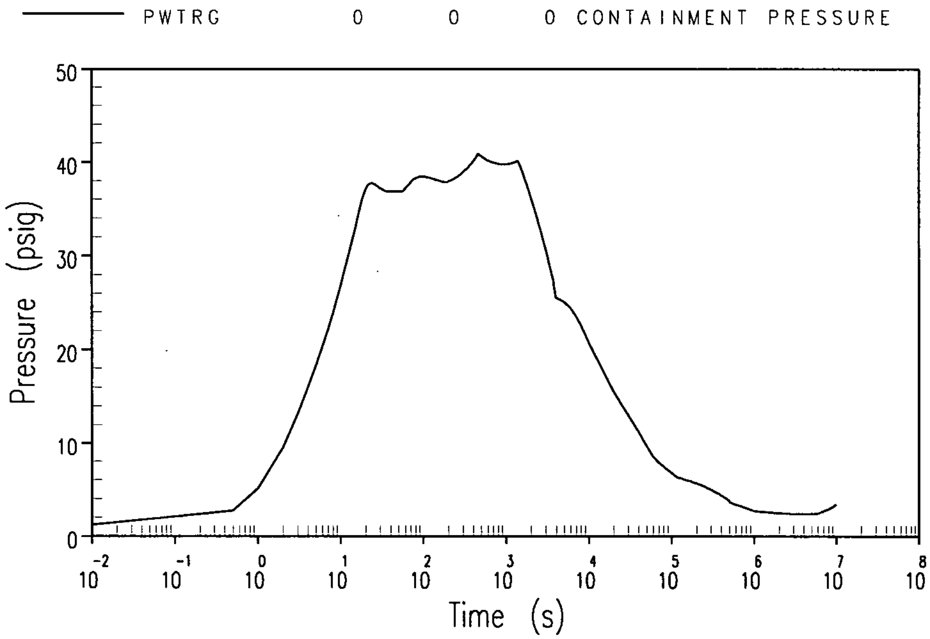

Figure 6.3-7 Containment Pressure – Double-ended Pump Suction Break at Salem Unit 1 WITH Recirculation Spray

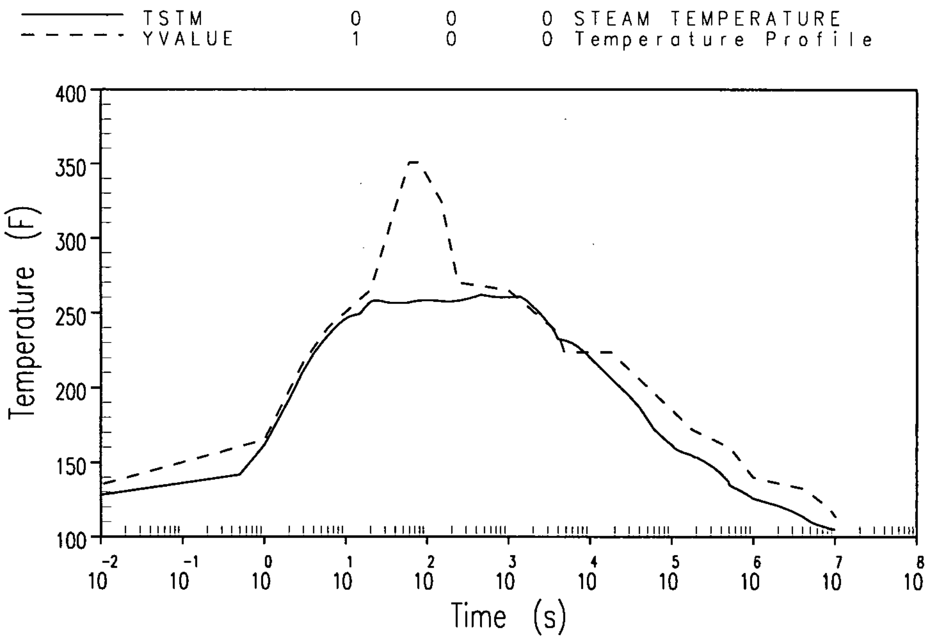

Figure 6.3-8 Containment Temperature – Double-ended Pump Suction Break at Salem Unit 1 WITH Recirculation Spray

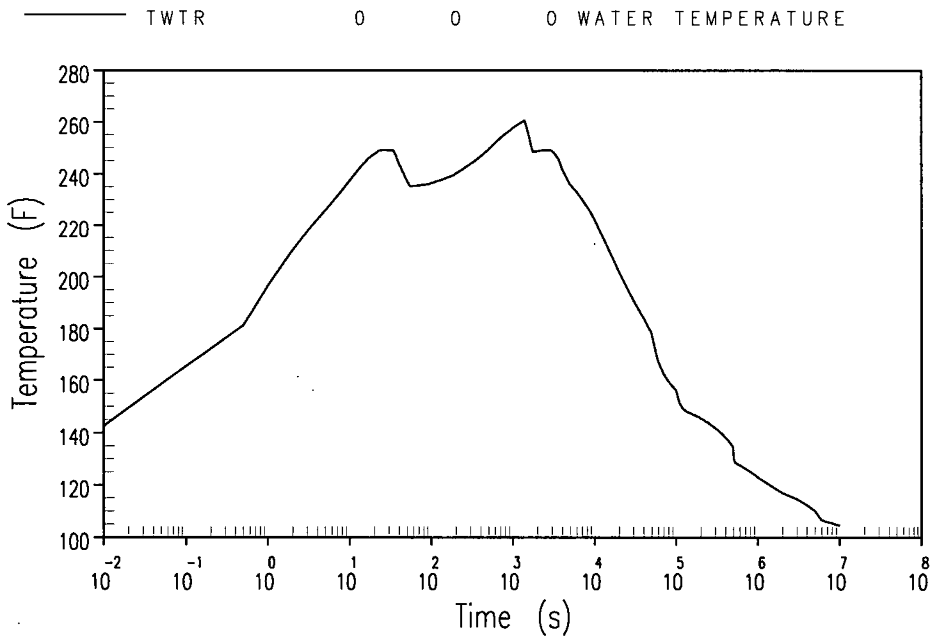

Figure 6.3-9 Containment Sump Temperature – Double-ended Pump Suction Break at Salem Unit 1 WITH Recirculation Spray

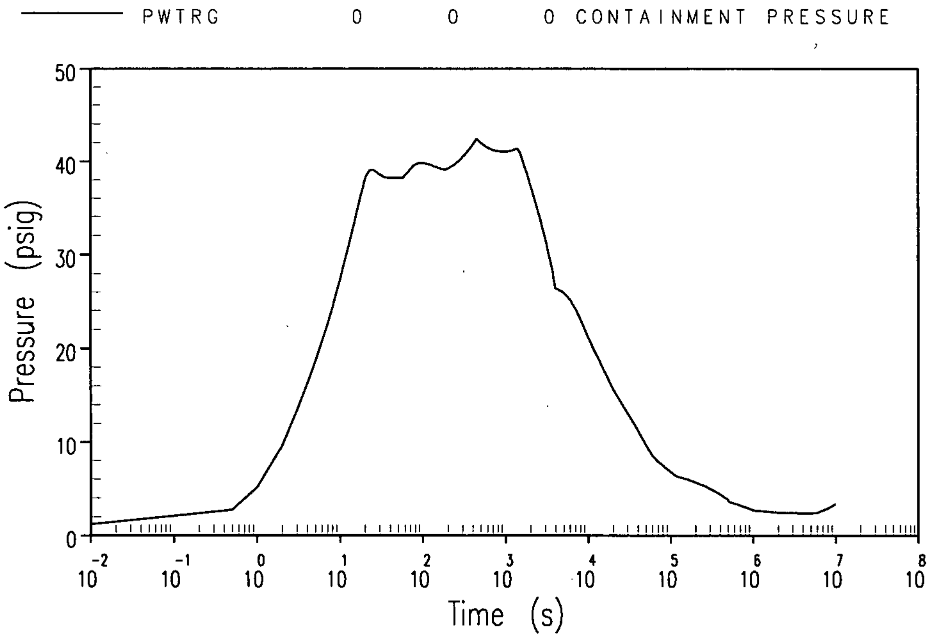

Figure 6.3-10 Containment Pressure – Double-ended Pump Suction Break at Salem Unit 2 WITH Recirculation Spray

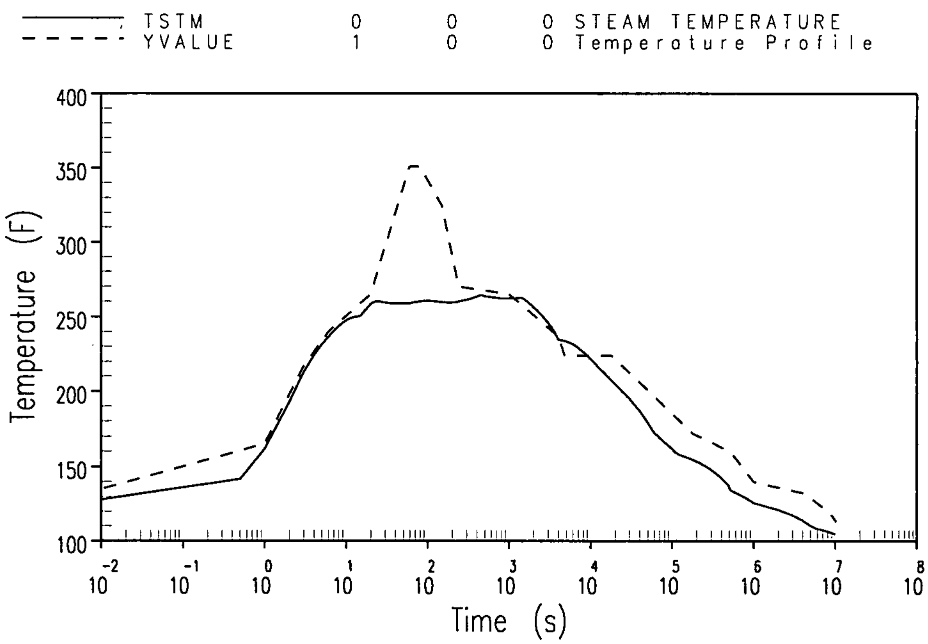

Figure 6.3-11 Containment Temperature – Double-ended Pump Suction Break at Salem Unit 2 WITH Recirculation Spray

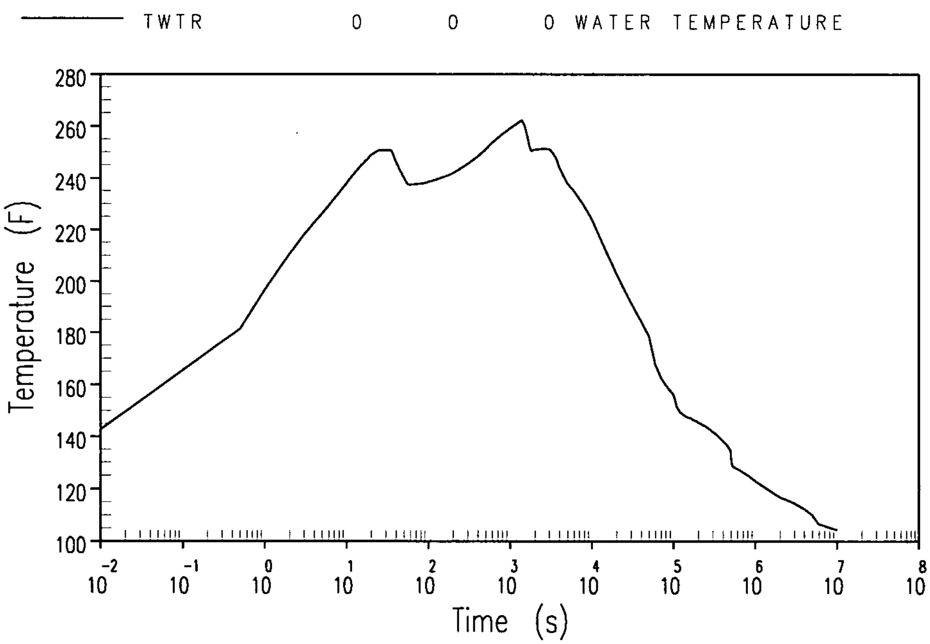

Figure 6.3-12 Containment Sump Temperature – Double-ended Pump Suction Break at Salem Unit 2 WITH Recirculation Spray

6.4 CONCLUSIONS

The MSLB and LOCA containment response analyses have been performed as part of the CFCU margin recovery program for Salem Unit 1 and Unit 2. The analyses included long-term pressure and temperature profiles for each unit. As illustrated in the results in Sections 6.2 and 6.3, all cases resulted in a peak containment pressure that was less than 47 psig. In addition, all of the long-term cases were below 50% of the peak value within 24 hours. Based on the results, all applicable Standard Review Plan criteria for Salem Unit 1 and Unit 2 have been met.

The peak calculated pressure for the DEPS minimum safeguards LOCA case for Salem Unit 1 with Model F steam generators was 40.9 psig. The peak calculated pressure for the DEPS minimum safeguards LOCA case for Salem Unit 2 with Model 51 steam generators was 42.4 psig. The revised, design-basis LOCA containment transient conservatively assumes no recirculation spray in order to bound any potential changes in the time that hot leg recirculation is initiated. This results in a harsher longer-term temperature and pressure transient than presently postulated. A second analysis assumes initiating containment recirculation spray and either maintaining it throughout the remaining duration of the transient, or crediting the condensation of steam in the reactor vessel when hot leg recirculation is commenced. This latter analysis does not conform to Salem's design basis but it provides a more realistic pressure and temperature transient following the limiting LOCA. The second analysis demonstrates that the present EQ profile is exceeded only for a duration of about two hours for both units, which is relatively short for a 120 day transient.

For MSLB, the limiting containment pressure case is the Unit 2 4.6 ft^2 DER initiated at 30% power with a feedwater regulator valve failure. The limiting containment temperature case is the Unit 1 0.88 ft^2 split rupture initiated at 30% power with a MSIV failure. For Unit 1, the peak pressure is 41.0 psig and the peak temperature is 348.2°F. For Unit 2, the peak pressure is 42.8 psig and the peak temperature is 348.2°F. While the peak temperature from the composite of all of the steamline break cases is less than 351.3°F and the long-term temperature is less than the current profile, there is a period from approximately 100 seconds to 300 seconds where the new composite exceeds the envelope as much as 19°F.

See Appendix A for the containment results for Unit 2 with Model 61/19T replacement steam generators.

The noted EQ temperature limit issues are addressed by PSEG Nuclear outside of this report.

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APPENDIX A
SALEM UNIT 2 REPLACEMENT STEAM GENERATOR ANALYSIS FOR INSIDE CONTAINMENT

A.1 INTRODUCTION

This evaluation builds upon the methods and assumptions discussed in the main body of this document and presents the most limiting loss-of-coolant accident (LOCA) and the most limiting main steamline break (MSLB) configuration(s) for the containment for Salem Unit 2 with the revised containment heat removal systems and the Framatome ANP Model 61/19T replacement steam generators. The impact of the most limiting single failure is applied to each scenario. This evaluation determined the limiting transients based on the containment analysis methodology described in the following sections and in the main body of this document.

Note that this analysis, as with the analysis presented in the main body of this document, is performed specifically in terms of maximizing the global containment pressure and temperature response to design-basis mass and energy release events; any specific requirements for the service water system, the containment ventilation system, any subcompartment regions or structures for localized stress, and the spray coverage for dose-related analyses are outside the scope of this report.

A.2 BACKGROUND

PSEG is proposing to demonstrate reduced reliance on CFCU cooling during accident conditions. This effort will be referred to as the CFCU Margin Recovery Project. The purpose is to allow, as a separate future effort, reduced service water (SW) flows during an accident, permit higher fouling, and/or allow increased plugging of the CFCU heat exchanger tubes.

The overall purpose of this analytical effort is for Westinghouse to execute a sufficient number of containment mass and energy (M&E) release scenarios for Salem Unit 2 with the Framatome ANP Model 61/19T steam generators so that PSEG can be assured that the proposed CFCU Margin Recovery Project will result in sufficient cooling under postulated M&E release accidents. The design-basis containment pressure and temperature limits are to be maintained. This includes rapidly reducing the containment pressure and temperature and maintaining the containment conditions at acceptably low levels as required by GDC 38. The reduced reliance on CFCU cooling in combination with the replacement steam generators for Salem Unit 2 will result in a harsher long-term temperature and pressure transient, which will require PSEG to review the equipment qualification (EQ) transients for all components inside containment.

The detailed discussion of the proposed CFCU Margin Recovery Project is presented in the main body of this document. No changes to the heat removal assumptions are assumed and no new single failures are investigated as a result of the Framatome ANP Model 61/19T replacement steam generator.

A.3 ANALYSES DESCRIPTION

A.3.1 Objective

The objective of this program is to demonstrate through analyses and evaluations that the containment pressure and temperature for Salem Unit 2 with Framatome ANP Model 61/19T steam generators resulting from a design-basis large-break LOCA or main steamline break will remain within the acceptable design limits for the proposed reduction in the CFCU heat removal.

A.3.2 Analyses Approach

Consistent with the methodology reported in main body of this document, the LOCA and MSLB cases for Salem Unit 2 will be analyzed with the current licensing-basis methods and analysis tools that have been reviewed and approved for the Salem units many times over the duration of plant operation.

A.3.3 Acceptance Criteria

This analysis is considered acceptable if the current design limits are maintained. The containment design limits are defined in Section 5.2.2 of the Salem Technical Specifications: maximum internal pressure of 47 psig; air temperature up to 351.3°F (providing the containment pressure is in accordance with that described in the UFSAR).

It is also desirable to limit the containment temperature transient increases above the EQ temperature profile in Table 3.3-1. However, it is recognized that the temperature transient will change for the Framatome ANP replacement steam generators.

A.4 STEAMLINE BREAK MASS/ENERGY RELEASE ANALYSIS

Steamline ruptures occurring inside a reactor containment structure may result in significant releases of high-energy fluid to the containment environment and elevated containment temperatures and pressures. The magnitude of the releases following a steamline rupture is dependent upon the plant initial operating conditions and the size of the rupture as well as the configuration of the plant steam system and the containment design. These variations make it difficult to determine the absolute worst cases for either containment pressure or temperature evaluation following a steamline break. The analysis considers a variety of postulated pipe breaks encompassing wide variations in plant operation, safety system performance, and break size in determining the main steamline break (MSLB) mass and energy releases for use in containment analysis.

This section discusses the analysis that is done to generate the mass and energy releases from the steamline break. The containment pressure and temperature response analysis for the Salem Unit 2 replacement steam generator is documented in Section A.6.2.

A.4.1 Analysis Method

The steamline break mass and energy releases are generated using the NRC-approved LOFTRAN code (Reference 6). LOFTRAN is used for studies of the transient response of a PWR system to specified perturbations in process parameters. The code simulates a multi-loop system including the reactor vessel, hot and cold leg piping, steam generator (shell and tube sides), and the pressurizer. A neutron point kinetics model is used and the reactivity effects of the moderator, fuel, boron, and rods are included. The secondary side of the steam generator is modeled as a homogeneous saturated mixture. Protection and control systems are simulated, as well as the Emergency Core Cooling System. The calculation of secondary-side break flow is based on the Moody critical flow correlation (Reference 7) with fL/D = 0.

The Westinghouse steamline break mass and energy release methodology was approved by the NRC (Reference 8) and is documented in WCAP-8822, "Mass and Energy Releases Following a Steam Line Rupture" (Reference 9). WCAP-8822 forms the basis for the assumptions and models used in the calculation of the mass and energy releases resulting from a steamline rupture.

A.4.2 Case Definitions and Single Failures

There are many factors that influence the quantity and rate of the mass and energy release from the steamline. To encompass these factors, a spectrum of cases is analyzed that vary the initial power level, the break type, the break area, and the single failure. This section summarizes the basis of the cases that have been defined for the Salem plant.

The power level at which the plant is operating when the steamline break is postulated can cause different competing effects that make it difficult to pre-determine a single limiting case. For example, at higher power levels there is less initial water/steam in the steam generator, which is a benefit. However, at a higher power level there is a higher initial feedwater flowrate, higher feedwater temperature, higher decay heat, and there is a higher rate of heat transfer from the primary side, which are all penalties. Therefore, cases consider initial power levels varying from full power to zero power.

There are two types of pipe ruptures that are considered. First is a double-ended guillotine rupture in which the steam pipe is completely severed and the ends of the break displace from each other. Guillotine ruptures are characterized by two distinct break locations, each of equal area but being fed by different steam generators. The other postulated break type is a split rupture in which a hole opens at some point on the side of the steam pipe but does not result in a complete severance of the pipe. A single, distinct break area is fed uniformly by all steam generators until steamline isolation occurs. Following MSIV closure, the split break is unisolable from one faulted steam generator.

The break area is also important when evaluating steamline breaks. It controls the rate of releases to the containment as well as influencing the amount of entrained water in the blowdown and the steamline depressurization. There are a total of 3 break types/areas that are analyzed.

1. A 1.4 ft^2 DER downstream of the flow restrictor. The reverse flow area for theses cases is limited to 3.2 ft^2, the cross-sectional area of the MSIV.

2. Small DERs having the largest area that does not get water entrainment.

3. Split ruptures that are the largest break area that will neither generate a steamline isolation signal from the primary protection equipment nor result in moisture entrainment. The safety injection signal is also generated by a high containment pressure signal for these cases.

Several single failures can be postulated that would impair the performance of various steamline break protection systems. The single failures either reduce the heat removal capacity of the containment safeguards, or increase the energy release from steamline break. The single failures that have been postulated for Salem are summarized below.

Containment Safeguards Failure (CSF)

A containment safeguards train is one of the single failures considered in the analysis. This failure causes a reduction in the number of containment spray pumps and the CFCU heat removal rate as defined in Table 6.1-3 and Table 6.1-4 in Section 6.1. The total reduction in the containment heat removal capacity is approximately 70,000 Btu/sec due to the failure.

AFW Runout Protection Failure

This failure increases the auxiliary feedwater flowrate to the faulted SG. The penalty of this failure depends on the SG pressure, but in the long term will usually be between about 150 to 350 gpm extra AFW to the faulted SG.

Feedwater Regulator Valve Failure

The feedwater regulator valve (FRV) is a fast-closing valve (10 second delay) in the feedwater system that is the preferred method for terminating feedwater addition to the faulted SG during a steamline break. If the FRV on the faulted loop fails open, the back-up feedwater isolation valve (FIV, valve BF-13), with a 32 second delay, is credited to close. The slower closure time creates the possibility of additional pumped feedwater entering the faulted SG. Although the main feedwater pumps trip on a SI signal, the condensate pumps do not trip and can continue to provide pumped flow when the faulted SG depressurizes. There is also a slight increase in the unisolable feedline volume if the FRV is postulated to fail open, which increases the mass of hot feedwater that may flash as the SG depressurizes.

Feedwater addition assumptions include a delay of 7 seconds after the SI setpoint is reached to account for main feedwater (MFW) pump signal processing and mechanical delays. The MFW pumps are then assumed to coastdown over the following 7 seconds. The closure of the BF-13 valve terminates the remaining pumped flow from the condensate system. The valve closure modeling includes a 2 second electronic delay, 20 seconds of valve closure that have no impact on the MFW flowrate, and a linear flowrate reduction during the final 10 seconds of the valve stroke.

This failure is the most severe for the largest breaks which depressurize the SG the fastest and thus allow a higher pumped feedwater flowrate to continue for the extra 22 seconds.

MSIV Failure

When the MSIVs close, the intact loop SGs are isolated from the break. Even if the faulted loop MSIV fails open, the isolation of the intact SGs is accomplished by the closure of the MSIVs on each of those loops. However, the unisolable steamline volume increases from 542 ft^3 to 10,083 ft^3 if the MSIV on the faulted loop fails open.

The full spectrum of steamline break cases that has been analyzed for Salem is summarized in Table A.4.2-1. However, a subset of cases was selected for this analysis to evaluate the acceptability of the CFCU margin recovery program combined with the Framatome ANP Model 61/19T steam generators. The selected cases are indicated in Table A.4.2-1, and represent the most limiting containment pressure scenarios, the most limiting containment temperature scenarios, and cases that might experience the largest impact from the reduction in CFCU heat removal capability. Note that the 4.6 ft^2 DER cases will no longer apply to Unit 2 once the Framatome ANP steam generators are installed because of the integral flow restrictor at the steam generator's outlet nozzle.

Table A.4.2-1 Spectrum of Salem SLB/Containment Cases					
		Single Failure			
Break	**Power**	**CSF**	**AFW**	**FRV**	**MSIV**
4.6 ft^2 DER	100	Case 1	Case 5	CASE 9	Case 13
	70	Case 2	Case 6	Case 10	Case 14
	30	Case 3	Case 7	CASE 11	Case 15
	0	Case 4	Case 8	Case 12	Case 16
1.4 ft^2 DER	100	Case 17	Case 21	**CASE 25**	Case 29
	70	Case 18	Case 22	Case 26	Case 30
	30	**CASE 19**	**CASE 23**	Case 27	Case 31
	0	Case 20	Case 24	Case 28	Case 32
Small DER With Entrainment	100	Case 33	Case 37	Case 41	Case 45
	70	Case 34	Case 38	Case 42	Case 46
	30	Case 35	Case 39	Case 43	Case 47
	0	Case 36	Case 40	Case 44	Case 48
Small DER Without Entrainment	100	Case 49	Case 53	Case 57	**CASE 61**
	70	Case 50	Case 54	Case 58	Case 62
	30	Case 51	Case 55	Case 59	Case 63
	0	Case 52	Case 56	Case 60	Case 64
Split Break	100	Case 65	Case 69	Case 73	Case 77
	70	Case 66	Case 70	Case 74	Case 78
	30	**CASE 67**	Case 71	Case 75	**CASE 79**
	0	Case 68	Case 72	Case 76	Case 80

Note that cases in **BOLD** were selected for this replacement steam generator analysis.

A.4.3 Analysis Assumptions

A.4.3.1 Protection Logic and Setpoints

Salem Unit 2 steamline break protection, in terms of the pertinent signals and setpoints that are actuated in these analyses, is summarized below.

The first SI signal comes from either:

- Low steamline pressure (514.7 psia) in at least 2 loops coincident with high steam flow in at least 2 loops, or
- High steamline differential pressure (200 psid), or
- High-1 containment pressure (5.5 psig).

An SI signal starts the SI pumps and will also result in:

- Reactor trip (2 sec delay)
- Start of auxiliary feedwater (no delay)
- Closure of feedwater regulator valve (10 sec delay) and feedwater isolation valve (32 sec delay, only credited if FRV fails open)
- Trip of MFW pumps (7 sec delay and 7 sec coastdown, only credited if FRV fails open)
- Start of containment fan coolers (100 sec delay)

Steamline isolation (closure of main steam isolation valves, MSIVs) will also occur on the low steamline pressure coincident with high steam flow signal, after a 12.0 second delay. However, if this signal is not generated, MSIVs will close on a high-2 containment pressure (17.0 psig) signal. The high-2 containment pressure signal also causes the start of containment spray pumps, after an 85 second delay.

A.4.3.2 Secondary-Side Assumptions

This section summarizes the input assumptions associated with the steam generator and the piping attached to it.

Initial Steam Generator Inventory

A high initial steam generator mass is assumed. The initial level corresponds to 44% NRS + 5% uncertainty for at-power cases. At zero power, the nominal initial water level decreases to 33%.

Main Feedwater System

Key assumptions and methods regarding the main feedwater system are summarized below.

1. The initial flow to each SG is based on the initial power.

2. The FRV on each of the intact SGs is assumed to close at the time of the SI signal. This terminates the main feedwater addition to the intact SGs. Since they are isolated from the break long before their inventory is depleted, the overall results are insensitive to the details of this modeling.

3. The FRV on the faulted loop is assumed to quickly open in response to the steamline break. Starting at 0.2 seconds, the main feedwater flowrate modeling is based on the faulted loop FRV fully open (and the intact FRVs fully closed).

4. Main feedwater is added to the faulted SG until the FRV closes, 10 seconds after the SI setpoint is reached.

5. If the FRV on the faulted loop fails open, the main feedwater pump trip is credited with a 7 second delay after the SI setpoint is reached and a 7 second coastdown. However, the condensate pumps are not tripped from an SI signal, and pumped flow continues until the feedwater isolation valve is fully closed 32 seconds after the SI setpoint is reached.

6. All cases model the flashing of the feedwater in the unisolable section of the feedline between the faulted steam generator and the FRV or FIV, whichever is credited to close. Only the cases initiated from hot zero power do not experience feedwater flashing due to the low temperature of the feedwater.

Auxiliary Feedwater

Generally within the first minute following a steamline break, the auxiliary feedwater system will be initiated due to an SI signal. Addition of auxiliary feedwater to the steam generators will increase the secondary mass available for release to containment. Maximum auxiliary feedwater flowrates are assumed, and are input as a function of the pressure in the faulted steam generator. In addition, the full auxiliary feedwater flowrate is assumed at the time the SI setpoint is reached, with no electronic delay or pump start-up time. Operator action is credited to terminate the auxiliary feedwater flow to the faulted steam generator after 10 minutes.

Quality of the Break Effluent

The quality of the break effluent is generally assumed to be 1.0, corresponding to saturated steam that is all vapor with no liquid. However, when a large double-ended break first occurs, it is expected that there will be a significant quantity of liquid in the break effluent. Modeling entrainment is a benefit to the analysis, since it allows a portion of the initial steam generator inventory to be released at the lower enthalpy of saturated liquid rather than saturated vapor. The break quality for the DERs from WCAP-8822 (Reference 9) addresses only Westinghouse designed steam generators so entrainment is not modeled for the Framatome ANP Model 61/19T replacement steam generators. This will result in more limiting containment transients.

Heat Transfer to Faulted Steam Generator

The ability of the steam generator feeding the broken steamline to transfer heat from the primary coolant to the secondary water inventory can have an important influence on the mass and energy that is released through the break. As discussed in Reference 8, the film coefficient on the outside of the tubes and the forced convection from the reactor coolant pumps will typically maintain a large secondary-side heat transfer coefficient. The only mechanism for reducing the heat transfer capability to the steam generator is to lower the effective heat transfer area. Such a reduction occurs when sufficient mass is lost from the steam generator to lower the water level below the top of the tube bundle. To conservatively force a high heat transfer rate to the faulted steam generator, the SG tubes are assumed to be fully covered until the water volume on the secondary side decreases below 100 ft^3.

A.4.3.3 Reactor Coolant System Assumptions

While the mass and energy released from the break is determined from assumptions that have been discussed in the previous section, the long-term rate at which the release occurs is largely controlled by the conditions in the reactor coolant system. The major features of the primary-side analysis model are summarized below.

- Continued operation of the reactor coolant pumps maintains a high heat transfer rate to the steam generators.
- The model includes consideration of the heat that is stored in the RCS metal.
- Reverse heat transfer from the intact steam generators to the RCS coolant is modeled as the temperature in the RCS falls below the steam generator fluid temperature.
- Minimum flowrates are modeled from ECCS injection, to conservatively minimize the amount of boron that provides negative reactivity feedback.
- The core power is 3459 MWt, with a maximum pump heat of 20 MWt, resulting in NSSS power of 3479 MWt. This bounds the current NSSS power of 3471 MWt.
- Maximum reactor power calorimetric uncertainty of +0.6% is used for full-power cases.
- RCS average temperature is the full-power nominal (high-end) value of 577.9°F plus an uncertainty of +5.0°F.
- Core residual heat generation is assumed based on the 1979 ANS decay heat plus 2σ model (Reference 10).

- Conservative core reactivity coefficients corresponding to end-of-cycle conditions were chosen to maximize the reactivity feedback effects as the RCS cools down as a result of the steamline break.

- All cases have credited a shutdown margin of 1.3% $\Delta k/k$.

A.4.4 Steamline Break Mass/Energy Releases

Steamline break mass and energy release rates are provided in Table A.4.4-1 to Table A.4.4-6 for Salem Unit 2 with the Framatome ANP Model 61/19T steam generators. The time steps included in the tables are representative sample of the entire transient results. The containment pressure and temperature response results are discussed in Section A.6.2. The sequence of events for the limiting case for pressure and temperature are summarized in Table A.6.2-2.

Table A.4.4-1 Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.0	0.0	0.0
0.20	9005.30	1191.80
0.60	8729.83	1192.73
1.60	8219.55	1194.67
3.00	7632.88	1196.74
3.20	7711.79	1196.94
5.80	6986.26	1199.17
8.60	6403.17	1200.74
11.40	5921.43	1201.90
13.40	5679.98	1202.45
13.60	3385.76	1202.84
13.80	1572.00	1203.96
23.20	1278.08	1204.47
28.20	1156.40	1204.36
33.20	1067.13	1204.11
38.20	999.77	1203.82
43.20	951.50	1203.55
48.20	917.17	1203.31
53.20	892.56	1203.12
63.20	862.20	1202.87
83.20	837.16	1202.63
129.80	824.63	1202.51
228.60	819.70	1202.46
229.80	813.55	1202.38
231.20	795.34	1202.18
233.80	746.05	1201.55
235.20	709.33	1201.00
236.40	670.91	1200.34
238.80	576.12	1198.33
242.60	410.28	1192.98

Table A.4.4-1 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
243.80	365.44	1190.91
245.20	321.70	1188.63
246.40	291.45	1186.88
247.60	267.35	1185.30
248.40	254.36	1184.36
249.00	249.01	1184.08
249.60	252.57	1184.44
250.60	264.60	1185.26
251.20	266.53	1185.35
252.40	262.20	1185.00
253.80	252.90	1184.37
254.20	253.75	1184.48
255.40	261.55	1185.00
256.40	259.39	1184.80
257.40	253.41	1184.40
257.80	253.51	1184.45
259.20	261.22	1184.97
260.00	259.26	1184.79
261.00	253.36	1184.39
261.40	253.35	1184.43
262.80	260.89	1184.95
263.80	257.92	1184.69
264.60	253.12	1184.37
265.00	253.22	1184.43
266.40	260.79	1184.94
267.20	258.78	1184.76
268.20	252.86	1184.35
268.60	252.98	1184.41
270.00	260.63	1184.93
270.80	258.58	1184.74

Table A.4.4-1 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
271.80	252.81	1184.35
272.20	253.01	1184.41
273.60	260.25	1184.90
275.40	252.66	1184.35
277.00	259.71	1184.86
277.80	257.88	1184.69
278.80	252.65	1184.34
280.40	259.47	1184.84
281.20	257.82	1184.69
282.20	252.51	1184.33
282.60	252.81	1184.39
283.80	259.20	1184.83
284.80	256.70	1184.60
285.60	252.35	1184.32
286.00	252.56	1184.37
287.20	258.92	1184.81
288.00	257.47	1184.66
289.00	252.19	1184.31
289.40	252.40	1184.36
290.60	258.66	1184.79
291.40	257.16	1184.64
292.40	251.98	1184.29
292.80	252.29	1184.35
294.00	258.46	1184.77
294.80	256.85	1184.61
295.80	251.72	1184.27
297.40	258.27	1184.76
298.20	256.58	1184.59
299.20	251.47	1184.25
300.80	258.06	1184.74

Table A.4.4-1 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
301.40	257.18	1184.65
302.60	251.23	1184.24
304.20	257.81	1184.72
305.00	256.10	1184.56
306.00	250.98	1184.22
307.60	257.56	1184.70
308.40	255.86	1184.54
309.40	250.76	1184.20
311.00	257.28	1184.68
311.80	255.58	1184.52
312.80	250.51	1184.18
314.40	257.02	1184.66
315.20	255.32	1184.50
316.20	250.26	1184.16
317.80	256.74	1184.64
318.40	255.88	1184.55
319.60	250.00	1184.14
321.20	256.45	1184.62
322.00	254.77	1184.45
323.00	249.74	1184.12
324.60	256.15	1184.60
325.40	254.45	1184.43
326.40	249.45	1184.10
328.00	255.85	1184.57
328.60	254.99	1184.48
329.80	249.31	1184.09
331.40	255.46	1184.54
333.20	249.26	1184.09
334.80	255.07	1184.51
336.40	249.08	1184.06

Table A.4.4-1 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
338.20	254.87	1184.49
339.80	248.62	1184.03
340.40	249.54	1184.14
341.40	254.47	1184.47
342.20	253.21	1184.34
343.20	248.29	1184.00
345.00	254.32	1184.45
346.60	248.05	1183.98
348.40	253.92	1184.42
350.00	247.74	1183.96
351.80	253.53	1184.39
353.40	247.39	1183.93
355.20	253.18	1184.36
356.80	247.04	1183.90
358.60	252.77	1184.33
360.20	246.89	1183.89
361.80	252.06	1184.29
362.40	251.54	1184.22
363.60	246.65	1183.88
365.20	251.69	1184.26
367.00	246.15	1183.84
368.60	251.39	1184.23
370.20	246.04	1183.82
371.80	250.65	1184.18
373.60	245.51	1183.79
375.20	250.48	1184.16
376.80	245.36	1183.77
378.40	249.72	1184.11
380.20	244.80	1183.73
381.80	249.47	1184.08

Table A.4.4-1 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
383.40	244.63	1183.71
385.20	248.96	1184.04
386.80	243.98	1183.66
388.40	248.46	1184.00
390.00	243.80	1183.64
391.80	247.94	1183.96
393.40	243.34	1183.61
395.00	247.30	1183.91
396.60	242.99	1183.58
398.20	246.66	1183.87
399.80	242.47	1183.54
401.40	246.06	1183.83
403.20	241.99	1183.50
404.80	245.59	1183.78
406.40	241.61	1183.47
408.00	244.86	1183.73
409.60	241.18	1183.43
411.20	244.14	1183.67
412.80	240.72	1183.39
414.60	243.65	1183.63
416.20	240.00	1183.34
417.80	242.95	1183.57
419.40	239.53	1183.30
421.20	242.31	1183.51
422.80	238.97	1183.26
424.40	241.51	1183.45
426.00	238.49	1183.21
427.80	240.74	1183.39
429.40	238.01	1183.17
431.00	239.74	1183.31

Table A.4.4-1 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 19-2 – 1.4 ft^2 DER, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
432.80	237.55	1183.13
434.60	238.82	1183.23
436.40	236.98	1183.08
485.80	222.38	1181.82
562.20	191.58	1178.87
600.20	183.18	1178.08
600.40	184.34	1178.06
601.00	180.11	1177.52
603.20	149.14	1173.94
604.00	141.22	1172.91
605.20	133.27	1171.81
608.80	118.22	1169.05
613.20	90.87	1163.98
618.40	54.99	1154.69
619.00	50.31	1153.63
620.00	41.76	1152.12
621.00	31.81	1150.93
621.40	27.21	1150.66
621.60	26.60	1150.41
621.80	0.00	0.00
622.00	22.55	1150.35
622.20	0.00	0.00
700.00	0.00	0.00

Table A.4.4-2 Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
0.0	0.0	0.0
0.20	9005.30	1191.80
0.60	8729.83	1192.73
1.40	8316.22	1194.33
2.80	7711.15	1196.48
3.20	7712.30	1196.94
5.60	7037.36	1199.02
8.40	6444.57	1200.62
11.20	5959.92	1201.80
13.40	5686.34	1202.42
13.60	3383.49	1202.83
13.80	1562.44	1204.00
22.80	1278.74	1204.47
27.80	1153.02	1204.35
33.00	1059.09	1204.08
38.00	991.75	1203.78
43.00	943.63	1203.49
48.00	909.35	1203.25
53.00	884.71	1203.06
63.00	854.26	1202.80
83.00	829.82	1202.56
172.60	815.43	1202.41
247.80	813.78	1202.40
249.40	801.74	1202.25
250.80	782.63	1202.03
253.80	724.31	1201.24
255.20	686.74	1200.63
256.80	634.94	1199.66
261.80	442.40	1194.32
262.80	407.22	1192.87

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
264.20	364.28	1190.89
265.80	325.35	1188.87
267.20	299.58	1187.41
268.80	277.94	1186.08
270.20	264.70	1185.18
271.80	254.94	1184.53
273.00	261.14	1185.00
273.80	263.03	1185.11
274.80	262.05	1185.02
276.80	256.15	1184.61
278.60	260.86	1184.95
280.80	256.26	1184.61
282.60	260.89	1184.95
285.00	256.14	1184.61
286.60	260.45	1184.92
289.00	256.06	1184.61
290.60	260.51	1184.93
293.00	255.93	1184.60
294.60	260.56	1184.93
297.00	255.90	1184.59
298.60	260.40	1184.92
301.00	255.84	1184.59
302.60	260.35	1184.92
305.00	255.77	1184.59
306.60	260.29	1184.91
309.00	255.72	1184.58
310.60	260.18	1184.90
313.00	255.65	1184.58
314.60	260.14	1184.90
317.00	255.60	1184.57

Table A.4.4-2 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure

Table A.4.4-2 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
318.60	260.01	1184.89
321.00	255.53	1184.57
322.60	259.97	1184.89
325.00	255.48	1184.56
326.60	259.85	1184.88
329.00	255.41	1184.56
330.60	259.79	1184.87
333.00	255.36	1184.55
334.60	259.68	1184.86
337.00	255.30	1184.55
338.60	259.61	1184.86
341.00	255.24	1184.55
342.60	259.52	1184.85
345.00	255.18	1184.54
346.60	259.44	1184.85
349.00	255.12	1184.54
350.60	259.35	1184.84
353.00	255.06	1184.53
354.60	259.26	1184.83
357.00	254.99	1184.53
358.60	259.18	1184.83
361.00	254.93	1184.52
362.60	259.09	1184.82
365.00	254.86	1184.52
366.60	259.02	1184.82
369.00	254.80	1184.51
370.60	258.92	1184.81
373.00	254.73	1184.51
374.60	258.86	1184.80
377.00	254.67	1184.50

Table A.4.4-2 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
378.60	258.75	1184.80
381.00	254.60	1184.50
382.60	258.68	1184.79
385.00	254.53	1184.49
386.60	258.60	1184.79
389.00	254.46	1184.49
390.60	258.51	1184.78
393.00	254.40	1184.48
394.60	258.42	1184.77
397.00	254.33	1184.47
398.60	258.34	1184.77
401.00	254.22	1184.47
402.60	258.06	1184.74
404.80	254.04	1184.45
406.40	258.16	1184.75
408.60	254.08	1184.45
410.20	257.71	1184.72
412.20	254.08	1184.44
414.00	258.04	1184.74
416.20	253.89	1184.44
417.80	257.61	1184.71
420.00	253.69	1184.43
421.60	257.86	1184.73
423.80	253.75	1184.43
425.40	257.51	1184.70
427.60	253.67	1184.42
429.20	257.28	1184.69
431.20	253.70	1184.42
433.00	257.42	1184.69
435.00	253.58	1184.41

Table A.4.4-2 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
436.80	257.40	1184.69
439.00	253.23	1184.39
440.60	257.39	1184.69
442.80	253.33	1184.39
444.40	257.06	1184.67
446.60	253.25	1184.39
448.20	256.74	1184.65
450.20	253.26	1184.39
451.80	256.75	1184.65
454.00	252.99	1184.37
455.60	256.79	1184.65
457.80	252.84	1184.36
459.40	256.81	1184.65
461.60	252.83	1184.36
463.20	256.49	1184.63
465.20	252.92	1184.36
467.00	256.57	1184.63
469.20	252.52	1184.34
470.80	256.59	1184.63
473.00	252.61	1184.34
474.60	256.23	1184.61
476.80	252.49	1184.33
478.40	256.05	1184.59
480.40	252.56	1184.33
482.20	256.06	1184.59
484.20	252.39	1184.32
485.80	255.83	1184.58
488.00	252.11	1184.31
489.60	255.98	1184.59
491.80	252.09	1184.30

Table A.4.4-2 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
493.40	255.66	1184.56
495.40	252.19	1184.30
497.20	255.64	1184.56
499.20	252.05	1184.29
501.00	255.52	1184.55
503.00	251.89	1184.28
504.60	255.20	1184.53
506.60	251.88	1184.28
508.20	255.14	1184.53
510.20	251.83	1184.27
512.00	255.20	1184.53
514.00	251.69	1184.26
515.60	255.00	1184.52
517.80	251.51	1184.25
519.40	254.71	1184.49
521.40	251.43	1184.25
523.00	254.61	1184.48
525.00	251.33	1184.24
526.60	254.52	1184.48
528.60	251.24	1184.23
530.20	254.37	1184.46
532.20	251.12	1184.23
533.80	254.32	1184.46
535.80	251.06	1184.22
537.40	254.13	1184.45
539.40	250.92	1184.21
541.00	254.12	1184.45
543.00	250.87	1184.20
544.60	253.97	1184.44
546.60	250.81	1184.20

Table A.4.4-2 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
548.20	253.89	1184.43
550.20	250.77	1184.19
552.00	253.86	1184.43
554.00	250.51	1184.18
555.60	253.60	1184.41
557.60	250.44	1184.17
559.20	253.43	1184.39
561.20	250.30	1184.16
562.80	253.43	1184.39
564.80	250.26	1184.16
566.40	253.29	1184.38
568.40	250.22	1184.15
570.00	253.18	1184.38
572.20	249.89	1184.13
573.80	253.22	1184.38
575.80	250.01	1184.13
577.60	253.04	1184.36
579.60	249.82	1184.12
581.20	252.82	1184.35
583.20	249.81	1184.12
585.00	252.73	1184.34
587.00	249.53	1184.10
588.60	252.53	1184.32
590.60	249.49	1184.10
592.20	252.34	1184.31
594.20	249.38	1184.09
595.80	252.15	1184.30
597.80	249.17	1184.08
599.40	252.23	1184.30
600.20	251.61	1184.34

Table A.4.4-2 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 23-2 – 1.4 ft^2 DER, 30% Power, AFW Runout Protection Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
600.40	253.22	1184.32
601.00	247.31	1183.77
601.80	233.74	1182.71
602.60	227.32	1182.26
603.40	229.26	1182.49
605.40	240.39	1183.36
607.60	233.07	1182.73
608.60	231.58	1182.63
610.60	232.90	1182.74
624.60	216.63	1181.29
631.60	203.97	1180.09
638.60	185.87	1178.25
642.00	174.14	1176.98
645.60	159.08	1175.26
652.60	123.19	1169.91
658.60	85.80	1162.85
659.60	78.39	1161.09
662.40	59.50	1155.79
663.20	53.55	1154.33
664.60	41.72	1152.12
665.40	33.78	1151.13
666.00	27.15	1150.66
666.20	26.54	1150.41
666.40	0.00	0.00
668.00	0.00	0.00
668.20	20.97	1150.35
668.40	0.00	0.00
700.00	0.00	0.00

Table A.4.4-3 Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 25-2 – 1.4 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
0.00	0.00	0.00
0.20	8123.52	1194.12
1.00	7760.20	1195.40
3.00	7141.14	1197.63
6.60	7060.46	1198.98
9.80	6708.66	1199.98
13.40	6188.65	1201.36
13.60	3732.19	1201.78
13.80	1781.41	1202.92
19.80	1516.04	1204.16
23.00	1394.71	1204.40
27.00	1275.48	1204.47
33.00	1147.44	1204.34
38.80	1058.69	1204.08
44.60	994.39	1203.80
50.60	947.32	1203.52
56.40	915.28	1203.30
62.40	891.75	1203.12
74.20	862.07	1202.87
97.80	836.32	1202.63
182.20	819.61	1202.46
240.60	817.42	1202.43
242.40	805.60	1202.30
248.00	733.01	1201.38
251.60	671.19	1200.38
262.80	444.05	1194.44
266.60	374.36	1191.43
268.40	345.71	1190.00
270.40	317.53	1188.47
272.20	295.35	1187.19

Table A.4.4-3 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 25-2 – 1.4 ft^2 DER, 100% Power, Feedwater Regulator Valve Failure		
Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
274.00	276.42	1185.99
275.80	260.39	1184.86
277.80	245.73	1183.75
281.40	226.66	1182.17
285.20	213.62	1181.00
289.00	205.31	1180.22
292.80	200.10	1179.72
300.20	194.67	1179.18
315.00	190.41	1178.75
360.00	185.00	1178.19
419.80	180.25	1177.68
507.20	177.15	1177.35
599.80	176.70	1177.30
600.40	177.82	1177.37
601.00	173.87	1176.85
601.80	161.66	1175.18
602.40	143.62	1172.99
602.80	133.70	1171.58
604.20	107.30	1166.91
604.80	97.25	1165.07
605.40	88.56	1163.36
606.80	71.12	1158.98
608.00	56.92	1155.01
608.60	48.77	1153.22
609.20	39.81	1151.76
609.60	32.87	1150.97
609.80	28.88	1150.66
610.00	24.56	1150.40
610.20	0.00	0.00
700.00	0.00	0.00

Table A.4.4-4 Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 61-2 – 0.6 ft^2 Small DER, 100% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	2310.02	1193.97
1.00	2248.30	1194.67
3.80	2129.82	1196.13
7.40	2023.44	1197.44
7.60	2074.06	1197.26
11.20	2180.46	1195.89
14.80	2232.14	1195.12
17.80	2216.07	1195.93
24.40	1864.34	1197.11
34.20	1373.81	1198.91
48.40	715.37	1203.52
49.00	706.97	1203.62
53.80	682.05	1203.88
63.60	641.67	1204.20
73.40	611.51	1204.35
103.80	555.08	1204.47
134.40	526.58	1204.45
149.80	518.84	1204.44
183.80	511.93	1204.42
320.00	510.47	1204.42
324.20	499.57	1204.38
328.40	480.06	1204.28
336.40	417.12	1203.68
340.80	421.22	1203.74
370.20	390.49	1203.27
385.00	367.41	1202.82
399.80	337.11	1202.09
429.40	263.92	1199.32
444.20	231.63	1197.53

Table A.4.4-4 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 61-2 – 0.6 ft^2 Small DER, 100% Power, MSIV Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
451.60	218.85	1196.70
459.00	208.46	1195.97
473.80	194.20	1194.85
488.60	186.00	1194.13
503.40	181.40	1193.70
518.20	178.80	1193.44
599.60	174.75	1193.04
600.40	175.59	1193.12
601.00	174.62	1192.97
602.00	168.54	1192.31
604.40	149.07	1190.10
606.80	131.33	1187.81
611.20	102.13	1183.07
613.60	88.09	1180.19
616.00	75.93	1177.23
618.20	65.73	1174.48
620.40	56.45	1171.42
625.00	40.93	1164.90
627.40	34.61	1161.74
632.00	24.03	1154.97
633.00	21.42	1153.61
634.20	18.02	1152.20
634.80	16.04	1151.56
635.40	13.88	1151.01
635.80	12.24	1150.68
636.00	11.30	1150.54
636.20	10.20	1150.41
636.40	8.28	1150.35
636.60	0.00	0.00
700.00	0.00	0.00

Table A.4.4-5 Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 67-2 – 0.88 ft^2 Split Break, 30% Power, Containment Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
0.00	0.00	0.00
0.20	1828.74	1191.40
3.80	1739.44	1193.19
7.40	1671.97	1194.49
14.60	1569.91	1196.35
15.00	1578.42	1196.36
23.20	1564.58	1196.60
59.00	1284.40	1200.93
62.60	1155.09	1202.57
67.40	1026.21	1203.71
70.60	961.78	1204.11
77.40	859.74	1204.43
83.00	800.99	1204.47
89.60	750.70	1204.42
96.40	716.26	1204.33
103.00	694.08	1204.24
109.60	679.26	1204.17
123.00	662.56	1204.07
149.20	651.85	1204.00
341.00	647.00	1203.97
343.80	634.21	1203.87
346.80	608.70	1203.64
349.80	570.01	1203.22
352.80	516.18	1202.44
358.80	383.00	1199.12
361.80	324.02	1196.78
363.20	301.63	1195.70
364.60	282.59	1194.65
366.00	266.65	1193.67
367.40	253.52	1192.79

Table A.4.4-5 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 67-2 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
370.40	233.23	1191.31
373.40	220.53	1190.32
376.40	212.64	1189.67
382.20	204.77	1189.00
386.20	202.13	1188.77
394.00	191.45	1187.79
400.00	187.18	1187.40
412.00	183.93	1187.09
478.60	178.16	1186.51
600.00	175.38	1186.22
600.40	176.37	1186.30
600.80	175.41	1186.15
601.40	170.77	1185.60
602.00	163.30	1184.54
602.20	158.57	1184.22
602.80	151.65	1183.48
603.40	152.78	1183.69
604.80	165.27	1185.11
605.40	164.67	1184.96
606.40	156.34	1183.95
607.00	153.74	1183.73
607.40	154.69	1183.91
608.80	163.70	1184.91
609.20	163.13	1184.79
610.00	157.41	1184.08
610.60	154.50	1183.81
611.00	154.78	1183.90
612.40	162.60	1184.79
612.80	162.50	1184.72
614.20	154.64	1183.83

Table A.4.4-5 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 67-2 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
615.00	156.62	1184.14
616.00	161.94	1184.72
616.40	161.86	1184.64
617.80	154.46	1183.81
618.60	156.52	1184.13
619.60	161.48	1184.66
620.00	161.32	1184.57
621.00	155.34	1183.87
621.40	154.29	1183.79
622.20	156.36	1184.10
623.20	160.97	1184.60
623.60	160.76	1184.51
625.00	154.24	1183.78
625.40	154.68	1183.87
626.80	160.36	1184.53
627.20	160.28	1184.45
628.60	154.13	1183.77
629.00	154.46	1183.84
630.60	159.92	1184.45
632.40	154.22	1183.78
634.20	158.94	1184.35
634.60	158.90	1184.31
636.20	154.48	1183.81
638.20	157.99	1184.23
640.20	154.60	1183.82
642.20	156.90	1184.10
644.20	154.54	1183.81
646.20	155.82	1183.96
648.60	154.17	1183.76
651.20	154.55	1183.80

Table A.4.4-5 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 67-2 – 0.88 ft^2 Split Break, 30% Power, Cont. Safeguards Failure		
Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
674.00	148.33	1182.99
686.60	142.84	1182.25
699.20	134.14	1180.99
705.40	127.97	1180.05
711.80	119.56	1178.71
718.00	108.83	1176.88
721.20	102.10	1175.67
730.80	77.82	1170.05
740.20	49.32	1161.17
743.40	40.07	1157.03
745.80	32.21	1153.88
746.60	29.06	1153.04
747.20	27.32	1152.24
747.40	25.41	1152.16
748.00	23.71	1151.43
748.20	21.50	1151.36
748.80	19.70	1150.79
749.00	17.28	1150.74
749.20	17.55	1150.51
749.40	13.81	1150.47
749.60	14.62	1150.35
749.80	0.00	0.00
1000.00	0.00	0.00

Table A.4.4-6 Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 79-2 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
0.00	0.00	0.00
0.20	1828.75	1191.40
3.80	1741.18	1193.15
7.40	1674.65	1194.44
14.60	1573.91	1196.28
15.00	1582.32	1196.29
23.40	1566.80	1196.56
59.40	1281.90	1201.07
61.40	1208.42	1201.97
66.40	1068.63	1203.38
70.60	982.62	1204.00
74.80	914.43	1204.31
79.20	857.59	1204.44
85.00	800.98	1204.47
92.20	750.45	1204.42
99.40	716.93	1204.33
106.60	694.62	1204.24
113.80	679.76	1204.17
128.20	663.20	1204.07
154.60	652.72	1204.01
384.20	648.18	1203.98
387.20	634.23	1203.87
390.20	607.99	1203.64
393.20	568.27	1203.20
396.20	513.35	1202.39
402.20	379.36	1198.99
403.80	346.50	1197.74
405.20	321.04	1196.64
406.80	296.18	1195.41
408.40	275.63	1194.24

Table A.4.4-6 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 79-2 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
409.80	260.88	1193.29
411.40	247.28	1192.34
414.40	229.32	1191.01
417.40	218.09	1190.12
420.60	210.75	1189.51
426.80	203.74	1188.91
432.80	199.42	1188.52
438.80	191.68	1187.81
444.80	187.52	1187.43
457.00	184.20	1187.12
530.00	178.06	1186.50
600.60	176.80	1186.32
601.40	171.39	1185.67
602.00	163.90	1184.62
602.20	159.21	1184.30
603.00	150.69	1183.35
603.40	151.58	1183.54
604.40	161.71	1184.81
605.00	165.93	1185.17
605.40	165.61	1185.08
606.00	161.74	1184.57
606.40	157.64	1184.08
607.00	153.68	1183.70
607.40	153.74	1183.77
608.60	162.15	1184.80
609.00	163.85	1184.92
609.40	163.15	1184.79
610.80	154.40	1183.80
611.20	154.73	1183.89
612.60	162.64	1184.80
613.00	162.47	1184.71

Table A.4.4-6 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 79-2 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure		
Time (sec)	**Flowrate (lbm/s)**	**Enthalpy (Btu/lbm)**
614.00	155.98	1183.94
614.40	154.59	1183.82
615.00	155.63	1184.01
616.20	161.94	1184.72
616.60	161.85	1184.64
617.40	156.75	1184.02
618.00	154.43	1183.80
618.80	156.52	1184.13
619.80	161.47	1184.66
620.20	161.30	1184.57
621.00	156.34	1183.97
621.60	154.28	1183.79
622.40	156.34	1184.10
623.40	160.95	1184.60
623.80	160.74	1184.50
625.20	154.23	1183.78
625.60	154.67	1183.87
627.00	160.34	1184.53
627.40	160.26	1184.45
628.80	154.11	1183.76
629.20	154.44	1183.84
630.80	159.89	1184.45
632.60	154.20	1183.78
634.40	158.90	1184.35
634.80	158.89	1184.31
636.40	154.46	1183.80
638.40	157.95	1184.23
640.40	154.58	1183.81
642.40	156.86	1184.09
644.60	154.48	1183.80
646.40	155.78	1183.96

Table A.4.4-6 (cont.) Salem Unit 2 (Model 61/19T) Steamline Break Mass/Energy Release, Case 79-2 – 0.88 ft^2 Split Break, 30% Power, MSIV Failure

Time (sec)	Flowrate (lbm/s)	Enthalpy (Btu/lbm)
648.80	154.14	1183.76
654.60	153.72	1183.70
678.40	146.67	1182.77
690.40	140.66	1181.94
702.20	131.38	1180.58
708.00	124.86	1179.56
714.00	116.12	1178.13
720.00	104.81	1176.17
726.00	90.14	1173.26
732.00	74.56	1169.13
736.40	61.31	1165.33
738.00	56.01	1163.64
744.00	38.33	1156.25
746.20	30.80	1153.42
746.60	29.18	1153.08
746.80	29.10	1152.71
747.00	27.27	1152.62
747.60	25.74	1151.84
747.80	23.58	1151.77
748.00	23.85	1151.46
748.20	21.66	1151.39
748.40	21.92	1151.11
748.60	19.57	1151.05
748.80	19.86	1150.81
749.00	17.47	1150.76
749.20	17.74	1150.53
749.40	14.15	1150.49
749.60	14.88	1150.35
749.80	0.00	0.00
1000.00	0.00	0.00

A.5 LOCA MASS AND ENERGY RELEASES

The uncontrolled release of pressurized high-temperature reactor coolant, termed a loss-of-coolant accident (LOCA), will result in release of steam and water into the containment. This, in turn, will result in increases in the local subcompartment pressures, and an increase in the global containment pressure and temperature. Therefore, there are typically both long- and short-term issues reviewed relative to a postulated LOCA that must be considered for a complete containment integrity analysis. Since the steam generators are being replaced in Salem Unit 2, the long-term LOCA transients will be analyzed and the short term issues will be evaluated.

The long-term LOCA mass and energy releases are analyzed to approximately $1x10^7$ seconds and are utilized as input to the containment integrity analysis. This demonstrates the acceptability of the containment safeguards systems to mitigate the consequences of a hypothetical large-break LOCA. The containment safeguards systems must be capable of limiting the peak containment pressure to less than the design pressure and to limit the temperature excursion to less than the acceptance limits. For this CFCU margin recovery program combined with a steam generator replacement, Westinghouse generated Salem Unit 2 specific LOCA mass and energy releases for containment design using the flexible multi-nodal model (hereafter referred to as "the March 1979 model") described in Reference 11. The Nuclear Regulatory Commission (NRC) review and approval letter is included with Reference 11. This section discusses the long-term LOCA mass and energy releases generated for this program. The results of this Salem Unit 2 replacement steam generator analysis were provided for use in the containment response analysis (see Section A.6.3).

A.5.1 Long-Term LOCA Mass and Energy Releases

The mass and energy release rates described in this section form the basis of further computations to evaluate the containment following the postulated accident. Discussed in this section are the long-term LOCA mass and energy releases for the hypothetical double-ended pump suction (DEPS) rupture with minimum and maximum safeguards and the blowdown portion of the double-ended hot leg (DEHL) rupture break. The mass and energy releases for these three cases for Salem Unit 2 are used for the long-term containment response analyses in Section A.6.3. The basis for using these cases is discussed in Section A.5.1.5 and Section A.5.1.6.

A.5.1.1 Input Parameters and Assumptions

The mass and energy release analysis is sensitive to the assumed characteristics of various plant systems, in addition to other key modeling assumptions. Where appropriate, bounding inputs are utilized and instrumentation uncertainties are included. For example, the RCS operating temperatures are chosen to bound the highest average coolant temperature range of all operating cases and a temperature uncertainty allowance (+5.0°F) is then added. Nominal parameters are used in certain instances. For example, the RCS pressure in this analysis is based on a nominal value of 2250 psia plus an uncertainty allowance (+50.0 psi). All input parameters are chosen consistent with accepted analysis methodology.

Some of the most critical items are the RCS initial conditions, core decay heat, safety injection flow, and primary and secondary metal mass and steam generator heat release modeling. Specific assumptions concerning each of these items are discussed in the following paragraphs. Tables A.5.1-1 through A.5.1-3 present key data assumed in the analysis.

The core rated power of 3459 MWt, adjusted for calorimetric error (i.e., 100.6% or 3479.75 MWt) was used in the analysis. As previously noted, the use of RCS operating temperatures to bound the highest average coolant temperature range were used as bounding analysis conditions. The use of higher temperatures is conservative because the initial fluid energy is based on coolant temperatures that are at the maximum levels attained in steady-state operation. Additionally, an allowance to account for instrument error and deadband is reflected in the initial RCS temperatures. The selection of 2250 psia as the limiting pressure is considered to affect the blowdown phase results only, since this represents the initial pressure of the RCS. The RCS rapidly depressurizes from this value until the point at which it equilibrates with containment pressure.

The rate at which the RCS blows down is initially more severe at the higher RCS pressure. Additionally, the RCS has a higher fluid density at the higher pressure (assuming a constant temperature) and subsequently has a higher RCS mass available for releases. Thus, 2250 psia plus uncertainty was selected for the initial pressure as the limiting case for the long-term mass and energy release calculations.

The selection of the fuel design features for the long-term mass and energy release calculation is based on the need to conservatively maximize the energy stored in the fuel at the beginning of the postulated accident (i.e., to maximize the core stored energy). The core stored energy that was selected to bound the Westinghouse 17 x 17 RFA fuel product that will be used at Salem Unit 2 was 4.23 full-power seconds (FPS). The margins in the core stored energy include +15 percent in order to address the thermal fuel model and associated manufacturing uncertainties and the time in the fuel cycle for maximum fuel densification. Thus, the analysis very conservatively accounts for the stored energy in the core.

Margin in RCS volume of 3 percent (which is composed of 1.6-percent allowance for thermal expansion and 1.4-percent allowance for uncertainty) was modeled.

A uniform steam generator tube plugging level of 0 percent was modeled. This assumption maximizes the reactor coolant volume and fluid release by virtue of consideration of the RCS fluid in all steam generator tubes. During the post-blowdown period, the steam generators are active heat sources since significant energy remains in the secondary metal and secondary mass that has the potential to be transferred to the primary side. The 0-percent tube plugging assumption maximizes the heat transfer area and, therefore, the transfer of secondary heat across the steam generator tubes. Additionally, this assumption reduces the reactor coolant loop resistance, which reduces the ΔP upstream of the break for the pump suction breaks and increases break flow. Thus, the analysis conservatively accounts for the level of steam generator tube plugging.

The secondary-to-primary heat transfer is maximized by assuming conservative heat transfer coefficients. This conservative energy transfer is ensured by maximizing the initial internal energy of the inventory in the steam generator secondary side. This internal energy is based on full-power operation plus uncertainties.

Regarding safety injection flow, the mass and energy release calculation considered configurations, component failures, and offsite power assumptions to conservatively bound respective alignments. The cases include a minimum safeguards assumption (1 charging/safety injection (CHG/SI) pump, 1 intermediate-head safety injection (IHSI) pump, and 1 low-head safety injection (LHSI) pump) (see Table A.5.1-2) and a maximum safeguards assumption case (2 CHG/SI, 2 IHSI and 2 LHSI pumps) (see Table A.5.1-3). In addition, the containment backpressure is assumed to be equal to the containment design pressure. This assumption was shown in Reference 11 to be conservative for the generation of mass and energy releases. Another aspect of the safety injection system that is considered is the recirculation flow that would occur if the operators did not initiate recirculation spray.

In summary, the following assumptions were employed to ensure that the mass and energy releases are conservatively calculated, thereby maximizing energy release to containment.

1. Maximum expected operating temperature of the RCS (100-percent full-power conditions)
2. Allowance for RCS temperature uncertainty (+5.0°F)
3. Margin in RCS volume of 3 percent (which is composed of 1.6-percent allowance for thermal expansion, and 1.4-percent allowance for uncertainty)
4. Core rated power of 3459 MWt
5. Allowance for calorimetric error (+0.6 percent of power)
6. Conservative heat transfer coefficients (i.e., steam generator primary/secondary heat transfer, and RCS metal heat transfer)
7. Allowance in core stored energy for effect of fuel densification
8. A margin in core stored energy (+15 percent to account for manufacturing tolerances)
9. An allowance for RCS initial pressure uncertainty (+50 psi)
10. A maximum containment backpressure equal to design pressure (47.0 psig)
11. Steam generator tube plugging leveling (0-percent uniform)
    a. Maximizes reactor coolant volume and fluid release
    b. Maximizes heat transfer area across the steam generator tubes
    c. Reduces coolant loop resistance, which reduces the ΔP upstream of the break for the pump suction breaks and increases break flow

Thus, based on the previously discussed conditions and assumptions, an analysis of Salem Unit 2 with Framatome ANP Model 61/19T steam generators was made for the release of mass and energy from the RCS in the event of a large-break LOCA at 3479.75 MWt.

A.5.1.2 Description of Analyses

The evaluation model used for the long-term LOCA mass and energy release calculations is the March 1979 model described in Reference 11. These mass and energy releases are then subsequently used in the containment integrity analysis and qualification temperature evaluation.

A.5.1.3 LOCA Mass and Energy Release Phases

The containment system receives mass and energy releases following a postulated rupture in the RCS. These releases continue over a time period, which, for the LOCA mass and energy analysis, is typically divided into four phases. These four phases are described in Section 5.1.3 in the main body of this document.

A.5.1.4 Computer Codes

The Reference 11 mass and energy release evaluation model is comprised of mass and energy release versions of the following codes: SATAN VI, WREFLOOD, FROTH, and EPITOME. These codes were used to calculate the long-term LOCA mass and energy releases for Salem Unit 2. Each of these codes are described in Section 5.1.4 of the main body of this document.

A.5.1.5 Break Size and Location

Generic studies have been performed and documented in Reference 11 with respect to the effect of postulated break size on the LOCA mass and energy releases. The double-ended guillotine break has been found to be limiting due to larger mass flow rates during the blowdown phase of the transient. During the reflood and froth phases, the break size has little effect on the releases.

Three distinct locations in the RCS loop can be postulated for a pipe rupture for mass and energy release purposes:

- Hot leg (between vessel and steam generator)
- Cold leg (between pump and vessel)
- Pump suction (between steam generator and pump)

The break locations analyzed for this program are the DEPS rupture (10.48 ft^2) and the DEHL break (9.17 ft^2). Break mass and energy releases have been calculated for the blowdown, reflood, and post-reflood phases of the LOCA for the DEPS cases. The following information provides a discussion on the three possible break locations and why the DEPS break is limiting for the long term.

The DEHL rupture has been shown in previous studies to result in the highest blowdown mass and energy release rates. Although the core flooding rate would be the highest for this break location, the amount of energy released from the steam generator secondary is minimal because the majority of the fluid that exits the core vents directly to containment bypassing the steam generators. As a result, the reflood mass and energy releases are reduced significantly as compared to either the pump suction or cold leg break locations where the core exit mixture must pass through the steam generators before venting through the break. For the hot leg break, generic studies have confirmed that there is no reflood peak (i.e., from the end of the blowdown period the containment pressure would continually decrease). Therefore, only the mass and energy releases for the hot leg break blowdown phase are calculated because of the replacement steam generators. The DEHL break case is not impacted by the CFCU margin recovery program.

The cold leg break location has also been found in previous studies to be much less limiting in terms of the overall containment energy releases. The cold leg blowdown is faster than that of the pump suction break, and more mass is released into the containment. However, the core heat transfer is greatly reduced, and this results in a considerably lower energy release into containment. Studies have determined that the blowdown transient for the cold leg is, in general, less limiting than that for the pump suction break. During reflood, the flooding rate is greatly reduced and the energy release rate into the containment is reduced. Therefore, the cold leg break is bounded by other breaks and no further evaluation is necessary.

The pump suction break combines the effects of the relatively high core flooding rate, as in the hot leg break, and the addition of the stored energy in the steam generators. As a result, the pump suction break yields the highest energy flow rates during the post-blowdown period by including all of the available energy of the RCS in calculating the releases to containment. Thus, only the DEHL and DEPS cases are used to analyze long-term LOCA containment integrity for full scope programs.

A.5.1.6 Application of Single-Failure Criterion

An analysis of the effects of the single-failure criterion has been performed on the mass and energy release rates for each break analyzed. An inherent assumption in the generation of the mass and energy release is that offsite power is lost coincident with the pipe rupture. This results in the actuation of the emergency diesel generators. Operation of the diesel generators delays the operation of the safety injection system that is required to mitigate the transient.

The single failures that are analyzed for the LOCA mass and energy releases for the CFCU Margin Recovery Program combined with replacement steam generators for Salem Unit 2 are the postulated failure of an entire train of safeguards equipment and the failure of a single containment spray pump. Typically, the failure of an entire train of safeguards equipment is synonymous with the failure of an emergency diesel generator to start. However, the Salem plants have a three diesel generator system, so the loss of one diesel would be less limiting than the loss of one complete train of safeguards equipment. The loss of one entire train of safety injection pumps results in only one CHG/SI pump, one IHSI pump, and one LHSI pump available for accident mitigation. The containment heat removal equipment that is assumed to operate for this train-failure scenario is discussed in Section 6.3.3.

A.5.1.7 Acceptance Criteria for LOCA M&E Analyses

A large-break loss-of-coolant accident is classified as an American Nuclear Society (ANS) Condition IV event, an infrequent fault. To satisfy the NRC acceptance criteria presented in the Standard Review Plan, Section 6.2.1.3, the relevant requirements are the following:

- 10 CFR 50, Appendix A
- 10 CFR 50, Appendix K, paragraph I.A

To meet these requirements, the following must be addressed:

- Break size and location
- Calculation of each phase of the accident
- Sources of energy

The description of the modeling of each phase of the transient with the March 1979 model (Reference 11) and the individual sources of energy are provided in the following section. The break size and location was discussed in Section A.5.1.5.

Table A.5.1-1 System Parameters Initial Conditions for Salem Unit 2	
Parameters	**Value**
Core Thermal Power (MWt)	3479.75
Reactor Coolant System Total Flowrate (lbm/sec)	34805.56
Vessel Outlet Temperature (°F)	618.1
Core Inlet Temperature (°F)	547.7
Initial Steam Generator Steam Pressure (psia)	911
Steam Generator Design	Model 61/19T
Steam Generator Total Dry Weight (lb_m)	695,144.0
Steam Generator Tube Plugging (%)	0
Initial Steam Generator Secondary-Side Mass (lbm)	126287.7
Assumed Maximum Containment Backpressure (psia)	61.7(1)
Accumulator Water Volume (ft^3) per accumulator N_2 Cover Gas Pressure (psia) Temperature (°F)	 850 592.2 120
Safety Injection Delay, total (sec) (from beginning of event)	35.6

Note:

1. Bounding assumption for mass and energy release calculation per Reference 11.

   Core Thermal Power, RCS Total Flowrate, RCS Coolant Temperatures, and Steam Generator Secondary-Side Mass include appropriate uncertainty and/or allowance.

Table A.5.1-2 Safety Injection Flow Minimum Safeguards	
RCS Pressure (psig)	**Total Flow (ft^3/sec)***
Injection Mode (Reflood Phase)	
0	10.92
20	10.37
40	9.79
47	9.57
60	9.16
80	8.47
100	7.70
120	6.78
140	5.56
160	3.30
180	1.95
200	1.93
* Density of 62.0 lb_m/ft^3 has been assumed	
RCS Pressure (psig)	**Total Flow (gpm)**
Cold Leg Recirculation Mode	
Recirculation Flow at 0 psig (until Injection Spray Termination)	3200.0
Recirculation Flow at 0 psig (AFTER Injection Spray Termination)	1225.2

Table A.5.1-3 Safety Injection Flow Maximum Safeguards	
RCS Pressure (psig)	**Total Flow (ft^3/sec)***
Injection Mode (Reflood Phase)	
0	22.43
20	21.50
40	20.51
47	20.14
60	19.46
80	18.32
100	17.09
120	15.72
140	14.18
160	12.38
180	10.16
200	7.21
* Density of 62.0 lb_m/ft^3 has been assumed	
RCS Pressure (psig)	**Total Flow (gpm)**
Cold Leg Recirculation Mode	
Recirculation Flow at 0 psig (until Injection Spray Termination)	6200.0
Recirculation Flow at 0 psig (AFTER Injection Spray Termination)	5018.3

A.5.2 Mass and Energy Release Data

A.5.2.1 Blowdown Mass and Energy Release Data

The SATAN-VI code is used for computing the blowdown transient. The code utilizes the control volume (element or nodal) approach with the capability for modeling a large variety of plant-specific thermal-fluid system configurations. The fluid properties are considered uniform and thermodynamic equilibrium is assumed in each element. A point kinetics model is used with weighted feedback effects. The major feedback effects include moderator density, moderator temperature, and Doppler broadening. A critical flow calculation for subcooled (modified Zaloudek), two-phase (Moody), or superheated break flow is incorporated into the analysis. The methodology for the use of this model is described in Reference 11. A comparison of these two critical flow correlations is shown in Section III-1 of Reference 12.

Table A.5.2-1 presents the calculated mass and energy release for the blowdown phase of the DEHL break for Salem Unit 2. For the hot leg break mass and energy release tables, break path 1 refers to the mass and energy exiting from the reactor vessel side of the break; break path 2 refers to the mass and energy exiting from the steam generator side of the break. Table A.5.2-2 presents the calculated mass and energy release for the blowdown phase of the DEPS break for Salem Unit 2. Break path 1 for the pump suction break in the mass and energy release tables refers to the mass and energy exiting from the steam generator side of the break. Break path 2 refers to the mass and energy exiting from the pump side of the break.

A.5.2.2 Reflood Mass and Energy Release Data

The WREFLOOD code is used for computing the reflood transient. The WREFLOOD code consists of two basic hydraulic models – one for the contents of the reactor vessel and one for the coolant loops. The two models are coupled through the interchange of the boundary conditions applied at the vessel outlet nozzles and at the top of the downcomer. Additional transient phenomena such as pumped safety injection and accumulators, reactor coolant pump performance, and steam generator release are included as auxiliary equations that interact with the basic models as required. The WREFLOOD code permits the capability to calculate variations during the core reflooding transient of basic parameters such as core flooding rate, core and downcomer water levels, fluid thermodynamic conditions (pressure, enthalpy, density) throughout the primary system, and mass flow rates through the primary system. The code permits hydraulic modeling of the two flow paths available for discharging steam and entrained water from the core to the break, i.e., the path through the broken loop and the path through the unbroken loops.

A complete thermal equilibrium mixing condition for the steam and ECCS injection water during the reflood phase has been assumed for each loop receiving ECCS water. This is consistent with the usage and application of the Reference 11 mass and energy release evaluation model in recent analyses, e.g., Salem Unit 1 Docket (Reference 13). Even though the Reference 11 model credits steam/water mixing only in the intact loop and not in the broken loop, the justification, applicability, and NRC approval for using the mixing model in the broken loop has been documented (Reference 13). Moreover, this assumption is supported by test data and is further discussed below. Please note that the steam/water mixing inside the RCS is not impacted by the containment design.

The model assumes a complete mixing condition (i.e., thermal equilibrium) for the steam/water interaction. The complete mixing process, however, is made up of two distinct physical processes.

The first is a two-phase interaction with condensation of steam by cold ECCS water. The second is a single-phase mixing of condensate and ECCS water. Since the steam release is the most important influence to the containment pressure transient, the steam condensation part of the mixing process is the only part that need be considered. (Any spillage directly heats only the sump and not the atmosphere.)

The most applicable steam/water mixing test data have been reviewed for validation of the containment integrity reflood steam/water mixing model. This data was generated in 1/3-scale tests (Reference 14), which are the largest scale data available and thus most clearly simulates the flow regimes and gravitational effects that would occur in a pressurized water reactor (PWR). These tests were designed specifically to study the steam/water interaction for PWR reflood conditions.

A group of 1/3-scale steam/water mixing tests discussed in Reference 14 corresponds directly to containment integrity reflood conditions. The injection flow rates for this group cover all phases and mixing conditions calculated during the reflood transient. The data from these tests were reviewed and discussed in detail in Reference 11. For all of these tests, the data clearly indicate the occurrence of very effective mixing with rapid steam condensation. The mixing model used in the containment integrity reflood calculation is, therefore, wholly supported by the 1/3-scale steam/water mixing data.

Additionally, the following justification is also noted. The post-blowdown limiting break for the containment integrity peak pressure analysis is the pump suction double-ended rupture. For this break, there are two flow paths available in the RCS by which mass and energy may be released to containment. One is through the outlet of the steam generator, the other via reverse flow through the reactor coolant pump. Steam that is not condensed by ECCS injection in the intact RCS loops passes around the downcomer and through the broken loop cold leg and pump in venting to containment. This steam also encounters ECCS injection water as it passes through the broken loop cold leg, complete mixing occurs and a portion of it is condensed. It is this portion of steam that is condensed that is taken credit for in this analysis. This assumption is justified based upon the postulated break location, and the actual physical presence of the ECCS injection nozzle. A description of the test and test results are contained in References 11 and 13.

Tables A.5.2-3 and A.5.2-4 present the calculated mass and energy releases for the reflood phase of the pump suction double-ended rupture, minimum safeguards and maximum safeguards cases for Salem Unit 2.

The principal parameters during reflood are given in Tables A.5.2-5 and A.5.2-6 for the DEPS cases.

A.5.2.3 Post-Reflood Mass and Energy Release Data

The FROTH code (Reference 12) is used for computing the post-reflood transient. The FROTH code calculates the heat release rates resulting from a two-phase mixture present in the steam generator tubes. The mass and energy releases that occur during this phase are typically superheated (Reference 19) due to the depressurization and equilibration of the broken loop and intact loop steam generators. During this phase of the transient, the RCS has equilibrated with the containment pressure. However, the steam generators contain a secondary inventory at an enthalpy that is much higher than the primary side. Therefore, there is a significant amount of reverse heat transfer that occurs. Steam is produced in the core due to core decay heat. For a pump suction break, a two-phase fluid exits the core, flows through the hot legs, and becomes superheated as it passes through the steam generator. Once the broken loop cools, the break flow becomes two phase. During the FROTH calculation, ECCS injection is addressed for both the injection phase and the recirculation phase. The FROTH code calculation stops when the secondary side equilibrates to the saturation temperature (T_{sat}) at the containment design pressure, after this point the EPITOME code completes the steam generator depressurization (see Subsection A.5.2.5 for additional information).

The methodology for the use of this model is described in Reference 11. The mass and energy release rates are calculated by FROTH and EPITOME until the time of containment depressurization. After containment depressurization (14.7 psia), the mass and energy release available to containment is generated directly from core boil-off/decay heat.

Tables A.5.2-7 and A.5.2-8 present the two-phase post-reflood mass and energy release data for the pump suction double-ended break cases for Salem Unit 2.

A.5.2.4 Decay Heat Model

On November 2, 1978, the Nuclear Power Plant Standards Committee (NUPPSCO) of the ANS approved ANS Standard 5.1 (Reference 10) for the determination of decay heat. This standard was used in the mass and energy release model for Salem. Table A.5.2-9 lists the decay heat curve used in the Salem Unit 2 mass and energy release analysis.

Significant assumptions in the generation of the decay heat curve for use in the LOCA mass and energy releases analysis include the following.

1. The decay heat sources considered are fission product decay and heavy element decay of U-239 and Np-239.

2. The decay heat power from fissioning isotopes other than U-235 is assumed to be identical to that of U-235.

3. The fission rate is constant over the operating history of maximum power level.

4. The factor accounting for neutron capture in fission products has been taken from Reference 10.

5. The fuel has been assumed to be at full power for 1×10^8 seconds.

6. The total recoverable energy associated with one fission has been assumed to be 200 MeV/fission.

7. Two sigma uncertainty (two times the standard deviation) has been applied to the fission product decay.

Based upon NRC staff review, (Safety Evaluation Report [SER] of the March 1979 evaluation model [Reference 11]), use of the ANS Standard-5.1, November 1979 decay heat model (Reference 10) was approved for the calculation of mass and energy releases to the containment following a LOCA.

A.5.2.5 Steam Generator Equilibration and Depressurization

Steam generator equilibration and depressurization is the process by which secondary-side energy is removed from the steam generators in stages. The FROTH computer code calculates the heat removal from the secondary mass until the secondary temperature is the saturation temperature (T_{sat}) at the containment design pressure. After the FROTH calculations, the EPITOME code continues the FROTH calculation for steam generator cooldown removing steam generator secondary energy at different rates (i.e., first- and second-stage rates). The first-stage rate is applied until the steam generator reaches T_{sat} at the user-specified intermediate equilibration pressure, when the secondary pressure is assumed to reach the actual containment pressure. Then the second-stage rate is used until the final depressurization, when the secondary reaches the reference temperature of T_{sat} at 14.7 psia, or 212°F. The heat removal of the broken loop and intact loop steam generators are calculated separately.

During the FROTH calculations, steam generator heat removal rates are calculated using the secondary-side temperature, primary-side temperature and a secondary-side heat transfer coefficient determined using a modified McAdams correlation. Steam generator energy is removed during the FROTH transient until the secondary-side temperature reaches saturation temperature at the containment design pressure. The constant heat removal rate used during the first heat removal stage is based on the final heat removal rate calculated by FROTH. The steam generator energy available to be released during the first-stage interval is determined by calculating the difference in secondary energy available at the containment design pressure and that at the (lower) user-specified intermediate equilibration pressure, assuming saturated conditions. This energy is then divided by the first-stage energy removal rate, resulting in an intermediate equilibration time. At this time, the rate of energy release drops substantially to the second-stage rate. The second-stage rate is determined as the fraction of the difference in secondary energy available between the intermediate equilibration and final depressurization at 212°F, and the time difference from the time of the intermediate equilibration to the user-specified time of the final depressurization at 212°F. With current methodology, all of the secondary energy remaining after the intermediate equilibration is conservatively assumed to be released by imposing a mandatory cooldown and subsequent depressurization down to atmospheric pressure at 3600 seconds, i.e., 14.7 psia and 212°F (the mass and energy balance tables have this point labeled as "Available Energy").

A.5.2.6 Sources of Mass and Energy

The sources of mass considered in the LOCA mass and energy release analysis are given in Table A.5.2-10 for the DEHL case and in Table A.5.2-11 and Table A.5.2-12 for the DEPS cases. These sources are the RCS, accumulators, and pumped safety injection.

The analysis used the following energy reference points:

- Available energy: 212°F; 14.7 psia [energy that could be released] (as discussed in A.5.2.5)
- Total energy content: 32°F; 14.7 psia [total internal energy of the RCS]

The energy inventories considered in the LOCA mass and energy release analysis are given in Table A.5.2-13 for the DEHL case and in Table A.5.2-14 and Table A.5.2-15 for the DEPS cases. The energy sources are the following.

- Reactor coolant system water
- Accumulator water (all four inject)
- Pumped safety injection water
- Decay heat
- Core-stored energy
- Reactor coolant system metal (includes steam generator tubes)
- Steam generator metal (includes transition cone, shell, wrapper, and other internals)
- Steam generator secondary energy (includes fluid mass and steam mass)
- Secondary transfer of energy (feedwater into and steam out of the steam generator secondary)

The mass and energy inventories are presented at the following times, as appropriate.

- Time zero (initial conditions)
- End of blowdown time
- End of refill time
- End of reflood time
- Time of broken loop steam generator equilibration to pressure setpoint
- Time of intact loop steam generator equilibration to pressure setpoint
- Time of full depressurization (3600 seconds)

The energy release from the metal-water reaction rate is considered as part of the WCAP-10325-P-A (Reference 11) methodology. Based on the way that the energy in the fuel is conservatively releases to the vessel fluid, the fuel cladding temperature does not increase to the point where the metal-water reaction is significant. This is in contrast to the 10 CFR 50.46 analyses, which are based to calculate high fuel rod cladding temperatures and, therefore, a non-significant metal-water reaction. For the LOCA mass and energy release calculation, the energy created by the metal-water reaction value is small and is not explicitly provided in the energy balance tables. The energy that is determined is part of the mass and energy releases and is therefore already included in the overall mass and energy releases for Salem Unit 2.

The sequence of events for each Salem Unit 2 LOCA transient is shown in Table A.6.3-1 through Table A.6.3-3 of Section A.6.3.

A.5.3 LONG-TERM Conclusions

The consideration of the various energy sources listed in Section A.5.2.6 for the long-term mass and energy release analysis provides assurance that all available sources of energy have been included in this analysis. By addressing all available sources of energy as well as the limiting break size and location and the specific modeling of each phase of the long-term LOCA transient, the review guidelines presented in Standard Review Plan Section 6.2.1.3 have been satisfied. The results of this analysis were provided for use in the containment response analysis documented in Section A.6.3.

Table A.5.2-1 Double-Ended Hot Leg Break Blowdown Mass and Energy Releases				
	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
.00000	.0	.0	.0	.0
.00108	45648.6	29077.7	45646.1	29074.8
.00202	45635.7	29068.7	45387.8	28904.5
.00303	45179.9	28778.5	44647.3	28427.0
.00400	44793.8	28533.8	43996.9	28007.1
.00521	44311.3	28230.0	43137.6	27452.9
.102	45186.7	29120.7	26841.6	17061.1
.201	34008.6	22157.6	23855.2	15078.6
.302	33881.8	22035.0	21266.7	13289.8
.402	33081.1	21491.0	19953.3	12280.0
.502	32664.8	21211.0	19130.1	11591.4
.602	32636.9	21193.3	18503.0	11053.8
.702	32553.7	21163.0	18106.0	10682.0
.802	32211.3	20985.3	17744.2	10357.5
.901	31797.2	20775.2	17497.6	10120.7
1.00	31380.7	20576.2	17268.7	9909.6
1.10	31008.3	20414.4	17098.8	9745.4
1.20	30753.4	20338.2	16946.8	9602.2
1.30	30454.2	20235.1	16829.7	9486.9
1.40	30084.8	20080.0	16744.5	9395.2
1.50	29672.0	19887.5	16687.2	9324.6
1.60	29266.0	19688.9	16669.9	9279.8
1.70	28913.5	19520.1	16677.5	9252.2
1.80	28579.1	19359.5	16704.3	9238.2
1.90	28185.6	19153.5	16743.2	9233.3
2.00	27716.7	18886.2	16787.9	9234.3
2.10	27220.5	18592.2	16835.0	9238.6
2.20	26812.4	18357.1	16885.0	9247.0
2.30	26471.9	18170.2	16935.9	9257.9

Table A.5.2-1 Double-Ended Hot Leg Break Blowdown Mass and Energy Releases (cont.)				
	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
Time Seconds	**lbm/sec**	**Thousand Btu/sec**	**lbm/sec**	**Thousand Btu/sec**
2.40	26101.3	17956.9	16983.7	9269.2
2.50	25662.9	17683.2	17024.2	9278.6
2.60	25197.5	17380.4	17057.6	9285.9
2.70	24794.1	17119.0	17085.7	9291.9
2.80	24475.5	16919.5	17108.6	9296.6
2.90	24159.3	16717.9	17124.9	9299.1
3.00	23798.8	16474.3	17132.5	9298.1
3.10	23429.8	16216.4	17131.0	9293.2
3.20	23112.4	15993.3	17122.8	9285.6
3.30	22838.4	15800.3	17108.5	9275.5
3.40	22570.1	15607.2	17087.8	9262.6
3.50	22300.3	15407.2	17059.3	9246.1
3.60	22060.0	15225.1	17025.4	9227.2
3.70	21832.4	15049.0	16985.6	9205.5
3.80	21613.9	14875.6	16941.7	9181.9
3.90	21416.1	14713.8	16892.9	9156.0
4.00	21247.9	14571.7	16840.4	9128.3
4.20	20930.4	14292.4	16723.1	9067.0
4.40	20676.3	14048.3	16587.3	8996.5
4.60	20470.3	13831.6	16428.5	8914.2
4.80	20325.7	13651.6	16230.5	8811.5
5.00	20216.3	13491.2	15982.6	8682.8
5.20	20163.4	13367.1	15712.3	8543.3
5.40	20141.5	13263.5	15424.6	8395.7
5.60	20192.9	13206.6	15117.1	8238.4
5.80	20307.6	13191.5	14796.4	8075.0
6.00	20439.1	13191.5	14464.8	7906.3
6.20	20628.2	13237.7	14132.1	7737.4
6.40	20962.9	13360.4	13874.2	7610.0

Table A.5.2-1 Double-Ended Hot Leg Break Blowdown Mass and Energy Releases (cont.)

Time Seconds	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
6.60	15931.3	11291.5	13556.8	7448.8
6.80	15082.0	10783.7	13221.8	7277.1
7.00	15163.3	10746.0	12903.0	7114.5
7.20	15321.9	10792.4	12578.8	6948.7
7.40	15476.9	10868.5	12241.9	6775.2
7.60	15668.6	10932.7	11895.6	6596.3
7.80	15916.2	11014.9	11560.7	6423.7
8.00	16176.5	11087.5	11251.5	6265.3
8.20	16127.3	10964.9	10950.0	6110.3
8.40	16516.7	11064.2	10648.6	5954.9
8.60	16961.9	11198.7	10348.2	5799.5
8.80	17441.4	11362.7	10060.4	5650.6
9.00	17965.6	11560.4	9785.5	5508.4
9.20	18848.7	11965.0	9522.9	5372.7
9.40	19425.2	12265.0	9266.9	5240.3
9.60	19572.8	12307.8	9020.9	5113.0
9.80	19467.4	12193.6	8778.9	4987.8
10.0	19019.6	11873.1	8537.4	4862.7
10.2	18495.3	11517.7	8301.7	4741.2
10.2	18491.3	11514.9	8300.0	4740.3
10.4	16027.8	10198.4	8067.4	4620.7
10.6	14986.1	9652.2	7846.7	4508.2
10.8	15029.9	9656.1	7631.8	4399.3
11.0	15206.4	9738.9	7432.4	4299.3
11.2	15324.6	9789.5	7247.2	4207.1
11.4	15465.2	9851.2	7071.3	4119.2
11.6	15676.0	9947.0	6904.3	4035.7
11.8	16129.0	10186.2	6739.9	3953.2
12.0	15944.6	10067.8	6577.7	3872.0

Table A.5.2-1 Double-Ended Hot Leg Break Blowdown Mass and Energy Releases (cont.)

Time Seconds	Break Path No. 1 Flow* lbm/sec	Break Path No. 1 Flow* Thousand Btu/sec	Break Path No. 2 Flow** lbm/sec	Break Path No. 2 Flow** Thousand Btu/sec
12.2	15690.7	9898.1	6420.1	3793.4
12.4	15319.9	9654.9	6259.0	3713.4
12.6	13894.0	8876.4	6100.6	3635.2
12.8	12780.7	8292.7	5942.5	3558.2
13.0	12574.8	8174.2	5792.1	3486.2
13.2	12512.0	8131.3	5644.4	3416.3
13.4	12459.1	8098.3	5504.4	3350.9
13.6	12384.2	8056.8	5374.0	3290.0
13.8	12274.2	7998.4	5247.8	3230.8
14.0	12120.9	7918.1	5126.5	3173.6
14.2	11892.7	7799.0	5009.6	3118.5
14.4	11554.6	7622.6	4895.4	3064.7
14.6	11130.6	7403.3	4784.3	3012.6
14.8	10718.7	7194.0	4674.5	2961.7
15.0	10387.6	7030.5	4565.6	2911.8
15.2	10127.1	6907.8	4459.9	2863.9
15.4	9896.9	6804.9	4356.5	2817.2
15.6	9670.8	6707.8	4256.6	2772.3
15.8	9429.7	6607.4	4157.9	2728.0
16.0	9164.6	6497.2	4062.1	2684.9
16.2	8854.0	6367.1	3964.4	2640.6
16.4	8489.8	6213.8	3862.1	2594.1
16.6	8088.8	6048.0	3750.3	2543.8
16.8	7669.0	5882.3	3625.2	2489.4
17.0	7240.2	5722.6	3483.9	2430.5
17.2	6805.2	5569.4	3328.4	2367.7
17.4	6354.8	5419.1	3159.7	2300.7
17.6	5880.6	5249.1	2987.6	2232.2
17.8	5412.4	4941.0	2818.5	2162.4

Table A.5.2-1 Double-Ended Hot Leg Break Blowdown Mass and Energy Releases (cont.)

Time Seconds	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
18.0	4994.5	4625.9	2656.3	2091.8
18.2	4656.6	4382.2	2513.2	2025.8
18.4	4385.5	4196.8	2383.8	1963.0
18.6	4144.4	4033.0	2269.6	1907.3
18.8	3928.6	3882.6	2167.1	1857.8
19.0	3736.2	3727.1	2071.4	1812.1
19.2	3549.7	3580.8	1982.0	1769.8
19.4	3354.2	3431.1	1894.5	1729.6
19.6	3138.4	3274.0	1809.6	1693.4
19.8	2900.6	3099.0	1723.7	1664.0
20.0	2651.4	2928.4	1642.4	1629.7
20.2	2409.8	2750.6	1564.5	1596.3
20.4	2206.3	2575.0	1479.9	1566.4
20.6	2031.8	2407.2	1395.3	1536.0
20.8	1852.5	2219.7	1307.1	1497.2
21.0	1772.7	2142.9	1231.4	1446.6
21.2	1690.6	2050.8	1163.9	1394.4
21.4	1622.8	1980.7	1107.2	1337.8
21.6	1542.6	1889.3	1064.7	1292.8
21.8	1457.4	1792.6	1025.2	1249.5
22.0	1363.5	1685.4	998.1	1219.1
22.2	1275.5	1584.7	974.2	1191.7
22.4	1204.5	1501.9	956.9	1171.3
22.6	1139.6	1421.0	942.4	1153.4
22.8	1061.4	1325.3	931.1	1139.6
23.0	984.6	1235.3	909.1	1114.5
23.2	922.6	1159.3	860.4	1058.0
23.4	858.7	1079.0	785.8	968.7
23.6	798.0	1005.0	731.6	904.0

Table A.5.2-1 Double-Ended Hot Leg Break Blowdown Mass and Energy Releases (cont.)

Time Seconds	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
23.8	735.3	926.9	665.8	823.4
24.0	684.5	863.3	561.4	695.4
24.2	644.0	812.4	472.8	587.2
24.4	609.8	768.9	369.6	460.2
24.6	593.8	747.5	295.5	369.2
24.8	566.8	709.3	253.7	317.8
25.0	561.3	700.6	239.9	301.1
25.0	561.2	700.6	239.9	301.1
25.2	302.2	386.1	108.8	137.0
25.4	.0	.0	.0	.0

* Mass and energy exiting from the vessel side of the break

** Mass and energy exiting from the steam generator side of the break

Table A.5.2-2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases				
	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
Time Seconds	lbm/sec	Thousand Btu/sec	Thousand Btu/sec	lbm/sec
.00000	.0	.0	.0	.0
.00112	89417.6	48314.5	40440.8	21798.8
.101	40209.7	21725.0	21055.7	11344.3
.201	40820.4	22164.7	22926.5	12359.9
.302	42600.2	23280.9	23105.7	12467.0
.401	42945.7	23648.5	22776.4	12302.5
.502	43306.9	24064.0	22111.7	11953.2
.602	43324.6	24316.9	21438.3	11595.9
.701	43803.1	24831.7	20884.7	11301.0
.802	43955.8	25161.9	20388.1	11035.1
.901	43720.4	25252.4	20013.8	10834.5
1.00	43059.6	25078.0	19763.0	10701.2
1.10	42228.5	24793.8	19610.7	10620.6
1.20	41366.7	24483.1	19523.6	10574.8
1.30	40492.5	24162.8	19482.7	10553.3
1.40	39587.4	23824.4	19479.2	10551.7
1.50	38630.9	23455.8	19502.4	10564.3
1.60	37659.4	23069.6	19534.9	10581.9
1.70	36703.3	22682.1	19567.6	10599.6
1.80	35785.8	22305.5	19589.5	10611.4
1.90	34911.3	21947.3	19589.1	10611.1
2.00	34042.0	21586.6	19567.6	10599.4
2.10	33173.8	21223.4	19536.8	10583.0
2.20	32325.6	20866.6	19486.5	10556.3
2.30	31398.8	20453.8	19255.5	10431.0
2.40	30521.3	20059.1	19044.7	10317.5
2.50	29609.6	19629.5	18891.9	10235.6
2.60	28702.2	19189.8	18743.7	10156.3
2.70	27800.3	18738.8	18581.6	10069.4

Table A.5.2-2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)				
	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
2.80	26577.2	18049.3	18405.9	9975.3
2.90	24736.0	16908.1	18220.2	9875.9
3.00	22105.4	15187.1	18028.9	9773.7
3.10	21004.9	14533.7	17833.9	9669.3
3.20	20857.6	14505.5	17636.4	9563.8
3.30	19926.2	13883.3	17455.1	9467.2
3.40	19243.4	13436.8	17278.3	9373.0
3.50	18840.2	13179.3	17095.2	9275.4
3.60	18262.6	12786.1	16911.6	9177.5
3.70	17709.3	12410.3	16738.7	9085.5
3.80	17238.9	12092.9	16585.9	9004.6
3.90	16808.4	11800.6	16438.8	8926.7
4.00	16399.5	11519.9	16288.1	8846.8
4.20	15623.4	10981.7	16001.0	8694.9
4.40	15000.0	10549.8	15753.5	8564.4
4.60	14479.0	10180.0	15503.2	8432.3
4.80	14043.7	9864.8	15279.6	8314.7
5.00	13713.3	9617.2	15061.4	8200.0
5.20	13419.6	9387.1	14848.6	8088.2
5.40	13202.7	9206.2	14653.8	7986.3
5.60	13040.8	9056.4	14453.5	7881.3
5.80	12927.0	8934.3	14265.8	7783.3
6.00	12898.7	8863.6	14056.6	7673.5
6.20	13121.6	8961.8	13615.5	7435.9
6.40	13024.1	8810.1	13498.1	7378.2
6.60	12621.5	8645.4	13280.1	7263.2
6.80	11396.2	8219.8	13130.2	7185.7
7.00	10234.4	7710.2	14640.2	8019.8
7.20	10007.2	7554.9	14435.9	7910.9

Table A.5.2-2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)

Time Seconds	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
7.40	10219.3	7601.6	14358.7	7875.0
7.60	10515.4	7694.1	14191.7	7788.2
7.80	10856.3	7827.5	14004.0	7690.7
8.00	11193.0	7963.8	13788.6	7577.5
8.20	11478.5	8071.8	13562.5	7457.4
8.40	11678.5	8133.7	13366.3	7353.1
8.60	11765.3	8134.6	13179.1	7252.4
8.80	11442.7	7875.1	13051.8	7183.9
9.00	10681.2	7361.2	13035.2	7175.2
9.20	10210.9	7092.4	12985.3	7145.2
9.40	9878.1	6928.8	12853.6	7068.8
9.60	9544.0	6786.1	12748.9	7008.7
9.80	9298.8	6713.1	12640.5	6948.3
10.0	9003.8	6578.8	12516.8	6879.8
10.2	8799.8	6482.0	12402.1	6816.2
10.4	8632.6	6390.4	12260.1	6737.4
10.6	8470.9	6292.4	12136.2	6668.6
10.8	8322.3	6197.4	12013.4	6600.4
11.0	8173.8	6100.2	11888.3	6530.7
11.2	8041.9	6015.6	11771.0	6465.2
11.4	7911.2	5931.9	11649.4	6397.2
11.6	7790.5	5855.7	11532.4	6332.0
11.8	7675.2	5782.9	11413.2	6265.5
12.0	7563.0	5712.2	11294.6	6199.5
12.2	7453.6	5643.6	11176.2	6133.7
12.4	7344.5	5576.8	11059.4	6068.9
12.6	7233.3	5510.7	10942.2	6003.9
12.8	7121.8	5447.2	10827.0	5940.2
13.0	7006.2	5383.7	10711.0	5876.2

Table A.5.2-2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)				
	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
13.2	6890.1	5323.1	10599.1	5814.6
13.4	6774.4	5266.0	10484.9	5751.7
13.6	6657.2	5208.9	10371.0	5689.0
13.8	6541.0	5152.7	10257.1	5626.5
14.0	6429.4	5097.0	10144.3	5564.7
14.2	6320.7	5042.2	10031.4	5502.8
14.4	6214.6	4988.6	9919.6	5441.7
14.6	6111.0	4936.7	9810.3	5381.9
14.8	6008.2	4885.7	9700.8	5322.2
15.0	5907.1	4835.9	9592.8	5263.3
15.2	5807.2	4787.2	9484.8	5204.6
15.4	5709.6	4741.0	9378.5	5146.8
15.6	5612.2	4693.9	9271.2	5088.6
15.8	5509.0	4642.7	9149.7	5022.9
16.0	5398.0	4585.2	9026.7	4957.0
16.2	5285.4	4522.7	8910.7	4895.5
16.4	5175.4	4456.3	8787.1	4829.6
16.6	5072.5	4390.2	8667.4	4765.9
16.8	4973.7	4324.5	8545.4	4701.1
17.0	4878.7	4260.0	8426.5	4638.3
17.2	4789.1	4199.1	8313.9	4579.2
17.4	4706.3	4144.4	8201.2	4520.0
17.6	4627.0	4094.5	7985.3	4402.2
17.8	4557.0	4056.6	7936.0	4381.1
18.0	4485.2	4023.2	7670.5	4228.5
18.2	4412.7	3997.0	7589.8	4155.8
18.4	4337.9	3977.4	7626.1	4132.1
18.6	4253.1	3959.0	7303.8	3901.8
18.8	4163.5	3946.9	7623.5	4008.7

Table A.5.2-2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)

Time Seconds	Break Path No. 1 Flow* lbm/sec	Break Path No. 1 Flow* Thousand Btu/sec	Break Path No. 2 Flow** lbm/sec	Break Path No. 2 Flow** Thousand Btu/sec
19.0	4059.9	3934.5	7255.9	3751.4
19.2	3949.6	3927.9	7670.2	3906.2
19.4	3819.4	3915.8	6837.8	3426.4
19.6	3624.4	3850.7	7077.8	3480.6
19.8	3361.4	3736.4	5997.2	2895.3
20.0	3113.0	3602.3	5849.2	2746.5
20.2	2891.5	3460.2	5443.5	2508.1
20.4	2694.1	3283.2	5133.7	2316.0
20.6	2504.9	3076.5	4854.1	2147.3
20.8	2348.7	2897.9	4620.7	2006.9
21.0	2210.7	2736.3	4432.4	1891.3
21.2	2090.8	2594.4	4158.0	1744.3
21.4	1976.8	2458.1	3857.4	1585.8
21.6	1864.0	2322.1	3655.0	1466.3
21.8	1758.0	2194.1	3622.6	1420.7
22.0	1646.1	2057.7	4290.9	1650.7
22.2	1511.1	1892.3	6737.5	2572.6
22.4	1388.8	1742.3	6009.8	2307.7
22.6	1299.4	1632.8	3950.5	1516.9
22.8	1227.8	1545.0	3733.1	1439.1
23.0	1163.0	1465.0	2956.6	1138.1
23.2	1084.5	1367.1	2050.3	787.7
23.4	1008.9	1273.4	1507.6	542.1
23.6	925.8	1170.2	3715.6	1170.3
23.8	846.4	1070.8	7246.2	2215.1
24.0	773.3	979.2	4909.0	1501.1
24.2	701.5	889.0	4290.9	1314.6
24.4	628.0	796.3	3978.9	1220.3
24.6	561.1	712.1	3765.7	1155.4

Table A.5.2-2 Double-Ended Pump Suction Break Blowdown Mass and Energy Releases (cont.)

Time Seconds	Break Path No. 1 Flow*		Break Path No. 2 Flow**	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
24.8	498.1	632.4	3171.1	971.8
25.0	444.4	564.7	2699.2	822.6
25.2	409.1	520.2	2403.5	724.1
25.4	364.3	463.4	2173.9	645.4
25.6	330.0	420.0	1936.9	567.0
25.8	300.5	382.5	1643.4	474.8
26.0	268.2	341.6	1277.9	365.0
26.2	234.0	298.2	850.5	240.9
26.4	198.7	253.4	403.0	113.7
26.6	161.9	206.6	.0	.0
26.8	122.7	156.7	.0	.0
27.0	79.7	102.0	.0	.0
27.2	32.8	42.1	.0	.0
27.4	.0	.0	.0	.0

* Mass and energy exiting from the steam generator side of the break
** Mass and energy exiting from the pump side of the break

Table A.5.2-3 Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)				
	Break Path No. 1 Flow		Break Path No. 2 Flow	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
27.4	.0	.0	.0	.0
28.0	.0	.0	.0	.0
28.1	.0	.0	.0	.0
28.2	.0	.0	.0	.0
28.3	.0	.0	.0	.0
28.4	.0	.0	.0	.0
28.4	.0	.0	.0	.0
28.5	44.2	52.1	.0	.0
28.6	16.8	19.8	.0	.0
28.7	12.5	14.7	.0	.0
28.8	14.3	16.8	.0	.0
28.9	24.5	28.8	.0	.0
29.0	29.6	34.8	.0	.0
29.1	33.8	39.9	.0	.0
29.2	37.6	44.3	.0	.0
29.4	42.0	49.5	.0	.0
29.5	46.3	54.5	.0	.0
29.6	49.3	58.1	.0	.0
29.7	52.3	61.6	.0	.0
29.8	55.2	65.0	.0	.0
29.9	57.9	68.3	.0	.0
30.0	60.6	71.4	.0	.0
30.1	63.2	74.5	.0	.0
30.2	65.7	77.4	.0	.0
30.3	68.2	80.3	.0	.0
30.4	70.5	83.1	.0	.0
30.5	72.9	85.9	.0	.0
31.5	93.4	110.1	.0	.0
32.5	110.5	130.3	.0	.0

Table A.5.2-3 (cont.) Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)				
	Break Path No. 1 Flow		Break Path No. 2 Flow	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
33.5	125.5	148.0	.0	.0
34.5	138.9	163.8	.0	.0
35.0	145.8	171.9	.0	.0
35.5	157.2	185.4	461.0	64.3
36.6	425.0	503.6	4325.3	626.0
37.6	436.5	517.5	4427.3	655.2
38.6	431.2	511.1	4376.9	650.0
39.6	425.1	503.9	4319.5	643.3
39.8	423.9	502.4	4307.9	641.9
40.6	419.1	496.7	4261.7	636.4
41.6	413.2	489.6	4204.6	629.5
42.6	407.5	482.8	4148.4	622.6
43.6	401.9	476.1	4093.4	616.0
44.6	396.5	469.7	4039.7	609.4
45.3	392.8	465.3	4003.0	604.9
45.6	391.3	463.5	3987.4	603.0
46.6	386.3	457.4	3936.5	596.8
47.6	381.4	451.6	3886.9	590.8
48.6	376.7	446.0	3838.6	584.9
49.6	372.1	440.6	3791.6	579.1
50.6	367.7	435.3	3745.8	573.5
51.6	363.4	430.2	3701.2	568.1
51.7	363.0	429.7	3696.8	567.5
52.6	359.3	425.3	3657.7	562.8
53.6	355.2	420.5	3615.3	557.6
54.6	351.3	415.8	3574.0	552.5
55.6	347.6	411.3	3533.6	547.6
56.6	286.3	338.4	2824.9	469.3
57.6	283.6	335.2	2793.5	465.3

Table A.5.2-3 (cont.) Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

Time Seconds	Break Path No. 1 Flow		Break Path No. 2 Flow	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
58.7	392.8	465.1	310.5	213.6
58.8	404.1	478.6	315.3	220.5
59.7	420.0	497.7	322.1	230.3
60.7	413.0	489.4	318.9	226.1
61.7	405.9	480.9	315.6	221.7
62.7	398.9	472.5	312.4	217.5
63.7	392.0	464.4	309.3	213.3
64.7	385.3	456.3	306.3	209.3
65.7	378.5	448.2	303.2	205.2
66.7	372.3	440.8	300.4	201.5
67.7	366.3	433.7	297.7	197.9
68.7	360.5	426.7	295.1	194.4
69.7	354.8	420.0	292.5	191.0
70.7	349.2	413.3	290.0	187.7
71.7	343.8	406.8	287.6	184.5
72.5	339.6	401.8	285.7	182.0
72.7	338.5	400.5	285.2	181.4
73.7	333.3	394.4	282.9	178.4
74.7	328.3	388.3	280.7	175.4
75.7	323.3	382.4	278.5	172.5
76.7	318.5	376.7	276.3	169.7
77.7	313.8	371.1	274.3	167.0
78.7	309.2	365.6	272.2	164.4
79.7	304.7	360.3	270.3	161.8
80.7	300.4	355.1	268.4	159.3
81.7	296.1	350.1	266.5	156.9
82.7	291.9	345.1	264.7	154.5
83.7	287.9	340.3	262.9	152.2
84.7	284.0	335.7	261.2	150.0

Table A.5.2-3 (cont.) Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

Time Seconds	Break Path No. 1 Flow lbm/sec	Break Path No. 1 Flow Thousand Btu/sec	Break Path No. 2 Flow lbm/sec	Break Path No. 2 Flow Thousand Btu/sec
85.7	280.2	331.1	259.5	147.9
86.7	276.5	326.7	257.9	145.8
87.7	272.9	322.4	256.4	143.8
88.7	269.3	318.3	254.8	141.8
89.4	266.9	315.4	253.8	140.5
90.7	262.6	310.3	251.9	138.1
92.7	256.3	302.8	249.2	134.6
94.7	250.3	295.7	246.7	131.3
96.7	244.7	289.0	244.3	128.3
98.7	239.4	282.8	242.0	125.4
100.7	234.5	276.9	240.0	122.8
102.7	229.9	271.4	238.0	120.3
104.7	225.5	266.3	236.2	118.0
106.7	221.5	261.5	234.5	115.8
108.7	217.7	257.0	232.9	113.8
109.8	215.7	254.7	232.1	112.8
110.7	214.2	252.9	231.5	111.9
112.7	210.9	249.0	230.1	110.2
114.7	207.9	245.4	228.9	108.6
116.7	205.1	242.1	227.7	107.2
118.7	202.5	239.0	226.6	105.8
120.7	200.1	236.1	225.6	104.6
122.7	197.9	233.5	224.7	103.4
124.7	195.8	231.1	223.9	102.3
126.7	194.0	228.9	223.1	101.4
128.7	192.3	226.9	222.4	100.5
130.7	190.7	225.1	221.8	99.7
132.7	189.3	223.4	221.2	98.9
133.5	188.8	222.8	221.0	98.7

Table A.5.2-3 (cont.) Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Minimum Safeguards)

Time Seconds	Break Path No. 1 Flow lbm/sec	Break Path No. 1 Flow Thousand Btu/sec	Break Path No. 2 Flow lbm/sec	Break Path No. 2 Flow Thousand Btu/sec
134.7	188.0	221.9	220.7	98.3
136.7	186.9	220.5	220.2	97.7
138.7	185.8	219.2	219.8	97.1
140.7	184.9	218.1	219.4	96.6
142.7	184.0	217.1	219.0	96.2
144.7	183.3	216.2	218.7	95.8
146.7	182.6	215.5	218.4	95.4
148.7	182.0	214.8	218.1	95.1
150.7	181.5	214.2	217.9	94.8
152.7	181.0	213.6	217.7	94.5
154.7	180.6	213.1	217.5	94.3
156.7	180.3	212.7	217.4	94.1
158.7	180.0	212.4	217.2	93.9
159.5	179.9	212.3	217.2	93.9
160.7	179.8	212.1	217.1	93.8
162.7	179.6	211.9	217.0	93.7
164.7	179.4	211.7	217.0	93.6
166.7	179.3	211.6	216.9	93.5
168.7	179.3	211.5	216.8	93.4
170.7	179.2	211.5	216.8	93.4
172.7	179.2	211.5	216.8	93.4
174.7	179.3	211.5	216.8	93.3
176.7	179.3	211.6	216.8	93.4
178.7	180.0	212.4	217.3	93.7
180.7	180.9	213.4	218.8	94.2
182.7	182.0	214.7	221.3	95.0
184.7	183.3	216.3	224.5	95.9
186.7	184.6	217.9	228.3	96.9
187.0	184.8	218.1	228.9	97.0

Table A.5.2-4 Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Maximum Safeguards)				
	Break Path No. 1 Flow		Break Path No. 2 Flow	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
27.4	.0	.0	.0	.0
28.0	.0	.0	.0	.0
28.1	.0	.0	.0	.0
28.2	.0	.0	.0	.0
28.3	.0	.0	.0	.0
28.4	.0	.0	.0	.0
28.5	44.2	52.1	.0	.0
28.6	16.8	19.8	.0	.0
28.7	12.5	14.7	.0	.0
28.8	14.3	16.8	.0	.0
28.9	24.5	28.8	.0	.0
29.0	29.6	34.8	.0	.0
29.1	33.8	39.9	.0	.0
29.2	37.6	44.3	.0	.0
29.4	42.0	49.5	.0	.0
29.5	46.3	54.5	.0	.0
29.6	49.3	58.1	.0	.0
29.7	52.3	61.6	.0	.0
29.8	55.2	65.0	.0	.0
29.9	57.9	68.3	.0	.0
30.0	60.6	71.4	.0	.0
30.1	63.2	74.5	.0	.0
30.2	65.7	77.4	.0	.0
30.3	68.2	80.3	.0	.0
30.4	70.5	83.1	.0	.0
30.5	72.9	85.9	.0	.0
31.5	93.4	110.1	.0	.0
32.5	110.5	130.3	.0	.0
33.5	125.5	148.0	.0	.0

Table A.5.2-4 (cont.)	Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Maximum Safeguards)			
	Break Path No. 1 Flow		Break Path No. 2 Flow	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
34.5	138.9	163.8	.0	.0
35.0	145.8	171.9	.0	.0
35.5	157.2	185.4	461.0	64.3
36.6	468.0	555.1	4769.9	665.3
37.6	478.5	567.7	4858.2	690.6
38.6	473.1	561.3	4809.4	685.2
39.6	467.1	554.1	4754.6	678.6
40.6	461.1	546.9	4699.2	671.8
41.6	455.2	539.9	4644.3	665.0
42.6	449.5	533.0	4590.2	658.3
43.6	443.9	526.4	4537.2	651.8
44.6	438.5	519.9	4485.4	645.3
44.7	438.0	519.3	4480.3	644.7
45.6	433.3	513.7	4434.8	639.1
46.6	428.3	507.6	4385.6	633.0
47.6	423.4	501.8	4337.6	627.0
48.6	418.7	496.1	4290.9	621.2
49.6	414.1	490.7	4245.3	615.6
50.6	409.6	485.4	4201.0	610.1
51.6	405.3	480.2	4157.8	604.7
52.6	401.2	475.3	4115.6	599.5
53.6	397.1	470.4	4074.5	594.4
54.6	393.2	465.8	4034.5	589.5
55.6	389.4	461.2	3995.4	584.6
56.6	329.0	389.2	3328.1	512.9
57.0	327.3	387.2	3321.6	509.6
57.6	325.6	385.2	3303.4	507.3
58.6	322.9	381.9	3273.6	503.5
59.7	185.7	219.1	921.8	227.6

Table A.5.2-4 (cont.) Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Maximum Safeguards)

Time Seconds	Break Path No. 1 Flow		Break Path No. 2 Flow	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
60.7	185.2	218.5	922.8	227.3
61.7	184.7	218.0	923.8	227.0
62.7	184.2	217.4	924.9	226.7
63.7	183.7	216.8	925.9	226.5
64.7	183.2	216.2	926.9	226.2
65.7	182.8	215.7	927.9	225.9
66.7	182.3	215.1	928.9	225.6
67.7	181.8	214.5	929.9	225.4
68.7	181.3	213.9	930.9	225.1
69.7	180.8	213.4	931.8	224.8
70.7	180.4	212.8	932.8	224.5
71.7	179.9	212.2	933.8	224.3
72.7	179.4	211.7	934.7	224.0
73.7	178.9	211.1	935.7	223.7
74.7	178.5	210.6	936.6	223.5
75.7	178.0	210.0	937.6	223.2
76.0	177.8	209.8	937.9	223.1
76.7	177.5	209.4	938.6	222.9
77.7	177.0	208.9	939.5	222.7
78.7	176.6	208.3	940.4	222.4
79.7	176.1	207.8	941.4	222.1
80.7	175.6	207.2	942.3	221.9
81.7	175.1	206.6	943.3	221.6
82.7	174.7	206.1	944.2	221.3
83.7	174.2	205.5	945.2	221.1
84.7	173.7	204.9	946.1	220.8
85.7	173.2	204.4	947.1	220.5
86.7	172.7	203.8	948.1	220.3
87.7	172.3	203.2	949.0	220.0

Table A.5.2-4 (cont.) Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Maximum Safeguards)

Time Seconds	Break Path No. 1 Flow lbm/sec	Break Path No. 1 Flow Thousand Btu/sec	Break Path No. 2 Flow lbm/sec	Break Path No. 2 Flow Thousand Btu/sec
88.7	171.8	202.7	950.0	219.7
90.7	170.8	201.5	951.9	219.2
92.7	169.9	200.4	953.8	218.7
94.7	168.9	199.2	955.7	218.2
96.7	167.9	198.1	957.7	217.6
97.1	167.7	197.8	958.1	217.5
98.7	166.9	196.9	959.6	217.1
100.7	165.9	195.7	961.6	216.6
102.7	164.9	194.5	963.6	216.1
104.7	163.9	193.3	965.5	215.6
106.7	162.9	192.1	967.5	215.1
108.7	161.8	190.9	969.5	214.6
110.7	160.8	189.7	971.5	214.1
112.7	159.8	188.4	973.5	213.5
114.7	158.7	187.2	975.5	213.0
116.7	157.7	186.0	977.5	212.5
118.7	156.6	184.7	979.6	212.0
120.0	155.9	183.9	980.9	211.7
120.7	155.5	183.4	981.6	211.5
122.7	154.4	182.1	983.6	211.0
124.7	153.3	180.9	985.6	210.5
126.7	152.3	179.6	987.6	210.0
128.7	151.1	178.3	989.6	209.5
130.7	150.0	177.0	991.6	208.9
132.7	148.9	175.6	993.7	208.4
134.7	147.8	174.3	995.7	207.9
136.7	146.7	173.0	997.7	207.4
138.7	145.6	171.7	999.7	206.9
140.7	144.4	170.3	1001.8	206.4

Table A.5.2-4 (cont.) Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Maximum Safeguards)

Time Seconds	Break Path No. 1 Flow		Break Path No. 2 Flow	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
142.7	143.3	169.0	1003.8	205.9
144.7	142.2	167.7	1005.9	205.5
145.2	142.1	167.5	1006.1	205.5
146.7	141.7	167.1	1006.8	205.2
148.7	141.2	166.5	1007.8	204.9
150.7	140.7	166.0	1008.7	204.5
152.7	140.3	165.4	1009.6	204.2
154.7	139.8	164.8	1010.5	203.9
156.7	139.3	164.3	1011.4	203.5
158.7	138.8	163.7	1012.3	203.2
160.7	138.4	163.2	1013.2	202.8
162.7	137.9	162.6	1014.1	202.5
164.7	137.4	162.0	1015.0	202.1
166.7	137.0	161.5	1015.9	201.8
168.7	136.5	160.9	1016.8	201.4
170.7	136.0	160.4	1017.7	201.1
172.7	135.6	159.9	1018.5	200.7
172.8	135.5	159.8	1018.6	200.7
174.7	135.1	159.3	1019.4	200.4
176.7	134.7	158.8	1020.3	200.0
178.7	134.2	158.2	1021.2	199.6
180.7	133.7	157.7	1022.0	199.2
182.7	133.3	157.2	1022.9	198.9
184.7	132.9	156.6	1023.7	198.5
186.7	132.4	156.1	1024.6	198.1
188.7	132.0	155.6	1025.4	197.7
190.7	131.5	155.1	1026.3	197.4
192.7	131.1	154.6	1027.1	197.0
194.7	130.7	154.1	1028.0	196.6

Table A.5.2-4 (cont.)	Double-Ended Pump Suction Break Reflood Mass and Energy Releases (Maximum Safeguards)			
	Break Path No. 1 Flow		Break Path No. 2 Flow	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
196.7	130.2	153.5	1028.8	196.2
198.7	129.8	153.0	1029.6	195.8
200.7	129.4	152.5	1030.4	195.4
202.7	128.9	152.0	1031.3	195.0
203.2	128.8	151.9	1031.5	194.9

Table A.5.2-5 Double-Ended Pump Suction Break Principal Parameters During Reflood (Minimum Safeguards)

Time Seconds	Flooding Temp Degree F	Flooding Rate in/sec	Carryover Fraction	Core Height ft	Downcomer Height ft	Flow Fraction	Injection Total (Pounds Mass per Second)	Injection Accumulator (Pounds Mass per Second)	Injection Spill (Pounds Mass per Second)	Enthalpy Btu/lbm
27.4	178.5	.000	.000	.00	.00	.250	.0	.0	.0	.00
28.2	176.8	22.274	.000	.66	1.14	.000	6479.1	6479.1	.0	89.48
28.4	175.9	23.734	.000	1.04	1.16	.000	6443.2	6443.2	.0	89.48
28.7	175.5	2.543	.104	1.31	1.71	.186	6362.3	6362.3	.0	89.48
28.9	175.6	2.749	.140	1.35	2.14	.246	6328.1	6328.1	.0	89.48
29.9	175.8	2.339	.299	1.50	4.11	.324	6168.3	6168.3	.0	89.48
31.5	176.3	2.268	.460	1.69	7.49	.350	5927.7	5927.7	.0	89.48
35.0	177.5	2.524	.615	2.00	14.59	.368	5470.2	5470.2	.0	89.48
36.6	178.0	4.321	.662	2.16	16.10	.586	5386.9	4845.1	.0	87.32
38.6	178.8	4.152	.694	2.38	16.12	.585	5143.0	4604.7	.0	87.23
39.8	179.3	4.034	.705	2.50	16.12	.583	5045.4	4505.3	.0	87.18
45.3	181.9	3.681	.727	3.00	16.12	.574	4659.4	4111.7	.0	86.96
51.7	185.3	3.424	.736	3.51	16.12	.563	4296.3	3741.6	.0	86.71
57.6	188.7	2.908	.737	3.93	16.12	.517	3273.1	2701.2	.0	85.73
58.7	189.4	3.599	.742	4.00	16.08	.590	550.4	.0	.0	68.00
58.8	189.4	3.654	.742	4.00	16.06	.592	546.3	.0	.0	68.00
59.7	190.0	3.718	.743	4.08	15.92	.595	539.8	.0	.0	68.00
65.7	194.5	3.383	.743	4.53	15.06	.589	549.5	.0	.0	68.00
72.5	200.1	3.074	.743	5.00	14.33	.581	558.0	.0	.0	68.00

Table A.5.2-5 Double-Ended Pump Suction Break Principal Parameters During Reflood (Minimum Safeguards) (cont.)

Time Seconds	Flooding Temp Degree F	Flooding Rate in/sec	Carryover Fraction	Core Height ft	Downcomer Height ft	Flow Fraction	Injection Total (Pounds Mass per Second)	Injection Accumulator (Pounds Mass per Second)	Injection Spill (Pounds Mass per Second)	Enthalpy Btu/lbm
80.7	207.5	2.766	.743	5.51	13.71	.572	565.9	.0	.0	68.00
89.4	215.5	2.506	.743	6.00	13.30	.561	571.6	.0	.0	68.00
100.7	225.5	2.253	.743	6.58	13.08	.548	576.6	.0	.0	68.00
109.8	232.4	2.107	.743	7.00	13.08	.539	579.2	.0	.0	68.00
122.7	240.8	1.966	.745	7.56	13.28	.529	581.5	.0	.0	68.00
133.5	246.7	1.892	.747	8.00	13.55	.523	582.7	.0	.0	68.00
146.7	253.1	1.837	.750	8.52	13.98	.519	583.5	.0	.0	68.00
159.5	258.5	1.808	.753	9.00	14.44	.517	583.8	.0	.0	68.00
174.7	264.2	1.791	.758	9.56	15.03	.517	583.9	.0	.0	68.00
176.7	264.9	1.790	.759	9.63	15.11	.517	583.9	.0	.0	68.00
187.0	268.2	1.812	.762	10.00	15.48	.524	583.3	.0	.0	68.00

Table A.5.2-6 Double-Ended Pump Suction Break Principal Parameters During Reflood (Maximum Safeguards)										
	Flooding							Injection		
Time Seconds	Temp Degree F	Rate in/sec	Carryover Fraction	Core Height ft	Downcomer Height ft	Flow Fraction	Total	Accumulator	Spill	Enthalpy Btu/lbm
							(Pounds Mass per Second)			
27.4	178.5	.000	.000	.00	.00	.250	.0	.0	.0	.00
28.2	176.8	22.274	.000	.66	1.14	.000	6479.1	6479.1	.0	89.48
28.4	175.9	23.734	.000	1.04	1.16	.000	6443.2	6443.2	.0	89.48
28.7	175.5	2.543	.104	1.31	1.71	.186	6362.3	6362.3	.0	89.48
28.9	175.6	2.749	.140	1.35	2.14	.246	6328.1	6328.1	.0	89.48
29.9	175.8	2.339	.299	1.50	4.11	.324	6168.3	6168.3	.0	89.48
31.5	176.3	2.268	.460	1.69	7.49	.350	5927.7	5927.7	.0	89.48
35.0	177.5	2.524	.615	2.00	14.59	.368	5470.2	5470.2	.0	89.48
36.6	178.0	4.618	.664	2.16	16.11	.601	5875.2	4732.1	.0	85.30
38.6	178.8	4.419	.696	2.40	16.12	.601	5637.6	4498.9	.0	85.14
39.6	179.2	4.315	.705	2.51	16.12	.600	5557.7	4416.4	.0	85.07
44.7	181.5	3.967	.728	3.00	16.12	.593	5203.3	4049.5	.0	84.72
50.6	184.6	3.715	.737	3.50	16.12	.585	4868.3	3702.7	.0	84.34
57.0	188.3	3.169	.740	4.01	16.12	.547	3863.6	2665.6	.0	82.82
59.7	189.7	2.331	.732	4.18	16.12	.426	1241.0	.0	.0	68.00
66.7	193.7	2.286	.733	4.54	16.12	.426	1241.3	.0	.0	68.00
76.0	199.9	2.228	.735	5.00	16.12	.425	1241.6	.0	.0	68.00
86.7	207.8	2.163	.737	5.52	16.12	.424	1241.9	.0	.0	68.00
97.1	215.9	2.099	.739	6.00	16.12	.423	1242.3	.0	.0	68.00

Table A.5.2-6 Double-Ended Pump Suction Break Principal Parameters During Reflood (Maximum Safeguards) (cont.)

Time Seconds	Flooding Temp Degree F	Flooding Rate in/sec	Carryover Fraction	Core Height ft	Downcomer Height ft	Flow Fraction	Injection Total (Pounds Mass per Second)	Injection Accumulator (Pounds Mass per Second)	Injection Spill (Pounds Mass per Second)	Enthalpy Btu/lbm
108.7	224.9	2.026	.741	6.52	16.12	.422	1242.7	.0	.0	68.00
120.0	232.8	1.955	.744	7.00	16.12	.420	1243.1	.0	.0	68.00
132.7	240.5	1.875	.746	7.52	16.12	.417	1243.6	.0	.0	68.00
145.2	247.0	1.797	.748	8.00	16.12	.414	1244.1	.0	.0	68.00
158.7	253.2	1.739	.750	8.50	16.12	.417	1244.1	.0	.0	68.00
172.8	258.8	1.679	.753	9.00	16.12	.420	1244.0	.0	.0	68.00
188.7	264.2	1.613	.756	9.54	16.12	.424	1244.0	.0	.0	68.00
203.2	268.6	1.554	.758	10.00	16.12	.428	1243.9	.0	.0	68.00

Table A.5.2-7 Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Minimum Safeguards) without Recirculation Sprays

Time Seconds	Break Path No. 1 Flow lbm/sec	Break Path No. 1 Flow Thousand Btu/sec	Break Path No. 2 Flow lbm/sec	Break Path No. 2 Flow Thousand Btu/sec
187.0	220.6	275.4	372.7	133.1
192.0	219.3	273.8	374.0	133.2
197.0	219.1	273.6	374.2	133.0
202.0	219.0	273.4	374.3	132.8
207.0	218.0	272.2	375.3	132.8
212.0	218.0	272.2	375.3	132.6
217.0	218.0	272.2	375.3	132.4
222.0	217.0	270.9	376.3	132.4
227.0	216.9	270.8	376.4	132.2
232.0	215.9	269.5	377.4	132.3
237.0	215.8	269.4	377.5	132.1
242.0	215.7	269.3	377.6	131.9
247.0	214.6	267.9	378.7	132.0
252.0	214.4	267.7	378.9	131.8
257.0	214.2	267.5	379.1	131.6
262.0	213.1	266.0	380.2	131.7
267.0	212.9	265.8	380.4	131.5
272.0	212.6	265.4	380.7	131.4
277.0	212.3	265.1	381.0	131.2
282.0	212.0	264.7	381.3	131.0
287.0	210.8	263.1	382.5	131.2
292.0	210.4	262.7	382.9	131.0
297.0	210.0	262.2	383.3	130.9
302.0	209.6	261.7	383.7	130.8
307.0	209.1	261.1	384.2	130.7
312.0	208.7	260.5	384.7	130.6
317.0	208.1	259.8	385.2	130.5
322.0	207.5	259.1	385.8	130.4
327.0	206.9	258.3	386.4	130.3

Table A.5.2-7 (cont.) Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Minimum Safeguards) without Recirculation Sprays

Time Seconds	Break Path No. 1 Flow		Break Path No. 2 Flow	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
332.0	207.1	258.6	386.2	130.0
337.0	206.4	257.7	386.9	130.0
342.0	205.7	256.7	387.7	130.0
347.0	204.8	255.7	388.5	129.9
352.0	204.8	255.7	388.5	129.7
357.0	203.9	254.5	389.4	129.7
362.0	203.7	254.3	389.6	129.5
367.0	203.4	254.0	389.9	129.4
372.0	202.3	252.6	391.0	129.4
377.0	201.9	252.0	391.4	129.3
382.0	201.3	251.4	392.0	129.2
387.0	200.7	250.6	392.6	129.1
392.0	200.7	250.5	392.6	128.9
397.0	199.8	249.4	393.5	128.9
402.0	199.6	249.1	393.8	128.7
407.0	198.6	247.9	394.8	128.8
412.0	198.1	247.3	395.2	128.7
417.0	198.0	247.2	395.3	128.4
422.0	197.1	246.1	396.2	128.4
427.0	196.6	245.4	396.7	128.3
432.0	196.4	245.2	396.9	128.2
437.0	195.8	244.4	397.5	128.1
442.0	195.3	243.8	398.0	128.0
447.0	194.3	242.6	399.0	128.0
452.0	193.7	241.8	399.6	127.9
457.0	193.3	241.3	400.0	127.8
462.0	192.6	240.4	400.7	127.7
467.0	192.4	240.2	400.9	127.6
472.0	191.5	239.1	401.8	127.5
477.0	191.1	238.5	402.2	127.4

Table A.5.2-7 (cont.)	Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Minimum Safeguards) without Recirculation Sprays			
	Break Path No. 1 Flow		Break Path No. 2 Flow	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
482.0	190.3	237.6	403.0	127.4
487.0	89.7	112.0	503.6	153.7
689.2	89.7	112.0	503.6	153.7
689.3	92.3	114.4	501.0	148.3
692.0	92.2	114.3	501.1	148.2
1564.5	92.2	114.3	501.1	148.2
1564.6	76.1	87.6	517.2	46.2
1748.3	74.1	85.3	519.2	46.6
1748.4	74.1	85.3	353.2	81.0
3000.0	65.4	75.2	361.9	82.6
3000.1	65.4	75.2	366.1	70.8
3600.0	61.8	71.1	369.8	71.5
3600.1	50.9	58.5	380.7	55.6
4441.6	47.3	54.4	384.3	56.1
4441.7	47.1	54.2	118.1	16.9
7000.0	41.0	47.2	124.2	17.8
7000.1	40.8	46.9	124.4	17.2
10000.0	36.7	42.2	128.5	17.7
10000.1	36.5	42.0	128.7	17.1
50000.0	23.9	27.5	141.3	18.8
50000.1	23.4	26.9	141.9	15.6
100000.0	19.1	22.0	146.1	16.1
100000.1	18.9	21.7	146.3	14.3
500000.0	10.9	12.6	154.3	15.1
500000.1	10.8	12.4	154.4	13.3
1000000.0	8.0	9.2	157.2	13.5
1000000.1	7.9	9.1	157.3	12.3
5000000.0	3.8	4.3	161.5	12.6
5000000.1	3.8	4.3	161.5	12.1
10000000.0	2.5	2.9	162.7	12.2

Table A.5.2-8 Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Maximum Safeguards) without Recirculation Sprays

Time Seconds	Break Path No. 1 Flow lbm/sec	Break Path No. 1 Flow Thousand Btu/sec	Break Path No. 2 Flow lbm/sec	Break Path No. 2 Flow Thousand Btu/sec
203.2	142.4	179.2	1106.3	195.1
208.2	142.0	178.7	1106.7	195.0
213.2	142.9	179.8	1105.8	194.5
218.2	142.5	179.3	1106.2	194.4
223.2	142.0	178.8	1106.6	194.3
228.2	142.9	179.8	1105.8	193.9
233.2	142.5	179.3	1106.2	193.7
238.2	142.1	178.8	1106.6	193.6
243.2	141.7	178.3	1107.0	193.5
248.2	142.5	179.3	1106.2	193.1
253.2	142.1	178.8	1106.6	193.0
258.2	141.7	178.3	1107.0	192.9
263.2	141.3	177.8	1107.4	192.8
268.2	142.1	178.8	1106.6	192.3
273.2	141.7	178.3	1107.0	192.2
278.2	141.2	177.8	1107.4	192.1
283.2	142.0	178.8	1106.6	191.7
288.2	141.6	178.2	1107.1	191.6
293.2	141.2	177.7	1107.5	191.4
298.2	140.8	177.2	1107.9	191.3
303.2	141.6	178.2	1107.1	190.9
308.2	141.1	177.6	1107.6	190.8
313.2	140.7	177.1	1108.0	190.7
318.2	141.5	178.0	1107.2	190.3
323.2	141.0	177.5	1107.6	190.1
328.2	140.6	177.0	1108.1	190.0
333.2	140.2	176.4	1108.5	189.9
338.2	140.9	177.3	1107.8	189.5
343.2	140.5	176.8	1108.2	189.4

Table A.5.2-8 (cont.) Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Maximum Safeguards) without Recirculation Sprays				
	Break Path No. 1 Flow		Break Path No. 2 Flow	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
348.2	140.0	176.2	1108.7	189.3
353.2	140.8	177.2	1107.9	188.8
358.2	140.3	176.6	1108.4	188.7
363.2	139.9	176.0	1108.8	188.6
368.2	140.6	176.9	1108.1	188.2
373.2	140.1	176.4	1108.5	188.1
378.2	139.7	175.8	1109.0	188.0
383.2	140.4	176.7	1108.3	187.6
388.2	139.9	176.1	1108.8	187.5
393.2	139.5	175.5	1109.2	187.4
398.2	140.1	176.4	1108.5	186.9
403.2	139.8	175.9	1108.9	186.8
408.2	139.4	175.5	1109.2	186.7
413.2	139.1	175.1	1109.6	186.5
418.2	139.9	176.1	1108.8	186.1
423.2	139.6	175.7	1109.1	186.0
428.2	139.3	175.3	1109.4	185.8
433.2	138.9	174.9	1109.7	185.7
438.2	139.7	175.8	1109.0	185.2
443.2	139.4	175.4	1109.3	185.1
448.2	139.0	175.0	1109.6	185.0
453.2	138.7	174.6	1110.0	184.8
458.2	139.5	175.5	1109.2	184.4
463.2	139.1	175.1	1109.6	184.2
468.2	138.8	174.6	1109.9	189.3
473.2	139.5	175.6	1109.2	188.9
478.2	139.1	175.1	1109.5	188.7
483.2	138.8	174.7	1109.9	188.6
488.2	138.4	174.2	1110.3	188.4

Table A.5.2-8 (cont.)	Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Maximum Safeguards) without Recirculation Sprays			
	Break Path No. 1 Flow		Break Path No. 2 Flow	
Time Seconds	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
493.2	139.1	175.1	1109.5	188.0
498.2	138.8	174.6	1109.9	187.8
503.2	138.4	174.2	1110.3	187.7
508.2	139.1	175.1	1109.6	187.2
513.2	138.7	174.6	1110.0	187.1
518.2	138.3	174.1	1110.4	186.9
523.2	139.0	174.9	1109.7	186.5
528.2	138.6	174.4	1110.1	186.3
533.2	138.2	174.0	1110.5	186.2
538.2	138.9	174.8	1109.8	185.8
543.2	138.5	174.3	1110.2	185.6
548.2	138.1	173.8	1110.6	185.5
553.2	138.7	174.5	1110.0	185.0
558.2	138.3	174.0	1110.4	184.9
563.2	137.9	173.5	1110.8	184.7
568.2	138.4	174.2	1110.2	184.3
573.2	138.0	173.7	1110.7	184.2
578.2	137.6	173.2	1111.1	184.0
583.2	138.2	173.9	1110.5	183.6
588.2	137.7	173.3	1111.0	183.4
593.2	138.3	174.0	1110.4	183.0
598.2	137.8	173.4	1110.9	182.9
603.2	137.4	172.9	1111.3	182.7
608.2	138.0	173.6	1110.7	182.3
613.2	137.5	173.1	1111.2	182.2
618.2	138.1	173.8	1110.6	181.8
623.2	137.6	173.2	1111.0	181.6
628.2	137.2	172.7	1111.5	181.5
633.2	137.7	173.3	1111.0	181.0

Table A.5.2-8 (cont.) Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Maximum Safeguards) without Recirculation Sprays

Time Seconds	Break Path No. 1 Flow		Break Path No. 2 Flow	
	lbm/sec	Thousand Btu/sec	lbm/sec	Thousand Btu/sec
638.2	137.3	172.8	1111.4	180.9
643.2	137.8	173.4	1110.9	180.5
648.2	137.3	172.8	1111.4	180.4
653.2	137.8	173.4	1110.9	180.0
658.2	137.3	172.8	1111.4	179.8
663.2	137.7	173.3	1111.0	179.4
668.2	137.2	172.7	1111.5	184.1
673.2	137.6	173.2	1111.1	183.7
678.2	137.1	172.5	1111.6	183.6
683.2	137.5	173.0	1111.2	183.2
688.2	136.9	172.3	1111.8	183.0
693.2	137.3	172.7	1111.4	182.6
698.2	136.7	172.0	1112.0	182.5
703.2	137.0	172.4	1111.7	182.1
708.2	136.4	171.7	1112.3	182.0
713.2	136.7	172.0	1112.0	181.6
718.2	136.9	172.3	1111.7	181.2
723.2	136.3	171.6	1112.4	181.1
728.2	136.5	171.8	1112.2	180.7
733.2	136.7	172.0	1112.0	180.4
738.2	136.8	172.2	1111.8	180.0
743.2	136.2	171.4	1112.5	179.9
748.2	136.3	171.5	1112.4	179.6
753.2	136.3	171.6	1112.4	179.3
758.2	136.4	171.6	1112.3	178.9
763.2	136.4	171.6	1112.3	178.6
768.2	136.3	171.6	1112.3	178.3
773.2	136.3	171.5	1112.4	178.0
778.2	136.2	171.4	1112.5	177.7

Table A.5.2-8 (cont.) Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Maximum Safeguards) without Recirculation Sprays

Time Seconds	Break Path No. 1 Flow lbm/sec	Break Path No. 1 Flow Thousand Btu/sec	Break Path No. 2 Flow lbm/sec	Break Path No. 2 Flow Thousand Btu/sec
783.2	136.0	171.2	1112.7	177.5
788.2	135.8	171.0	1112.8	177.2
793.2	135.6	170.7	1113.1	181.5
798.2	136.0	171.2	1112.7	181.1
803.2	135.7	170.8	1113.0	180.8
808.2	136.0	171.2	1112.7	180.4
813.2	135.6	170.6	1113.1	180.2
818.2	135.7	170.8	1113.0	179.8
823.2	135.8	170.9	1112.9	179.4
828.2	135.7	170.8	1113.0	179.1
833.2	135.6	170.6	1113.1	178.8
838.2	135.3	170.3	1113.4	178.5
843.2	135.4	170.5	1113.2	178.1
848.2	135.4	170.4	1113.3	177.8
853.2	135.2	170.1	1113.5	177.5
858.2	135.2	170.2	1113.5	177.1
863.2	135.0	169.9	1113.7	176.9
868.2	134.8	169.7	1113.9	176.5
873.2	135.1	170.0	1113.6	176.1
878.2	135.1	170.0	1113.6	175.8
883.2	134.8	169.7	1113.9	179.8
888.2	78.4	98.7	1170.3	194.3
1053.2	75.2	94.7	1173.5	189.0
1056.0	75.2	94.6	752.8	228.0
1320.3	75.2	94.6	752.8	228.0
1320.4	79.7	99.4	748.3	225.6
1321.0	79.7	99.3	748.3	225.8
1594.6	79.7	99.3	748.3	225.8
1594.7	75.3	86.6	752.7	128.3

Table A.5.2-8 (cont.) Double-Ended Pump Suction Break Post-Reflood Mass and Energy Releases (Maximum Safeguards) without Recirculation Sprays

Time Seconds	Break Path No. 1 Flow lbm/sec	Break Path No. 1 Flow Thousand Btu/sec	Break Path No. 2 Flow lbm/sec	Break Path No. 2 Flow Thousand Btu/sec
2500.0	67.8	78.0	760.1	129.7
2500.1	67.8	78.0	760.1	117.3
3600.0	61.2	70.4	766.7	118.4
3600.1	50.3	57.9	777.6	105.0
3749.3	49.5	56.9	778.5	105.1
3749.4	49.2	56.6	627.5	81.6
5000.0	45.0	51.7	631.7	82.1
5000.1	44.5	51.2	632.2	75.9
10000.0	36.0	41.5	640.7	76.9
10000.1	35.6	40.9	641.1	68.0
50000.0	23.3	26.8	653.4	69.3
50000.1	23.0	26.4	653.7	60.1
100000.0	18.8	21.6	657.9	60.5
100000.1	18.7	21.5	658.0	59.2
500000.0	10.8	12.5	665.9	59.9
500000.1	10.8	12.5	665.9	58.6
1000000.0	8.0	9.2	668.7	58.8
1000000.1	8.0	9.2	668.7	54.8
5000000.0	3.8	4.3	672.9	55.2
5000000.1	3.8	4.3	672.9	50.5
10000000.0	2.5	2.9	674.2	50.6

Table A.5.2-9 LOCA Mass and Energy Release Analysis Core Decay Heat Fraction	
Time (sec)	**Decay Heat Generation Rate (Btu/Btu)**
10	0.053876
15	0.050401
20	0.048018
40	0.042401
60	0.039244
80	0.037065
100	0.035466
150	0.032724
200	0.030936
400	0.027078
600	0.024931
800	0.023389
1000	0.022156
1500	0.019921
2000	0.018315
4000	0.014781
6000	0.013040
8000	0.012000
10000	0.011262
15000	0.010097
20000	0.009350
40000	0.007778
60000	0.006958
80000	0.006424
100000	0.006021
150000	0.005323
200000	0.004847
400000	0.003770
600000	0.003201
800000	0.002834

Table A.5.2-9 LOCA Mass and Energy Release Analysis Core Decay Heat Fraction (cont.)	
Time (sec)	**Decay Heat Generation Rate (Btu/Btu)**
1000000	0.002580
2000000	0.001909
4000000	0.001355
6000000	0.001091
8000000	0.000927
10000000	0.000808

Table A.5.2-10 Double-Ended Hot Leg Break - Mass Balance				
Time (Seconds)		**.00**	**25.40**	**25.40**
		Mass (Thousand lbm)		
Initial	In RCS and ACC	766.52	766.52	766.52
Added Mass	Pumped Injection	.00	.00	.00
	Total Added	.00	.00	.00
*****Total Available*****		766.52	766.52	766.52
Distribution	Reactor Coolant	547.82	66.36	96.17
	Accumulator	218.70	169.01	139.20
	Total Contents	766.52	235.37	235.37
Effluent	Break Flow	.00	531.13	531.13
	ECCS Spill	.00	.00	.00
	Total Effluent	.00	531.13	531.13
*****Total Accountable*****		766.52	766.50	766.50

Table A.5.2-11 Double-Ended Pump Suction Break Mass Balance (Minimum Safeguards)								
Time (Seconds)		**.00**	**27.40**	**27.40**	**186.95**	**689.29**	**1564.46**	**3600.00**
		Mass (Thousand lbm)						
Initial	In RCS and ACC	766.52	766.52	766.52	766.52	766.52	766.52	766.52
Added Mass	Pumped Injection	.00	.00	.00	86.48	384.50	903.75	1806.62
	Total Added	.00	.00	.00	86.48	384.50	903.75	1806.62
Total Available		766.52	766.52	766.52	853.00	1151.02	1670.27	2573.14
Distribution	Reactor Coolant	547.82	47.57	77.38	145.96	145.96	145.96	145.96
	Accumulator	218.70	168.24	138.43	.00	.00	.00	.00
	Total Contents	766.52	215.81	215.81	145.96	145.96	145.96	145.96
Effluent	Break Flow	.00	550.70	550.70	707.03	1005.04	1524.30	2427.17
	ECCS Spill	.00	.00	.00	.00	.00	.00	.00
	Total Effluent	.00	550.70	550.70	707.03	1005.04	1524.30	2427.17
Total Accountable		766.52	766.50	766.50	852.99	1151.00	1670.26	2573.13

Table A.5.2-12 Double-Ended Pump Suction Break Mass Balance (Maximum Safeguards)								
Time (Seconds)		**.00**	**27.40**	**27.40**	**203.15**	**1320.42**	**1594.64**	**3600.00**
		Mass (Thousand lbm)						
Initial	In RCS and ACC	766.52	766.52	766.52	766.52	766.52	766.52	766.52
Added Mass	Pumped Injection	.00	.00	.00	206.15	1489.96	1716.99	3377.31
	Total Added	.00	.00	.00	206.15	1489.96	1716.99	3377.31
Total Available		766.52	766.52	766.52	972.67	2256.48	2483.51	4143.83
Distribution	Reactor Coolant	547.82	47.57	77.38	148.08	148.08	148.08	148.08
	Accumulator	218.70	168.24	138.43	.00	.00	.00	.00
	Total Contents	766.52	215.81	215.81	148.08	148.08	148.08	148.08
Effluent	Break Flow	.00	550.70	550.70	824.57	2108.38	2334.83	3995.14
	ECCS Spill	.00	.00	.00	.00	.00	.00	.00
	Total Effluent	.00	550.70	550.70	824.57	2108.38	2334.83	3995.14
Total Accountable		766.52	766.50	766.50	972.66	2256.46	2482.91	4143.23

Table A.5.2-13 Double-Ended Hot Leg Break – Energy Balance				
Time (Seconds)		**.00**	**25.40**	**25.40**
		Energy (Million Btu)		
Initial Energy	In RCS, ACC, S GEN	905.24	905.24	905.24
Added Energy	Pumped Injection	.00	.00	.00
	Decay Heat	.00	8.34	8.34
	Heat from Secondary	.00	6.63	6.63
	Total Added	.00	14.97	14.97
*****Total Available*****		905.24	920.21	920.21
Distribution	Reactor Coolant	321.09	16.46	19.12
	Accumulator	19.57	15.12	12.46
	Core Stored	25.60	9.77	9.77
	Primary Metal	159.22	148.70	148.70
	Secondary Metal	99.43	96.87	96.87
	Steam Generator	280.33	286.70	286.70
	Total Contents	905.24	573.62	573.62
Effluent	Break Flow	.00	345.98	345.98
	ECCS Spill	.00	.00	.00
	Total Effluent	.00	345.98	345.98
*****Total Accountable*****		905.24	919.60	919.60

Table A.5.2-14 Double-Ended Pump Suction Break Energy Balance (Minimum Safeguards)								
Time (Seconds)		**.00**	**27.40**	**27.40**	**186.95**	**689.29**	**1564.46**	**3600.00**
		Mass (Thousand lbm)						
Initial Energy	In RCS, ACC, S GEN	905.24	905.24	905.24	905.24	905.24	905.24	905.24
Added Energy	Pumped Injection	.00	.00	.00	5.88	26.15	61.46	200.28
	Decay Heat	.00	8.25	8.25	27.22	72.20	134.94	250.63
	Heat from Secondary	.00	8.38	8.38	8.38	19.30	35.12	35.12
	Total Added	.00	16.63	16.63	41.49	117.65	231.51	486.03
*****Total Available*****		905.24	921.86	921.86	946.72	1022.88	1136.75	1391.27
Distribution	Reactor Coolant	321.09	10.78	13.45	38.01	38.01	38.01	38.01
	Accumulator	19.57	15.05	12.39	.00	.00	.00	.00
	Core Stored	25.60	13.54	13.54	4.85	4.64	4.25	3.33
	Primary Metal	159.22	150.66	150.66	124.87	88.27	66.27	51.38
	Secondary Metal	99.43	98.88	98.88	90.73	70.22	47.88	36.88
	Steam Generator	280.33	293.87	293.87	266.17	210.90	158.59	127.42
	Total Contents	905.24	582.78	582.78	524.62	412.04	314.99	257.02
Effluent	Break Flow	.00	338.50	338.50	413.47	602.21	812.75	1126.69
	ECCS Spill	.00	.00	.00	.00	.00	.00	.00
	Total Effluent	.00	338.50	338.50	413.47	602.21	812.75	1126.69
*****Total Accountable*****		905.24	921.28	921.28	938.10	1014.26	1127.75	1383.71

Table A.5.2-15 Double-Ended Pump Suction Break Energy Balance (Maximum Safeguards)								
Time (Seconds)		.00	27.40	27.40	203.15	1320.42	1594.64	3600.00
		Mass (Thousand lbm)						
Initial Energy	In RCS, ACC, S GEN	905.24	905.24	905.24	905.24	905.24	905.24	905.24
Added Energy	Pumped Injection	.00	.00	.00	14.02	119.27	153.32	388.71
	Decay Heat	.00	8.25	8.25	28.89	118.66	136.90	250.64
	Heat from Secondary	.00	8.38	8.38	8.38	32.66	34.62	34.62
	Total Added	.00	16.63	16.63	51.29	270.59	324.84	673.97
Total Available		905.24	921.86	921.86	956.53	1175.83	1230.08	1579.21
Distribution	Reactor Coolant	321.09	10.78	13.45	38.49	38.49	38.49	38.49
	Accumulator	19.57	15.05	12.39	.00	.00	.00	.00
	Core Stored	25.60	13.54	13.54	4.85	4.29	4.18	3.33
	Primary Metal	159.22	150.66	150.66	124.18	71.90	65.04	51.52
	Secondary Metal	99.43	98.88	98.88	91.30	53.96	46.95	37.05
	Steam Generator	280.33	293.87	293.87	267.58	173.52	155.27	127.36
	Total Contents	905.24	582.78	582.78	526.40	342.16	309.92	257.75
Effluent	Break Flow	.00	338.50	338.50	421.49	825.03	890.31	1292.94
	ECCS Spill	.00	.00	.00	.00	.00	.00	.00
	Total Effluent	.00	338.50	338.50	421.49	825.03	890.31	1292.94
Total Accountable		905.24	921.28	921.28	947.89	1167.19	1200.23	1550.69

A.5.4 Short-Term LOCA Mass and Energy Releases

A.5.4.1 Purpose

An evaluation was conducted to determine the effect of replacing Model 51 steam generators with Framatome ANP Model 61/19T steam generators on the short-term LOCA-related mass and energy releases. The short term LOCA releases are used to support the subcompartment analyses for Section 15.4.8.3 of the Salem UFSAR (Reference 24). From the UFSAR, a double-ended circumferential rupture of the primary reactor coolant piping forms the basis for the steam generator enclosure and the pressurizer enclosure and a 100 in^2 area break in the reactor vessel nozzle forms the basis for the reactor vessel gap in the reactor cavity region. This evaluation addresses the impact of the steam generator replacement and other relevant issues on the current licensing basis for these breaks.

A.5.4.2 Discussion and Evaluation

The subcompartment analysis is performed to ensure that the walls of a subcompartment can maintain their structural integrity during the short pressure pulse (generally less than 3 seconds) which accompanies a high energy line pipe rupture within the subcompartment. The magnitude of the pressure differential across the walls is a function of several parameters, which include the blowdown M&E release rates, the subcompartment volume, vent areas, and vent flow behavior. The blowdown M&E release rates are affected by the initial RCS temperature conditions. Since short-term releases are linked directly to the critical mass flux, which increases with decreasing temperatures, the short-term LOCA releases would be expected to increase due to any reductions in RCS coolant temperature conditions. Short term blowdown transients are characterized by a peak mass and energy release rate that occurs during a subcooled condition, thus the Zaloudek correlation, which models this condition, is currently used in the short term LOCA mass and energy release analyses with the SATAN computer program. This correlation appears in the critical flow routine of SATAN (Reference 12) in the form:

$$G_{crit} = CK1 * SQRT[K2 * (P - C_1 * P_{sat})]$$

where:

- CK1 = constant
- K2 = constant
- C_1 = constant
- P = reservoir pressure in psia [RCS normal operating pressure with uncertainties]
- P_{sat} = saturation pressure in psia [at the RCS temperature of interest with uncertainties]
- G_{crit} = critical flux in lbm/sec-ft^2

This calculation was used to conservatively evaluate the impact of the changes in RCS temperature conditions due to the replacement steam generator on the short term releases from the originally licensed operating conditions. This was accomplished by maximizing the reservoir pressure and minimizing the RCS inlet and outlet temperatures for the replacement steam generator data (which maximizes G_{crit}). Using a lower temperature results in a lower P_{sat} and a higher G_{crit}. Since this maximizes the change in short-term LOCA mass and energy releases, data representative of the lowest inlet and outlet temperatures with uncertainty subtracted was used for the replacement steam generator evaluation.

Any changes in RCS volume and steam generator liquid/steam mass and volume have no effect on the releases because of the short duration of the postulated accident. Any volumetric changes are small and have no impact on the subcompartment model. Therefore, the only change that needs to be addressed for this program is the impact of the steam generator replacement on the RCS coolant temperatures.

The comparison of the RCS operating conditions for the lower portion of the T_{avg} operating window for the steam generator replacement program and the original licensed RCS operating conditions showed that the low end of the replacement steam generator temperature window would be more limiting because short term releases are controlled by density effects. The comparison of the original data and the low T_{avg} conditions with uncertainties included is shown in Table A.5.4-1.

Based upon the results of the evaluation, the design basis LOCA-related mass and energy releases could increase by 3.98% from the original design basis for the hot leg break, 3.4% for the cold leg break, and 0.26% for the reactor cavity break due to RCS temperature effects. No additional factors need to be considered for the RSG program.

Per References 25 and 26, Salem Unit 2 is analyzed and NRC approved for leak-before-break (LBB). LBB eliminates the dynamic effects of postulated primary loop pipe ruptures from the design basis. This means that the current breaks (a double-ended circumferential rupture of the reactor coolant cold leg break for the steam generator enclosure and the pressurizer enclosure, and a 100 in^2 reactor vessel inlet break for the reactor cavity region) no longer have to be considered for the short-term effects. Since the double-ended rupture of the primary RCS piping has been eliminated from consideration, the largest break that should be postulated would be less than the area of the largest attached nozzle, such as the accumulator line, spray line, surge line or RHR suction line. These smaller breaks would result in minimal pressurization. Additionally, compared to the large RCS double-ended ruptures, the differential loadings from the largest branch lines are significantly reduced. For example, the reduction in the flow area between a double-ended RCS break and a double-ended attached nozzle break is greater than a factor of 8 reduction. This means that the peak differential pressure that could be exerted across an adjacent wall can be dramatically reduced if the nozzle breaks are considered. Therefore, since Salem Unit 2 is approved for LBB, the decrease in mass and energy releases associated with the smaller RCS nozzle breaks, as compared to the large double-ended RCS pipe breaks, more than offsets the minimal increase in the releases associated with decreased RCS initial coolant temperatures. The original licensing basis subcompartment analyses that consider breaks in the RCS primary loop piping remain bounding.

A.5.4.3 Results and Conclusion

The short-term LOCA-related analyses discussed in the Salem UFSAR have been reviewed to assess the effects associated with the Salem Unit 2 replacement steam generator (RSG) program. The results show that the original design basis releases would remain bounding considering the penalties associated with the RCS temperature effects from the T_{avg} operating window that is proposed for the RSG program and the benefits of applying leak before break methods. There are no other changes due to replacing the Westinghouse Model 51 steam generators with Framatome ANP Model 61/19T steam generators that would alter this conclusion.

Table A.5.4-1 Comparison of RCS Conditions for Short-Term LOCA Mass and Energy Releases

	RCS Temperature (°F)	
	Original Design Model 51	**RSG* (low Tavg) FRAMATOME ANP Model 61/19T**
Hot Leg	606.56	596.8
Cold Leg	544.00	525.2
Reactor Cavity	531.07	525.2
	RCS Pressure (psia)	
All Locations	2331.1	2300.0

Note:
* 5°F Temperature uncertainty has been removed from the RSG temperatures and 50 psi has been added to the initial pressure.

A.6 CONTAINMENT RESPONSE ANALYSES

A.6.1 Description of COCO Model

Calculation of containment pressure and temperature is accomplished by use of the digital computer code COCO (Reference 5). COCO is described in Section 6.1 of the main body of this document.

Passive Heat Removal

The significant heat removal source during the early portion of the transient is the containment structural heat sinks. Provision is made in the containment pressure response analysis for heat transfer through, and heat storage in, both interior and exterior walls. Every wall is divided into a large number of nodes. A conservation of energy equation expressed in finite-difference form accounts for heat conduction into and out of the wall nodes and the temperature rise within the wall nodes. Table 6.1-1 is the summary of the containment structural heat sinks used in this replacement steam generator analysis for Salem Unit 2. The thermal properties of each heat sink material are shown in Table 6.1-2.

Active Heat Removal

For a large break, the engineered safety features are quickly brought into operation. Because of the brief period of time required to depressurize the reactor coolant system or the main steam system, the containment safeguards are not a major influence on the blowdown peak pressure; however, they reduce the containment pressure after the blowdown and maintain a low long-term pressure and a low long-term temperature.

Safety Injection – RWST

During the injection phase of post-accident operation, the emergency core cooling system pumps water from the refueling water storage tank (RWST) into the reactor vessel. Since this water enters the vessel at RWST temperature, which is less than the temperature of the water in the vessel, it is modeled as absorbing heat from the core until the saturation temperature is reached. Safety injection and containment spray can be operated for a limited time, depending on the RWST capacity.

Safety Injection – RHR/Sump Recirculation

After the supply of refueling water is exhausted, the recirculation system is operated to provide long-term cooling of the core. In this operation, water is drawn from the sump, cooled in a residual heat removal (RHR) exchanger, and then pumped back into the reactor vessel to remove core residual heat and energy stored in the vessel metal. The heat is removed from the RHR heat exchanger by the component cooling water (CCW). The RHR heat exchangers and CCW heat exchangers are coupled in a closed loop system, where the ultimate heat sink is the service water cooling the CCW heat exchanger.

Containment Spray

Containment spray (CS) is an active removal mechanism which is used for rapid pressure reduction and for containment iodine removal. During the injection phase of operation, the containment spray pumps draw water from the RWST and spray it into the containment through nozzles mounted high above the operating deck. As the spray droplets fall, they absorb heat from the containment atmosphere. Since the water comes from the RWST, the entire heat capacity of the spray from the RWST temperature to the temperature of the containment atmosphere is available for energy absorption. During the cold leg recirculation phase, the analysis does not credit any recirculation spray flow, even if it is available. Once in the hot leg recirculation alignment, the current procedures at both Salem units instruct the operators to isolate the spray header from the ECCS and terminate the recirculation spray (if it had been initiated).

The mathematical model for the spray droplet is described in Section 6.1 of the main body of this document.

Containment Recirculation Spray Assumptions

This analysis assumes no containment recirculation spray. This conservatively bounds a potential revision to Salem's operating procedures to initiate hot leg recirculation at 6.5 hours following a LOCA, which terminates recirculation spray. In addition, to comply with Salem's containment cooling systems design basis, it does not credit subcooling during the cold leg or hot leg recirculation alignments for terminating steam releases into the containment. This imposes a harsher, long-term containment temperature and pressure transient in comparison with the present transient.

CFCU

The containment fan cooler units (CFCUs) are an additional means of heat removal. The main aspects of a fan cooler from the heat removal standpoint are the fan and the banks of cooling coils. The fans draw the dense containment atmosphere (steam/air mixture) through banks of finned cooling coils and discharge the cooled steam/air mixture through the containment ventilation ducting to mix with the rest of the containment atmosphere. The coils are kept at a low temperature by a constant flow of cooling water. Under accident conditions, the cooling water is provided by the Service Water System. Since this system does not use water from the RWST, the mode of operation remains the same both before and after the spray system and emergency core cooling system change to recirculation mode. See Table 6.1-3 for the CFCU heat removal capability assumed for the containment response analyses.

A.6.2 Containment Response to Steamline Break

The containment response to a steamline break was calculated with the COCO model described in Section A.6.1 and the mass and energy releases from Section A.4.4. The peak containment pressures and temperatures are summarized in Table A.6.2-1. The limiting containment pressure case is a 1.4 ft^2 DER initiated at 30% power with a containment safeguards failure. The limiting containment temperature case is a 0.88 ft^2 split rupture initiated at 30% power with a MSIV failure. For Salem Unit 2 with Model 61/19T steam generators, the peak pressure is 45.6 psig and the peak temperature is 349.6°F. Figure A.6.2-1 shows the peak pressure case transient and Figure A.6.2-2 shows the peak temperature case transient. The sequence of events for the limiting cases are summarized in Table 6.2-2.

The containment air temperature composite profile from all the cases is in Table A.6.2-3. The composite temperature transient is compared to the EQ temperature limit from Section 3.3 in Figure A.6.2-3.

Table A.6.2-1 Summary of MSLB Peak Containment Pressures and Temperatures

Case Description			Unit 2 Model 61/19T SGs		
Break (ft^2)	**Power (%)**	**Failure**	**Case**	**Peak Press (psig @ sec)**	**Peak Temp (°F @ sec)**
1.4 DER	30	CSF	19-2	45.6 @ 602	282.4 @ 14
1.4 DER	30	AFW	23-2	43.4 @ 265	282.4 @ 14
1.4 DER	100	FRV	25-2	44.4 @ 268	285.2 @ 14
Small DER	100	MSIV	61-2	32.6 @ 434	335.4 @ 110
Split	30	CSF	67-2	41.8 @ 369	348.7 @ 113
Split	30	MSIV	79-2	42.1 @ 406	349.6 @ 113

Table A.6.2-2 Sequence of Events for Peak Containment Pressure and Peak Containment Temperature Cases

	Case 19 **1.4 ft^2 DER, 30% Power, CSF Failure**	**Case 79** **0.88 ft^2 Split Break, 30% Power, MSIV Failure**
Low Steamline Pressure + High Steam Flow setpoints reached	1.1 sec	NA
Start of AFW	1.1 sec	12.7 sec
Hi-1 cont. pressure setpoint reached	2.7 sec	12.7 sec
Reactor trip (start of rod motion)	3.1 sec	14.7 sec
FRV closes	11.1 sec	22.7 sec
Hi-2 cont. pressure setpoint reached	10.7 sec	46.8 sec
MSIV closes	13.1 sec	58.9 sec
Peak Temperature Occurs	14.0 sec	113.0 sec
Start of SG tube uncovery on the secondary side is credited	228.8 sec	384.4 sec
Peak Pressure Occurs	602.0 sec	406.0 sec
AFW terminated to faulted loop	600.0 sec	600.0 sec
Break releases stop	622.4 sec	749.6 sec

Table A.6.2-3 Composite of Maximum Containment Air Temperature from SLB Analyses for Unit 2 with RSG	
	Maximum Containment Temperature (°F)
Time (sec)	Unit 2
0.00	120.0
0.10	122.3
0.25	125.9
0.50	135.4
0.75	144.4
1.00	152.9
2.00	181.9
3.00	203.6
4.00	220.8
5.00	234.4
6.00	245.4
7.00	254.2
8.00	261.4
9.00	267.3
10.00	272.5
12.00	280.8
13.00	283.8
14.00	283.9
16.00	276.5
17.00	273.0
18.00	269.7
20.00	263.5
22.00	262.4
25.00	272.9
27.00	279.0
29.00	284.4
32.00	291.3
36.00	298.9
39.00	303.4

Table A.6.2-3 (cont.) Composite of Maximum Containment Air Temperature from SLB Analyses for Unit 2 with RSG

Time (sec)	Maximum Containment Temperature (°F)
	Unit 2
43.00	308.1
46.00	310.9
53.00	315.3
57.00	317.4
64.00	325.0
71.00	331.3
78.00	336.1
85.00	339.8
99.00	345.4
113.00	349.6
119.00	348.4
132.00	347.6
133.00	346.9
151.00	334.7
164.00	326.7
190.00	312.4
216.00	300.2
242.00	289.6
268.00	280.5
294.00	272.5
320.00	267.4
331.00	267.4
354.00	267.6
378.00	267.8
403.00	268.1
415.00	268.2
429.00	268.4
500.00	269.2
603.00	269.9

Table A.6.2-3 (cont.) Composite of Maximum Containment Air Temperature from SLB Analyses for Unit 2 with RSG	
	Maximum Containment Temperature (°F)
Time (sec)	Unit 2
615.00	269.7
627.00	269.3
680.00	267.1
720.00	265.5
1000.00	255.4

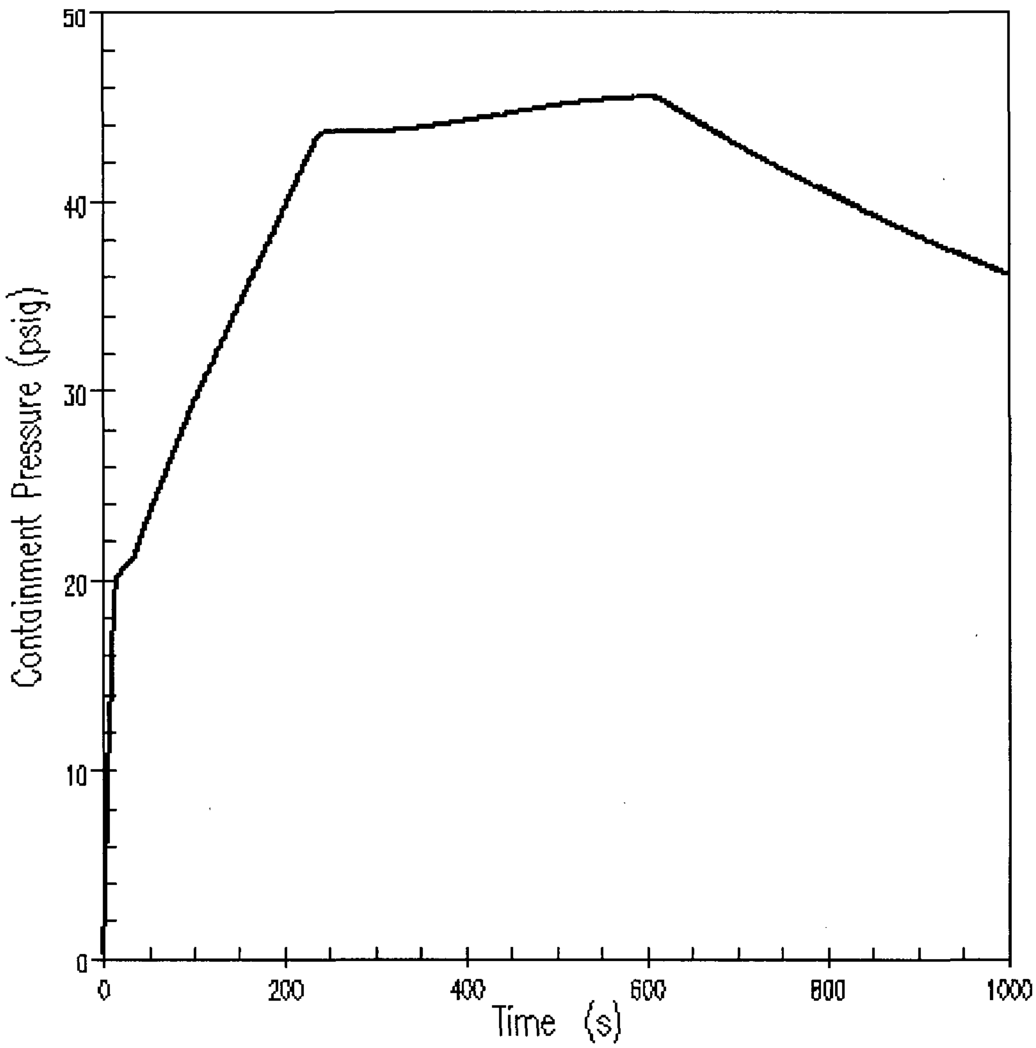

Figure A.6.2-1 Containment Pressure Transient for 1.4 ft^2 DER at 30% Power with a Containment Safeguards Failure

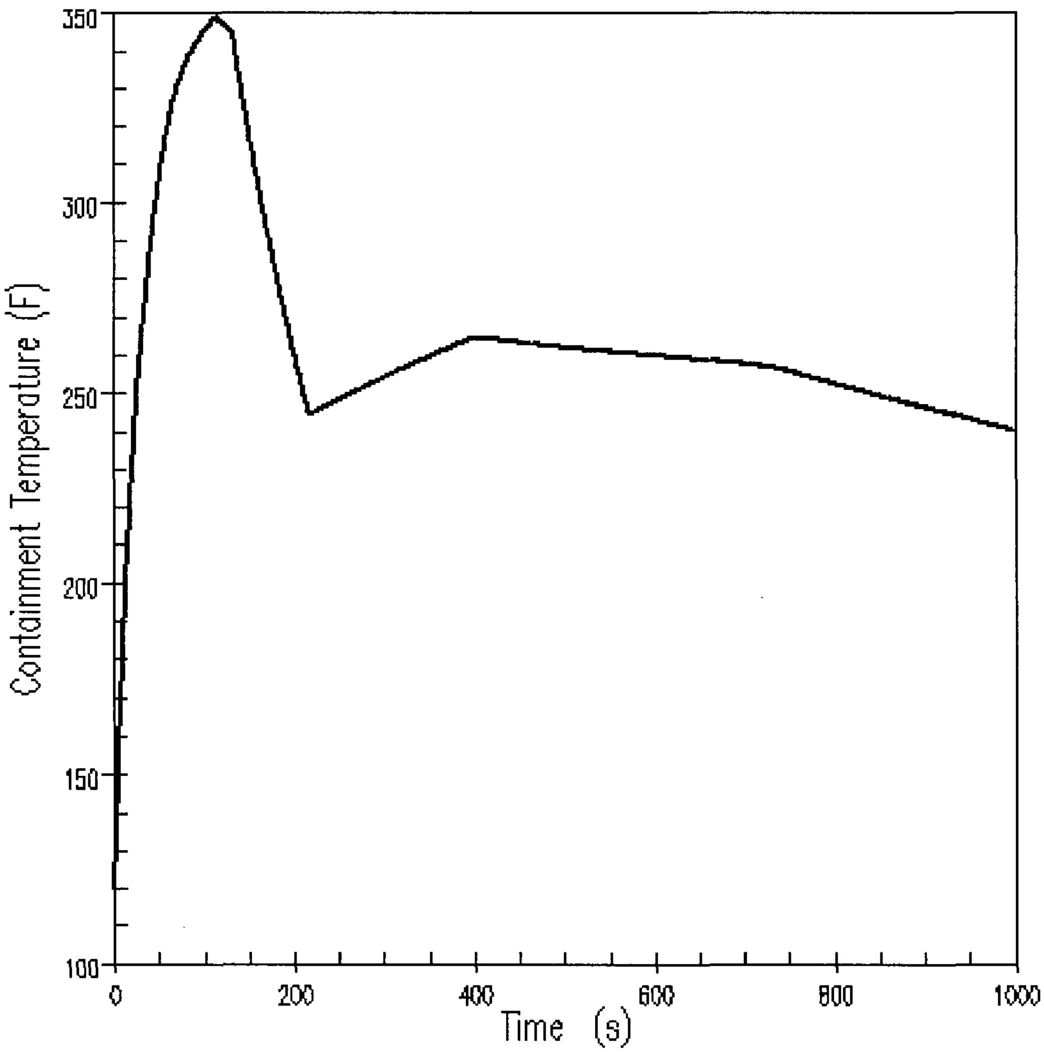

Figure A.6.2-2 Containment Temperature Transient for 0.88 ft² Split Break at 30% Power with a MSIV Failure

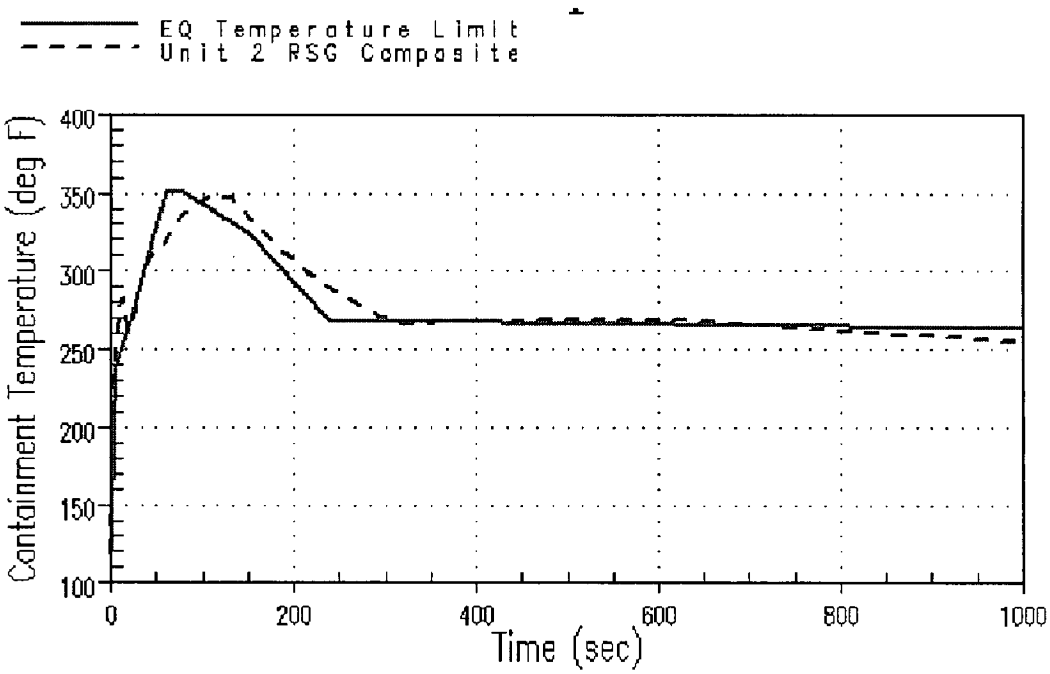

Figure A.6.2-3 Containment Temperature Composite Results for Steamline Break

A.6.3 Containment Response to LOCA

The Salem containment system is designed such that for all loss-of-coolant accident (LOCA) break sizes, up to and including the double-ended severance of a reactor coolant pipe, the containment peak pressure remains below the design pressure. This section details the containment response subsequent to a hypothetical LOCA. The containment response analysis uses the long-term mass and energy release data from Section A.5.

The containment response analysis demonstrates the acceptability of the containment safeguards systems to mitigate the consequences of a LOCA inside containment. The impact of LOCA mass and energy releases on the containment pressure is addressed to assure that the containment pressure remains below its design pressure at the licensed core power conditions. In support of equipment design and licensing criteria (e.g., qualified operating life), with respect to post-accident environmental conditions, long-term containment pressure and temperature transients are generated to conservatively bound the potential post-LOCA containment conditions.

A.6.3.1 Input Parameters and Assumptions

An analysis of containment response to the rupture of the RCS must start with knowledge of the initial conditions in the containment. The pressure, temperature, and humidity of the containment atmosphere prior to the postulated accident are specified in the analysis as shown in Table 6.1-4.

Also, values for the initial temperature of the service water (SW) and refueling water storage tank (RWST) are assumed, along with containment spray (CS) pump flowrate and containment fan cooler unit (CFCU) heat removal performance. All of these values are chosen conservatively, as shown in Table 6.1-4. Long-term sump recirculation is addressed via Residual Heat Removal System (RHR) heat exchanger performance. The primary function of the RHR system is to remove heat from the core by way of Emergency Core Cooling System (ECCS). Table 6.1-4 provides the RHR system parameters assumed in the analysis.

Several cases were performed for the LOCA containment response. Section A.5 documented the LOCA M&E releases for three break cases for Salem Unit 2. Table 6.1-5 provides the performance data for the containment spray pumps. Emergency safeguards equipment data is given in Table 6.1-4. The minimum safeguards case was based upon a train failure (which leaves available as active heat removal systems one containment spray pump and 3 CFCUs).

The maximum safeguards case models that failure of a containment spray pump (which leaves one containment spray pump and 5 CFCUs).

The calculation for the DEHL case is for the duration of the initial RCS blowdown period. The calculations for both DEPS cases were performed for 10 million seconds (approximately 116 days). The sequence of events for each of these cases is shown in Table A.6.3-1 through Table A.6.3-3.

The following are the major assumptions made in the analysis.

1. The mass and energy released to the containment are described in Section A.5 for LOCA.

2. Homogeneous mixing is assumed. The steam-air mixture and the water phases each have uniform properties. More specifically, thermal equilibrium between the air and the steam is assumed. However, this does not imply thermal equilibrium between the steam-air mixture and the water phase.

3. Air is taken as an ideal gas, while compressed water and steam tables are employed for water and steam thermodynamic properties.

4. For the blowdown portion of the LOCA analysis, the discharge flow separates into steam and water phases at the breakpoint. The saturated water phase is at the total containment pressure, while the steam phase is at the partial pressure of the steam in the containment. For the post-blowdown portion of the LOCA analysis, steam and water releases are input separately.

5. The saturation temperature at the partial pressure of the steam is used for heat transfer to the heat sinks, the fan coolers, and the spray droplets.

A.6.3.2 Acceptance Criteria

The containment response for design-basis containment integrity is an ANS Condition IV event, an infrequent fault. The relevant requirements to satisfy Nuclear Regulatory Commission acceptance criteria are as follows.

1. GDC 16 and GDC 50: In order to satisfy the requirements of GDC 16 and 50, the peak calculated containment pressure should be less than the containment design pressure of 47 psig;

2. GDC 38: In order to satisfy the requirements of GDC 38, the calculated containment pressure and temperature need to be rapidly reduced and maintained at a low level.

Note that the Salem UFSAR does not reference the general design criteria (GDCs), but lists the draft/interim general design criteria that were proposed by the Atomic Energy Commission (AEC). These do not provide specific system requirements and refer back to the various sections of the UFSAR for the design bases. In addition to the GDCs, the analyses also comply with a requirement from the Standard Review Plan (i.e., NUREG-0800) Section 6.2.1.1.A which states that the containment pressure at 24 hours should be less than 50% of the peak calculated value. (This is related to the criteria for doses at 24 hours.) Meeting the above GDC requirements along with the Technical Specifications design features for pressure and temperature and equipment qualifications temperature limits will ensure all containment design limits remain bounded under the CFCU margin recovery program.

A.6.3.3 Analysis Results

The containment pressure, steam temperature and water (sump) temperature profiles from each of the LOCA cases are shown in Figures A.6.3-1 through A.6.3-9. Neither of the DEPS cases modeled recirculation spray. Table A.6.3-4 provides the peak pressure and temperature and the times of occurrence along with the containment conditions at 24 hours after the accident initiation.

Double-Ended Hot Leg Break

This analysis assumes a loss of offsite power coincident with a double-ended rupture of the RCS piping between the reactor vessel outlet nozzle and the steam generator inlet (i.e., a break in the RCS hot leg). The associated single-failure assumption is the failure of a diesel generator to start, resulting in one train of low-head safety injection and containment safeguards equipment being available. This combination results in a minimum set of safeguards being available. Further, loss of offsite power delays the actuation times of the safeguards equipment due to the required diesel generator startup time after receipt of the safety injection signal.

The postulated RCS break results in a rapid release of mass and energy to the containment with a resulting rapid rise in both the containment pressure and temperature. This rapid rise in containment pressure results in the generation of a containment high signal at 1.1 seconds and a containment high-high signal at 4.4 seconds. The containment pressure continues to rise rapidly in response to the release of mass and energy until the end of blowdown at 25.4 seconds, with the pressure reaching a value of 42.8 psig at 25.1 seconds. The end of blowdown marks the time when the initial inventory in the RCS has been exhausted and the process of filling the RCS downcomer in preparation for reflood has begun. Since the reflood for a hot leg break is very fast due to the low resistance to steam venting posed by the broken hot leg, Westinghouse terminates hot leg break mass and energy release transients at the end of blowdown. The detailed transient times are shown in Table A6.3-1. Figures A6.3-1, A6.3-2 and A6.3-3 show the pressure, steam temperature and sump temperature transients. The detailed containment conditions for the DEHL case can be seen in Table A.6.3-5 for the containment pressure, steam temperature and sump temperature.

Double-Ended Pump Suction Break with Minimum Safeguards

This analysis assumes a loss of offsite power coincidence with a double ended rupture of the RCS piping between the steam generator outlet and the RCS pump inlet (suction). The associated single failure assumption is the failure of a complete train of safeguards equipment. This single failure assumption is conservative because Salem Unit 2 has three emergency diesel generators. The loss of a single diesel generator would result in the loss of only a few components. This combination results in a conservative minimum set of safeguards being available. The containment heat removal systems that are assumed to be available are one RHR heat exchanger, one containment spray pump, and the minimum CFCU heat removal presented in Table 6.1-3. Further, loss of offsite power delays the actuation times of the safeguards equipment due to the required diesel generator startup time after receipt of the safety injection signal.

The postulated RCS break results in a rapid release of mass and energy to the containment with a resulting rapid rise in both the containment pressure and temperature. This rapid rise in containment pressure results in the generation of a containment Hi-1 signal at 1.1 seconds and a containment Hi-2 signal at 4.3 seconds. The containment pressure continues to rise rapidly in response to the release of mass and energy until the end of blowdown at 27.4 seconds. The end of blowdown marks a time when the initial inventory in the RCS has been exhausted and a slow process of filling the RCS downcomer in preparation for reflood has begun. Since the mass and energy release during this period is low, pressure decreases slightly and then increases in response to the reflood mass and energy release out to a second peak which occurs at 100 seconds.

The turn around in containment pressure at 100 seconds is a result of the initiation of the containment spray pump at 89.3 seconds and the CFCUs at 101.1 seconds. Reflood continues at a reduced flooding rate due to the buildup of mass in the RCS core which offsets the downcomer head. This reduction in flooding rate and the continued action of the CFCUs and containment spray leads to a slowly decreasing pressure out to the end of reflood, which occurs at 187.0 seconds.

At this juncture, energy removal from the steam generator secondary side begins at a very high rate, resulting in a rise in containment pressure from 186.4 seconds to 484.7 seconds when the ultimate peak pressure of 43.5 psig is reached. Energy continues to be removed in a conservative manner from the secondary side of the faulted loop and intact loop steam generators until 3600 seconds when the system is assumed to reach atmospheric conditions. The faulted loop steam generator reaches an equilibrium pressure with the containment at 689.3 seconds and the intact loop steam generator reaches its equilibrium with the containment at 1564.5 seconds. The containment pressure at the end of this steam generator energy release period approaches peak pressure. After 1564.5 seconds, the containment pressure decreases through the initiation of cold leg recirculation at 1748.3 seconds out to 4141.6 seconds when the containment spray is terminated from the RWST. No recirculation spray flow is modeled for Salem Unit 2 for the remainder of the transient. This can be seen in Figures A6.3-4 through A.6.3-6 and in Table A6.3-2. This transient satisfies GDC 38 and Standard Review Plan Section 6.2.1.1.A since the containment pressure is reduced below one half of the peak containment pressure within 24 hours, but it requires PSEG to verify that the equipment qualifications remain acceptable since it imposes a harsher long-term containment transient. The detailed containment conditions for the DEPS minimum safeguards case can be seen in Table A.6.3-6 for the containment pressure, steam temperature and sump temperature.

Double-Ended Pump Suction Break with Maximum Safeguards

The DEPS break with maximum safeguards has a transient history similar to the minimum safeguards case discussed above except that the peak pressure occurs during the initial blowdown period. The peak pressure is 40.6 psig at 25.1 seconds. This can be seen in Figures A.6.3-7 through A.6.3-9 and in Table A.6.3-3. As described in the main body of this document, the "no recirculation spray" assumption is acceptable from the aspect of GDC 38 and Standard Review Plan 6.2.1.1.A, but it requires a reevaluation of the equipment qualifications. The detailed containment conditions for the DEPS case with maximum safeguards can be seen in Table A.6.3-7 for the containment pressure, steam temperature and sump temperature.

Table A.6.3-1 Double-Ended Hot Leg Break Sequence of Events (Salem Unit 2 RSG)	
Time (sec)	**Event Description**
0.0	Break Occurs and Loss of Offsite Power are assumed
1.1	Reactor Trip Occurs on Compensated Low Pressurizer Pressure Setpoint and Containment HI-1 Pressure Setpoint Reached (5.5 psig)
3.7	Low Pressurizer Pressure SI Setpoint = 1715 psia Reached (Safety Injection Begins co-incident with Low Pressurizer Pressure SI Setpoint)
4.4	Containment HI-2 Pressure Setpoint Reached (17.0 psig)
15.5	Broken Loop Accumulator Begins Injecting Water
15.9	Intact Loop Accumulator Begins Injecting Water
25.1	Peak Temperature Occurs
25.1	Peak Pressure Occurs
25.4	End of Blowdown Phase
25.4	Accumulator Mass Adjustment for Refill Period
50.0	Transient Modeling Terminated

Table A.6.3-2 DEPS Break Sequence of Events (Minimum Safeguards) (Salem Unit 2 RSG)	
Time (sec)	**Event Description**
0.0	Break Occurs and Loss of Offsite Power are assumed
1.1	Reactor Trip Occurs on Compensated Low Pressurizer Pressure Setpoint and Containment HI-1 Pressure Setpoint Reached (5.5 psig)
3.6	Low Pressurizer Pressure SI Setpoint = 1715 psia Reached (Safety Injection Begins co-incident with Low Pressurizer Pressure SI Setpoint)
4.3	Containment HI-2 Pressure Setpoint Reached (17.0 psig)
13.6	Main Feedwater Flow Isolated
17.7	Broken Loop Accumulator Begins Injecting Water
18.1	Intact Loop Accumulator Begins Injecting Water
27.4	End of Blowdown Phase
35.6	Pumped Safety Injection Begins (after a 32-second delay from the setpoint)
55.8	Broken Loop Accumulator Water Injection Ends
58.2	Intact Loop Accumulator Water Injection Ends
89.3	Containment Spray Pump (RWST) Begins
187.0	End of Reflood for MIN SI Case
484.7	Peak Temperature Occurs
484.7	Peak Pressure Occurs
689.3	Mass and Energy Release Assumption: Broken Loop SG Equilibration to 51.7 psia
1564.5	Mass and Energy Release Assumption: Intact Loop SG Equilibration to 41.7 psia
1748.3	Cold Leg Recirculation Water Begins
4141.6	Containment Spray from RWST is Terminated
1.0E+07	Transient Modeling Terminated

Table A.6.3-3 DEPS Break Sequence of Events (Maximum Safeguards) (Salem Unit 2 RSG)	
Time (sec)	**Event Description**
0.0	Break Occurs and Loss of Offsite Power are assumed
1.1	Containment HI-1 Pressure Setpoint Reached (5.5 psig)
3.6	Low Pressurizer Pressure SI Setpoint = 1715 psia Reached (Safety Injection Begins co-incident with Low Pressurizer Pressure SI Setpoint)
4.3	Containment HI-2 Pressure Setpoint Reached (17.0 psig)
13.6	Main Feedwater Flow Isolated
17.7	Broken Loop Accumulator Begins Injecting Water
18.1	Intact Loop Accumulator Begins Injecting Water
25.1	Peak Temperature Occurs
25.1	Peak Pressure Occurs
27.4	End of Blowdown Phase
35.6	Pumped Safety Injection Begins (after a 32-second delay from the setpoint)
56.4	Broken Loop Accumulator Water Injection Ends
58.9	Intact Loop Accumulator Water Injection Ends
89.3	Containment Spray Pump (RWST) Begins
203.2	End of Reflood for MAX SI Case
1056.0	Cold Leg Recirculation Water Begins
1320.4	Mass and Energy Release Assumption: Broken Loop SG Equilibration to 38.2 psia
1594.6	Mass and Energy Release Assumption: Intact Loop SG Equilibration to 37.6 psia
3449.3	Containment Spray from RWST is Terminated
1.0E+07	Transient Modeling Terminated

Table A.6.3-4 LOCA Containment Response Results (Loss-of-Offsite Power Assumed)

Case	Peak Pressure (psig)	Peak Temperature (°F)	Pressure (psig) @ 24 hours	Temperature (°F) @ 24 hours
Unit 2 DEHL Break Model 61/19T SGs	42.8 @ 25.1 sec	265.8 @ 25.1 sec	NA	NA
Unit 2 DEPS Break Minimum Safeguards Model 61/19T SGs	43.5 @ 484.7sec	265.9 @ 484.7sec	17.0	209.3
Unit 2 DEPS Break Maximum Safeguards Model 61/19T SGs	40.6 @ 25.1sec	262.5 @ 25.1sec	9.2	177.2

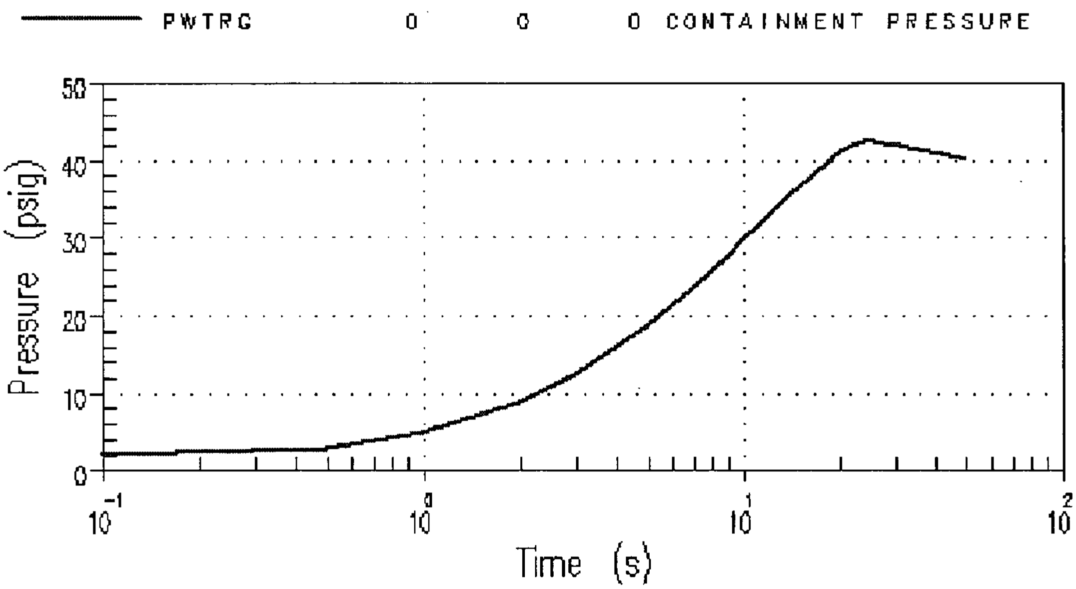

Figure A.6.3-1 Containment Pressure – Double-ended Hot Leg Break at Salem Unit 2

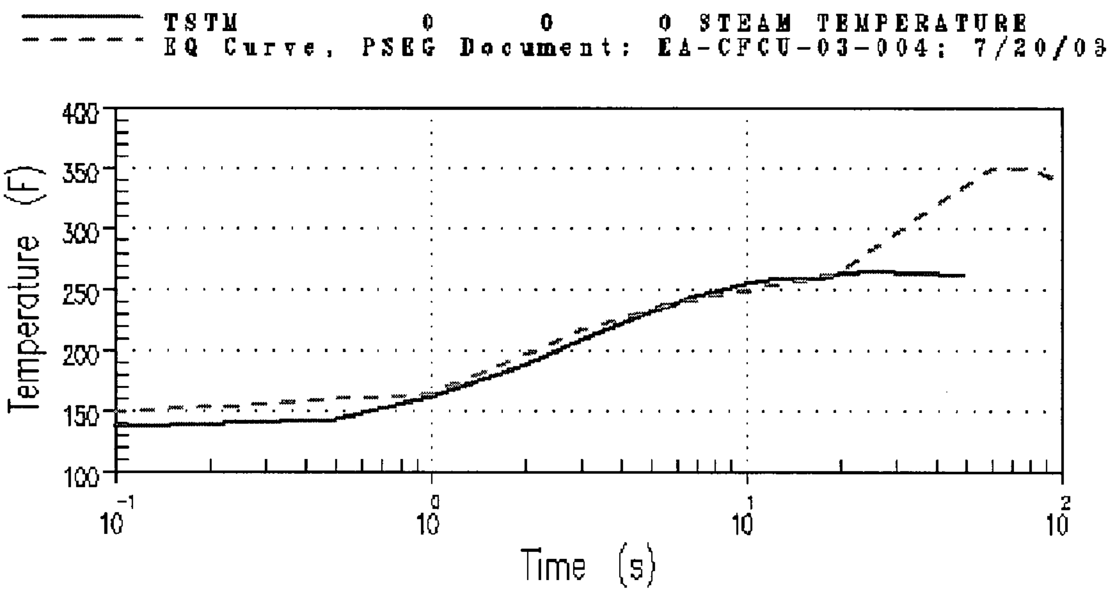

Figure A.6.3-2 Containment Temperature – Double-ended Hot Leg Break at Salem Unit 2

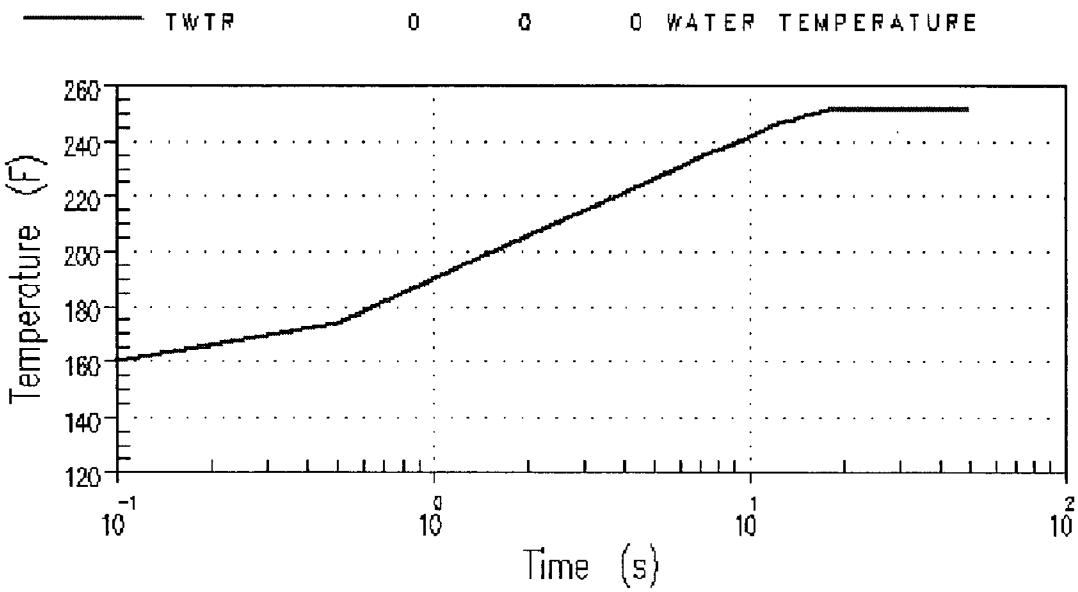

Figure A.6.3-3 Containment Sump Temperature – Double-ended Hot Leg Break at Salem Unit 2

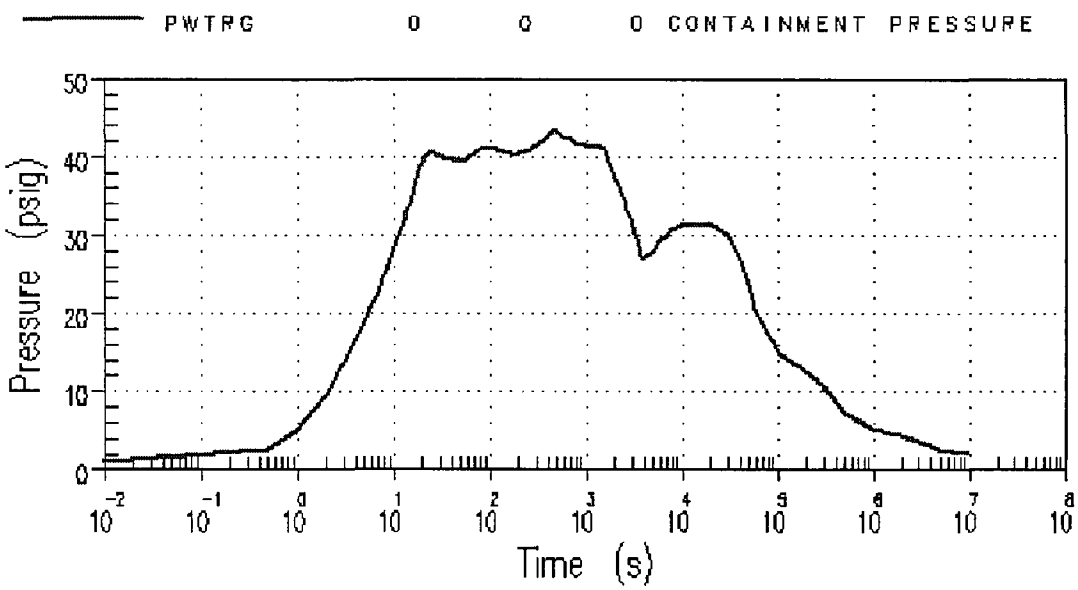

Figure A.6.3-4 Containment Pressure – Double-ended Pump Suction Break with Minimum Safeguards for Salem Unit 2 without Recirculation Spray

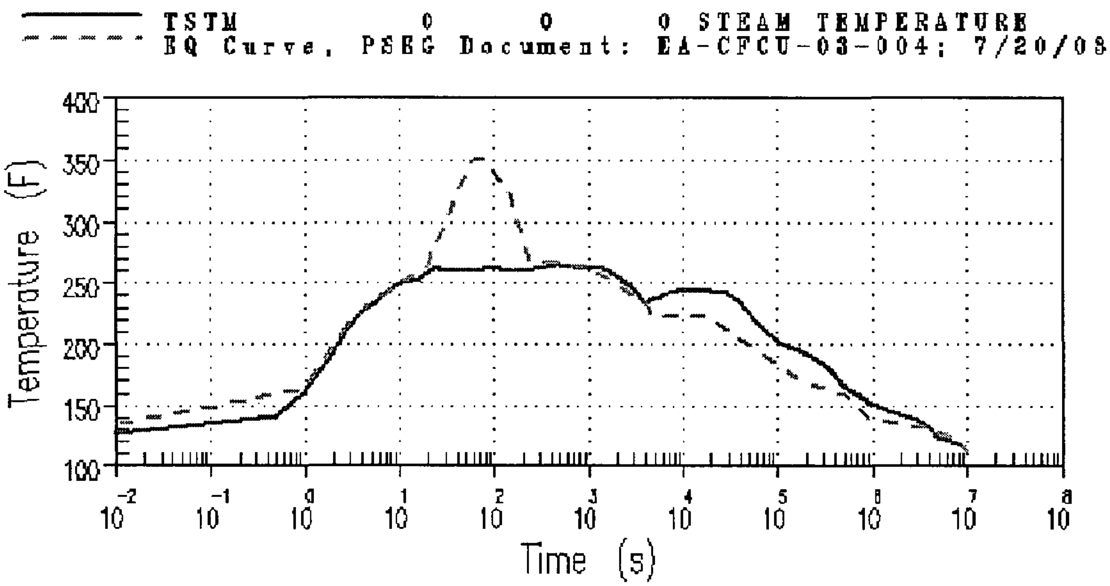

Figure A.6.3-5 Containment Temperature – Double-ended Pump Suction Break with Minimum Safeguards for Salem Unit 2 without Recirculation Spray

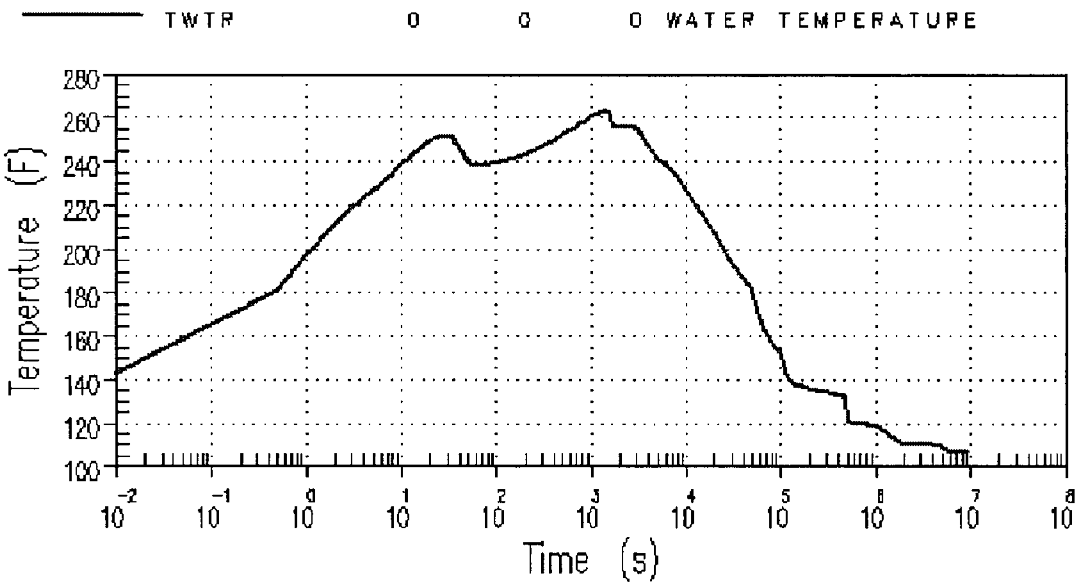

Figure A.6.3-6 Containment Sump Temperature – Double-ended Pump Suction Break with Minimum Safeguards for Salem Unit 2 without Recirculation Spray

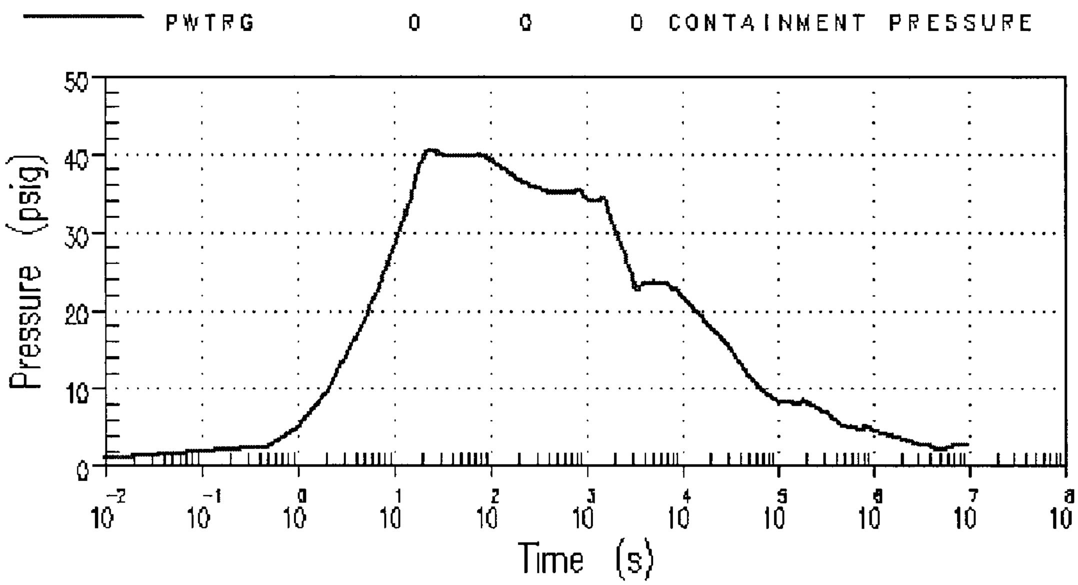

Figure A.6.3-7 Containment Pressure – Double-ended Pump Suction Break with Maximum Safeguards for Salem Unit 2 without Recirculation Spray

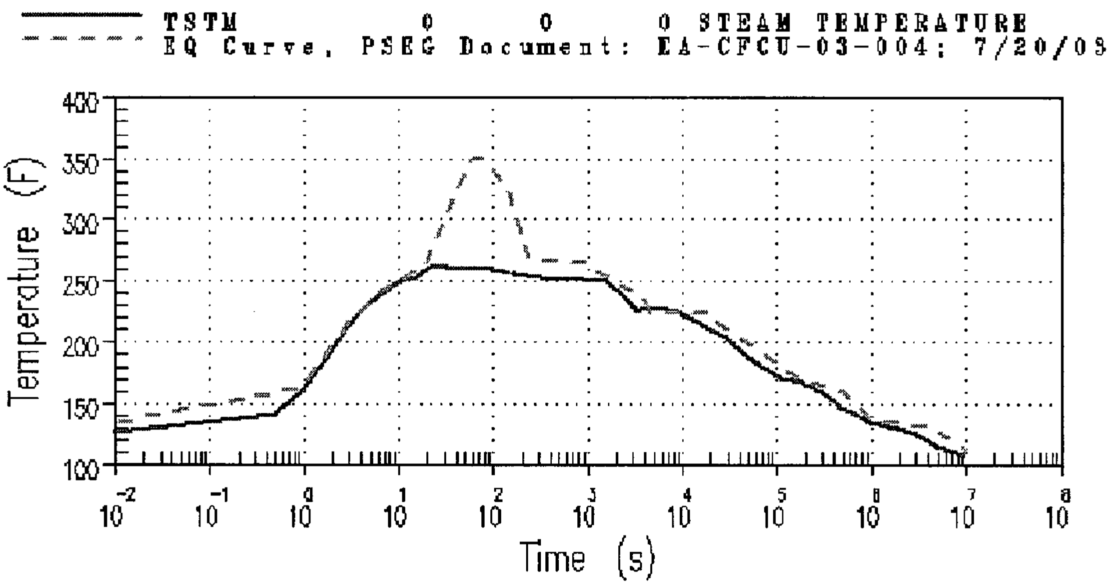

Figure A.6.3-8 Containment Temperature – Double-ended Pump Suction Break with Maximum Safeguards for Salem Unit 2 without Recirculation Spray

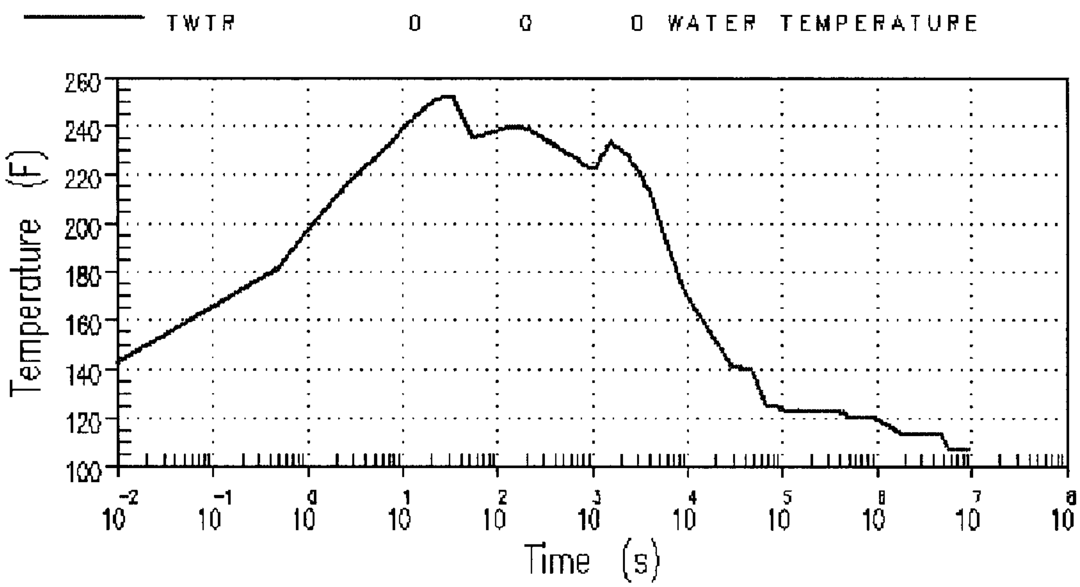

Figure A.6.3-9 Containment Sump Temperature – Double-ended Pump Suction Break with Maximum Safeguards for Salem Unit 2 without Recirculation Spray

Table A.6.3-5 Containment Response Time History LOCA DEHL Break Unit 2			
Time, seconds	**Pressure, psig**	**Steam Temp, °F**	**Water Temp, °F**
1.0000000E-03	3.0000001E-01	1.2000000E+02	1.2000000E+02
5.0000101E-01	2.9974909E+00	1.4407857E+02	1.7436661E+02
1.0000020E+00	5.1858926E+00	1.6225713E+02	1.9047081E+02
2.0000031E+00	9.1857882E+00	1.8962465E+02	2.0625116E+02
3.0000041E+00	1.2785799E+01	2.0876616E+02	2.1530943E+02
4.0000048E+00	1.5992664E+01	2.2235213E+02	2.2177161E+02
5.0000062E+00	1.8879787E+01	2.3233104E+02	2.2689819E+02
6.0000072E+00	2.1518888E+01	2.3991296E+02	2.3120027E+02
7.0000081E+00	2.3897449E+01	2.4554007E+02	2.3459985E+02
8.0000086E+00	2.5998247E+01	2.4952411E+02	2.3721846E+02
9.0000095E+00	2.7984505E+01	2.5276570E+02	2.3969310E+02
1.0000011E+01	2.9949047E+01	2.5572682E+02	2.4217075E+02
1.1000012E+01	3.1609825E+01	2.5739081E+02	2.4418195E+02
1.2000013E+01	3.3127331E+01	2.5851877E+02	2.4592206E+02
1.3000014E+01	3.4507416E+01	2.5916177E+02	2.4744957E+02
1.4000015E+01	3.5695835E+01	2.5919626E+02	2.4868417E+02
1.5000016E+01	3.6794529E+01	2.5900558E+02	2.4975461E+02
1.6000017E+01	3.7783298E+01	2.5853580E+02	2.5062361E+02
1.7000017E+01	3.8797394E+01	2.5968933E+02	2.5130164E+02
1.8000019E+01	3.9760216E+01	2.6121823E+02	2.5172302E+02
1.9000019E+01	4.0554836E+01	2.6245752E+02	2.5193655E+02
2.0000021E+01	4.1215778E+01	2.6347333E+02	2.5204836E+02
2.1000023E+01	4.1745052E+01	2.6427728E+02	2.5206381E+02
2.2000023E+01	4.2156380E+01	2.6489636E+02	2.5205128E+02
2.3000025E+01	4.2466713E+01	2.6536011E+02	2.5204008E+02
2.4000025E+01	4.2672180E+01	2.6566559E+02	2.5203249E+02
2.5000027E+01	4.2749409E+01	2.6578006E+02	2.5202687E+02
2.6000027E+01	4.2669342E+01	2.6566116E+02	2.5201706E+02
2.7000029E+01	4.2552422E+01	2.6548730E+02	2.5201440E+02
2.8000029E+01	4.2438751E+01	2.6531790E+02	2.5201566E+02
2.9000031E+01	4.2327686E+01	2.6515201E+02	2.5201599E+02

Table A.6.3-5 Containment Response Time History LOCA DEHL Break Unit 2 (cont.)

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
3.0000031E+01	4.2219189E+01	2.6498959E+02	2.5201579E+02
3.1000032E+01	4.2112953E+01	2.6483023E+02	2.5201178E+02
3.2000034E+01	4.2009392E+01	2.6467459E+02	2.5200961E+02
3.3000034E+01	4.1907967E+01	2.6452182E+02	2.5200859E+02
3.4000034E+01	4.1808731E+01	2.6437207E+02	2.5200542E+02
3.5000034E+01	4.1711475E+01	2.6422501E+02	2.5200330E+02
3.6000038E+01	4.1616249E+01	2.6408075E+02	2.5199921E+02
3.7000038E+01	4.1522858E+01	2.6393903E+02	2.5199612E+02
3.8000038E+01	4.1431355E+01	2.6379987E+02	2.5199121E+02
3.9000038E+01	4.1341553E+01	2.6366309E+02	2.5198726E+02
4.0000042E+01	4.1253506E+01	2.6352875E+02	2.5198161E+02
4.1000042E+01	4.1167049E+01	2.6339658E+02	2.5197690E+02
4.2000042E+01	4.1082226E+01	2.6326669E+02	2.5197060E+02
4.3000046E+01	4.0998886E+01	2.6313889E+02	2.5196518E+02
4.4000046E+01	4.0917076E+01	2.6301318E+02	2.5195830E+02
4.5000046E+01	4.0836647E+01	2.6288940E+02	2.5195227E+02
4.6000046E+01	4.0757648E+01	2.6276764E+02	2.5194487E+02
4.7000050E+01	4.0679947E+01	2.6264767E+02	2.5193828E+02
4.8000050E+01	4.0603577E+01	2.6252960E+02	2.5193040E+02
4.9000050E+01	4.0528419E+01	2.6241321E+02	2.5192332E+02
5.0000000E+01	4.0454521E+01	2.6229861E+02	2.5191502E+02

Table A.6.3-6 Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
1.0000000E-03	3.0000001E-01	1.2000000E+02	1.2000000E+02
5.0000101E-01	2.7377305E+00	1.4175673E+02	1.8165433E+02
1.0000020E+00	5.1043859E+00	1.6172694E+02	1.9698438E+02
2.0000031E+00	9.6145220E+00	1.9290843E+02	2.1093115E+02
3.0000041E+00	1.3546153E+01	2.1365404E+02	2.1841243E+02
4.0000048E+00	1.6446903E+01	2.2515033E+02	2.2304181E+02
5.0000062E+00	1.8802063E+01	2.3241910E+02	2.2657838E+02
6.0000072E+00	2.0861027E+01	2.3753821E+02	2.2955685E+02
7.0000081E+00	2.2747114E+01	2.4143102E+02	2.3215051E+02
8.0000086E+00	2.4569263E+01	2.4475485E+02	2.3442120E+02
9.0000095E+00	2.6332142E+01	2.4760060E+02	2.3663675E+02
1.0000011E+01	2.7894531E+01	2.4947014E+02	2.3856372E+02
1.1000012E+01	2.9344450E+01	2.5083463E+02	2.4022670E+02
1.2000013E+01	3.0683960E+01	2.5175533E+02	2.4172232E+02
1.3000014E+01	3.1928970E+01	2.5233685E+02	2.4307883E+02
1.4000015E+01	3.3092827E+01	2.5265875E+02	2.4430215E+02
1.5000016E+01	3.4186600E+01	2.5278084E+02	2.4540190E+02
1.6000017E+01	3.5273300E+01	2.5381152E+02	2.4639232E+02
1.7000017E+01	3.6346729E+01	2.5565021E+02	2.4728506E+02
1.8000019E+01	3.7343456E+01	2.5731796E+02	2.4808972E+02
1.9000019E+01	3.8266605E+01	2.5883020E+02	2.4881111E+02
2.0000021E+01	3.9100410E+01	2.6017050E+02	2.4944312E+02
2.1000023E+01	3.9715305E+01	2.6114410E+02	2.4989507E+02
2.2000023E+01	4.0117481E+01	2.6177411E+02	2.5025262E+02
2.3000025E+01	4.0410000E+01	2.6222873E+02	2.5069812E+02
2.4000025E+01	4.0547562E+01	2.6244131E+02	2.5103242E+02
2.5000027E+01	4.0595924E+01	2.6251535E+02	2.5142020E+02
2.6000027E+01	4.0576283E+01	2.6248447E+02	2.5162814E+02
2.7000029E+01	4.0511387E+01	2.6238376E+02	2.5169714E+02
2.8000029E+01	4.0403172E+01	2.6221579E+02	2.5169411E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
2.9000031E+01	4.0293980E+01	2.6204593E+02	2.5168768E+02
3.0000031E+01	4.0194103E+01	2.6189023E+02	2.5168175E+02
3.1000032E+01	4.0102493E+01	2.6174713E+02	2.5167653E+02
3.2000034E+01	4.0017597E+01	2.6161429E+02	2.5167094E+02
3.3000034E+01	3.9937447E+01	2.6148865E+02	2.5166087E+02
3.4000034E+01	3.9862865E+01	2.6137152E+02	2.5165269E+02
3.5000034E+01	3.9792828E+01	2.6126138E+02	2.5164627E+02
3.6000038E+01	3.9730282E+01	2.6116281E+02	2.5155420E+02
3.7000038E+01	3.9705872E+01	2.6112369E+02	2.5085823E+02
3.8000038E+01	3.9699924E+01	2.6111343E+02	2.4996265E+02
3.9000038E+01	3.9695457E+01	2.6110553E+02	2.4911298E+02
4.0000042E+01	3.9691570E+01	2.6109851E+02	2.4829872E+02
4.1000042E+01	3.9687847E+01	2.6109180E+02	2.4752342E+02
4.2000042E+01	3.9684582E+01	2.6108582E+02	2.4677913E+02
4.3000046E+01	3.9681435E+01	2.6107999E+02	2.4606985E+02
4.4000046E+01	3.9678696E+01	2.6107486E+02	2.4538774E+02
4.5000046E+01	3.9676052E+01	2.6106989E+02	2.4473714E+02
4.6000046E+01	3.9673790E+01	2.6106549E+02	2.4411032E+02
4.7000050E+01	3.9671616E+01	2.6106128E+02	2.4351195E+02
4.8000050E+01	3.9669796E+01	2.6105762E+02	2.4293443E+02
4.9000050E+01	3.9668056E+01	2.6105411E+02	2.4238271E+02
5.0000050E+01	3.9666653E+01	2.6105115E+02	2.4184935E+02
5.1000053E+01	3.9665318E+01	2.6104828E+02	2.4133945E+02
5.2000053E+01	3.9664299E+01	2.6104593E+02	2.4084576E+02
5.3000053E+01	3.9663338E+01	2.6104367E+02	2.4037350E+02
5.4000053E+01	3.9662674E+01	2.6104187E+02	2.3991559E+02
5.5000057E+01	3.9662060E+01	2.6104019E+02	2.3947731E+02
5.6000057E+01	3.9661476E+01	2.6103854E+02	2.3905502E+02
5.7000057E+01	3.9660339E+01	2.6102542E+02	2.3876781E+02
5.8000057E+01	3.9656666E+01	2.6100833E+02	2.3851617E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
5.9000061E+01	3.9697388E+01	2.6104141E+02	2.3854469E+02
6.0000061E+01	3.9771782E+01	2.6111566E+02	2.3855920E+02
6.1000061E+01	3.9847462E+01	2.6119186E+02	2.3857700E+02
6.2000065E+01	3.9921856E+01	2.6126599E+02	2.3859746E+02
6.3000065E+01	3.9994831E+01	2.6133777E+02	2.3861861E+02
6.4000069E+01	4.0066448E+01	2.6140738E+02	2.3863905E+02
6.5000069E+01	4.0136703E+01	2.6147476E+02	2.3866019E+02
6.6000069E+01	4.0205597E+01	2.6153995E+02	2.3868062E+02
6.7000069E+01	4.0273205E+01	2.6160306E+02	2.3870172E+02
6.8000069E+01	4.0339642E+01	2.6166428E+02	2.3872214E+02
6.9000069E+01	4.0404926E+01	2.6172363E+02	2.3874321E+02
7.0000069E+01	4.0469101E+01	2.6178122E+02	2.3876361E+02
7.1000069E+01	4.0532177E+01	2.6183704E+02	2.3878465E+02
7.2000076E+01	4.0594200E+01	2.6189114E+02	2.3880502E+02
7.3000076E+01	4.0655170E+01	2.6194360E+02	2.3882603E+02
7.4000076E+01	4.0715141E+01	2.6199445E+02	2.3884639E+02
7.5000076E+01	4.0774113E+01	2.6204370E+02	2.3886736E+02
7.6000076E+01	4.0832138E+01	2.6209146E+02	2.3888768E+02
7.7000076E+01	4.0881500E+01	2.6213629E+02	2.3891238E+02
7.8000076E+01	4.0929882E+01	2.6217957E+02	2.3893221E+02
7.9000076E+01	4.0964104E+01	2.6221936E+02	2.3895769E+02
8.0000084E+01	4.0987869E+01	2.6225610E+02	2.3897502E+02
8.1000084E+01	4.1010792E+01	2.6229153E+02	2.3899702E+02
8.2000084E+01	4.1032990E+01	2.6232584E+02	2.3901578E+02
8.3000084E+01	4.1054340E+01	2.6235883E+02	2.3903996E+02
8.4000084E+01	4.1074883E+01	2.6239053E+02	2.3905936E+02
8.5000084E+01	4.1094776E+01	2.6242120E+02	2.3907820E+02
8.6000084E+01	4.1113953E+01	2.6245081E+02	2.3909959E+02
8.7000092E+01	4.1132423E+01	2.6247925E+02	2.3912065E+02
8.8000092E+01	4.1150200E+01	2.6250665E+02	2.3914198E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
8.9000092E+01	4.1167316E+01	2.6253299E+02	2.3916296E+02
9.0000092E+01	4.1177494E+01	2.6254858E+02	2.3920303E+02
9.1000092E+01	4.1181259E+01	2.6255423E+02	2.3924449E+02
9.2000092E+01	4.1184433E+01	2.6255896E+02	2.3928629E+02
9.3000092E+01	4.1187042E+01	2.6256284E+02	2.3933330E+02
9.4000092E+01	4.1189075E+01	2.6256580E+02	2.3937735E+02
9.5000099E+01	4.1190639E+01	2.6256805E+02	2.3941888E+02
9.6000099E+01	4.1191677E+01	2.6256949E+02	2.3946315E+02
9.7000099E+01	4.1192226E+01	2.6257019E+02	2.3950639E+02
9.8000099E+01	4.1192326E+01	2.6257016E+02	2.3954713E+02
9.9000099E+01	4.1192081E+01	2.6256964E+02	2.3958289E+02
1.0000010E+02	4.1191525E+01	2.6256860E+02	2.3962268E+02
1.0100010E+02	4.1190659E+01	2.6256711E+02	2.3966277E+02
1.0200011E+02	4.1185452E+01	2.6255890E+02	2.3970602E+02
1.0300011E+02	4.1177898E+01	2.6254709E+02	2.3974724E+02
1.0400011E+02	4.1169971E+01	2.6253467E+02	2.3979187E+02
1.0500011E+02	4.1161766E+01	2.6252182E+02	2.3983272E+02
1.0600011E+02	4.1153229E+01	2.6250845E+02	2.3987689E+02
1.0700011E+02	4.1144444E+01	2.6249472E+02	2.3991734E+02
1.0800011E+02	4.1135357E+01	2.6248053E+02	2.3996106E+02
1.0900011E+02	4.1126057E+01	2.6246597E+02	2.4000111E+02
1.1000011E+02	4.1116474E+01	2.6245099E+02	2.4004439E+02
1.1100011E+02	4.1106712E+01	2.6243573E+02	2.4008405E+02
1.1200011E+02	4.1096710E+01	2.6242010E+02	2.4012688E+02
1.1300011E+02	4.1086552E+01	2.6240421E+02	2.4016615E+02
1.1400011E+02	4.1076176E+01	2.6238800E+02	2.4020854E+02
1.1500011E+02	4.1065670E+01	2.6237158E+02	2.4024742E+02
1.1600011E+02	4.1054977E+01	2.6235486E+02	2.4028938E+02
1.1700011E+02	4.1044182E+01	2.6233798E+02	2.4032790E+02
1.1800012E+02	4.1033218E+01	2.6232083E+02	2.4036942E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
1.1900012E+02	4.1022179E+01	2.6230356E+02	2.4040755E+02
1.2000012E+02	4.1010994E+01	2.6228607E+02	2.4044865E+02
1.2100012E+02	4.0999752E+01	2.6226849E+02	2.4048640E+02
1.2200012E+02	4.0988396E+01	2.6225073E+02	2.4052708E+02
1.2300012E+02	4.0976997E+01	2.6223291E+02	2.4056447E+02
1.2400012E+02	4.0965504E+01	2.6221490E+02	2.4060474E+02
1.2500013E+02	4.0953991E+01	2.6219690E+02	2.4064177E+02
1.2600013E+02	4.0942402E+01	2.6217874E+02	2.4068163E+02
1.2700013E+02	4.0930813E+01	2.6216058E+02	2.4071829E+02
1.2800012E+02	4.0919163E+01	2.6214236E+02	2.4075775E+02
1.2900014E+02	4.0907528E+01	2.6212411E+02	2.4079407E+02
1.3000014E+02	4.0895855E+01	2.6210583E+02	2.4083313E+02
1.3100014E+02	4.0884212E+01	2.6208759E+02	2.4086908E+02
1.3200014E+02	4.0872543E+01	2.6206931E+02	2.4090776E+02
1.3300014E+02	4.0860920E+01	2.6205106E+02	2.4094337E+02
1.3400014E+02	4.0849281E+01	2.6203281E+02	2.4098166E+02
1.3500014E+02	4.0837708E+01	2.6201465E+02	2.4101694E+02
1.3600014E+02	4.0826134E+01	2.6199649E+02	2.4105484E+02
1.3700014E+02	4.0814632E+01	2.6197845E+02	2.4108978E+02
1.3800014E+02	4.0803150E+01	2.6196042E+02	2.4112732E+02
1.3900014E+02	4.0791748E+01	2.6194250E+02	2.4116193E+02
1.4000014E+02	4.0780373E+01	2.6192465E+02	2.4119910E+02
1.4100014E+02	4.0769093E+01	2.6190692E+02	2.4123338E+02
1.4200014E+02	4.0757847E+01	2.6188925E+02	2.4127019E+02
1.4300014E+02	4.0746708E+01	2.6187173E+02	2.4130415E+02
1.4400015E+02	4.0735615E+01	2.6185428E+02	2.4134061E+02
1.4500015E+02	4.0724632E+01	2.6183701E+02	2.4137427E+02
1.4600015E+02	4.0713707E+01	2.6181982E+02	2.4141037E+02
1.4700015E+02	4.0702904E+01	2.6180283E+02	2.4144371E+02
1.4800015E+02	4.0692162E+01	2.6178592E+02	2.4147946E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
1.4900015E+02	4.0681549E+01	2.6176920E+02	2.4151251E+02
1.5000015E+02	4.0671009E+01	2.6175259E+02	2.4154793E+02
1.5100015E+02	4.0660599E+01	2.6173618E+02	2.4158067E+02
1.5200015E+02	4.0650269E+01	2.6171991E+02	2.4161577E+02
1.5300015E+02	4.0640076E+01	2.6170383E+02	2.4164822E+02
1.5400015E+02	4.0629959E+01	2.6168787E+02	2.4168298E+02
1.5500015E+02	4.0619991E+01	2.6167215E+02	2.4171515E+02
1.5600015E+02	4.0610107E+01	2.6165656E+02	2.4174959E+02
1.5700015E+02	4.0600368E+01	2.6164117E+02	2.4178146E+02
1.5800015E+02	4.0590725E+01	2.6162595E+02	2.4181560E+02
1.5900015E+02	4.0581230E+01	2.6161096E+02	2.4184720E+02
1.6000017E+02	4.0571835E+01	2.6159610E+02	2.4188101E+02
1.6100017E+02	4.0562592E+01	2.6158148E+02	2.4191234E+02
1.6200017E+02	4.0553452E+01	2.6156705E+02	2.4194586E+02
1.6300017E+02	4.0544468E+01	2.6155283E+02	2.4197693E+02
1.6400017E+02	4.0535591E+01	2.6153879E+02	2.4201015E+02
1.6500017E+02	4.0526875E+01	2.6152499E+02	2.4204094E+02
1.6600017E+02	4.0518265E+01	2.6151135E+02	2.4207387E+02
1.6700017E+02	4.0509819E+01	2.6149799E+02	2.4210440E+02
1.6800017E+02	4.0501484E+01	2.6148477E+02	2.4213704E+02
1.6900017E+02	4.0493317E+01	2.6147183E+02	2.4216733E+02
1.7000017E+02	4.0485264E+01	2.6145905E+02	2.4219969E+02
1.7100017E+02	4.0477375E+01	2.6144653E+02	2.4222972E+02
1.7200017E+02	4.0469604E+01	2.6143420E+02	2.4226181E+02
1.7300017E+02	4.0462002E+01	2.6142212E+02	2.4229160E+02
1.7400017E+02	4.0454517E+01	2.6141025E+02	2.4232341E+02
1.7500018E+02	4.0447205E+01	2.6139862E+02	2.4235297E+02
1.7600018E+02	4.0440010E+01	2.6138718E+02	2.4238452E+02
1.7700018E+02	4.0432987E+01	2.6137604E+02	2.4241383E+02
1.7800018E+02	4.0426128E+01	2.6136511E+02	2.4244513E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	**Pressure, psig**	**Steam Temp, °F**	**Water Temp, °F**
1.7900018E+02	4.0419521E+01	2.6135458E+02	2.4247423E+02
1.8000018E+02	4.0413113E+01	2.6134439E+02	2.4250533E+02
1.8100018E+02	4.0406971E+01	2.6133459E+02	2.4253429E+02
1.8200018E+02	4.0401043E+01	2.6132513E+02	2.4256526E+02
1.8300018E+02	4.0395397E+01	2.6131613E+02	2.4259419E+02
1.8400018E+02	4.0389980E+01	2.6130746E+02	2.4262514E+02
1.8500018E+02	4.0384853E+01	2.6129926E+02	2.4265410E+02
1.8600018E+02	4.0379963E+01	2.6129144E+02	2.4268507E+02
1.8700018E+02	4.0375359E+01	2.6128406E+02	2.4271411E+02
1.8800018E+02	4.0380661E+01	2.6129218E+02	2.4275697E+02
1.8900018E+02	4.0386021E+01	2.6130042E+02	2.4279738E+02
1.9000020E+02	4.0391399E+01	2.6130869E+02	2.4283952E+02
1.9100020E+02	4.0396854E+01	2.6131705E+02	2.4287971E+02
1.9200020E+02	4.0402325E+01	2.6132544E+02	2.4292162E+02
1.9300020E+02	4.0407879E+01	2.6133398E+02	2.4296159E+02
1.9400020E+02	4.0413490E+01	2.6134262E+02	2.4300323E+02
1.9500020E+02	4.0419216E+01	2.6135141E+02	2.4304297E+02
1.9600020E+02	4.0424999E+01	2.6136029E+02	2.4308435E+02
1.9700020E+02	4.0430897E+01	2.6136935E+02	2.4312383E+02
1.9800020E+02	4.0436848E+01	2.6137851E+02	2.4316495E+02
1.9900020E+02	4.0442917E+01	2.6138785E+02	2.4320419E+02
2.0900020E+02	4.0507156E+01	2.6148669E+02	2.4356624E+02
2.1900020E+02	4.0581089E+01	2.6160056E+02	2.4397011E+02
2.2900020E+02	4.0658741E+01	2.6172006E+02	2.4432762E+02
2.3900020E+02	4.0743034E+01	2.6184976E+02	2.4471132E+02
2.4900020E+02	4.0830868E+01	2.6198474E+02	2.4504443E+02
2.5900021E+02	4.0925652E+01	2.6213025E+02	2.4540538E+02
2.6900021E+02	4.1021111E+01	2.6227655E+02	2.4573274E+02
2.7900021E+02	4.1122654E+01	2.6243198E+02	2.4606891E+02
2.8900021E+02	4.1227139E+01	2.6259164E+02	2.4639607E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	**Pressure, psig**	**Steam Temp, °F**	**Water Temp, °F**
2.9900021E+02	4.1332500E+01	2.6275232E+02	2.4671776E+02
3.0900021E+02	4.1440376E+01	2.6291650E+02	2.4702124E+02
3.1900021E+02	4.1551456E+01	2.6308530E+02	2.4733575E+02
3.2900021E+02	4.1662994E+01	2.6325436E+02	2.4763008E+02
3.3900021E+02	4.1778263E+01	2.6342877E+02	2.4792667E+02
3.4900021E+02	4.1893257E+01	2.6360239E+02	2.4821886E+02
3.5900021E+02	4.2009678E+01	2.6377774E+02	2.4850156E+02
3.6900021E+02	4.2126579E+01	2.6395346E+02	2.4878903E+02
3.7900021E+02	4.2244324E+01	2.6413004E+02	2.4906316E+02
3.8900021E+02	4.2361507E+01	2.6430536E+02	2.4934213E+02
3.9900021E+02	4.2479481E+01	2.6448148E+02	2.4960844E+02
4.0900021E+02	4.2597214E+01	2.6465680E+02	2.4987930E+02
4.1900021E+02	4.2714695E+01	2.6483136E+02	2.5013840E+02
4.2900021E+02	4.2831608E+01	2.6500470E+02	2.5040196E+02
4.3900021E+02	4.2948689E+01	2.6517786E+02	2.5065417E+02
4.4900021E+02	4.3064953E+01	2.6534946E+02	2.5091075E+02
4.5900021E+02	4.3180046E+01	2.6551889E+02	2.5115680E+02
4.6900021E+02	4.3293800E+01	2.6568597E+02	2.5140718E+02
4.7900021E+02	4.3407330E+01	2.6585239E+02	2.5164720E+02
4.8900024E+02	4.3438698E+01	2.6589700E+02	2.5192436E+02
4.9900024E+02	4.3348747E+01	2.6576205E+02	2.5219897E+02
5.9900024E+02	4.2661674E+01	2.6471912E+02	2.5459923E+02
6.9900024E+02	4.2252506E+01	2.6408389E+02	2.5650812E+02
7.9900024E+02	4.1922268E+01	2.6356375E+02	2.5804428E+02
8.9900024E+02	4.1691753E+01	2.6319299E+02	2.5930780E+02
9.9900024E+02	4.1532703E+01	2.6293036E+02	2.6036475E+02
1.0990002E+03	4.1427536E+01	2.6274985E+02	2.6127325E+02
1.1990002E+03	4.1367294E+01	2.6263828E+02	2.6205905E+02
1.2990002E+03	4.1338856E+01	2.6257562E+02	2.6275055E+02
1.3990002E+03	4.1339417E+01	2.6255768E+02	2.6336282E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
1.4990002E+03	4.1358017E+01	2.6256757E+02	2.6390970E+02
1.5990002E+03	4.1100357E+01	2.6214996E+02	2.6286227E+02
1.6990002E+03	4.0341888E+01	2.6094461E+02	2.5909674E+02
1.7990002E+03	3.9627110E+01	2.5979214E+02	2.5641498E+02
1.8990002E+03	3.8930882E+01	2.5866089E+02	2.5652002E+02
1.9990002E+03	3.8261452E+01	2.5755661E+02	2.5656296E+02
2.0990002E+03	3.7615620E+01	2.5647543E+02	2.5657990E+02
2.1990002E+03	3.6988983E+01	2.5541098E+02	2.5657196E+02
2.2990002E+03	3.6379208E+01	2.5436023E+02	2.5654285E+02
2.3990002E+03	3.5782349E+01	2.5331702E+02	2.5649411E+02
2.4990002E+03	3.5199162E+01	2.5228319E+02	2.5642664E+02
2.5990002E+03	3.4626514E+01	2.5125368E+02	2.5634259E+02
2.6990002E+03	3.4065338E+01	2.5023050E+02	2.5624261E+02
2.7990002E+03	3.3513073E+01	2.4920940E+02	2.5612851E+02
2.8990002E+03	3.2970726E+01	2.4819246E+02	2.5600076E+02
2.9990002E+03	3.2436111E+01	2.4717592E+02	2.5586084E+02
3.0990002E+03	3.1910686E+01	2.4616272E+02	2.5548123E+02
3.1990002E+03	3.1393759E+01	2.4515187E+02	2.5485771E+02
3.2990002E+03	3.0886284E+01	2.4414545E+02	2.5424655E+02
3.3990002E+03	3.0386446E+01	2.4314020E+02	2.5364651E+02
3.4990002E+03	2.9895210E+01	2.4213824E+02	2.5305693E+02
3.5990002E+03	2.9409592E+01	2.4113376E+02	2.5247696E+02
3.6990002E+03	2.8835196E+01	2.3992908E+02	2.5160596E+02
3.7990002E+03	2.8181076E+01	2.3853357E+02	2.5042717E+02
3.8990002E+03	2.7546234E+01	2.3715218E+02	2.4927922E+02
3.9990002E+03	2.6928131E+01	2.3578065E+02	2.4815977E+02
4.9990005E+03	2.7995838E+01	2.3809891E+02	2.4226140E+02
5.9990005E+03	2.9336639E+01	2.4092642E+02	2.3944005E+02
6.9990005E+03	3.0215376E+01	2.4272096E+02	2.3676080E+02
7.9990005E+03	3.0776918E+01	2.4384483E+02	2.3401547E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	**Pressure, psig**	**Steam Temp, °F**	**Water Temp, °F**
8.9990000E+03	3.1147141E+01	2.4457643E+02	2.3140181E+02
9.9990000E+03	3.1344822E+01	2.4496410E+02	2.2893909E+02
1.9999000E+04	3.1712830E+01	2.4568095E+02	2.0799855E+02
2.9999000E+04	3.0407043E+01	2.4310707E+02	1.9567717E+02
3.9999000E+04	2.7495953E+01	2.3701285E+02	1.8860847E+02
4.9999000E+04	2.3893183E+01	2.2866263E+02	1.8327917E+02
5.9999000E+04	2.0748383E+01	2.2045302E+02	1.7136578E+02
6.9999000E+04	1.8982918E+01	2.1537199E+02	1.6341751E+02
7.9999000E+04	1.7721331E+01	2.1149138E+02	1.5836533E+02
8.9999000E+04	1.6661583E+01	2.0804773E+02	1.5509903E+02
9.9999000E+04	1.5690962E+01	2.0472798E+02	1.5286258E+02
1.0999900E+05	1.4880422E+01	2.0182376E+02	1.4691727E+02
1.1999900E+05	1.4459888E+01	2.0026926E+02	1.4272394E+02
1.2999900E+05	1.4172567E+01	1.9918858E+02	1.4007407E+02
1.3999900E+05	1.3945285E+01	1.9832292E+02	1.3863980E+02
1.4999900E+05	1.3729558E+01	1.9749106E+02	1.3776469E+02
1.5999900E+05	1.3553062E+01	1.9680421E+02	1.3741458E+02
1.6999900E+05	1.3333532E+01	1.9593669E+02	1.3868260E+02
1.7999900E+05	1.3140196E+01	1.9516452E+02	1.3666537E+02
1.8999900E+05	1.2934007E+01	1.9432979E+02	1.3627332E+02
1.9999900E+05	1.2761701E+01	1.9362515E+02	1.3790399E+02
2.0999900E+05	1.2569163E+01	1.9282777E+02	1.3600957E+02
2.1999900E+05	1.2380672E+01	1.9203734E+02	1.3569241E+02
2.2999900E+05	1.2195756E+01	1.9125255E+02	1.3585246E+02
2.3999900E+05	1.2006000E+01	1.9043675E+02	1.3545036E+02
2.4999900E+05	1.1819395E+01	1.8962415E+02	1.3523177E+02
2.5999900E+05	1.1635199E+01	1.8881155E+02	1.3570601E+02
2.6999900E+05	1.1447936E+01	1.8797484E+02	1.3507417E+02
2.7999900E+05	1.1266123E+01	1.8715187E+02	1.3488518E+02
2.8999900E+05	1.1065473E+01	1.8622952E+02	1.3506075E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
2.9999900E+05	1.0899832E+01	1.8546017E+02	1.3466954E+02
3.0999900E+05	1.0722490E+01	1.8462491E+02	1.3452797E+02
3.1999900E+05	1.0529454E+01	1.8370169E+02	1.3461679E+02
3.2999900E+05	1.0360531E+01	1.8288361E+02	1.3539577E+02
3.3999900E+05	1.0189473E+01	1.8204486E+02	1.3395914E+02
3.4999900E+05	1.0013686E+01	1.8117044E+02	1.3394897E+02
3.5999900E+05	9.8425398E+00	1.8030736E+02	1.3387988E+02
3.6999900E+05	9.6631165E+00	1.7938882E+02	1.3394238E+02
3.7999900E+05	9.4934206E+00	1.7850761E+02	1.3474648E+02
3.8999900E+05	9.3277550E+00	1.7763644E+02	1.3350316E+02
3.9999900E+05	9.1578321E+00	1.7672929E+02	1.3344215E+02
4.0999900E+05	8.9893742E+00	1.7581673E+02	1.3343324E+02
4.1999900E+05	8.8188725E+00	1.7487900E+02	1.3329665E+02
4.2999900E+05	8.6608839E+00	1.7399744E+02	1.3390915E+02
4.3999900E+05	8.5009003E+00	1.7309283E+02	1.3290514E+02
4.4999900E+05	8.3743687E+00	1.7237050E+02	1.3313115E+02
4.5999900E+05	8.1838408E+00	1.7125861E+02	1.3309465E+02
4.6999900E+05	8.0362225E+00	1.7038710E+02	1.3267313E+02
4.7999900E+05	7.8809385E+00	1.6945526E+02	1.3300185E+02
4.8999900E+05	7.7213731E+00	1.6848323E+02	1.3247047E+02
4.9999900E+05	7.5737901E+00	1.6757108E+02	1.3242033E+02
5.0999900E+05	7.4071469E+00	1.6652419E+02	1.2747350E+02
5.1999900E+05	7.3257651E+00	1.6601840E+02	1.2320090E+02
5.2999900E+05	7.2339711E+00	1.6543831E+02	1.2302129E+02
5.3999900E+05	7.1931095E+00	1.6519128E+02	1.2123569E+02
5.4999900E+05	7.1377625E+00	1.6484720E+02	1.2074593E+02
5.5999900E+05	7.0730925E+00	1.6443864E+02	1.2072103E+02
5.6999900E+05	7.0328526E+00	1.6419107E+02	1.2058758E+02
5.7999900E+05	6.9798737E+00	1.6385721E+02	1.2027435E+02
5.8999900E+05	6.9211349E+00	1.6348232E+02	1.2055446E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
5.9999900E+05	6.8855424E+00	1.6326202E+02	1.2142476E+02
6.0999900E+05	6.8395510E+00	1.6297087E+02	1.2038018E+02
6.1999900E+05	6.7945986E+00	1.6268535E+02	1.2013365E+02
6.2999900E+05	6.7561998E+00	1.6244353E+02	1.2042265E+02
6.3999900E+05	6.7010479E+00	1.6208478E+02	1.2059392E+02
6.4999900E+05	6.6561451E+00	1.6179541E+02	1.2021353E+02
6.5999900E+05	6.6104097E+00	1.6149879E+02	1.2020139E+02
6.6999900E+05	6.5752826E+00	1.6127528E+02	1.2013316E+02
6.7999900E+05	6.5202117E+00	1.6090817E+02	1.2148656E+02
6.8999900E+05	6.4804864E+00	1.6064996E+02	1.2003127E+02
6.9999900E+05	6.4350915E+00	1.6035007E+02	1.1978843E+02
7.0999900E+05	6.4819622E+00	1.6020757E+02	1.2013621E+02
7.1999900E+05	6.4217434E+00	1.5979976E+02	1.2048936E+02
7.2999900E+05	6.3780379E+00	1.5950829E+02	1.2008989E+02
7.3999900E+05	6.3434334E+00	1.5928142E+02	1.1994733E+02
7.4999900E+05	6.2889929E+00	1.5890678E+02	1.2117664E+02
7.5999900E+05	6.2452950E+00	1.5861108E+02	1.2007929E+02
7.6999900E+05	6.2096267E+00	1.5837297E+02	1.1980656E+02
7.7999900E+05	6.1569815E+00	1.5800587E+02	1.2120753E+02
7.8999900E+05	6.1136513E+00	1.5770845E+02	1.1999863E+02
7.9999900E+05	6.0681524E+00	1.5739316E+02	1.1970688E+02
8.0999900E+05	6.0157022E+00	1.5702373E+02	1.1990597E+02
8.1999900E+05	5.9834242E+00	1.5680356E+02	1.2058109E+02
8.2999900E+05	5.9405408E+00	1.5650346E+02	1.1975439E+02
8.3999900E+05	5.8887148E+00	1.5613339E+02	1.1959532E+02
8.4999900E+05	5.8548675E+00	1.5589713E+02	1.2076540E+02
8.5999900E+05	5.8177571E+00	1.5563701E+02	1.1964615E+02
8.6999900E+05	5.7962255E+00	1.5549590E+02	1.1957427E+02
8.7999900E+05	5.7315784E+00	1.5501941E+02	1.1983505E+02
8.8999900E+05	5.6928139E+00	1.5474242E+02	1.1947121E+02

Table A.6.3-6 (cont.) Containment Response Time History LOCA DEPS Minimum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
8.9999900E+05	5.6784687E+00	1.5465544E+02	1.1946669E+02
9.0999900E+05	5.6072531E+00	1.5411992E+02	1.1973032E+02
9.1999900E+05	5.5702462E+00	1.5385269E+02	1.1936458E+02
9.2999900E+05	5.5674348E+00	1.5385568E+02	1.1950878E+02
9.3999900E+05	5.4849429E+00	1.5322250E+02	1.1963742E+02
9.4999900E+05	5.4483552E+00	1.5295461E+02	1.1927088E+02
9.5999900E+05	5.4476647E+00	1.5297461E+02	1.1944189E+02
9.6999900E+05	5.3639402E+00	1.5232204E+02	1.1953861E+02
9.7999900E+05	5.3278642E+00	1.5205426E+02	1.1917640E+02
9.8999900E+05	5.3296523E+00	1.5209468E+02	1.1938239E+02
9.9999900E+05	5.2434459E+00	1.5141179E+02	1.1979611E+02
1.9999990E+06	4.4972239E+00	1.4464240E+02	1.1106709E+02
2.9999990E+06	3.8703470E+00	1.3857857E+02	1.1100359E+02
3.9999990E+06	3.2780111E+00	1.3189030E+02	1.1063203E+02
4.9999990E+06	2.6789305E+00	1.2512090E+02	1.1029323E+02
5.9999990E+06	2.5494401E+00	1.2312603E+02	1.0726540E+02
6.9999990E+06	2.4186227E+00	1.2140044E+02	1.0725146E+02
7.9999990E+06	2.4018857E+00	1.1963458E+02	1.0720021E+02
8.9999990E+06	2.3157248E+00	1.1762753E+02	1.0712606E+02
9.9999990E+06	2.4463527E+00	1.1571759E+02	1.0710013E+02
1.0000000E+07	2.4460907E+00	1.1571380E+02	1.0710018E+02

Table A.6.3-7 Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
1.0000000E-03	3.0000001E-01	1.2000000E+02	1.2000000E+02
5.0000101E-01	2.7377305E+00	1.4175673E+02	1.8165433E+02
1.0000020E+00	5.1043859E+00	1.6172694E+02	1.9698438E+02
2.0000031E+00	9.6145220E+00	1.9290843E+02	2.1093115E+02
3.0000041E+00	1.3546153E+01	2.1365404E+02	2.1841243E+02
4.0000048E+00	1.6446903E+01	2.2515033E+02	2.2304181E+02
5.0000062E+00	1.8802063E+01	2.3241910E+02	2.2657838E+02
6.0000072E+00	2.0861027E+01	2.3753821E+02	2.2955685E+02
7.0000081E+00	2.2747114E+01	2.4143102E+02	2.3215051E+02
8.0000086E+00	2.4569263E+01	2.4475485E+02	2.3442120E+02
9.0000095E+00	2.6332142E+01	2.4760060E+02	2.3663675E+02
1.0000011E+01	2.7894531E+01	2.4947014E+02	2.3856372E+02
1.1000012E+01	2.9344450E+01	2.5083463E+02	2.4022670E+02
1.2000013E+01	3.0683960E+01	2.5175533E+02	2.4172232E+02
1.3000014E+01	3.1928970E+01	2.5233685E+02	2.4307883E+02
1.4000015E+01	3.3092827E+01	2.5265875E+02	2.4430215E+02
1.5000016E+01	3.4186600E+01	2.5278084E+02	2.4540190E+02
1.6000017E+01	3.5273300E+01	2.5381152E+02	2.4639232E+02
1.7000017E+01	3.6346729E+01	2.5565021E+02	2.4728506E+02
1.8000019E+01	3.7343456E+01	2.5731796E+02	2.4808972E+02
1.9000019E+01	3.8266605E+01	2.5883020E+02	2.4881111E+02
2.0000021E+01	3.9100410E+01	2.6017050E+02	2.4944312E+02
2.1000023E+01	3.9715305E+01	2.6114410E+02	2.4989507E+02
2.2000023E+01	4.0117481E+01	2.6177411E+02	2.5025262E+02
2.3000025E+01	4.0410000E+01	2.6222873E+02	2.5069812E+02
2.4000025E+01	4.0547562E+01	2.6244131E+02	2.5103242E+02
2.5000027E+01	4.0595924E+01	2.6251535E+02	2.5142020E+02
2.6000027E+01	4.0576283E+01	2.6248447E+02	2.5162814E+02
2.7000029E+01	4.0511387E+01	2.6238376E+02	2.5169714E+02
2.8000029E+01	4.0403172E+01	2.6221579E+02	2.5169411E+02

Table A.6.3-7 (cont.) Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
2.9000031E+01	4.0293980E+01	2.6204593E+02	2.5168768E+02
3.0000031E+01	4.0194103E+01	2.6189023E+02	2.5168175E+02
3.1000032E+01	4.0102493E+01	2.6174713E+02	2.5167653E+02
3.2000034E+01	4.0017597E+01	2.6161429E+02	2.5167094E+02
3.3000034E+01	3.9937447E+01	2.6148865E+02	2.5166087E+02
3.4000034E+01	3.9862865E+01	2.6137152E+02	2.5165269E+02
3.5000034E+01	3.9792828E+01	2.6126138E+02	2.5164627E+02
3.6000038E+01	3.9730713E+01	2.6116348E+02	2.5154575E+02
3.7000038E+01	3.9712337E+01	2.6113382E+02	2.5073215E+02
3.8000038E+01	3.9714947E+01	2.6113696E+02	2.4969667E+02
3.9000038E+01	3.9718224E+01	2.6114117E+02	2.4869182E+02
4.0000042E+01	3.9721989E+01	2.6114615E+02	2.4773247E+02
4.1000042E+01	3.9726044E+01	2.6115161E+02	2.4681422E+02
4.2000042E+01	3.9730415E+01	2.6115756E+02	2.4592892E+02
4.3000046E+01	3.9735088E+01	2.6116400E+02	2.4507687E+02
4.4000046E+01	3.9740173E+01	2.6117111E+02	2.4426447E+02
4.5000046E+01	3.9745453E+01	2.6117853E+02	2.4348883E+02
4.6000046E+01	3.9750931E+01	2.6118628E+02	2.4273549E+02
4.7000050E+01	3.9756741E+01	2.6119455E+02	2.4202284E+02
4.8000050E+01	3.9762596E+01	2.6120288E+02	2.4132089E+02
4.9000050E+01	3.9768856E+01	2.6121188E+02	2.4065150E+02
5.0000050E+01	3.9775311E+01	2.6122119E+02	2.4000710E+02
5.1000053E+01	3.9781933E+01	2.6123077E+02	2.3938533E+02
5.2000053E+01	3.9788780E+01	2.6124072E+02	2.3878592E+02
5.3000053E+01	3.9795715E+01	2.6125082E+02	2.3820609E+02
5.4000053E+01	3.9802887E+01	2.6126129E+02	2.3764825E+02
5.5000057E+01	3.9810108E+01	2.6127185E+02	2.3710771E+02
5.6000057E+01	3.9816921E+01	2.6128177E+02	2.3660289E+02
5.7000057E+01	3.9819637E+01	2.6127948E+02	2.3620250E+02
5.8000057E+01	3.9823765E+01	2.6127460E+02	2.3582816E+02
5.9000061E+01	3.9826962E+01	2.6126804E+02	2.3551175E+02

Table A.6.3-7 (cont.) Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	**Pressure, psig**	**Steam Temp, °F**	**Water Temp, °F**
6.0000061E+01	3.9833584E+01	2.6123532E+02	2.3551071E+02
6.1000061E+01	3.9835125E+01	2.6119470E+02	2.3560187E+02
6.2000065E+01	3.9837425E+01	2.6115524E+02	2.3569289E+02
6.3000065E+01	3.9840446E+01	2.6111691E+02	2.3578146E+02
6.4000069E+01	3.9844147E+01	2.6107965E+02	2.3586798E+02
6.5000069E+01	3.9848557E+01	2.6104346E+02	2.3595583E+02
6.6000069E+01	3.9853546E+01	2.6100821E+02	2.3603384E+02
6.7000069E+01	3.9859211E+01	2.6097400E+02	2.3611641E+02
6.8000069E+01	3.9865463E+01	2.6094067E+02	2.3619669E+02
6.9000069E+01	3.9872295E+01	2.6090829E+02	2.3627530E+02
7.0000069E+01	3.9879688E+01	2.6087677E+02	2.3635263E+02
7.1000069E+01	3.9887627E+01	2.6084610E+02	2.3642839E+02
7.2000076E+01	3.9896084E+01	2.6081625E+02	2.3650256E+02
7.3000076E+01	3.9905052E+01	2.6078717E+02	2.3657521E+02
7.4000076E+01	3.9914509E+01	2.6075888E+02	2.3664635E+02
7.5000076E+01	3.9924442E+01	2.6073135E+02	2.3671599E+02
7.6000076E+01	3.9934837E+01	2.6070453E+02	2.3678415E+02
7.7000076E+01	3.9942085E+01	2.6067783E+02	2.3685402E+02
7.8000076E+01	3.9945740E+01	2.6065106E+02	2.3691565E+02
7.9000076E+01	3.9949848E+01	2.6062503E+02	2.3698207E+02
8.0000084E+01	3.9935959E+01	2.6059653E+02	2.3704358E+02
8.1000084E+01	3.9918072E+01	2.6056796E+02	2.3710417E+02
8.2000084E+01	3.9900543E+01	2.6053992E+02	2.3716350E+02
8.3000084E+01	3.9883385E+01	2.6051248E+02	2.3722270E+02
8.4000084E+01	3.9866558E+01	2.6048557E+02	2.3728052E+02
8.5000084E+01	3.9850048E+01	2.6045911E+02	2.3733575E+02
8.6000084E+01	3.9833923E+01	2.6043329E+02	2.3739034E+02
8.7000092E+01	3.9818069E+01	2.6040787E+02	2.3744518E+02
8.8000092E+01	3.9802544E+01	2.6038297E+02	2.3749721E+02
8.9000092E+01	3.9787273E+01	2.6035849E+02	2.3754947E+02
9.0000092E+01	3.9767498E+01	2.6032678E+02	2.3760602E+02

Table A.6.3-7 (cont.) Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
9.1000092E+01	3.9740978E+01	2.6028427E+02	2.3767508E+02
9.2000092E+01	3.9714783E+01	2.6024228E+02	2.3774199E+02
9.3000092E+01	3.9688820E+01	2.6020062E+02	2.3780922E+02
9.4000092E+01	3.9663166E+01	2.6015942E+02	2.3787318E+02
9.5000099E+01	3.9637737E+01	2.6011859E+02	2.3793747E+02
9.6000099E+01	3.9612602E+01	2.6007819E+02	2.3799855E+02
9.7000099E+01	3.9587673E+01	2.6003809E+02	2.3805995E+02
9.8000099E+01	3.9563026E+01	2.5999841E+02	2.3811823E+02
9.9000099E+01	3.9538574E+01	2.5995905E+02	2.3817680E+02
1.0000010E+02	3.9514389E+01	2.5992007E+02	2.3823235E+02
1.0100010E+02	3.9490387E+01	2.5988138E+02	2.3828818E+02
1.0200011E+02	3.9463066E+01	2.5983734E+02	2.3834102E+02
1.0300011E+02	3.9430744E+01	2.5978528E+02	2.3839560E+02
1.0400011E+02	3.9398689E+01	2.5973361E+02	2.3844772E+02
1.0500011E+02	3.9366814E+01	2.5968219E+02	2.3850029E+02
1.0600011E+02	3.9335186E+01	2.5963110E+02	2.3854976E+02
1.0700011E+02	3.9303730E+01	2.5958029E+02	2.3859966E+02
1.0800011E+02	3.9272511E+01	2.5952982E+02	2.3864650E+02
1.0900011E+02	3.9241451E+01	2.5947958E+02	2.3869377E+02
1.1000011E+02	3.9210621E+01	2.5942966E+02	2.3873805E+02
1.1100011E+02	3.9179943E+01	2.5937997E+02	2.3878276E+02
1.1200011E+02	3.9149483E+01	2.5933057E+02	2.3882455E+02
1.1300011E+02	3.9119164E+01	2.5928140E+02	2.3886674E+02
1.1400011E+02	3.9089054E+01	2.5923251E+02	2.3890608E+02
1.1500011E+02	3.9059082E+01	2.5918381E+02	2.3894582E+02
1.1600011E+02	3.9029308E+01	2.5913541E+02	2.3898276E+02
1.1700011E+02	3.8999660E+01	2.5908719E+02	2.3902008E+02
1.1800012E+02	3.8970207E+01	2.5903925E+02	2.3905467E+02
1.1900012E+02	3.8940876E+01	2.5899146E+02	2.3908965E+02
1.2000012E+02	3.8911728E+01	2.5894394E+02	2.3912195E+02
1.2100012E+02	3.8882690E+01	2.5889658E+02	2.3915460E+02

Table A.6.3-7 (cont.) Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	**Pressure, psig**	**Steam Temp, °F**	**Water Temp, °F**
1.2200012E+02	3.8853832E+01	2.5884949E+02	2.3918465E+02
1.2300012E+02	3.8825081E+01	2.5880252E+02	2.3921504E+02
1.2400012E+02	3.8796501E+01	2.5875583E+02	2.3924289E+02
1.2500013E+02	3.8768021E+01	2.5870926E+02	2.3927107E+02
1.2600013E+02	3.8739708E+01	2.5866290E+02	2.3929675E+02
1.2700013E+02	3.8711487E+01	2.5861670E+02	2.3932277E+02
1.2800012E+02	3.8683426E+01	2.5857074E+02	2.3934633E+02
1.2900014E+02	3.8655453E+01	2.5852487E+02	2.3937022E+02
1.3000014E+02	3.8627632E+01	2.5847922E+02	2.3939171E+02
1.3100014E+02	3.8599895E+01	2.5843369E+02	2.3941353E+02
1.3200014E+02	3.8572308E+01	2.5838837E+02	2.3943298E+02
1.3300014E+02	3.8544796E+01	2.5834314E+02	2.3945277E+02
1.3400014E+02	3.8517429E+01	2.5829813E+02	2.3947023E+02
1.3500014E+02	3.8490135E+01	2.5825320E+02	2.3948802E+02
1.3600014E+02	3.8462975E+01	2.5820850E+02	2.3950352E+02
1.3700014E+02	3.8435886E+01	2.5816385E+02	2.3951936E+02
1.3800014E+02	3.8408932E+01	2.5811942E+02	2.3953296E+02
1.3900014E+02	3.8382038E+01	2.5807504E+02	2.3954688E+02
1.4000014E+02	3.8355274E+01	2.5803085E+02	2.3955861E+02
1.4100014E+02	3.8328568E+01	2.5798676E+02	2.3957065E+02
1.4200014E+02	3.8301987E+01	2.5794281E+02	2.3958054E+02
1.4300014E+02	3.8275463E+01	2.5789896E+02	2.3959074E+02
1.4400015E+02	3.8249058E+01	2.5785526E+02	2.3959886E+02
1.4500015E+02	3.8222710E+01	2.5781161E+02	2.3960736E+02
1.4600015E+02	3.8196518E+01	2.5776822E+02	2.3961400E+02
1.4700015E+02	3.8170437E+01	2.5772498E+02	2.3962129E+02
1.4800015E+02	3.8144531E+01	2.5768201E+02	2.3962686E+02
1.4900015E+02	3.8118732E+01	2.5763919E+02	2.3963307E+02
1.5000015E+02	3.8093109E+01	2.5759662E+02	2.3963759E+02
1.5100015E+02	3.8067589E+01	2.5755420E+02	2.3964275E+02
1.5200015E+02	3.8042236E+01	2.5751205E+02	2.3964624E+02

Table A.6.3-7 (cont.) Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	**Pressure, psig**	**Steam Temp, °F**	**Water Temp, °F**
1.5300015E+02	3.8016983E+01	2.5747003E+02	2.3965034E+02
1.5400015E+02	3.7991898E+01	2.5742828E+02	2.3965282E+02
1.5500015E+02	3.7966911E+01	2.5738666E+02	2.3965588E+02
1.5600015E+02	3.7942085E+01	2.5734528E+02	2.3965735E+02
1.5700015E+02	3.7917358E+01	2.5730402E+02	2.3965941E+02
1.5800015E+02	3.7892788E+01	2.5726303E+02	2.3965988E+02
1.5900015E+02	3.7868309E+01	2.5722214E+02	2.3966095E+02
1.6000017E+02	3.7843990E+01	2.5718152E+02	2.3966045E+02
1.6100017E+02	3.7819759E+01	2.5714099E+02	2.3966052E+02
1.6200017E+02	3.7795681E+01	2.5710074E+02	2.3965906E+02
1.6300017E+02	3.7771694E+01	2.5706058E+02	2.3965817E+02
1.6400017E+02	3.7747852E+01	2.5702066E+02	2.3965576E+02
1.6500017E+02	3.7724102E+01	2.5698087E+02	2.3965393E+02
1.6600017E+02	3.7700497E+01	2.5694128E+02	2.3965059E+02
1.6700017E+02	3.7676975E+01	2.5690182E+02	2.3964780E+02
1.6800017E+02	3.7653599E+01	2.5686261E+02	2.3964354E+02
1.6900017E+02	3.7630306E+01	2.5682349E+02	2.3963983E+02
1.7000017E+02	3.7607151E+01	2.5678458E+02	2.3963467E+02
1.7100017E+02	3.7584080E+01	2.5674579E+02	2.3963005E+02
1.7200017E+02	3.7561146E+01	2.5670721E+02	2.3962401E+02
1.7300017E+02	3.7538292E+01	2.5666873E+02	2.3961848E+02
1.7400017E+02	3.7515572E+01	2.5663049E+02	2.3961156E+02
1.7500018E+02	3.7492931E+01	2.5659235E+02	2.3960515E+02
1.7600018E+02	3.7470421E+01	2.5655438E+02	2.3959735E+02
1.7700018E+02	3.7447987E+01	2.5651654E+02	2.3959007E+02
1.7800018E+02	3.7425686E+01	2.5647891E+02	2.3958142E+02
1.7900018E+02	3.7403458E+01	2.5644138E+02	2.3957327E+02
1.8000018E+02	3.7381359E+01	2.5640402E+02	2.3956378E+02
1.8100018E+02	3.7359329E+01	2.5636679E+02	2.3955479E+02
1.8200018E+02	3.7337429E+01	2.5632974E+02	2.3954448E+02
1.8300018E+02	3.7315594E+01	2.5629282E+02	2.3953465E+02

Table A.6.3-7 Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray (cont.)

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
1.8400018E+02	3.7293888E+01	2.5625607E+02	2.3952351E+02
1.8500018E+02	3.7272247E+01	2.5621939E+02	2.3951286E+02
1.8600018E+02	3.7250732E+01	2.5618295E+02	2.3950092E+02
1.8700018E+02	3.7229282E+01	2.5614658E+02	2.3948946E+02
1.8800018E+02	3.7207954E+01	2.5611038E+02	2.3947670E+02
1.8900018E+02	3.7186687E+01	2.5607428E+02	2.3946445E+02
1.9000020E+02	3.7165543E+01	2.5603836E+02	2.3945091E+02
1.9100020E+02	3.7144459E+01	2.5600253E+02	2.3943787E+02
1.9200020E+02	3.7123493E+01	2.5596689E+02	2.3942355E+02
1.9300020E+02	3.7102589E+01	2.5593134E+02	2.3940973E+02
1.9400020E+02	3.7081802E+01	2.5589595E+02	2.3939467E+02
1.9500020E+02	3.7061069E+01	2.5586066E+02	2.3938007E+02
1.9600020E+02	3.7040455E+01	2.5582553E+02	2.3936424E+02
1.9700020E+02	3.7019897E+01	2.5579050E+02	2.3934889E+02
1.9800020E+02	3.6999454E+01	2.5575563E+02	2.3933232E+02
1.9900020E+02	3.6979065E+01	2.5572084E+02	2.3931622E+02
2.0900020E+02	3.6785416E+01	2.5538945E+02	2.3908580E+02
2.1900020E+02	3.6647736E+01	2.5515187E+02	2.3868565E+02
2.2900020E+02	3.6519012E+01	2.5492885E+02	2.3829355E+02
2.3900020E+02	3.6399422E+01	2.5472081E+02	2.3791051E+02
2.4900020E+02	3.6289242E+01	2.5452837E+02	2.3755505E+02
2.5900021E+02	3.6185143E+01	2.5434589E+02	2.3718517E+02
2.6900021E+02	3.6089375E+01	2.5417737E+02	2.3683112E+02
2.7900021E+02	3.6000111E+01	2.5401971E+02	2.3649432E+02
2.8900021E+02	3.5917568E+01	2.5387338E+02	2.3615598E+02
2.9900021E+02	3.5839985E+01	2.5373537E+02	2.3583371E+02
3.0900021E+02	3.5768303E+01	2.5360738E+02	2.3550957E+02
3.1900021E+02	3.5700901E+01	2.5348662E+02	2.3520033E+02
3.2900021E+02	3.5639996E+01	2.5337701E+02	2.3488846E+02
3.3900021E+02	3.5581436E+01	2.5327133E+02	2.3459096E+02
3.4900021E+02	3.5528744E+01	2.5317577E+02	2.3429057E+02

Table A.6.3-7 (cont.) Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
3.5900021E+02	3.5479397E+01	2.5308595E+02	2.3400317E+02
3.6900021E+02	3.5434189E+01	2.5300328E+02	2.3371306E+02
3.7900021E+02	3.5392395E+01	2.5292653E+02	2.3343501E+02
3.8900021E+02	3.5354065E+01	2.5285576E+02	2.3315413E+02
3.9900021E+02	3.5317997E+01	2.5278891E+02	2.3288486E+02
4.0900021E+02	3.5286362E+01	2.5272981E+02	2.3261218E+02
4.1900021E+02	3.5255886E+01	2.5267271E+02	2.3235088E+02
4.2900021E+02	3.5229908E+01	2.5262349E+02	2.3208603E+02
4.3900021E+02	3.5204823E+01	2.5257581E+02	2.3183197E+02
4.4900021E+02	3.5183861E+01	2.5253537E+02	2.3157426E+02
4.5900021E+02	3.5163502E+01	2.5249599E+02	2.3132684E+02
4.6900021E+02	3.5146935E+01	2.5246327E+02	2.3108308E+02
4.7900021E+02	3.5132114E+01	2.5243362E+02	2.3088704E+02
4.8900024E+02	3.5119339E+01	2.5240759E+02	2.3068567E+02
4.9900024E+02	3.5108059E+01	2.5238419E+02	2.3049181E+02
5.9900024E+02	3.5084175E+01	2.5230730E+02	2.2849504E+02
6.9900024E+02	3.5175621E+01	2.5243436E+02	2.2688829E+02
7.9900024E+02	3.5325573E+01	2.5266425E+02	2.2531636E+02
8.9900024E+02	3.5516178E+01	2.5296471E+02	2.2390889E+02
9.9900024E+02	3.4624561E+01	2.5134828E+02	2.2295018E+02
1.0990002E+03	3.4118961E+01	2.5041013E+02	2.2326105E+02
1.1990002E+03	3.4118862E+01	2.5040103E+02	2.2571136E+02
1.2990002E+03	3.4132069E+01	2.5041606E+02	2.2791162E+02
1.3990002E+03	3.4196594E+01	2.5052420E+02	2.2993779E+02
1.4990002E+03	3.4281696E+01	2.5066939E+02	2.3185571E+02
1.5990002E+03	3.4375076E+01	2.5082924E+02	2.3364830E+02
1.6990002E+03	3.3480335E+01	2.4918706E+02	2.3294827E+02
1.7990002E+03	3.2674625E+01	2.4767520E+02	2.3226028E+02
1.8990002E+03	3.1915010E+01	2.4622015E+02	2.3159097E+02
1.9990002E+03	3.1192968E+01	2.4480917E+02	2.3093826E+02
2.0990002E+03	3.0499338E+01	2.4342703E+02	2.3030206E+02

Table A.6.3-7 (cont.) Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray			
Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
2.1990002E+03	2.9830833E+01	2.4206912E+02	2.2968112E+02
2.2990002E+03	2.9180849E+01	2.4072356E+02	2.2907550E+02
2.3990002E+03	2.8546835E+01	2.3938599E+02	2.2848392E+02
2.4990002E+03	2.7926308E+01	2.3805196E+02	2.2790594E+02
2.5990002E+03	2.7320595E+01	2.3672499E+02	2.2705640E+02
2.6990002E+03	2.6729622E+01	2.3540576E+02	2.2607352E+02
2.7990002E+03	2.6153709E+01	2.3409578E+02	2.2512866E+02
2.8990002E+03	2.5592936E+01	2.3279596E+02	2.2421544E+02
2.9990002E+03	2.5044342E+01	2.3150047E+02	2.2333507E+02
3.0990002E+03	2.4508959E+01	2.3021231E+02	2.2248381E+02
3.1990002E+03	2.3985987E+01	2.2893027E+02	2.2165910E+02
3.2990002E+03	2.3474894E+01	2.2765375E+02	2.2086037E+02
3.3990002E+03	2.2975071E+01	2.2638191E+02	2.2008536E+02
3.4990002E+03	2.2701723E+01	2.2567339E+02	2.1931593E+02
3.5990002E+03	2.3089132E+01	2.2666180E+02	2.1850589E+02
3.6990002E+03	2.3227501E+01	2.2701183E+02	2.1722554E+02
3.7990002E+03	2.3334095E+01	2.2728027E+02	2.1602223E+02
3.8990002E+03	2.3420380E+01	2.2749672E+02	2.1493428E+02
3.9990002E+03	2.3493975E+01	2.2768082E+02	2.1386526E+02
4.9990005E+03	2.3801609E+01	2.2844597E+02	2.0445390E+02
5.9990005E+03	2.3709421E+01	2.2822012E+02	1.9462241E+02
6.9990005E+03	2.3498079E+01	2.2769659E+02	1.8661501E+02
7.9990005E+03	2.3179003E+01	2.2689735E+02	1.8031090E+02
8.9990000E+03	2.2718826E+01	2.2572710E+02	1.7558377E+02
9.9990000E+03	2.2135555E+01	2.2421397E+02	1.7173230E+02
2.9999000E+04	1.5843836E+01	2.0532802E+02	1.4159331E+02
4.9999000E+04	1.1892923E+01	1.8993829E+02	1.4008865E+02
6.9999000E+04	1.0031409E+01	1.8123805E+02	1.2592603E+02
8.9999000E+04	9.0686769E+00	1.7628206E+02	1.2569686E+02
1.0999900E+05	8.3468113E+00	1.7232651E+02	1.2314731E+02
1.2999900E+05	8.5061579E+00	1.7099677E+02	1.2330643E+02

Table A.6.3-7 (cont.) Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
1.4999900E+05	8.5216074E+00	1.6982181E+02	1.2378082E+02
1.6999900E+05	8.2946892E+00	1.6860262E+02	1.2297537E+02
1.8999900E+05	8.6947937E+00	1.6827307E+02	1.2282840E+02
2.0999900E+05	8.3487444E+00	1.6625612E+02	1.2298527E+02
2.2999900E+05	8.1261501E+00	1.6500490E+02	1.2328652E+02
2.4999900E+05	7.9437151E+00	1.6399620E+02	1.2289118E+02
2.6999900E+05	7.7063627E+00	1.6259532E+02	1.2279131E+02
2.8999900E+05	7.4969945E+00	1.6135490E+02	1.2276364E+02
3.0999900E+05	7.2899656E+00	1.6010411E+02	1.2302059E+02
3.2999900E+05	7.0938225E+00	1.5890680E+02	1.2269785E+02
3.4999900E+05	6.8689427E+00	1.5747005E+02	1.2262222E+02
3.6999900E+05	6.6572146E+00	1.5609682E+02	1.2284418E+02
3.8999900E+05	6.4524813E+00	1.5474602E+02	1.2256856E+02
4.0999900E+05	6.2495151E+00	1.5337718E+02	1.2263068E+02
4.2999900E+05	6.0487204E+00	1.5199310E+02	1.2242387E+02
4.4999900E+05	5.8441200E+00	1.5054297E+02	1.2261440E+02
4.6999900E+05	5.6578054E+00	1.4921214E+02	1.2234701E+02
4.8999900E+05	5.4650488E+00	1.4779445E+02	1.2237630E+02
5.0999900E+05	5.2976074E+00	1.4656592E+02	1.2120309E+02
5.2999900E+05	5.3749228E+00	1.4608067E+02	1.2051913E+02
5.4999900E+05	5.3374214E+00	1.4600426E+02	1.2022603E+02
5.6999900E+05	5.2105489E+00	1.4512027E+02	1.2027464E+02
5.8999900E+05	5.2855639E+00	1.4468503E+02	1.2038059E+02
6.0999900E+05	5.2045021E+00	1.4420981E+02	1.2022037E+02
6.2999900E+05	5.2557502E+00	1.4380934E+02	1.2037413E+02
6.4999900E+05	5.1838722E+00	1.4341533E+02	1.2021143E+02
6.6999900E+05	5.1034474E+00	1.4293527E+02	1.2023843E+02
6.8999900E+05	5.0313001E+00	1.4252707E+02	1.2042096E+02
7.0999900E+05	4.9367127E+00	1.4190477E+02	1.2021687E+02
7.2999900E+05	5.0017819E+00	1.4168025E+02	1.2031196E+02
7.4999900E+05	4.9781704E+00	1.4173256E+02	1.2017672E+02

Table A.6.3-7 (cont.) Containment Response Time History LOCA DEPS Maximum Safeguards Unit 2 without Recirculation Spray

Time, seconds	Pressure, psig	Steam Temp, °F	Water Temp, °F
7.6999900E+05	4.8558922E+00	1.4083333E+02	1.2020282E+02
7.8999900E+05	4.9634852E+00	1.4042856E+02	1.2031418E+02
8.0999900E+05	4.8859215E+00	1.3995837E+02	1.2016145E+02
8.2999900E+05	5.6102118E+00	1.4011707E+02	1.2016338E+02
8.4999900E+05	5.4750152E+00	1.3908525E+02	1.2023833E+02
8.6999900E+05	5.3982983E+00	1.3863762E+02	1.2030698E+02
8.8999900E+05	5.3055916E+00	1.3802934E+02	1.2018389E+02
9.0999900E+05	5.2387953E+00	1.3767111E+02	1.2020184E+02
9.2999900E+05	5.1539655E+00	1.3712956E+02	1.2016016E+02
9.4999900E+05	5.0843472E+00	1.3673346E+02	1.2019688E+02
9.6999900E+05	5.0555124E+00	1.3675502E+02	1.2014791E+02
9.8999900E+05	4.9329653E+00	1.3580748E+02	1.2014828E+02
1.9899990E+06	3.9604771E+00	1.3048380E+02	1.1415997E+02
2.9899990E+06	3.0744197E+00	1.2578875E+02	1.1408563E+02
3.9899990E+06	2.9168496E+00	1.2134548E+02	1.1403611E+02
4.9899990E+06	2.4114234E+00	1.1613166E+02	1.1399490E+02
5.9899990E+06	2.4883697E+00	1.1417463E+02	1.0701016E+02
6.9899990E+06	2.7070270E+00	1.1297253E+02	1.0699879E+02
7.9899990E+06	2.8518384E+00	1.1149843E+02	1.0698975E+02
8.9899990E+06	2.8244438E+00	1.1033306E+02	1.0698287E+02
9.9899990E+06	3.0044870E+00	1.0875464E+02	1.0697935E+02
1.0000000E+07	3.0239089E+00	1.0874873E+02	1.0697844E+02

A.6.4 Conclusions

The MSLB and LOCA containment response analyses for Salem Unit 2 with Framatome ANP Model 61/19T steam generators have been performed as part of the CFCU margin recovery program. The analyses included long-term pressure and temperature profiles from the limiting break cases. As illustrated in the results in Sections 6.2 and 6.3, all cases resulted in a peak containment pressure that was less than 47 psig. In addition, all of the long-term cases were below 50% of the peak value within 24 hours. Based on the results, all applicable Standard Review Plan criteria for Salem Unit 2 have been met.

The peak calculated pressure for the DEPS minimum safeguards LOCA case for Salem Unit 2 with Model 61/19T steam generators was 43.5 psig. The peak temperature for the LOCA cases was 265.9°F from the DEPS minimum safeguards case. The revised, design-basis LOCA containment transient conservatively assumes no recirculation spray in order to bound any potential changes in the time that hot leg recirculation is initiated. This results in a harsher longer-term temperature and pressure transient than presently postulated.

For MSLB, the limiting containment pressure case is a 1.4 ft^2 DER initiated at 30% power with a containment safeguards failure. The limiting containment temperature case is a 0.88 ft^2 split rupture initiated at 30% power with a MSIV failure. For Salem Unit 2, the peak pressure is 45.6 psig and the peak temperature is 349.6°F.

These containment results for Salem Unit 2 with the Model 61/19T steam generators bound the results for Unit 1 and Unit 2 with Model 51 steam generators.

The noted EQ temperature limit issues are addressed by PSEG Nuclear outside of this report.