YANKEE ATOMIC ELECTRIC COMPANY

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Seabrook Station Code Safety Valve Setpoint Tolerance Relaxation

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1.0 INTRODUCTION

The code safety valves on the Seabrook station pressurizer and main steam lines currently are tested and verified to have their setpoints within a tolerance of ±1% of nominal. This tolerance is more limiting than required by the ASME Code and imposes unnecessary valve testing requirements. By increasing the setpoint tolerance, the amount of testing and also the man-rem exposure can be reduced without impacting plant safety.

This evaluation supports a change in Seabrook Technical Specifications (3.4.2.1 and 3.4.2.2 Safety Valves and 3.7.1.1 Turbine Cycle Safety Valves) to increase the setpoint tolerance from ±1% to ±3%. With the increased tolerance the upper and lower limits on safety valve setpoints will be 2575 psia and 2425 psia for the pressurizer. Each main steam line has five valves with different setpoints. The valves with the lowest nominal setpoint will have an opening pressure between 1164 psia and 1236 psia.

2.0 TECHNICAL APPROACH

The evaluation which follows demonstrates that the proposed changes in Technical Specifications represents no significant hazards consideration. Each of the transients considered in the Updated Final Safety Analysis Report (UFSAR, Ref. 1) is evaluated to determine the effects of increased safety valve setpoint tolerance. In most cases it is apparent that a change in setpoint tolerance cannot have an effect on the existing calculation, as for example when the opening setpoint is not challenged.

UFSAR DNBR evaluations take credit for operation of the pressurizer PORVs, which have a setpoint pressure of 2400 psia. Since this is lower than the proposed lower limit of 2425 psia on pressurizer safety valve setpoint, revising the safety valve setpoint tolerance does not affect DNBR. Increasing pressure yields less limiting values of DNBR. Therefore, all further evaluations address peak pressure response.

Each event was then evaluated to determine the effects of revised safety valve setpoint tolerance on peak pressure. The most detailed evaluation was performed for the limiting pressurization transient, the turbine trip. This event was simulated using the RETRAN02 MOD5 (Ref. 2) computer code. The Safety Evaluation Report for this code (Ref. 3) has recently been issued by the NRC. This code is acceptable for the type of system transient analyzed in this report.

Comparisons were performed with the licensing basis analysis of record to demonstrate that the RETRAN model provides comparable results. The limiting peak pressure case with minimum reactivity feedback and without pressure control was simulated using RETRAN. Agreement with UFSAR results was very close, with the RETRAN analysis results slightly overpredicting the peak pressure compared to the UFSAR. Evaluations with revised setpoints were then performed with the RETRAN model to demonstrate that the peak pressure remains well below the Condition II limit of 110% of design pressure, or 2750 psia for the primary system and 1320 psia for the secondary system.

3.0 DETAILED EVALUATION

3.1 Transient Analysis

A lower safety valve setpoint will increase steam flow from the system and hence decrease the pressurization. This will decrease the severity of a pressurization event. The important consideration at the lower value of the setpoint is whether the decreased setpoint will result in increased challenges to the safety valve, or interfere with other pressure dependent functions, such as the high pressure reactor trip.

The proposed lower limit of the pressurizer safety valve setpoint (-3% tolerance) is 2425 psia. This is sufficiently above the PORV setpoint of 2400 psia to prevent unnecessary challenges to the safety valve. The high pressure reactor trip setpoint is also set at 2400 psia, so the trip will occur prior to opening of the safety valves.

Group 1 main steam safety valves (MSSVs), which have the lowest opening setpoint, have a proposed lower limit setpoint (-3% tolerance) of 1164 psia. This is sufficiently above the atmospheric steam dump valve opening setpoint of 1140 psia to prevent challenges to the safety valves. It is also well above the no load steam pressure of 1106 psia.

In summary, no increase is expected in the frequency of challenges to either the pressurizer or main steam safety valves due to the increased setpoint tolerance. A margin on the order of 25 psi remains between the PORV setpoints and the pressurizer safety valve (PSV) setpoints. Similarly, the high pressure reactor trip will also occur at 25 psi below the minimum PSV lift point.

Mass and energy release for the containment performance analyses in UFSAR Chapter 6 will not be affected by the change in setpoint tolerance.

Each of the events analyzed in the Seabrook UFSAR Chapter 15 (Ref. 1) was evaluated to determine the effects of increased safety valve setpoint tolerance. Following is a summary of the results of the evaluations:

3.1.1 Increase in Heat Removal by the Secondary System

Reduction in Feedwater Temperature

This event is bounded by the Excessive Increase in Steam Flow event discussed below. For this event RCS pressure and MSS pressure do not reach the reduced PSV and MSSV setpoints. Thus the results are unaffected by increasing the setpoint tolerance to ±3%.

Increase in Feedwater Flow

The peak pressurizer pressure does not reach the reduced setpoint pressure of 2425 psia (UFSAR Figure 15.1-1, Sheet 3) and therefore, the relaxed tolerance does not affect the existing analysis for this event. Secondary side pressure decreases for this event so the relaxed tolerance setpoint cannot affect the existing analysis.

Excessive Increase in Steam Flow

As shown in UFSAR Figures 15.1-2 through 15.1-5 pressure decreases for this event so the relaxation in pressurizer safety valve setpoint tolerance does not affect the existing analysis.

Inadvertent Opening of a Steam Generator Relief or Safety Valve

As shown in UFSAR Figure 15.1-7 pressure decreases for this event and therefore the relaxed safety valve setpoint tolerance does not affect the existing analysis for this case.

Steam Line Break

As shown in UFSAR Figures 15.1-10 and 15.1-11 the pressure does not rise above the initial system pressure. Therefore, the relaxed safety valve setpoint tolerance does not affect the existing analysis for this case.

3.1.2 Decrease in Heat Removal by the Secondary System

Steam Pressure Regulator Malfunction

The Seabrook plant does not have steam pressure regulators, therefore this event need not be considered.

Loss of External Load

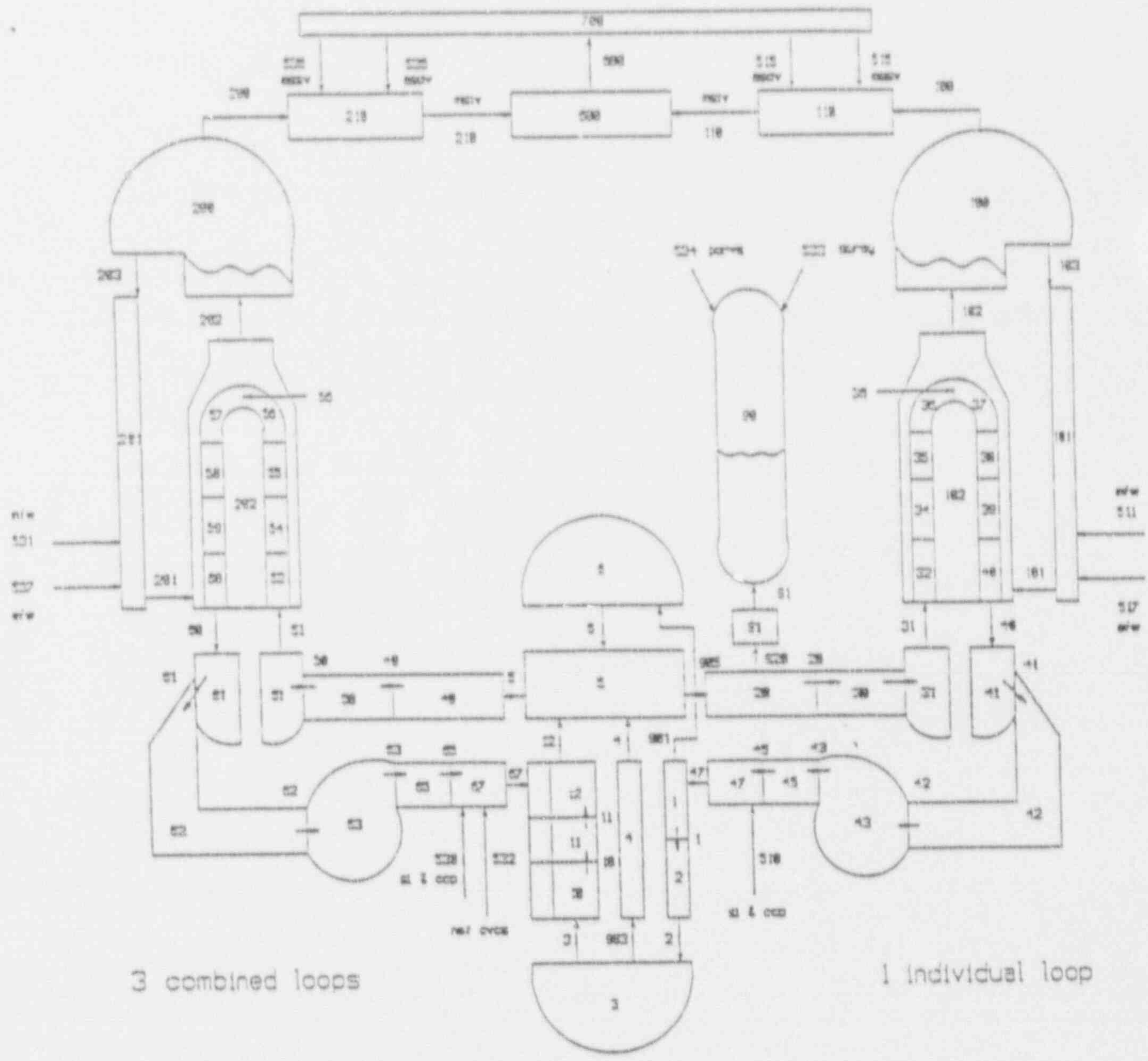
The pressurization during this event is bounded by the turbine trip which is evaluated in the next section.

Turbine Trip

This is the limiting RCS pressurization event. To demonstrate that the increased tolerance on safety valve opening setpoints does not compromise safety limits, a detailed evaluation was performed including simulation of the event with revised setpoints.

Since both the pressurizer and steam generator pressures increase for this event, the increased opening setpoints are considered in the reanalysis. The RETRAN02 MOD5 (Ref. 2) computer code was used to simulate the system response for this limiting event. Figure 3-1 is a nodal diagram of the RETRAN model for the Seabrook plant. The model is a 1 x 3 representation, with one loop to which the pressurizer is connected, modeled as a single loop, and the remaining three loops combined as a single loop. A total of 53 nodes and 71 junctions are used to model the plant.

FIGURE 3-1 RETRAN NODAL DIAGRAM



Technical Specification opening setpoints were used for both the pressurizer and main steam safety valves. Accumulation of 3% was assumed, i.e., valves are fully open at a pressure 3% above the openin^ setpoint. Blowdown pressure was taken as 75 psi below the opening setpoints for the main steam safety valves based on manufacturer's test data summarized in Reference 4. Pressurizer safety valve blowdown pressure was assumed as 96% of the lift setpoint, which is equivalent to 100 psi below the setpoint. Since the relief lines for the Seabrook plant do not have loop seals, no delay is required to account for loop seal clearing.

RETRAN Benchmark

To demonstrate that the RETRAN model is suitable for this analysis, the model was first benchmarked against the calculated results for the event presented in the UFSAR. Bounding initial conditions and a conservative control system operability are assumed for the UFSAR analysis. The direction of the uncertainty included on each parameter (high or low) is consistent with the conservative UFSAR analysis. The following initial conditions were assumed:

Parameter	Value	Comments
Core Power Level	3479 MWt (102%)	rated + uncertainty
Average Temperature	594.3°F	nominal + uncertainty
Pressurizer Pressure	2220 psia	nominal - uncertainty
RCS Loop Flow	97,700 gpm	nominal
Steam Flow	15.14 Mlb/hr	from heat balance
Secondary Pressure	1000 psia	nominal
Feedwater Temperature	440°F	nominal
Pressurizer Liq Vol	1110 ft^3	nominal + uncertainty

The point reactor kinetics model was used with Beginning of Cycle (BOC) neutronics parameters and minimum reactivity feedback, as in the UFSAR.

Additionally, control system operability was set to be the same as the UFSAR. The following Table summarizes assumed system status:

System	Operability	Comments
Pressurizer Safety Valves	operable	nominal setpoint 3% accumulation
Main Steam Safety Valves	operable	nominal setpoint 3% accumulation
Pressurizer PORVs	inoperable	
Pressurizer Sprays	inoperable	
Atmospheric Dump Valves	inoperable	
Steam Dump to Condenser	inoperable	
Feedwater Flow	isolate on turbine trip	
Emergency Feed Flow	inoperable	
Direct Reactor Trip on Turbine Trip	inoperable	
High Pressure Reactor Trip	operable	
Overtemperature ΔT Trip	operable	
Pressurizer Heaters	inoperable	
CVCS	inoperable	

Figures 3-2 through 3-5 show system responses for the turbine trip event for both the RETRAN calculations and the UFSAR results. The RETRAN predicted peak pressurizer pressure (2543 psia) shows excellent agreement with the UFSAR result (2540 psia). The peak pressure in the primary system occurs at the bottom of the reactor vessel lower plenum. A peak pressure of 2639 psi, well below the 2750 limit, is reached momentarily during the event. Maximum steam generator pressure is calculated to be 1279 psia at the bottom of the downcomer, well below the 1320 psia limit. Steam generator pressure is not reported in the UFSAR.

The nuclear power, pressurizer liquid volume and core inlet temperature responses are also comparable. There is a somewhat lower pressurizer pressure predicted by RETRAN later in the event since the steam line and header model in RETRAN is believed to be more detailed (additional volume is modeled) than the fuel vendor model presented in the UFSAR. The close comparison of the RETRAN and UFSAR results, particularly the peak pressure, demonstrates

FIGURE 3-2

TURBINE TRIP WITHOUT PRESSURIZER CONTROL, MINIMUM REACTIVITY FEEDBACK

PRESSURIZER PRESSURE VS. TIME - UFSAR BENCHMARK

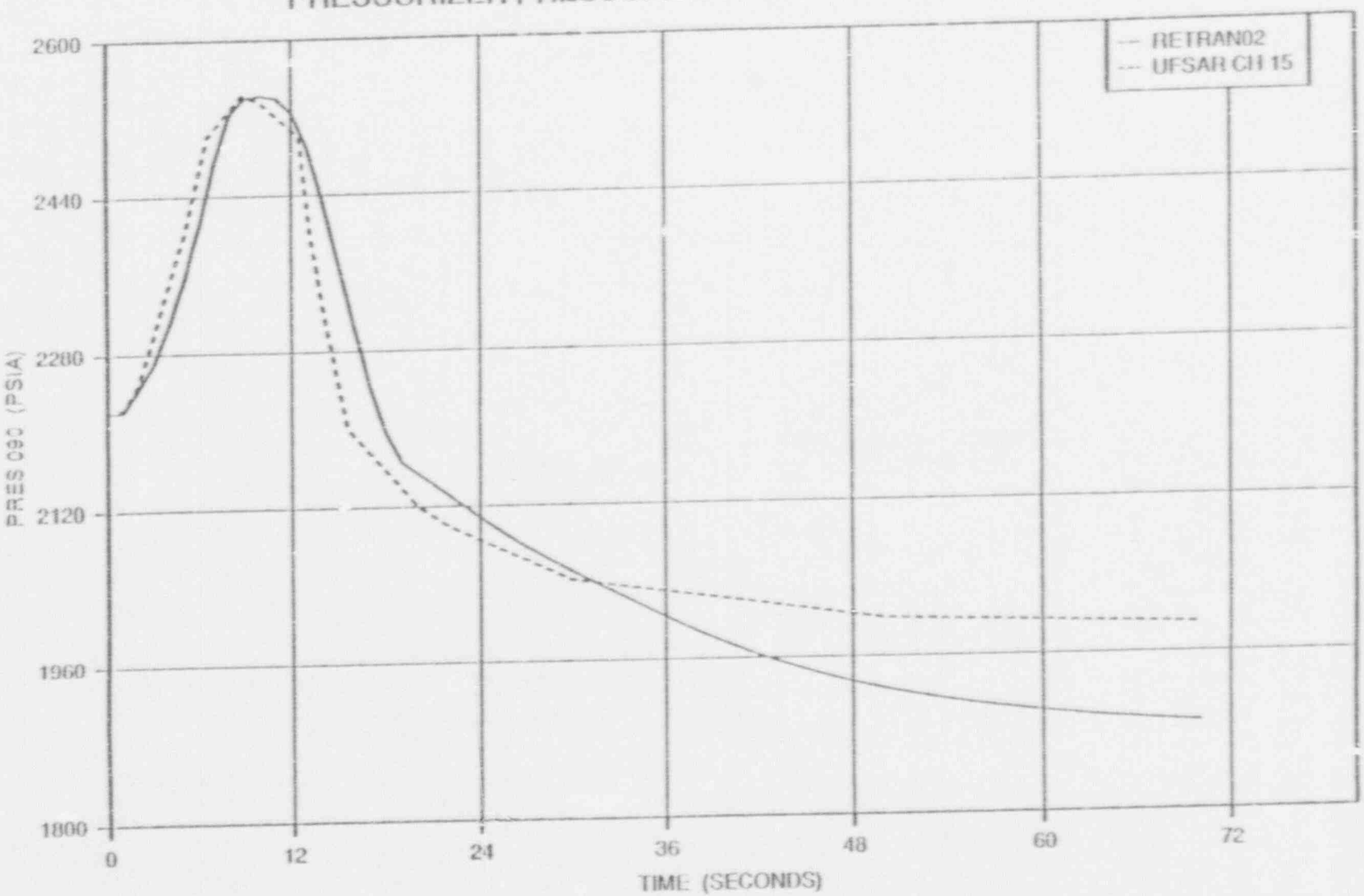


FIGURE 3-3

TURBINE TRIP WITHOUT PRESSURIZER CONTROL, MINIMUM REACTIVITY FEEDBACK

NORMALIZED POWER VS. TIME - UFSAR BENCHMARK

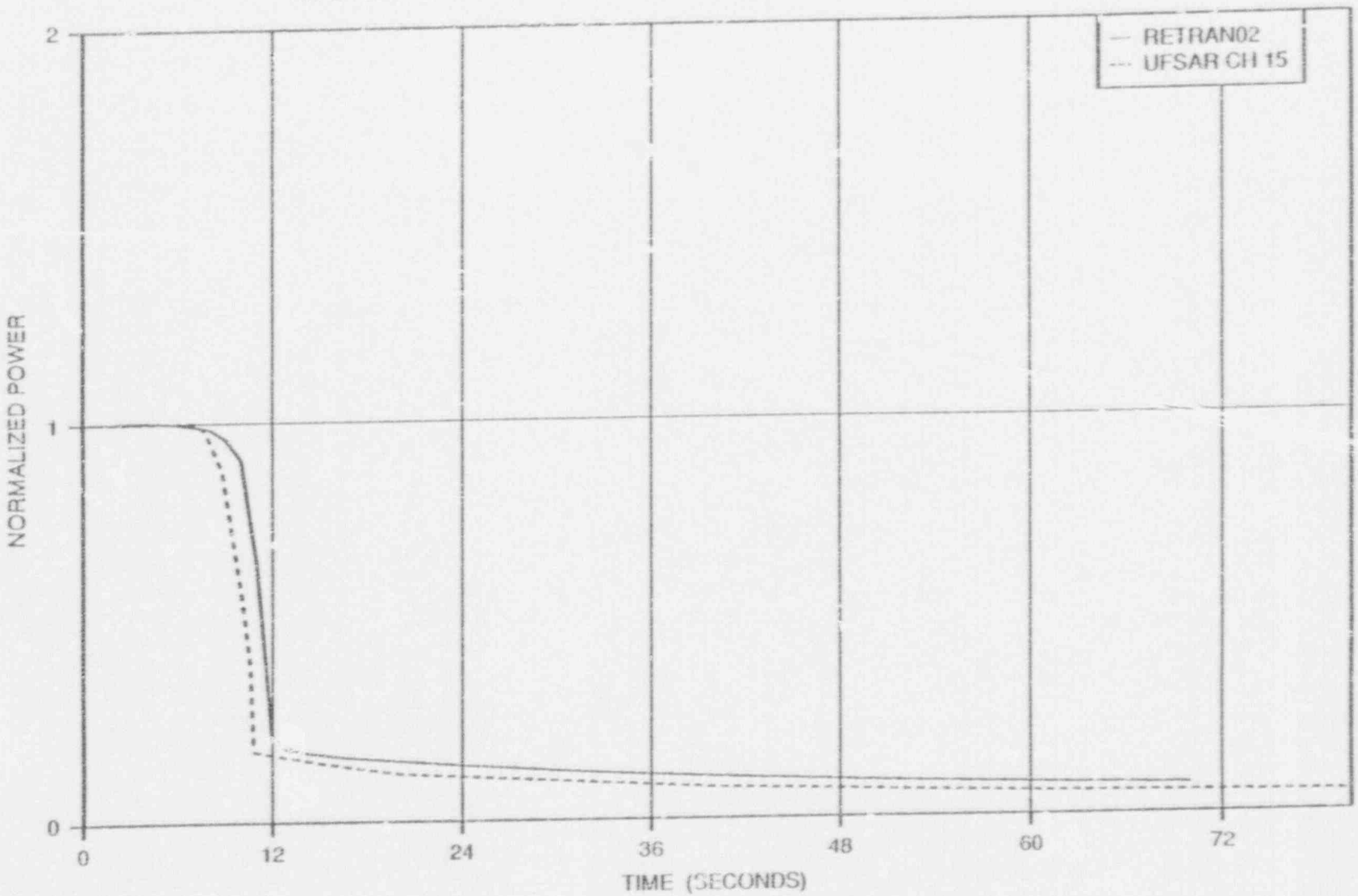


FIGURE 3-4

TURBINE TRIP WITHOUT PRESSURIZER CONTROL, MINIMUM REACTIVITY FEEDBACK

PRESSURIZER LIQUID VOLUME - UFSAR BENCHMARK

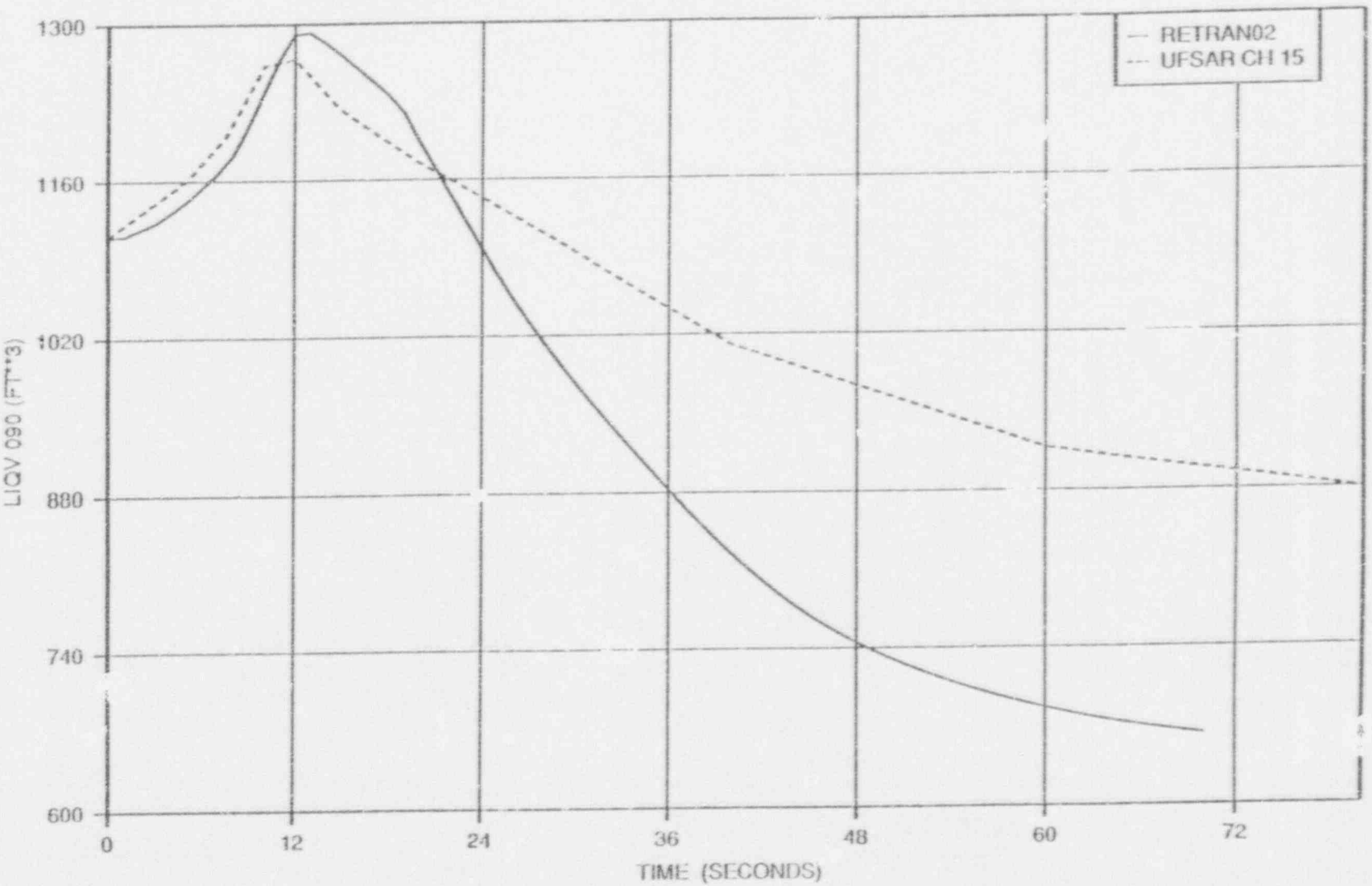
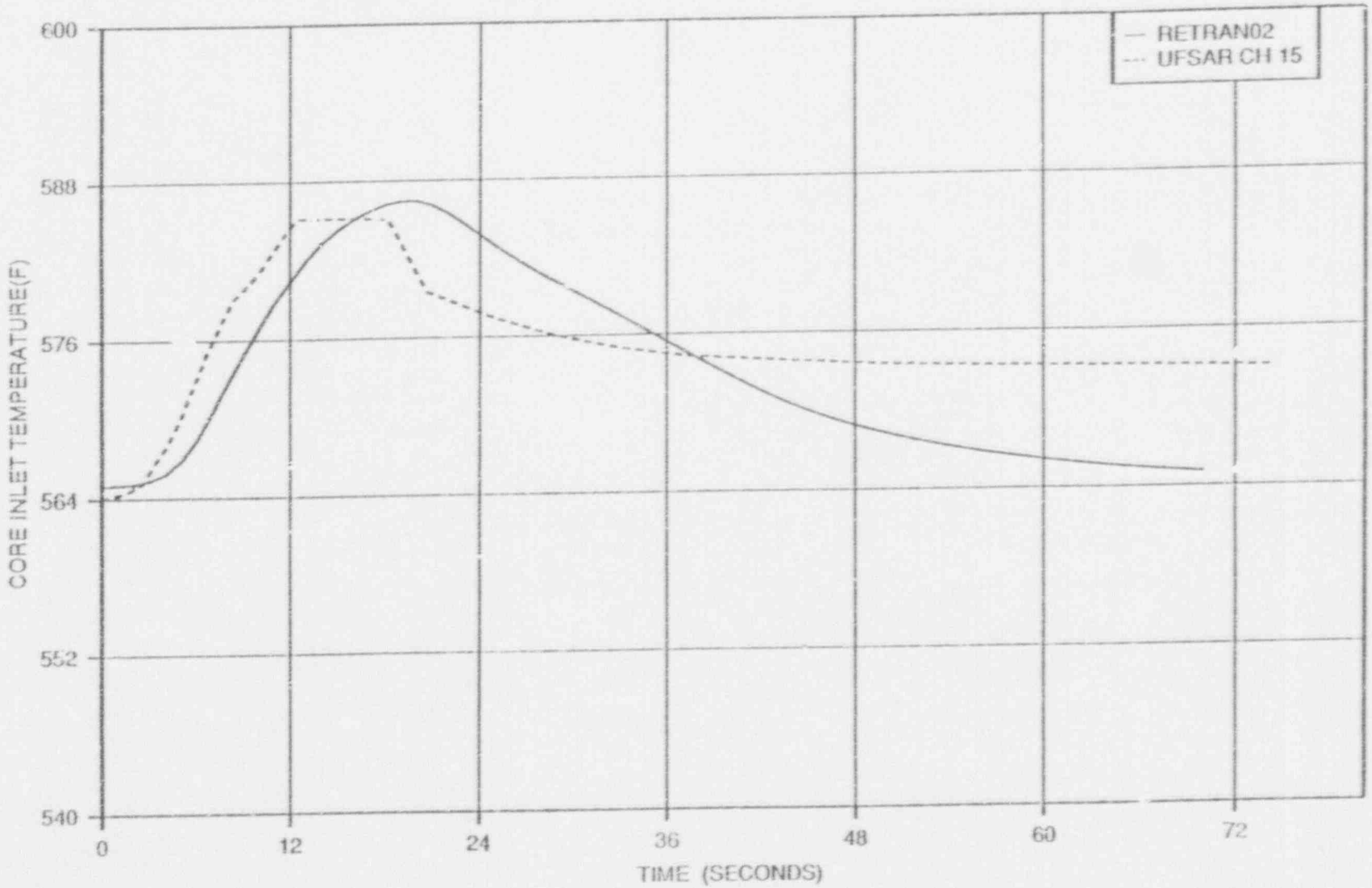


FIGURE 3-5

TURBINE TRIP WITHOUT PRESSURIZER CONTROL, MINIMUM REACTIVITY FEEDBACK

CORE INLET TEMPERATURE VS. TIME - UFSAR BENCHMARK



that the Seabrook RETRAN model is acceptable for predicting system responses for the turbine trip event, and in particular the peak primary and secondary system pressures.

Turbine Trip Reanalysis

The RETRAN model was run with the pressurizer and steam generator safety valve opening setpoints increased by 3%. The only differences between the UFSAR benchmark RETRAN model and the model used for this analysis, in addition to the setpoint increases, was a pressurizer nominal liquid volume of 1080 ft^3 with an uncertainty of 170 ft^3 and a pressurizer pressure of 2200 psia. The revised liquid volume uncertainty represents current information. Initial pressurizer pressure is based on the nominal 2250 psia minus a new value of uncertainty of 50 psia.

Figure 3-6 shows the pressurizer pressure response versus time for the increased setpoint (+3%) case. Peak pressurizer pressure is 2620 psia. The peak primary system pressure reached is 2718 psia which is below the limit of 2750 psia. The peak secondary side pressure is 1311 psia, which is also below the limit of 1320 psia. Therefore, increasing the PSV and MSSV setpoints by +3% will still maintain the peak pressure in both the primary and secondary systems below their respective limiting values.

To assure that the bounding case has been considered, three sensitivity study cases were run with 1) initial pressurizer pressure at the high limit of 2250 + 50 = 2300 psia, 2) initial pressurizer liquid volume at the low initial value of 1080 - 170 = 910 ft^3 and 3) initial pressurizer liquid volume at the high initial value of 1080 + 170 = 1250 ft^3. The most recent value for pressurizer liquid volume uncertainty is 170 ft^3, the value used above.

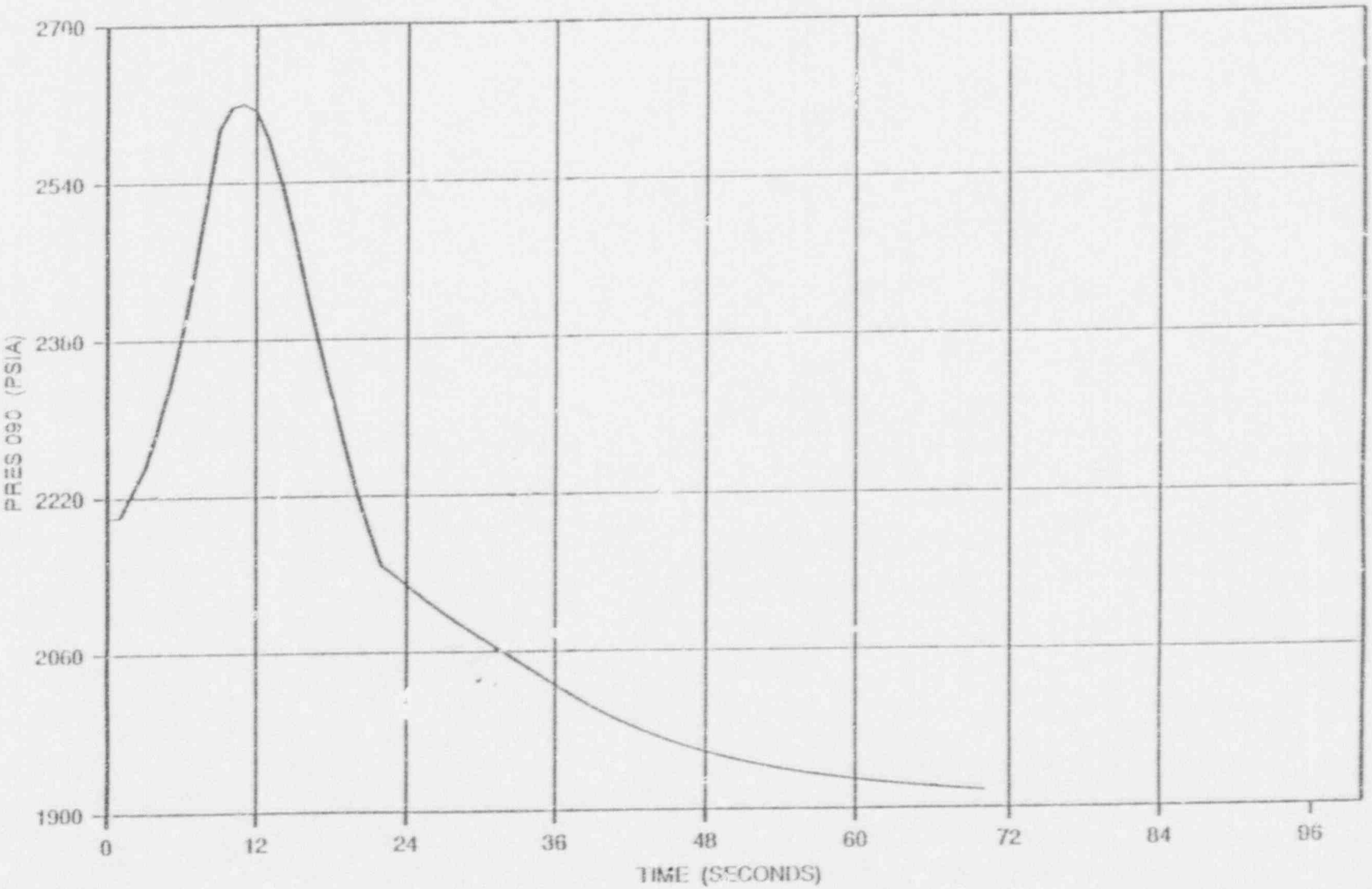
Each of the above sensitivity runs produced peak primary system and steam generator pressures which were comparable to or less than the base case. These sensitivity studies assure that the peak pressures determined above are bounding values. The following Table summarizes the results of the sensitivity study.

	INITIAL PRESSURIZER		PEAK PRESSURE	
CASE	PRESSURE (psia)	LIQUID VOLUME (ft^3)	PRIMARY (psia)	SECONDARY (psia)
Base	2200	1080	2718	1311
1	2300	1080	2712	1304
2	2200	910	2716	1312
3	2200	1250	2717	1309

FIGURE 3-6

TURBINE TRIP WITHOUT PRESSURIZER CONTROL, MINIMUM REACTIVITY FEEDBACK

PRESSURIZER PRESSURE - HIGH SAFETY VALVE SETPOINT ANALYSIS



Inadvertent Closure of MSIVs

This event is bounded by the turbine trip discussed above. The faster acting turbine control valves produce a more limiting overpressure transient.

Loss of Condenser Vacuum

This event is bounded by the turbine trip discussed above.

Loss of Off-Site Power

While this event results in a pressure increase, the event proceeds in a much slower manner than the turbine trip. The pressure increase in both the primary and secondary systems is slow enough that the peak pressure is only a few psi above the opening pressure of the safety valves. Figures 15.2-5 and 15.2-9 of the UFSAR show that the peak pressures in both the primary and secondary are less than those calculated for the turbine trip event, i.e., 2543 psia for the pressurizer and 1279 psia for the secondary. It is noted that the turbine trip simulation assumes feedwater isolation on turbine trip and also the unavailability of emergency feedwater flow. These assumptions make the turbine trip a more limiting event in terms of the peak pressure.

Loss of Feedwater Flow

Figures 15.2-11 and 15.2-14 of the UFSAR show that the peak pressurizer and steam generator pressures are below those calculated for the turbine trip event. Therefore, this event is less limiting than the turbine trip event discussed above.

Feedwater Line Break

Figures 15.2-17 and 15.2-20 of the UFSAR show that the peak pressurizer and steam generator pressure are below those calculated for the turbine trip event. Therefore, this event is less limiting than the turbine trip event discussed above.

3.1.3 Decrease in Reactor Coolant System Flow Rate

Partial Loss of Flow

For this event the peak pressurizer pressure remains below the reduced safety valve setpoint of 2425 psia as shown in Figure 15.3-1, Sh. 2 of the UFSAR. Increase of secondary side pressure is not significant for this event. Therefore, increasing the safety valve setpoint tolerance will not affect this event.

Complete Loss of Forced Reactor Coolant Flow

As with the partial loss of flow, pressurizer pressure remains well below the reduced safety valve setpoint as shown in UFSAR Figure 15.3-4, Sh. 1., and secondary side pressure increase is not significant. Therefore, the increased safety valve tolerance will not affect this event.

Reactor Coolant Pump Shaft Seizure (Locked Rotor)

As shown in Figure 15.3-7 of the UFSAR, the peak pressurizer pressure (2531 psia, Table 15.3-2 of the UFSAR) remains below that for the turbine trip event discussed earlier (2543 psia). Therefore, this event is less limiting than the turbine trip. Increase in secondary side pressure is not significant.

Reactor Coolant Pump Shaft Break

The consequences of this event are limited by the locked rotor event described above.

3.1.4 Reactivity and Power Distribution Anomalies

Uncontrolled RCCA Withdrawal from Subcritical Condition

When the safety valve opening setpoints are increased the peak pressure for this event will continue to be bounded by the turbine trip event discussed earlier. Decreasing the opening setpoint will cause the event to be less severe. Therefore, increasing the safety valve opening setpoint tolerance will not cause this event to exceed established pressure limits.

Uncontrolled RCCA Withdrawal at Power

As shown in UFSAR Figures 15.4-4, Sh. 2 and 15.4-5, Sh. 2 the peak pressurizer pressure for this event does not reach the reduced opening setpoint. Therefore, increasing the setpoint tolerance will not affect this event.

RCCA Misoperation

This category includes several events all of which can reduce DNBR. Non of the events causes the pressure to increase above the reduced safety valve setpoints. Therefore, increasing the setpoint tolerance will have no affect on these events.

Startup of an Inactive Reactor Coolant Pump

As shown in UFSAR Figure 15.4-10, Sh. 4, the maximum reactor coolant pressure remains well below the decreased safety valve setpoint. Therefore, increasing the safety valve setpoint tolerance will not affect the results for this event.

Boron Dilution

This event is analyzed in all six modes of operation. During power operation, the consequences of this event are bounded by the RCCA withdrawal. For shutdown operation, the operator has adequate time to take action prior to criticality. There is no pressure increase and therefore the increased setpoint tolerance has no affect for this event.

Fuel Loading Error

No pressurization results from this event. Therefore, the decreased safety valve setpoints cannot affect the results.

RCCA Ejection

This is a Condition IV event and therefore emergency condition stress limits apply. From Reference 5 the emergency condition primary system pressure limit is 3200 psig.

Generic analyses for this event are discussed in WCAP-7588, Rev. 1 (Ref. 6). Very conservative analyses of this event show that with a

pressurizer safety valve setpoint of 2500 psia, the peak pressure will not exceed 2800 psia. The increase in peak pressure due to increased safety valve setpoint tolerance will be equal or less than the 75 psi increase in the setpoints. Maximum pressure will therefore remain below 2900 psia and the emergency condition stress limits will not be exceeded.

Less conservative three-dimensional studies reported in Reference 6 show that pressurizer surge rate is such that the pressurizer steam pressure will not rise above 2600 psia with a 2500 psia safety valve setpoint. It is noted that no credit is taken for flow through the PORVs. With an increase of 75 psi (+3%) in the safety valve setpoint the peak pressure will increase by no more than 75 psi and remain below 2750 psia. With the increased setpoint the safety valves will open later during the event. However, the flow after opening will be greater due to the higher pressurizer pressure.

Increasing the safety valve setpoints will therefore not result in exceeding the applicable stress limits for this event.

3.1.5 Increase in Reactor Coolant Inventory

Inadvertent Operation of ECCS during Power Operation

The pressure does not reach the reduced safety valve setpoint during this event and therefore the relaxed safety valve setpoint tolerance cannot affect this event.

CVCS Malfunction that Increases Reactor Coolant Inventory

The pressurizer PORVs are assumed to operate for this event. Since the pressure does not rise significantly above the PORV setpoint, the increased safety valve setpoint tolerance will not affect this event.

3.1.6 Decrease in Reactor Coolant Inventory (Non-LOCA)

All of the events in this category result in pressure decrease. The safety valves are not required to lift and the setpoint pressure is not approached. Therefore, this class of events cannot be affected by the increased safety valve setpoint tolerance.

3.2 LOCA Analysis

3.2.1 Large Break LOCA

The postulated LBLOCA events in the Seabrook UFSAR do not challenge the MSSVs because the primary system pressure draws down the secondary pressure almost immediately after initiation. The postulated SBLOCA events, however, by virtue of their break sizes (< 1 ft^2), can challenge the MSSVs because the secondary side plays the role of heat sink early in the transient.

3.2.2 Small Break LOCA

In the UFSAR SBLOCA analysis, the limiting event was defined as a cold leg pipe rupture, at the ECCS injection location, with an equivalent diameter of 4 inches. This evaluation is performed for this limiting event since it yielded the highest peak cladding temperature (PCT) of 1973.2 °F.

The UFSAR SBLOCA analysis assumes loss-of-off-site power coincident with reactor scram. This causes closure of the main steam isolation valves (MSIVs) and as a result an increase in secondary pressure to the MSSV setpoint. At the same time, the initial subcooled break flow causes the primary system to depressurize to a pressure slightly above the MSSV setpoint where the portion of the decay heat not removed by the break gets transferred to the secondary system. The secondary pressure is controlled by the safety valves as long as the break energy removal capacity is insufficient to remove decay heat. This time period is characterized by two-phase flow at the break. The primary liquid mass is distributed in the vessel and the loops with the pump suction loop seals filled with liquid. This condition remains until pump suction loop seal clearing occurs and steam produced in the core can be vented out the break. Vapor venting causes the energy removal at the break to exceed decay heat. Thus depressurizing the primary and secondary systems.

The MSSV setpoint assumption influences the primary heat transfer rate to the secondary and consequently, the primary system pressure before initiation of vapor venting. Therefore, the core mass inventory and by implication the extent of core heatup and the PCT are also affected.

The proposed MSSV setpoint tolerance relaxation translates into about ±25 psia wider band. A higher MSSV setpoint assumption causes a decrease in the primary heat transfer rate to the secondary resulting in a higher primary system pressure and thereby higher break flow. This, in turn results in decreased core mass inventory. In addition, the higher primary system

pressure causes decreased ECCS flow and, thus, decreased core mass inventory. Correspondingly, a lower MSSV setpoint assumption results in increased core mass inventory due to both a decrease in break flow and an increase in ECCS flow.

Table 3-1 shows the results of the safety evaluation. A 25 psia increase in MSSV setpoint was assumed in order to bound the impact of the proposed Technical Specification change on the SBLOCA PCT. The decrease in core mass inventory due to lower ECCS injection and higher break flow was evaluated as described in Table 3-1. This resulted in a maximum increase in PCT of about 2.5 °F over the reported PCT of 1973.2 °F for the limiting SBLOCA event (4-inch ID).

3.3 SGTR Mass Release

An evaluation of the effect on steam mass flow to the atmosphere was performed. An overall increase in steam generator steam mass release will result due to increased MSSV "open time" from 20 seconds to 31.5 seconds. The MSSV "open time" however, occurs immediately following the reactor/turbine trip which is early on in the event at t= 904 seconds, and lasts only approximately 30 seconds. The incremental dose increase of approximately 2% during this time period due to slightly longer MSSV open time, is small and is within round-off error of the total dose for either the 0-2 hour EAB or the 0-8 hour LPZ doses.

Table 3-1
Effect of MSSV Setpoint Tolerance Relaxation on Seabrook Station SBLOCA Analysis

Interval of Time After Pipe Rupture[1] (sec)	Increase in MSSV Setpoint Pressure[2] (psia)	Total Decrease In Vessel Mass Inventory[3] (lbm)	Equivalent Vessel Level Decrease[4] (in.)	Maximum Increase in PCT[5] (°F)
80-385	25	2288	5.5	2.5

Notes:

1. Time interval of interest during the SBLOCA scenario when pressure of primary and secondary systems are controlled by the MSSVs (UFSAR Figure 15.6-31).

2. Equivalent to bounding increase in tolerance from +1% to +3% relative to the nominal MSSV setpoint pressure (Technical Specification Table 3.7-2).

3. Due to both an increase in break flow and a decrease in ECCS flow.

   Saturated liquid was assumed for calculation of break flow increase for the limiting break (4-inch ID) during the time interval of interest. HEM tables were used to calculate critical flows at the break. The rate of break flow increase was calculated to be about 7 lbm/sec for a 25 psia primary system pressure increase from 1212 psia to 1236 psia. This result was also verified by using Moody tables to calculate critical flows at the break as required by Appendix K.

   UFSAR Figure 15.6-43 was used to calculate the rate of ECCS flow decrease at 1200-1300 psia during the time interval of interest. The rate of ECCS flow decrease was calculated to be about 0.5 lbm/sec for a 25 psia primary system pressure increase.

4. Calculation based on vessel flow area of 106 ft^2.

5. In order to maximize the PCT increase, the slowest rate of vessel level decrease of about 2.2 in./sec (UFSAR Figure 15.6-32) and the maximum rate of clad Heatup of about 1 °F/sec (UFSAR Figure 15.6-33) were used.

3.4 ASME Code Review

The Seabrook Station PSVs and MSSVs were designed and manufactured to meet the 1971 Edition including the Winter 1972 Addenda and the 1974 Edition including the Summer 1975 Addenda respectively of the ASME Code, Section III, which required the PSVs and MSSVs to be designed to open within ±1% of the set pressure. The current Technical Specifications (TS) also impose a tolerance of ±1% on the set pressure in the LCO for the PSVs and MSSVs. However, the Surveillance Requirements of these TS require testing the PSVs and MSSVs under Section XI of the ASME Code. The in-service test program at Seabrook is based

on the requirements of Paragraph IWV of the ASME Code, Section XI, 1983 Edition through the Summer 1983 Addenda. This Edition of Section XI does not specify a tolerance to be applied to lift pressure verification; therefore, the tolerance prescribed in the LCO (±1%) is used as the acceptance criteria for Section XI testing. Section XI also requires that when any valve in a system fails the setpoint criteria, additional valves in the system shall be tested, and a valve failing to function during a test shall be repaired or replaced.

The 1989 Edition of the ASME Code, Section XI, requires that the PSVs and the MSSVs be tested per the standard ASME/ANSI OM-1987, Part 1. This standard allows the tested lift pressure to exceed the stamped set pressure by up to 3% before declaring a test failure. It also provides a guideline for testing additional valves when a valve exceeds the ±3% tolerance. Therefore, increasing the PSV and MSSV setpoint tolerance to ±3% for testing acceptance criteria is in compliance with the later Code requirements.

The PSVs and MSSVs have been reconciled to be in compliance with the 1989 ASME Code Section III, Subarticle NB-7410/NC-7410, which states that "The set pressure of at least one of the pressure relief devices connected to the system not be greater than the Design Pressure of any component within the pressure retaining boundary of the protected system" (in this case 2485 psig for the PSV and 1185 psig for the MSSV). The licensing basis analysis has been reviewed/evaluated and it shows that the licensing basis criteria is still met when the increased +3% tolerance is applied to the relief pressures discussed above.

Seabrook Station will use the ±3% tolerance for the "as found" acceptance criteria during valve testing and has committed to reset the valve to within ±1% prior to declaring the valve operable.

4.0 SUMMARY AND CONCLUSIONS

An evaluation has been performed which demonstrates that no significant hazards consideration results when the Seabrook PSV and MSSV setpoint tolerance is increased from ±1% to ±3%.

The evaluation centered on satisfying peak pressure limits in the primary and secondary systems. DNBR evaluations take credit for the PORV opening since lower pressure is more limiting. The PORV opens at a pressure 25 psi below the minimum pressurizer safety valve opening pressure. Therefore, DNBR will not be affected by the revised safety valve setpoint tolerances.

For the lower limit of the setpoint (-3% tolerance) the PSV setpoint remains on the order of 25 psi above the power operated relief valve opening pressure and the high pressure reactor trip setpoint. The high pressure trip will therefore not be compromised, and challenges to the safety valve will not be increased. Similarly, the steam generator safety valve lower limit setpoint remains 24 psi above the atmospheric dump valve opening pressure and 58 psi above the no load operating steam pressure. These margins are sufficient to assure that challenges to the MSSVs will also not be increased.

The evaluation considered each of the events documented in Chapter 15 of the UFSAR. Detailed calculations were performed for the limiting pressurization event, the turbine trip, utilizing the RETRAN02 MOD5 code. These calculations demonstrated that peak pressure limits are not exceeded due to the increase in PSV or MSSV setpoint tolerances.

The impact of the proposed MSSV tolerance relaxation on the UFSAR design basis LOCA events were evaluated. The limiting LOCA analysis for Seabrook is a large break LOCA event with a PCT of 2041.2 °F. This is not affected by the proposed change to MSSV tolerance. The LOCA analysis event affected by this change is a SBLOCA. The proposed modification may result in a SBLOCA PCT increase of about 2.5 °F. A conservative PCT penalty of 5° F will be applied to the SBLOCA PCT result. The 5 °F PCT penalty should be tracked in accordance with 10CFR50.46 reporting requirements. This net PCT increase is less than 50 °F and, hence, is not a significant change to the Seabrook UFSAR SBLOCA analysis per 10CFR50.46 requirements. Also the revised SBLOCA PCT value (1978.2 °F) remains below the 2200 °F limit as well as below the large break LOCA results.

Increasing the MSSV setpoint tolerance from ±1% to ±3% will not impact the design bases SGTR calculation. Incremental dose increases due to the slightly increased steam mass releases during the time that MSSV are actually open, will not impact the total dose beyond round-off error.

5.0 REFERENCES

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