Hydrogen Control Calculations for the Sequoyah Plant
Reference and Uncertainty Calculations

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1 Introduction

The Sequoyah containment is equipped with a system of igniters designed to ensure controlled burning of hydrogen in the unlikely event that excessive quantities of hydrogen are generated and released to the containment during a postulated degraded core accident. Power is supplied directly to the igniters at 120VAC.

During station blackout accident scenarios, both offsite and backup onsite AC power to the igniters will be interrupted; therefore, the igniters will not be available as a hydrogen control system. The series of calculations discussed in this report addresses hydrogen distribution and burn (deflagration) behavior in the Sequoyah containment should supplemental onsite power be provided to igniters and/or air return fans during a station blackout accident.[1] The calculations have been performed (using MELCOR) by de-coupling the MELCOR reactor cooling system (RCS) models from the containment model, thereby analyzing the containment response as a standalone problem. This de-coupling procedure has the advantage of unburdening the containment analysis of the time consuming calculations performed in the CORE package of an otherwise combined RCS and containment response calculation. Because feedback from the containment system to the RCS is weak, this type of de-coupling can be accomplished without significantly affecting the source terms (water, steam, and hydrogen) to the containment or the subsequent containment response.[2] Within MELCOR's control volume and flow path packages, I/O features are provided to allow the type of de-coupling discussed here.

The specific accident event selected for analysis is a short-term station blackout with pump seal leakage (250 gpm leakage), STSBO-L. From a series of MELCOR source-term uncertainty calculations, reference and selected uncertainty runs have been chosen for use in the containment analysis study. The selection criteria for the reference and uncertainty source-terms (water, steam, and hydrogen injections to the containment) used in this study are discussed later. Issues of hydrogen control scenarios explored in the report are:

- Delayed deflagration without power to either igniters or fans
- Controlled burning (deflagration) with power to igniters
- Controlled burning (deflagration) with power to both igniters and fans.

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[1] The calculations describe controlled or ignited burns characterized as deflagrations. Detonations or deflagrations to detonation transitions (DDT) are not specifically addressed in this report except to note in general terms the extended time periods when there may exist a potential for large-scale detonations or DDT behavior.

[2] A fully coupled calculation is required to account for the atmospheric heating resulting from small releases of radioactive nuclides. The decay heating from nuclides in the containment however is a second order effect as noted in fully coupled calculations discussed in Appendix A.

The discussions in the following sections focus on hydrogen control conditions with uncertainties investigated for burn parameters and source terms. Other uncertainties associated with code input have also been addressed during the course of this effort: ice bed nodalization and bypass leakage flow modeling. Ice bed nodalization, being an issue in previous ice-condenser plant analyses, is discussed here in the context of MELCOR ice bed nodalization sensitivity calculations which are reported in some detail in Appendix B. In the case of the bypass leakage flow modeling,[3] it has been observed in calculations that changes in flow area (0.03 to 0.29 m^2) and elevation (10 to 20 m) produce no significant change in containment hydrogen concentrations, and therefore these calculations are not discussed further. Additionally, in earlier addendums to previous draft reports, fully-coupled RCS/containment MELCOR calculations with power to igniters were conducted to investigate late time (post vessel failure) hydrogen control behavior with core/concrete interactions (CCI). These calculations, conducted with earlier MELCOR derived source terms,[4] indicated that oxygen depletion prior to vessel failure substantially reduced the risk of late time overpressurization due to deflagrations or potential detonations. This conclusion is not expected to change with the more recent source terms generated by the current MELCOR Sequoyah plant models. Therefore, these calculations were not repeated for this report. The results of the earlier, fully coupled RCS/containment calculations are however included as Appendix A. Finally, the possibility of diffusion flames at the top of the ice condenser was considered in the preparation of this report, with attempts to include this type of burn scenario in the study. However, the analysis (diffusion flame without DCH) could not be completed without code modification, and therefore was excluded from the study.

In Section 2, the MELCOR containment model is described along with the various hydrogen source terms obtained from MELCOR station blackout calculations. The reference and representative "uncertainty" source term inputs are also discussed in this section. Hydrogen control in the containment is discussed in Section 3 for both reference and uncertainty source terms. Section 4 presents the results of an uncertainty/sensitivity analysis for burn parameters (Monte Carlo uncertainty study for the standalone containment analysis). Section 5 summarizes the study results.

2 MELCOR Sequoyah Containment Model (s)

Shown in Figure 1 is a drawing of the Sequoyah containment indicating boundaries of three major containment regions: lower containment, ice-condenser, and upper containment. The ice bed is isolated from the lower and upper containment by lower plenum, intermediate, and upper plenum doors that remain shut during normal operation. During postulated accident events leading to RCS injections of liquid water and steam to the lower containment, these doors can open as a result of the pressure differentials

[3] Bypass flow refers to uncertain leakages assumed to occur in the vicinity of the operation deck dividing the lower and upper containment. These flows are separate from those flows associated with open refueling drains.
[4] R.O. Gauntt and L. L. Humphries, "Hydrogen Source Terms for Station Blackout Accidents in Sequoyah and Grand Gulf Estimates Using MELCOR 1.8.5, Draft Sandia Report, July 26, 2001.

across the doors. Steam flowing into the ice condenser is condensed onto ice baskets holding flakes of ice. The ice bed is therefore a region of low steam concentration, and a probable location for high concentrations of released hydrogen in the case of degraded core accidents. There are no igniters located in the ice bed, and therefore any burns in this region must be initiated as a result of flame propagation.

2.1 Nodalization

Figure 2 is a sketch of a containment model indicating the various sub-compartments that are modeled by the MELCOR standalone containment model, referred to here as the 26-cell model. Table 1 lists the compartment descriptions for each cell in the model. The 26-cell containment model is derived directly from a CONTAIN containment model discussed in NUREG 5586 – a copy of the MELCOR standalone containment input files (MELGEN/MELCOR files) for the case with power to igniters is included as Appendix C. One important feature of the model is the nodalization of the ice bed, Figure 3. The ice bed is represented by four azimuthally arranged cells (18-21) that extend from the bottom to top of the ice bed. Vertical density profiles within the ice bed obviously cannot be calculated with this model. However, upper and lower circulation paths within the ice bed are provided to allow circulation caused by variations in the static heads between cells. The rationale for using single cells to represent vertical portions of the ice bed is driven by a number of reasons, some physically based and others based on practical and model consistency arguments. Additionally, calculations were performed that included axial subdivision of the ice bed control volumes to confirm the appropriateness of the simpler nodalization, as will be demonstrated in subsequent sections, and in Appendix B.

From a physical standpoint, we contend that significant vertical compositional and density differences within the ice bed, during a degraded core accident such as the STSBO-L sequence, are not to be expected. This assertion is based mainly on mixing processes generated as the result of 1) the relatively high rates of steam and hydrogen injected into the ice condenser during the scenario, 2) the likely asymmetrical character of those injections, and 3) the turbulence created during deflagrations. Additionally, the entrance location for ice bed gas mixture injection is in a region, under stagnant conditions, that is most likely to form a stratified layer (gas mixtures remaining in the ice bed will become heavier as the mixture is cooled and depleted of steam, settling to the lower regions of the ice bed). Injections into this region will most readily disrupt the stratifying layer. To investigate the propensity for circulation and uniform mixing, a coarse one-dimensional, vertically stacked ice bed nodalization scheme and a detailed vertical/horizontal nodalization scheme were included in the study. The purpose for using the one-dimensional scheme was to show resulting ice bed hydrogen concentrations for a scheme that does not allow circulation within the ice bed. The one-dimensional scheme has a history of being employed in early ice-condenser plant analyses and therefore was included for completeness.[5,6] A more detailed nodalization scheme than

[5] Camp, A. L., et al., "MARCH-HECTR Analysis of Selected Accidents in an Ice-condenser containment," NUREG/CR-3912, SAND83-0501, Sandia National Laboratories, December 1984.

the 26-cell model, consisting of four columns and four rows of interconnected ice bed cells (38-cell model) was investigated to show that gross circulations within the ice bed do indeed occur during the accident sequence resulting in mixing, and that models based on single, vertical cells azimuthally configured, as in the 26-cell model, therefore represent a reasonable nodalization for the study. Of course, small local or secondary circulation behavior cannot be addressed with a lumped-parameter code, such as MELCOR; however, small regions with variable vertical composition and density variations are considered of minor significance for the purpose of this study, which focuses on overpressurization resulting from regional or global deflagrations. A discussion of the nodalization sensitivity study is included here as Appendix B.

For the practical aspects of ice bed modeling, additional vertical segmentation of the ice bed, especially for cases with fans operating significantly slows the calculations, inhibiting our ability to perform statistical (Monte Carlo) uncertainty/sensitivity studies for burn parameters. From a model consistency standpoint, vertical burn propagation using single, vertical cells in the ice bed represents a consistent treatment for flame propagation correlation and usage. The correlations for flame speeds are derived only for single compartment burns. Propagation of burns in relatively open regions (which may also have composition and density gradients) using multiple-cells is not validated for a lumped-parameter code like MELCOR. A single, vertical cell model represents therefore a relatively consistent treatment for flame propagation based on current code correlations.

Within the other regions of the containment (upper and lower containment), the containment model divides into specific confinement regions, generally isolated by well-defined flow paths. The vertical segmentation in the upper containment with the 26-cell model allows for the possibility of upper containment stratification of air and hydrogen in the dome. A tendency for some stratification in this regard is noted in calculations without the fans operating. Within the lower containment, additional compartments are modeled to allow simulation of dead-ended regions. These regions can be inerted during significant periods due to high concentration of steam that builds up during the early portion of an accident, prior to hydrogen release.

2.2 Source terms

Hydrogen control calculations for the Sequoyah plant were first reported in an April 2002 draft report. In that report, the source term for the containment was documented by SNL in a report "Hydrogen Source Terms for Station Blackout Accidents in Sequoyah and Grand Gulf Estimated Using MELCOR 1.8.5, dated July 26, 2001. Since that time,, an updated set of hydrogen source term calculations have been completed.[7] The purpose of the more recent calculations (40 runs in all) was to estimate the uncertainty in hydrogen

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[6] S. Dingman, et al., "HECTR Version 1.5 User's Manual," NUREG/CR-4507, SAND86-0101, Sandia National Laboratories, April 1986.
[7] See R. Gauntt et al.,"An Uncertainty Analysis of the Hydrogen Source Term for a Station Blackout Accident in Sequoyah Using MELCOR 1.8.5", Sandia National Laboratories Letter Report, 30 September, 2002.

source terms though variations in reactor core and RCS model input parameters. The calculations were conducted for a STSBO-L sequence using a new 5-Ring model of the Sequoyah core (original calculations made with 3-Ring core model) together with other modifications made to the RCS coolant loops.

Shown in Figures 4 and 5 are the in-vessel hydrogen generation profiles for the 40 MELCOR runs completed by SNL. The hydrogen generation ranges from approximately 430 to 600 kg at the time of vessel failure. For the purpose of determining the effect of source term variation on hydrogen control, three representative source term runs were selected for the standalone containment analyses. These runs are summarized in Table 2. The selected runs provide a reasonable range of the high and low hydrogen source terms (run 21 vs. 35) and in addition include the variability of hot leg failure/no failure (run 21 vs. 32).

Hydrogen, water, and steam can enter the lower containment (prior to vessel failure) from primary system leaks (pump seals), valve openings (PORVs, etc.), and coolant line breaks (hot leg and/or surgeline breaks).[8] Shown in Figure 6 are the approximate locations for these sources. The mass rate and integral amount of hydrogen injected into the containment for MELCOR run 21 are shown in Figure 7 and 8 for the pump seals and hot leg break, respectively. For run 21, hydrogen is not released from the PORVs since these injections (both water and steam), as shown in Figure 9, occur prior to the start of hydrogen generation, shown in Figure 10. Since the surgeline does not fail in run 21, there are no hydrogen injections from the surgeline. Water and steam injections from the pump seals and steam injection from the hot leg break are shown in Figures 11 – 13.

Total hydrogen generated in-vessel for run 21, Figure 10, shows that there are essentially two phases to the generation and similarly the injection process. The first phase, responsible for approximately 515 kg or 90% of the total hydrogen release, is from the pump seal leakage over about a 1.5-hour period beginning at 3.5 hours into the accident. When the hot leg of the RCS fails due to creep rupture at ~ 5.4 hours, an additional ~55 kg of hydrogen is released along with a surge of steam which rapidly pressurizes the containment. Following the hot leg rupture, the steam sources to the containment are relatively minor and the containment depressurizes somewhat as it cools before lower head failure occurs at approximately 6.4 hours into the accident.

The uncertainty range for hydrogen source terms is represented by MELCOR runs 21, 32 and 35 as indicated in Table 2. The in-vessel hydrogen generation rate and integral amount for runs 32 and 35 are shown in Figures 14 and 15. These sources can be compared to those in Figure 10 for run 21, representing a case with both high mass rate and cumulative injection. The hydrogen injection rates for run 32 (pump seal) and 35 (pump seal and hot leg) are shown in Figures 16 - 18.

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[8] Nitrogen releases to the containment from the accumulators tanks does not occur for this scenario until vessel failure.

3 Hydrogen Control

Without controlled hydrogen burning there is likelihood that hydrogen will accumulate in the containment and ignite at a time when a "global" deflagration will be severe enough to threaten the integrity of the containment. For example, shown in Figure 19 is a case where a global burn is delayed until ignited by hot ejected core material at the time of vessel failure. Random autoignition is to be expected even without hot ejected debris owing to static discharges associated with flowing gases and dust. For the Sequoyah containment, the pressure corresponding to an estimated 10% failure probability is 525 kPa (absolute).[9] The risk of over-pressurizing the containment from a delayed global deflagration is clearly apparent without hydrogen control. However, there are also other concerns. Local pockets of hydrogen having high concentrations could ignite to produce an accelerated flame, deflagration to detonation transition (DDT), or in some cases a detonation directly. In the following analyses we assess the hydrogen distributions within the containment for potential combustion events. The cases investigated are those having 1) no power to igniters, 2) power to igniters only, and 3) power to both igniters and fans (single train). The hydrogen source term calculated in MELCOR run 21, representing a high injection case, is selected as a "reference case." Source terms for MELCOR runs 32 and 35 are used to indicate the variability in hydrogen behavior as a result of source term uncertainty.

Shown in Figures 20 – 22 are containment pressures calculated for the cases without igniters, with igniters, and with igniters and fans (single train). For the ignition of hydrogen, the combustion and propagation limits listed in Table 3 are used. Locations for the igniters are shown in Table 4. Figures 23 – 25 show the ice-bed hydrogen concentrations for run 21 for the case without igniters, with igniters, and with igniters and fans, respectively. The ice-bed hydrogen concentrations for runs 32 and 35 are presented in Figures 26 – 28 and Figures 29 – 31.

The upper containment (compartment #24) hydrogen concentrations for the MELCOR runs 21, 32, and 35 are shown in Figures 32, 33, and 34, respectively, for each case with, without igniters and with igniters and fans.

A comparison of hydrogen burn totals by region for the various MELCOR runs (source terms) with igniters and with igniters and fans is presented in Tables 5a, 5b, and 5c. The total hydrogen burn percentage (hydrogen burn / hydrogen injected X 100) for various source terms show minor sensitivity with percentages ranging from 68 to 74 %. Burn percentages by compartment indicate the shift towards more burning in regions with igniters when the fans operate as compared to the cases with power to igniters only. This means that burns in the ice bed and lower plenum due to flame propagation are minimized when the fans are active. For the upper containment, which is an important control region, the distinction between power to igniters and power to both igniters and fans is small.

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[9] See Table B.4 in NUREG 6247 for ice condenser containment fragility measures.

It is noted in these calculations for the various source terms that a substantial amount of hydrogen is consumed in the lower containment (58-68%) even when fans are not activated. There has been speculation that the lower containment will be steam inerted during the injection, or will be depleted of oxygen as a result of expulsion of air from the lower containment during the injection event, thereby limiting lower compartment burning. Additionally, burning in the lower compartment could consume what small amount of oxygen existed and therefore preclude further burning. As indicated in Figure 35, the lower containment is <u>not</u> inerted by steam during a critical burn period between 3.5 and 5 hours. Furthermore, oxygen in the lower compartment is not limited since there are return air flows from 1) the refueling drains and 2) partially open lower plenum doors (dynamic action and leakage). An important source of the return air to the lower compartment is from the refueling drains. This behavior is shown in Figure 36, where the oxygen flow through the refueling drains to the lower containment is shown (negative flows indicate upper containment to lower containment oxygen transfer). The refueling drains remain open during the early portion of the accident (prior to vessel failure) since containment sprays are inactive for the SBO event and the lower compartment water level is too low to flood the drains.[10] Later in the accident, the lower containment water will flood the drains, however, by this time a significant amount of in-vessel generated hydrogen will have been burned.

Shown in Tables 6a and 6b are the hydrogen burn amounts by compartment for two cases (based on the reference calculation) where the refueling drains are assumed closed and in addition the lower plenum door leakages are minimized. A comparison of the results from Tables 5a and 6a indicate that the refueling drain flows affect lower compartment burns significantly – changing the amount burned in the lower containment from 229 to 135 kg, and increasing the amount of hydrogen consumed in the ice bed from 111 to 181 kg. The addition of fans, even with the refueling drains closed, returns the compartment burn percentages to approximately the same percentages when the refueling drains are open. An additional reduction in lower compartment burning occurs when both the refueling drains are closed and the lower plenum door leakage is minimized, Table 6b. However, the amount is not as significant as when closing just the refueling drain pathways. In each case reported for drains or leakage, the addition of fans does substantially reduce the amount of burning in the ice bed, returning the majority of the burns to regions where igniters are located (upper plenum, lower and upper compartment).

Although fan operation produces more burning in regions of igniters, which in and of itself may be viewed as advantageous, fan operation also results in more rapid depletion of ice prior a period of overpressurization caused by late time CCI. Since this occurrence (rapid ice depletion) may result in a somewhat earlier threat to the containment integrity due to overpressurization, the degree of ice melt for various scenarios is reported in Table 7 for comparisons. Fan operation is seen to increase ice depletion by approximate 15% (i.e. an increase from ~ 45 to 65 % depletion). However, source term uncertainty also

[10] Lower compartment water flooding profiles are modeled in the Sequoyah plant using flooding estimates referenced in Pilch M. M., et al., "Assessment of the DCH Issue for Plants with Ice Condenser Containments," NUREG/CR-6427, SAND99-2553, Sandia National Laboratories, September 1999.

causes a substantial variation of ~10% depletion (e.g., 38 to 47% depletion). Interestingly, the ice depletion percentage with fans for one case (run 32) is nearly the same as other cases (runs 21 and 35) without fans. Ice depletion variability, in terms of depletion percentages, may be as important for the source term uncertainties as for an option of power/no power to fans.

4 Burn Uncertainty/Sensitivity Analysis

The burn parameter uncertainty/sensitivity analysis is performed for the "reference" containment calculation with power to the igniters only. The methodology used for the uncertainty analysis/sensitivity analysis is based on a Monte Carlo (direct statistical method) using subjective probability density functions to describe the burn parameter uncertainties. The method is described in some detail by the International Uncertainty Methods Study Group (labeled the GRS method).[11]

Table 8 gives the deflagration parameters ranges selected for the analysis – the default parameters (see Table 3) are also indicated within the parenthesizes. It was assumed that the subjective probability function profiles for the parameter distributions are uniform. The output indicator of interest for the study is the maximum hydrogen concentration during or at the end of each significant phase of the hydrogen injection event. For this case (MELCOR run 21) the phases are 1) the period of significant pump seal release (3.5 – 5 hours) and at the time just before vessel failure (~ 6.4 hours). The maximum hydrogen concentrations for each time period obtained using the reference case parameters are shown in Table 9. Shown in Table 10 are the uncertainty intervals, represented as the 95% probable and 95% confidence level, for each time interval. To obtain these results 100 calculations were run using random vector inputs for the deflagration parameters (sampling from a uniform probability distribution function). The largest uncertainty range in hydrogen concentration variation (~ 5%) is for the ice bed, with a maximum concentration of 14.7% indicated. As stated earlier in 2.1, small local circulation and concentration details cannot be modeled with a lumped-parameter control volume code such as MELCOR, suggesting that other higher fidelity models might calculate pockets of higher concentration.

For the sensitivity analysis, Spearman rank coefficients were determined for each burn parameter based on the results of the uncertainty study that included 100 output vectors. The Spearman rank coefficients can vary from -1 to 1. A negative coefficient indicates that an increase in the burn parameter value will result in a decrease in the output variable. Conversely, a positive coefficient indicates that an increase in the burn parameter results in an increase in the output variable. A 95% confidence level that there exists a correlation requires that the absolute value for the rank should be greater than approximately 0.2 (100 random trials). Tables 11 and 12 present the rank coefficients for each injection or analysis period. Larger absolute values of the rank coefficients indicate a stronger correlation. For example, an increase in the hydrogen concentration limit for ignition results in an increase in the maximum hydrogen concentration in the ice bed during the 3.5 - 5 hour period. The most obvious correlations are for 1) the hydrogen

[11] "Report on the Uncertainty Methods Study," NEA/CSNI/R(97)35/Volume 1, June, 1998.

concentration limit for ignition (all regions), 2) the maximum steam concentration for ignition (ice bed and upper containment), and 3) the hydrogen concentration limit for downward propagation (ice bed). Phenomena with no apparent correlation between hydrogen concentration uncertainties and burn parameter are 1) hydrogen concentration for upward propagation (lower compartment and ice bed) and 2) hydrogen concentration for horizontal propagation (lower compartment and ice bed).

5 Summary

A short-term station blackout with pump seal leakage scenario (STSBO-L) has been analyzed using the MELCOR code to determine potentially severe containment loads that may be produced with and without active hydrogen control. The analysis, conducted for the period of time up to and including vessel failure, showed that active hydrogen control using dc igniters can be effective in controlling challenges to the containment when compared to the option of no active control. The standalone containment analysis used a detailed description of the containment (26-cell model) and source terms for water, steam, and hydrogen to the containment. The source terms were generated by separate MELCOR code calculations reported elsewhere (prior reference 7). Three scenarios were selected from a MELCOR uncertainty analysis of hydrogen sources terms to obtain a representative range of high and low hydrogen injections (570 to 430 kg) to the containment.

Hydrogen control through the supply of supplemental onsite power to igniters was studied, as well as the case for power to both igniters and fans (single train). For scenarios with power to igniters only, it was shown that 1) global hydrogen concentrations (especially in the upper containment) can be significantly reduced from the levels that would be attained without any control, and the potential for a delayed global burn minimized, and 2) local hydrogen build-up in the ice bed can also be significantly reduced such that the time period where locally higher hydrogen concentrations (9-15%) exists can be minimized. It should be noted that local concentrations of hydrogen within the ice bed are only estimates due to the lumped-parameter control volume nature of the MELCOR code, and therefore these calculations do not confirm that there is a zero probability of events occurring such as DDT or detonations; rather, they show that hydrogen concentrations in the ice bed are in a relatively low range (both in terms of time duration and absolute value) such that the events are very unlikely. Should however power not be supplied to igniters, the likelihood of a detonation is significantly increased not only in the ice bed, but more importantly in the upper containment region.

The range of source term uncertainties investigated indicated only minor variations in hydrogen concentrations or compartment burn percentages (i.e., containment burn profiles) when hydrogen control is active (power to igniters or to igniters and fans). These analyses have also explored sensitivity to nodalization. These sensitivity studies with 26-cell and 38-cell models indicate some residual uncertainty with respect to peak hydrogen concentrations in the ice beds remains that likely cannot be reduced by additional MELCOR calculations with finer nodalization. Predicted peak concentrations

ranged from ~8% for the 26-cell model to ~12% for the 38-cell model. We conclude from this that peak concentrations are likely to be in the low range and under 15%. If greater spatial resolution is needed than inherent in these analyses, then use of more sophisticated codes and confirmatory experimental studies might be required.

Fan operation, by mixing the gases in the containment, is shown to 1) reduce somewhat the local build-up of hydrogen, 2) aid in the prevention of steam inerting, and 3) help supply oxygen to regions with high burn rates (e.g. the lower containment). In general, the fans enable more burning in regions that have igniters in place (upper plenum and lower containment). The use of fans results in less dependency on flame propagation into regions like the ice bed. Although the fans help direct most burns to igniter locations, the total amount of hydrogen consumed (at time of vessel failure) is not substantially affected by having fans powered. Additionally, with igniters powered, the global hydrogen concentration in the large upper containment region is essentially unchanged with and without fans on.

Burns in the lower containment regions are observed to be responsible for the majority of hydrogen depletion. Such burn behavior is not substantially varied even if fans are powered. Circulation pathways represented by the refueling drains distribute a significant amount of oxygen to the lower compartment even without fan operation. This circulation enables a substantial amount of lower compartment burning to occur.

An uncertainty/sensitivity analysis (direct statistical analysis) of hydrogen burn parameters (e.g., ignition and propagation limits) was completed for a reference scenario (high hydrogen source term) with power to igniters only. Hydrogen concentration uncertainty ranges for the lower containment, ice bed and upper containment were determined for the period of substantial hydrogen injection and the time just prior to vessel failure. The largest uncertainty range (~5% variation) occurred for the ice bed both during the pump seal injection period (~ 9.5 to 14.7%) and later at the ~ time of vessel failure (3.5 – 7.9%). The sensitivity analysis indicated strong correlations between the uncertainty ranges and some parameters for the ice bed (hydrogen concentration limit for ignition and downward propagation, and maximum steam concentration limit for ignition). There were only weak or no correlation for burn parameters including upward and horizontal flame propagation limits.

Table 1. Reference MELCOR containment model for the Sequoyah plant.	
CVH Nos.*	**Location**
26-cell model	
1	Cavity
2-5	Steam Gen. Doghouses
6	Upper Reactor Space
7	Pressurizer Doghouse
8-10	Lower Containment (Inside Crane Wall)
11-13	Lower Annulus (Between Crane Wall and Shell)
14-17	Lower Plenum
18-21	Ice bed
22-23	Upper Plenum
24-25	Upper Dome
26	Lower Dome & Operating Floor

* note the CVH package of MELCOR does not require that compartments (cells) be sequenced in any order.

Table 2. Selected MELCOR Sequoyah Sensitivity Runs					
Run #	Primary System Failure Times (Hours)		Hydrogen Cumulative Mass (Kg)		
	Vessel	Hot Leg	Generated in Core*	Core to Containment	
				Hot Leg	Pump Seals
21	6.37	5.57**	570	55.6	515.2
32	6.3	----	510	----	508.9
35	7.57	6.38	434.5	13.9	420.2
Rev 1 Rpt***	5.45	3.99	476	170	305

* At time of vessel failure
** (triple loop, single loop not failed)
*** "Hydrogen Control Calculation for the Sequoyah Plant: Station Blackout Scenario," April 2002 draft report.

Table 3. Ignition and propagation limits for deflagrations.			
Limits	**X (H2)***	**X (O2)**	**X (steam)**
Ignition	>= 0.05	>= 0.05	<= 0.55
Upward propagation	>= 0.041	>= 0.05	<= 0.55
Horizontal propagation	>= 0.06	>= 0.05	<= 0.55
Downward propagation	>= 0.09	>= 0.05	<= 0.55

Table 4. Igniter locations used in the analysis of the Sequoyah plant.	
Location	**Igniters**
Cavity	No
Steam Gen. Doghouses	Yes
Upper Reactor Space	Yes
Pressurizer Doghouse	Yes
Lower Containment (Inside Crane Wall)	Yes
Lower Annulus (Between Crane Wall and Shell)	Yes
Lower Plenum	No
Ice bed	No
Upper Plenum	Yes
Upper Dome	Yes
Lower Dome & Operating Floor	Yes

Table 5a. Hydrogen consumed in containment for period up to and including vessel breach (26-cell containment model), MELCOR run 21.*

Location	Hydrogen consumed (kg)	
	Igniters only	Igniters and fans
Lower containment	229 (58.2)**	255.5 (61.4)
Ice condenser	159 (40.4)	105 (25.4)
Ice bed	111.4 (28.3)	25.9 (6.2)
Upper plenum	18.2 (4.6)	76.5 (18.4)
Lower plenum	29.4 (7.5)	2.7 (0.6)
Upper containment	5.6 (1.4)	55.4 (13.3)
Total	393.6	416

* Total hydrogen released to containment up to and including vessel breach is ~ 570 kg.
** Percentage of burned

Table 5b. Hydrogen consumed in containment for period up to and including vessel breach (26-cell containment model), MELCOR run 32.*

Location	Hydrogen consumed (kg)	
	Igniters only	Igniters and fans
Lower containment	254.4 (66.9)**	227 (60.5)
Ice condenser	126 (33.1)	102.8 (27.5)
Ice bed	96.8 (25.4)	18.6 (5.0)
Upper plenum	13.16 (3.5)	82.4 (22.0)
Lower plenum	16.0 (4.2)	1.8 (0.5)
Upper containment	0.0 (0.0)	45.4 (12.1)
Total	380.4	375.2

* Total hydrogen released to containment up to and including vessel breach is ~ 508kg.
** Percentage of burned

Table 5c. Hydrogen consumed in containment for period up to and including vessel breach (26-cell containment model), MELCOR run 35.*		
Location	Hydrogen consumed (kg)	
	Igniters only	Igniters and fans
Lower containment	163 (55.6)**	151 (49.1)
Ice condenser	127.3 (43.4)	97.5 (31.7)
Ice bed	93.8 (32.0)	20.5 (6.7)
Upper plenum	19.0 (6.5)	75.2 (24.5)
Lower plenum	14.5 (4.9)	1.8 (0.6)
Upper containment	2.74 (0.9)	59 (19.2)
Total	293	307.6

* Total hydrogen released to containment up to and including vessel breach is ~ 434kg
** Percentage of burned

Table 6a. Hydrogen consumed in containment for period up to and including vessel breach (26-cell containment model) for MELCOR run 21, with no circulation through refueling drains.		
Location	Hydrogen consumed (kg)	
	Igniters only	Igniters and fans
Lower containment	135 (35.4)**	255.4 (60.9)
Ice condenser	238 (62.5)	104 (24.8)
Ice bed	181.5 (13.5)	20.5 (4.9)
Upper plenum	13.5 (3.5)	81.5 (19.4)
Lower plenum	43 (11.3)	2.0 (0.5)
Upper containment	7.9 (2.1)	60.0 (14.3)
Total	380.9	419.4

* Total hydrogen released to containment up to and including vessel breach is ~ 570 kg.
** Percentage of burned

Table 6b. Hydrogen consumed in containment for period up to and including vessel breach (26-cell containment model) for MELCOR run 21, with no circulation through refueling drains and no lower plenum door leakage.		
Location	Hydrogen consumed (kg)	
	Igniters only	Igniters and fans
Lower containment	119 (28.8)**	268.0 (63.5)
Ice condenser	283.2 (68.4)	102.8 (24.2)
Ice bed	224 (54.1)	4.8 (1.1)
Upper plenum	29.2 (7.1)	97.0 (23.0)
Lower plenum	30.0 (7.2)	0.5 (0.1)
Upper containment	11.7 (2.8)	51.9 (12.3)
Total	413.9	422.2

* Total hydrogen released to containment up to and including vessel breach is ~ 570 kg.
** Percentage of burned

Table 7. Ice melt percentage at time of vessel failure		
Source Term*	Ice melt %	
	Igniters only	Igniters with fans
Run 21	46.7	64.2
Run 32	37.5	51.2
Run 35	46.1	64.9

* From MELCOR source term uncertainty study, see Table 2.

Table 8. Deflagration parameter uncertainty range		
Parameter	**Uncertainty Range, %**	
	Low	**High**
Hydrogen conc limit for ignition with igniters	5 (5)*	7
Max vapor conc for ignition	45 (55)	65
Hydrogen conc limit for upward propagation	3 (4.1)	5
Hydrogen conc limit for horizontal propagation	5 (6)	7
Hydrogen conc limit for downward propagation	7 (9)	10

* (Default parameter)

Table 9. Maximum hydrogen concentration in Sequoyah containment for the STSBO_L accident event with igniters only (default deflagration parameters)		
Location	**Concentration**	
	3.5 – 5 hrs (pump seals)	**~6.4 hrs (vessel failure)**
Lower cont. (cell #9)	14 %	3.7%
Ice bed (cell #19)	9.5%	6.4%
Upper cont. (cell #24)	3.5%	4.1%

Table 10. Maximum hydrogen concentration uncertainty interval (95%/95%) in Sequoyah containment for the STSBO_L accident event with igniters only		
Location	**Concentration**	
	3.5 – 5 hrs (pump seals)	**~6.4 hrs (vessel failure)**
Lower cont. (cell #9)	14 – 16.6%	3.2 – 4.6%
Ice bed (cell #19)	9.5 – 14.7%	3.5 – 7.9%
Upper cont. (cell #24)	3 – 4.6%	3.8 – 5.2%

Table 11. Spearman rank coefficients for the hydrogen burn parameter study at the 3.5 – 5 hour period (pump seals)			
Parameter	Rank coefficient		
	Cell #9	Cell #19	Cell #24
Hydrogen conc limit for ignition with igniters	0.96	0.66	0.435
Max vapor conc for ignition	-0.11	-0.47	-0.53
Hydrogen conc limit for upward propagation	-0.14	-0.07	0.19
Hydrogen conc limit for horizontal propagation	0.0068	0.03	0.35
Hydrogen conc limit for downward propagation	0.29	0.25	0.24

Table 12. Spearman rank coefficients for the hydrogen burn parameter study near the time of vessel failure (~ 6.4 hours)			
Parameter	Rank coefficient		
	Cell #9	Cell #19	Cell #24
Hydrogen conc limit for ignition with igniters	0.29	0.57	0.41
Max vapor conc for ignition	-0.20	-0.012	-0.1
Hydrogen conc limit for upward propagation	0.204	-0.05	0.17
Hydrogen conc limit for horizontal propagation	0.12	0.14	0.26
Hydrogen conc limit for downward propagation	0.21	0.413	0.10

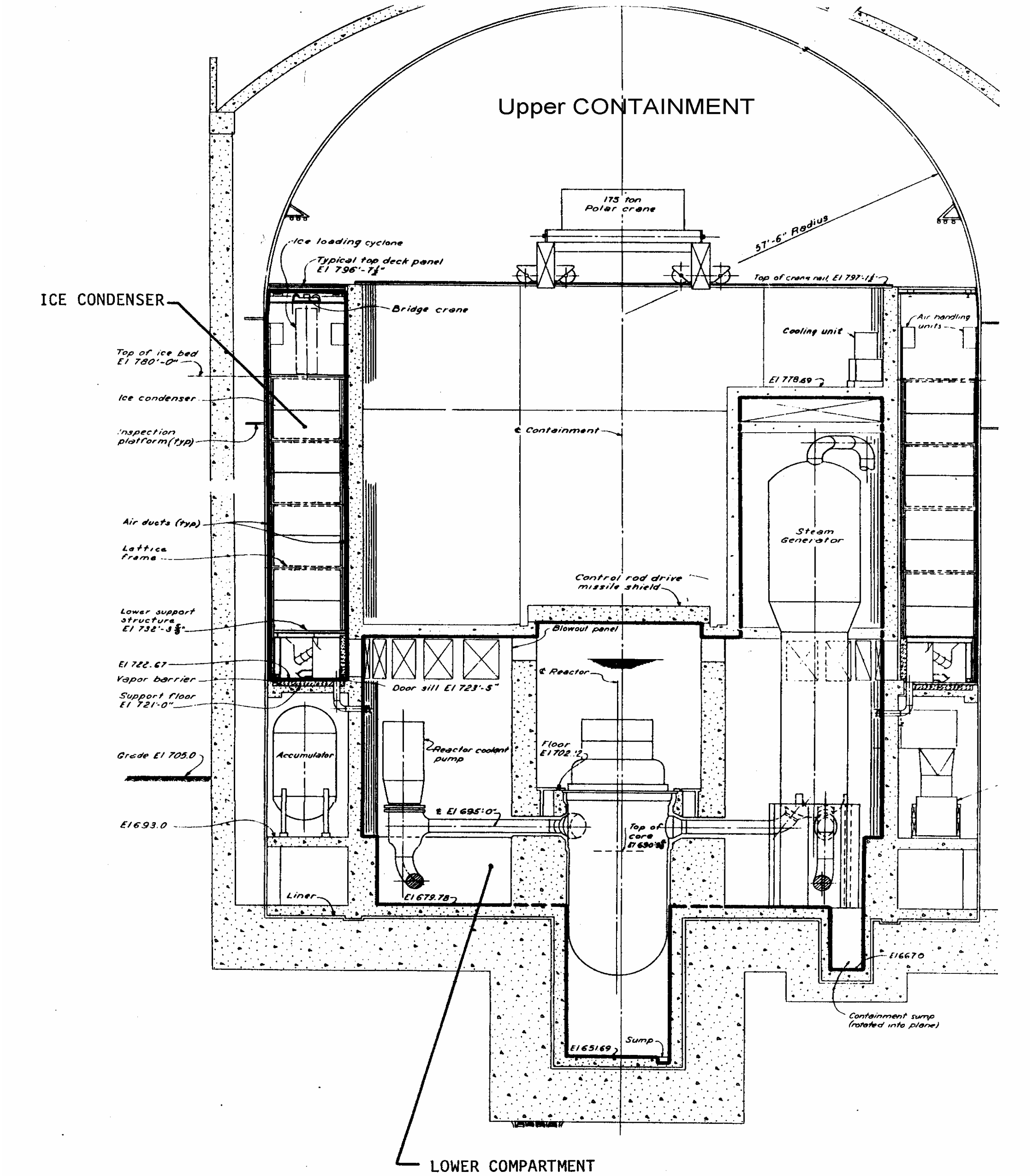

Figure 1 Sequoyah containment drawing [Sequoyah FSAR].

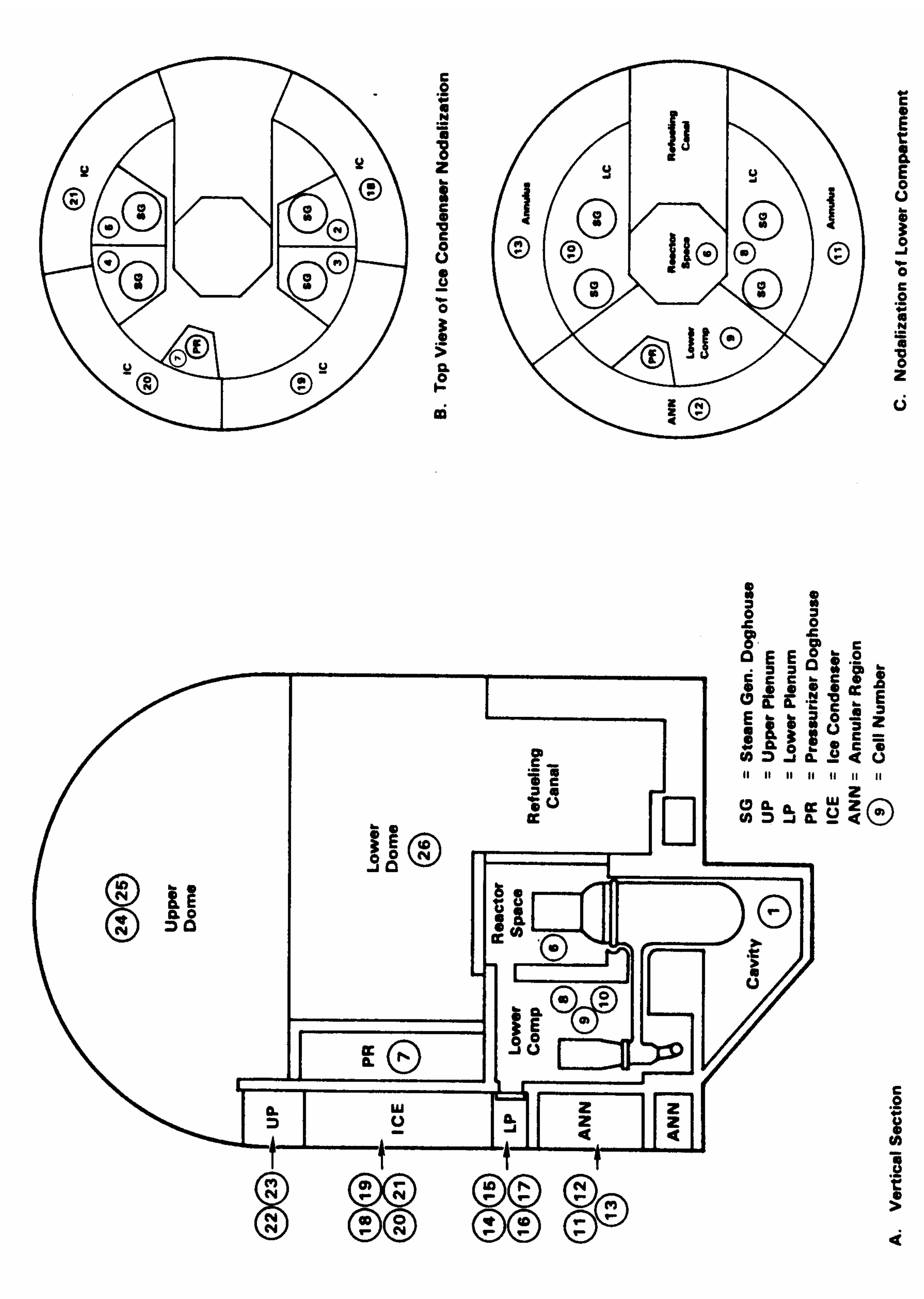

Figure 2 Sketch of Sequoyah containment nodalization for the 26-cell MELCOR containment model.

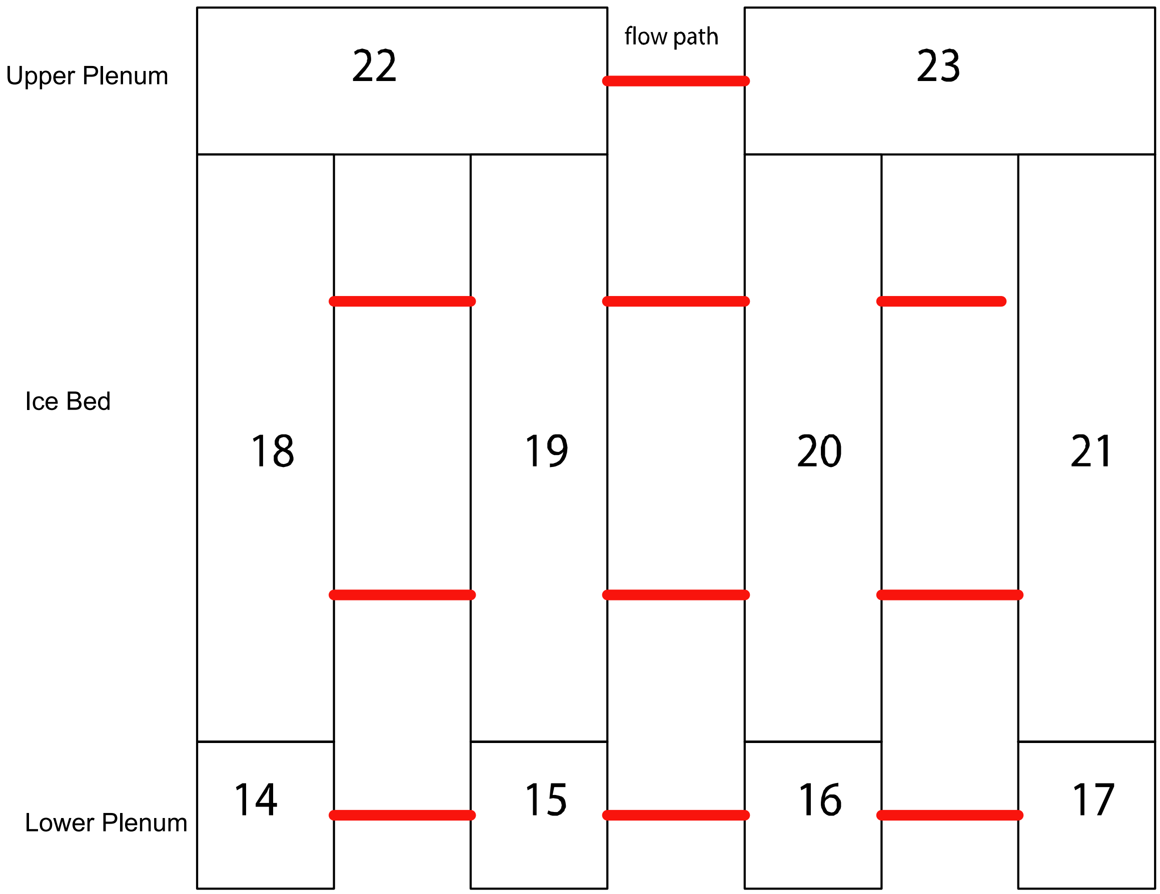

Figure 3 Ice bed nodalization for the 26-cell MELCOR containment model.

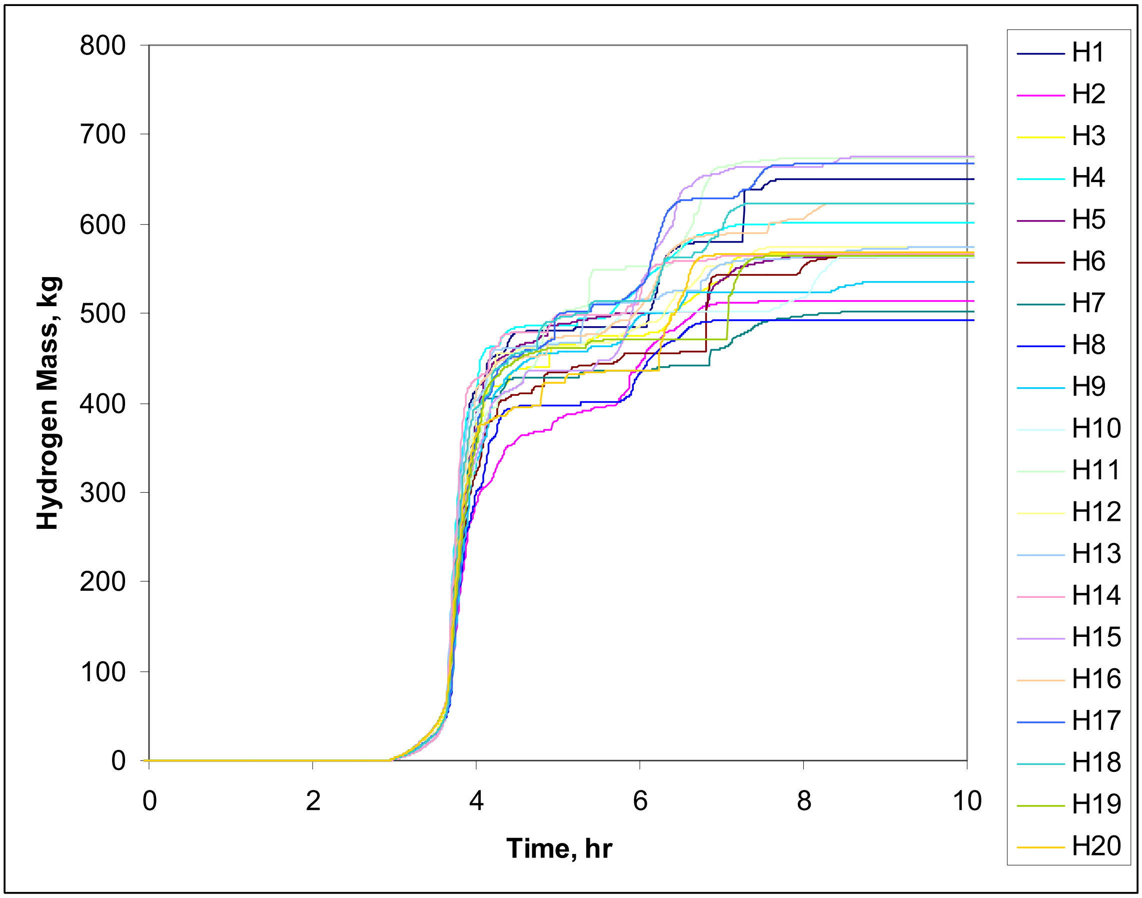

Figure 4 In-vessel hydrogen generation for MELCOR uncertainty runs #1 - #20.

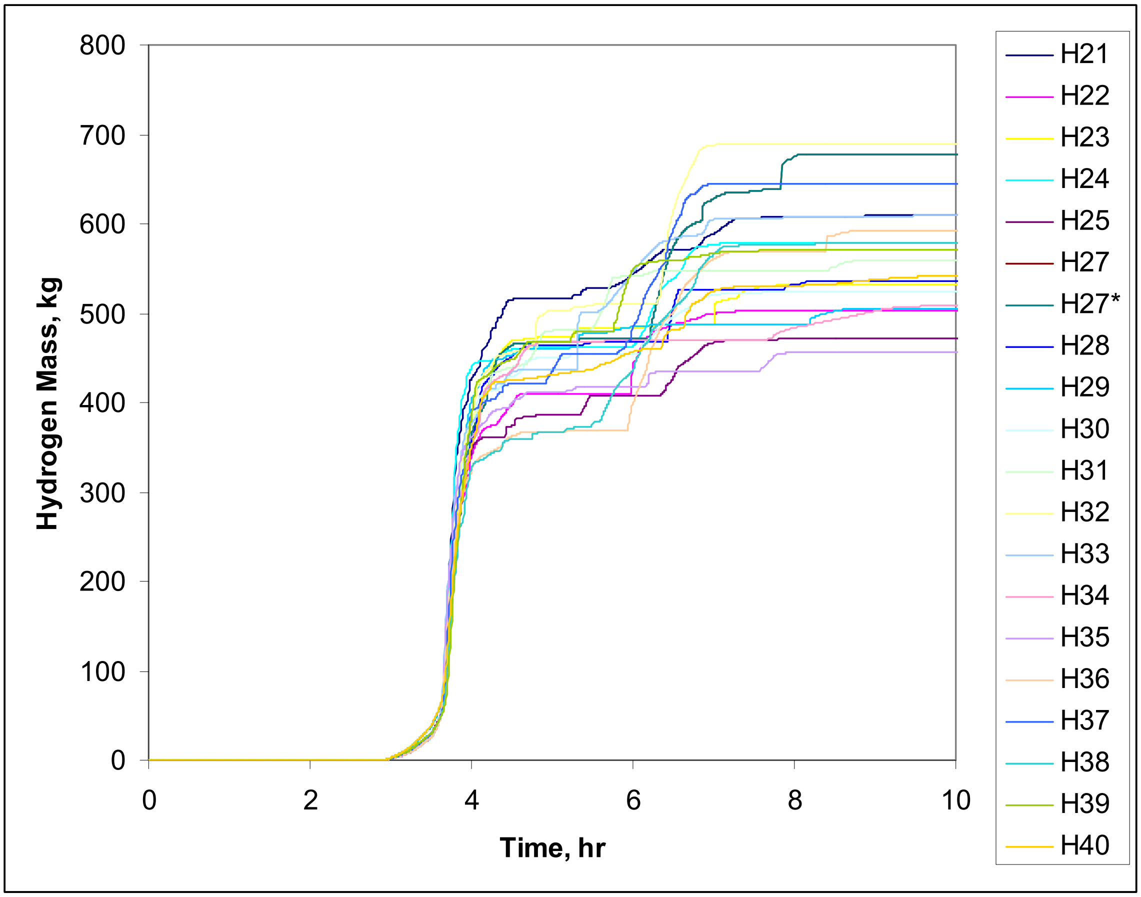

Figure 5 In-vessel hydrogen generation for MELCOR uncertainty runs #21 - #40.

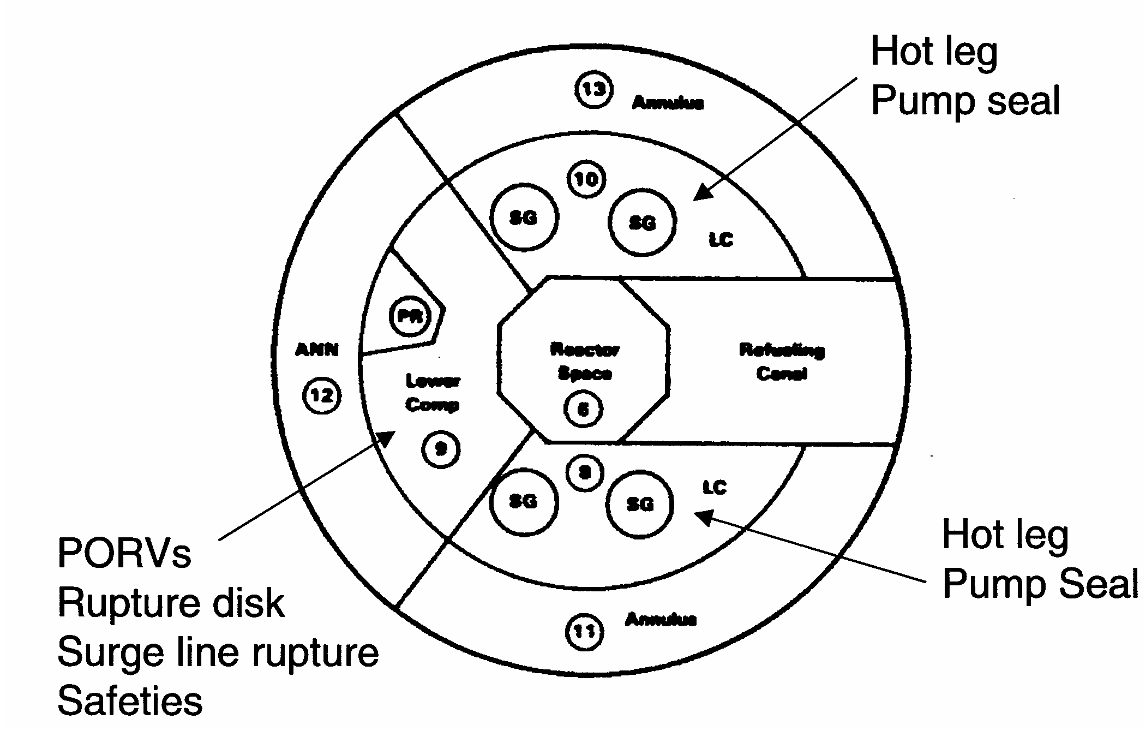

Figure 6 Approximate location for water, steam, and hydrogen injections.

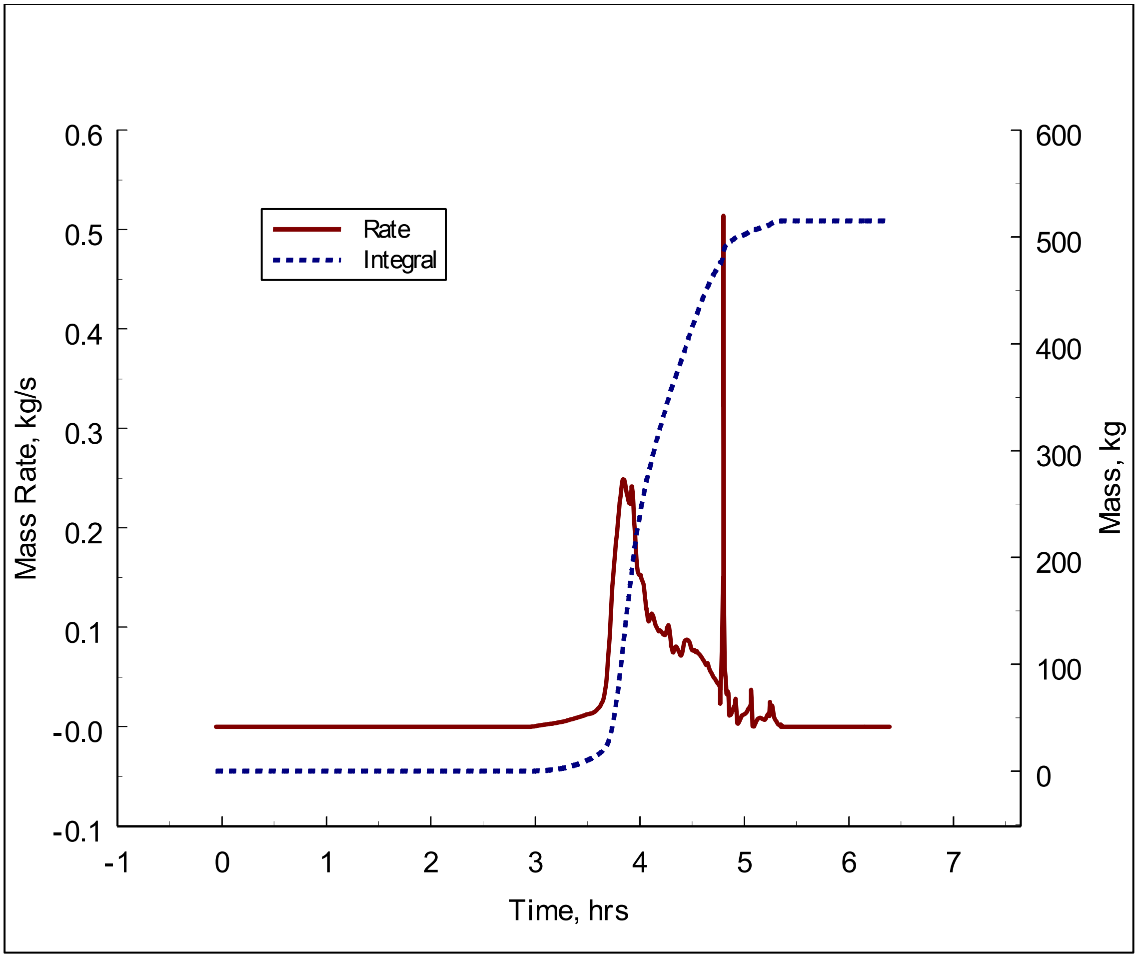

Figure 7 Hydrogen injected through pump seals for MELCOR run 21.

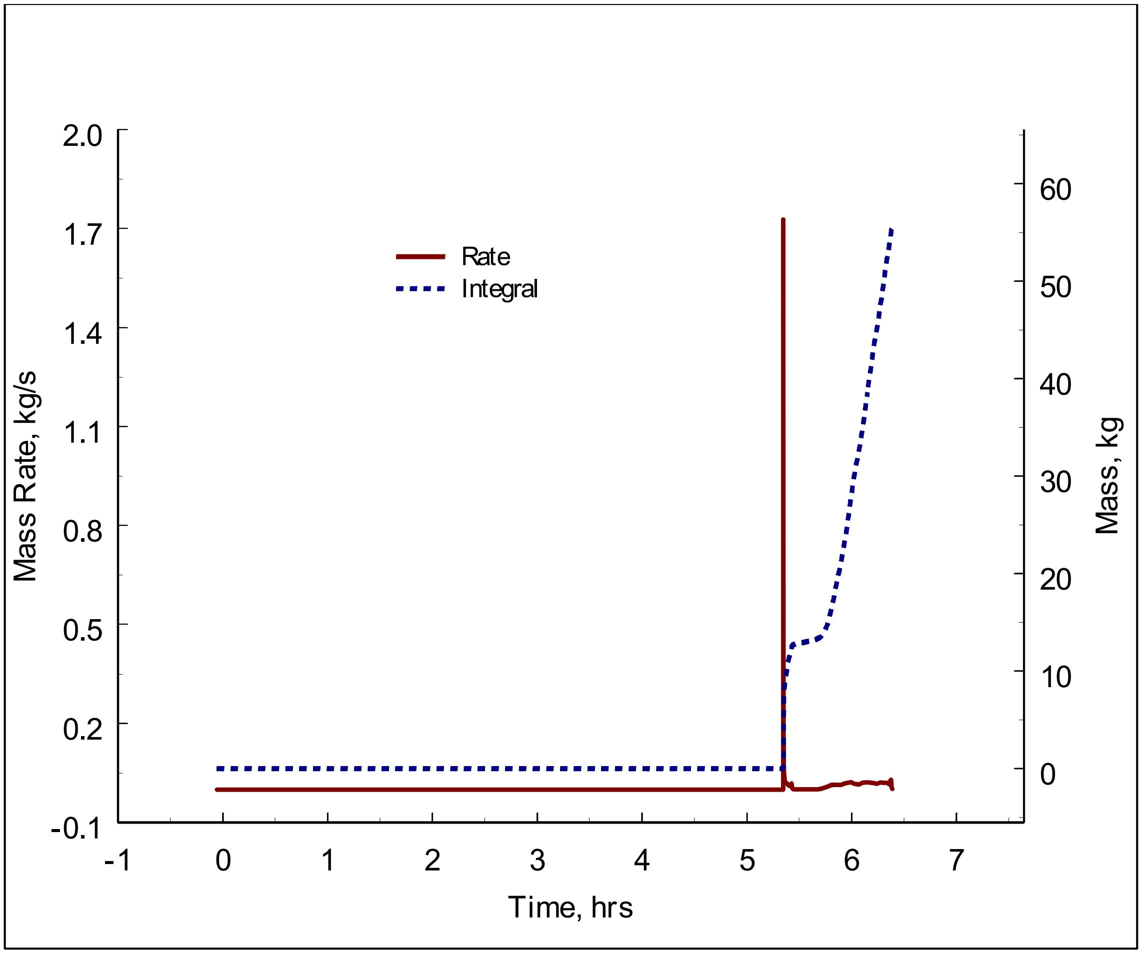

Figure 8 Hydrogen injection through hot leg (triple loop) for MELCOR run 21.

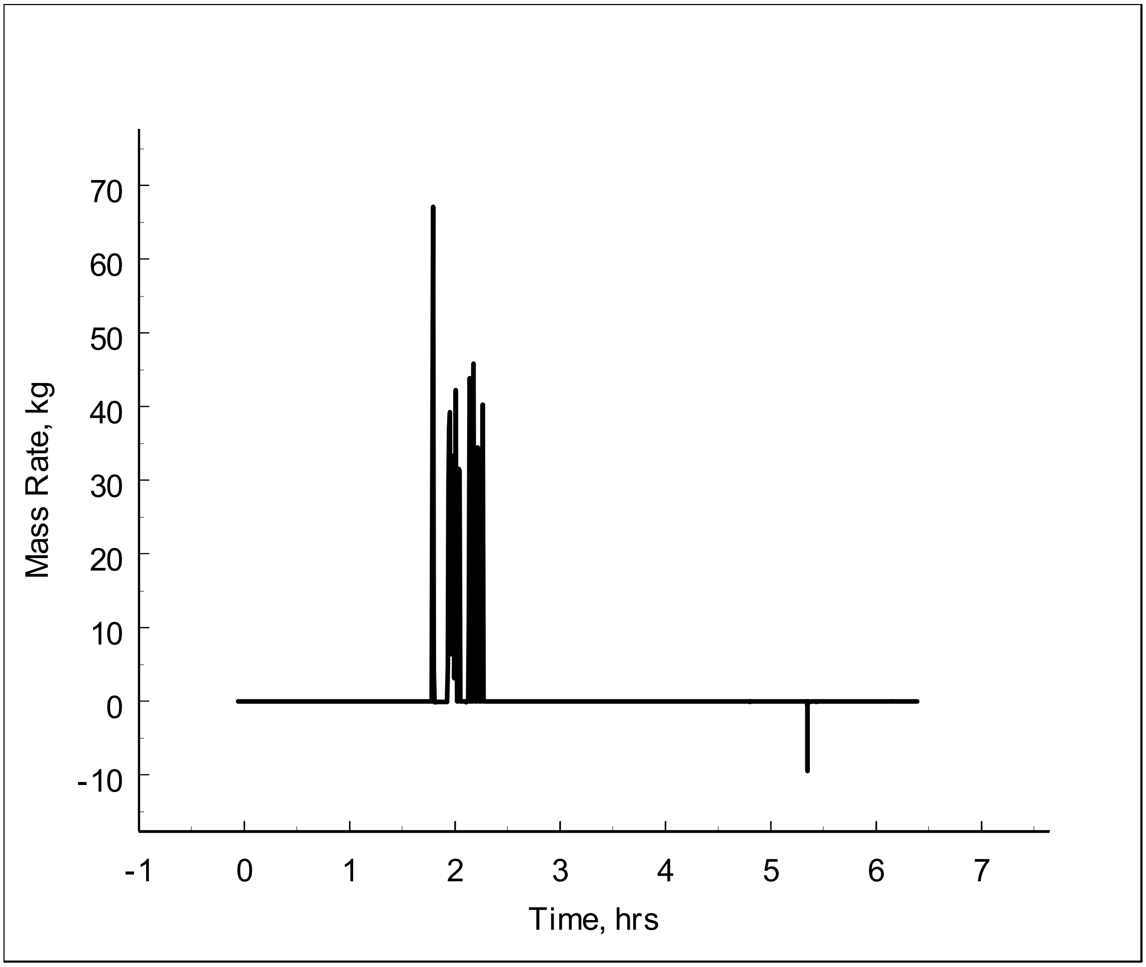

Figure 9 Steam injection from PORVs for MELCOR run 21.

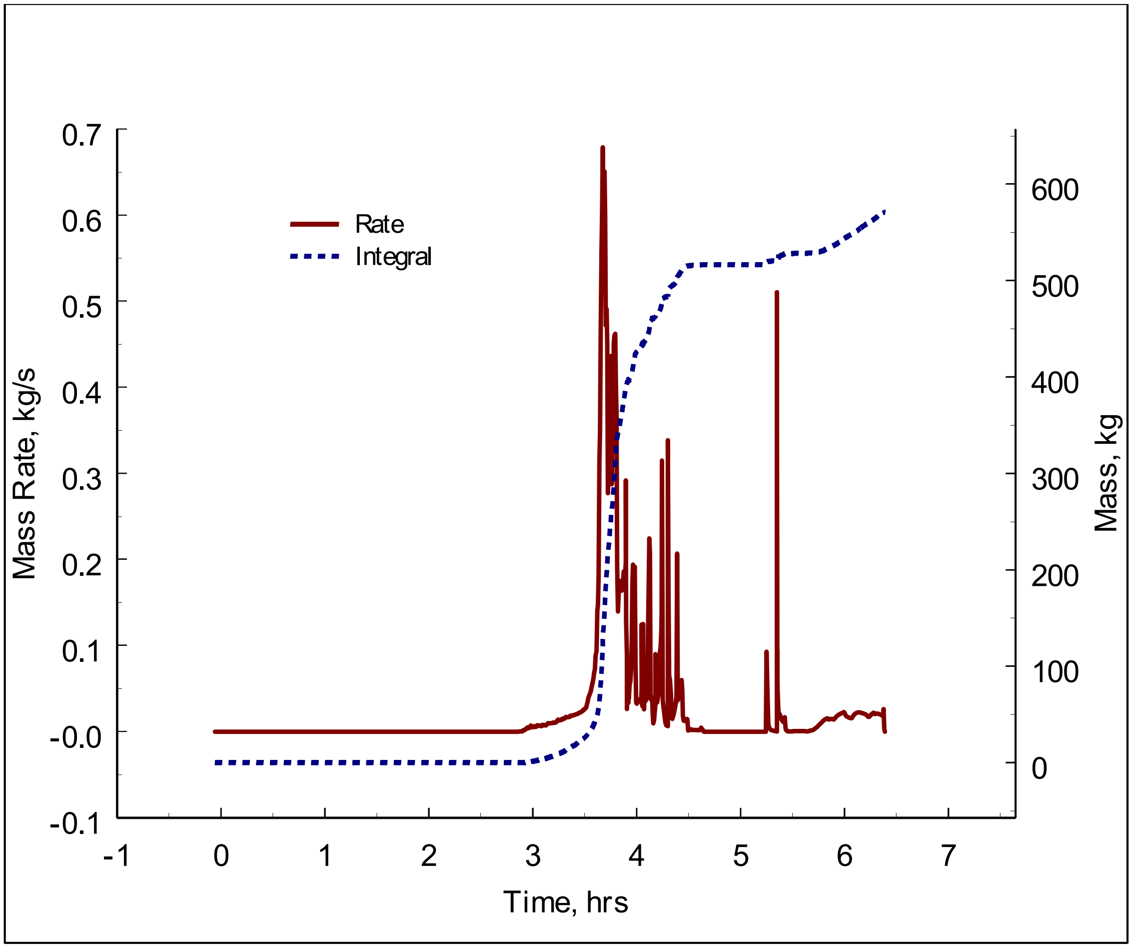

Figure 10 In-vessel hydrogen generation for MELCOR run 21.

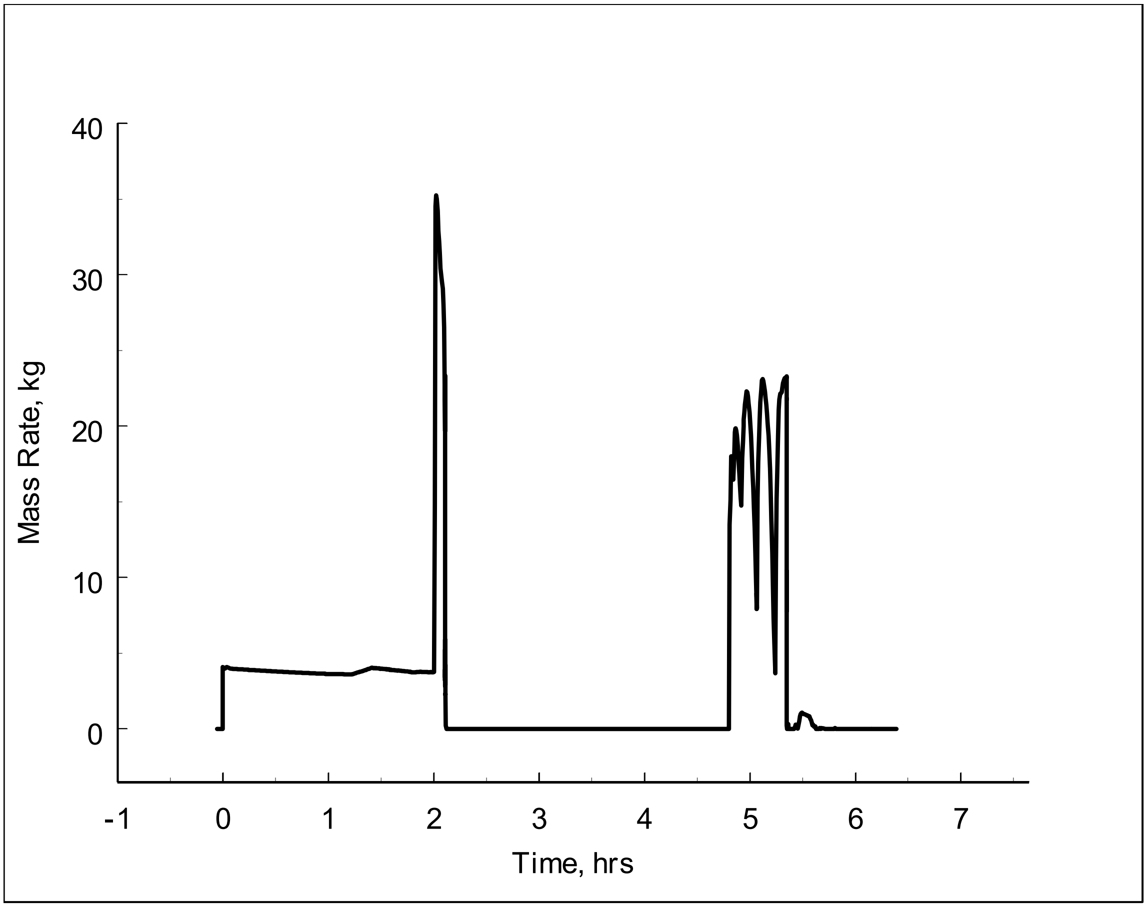

Figure 11 Water injection from pump seals for MELCOR run 21.

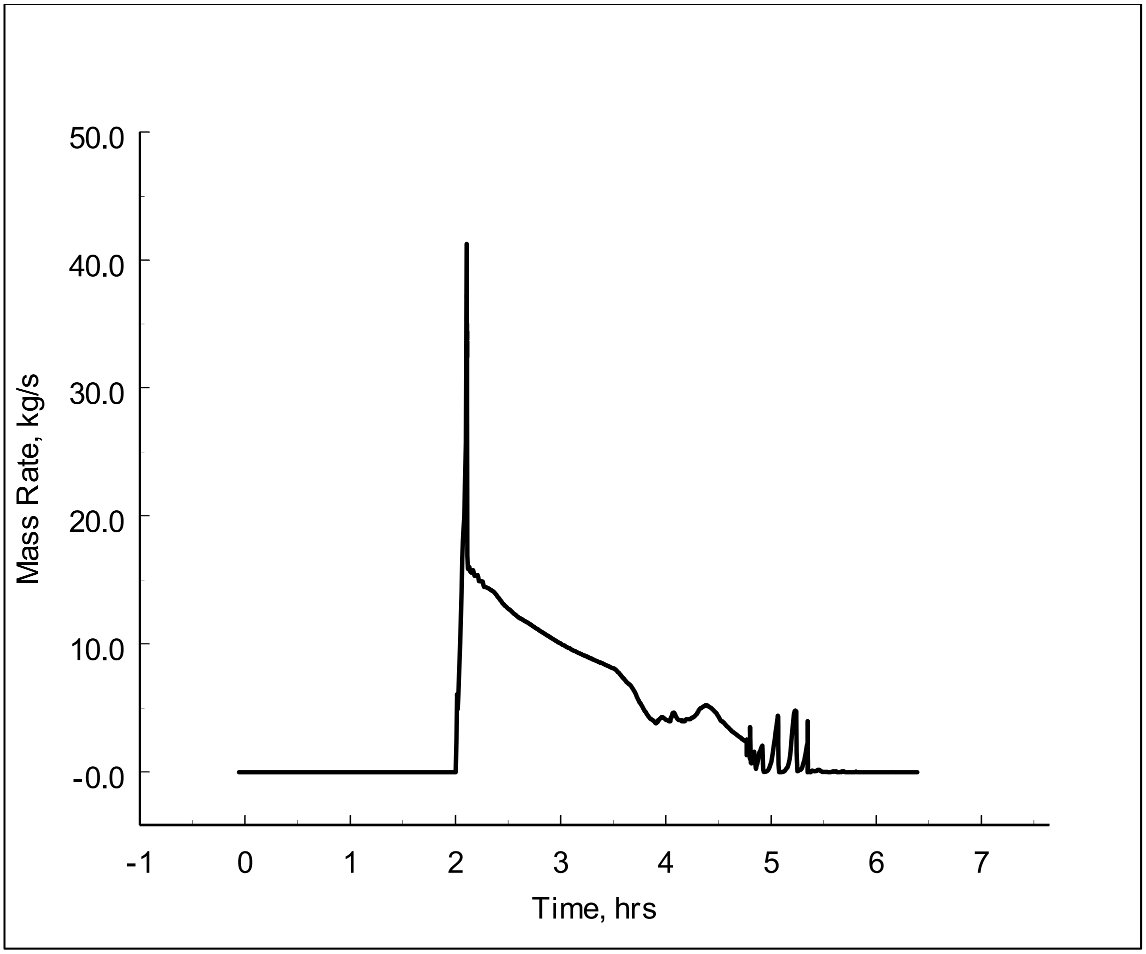

Figure 12. Steam injection from pump seals for MELCOR run 21.

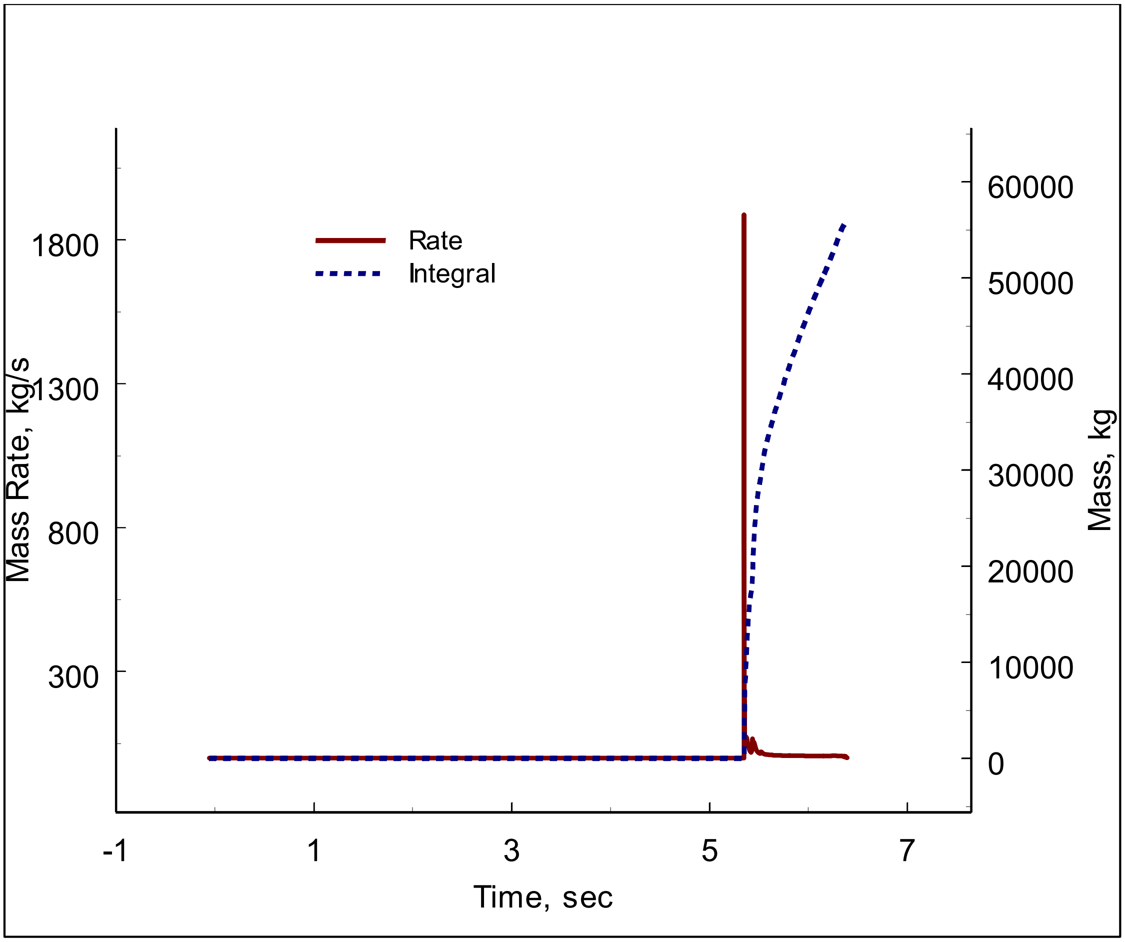

Figure 13 Steam injection from hot leg break for MELCOR run 21 (no liquid water injection).

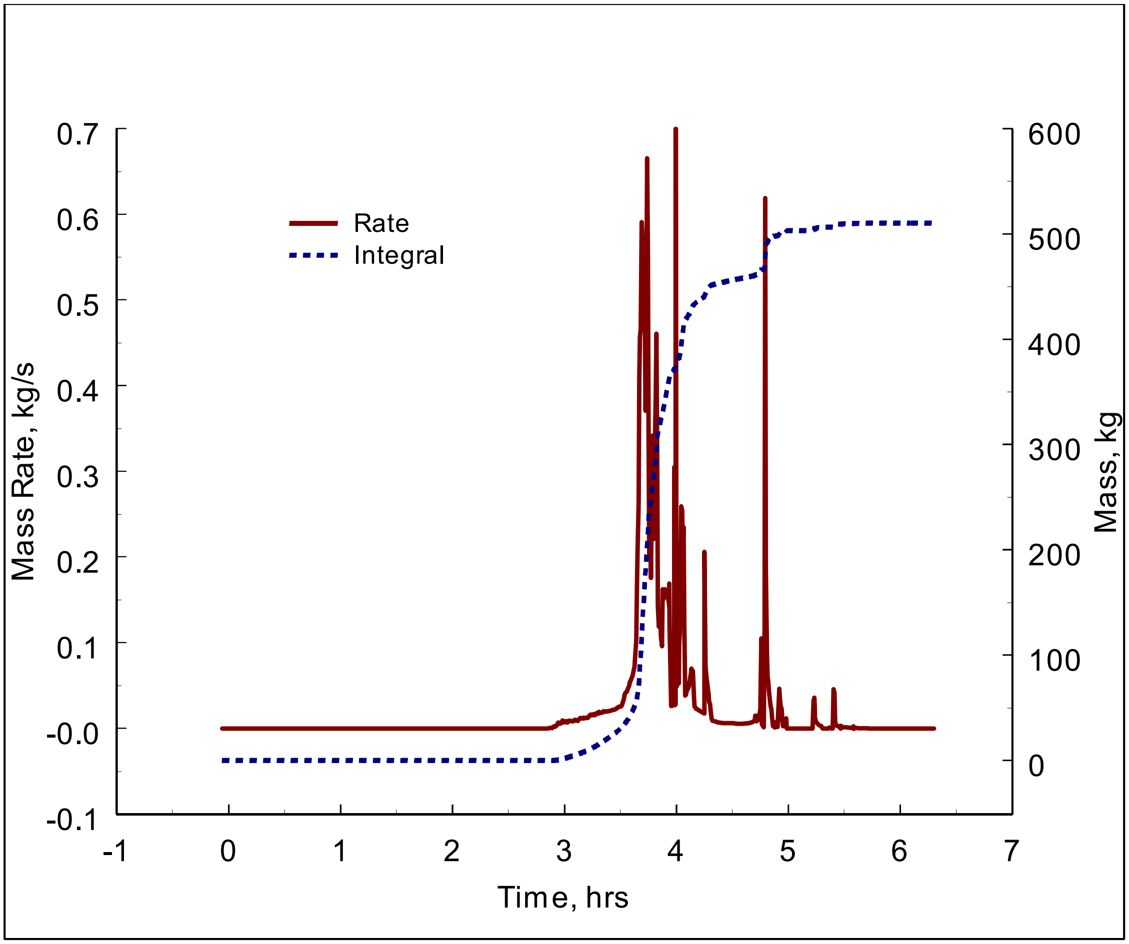

Figure 14. In-vessel hydrogen generation for MELCOR run 32.

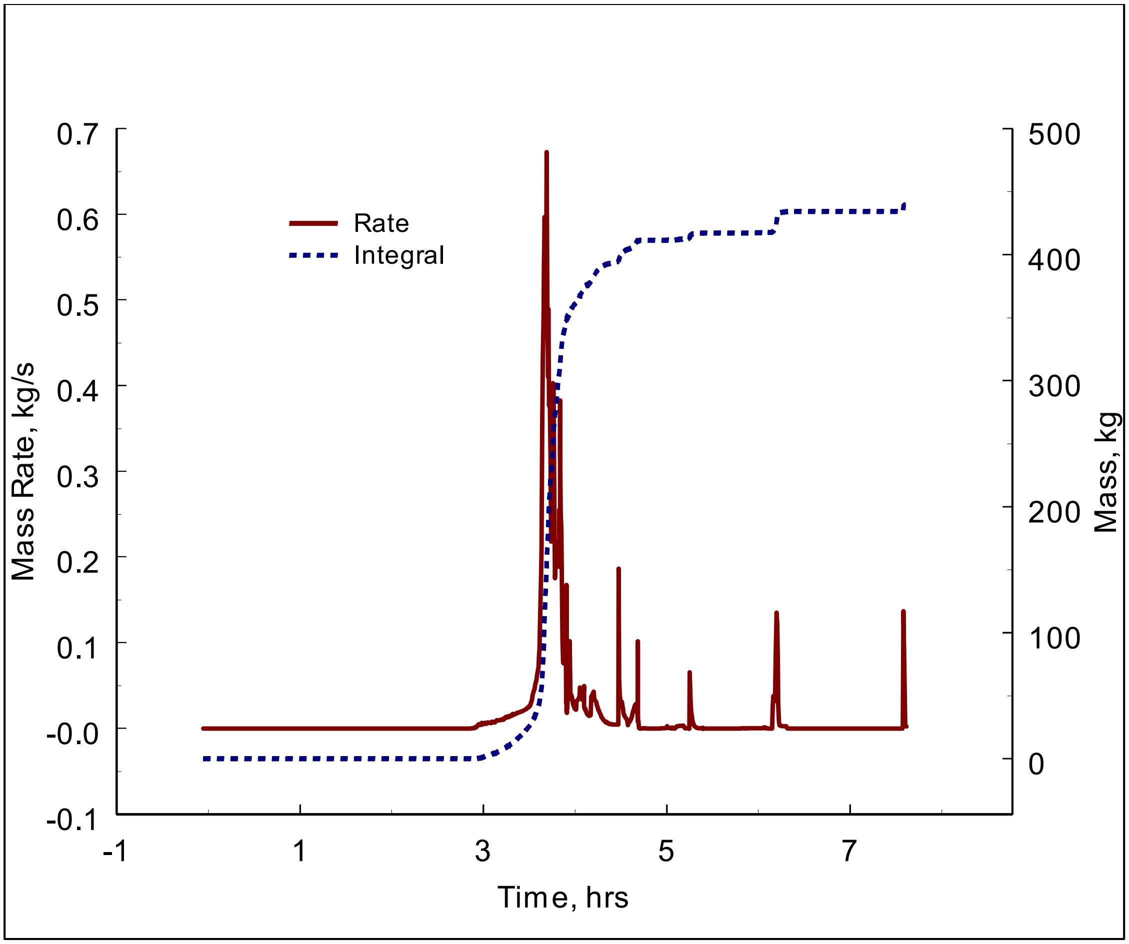

Figure 15. In-vessel hydrogen generation for MELCOR run 35.

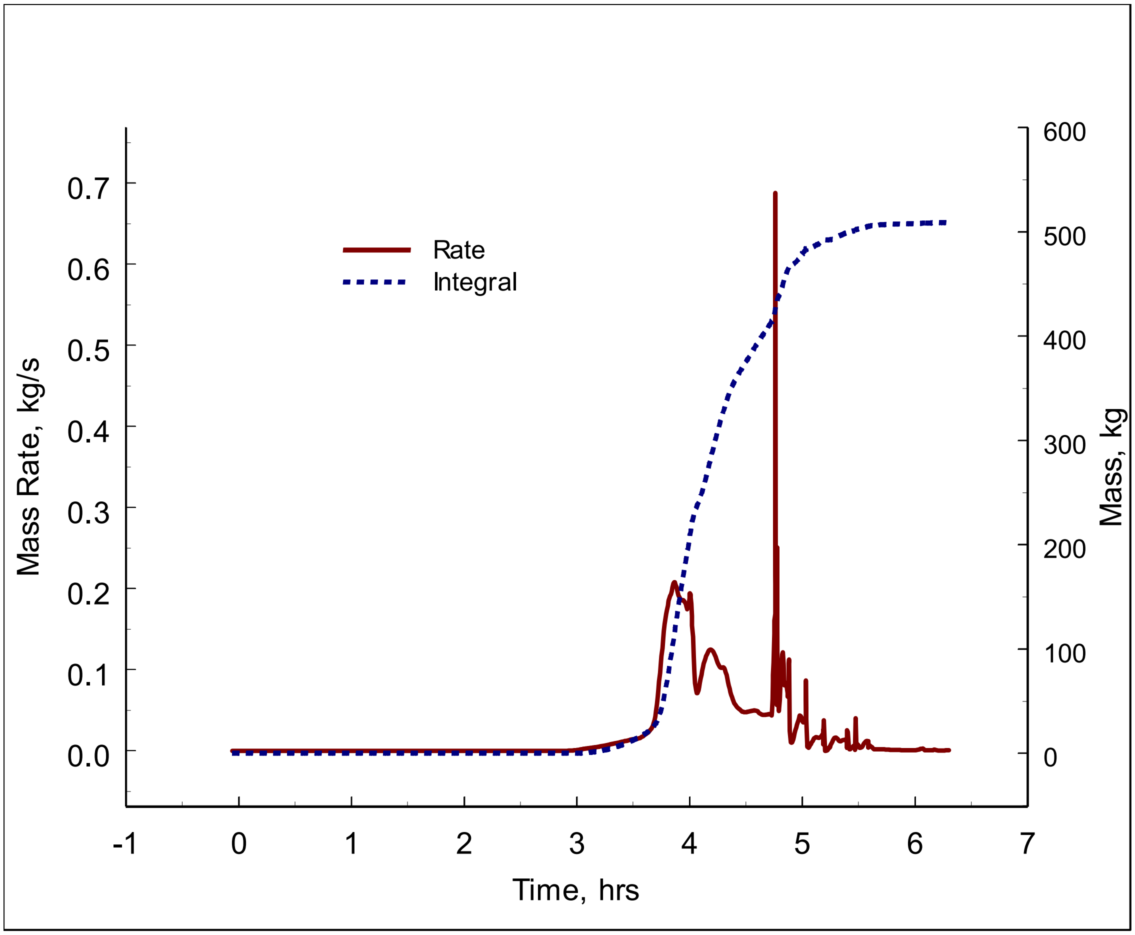

Figure 16. Hydrogen injection from pump seals for MELCOR run 32.

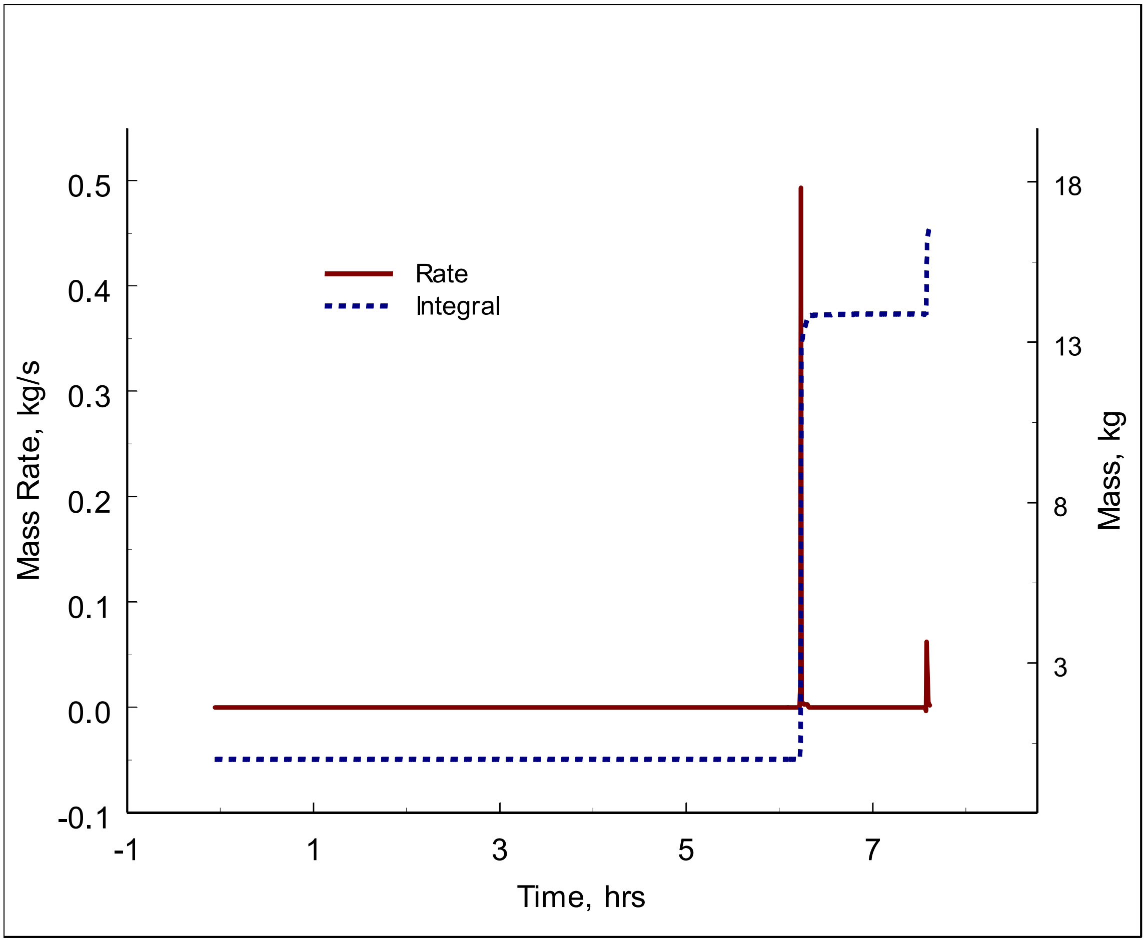

Figure 17. Hydrogen injection from hot leg failure for MELCOR run 35.

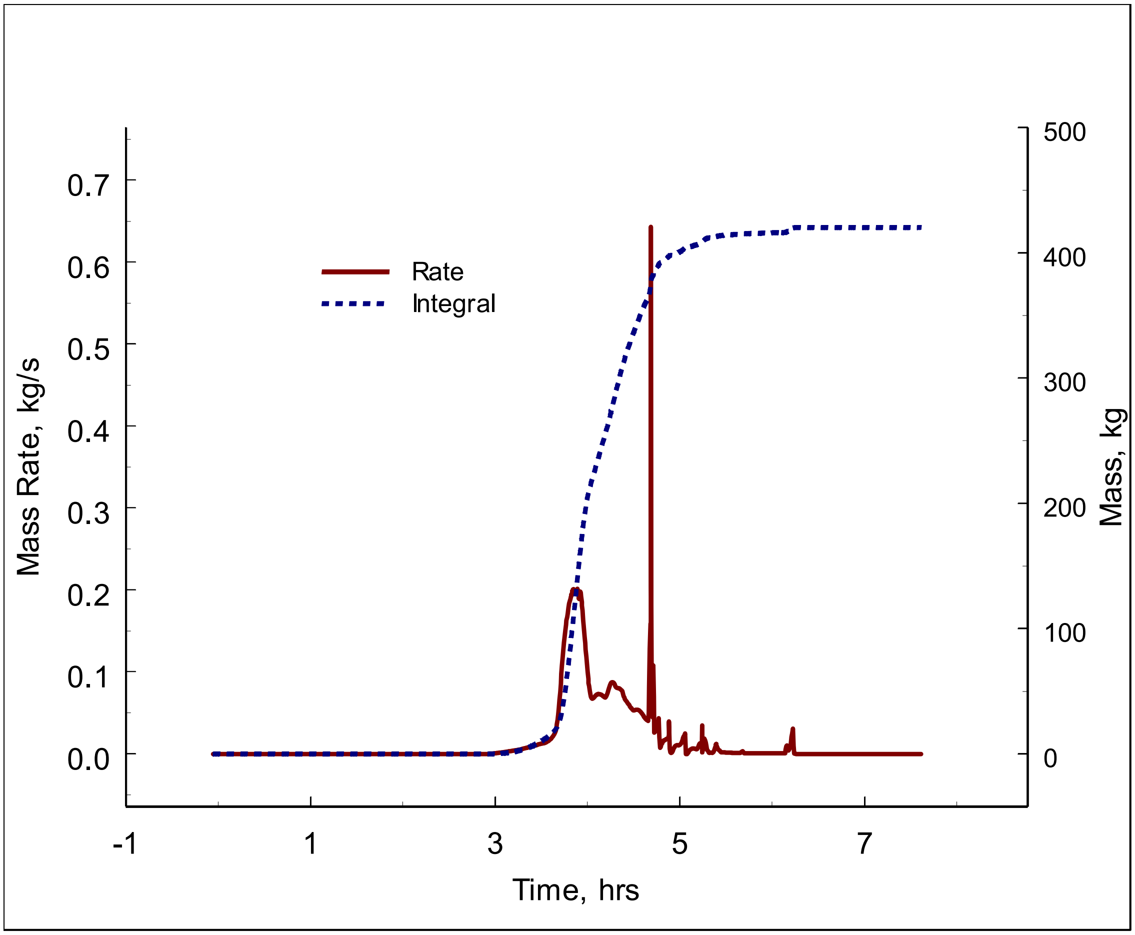

Figure 18. Hydrogen injection from pump seals for MELCOR run 35.

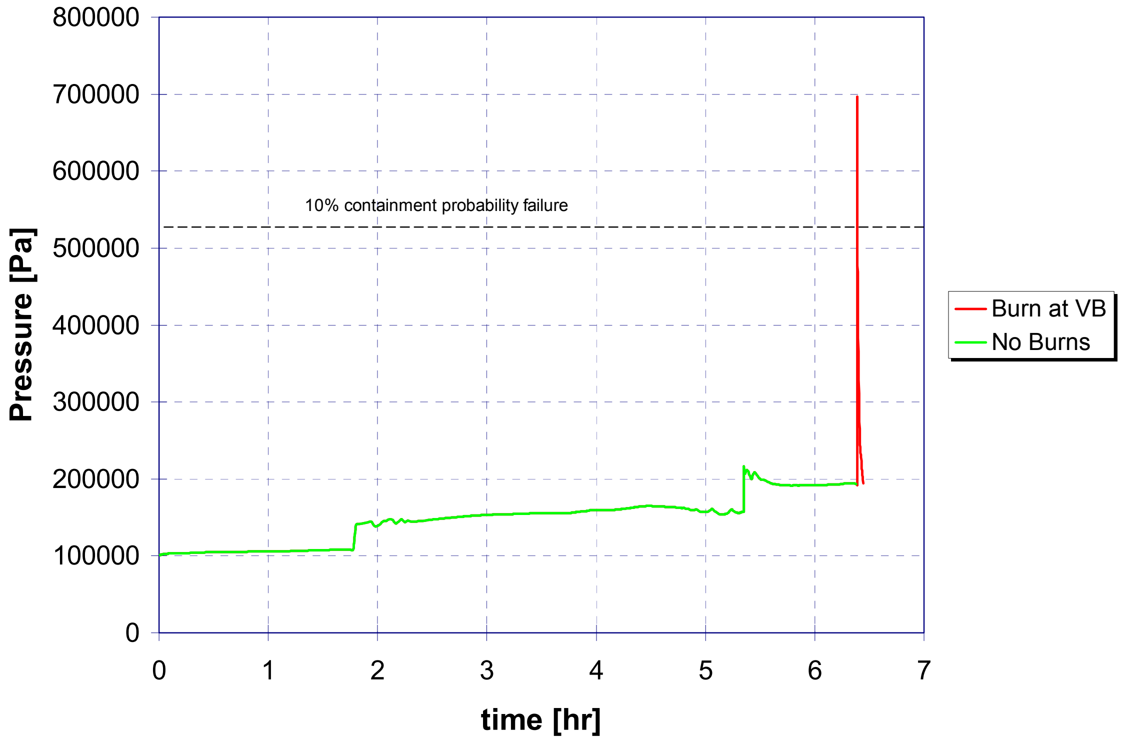

Figure 19. Containment pressure for MELCOR run 21 source term showing the overpressure that results from a delayed deflagration at the time of vessel failure.

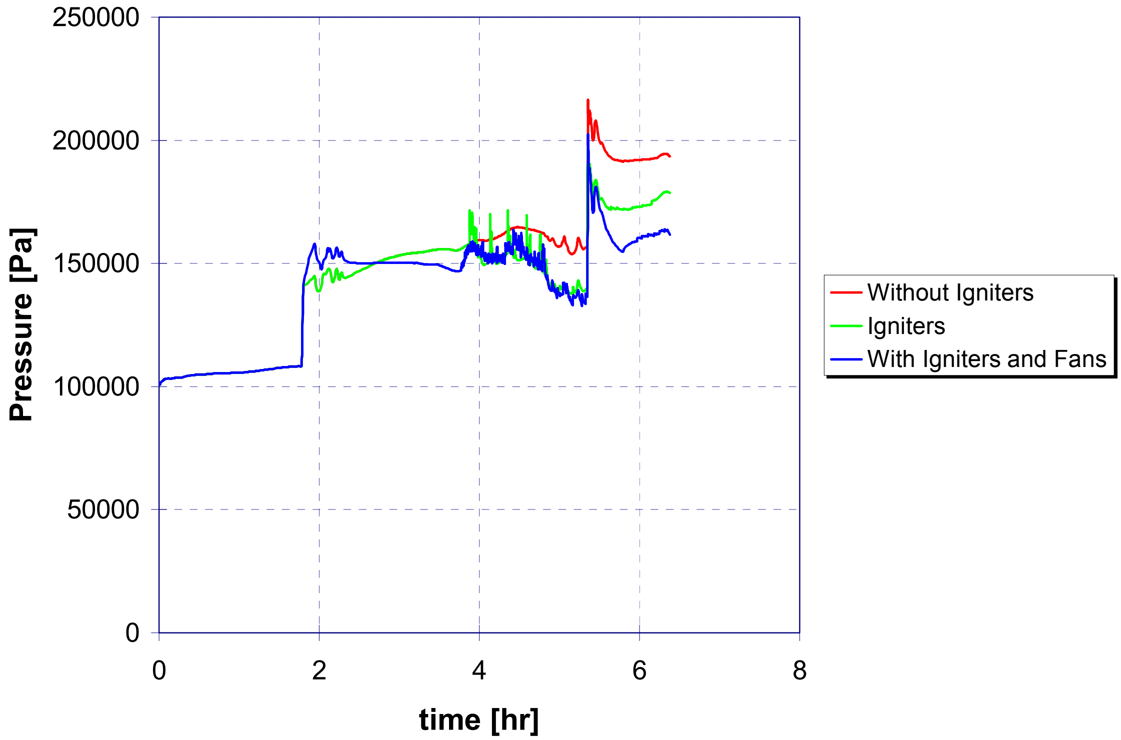

Figure 20. Containment pressure using hydrogen source term from MELCOR run #21.

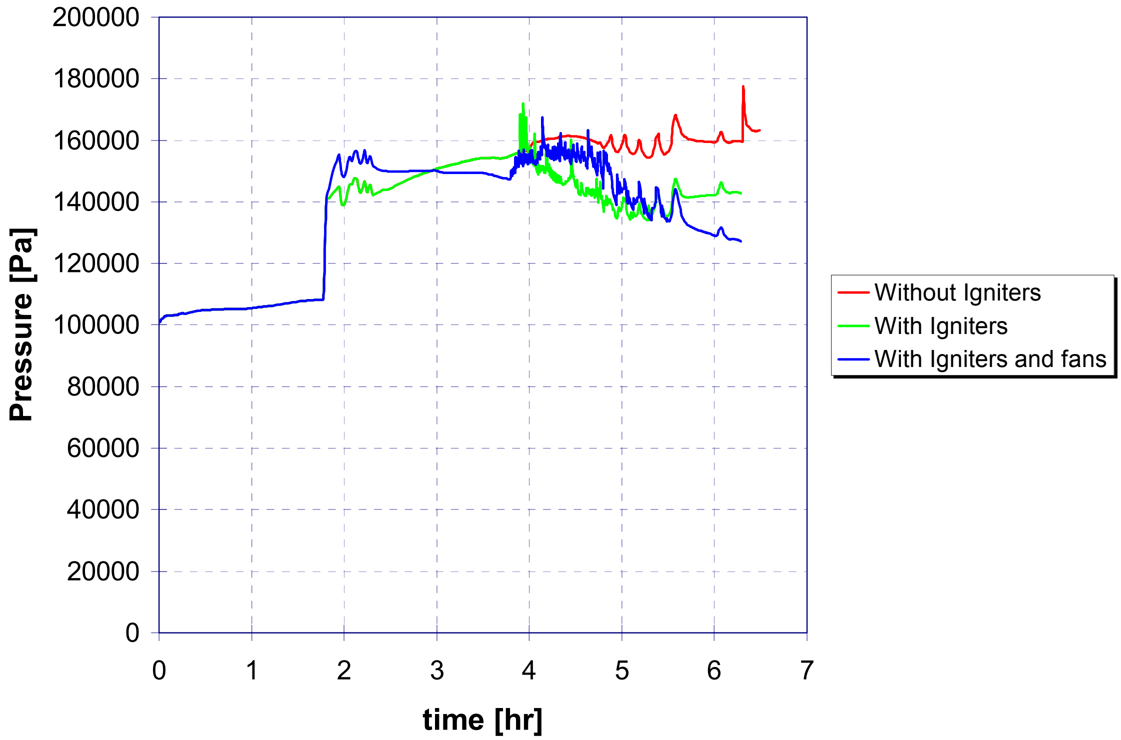

Figure 21. Containment pressure using hydrogen source term from MELCOR run #32.

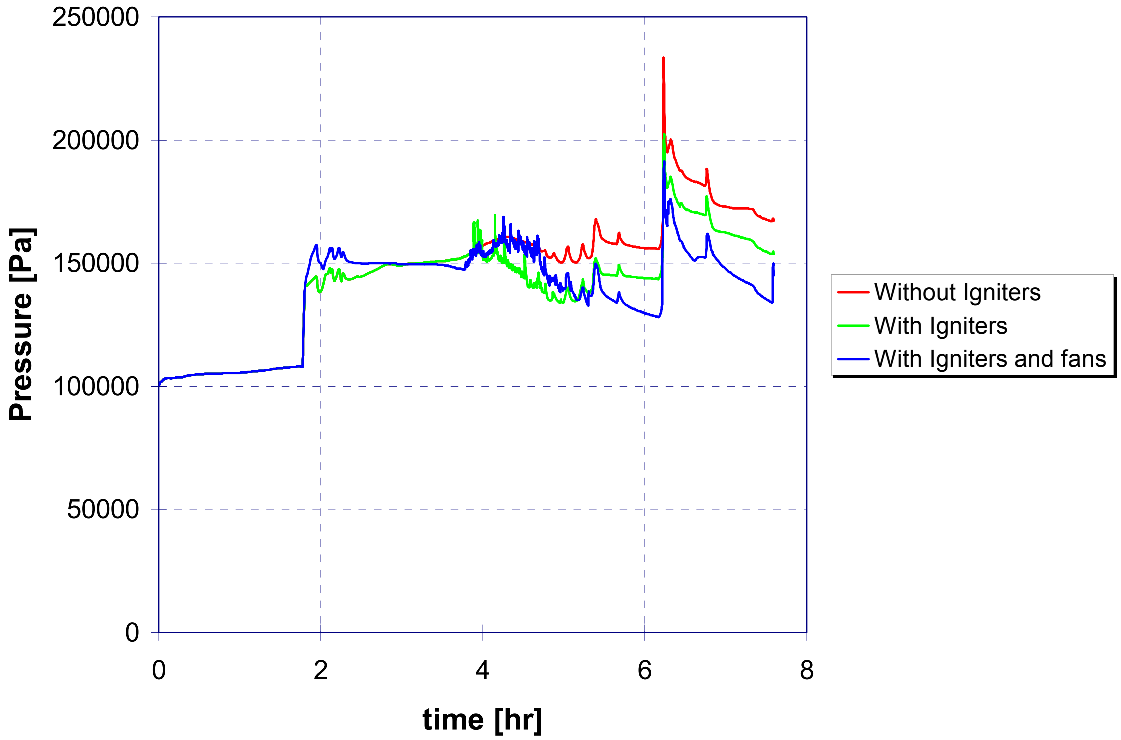

Figure 22. Containment pressure using hydrogen source term from MELCOR run #35.

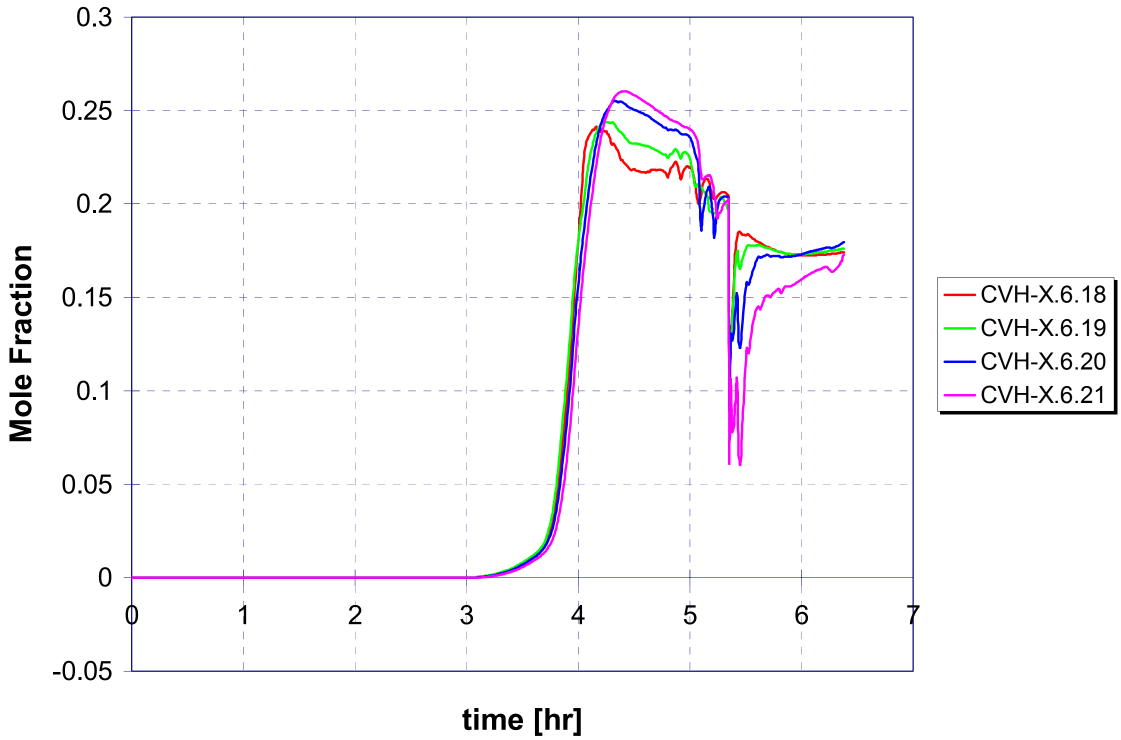

Figure 23. Hydrogen concentration in ice-bed for case without igniters, MELCOR run # 21.

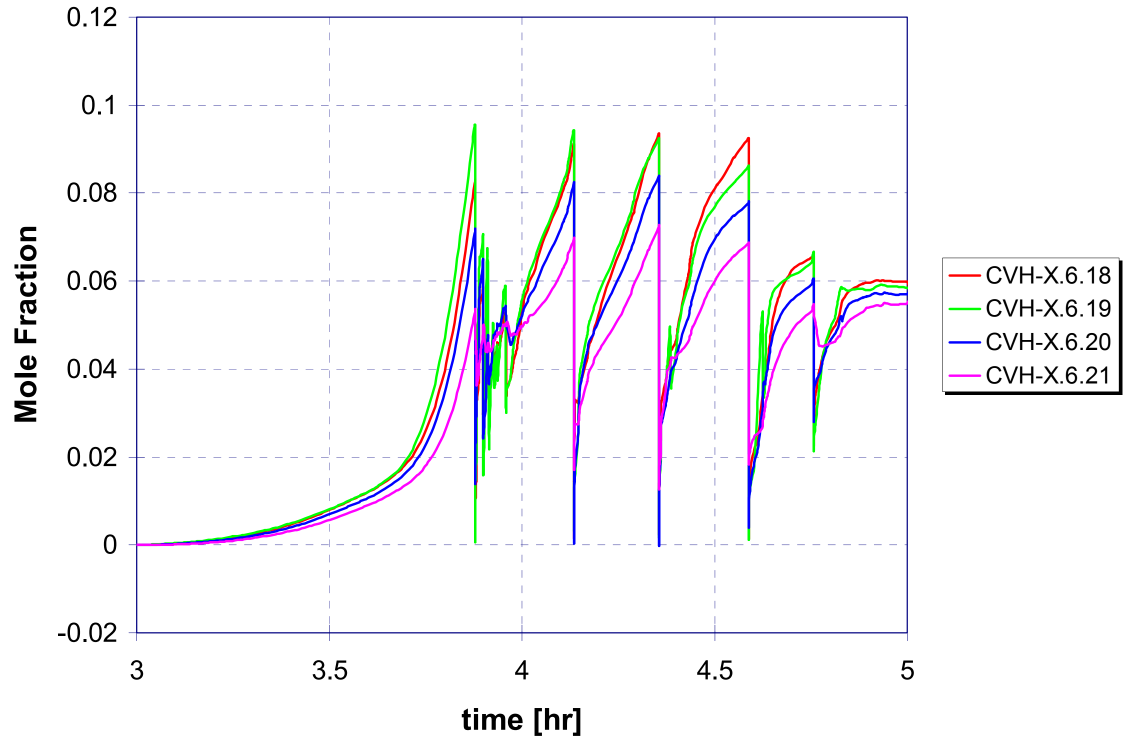

Figure 24 Hydrogen concentration in ice-bed for case with igniters, MELCOR run # 21.

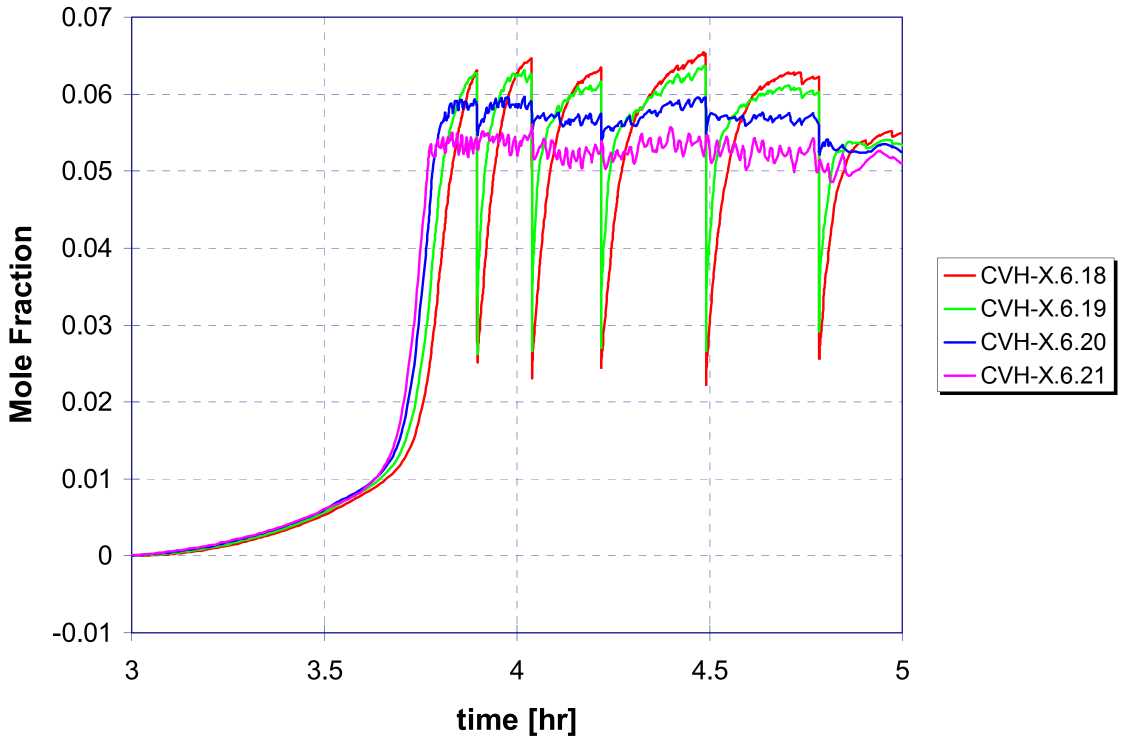

Figure 25. Hydrogen concentration in ice-bed for case with igniters and fans, MELCOR run # 21.

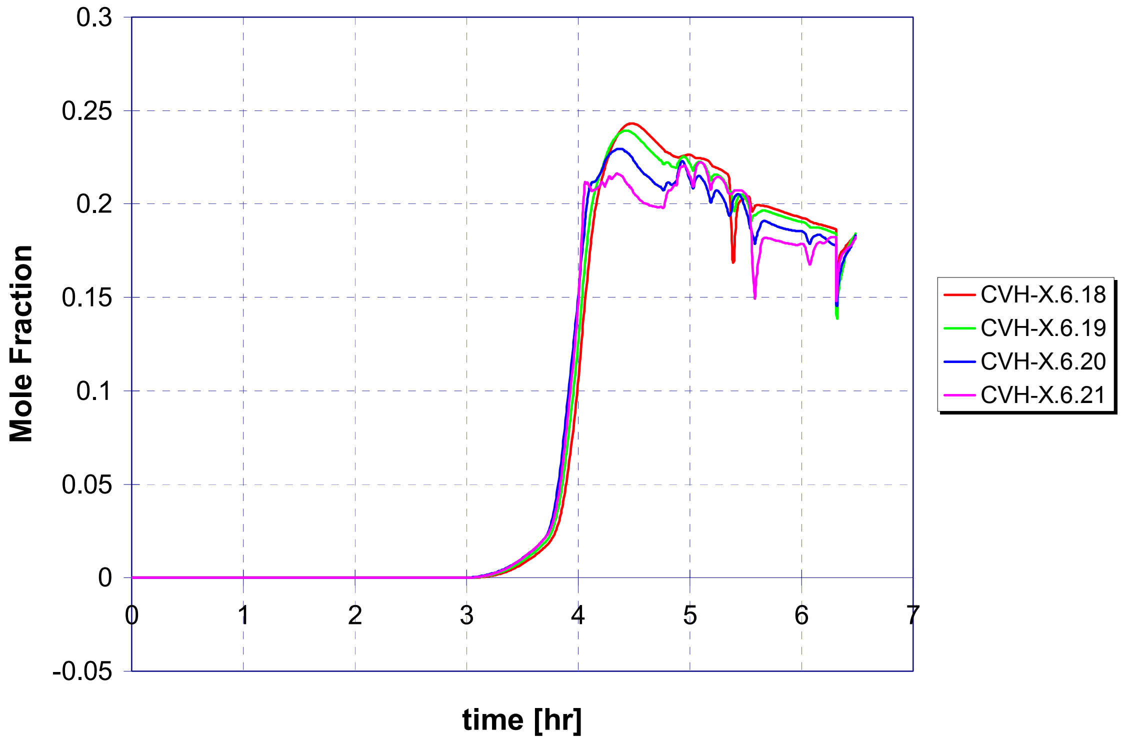

Figure 26. Hydrogen concentration in ice-bed for case without igniters, MELCOR run # 32

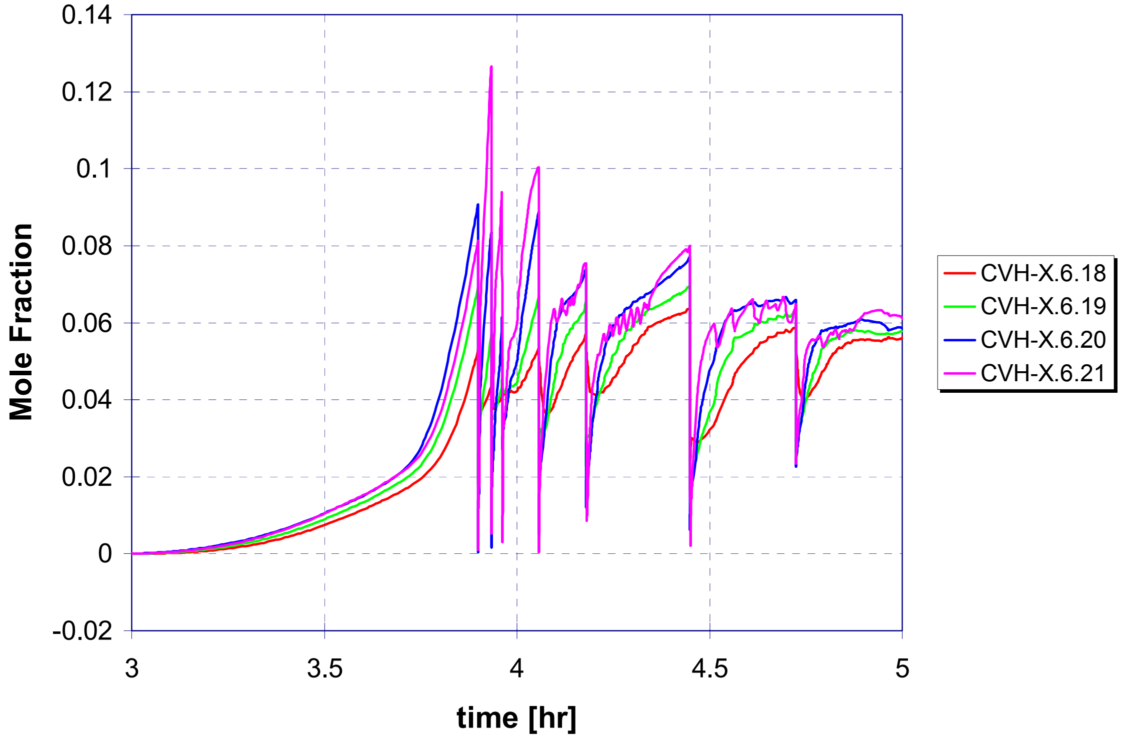

Figure 27. Hydrogen concentration in ice-bed for case with igniters, MELCOR run # 32

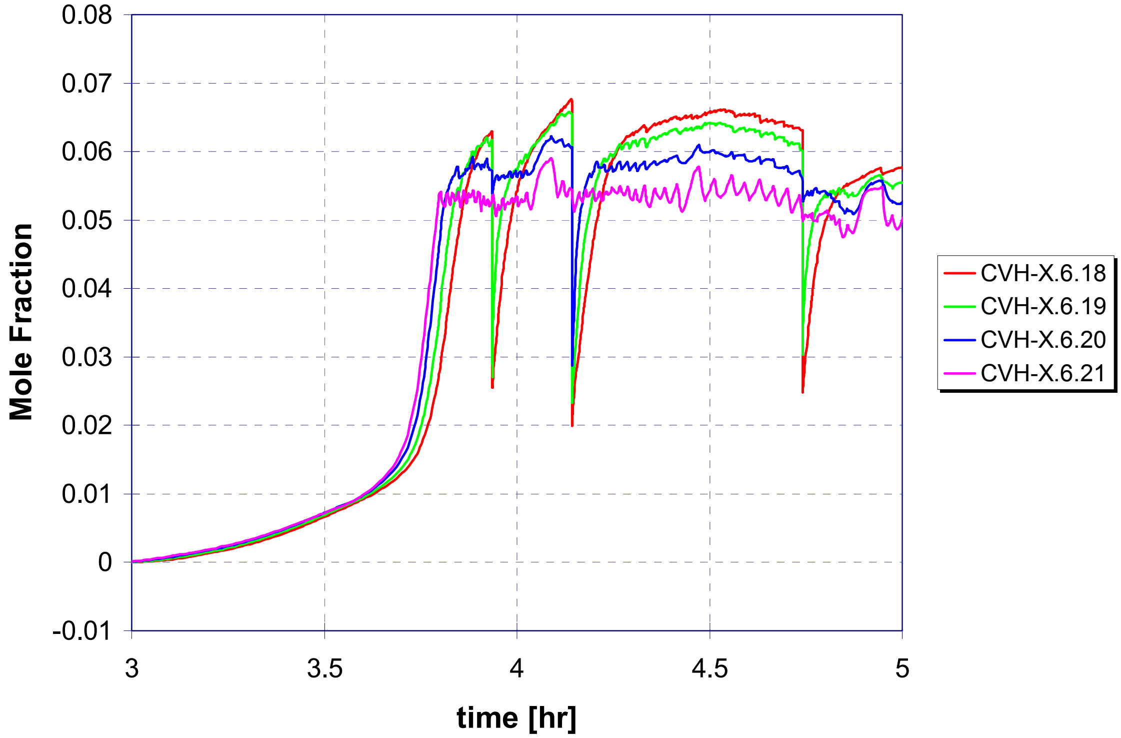

Figure 28. Hydrogen concentration in ice-bed for case with igniters and fans, MELCOR run # 32

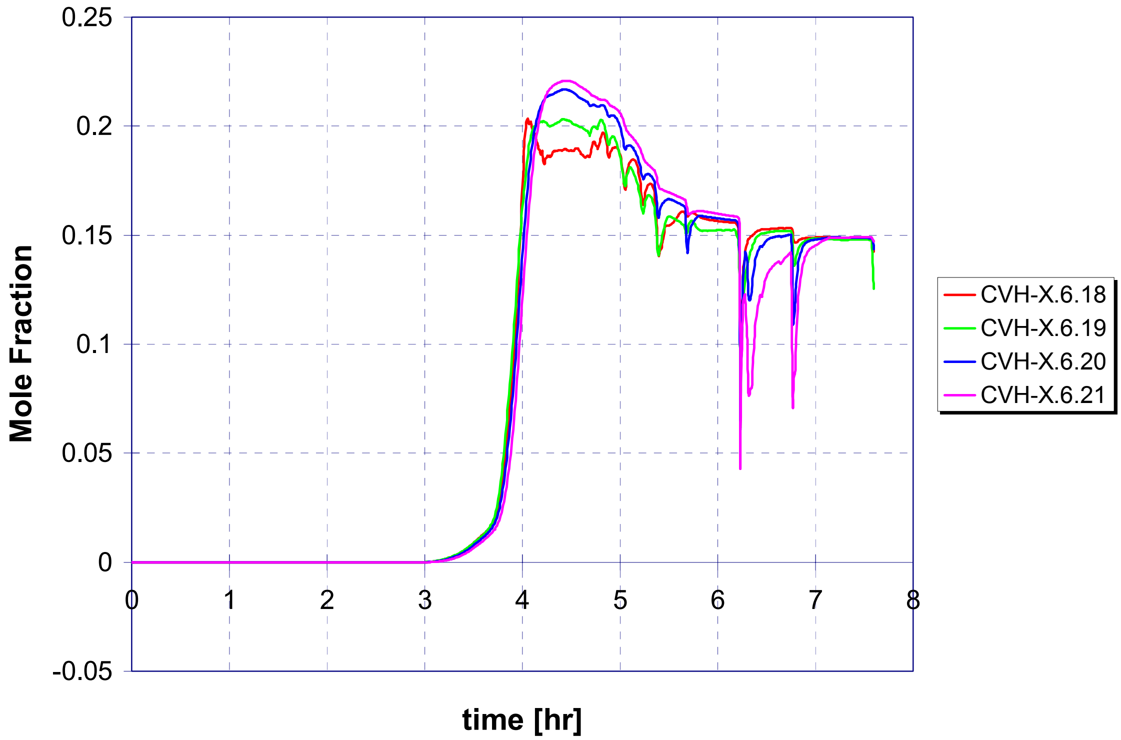

Figure 29. Hydrogen concentration in ice-bed for case without igniters , MELCOR run # 35.

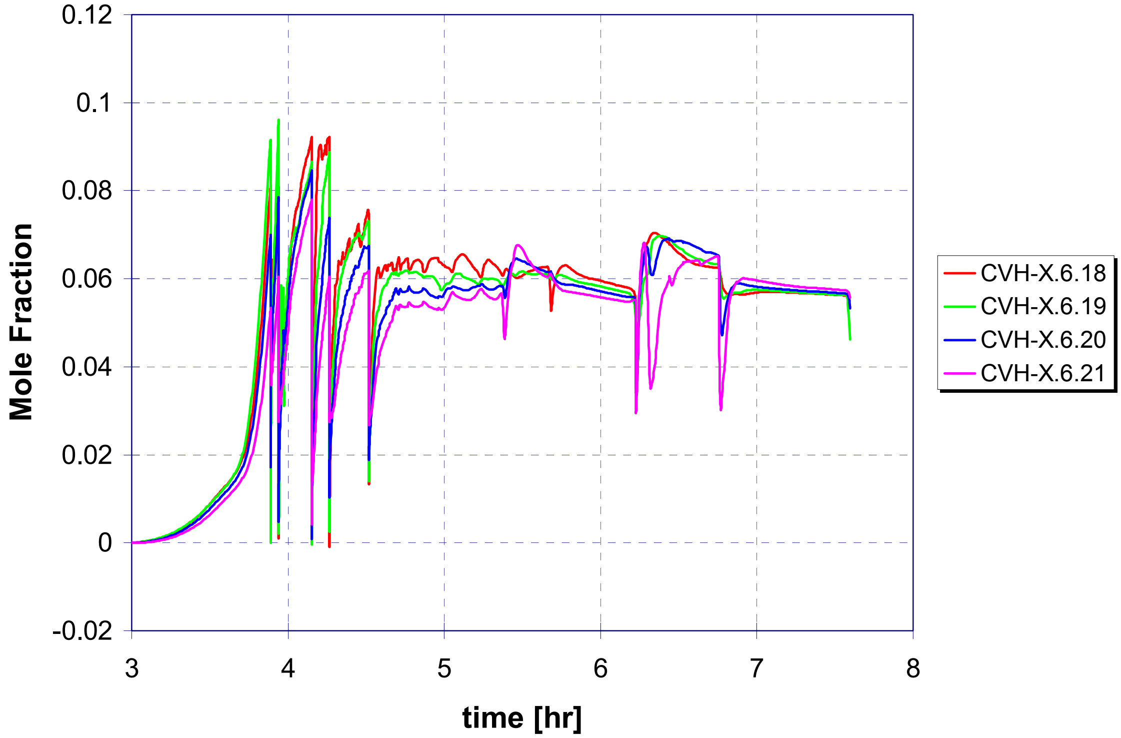

Figure 30. Hydrogen concentration in ice-bed for case with igniters , MELCOR run # 35.

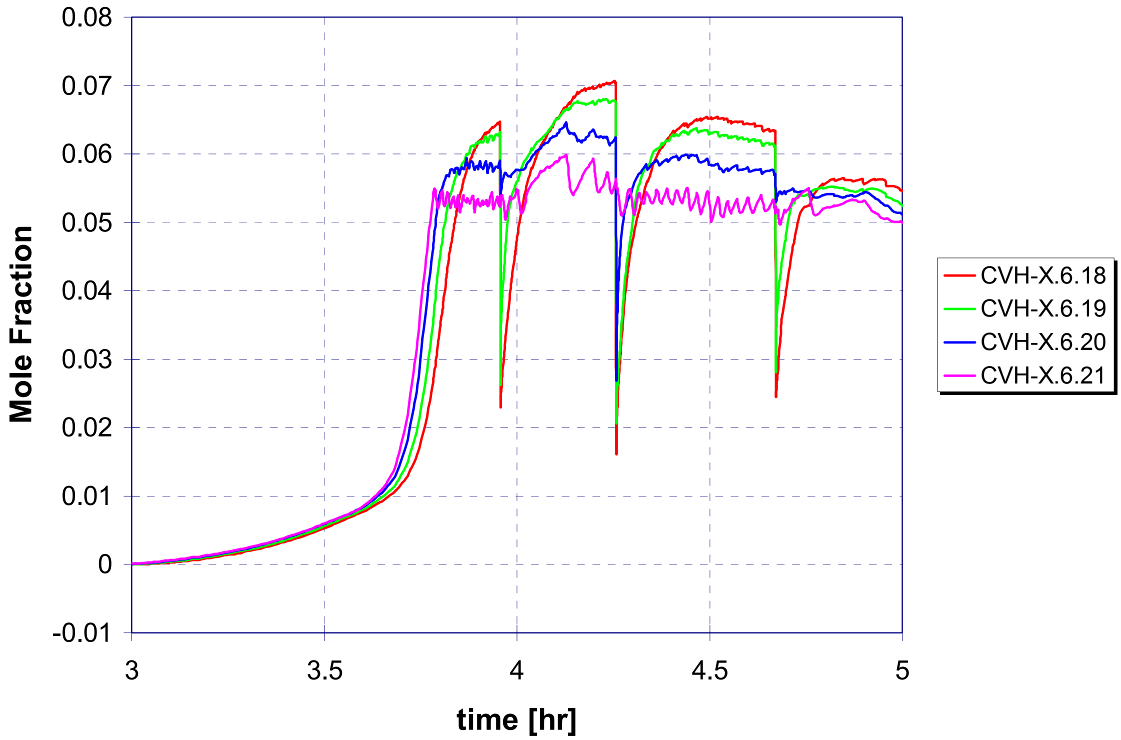

Figure 31. Hydrogen concentration in ice-bed for case with igniters and fans , MELCOR run # 35.

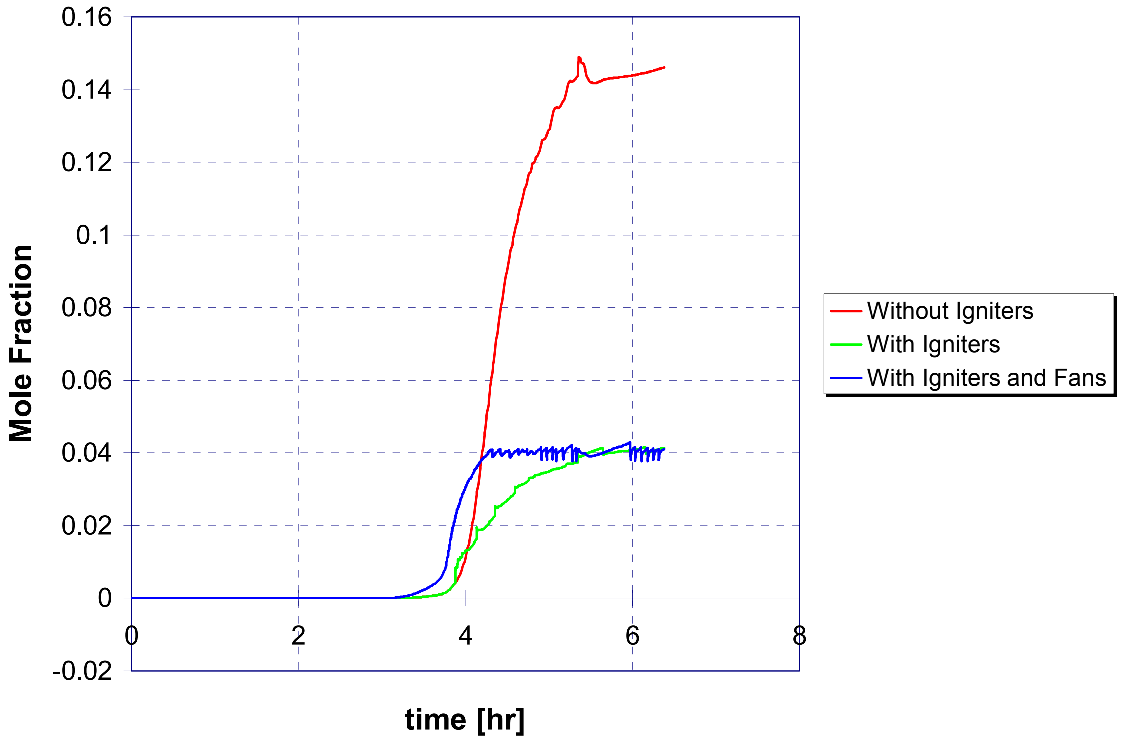

Figure 4 Hydrogen concentration in upper containment (compartment #24) for MELCOR run #21.

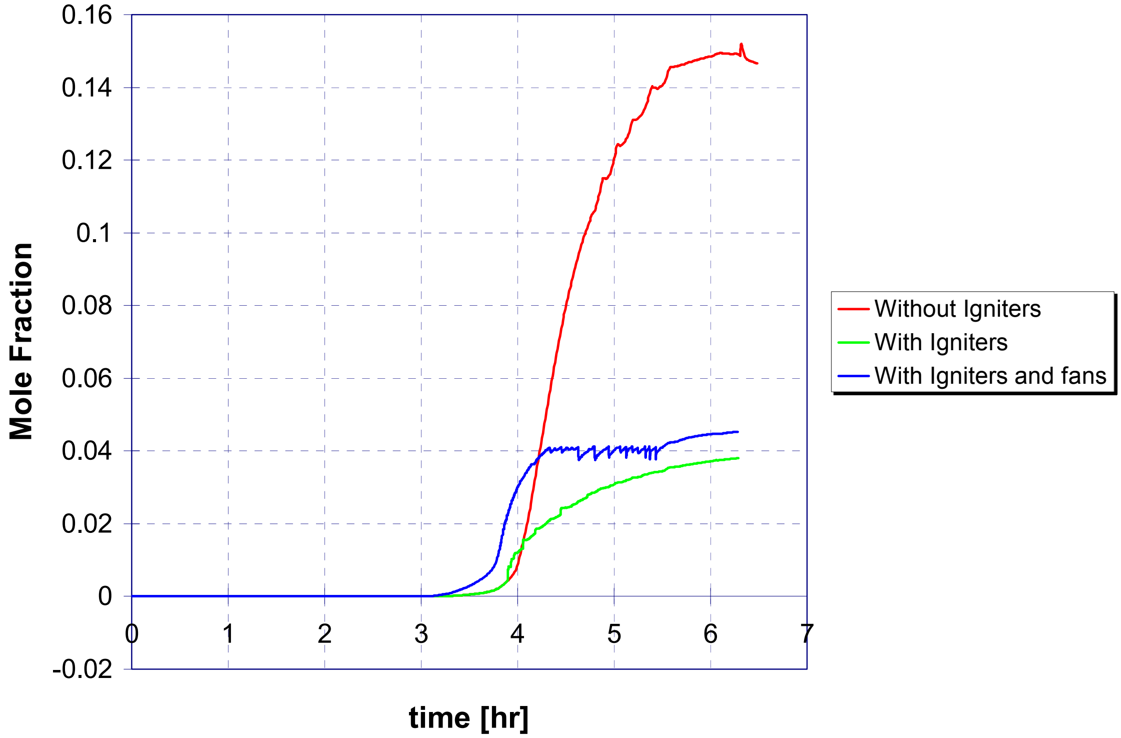

Figure 33. Hydrogen concentration in upper containment (compartment #24) for MELCOR run #32.

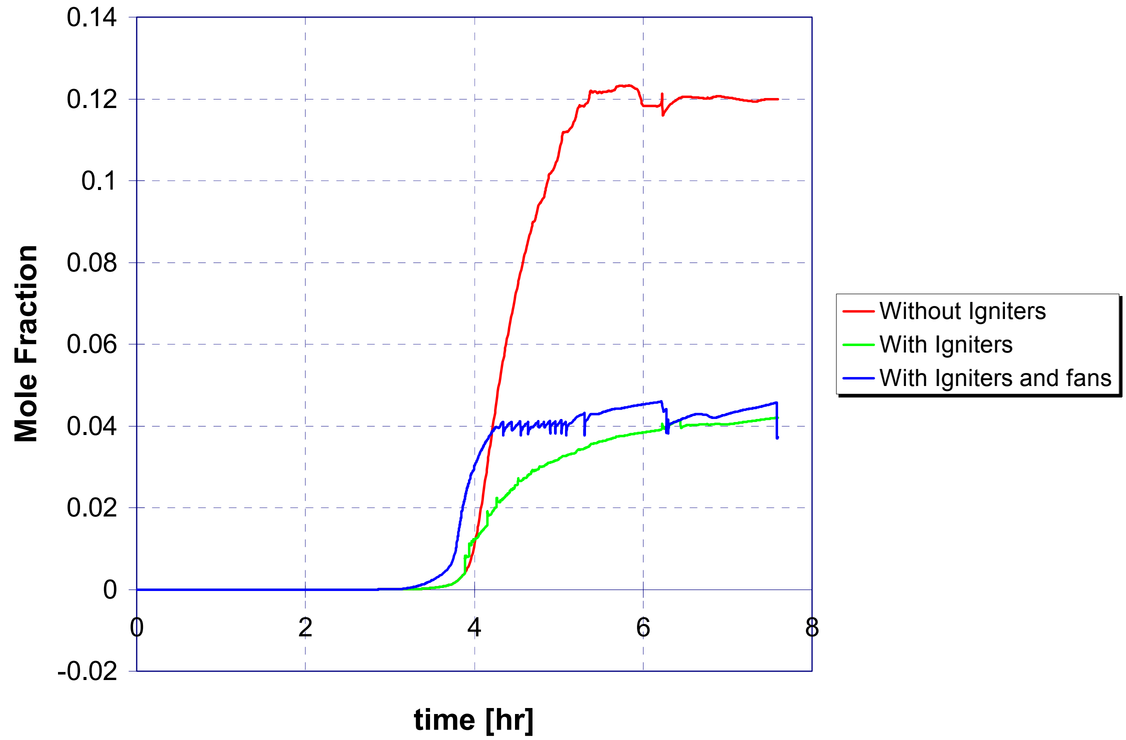

Figure 34. Hydrogen concentration in upper containment (compartment #24) for MELCOR run #35

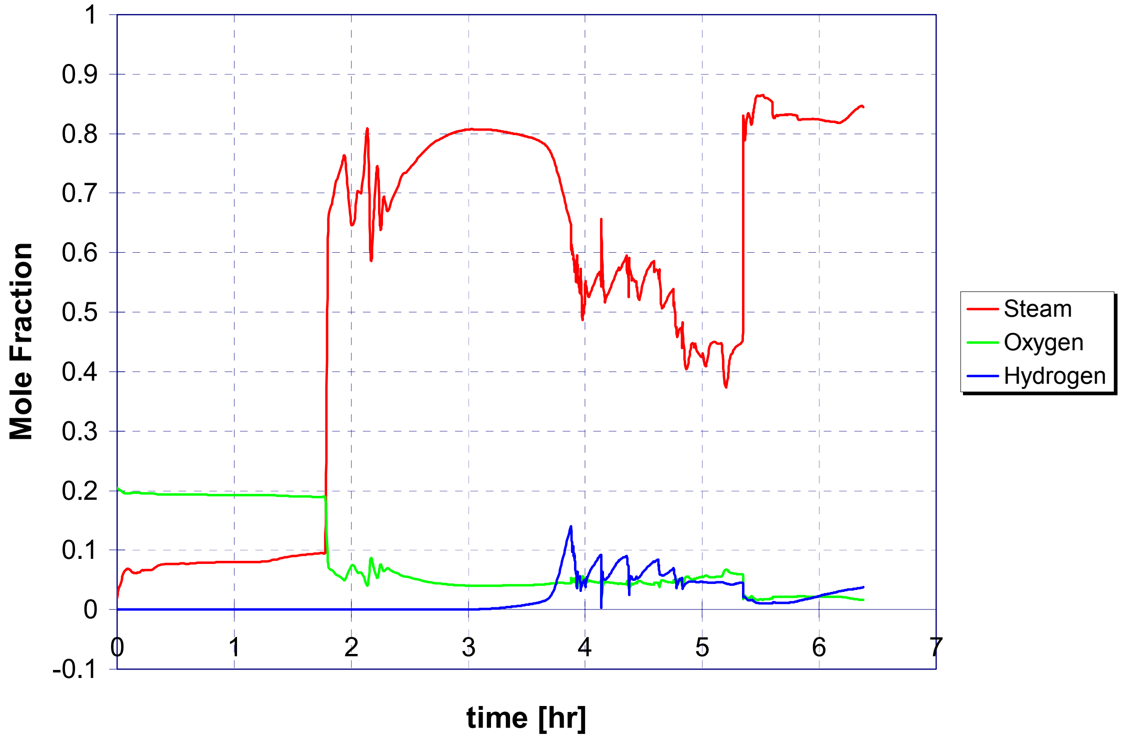

Figure 35. Containment atmosphere composition in compartment #9 (lower containment) for MELCOR run 21.

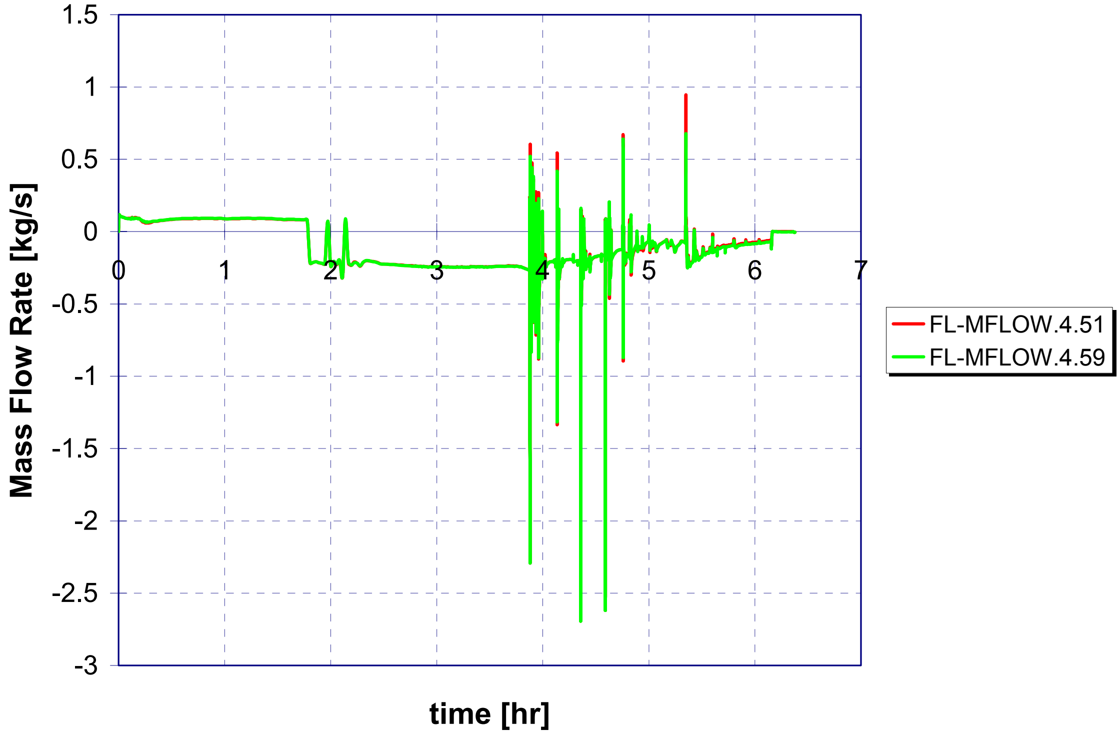

Figure 36. Oxygen flows for the refueling drains, showing the transfer of oxygen from the upper containment to the lower containment (negative flows).

Appendix A: Fully-coupled RCS/containment Plant Calculations for Sequoyah

Two long-term (CCI) fully-coupled RCS/containment plant calculations were completed for 1) a case without power to igniters and 2) with power to igniters only. The calculations were made using a detailed, 26-cell containment model. The scenario was a short-term station blackout with pump seal leakage (250 gpm) as described in the Sandia report "Hydrogen Source Terms for Station Blackout Accidents in Sequoyah and Grand Gulf Estimated Using MELCOR 1.8.5," July 26, 2001. More recent source terms calculations have been performed, however conclusions based on earlier source terms are not expected to change, even with more recent source terms.

Shown in Figures 1- 8 are representative plots for the extended STSBO_L Sequoyah runs out to 24 hours, with and without igniters. The calculations differ in small degrees from decoupled, containment only runs (to vessel failure only) mainly because of the addition of radioactive fission products in the containment for the coupled (RCS plus containment) calculations. In the current MELCOR code (revision RE1 used here), transfer of radioactive (also non-radioactive) products from the RCS to the containment atmosphere is possible only for decoupled (i.e., standalone containment analysis) calculations involving cavity models.

What can be clearly noted in these comparison calculations without power to igniters is 1) significant late time overpressurization, and 2) the very dangerous potential for detonations in the dome late in the accident after vessel failure and during CCI. The case with igniters shows that hydrogen control is effective for this late time period, with attendant reduction in overpressurization Additionally, the late time hydrogen concentration increase, even with igniters, is during the time when there is insufficient oxygen available for burning.

[In the figures below, the compartment and gas component designation is noted in the legend. For example "cvh-x.3.9" represents the steam(3) component in compartment #9 (lower containment region), "cvh-x.4.9 is the oxygen (4) component, and "cvh-x.6.9 is the hydrogen (6) component.]

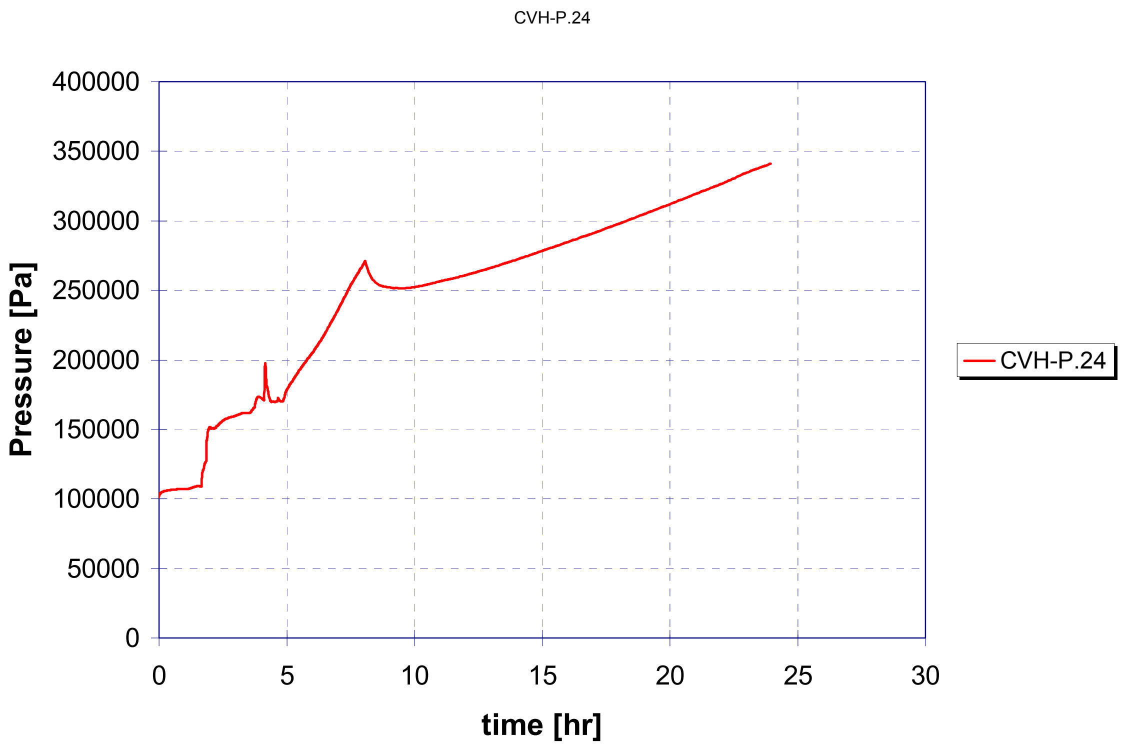

Figure A1. Sequoyah containment pressure without igniters

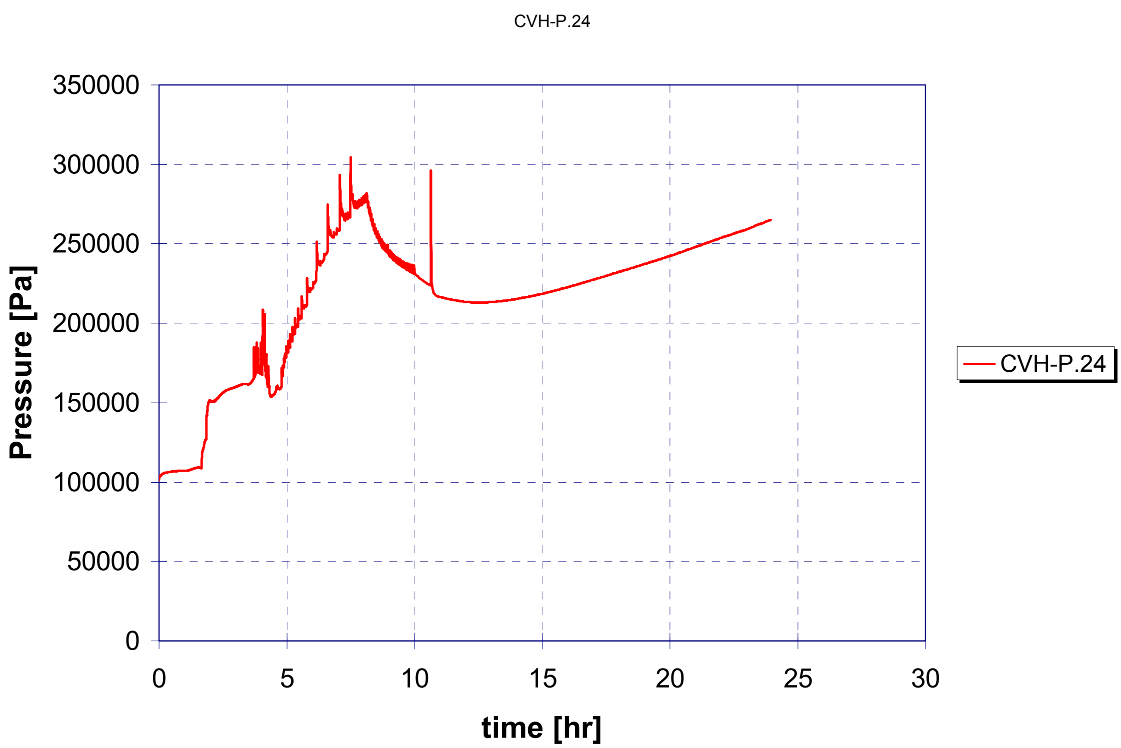

Figure A2. Sequoyah containment pressure with igniters

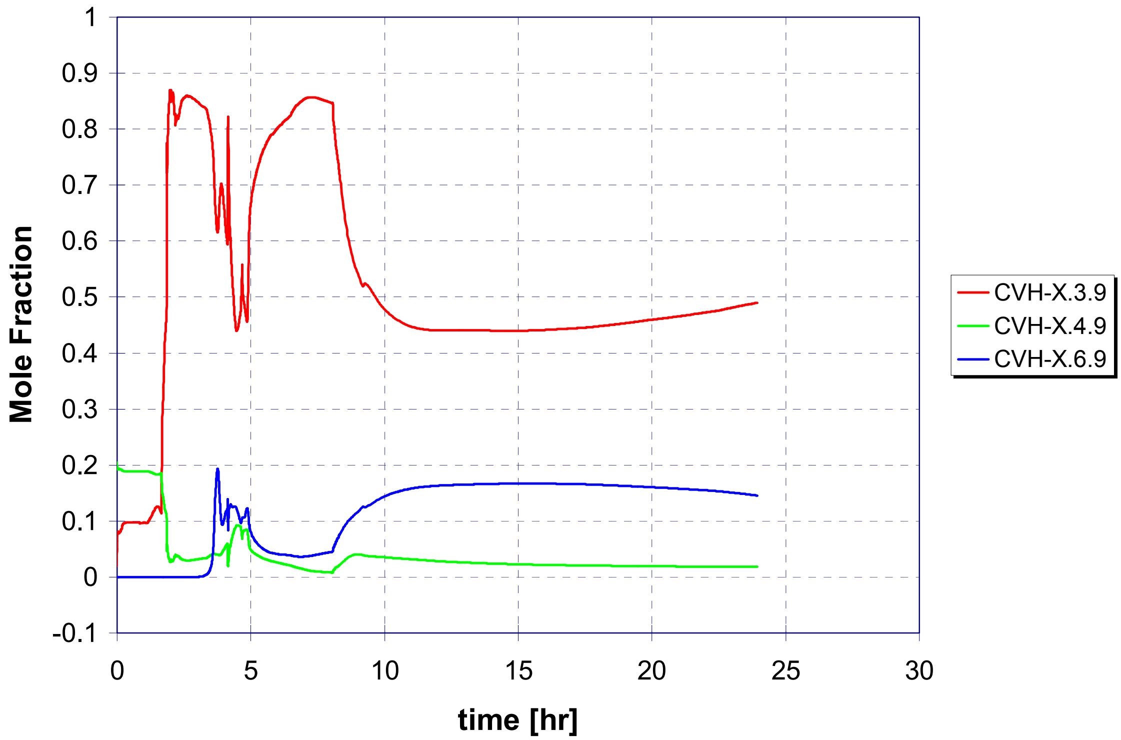

Figure A3. Gas concentrations in lower compartment (cell #9) for case without igniters

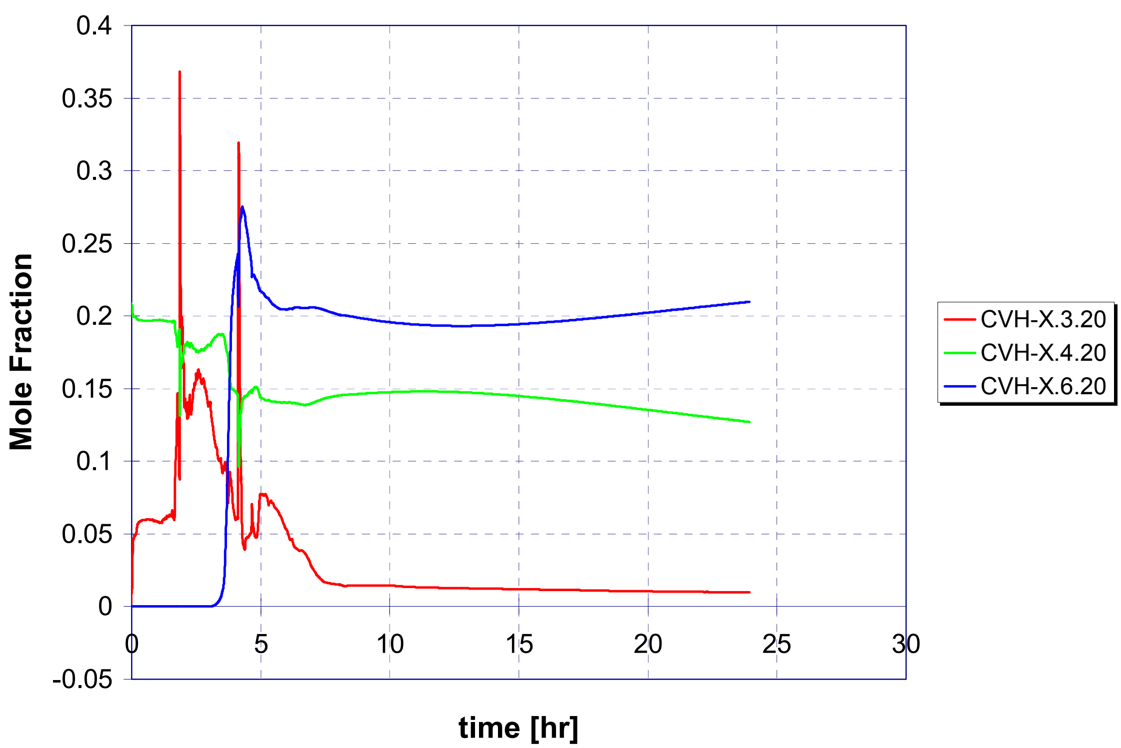

Figure A4. Gas concentrations in ice bed (cell #20) for case without igniters

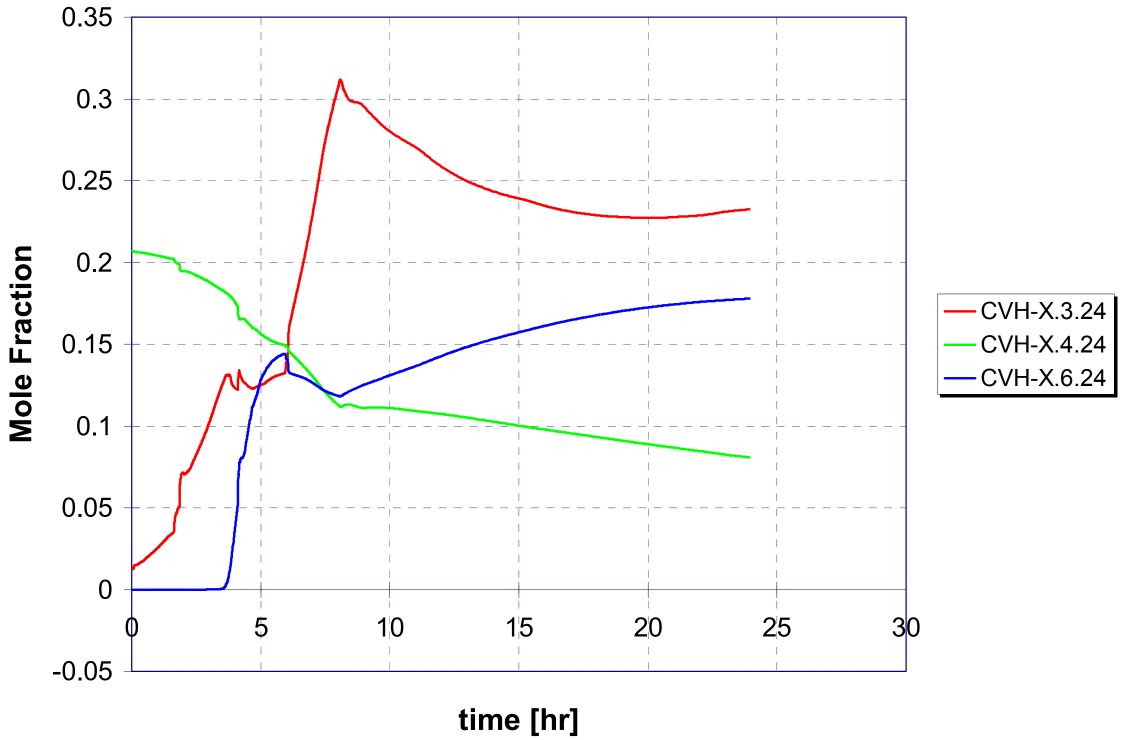

Figure A5. Gas concentrations in dome (cell #24) for case without igniters

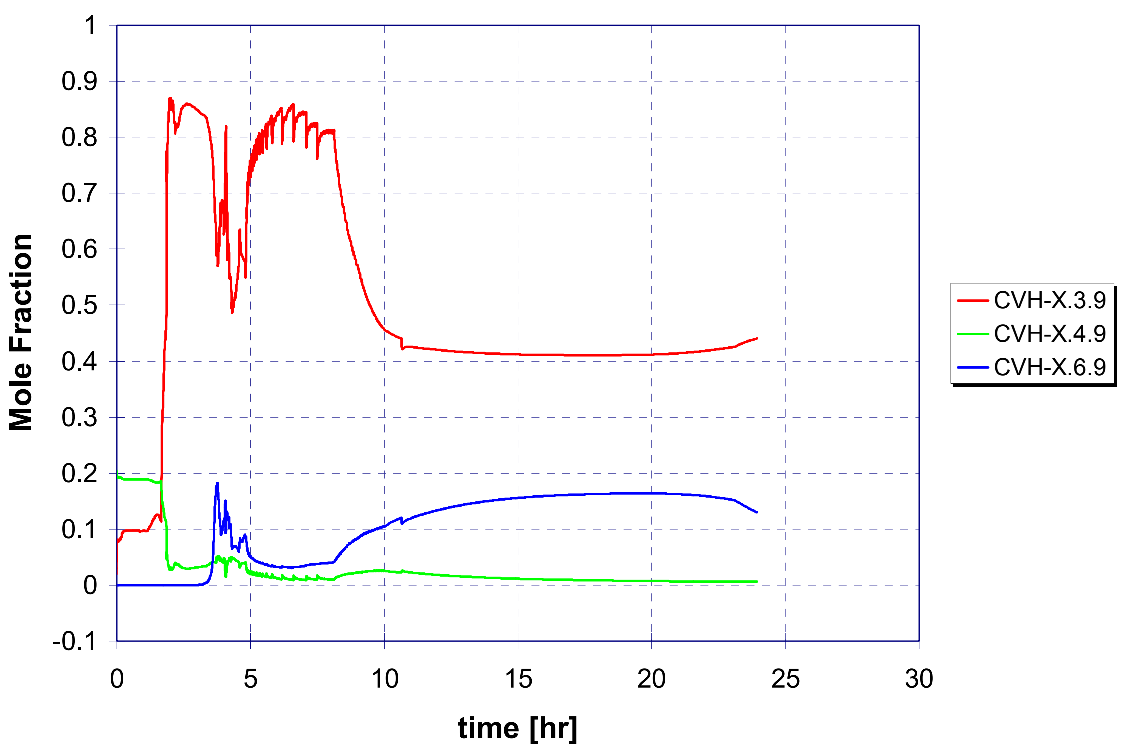

Figure A6. Gas concentrations in lower containment (cell #9) for case with igniters

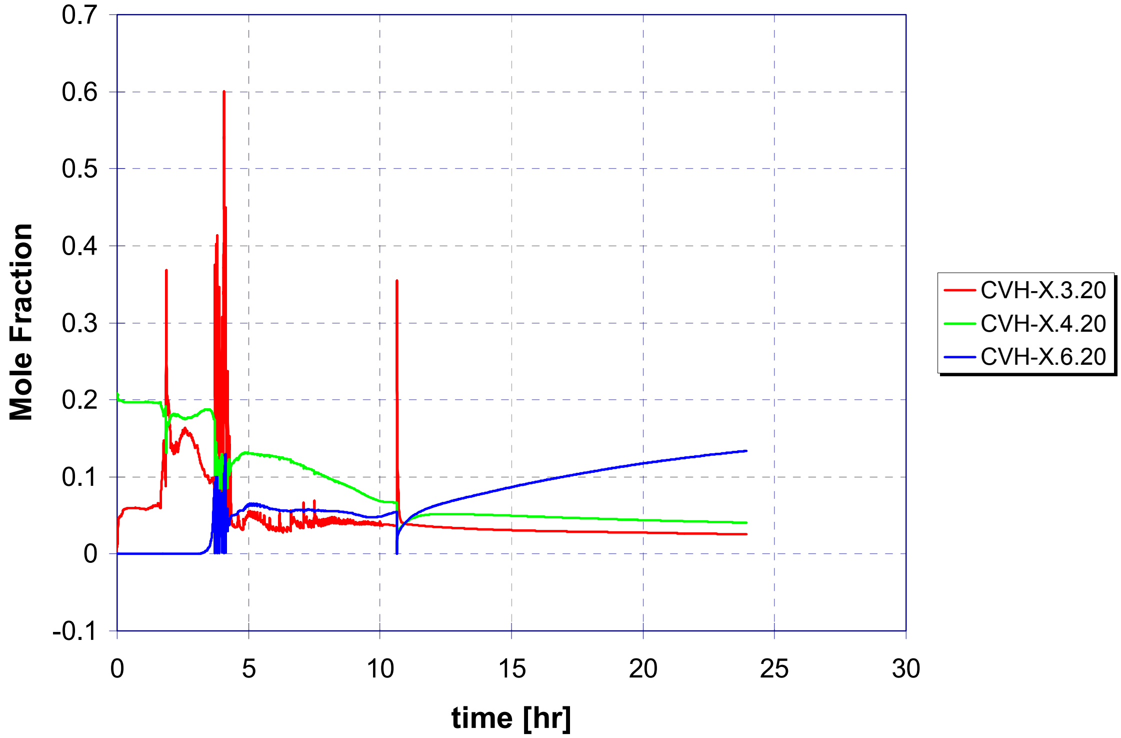

Figure A7. Gas concentrations in ice bed (cell #20) for case with igniters

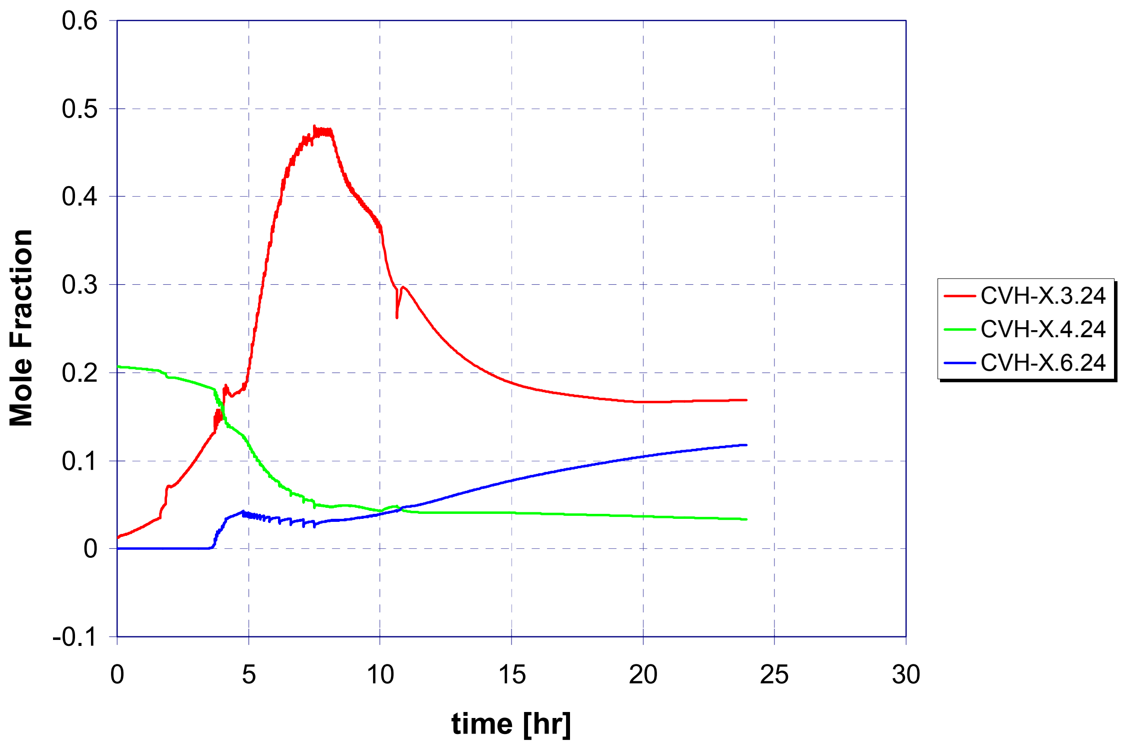

Figure A8. Gas concentrations in dome (cell #24) for case with igniters

Appendix B: Nodalization Study for the Sequoyah Containment

The standalone, multi-cell analysis for the Sequoyah plant containment began with a decision regarding the nodalization scheme. In general, there are guidelines that aid in determining an acceptable strategy for the compartmentalization of the containment: 1) assign separate cells to each well defined physical compartment or room; 2) compartmentalize so that physically probable flows are not eliminated; 3) minimize the degree of open compartment sub-nodalization; 4) nodalize to allow a physical representation of standing liquid pools and pool transport paths; and finally, 5) investigate result dependency for potential nodalization schemes. Typically, these guidelines may also include consideration for code CPU run times, degree of geometrical data available, time constraints for the input preparation, and the type of results required (global or local). For the Sequoyah containment, the guidelines for containment nodalization were followed for the most part, using a 26-cell model previously developed for direct containment heating studies as the initial reference nodalization scheme, Figure B1. Some variations however on this model were used in the preparation of this report to determine result dependency; this appendix discusses that usage. For all the calculations reported in this appendix, the sources to the containment are from MELCOR run 21 described in the report.

Nodalization schemes

The simplest model used in this study was the 12-cell nodalization used in the fully coupled MELCOR RCS/containment calculations to generate the source terms for the standalone containment analysis. Due to the weak coupling between the RCS and containment and the need to reduce CPU time, a detailed nodalization of the containment was not used for the coupled calculations. The 12-cell nodalization model is described in Table B1, using the compartment numbering and location portrayed in the sketch of the containment in Figure B1. Note that in the 12-cell model the ice bed is modeled with a single cell, as indicated in Figure B2 (a).

During the mid-80's when multi-cell, lumped-parameter analyses of ice condenser type containments were just appearing in the literature, a number of analyses were conducted with the ice bed modeled using vertically stacked cells. These configurations, most notable in early HECTR code analyses,[1] precluded the possibility of vertical mixing that could occur within the ice bed due to the substantial hydrostatic heads that develop during post-blowdown periods. For completeness and a demonstration of the extreme case that limits vertical mixing, a nodalization case was included here to investigate global and local results using stacked, ice bed vertical cells. This scheme, built on the 12-cell model, included an additional three cells in the ice bed. The 15-cell model is described in Table B1. Stacking of the cells in the ice bed is shown in Figure B2 (b).

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[1] Camp, A. L., et al., "MARCH-HECTR Analysis of Selected Accidents in an Ice Condenser Containment," NUREG/CR-3912, SAND83-0501, December, 1984.
Dingman, S. E., et al., "HECTR Version 1.5 User's Manual," NUREG/CR-4507, SAND86-0101, April, 1986.

In order to allow more detailed representation of the lower compartment source injection, including the asymmetric characterization of the sources, the 12-cell model was replaced with the 26-cell model, configured as shown in Figure B1. The description of the model is given in Table B2. One of the more noticeable modifications from the 12-cell model is the addition of four asymmetric cells in the ice bed region, Figure B3. Each vertical cell in the region is connect to adjacent cells by upper and lower connecting flow paths to allow horizontal mixing due to variations in developing static heads.

The 26-cell model does not resolve potential vertical gradients that may occur in the ice bed due to stratifying layers that may develop due to light gas injection and/or local steam condensation and ice melt-out. The potential for vertical/horizontal mixing within the ice bed was noted in early HECTR analyses, and later investigated using a detailed nodalization of the ice bed as indicated in Figure B4.[2] To investigate the effect of gross circulation patterns in the ice bed, an ice condenser nodalization scheme similar to that shown in Figure B4 was applied to the 26-cell model, resulting in a 38-cell model. The ice condenser model for this scheme is shown in Figure B5.

Comparison of 12 and 15-cell Model Results

Shown in Figure B6 are the containment pressure response curves for cases where there is no auxiliary power supplied to the containment igniters or fans. The higher pressure obtained with the 15-cell model occurs as a consequence of the increase in ice bed gas mixture density that develops during the early injection. Without ice bed mixing, severe density gradients develop, resulting in an inversion condition where high density gas regions form over lower density regions, Figure B7. The gas densities in the case of the stacked cells can be compared to the significantly lower densities that occur with the single, well-mixed ice bed cell in the 12-cell model, Figure B8. Shown in Figure B9 and B10 are the hydrogen concentrations in the ice bed for the 12 and 15-cell models, respectively. Here we see that hydrogen concentration maximum is less in the 15-cell model as in the 12-cell model. This is due in part to the variation in the lower plenum to ice bed flows between each model.

Comparison of 26 and 38-cell Model Results

Shown in Figure B11 are the containment pressure response curves for the 26 and 38-cell models where there is no auxiliary power supplied to the containment igniters or fans. Both pressure curves are essentially identical. This would imply that the ice bed mixing (hydrostatic heads) is also similar; and, this is confirmed from the ice bed hydrogen concentrations for each model, Figures B12 and B13.

In the case where igniters are powered (without fans), we note that again the ice bed hydrogen concentrations are similar as shown in Figures B14 and B15. There is a small increase in the local maximum hydrogen concentration observed with the 38-cell model – local concentration peak ~12% for the 38-cell model as compared to ~ 9% with the 26-

[2] Dingman, S. E. and Camp, A. L., "Pressure-Temperature Response in an Ice-Condenser Containment for Selected Accidents," SAND85-1824C,

cell model. The cells in the 38-cell model that reach ~12% hydrogen concentration are cells # 31 and 32. The remaining cells have concentrations that are essentially the same as noted in the 26-cell model. The cause of the slightly higher concentrations for these upper cells during periods of intermittent burns is difficult to analyze. The cause may be a combination of mixing processes modeled in more detail in the 38-cell model and the changes in concentration due to the flame speed and propagation characteristics affected also by the different nodalizations. What can be suggested however from the comparisons of both models, with and without igniters powered, is that the general behavior of the hydrogen distribution in both models is essentially identical for nearly all the time when the ice bed is in a flammable condition. Therefore, for the purpose of this scoping study there is no strong argument for selecting the 38-cell over the 26-cell model. For this reason and others mentioned in the report concerning burn model implementation (consistency) and efficiency, the 26-cell model is used as the reference standalone containment model for the report.

Table B1. MELCOR nodalization for the 12 and 15-cell containment models.		
CVH Nos.*		**Location**
12-cell	15-cell	
1	1	Cavity
2-3	2-3	Steam Gen. Doghouses
6	6	Upper Reactor Space
7	7	Pressurizer Doghouse
8-9	8-9	Lower Containment (Inside Crane Wall)
11	11	Lower Annulus (Between Crane Wall and Shell)
14	14	Lower Plenum
18	18-21	Ice bed
22	22	Upper Plenum
24	24	Upper Dome
		Lower Dome & Operating Floor

* note the CVH package of MELCOR does not require that compartments (cells) be sequenced in any order.

Table B2. . MELCOR nodalization for the 26 and 38-cell containment models.		
CVH Nos.		**Location**
26-cell*	38-cell	
1	1	Cavity
2-5	2-5	Steam Gen. Doghouses
6	6	Upper Reactor Space
7	7	Pressurizer Doghouse
8-10	8-10	Lower Containment (Inside Crane Wall)
11-13	11-13	Lower Annulus (Between Crane Wall and Shell)
14-17	14-17	Lower Plenum
18-21	18-33	Ice bed
22-23	34-35	Upper Plenum
24-25	36-37	Upper Dome
26	38	Lower Dome & Operating Floor

* reference containment model

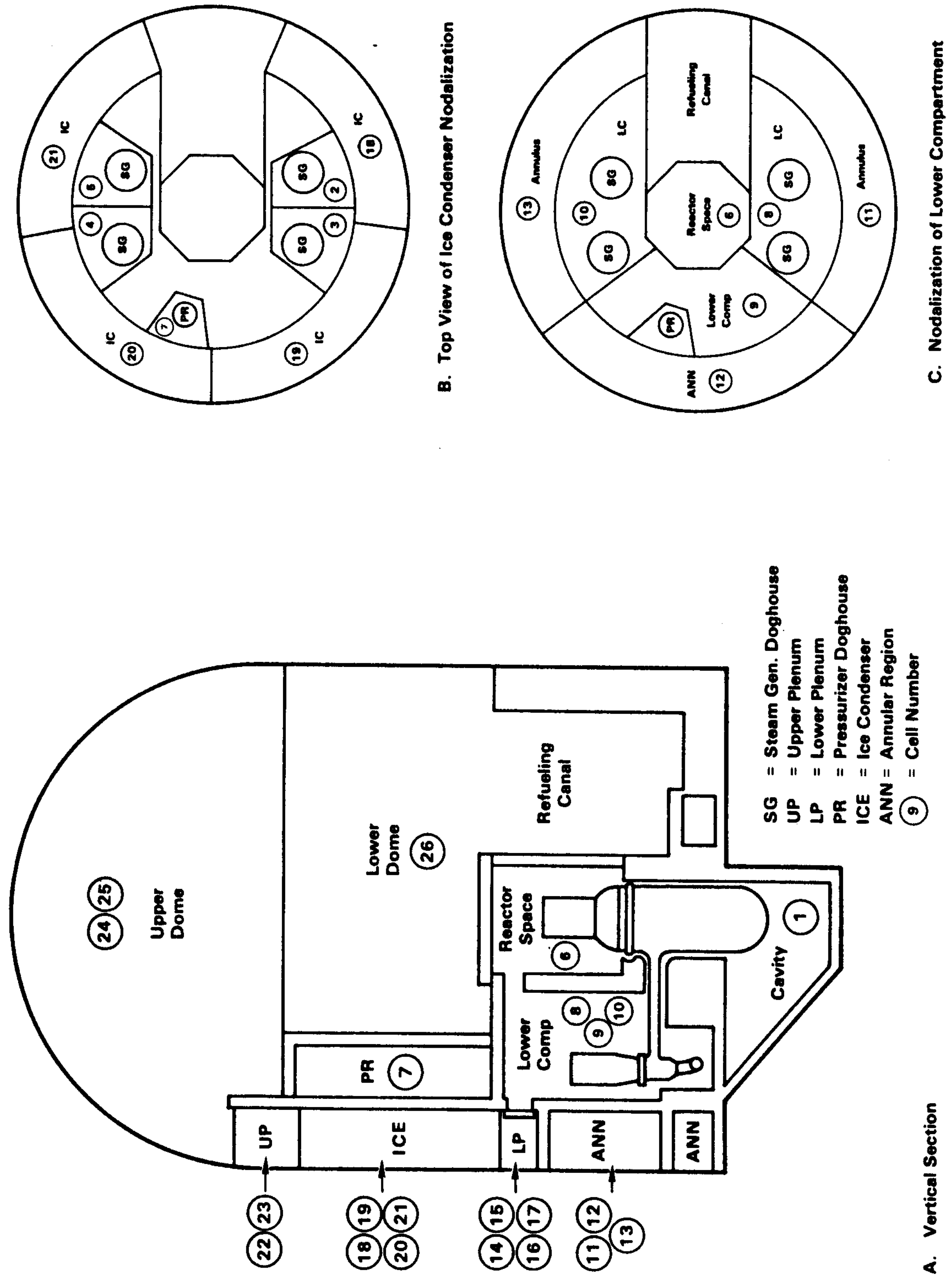

Figure B1. Sketch of Sequoyah containment nodalization for the 26-cell MELCOR containment model.

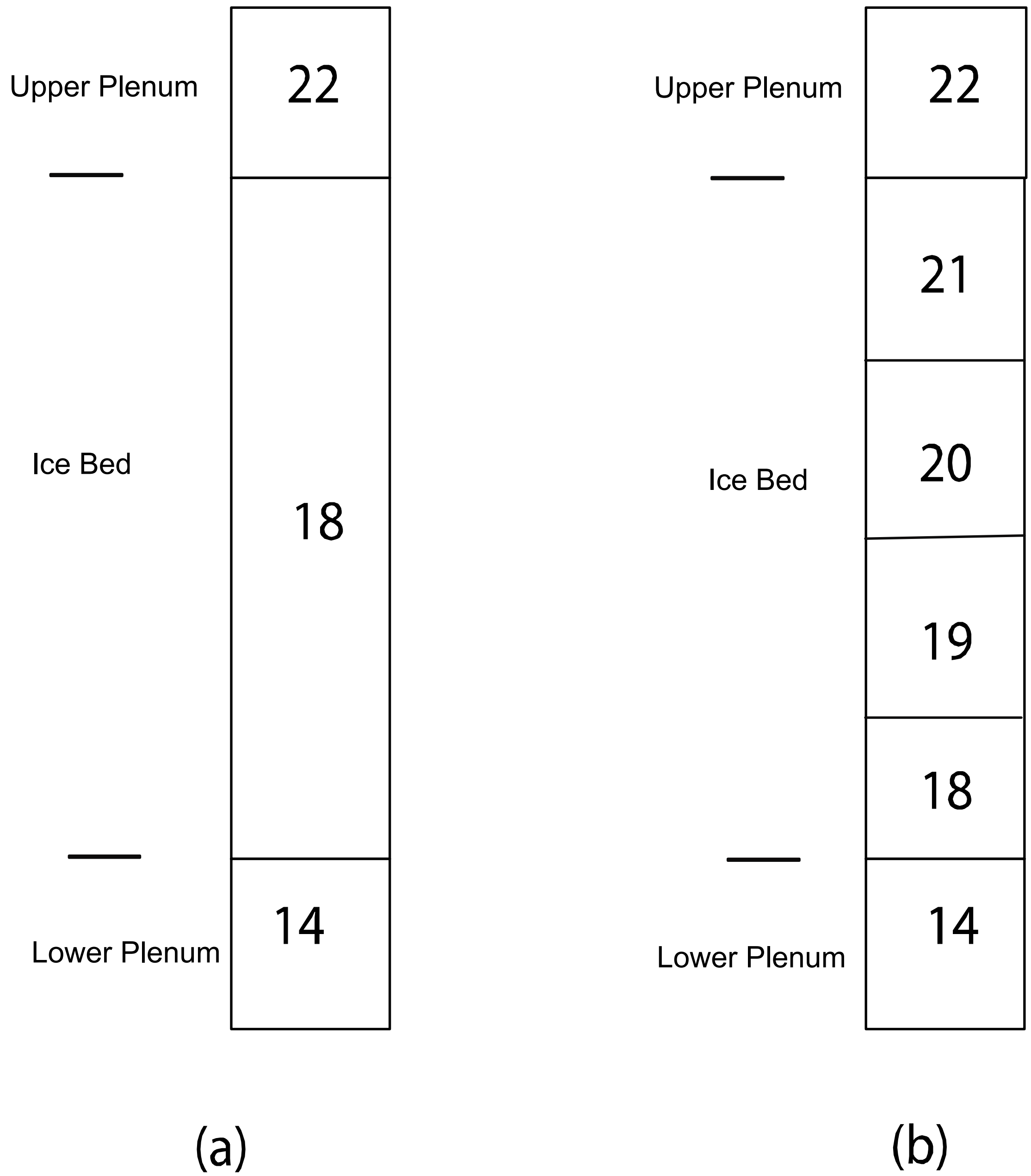

Figure B2. Ice condenser nodalization for the (a) 12-cell and (b) 15-cell model of the Sequoyah containment.

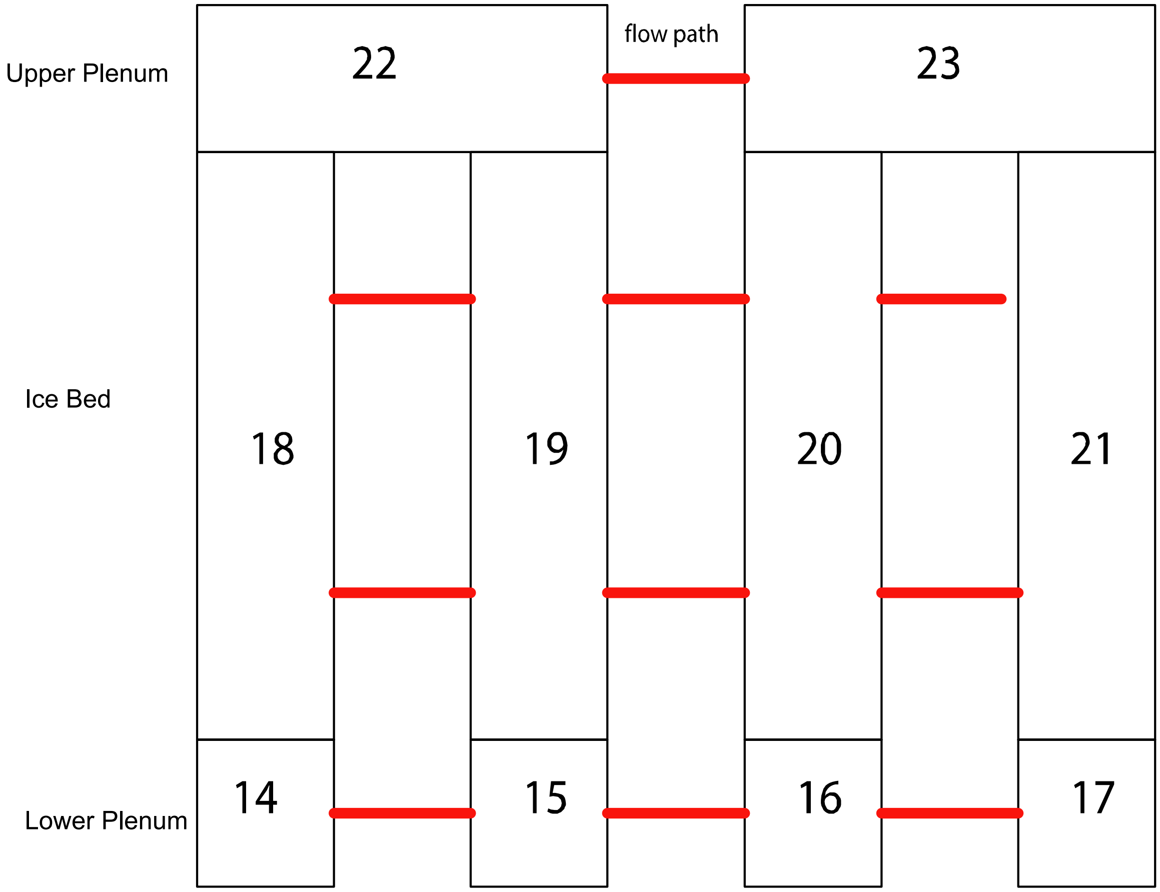

Figure B3. Ice condenser nodalization for the 26-cell model of the Sequoyah containment.

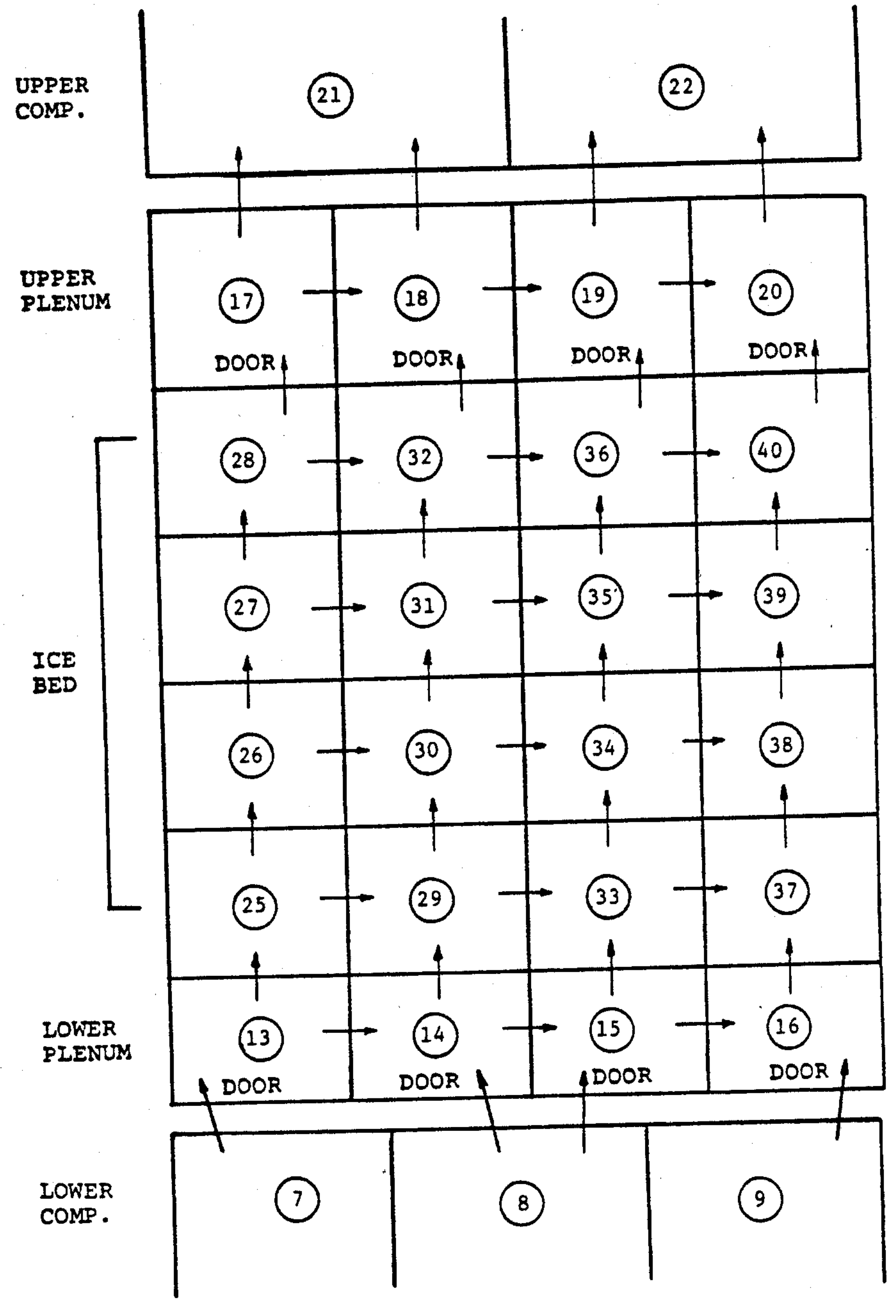

Figure B4. Sketch of the detailed ice condenser nodalization used for HECTR analysis of the Sequoyah containment [SAND85-1824C].

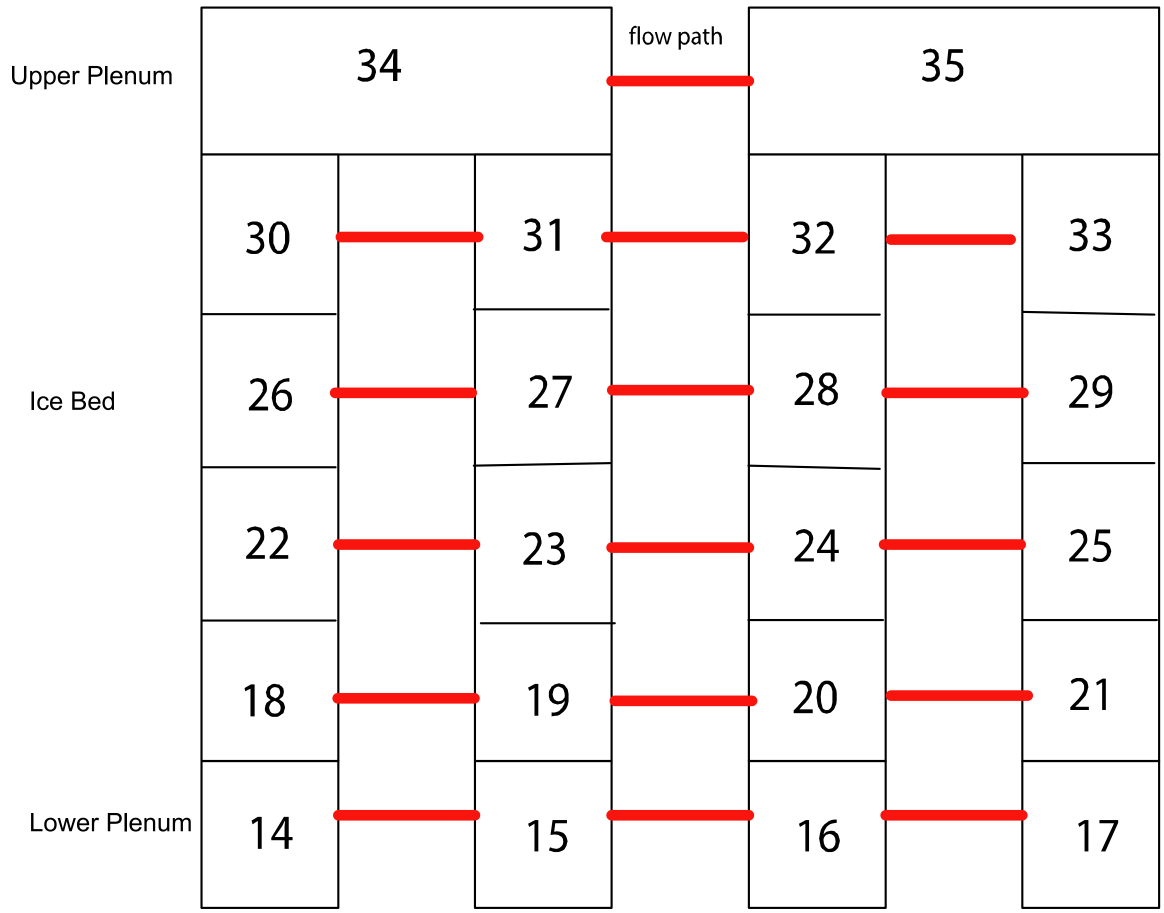

Figure B5. Ice condenser nodalization for the 38-cell model of the Sequoyah containment.

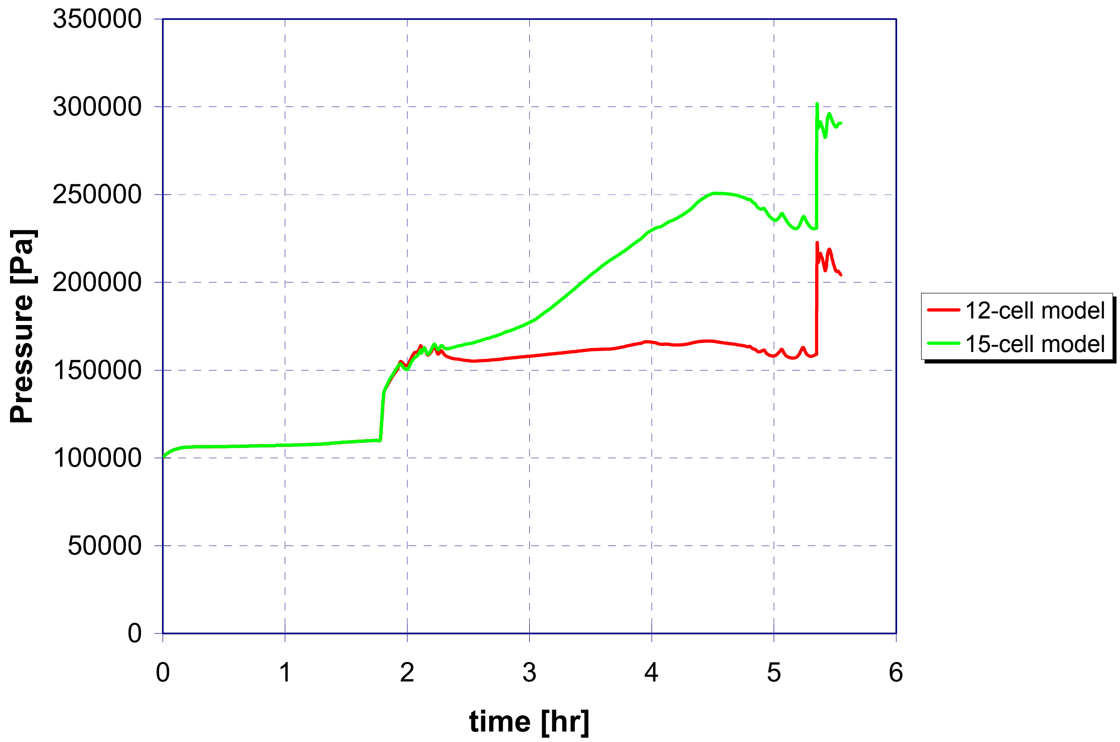

Figure B6. Containment pressure response for the STSBO-L accident, without auxiliary power.

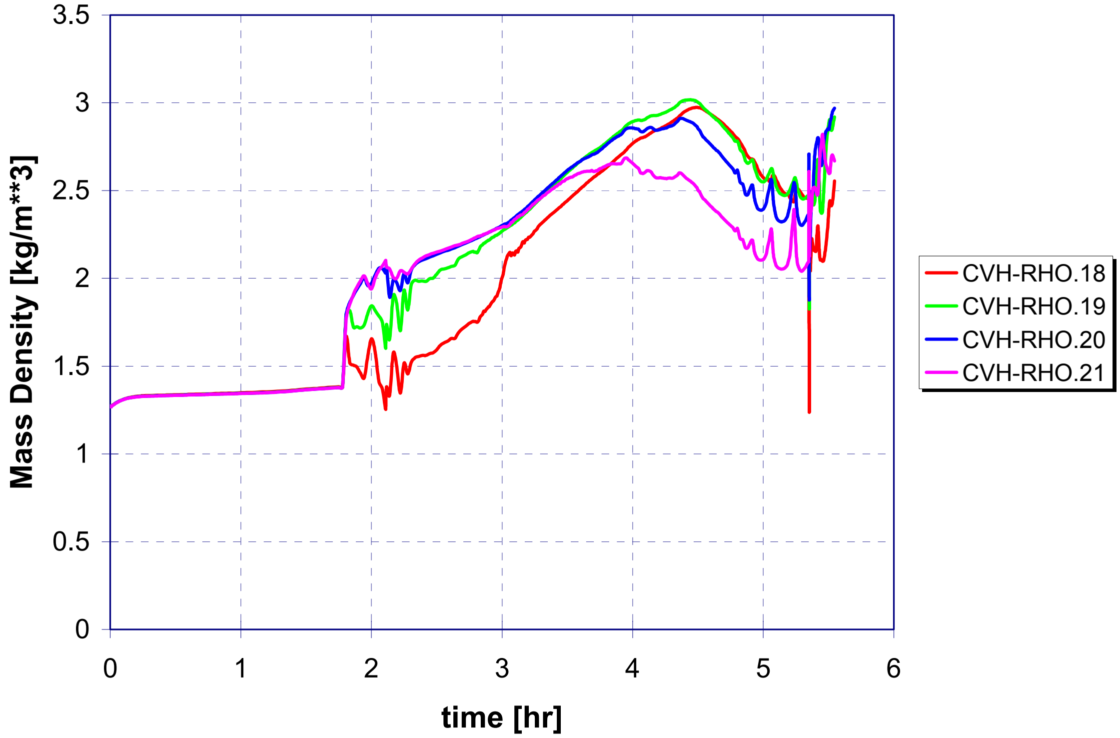

Figure B7. Ice bed gas mixture density for the STSBO-L accident using the 15-cell model, without auxiliary power.

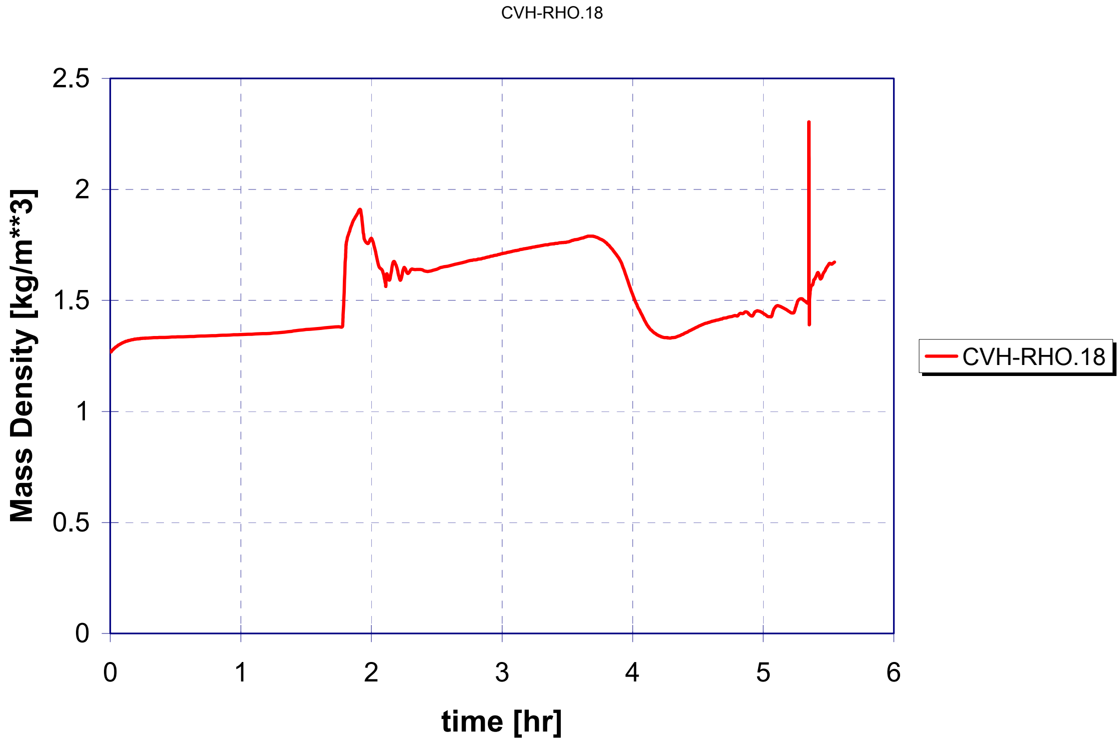

Figure B8. Ice bed gas mixture density for the STSBO-L accident using the 12-cell model, without auxiliary power.

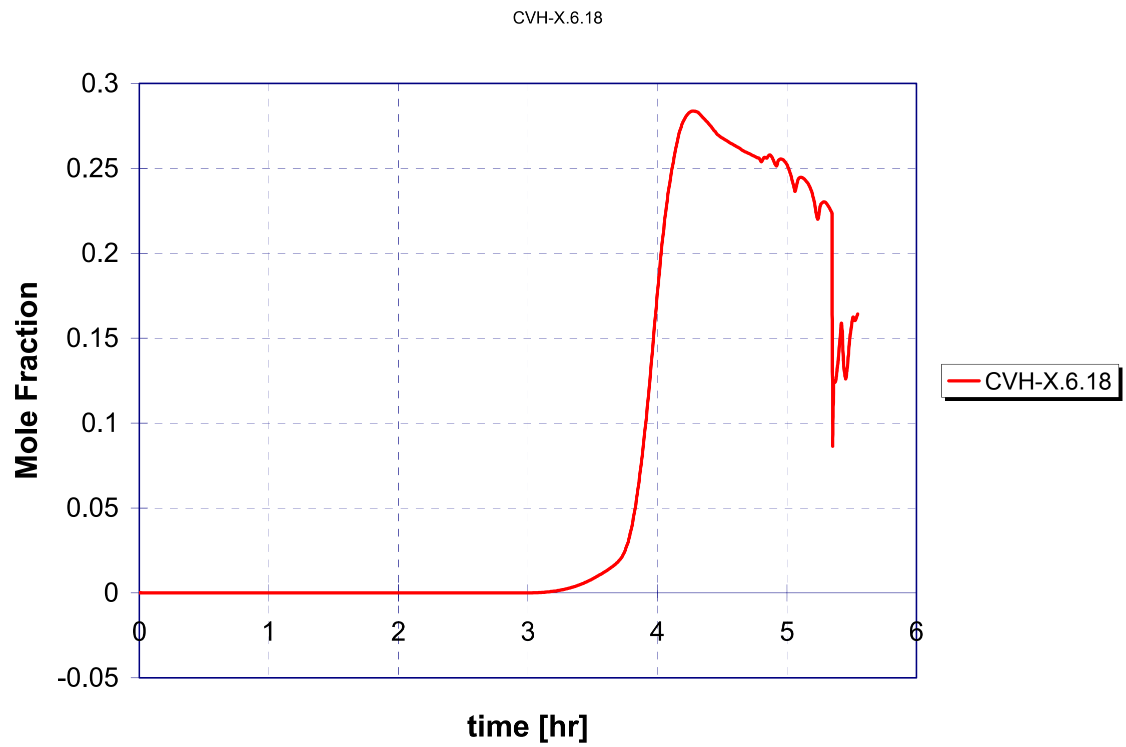

Figure B9. Ice bed hydrogen concentration for the STSBO-L accident using the 12-cell model, without auxiliary power.

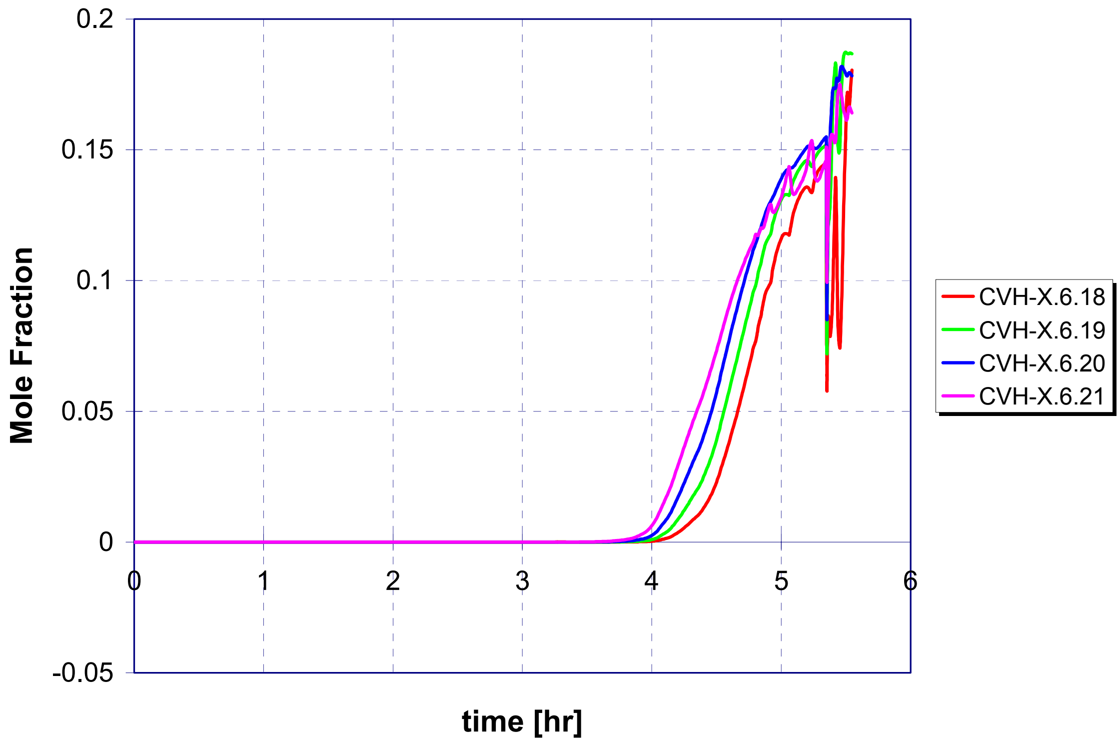

Figure B10. Ice bed hydrogen concentration for the STSBO-L accident using the 15-cell model, without auxiliary power.

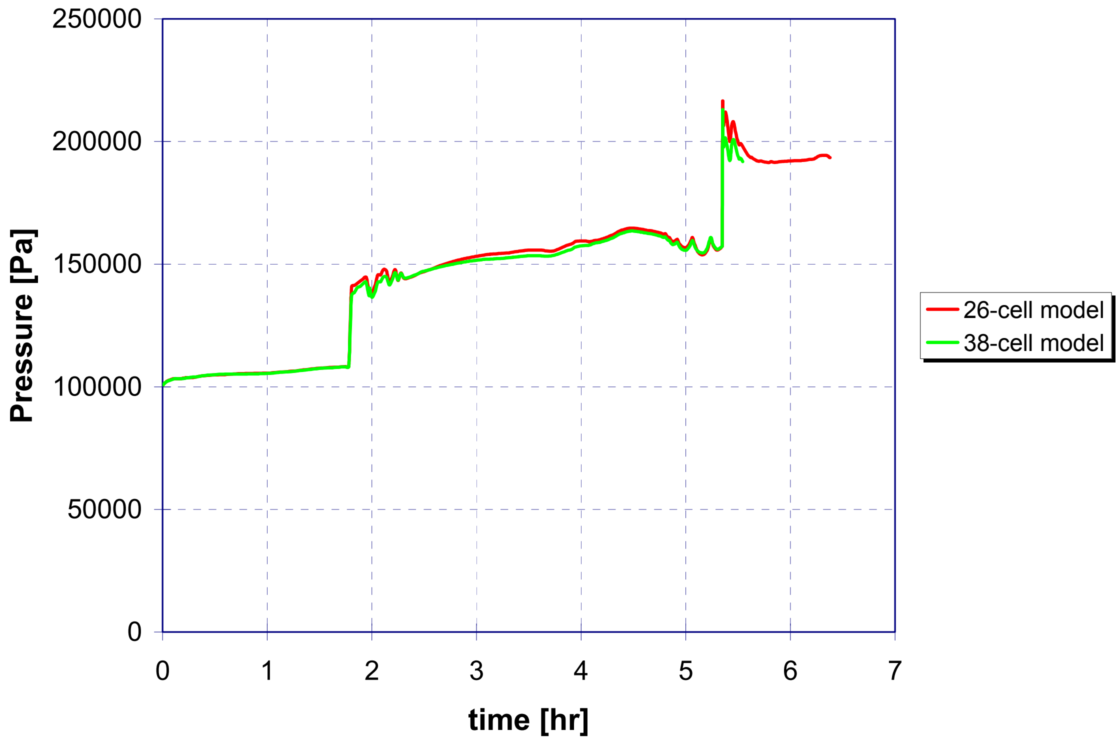

Figure B11. Containment pressure response for the STSBO-L accident using the 26 and 38-cell models, without auxiliary power.

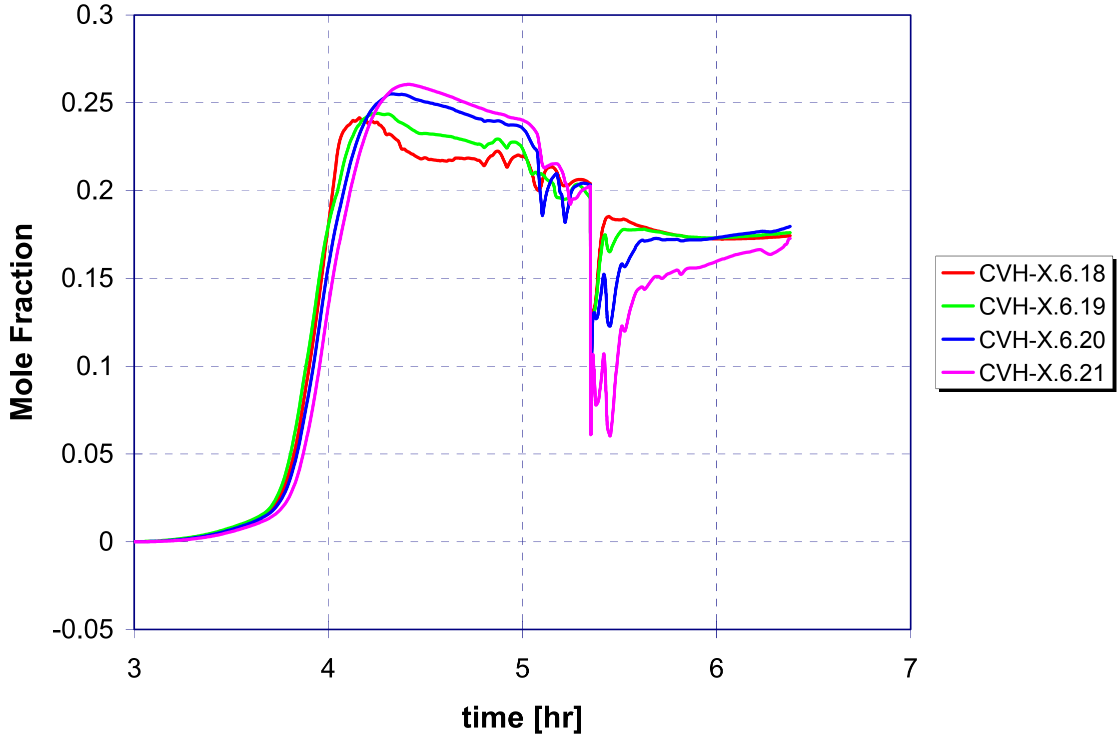

Figure B12. Ice bed hydrogen concentrations for the STSBO-L accident using the 26-cell model, without auxiliary power.

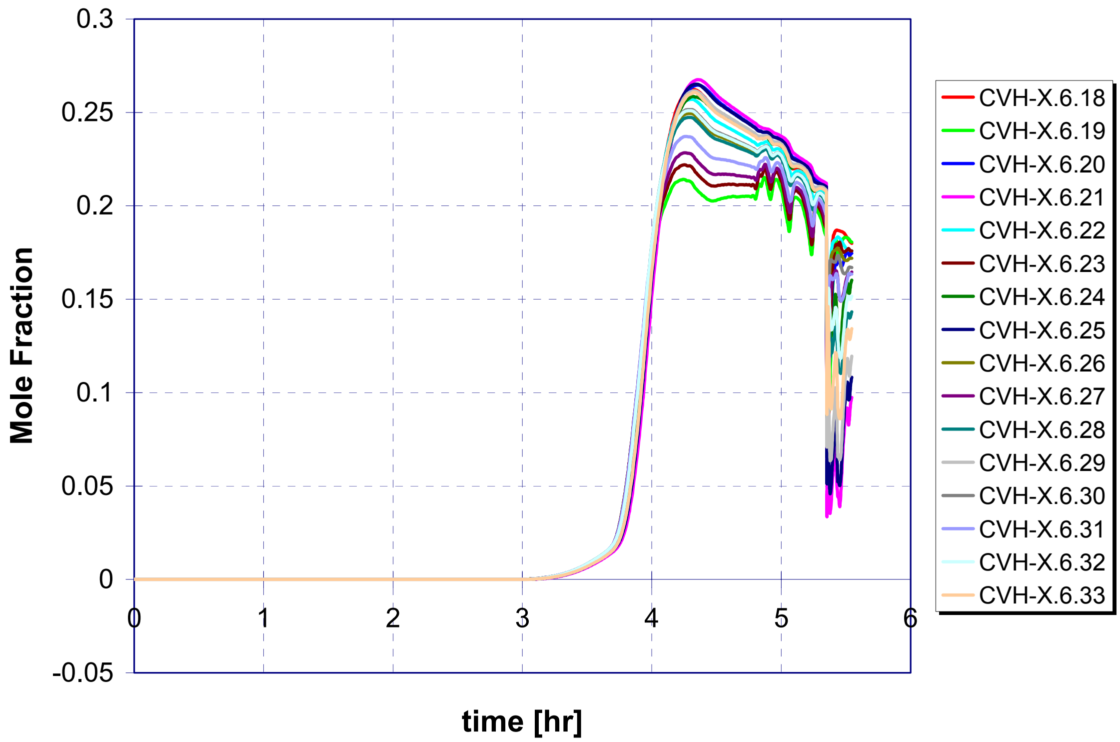

Figure B13. Ice bed hydrogen concentrations for the STSBO-L accident using the 38-cell model, without auxiliary power.

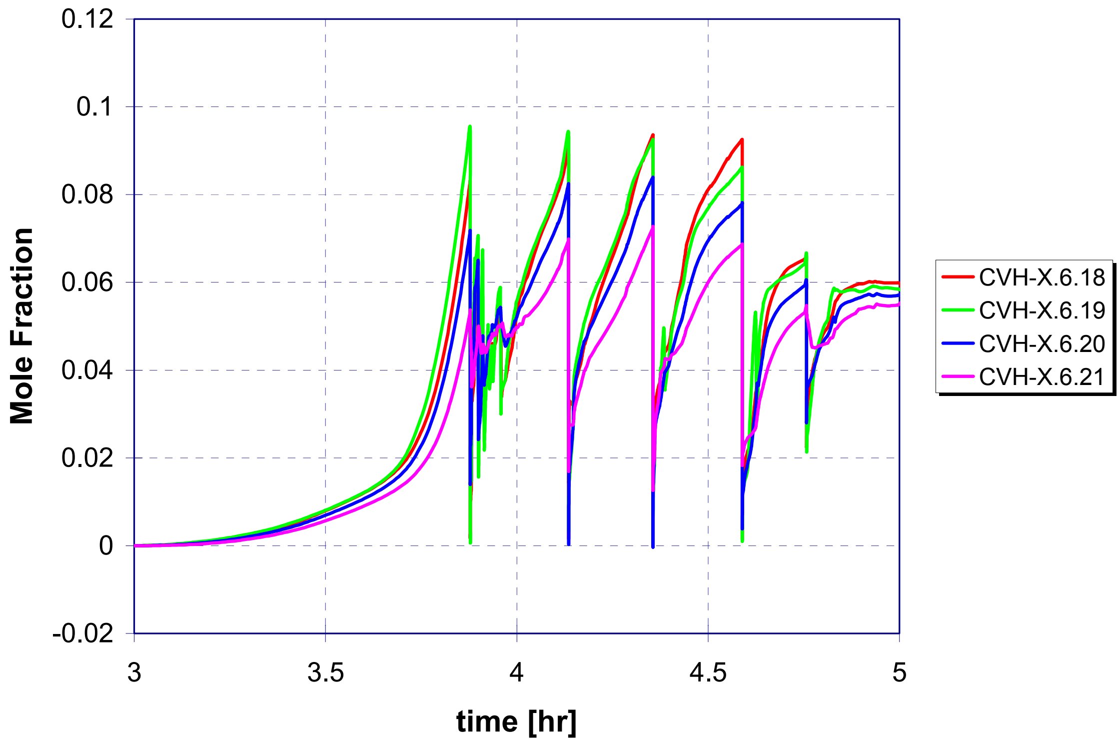

Figure B14. Ice bed hydrogen concentrations for the STSBO-L accident using the 26-cell model, with auxiliary power to igniters.

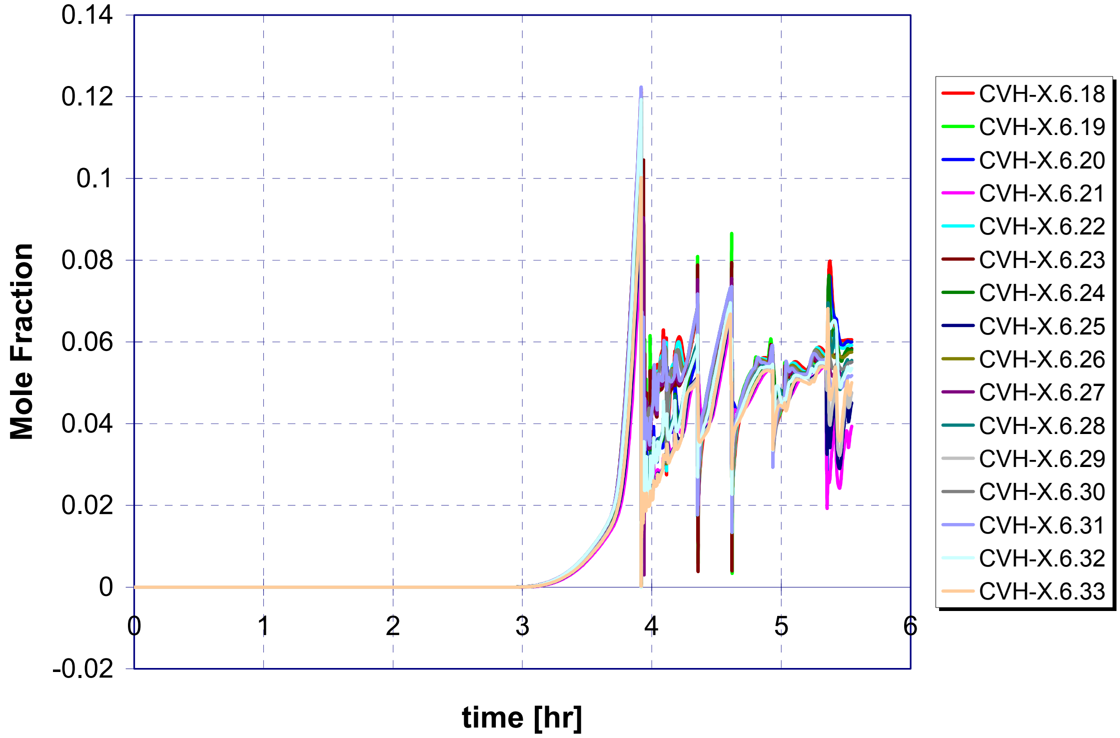

Figure B15. Ice bed hydrogen concentrations for the STSBO-L accident using the 38-cell model, with auxiliary power to igniters.

Appendix C: MELGEN/MELCOR Input Files for Igniter Only Sequoyah Containment Calculation

The MELGEN input files for the igniter only Sequoyah containment calculation using the 26-cell model are: sbo.inp, mp.gen, s_cont.gen, and s_small_burn.gen. The sources to the containment (external files) for the hot leg (hl1 – single loop, hl3 – triple loop), surgeline (sl), relief valves (rv), seals (seal8 and seal10), and vessel (vessel) are indicated for each receiving compartment. These external files are changed depending on the MELCOR run used to generate the source terms (run #). The MELCOR input file is listed as sbo.cor.

MELGEN Files:

SBO.INP

```
************************************************
*                                              *
*    SBO Comparison Calculation                *
*    Using the MELCOR 26-cell input            *
*                                              *
************************************************
*
title  'STSBO_L Containment'
*
restartf      SBO_Case1.rst
outputf              SBO_Case1.out
diagf         SBO_Case1_g.dia
*
dttime 0.1
************************************
* Read data from external files    *
************************************
* mp.gen           NCG and material properties
* s_cont.gen     Containment model
*
************************************
* Active                           *
************************************
*
r*i*f .\mp.gen
r*i*f .\s_cont.gen
r*i*f .\s_small_burn.gen
*
.
```

S_SMALL_BURN.GEN

```
************************************************************
*
***  BURN PACKAGE     MODIFIED BY Ahill 8-7-00
*
************************************************************
*
BUR000   0                    * ACTIVE
*BUR000   1                    * INACTIVE
BUR001   0.99  0.167 0.05 0.129 0.05 0.55  0.10  0.167  0.05 0.55
BUR002  0.99 0.09  0.30
BUR004 -1
*
BUR101   001   0    *  no ignitor in cavity
BUR102   002  -915
BUR103   003  -915
BUR104   004  -915
BUR105   005  -915
BUR106   006  -915
BUR107   007  -915
BUR108   008  -915
BUR109   009  -915
BUR110   010  -915
BUR111   011  -915
BUR112   012  -915
BUR113   013  -915
BUR114   014   0       * no ignitor in lower plenum
BUR115   015   0
BUR116   016   0
BUR117   017   0
BUR118   018  0      *    ignitor in ice bed for vessel breach
BUR119   019  0
BUR120   020  0
BUR121   021  0
BUR122   022  -915
BUR123   023  -915
BUR124   024  -915
BUR125   025  -915
BUR126   026  -915
*
*
*
*
CF04100  BURN_FLAG L-GT  2  1.0
CF04101 .FALSE.
CF04110 1.0 0.0 TIME
CF04111 0.0 0.0 TIME                      * Ignitors if set to true
*
CF91500    'ignitoron'  l-a-ifte  3  1.0  0.0 *Ignitors off if pwr off (cf041)
CF91510     1.0  0.0   cfvalu.041                  * if cf041 is true, then
CF91511     0.0  1.0   time                      * ignitors on, otherwise
CF91512     0.0  0.0   time                      * ignitors off
.
```

```
***  CVTYPE input
CVTYPE01 Vessel
CVTYPE02 PL-1
CVTYPE03 PL-3
CVTYPE04 Ctmt
CVTYPE05 SurgTnk
CVTYPE06 SG-1
CVTYPE07 SG-3
CVTYPE09 ECCS
CVTYPE10 AuxFW
CVTYPE11 Pressrz
CVTYPE98 Envir1
CVTYPE99 Envir2
***
*******************************************************************************
***
***       NON-CONDENSIBLE GASES
*************************************************************************
***
***     GAS   MATERIAL NUMBER
***
NCG000   O2        4
NCG001   N2        5
NCG002   H2        6
NCG003   CO2       7
NCG004   CO        8
NCG005   CH4       9
***
***********************************************************************
***
***          MATERIAL PROPERTIES
***********************************************************************
***            Property              Units
***            temperature           K
***            density               kg/m*3
***            heat capacity         J/kg-K
***            thermal conductivity  W/m-K
***
*----------------------------------
***          Material 1 is steel
*----------------------------------
MPMAT00100   STEEL
***
***          PROPERTY   TAB FUNC
***
MPMAT00101     RHO          1
MPMAT00102     CPS          2
MPMAT00103     THC          3
***
***          Density of steel
***
TF00100     'RHO STEEL'   2   1.00   0.0
***
***          TEMPERATURE     RHO
***
TF00112       200.00     7808.01      *487 lb/ft^3 'DEN(NM)' SLAB
TF00113      5000.00     7808.01
***
***          Heat capacity of steel
***
```

```
TF00200     'CPS STEEL'   2   1.00   0.0
***
***          TEMPERATURE     CPS
***
TF00212         200.00      475.72      *0.113 BTU/LB/F 'HC(NM)' SLAB
TF00213        5000.00      475.72
***
***          Thermal conductivty of steel
***
TF00300     'THC STEEL'   2   1.00   0.0
***
***          TEMPERATURE     THC
***
TF00312         200.00       43.24      *25.0 BTU/hr/ft/F 'TC(NM)' SLAB
TF00313        5000.00       43.24
***
*-----------------------------------
***          Material 2 is concrete
*-----------------------------------
MPMAT00200   CONCRETE
***
***          PROPERTY   TAB FUNC
***
MPMAT00201     RHO         4
MPMAT00202     CPS         5
MPMAT00203     THC         6
***
***          Density of concrete
***
TF00400     'RHO CONCRETE'   2   1.00   0.0
***
***          TEMPERATURE     RHO
***
TF00412         200.00     2533.19      *157.5 LB/FT^3 'DEN(NM) SLAB
TF00413        5000.00     2533.19
***
***          Heat capacity of concrete
***
TF00500     'CPS CONCRETE'   2   1.00   0.0
***
***          TEMPERATURE     CPS
***
TF00512         200.00     880.0     *  MODIFIED BY IKM 4-03-95
TF00513        5000.00     880.0
***
***          Thermal conductivity of concrete
***
TF00600     'THC CONCRETE'   2   1.00   0.0
***
***          TEMPERATURE     THC
***
TF00612         200.00        1.524     *0.800 BTU/HR/FT/F 'TC(NM)' SLAB
TF00613        5000.00        1.524
***
*----------------------------------------
***          Material 3 is carbon steel
*----------------------------------------
MPMAT00300  'CARBON STEEL'
***
***          PROPERTY   TAB FUNC
***
MPMAT00301     RHO          7
MPMAT00302     CPS          8
```

```
MPMAT00303     THC          9
***
***          Density of carbon steel
***
TF00700     'RHO CARBON STEEL'   2   1.00   0.0
***
***          TEMPERATURE     RHO
***
TF00712         273.15     7833.0
TF00713        5000.00     7833.0
***
***          Heat capacity of carbon steel
***
TF00800     'CPS CARBON STEEL'   2   1.00   0.0
***
***          TEMPERATURE     CPS
***
TF00812         273.15      465.0
TF00813        5000.00      465.0
***
***          Thermal conductivty of carbon steel
***
TF00900     'THC CARBON STEEL'  10   1.00   0.0
***
***          TEMPERATURE     THC
***
TF00910         273.15       55.0
TF00911         373.15       52.0
TF00912         473.15       48.0
TF00913         573.15       45.0
TF00914         673.15       42.0
TF00915         873.15       35.0
TF00916        1073.15       31.0
TF00917        1223.15       29.0
TF00918        1473.15       31.0
TF00919        9973.15       31.0
***
*-----------------------------------
***          MATERIAL 4 IS SS-3161
*-----------------------------------
MPMAT00400  'SS-3161'
***
***          PROPERTY   TAB FUNC
***
MPMAT00401     RHO          70
MPMAT00402     CPS          80
MPMAT00403     THC          90
***
***          Density of carbon steel
***
TF07000     'RHO SS-3161'   2   1.00   0.0
***
***          TEMPERATURE     RHO
***
TF07012         273.15     7930.0
TF07013        5000.00     7930.0
***
***          HEAT CAPACITY OF SS-3161
***
TF08000     'CPS SS-3161'   2   1.00   0.0
***
***          TEMPERATURE     CPS
***
```

```
TF08012         273.15      381.1
TF08013        5000.00      381.1
***
***          THERMAL CONDUCTIVTY OF SS-3161
***
TF09000     'THC SS-3161'  7   1.00   0.0
***
***          TEMPERATURE     THC
***
TF09010         273.15       17.0
TF09011         310.90       17.0
TF09012         422.00       18.92
TF09013         553.10       21.18
TF09014         644.30       23.21
TF09015         755.40       25.22
TF09016         866.50       29.51
***
*-----------------------------------
*            MATERIAL 5 IS insul

*-----------------------------------
*
MPMAT00500     insul
MPMAT00501     RHO  11
MPMAT00502     CPS  12
MPMAT00503     THC  13
*
*    insul   solid
*      molew 60.0
*      condt 1.454 1.454
*      entht 3.375e4 3.409e6
*      rhot  2000.0  2000.0
*      spht  1250.0  1250.0
*
* Density
TF01100  'RHO insul'  1  1.00  0.0
TF01110  300.0   2000.0
*
* Specific Heat
TF01200  'CPS insul'  1  1.00  0.0
TF01210  300.0  1250.0
*
* Conductivity
TF01300  'THC insul'  1  1.00  0.0
TF01310  300.0  1.454
*
*-----------------------------------
*            MATERIAL 6 IS ice substitute
*-----------------------------------
*
mpmat00600 'ice'
mpmat00601 THC 14
mpmat00602 CPS 15
mpmat00603 RHO 16
*
* Thermal conductivity of ice is 2.18 W/m/K
* Large value used here to accomodate lump-capacity model
* Same as NRC's Cook model
*
tf01400   'thc ice'    2     1.    0.
tf01411   273.15    50.
tf01420   5000.     50.
*
```

```
* Specific heat capacity of ice is 2040 J/kg/K at freezing
* Low value used here because heat capacities were included in
* heat of reaction of the degassing-ice-condenser-model.
* Same as NRC's Cook model.
*
tf01500   'cps ice'    2     1.    0.
tf01511   273.15    1.
tf01518   5000.     1.
*
* Density of solid ice is about 915 kg/m3
* Density of granulated ice on order of 575 to 700 kg/m3
* See calculation of density in ice condensor input (below)
*
tf01600   'rho ice'    2     1.    0.  * granulated ice
tf01611   273.15    596.77
tf01612   5000.     596.77
*
***********************************************************************
*  The following (Inconel MP Data) was taken from the Surry deck Ahill
*
*            MATERIAL 7 IS INCONEL
*
MPMAT00700  INCONEL
MPMAT00701     RHO  17
MPMAT00702     CPS  18
MPMAT00703     THC  19
*
TF01700  'RHO INCONEL'  1  1.00  0.0
TF01710   273.15  8415.0
*
TF01800  'CPS INCONEL'  1  1.00  0.0
TF01810   273.15   439.0
*
TF01900  'THC INCONEL'  7  1.00  0.0
TF01910   310.928  14.704
TF01911   422.039  16.636
TF01912   533.150  18.318
TF01913   644.261  20.063
TF01914   755.372  21.807
TF01915   866.483  23.552
TF01916  1922.039  41.060
*
*****    Vessel temp for heat transfer
*****
TF11000  Temp   2  1.0  0.0
*****
*****    Time   Temp
*****
TF11010  0.0     616.0
TF11011  1.0E10  616.0
*
*      HEAT TRANSFER COEFFICIENT FOR STRUCTURE INSULATION
*      BASED ON REFLECTIVE INSULATION PROPERITES TAKEN
*      FROM DEGRADED INSULATION SCOPING STUDY, RJD-32-87,
*      9/30/87.  COEFFICIENT ASSUMMED CONSTANT BELOW AND
*      ABOVE ENDPOINTS OF DATA GIVEN IN PAPER.
*
TF70000  'PIPE INSULATION'  4  1.00  0.0
*
*     TEMPERATURE  HTC
*
TF70010   273.15  1.14
TF70011   422.    1.14
```

```
TF70012  1089.    3.68
TF70013  5000.    3.68
*
.
```

S_SMALL_CONT.GEN

```
*******************************************************************************
*
*
*
* Sequoyah 26-Cell Containment Model.  Converted from CONTAIN input deck
*
*
*
*******************************************************************************
*
*
****************************
* External data file write *
* pressure and ice melt    *
****************************
edf00100  seq_data   8   write
edf00101  'seq_data.txt'
edf00102  '1P,9e14.5'
edf00110 0. 30.0
edf001aa cvh-p.024
edf001bb cfvalu.152   * peak-pressure cv024
edf001cc cfvalu.841   * lw-door1
edf001dd cfvalu.843   * lw-door2
edf001ee cfvalu.860   * lw-door3
edf001ff cfvalu.870   * lw-door4
edf001gg cfvalu.880   * lw-door5
edf001hh cfvalu.890   * lw-door6
*************
* CVH Input *
*************
*
******************
* reactor cavity *
******************
*
*  Cell number     =        1
*  Cell bottom     =  -3.5200 m
*  cell top        =   3.5200 m
*  Cell height     =   7.0400 m
*  Cell volume     = 396.0000 m3
*
cv00100  cavity        2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv001a0  3
cv001a1  pvol       1.013e5
cv001a2  tatm     311.
cv001a3  mlfr.4     0.2095
cv001a4  mlfr.5     0.7905
cv001a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv001b1 -3.5200     0.0000 *
cv001b2  3.5200   396.0000
*
******************************
* External files for sources  *
******************************
cv001c1 file integral edf.010 1.0
```

```
*
edf01000 'vessel' 11 read
edf01001 'vessel.dat'
edf01002 '12(1x,1pe20.9)'
*
*******************************
* steam generator doghouse #1 *
*******************************
*
*  Cell number     =        2
*  Cell bottom     =  21.4000 m
*  cell top        =  32.6000 m
*  Cell height     =  11.2000 m
*  Cell volume     = 362.5000 m3
*
cv00200  sg_doghouse_1 2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv002a0  3
cv002a1  pvol       1.010e5
cv002a2  tatm     311.
cv002a3  mlfr.4     0.2095
cv002a4  mlfr.5     0.7905
cv002a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv002b1  21.4000    0.0000
cv002b2  32.6000  362.5000
*
*******************************
* steam generator doghouse #2 *
*******************************
*
*  Cell number     =        3
*  Cell bottom     =  21.4000 m
*  cell top        =  32.6000 m
*  Cell height     =  11.2000 m
*  Cell volume     = 362.5000 m3
*
cv00300  sg_doghouse_2 2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv003a0  3
cv003a1  pvol       1.010e5
cv003a2  tatm     311.
cv003a3  mlfr.4     0.2095
cv003a4  mlfr.5     0.7905
cv003a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv003b1  21.4000    0.0000
cv003b2  32.6000  362.5000
*
*******************************
* steam generator doghouse #3 *
*******************************
*
*  Cell number     =        4
*  Cell bottom     =  21.4000 m
*  cell top        =  32.6000 m
*  Cell height     =  11.2000 m
*  Cell volume     = 362.5000 m3
*
cv00400  sg_doghouse_3 2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv004a0  3
cv004a1  pvol       1.010e5
cv004a2  tatm     311.
cv004a3  mlfr.4     0.2095
cv004a4  mlfr.5     0.7905
cv004a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv004b1  21.4000    0.0000
```

```
cv004b2  32.6000  362.5000
*
*******************************
* steam generator doghouse #4 *
*******************************
*
*  Cell number     =        5
*  Cell bottom     =  21.4000 m
*  cell top        =  32.6000 m
*  Cell height     =  11.2000 m
*  Cell volume     = 362.5000 m3
*
cv00500  sg_doghouse_4 2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv005a0  3
cv005a1  pvol       1.010e5
cv005a2  tatm     311.
cv005a3  mlfr.4     0.2095
cv005a4  mlfr.5     0.7905
cv005a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv005b1  21.4000    0.0000
cv005b2  32.6000  362.5000
*
********************************
* reactor space - upper cavity *
********************************
*
*  Cell number     =        6
*  Cell bottom     =  12.1000 m
*  cell top        =  19.9000 m
*  Cell height     =   7.8000 m
*  Cell volume     = 439.0000 m3
*
cv00600  Upper_Cavity  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv006a0  3
cv006a1  pvol       1.01122e5
cv006a2  tatm     311.
cv006a3  mlfr.4     0.2095
cv006a4  mlfr.5     0.7905
cv006a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv006b1  12.1000    0.0000
cv006b2  19.9000  439.0000
*
************************
* pressurizer doghouse *
************************
*
*  Cell number     =        7
*  Cell bottom     =  21.4000 m
*  cell top        =  32.6000 m
*  Cell height     =  11.2000 m
*  Cell volume     = 135.0000 m3
*
cv00700  Pszr_Doghouse 2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv007a0  3
cv007a1  pvol       1.010e5
cv007a2  tatm     311.
cv007a3  mlfr.4     0.209
cv007a4  mlfr.5     0.790
cv007a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv007b1  21.4000    0.0000
cv007b2  32.6000  135.0000
*
************************
```

```
* lower containment #1 *

***********************
*
*  Cell number     =        8
*  Cell bottom     =   5.3000 m
*  cell top        =  19.3000 m
*  Cell height     =  14.0000 m
*  Cell volume     =1510.     m3
*
cv00800  lwr_ctmt_1    2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv008a0  3
cv008a1  pvol       1.01163e5
cv008a2  tatm     311.
cv008a3  mlfr.4     0.209
cv008a4  mlfr.5     0.790
cv008a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv008b1   1.14    0.0000
cv008b2   5.3     60.467
cv008b3   6.47    186.66
cv008b4   8.53    408.846
cv008b5  19.3000 1510.0000
*
cv008ca file integral edf.050 1.0
cv008cb file integral edf.080 0.333
cv008cc file integral edf.100 1.0
*
edf05000 'hl1' 11 read      * Vessel nozzle (hot-1 leg)
edf05001 'hl1.dat'
edf05002 '12(1x,1pe20.9)'
*
edf08000 'hl3a' 11 read      * Vessel nozzle (hot-3 leg)*1/3
edf08001 'hl3a.dat'
edf08002 '12(1x,1pe20.9)'
*
edf10000 'seal8' 11 read      * Seals (loops 1 and 3)
edf10001 'seal8.dat'
edf10002 '12(1x,1pe20.9)'
*
***********************
* lower containment #2 *
***********************
*
*  Cell number     =        9
*  Cell bottom     =   5.3000 m  *$$$Bottom should be at 4.639056m below nozzle
*  cell top        =  19.3000 m  *$$$ = 8.324 - 4.639056 = 3.684944 SQ FSAR
6.2-23
*  Cell height     =  14.0000 m
*  Cell volume     =1290.     m3
*
cv00900  lwr_ctmt_2    2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv009a0  3
cv009a1  pvol       1.01163e5
cv009a2  tatm     311.
cv009a3  mlfr.4     0.209
cv009a4  mlfr.5     0.790
cv009a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv009b1   1.14    0.0000
cv009b2   5.3     60.467
cv009b3   6.47    154.213
cv009b4   8.53    319.269
cv009b5  21.4000 1290.0000
*
```

```
*********************************************
* Input steam, water, and hydrogen sources  *
*********************************************
*
cv009ce file integral edf.030 1.0
cv009cf file integral edf.040 1.0
* cv009cg file integral edf.060 1.0
* cv009ch file integral edf.070 1.0
*
*
*
********************************************
* edf files for source input               *
********************************************
*
* edf02000 'flo_450' 11 read
* edf02001 'flo_450.dat'
*
* edf00700 'water' 2 read             * Rupture Disk
* edf00701 'water.dat'
* edf00702 '3(1x,1pe12.4)'
*
* edf00800 'steam' 2 read             * Rupture Disk
* edf00801 'steam.dat'
* edf00802 '3(1x,1pe12.4)'
*
edf03000 'rv' 11 read          * Relief Values
edf03001 'rv.dat'
edf03002 '12(1x,1pe20.9)'
*
edf04000 'sl' 11 read          * surgelines
edf04001 'sl.dat'
edf04002 '12(1x,1pe20.9)'
*
*
* edf06000 'flo_895' 11 read          * Surgeline rupture
* edf06001 'flo_895.dat'
*
* edf07000 'flo_896' 11 read          * Surgeline rupture CV503
* edf07001 'flo_896.dat'
*
*
***********************
* lower containment #3 *
***********************
*
*  Cell number     =       10
*  Cell bottom     =   5.3000 m
*  cell top        =  19.3000 m
*  Cell height     =  14.0000 m
*  Cell volume     =1510.     m3
*
cv01000  lwr_ctmt_3    2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv010a0  3
cv010a1  pvol       1.01163e5
cv010a2  tatm     311.
cv010a3  mlfr.4     0.209
cv010a4  mlfr.5     0.790
cv010a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv010b1   1.14      0.0000
cv010b2   5.3       60.467
cv010b3   6.47      186.66
cv010b4   8.53      408.846
```

```
cv010b5  19.3000 1510.0000
*
********************************
* External file read sources   *
********************************
cv010ca file integral edf.140 0.6666
* cv010cb file integral edf.120 1.0
* cv010cc file integral edf.130 1.0
cv010cd file integral edf.090 1.0
* cv010ce file integral edf.110 1.0
*
edf14000 'hl3b' 11 read        * Vessel nozzle rupture (hot-3 leg)* 2/3
edf14001 'hl3b.dat'
edf14002 '12(1x,1pe20.9)'
*
edf09000 'seal10' 11 read          * seals
edf09001 'seal10.dat'
edf09002 '12(1x,1pe20.9)'

* edf09000 'flo_903' 11 read        * A loop 3
* edf09001 'flo_903.dat'
*
* edf11000 'flo_913' 11 read        * B loop 3
* edf11001 'flo_913.dat'
*
* edf12000 'flo_902' 11 read        * A loop 3
* edf12001 'flo_902.dat'
*
* edf13000 'flo_912' 11 read        * B loop 3
* edf13001 'flo_912.dat'
*
********************
* lower annulus #1 *
********************
*
*  Cell number     =       11
*  Cell bottom     =   5.3000 m
*  cell top        =  19.3000 m
*  Cell height     =  14.0000 m
*  Cell volume     = 864.0000 m3
*
cv01100  lwr_annulus_1 2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv011a0  3
cv011a1  pvol       1.01163e5
cv011a2  tatm     311.
cv011a3  mlfr.4     0.209
cv011a4  mlfr.5     0.790
cv011a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv011b1   5.3000    0.0000
cv011b2  19.3000  864.0000
*
********************
* lower annulus #2 *
********************
*
*  Cell number     =       12
*  Cell bottom     =   5.3000 m
*  cell top        =  19.3000 m
*  Cell height     =  14.0000 m
*  Cell volume     = 846.0000 m3
*
cv01200  lwr_annulus_2 2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv012a0  3
```

```
cv012a1  pvol       1.01163e5
cv012a2  tatm     311.
cv012a3  mlfr.4     0.2095
cv012a4  mlfr.5     0.7905
cv012a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv012b1   5.3000    0.0000
cv012b2  19.3000  846.0000
*
********************
* lower annulus #3 *
********************
*
*  Cell number     =       13
*  Cell bottom     =   5.3000 m
*  cell top        =  19.3000 m
*  Cell height     =  14.0000 m
*  Cell volume     = 952.0000 m3
*
cv01300  lwr_annulus_3 2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv013a0  3
cv013a1  pvol       1.01163e5
cv013a2  tatm     311.
cv013a3  mlfr.4     0.2095
cv013a4  mlfr.5     0.7905
cv013a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv013b1   5.3000    0.0000
cv013b2  19.3000  952.0000
*
*******************
* lower plenum #1 *
*******************
*
*  Cell number     =       14
*  Cell bottom     =  17.7500 m
*  cell top        =  20.2500 m
*  Cell height     =   2.5000 m
*  Cell volume     = 171.2500 m3
*
cv01400  lwr_plenum_1  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv014a0  3
cv014a1  pvol       1.01089e5
cv014a2  tatm     275.0
cv014a3  mlfr.4     0.2095
cv014a4  mlfr.5     0.7905
cv014a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv014b1  17.7500    0.0000
cv014b2  20.2500  171.2500
*
*******************
* lower plenum #2 *
*******************
*
*  Cell number     =       15
*  Cell bottom     =  17.7500 m
*  cell top        =  20.2500 m
*  Cell height     =   2.5000 m
*  Cell volume     = 171.2500 m3
*
cv01500  lwr_plenum_2  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv015a0  3
cv015a1  pvol       1.01089e5
cv015a2  tatm     275.0
cv015a3  mlfr.4     0.2095
```

```
cv015a4  mlfr.5     0.7905
cv015a5  rhum       0.30            * relative humidity 30% per FSAR Table 6-1

cv015b1  17.7500    0.0000
cv015b2  20.2500  171.2500
*
******************
* lower plenum #3 *
******************
*
*  Cell number     =       16
*  Cell bottom     =  17.7500 m
*  cell top        =  20.2500 m
*  Cell height     =   2.5000 m
*  Cell volume     = 171.2500 m3
*
cv01600  lwr_plenum_3  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv016a0  3
cv016a1  pvol       1.01089e5
cv016a2  tatm     275.0
cv016a3  mlfr.4     0.2095
cv016a4  mlfr.5     0.7905
cv016a5  rhum       0.30            * relative humidity 30% per FSAR Table 6-1
cv016b1  17.7500    0.0000
cv016b2  20.2500  171.2500
*
******************
* lower plenum #4 *
******************
*
*  Cell number     =       17
*  Cell bottom     =  17.7500 m
*  cell top        =  20.2500 m
*  Cell height     =   2.5000 m
*  Cell volume     = 171.2500 m3
*
cv01700  lwr_plenum_4  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv017a0  3
cv017a1  pvol       1.01089e5
cv017a2  tatm     275.0
cv017a3  mlfr.4     0.2095
cv017a4  mlfr.5     0.7905
cv017a5  rhum       0.30            * relative humidity 30% per FSAR Table 6-1
cv017b1  17.7500    0.0000
cv017b2  20.2500  171.2500
*
*******************
* ice condenser #1 *
*******************
*
*  Cell number     =       18
*  Cell bottom     =  20.4000 m
*  cell top        =  35.0000 m
*  Cell height     =  14.6000 m
*  Cell volume     = 611.0000 m3
*
cv01800  ice_cndnsr_1  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv01803  41.75                      * flow area from contain ice condensor
input
cv018a0  3
cv018a1  pvol       1.00992e5
cv018a2  tatm     275.0
cv018a3  mlfr.4     0.2095
```

```
cv018a4  mlfr.5     0.7905
cv018a5  rhum       0.30              * relative humidity 30% per FSAR Table 6-1
cv018b1  20.4000    0.0000
cv018b2  35.0000  611.0000
*
*******************
* ice condenser #2 *
*******************
*
*  Cell number     =       19
*  Cell bottom     =  20.4000 m
*  cell top        =  35.0000 m
*  Cell height     =  14.6000 m
*  Cell volume     = 611.0000 m3
*
cv01900  ice_cndnsr_2  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv01903  41.75                        * flow area from contain ice condensor
input
cv019a0  3
cv019a1  pvol       1.00992e5
cv019a2  tatm     275.0
cv019a3  mlfr.4     0.2095
cv019a4  mlfr.5     0.7905
cv019a5  rhum       0.30              * relative humidity 30% per FSAR Table 6-1
cv019b1  20.4000    0.0000
cv019b2  35.0000  611.0000
*
*******************
* ice condenser #3 *
*******************
*
*  Cell number     =       20
*  Cell bottom     =  20.4000 m
*  cell top        =  35.0000 m
*  Cell height     =  14.6000 m
*  Cell volume     = 611.0000 m3
*
cv02000  ice_cndnsr_3  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv02003  41.75                        * flow area from contain ice condensor
input
cv020a0  3
cv020a1  pvol       1.00992e5
cv020a2  tatm     275.0
cv020a3  mlfr.4     0.2095
cv020a4  mlfr.5     0.7905
cv020a5  rhum       0.30              * relative humidity 30% per FSAR Table 6-1
cv020b1  20.4000    0.0000
cv020b2  35.0000  611.0000
*
*******************
* ice condenser #4 *
*******************
*
*  Cell number     =       21
*  Cell bottom     =  20.4000 m
*  cell top        =  35.0000 m

*  Cell height     =  14.6000 m
*  Cell volume     = 611.0000 m3
*
cv02100  ice_cndnsr_4  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv02103  41.75                        * flow area from contain ice condensor
input
```

```
cv021a0  3
cv021a1  pvol       1.00992e5
cv021a2  tatm     275.0
cv021a3  mlfr.4     0.2095
cv021a4  mlfr.5     0.7905
cv021a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv021b1  20.4000    0.0000
cv021b2  35.0000  611.0000
*
*******************
* upper plenum #1 *
*******************
*
*  Cell number     =       22
*  Cell bottom     =  35.1000 m
*  cell top        =  40.1000 m
*  Cell height     =   5.0000 m
*  Cell volume     = 665.0000 m3
*
cv02200  upp_plenum_1  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv022a0  3
cv022a1  pvol       1.00883e5
cv022a2  tatm     275.0
cv022a3  mlfr.4     0.2095
cv022a4  mlfr.5     0.7905
cv022a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv022b1  35.1000    0.0000
cv022b2  40.1000  665.0000
*
*******************
* upper plenum #2 *
*******************
*
*  Cell number     =       23
*  Cell bottom     =  35.1000 m
*  cell top        =  40.1000 m
*  Cell height     =   5.0000 m
*  Cell volume     = 665.0000 m3
*
cv02300  upp_plenum_2  2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv023a0  3
cv023a1  pvol       1.00883e5
cv023a2  tatm     275.0
cv023a3  mlfr.4     0.2095
cv023a4  mlfr.5     0.7905
cv023a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv023b1  35.1000    0.0000
cv023b2  40.1000  665.0000
*
************************
* upper dome region #1 *
************************
*
*  Cell number     =       24
*  Cell bottom     =  33.7000 m
*  cell top        =  54.7000 m
*  Cell height     =  21.0000 m
*  Cell volume     =6387.     m3
*
cv02400  upp_dome_1    2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv024a0  3
cv024a1  pvol       1.00810e5
cv024a2  tatm     303.
```

```
cv024a3  mlfr.4     0.2095
cv024a4  mlfr.5     0.7905
cv024a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv024b2  33.7000    0.0000
cv024b3  54.7000 6387.0000
*
************************
* upper dome region #2 *
************************
*
*  Cell number     =       25
*  Cell bottom     =  33.7000 m
*  cell top        =  54.7000 m
*  Cell height     =  21.0000 m
*  Cell volume     =6387.     m3
*
cv02500  upp_dome_2    2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv025a0  3
cv025a1  pvol       1.00810e5
cv025a2  tatm     303.
cv025a3  mlfr.4     0.2095
cv025a4  mlfr.5     0.7905
cv025a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv025b1  33.7000    0.0000
cv025b2  54.7000 6387.0000
*
*********************

* lower dome region *
*********************
*
*  Cell number     =       26
*  Cell bottom     =  17.9000 m
*  cell top        =  34.1000 m
*  Cell height     =  16.2000 m
*  Cell volume     = 5852.    m3
*
cv02600  lwr_dome      2  2  4       * Non-Equ Thermo, Vert Flow, Ctmt
cv026a0  3
cv026a1  pvol       1.00989e5
cv026a2  tatm     303.
cv026a3  mlfr.4     0.2095
cv026a4  mlfr.5     0.7905
cv026a5  rhum       0.30             * relative humidity 30% per FSAR Table 6-1
cv026b1  6.48      0.0000
cv026b2  8.53      430.0
cv026b3  34.1000   5852.0000
*
***********************************************************************
* Note: CONTAIN Cell 27 was dummy primary system cell to hold blowdown *
*       steam and hydrogen sources.  Not converted for MELCOR          *
***********************************************************************
*
***************
* environment *
***************
*
*  Cell number     =       28
*  Cell bottom     = 0.       m
*  cell top        = 1.e02    m
*  Cell height     = 1.e02    m
*  Cell volume     = 1.e03    m3
*
```

```
cv02800  ENVIRONMENT   2  2  99      * NON-EQU THERMO, VERT FLOW, ENVIRON
cv02801   0   -1
cv028a0   3
cv028a1  pvol       1.00e5
cv028a2  tatm     303.
cv028a3  mlfr.4     0.2095
cv028a4  mlfr.5     0.7905
cv028b1  -1.e01     0.0000
cv028b2   5.e01     1.e03
***************
* environment *
***************
*
*  Cell number     =       29
*  Cell bottom     = 0.       m
*  cell top        = 1.e02    m
*  Cell height     = 1.e02    m
*  Cell volume     = 1.e03    m3
*
cv02900  ENVIRONMENT   2  2  97      * NON-EQU THERMO, VERT FLOW, ENVIRON
cv02901   0   -1
cv029a0   3
cv029a1  pvol       1.00e5
cv029a2  tatm     303.
cv029a3  mlfr.4     0.2095
cv029a4  mlfr.5     0.7905
cv029b1  -1.e01     0.0000
cv029b2   5.e01     1.e03
*******************************************************************************
*
*
*
cf15200 peak-dome max 2 1.
cf15201 0.0
cf15210 1.0 0.0 cvh-p.024
cf15211 1.0 0.0 cfvalu.152
*
***********************************************
* FL Input (from CONTAIN standard flow paths) *
***********************************************
*
**************************
* reactor vessel annulus *
**************************
*
*  Flow path number  =        1
*  Flow area         =   1.0000 m2
*  Area/length ratio =    .1000 m
*  Flow coefficient  =   4.0000  (Cfc = 0.5 * k)
*  From cell         =        1
*  To cell           =        6
*
fl00100  rx-annulus    1   6    2.97   12.97   * fm,to elev
fl00101  1.0000   10.0000   1.0000             * area, length, frac open
fl00103  8.00      8.00                        * k(forward),k(reverse)
fl001s1  1.0000   10.0000   0.56               * area,length,shyd (segment)
*
*******************************
* cavity to lower compartment *
*******************************
*
*  Flow path number  =        2
*  Flow area         =   3.3000 m2
```

```
*  Area/length ratio =   1.4300 m
*  Flow coefficient  =   1.0000
*  From cell         =       1
*  To cell           =       9
*
fl00200  cav-to-lc     1   9    3.52    8.53   * fm,to elev
fl00201  3.3000    2.3077   1.0000             * area, length, frac open
fl00203  2.00      2.00                        * k(forward),k(reverse)
fl002s1  3.3000    2.3077   1.025              * area,length,shyd (segment)
*
* Note: From elevation changed from 8.53 to 3.52 so it fits in CV1
**************
* seal table *
**************
*
*  Flow path number  =       3
*  Flow area         =   1.8000 m2
*  Area/length ratio =   1.4000 m
*  Flow coefficient  =   1.0000
*  From cell         =       1
*  To cell           =      12
*
* fl00300  seal-table    1  12    3.52   10.27   * fm,to elev
* fl00301  1.8000    1.2857   0.0000             * area, length, frac open
* fl00303  2.00      2.00                        * k(forward),k(reverse)
* fl003s1  1.8000    1.2857   0.757              * area,length,shyd (segment)
* fl003v1  -1        905      905                * cf905 defines fraction open
*
* Note: From elevation changed from 10.27 to 3.52 so it fits in CV1
*******************************************************************************
*
**** contain input specifies that this path is closed initially, and opens if
**** the dp across the flow path is >10 MPa (either positive or negative). once
**** the flow path is open, it remains open. the cf below takes care of this.
*******************************************************************************
*
* cf90500   'seal-tab-fo'  l-a-ifte  3  1.0  0.0

* cf90510   1.0   0.0   cfvalu.904               * if cf392 = true, then
* cf90511   0.0   1.0   time                     * fraction open is 1.0,
otherwise
* cf90512   0.0   0.0   time                     * fraction open is 0.0
*
* cf90400   'dp check'     l-or      2  1.0  0.0
* cf90401   .FALSE.
* cf90405   latch                                * always true after change
* cf90410   1.0   0.0   cfvalu.903               * dp(cv12-cv1) > 1.e7 pa
* cf90411   1.0   0.0   cfvalu.902               * dp(cv1-cv12) > 1.e7 pa
*
* cf90300   'dp_cv1-12'    l-gt      2  1.0  0.0
* cf90310   1.0   0.0   cfvalu.901
* cf90311   0.0   1.0e7 time
*
* cf90200   'dp_cv12-1'    l-gt      2  1.0  0.0
* cf90210   1.0   0.0   cfvalu.900
* cf90211   0.0   1.0e7 time
*
* cf90100   'cv1-12_dp'    add       2  1.0  0.0
* cf90110   1.0   0.0   cvh-p.001
* cf90111  -1.0   0.0   cvh-p.012
*
* cf90000   'cv12-1_dp'    add       2  1.0  0.0
* cf90010   1.0   0.0   cvh-p.012
```

```
* cf90011  -1.0   0.0   cvh-p.001
*
*****************************
* intra-doghouse connection *
*****************************
*
*  Flow path number  =        5
*  Flow area         =  16.5000 m2
*  Area/length ratio =   5.0000 m
*  Flow coefficient  =    .7000
*  From cell         =        2
*  To cell           =        3
*
fl00500  intra-dogh    2   3   32.00   32.00   * fm,to elev
fl00501  16.500    3.3000   1.0000             * area, length, frac open
fl00503  1.40      1.40                        * k(forward),k(reverse)
fl005s1  16.500    3.3000   2.292              * area,length,shyd (segment)
*
*****************************
* sgd1 to lower containment *
*****************************
*
*  Flow path number  =        6
*  Flow area         =  16.0000 m2
*  Area/length ratio =   3.1000 m
*  Flow coefficient  =    .7100
*  From cell         =        2
*  To cell           =        8
*
fl00600  sgd1-lwrct    2   8   21.40   19.30   * fm,to elev
fl00601  16.000    5.1610   1.0000             * area, length, frac open
fl00603  1.42      1.42                        * k(forward),k(reverse)
fl006s1  16.000    5.1610   2.257              * area,length,shyd (segment)
*
* Note: From elevation changed from 20.0 to 21.4 so it fits in CV2
* Note: To   elevation changed from 20.0 to 19.3 so it fits in CV8
*****************************
* sgd2 to lower containment *
*****************************
*
*  Flow path number  =        7
*  Flow area         =  16.0000 m2
*  Area/length ratio =   3.1000 m
*  Flow coefficient  =    .6900
*  From cell         =        3
*  To cell           =        8
*
fl00700  sgd2-lwrct    3   8   21.40   19.30   * fm,to elev
fl00701  16.000    5.1610   1.0000             * area, length, frac open
fl00703  1.38      1.38                        * k(forward),k(reverse)
fl007s1  16.000    5.1610   2.257              * area,length,shyd (segment)
*
* Note: From elevation changed from 20.0 to 21.4 so it fits in CV3
* Note: To   elevation changed from 20.0 to 19.3 so it fits in CV8
*****************************
* intra-doghouse connection *
*****************************
*
*  Flow path number  =        8
*  Flow area         =  16.5000 m2
*  Area/length ratio =   5.0000 m
*  Flow coefficient  =    .7000
*  From cell         =        4
```

```
*  To cell           =        5
*
fl00800  intra-dogh    4   5   32.00   32.00   * fm,to elev
fl00801  16.500    3.3000   1.0000             * area, length, frac open
fl00803  1.40      1.40                        * k(forward),k(reverse)
fl008s1  16.500    3.3000   2.292              * area,length,shyd (segment)
*
****************************
* sgd3 to lower containment *
****************************
*
*  Flow path number  =        9
*  Flow area         =  16.0000 m2
*  Area/length ratio =   3.1000 m
*  Flow coefficient  =    .7100
*  From cell         =        4
*  To cell           =       10
*
fl00900  sgd3-lwrct    4  10   21.40   19.30   * fm,to elev
fl00901  16.000    5.1610   1.0000             * area, length, frac open
fl00903  1.42      1.42                        * k(forward),k(reverse)
fl009s1  16.000    5.1610   2.257              * area,length,shyd (segment)
*
* Note: From elevation changed from 20.0 to 21.4 so it fits in CV4
* Note: To   elevation changed from 20.0 to 19.3 so it fits in CV10
****************************
* sgd4 to lower containment *
****************************
*
*  Flow path number  =       10
*  Flow area         =  16.0000 m2
*  Area/length ratio =   3.1000 m
*  Flow coefficient  =    .6900
*  From cell         =        5
*  To cell           =       10
*
fl01000  sgd4-lwrct    5  10   21.40   19.30   * fm,to elev
fl01001  16.000    5.1610   1.0000             * area, length, frac open
fl01003  1.38      1.38                        * k(forward),k(reverse)
fl010s1  16.000    5.1610   2.257              * area,length,shyd (segment)
*
* Note: From elevation changed from 20.0 to 21.4 so it fits in CV5
* Note: To   elevation changed from 20.0 to 19.3 so it fits in CV10
**************************************
* upper cavity to lower containment 1 *
**************************************
*
*  Flow path number  =       11
*  Flow area         =   7.5000 m2
*  Area/length ratio =   6.7000 m
*  Flow coefficient  =   2.0000
*  From cell         =        6
*  To cell           =        8
*
fl01100  ucav-lwrct    6   8   19.50   19.30   * fm,to elev
fl01101  7.5000    1.1194   1.0000             * area, length, frac open
fl01103  4.00      4.00                        * k(forward),k(reverse)
fl011s1  7.5000    1.1194   1.545              * area,length,shyd (segment)
*
* Note: To   elevation changed from 19.5 to 19.3 so it fits in CV8
**************************************
* upper cavity to lower containment 2 *
**************************************
```

```
*
*  Flow path number  =       12
*  Flow area         =   7.4000 m2
*  Area/length ratio =   6.7000 m
*  Flow coefficient  =   2.0000
*  From cell         =        6
*  To cell           =        9
*
fl01200  ucav-lwrct    6   9   19.50   19.30   * fm,to elev
fl01201  7.4000    1.1045   1.0000             * area, length, frac open
fl01203  4.00      4.00                        * k(forward),k(reverse)
fl012s1  7.4000    1.1045   1.535              * area,length,shyd (segment)
*
* Note: To   elevation changed from 19.5 to 19.3 so it fits in CV9
***************************************
* upper cavity to lower containment 3 *
***************************************
*
*  Flow path number  =       13
*  Flow area         =   7.4000 m2
*  Area/length ratio =   6.7000 m
*  Flow coefficient  =   2.0000
*  From cell         =        6
*  To cell           =       10
*
fl01300  ucav-lwrct    6  10   19.50   19.30   * fm,to elev
fl01301  7.4000    1.1045   1.0000             * area, length, frac open
fl01303  4.00      4.00                        * k(forward),k(reverse)
fl013s1  7.4000    1.1045   1.535              * area,length,shyd (segment)
*
* Note: To   elevation changed from 19.5 to 19.3 so it fits in CV10
*********************************************
* pressurizer doghouse to lower containment *
*********************************************
*
*  Flow path number  =       14
*  Flow area         =   8.6000 m2
*  Area/length ratio =   1.5000 m
*  Flow coefficient  =    .7000
*  From cell         =        7
*  To cell           =        9
*
fl01400  pdog-lwrct    7   9   21.40   19.30   * fm,to elev
fl01401  8.6000    5.7333   1.0000             * area, length, frac open
fl01403  1.40      1.40                        * k(forward),k(reverse)
fl014s1  8.6000    5.7333   1.655              * area,length,shyd (segment)
*
* Note: From elevation changed from 20.0 to 21.4 so it fits in CV7
* Note: To   elevation changed from 20.0 to 19.3 so it fits in CV9
************************
* lower containment 1-2 *
************************
*
*  Flow path number  =       15
*  Flow area         =  23.5000 m2
*  Area/length ratio =   1.5000 m
*  Flow coefficient  =    .7000
*  From cell         =        8
*  To cell           =        9
*
fl01500  lwrct1-2      8   9   10.60   10.60   * fm,to elev
fl01501  23.500   15.6667   1.0  100.0  100.0  * area, length, frac open, liq
flow
```

```
fl01503  1.40      1.40                        * k(forward),k(reverse)
fl01505  0.1
fl015s1  23.500   15.6667   2.735              * area,length,shyd (segment)
fl0150f   5.3    12.3
fl0150t   5.3    12.3
*
*************************
* lower containment 1-3 *
*************************
*
*  Flow path number  =       16
*  Flow area         =   9.0000 m2
*  Area/length ratio =   2.0000 m
*  Flow coefficient  =   1.0000
*  From cell         =        8
*  To cell           =       10
*
fl01600  lwrct1-3      8  10    5.30    5.30   * fm,to elev
fl01601  9.0000    4.5000   1.0                * area, length, frac open
fl01603  2.00      2.00                        * k(forward),k(reverse)
fl01605  0.01
fl016s1  9.0000    4.5000   1.693              * area,length,shyd (segment)
fl0160f  5.30      5.3
fl0160t  5.30      5.32
*
* Note: From elevation changed from 5.0 to 5.3 so it fits in CV8
* Note: To   elevation changed from 5.0 to 5.3 so it fits in CV10
* This represented an "under slab" pathway across the containment.
* The opening height was reduced accordingly.

*
******************************************
* lower containment 1 to lower annulus 1 *
******************************************
*
*  Flow path number  =       17
*  Flow area         =   4.5000 m2
*  Area/length ratio =    .7500 m
*  Flow coefficient  =    .7000
*  From cell         =        8
*  To cell           =       11
*
fl01700  lwrct-ann1    8  11   11.55   11.55   * fm,to elev
fl01701  4.5000    6.0000   1.0                * area, length, frac open, liq
flow
fl01703  1.40      1.40                        * k(forward),k(reverse)
fl01705  0.1
fl017s1  4.5000    6.0000   1.197              * area,length,shyd (segment)
*
*****************************************************
* lower containment 1 to dome (deck bypass leakage) *
*****************************************************
*
*  Flow path number  =       18
*  Flow area         =    .0967 m2
*  Area/length ratio =    .1610 m
*  Flow coefficient  =   1.2500
*  From cell         =        8
*  To cell           =       26
*
fl01800  deck-leakg    8  26   19.30   20.92   * fm,to elev
fl01801  0.0967    0.6006   1.0000             * area, length, frac open
fl01803  2.50      2.50                        * k(forward),k(reverse)
```

```
fl018s1  0.0967    0.6006   0.175              * area,length,shyd (segment)
*
* Note: From elevation changed from 20.32 to 19.3 so it fits in CV8
*************************
* lower containment 2-3 *
*************************
*
*  Flow path number  =       19
*  Flow area         =  23.5000 m2
*  Area/length ratio =   1.5000 m
*  Flow coefficient  =    .7000
*  From cell         =        9
*  To cell           =       10
*
fl01900  lwrct2-3      9  10   10.60   10.60   * fm,to elev
fl01901  23.500   15.6667   1.0  100.0 100.0   * area, length, frac open, liq
flow
fl01903  1.40      1.40                        * k(forward),k(reverse)
fl01905  0.1
fl019s1  23.500   15.6667   2.735              * area,length,shyd (segment)
fl0190f   5.3    12.3
fl0190t   5.3    12.3
*
******************************************
* lower containment 2 to lower annulus 2 *
******************************************
*
*  Flow path number  =       20
*  Flow area         =   4.4000 m2
*  Area/length ratio =    .7500 m
*  Flow coefficient  =    .7000
*  From cell         =        9
*  To cell           =       12
*
fl02000  lwrc-ann2     9  12   11.55   11.55   * fm,to elev
fl02001  4.4000    5.8667   1.0000             * area, length, frac open
fl02003  1.40      1.40                        * k(forward),k(reverse)
fl020s1  4.4000    5.8667   1.183              * area,length,shyd (segment)
fl0200f   5.3    12.3                          * jlt (equal liquid levels in
lower containment)
fl0200t   5.3    12.3                          * jlt ( same )
*
*
*****************************************************
* lower containment 2 to dome (deck bypass leakage) *
*****************************************************
*
*  Flow path number  =       21
*  Flow area         =    .0967 m2
*  Area/length ratio =    .1610 m
*  Flow coefficient  =   1.2500
*  From cell         =        9
*  To cell           =       26
*
fl02100  deck-leakg    9  26   19.30   20.92   * fm,to elev
fl02101  0.0967    0.6006   1.0000             * area, length, frac open
fl02103  2.50      2.50                        * k(forward),k(reverse)
fl021s1  0.0967    0.6006   0.175              * area,length,shyd (segment)
*
* Note: From elevation changed from 20.32 to 19.3 so it fits in CV9
******************************************
* lower containment 3 to lower annulus 3 *
******************************************
```

```
*
*  Flow path number  =       22
*  Flow area         =   4.9500 m2
*  Area/length ratio =    .7500 m
*  Flow coefficient  =    .7000
*  From cell         =       10
*  To cell           =       13
*
fl02200  lwrc-ann3    10  13   11.55   11.55   * fm,to elev
fl02201  4.9500    6.6000   1.0000             * area, length, frac open
fl02203  1.40      1.40                        * k(forward),k(reverse)
fl022s1  4.9500    6.6000   1.255              * area,length,shyd (segment)
fl0220f   5.3    12.3                          * jlt (equal liquid levels in
lower containment)
fl0220t   5.3    12.3                          * jlt ( same )
*
*
*****************************************************
* lower containment 3 to dome (deck bypass leakage) *
*****************************************************
*
*  Flow path number  =       23
*  Flow area         =    .0967 m2
*  Area/length ratio =    .1610 m
*  Flow coefficient  =   1.2500
*  From cell         =       10
*  To cell           =       26
*
fl02300  deck-leakg   10  26   19.30   20.92   * fm,to elev
fl02301  0.0967    0.6006   1.0000             * area, length, frac open
fl02303  2.50      2.50                        * k(forward),k(reverse)
fl023s1  0.0967    0.6006   0.175              * area,length,shyd (segment)
*
* Note: From elevation changed from 20.32 to 19.3 so it fits in CV10
***********************
* lower annulus 1 to 2 *
***********************
*
*  Flow path number  =       24
*  Flow area         =   1.5000 m2
*  Area/length ratio =    .6700 m
*  Flow coefficient  =   1.0000
*  From cell         =       11
*  To cell           =       12
*
fl02400  lwrann1-2    11  12   12.30   12.30   * fm,to elev
fl02401  1.5000    2.2390   1.0000             * area, length, frac open
fl02403  2.00      2.00                        * k(forward),k(reverse)
fl02405  0.01                                  * Maximize slip
fl024s1  1.5000    2.2390   0.175              * area,length,shyd (segment)
fl0240f  5.3000   19.3000
fl0240t  5.3000   19.3000
*
***********************
* lower annulus 2 to 3 *
***********************
*
*  Flow path number  =       25
*  Flow area         =   1.5000 m2
*  Area/length ratio =    .6700 m
*  Flow coefficient  =   1.0000
*  From cell         =       12
*  To cell           =       13
```

```
*
fl02500  lwrann2-3    12  13   12.30   12.30   * fm,to elev
fl02501  1.5000    2.2390   1.0000             * area, length, frac open
fl02503  2.00      2.00                        * k(forward),k(reverse)
fl02505  0.01                                  * Maximize slip
fl025s1  1.5000    2.2390   0.175              * area,length,shyd (segment)
fl0250f  5.3000   19.3000
fl0250t  5.3000   19.3000
*
**********************
* lower plenum 1 to 2 *
**********************
*
*  Flow path number  =       26
*  Flow area         =   2.1000 m2
*  Area/length ratio =    .7700 m
*  Flow coefficient  =   1.5000
*  From cell         =       14
*  To cell           =       15
*
fl02600  lwrplen1-2   14  15   19.00   19.00   * fm,to elev
fl02601  2.1000    2.7270   1.0  100.0 100.0   * area, length, frac open, allow
liq flow
fl02603  3.00      3.00                        * k(forward),k(reverse)
fl02605  0.1                                   * allow slip for drainage to
pool
fl026s1  2.1000    2.7270   0.818              * area,length,shyd (segment)
*
*********************************
* lower plenum 1 to ice chest 1 *
*********************************
*
*  Flow path number  =       27
*  Flow area         =  22.9000 m2
*  Area/length ratio =   2.6800 m
*  Flow coefficient  =    .7000
*  From cell         =       14
*  To cell           =       18
*
fl02700  lwrplen-ic1  14  18   20.25   20.41   * fm,to elev
fl02701  22.900    8.5448   1.0000             * area, length, frac open
fl02703  1.40      1.40                        * k(forward),k(reverse)
fl02705  0.1                                   * allow slip for drainage to
pool
fl027s1  22.900    8.5448   2.700              * area,length,shyd (segment)
*fl0270f  20.00    20.25
*fl0270t  20.41    35.0
*
* Note: From elevation changed from 20.40 to 20.25 so it fits in CV14
**********************
* lower plenum 2 to 3 *
**********************
*
*  Flow path number  =       28
*  Flow area         =   2.1000 m2
*  Area/length ratio =    .7700 m
*  Flow coefficient  =   1.5000
*  From cell         =       15
*  To cell           =       16
*
fl02800  lwrplen2-3   15  16   19.00   19.00   * fm,to elev
fl02801  2.1000    2.7270   1.0  100.0 100.0   * area, length, frac open -
Allow liq flow
```

```
fl02803  3.00      3.00                        * k(forward),k(reverse)
fl02805  0.1                                   * allow slip for drainage to
pool
fl028s1  2.1000    2.7270   0.818              * area,length,shyd (segment)
*
*********************************
* lower plenum 2 to ice chest 2 *
*********************************
*
*  Flow path number  =       29
*  Flow area         =  22.9000 m2
*  Area/length ratio =   2.6800 m
*  Flow coefficient  =    .7000
*  From cell         =       15
*  To cell           =       19
*
fl02900  lwrplen-ic2  15  19   20.25   20.41   * fm,to elev
fl02901  22.900    8.5448   1.0000             * area, length, frac open
fl02903  1.40      1.40                        * k(forward),k(reverse)
fl02905  0.1                                   * allow slip for drainage to
pool
fl029s1  22.900    8.5448   2.700              * area,length,shyd (segment)
*fl0290f  20.00    20.25
*fl0290t  20.41    35.0
*
* Note: From elevation changed from 20.40 to 20.25 so it fits in CV15
**********************
* lower plenum 3 to 4 *
**********************
*
*  Flow path number  =       30
*  Flow area         =   2.1000 m2
*  Area/length ratio =    .7700 m
*  Flow coefficient  =   1.5000
*  From cell         =       16
*  To cell           =       17
*
fl03000  lwrplen3-4   16  17   19.00   19.00   * fm,to elev
fl03001  2.1000    2.7270   1.0  100.0  100.0  * area, length, frac open, allow
liq flow
fl03003  3.00      3.00                        * k(forward),k(reverse)
fl03005  0.1                                   * allow slip for drainage to
pool
fl030s1  2.1000    2.7270   0.818              * area,length,shyd (segment)
*
*********************************
* lower plenum 3 to ice chest 3 *
*********************************
*
*  Flow path number  =       31
*  Flow area         =  22.9000 m2
*  Area/length ratio =   2.6800 m
*  Flow coefficient  =    .7000
*  From cell         =       16
*  To cell           =       20
*
fl03100  lwrplen-ic3  16  20   20.25   20.41   * fm,to elev
fl03101  22.900    8.5448   1.0000             * area, length, frac open
fl03103  1.40      1.40                        * k(forward),k(reverse)
fl03105  0.1                                   * allow slip for drainage to
pool
fl031s1  22.900    8.5448   2.700              * area,length,shyd (segment)
*fl0310f  20.00    20.25
```

```
*fl0310t  20.41    35.0
*
* Note: From elevation changed from 20.40 to 20.25 so it fits in CV16
*********************************
* lower plenum 4 to ice chest 4 *
*********************************
*
*  Flow path number  =       32
*  Flow area         =  22.9000 m2
*  Area/length ratio =   2.6800 m
*  Flow coefficient  =    .7000
*  From cell         =       17
*  To cell           =       21
*
fl03200  lwrplen-ic4  17  21   20.25   20.41   * fm,to elev
fl03201  22.900    8.5448   1.0000             * area, length, frac open
fl03203  1.40      1.40                        * k(forward),k(reverse)
fl03205  0.01                                  * allow slip for drainage to
pool
fl032s1  22.900    8.5448   2.700              * area,length,shyd (segment)
*fl0320f  20.00    20.25
*fl0320t  20.41    35.0
*
* Note: From elevation changed from 20.40 to 20.25 so it fits in CV17
******************************
* ice chest 1 to ice chest 2 *
******************************
*
*  Flow path number  =       33
*  Flow area         =   3.9500 m2
*  Area/length ratio =   1.2500 m
*  Flow coefficient  =   1.5000
*  From cell         =       18
*  To cell           =       19
*
fl03300  icechest1-2  18  19   24.05   24.05   * fm,to elev
fl03301  3.9500    3.1600   1.0000             * area, length, frac open
fl03303  3.00      3.00                        * k(forward),k(reverse)
fl033s1  3.9500    3.1600   1.121              * area,length,shyd (segment)
*
*****************************************************
* ice chest 1 to upper plenum 1 (intermediate doors) *
*****************************************************
*
*  Flow path number  =       34
*  Flow area         =    .0000 m2
*  Area/length ratio =   1.7900 m
*  Flow coefficient  =    .7000
*  From cell         =       18
*  To cell           =       22
*
fl03400  interdoors1  18  22   35.00   35.10   * fm,to elev
fl03401  17.560    9.8100   0.0                * area, length, frac open
fl03403  1.40      1.40                        * k(forward),k(reverse)
fl03405  0.01                                  * max slip
fl034s1  17.560    9.8100   2.364              * area,length,shyd (segment)
fl034v1  -1        922      922
*
* Note: To   elevation changed from 35.00 to 35.10 so it fits in CV22
*
cf92200  'Mid_Door1' add  2   0.1  0.0
cf92210    9.0 0.0  cfvalu.922
cf92211    1.0 0.0  cfvalu.921
```

```
*
cf92100  'door-p' tab-fun  1  1.0  0.0
* cf92101  0.02648
cf92103  921
cf92110  1.0  0.0  cfvalu.920
*
tf92100  'door-p'  4  1.0  0.0
tf92111     -1.e7  0.02648
tf92112    263.0   0.02648
tf92113  28498.0   1.0
tf92114      1.e7  1.0
*
cf92000  'dp 18-22' add  3  1.0   0.0
cf92010    1.0 0.0  cvh-p.018
cf92011   -1.0 0.0  cvh-p.022
cf92012 -143.2 0.0  cvh-rhoa.018   * rho*g*h (g*h = 9.81*(35.0-20.4))
*
******************************
* ice chest 2 to ice chest 3 *
******************************
*
*  Flow path number  =       35
*  Flow area         =   3.9500 m2
*  Area/length ratio =   1.2500 m
*  Flow coefficient  =   1.5000
*  From cell         =       19
*  To cell           =       20
*
fl03500  icechest2-3  19  20   24.05   24.05   * fm,to elev
fl03501  3.9500    3.1600   1.0000             * area, length, frac open

fl03503  3.00      3.00                        * k(forward),k(reverse)
fl035s1  3.9500    3.1600   1.121              * area,length,shyd (segment)
*
****************************************************
* ice chest 2 to upper plenum 1 (intermediate doors) *
****************************************************
*
*  Flow path number  =       36
*  Flow area         =    .0000 m2
*  Area/length ratio =   1.7900 m
*  Flow coefficient  =    .7000
*  From cell         =       19
*  To cell           =       22
*
fl03600  interdoors2  19  22   35.00   35.10   * fm,to elev
fl03601  17.560    9.8100   0.0                * area, length, frac open
fl03603  1.40      1.40                        * k(forward),k(reverse)
fl03605  0.01                                  * max slip
fl036s1  17.560    9.8100   2.364              * area,length,shyd (segment)
fl036v1  -1        925      925
*
* Note: To   elevation changed from 35.00 to 35.10 so it fits in CV22
*
cf92500  'Mid_Door2' add  2  0.1   0.0
cf92510    9.0 0.0  cfvalu.925
cf92511    1.0 0.0  cfvalu.924
*
cf92400  'door-p' tab-fun  1  1.0  0.0
* cf92401  0.02648
cf92403  921
cf92410  1.0  0.0  cfvalu.923
*
```

```
cf92300  'dp 19-22' add    3  1.0  0.0
cf92310    1.0 0.0  cvh-p.019
cf92311   -1.0 0.0  cvh-p.022
cf92312 -143.2 0.0  cvh-rhoa.019   * rho*g*h (g*h = 9.81*(35.0-20.4))
*
******************************
* ice chest 3 to ice chest 4 *
******************************
*
*  Flow path number  =       37
*  Flow area         =   3.9500 m2
*  Area/length ratio =   1.2500 m
*  Flow coefficient  =   1.5000
*  From cell         =       20
*  To cell           =       21
*
fl03700  icechest3-4  20  21   24.05   24.05   * fm,to elev
fl03701  3.9500    3.1600   1.0000             * area, length, frac open
fl03703  3.00      3.00                        * k(forward),k(reverse)
fl037s1  3.9500    3.1600   1.121              * area,length,shyd (segment)
*
******************************************************
* ice chest 3 to upper plenum 2 (intermediate doors) *
******************************************************
*
*  Flow path number  =       38
*  Flow area         =    .0000 m2
*  Area/length ratio =   1.7900 m
*  Flow coefficient  =    .7000
*  From cell         =       20
*  To cell           =       23
*
fl03800  interdoors3  20  23   35.00   35.10   * fm,to elev
fl03801  17.560    9.8100   0.0                * area, length, frac open
fl03803  1.40      1.40                        * k(forward),k(reverse)
fl03805  0.01                                  * max slip
fl038s1  17.560    9.8100   2.364              * area,length,shyd (segment)
fl038v1  -1        928      928
*
* Note: To   elevation changed from 35.00 to 35.10 so it fits in CV23
*
cf92800  'Mid_Door3' add   2  0.1  0.0
cf92810    9.0 0.0  cfvalu.928
cf92811    1.0 0.0  cfvalu.927
*
cf92700  'door-p' tab-fun  1  1.0  0.0
* cf92701  0.02648
cf92703  921
cf92710  1.0  0.0  cfvalu.926
*
cf92600  'dp 20-23' add    3  1.0  0.0
cf92610    1.0 0.0  cvh-p.020
cf92611   -1.0 0.0  cvh-p.023
cf92612 -143.2 0.0  cvh-rhoa.020   * rho*g*h (g*h = 9.81*(35.0-20.4))
*
******************************************************
* ice chest 4 to upper plenum 2 (intermediate doors) *
******************************************************
*
*  Flow path number  =       39
*  Flow area         =    .0000 m2
*  Area/length ratio =   1.7900 m
*  Flow coefficient  =    .7000
```

```
*  From cell         =       21
*  To cell           =       23
*
fl03900  interdoors4  21  23   35.00   35.10   * fm,to elev
fl03901  17.560    9.8100   0.0               * area, length, frac open
fl03903  1.40      1.40                       * k(forward),k(reverse)
fl03905  0.01                                 * max slip
fl039s1  17.560    9.8100   2.364             * area,length,shyd (segment)
fl039v1  -1        931      931
*
* Note: To   elevation changed from 35.00 to 35.10 so it fits in CV23
*
cf93100  'Mid_Door4' add   2  0.1  0.0
cf93110    9.0 0.0  cfvalu.931
cf93111    1.0 0.0  cfvalu.930
*
cf93000  'door-p' tab-fun  1  1.0  0.0
* cf93001  0.02648
cf93003  921
cf93010  1.0  0.0  cfvalu.929
*
cf92900  'dp 21-23' add    3  1.0  0.0
cf92910    1.0 0.0  cvh-p.021
cf92911   -1.0 0.0  cvh-p.023
cf92912 -143.2 0.0  cvh-rhoa.021   * rho*g*h (g*h = 9.81*(35.0-20.4))
*
**********************
* upper plenum 1 to 2 *
**********************
*
*  Flow path number  =       40
*  Flow area         =   6.2000 m2
*  Area/length ratio =   1.0000 m
*  Flow coefficient  =    .7000
*  From cell         =       22
*  To cell           =       23
*
fl04000  upplen1-2    22  23   36.30   36.30   * fm,to elev
fl04001  6.2000    6.2000   1.0               * area, length, frac open
fl04003  1.40      1.40                       * k(forward),k(reverse)
fl040s1  6.2000    6.2000   1.405             * area,length,shyd (segment)
*
***************************************
* upper plenum 1 to dome 1 (upper doors) *
***************************************
*
*  Flow path number  =       41
*  Flow area         =    .0000 m2
*  Area/length ratio =   4.7000 m
*  Flow coefficient  =    .7000
*  From cell         =       22
*  To cell           =       24
*
fl04100  upperdoors1  22  24   40.10   40.20   * fm,to elev
fl04101  46.950    9.9894   0.01981           * area, length, frac open
fl04103  1.40      1.40                       * k(forward),k(reverse)
fl041s1  46.950    9.9894   3.866             * area,length,shyd (segment)
fl041v1  -1        934      934
*
* Note: From elevation changed from 40.20 to 40.10 so it fits in CV22
*
cf93400  'Up_Door1' add  2  0.1   0.0
cf93410    9.0 0.0  cfvalu.934
```

```
cf93411    1.0 0.0  cfvalu.933
*
cf93300  'door-p' tab-fun  1  1.0  0.0
* cf93301  0.01981
cf93303  933
cf93310  1.0  0.0  cfvalu.932
*
tf93300  'door-p'  4  1.0  0.0
tf93311     -1.e7  0.01981
tf93312    263.0   0.01981
tf93313   4441.0   1.0
tf93314      1.e7  1.0
*
cf93200  'dp 22-24' add  3  1.0  0.0
cf93210    1.0 0.0  cvh-p.022
cf93211   -1.0 0.0  cvh-p.024
cf93212  -49.1 0.0  cvh-rhoa.022   * rho*g*h (g*h = 9.81*(40.1-35.1))
*
******************************************
* upper plenum 2 to dome 2 (upper doors) *
******************************************
*
*  Flow path number  =       42
*  Flow area         =    .0000 m2
*  Area/length ratio =   4.7000 m
*  Flow coefficient  =    .7000
*  From cell         =       23
*  To cell           =       25
*
fl04200  upperdoors2  23  25   40.10   40.20   * fm,to elev
fl04201  46.950    9.9894   0.01981            * area, length, frac open
fl04203  1.40      1.40                        * k(forward),k(reverse)
fl042s1  46.950    9.9894   3.866              * area,length,shyd (segment)
fl042v1  -1        937      937
*
* Note: From elevation changed from 40.20 to 40.10 so it fits in CV23
*
cf93700  'Up_Door2' add  2  0.1   0.0
cf93710    9.0 0.0  cfvalu.937
cf93711    1.0 0.0  cfvalu.936
*
cf93600  'door-p' tab-fun  1  1.0  0.0
* cf93601  0.01981
cf93603  933
cf93610  1.0  0.0  cfvalu.935
*
cf93500  'dp 23-25' add    3  1.0  0.0
cf93510    1.0 0.0  cvh-p.023
cf93511   -1.0 0.0  cvh-p.025
cf93512  -49.1 0.0  cvh-rhoa.023   * rho*g*h (g*h = 9.81*(40.1-35.1))
*
*******************
* dome 1 to dome 2 *
*******************
*
*  Flow path number  =       43
*  Flow area         = 296.5000 m2
*  Area/length ratio =  16.7000 m
*  Flow coefficient  =    .7000
*  From cell         =       24
*  To cell           =       25
*
fl04300  dome1-2      24  25   39.90   39.90   * fm,to elev
```

```
fl04301  296.50   17.7545   1.0                * area, length, frac open
fl04303  1.40      1.40                        * k(forward),k(reverse)
fl043s1  296.50   17.7545   9.715              * area,length,shyd (segment)
*
******************************
* upper dome 1 to lower dome *
******************************
*
*  Flow path number  =       44
*  Flow area         = 182.0000 m2
*  Area/length ratio =  11.1000 m
*  Flow coefficient  =    .7000
*  From cell         =       24
*  To cell           =       26
*
fl04400  up-lowdome1  24  26   35.00   34.10   * fm,to elev
fl04401  182.00   16.3964   1.0                * area, length, frac open
fl04403  1.40      1.40                        * k(forward),k(reverse)
fl044s1  182.00   16.3964   7.611              * area,length,shyd (segment)
*
* Note: To   elevation changed from 35.00 to 34.10 so it fits in CV26
*
********************************
* containment leak and failure *
********************************
*
* fl098   containment failure flow path
*
* The leak behaves as a critical orifce of area 0.1 m2.
*
fl09800  ctmt-fail    24  28   40.20   40.20   * fm,to elev
fl09801  0.1000    1.0000   0.0                * area, length, frac open
fl09803  1.40      1.40                        * k(forward),k(reverse)
fl098s1  0.1000    1.0000   7.611              * area,length,shyd (segment)
fl098v1  -1        998      998
*
cf99800  'Failure'  hyst     1  1.0  0.0
cf99803  -997
cf99804  -998
cf99810   1.0  0.0  cvh-p.24
*
tf99700  'load-p'  2  1.0  0.0  * Failure at 65 psia from IDCOR model
tf99710   6.58e+05 0.0
tf99711   6.58e+05 1.0
*
tf99800  'unload'  2  1.0  0.0
tf99810   0.00e+05 1.0
tf99811   6.58e+05 1.0
*
* fl099   containment leakage flow path
*
* The leak behaves as a critical orifce of diameter 2.3 mm.
* It is actually a friction limited flow path with a variable
* area to match critical flow leakage.
*
fl09900  'Leakage' 024  029  40.2  40.2
fl09901 1.4e-4  1.0  1.0
fl09902 3  0
fl09903 1.75e3 1.75e3
fl099S1 1.0    1.0    1.0    1.0E-6
fl099V0  -1  999  999
*
cf99900  'Leakage'   TAB-FUN  1  1.0  0.0
```

```
cf99903  999
cf99910  1.0   0.0  CVH-P.024
*
tf99900  'Pressure'  9  1.0  0.0
tf99910  1.000000E5    1.00
tf99911  1.600000E5    1.00
tf99912  1.650000E5    0.93
tf99913  2.000000E5    0.823
tf99914  2.500000E5    0.76
tf99915  3.000000E5    0.71
tf99916  4.000000E5    0.67
tf99917  5.000000E5    0.65
tf99918  6.000000E5    0.64
*
******************************
* upper dome 2 to lower dome *
******************************
*
*  Flow path number  =       46
*  Flow area         = 182.0000 m2
*  Area/length ratio =  11.1000 m
*  Flow coefficient  =    .7000
*  From cell         =       25
*  To cell           =       26
*
fl04600  up-lowdome2  25  26   35.00   34.10   * fm,to elev
fl04601  182.00   16.3964   1.0                * area, length, frac open
fl04603  1.40      1.40                        * k(forward),k(reverse)
fl046s1  182.00   16.3964   7.611              * area,length,shyd (segment)
*
* Note: To   elevation changed from 35.00 to 34.10 so it fits in CV26
*
********************************************
* FL Input (from CONTAIN engineered vents) *
********************************************

*
*************************
* lower containment 1-2 *
*************************
*
*  Flow path number  =       47 (identical to 15 except for elevation)
*  Flow area         =  23.5000 m2
*  Area/length ratio =   1.5000 m
*  Flow coefficient  =    .7000
*  From cell         =        8
*  To cell           =        9
*
fl04700  lwrct1-2      8   9   14.00   14.00   * fm,to elev
fl04701  23.500   15.6667   1.0  100.0 100.0   * area, length, frac open, liq
flow
fl04703  1.40      1.40                        * k(forward),k(reverse)
fl04705  0.1
fl047s1  23.500   15.6667   2.735              * area,length,shyd (segment)
fl0470f  12.3    19.3
fl0470t  12.3    19.3
*
******************************************
* lower containment 1 to lower annulus 1 *
******************************************
*
*  Flow path number  =       48 (identical to 17 except for elevation)
*  Flow area         =   4.5000 m2
```

```
*  Area/length ratio =    .7500 m
*  Flow coefficient  =    .7000
*  From cell         =        8
*  To cell           =       11
*
fl04800  lwrct-ann1    8  11   13.05   13.05   * fm,to elev
fl04801  4.5000    6.0000   1.0                * area, length, frac open, liq
flow
fl04803  1.40      1.40                        * k(forward),k(reverse)
fl04805  0.1
fl048s1  4.5000    6.0000   1.197              * area,length,shyd (segment)
fl0480f 12.3      19.3
fl0480t 12.3      19.3
*
************************************************
* lower doors 1 (lower ctmt to lower plenum 1) *
************************************************
*
*  Flow path number  =       49
*  Flow area         =  19.5100 m2
*  Area/length ratio =    .**** m
*  Flow coefficient  =    .7000
*  From cell         =        8
*  To cell           =       14
*
fl04900  lwr-doors1    8  14   19.00   19.00   * fm,to elev
fl04901  19.510    1.0000   0.0                * area, length, frac open
fl04903  1.40      1.40                        * k(forward),k(reverse)
fl049s1  19.510    1.0000   2.492              * area,length,shyd (segment)
fl049v1  -1        841      841
fl0490t  19.0      20.25
*
cf94000  'Low_Door1' add  2  0.1   0.0
cf94010    9.0 0.0  cfvalu.940
cf94011    1.0 0.0  cfvalu.939
*
cf84100 'Low_Door1_logic' l-a-ifte 3 1.0 0.0
cf84110 1.0 0.0 cfvalu.836
cf84111 0.0 1.0 time
cf84112 1.0 0.0 cfvalu.940
*
cf93900  'door-p' tab-fun  1  1.0  0.0
cf93903  939
cf93910  1.0  0.0  cfvalu.938
*
tf93900  'door-p'  10 1.0  0.0
tf93911     -1.e7     0.0000518
tf93912    -14.0      0.0000518
* tf93911     -1.e7     0.0
* tf93912    -14.0      0.0
tf93913      0.0      0.0256279
tf93914      4.788    0.0333163
tf93915      9.576    0.0480779
tf93916     19.15     0.0799590
tf93917     28.73     0.2593542
tf93918     38.30     0.5720144
tf93919     46.92     1.0
tf93920     46.9201   1.0
*
cf93800  'dp 8-14' add   4  0.2  0.0
cf93810    1.0 0.0  cvh-p.008
cf93811   -1.0 0.0  cvh-p.014
cf93812 -122.1 0.0  cvh-rhoa.008   * rho*g*h (g*h = 9.81*(17.75-5.30))
```

```
cf93813    4.0 0.0  cfvalu.938
*
cf83600 'open check' l-or  2  1.0  0.0
cf83601 .FALSE.
*cf83605 latch
cf83610 1.0 0.0 cfvalu.835
cf83611 1.0 0.0 cfvalu.834
*
cf83500 'dp_cv8-cv14' l-gt  2 1.0 0.0
cf83510 1.0 0.0 cfvalu.938
cf83511 0.0 46.92 time
*
cf83400 'open_test' l-gt 2 1.0 0.0
cf83410 1.0 0.0 cfvalu.940
cf83411 0.0 0.98 time
*
*
**************************************************
* lower doors 2 (lower ctmt 1 to lower plenum 2) *
**************************************************
*
*  Flow path number  =       50
*  Flow area         =   6.9800 m2
*  Area/length ratio =    .**** m
*  Flow coefficient  =    .7000
*  From cell         =        8
*  To cell           =       15
*
fl05000  lwr-doors2    8  15   19.00   19.00   * fm,to elev
fl05001  6.9800    1.0000   0.0               * area, length, frac open
fl05003  1.40      1.40                       * k(forward),k(reverse)
fl050s1  6.9800    1.0000   1.491             * area,length,shyd (segment)
fl050v1  -1        843      843
fl0500t  19.0      20.25
*
cf94300  'Low_Door2' add  2  0.1   0.0
cf94310    9.0 0.0  cfvalu.943
cf94311    1.0 0.0  cfvalu.942
*
cf84300 'Low_Door2_logic' l-a-ifte 3 1.0 0.0
cf84310 1.0 0.0 cfvalu.850
cf84311 0.0 1.0 time
cf84312 1.0 0.0 cfvalu.943
*
cf94200  'door-p' tab-fun  1  1.0  0.0
cf94203  939
cf94210  1.0  0.0  cfvalu.941
*
cf94100  'dp 8-15' add     4  0.2  0.0
cf94110    1.0 0.0  cvh-p.008
cf94111   -1.0 0.0  cvh-p.015
cf94112 -122.1 0.0  cvh-rhoa.008   * rho*g*h (g*h = 9.81*(17.75-5.30))
cf94113    4.0 0.0  cfvalu.941
*
cf85000 'open check' l-or  2  1.0  0.0
cf85001 .FALSE.
*cf85005 latch
cf85010 1.0 0.0 cfvalu.855
cf85011 1.0 0.0 cfvalu.854
*
cf85500 'dp_cv8-cv15' l-gt  2 1.0 0.0
cf85510 1.0 0.0 cfvalu.941
cf85511 0.0 46.92 time
```

```
*
cf85400 'open_test' l-gt 2 1.0 0.0
cf85410 1.0 0.0 cfvalu.943
cf85411 0.0 0.98 time
*
*
******************
* refueling drain *
******************
*
*  Flow path number  =       51
*  Flow area         =   0.0875 m2
*  Area/length ratio =    .0620 m
*  Flow coefficient  =    .7500
*  From cell         =        8
*  To cell           =       26
*
fl05100  ref-drain     8  26   6.47  6.48    * fm,to elev
fl05101  0.0875    1.4113   1.0000             * area, length, frac open
fl05103  1.50      1.50                        * k(forward),k(reverse)
fl051s1  0.0875    1.4113   0.167              * area,length,shyd (segment)
* fl0510f  17.90     19.30
* fl0510t  19.00     20.00
*
* Note: To   elevation changed from 7.89 to 17.90 so it fits in CV26
*
************************
* lower containment 2-3 *
************************
*
*  Flow path number  =       52 (identical to 19 except for elevation)
*  Flow area         =  23.5000 m2
*  Area/length ratio =   1.5000 m
*  Flow coefficient  =    .7000
*  From cell         =        9
*  To cell           =       10
*
fl05200  lwrct2-3      9  10   14.00   14.00   * fm,to elev
fl05201  23.500   15.6667   1.0  100.0 100.0   * area, length, frac open, liq
flow
fl05203  1.40      1.40                        * k(forward),k(reverse)
fl05205  0.1
fl052s1  23.500   15.6667   2.735              * area,length,shyd (segment)
fl0520f  12.3    19.3
fl0520t  12.3    19.3
*
*****************************************
* lower containment 2 to lower annulus 2 *
*****************************************
*
*  Flow path number  =       53 (identical to 20 except for elevation)
*  Flow area         =   4.4000 m2
*  Area/length ratio =    .7500 m
*  Flow coefficient  =    .7000
*  From cell         =        9
*  To cell           =       12
*
fl05300  lwrc-ann2     9  12   13.05   13.05   * fm,to elev
fl05301  4.4000    5.8667   1.0                * area, length, frac open
fl05303  1.40      1.40                        * k(forward),k(reverse)
fl05305  0.1
fl053s1  4.4000    5.8667   1.183              * area,length,shyd (segment)
```

```
*
************************************************
* lower doors 3 (lower ctmt 2 to lower plenum 2) *
************************************************

*
*  Flow path number  =       54
*  Flow area         =  12.5100 m2
*  Area/length ratio =    .**** m
*  Flow coefficient  =    .7000
*  From cell         =        9
*  To cell           =       15
*
fl05400  lwr-doors3    9  15   19.00   19.00   * fm,to elev
fl05401  12.510    1.0000   0.0               * area, length, frac open
fl05403  1.40      1.40                       * k(forward),k(reverse)
fl054s1  12.510    1.0000   1.996             * area,length,shyd (segment)
fl054v1  -1        860      860
fl0540t  19.0      20.25
*
*
cf94600  'Low_Door3' add  2  0.1   0.0
cf94610    9.0 0.0  cfvalu.946
cf94611    1.0 0.0  cfvalu.945
*
cf86000 'Low_Door3_logic' l-a-ifte 3 1.0 0.0
cf86010 1.0 0.0 cfvalu.866
cf86011 0.0 1.0 time
cf86012 1.0 0.0 cfvalu.946
*
cf94500  'door-p' tab-fun  1  1.0  0.0
cf94503  939
cf94510  1.0  0.0  cfvalu.944
*
cf94400  'dp 9-15' add     4  0.2  0.0
cf94410    1.0 0.0  cvh-p.009
cf94411   -1.0 0.0  cvh-p.015
cf94412 -122.1 0.0  cvh-rhoa.009   * rho*g*h (g*h = 9.81*(17.75-5.30))
cf94413    4.0 0.0  cfvalu.944
*
cf86600 'open check' l-or  2  1.0  0.0
cf86601 .FALSE.
*cf86605 latch
cf86610 1.0 0.0 cfvalu.865
cf86611 1.0 0.0 cfvalu.864
*
cf86500 'dp_cv9-cv15' l-gt  2 1.0 0.0
cf86510 1.0 0.0 cfvalu.944
cf86511 0.0 46.92 time
*
cf86400 'open_test' l-gt 2 1.0 0.0
cf86410 1.0 0.0 cfvalu.946
cf86411 0.0 0.98 time
*
************************************************
* lower doors 4 (lower ctmt 2 to lower plenum 3) *
************************************************
*
*  Flow path number  =       55
*  Flow area         =  12.5100 m2
*  Area/length ratio =    .**** m
*  Flow coefficient  =    .7000
*  From cell         =        9
```

```
*  To cell           =       16
*
fl05500  lwr-doors4    9  16   19.00   19.00   * fm,to elev
fl05501  12.510    1.0000   0.0               * area, length, frac open
fl05503  1.40      1.40                       * k(forward),k(reverse)
fl055s1  12.510    1.0000   1.996             * area,length,shyd (segment)
fl055v1  -1        870      870
fl0550t  19.0      20.25
*
cf87000 'Low_Door4_logic' l-a-ifte 3 1.0 0.0
cf87010 1.0 0.0 cfvalu.876
cf87011 0.0 1.0 time
cf87012 1.0 0.0 cfvalu.949
*
cf94900  'Low_Door4' add   2  0.1  0.0
cf94910    9.0 0.0  cfvalu.949
cf94911    1.0 0.0  cfvalu.948
*
cf94800  'door-p' tab-fun  1  1.0  0.0
cf94803  939
cf94810  1.0  0.0  cfvalu.947
*
cf94700  'dp 9-16' add     4  0.2  0.0
cf94710    1.0 0.0  cvh-p.009
cf94711   -1.0 0.0  cvh-p.016
cf94712 -122.1 0.0  cvh-rhoa.009   * rho*g*h (g*h = 9.81*(17.75-5.30))
cf94713    4.0 0.0  cfvalu.947
*
*
cf87600 'open check' l-or  2  1.0  0.0
cf87601 .FALSE.
*cf87605 latch
cf87610 1.0 0.0 cfvalu.875
cf87611 1.0 0.0 cfvalu.874
*
cf87500 'dp_cv9-cv16' l-gt  2 1.0 0.0
cf87510 1.0 0.0 cfvalu.947
cf87511 0.0 46.92 time
*
cf87400 'open_test' l-gt 2 1.0 0.0
cf87410 1.0 0.0 cfvalu.949
cf87411 0.0 0.98 time
*
******************************************
* lower containment 3 to lower annulus 3 *
******************************************
*
*  Flow path number  =       56 (identical to 22 except for elevation)
*  Flow area         =   4.9500 m2
*  Area/length ratio =    .7500 m
*  Flow coefficient  =    .7000
*  From cell         =       10
*  To cell           =       13
*
fl05600  lwrc-ann3    10  13   13.05   13.05   * fm,to elev
fl05601  4.9500    6.6000   1.0               * area, length, frac open
fl05603  1.40      1.40                       * k(forward),k(reverse)
fl05605  0.1
fl056s1  4.9500    6.6000   1.255             * area,length,shyd (segment)
*
**************************************************
* lower doors 4 (lower ctmt 3 to lower plenum 3) *
**************************************************
```

```
*
*  Flow path number  =       57
*  Flow area         =   6.9800 m2
*  Area/length ratio =    .**** m
*  Flow coefficient  =    .7000
*  From cell         =       10
*  To cell           =       16
*
fl05700  lwr-doors5   10  16   19.00   19.00   * fm,to elev
fl05701  6.9800    1.0000   0.0                * area, length, frac open
fl05703  1.40      1.40                        * k(forward),k(reverse)
fl057s1  6.9800    1.0000   1.491              * area,length,shyd (segment)
fl057v1  -1        880      880
fl0570t  19.0      20.25
*
*
cf88000 'Low_Door5_logic' l-a-ifte 3 1.0 0.0
cf88010 1.0 0.0 cfvalu.886
cf88011 0.0 1.0 time
cf88012 1.0 0.0 cfvalu.952
*
cf95200  'Low_Door5' add   2  0.1  0.0
cf95210    9.0 0.0  cfvalu.952
cf95211    1.0 0.0  cfvalu.951
*
cf95100  'door-p' tab-fun  1  1.0  0.0
cf95103  939
cf95110  1.0  0.0  cfvalu.950
*
cf95000  'dp 10-16' add    4  0.2  0.0
cf95010    1.0 0.0  cvh-p.010
cf95011   -1.0 0.0  cvh-p.016
cf95012 -122.1 0.0  cvh-rhoa.010   * rho*g*h (g*h = 9.81*(17.75-5.30))
cf95013    4.0 0.0  cfvalu.950
*
cf88600 'open check' l-or  2  1.0  0.0
cf88601 .FALSE.
*cf88605 latch
cf88610 1.0 0.0 cfvalu.885
cf88611 1.0 0.0 cfvalu.884
*
cf88500 'dp_cv10-cv16' l-gt  2 1.0 0.0
cf88510 1.0 0.0 cfvalu.950
cf88511 0.0 46.92 time
*
cf88400 'open_test' l-gt 2 1.0 0.0
cf88410 1.0 0.0 cfvalu.952
cf88411 0.0 0.98 time
*
*************************************************
* lower doors 5 (lower ctmt 3 to lower plenum 4) *
*************************************************
*
*  Flow path number  =       58
*  Flow area         =  19.5100 m2
*  Area/length ratio =    .**** m
*  Flow coefficient  =    .7000
*  From cell         =       10
*  To cell           =       17
*
fl05800  lwr-doors6   10  17   19.00   19.00   * fm,to elev
fl05801  19.510    1.0000   0.0                * area, length, frac open
fl05803  1.40      1.40                        * k(forward),k(reverse)
```

```
fl058s1  19.510    1.0000   2.492              * area,length,shyd (segment)
fl058v1  -1        890      890
fl0580t  19.0      20.25
*
*
cf89000 'Low_Door6_logic' l-a-ifte 3 1.0 0.0
cf89010 1.0 0.0 cfvalu.896
cf89011 0.0 1.0 time
cf89012 1.0 0.0 cfvalu.955
*
cf95500  'Low_Door6' add   2  0.1  0.0
cf95510    9.0 0.0  cfvalu.955
cf95511    1.0 0.0  cfvalu.954
*
cf95400  'door-p' tab-fun  1  1.0  0.0
cf95403  939
cf95410  1.0  0.0  cfvalu.953
*
cf95300  'dp 10-17' add    4  0.2  0.0
cf95310    1.0 0.0  cvh-p.010
cf95311   -1.0 0.0  cvh-p.017
cf95312 -122.1 0.0  cvh-rhoa.010   * rho*g*h (g*h = 9.81*(17.75-5.30))
cf95313    4.0 0.0  cfvalu.953
*
*
cf89600 'open check' l-or  2  1.0  0.0
cf89601 .FALSE.
*cf89605 latch
cf89610 1.0 0.0 cfvalu.895
cf89611 1.0 0.0 cfvalu.894
*
cf89500 'dp_cv10-cv17' l-gt  2 1.0 0.0
cf89510 1.0 0.0 cfvalu.953
cf89511 0.0 46.92 time
*
cf89400 'open_test' l-gt 2 1.0 0.0
cf89410 1.0 0.0 cfvalu.955
cf89411 0.0 0.98 time
*
*******************
* refueling drain *
*******************
*
*  Flow path number  =       59
*  Flow area         =   0.0875 m2
*  Area/length ratio =    .0620 m
*  Flow coefficient  =    .7500
*  From cell         =       10
*  To cell           =       26
*
fl05900  ref-drain    10  26   6.47  6.48    * fm,to elev
fl05901  0.0875    1.4113   1.0000             * area, length, frac open
fl05903  1.50      1.50                        * k(forward),k(reverse)
fl059s1  0.0875    1.4113   0.167              * area,length,shyd (segment)
* fl0590f  17.90     19.30
* fl0590t  19.00     20.00
*
* Note: To   elevation changed from 7.89 to 17.90 so it fits in CV26
*
******************************
* ice chest 1 to ice chest 2 *
******************************
*
```

```
*  Flow path number  =       60 (identical to 33 except for elevation)
*  Flow area         =   3.9500 m2
*  Area/length ratio =   1.2500 m
*  Flow coefficient  =   1.5000
*  From cell         =       18
*  To cell           =       19
*
fl06000  icechest1-2  18  19   31.35   31.35   * fm,to elev
fl06001  3.9500    3.1600   1.0000             * area, length, frac open
fl06003  3.00      3.00                        * k(forward),k(reverse)
fl060s1  3.9500    3.1600   1.121              * area,length,shyd (segment)
*
********************************
* ice chest 1 to upper plenum 1 *
********************************
*
*  Flow path number  =       61
*  Flow area         =   5.6980 m2
*  Area/length ratio =   0.5800 m
*  Flow coefficient  =   0.7000
*  From cell         =       18
*  To cell           =       22
*
fl06100  interdoors5  18  22   35.00   35.10   * fm,to elev
fl06101  5.6980    9.8241   0.0                * area, length, frac open
fl06103  1.40      1.40                        * k(forward),k(reverse)
fl06105  0.01                                  * max slip
fl061s1  5.6980    9.8241   1.347              * area,length,shyd (segment)
fl061v1  -1        963      963
*
* Note: To   elevation changed from 35.00 to 35.10 so it fits in CV22
*
cf96300  'doorpmax' max  2  1.0  0.0
cf96301  0.0
cf96310  1.0  0.0  cfvalu.963                  * this cf makes area increase
cf96311  1.0  0.0  cfvalu.962                  * irreversible
*
cf96200  'door-p' tab-fun  1  1.0  0.0
cf96203  962
cf96210  1.0  0.0  cfvalu.961
*
tf96200  'door-p'  4  1.0  0.0
tf96211     -1.e7     0.0
tf96212  28498.0      0.0
tf96213  37910.0      1.0
tf96214      1.e7     1.0
*
cf96100  'dp18-22' add  2  1.0  0.0
cf96110 -1.0  0.0  cvh-p.018
cf96111  1.0  0.0  cvh-p.022
*
*****************************
* ice chest 2 to ice chest 3 *
*****************************
*
*  Flow path number  =       62 (identical to 35 except for elevation)
*  Flow area         =   3.9500 m2
*  Area/length ratio =   1.2500 m
*  Flow coefficient  =   1.5000
*  From cell         =       19
*  To cell           =       20
*
fl06200  icechest2-3  19  20   31.35   31.35   * fm,to elev
```

```
fl06201  3.9500    3.1600   1.0000              * area, length, frac open
fl06203  3.00      3.00                         * k(forward),k(reverse)
fl062s1  3.9500    3.1600   1.121               * area,length,shyd (segment)
*
*********************************
* ice chest 2 to upper plenum 1 *
*********************************
*
*  Flow path number  =       63
*  Flow area         =   5.6980 m2
*  Area/length ratio =   0.5800 m
*  Flow coefficient  =   0.7000
*  From cell         =       19
*  To cell           =       22
*
fl06300  interdoors6  19  22   35.00   35.10   * fm,to elev
fl06301  5.6980    9.8241   0.0                 * area, length, frac open
fl06303  1.40      1.40                         * k(forward),k(reverse)
fl06305  0.01                                   * max slip
fl063s1  5.6980    9.8241   1.347               * area,length,shyd (segment)
fl063v1  -1        966      966
*
* Note: To   elevation changed from 35.00 to 35.10 so it fits in CV22
*
cf96600  'doorpmax' max  2  1.0  0.0
cf96601  0.0
cf96610  1.0  0.0  cfvalu.966                   * this cf makes area increase
cf96611  1.0  0.0  cfvalu.965                   * irreversible
*
cf96500  'door-p' tab-fun  1  1.0  0.0
cf96503  962
cf96510  1.0  0.0  cfvalu.964
*
cf96400  'dp19-22' add  2  1.0  0.0
cf96410  1.0  0.0  cvh-p.019
cf96411 -1.0  0.0  cvh-p.022
*
******************************
* ice chest 3 to ice chest 4 *
******************************

*
*  Flow path number  =       64 (identical to 37 except for elevation)
*  Flow area         =   3.9500 m2
*  Area/length ratio =   1.2500 m
*  Flow coefficient  =   1.5000
*  From cell         =       20
*  To cell           =       21
*
fl06400  icechest3-4  20  21   31.35   31.35   * fm,to elev
fl06401  3.9500    3.1600   1.0000              * area, length, frac open
fl06403  3.00      3.00                         * k(forward),k(reverse)
fl064s1  3.9500    3.1600   1.121               * area,length,shyd (segment)
*
*********************************
* ice chest 3 to upper plenum 2 *
*********************************
*
*  Flow path number  =       65
*  Flow area         =   5.6980 m2
*  Area/length ratio =   0.5800 m
*  Flow coefficient  =   0.7000
*  From cell         =       20
```

```
*  To cell           =       23
*
fl06500  interdoors7  20  23   35.00   35.10   * fm,to elev
fl06501  5.6980    9.8241   0.0                * area, length, frac open
fl06503  1.40      1.40                        * k(forward),k(reverse)
fl06505  0.01                                  * max slip
fl065s1  5.6980    9.8241   1.347              * area,length,shyd (segment)
fl065v1  -1        969      969
*
* Note: To   elevation changed from 35.00 to 35.10 so it fits in CV23
*
cf96900  'doorpmax' max  2  1.0  0.0
cf96901  0.0
cf96910  1.0  0.0  cfvalu.969                  * this cf makes area increase
cf96911  1.0  0.0  cfvalu.968                  * irreversible
*
cf96800  'door-p' tab-fun  1  1.0  0.0
cf96803  962
cf96810  1.0  0.0  cfvalu.967
*
cf96700  'dp20-23' add  2  1.0  0.0
cf96710  1.0  0.0  cvh-p.020
cf96711 -1.0  0.0  cvh-p.023
*
*********************************
* ice chest 4 to upper plenum 2 *
*********************************
*
*  Flow path number  =       66
*  Flow area         =   5.6980 m2
*  Area/length ratio =   0.5800 m
*  Flow coefficient  =   0.7000
*  From cell         =       21
*  To cell           =       23
*
fl06600  interdoors7  21  23   35.00   35.10   * fm,to elev
fl06601  5.6980    9.8241   0.0                * area, length, frac open
fl06603  1.40      1.40                        * k(forward),k(reverse)
fl06605  0.01                                  * max slip
fl066s1  5.6980    9.8241   1.347              * area,length,shyd (segment)
fl066v1  -1        972      972
*
* Note: To   elevation changed from 35.00 to 35.10 so it fits in CV23
*
cf97200  'doorpmax' max  2  1.0  0.0
cf97201  0.0
cf97210  1.0  0.0  cfvalu.972                  * this cf makes area increase
cf97211  1.0  0.0  cfvalu.971                  * irreversible
*
cf97100  'door-p' tab-fun  1  1.0  0.0
cf97103  962
cf97110  1.0  0.0  cfvalu.970
*
cf97000  'dp21-23' add  2  1.0  0.0
cf97010  1.0  0.0  cvh-p.021
cf97011 -1.0  0.0  cvh-p.023
*
**********************
* upper plenum 1 to 2 *
**********************
*
*  Flow path number  =       67 (identical to 40 except for elevation)
*  Flow area         =   6.2000 m2
```

```
*  Area/length ratio =   1.0000 m
*  Flow coefficient  =    .7000
*  From cell         =       22
*  To cell           =       23
*
fl06700  upplen1-2    22  23   38.90   38.90   * fm,to elev
fl06701  6.2000    6.2000   1.0                * area, length, frac open
fl06703  1.40      1.40                        * k(forward),k(reverse)
fl067s1  6.2000    6.2000   1.405              * area,length,shyd (segment)
*
*************************************
* upper plenum doors to upper dome 1 *
*************************************
*
*  Flow path number  =       68
*  Flow area         =  46.0400 m2
*  Area/length ratio =   9.2100 m
*  Flow coefficient  =   0.6900
*  From cell         =       22
*  To cell           =       24
*
fl06800  upplendoor1  22  24   40.10   40.20   * fm,to elev
fl06801  46.040    4.9989   0.0                * area, length, frac open
fl06803  1.38      1.38                        * k(forward),k(reverse)
fl068s1  46.040    4.9989   1.347              * area,length,shyd (segment)
fl068v1  -1        975      975
*

* Note: From elevation changed from 40.20 to 40.10 so it fits in CV22
*
cf97500  'doorpmax' max  2  1.0  0.0
cf97501  0.0
cf97510  1.0  0.0  cfvalu.975                  * this cf makes area increase
cf97511  1.0  0.0  cfvalu.974                  * irreversible
*
cf97400  'door-p' tab-fun  1  1.0  0.0
cf97403  974
cf97410  1.0  0.0  cfvalu.973
*
tf97400  'door-p'  4  1.0  0.0
tf97411     -1.e7     0.0
tf97412   4441.0      0.0
tf97413   8619.0      1.0
tf97414      1.e7     1.0
*
cf97300  'dp22-24' add  2  1.0  0.0
cf97310  1.0  0.0  cvh-p.022
cf97311 -1.0  0.0  cvh-p.024
*
*************************************
* upper plenum doors to upper dome 2 *
*************************************
*
*  Flow path number  =       69
*  Flow area         =  46.0400 m2
*  Area/length ratio =   9.2100 m
*  Flow coefficient  =   0.6900
*  From cell         =       23
*  To cell           =       25
*
fl06900  upplendoor2  23  25   40.10   40.20   * fm,to elev
fl06901  46.040    4.9989   0.0                * area, length, frac open
fl06903  1.38      1.38                        * k(forward),k(reverse)
```

```
fl069s1  46.040    4.9989   1.347              * area,length,shyd (segment)
fl069v1  -1        978      978
*
* Note: From elevation changed from 40.20 to 40.10 so it fits in CV22
*
cf97800  'doorpmax' max  2  1.0  0.0
cf97801  0.0
cf97810  1.0  0.0  cfvalu.978                  * this cf makes area increase
cf97811  1.0  0.0  cfvalu.977                  * irreversible
*
cf97700  'door-p' tab-fun  1  1.0  0.0
cf97703  974
cf97710  1.0  0.0  cfvalu.976
*
cf97600  'dp23-25' add  2  1.0  0.0
cf97610  1.0  0.0  cvh-p.023
cf97611 -1.0  0.0  cvh-p.025
*
********************
* dome 1 to dome 2 *
********************
*
*  Flow path number  =       70 (identical to 43 except for elevation)
*  Flow area         = 296.5000 m2
*  Area/length ratio =  16.7000 m
*  Flow coefficient  =    .7000
*  From cell         =       24
*  To cell           =       25
*
fl07000  dome1-2      24  25   48.50   48.50   * fm,to elev
fl07001  296.50   17.7545   1.0                * area, length, frac open
fl07003  1.40      1.40                        * k(forward),k(reverse)
fl070s1  296.50   17.7545   9.715              * area,length,shyd (segment)
*
****************************
* air return fans, train 1 *
****************************
*
*  Flow path number  =       71
*  Flow area         =   1.0000 m2
*  Area/length ratio =  10.0000 m
*  Flow coefficient  =
*  From cell         =       24
*  To cell           =       11
*
*  Each fan provides min 40,000 cfm from upper compartment to accumulator room
*  of lower compartment per FSAR Section 6.6.  (Q = 40,000 cfm = 18.875 m3/s)
*  Sequoyah CONTAIN model has approx 58,000 cfm per fan.
*
* fl07100  returnfan1   24  11   33.70   19.30   * fm,to elev
* fl07101  1.0      10.0      1.0                * area, length, frac open
* fl071s1  1.0      10.0      5.0                * area,length,shyd (segment)
* fl071t0  2        910
*
* cf91000  'fanvel'  equals  1  1.0   0.0
* cf91010   18.875      0.0    cfvalu.138
*
****************************
* air return fans, train 2 *
****************************
*
*  Flow path number  =       72
*  Flow area         =   1.0000 m2
```

```
*  Area/length ratio =  10.0000 m
*  Flow coefficient  =    .****
*  From cell         =       25
*  To cell           =       13
*
* fl07200  returnfan2   25  13   33.70   19.30   * fm,to elev
* fl07201  1.0      10.0      1.0                * area, length, frac open
* fl072s1  1.0      10.0      5.0                * area,length,shyd (segment)
* fl072t0  2        910
*
**********************
* hydrogen skimmers 1 *
**********************
*
*  Flow path number  =       73
*  Flow area         =   0.1770 m2
*  Area/length ratio =   1.0000 m
*  Flow coefficient  =    .****
*  From cell         =        2
*  To cell           =       11
*
*fl07300  h2skimmer1    2  11   21.40   19.30   * fm,to elev
*fl07301  0.1770   1.00      1.0                * area, length, frac open
*fl073s1  0.1770   1.00      1.0                * area,length,shyd (segment)
*fl073t1  2        911
*
*cf91100  'skim_vel'  equals  1  1.0   0.0
*cf91110   1.0      0.0    cfvalu.138
*
**********************
* hydrogen skimmers 2 *
**********************
*
*  Flow path number  =       74
*  Flow area         =   0.1770 m2
*  Area/length ratio =   1.0000 m
*  Flow coefficient  =    .****
*  From cell         =        3
*  To cell           =       11
*
*fl07400  h2skimmer2    3  11   21.40   19.30   * fm,to elev
*fl07401  0.1770   1.00      1.0                * area, length, frac open
*fl074s1  0.1770   1.00      1.0                * area,length,shyd (segment)
*fl074t1  2        911
*
**********************
* hydrogen skimmers 3 *
**********************
*
*  Flow path number  =       75
*  Flow area         =   0.1420 m2
*  Area/length ratio =   1.0000 m
*  Flow coefficient  =    .****
*  From cell         =        6
*  To cell           =       11
*
*fl07500  h2skimmer3    6  11   19.90   19.30   * fm,to elev
*fl07501  0.1420   1.00      1.0                * area, length, frac open
*fl075s1  0.1420   1.00      1.0                * area,length,shyd (segment)
*fl075t1  2        911
*
**********************
* hydrogen skimmers 4 *
```

```
**********************
*
*  Flow path number  =       76
*  Flow area         =   0.1770 m2
*  Area/length ratio =   1.0000 m
*  Flow coefficient  =    .****
*  From cell         =        4
*  To cell           =       13
*
*fl07600  h2skimmer4    4  13   21.40   19.30   * fm,to elev
*fl07601  0.1770   1.00      1.0               * area, length, frac open
*fl076s1  0.1770   1.00      1.0               * area,length,shyd (segment)
*fl076t1  2        911
*
**********************
* hydrogen skimmers 5 *
**********************
*
*  Flow path number  =       77
*  Flow area         =   1.0000 m2
*  Area/length ratio =   1.0000 m
*  Flow coefficient  =    .****
*  From cell         =        5
*  To cell           =       13
*
*fl07700  h2skimmer5    5  13   21.40   19.30   * fm,to elev
*fl07701  0.1770   1.00      1.0               * area, length, frac open
*fl077s1  0.1770   1.00      1.0               * area,length,shyd (segment)
*fl077t1  2        911
*
**********************
* hydrogen skimmers 6 *
**********************
*
*  Flow path number  =       78
*  Flow area         =   0.1420 m2
*  Area/length ratio =   1.0000 m
*  Flow coefficient  =    .****
*  From cell         =        6
*  To cell           =       13
*
*fl07800  h2skimmer6    6  13   19.90   19.30   * fm,to elev
*fl07801  0.1420   1.00      1.0               * area, length, frac open
*fl078s1  0.1420   1.00      1.0               * area,length,shyd (segment)
*fl078t1  2        911
*
**********************************
* Model of CONTAIN ENGINEER PIPES *
**********************************
*
fl07900  Ice_drain    14   8   17.75    5.30   * fm,to elev
fl07901  0.1      1.0      1.0                 * area, length, frac open
fl079s1  0.1      1.0      1.0                 * area,length,shyd (segment)
fl0790f  17.75    17.76
fl079v1  -1       990      990
*
cf99000  'drain'  tab-fun  1  1.0  0.0
cf99003  990
cf99010  1.0  -17.75  cvh-cliqlev.014
*
tf99000  'drain'   3  1.0  0.0
tf99011   0.0   0.0
tf99012   0.15  0.0
```

```
tf99013   0.25  1.0
*
fl08000  Ice_drain    15   9   17.75    5.30   * fm,to elev
fl08001  0.1      1.00      1.0                * area, length, frac open
fl080s1  0.1      1.00      1.0                * area,length,shyd (segment)
fl0800f  17.75    17.76
fl080v1  -1       991       991
*
cf99100  'drain'  tab-fun  1  1.0  0.0
cf99103  990
cf99110  1.0  -17.75  cvh-cliqlev.015
*
fl08100  Ice_drain    16   9   17.75    5.30   * fm,to elev
fl08101  0.1      1.0       1.0                * area, length, frac open
fl081s1  0.1      1.0       1.0                * area,length,shyd (segment)
fl0810f  17.75    17.76
fl081v1  -1        992      992
*
cf99200  'drain'  tab-fun  1  1.0  0.0
cf99203  990
cf99210  1.0  -17.75  cvh-cliqlev.016
*
fl08200  Ice_drain    17  10   17.75    5.30   * fm,to elev
fl08201  0.1      1.0       1.0                * area, length, frac open
fl082s1  0.1      1.0       1.0                * area,length,shyd (segment)
fl0820f  17.75    17.76
fl082v1  -1        993      993
*
cf99300  'drain'  tab-fun  1  1.0  0.0
cf99303  990
cf99310  1.0  -17.75  cvh-cliqlev.017
*
******************************************************************************
*
*
************
* HS Input *
************
*
*************
* hs_conr1  *
*************
*
*  Type            =     slab
*  Cell number     =        1
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =   3.5200 m
*  LHS Cell bottom =  -3.5200 m
*  LHS Cell top    =   3.5200 m
*  Cell height     =      7.0     m
*  Charact. length =      5.2     m
*
hs00101000     13    1    1
hs00101001     hs_conr1
hs00101002     3.5200      .0000
hs00101003        1.
hs00101100     -1   1    .0000
hs00101102      .3500E-03   2
hs00101103      .1000E-02   3
hs00101104      .2000E-02   4
hs00101105      .4000E-02   5
hs00101106      .8000E-02   6
```

```
hs00101107      .1600E-01   7
hs00101108      .3000E-01   8
hs00101109      .6000E-01   9
hs00101110      .1200      10
hs00101111      .2400      11
hs00101112      .4800      12
hs00101113      .8000      13
hs00101200     -1
hs00101201     concrete    1
hs00101202     concrete    2
hs00101203     concrete    3
hs00101204     concrete    4
hs00101205     concrete    5
hs00101206     concrete    6
hs00101207     concrete    7
hs00101208     concrete    8
hs00101209     concrete    9
hs00101210     concrete   10
hs00101211     concrete   11
hs00101212     concrete   12
hs00101300     -1
hs00101400       1    1  ext    .5    .5
hs00101401        0.800  equiv-band      5.74
hs00101500      23.65       5.180       5.180
hs00101600        0   -1  ext    .5    .5
* hs00101800      -1
* hs00101801      311.0   13
*
*************
* hs_conw1  *
*************
*
*  Type            =     slab
*  Cell number     =        1
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  -3.5200 m
*  LHS Cell bottom =  -3.5200 m
*  LHS Cell top    =   3.5200 m
*  Cell height     =      7.0     m
*  Charact. length =      7.0     m
*
hs00102000     13    1    1
hs00102001     hs_conw1
hs00102002     -3.5200000  1.000
hs00102003        1.
hs00102100     -1   1    .0000
hs00102102      .3500E-03   2
hs00102103      .1000E-02   3
hs00102104      .2000E-02   4
hs00102105      .4000E-02   5
hs00102106      .8000E-02   6
hs00102107      .1600E-01   7
hs00102108      .3000E-01   8
hs00102109      .6000E-01   9
hs00102110      .1200      10
hs00102111      .2400      11
hs00102112      .4800      12
hs00102113      .8000      13
hs00102200     -1
hs00102201     concrete    1
hs00102202     concrete    2
hs00102203     concrete    3
```

```
hs00102204     concrete    4
hs00102205     concrete    5
hs00102206     concrete    6
hs00102207     concrete    7
hs00102208     concrete    8
hs00102209     concrete    9
hs00102210     concrete   10
hs00102211     concrete   11
hs00102212     concrete   12
hs00102300     -1
hs00102400       1    1  ext    .5    .5
hs00102401        0.800  equiv-band      5.74
hs00102500      123.2       7.000       7.000
hs00102600        0   -1  ext    .5    .5
* hs00102800      -1
* hs00102801      311.0   13
*
*************
* hs_conw1  *
*************
*
*  Type            =     slab
*  Cell number     =        1
*  Heat struct     =        3
*  Geometry        =     wall
*  HS elev.        =  -3.5200 m
*  LHS Cell bottom =  -3.5200 m
*  LHS Cell top    =   3.5200 m
*  Cell height     =      7.0     m
*  Charact. length =      7.0     m
*
hs00103000     13    1    1
hs00103001     hs_conw1
hs00103002     -3.5200000  1.000
hs00103003        1.
hs00103100     -1   1    .0000
hs00103102      .3500E-03   2
hs00103103      .1000E-02   3
hs00103104      .2000E-02   4
hs00103105      .4000E-02   5
hs00103106      .8000E-02   6
hs00103107      .1600E-01   7
hs00103108      .3000E-01   8
hs00103109      .6000E-01   9
hs00103110      .1200      10
hs00103111      .2400      11
hs00103112      .4800      12
hs00103113      .8000      13
hs00103200     -1
hs00103201     concrete    1
hs00103202     concrete    2
hs00103203     concrete    3
hs00103204     concrete    4
hs00103205     concrete    5
hs00103206     concrete    6
hs00103207     concrete    7
hs00103208     concrete    8
hs00103209     concrete    9
hs00103210     concrete   10
hs00103211     concrete   11
hs00103212     concrete   12
hs00103300     -1
hs00103400       1    1  ext    .5    .5
```

```
hs00103401        0.800  equiv-band      0.20
hs00103500      133.4       7.000       7.000
hs00103600        0   -1  ext    .5    .5
* hs00103800      -1
* hs00103801      311.0   13
*
*************
* hs_istrf  *
*************
*
*  Type            =    top of hemisphere
*  Cell number     =        1
*  Heat struct     =        4
*  Geometry        = h_sphere
*  HS elev.        =   1.0440 m
*  LHS Cell bottom =  -3.5200 m
*  LHS Cell top    =   3.5200 m
*  Cell height     =      7.0     m
*  Charact. length =      2.5     m
*
hs00104000     12    5    1
hs00104001     hs_istrf
hs00104002     1.0440      .0000
hs00104003        1.
hs00104100     -1   1    2.26
hs00104111      2.476      12
hs00104110      2.47565    11
hs00104109      2.475      10
hs00104108      2.473       9
hs00104107      2.469       8
hs00104106      2.461       7
hs00104105      2.445       6
hs00104104      2.423       5
hs00104103      2.400       4
hs00104102      2.380       3
hs00104101      2.320       2
hs00104200     -1
hs00104211     insul     11
hs00104210     insul     10
hs00104209     insul      9
hs00104208     insul      8
hs00104207     insul      7
hs00104206     insul      6
hs00104205     insul      5
hs00104204     insul      4
hs00104203     'CARBON STEEL'         3
hs00104202     'CARBON STEEL'         2
hs00104201     'CARBON STEEL'         1
hs00104300     -1
hs00104400       1    1  ext    .5    .5
hs00104401         .800  equiv-band      5.74
hs00104500      1.000       2.476       2.476
hs00104600      2110  -1  ext    .5    .5
* hs00104800      -1
* hs00104801      616.0   12
*
*************
* hs_istw1  *
*************
*
*  Type            =     slab
*  Cell number     =        1
*  Heat struct     =        5
```

```
*  Geometry        =     wall
*  HS elev.        =  -3.5200 m
*  LHS Cell bottom =  -3.5200 m
*  LHS Cell top    =   3.5200 m
*  Cell height     =      7.0     m
*  Charact. length =      7.0     m
*
hs00105000     13    1    1
hs00105001     hs_istw1
hs00105002     -3.5200000  1.000
hs00105003        1.
hs00105100     -1   1    .0000
hs00105102      .3500E-03   2
hs00105103      .1000E-02   3
hs00105104      .2000E-02   4
hs00105105      .4000E-02   5
hs00105106      .8000E-02   6
hs00105107      .1600E-01   7
hs00105108      .3000E-01   8
hs00105109      .5000E-01   9
hs00105110      .7600E-01  10
hs00105111      .1020      11
hs00105112      .1400      12
hs00105113      .2160      13
hs00105200     -1
hs00105201     insul      1

hs00105202     insul      2
hs00105203     insul      3
hs00105204     insul      4
hs00105205     insul      5
hs00105206     insul      6
hs00105207     insul      7
hs00105208     insul      8
hs00105209     insul      9
hs00105210     'CARBON STEEL'        10
hs00105211     'CARBON STEEL'        11
hs00105212     'CARBON STEEL'        12
hs00105300     -1
hs00105400       1    1  ext    .5    .5
hs00105401        0.800  equiv-band      0.20
hs00105500      126.4       7.000       7.000
hs00105600      2110  -1  ext    .5    .5
* hs00105800      -1
* hs00105801      616.0   13
*
*************
* hs_lcell  *
*************
*
*  Type            =     slab
*  Cell number     =        1
*  Heat struct     =        6
*  Geometry        =    floor
*  HS elev.        =  -7.1070 m
*  LHS Cell bottom =  -3.5200 m
*  LHS Cell top    =   3.5200 m
*  Cell height     =      7.0     m
*  Charact. length =      7.7     m = sqrt(59.2 m2)
*
hs00106000     13    1    1
hs00106001     hs_lcell
```

```
hs00106002    -7.1070    -1.e-07
hs00106003        1.
hs00106100     -1   1    .0000
hs00106102     0.0500       2
hs00106103     0.1000       3
hs00106104     0.2000       4
hs00106105     0.3000       5
hs00106106     0.4000       6
hs00106107     0.5000       7
hs00106108     1.0000       8
hs00106109     1.5000       9
hs00106110     2.0000      10
hs00106111     2.5000      11
hs00106112     3.0000      12
hs00106113     3.5870      13
hs00106200     -1
hs00106201     concrete    1
hs00106202     concrete    2
hs00106203     concrete    3
hs00106204     concrete    4
hs00106205     concrete    5
hs00106206     concrete    6
hs00106207     concrete    7
hs00106208     concrete    8
hs00106209     concrete    9
hs00106210     concrete   10
hs00106211     concrete   11
hs00106212     concrete   12
hs00106300     -1
hs00106400       1    1  ext    .5    .5
hs00106401        0.800  equiv-band      5.74
hs00106500      59.20       7.900       7.900
hs00106600       0   -1  ext    .5    .5
* hs00106800     -1
* hs00106801     311.0   13
*
*************
* hs_conr2  *
*************
*
*  Type            =     slab
*  Cell number     =        2
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  32.6000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      3.5     m
*
hs00201000     12    1    1
hs00201001     hs_conr2
hs00201002     32.600      .0000
hs00201003        1.
hs00201100     -1   1    .0000
hs00201102      .3500E-03   2
hs00201103      .1000E-02   3
hs00201104      .2000E-02   4
hs00201105      .4000E-02   5
hs00201106      .8000E-02   6
hs00201107      .1600E-01   7
hs00201108      .3000E-01   8
hs00201109      .6000E-01   9
```

```
hs00201110       .1200      10
hs00201111       .2000      11
hs00201112       .2700      12
hs00201200      -1
hs00201201      concrete    1
hs00201202      concrete    2
hs00201203      concrete    3
hs00201204      concrete    4
hs00201205      concrete    5
hs00201206      concrete    6
hs00201207      concrete    7
hs00201208      concrete    8
hs00201209      concrete    9
hs00201210      concrete   10
hs00201211      concrete   11
hs00201300      -1
hs00201400        1    2  ext    .5    .5
hs00201401         0.800  equiv-band      3.47
hs00201500       39.05       3.500       3.500
hs00201600         0   -1  ext    .5    .5
* hs00201800      -1
* hs00201801      311.0   12
*
*************
* hs_conf2  *
*************
*
*  Type            =     slab
*  Cell number     =        2
*  Heat struct     =        2
*  Geometry        =    floor
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      3.5     m
*
hs00202000      12    1    1
hs00202001      hs_conf2
hs00202002      21.400     -.1000E-06
hs00202003        1.
hs00202100      -1   1    .0000
hs00202102       .3500E-03   2
hs00202103       .1000E-02   3
hs00202104       .2000E-02   4
hs00202105       .4000E-02   5
hs00202106       .8000E-02   6
hs00202107       .1600E-01   7
hs00202108       .3000E-01   8
hs00202109       .6000E-01   9
hs00202110       .1200      10
hs00202111       .2000      11
hs00202112       .2700      12
hs00202200      -1
hs00202201      concrete    1
hs00202202      concrete    2
hs00202203      concrete    3
hs00202204      concrete    4
hs00202205      concrete    5
hs00202206      concrete    6
hs00202207      concrete    7

hs00202208      concrete    8
```

```
hs00202209     concrete    9
hs00202210     concrete   10
hs00202211     concrete   11
hs00202300     -1
hs00202400       1    2  ext    .5    .5
hs00202401          .800  equiv-band      3.47
hs00202500      23.05       3.500       3.500
hs00202600        0   -1  ext    .5    .5
* hs00202800     -1
* hs00202801     311.0   12
*
*************
* hs_conw2  *
*************
*
*  Type            =     slab
*  Cell number     =        2
*  Heat struct     =        3

*  Geometry        =     wall
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      5.5     m
*
hs00203000     12    1    1
hs00203001     hs_conw2
hs00203002     21.400      1.000
hs00203003        1.
hs00203100     -1   1    .0000
hs00203102      .3500E-03   2
hs00203103      .1000E-02   3
hs00203104      .2000E-02   4
hs00203105      .4000E-02   5
hs00203106      .8000E-02   6
hs00203107      .1600E-01   7
hs00203108      .3000E-01   8
hs00203109      .6000E-01   9
hs00203110      .1200      10
hs00203111      .2000      11
hs00203112      .2700      12
hs00203200     -1
hs00203201     concrete    1
hs00203202     concrete    2
hs00203203     concrete    3
hs00203204     concrete    4
hs00203205     concrete    5
hs00203206     concrete    6
hs00203207     concrete    7
hs00203208     concrete    8
hs00203209     concrete    9
hs00203210     concrete   10
hs00203211     concrete   11
hs00203300     -1
hs00203400       1    2  ext    .5    .5
hs00203401          .800  equiv-band      3.47
hs00203500      142.0       5.500       5.500
hs00203600        0   -1  ext    .5    .5
* hs00203800     -1
* hs00203801     311.0   12
*
*************
```

```
*  hs_stw2  *
*************
*
*  Type            =     slab
*  Cell number     =        2
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      5.5     m
*
hs00204000     10    1    1
hs00204001      hs_stw2
hs00204002     21.400      1.000
hs00204003        1.
hs00204100     -1   1    .0000
hs00204102      .3500E-03   2
hs00204103      .1000E-02   3
hs00204104      .2000E-02   4
hs00204105      .4000E-02   5
hs00204106      .8000E-02   6
hs00204107      .1600E-01   7
hs00204108      .3000E-01   8
hs00204109      .5000E-01   9
hs00204110      .6900E-01  10
hs00204200     -1
hs00204201     'CARBON STEEL'         1
hs00204202     'CARBON STEEL'         2
hs00204203     'CARBON STEEL'         3
hs00204204     'CARBON STEEL'         4
hs00204205     'CARBON STEEL'         5
hs00204206     'CARBON STEEL'         6
hs00204207     'CARBON STEEL'         7
hs00204208     'CARBON STEEL'         8
hs00204209     'CARBON STEEL'         9
hs00204300     -1
hs00204400       1    2  ext    .5    .5
hs00204401         .800  equiv-band      3.47
hs00204500      172.0       5.500       5.500
hs00204600        0   -1  ext    .5    .5
* hs00204800     -1
* hs00204801     311.0   10
*
*************
* hs_conr3  *
*************
*
*  Type            =     slab
*  Cell number     =        3
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  32.6000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      3.5     m
*
hs00301000     12    1    1
hs00301001     hs_conr3
hs00301002     32.600      .0000
hs00301003        1.
```

```
hs00301100      -1   1    .0000
hs00301102       .3500E-03   2
hs00301103       .1000E-02   3
hs00301104       .2000E-02   4
hs00301105       .4000E-02   5
hs00301106       .8000E-02   6
hs00301107       .1600E-01   7
hs00301108       .3000E-01   8
hs00301109       .6000E-01   9
hs00301110       .1200      10
hs00301111       .2000      11
hs00301112       .2700      12
hs00301200      -1
hs00301201      concrete    1
hs00301202      concrete    2
hs00301203      concrete    3
hs00301204      concrete    4
hs00301205      concrete    5
hs00301206      concrete    6
hs00301207      concrete    7
hs00301208      concrete    8
hs00301209      concrete    9
hs00301210      concrete   10
hs00301211      concrete   11
hs00301300      -1
hs00301400        1    3  ext    .5    .5
hs00301401         0.800  equiv-band      3.47
hs00301500       39.05       3.500       3.500
hs00301600         0   -1  ext    .5    .5
* hs00301800      -1
* hs00301801      311.0   12
*
*************
* hs_conf3  *
*************
*
*  Type            =     slab
*  Cell number     =        3
*  Heat struct     =        2
*  Geometry        =    floor
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      3.5     m
*
hs00302000      12    1    1
hs00302001      hs_conf3
hs00302002      21.400     -.1000E-06
hs00302003         1.
hs00302100      -1   1    .0000
hs00302102       .3500E-03   2
hs00302103       .1000E-02   3
hs00302104       .2000E-02   4
hs00302105       .4000E-02   5
hs00302106       .8000E-02   6
hs00302107       .1600E-01   7
hs00302108       .3000E-01   8
hs00302109       .6000E-01   9
hs00302110       .1200      10
hs00302111       .2000      11
hs00302112       .2700      12
hs00302200      -1
```

```
hs00302201     concrete    1
hs00302202     concrete    2
hs00302203     concrete    3
hs00302204     concrete    4
hs00302205     concrete    5
hs00302206     concrete    6
hs00302207     concrete    7
hs00302208     concrete    8
hs00302209     concrete    9
hs00302210     concrete   10
hs00302211     concrete   11
hs00302300     -1
hs00302400       1    3  ext    .5    .5
hs00302401           .800  equiv-band      3.47
hs00302500      23.05        3.500       3.500
hs00302600        0   -1  ext    .5    .5
* hs00302800     -1
* hs00302801     311.0   12
*
*************
* hs_conw3  *
*************
*
*  Type            =     slab
*  Cell number     =        3
*  Heat struct     =        3
*  Geometry        =     wall
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      5.5     m
*
hs00303000     12    1    1
hs00303001     hs_conw3
hs00303002     21.400      1.000
hs00303003        1.
hs00303100     -1   1    .0000
hs00303102      .3500E-03   2
hs00303103      .1000E-02   3
hs00303104      .2000E-02   4
hs00303105      .4000E-02   5
hs00303106      .8000E-02   6
hs00303107      .1600E-01   7
hs00303108      .3000E-01   8
hs00303109      .6000E-01   9
hs00303110      .1200      10
hs00303111      .2000      11
hs00303112      .2700      12
hs00303200     -1
hs00303201     concrete    1
hs00303202     concrete    2
hs00303203     concrete    3
hs00303204     concrete    4
hs00303205     concrete    5
hs00303206     concrete    6
hs00303207     concrete    7
hs00303208     concrete    8
hs00303209     concrete    9
hs00303210     concrete   10
hs00303211     concrete   11
hs00303300     -1
hs00303400       1    3  ext    .5    .5
```

```
hs00303401          .800  equiv-band      3.47
hs00303500      142.0       5.500       5.500
hs00303600        0   -1  ext    .5    .5
* hs00303800     -1
* hs00303801     311.0   12
*
*************
*  hs_stw3  *
*************
*
*  Type            =     slab
*  Cell number     =        3
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      5.5     m
*
hs00304000     10    1    1
hs00304001      hs_stw3
hs00304002     21.400      1.000
hs00304003        1.
hs00304100     -1   1    .0000
hs00304102      .3500E-03   2
hs00304103      .1000E-02   3
hs00304104      .2000E-02   4
hs00304105      .4000E-02   5
hs00304106      .8000E-02   6
hs00304107      .1600E-01   7
hs00304108      .3000E-01   8
hs00304109      .5000E-01   9
hs00304110      .6900E-01  10
hs00304200     -1
hs00304201     'CARBON STEEL'         1
hs00304202     'CARBON STEEL'         2
hs00304203     'CARBON STEEL'         3
hs00304204     'CARBON STEEL'         4
hs00304205     'CARBON STEEL'         5
hs00304206     'CARBON STEEL'         6
hs00304207     'CARBON STEEL'         7
hs00304208     'CARBON STEEL'         8
hs00304209     'CARBON STEEL'         9
hs00304300     -1
hs00304400       1    3  ext    .5    .5
hs00304401          .800  equiv-band      3.47
hs00304500      172.0       5.500       5.500
hs00304600        0   -1  ext    .5    .5
* hs00304800     -1
* hs00304801     311.0   10

*
*************
* hs_conr4  *
*************
*
*  Type            =     slab
*  Cell number     =        4
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  32.6000 m
*  LHS Cell bottom =  21.4000 m
```

```
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      3.5     m
*
hs00401000     12    1    1
hs00401001     hs_conr4
hs00401002     32.600      .0000
hs00401003        1.
hs00401100     -1   1    .0000
hs00401102      .3500E-03   2
hs00401103      .1000E-02   3
hs00401104      .2000E-02   4
hs00401105      .4000E-02   5
hs00401106      .8000E-02   6
hs00401107      .1600E-01   7
hs00401108      .3000E-01   8
hs00401109      .6000E-01   9
hs00401110      .1200      10
hs00401111      .2000      11
hs00401112      .2700      12
hs00401200     -1
hs00401201     concrete    1
hs00401202     concrete    2
hs00401203     concrete    3
hs00401204     concrete    4
hs00401205     concrete    5
hs00401206     concrete    6
hs00401207     concrete    7
hs00401208     concrete    8
hs00401209     concrete    9
hs00401210     concrete   10
hs00401211     concrete   11
hs00401300     -1
hs00401400       1    4  ext    .5    .5
hs00401401        0.800  equiv-band      3.47
hs00401500      39.05       3.500       3.500
hs00401600        0   -1  ext    .5    .5
* hs00401800      -1
* hs00401801      311.0   12
*
*************
* hs_conf4  *
*************
*
*  Type            =     slab
*  Cell number     =        4
*  Heat struct     =        2
*  Geometry        =    floor
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      3.5     m
*
hs00402000     12    1    1
hs00402001     hs_conf4
hs00402002     21.400     -.1000E-06
hs00402003        1.
hs00402100     -1   1    .0000
hs00402102      .3500E-03   2
hs00402103      .1000E-02   3
hs00402104      .2000E-02   4
hs00402105      .4000E-02   5
```

```
hs00402106       .8000E-02   6
hs00402107       .1600E-01   7
hs00402108       .3000E-01   8
hs00402109       .6000E-01   9
hs00402110       .1200      10
hs00402111       .2000      11
hs00402112       .2700      12
hs00402200      -1
hs00402201      concrete    1
hs00402202      concrete    2
hs00402203      concrete    3
hs00402204      concrete    4
hs00402205      concrete    5
hs00402206      concrete    6
hs00402207      concrete    7
hs00402208      concrete    8
hs00402209      concrete    9
hs00402210      concrete   10
hs00402211      concrete   11
hs00402300      -1
hs00402400        1    4  ext    .5    .5
hs00402401          .800  equiv-band      3.47
hs00402500       23.05       3.500       3.500
hs00402600         0   -1  ext    .5    .5
* hs00402800      -1
* hs00402801      311.0   12
*
*************
* hs_conw4  *
*************
*
*  Type            =     slab
*  Cell number     =        4
*  Heat struct     =        3
*  Geometry        =     wall
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      5.5     m
*
hs00403000      12    1    1
hs00403001      hs_conw4
hs00403002      21.400      1.000
hs00403003        1.
hs00403100      -1   1    .0000
hs00403102       .3500E-03   2
hs00403103       .1000E-02   3
hs00403104       .2000E-02   4
hs00403105       .4000E-02   5
hs00403106       .8000E-02   6
hs00403107       .1600E-01   7
hs00403108       .3000E-01   8
hs00403109       .6000E-01   9
hs00403110       .1200      10
hs00403111       .2000      11
hs00403112       .2700      12
hs00403200      -1
hs00403201      concrete    1
hs00403202      concrete    2
hs00403203      concrete    3
hs00403204      concrete    4
hs00403205      concrete    5
```

```
hs00403206     concrete    6
hs00403207     concrete    7
hs00403208     concrete    8
hs00403209     concrete    9
hs00403210     concrete   10
hs00403211     concrete   11
hs00403300     -1
hs00403400       1    4  ext    .5    .5
hs00403401         .800  equiv-band      3.47
hs00403500      142.0       5.500       5.500
hs00403600        0   -1  ext    .5    .5
* hs00403800      -1
* hs00403801      311.0   12
*
*************
*  hs_stw4  *
*************
*
*  Type            =     slab
*  Cell number     =        4
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      5.5     m
*
hs00404000     10    1    1
hs00404001      hs_stw4
hs00404002     21.400      1.000
hs00404003       1.
hs00404100     -1   1    .0000
hs00404102      .3500E-03   2
hs00404103      .1000E-02   3
hs00404104      .2000E-02   4
hs00404105      .4000E-02   5
hs00404106      .8000E-02   6
hs00404107      .1600E-01   7
hs00404108      .3000E-01   8
hs00404109      .5000E-01   9
hs00404110      .6900E-01  10
hs00404200     -1
hs00404201     'CARBON STEEL'         1
hs00404202     'CARBON STEEL'         2
hs00404203     'CARBON STEEL'         3
hs00404204     'CARBON STEEL'         4
hs00404205     'CARBON STEEL'         5
hs00404206     'CARBON STEEL'         6
hs00404207     'CARBON STEEL'         7
hs00404208     'CARBON STEEL'         8
hs00404209     'CARBON STEEL'         9
hs00404300     -1
hs00404400       1    4  ext    .5    .5
hs00404401         .800  equiv-band      3.47
hs00404500      172.0       5.500       5.500
hs00404600        0   -1  ext    .5    .5
* hs00404800      -1
* hs00404801      311.0   10
*
*************
* hs_conr5  *
*************
```

```
*
*  Type            =     slab
*  Cell number     =        5
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  32.6000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      3.5     m
*
hs00501000     12    1    1
hs00501001     hs_conr5
hs00501002     32.600      .0000
hs00501003        1.
hs00501100     -1   1    .0000
hs00501102      .3500E-03   2
hs00501103      .1000E-02   3
hs00501104      .2000E-02   4
hs00501105      .4000E-02   5
hs00501106      .8000E-02   6
hs00501107      .1600E-01   7
hs00501108      .3000E-01   8
hs00501109      .6000E-01   9

hs00501110      .1200      10
hs00501111      .2000      11
hs00501112      .2700      12
hs00501200     -1
hs00501201     concrete    1
hs00501202     concrete    2
hs00501203     concrete    3
hs00501204     concrete    4
hs00501205     concrete    5
hs00501206     concrete    6
hs00501207     concrete    7
hs00501208     concrete    8
hs00501209     concrete    9
hs00501210     concrete   10
hs00501211     concrete   11
hs00501300     -1
hs00501400       1    5  ext    .5    .5
hs00501401        0.800  equiv-band      3.47
hs00501500      39.05       3.500       3.500
hs00501600        0   -1  ext    .5    .5
* hs00501800     -1
* hs00501801     311.0   12
*
*************
* hs_conf5  *
*************
*
*  Type            =     slab
*  Cell number     =        5
*  Heat struct     =        2
*  Geometry        =    floor
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      3.5     m
*
hs00502000     12    1    1
```

```
hs00502001     hs_conf5
hs00502002     21.400     -.1000E-06
hs00502003        1.
hs00502100     -1   1    .0000
hs00502102      .3500E-03   2
hs00502103      .1000E-02   3
hs00502104      .2000E-02   4

hs00502105      .4000E-02   5
hs00502106      .8000E-02   6
hs00502107      .1600E-01   7
hs00502108      .3000E-01   8
hs00502109      .6000E-01   9
hs00502110      .1200      10
hs00502111      .2000      11
hs00502112      .2700      12
hs00502200     -1
hs00502201     concrete    1
hs00502202     concrete    2
hs00502203     concrete    3
hs00502204     concrete    4
hs00502205     concrete    5
hs00502206     concrete    6
hs00502207     concrete    7
hs00502208     concrete    8
hs00502209     concrete    9
hs00502210     concrete   10
hs00502211     concrete   11
hs00502300     -1
hs00502400       1    5  ext    .5    .5
hs00502401          .800  equiv-band      3.47
hs00502500      23.05       3.500       3.500
hs00502600        0   -1  ext    .5    .5
* hs00502800     -1
* hs00502801     311.0   12
*
*************
* hs_conw5  *
*************
*
*  Type           =     slab
*  Cell number    =        5
*  Heat struct    =        3
*  Geometry       =     wall
*  HS elev.       =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height    =      11.     m
*  Charact. length =      5.5     m
*
hs00503000     12    1    1
hs00503001     hs_conw5
hs00503002     21.400      1.000
hs00503003        1.
hs00503100     -1   1    .0000
hs00503102      .3500E-03   2
hs00503103      .1000E-02   3
hs00503104      .2000E-02   4
hs00503105      .4000E-02   5
hs00503106      .8000E-02   6
hs00503107      .1600E-01   7
hs00503108      .3000E-01   8
hs00503109      .6000E-01   9
```

```
hs00503110       .1200      10
hs00503111       .2000      11
hs00503112       .2700      12
hs00503200      -1
hs00503201      concrete    1
hs00503202      concrete    2
hs00503203      concrete    3
hs00503204      concrete    4
hs00503205      concrete    5
hs00503206      concrete    6
hs00503207      concrete    7
hs00503208      concrete    8
hs00503209      concrete    9
hs00503210      concrete   10
hs00503211      concrete   11
hs00503300      -1
hs00503400        1    5  ext    .5    .5
hs00503401          .800  equiv-band      3.47
hs00503500       142.0       5.500       5.500
hs00503600         0   -1  ext    .5    .5
* hs00503800      -1
* hs00503801      311.0   12
*
*************
*  hs_stw5  *
*************
*
*  Type            =     slab
*  Cell number     =        5
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      5.5     m
*
hs00504000      10    1    1
hs00504001       hs_stw5
hs00504002      21.400      1.000
hs00504003         1.
hs00504100      -1   1    .0000
hs00504102       .3500E-03   2
hs00504103       .1000E-02   3
hs00504104       .2000E-02   4
hs00504105       .4000E-02   5
hs00504106       .8000E-02   6
hs00504107       .1600E-01   7
hs00504108       .3000E-01   8
hs00504109       .5000E-01   9
hs00504110       .6900E-01  10
hs00504200      -1
hs00504201      'CARBON STEEL'         1
hs00504202      'CARBON STEEL'         2
hs00504203      'CARBON STEEL'         3
hs00504204      'CARBON STEEL'         4
hs00504205      'CARBON STEEL'         5
hs00504206      'CARBON STEEL'         6
hs00504207      'CARBON STEEL'         7
hs00504208      'CARBON STEEL'         8
hs00504209      'CARBON STEEL'         9
hs00504300      -1
hs00504400        1    5  ext    .5    .5
```

```
hs00504401         .800  equiv-band      3.47
hs00504500      172.0       5.500       5.500
hs00504600        0   -1  ext    .5    .5
* hs00504800      -1
* hs00504801      311.0   10
*
*************
* hs_conr6  *
*************
*
*  Type            =     slab
*  Cell number     =        6
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  19.9000 m
*  LHS Cell bottom =  12.1000 m
*  LHS Cell top    =  19.9000 m
*  Cell height     =      7.8     m
*  Charact. length =      8.1     m
*
hs00601000     13    1    1
hs00601001     hs_conr6
hs00601002     19.900      .0000
hs00601003        1.
hs00601100     -1   1    .0000
hs00601102      .3500E-03   2
hs00601103      .1000E-02   3
hs00601104      .2000E-02   4
hs00601105      .4000E-02   5
hs00601106      .8000E-02   6
hs00601107      .1600E-01   7
hs00601108      .3000E-01   8
hs00601109      .6000E-01   9
hs00601110      .1200      10
hs00601111      .2400      11
hs00601112      .4100      12
hs00601113      .6300      13
hs00601200     -1
hs00601201     concrete    1
hs00601202     concrete    2
hs00601203     concrete    3
hs00601204     concrete    4
hs00601205     concrete    5
hs00601206     concrete    6
hs00601207     concrete    7
hs00601208     concrete    8
hs00601209     concrete    9
hs00601210     concrete   10
hs00601211     concrete   11
hs00601212     concrete   12
hs00601300     -1
hs00601400       1    6  ext    .5    .5
hs00601401        0.800  equiv-band      3.95
hs00601500      51.50       8.100       8.100
hs00601600        0   -1  ext    .5    .5
* hs00601800      -1
* hs00601801      311.0   13
*
*************
* hs_conf6  *
*************
*
*  Type            =     slab
```

```
*  Cell number     =        6
*  Heat struct     =        2
*  Geometry        =    floor
*  HS elev.        =  12.1000 m
*  LHS Cell bottom =  12.1000 m
*  LHS Cell top    =  19.9000 m
*  Cell height     =      7.8     m
*  Charact. length =      1.6     m
*
hs00602000     13    1    1
hs00602001     hs_conf6
hs00602002     12.100     -.1000E-06
hs00602003        1.
hs00602100     -1   1    .0000
hs00602102      .3500E-03   2
hs00602103      .1000E-02   3
hs00602104      .2000E-02   4
hs00602105      .4000E-02   5
hs00602106      .8000E-02   6
hs00602107      .1600E-01   7
hs00602108      .3000E-01   8
hs00602109      .6000E-01   9
hs00602110      .1200      10
hs00602111      .2400      11
hs00602112      .4100      12
hs00602113      .6300      13
hs00602200     -1
hs00602201     concrete    1
hs00602202     concrete    2
hs00602203     concrete    3
hs00602204     concrete    4
hs00602205     concrete    5
hs00602206     concrete    6
hs00602207     concrete    7
hs00602208     concrete    8
hs00602209     concrete    9
hs00602210     concrete   10
hs00602211     concrete   11
hs00602212     concrete   12
hs00602300     -1
hs00602400       1    6  ext    .5    .5
hs00602401          .800  equiv-band      3.95
hs00602500      32.50       1.600       1.600
hs00602600        0   -1  ext    .5    .5
* hs00602800     -1
* hs00602801     311.0   13
*
* HS did not fit inside of volume
* Cell height    =   9.4000 m
* Reset to       =   7.8000 m
*
*
*************
* hs_conw6  *
*************
*
*  Type            =     slab
*  Cell number     =        6
*  Heat struct     =        3
*  Geometry        =     wall
*  HS elev.        =  12.1000 m
*  LHS Cell bottom =  12.1000 m
*  LHS Cell top    =  19.9000 m
```

```
*  Cell height     =      7.8     m
*  Charact. length =      7.8     m
*
hs00603000     13    1    1
hs00603001     hs_conw6
hs00603002     12.100      1.000
hs00603003        1.
hs00603100     -1   1    .0000
hs00603102      .3500E-03   2
hs00603103      .1000E-02   3
hs00603104      .2000E-02   4
hs00603105      .4000E-02   5
hs00603106      .8000E-02   6
hs00603107      .1600E-01   7
hs00603108      .3000E-01   8
hs00603109      .6000E-01   9
hs00603110      .1200      10
hs00603111      .2400      11
hs00603112      .4100      12
hs00603113      .6300      13
hs00603200     -1
hs00603201     concrete    1
hs00603202     concrete    2
hs00603203     concrete    3
hs00603204     concrete    4
hs00603205     concrete    5
hs00603206     concrete    6
hs00603207     concrete    7
hs00603208     concrete    8
hs00603209     concrete    9
hs00603210     concrete   10
hs00603211     concrete   11
hs00603212     concrete   12
hs00603300     -1
hs00603400       1    6  ext    .5    .5
hs00603401          .800  equiv-band      3.95
hs00603500      240.0       7.7999      7.7999
hs00603600        0   -1  ext    .5    .5
* hs00603800     -1
* hs00603801     311.0   13
*
*************
* hs_istw6  *
*************
*
*  Type            =     slab
*  Cell number     =        6
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =  12.1000 m
*  LHS Cell bottom =  12.1000 m
*  LHS Cell top    =  19.9000 m
*  Cell height     =      7.8     m
*  Charact. length =      4.1     m
*
hs00604000     13    1    1
hs00604001     hs_istw6
hs00604002     12.100      1.000
hs00604003        1.
hs00604100     -1   1    .0000
hs00604102      .3500E-03   2
hs00604103      .1000E-02   3
hs00604104      .2000E-02   4
```

```
hs00604105      .4000E-02   5
hs00604106      .8000E-02   6
hs00604107      .1600E-01   7
hs00604108      .3000E-01   8
hs00604109      .5000E-01   9
hs00604110      .7600E-01  10
hs00604111      .1020      11
hs00604112      .1540      12
hs00604113      .2410      13
hs00604200     -1
hs00604201     insul      1
hs00604202     insul      2
hs00604203     insul      3
hs00604204     insul      4
hs00604205     insul      5
hs00604206     insul      6
hs00604207     insul      7
hs00604208     insul      8
hs00604209     insul      9
hs00604210     'CARBON STEEL'         10
hs00604211     'CARBON STEEL'         11
hs00604212     'CARBON STEEL'         12
hs00604300     -1
hs00604400       1    6  ext    .5    .5
hs00604401          .800  equiv-band      3.95
hs00604500      57.20       4.100       4.100
hs00604600     2110   -1  ext    .5    .5
* hs00604800     -1
* hs00604801     616.0   13
*
*************
* hs_istf6  *
*************
*
*  Type            =     slab
*  Cell number     =        6
*  Heat struct     =        5
*  Geometry        =    floor
*  HS elev.        =  12.1000 m
*  LHS Cell bottom =  12.1000 m
*  LHS Cell top    =  19.9000 m
*  Cell height     =      7.8     m
*  Charact. length =      4.9     m
*
hs00605000     13    1    1
hs00605001     hs_istf6
hs00605002     12.100     -.1000E-06
hs00605003       1.
hs00605100     -1   1    .0000
hs00605102      .3500E-03   2
hs00605103      .1000E-02   3
hs00605104      .2000E-02   4
hs00605105      .4000E-02   5
hs00605106      .8000E-02   6
hs00605107      .1600E-01   7
hs00605108      .3000E-01   8
hs00605109      .5000E-01   9
hs00605110      .7600E-01  10
hs00605111      .1020      11
hs00605112      .1540      12
hs00605113      .2410      13
hs00605200     -1
hs00605201     insul      1
```

```
hs00605202     insul      2
hs00605203     insul      3
hs00605204     insul      4
hs00605205     insul      5
hs00605206     insul      6
hs00605207     insul      7
hs00605208     insul      8
hs00605209     insul      9
hs00605210     'CARBON STEEL'        10
hs00605211     'CARBON STEEL'        11
hs00605212     'CARBON STEEL'        12
hs00605300     -1
hs00605400       1    6  ext    .5    .5
hs00605401          .800  equiv-band      3.95
hs00605500      19.00       4.900       4.900
hs00605600     2110   -1  ext    .5    .5
* hs00605800     -1
* hs00605801     616.0   13
*
*************
* hs_conw7  *
*************
*
*  Type            =     slab
*  Cell number     =        7
*  Heat struct     =        1
*  Geometry        =     wall
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      5.5     m
*
hs00701000     12    1    1
hs00701001     hs_conw7
hs00701002     21.400      1.000
hs00701003        1.
hs00701100     -1   1    .0000
hs00701102      .3500E-03   2
hs00701103      .1000E-02   3
hs00701104      .2000E-02   4
hs00701105      .4000E-02   5
hs00701106      .8000E-02   6
hs00701107      .1600E-01   7
hs00701108      .3000E-01   8
hs00701109      .6000E-01   9
hs00701110      .1200      10
hs00701111      .2000      11
hs00701112      .2700      12
hs00701200     -1
hs00701201     concrete    1
hs00701202     concrete    2
hs00701203     concrete    3
hs00701204     concrete    4
hs00701205     concrete    5
hs00701206     concrete    6
hs00701207     concrete    7
hs00701208     concrete    8
hs00701209     concrete    9
hs00701210     concrete   10
hs00701211     concrete   11
hs00701300     -1
hs00701400       1    7  ext    .5    .5
```

```
hs00701401        0.800  equiv-band      3.47
hs00701500      64.00       5.500       5.500
hs00701600        0   -1  ext    .5    .5
* hs00701800      -1
* hs00701801      311.0   12
*
*************
*  hs_stw7  *
*************
*
*  Type            =     slab
*  Cell number     =        7
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  21.4000 m
*  LHS Cell bottom =  21.4000 m
*  LHS Cell top    =  32.6000 m
*  Cell height     =      11.     m
*  Charact. length =      5.5     m
*
hs00702000     10    1    1
hs00702001      hs_stw7
hs00702002     21.400      1.000
hs00702003        1.
hs00702100     -1   1    .0000
hs00702102      .3500E-03   2
hs00702103      .1000E-02   3
hs00702104      .2000E-02   4
hs00702105      .4000E-02   5
hs00702106      .8000E-02   6
hs00702107      .1600E-01   7
hs00702108      .3000E-01   8
hs00702109      .5000E-01   9
hs00702110      .6900E-01  10
hs00702200     -1
hs00702201     'CARBON STEEL'         1
hs00702202     'CARBON STEEL'         2
hs00702203     'CARBON STEEL'         3
hs00702204     'CARBON STEEL'         4
hs00702205     'CARBON STEEL'         5
hs00702206     'CARBON STEEL'         6
hs00702207     'CARBON STEEL'         7
hs00702208     'CARBON STEEL'         8
hs00702209     'CARBON STEEL'         9
hs00702300     -1
hs00702400       1    7  ext    .5    .5
hs00702401         .800  equiv-band      3.47
hs00702500      64.00       5.500       5.500
hs00702600        0   -1  ext    .5    .5
* hs00702800      -1
* hs00702801      311.0   10
*
*************
* hs_conr8  *
*************
*
*  Type            =     slab
*  Cell number     =        8
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  19.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
```

```
*  Cell height     =      14.     m
*  Charact. length =      6.7     m
*
hs00801000     12    1    1
hs00801001     hs_conr8
hs00801002     19.300      .0000
hs00801003        1.
hs00801100     -1   1    .0000
hs00801102      .3500E-03   2
hs00801103      .1000E-02   3
hs00801104      .2000E-02   4
hs00801105      .4000E-02   5
hs00801106      .8000E-02   6
hs00801107      .1600E-01   7
hs00801108      .3000E-01   8
hs00801109      .6000E-01   9
hs00801110      .1200      10
hs00801111      .2400      11
hs00801112      .3600      12
hs00801200     -1
hs00801201     concrete    1
hs00801202     concrete    2
hs00801203     concrete    3
hs00801204     concrete    4
hs00801205     concrete    5
hs00801206     concrete    6
hs00801207     concrete    7
hs00801208     concrete    8
hs00801209     concrete    9
hs00801210     concrete   10
hs00801211     concrete   11
hs00801300     -1
hs00801400       1    8  ext    .5    .5
hs00801401         .800  equiv-band      3.22
hs00801500      124.0       6.700       6.700
hs00801600        0   -1  ext    .5    .5
* hs00801800     -1
* hs00801801     311.0   12
*
* HS did not fit inside of volume
* Cell height    =  14.0000 m
* Reset to       =  14.0000 m
*
*
*************
* hs_conw8  *
*************
*
*  Type            =     slab
*  Cell number     =        8
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      14.     m
*
hs00802000     12    1    1
hs00802001     hs_conw8
hs00802002     5.3000      1.000
hs00802003        1.
hs00802100     -1   1    .0000
```

```
hs00802102       .3500E-03   2
hs00802103       .1000E-02   3
hs00802104       .2000E-02   4
hs00802105       .4000E-02   5
hs00802106       .8000E-02   6
hs00802107       .1600E-01   7
hs00802108       .3000E-01   8
hs00802109       .6000E-01   9
hs00802110       .1200      10
hs00802111       .2400      11
hs00802112       .3600      12
hs00802200      -1
hs00802201      concrete    1
hs00802202      concrete    2
hs00802203      concrete    3
hs00802204      concrete    4
hs00802205      concrete    5
hs00802206      concrete    6
hs00802207      concrete    7
hs00802208      concrete    8
hs00802209      concrete    9
hs00802210      concrete   10
hs00802211      concrete   11
hs00802300      -1
hs00802400        1    8  ext    .5    .5
hs00802401          .800  equiv-band      3.22
hs00802500       727.0       14.00       14.00
hs00802600         0   -1  ext    .5    .5
* hs00802800      -1
* hs00802801      311.0   12
*
* HS did not fit inside of volume
* Cell height    =  14.0000 m
* Reset to       =  14.0000 m
*
*
*************
*  hs_stw8  *
*************
*
*  Type            =     slab
*  Cell number     =        8
*  Heat struct     =        3
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      14.     m
*
hs00803000      10    1    1
hs00803001       hs_stw8
hs00803002      5.3000      1.000
hs00803003         1.
hs00803100      -1   1    .0000
hs00803102       .3500E-03   2
hs00803103       .1000E-02   3
hs00803104       .2000E-02   4
hs00803105       .4000E-02   5
hs00803106       .8000E-02   6
hs00803107       .1600E-01   7
hs00803108       .3000E-01   8
hs00803109       .5000E-01   9
```

```
hs00803110       .6900E-01  10
hs00803200      -1
hs00803201      'CARBON STEEL'         1
hs00803202      'CARBON STEEL'         2
hs00803203      'CARBON STEEL'         3
hs00803204      'CARBON STEEL'         4
hs00803205      'CARBON STEEL'         5
hs00803206      'CARBON STEEL'         6
hs00803207      'CARBON STEEL'         7
hs00803208      'CARBON STEEL'         8
hs00803209      'CARBON STEEL'         9
hs00803300      -1
hs00803400        1    8  ext    .5    .5

hs00803401          .800  equiv-band      3.22
hs00803500       784.3       14.00       14.00
hs00803600         0   -1  ext    .5    .5
* hs00803800      -1
* hs00803801      311.0   10
*
*************
* hs_lcell  *
*************
*
*  Type            =     slab
*  Cell number     =        8
*  Heat struct     =        4
*  Geometry        =    floor
*  HS elev.        =   1.6800 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =     11.1     m
*  Charact. length =     11.1     m = sqrt(124 m2)
*
hs00804000      13    1    1
hs00804001      hs_lcell
hs00804002      1.6900    -1.e-7
hs00804003         1.
hs00804100      -1   1    .0000
hs00804102      0.0500       2
hs00804103      0.1000       3
hs00804104      0.2000       4
hs00804105      0.3000       5
hs00804106      0.4000       6
hs00804107      0.5000       7
hs00804108      1.0000       8
hs00804109      1.5000       9
hs00804110      2.0000      10
hs00804111      2.5000      11
hs00804112      3.0000      12
hs00804113      3.6200      13
hs00804200      -1
hs00804201      concrete    1
hs00804202      concrete    2
hs00804203      concrete    3
hs00804204      concrete    4
hs00804205      concrete    5
hs00804206      concrete    6
hs00804207      concrete    7
hs00804208      concrete    8
hs00804209      concrete    9
hs00804210      concrete   10
hs00804211      concrete   11
```

```
hs00804212     concrete   12
hs00804300     -1
hs00804400       1    8  ext    .5    .5
hs00804401        0.800  equiv-band      3.22
hs00804500     124.0       11.100      11.100
hs00804600       0   -1  ext    .5    .5
* hs00804800     -1
* hs00804801     311.0   13
*
*************
* hs_conr9  *
*************
*
*  Type            =     slab
*  Cell number     =        9
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  19.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      6.7     m
*
hs00901000     12    1    1
hs00901001     hs_conr9
hs00901002     19.300      .0000
hs00901003        1.
hs00901100     -1   1    .0000
hs00901102      .3500E-03   2
hs00901103      .1000E-02   3
hs00901104      .2000E-02   4
hs00901105      .4000E-02   5
hs00901106      .8000E-02   6
hs00901107      .1600E-01   7
hs00901108      .3000E-01   8
hs00901109      .6000E-01   9
hs00901110      .1200      10
hs00901111      .2400      11
hs00901112      .3600      12
hs00901200     -1
hs00901201     concrete    1
hs00901202     concrete    2
hs00901203     concrete    3
hs00901204     concrete    4
hs00901205     concrete    5
hs00901206     concrete    6
hs00901207     concrete    7
hs00901208     concrete    8
hs00901209     concrete    9
hs00901210     concrete   10
hs00901211     concrete   11
hs00901300     -1
hs00901400       1    9  ext    .5    .5
hs00901401         .800  equiv-band      3.22
hs00901500      106.0       6.700       6.700
hs00901600        0   -1  ext    .5    .5
* hs00901800     -1
* hs00901801     311.0   12
*
* HS did not fit inside of volume
* Cell height    =  14.0000 m
* Reset to       =  14.0000 m
*
```

```
*
*************
* hs_conw9  *
*************
*
*  Type            =     slab
*  Cell number     =        9
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      14.     m
*
hs00902000     12    1    1
hs00902001     hs_conw9
hs00902002     5.3000      1.000
hs00902003        1.
hs00902100     -1   1    .0000
hs00902102      .3500E-03   2
hs00902103      .1000E-02   3
hs00902104      .2000E-02   4
hs00902105      .4000E-02   5
hs00902106      .8000E-02   6
hs00902107      .1600E-01   7
hs00902108      .3000E-01   8
hs00902109      .6000E-01   9
hs00902110      .1200      10
hs00902111      .2400      11
hs00902112      .3600      12
hs00902200     -1
hs00902201     concrete    1
hs00902202     concrete    2
hs00902203     concrete    3
hs00902204     concrete    4
hs00902205     concrete    5
hs00902206     concrete    6
hs00902207     concrete    7
hs00902208     concrete    8
hs00902209     concrete    9
hs00902210     concrete   10
hs00902211     concrete   11
hs00902300     -1
hs00902400       1    9  ext    .5    .5
hs00902401          .800  equiv-band      3.22
hs00902500      623.0       14.00       14.00
hs00902600        0   -1  ext    .5    .5
* hs00902800     -1
* hs00902801     311.0   12
*
* HS did not fit inside of volume
* Cell height    =  14.0000 m
* Reset to       =  14.0000 m
*
*
*************
*  hs_stw9  *
*************
*
*  Type            =     slab
*  Cell number     =        9
*  Heat struct     =        3
```

```
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      14.     m
*
hs00903000     10    1    1
hs00903001      hs_stw9
hs00903002     5.3000      1.000
hs00903003        1.
hs00903100     -1   1    .0000
hs00903102      .3500E-03   2
hs00903103      .1000E-02   3
hs00903104      .2000E-02   4
hs00903105      .4000E-02   5
hs00903106      .8000E-02   6
hs00903107      .1600E-01   7
hs00903108      .3000E-01   8
hs00903109      .5000E-01   9
hs00903110      .6900E-01  10
hs00903200     -1
hs00903201     'CARBON STEEL'         1
hs00903202     'CARBON STEEL'         2
hs00903203     'CARBON STEEL'         3
hs00903204     'CARBON STEEL'         4
hs00903205     'CARBON STEEL'         5
hs00903206     'CARBON STEEL'         6
hs00903207     'CARBON STEEL'         7
hs00903208     'CARBON STEEL'         8
hs00903209     'CARBON STEEL'         9
hs00903300     -1
hs00903400       1    9  ext    .5    .5
hs00903401          .800  equiv-band      3.22
hs00903500      681.3       14.00       14.00
hs00903600        0   -1  ext    .5    .5
* hs00903800      -1
* hs00903801      311.0   10
*
*************
* hs_lcell  *
*************
*
*  Type            =     slab
*  Cell number     =        9
*  Heat struct     =        4
*  Geometry        =    floor
*  HS elev.        =   1.6800 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =     10.2     m
*  Charact. length =     10.2     m = sqrt(106 m2)
*
hs00904000     13    1    1
hs00904001     hs_lcell
hs00904002     1.6900    -1.e-7
hs00904003        1.
hs00904100     -1   1    .0000
hs00904102     0.0500       2
hs00904103     0.1000       3
hs00904104     0.2000       4
hs00904105     0.3000       5
hs00904106     0.4000       6
```

```
hs00904107     0.5000       7
hs00904108     1.0000       8
hs00904109     1.5000       9
hs00904110     2.0000      10
hs00904111     2.5000      11
hs00904112     3.0000      12
hs00904113     3.6200      13
hs00904200     -1
hs00904201     concrete    1
hs00904202     concrete    2
hs00904203     concrete    3
hs00904204     concrete    4
hs00904205     concrete    5
hs00904206     concrete    6
hs00904207     concrete    7
hs00904208     concrete    8
hs00904209     concrete    9
hs00904210     concrete   10
hs00904211     concrete   11
hs00904212     concrete   12
hs00904300     -1
hs00904400       1    9  ext    .5    .5
hs00904401        0.800  equiv-band      3.22
hs00904500     106.0       10.200      10.200
hs00904600       0   -1  ext    .5    .5
* hs00904800      -1
* hs00904801      311.0   13
*
*************
* hs_conr1  *
*************
*
*  Type            =     slab
*  Cell number     =       10
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  19.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      6.7     m
*
hs01001000     12    1    1
hs01001001     hs_conr1
hs01001002     19.300      .0000
hs01001003        1.
hs01001100     -1   1    .0000
hs01001102      .3500E-03   2
hs01001103      .1000E-02   3
hs01001104      .2000E-02   4
hs01001105      .4000E-02   5
hs01001106      .8000E-02   6
hs01001107      .1600E-01   7
hs01001108      .3000E-01   8
hs01001109      .6000E-01   9
hs01001110      .1200      10
hs01001111      .2400      11
hs01001112      .3600      12
hs01001200     -1
hs01001201     concrete    1
hs01001202     concrete    2
hs01001203     concrete    3
hs01001204     concrete    4
```

```
hs01001205     concrete    5
hs01001206     concrete    6
hs01001207     concrete    7
hs01001208     concrete    8
hs01001209     concrete    9
hs01001210     concrete   10
hs01001211     concrete   11
hs01001300     -1
hs01001400       1   10  ext    .5    .5
hs01001401          .800  equiv-band      3.22
hs01001500      124.0        6.700       6.700
hs01001600        0   -1  ext    .5    .5
* hs01001800      -1
* hs01001801      311.0   12
*
* HS did not fit inside of volume
* Cell height    =  14.0000 m
* Reset to       =  14.0000 m
*
*
*************
* hs_conw1  *
*************
*
*  Type            =     slab
*  Cell number     =       10
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      14.     m
*
hs01002000     12    1    1
hs01002001     hs_conw1
hs01002002     5.3000      1.000
hs01002003        1.
hs01002100     -1   1    .0000
hs01002102      .3500E-03   2
hs01002103      .1000E-02   3
hs01002104      .2000E-02   4
hs01002105      .4000E-02   5
hs01002106      .8000E-02   6
hs01002107      .1600E-01   7
hs01002108      .3000E-01   8
hs01002109      .6000E-01   9
hs01002110      .1200      10
hs01002111      .2400      11
hs01002112      .3600      12
hs01002200     -1
hs01002201     concrete    1
hs01002202     concrete    2
hs01002203     concrete    3
hs01002204     concrete    4
hs01002205     concrete    5
hs01002206     concrete    6

hs01002207     concrete    7
hs01002208     concrete    8
hs01002209     concrete    9
hs01002210     concrete   10
hs01002211     concrete   11
```

```
hs01002300     -1
hs01002400       1   10  ext    .5    .5
hs01002401          .800  equiv-band      3.22
hs01002500      727.0       14.00       14.00
hs01002600        0   -1  ext    .5    .5
* hs01002800     -1
* hs01002801     311.0   12
*
* HS did not fit inside of volume
* Cell height    =  14.0000 m
* Reset to       =  14.0000 m
*
*
*************
* hs_stw10  *
*************
*
*  Type            =     slab
*  Cell number     =       10
*  Heat struct     =        3
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      14.     m
*
hs01003000     10    1    1
hs01003001     hs_stw10
hs01003002     5.3000      1.000
hs01003003        1.
hs01003100     -1   1    .0000
hs01003102      .3500E-03   2
hs01003103      .1000E-02   3
hs01003104      .2000E-02   4
hs01003105      .4000E-02   5
hs01003106      .8000E-02   6
hs01003107      .1600E-01   7
hs01003108      .3000E-01   8
hs01003109      .5000E-01   9
hs01003110      .6900E-01  10
hs01003200     -1
hs01003201     'CARBON STEEL'         1
hs01003202     'CARBON STEEL'         2
hs01003203     'CARBON STEEL'         3
hs01003204     'CARBON STEEL'         4
hs01003205     'CARBON STEEL'         5
hs01003206     'CARBON STEEL'         6
hs01003207     'CARBON STEEL'         7
hs01003208     'CARBON STEEL'         8
hs01003209     'CARBON STEEL'         9
hs01003300     -1
hs01003400       1   10  ext    .5    .5
hs01003401          .800  equiv-band      3.22
hs01003500      784.3       14.00       14.00
hs01003600        0   -1  ext    .5    .5
* hs01003800     -1
* hs01003801     311.0   10
*
*
*************
* hs_lcell  *
*************
```

```
*
*  Type            =     slab
*  Cell number     =        8
*  Heat struct     =        4
*  Geometry        =    floor
*  HS elev.        =   1.6800 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =     11.1     m
*  Charact. length =     11.1     m = sqrt(124 m2)
*
hs01004000     13    1    1
hs01004001     hs_lcell
hs01004002     1.6900    -1.e-7
hs01004003        1.
hs01004100     -1   1    .0000
hs01004102     0.0500       2
hs01004103     0.1000       3
hs01004104     0.2000       4
hs01004105     0.3000       5
hs01004106     0.4000       6
hs01004107     0.5000       7
hs01004108     1.0000       8
hs01004109     1.5000       9
hs01004110     2.0000      10
hs01004111     2.5000      11
hs01004112     3.0000      12
hs01004113     3.6200      13
hs01004200     -1
hs01004201     concrete    1
hs01004202     concrete    2
hs01004203     concrete    3
hs01004204     concrete    4
hs01004205     concrete    5
hs01004206     concrete    6
hs01004207     concrete    7
hs01004208     concrete    8
hs01004209     concrete    9
hs01004210     concrete   10
hs01004211     concrete   11
hs01004212     concrete   12
hs01004300     -1
hs01004400       1   10  ext    .5    .5
hs01004401        0.800  equiv-band      3.22
hs01004500     124.0       11.100      11.100
hs01004600       0   -1  ext    .5    .5
* hs01004800      -1
* hs01004801      311.0   13
*
*************
* hs_conr1  *
*************
*
*  Type            =     slab
*  Cell number     =       11
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  19.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      3.9     m
*
```

```
hs01101000     12    1    1
hs01101001     hs_conr1
hs01101002     19.300      .0000
hs01101003        1.
hs01101100     -1   1    .0000
hs01101102      .3500E-03   2
hs01101103      .1000E-02   3
hs01101104      .2000E-02   4
hs01101105      .4000E-02   5
hs01101106      .8000E-02   6
hs01101107      .1600E-01   7

hs01101108      .3000E-01   8
hs01101109      .6000E-01   9
hs01101110      .1200      10
hs01101111      .2400      11
hs01101112      .3600      12
hs01101200     -1
hs01101201     concrete    1
hs01101202     concrete    2
hs01101203     concrete    3
hs01101204     concrete    4
hs01101205     concrete    5
hs01101206     concrete    6
hs01101207     concrete    7
hs01101208     concrete    8
hs01101209     concrete    9
hs01101210     concrete   10
hs01101211     concrete   11
hs01101300     -1
hs01101400       1   11  ext    .5    .5
hs01101401         .800  equiv-band      1.89
hs01101500      215.0       3.900       3.900
hs01101600        0   -1  ext    .5    .5
* hs01101800     -1
* hs01101801     311.0   12
*
*************
* hs_conf1  *
*************
*
*  Type            =     slab
*  Cell number     =       11
*  Heat struct     =        2
*  Geometry        =    floor
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      3.9     m
*
hs01102000     12    1    1
hs01102001     hs_conf1
hs01102002     5.3000     -.1000E-06
hs01102003        1.
hs01102100     -1   1    .0000
hs01102102      .3500E-03   2

hs01102103      .1000E-02   3
hs01102104      .2000E-02   4
hs01102105      .4000E-02   5
hs01102106      .8000E-02   6
hs01102107      .1600E-01   7
```

```
hs01102108      .3000E-01   8
hs01102109      .6000E-01   9
hs01102110      .1200      10
hs01102111      .2400      11
hs01102112      .3600      12
hs01102200     -1
hs01102201     concrete    1
hs01102202     concrete    2
hs01102203     concrete    3
hs01102204     concrete    4
hs01102205     concrete    5
hs01102206     concrete    6
hs01102207     concrete    7
hs01102208     concrete    8
hs01102209     concrete    9
hs01102210     concrete   10
hs01102211     concrete   11
hs01102300     -1
hs01102400       1   11  ext    .5    .5
hs01102401         .800  equiv-band      1.89
hs01102500      215.0       3.900       3.900
hs01102600        0   -1  ext    .5    .5
* hs01102800     -1
* hs01102801     311.0   12
*
*************
* hs_conw1  *
*************
*
*  Type            =     slab
*  Cell number     =       11
*  Heat struct     =        3
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      7.0     m
*
hs01103000     12    1    1
hs01103001     hs_conw1
hs01103002     5.3000      1.000
hs01103003        1.
hs01103100     -1   1    .0000
hs01103102      .3500E-03   2
hs01103103      .1000E-02   3
hs01103104      .2000E-02   4
hs01103105      .4000E-02   5
hs01103106      .8000E-02   6
hs01103107      .1600E-01   7
hs01103108      .3000E-01   8
hs01103109      .6000E-01   9
hs01103110      .1200      10
hs01103111      .2400      11
hs01103112      .3600      12
hs01103200     -1
hs01103201     concrete    1
hs01103202     concrete    2
hs01103203     concrete    3
hs01103204     concrete    4
hs01103205     concrete    5
hs01103206     concrete    6
hs01103207     concrete    7
```

```
hs01103208     concrete    8
hs01103209     concrete    9
hs01103210     concrete   10
hs01103211     concrete   11
hs01103300     -1
hs01103400       1   11  ext    .5    .5
hs01103401          .800  equiv-band      1.89
hs01103500      627.0       7.000       7.000
hs01103600        0   -1  ext    .5    .5
* hs01103800      -1
* hs01103801      311.0   12
*
* HS did not fit inside of volume
* Cell height    =  14.0000 m
* Reset to       =  14.0000 m
*
*
*************
* hs_stw11  *
*************
*
*  Type            =     slab
*  Cell number     =       11
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      14.     m
*
hs01104000      9    1    1
hs01104001     hs_stw11
hs01104002     5.3000      1.000
hs01104003        1.
hs01104100     -1   1    .0000
hs01104102      .3500E-03   2
hs01104103      .1000E-02   3
hs01104104      .2000E-02   4
hs01104105      .4000E-02   5
hs01104106      .8000E-02   6
hs01104107      .1300E-01   7
hs01104108      .2100E-01   8
hs01104109      .3100E-01   9
hs01104200     -1
hs01104201     'CARBON STEEL'         1
hs01104202     'CARBON STEEL'         2
hs01104203     'CARBON STEEL'         3
hs01104204     'CARBON STEEL'         4
hs01104205     'CARBON STEEL'         5
hs01104206     'CARBON STEEL'         6
hs01104207     'CARBON STEEL'         7
hs01104208     'CARBON STEEL'         8
hs01104300     -1
hs01104400       1   11  ext    .5    .5
hs01104401          .800  equiv-band      1.89
hs01104500      595.0       14.00       14.00
hs01104600        0   -1  ext    .5    .5
* hs01104800      -1
* hs01104801      311.0    9
*
*************
* hs_conr1  *
```

```
*************
*
*  Type            =     slab
*  Cell number     =       12
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  19.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      3.9     m
*
hs01201000     12    1    1
hs01201001     hs_conr1
hs01201002     19.300      .0000
hs01201003        1.
hs01201100     -1   1    .0000
hs01201102      .3500E-03   2
hs01201103      .1000E-02   3
hs01201104      .2000E-02   4
hs01201105      .4000E-02   5
hs01201106      .8000E-02   6
hs01201107      .1600E-01   7
hs01201108      .3000E-01   8
hs01201109      .6000E-01   9
hs01201110      .1200      10
hs01201111      .2400      11
hs01201112      .3600      12
hs01201200     -1
hs01201201     concrete    1
hs01201202     concrete    2
hs01201203     concrete    3
hs01201204     concrete    4
hs01201205     concrete    5
hs01201206     concrete    6
hs01201207     concrete    7
hs01201208     concrete    8
hs01201209     concrete    9
hs01201210     concrete   10
hs01201211     concrete   11
hs01201300     -1
hs01201400       1   12  ext    .5    .5
hs01201401          .800  equiv-band      1.88
hs01201500      211.0       3.900       3.900
hs01201600        0   -1  ext    .5    .5
* hs01201800      -1
* hs01201801      311.0   12
*
*************
* hs_conf1  *
*************
*
*  Type            =     slab
*  Cell number     =       12
*  Heat struct     =        2
*  Geometry        =    floor
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      3.9     m
*
hs01202000     12    1    1
```

```
hs01202001     hs_conf1
hs01202002     5.3000     -.1000E-06
hs01202003        1.
hs01202100     -1   1    .0000
hs01202102      .3500E-03   2
hs01202103      .1000E-02   3
hs01202104      .2000E-02   4
hs01202105      .4000E-02   5
hs01202106      .8000E-02   6
hs01202107      .1600E-01   7
hs01202108      .3000E-01   8
hs01202109      .6000E-01   9
hs01202110      .1200      10
hs01202111      .2400      11
hs01202112      .3600      12
hs01202200     -1
hs01202201     concrete    1
hs01202202     concrete    2
hs01202203     concrete    3
hs01202204     concrete    4
hs01202205     concrete    5
hs01202206     concrete    6
hs01202207     concrete    7
hs01202208     concrete    8
hs01202209     concrete    9
hs01202210     concrete   10
hs01202211     concrete   11
hs01202300     -1
hs01202400       1   12  ext    .5    .5
hs01202401         .800  equiv-band      1.88
hs01202500      211.0       3.900       3.900
hs01202600        0   -1  ext    .5    .5
* hs01202800     -1
* hs01202801     311.0   12
*
*************
* hs_conw1  *
*************
*
*  Type            =     slab
*  Cell number     =       12
*  Heat struct     =        3
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      7.0     m
*
hs01203000     12    1    1
hs01203001     hs_conw1
hs01203002     5.3000      1.000
hs01203003        1.
hs01203100     -1   1    .0000
hs01203102      .3500E-03   2
hs01203103      .1000E-02   3
hs01203104      .2000E-02   4
hs01203105      .4000E-02   5
hs01203106      .8000E-02   6
hs01203107      .1600E-01   7
hs01203108      .3000E-01   8
hs01203109      .6000E-01   9
hs01203110      .1200      10
```

```
hs01203111       .2400      11
hs01203112       .3600      12
hs01203200     -1
hs01203201     concrete    1
hs01203202     concrete    2
hs01203203     concrete    3
hs01203204     concrete    4
hs01203205     concrete    5
hs01203206     concrete    6
hs01203207     concrete    7
hs01203208     concrete    8
hs01203209     concrete    9
hs01203210     concrete   10
hs01203211     concrete   11
hs01203300     -1
hs01203400       1   12  ext    .5    .5
hs01203401          .800  equiv-band      1.88
hs01203500      613.0       7.000       7.000
hs01203600        0   -1  ext    .5    .5
* hs01203800     -1
* hs01203801     311.0   12
*
* HS did not fit inside of volume
* Cell height    =  14.0000 m
* Reset to       =  14.0000 m
*
*
*************
* hs_stw12  *
*************
*
*  Type            =     slab
*  Cell number     =       12
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      14.     m
*
hs01204000      9    1    1
hs01204001     hs_stw12
hs01204002     5.3000      1.000
hs01204003       1.
hs01204100     -1   1    .0000
hs01204102      .3500E-03   2
hs01204103      .1000E-02   3
hs01204104      .2000E-02   4
hs01204105      .4000E-02   5
hs01204106      .8000E-02   6
hs01204107      .1300E-01   7
hs01204108      .2100E-01   8
hs01204109      .3100E-01   9
hs01204200     -1
hs01204201     'CARBON STEEL'         1
hs01204202     'CARBON STEEL'         2
hs01204203     'CARBON STEEL'         3
hs01204204     'CARBON STEEL'         4
hs01204205     'CARBON STEEL'         5
hs01204206     'CARBON STEEL'         6
hs01204207     'CARBON STEEL'         7
hs01204208     'CARBON STEEL'         8
```

```
hs01204300     -1
hs01204400       1   12  ext    .5    .5
hs01204401          .800  equiv-band      1.88
hs01204500      583.0       14.00       14.00
hs01204600        0   -1  ext    .5    .5
* hs01204800     -1
* hs01204801     311.0    9
*
*************
* hs_conr1  *
*************
*
*  Type            =     slab
*  Cell number     =       13
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  19.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      3.9     m
*
hs01301000     12    1    1
hs01301001     hs_conr1
hs01301002     19.300      .0000
hs01301003        1.
hs01301100     -1   1    .0000
hs01301102      .3500E-03   2
hs01301103      .1000E-02   3
hs01301104      .2000E-02   4
hs01301105      .4000E-02   5
hs01301106      .8000E-02   6
hs01301107      .1600E-01   7
hs01301108      .3000E-01   8
hs01301109      .6000E-01   9
hs01301110      .1200      10
hs01301111      .2400      11
hs01301112      .3600      12
hs01301200     -1
hs01301201     concrete    1
hs01301202     concrete    2
hs01301203     concrete    3
hs01301204     concrete    4
hs01301205     concrete    5
hs01301206     concrete    6
hs01301207     concrete    7
hs01301208     concrete    8
hs01301209     concrete    9
hs01301210     concrete   10
hs01301211     concrete   11
hs01301300     -1
hs01301400       1   13  ext    .5    .5
hs01301401          .800  equiv-band      1.88
hs01301500      237.4       3.900       3.900
hs01301600        0   -1  ext    .5    .5
* hs01301800     -1
* hs01301801     311.0   12
*
*************
* hs_conf1  *
*************
*
*  Type            =     slab
```

```
*  Cell number     =       13
*  Heat struct     =        2
*  Geometry        =    floor
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      3.9     m
*
hs01302000     12    1    1
hs01302001     hs_conf1
hs01302002     5.3000     -.1000E-06
hs01302003        1.
hs01302100     -1   1    .0000
hs01302102      .3500E-03   2
hs01302103      .1000E-02   3
hs01302104      .2000E-02   4
hs01302105      .4000E-02   5
hs01302106      .8000E-02   6
hs01302107      .1600E-01   7
hs01302108      .3000E-01   8
hs01302109      .6000E-01   9
hs01302110      .1200      10
hs01302111      .2400      11
hs01302112      .3600      12
hs01302200     -1
hs01302201     concrete    1
hs01302202     concrete    2
hs01302203     concrete    3
hs01302204     concrete    4
hs01302205     concrete    5
hs01302206     concrete    6
hs01302207     concrete    7
hs01302208     concrete    8
hs01302209     concrete    9
hs01302210     concrete   10
hs01302211     concrete   11
hs01302300     -1
hs01302400       1   13  ext    .5    .5
hs01302401         .800  equiv-band      1.88
hs01302500      237.4       3.900       3.900
hs01302600        0   -1  ext    .5    .5
* hs01302800     -1
* hs01302801     311.0   12
*
*************
* hs_conw1  *
*************
*
*  Type            =     slab
*  Cell number     =       13
*  Heat struct     =        3
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      7.0     m
*
hs01303000     12    1    1
hs01303001     hs_conw1
hs01303002     5.3000      1.000
hs01303003        1.
```

```
hs01303100      -1   1    .0000
hs01303102       .3500E-03   2
hs01303103       .1000E-02   3
hs01303104       .2000E-02   4
hs01303105       .4000E-02   5
hs01303106       .8000E-02   6
hs01303107       .1600E-01   7
hs01303108       .3000E-01   8
hs01303109       .6000E-01   9
hs01303110       .1200      10
hs01303111       .2400      11
hs01303112       .3600      12
hs01303200      -1
hs01303201      concrete    1
hs01303202      concrete    2
hs01303203      concrete    3
hs01303204      concrete    4
hs01303205      concrete    5
hs01303206      concrete    6
hs01303207      concrete    7
hs01303208      concrete    8
hs01303209      concrete    9
hs01303210      concrete   10
hs01303211      concrete   11
hs01303300      -1
hs01303400        1   13  ext    .5    .5
hs01303401          .800  equiv-band      1.88
hs01303500       690.2       7.000       7.000
hs01303600         0   -1  ext    .5    .5
* hs01303800      -1
* hs01303801      311.0   12
*
* HS did not fit inside of volume
* Cell height    =  14.0000 m
* Reset to       =  14.0000 m
*
*
*************
* hs_stw13  *
*************
*
*  Type            =     slab
*  Cell number     =       13
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =   5.3000 m
*  LHS Cell bottom =   5.3000 m
*  LHS Cell top    =  19.3000 m
*  Cell height     =      14.     m
*  Charact. length =      14.     m
*
hs01304000       9    1    1
hs01304001      hs_stw13
hs01304002      5.3000      1.000
hs01304003         1.
hs01304100      -1   1    .0000
hs01304102       .3500E-03   2
hs01304103       .1000E-02   3
hs01304104       .2000E-02   4
hs01304105       .4000E-02   5
hs01304106       .8000E-02   6
hs01304107       .1300E-01   7
```

```
hs01304108      .2100E-01   8
hs01304109      .3100E-01   9
hs01304200     -1
hs01304201     'CARBON STEEL'         1
hs01304202     'CARBON STEEL'         2
hs01304203     'CARBON STEEL'         3
hs01304204     'CARBON STEEL'         4
hs01304205     'CARBON STEEL'         5
hs01304206     'CARBON STEEL'         6
hs01304207     'CARBON STEEL'         7
hs01304208     'CARBON STEEL'         8
hs01304300     -1
hs01304400       1   13  ext    .5    .5
hs01304401         .800  equiv-band      1.88
hs01304500      656.0       14.00       14.00
hs01304600        0   -1  ext    .5    .5
* hs01304800     -1
* hs01304801     311.0    9
*
*************
* hs_stw14  *
*************
*
*  Type            =     slab
*  Cell number     =       14
*  Heat struct     =        1
*  Geometry        =     wall
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      2.5     m
*
hs01401000      7    1    1
hs01401001     hs_stw14
hs01401002     17.750      1.000
hs01401003        1.
hs01401100     -1   1    .0000
hs01401102      .3500E-03   2
hs01401103      .1000E-02   3
hs01401104      .2000E-02   4
hs01401105      .4000E-02   5
hs01401106      .8000E-02   6
hs01401107      .1300E-01   7
hs01401200     -1
hs01401201     'CARBON STEEL'         1
hs01401202     'CARBON STEEL'         2
hs01401203     'CARBON STEEL'         3
hs01401204     'CARBON STEEL'         4
hs01401205     'CARBON STEEL'         5
hs01401206     'CARBON STEEL'         6
hs01401300     -1
hs01401400       1   14  ext    .5    .5
hs01401401         .800  equiv-band      0.76
hs01401500      70.00       2.500       2.500
hs01401600        0   -1  ext    .5    .5
* hs01401800     -1
* hs01401801     274.5    7
*
*************
* hs_stw14  *
*************
*
```

```
*  Type             =     slab
*  Cell number      =       14
*  Heat struct      =        2
*  Geometry         =     wall
*  HS elev.         =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top     =  20.2500 m
*  Cell height      =      2.5     m
*  Charact. length =      .20     m
*
hs01402000      7    1    1
hs01402001     hs_stw14
hs01402002     17.750      1.000
hs01402003        1.
hs01402100     -1   1    .0000
hs01402102      .3500E-03   2
hs01402103      .1000E-02   3
hs01402104      .2000E-02   4
hs01402105      .4000E-02   5
hs01402106      .6000E-02   6
hs01402107      .8100E-02   7
hs01402200     -1
hs01402201     'CARBON STEEL'         1
hs01402202     'CARBON STEEL'         2
hs01402203     'CARBON STEEL'         3
hs01402204     'CARBON STEEL'         4
hs01402205     'CARBON STEEL'         5
hs01402206     'CARBON STEEL'         6
hs01402300     -1
hs01402400       1   14  ext    .5    .5
hs01402401          .800  equiv-band      0.76
hs01402500      665.0       .2000       .2000
hs01402600        0   -1  ext    .5    .5
* hs01402800      -1
* hs01402801      274.5    7
*
*************
* hs_conf1  *
*************
*
*  Type             =     slab
*  Cell number      =       14
*  Heat struct      =        3
*  Geometry         =    floor
*  HS elev.         =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top     =  20.2500 m
*  Cell height      =      2.5     m
*  Charact. length =      3.2     m
*
hs01403000     13    1    1
hs01403001     hs_conf1
hs01403002     17.750     -.1000E-06
hs01403003        1.
hs01403100     -1   1    .0000
hs01403102      .3500E-03   2
hs01403103      .1000E-02   3
hs01403104      .2000E-02   4
hs01403105      .4000E-02   5
hs01403106      .8000E-02   6
hs01403107      .1600E-01   7
hs01403108      .3200E-01   8
hs01403109      .6400E-01   9
```

```
hs01403110      .1300      10
hs01403111      .2600      11
hs01403112      .5000      12
hs01403113      .7500      13
hs01403200     -1
hs01403201     concrete    1
hs01403202     concrete    2
hs01403203     concrete    3
hs01403204     concrete    4
hs01403205     concrete    5
hs01403206     concrete    6
hs01403207     concrete    7
hs01403208     concrete    8

hs01403209     concrete    9
hs01403210     concrete   10
hs01403211     concrete   11
hs01403212     concrete   12
hs01403300     -1
hs01403400       1   14  ext    .5    .5
hs01403401         .800  equiv-band      0.76
hs01403500      77.50       3.200       3.200
hs01403600        0   -1  ext    .5    .5
* hs01403800     -1
* hs01403801     274.5   13
*
*************
* hs_stw15  *
*************
*
*  Type            =     slab
*  Cell number     =       15
*  Heat struct     =        1
*  Geometry        =     wall
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      2.5     m
*
hs01501000      7    1    1
hs01501001     hs_stw15
hs01501002     17.750      1.000
hs01501003       1.
hs01501100     -1   1    .0000
hs01501102      .3500E-03   2
hs01501103      .1000E-02   3
hs01501104      .2000E-02   4
hs01501105      .4000E-02   5
hs01501106      .8000E-02   6
hs01501107      .1300E-01   7
hs01501200     -1
hs01501201     'CARBON STEEL'         1
hs01501202     'CARBON STEEL'         2
hs01501203     'CARBON STEEL'         3
hs01501204     'CARBON STEEL'         4
hs01501205     'CARBON STEEL'         5
hs01501206     'CARBON STEEL'         6
hs01501300     -1
hs01501400       1   15  ext    .5    .5
hs01501401         .800  equiv-band      0.76
hs01501500      70.00       2.500       2.500
hs01501600        0   -1  ext    .5    .5
```

```
* hs01501800     -1
* hs01501801     274.5    7
*
*************
* hs_stw15  *
*************
*
*  Type            =     slab
*  Cell number     =       15
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      .20     m
*
hs01502000      7    1    1
hs01502001     hs_stw15
hs01502002     17.750      1.000
hs01502003        1.
hs01502100     -1   1    .0000
hs01502102      .3500E-03   2
hs01502103      .1000E-02   3
hs01502104      .2000E-02   4
hs01502105      .4000E-02   5
hs01502106      .6000E-02   6
hs01502107      .8100E-02   7
hs01502200     -1
hs01502201     'CARBON STEEL'         1
hs01502202     'CARBON STEEL'         2
hs01502203     'CARBON STEEL'         3
hs01502204     'CARBON STEEL'         4
hs01502205     'CARBON STEEL'         5
hs01502206     'CARBON STEEL'         6
hs01502300     -1
hs01502400       1   15  ext    .5    .5
hs01502401         .800  equiv-band      0.76
hs01502500      665.0       .2000       .2000
hs01502600        0   -1  ext    .5    .5
* hs01502800     -1
* hs01502801     274.5    7
*
*************
* hs_conf1  *
*************
*
*  Type            =     slab
*  Cell number     =       15
*  Heat struct     =        3
*  Geometry        =    floor
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      3.2     m
*
hs01503000     13    1    1
hs01503001     hs_conf1
hs01503002     17.750     -.1000E-06
hs01503003        1.
hs01503100     -1   1    .0000
hs01503102      .3500E-03   2
```

```
hs01503103       .1000E-02   3
hs01503104       .2000E-02   4
hs01503105       .4000E-02   5
hs01503106       .8000E-02   6
hs01503107       .1600E-01   7
hs01503108       .3200E-01   8
hs01503109       .6400E-01   9
hs01503110       .1300      10
hs01503111       .2600      11
hs01503112       .5000      12
hs01503113       .7500      13
hs01503200      -1
hs01503201      concrete    1
hs01503202      concrete    2
hs01503203      concrete    3
hs01503204      concrete    4
hs01503205      concrete    5
hs01503206      concrete    6
hs01503207      concrete    7
hs01503208      concrete    8
hs01503209      concrete    9
hs01503210      concrete   10
hs01503211      concrete   11
hs01503212      concrete   12
hs01503300      -1
hs01503400        1   15  ext    .5    .5
hs01503401          .800  equiv-band      0.76
hs01503500       77.50       3.200       3.200
hs01503600         0   -1  ext    .5    .5
* hs01503800      -1
* hs01503801      274.5   13
*
*************
* hs_stw16  *
*************
*
*  Type            =     slab
*  Cell number     =       16
*  Heat struct     =        1
*  Geometry        =     wall
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      2.5     m
*
hs01601000       7    1    1
hs01601001      hs_stw16
hs01601002      17.750      1.000
hs01601003         1.
hs01601100      -1   1    .0000
hs01601102       .3500E-03   2
hs01601103       .1000E-02   3
hs01601104       .2000E-02   4
hs01601105       .4000E-02   5
hs01601106       .8000E-02   6
hs01601107       .1300E-01   7
hs01601200      -1
hs01601201      'CARBON STEEL'         1
hs01601202      'CARBON STEEL'         2
hs01601203      'CARBON STEEL'         3
hs01601204      'CARBON STEEL'         4
hs01601205      'CARBON STEEL'         5
```

```
hs01601206     'CARBON STEEL'         6
hs01601300     -1
hs01601400       1   16  ext    .5    .5
hs01601401          .800  equiv-band      0.76

hs01601500      70.00       2.500       2.500
hs01601600        0   -1  ext    .5    .5
* hs01601800     -1
* hs01601801     274.5    7
*
*************
* hs_stw16  *
*************
*
*  Type            =     slab
*  Cell number     =       16
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      .20     m
*
hs01602000      7    1    1
hs01602001     hs_stw16
hs01602002     17.750      1.000
hs01602003        1.
hs01602100     -1   1    .0000
hs01602102      .3500E-03   2
hs01602103      .1000E-02   3
hs01602104      .2000E-02   4
hs01602105      .4000E-02   5
hs01602106      .6000E-02   6
hs01602107      .8100E-02   7
hs01602200     -1
hs01602201     'CARBON STEEL'         1
hs01602202     'CARBON STEEL'         2
hs01602203     'CARBON STEEL'         3
hs01602204     'CARBON STEEL'         4
hs01602205     'CARBON STEEL'         5
hs01602206     'CARBON STEEL'         6
hs01602300     -1
hs01602400       1   16  ext    .5    .5
hs01602401          .800  equiv-band      0.76
hs01602500      665.0       .2000       .2000
hs01602600        0   -1  ext    .5    .5
* hs01602800     -1
* hs01602801     274.5    7
*
*************
* hs_conf1  *
*************
*
*  Type            =     slab
*  Cell number     =       16
*  Heat struct     =        3
*  Geometry        =    floor
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      3.2     m
```

```
*
hs01603000     13    1    1
hs01603001     hs_conf1
hs01603002     17.750     -.1000E-06
hs01603003        1.
hs01603100     -1   1    .0000
hs01603102      .3500E-03   2
hs01603103      .1000E-02   3
hs01603104      .2000E-02   4
hs01603105      .4000E-02   5
hs01603106      .8000E-02   6
hs01603107      .1600E-01   7
hs01603108      .3200E-01   8
hs01603109      .6400E-01   9
hs01603110      .1300      10
hs01603111      .2600      11
hs01603112      .5000      12
hs01603113      .7500      13
hs01603200     -1
hs01603201     concrete    1
hs01603202     concrete    2
hs01603203     concrete    3
hs01603204     concrete    4
hs01603205     concrete    5
hs01603206     concrete    6
hs01603207     concrete    7
hs01603208     concrete    8
hs01603209     concrete    9
hs01603210     concrete   10
hs01603211     concrete   11
hs01603212     concrete   12
hs01603300     -1
hs01603400       1   16  ext    .5    .5
hs01603401         .800  equiv-band      0.76
hs01603500      77.50       3.200       3.200
hs01603600        0   -1  ext    .5    .5
* hs01603800      -1
* hs01603801      274.5   13
*
*************
* hs_stw17  *
*************
*
*  Type            =     slab
*  Cell number     =       17
*  Heat struct     =        1
*  Geometry        =     wall
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      2.5     m
*
hs01701000      7    1    1
hs01701001     hs_stw17
hs01701002     17.750      1.000
hs01701003        1.
hs01701100     -1   1    .0000
hs01701102      .3500E-03   2
hs01701103      .1000E-02   3
hs01701104      .2000E-02   4
hs01701105      .4000E-02   5
hs01701106      .8000E-02   6
```

```
hs01701107      .1300E-01   7
hs01701200     -1
hs01701201     'CARBON STEEL'         1
hs01701202     'CARBON STEEL'         2
hs01701203     'CARBON STEEL'         3
hs01701204     'CARBON STEEL'         4
hs01701205     'CARBON STEEL'         5
hs01701206     'CARBON STEEL'         6
hs01701300     -1
hs01701400       1   17  ext    .5    .5
hs01701401         .800  equiv-band      0.76
hs01701500      70.00       2.500       2.500
hs01701600        0   -1  ext    .5    .5
* hs01701800      -1
* hs01701801      274.5    7
*
*************
* hs_stw17  *
*************
*
*  Type            =     slab
*  Cell number     =       17
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      .20     m
*
hs01702000      7    1    1
hs01702001     hs_stw17
hs01702002     17.750      1.000
hs01702003        1.
hs01702100     -1   1    .0000
hs01702102      .3500E-03   2
hs01702103      .1000E-02   3
hs01702104      .2000E-02   4
hs01702105      .4000E-02   5
hs01702106      .6000E-02   6
hs01702107      .8100E-02   7
hs01702200     -1
hs01702201     'CARBON STEEL'         1
hs01702202     'CARBON STEEL'         2
hs01702203     'CARBON STEEL'         3
hs01702204     'CARBON STEEL'         4
hs01702205     'CARBON STEEL'         5
hs01702206     'CARBON STEEL'         6
hs01702300     -1
hs01702400       1   17  ext    .5    .5
hs01702401         .800  equiv-band      0.76
hs01702500      665.0       .2000       .2000
hs01702600        0   -1  ext    .5    .5
* hs01702800      -1
* hs01702801      274.5    7
*
*************
* hs_conf1  *
*************
*
*  Type            =     slab
*  Cell number     =       17
*  Heat struct     =        3
```

```
*  Geometry        =    floor
*  HS elev.        =  17.7500 m
*  LHS Cell bottom =  17.7500 m
*  LHS Cell top    =  20.2500 m
*  Cell height     =      2.5     m
*  Charact. length =      3.2     m
*
hs01703000     13    1    1
hs01703001     hs_conf1
hs01703002     17.750     -.1000E-06
hs01703003        1.
hs01703100     -1   1    .0000
hs01703102      .3500E-03   2
hs01703103      .1000E-02   3
hs01703104      .2000E-02   4
hs01703105      .4000E-02   5
hs01703106      .8000E-02   6
hs01703107      .1600E-01   7
hs01703108      .3200E-01   8
hs01703109      .6400E-01   9
hs01703110      .1300      10
hs01703111      .2600      11
hs01703112      .5000      12
hs01703113      .7500      13
hs01703200     -1
hs01703201     concrete    1
hs01703202     concrete    2
hs01703203     concrete    3
hs01703204     concrete    4
hs01703205     concrete    5
hs01703206     concrete    6
hs01703207     concrete    7
hs01703208     concrete    8
hs01703209     concrete    9
hs01703210     concrete   10

hs01703211     concrete   11
hs01703212     concrete   12
hs01703300     -1
hs01703400       1   17  ext    .5    .5
hs01703401          .800  equiv-band      0.76
hs01703500      77.50       3.200       3.200
hs01703600        0   -1  ext    .5    .5
* hs01703800      -1
* hs01703801      274.5   13
*
*************
* hs_stf18  *
*************
*
*  Type            =     slab
*  Cell number     =       18
*  Heat struct     =        1
*  Geometry        =    floor
*  HS elev.        =  20.4000 m
*  LHS Cell bottom =  20.4000 m
*  LHS Cell top    =  35.0000 m
*  Cell height     =      15.     m
*  Charact. length =      3.0     m
*
hs01801000      4    1    1
hs01801001     hs_stf18
hs01801002     20.400     -.1000E-06
```

```
hs01801003        1.
hs01801100     -1   1    .0000
hs01801102      .3500E-03   2
hs01801103      .1000E-02   3
hs01801104      .2000E-02   4
hs01801200     -1
hs01801201     'CARBON STEEL'         1

hs01801202     'CARBON STEEL'         2
hs01801203     'CARBON STEEL'         3
hs01801300     -1
hs01801400       1   18  ext    .5    .5
hs01801401          .800  equiv-band      0.76
hs01801500      40.75       3.000       3.000
hs01801600        0   -1  ext    .5    .5
* hs01801800      -1
* hs01801801      274.5    4
*
* HS did not fit inside of volume
* Cell height    =  14.6000 m
* Reset to       =  14.6000 m
*
*
*************
* hs_stw18  *
*************
*
*  Type            =     slab
*  Cell number     =       18
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  20.4000 m
*  LHS Cell bottom =  20.4000 m
*  LHS Cell top    =  35.0000 m
*  Cell height     =      15.     m
*  Charact. length =      15.     m
*
hs01802000      7    1    1
hs01802001     hs_stw18
hs01802002     20.400      1.000
hs01802003        1.
hs01802100     -1   1    .0000
hs01802102      .3500E-03   2
hs01802103      .1000E-02   3
hs01802104      .2000E-02   4
hs01802105      .4000E-02   5
hs01802106      .8000E-02   6
hs01802107      .1220E-01   7
hs01802200     -1
hs01802201     'CARBON STEEL'         1
hs01802202     'CARBON STEEL'         2
hs01802203     'CARBON STEEL'         3
hs01802204     'CARBON STEEL'         4
hs01802205     'CARBON STEEL'         5
hs01802206     'CARBON STEEL'         6
hs01802300     -1
hs01802400       1   18  ext    .5    .5
hs01802401          .800  equiv-band      0.326
hs01802500      514.5       14.60       14.60
hs01802600        0   -1  ext    .5    .5
* hs01802800      -1
* hs01802801      274.5    7
*
```

```
*************
* hs_stf19  *
*************
*
*  Type            =     slab
*  Cell number     =       19
*  Heat struct     =        1
*  Geometry        =    floor
*  HS elev.        =  20.4000 m
*  LHS Cell bottom =  20.4000 m
*  LHS Cell top    =  35.0000 m
*  Cell height     =      15.     m
*  Charact. length =      3.0     m
*
hs01901000      4    1    1
hs01901001     hs_stf19
hs01901002     20.400     -.1000E-06
hs01901003        1.
hs01901100     -1   1    .0000
hs01901102      .3500E-03   2
hs01901103      .1000E-02   3
hs01901104      .2000E-02   4
hs01901200     -1
hs01901201     'CARBON STEEL'         1
hs01901202     'CARBON STEEL'         2
hs01901203     'CARBON STEEL'         3
hs01901300     -1
hs01901400       1   19  ext    .5    .5
hs01901401          .800  equiv-band      0.326
hs01901500      40.75       3.000       3.000
hs01901600        0   -1  ext    .5    .5
* hs01901800     -1
* hs01901801     274.5    4
*
* HS did not fit inside of volume
* Cell height    =  14.6000 m
* Reset to       =  14.6000 m
*
*
*************
* hs_stw19  *
*************
*
*  Type            =     slab
*  Cell number     =       19
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  20.4000 m
*  LHS Cell bottom =  20.4000 m
*  LHS Cell top    =  35.0000 m
*  Cell height     =      15.     m
*  Charact. length =      15.     m
*
hs01902000      7    1    1
hs01902001     hs_stw19
hs01902002     20.400      1.000
hs01902003        1.
hs01902100     -1   1    .0000
hs01902102      .3500E-03   2
hs01902103      .1000E-02   3
hs01902104      .2000E-02   4
hs01902105      .4000E-02   5
hs01902106      .8000E-02   6
```

```
hs01902107      .1220E-01   7
hs01902200     -1
hs01902201     'CARBON STEEL'         1
hs01902202     'CARBON STEEL'         2
hs01902203     'CARBON STEEL'         3
hs01902204     'CARBON STEEL'         4
hs01902205     'CARBON STEEL'         5
hs01902206     'CARBON STEEL'         6
hs01902300     -1
hs01902400       1   19  ext    .5    .5
hs01902401         .800  equiv-band      0.326
hs01902500      514.5       14.60       14.60
hs01902600        0   -1  ext    .5    .5
* hs01902800      -1
* hs01902801      274.5    7

*
*************
* hs_stf20  *
*************
*
*  Type            =     slab
*  Cell number     =       20
*  Heat struct     =        1
*  Geometry        =    floor
*  HS elev.        =  20.4000 m
*  LHS Cell bottom =  20.4000 m
*  LHS Cell top    =  35.0000 m
*  Cell height     =      15.     m
*  Charact. length =      3.0     m
*
hs02001000      4    1    1
hs02001001     hs_stf20
hs02001002     20.400     -.1000E-06
hs02001003        1.
hs02001100     -1   1    .0000
hs02001102      .3500E-03   2
hs02001103      .1000E-02   3
hs02001104      .2000E-02   4
hs02001200     -1
hs02001201     'CARBON STEEL'         1
hs02001202     'CARBON STEEL'         2
hs02001203     'CARBON STEEL'         3
hs02001300     -1
hs02001400       1   20  ext    .5    .5
hs02001401         .800  equiv-band      0.326
hs02001500      40.75       3.000       3.000
hs02001600        0   -1  ext    .5    .5
* hs02001800     -1
* hs02001801     274.5    4
*
* HS did not fit inside of volume
* Cell height    =  14.6000 m
* Reset to       =  14.6000 m
*
*
*************
* hs_stw20  *
*************
*
*  Type            =     slab
*  Cell number     =       20
*  Heat struct     =        2
```

```
*  Geometry         =     wall
*  HS elev.         =  20.4000 m
*  LHS Cell bottom =  20.4000 m
*  LHS Cell top    =  35.0000 m
*  Cell height     =      15.     m
*  Charact. length =      15.     m
*
hs02002000      7    1    1
hs02002001     hs_stw20
hs02002002     20.400      1.000
hs02002003        1.
hs02002100     -1   1    .0000
hs02002102      .3500E-03   2
hs02002103      .1000E-02   3
hs02002104      .2000E-02   4
hs02002105      .4000E-02   5
hs02002106      .8000E-02   6
hs02002107      .1220E-01   7
hs02002200     -1
hs02002201     'CARBON STEEL'         1
hs02002202     'CARBON STEEL'         2
hs02002203     'CARBON STEEL'         3
hs02002204     'CARBON STEEL'         4
hs02002205     'CARBON STEEL'         5
hs02002206     'CARBON STEEL'         6
hs02002300     -1
hs02002400       1   20  ext    .5    .5
hs02002401          .800  equiv-band      0.326
hs02002500      514.5       14.60       14.60
hs02002600        0   -1  ext    .5    .5
* hs02002800      -1
* hs02002801      274.5    7
*
*************
* hs_stf21  *
*************
*
*  Type             =     slab
*  Cell number      =       21
*  Heat struct      =        1
*  Geometry         =    floor
*  HS elev.         =  20.4000 m
*  LHS Cell bottom =  20.4000 m
*  LHS Cell top    =  35.0000 m
*  Cell height     =      15.     m
*  Charact. length =      3.0     m
*
hs02101000      4    1    1
hs02101001     hs_stf21
hs02101002     20.400     -.1000E-06
hs02101003        1.
hs02101100     -1   1    .0000
hs02101102      .3500E-03   2
hs02101103      .1000E-02   3
hs02101104      .2000E-02   4
hs02101200     -1
hs02101201     'CARBON STEEL'         1
hs02101202     'CARBON STEEL'         2
hs02101203     'CARBON STEEL'         3
hs02101300     -1
hs02101400       1   21  ext    .5    .5
hs02101401          .800  equiv-band      0.326
hs02101500      40.75       3.000       3.000
```

```
hs02101600        0   -1  ext    .5    .5
* hs02101800     -1
* hs02101801     274.5    4
*
* HS did not fit inside of volume
* Cell height    =  14.6000 m
* Reset to       =  14.6000 m
*
*
*************
* hs_stw21  *
*************
*
*  Type             =     slab
*  Cell number      =       21
*  Heat struct      =        2
*  Geometry         =     wall
*  HS elev.         =  20.4000 m
*  LHS Cell bottom =  20.4000 m
*  LHS Cell top    =  35.0000 m
*  Cell height      =      15.     m
*  Charact. length =      15.     m
*
hs02102000      7    1    1
hs02102001     hs_stw21
hs02102002     20.400      1.000
hs02102003        1.
hs02102100     -1   1    .0000
hs02102102      .3500E-03   2
hs02102103      .1000E-02   3
hs02102104      .2000E-02   4
hs02102105      .4000E-02   5
hs02102106      .8000E-02   6
hs02102107      .1220E-01   7
hs02102200     -1
hs02102201     'CARBON STEEL'         1
hs02102202     'CARBON STEEL'         2
hs02102203     'CARBON STEEL'         3
hs02102204     'CARBON STEEL'         4
hs02102205     'CARBON STEEL'         5
hs02102206     'CARBON STEEL'         6
hs02102300     -1
hs02102400      1   21  ext    .5    .5
hs02102401         .800  equiv-band      0.326
hs02102500      514.5       14.60       14.60
hs02102600        0   -1  ext    .5    .5
* hs02102800     -1
* hs02102801     274.5    7
*
*************
* hs_stf22  *
*************
*
*  Type             =     slab
*  Cell number      =       22
*  Heat struct      =        1
*  Geometry         =    floor
*  HS elev.         =  35.1000 m
*  LHS Cell bottom =  35.1000 m
*  LHS Cell top    =  40.1000 m
*  Cell height      =      5.0     m
*  Charact. length =      3.5     m
*
```

```
hs02201000      7    1    1
hs02201001     hs_stf22
hs02201002     35.100     -.1000E-06
hs02201003        1.
hs02201100     -1   1    .0000
hs02201102      .3500E-03   2
hs02201103      .1000E-02   3
hs02201104      .2000E-02   4
hs02201105      .4000E-02   5
hs02201106      .8000E-02   6
hs02201107      .1300E-01   7
hs02201200     -1
hs02201201     'CARBON STEEL'         1
hs02201202     'CARBON STEEL'         2
hs02201203     'CARBON STEEL'         3
hs02201204     'CARBON STEEL'         4
hs02201205     'CARBON STEEL'         5
hs02201206     'CARBON STEEL'         6
hs02201300     -1
hs02201400       1   22  ext    .5    .5
hs02201401          .800  equiv-band      3.78
hs02201500      133.0       3.500       3.500
hs02201600        0   -1  ext    .5    .5
* hs02201800     -1
* hs02201801     274.5    7
*
*************
* hs_stw22  *
*************
*
*  Type            =     slab
*  Cell number     =       22
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  35.1000 m
*  LHS Cell bottom =  35.1000 m
*  LHS Cell top    =  40.1000 m
*  Cell height     =      5.0     m
*  Charact. length =      5.0     m
*
hs02202000      7    1    1
hs02202001     hs_stw22
hs02202002     35.100      1.000
hs02202003        1.
hs02202100     -1   1    .0000
hs02202102      .3500E-03   2
hs02202103      .1000E-02   3
hs02202104      .2000E-02   4
hs02202105      .4000E-02   5
hs02202106      .8000E-02   6
hs02202107      .1300E-01   7
hs02202200     -1
hs02202201     'CARBON STEEL'         1
hs02202202     'CARBON STEEL'         2
hs02202203     'CARBON STEEL'         3
hs02202204     'CARBON STEEL'         4
hs02202205     'CARBON STEEL'         5
hs02202206     'CARBON STEEL'         6
hs02202300     -1
hs02202400       1   22  ext    .5    .5
hs02202401          .800  equiv-band      3.78
hs02202500      500.0       5.000       5.000
hs02202600        0   -1  ext    .5    .5
```

```
* hs02202800     -1
* hs02202801     274.5    7
*
*************
* hs_stf23  *
*************
*
*  Type            =     slab
*  Cell number     =       23
*  Heat struct     =        1
*  Geometry        =    floor
*  HS elev.        =  35.1000 m
*  LHS Cell bottom =  35.1000 m
*  LHS Cell top    =  40.1000 m
*  Cell height     =      5.0     m
*  Charact. length =      3.5     m
*
hs02301000      7    1    1
hs02301001     hs_stf23
hs02301002     35.100     -.1000E-06
hs02301003        1.
hs02301100     -1   1    .0000
hs02301102      .3500E-03   2
hs02301103      .1000E-02   3
hs02301104      .2000E-02   4
hs02301105      .4000E-02   5
hs02301106      .8000E-02   6
hs02301107      .1300E-01   7
hs02301200     -1
hs02301201     'CARBON STEEL'         1
hs02301202     'CARBON STEEL'         2
hs02301203     'CARBON STEEL'         3
hs02301204     'CARBON STEEL'         4
hs02301205     'CARBON STEEL'         5
hs02301206     'CARBON STEEL'         6
hs02301300     -1
hs02301400       1   23  ext    .5    .5
hs02301401          .800  equiv-band      3.78
hs02301500      133.0       3.500       3.500
hs02301600        0   -1  ext    .5    .5
* hs02301800     -1
* hs02301801     274.5    7
*
*************
* hs_stw23  *
*************
*
*  Type            =     slab
*  Cell number     =       23
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  35.1000 m
*  LHS Cell bottom =  35.1000 m
*  LHS Cell top    =  40.1000 m
*  Cell height     =      5.0     m
*  Charact. length =      5.0     m
*
hs02302000      7    1    1
hs02302001     hs_stw23
hs02302002     35.100      1.000
hs02302003        1.
hs02302100     -1   1    .0000
hs02302102      .3500E-03   2
```

```
hs02302103      .1000E-02   3
hs02302104      .2000E-02   4
hs02302105      .4000E-02   5
hs02302106      .8000E-02   6
hs02302107      .1300E-01   7
hs02302200     -1
hs02302201     'CARBON STEEL'         1
hs02302202     'CARBON STEEL'         2
hs02302203     'CARBON STEEL'         3
hs02302204     'CARBON STEEL'         4
hs02302205     'CARBON STEEL'         5
hs02302206     'CARBON STEEL'         6
hs02302300     -1
hs02302400       1   23  ext    .5    .5
hs02302401         .800  equiv-band      3.78
hs02302500      500.0       5.000       5.000
hs02302600        0   -1  ext    .5    .5
* hs02302800      -1
* hs02302801      274.5    7
*
*************
* hs_str24  *
*************
*
*  Type            =     slab
*  Cell number     =       24
*  Heat struct     =        1
*  Geometry        =     roof
*  HS elev.        =  54.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      18.     m
*
hs02401000      7    1    1
hs02401001     hs_str24
hs02401002     54.700      .0000
hs02401003       1.
hs02401100     -1   1    .0000
hs02401102      .3500E-03   2
hs02401103      .1000E-02   3
hs02401104      .2000E-02   4
hs02401105      .4000E-02   5
hs02401106      .8000E-02   6
hs02401107      .1270E-01   7
hs02401200     -1
hs02401201     'CARBON STEEL'         1
hs02401202     'CARBON STEEL'         2
hs02401203     'CARBON STEEL'         3
hs02401204     'CARBON STEEL'         4
hs02401205     'CARBON STEEL'         5
hs02401206     'CARBON STEEL'         6
hs02401300     -1
hs02401400       1   24  ext    .5    .5
hs02401401         .800  equiv-band     10.40
hs02401500      881.0       17.50       17.50
hs02401600        0   -1  ext    .5    .5
* hs02401800      -1
* hs02401801      303.0    7
*
*************
* hs_stw24  *
*************
```

```
*
*  Type            =     slab
*  Cell number     =       24
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  33.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      8.0     m
*
hs02402000      7    1    1
hs02402001     hs_stw24
hs02402002     33.700      1.000
hs02402003        1.
hs02402100     -1   1    .0000
hs02402102      .3500E-03   2
hs02402103      .1000E-02   3
hs02402104      .2000E-02   4
hs02402105      .4000E-02   5
hs02402106      .8000E-02   6
hs02402107      .1300E-01   7
hs02402200     -1
hs02402201     'CARBON STEEL'         1
hs02402202     'CARBON STEEL'         2
hs02402203     'CARBON STEEL'         3
hs02402204     'CARBON STEEL'         4
hs02402205     'CARBON STEEL'         5
hs02402206     'CARBON STEEL'         6
hs02402300     -1
hs02402400       1   24  ext    .5    .5
hs02402401          .800  equiv-band     10.40
hs02402500      910.0       8.000       8.000
hs02402600        0   -1  ext    .5    .5
* hs02402800     -1
* hs02402801     303.0    7
*
*************
* hs_stf24  *
*************
*
*  Type            =     slab
*  Cell number     =       24
*  Heat struct     =        3
*  Geometry        =    floor
*  HS elev.        =  33.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      3.7     m
*
hs02403000      7    1    1
hs02403001     hs_stf24
hs02403002     33.700     -.1000E-06
hs02403003        1.
hs02403100     -1   1    .0000
hs02403102      .3500E-03   2
hs02403103      .1000E-02   3
hs02403104      .2000E-02   4
hs02403105      .4000E-02   5
hs02403106      .8000E-02   6
hs02403107      .1300E-01   7
hs02403200     -1
```

```
hs02403201     'CARBON STEEL'         1
hs02403202     'CARBON STEEL'         2
hs02403203     'CARBON STEEL'         3
hs02403204     'CARBON STEEL'         4
hs02403205     'CARBON STEEL'         5
hs02403206     'CARBON STEEL'         6
hs02403300     -1
hs02403400       1   24  ext    .5    .5
hs02403401          .800  equiv-band     10.40
hs02403500      90.00       3.700       3.700
hs02403600        0   -1  ext    .5    .5
* hs02403800     -1
* hs02403801     303.0    7
*
*************
* hs_conw2  *
*************
*
*  Type            =     slab
*  Cell number     =       24
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =  33.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      5.5     m
*
hs02404000     13    1    1
hs02404001     hs_conw2
hs02404002     33.700      1.000
hs02404003        1.
hs02404100     -1   1    .0000
hs02404102      .3500E-03   2
hs02404103      .1000E-02   3
hs02404104      .2000E-02   4
hs02404105      .4000E-02   5
hs02404106      .8000E-02   6
hs02404107      .1600E-01   7
hs02404108      .3000E-01   8
hs02404109      .6000E-01   9
hs02404110      .1200      10
hs02404111      .2400      11
hs02404112      .4800      12
hs02404113      .9100      13
hs02404200     -1
hs02404201     concrete    1

hs02404202     concrete    2
hs02404203     concrete    3
hs02404204     concrete    4
hs02404205     concrete    5
hs02404206     concrete    6
hs02404207     concrete    7
hs02404208     concrete    8
hs02404209     concrete    9
hs02404210     concrete   10
hs02404211     concrete   11
hs02404212     concrete   12
hs02404300     -1
hs02404400       1   24  ext    .5    .5
hs02404401          .800  equiv-band     10.40
hs02404500      217.5       5.500       5.500
```

```
hs02404600        0   -1  ext    .5    .5
* hs02404800      -1
* hs02404801      303.0   13
*
*************
* hs_conf2  *
*************
*
*  Type            =     slab
*  Cell number     =       24
*  Heat struct     =        5
*  Geometry        =    floor
*  HS elev.        =  33.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      10.     m
*
hs02405000     13    1    1
hs02405001     hs_conf2
hs02405002     33.700     -.1000E-06
hs02405003        1.
hs02405100     -1   1    .0000
hs02405102      .3500E-03   2
hs02405103      .1000E-02   3
hs02405104      .2000E-02   4
hs02405105      .4000E-02   5
hs02405106      .8000E-02   6
hs02405107      .1600E-01   7
hs02405108      .3000E-01   8
hs02405109      .6000E-01   9
hs02405110      .1200      10
hs02405111      .2400      11
hs02405112      .4800      12
hs02405113      .9100      13
hs02405200     -1
hs02405201     concrete    1
hs02405202     concrete    2
hs02405203     concrete    3
hs02405204     concrete    4
hs02405205     concrete    5
hs02405206     concrete    6
hs02405207     concrete    7
hs02405208     concrete    8
hs02405209     concrete    9
hs02405210     concrete   10
hs02405211     concrete   11
hs02405212     concrete   12
hs02405300     -1
hs02405400       1   24  ext    .5    .5
hs02405401          .800  equiv-band     10.40
hs02405500      107.0       10.00       10.00
hs02405600        0   -1  ext    .5    .5
* hs02405800      -1
* hs02405801      303.0   13
*
*************
* hs_str25  *
*************
*
*  Type            =     slab
*  Cell number     =       25
*  Heat struct     =        1
```

```
*  Geometry        =     roof
*  HS elev.        =  54.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      18.     m
*
hs02501000      7    1    1
hs02501001     hs_str25
hs02501002     54.700      .0000
hs02501003        1.
hs02501100     -1   1    .0000
hs02501102      .3500E-03   2
hs02501103      .1000E-02   3
hs02501104      .2000E-02   4
hs02501105      .4000E-02   5
hs02501106      .8000E-02   6
hs02501107      .1270E-01   7
hs02501200     -1
hs02501201     'CARBON STEEL'         1
hs02501202     'CARBON STEEL'         2
hs02501203     'CARBON STEEL'         3
hs02501204     'CARBON STEEL'         4
hs02501205     'CARBON STEEL'         5
hs02501206     'CARBON STEEL'         6
hs02501300     -1
hs02501400       1   25  ext    .5    .5
hs02501401          .800  equiv-band     10.40
hs02501500      881.0       17.50       17.50
hs02501600        0   -1  ext    .5    .5
* hs02501800      -1
* hs02501801      303.0    7
*
*************
* hs_stw25  *
*************
*
*  Type            =     slab
*  Cell number     =       25
*  Heat struct     =        2
*  Geometry        =     wall
*  HS elev.        =  33.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      8.0     m
*
hs02502000      7    1    1
hs02502001     hs_stw25
hs02502002     33.700      1.000
hs02502003        1.
hs02502100     -1   1    .0000
hs02502102      .3500E-03   2
hs02502103      .1000E-02   3
hs02502104      .2000E-02   4
hs02502105      .4000E-02   5
hs02502106      .8000E-02   6
hs02502107      .1300E-01   7
hs02502200     -1
hs02502201     'CARBON STEEL'         1
hs02502202     'CARBON STEEL'         2
hs02502203     'CARBON STEEL'         3
hs02502204     'CARBON STEEL'         4
```

```
hs02502205     'CARBON STEEL'         5
hs02502206     'CARBON STEEL'         6
hs02502300     -1
hs02502400       1   25  ext    .5    .5
hs02502401          .800  equiv-band     10.40
hs02502500      910.0       8.000       8.000
hs02502600        0   -1  ext    .5    .5
* hs02502800     -1
* hs02502801     303.0    7
*
*************
* hs_stf25  *
*************
*
*  Type            =     slab
*  Cell number     =       25
*  Heat struct     =        3
*  Geometry        =    floor
*  HS elev.        =  33.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      3.7     m
*
hs02503000      7    1    1
hs02503001     hs_stf25
hs02503002     33.700     -.1000E-06
hs02503003        1.
hs02503100     -1   1    .0000
hs02503102      .3500E-03   2
hs02503103      .1000E-02   3
hs02503104      .2000E-02   4
hs02503105      .4000E-02   5
hs02503106      .8000E-02   6
hs02503107      .1300E-01   7
hs02503200     -1
hs02503201     'CARBON STEEL'         1
hs02503202     'CARBON STEEL'         2
hs02503203     'CARBON STEEL'         3
hs02503204     'CARBON STEEL'         4
hs02503205     'CARBON STEEL'         5
hs02503206     'CARBON STEEL'         6
hs02503300     -1
hs02503400       1   25  ext    .5    .5
hs02503401          .800  equiv-band     10.40
hs02503500      90.00       3.700       3.700
hs02503600        0   -1  ext    .5    .5
* hs02503800     -1
* hs02503801     303.0    7
*
*************
* hs_conw2  *
*************
*
*  Type            =     slab
*  Cell number     =       25
*  Heat struct     =        4
*  Geometry        =     wall
*  HS elev.        =  33.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      5.5     m
```

```
*
hs02504000     13    1    1
hs02504001     hs_conw2
hs02504002     33.700      1.000
hs02504003        1.
hs02504100     -1   1    .0000
hs02504102      .3500E-03   2
hs02504103      .1000E-02   3
hs02504104      .2000E-02   4
hs02504105      .4000E-02   5
hs02504106      .8000E-02   6
hs02504107      .1600E-01   7
hs02504108      .3000E-01   8
hs02504109      .6000E-01   9
hs02504110      .1200      10
hs02504111      .2400      11
hs02504112      .4800      12
hs02504113      .9100      13
hs02504200     -1
hs02504201     concrete    1
hs02504202     concrete    2
hs02504203     concrete    3
hs02504204     concrete    4
hs02504205     concrete    5
hs02504206     concrete    6
hs02504207     concrete    7
hs02504208     concrete    8
hs02504209     concrete    9
hs02504210     concrete   10
hs02504211     concrete   11
hs02504212     concrete   12
hs02504300     -1
hs02504400       1   25  ext    .5    .5
hs02504401         .800  equiv-band     10.40
hs02504500      217.5       5.500       5.500
hs02504600        0   -1  ext    .5    .5
* hs02504800     -1
* hs02504801     303.0   13
*
*************
* hs_conf2  *
*************
*
*  Type            =     slab
*  Cell number     =       25
*  Heat struct     =        5
*  Geometry        =    floor
*  HS elev.        =  33.7000 m
*  LHS Cell bottom =  33.7000 m
*  LHS Cell top    =  54.7000 m
*  Cell height     =      21.     m
*  Charact. length =      10.     m
*
hs02505000     13    1    1
hs02505001     hs_conf2
hs02505002     33.700     -.1000E-06
hs02505003        1.
hs02505100     -1   1    .0000
hs02505102      .3500E-03   2
hs02505103      .1000E-02   3
hs02505104      .2000E-02   4
hs02505105      .4000E-02   5
hs02505106      .8000E-02   6
```

```
hs02505107      .1600E-01   7
hs02505108      .3000E-01   8
hs02505109      .6000E-01   9
hs02505110      .1200      10
hs02505111      .2400      11
hs02505112      .4800      12
hs02505113      .9100      13
hs02505200     -1
hs02505201     concrete    1
hs02505202     concrete    2
hs02505203     concrete    3
hs02505204     concrete    4
hs02505205     concrete    5
hs02505206     concrete    6
hs02505207     concrete    7
hs02505208     concrete    8
hs02505209     concrete    9
hs02505210     concrete   10
hs02505211     concrete   11
hs02505212     concrete   12
hs02505300     -1
hs02505400       1   25  ext    .5    .5
hs02505401         .800  equiv-band     10.40
hs02505500      107.0       10.00       10.00
hs02505600        0   -1  ext    .5    .5
* hs02505800     -1
* hs02505801     303.0   13
*
*************
* hs_conw2  *
*************
*
*  Type             =     slab
*  Cell number      =       26
*  Heat struct      =        1
*  Geometry         =     wall
*  HS elev.         =  17.9000 m
*  LHS Cell bottom  =  17.9000 m
*  LHS Cell top     =  34.1000 m
*  Cell height      =      16.     m
*  Charact. length  =      14.     m
*
hs02601000     13    1    1
hs02601001     hs_conw2
hs02601002     17.900      1.000
hs02601003        1.
hs02601100     -1   1    .0000
hs02601102      .3500E-03   2
hs02601103      .1000E-02   3
hs02601104      .2000E-02   4
hs02601105      .4000E-02   5
hs02601106      .8000E-02   6
hs02601107      .1600E-01   7
hs02601108      .3000E-01   8
hs02601109      .6000E-01   9
hs02601110      .1200      10
hs02601111      .2400      11
hs02601112      .4800      12
hs02601113      .9100      13
hs02601200     -1
hs02601201     concrete    1
hs02601202     concrete    2
hs02601203     concrete    3
```

```
hs02601204     concrete    4
hs02601205     concrete    5
hs02601206     concrete    6
hs02601207     concrete    7
hs02601208     concrete    8
hs02601209     concrete    9
hs02601210     concrete   10
hs02601211     concrete   11
hs02601212     concrete   12
hs02601300     -1
hs02601400       1   26  ext    .5    .5
hs02601401          .800  equiv-band      9.21
hs02601500      1884.       14.00       14.00
hs02601600        0   -1  ext    .5    .5
* hs02601800      -1
* hs02601801      303.0   13
*
*************
* hs_conf2  *
*************
*
*  Type            =     slab
*  Cell number     =       26
*  Heat struct     =        2
*  Geometry        =    floor
*  HS elev.        =  17.9000 m
*  LHS Cell bottom =  17.9000 m
*  LHS Cell top    =  34.1000 m
*  Cell height     =      16.     m
*  Charact. length =      10.     m
*
hs02602000     13    1    1
hs02602001     hs_conf2
hs02602002     17.900     -.1000E-06
hs02602003        1.
hs02602100     -1   1    .0000
hs02602102      .3500E-03   2
hs02602103      .1000E-02   3
hs02602104      .2000E-02   4
hs02602105      .4000E-02   5
hs02602106      .8000E-02   6
hs02602107      .1600E-01   7
hs02602108      .3000E-01   8
hs02602109      .6000E-01   9
hs02602110      .1200      10
hs02602111      .2400      11
hs02602112      .4800      12
hs02602113      .9100      13
hs02602200     -1
hs02602201     concrete    1
hs02602202     concrete    2
hs02602203     concrete    3
hs02602204     concrete    4
hs02602205     concrete    5
hs02602206     concrete    6
hs02602207     concrete    7
hs02602208     concrete    8
hs02602209     concrete    9
hs02602210     concrete   10
hs02602211     concrete   11
hs02602212     concrete   12
hs02602300     -1
hs02602400       1   26  ext    .5    .5
```

```
hs02602401          .800  equiv-band      9.21
hs02602500      403.0       10.00       10.00
hs02602600        0   -1  ext    .5    .5
* hs02602800     -1
* hs02602801     303.0   13
*
*******************************************************************************
*
***
*** HS Input to Model Ice in Baskets
***
*** HS numbering is:  HSacvnn, where,
***                   a  = 9 (identifies hs as ice)
***                   cv = cv number for ice condensor
***                   nn = counter
***
*** Typical models for PWR ice condensors suggest using a cylindrical geometry

*** with outer radius of 15 cm.
***
*** Calculate geometry based on Sequoyah CONTAIN Input of:
*** Total Ice Bed Mass      = 2.775e5 kg/compartment (total of 4)
*** Height of Ice Bed       = 14.53 m
*** Surface Area of Ice Bed = 6200.0 m2
***
*** Define:
*** z = multiplicity
*** h = height of ice bed (14.53 m)
*** m = mass of ice bed (2.775e5 kg)
*** a = surface area of ice bed (6200. m2)
*** v = Total volume of ice (m3)
*** r = radius of cylindrical heat structure (0.15 m)
*** p = density of granulated ice (kg/m3)
***
*** a = z * 2 * pi * r * h, solve for z
*** z = 6200. / (2 * pi * 0.15 * 14.53) = 452.75
***
*** v = m / p = z * h * pi * r * r
*** solve for p
*** p = 2.775e5 / (452.75 * 14.53 * pi * 0.15 * 0.15) = 596.77 kg/m3
***
*** Radiation emmissivity and path length from NRC's Cook model
***
*** Heat transfer characteristic length from NRC's Cook model
***
*** Nu multiplier & gas source heat of reaction from NRC's Cook model
***
hs01809000      2    2   -1
hs01809001   'ic1-ice'
hs01809002   20.47      1.
hs01809003   452.75
hs01809100   -1    1    0.
hs01809101   0.15  2
hs01809200    -1
hs01809201   'ice'  1
hs01809300    0
hs01809400    0
hs01809600    1   18   ICE   1.0  1.0        * to atm only
hs01809601    0.985    'EQUIV BAND'   0.05
hs01809700    6200.0  0.05   14.53
hs01809800    -1
hs01809801    275.1  2
*
```

```
hsdg018090   01809   1   'POOL'
hsdg018091   596.77  5.13e+05  277.  320.  5.0  0.05   1.
*
hs01909000      2    2   -1
hs01909001   'ic2-ice'
hs01909002   20.47      1.
hs01909003   452.75
hs01909100   -1    1    0.
hs01909101   0.15  2
hs01909200    -1
hs01909201   'ice'  1
hs01909300    0
hs01909400    0
hs01909600    1   19   ICE   1.0  1.0        * to atm only
hs01909601    0.985    'EQUIV BAND'   0.05
hs01909700    6200.0  0.05   14.53
hs01909800    -1
hs01909801    275.1  2
*
hsdg019090   01909   1   'POOL'
hsdg019091   596.77  5.13e+05  277.  320.  5.0  0.05   1.
*
hs02009000      2    2   -1
hs02009001   'ic3-ice'
hs02009002   20.47      1.
hs02009003   452.75
hs02009100   -1    1    0.
hs02009101   0.15   2
hs02009200    -1
hs02009201   'ice'  1
hs02009300    0
hs02009400    0
hs02009600    1   20   ICE   1.0  1.0        * to atm only
hs02009601    0.985    'EQUIV BAND'   0.05
hs02009700    6200.0  0.05   14.53
hs02009800    -1
hs02009801    275.1  2
*
hsdg020090   02009   1   'POOL'
hsdg020091   596.77  5.13e+05  277.  320.  5.0  0.05   1.
*
hs02109000      2    2   -1
hs02109001   'ic4-ice'
hs02109002   20.47      1.
hs02109003   452.75
hs02109100   -1    1    0.
hs02109101   0.15  2
hs02109200    -1
hs02109201   'ice'  1
hs02109300    0
hs02109400    0
hs02109600    1   21   ICE   1.0  1.0        * to atm only
hs02109601    0.985    'EQUIV BAND'   0.05
hs02109700    6200.0  0.05   14.53
hs02109800    -1
hs02109801    275.1  2
*
hsdg021090   02109   1   'POOL'
hsdg021091   596.77  5.13e+05  277.  320.  5.0  0.05   1.
*
********************************************************************************
*
* End of Input
```

```
********************************************************************************
*
**********************************************************
* Environment heat structure added for RN deposition Ahill *
**********************************************************
*
*  Type            =     slab
*  Cell number     =        1
*  Heat struct     =        6
*  Geometry        =    floor
*  HS elev.        =      0.0 m
*  LHS Cell bottom =  0.0     m
*  LHS Cell top    =   1e10   m
*  Cell height     =   1e10   m
*  Charact. length =   10.0   m = sqrt(100.0 m2)
*
HS02801000     13    1    1
HS02801001     Environment
HS02801002     0.0     1.e-06
HS02801003        1.
HS02801100     -1   1    .0000
HS02801102     0.0500       2
HS02801103     0.1000       3
HS02801104     0.2000       4
HS02801105     0.3000       5
HS02801106     0.4000       6
HS02801107     0.5000       7
HS02801108     1.0000       8
HS02801109     1.5000       9
HS02801110     2.0000      10
HS02801111     2.5000      11
HS02801112     3.0000      12
HS02801113     3.5870      13
HS02801200     -1
HS02801201     concrete    1
HS02801202     concrete    2
HS02801203     concrete    3
HS02801204     concrete    4
HS02801205     concrete    5
HS02801206     concrete    6
HS02801207     concrete    7
HS02801208     concrete    8
HS02801209     concrete    9
HS02801210     concrete   10
HS02801211     concrete   11
HS02801212     concrete   12
HS02801300     -1
HS02801400     0   -1  ext    .5    .5
HS02801600     1    28  ext    .5    .5
HS02801601     0.800  equiv-band      5.74
HS02801700     100.0       10.0       10.0
.
```

MELCOR FILE:

SBO.COR

```
**********************************************************
*          MELCOR Input                                  *
*          26-cell test problem                          *
```

```
**********************************************************
*
title  'STSBO_L Containment'
*
restartf      SBO_Case1.rst
outputf              SBO_Case1.out
diagf         SBO_Case1_g.dia
plotf         SBO_Case1.ptf
messagef      SBO_Case1.mes
*
crtout
*
cpulim 20000.0
cpuleft 30.0
*
restart 0
dttime 0.01
*
tend   23000.0
*
*       time    dtmax   dtmin   dtedit  dtplot  dtrest
time1  0.0    2.0    0.001  100.0  20.0   500.0
time2   1000.   5.0     0.001   500.0   100.0   500.0
time3   10000.  5.0     0.001   500.0    30.0   1000.0
time4   32000.  5.0     0.001   500.0   200.0   5000.0
*
*
.
```