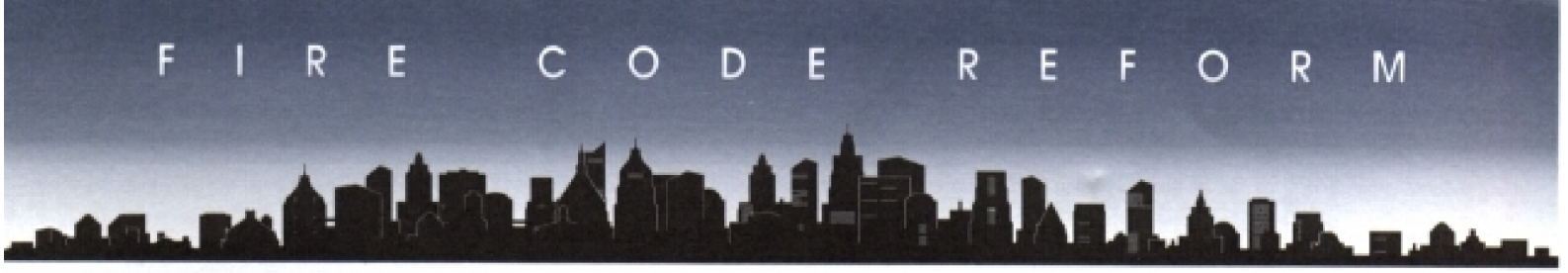

FCRC PROJECT 4
FIRE SAFETY SYSTEM DESIGN SOLUTIONS
PART 1: CORE MODEL AND RESIDENTIAL BUILDINGS, MODELLING PHASE

FIRE-RISK: SUMMARY REPORT

Ian R Thomas
Denny Verghese

CENTRE FOR ENVIRONMENTAL SAFETY AND RISK ENGINEERING
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VICTORIA UNIVERSITY OF TECHNOLOGY & FIRE CODE REFORM CENTRE LTD

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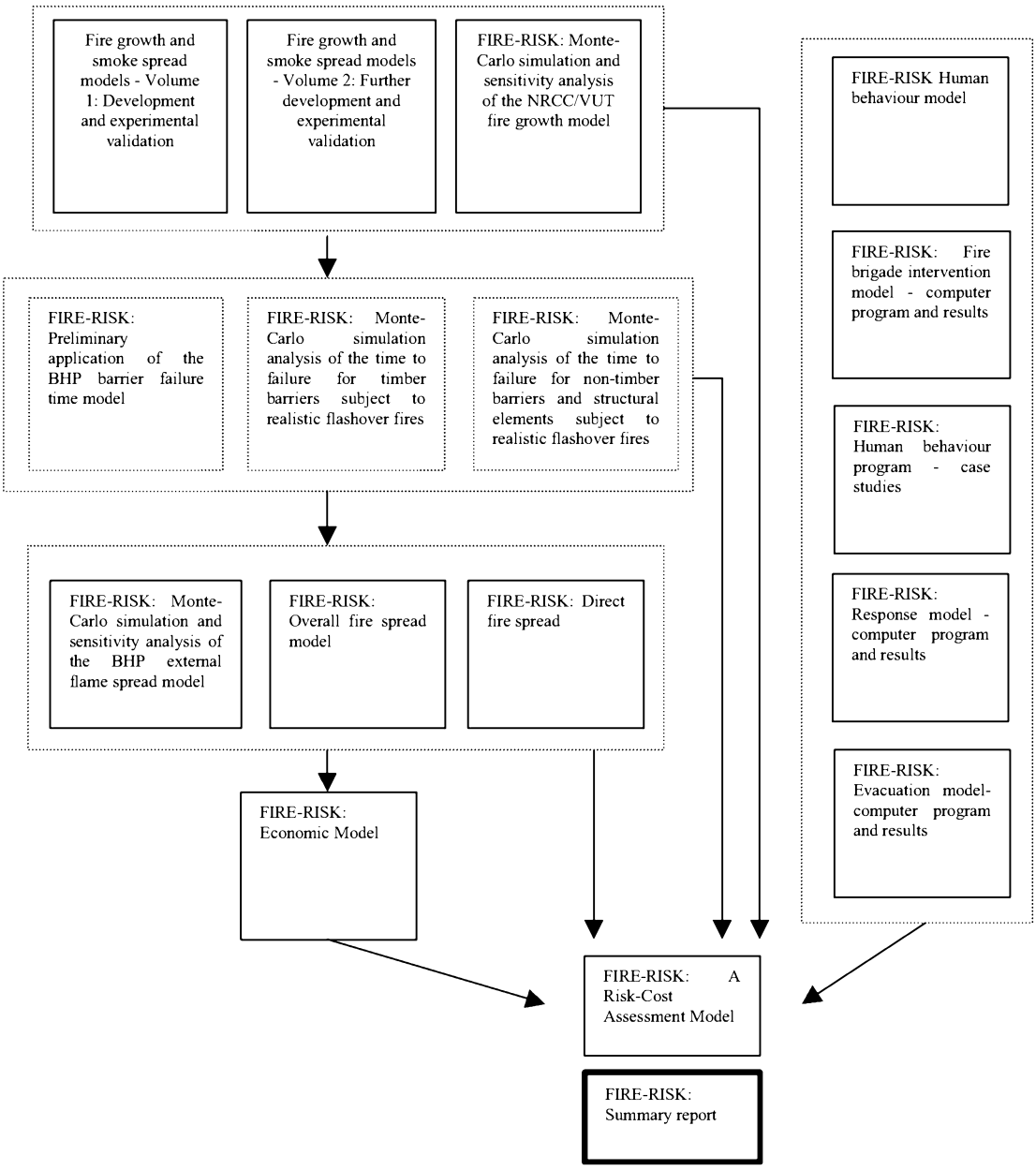
EXECUTIVE SUMMARY

The purpose of this document is to provide a summary of the development and use of the individual models that make up the Fire-Risk model (formerly known as CESARE-Risk). This report is primarily applicable for Occupant Class 2 buildings but also contains information on the application of Fire-Risk to Class 3 buildings (Hotels and Motels and Aged Care).

The reports produced as part of FCRC Project 4, and their relationship to this Summary Report are shown in the figure below.

This report also presents results of sensitivity analyses that cover variations in many of the input variables used by Fire-Risk.



CONTENT PAGE

1 INTRODUCTION

The objectives of this project are to quantify changes in fire safety system designs applicable for Occupant Class 2, 3 and 4 buildings through variations in the Expected Risk to Life Value (ERL) and Fire Cost Expectation (FCE), and in doing so, provide a basis for change to deemed to satisfy provisions in the Building Code of Australia. By examining these variations to the presented design options though referenced examples and professional judgement, validation of the developed risk model will be discussed. A further objective of the project is to publish the research in forms that allows consultation by building regulators, designers and the scientific community.

While mathematical models are widely used in the prediction of fire growth, smoke spread and human evacuation, a complete set of models within a single shell in order to predict the events from fire initiation to fire extinguishment and relevant activities including human behaviour and losses due to the fire is rare. Prediction of expected fire risk and losses for a building requires a complete set of models together with a methodology for efficient integration. Included within this report is a methodology describing the development and use of individual models together with their utilisation within the Fire-Risk shell. Fire-Risk has been developed by the Centre for Environmental Safety and Risk Engineering (CESARE) at the Victoria University of Technology in conjunction with BHP, CSIRO, and SSL.

The objectives of this study have maintained a sharp focus on the FCRC mission statement of facilitating the introduction of a fully engineered approach to building fire safety regulation which will provide benefits of greater efficiency and significant cost savings to all participants in the building construction and property investment industries.

Since the last international review on March 1999, the project has produced a fully integrated model capable of producing more realistic results.

This report also contains results of sensitivity studies on Fire-Risk. In these studies many of the Fire-Risk input variables were varied one-by-one by a substantial margin and the resultant change on the outputs of Fire-Risk noted. The results of the sensitivity studies are tabulated in Appendices C, D and E and briefly discussed in Section 5.

This summary report is not intended to give complete details of Fire-Risk. A listing of all of the significant reports that have been issued in the course of the development of Fire-Risk is given in the bibliography.

2 TERMS AND DEFINITIONS

A summary of abbreviated terms and their definitions used in this report are shown in Table 2.1.

TABLE 2.1 KEY ITEMS AND DEFINITIONS

Item	*Definition*
AFAC	Australasian Fire Authorities Council
AFO	Apartment of Fire Origin
ALNF	Apartments on Level of Non-Fire Origin
ANFO	Apartments of Non-Fire Origin
BFO	Building of Fire Origin
BNFO	Building of Non-Fire Origin
COHb	Carboxyhaemoglobin
ERL	Expected Risk to Life
EWIS	Early Warning Evacuation System
FCE	Final Cost Expectation
FRL	Fire Resistance level
LFO	Level of Fire Origin
LNFO	Level of Non-Fire Origin
RFO	Room of Fire Origin
RNFO	Room of Non-Fire Origin

3 METHODS AND PROCEDURES

Fire-Risk uses a combination of deterministic and probabilistic approaches in order to estimate the two performance parameters Expected Risk to Life (ERL) and Fire Cost Expectation (FCE). In this report the ERL is presented as the expected number of fatalities per 1000 fires reported to the fire brigade. It is fires reported to the fire brigades that forms the major basis for our knowledge of the actual fires that actually occur and of the outcomes of those fires – the casualties and property and other losses. In summary, the model:

- defines fire scenarios to represent various combinations of factors
- deterministically models fire growth and propagation and probabilistically models occupant evacuation and fire brigade intervention for each scenario
- calculates the ERL for a given scenario by multiplying the life loss in the scenario by the probability of the scenario occurring
- calculates the overall ERL from all fires in a building by summing all ERL of all scenarios (this can be over the over the design life of the building or, as in this report, over any arbitrary interval – in the case of this report over 1000 reported fires)
- calculates the FCE by summing all property losses from all fires in the building over the design life of the building

The ERL and FCE are evaluated using probabilistic and deterministic sub-models which are described further in Sections 4.1 to 4.5. The sub-models maybe categorised in two parts: the time dependent part (TD) and the non-time dependent part (NTD). The TD part deals with the effects of a fire in the room of fire origin (RFO) while the NTD part deals with the fire after spread out of the RFO. The two models are assumed to run "parallel" to each other. However, to avoid double counting of casualties occupants who are effected by the NTD part are those that remain in the building after the TD part ends.

In order to limit the computational time of the there are constraints on the complexity of the sub-models and on the number of scenarios that are considered. Events which have multiple states (such as fractional door opening) are simplified. The model considers those factors which have significant influence on fire growth, fire and smoke spread, barrier failure, expected monetary losses, human behaviour or evacuation. These include:

- building layout - dimensions of the building
- fire starts - location of fire origin, rate of fire starts and proportion of fires (smouldering, flaming and flashover)
- building contents - rate of fire growth and fuel load
- active fire protection systems - presence of smoke detectors, sprinklers, smoke management

Fire-Risk considers 384 scenarios (three fire types, twelve fire growth rates, fuel loads, etc and four ventilation states). In theory each of these scenarios may still have an infinite number of realisations, determined by a number of factors that will not have been considered in the defining of the scenarios such as fuel load, room size or window glass breakage temperature. A simplified approach has been used to account for the many possible variations in factors: the continuous distributions have been replaced by equivalent 3-point discrete distributions. The results (in terms of expected values) are the

combination of the three realizations. This approach is used in the Fire Growth, Fire Brigade Intervention and Human Response models.

Fire-Risk execution times are dependent on the size of the buildings being considered and computer processing power.

4 FIRE-RISK SUB-MODELS

4.1 FIRE GROWTH AND SMOKE SPREAD

The modelling of fire growth and smoke spread is achieved through the three sub-models:

- NRCC-VUT fire growth model (room of fire origin)
- the TWO-ZONE smoke spread model (floor of fire origin)
- the NETWORK smoke spread model (stairs and floors of non-fire origin).

Prediction of smoke detector activation is achieved through the Smoke Detector Activation Model, based on smoke obscuration.

The fire growth is based on the fuel load, rate of flame spread and ventilation conditions in the burn room. Important parameters produced are the predicted species concentrations, exhaust flow rates and temperatures, and smoke layer height.

Modelling of the timing of window breakage is achieved through the average temperature correlation approach.

In the fire growth model, the fire is confined to the RFO even for situations of flashover fires. Fire spread beyond the RFO is considered in the non-time dependent part of Fire-Risk. Only the effects of a fire in the RFO are modelled in the time-dependent part. Smoke and associated species are transported to other parts of the building via the TWO-ZONE and NETWORK models.

The fire growth and smoke spread models were validated against results from experiments conducted in the Experimental Building Fire Facility of VUT. Generally good agreement between the predictions of the models and the experimental results were obtained, with temperature prediction generally better than the prediction of species concentrations.

The sub-models listed above produce predictions of smoke density. Quantified criteria are introduced in order to classify smoke as either 'no smoke', 'light smoke', 'medium smoke', or 'heavy smoke'. Characterisation of smoke density may pertain to a number of physical conditions stimulating human sensing organs and thereby affecting human behaviour.

Some of the limitations set by the modelling approaches used for this group of models are:

- Fire
  - heat release and species yields may vary for fire materials different to what the model was calibrated against
  - exhaust flow rates to the adjacent enclosure are independent of conditions in the adjacent enclosure and subsequent enclosures downstream
  - modeled fire growth is independent of human intervention or fire suppression systems (e.g. sprinklers)
- Smoke

- enclosures in the apartments of non-fire origin are not distinguished from one another
- spatial variation of smoke in an enclosure is neglected
- limitations in network branching exist within the NETWORK model
- a very simplified approach to feedback of smoke from downstream enclosure to upstream enclosure is incorporated

4.1.1 MONTE CARLO SIMULATION AND SENSITIVITY ANALYSIS OF THE NRCC/VUT FIRE GROWTH MODEL

The full time history of temperature and mass loss for all simulations, and the time of occurrence of untenability, flashover, window breakage, and spread of fire to the room adjoining the room of fire origin are important parameters in the Fire-Risk model, and are modelled using the NRCC/VUT fire growth model, as mentioned in Section 4.1. In order to test the validity and sensitivity of this model, a number of simulations were conducted. Examination of the results has proved to be useful in identifying discrepancies and shortcomings of the model.

The scenarios were constrained to within those that could credibly be experienced for an apartment block fire. The simulated Room of Fire Origin (RFO) is assumed to possess a door and a single window (with multiple windows treated as a combination of one window). The status of the door and window (open, closed or broken in the course of the fire) affect the ventilation conditions in the room, and hence the outcome of the fire. Air handling is also modelled (but not currently used).

A total of 12 fire scenarios are considered by the sub-model, with there being three fire types for four ventilation conditions. The four ventilation conditions modelled as part of the simulations consider door and window states. Smouldering, flaming and flashover fires were examined for this study, with the distinction between flaming and flashover fire being solely on whether enough fuel load would exist to allow flashover to occur.

The input variables that were varied within the study were:

- fuel consumption factor
- fuel area factor (potential floor area fraction that can become involved)
- window to floor area ratio
- fuel mass
- distance from door to item in RNFO
- critical heat flux for item ignition
- flame spread rate
- gas temperature causing window breakage
- floor area
- peak mass loss rate (applies to smouldering fires only)
- time of peak mass loss rate (smouldering fires only)

Output data from the exercise comprises a time history of temperature, mass loss rate, time of events such as untenability, flashover, window breakage, and item ignition in the RNFO.

Sensitivity analysis undertaken on the 13 input variables showed that for smouldering fires the only variables affecting the fire were those associated with ventilation conditions such as floor and window area (when the window is open). For flaming and flashover fires, trends for a particular variable were consistent across all ventilation conditions, and the flame spread rate factor was found to have the most significant effect on the outcome. As a consequence, a sensitivity analysis for each variable was performed under the same ventilation conditions.

Sensitivity analysis of flashover fires showed that the critical heat flux of ignition and the distance of items from the door are the determining factors for the occurrence of ignition of items in the RNFO. For the cases where ignition was predicted these factors had minimal effect on the temperature history. The closing of both the door and window are also shown to inhibit fire development, with only flame spread rate and window breakage contributing to flashover and the full development of the fire. If the window breaks before oxygen depletion, sufficient ventilation is provided for further fire development. Also, if the fire develops rapidly, as is the case with a high flame spread rate factor, then a higher temperature is reached before oxygen depletion occurs, so that there is a greater chance of reaching window breakage before oxygen depletion. (The air handling system is observed to significantly enhance the probability of window breakage should both the door and window be closed.)

Little evidence was obtained from sensitivity analysis of flaming fires that was not deduced from flashover fires. Oxygen depletion is observed for even very small fire loads under constrained ventilation conditions, although combinations of variables are capable of producing a sufficiently hot fire to cause window breakage.

For smouldering fires, the mass loss rate is specified independently of fuel load and conditions prevailing in the enclosure. All fires are observed to have similar burning histories and are only affected by two quantities which are both associated with ventilation, namely floor area and window to floor area ratio, with the latter only applying when the window is open. Smaller floor areas result in higher temperatures owing to lower heat loss and less dilution with cold air.

The Monte Carlo simulations showed that untenable conditions were obtained for all potential flashover fires, with the shortest time to untenability occurring when both the door and window are closed. The longest time to untenability is predicted to occur when the window is open, with an open door delaying the onset of untenable conditions further. Window breakage was observed to occur in all conditions except when the door and window are closed and there is no air conditioning. Lack of ventilation is predicted to extinguish the fire before the window breakage temperature is reached. For simulations where the door was open, the majority of fires which obtained flashover also caused ignition in the RNFO.

For the Monte Carlo simulations of flaming fires, it is noted that untenability occurs after a significantly longer period where the window is open to begin with. For smouldering fires, the condition which appears to have the greatest impact on the outcome of the fire is the status of the window. With the window open, untenability was observed in only a small percent of smouldering fires. The shortest time to untenability was observed with both the door and window closed and air handling off.

A conclusion of the simulation study is that only one or two of the quantities nominated to be variables in the study have a profound effect on the outcome of the simulations (floor area and window area), with the rest having only a minor effect. Limitations of the

model which are noted are that the Fire Growth model was designed to apply to imposed radiant fluxes less than 13 kW/m^2 and oxygen concentrations greater than 12%. The model frequently predicts conditions outside these limits.

As a result of the Monte Carlo simulations, three realisations for each type of fire were identified, which were then incorporated back into the risk analysis so that three representative values for each fire type could be considered.

4.2 MODELLING TIME OF FIRE SPREAD VIA EXTERNAL WINDOWS

This sub-model predicts the time at which fire may spread via an external window to an adjacent building or the level above the room of fire origin. The conditions considered include fire severity, the development of a flaming plume outside the window, and the presence and location of combustibles. A computer program called ExSpread was developed by BHP and compared with a limited number of full scale fire tests. It was observed that predictions of glazing failure on the level above the room of fire origin compared favourably with those observed in experimentation. It was also deduced that the NRCC/VUT Fire Growth Model provided sufficiently accurate estimates of burning for use with ExSpread.

The methodology used for predicting the combustibility of items on the floor above the RFO is:

- to determine the size of the radiating panel. For external flaming this is taken as the temperature of the flame at an appropriate distance along the flame axis as given by the algorithm referred to in BHPR/SM/R/G/003
- to calculate the effective temperature of the external fire plume
- to calculate the configuration factor, relating to the amount of heat transferred from the heat source to the point receiver
- to calculate the radiant heat flux on the combustible

The time for fire spread is taken to occur when the imposed radiant heat flux on the combustible exceeds its critical heat flux for ignition.

4.2.1 MONTE CARLO SIMULATION AND SENSITIVITY OF THE BHP EXTERNAL FLAME SPREAD MODEL

This model takes the time history of the temperature and mass loss rate in the Room of Fire Origin (RFO), and calculates the size and temperature of the fire plume leaving the window of RFO and impinging on the external wall of the building above the window. A combustible item is taken to lie at a specified distance from the window on the level of non-fire origin (LNFO). This item is heated by the window plume, either with the window of the LNFO intact or not, and may ignite. The External Flame Spread model reports on whether this item or the Building of Non-Fire Origin ignites and if so, at what time ignition occurs.

Input variables for the Monte Carlo simulation of the External Flame Spread model was:

- the window width
- the window height

- the height of the sill
- width of combustible panelling (assumed non-combustible in this study)
- height of combustible panel
- floor to floor height
- horizontal spandrel outstand
- glazing thickness
- glazing failure temperature
- transmissivity (fixed at 0.5)
- window flag (either open or closed)
- horizontal distance to combustible item in adjoining building
- critical heat flux for ignition of item in adjoining building
- horizontal distance to combustible item from window in level above
- critical heat flux for ignition of item in level above

For the sensitivity analysis the glazing thickness, spandrel projection and window height were altered and the effect on the time history of the flux of the item in the level above and the height of the plume were noted. Fires used in the analysis were for three realisations for six ventilation scenarios. The presence of the spandrel projection causes the external flame to be diverted some distance horizontally as it moves round the obstruction before coming into contact with the wall again. This was observed to produce a marked effect on the heat flux to the item on the LNFO, with heat flux decreasing with increasing spandrel width. The sensitivity of the RFO window height was also tested for all flashover fire realisations, and it was observed that there is a strong trend of increasing heat flux to the item in the level above the RFO with increasing window height.

For the Monte Carlo simulation, 2000 simulations were carried out for 18 fire scenarios. Simulations were carried out twice for spandrel and no spandrel. Examination of resultant probabilities shows that the probability of ignition of the item on the LNFO when no spandrel is present is approximately 0.2 for all fires, and approximately 0.9 for flashover fires. It was also observed that simulated 'fast fires' were more likely to cause ignition in the floor above RFO.

The simulations of the External Fire Spread model carried out with input data generated by the NRCC/VUT fire growth model show that for fully developed fires, flames will readily spread from the level of fire origin to the level of non-fire origin. Results also show that fire will readily spread to a building that is 6 metres from the building of fire origin, and that probability of fire spread to the level of non-fire origin is significantly dependent on the flame spread rate factor.

4.3 MODELLING BARRIER FAILURE TIMES

The evaluation of barriers and structural elements performance is via sequential application of the Fire Growth Model and Barrier Failure Model. These models are run outside the Fire-Risk model with the results being time independent.

A method for predicting the times of failure of barrier and structural elements of construction exposed to enclosure fires in buildings was developed by BHP

(BHPR/R/1997/006), and was compared against selected published test results. The models developed by this work consider the following elements of construction:

- steel stud walls
- masonry walls
- concrete walls and shafts
- concrete beams and slabs
- concrete columns
- steel structural members
- metal shafts and ducts.

The models allow failure times due to failure from structural adequacy, integrity and insulation to be predicted for specific values of fire severity, with failure considered to have occurred when flames or hot gases pass through sufficiently to ignite combustibles located behind the barrier. For structural elements which do not have a separating function such as beams or columns, their failure is assessed on how it would affect the performance of barrier elements which depend upon their stability to remain in place. Timber barriers which have combustible linings are considered by a separate model (CESARE report IR97-011), and the results of simulations under different fire severity conditions are input into the Fire-Risk model in the same way as for the elements mentioned above. A study on the performance of doors in fires revealed that there exist numerous configurations for doors of a similar FRL and there is no model that is suitable for all of these proprietary designs. It was therefore concluded that the use of a timber wall model of the appropriate FRL was a good approximation.

4.3.1 APPLICATION OF THE BARRIER FAILURE MODEL

Validation and sensitivity study of the ' Modelling Barrier Failure Times' research is described in the CESARE report 'Preliminary Application of the BHP Barrier Failure Time Model'. Specifically, this study covers:

- confirmation of the validation of the Barrier Failure Time Model;
- application of the Barrier Failure Time Model to standard fire conditions; and
- a sensitivity study of the variables for the Barrier Failure Time Model.

For steel stud walls, steel columns, steel beams and concrete walls the model was observed to give satisfactory predictions of barrier failure time with no significant variation from Fire Resistance Levels. Whilst there was no significant variation between predicted results and FRL values for masonry walls, recommendations were made for possible review of the model regarding the interpretation of temperature variations across the barrier. For metal shafts and ducts, the failure time model prediction gives a time of failure that is significantly larger than the FRL. Large variations in thermal properties of insulation materials and approximations of representing a two-dimensional element by a one dimensional analysis are given as possible explanations. For concrete beams, slabs and columns, the failure times predicted by the model are approximately 10% below the given FRL which is partly explained by large variations in thermal properties of concrete materials. The sensitivity study of variables for the Barrier Failure Time Model considered variation in fire severity and specific input data for each barrier.

4.3.2 MONTE CARLO SIMULATION ANALYSIS OF THE TIME TO FAILURE FOR BARRIERS AND STRUCTURAL ELEMENTS SUBJECT TO REALISTIC FLASHOVER FIRES

The purpose of this part of the project was to calculate the probability of failure, standard deviation and mean time of failure of barriers using the Monte Carlo technique. These values are then used as input parameters in the Fire-Risk system model. The three criteria used to assess barrier failure in this study were:

- insulation failure. A temperature rise of 280°C on the unexposed surface is used and termed the "fire spread insulation criterion". This temperature is the piloted ignition temperature of polyurethane, and though it is not usually found in an exposed state in residential dwellings, this value is considered to be a valid estimate
- integrity failure is assumed to have occurred when hot gases, smoke or flames are able to pass through part of the barrier
- structural failure occurs when a barrier is no longer capable of carrying a specified load or stress level, or when the lateral deflection from thermal bowing at mid height exceeds a critical deflection limit

Variables associated with sizes of structural elements, thermo-mechanical properties of materials, and mechanical and thermal loading along with two sets of 2000 independently generated fire severity time-temperature relationships were input into the analysis for each barrier. The two sets of fires are based on the two sets of AFO aspect ratios used by the Fire-Risk model for type A and type B enclosures. These enclosures are defined in the report 'Fire-Risk: A Risk Cost Assessment Model', and attempt to represent the categories of enclosure shapes that may be expected in practice. A third set of fire scenarios for fires that reach the fully developed stage but do not spread to other enclosures owing to restricted fuel loads or ventilation conditions is also considered.

The results of incorporating the barrier failure models into the Monte Carlo simulation approach are reported for those items listed in Section 4.3. Detailed results are presented in the report of the sub-model.

4.4 DIRECT FIRE SPREAD MODEL

This non-time dependent model calculates the probability of fire spread between adjoining enclosures under flashover fire conditions either based on the probabilities of failure for individual barriers obtained from the Monte Carlo simulation method discussed above or, through openings located in barriers, or via windows. The three methods of barrier failure (Insulation, integrity, and structural) are assumed equally likely to result in fire spread.

To investigate the probability of fire spread through an apartment building, the building was conceived as a collection of horizontal boundary elements (floors), and vertical elements consisting of external walls and internal stair and lift and service ducts. All apartments other than the AFO on a floor are aggregated into an Apartment of Non-Fire Origin (ANFO). All apartments are assumed to be of equal size and have identical barrier elements. Walls and floors are assigned a probability of possessing inadvertent openings and a corresponding probability of fire spread though these openings is given. The fire spread directions assumed by the model are:

- fire spread between adjoining apartments vertically upwards

- fire spread between adjoining apartments vertically downwards
- fire spread between corridor and stair shafts
- fire spread between corridor and service, heating and ventilation ducts
- fire spread between adjoining apartments in the horizontal direction
- fire spread between apartment and corridor in the horizontal direction

Fire spread between areas may be divided into a number of paths, for example, through the floor system, through the windows, and via inadvertent openings. Allowance is made for floors and walls constructed from timber, steel or concrete, with materials of construction being specified for the apartment floor and wall, service duct wall, heating and ventilation duct wall, stair shaft wall and lift shaft wall.

The probability of failure is dependent on both the materials of construction and their FRL values. Further, components have different failure probabilities based on whether they are load-bearing structures or not. The results of this non-time dependent model are presented as an input file to the Overall Fire Spread model.

4.5 OVERALL FIRE SPREAD MODEL

The Overall Fire Spread model determines the fire spread probabilities for various categories of building layout. The results obtained from the Direct Fire Spread model, namely the probability of failure for fire spread through boundary elements of construction, are used as input data for the calculation of the probability of fire spread. These probabilities are used in the NTD part to determine fatalities for occupants who are trapped in their apartments. The Overall Fire Spread model assumes:

- fire spread is by the spread of high temperature gases through the building
- the fire initiates in apartments and not other areas of the building
- fire spread is due to the occurrence of certain limit states in boundary elements of construction
- fire can spread in-between apartments either through elements of construction or via corridors, stairs or ducts
- fire spread to an adjoining area will lead to a fully developed fire based a normalised fuel load density for that enclosure

There is no modelling of overall structural collapse of the building (although allowance is made for structural collapse of elements of construction in the Direct Fire Spread model)

The building to which this model is applied is represented by allocating building compartments as nodes and assigning probabilities for fire spread to links connecting these nodes. Thus, a stochastic network for fire spread is created and it is possible to calculate the probability for fire spread between any two compartments in the building. It is assumed that nodes of the network are completely reliable and that the links are either in the state of functioning or failed, where functioning relates to the link preventing the spread of fire.

The boundary element failure probabilities calculated by the Direct Fire Spread model are assembled into appropriate locations in a Boundary Element Failure Matrix of the Overall Fire Spread program. In the matrix, the row elements represent volumes in which

a fully developed fire originated whilst the corresponding columns represent volumes to which the fire spreads. From the probability data contained in the Boundary Element Failure Matrix, the Fire Spread Matrix is derived which consists of the probability of fire spread between any two volumes in the building. These values are then used as an input file to the Fire-Risk model.

4.6 HUMAN BEHAVIOUR MODEL

The Human Behaviour model addresses human response during a fire scenario and is therefore an important part of calculating the ERL of a building design. There is also a Fire Brigade/Staff Intervention model embedded into the Human Behaviour model.

Research has determined the Apartment of Fire Origin (AFO) is the most critical apartment during a fire with regards to the ERL and FCE. However, attempts to use Human Behaviour data from actual fires has proved unsuccessful so far, and consequently fatalities for the AFO are based primarily on fire statistics.

The model distributes up to six occupant groups throughout the building in Apartments of Non-Fire Origin (ANFO) in proportion to their percentage of the population. The groups vary in mobility and responsiveness and are described in the Human Behaviour report. The state of alertness of occupants is considered by having separate runs reflecting awake and asleep conditions. Further, occupancy rates can be adjusted in order to acknowledge that more apartments are likely to be vacant during the day.

The components of the Human Behaviour model are summarised in Sections 4.6.1 to 4.6.3.

4.6.1 RESPONSE SUB-MODEL

The Response Model considers the behaviour of occupants up to the time when evacuation begins and occupants leave their apartments. It is a probabilistic model covering the response in the recognition and coping stages of fire emergencies.

Once occupant groups have been assigned throughout the building, estimation takes place of the times at which occupants will be exposed to the cues of:

- smoke (smoke spread model)
- alarms - 9 different types of alarm are possible (smoke detector activation model), though only one type per model execution is considered (see Table 4.6)
- warnings by occupants evacuating from the ANFO (response and evacuation model)
- sound of breaking glass (fire growth model).

The probability of recognition of a cue and the probability of action after recognising a cue are obtained from data collected by CESARE researchers. Action can be to do nothing, to evacuate or to investigate. The last two may result in evacuation. The model also allows occupants to respond to a series of cues, such as alarm, smoke and warnings.

Two types of response times are calculated by the model:

- the direct evacuation time
- the investigation time

Table 4.6

	Intended Alarm Types		Implementation				
Alarm Type	**Alarm Name**	**Description**	**Location of Detectors**	**Location of Alarms**	**Time to Building Alarm**	**Type of Building Alarm**	***Remarks:***
1	No Alarms	No Alarms No Detectors	n/a	n/a	n/a	n/a	
2	Single point Detector/Alarm in Apartments	Single point Detector activates Alarm at detection source	Apartments	Apartments	n/a	n/a	*Apartment alarms activate as smoke is detected in each apartment*
3	Interconnected Apartment Detector/Alarm	Interconnected Detector activates all Alarms within source Apartment	Apartments	Apartments	n/a	n/a	*same as alarm type 2*
4	Corridor Detector - Building Alarm	Corridor Detector activates Alarms in all corridors	Corridors	Corridors	on detection in LFO Corridor	Corridor	
5	Single point Detectors for Apartment Alarm & Corridor Detector for Building Alarm	Single point Detector activates AFO Alarm & Corridor Detector activates all Corridor alarms	Apartments	Apartments and/or Corridor	detection in AFO + 60 secs	Corridor	*no corridor detection*
6	Single point Detectors for AFO Alarm & Corridor Detector for Building Alarm (with building alarm setting off all apartment alarms)	Single point Detector activates AFO Alarm & Corridor Detector activates alarms in all other Apartments	Apartments	Apartments	Detection in AFO + 60 secs	Apartment	*same as alarm type 5 except building alarm sounds in apartments*
7	Interconnected AFO Detector/Alarm activate Building Alarms	Multiple AFO (Interconnected) detection activates alarms in all other Apartments	Apartments	Apartments	Detection in AFO + 30 secs	Apartment	*same as alarm type 6 except 30 sec for building alarm*
8	EWIS	Early Warning Intercommunication Alarm or two-tone alarm	Apartments	Apartments	Detection in AFO + 5 minutes	Apartment	*same as alarm type 6 & 7 except 5 mins for building alarms*
9	Break Glass Alarm	Break Glass Alarm activated by building occupants activates building alarm	Corridor	Corridor	on activation by AFO evacuees	Corridor	*not activated if no AFO occupants or no AFO evacuees*

These times are dependent on the time to recognise the cues and the time for the occupant to start moving. The time to start moving is obtained from collected data and the model uses three values based on the distribution of this data. The method of selecting these three times (three point realisation) is the same process as used in other Fire-Risk sub-models and is explained in detail in the "Three-point representation of a Hasofer). Thus, for each scenario, occupants evacuating are assigned three different possible evacuation times with associated probabilities. However, the final result of the Fire-Risk model produces only one value of ERL.

The response model allows the user to define variables such as the time step, total simulation time, building conditions, and the occupant group in the AFO. Variables read from other files include the occupant groups and occupancy rates, detection times for alarms, and probability of recognition of cues. The output file includes the distribution of occupants within the building (with output files containing data on incapacitation and fatalities of occupants being produced by the Evacuation model). Times for evacuation for each apartment are passed to the evacuation model for further analysis.

The main limitations of the response model are:

- there is no interaction between the occupant and the fire
- probabilities of cue recognition are associated with independent and not cumulative cues

Other limitations are concerned with assumptions about the building layout, with all floors having the same dimensions and all apartments having the same area. Apartments are also considered to be located in rows, with stairways at the end of corridors.

4.6.2 EVACUATION MODEL

The evacuation model calculates the time for occupants to move from their apartments to the corridor, from the corridor to the stairway, and then downstairs to the building exit. The evacuation model also calculates the accumulation of Carboxyhaemoglobin (COHb) in the blood and the exposure of occupants to heat radiation.

The evacuation model in turn comprises the standard evacuation module and the smoke evacuation module. The standard evacuation module describes the evacuation time without considering the effects of heat and smoke, whereas the smoke evacuation module considers various evacuation strategies based on different smoke conditions.

In the standard evacuation the building is described as a network which is composed of a series of nodes and arcs, a node representing a physical building cell, such as an apartment, corridor, stairway or exit. An arc represents a direct link between nodes. A standard evacuation route is then determined and the total evacuation time for an occupant subgroup is calculated, making reference to both travel time and queuing time. The travel time between nodes varies according to the density of people in the enclosure, the type of node, and the occupant group. Queuing time is calculated taking into account congestion at nodes and between nodes.

As observed research shows that occupants will change their evacuation route when confronted by heavy smoke (defined here as visibility less than one metre), the evacuation model calculates the time for occupants to move to the next enclosure in the selected route.

During evacuation under smoke conditions, occupants will accumulate a COHb dosage in the blood. Critical levels are given in the model defining when incapacitation and death occur. The toxic gases considered in Fire-Risk are CO and CO_2, and their production and concentration is calculated by the fire growth model. Temperature is also used to define an occupant fatality condition. Able occupants who have recognised a cue but who have failed to evacuate are assumed to be able to take protective action within the apartment, this action is termed "Defend in Place" in this report. Occupants on the first and second floors are assumed to be able to evacuate by exiting through windows. These two options can be switched on or off by the program user.

The evacuation model classifies occupants as either being mobile or non-mobile. Non-mobile occupants are either disabled, trapped, incapacitated or fatalities. Trapped occupants cannot evacuate by themselves because of smoke conditions and will be required to be rescued by Fire Brigade intervention.

The output files of the evacuation model give information about the location of occupants at every step of the simulation period, and information on the occupants who are non-mobile.

While validation and verification of the model have been attempted, it is recognised that fire incidents seldom give enough information on the data for the incident to be modelled without making some assumptions. However, the results obtained show that the evacuation model is suitable for key elements of occupant behaviour in fire incidents. A limitation of this model is that toxic species affect all occupant groups in the same way, whereas in reality the conditions for occupants to become incapacitated should depend on the occupant group. The limitations on layout as mentioned previously also apply with this model.

4.6.3 FIRE BRIGADE INTERVENTION MODEL

The CESARE Fire Brigade Intervention Model is a simplified version of the Australasian Fire Authorities Council's (AFAC) Fire Brigade Intervention Model. It is a probabilistic model and takes account of all stages of Fire Brigade actions in fighting the fire, helping occupants reach the building exits, and rescuing injured occupants.

The Fire Brigade Intervention Model interacts with the evacuation model at each time step to get information on the number of occupants in each enclosure of the building and their well-being.

The first calculation of the program is the arrival time to the building entrance. A major component in calculating this, is the time the Fire Brigade takes to travel from the station to the building. This in turn is dependant on the Fire Brigade travelling speed, which is given by AFAC in the form of a probabilistic function. The time the Fire Brigade receives notification of the fire is dependent on whether there is automatic notification via the detection system or the time taken for the Fire Brigade to be contacted by telephone. Default times for these factors are given in the program, along with time for relaying information from the reception centre and Fire Brigade assembly time. The overall arrival time is presented in the form of three realisations using the three point realisation method referenced earlier in this summary.

Once the Fire Brigade arrives at the building the preparation time is calculated from the times taken to gather information, assess the fire and set up equipment. Information gathering and assessment time is dependant on the floor area of the building, the number

of floors, walking speed of a fire fighter, and the level of development of the fire. The time to set up equipment depends on the location and size of the fire. The times for setting up the various hoses required are defined in the program

The time at which the Fire Brigade is able to start search and rescue and fighting the fire is calculated from preparation and arrival times. The search and rescue group is not able to start until completion of the preparation period as the protection of a hose line is required.

The two possible outcomes of the program are either that the fire is successfully extinguished or that it is not. The outcome depends on the severity of the fire, the time the Fire Brigade starts fighting the fire, and on the water delivery capacity. Whilst fire severity is calculated using the Fire Growth Model, water delivery capacity is dependent on whether the fire can be fought from within the building or not. Internal fire fighting can only be carried out if the conditions in the corridor have not reached the untenable limit (250°C) of Fire Brigade personnel. Similarly, search and rescue activities are only assumed to occur if the fire conditions in the floor have not reached untenable conditions. The program compares the heat release rate with the water extinguishment capacity, and if the later is greater, assumes the fire is eventually extinguished. The resultant reduction and dispersal of toxic species is also taken into consideration.

After assessing a fire, the officer in charge may decide to call for more resources. This activity is simulated in the program by comparing the fire severity against the water delivery capacity. If the fire severity is greater than the resources available the model assumes that more resources are made available and calculates the time at which the second crew starts fighting the fire.

A limitation of the Fire Brigade Intervention Model that is inherent in the Human Behaviour Model is that the number of occupants are stored on a floor by floor basis and the number and condition of occupants in each apartment is not considered. This method is used as it greatly speeds up computer processing time. However it is recognised that if the search and rescue is done on an apartment by apartment basis it may be possible for the FB to rescue more occupants.

4.6.4 HUMAN BEHAVIOUR MODEL CASE STUDIES

In order to validate the Human Behaviour components of the Fire-Risk model result, results have been compare to the actual losses of five fire incidents:

- New Empire hotel fire, New Zealand
- Backpackers hotel fire, Sydney
- Hostel for the aged fire, Melton, Victoria
- North York building fire, Ontario, Canada
- Westchase Hilton hotel fire, Houston, USA.

In modelling the fire incidents, each has been considered in four parts:

- fire characteristics in the apartment of fire origin and smoke conditions throughout the building
- profile of occupants in the building at the time of fire
- evacuation of occupants without fire brigade or staff intervention

- evacuation of occupants taking into account staff and fire brigade intervention.

For each fire listed above, building layout and occupant groups together with their distribution throughout the building were represented in the model. The availability of fire and smoke alarms was also modelled. The fire and smoke simulation was obtained by the evaluation of fire reports where the fuel loads had been estimated. Resulting maximum heat release rates together with times for flashover and other fire product conditions were then estimated by the fire growth and smoke spread models and the resulting human behaviour estimated. It should be noted that fire incident reports seldom give all the necessary detail to carry out accurate modelling, so some crucial input parameters in these case studies were estimated based on professional judgement. In most cases the final value for some of the key parameters were estimated using a trial and error based methodology working back from the known consequences of the fire. The results of the modelling of the case studies are presented in the Human Behaviour case studies report (Sanabria and He, 1998).

4.7 ECONOMIC MODEL

The Economic Model is used to estimate the monetary costs and losses associated with fire safety and protection provisions and fire events in buildings. The monetary components are aggregated into a Fire Cost Expectation (FCE) performance parameter.

In calculating the expected losses, the probabilities of smouldering, flaming and fully developed fires are estimated and the losses owing to fire damage, smoke damage and water damage for each type of fire are calculated. Results from the overall fire spread model are used to estimate the losses from the estimated spread of fire in fully developed fires. Results from the smoke spread model are used to estimate the smoke damage from smoke spread in fully developed and flaming fires. Spread of fire and smoke to areas outside the apartment of fire origin is considered for flaming and fully developed fires, whereas only smoke damage in the apartment of fire origin is considered for smouldering fires. Water damage from fire brigade intervention in fully developed fires and sprinkler activation in flaming fires is also considered. The present value of expected losses is calculated over the whole life of the building.

Capital costs associated with fire protection including both active and passive features are also used in the calculation of the fire expectation cost, as are annual costs for maintenance and inspection.

The Fire Cost Expectation is given in dollars as a present worth. Results from the model, through data supplied by Rider Hunt (professional Quantity Surveyors), estimate the FCE to be approximately $300,000 for a three storey apartment of eight apartments per storey over a building life of 25 years.

5 DISCUSSION AND RESULTS

A series of comprehensive sensitivity studies have been conducted by varying the inputs to Fire-Risk one by one from a "base-case". The base-case is quite arbitrary but represents a reasonably typical situation for each occupancy case.

The sensitivity studies have covered apartments, hotels and motels and aged-care facilities. There are currently two "versions" of Fire-Risk, one for apartments, the other for hotels and motels and aged-care facilities. In essence these versions are identical, but due to difficulties in running the apartments version (which assumes two rooms in the AFO) a second version was created to cover occupancies where it is assumed that the AFO is a single room. Otherwise the models are identical, although "staff" are considered not to be present in both apartments and hotels and motels, but are present in aged-care facilities.

The results of the sensitivity studies are presented in Appendix C for Apartment Buildings, Appendix D for Hotels and Motels and Appendix E for Aged-Care Facilities. The sensitivity studies are presented largely to enable evaluation of Fire-Risk by CESARE staff and ABCB.

The sensitivity studies have been done on the basis that able occupants on level 1 and 2 can evacuate through windows. This has little effect on the fatality rates but can be turned on or off in the input data for the program.

The results of the sensitivity studies will be briefly discussed below. It is intended that several papers be published in the near future analyzing the sensitivity study results and comparing them with what is known of the real fire situation through fire statistics and the like.

A summary of some USA and Australian statistics are included in Appendices F (Apartments), G (Hotels and Motels) and H (Aged Care) to give a perspective against which to consider the sensitivity studies.

There is no available statistical basis against which to evaluate many of the results generated in the sensitivity studies because many of the variables that are used as input to Fire-Risk are not considered or recorded in reports on fires, even though they are obviously important when risk-cost modelling (like Fire-Risk) is undertaken. It is thus impossible to check whether the results or trends that are apparent in the sensitivity studies are realistic. It will only be possible to do so if large scale, long term studies are undertaken.

Based on coroners reports and the USA NFIRS data we estimate that between 80% and 90% of fatalities in fires in apartment buildings occur to people from the AFO. The overall average USA fatality rate for apartment buildings is about 7 fatalities per 1000 reported fires and the Australian rate is similar (Appendix F). The base-case estimate by Fire-Risk is slightly higher. Considering SG1 in the RFO and RNFO, SG2 in the RFO and RNFO (the AFO cases) and the overall ANFO estimates in that order the Fire-Risk fatality rate estimate is (Appendix C):

$$0.1 + 0.0 + 7.3 + 0.6 + 0.8 = \mathbf{8.8}$$

A review of the estimates for the various cases in Appendix C reveals that changing many of the inputs, even by quite a considerable margin results in very little change in the estimated fatality rate. The rate within the AFO changes little except for the

sprinklered cases. The rate outside the AFO (the ANFO) changes more, with the various alarm types having a small effect, FRL's having little effect when they are above a certain level and a significant effect when they are below that level, and sprinklers having a significant effect.

We have no significant database of coroners reports for hotel and motel fires or for aged-care facility fires, and are thus unable to estimate the proportion of fatalities that occur in the AFO (or RFO, the two are synonymous in these cases). However, we assume it would be similar to the estimate for apartments mentioned above. Certainly the majority of fatalities in these types of buildings are single fatalities per fire, as is the case for apartment buildings (Appendices F, G and H).

The overall fatality rate for fires in Hotels and Motels in the USA is about 6 fatalities per 1000 fires (Appendix G). Considering SG1 in the RFO, SG2 in the RFO (the AFO cases) and the overall ANFO estimate in that order the Fire-Risk fatality rate estimate (with no staff intervention) is (Appendix D):

$$0.3 + 12.2 + 2.7 = \mathbf{15.2}$$

This is higher than for apartments due to several factors including different (assumed) probabilities of doors being open and there being only one door between the RFO and the corridor. The assumed proportions of SG1 and SG2 are the same as for apartment buildings and this greatly influences the result. It may be that the occupants in Hotels and Motels differ significantly from those in Apartments and this may significantly affect the fatality estimates.

The overall fatality rate for fires in Aged Care facilities in the USA is about 5 fatalities per 1000 fires (Appendix H), but there appears to be a significant difference between facilities with nursing staff (about 4 per 1000 fires) and those without nursing staff (about 8 per 1000 fires). However, it should be noted that this difference could be due to the presence of nursing staff, but it may not be – it may be due to other factors that largely coincide with the presence or absence of nursing staff but that are not recorded in the fire incident reports.

Considering SG1 in the RFO, SG2 in the RFO (the AFO cases) and the overall ANFO estimate in that order the Fire-Risk fatality rate estimate for Aged Care facilities is (Appendix E):

$$1.1 + 5.9 + 1.7 = \mathbf{8.7}$$

In this case the assumed proportions of SG1 and SG2 do differ from those in apartments but it may be that our estimates (which are based on little data) differ from the actual proportions in USA Aged Care facilities.

It is recommended that the sensitivity study estimates be further reviewed and that, where possible, trends in the Fire-Risk estimates be compared with real fire data.

6 MAJOR ASSUMPTIONS AND LIMITS OF APPLICABILITY

In meeting the goal of identifying cost effective design solutions for Class 2, 3 and 4 buildings, Fire-Risk currently allows the users to define the number of floors and number of apartments per floor. The model is constrained to six occupant groups and randomly distributes these throughout each floor. At present, the model uses a single floor layout and replicates this throughout the building. Future development is required to allow alternative floor layouts to be considered.

Within the constraints of complexity and computational duration, a selected number of pre-designed fire scenarios are considered. Principally these are smouldering, flaming / non-flashover or flaming/ potential flashover within bedroom, kitchen or lounge room locations. Design options are required to be selected by the model user in order to meet the end goal of a fully engineered approach to building safety. These include:

- stair configurations
- linings of corridors and stairways
- fire resistance levels of structural elements
- sprinkler and smoke management configurations
- detector, occupant warning systems and alarm types and locations
- building alarm configurations

In a number of cases, assumptions have been made owing to the complexity of the problem at hand. Thus, overall results of risk and cost estimation should be considered as approximations. Some principal limitations of the Fire-Risk model are:

- the probability of windows and doors being open or closed is very important input data to the model, yet little statistical data is available (the model uses values based on the limited data available)
- the model assumes a generic layout due to the complexity of layout of different types of buildings (this approach obviously simplifies the model, however the impact of such a simplification on the final results is unknown)
- to evaluate fire growth and occupant response as time dependent processes from ignition to extinguishment is computationally expensive and complex, especially when fire spread beyond the apartment of origin occurs
- the treatment of the apartment of fire origin as a single enclosure after the fire has spread from the room of fire origin to the adjoining room is an approximation
- the model has been developed based on results obtained for fuel loads comprising of polyurethane foam (if the fuel load involved in a fire has a vastly different composition, the heat release and chemical yields can deviate significantly)
- with respect to smoke spread, spatial variation may be significant in enclosures with large aspect ratios, though this is neglected in this model

- the base times and probabilities of response to cues and other values in the Human Behaviour model are based on a small number of cases and whilst they conform to expert opinion, their statistical reliability and validity is not well established

7 CHANGES TO THE MODEL SINCE THE LAST INTERNATIONAL REVIEW

Changes to the model since the last international review are summarised in Appendix B

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APPENDIX A
AUTHORISING CHECKLIST

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Research Report Approval Checklist

APPENDIX B
SUMMARY OF CHANGES

Summary of the main changes implemented in Fire-Risk upto version 4.5 (March 2001).

V1.0. All sub-models were integrated into Fire-Risk. All auxiliary programs were located into a single directory including Economic Model, NRCC-VUT Model, Scenario Generation Model, Direct Fire Spread Model, etc. Following a suggestion from the International Review Panel, separate inputs for AFO and the rest of the building were implemented. Now the program can be run with occupants only in the AFO and the rest of the building empty.

Based on sensitivity studies done on the Fire Growth Model a number of modifications were introduced in the model. These modifications give more accurate results of temperature, species concentrations and exhaust flow rates. A new wall routine to calculate heat loss to the walls was incorporated into the model to make the program more stable.

V1.01. A large number of modifications to Fire-Risk shell and its sub-models were made in order to integrate all common input variables into a central input data file called 'design.in'. This substantially increases the reliability of the program.

A new algorithm to deal with the fire spread situation has been implemented. Before the program simply copied the RFO conditions into the RNFO conditions at the time of fire spread. In this version the Fire Growth sub-model generates two fire conditions: one fire file for the RFO as before, and another one for a much larger RFO made up of the RFO and the RNFO. So the program now recognises that a different set of conditions (like volume, ventilation, etc.) are found when the fire spreads from the RFO into the RNFO.

V1.02. A number of processing inconsistencies were noticed when the fire spreads from the RFO into the RNFO. One of them is that in some scenarios Heavy smoke in the RNFO is detected before Light smoke has occurred. The second inconsistency is that in some scenarios the alarm is not activated in spite the fact that Heavy smoke is detected in the RNFO. Both problems are due to the change in conditions of the RNFO to those of the combined RFO+RNFO when fire spreads. These problems were fixed by copying the RFO+RNFO conditions in both the upper and the lower layer of the RNFO (TwoZone) conditions.

Inconsistencies in the time of alarm activation were also noticed. In some smouldering fires the alarm is activated but no activation occurs in the corresponding flaming or flashover fires. This happens because the program assumes the existence of smoke detectors in smouldering fires and temperature-based detectors in the other two types of fires. The problem was fixed by making detection of all fires based on smoke obscuration.

In previous versions, the AFO alarm was located in the same room where the occupants were located (either the RFO or the RNFO but not both). In this version the location of the AFO alarm is input by the program user using an 'AFO_alarm_flag' in file 'design.in'. Hence the location of the AFO alarm is independent of the AFO occupants location.

A problem in the calculation of the number of occupants in a room in the Non-Time-Dependent part (NTD) was located and fixed. Before, the program considered all occupants remaining in the room, including fatalities. This is wrong because fatalities are taking into account in the Time-Dependent part (TD), they should not be counted twice.

V1.03. Opening areas and leakages in the model were reconsidered and equations to calculate them based on the floor area were defined. There is now more consistency between the leakage factors used in the TwoZone Model and the Network Model. The openings and leakages considered were:
Openings and leakages in the Network Model (floors above the LFO):
Stair doors. Opening between stair to corridor.
Leakage from corridor to outside.
Opening from corridor to apartments.
Leakage form apartment to outside.

In the TwoZone Model (LFO) only an opening area (between the corridor and the ANFO) and a leakage (between the ANFO window and the outside) were considered.

V3.0. All changes made between version 1.03 and version 3.0 affect only the TwoZone Model.

A number of problems were noticed with the results from the TwoZone, particularly dealing with Mass Flow and the volume of upper and lower layers.

An improvement to the TwoZone Model was made by allowing the flow between enclosures to reflect the conditions in downstream enclosures. Previously the Mass Flow to next room was calculated only taking into account the conditions in the current room and the door height. In the current version the equations to calculate the Mass Flow to next room are influenced by the Interface height of the next room.

Another important change introduced in the TwoZone Model is the way the model deals with next room when this room is full with smoke. In this case the TwoZone equations don't hold and the program crashes. The following algorithm has been implemented: when a room is full with smoke, program processing is stoped and the conditions for RNFO, Corridor and ANFO are kept constant to the last value until the end of the simulation. If the last value is greater then the RFO conditions, then the RNFO, Corridor and ANFO conditions are those of the RFO (conditions downstream cannot be greater than upstream).

V3.1. In this version the probability of recognition of an alarm cue is affected by the detector reliability.

This version also implements a new strategy to run Fire-Risk: Now the AFO and the ANFO are run separately. The ANFO is run with no occupants in the AFO. The AFO is run with two types of occupants in two locations within the AFO. AFO occupants may either be SG1 (Super Group 1) or SG2 (Super Group 2). SG1 are capable occupants who have average recognition and reaction characteristics. SG2 are essentially non-responsive occupants. SG2 have a higher probability of being in a FO fire based on the fact that they are unable to actively suppress a fire.

Now one full run of Fire-Risk is made up of five runs as follows: One run with an SG1 in the RFO and the rest of the building empty. Another run with an SG1 in the RNFO and the rest of the building empty. Another run with an SG2 in the RFO. Another one with an SG2 in the RNFO and finally one run with an empty AFO and occupants in the rest of the building.

The new SG1 corresponds to the former OG1 (occupant group 1) but with two important differences, the probability of recognition of a cue by SG1 is higher and secondly, the Time to Start Evacuation, once the decision to evacuate has been taken, is shorter. SG2 correspond to OG5.

V3.2. In this version the stair length is assumed to be 2.5 times the apartment height (before, the stairs length was input by the user).

Another change introduced in this version is in the calculation of the number of occupants in a floor who recognise a warning cue. This number is given as the number of occupants exposed to the cue times the probability of recognition of the cue. Before, it was assumed that all occupants in the floor, would recognise the cue (but only a fraction of them would evacuate).

V3.3. Warning cues for occupants evacuating their apartments are now given by the first of the (three) realisation of occupants' evacuation. (previously they were given by the second realisation).

V3.4. Changes in the input data files of the Human Behaviour sub-model were introduced in this version. Another change in the Human Behaviour sub-model is that now occupants in the RNFO do only direct evacuation (they don't do investigation prior to taking a decision).

V3.5. In this version changes to the algorithm to calculate the number of fatalities on the Non-Time-Dependent part (NTD) were introduced. In the new algorithm the program runs the 12 flashover fires, with fire spread, to the end of the simulation. At the end of the simulation the number of occupants remaining in the building and their status is calculated and passed to the NTD function.

The number of occupants who will be counted as fatalities in the NTD part is given by the expression,

Fatal = Prob_fire_spreading*Prob_getting_killed*Remaining_in_enclosure

Where: Prob_fire_spreading = Probability of fire spreading to the enclosure
Prob_getting_killed = Probability that these occ. will be killed given that the fire has spread to their enclosure

If occupants of the 1st and 2nd floor are allowed to escape through the window (by setting the corresponding flag to 1 in 'design.in') these occupants are not taken into account in variable they are considered to be safe in both TD and NTD parts. Occupants who are allowed to take protective action within their apartments (by setting corresponding flag to 1 in 'design.in') are considered to be safe in the TD part but not in the NTD part.

V3.6 . A small change in the equation to calculate the outflow in the upper zone of an enclosure of the TwoZone Model has been implemented. The new equation takes into account two components of flow: Free flow and Submerged flow.

The non-time dependent overall fire spread model has been modified to take into account the severity of fire spread through different types of enclosures. The probability of flashover in an enclosure is now dependent on the fuel load density. It is assumed that the probability of a fire becoming fully developed in bedrooms or lounge is 1.0. Hence now, the probability of a fully developed fire (given fire start) in the corridors is equal to the ratio of the average fuel load density in corridors and the average fuel load density in bedrooms or lounge. The same applies for stairs.

The probability of fire spread from the AFO to any apartment above is now the average probability of fire spread to all apartments on the level above.

V3.7. In this version an interface between the NRCC model output and Two Zone model was introduced. Before this version the inflow was treated as a time-dependent flow calculated in the NRCC Model. This approach failed to recognise the fact that the RFO flow has to be affected by the conditions in the RNFO, which in turn are affected by the conditions downstream. The new program calculates a correction factor for RNFO inflow based on the RNFO Interface height.

V3.8. A stability problem with the equations to calculate conditions in the RNFO was found. This problem was introduced in the program after the correction factor in the flow coming from the RFO was included. The problem was due to the fact that the NRCC Model is a one-zone model. This problem was rectified by assuming an interface height for the one zone model at half the height of the door connecting the RFO and the RNFO.

Significants changes were introduced to the program to cut execution time. Now a complete run (384 scenarios) takes approximately 25 minutes on a Pentium III (450 MHz).

V3.9. In this version, a new algorithm to calculate fatalities in the NTD, part has been implemented. The TD part is now restricted to a fire in the RFO only. Previously the NTD part was assumed to start when the fire reached the stair. An arbitrary value for the time of fire spread was assumed. Now the NTD part is not assumed to start at any specific time but is considered to run parallel to the TD part. Occupants who have not reacted to cues from a fire in the RFO make still escape in the NTD part if safe egress exists. Those trapped in the TD part are also considered to be trapped in the NTD part. Those who have evacuated in the TD part are also considered to have evacuated in the NTD part. This

assumption is based on the fact that if occupants have decided to evacuate and have evacuated before the onset of Heavy smoke conditions in the TD part, they would have done so before fire spread.

Occupants who do not react or decided to do nothing in the TD part may evacuate in the NTD part if safe egress routes exist. The probability of safe egress routes from an apartment is based on the probability of no fire or smoke spread to any enclosure along the egress path. It is assumed that in a spreading fire all occupants except non-mobile, fatalities or incapacitated will attempt evacuation.

The equation to calculate the number of occupants who cannot escape in the NTD part is as follows,

Cannot_esc_NTD = Occ. remaining x (1.0 – Prob. of safe egress from occ. Aprt)

The Prob. of safe egress from occupants' Apartment is calculated externally and input into the program via a data file called '

The number of fatalities in the NTD part is, then made up of two groups: those who could not escape in the NTD part (as explained above) and those who are passed from the TD part as trapped occupants , that is,

NTD_fatal = Prob of FS x (TD_trapped + Cannot_esc_NTD)

Where Prob of FS is the probability that the fire spreads to the enclosure where the occupants are located. This probability is also calculated externally and input into the program via data file 'crisk.fm2'.

V4.0. The major difference between Version 4.0 and previous versions, is in the Fire Brigade (FB) intervention algorithm. The new Fire Brigade algorithm makes the program more consistent. Before, occupants instructed to evacuate by the Fire Brigade were considered safe from heat and gases because it was assumed that the Fire Brigade would instruct and help these occupants to evacuate. They would evacuate by means other than walking through the corridors to reach the exit, like evacuating through windows using ladders, ropes or even helicopters, or the FB leading them to a safe emergency exit upstairs and so on. However disabled or incapacitated occupants, who were supposed to be rescued by the fire fighters, were assumed to continue accumulating gases and heat. In Version 4.0 both kinds of occupants are assumed to be safe once the FB reach them.

The other change in Version 4.0 is that occupants rescued by the FB should not be included in the NTD part of the program, so these occupants are now deleted from the program storage area at the time they are rescued by the FB.

V4.1. In this version leakage and openings in the program were revisited and new definitions were implemented. All factors and probabilities to calculate openings and leakages are now read from input data file 'design.in' so users can change them easily. In particular five parameters were defined and equations for calculation of openings and leakages were developed for the TwoZone Model. These parameters are (the equations are not presented here):

Prob_ANFODO = Probability of finding ANFO Door open (in LFO)
Prob_ANFOWO = Probability of finding ANFO Window open
DoorLeakage1 = Leakage through closed RFO Door (Connecting to RNFO)
DoorLeakage2 = Leakage through closed AFO Door (Connecting to Corridor)
DoorLeakage3 = Leakage through closed Stair Door (in LFO).

The default values for these parameters are presented in Table 1.

Table 1. Default values – Two Zone

Variable	Value
Prob_ANFODO	0.01
Prob_ANFOWO	0.001
DoorLeakage1	0.001
DoorLeakage2	0.001
DoorLeakage3	0.001

Similarly parameters for calculation of openings and leakages in the Network Model (above LFO) are:
Prob_SDO = Probability of finding the Stair Door open
Prob_ADO = Probability of finding Apartment Doors open
Leaka1 = Leakage factor for Corridor-Outside
Leaka2 = Leakage factor for Stairs-Outside
Leaka3 = Leakage factor for Apart-Outside
Table 2 shows the default values for these parameters.

Table 2. Default values - Network

Variable	Value
Prob_SDO	0.1
Prob_ADO	0.01
Leaka1	0.001
Leaka2	0.04
Leaka3	0.001

V4.2. In this version a bug in one of the input data files was located and fixed. The bug affects the Probability of Initial Action (Pinit_act) for RFO occupants. One of the Human Behaviour rules implemented in Fire-Risk says that RFO occupants who recognise a cue do Direct evacuation, they don't Investigate prior to taking a decision about evacuation. So the value for Pinit_act for the Direct evacuation case should be 1.0 and for the Investigate case should be 0.0 (Before this version both were 1.0 so the number of occupants evacuating was overestimated).

V4.3. This version of Fire-Risk has been developed to model some Class 3 buildings like hotels. The fundamental difference between these buildings and residential buildings (Class 2) is that in Class 3 buildings we have to deal with single-enclosure AFO apartments, ie. there is no RNFO in the AFO, the RFO faces the corridor directly.

After some effort it was found that the current program does not allow an easy model of single-enclosure AFO apartments. The TwoZone model does not allow an enclosure to be connected to the RFO and to the outside at the same time. A number of solutions to by-pass this limitation were developed and tested. The solution implemented in version 4.3 has a dummy enclosure connected to the corridor. This dummy enclosure is also connected to the outside (stairs).

To correctly implement this solution for the single-enclosure case, three major modifications of the program were carried out: 1) The flow into the stairs is assumed to be the flow going from the corridor into the dummy enclosure. 2) No feedback from the dummy enclosure to the corridor is allowed, and 3) Because there is no RNFO, the corresponding fields for RNFO data, used in the Human Behaviour data files have been filled out with zeros. Because of these modifications there are now two versions of Fire-Risk: one version for residential building with the normal two-enclosure AFO (ie. RFO and RNFO) and another version for Class 3 buildings with a single-enclosure AFO (ie. the AFO is made up of only an RFO). The single-enclosure AFO version is marked with the letter H.

V4.4(H). This version includes a new algorithm to simulate staff intervention. The new algorithm is based on document PB_22.01.01. The main differences between this and the previous algorithm to simulate staff intervention are as follows:

As before, staff is considered to be located in the first floor. Staff action is activated by the production of cues in the first floor corridor. In the new version staff is also activated by a call to the reception desk by a building occupant. This is particularly important in the case in which the LFO is not located in the first floor.

A call to reception desk is simulated by assuming that an occupant would call if he/she thinks that there is a fire. This is implemented in the program by producing this call at the time of average light smoke in the LFO corridor for the awake case or the time of average light smoke in the LFO stair for the asleep conditions.

A new feature of this version is that staff intervention is assumed to cease when Heavy Smoke reaches the LFO stair. Before, staff intervention continued until the top floor was reached or to the end of the simulation, whatever came first. Staff intervention also stops when the FB reaches the building and starts search and rescue.

The number of active Staff members for search and rescue is still calculated by the program based on the probability of cue recognition, but in this version this probability depends on the number of Staff members. The equation for calculating the actual probability is as follows:

$$Prec = 1.0 - (1.0 - Old\_Prec)^n$$

Where: n = number of Staff members
Old_Prec = Probability of cue recognition as read from input data files.

A new cue for Staff was introduced in this version: Staff can receive and react to a Window Breaking Glass cue, when this cue happens in the first floor.

Although these changes don't affect version 4.3 (for Residential buildings) because no Staff intervention is assumed in residential buildings, a Fire-Risk version 4.4 will also be generated and stored. From version 4.3 onwards there will always be two streams of Fire-Risk, the two streams will be identical except for the differences explained above in version 4.3 (which affect only the TwoZone model).

V4.5. There are no significant changes in the program between this version and version 4.4. In this version, a bug in the program and a few bugs in some of the input data files have been located and fixed. The bug in the program affected occupants in the corridor. In some cases the program was leaving these occupants in the corridor instead of moving them to the stairs, so the total number of fatalities in most scenarios were overestimated.

It is important to point out that in this version the program is run with an RNFO size which is different from the Apartment size. The base case before this version had an ANFO and an RNFO of 9.5 x 10 m^2. In this version the RNFO is assumed to be 7.5 x 10 m^2. The ANFO's remain the same, ie. 9.5 x 10. As a result of reducing the size of the RNFO, an increase in the number of fatalities in the (Open, Open) case was noticed.

The reason for the increased in the number of fatalities was studied and found to be correct. A document titled 'Effect of Reducing the RNFO Size in the Base Case' was produced on 1/03/01.

APPENDIX C
SENSITIVITY ANALYSIS RESULTS – CLASS 2 (APARTMENTS)

Results of Sensitivity Studies v4.5 for Class 2 (Apartment Buildings)

The following sensitivity study was carried out for version 4.5 of Fire-Risk. An extensive list of parameter were varied which include building related and human behaviour variables. It must be noted that the sensitivity is done for the variables in the program and is therefore not always a realistic situation. As a rule only one variable is modified at a time with all others being set to the base case, the only exceptions are: US statistics used for sprinkler reliability in apartment buildings(insufficient Australian data available), occupant sensitivity to building alarms uses building alarms as compared to the base case combined alarms and occupant sensitivity to apartment alarms uses apartment alarms as the alarm type.

The results are tabulated and at the end of each table an explanation of the column headings can be found. The row headings are explained in the list of sensitivity study parameters. It is assumed that the reader is familiar with the basic concepts used in the model.

Note: see inset in the list of sensitivity study parameters for a brief description of the alarm types used

This document contains:

List of Sensitivity Study Parameters

Building Dimensions								
[Apartment Size]	**Aptm Size**	9.5x5	9.5x10	9.5x15	9.5x20	12x10	12x15	12x20
[Room of Fire Origin Size]	**RFO Size**	5x4	5x6	5x8	6x4	6x6	6x8	
[Room of Non-Fire Origin Size]	**RFNO Size**	5X10	7.5X10	10X10	20X10			
[RFO Window Size]	**RFOWin Size**	1.6x2.4	2.4x4					
	Corridor Length	10	20	40	80	160	*(only ANFOs)*	
	Enclosure Height	2.4	2.6	2.8	3	3.2		

Dimensions: meters

No of Apts w/OG							
[No. of apartments per level with single OG type]	**No of Apts w/OG1**	4	6	8	10	12	
	No of Apts w/OG4	4	6	8	10	12	
	No of Apts w/OG5	4	6	8	10	12	

Alarm Types:
1 No Alarms
2 Smoke Detectors
3 Interconn. Smoke Detectors
4 Corridor Alarms only
5 Building Alarm - Corridor
6 Building Alarm - Apartments
7 Building Alarm - Interconn. Apart

Detectors/Alarms							
	Alarms	1	2	3	4	5	6	7
	Smoke Detector Reliability	0.9	0.95	0.99				

Fire Protection Systems - Active			
Sprinkler Reliability.	0.85	0.9	0.95
Smoke Management Reliability.	0.7	0.8	0.9
Stair Pressurisation Reliability	0.5	0.95	1

Fire Protection Systems - Passive (only ANFOs)						
****FRLs**	30	60	90	120	180	240

Dimensions: minutes

** The base FRL is a combination of 60 and 90 minute barrier elements

Statistical parameters			
[Statistical Data]	**AUS/US Stats**	AUS	US

Scenario Probabilities (only ANFOs)				
Stair Door Opening Probability	1	5	10	25
Apartment Door Opening Probability	0.1	1	10	20

Non Base Case

Base Case

Occupant Behaviour

3point Evacuation	- Awake	0_0_1	0_1_0	1_0_0			
	- Asleep	0_0_1	0_1_0	1_0_0			
	[Base AW = 0.22, 0.59, 0.19 ; BaseAS = 0.46, 0.33, 0.15]						
3point Investigate & Evacuate	- Awake	0_0_1	0_1_0	1_0_0			
	- Asleep	0_0_1	0_1_0	1_0_0			
	[Base AW = 0.47, 0.19, 0.33 ; BaseAS = 0.47, 0.39, 0.14]						
Initial Action	- Alarms	05_05_0	05_0_05	0_05_05	0_0_1	0_1_0	1_0_0
	- Smoke	05_05_0	05_0_05	0_05_05	0_0_1	0_1_0	1_0_0
	- Warnings	05_05_0	05_0_05	0_05_05	0_0_1	0_1_0	1_0_0
	[Base Alarms = 0.2, 0.2, 0.6]						
Investigate and Act	- Heavy Smoke	05_05_0	05_0_05	0_05_05	0_0_1	0_1_0	1_0_0
	- Light or Medium Smoke	05_05_0	05_0_05	0_05_05	0_0_1	0_1_0	1_0_0
	- No Smoke	05_05_0	05_0_05	0_05_05	0_0_1	0_1_0	1_0_0
	[Base L/MSmk = 0.65, 0.35, 0.0]						
Occupant G roup Type		All OG1	All OG2	All OG3	All OG4	All OG5	All OG6
	[BaseOG AW = 0.32, 0.09, 0.2, 0.34, 0.01, 0.04 ; BaseOG AS = 0.31, 0.07, 0.2, 0.34, 0.04, 0.04]						
Recognition OG1(Asleep) *[Cue Recognition with single OG type = OG1]*	-Apartment Alarms	0.0	0.5	0.8	0.9	1.0	
	Building Alarms	0.0	0.5	0.7	0.9	1.0	
	Combined Alarms	0.0	0.5	0.9	1.0		
	Smoke	0.0	0.5	0.1	0.2	0.4	
	Warnings	0.0	0.5	1.0			
Recognition OG1(Awake) *[Cue Recognition with single OG type = OG1]*	-Apartment Alarms	0.0	0.5	0.8	0.9	1.0	
	Building Alarms	0.0	0.5	0.7	0.9	1.0	
	Combined Alarms	0.0	0.5	0.9	1.0		
	Smoke	0.0	0.5	0.1	0.2	0.4	
	Warnings	0.0	0.5	1.0			

Evacuation Probability:

'0_0_1	100% Evacuate at time3
'0_1_0	100% Evacuate at time2
'1_0_1	100% Evacuate at time1
'05_05_0	50% Evacuate at time1 50% Evacuate at time2
'05_0_05	50% Evacuate at time1 50% Evacuate at time3
'0_05_05	50% Evacuate at time2 50% Evacuate at time3

Initial Action Probability:

'0_0_1	100% Do Nothing
'0_1_0	100% Investigate
'1_0_1	100% Direct Evacuate
'05_05_0	50% Direct Evacuate + 50% Investigate
'05_0_05	50% Direct Evacuate + 50% Do Nothing
'0_05_05	50% Investigate + 50% Do Nothing

Investigate & Act Probability:

'0_0_1	100% Trapped
'0_1_0	100% Return
'1_0_1	100% Evacuate
'05_05_0	50% Evacuate + 50% Return
'05_0_05	50% Evacuate + 50% Trapped
'0_05_05	50% Return + 50% Trapped

Recognition Probability:
0 = No Recognition
1 = 100% Recognition

Recognition Probability:
0 = No Recognition
1 = 100% Recognition

Non Base Case

Base Case

Results Summary Sheet for Base Cases

Building Descriptions and Characteristics (1: YES; 0: NO)

Building Class =	2	*Fire Flr Level =*	1					*No occupants in AFO*			
No. of Levels =	3	*No. of Aptmts =*	6	*No. of Stairs =*	2			*Prob of being killed in NTD =*	1.0		
Building	*Length (m)*	*Width (m)*	*Height (m)*	*Door Size*	*Height (m)*	*Width (m)*	*Window Size*	*Height (m)*	*Width (m)*	*Window Openability =*	1
Apartment Size:	9.5	10.0	2.4	*Apartment:*	2.0	0.8	*Apartment:*	2.0	10.0	*Occ. can escape thr' windows of flrs 1 & 2 =*	1
RFO Size:	5.0	4.0	2.4	*RFO:*	2.0	0.8	*RFO:*	1.6	2.4	*Defend in Place =*	1
Stair:	4.8	2.4	2.57	*Stair:*	2.0	0.9					
Corridor:	40.0	1.5	2.4								

Detection System: Alarm Type =	5	*Smoke Detector Reliability =*	0.95	*Detector Type =* 1	*Smk Det. Actv. Extg. Coeff. =* 0.2
Sprinkler installed =	0	*Sprinkler Reliability =*	0.9	Data = 1	(1: Aust., 2: US)
Smoke Management Installed =	0	*Smk Mgtmt Reliability =*	0.8	*(Note: if Smoke Management is installed, AFO Door open in STATS [1] is adjusted to Effective AFO Door open)*	
Stair Pressurisation Installed =	0	*Stair Pressurisation Reliability =*	0.95	*(Note: if Stair Pressurisation is installed, Stair Door open in STATS [1] is adjusted to Effective Stair Door open)*	
Connection to Fire Brigade =	1	*Fire Brigade Interv =*	0		

STATS:

[1] Prob. of AFO & Stair Doors being open; Proportions of fire during Awake (7am-10pm)

AFO Door open(AFOD) =	0.01	*Stair Door open (SD) =*	0.10
Effective AFO Door open (AFOD) =	0.010	*Effective Stair Door open (SD) =*	0.100
Awake: Kitchen (K) =	0.77	*Bedroom (B) and Lounge (L) =*	0.65

Aust. Data

[2] Fire *Proportions of SM Fire / FL Fire / FO Fire*

kitchen (K)	48.6%	48.3%	3.1%	**No**
bedroom (B)	16.8%	67.4%	15.8%	**Sprkls**
lounge (L)	23.1%	63.8%	13.1%	
kitchen (K)				
bedroom (B)				**Sprkls**
lounge (L)				

Aust. Data

[3] Fire *Proportions of fire in K, B & L*

kitchen (K)	64.0%	**No**
bedroom (B)	21.8%	**Sprkls**
lounge (L)	14.2%	
kitchen (K)		
bedroom (B)		**Sprkls**
lounge (L)		

[1] Conditions for Occps, AFOD & SD

Fatality for 1000 SM, FL & FO fires (data fr Fire-Risk Prog.)

Weighted Proportion for [1] Aw/As, AFOD, SD

Weighted Fatality per 1000 Fires (incl. [1])

Occupants (Occps)	AFO Door (AFOD)	Stair Door (SD)	SM Fire TD	FL Fire TD	FO Fire TD	FO Fire NTD	FO Fire Total	% TD Fat.	Kitchen	Bedroom/Lounge	Kitchen (K) SM Fire	Kitchen (K) FL Fire	Kitchen (K) FO Fire	Bedroom (B) & Lounge (L) SM Fire	Bedroom (B) & Lounge (L) FL Fire	Bedroom (B) & Lounge (L) FO Fire
Awake (Aw)	Open	Open	0.00	0.00	0.00	1.15	1.15	0%	0.001	0.001	0.00	0.00	0.00	0.00	0.00	0.00
Awake	Open	Closed	0.00	0.00	0.00	0.00	0.00	0%	0.007	0.006	0.00	0.00	0.00	0.00	0.00	0.00
Awake	Closed	Open	0.00	0.00	0.00	0.01	0.01	0%	0.076	0.064	0.00	0.00	0.00	0.00	0.00	0.00
Awake	Closed	Closed	0.00	0.00	0.00	0.00	0.00	0%	0.686	0.579	0.00	0.00	0.00	0.00	0.00	0.00
										Total Aw:	0.00	0.00	0.00	0.00	0.00	0.00
Asleep (As)	Open	Open	0.00	0.00	908.31	54.07	962.38	94%	0.000	0.000	0.00	0.00	0.22	0.00	0.00	0.34
Asleep	Open	Closed	0.00	0.00	0.00	50.19	50.19	0%	0.002	0.003	0.00	0.00	0.10	0.00	0.00	0.16
Asleep	Closed	Open	0.00	0.00	0.00	34.76	34.76	0%	0.023	0.035	0.00	0.00	0.79	0.00	0.00	1.20
Asleep	Closed	Closed	0.00	0.00	0.00	34.74	34.74	0%	0.205	0.312	0.00	0.00	7.12	0.00	0.00	10.83
										Total As:	0.00	0.00	8.24	0.00	0.00	12.53
										Totals (Aw & As):	0.00	0.00	8.24	0.00	0.00	12.53

(Notes: TD: Time Dependent path; NTD: Non Time Dependent path)

Weighted Fatality per 1000 Fires (incl. [1] & [2])

	SM Fire	FL Fire	FO Fire	Total	Tot (Aw & As)
kitchen (K) - Aw	0.00	0.00	0.00	0.00	
- As	0.00	0.00	0.26	0.26	0.26
bedroom (B) - Aw	0.00	0.00	0.00	0.00	
- As	0.00	0.00	1.98	1.98	1.98
lounge (L) - Aw	0.00	0.00	0.00	0.00	
- As	0.00	0.00	1.64	1.64	1.64

Proportions of Fatality Rate per 1000 SM, FL & FO Fires (incl. [1], [2] & [3])

	SM Fire	FL Fire	FO Fire	Total
kitchen (K) - Aw	0.00	0.00	0.00	0.00
- As	0.00	0.00	0.16	0.16
bedroom (B) - Aw	0.00	0.00	0.00	0.00
- As	0.00	0.00	0.43	0.43
lounge (L) - Aw	0.00	0.00	0.00	0.00
- As	0.00	0.00	0.23	0.23
Total (Aw & As):	0.00	0.00	0.83	**0.828**
%SM, %FL & %FO fatalities (Aw & As):	0%	0%	100%	

Results Summary Sheet for Base Cases

Building Descriptions and Characteristics (1: YES; 0: NO)

Building Class = 2 *Fire Flr Level =* 1 ***Super Group in AFO (SG) =*** **1** (1: Normal; 2: Non responding)

No. of Levels = 3 *No. of Aptmts =* 6 *No. of Stairs =* 2 ***SG location in AFO =*** **0** (0: RFO; 1: RNFO)

Building	*Length (m)*	*Width (m)*	*Height (m)*	*Door Size*	*Height (m)*	*Width (m)*	*Window Size*	*Height (m)*	*Width (m)*
Apartment Size:	9.5	10	2.4	*Apartment:*	2	0.8	*Apartment:*	2	10
RFO Size:	5	4	2.4	*RFO:*	2	0.8	*RFO:*	1.6	2.4
Stair:	4.8	2.4	2.57	*Stair:*	2	0.9			
Corridor:	40	1.5	2.4						

Window Openability = 1

Occ. can escape thr' windows of flrs 1 & 2 = 1

Defend in Place = 1

Detection System: Alarm Type = 5 *Smoke Detector Reliability =* 0.95 *Detector Type =* 1 *Smk Det. Actv. Extg. Coeff. =* 0.2

Sprinkler installed = 0 *Sprinkler Reliability =* 0.9 Data = 1 (1: Aust., 2: US)

Smoke Management Installed = 0 *Smk Mgtmt Reliability =* 0.8 *(Note: if Smoke Management is installed, AFO Door open in STATS [1] is adjusted to Effective AFO Door open)*

Stair Pressurisation Installed = 0 *Stair Pressurisation Reliability =* 0.95 *(Note: if Stair Pressurisation is installed, Stair Door open in STATS [1] is adjusted to Effective Stair Door open)*

Connection to Fire Brigade = 1 *Fire Brigade Interv =* 0

STATS: [1] Prob. of AFO & Stair Doors being open; Proportions of fire during Awake (7am-10pm)

AFO Door open (AFOD) = 0.01 *Stair Door open (SD) =* 0.10

Effective AFO Door open (AFOD) = 0.010 *Effective Stair Door open (SD) =* 0.100

Awake: Kitchen (K) = 0.77 *Bedroom (B) and Lounge (L) =* 0.65

[2] Fire: ***Aust. Data***

		Proportions	*of SM Fire*	*FL Fire*	*FO Fire*		*SM Fire*	*FL Fire*	*FO Fire*
No	*kitchen (K)*	48.6%	48.3%	3.1%					
Sprks	**bedroom (B)**	16.8%	67.4%	15.8%		**Sprks**			
	lounge (L)	23.1%	63.8%	13.1%					

[3] Fire	***Aust. Data***	*Proportions of fire in K, B & L*	
kitchen (K)	**No**	64.0%	
bedroom (B)	**Sprks**	21.8%	**Sprks**
lounge (L)		14.2%	

[4] SG	*SG in SM, FL & FO fires during Aw/As*		
1	*SM Fire*	*FL Fire*	*FO Fire*
Awake	99.9%	99.7%	87.0%
Asleep	99.9%	99.5%	87.0%

[5] SG	*multiplier for Aw & As*	
1	*Awake*	*Asleep*
	1.8	1.7

[6] SG	*% in RFO & RNFO*	
1	*RFO*	*RNFO*
	65%	35%

[1] Conditions for Occps, AFOD & SD

Occupants (Occps)	AFO Door (AFOD)	Stair Door (SD)
Awake (Aw)	Open	Open
Awake	Open	Closed
Awake	Closed	Open
Awake	Closed	Closed
Asleep (As)	Open	Open
Asleep	Open	Closed
Asleep	Closed	Open
Asleep	Closed	Closed

Fatality for 1000 SM, FL & FO fires (data fr Fire-Risk Prog.)

SM Fire - TD	FL Fire - TD	FO Fire - TD
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.30	0.39	0.5950
0.30	0.39	0.5950
0.30	0.39	0.5950
0.30	0.39	0.5950

(Note: TD: Time Dependent path)

Weighted Proportion for [1] Aw/As, AFOD, SD

Kitchen	Bedroom/Lounge
0.001	0.001
0.007	0.006
0.076	0.064
0.686	0.579
0.000	0.000
0.002	0.003
0.023	0.035
0.205	0.312

Weighted Fatality per 1000 Fires (incl. [1])

Kitchen (K)			Bedroom (B) & Lounge (L)		
SM Fire	FL Fire	FO Fire	SM Fire	FL Fire	FO Fire
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.02
0.06	0.08	0.12	0.09	0.12	0.19
0.07	0.09	0.14	0.10	0.14	0.21
0.07	0.09	0.14	0.10	0.14	0.21

Total Aw: 0.00 0.00 0.00 0.00 0.00 0.00

Total As: 0.07 0.09 0.14 0.10 0.14 0.21

Totals (Aw & As): 0.07 0.09 0.14 0.10 0.14 0.21

Weighted Fatality per 1000 Fires (incl. [1] & [2])

	SM Fire	FL Fire	FO Fire	Total	Tot (Aw & As)
kitchen (K) - Aw	0.00	0.00	0.00	0.00	
- As	0.03	0.04	0.00	0.08	0.08
bedroom (B) - Aw	0.00	0.00	0.00	0.00	
- As	0.02	0.09	0.03	0.14	0.14
lounge (L) - Aw	0.00	0.00	0.00	0.00	
- As	0.02	0.09	0.03	0.14	0.14

Proportions of Fatality Rate per 1000 SM, FL & FO Fires (incl. [1], [2], [3], [4], [5] & [6])

	SM Fire	FL Fire	FO Fire	Total
kitchen (K) - Aw	0.00	0.00	0.00	0.00
- As	0.02	0.03	0.00	0.06
bedroom (B) - Aw	0.00	0.00	0.00	0.00
- As	0.00	0.02	0.01	0.03
lounge (L) - Aw	0.00	0.00	0.00	0.00
- As	0.00	0.01	0.00	0.02
Total (Aw & As):	0.03	0.07	0.01	**0.1129**
%SM, %FL & %FO fatalities (Aw & As):	28%	60%	12%	

Results Summary Sheet for Base Cases

Building Descriptions and Characteristics (1: YES; 0: NO)

Building Class = 2 *Fire Flr Level =* 1 ***Super Group in AFO (SG) =*** **2** (1: Normal; 2: Non responding)

No. of Levels = 3 *No. of Aptmts =* 6 *No. of Stairs =* 2 ***SG location in AFO =*** **0** (0: RFO; 1: RNFO)

Building	Length (m)	Width (m)	Height (m)	Door Size	Height (m)	Width (m)	Window Size	Height (m)	Width (m)
Apartment Size:	9.5	10	2.4	*Apartment:*	2	0.8	*Apartment:*	2	10
RFO Size:	5	4	2.4	*RFO:*	2	0.8	*RFO:*	1.6	2.4
Stair:	4.8	2.4	2.57	*Stair:*	2	0.9			
Corridor:	40	1.5	2.4						

Window Openability = 1
Occ. can escape thr' windows of flrs 1 & 2 = 1
Defend in Place = 1

Detection System: Alarm Type = 5 *Smoke Detector Reliability =* 0.95 *Detector Type =* 1 *Smk Det. Actv. Extg. Coeff. =* 0.2

Sprinkler installed = 0 *Sprinkler Reliability =* 0.9 Data = 1 (1: Aust., 2: US)

Smoke Management Installed = 0 *Smk Mgtmt Reliability =* 0.8 *(Note: if Smoke Management is installed, AFO Door open in STATS [1] is adjusted to Effective AFO Door open)*

Stair Pressurisation Installed = 0 *Stair Pressurisation Reliability =* 0.95 *(Note: if Stair Pressurisation is installed, Stair Door open in STATS [1] is adjusted to Effective Stair Door open)*

Connection to Fire Brigade = 1 *Fire Brigade Interv =* 0

STATS: [1] Prob. of AFO & Stair Doors being open; Proportions of fire during Awake (7am-10pm)

AFO Door open (AFOD) = 0.01 *Stair Door open (SD) =* 0.10

Effective AFO Door open (AFOD) = 0.010 *Effective Stair Door open (SD) =* 0.100

Awake: Kitchen (K) = 0.77 *Bedroom (B) and Lounge (L) =* 0.65

[2] Fire: ***Aust. Data***

	Proportions of SM Fire	FL Fire	FO Fire		SM Fire	FL Fire	FO Fire
No	*kitchen (K)*	48.6%	48.3%	3.1%			
Sprks	**bedroom (B)**	16.8%	67.4%	15.8%	**Sprks**		
	lounge (L)	23.1%	63.8%	13.1%			

[3] Fire	***Aust. Data***	*Proportions of fire in K, B & L*		**[4] SG**	*SG in SM, FL & FO fires during Aw/As*		
kitchen (K)	**No**	64.0%		***2***	*SM Fire*	*FL Fire*	*FO Fire*
bedroom (B)	**Sprks**	21.8%	**Sprks**	*Awake*	0.1%	0.3%	13.0%
lounge (L)		14.2%		*Asleep*	0.1%	0.5%	13.0%

[5] SG	*multiplier for Aw & As*		**[6] SG**	*% in RFO & RNFO*	
2	*Awake*	*Asleep*	***2***	*RFO*	*RNFO*
	1.2	1.5		65%	35%

[1] Conditions for Occps, AFOD & SD

Occupants (Occps)	AFO Door (AFOD)	Stair Door (SD)
Awake (Aw)	Open	Open
Awake	Open	Closed
Awake	Closed	Open
Awake	Closed	Closed
Asleep (As)	Open	Open
Asleep	Open	Closed
Asleep	Closed	Open
Asleep	Closed	Closed

Fatality for 1000 SM, FL & FO fires (data fr Fire-Risk Prog.)

SM Fire - TD	FL Fire - TD	FO Fire - TD
141.75	292.25	700.00
141.75	292.25	700.00
141.75	292.25	700.00
141.75	292.25	700.00
498.75	651.25	1000.0
498.75	651.25	1000.0
498.75	651.25	1000.0
498.75	651.25	1000.0

(Note: TD: Time Dependent path)

Weighted Proportion for [1] Aw/As, AFOD, SD

Kitchen	Bedroom/Lounge
0.001	0.001
0.007	0.006
0.076	0.064
0.686	0.579
	Total Aw:
0.000	0.000
0.002	0.003
0.023	0.035
0.205	0.312
	Total As:
	Totals (Aw & As):

Weighted Fatality per 1000 Fires (incl. [1])

Kitchen (K)			Bedroom (B) & Lounge (L)		
SM Fire	FL Fire	FO Fire	SM Fire	FL Fire	FO Fire
0.11	0.23	0.54	0.09	0.19	0.46
0.98	2.03	4.85	0.83	1.71	4.10
10.81	22.28	53.36	9.12	18.81	45.05
97.25	200.50	480.25	82.09	169.26	405.41
109.15	225.03	539.00	92.14	189.96	455.00
0.11	0.15	0.23	0.17	0.23	0.35
1.03	1.35	2.07	1.57	2.05	3.15
11.36	14.83	22.77	17.28	22.57	34.65
102.21	133.46	204.93	155.54	203.09	311.85
114.71	149.79	230.00	174.56	227.94	350.00
223.86	374.82	769.00	266.70	417.90	805.00

Weighted Fatality per 1000 Fires (incl. [1] & [2])

	SM Fire	FL Fire	FO Fire	Total	Tot (Aw & As)
kitchen (K) - Aw	53.05	108.69	16.71	178.45	
- As	55.75	72.35	7.13	135.23	313.67
bedroom (B) - Aw	15.48	128.03	71.89	215.40	
- As	29.33	153.63	55.30	238.26	453.66
lounge (L) - Aw	21.28	121.20	59.61	202.08	
- As	40.32	145.42	45.85	231.60	433.68

Proportions of Fatality Rate per 1000 SM, FL & FO Fires (incl. [1], [2], [3], [4], [5] & [6])

	SM Fire	FL Fire	FO Fire	Total
kitchen (K) - Aw	0.03	0.16	1.09	1.27
- As	0.03	0.23	0.58	0.84
bedroom (B) - Aw	0.00	0.07	1.59	1.66
- As	0.01	0.16	1.53	1.70
lounge (L) - Aw	0.00	0.04	0.86	0.90
- As	0.01	0.10	0.82	0.93
Total (Aw & As):	0.08	0.76	6.46	**7.2950**
%SM, %FL & %FO fatalities (Aw & As):	1%	10%	89%	

Results Summary Sheet for Base Cases

Building Descriptions and Characteristics (1: YES; 0: NO)

Building Class = 2 *Fire Flr Level =* 1 ***Super Group in AFO (SG) =* 1** (1: Normal; 2: Non responding)

No. of Levels = 3 *No. of Aptmts =* 6 *No. of Stairs =* 2 ***SG location in AFO =* 1** (0: RFO; 1: RNFO)

Building	Length (m)	Width (m)	Height (m)	Door Size	Height (m)	Width (m)	Window Size	Height (m)	Width (m)
Apartment Size:	9.5	10	2.4	*Apartment:*	2	0.8	*Apartment:*	2	10
RFO Size:	5	4	2.4	*RFO:*	2	0.8	*RFO:*	1.6	2.4
Stair:	4.8	2.4	2.57	*Stair:*	2	0.9			
Corridor:	40	1.5	2.4						

Window Openability = 1
Occ. can escape thr' windows of flrs 1 & 2 = 1
Defend in Place = 1

Detection System: Alarm Type = 5 *Smoke Detector Reliability =* 0.95 *Detector Type =* 1 *Smk Det. Actv. Extg. Coeff. =* 0.2

Sprinkler installed = 0 *Sprinkler Reliability =* 0.9 Data = 1 (1: Aust., 2: US)

Smoke Management Installed = 0 *Smk Mgtmt Reliability =* 0.8 *(Note: if Smoke Management is installed, AFO Door open in STATS [1] is adjusted to Effective AFO Door open)*

Stair Pressurisation Installed = 0 *Stair Pressurisation Reliability =* 0.95 *(Note: if Stair Pressurisation is installed, Stair Door open in STATS [1] is adjusted to Effective Stair Door open)*

Connection to Fire Brigade = 1 *Fire Brigade Interv =* 0

STATS: [1] Prob. of AFO & Stair Doors being open; Proportions of fire during Awake (7am-10pm)

AFO Door open (AFOD) = 0.01 *Stair Door open (SD) =* 0.10

Effective AFO Door open (AFOD) = 0.010 *Effective Stair Door open (SD) =* 0.100

Awake: Kitchen (K) = 0.77 *Bedroom (B) and Lounge (L) =* 0.65

[2] Fire: ***Aust. Data***

		Proportions of SM Fire	FL Fire	FO Fire
No	*kitchen (K)*	48.6%	48.3%	3.1%
Sprks	**bedroom (B)**	16.8%	67.4%	15.8%
	lounge (L)	23.1%	63.8%	13.1%

	SM Fire	FL Fire	FO Fire
Sprks			

[3] Fire	***Aust. Data***	*Proportions of fire in K, B & L*	
kitchen (K)	**No**	64.0%	
bedroom (B)	**Sprks**	21.8%	**Sprks**
lounge (L)		14.2%	

[4] SG	*SG in SM, FL & FO fires during Aw/As*		
1	*SM Fire*	*FL Fire*	*FO Fire*
Awake	99.9%	99.7%	87.0%
Asleep	99.9%	99.5%	87.0%

[5] SG	*multiplier for Aw & As*	
1	*Awake*	*Asleep*
	1.8	1.7

[6] SG	*% in RFO & RNFO*	
1	*RFO*	*RNFO*
	65%	35%

[1] Conditions for Occps, AFOD & SD

Occupants (Occps)	AFO Door (AFOD)	Stair Door (SD)
Awake (Aw)	Open	Open
Awake	Open	Closed
Awake	Closed	Open
Awake	Closed	Closed
Asleep (As)	Open	Open
Asleep	Open	Closed
Asleep	Closed	Open
Asleep	Closed	Closed

Fatality for 1000 SM, FL & FO fires (data fr Fire-Risk Prog.)

SM Fire - TD	FL Fire - TD	FO Fire - TD
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.2535
0.00	0.10	0.2517
0.00	0.00	0.0008
0.00	0.00	0.0008

(Note: TD: Time Dependent path)

Weighted Proportion for [1] Aw/As, AFOD, SD

Kitchen	Bedroom/Lounge
0.001	0.001
0.007	0.006
0.076	0.064
0.686	0.579
0.000	0.000
0.002	0.003
0.023	0.035
0.205	0.312

Weighted Fatality per 1000 Fires (incl. [1])

Kitchen (K)			Bedroom (B) & Lounge (L)		
SM Fire	FL Fire	FO Fire	SM Fire	FL Fire	FO Fire
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
Total Aw: 0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
Total As: 0.00	0.00	0.00	0.00	0.00	0.00
Totals (Aw & As): 0.00	0.00	0.00	0.00	0.00	0.00

Weighted Fatality per 1000 Fires (incl. [1] & [2])

	SM Fire	FL Fire	FO Fire	Total	Tot (Aw & As)
kitchen (K) - Aw	0.00	0.00	0.00	0.00	
- As	0.00	0.00	0.00	0.00	0.00
bedroom (B) - Aw	0.00	0.00	0.00	0.00	
- As	0.00	0.00	0.00	0.00	0.00
lounge (L) - Aw	0.00	0.00	0.00	0.00	
- As	0.00	0.00	0.00	0.00	0.00

Proportions of Fatality Rate per 1000 SM, FL & FO Fires (incl. [1], [2], [3], [4], [5] & [6])

	SM Fire	FL Fire	FO Fire	Total
kitchen (K) - Aw	0.00	0.00	0.00	0.00
- As	0.00	0.00	0.00	0.00
bedroom (B) - Aw	0.00	0.00	0.00	0.00
- As	0.00	0.00	0.00	0.00
lounge (L) - Aw	0.00	0.00	0.00	0.00
- As	0.00	0.00	0.00	0.00
Total (Aw & As):	0.00	0.00	0.00	**0.0001**
%SM, %FL & %FO fatalities (Aw & As):	0%	67%	33%	

Results Summary Sheet for Base Cases

Building Descriptions and Characteristics (1: YES; 0: NO)

Building Class = 2 *Fire Flr Level =* 1 ***Super Group in AFO (SG) =*** **2** (1: Normal; 2: Non responding)

No. of Levels = 3 *No. of Aptmts =* 6 *No. of Stairs =* 2 ***SG location in AFO =*** **1** (0: RFO; 1: RNFO)

Building	Length (m)	Width (m)	Height (m)	Door Size	Height (m)	Width (m)	Window Size	Height (m)	Width (m)
Apartment Size:	9.5	10	2.4	*Apartment:*	2	0.8	*Apartment:*	2	10
RFO Size:	5	4	2.4	*RFO:*	2	0.8	*RFO:*	1.6	2.4
Stair:	4.8	2.4	2.57	*Stair:*	2	0.9			
Corridor:	40	1.5	2.4						

Window Openability = 1
Occ. can escape thr' windows of flrs 1 & 2 = 1
Defend in Place = 1

Detection System: Alarm Type = 5 *Smoke Detector Reliability =* 0.95 *Detector Type =* 1 *Smk Det. Actv. Extg. Coeff. =* 0.2

Sprinkler installed = 0 *Sprinkler Reliability =* 0.9 Data = 1 (1: Aust., 2: US)

Smoke Management Installed = 0 *Smk Mgtmt Reliability =* 0.8 *(Note: if Smoke Management is installed, AFO Door open in STATS [1] is adjusted to Effective AFO Door open)*

Stair Pressurisation Installed = 0 *Stair Pressurisation Reliability =* 0.95 *(Note: if Stair Pressurisation is installed, Stair Door open in STATS [1] is adjusted to Effective Stair Door open)*

Connection to Fire Brigade = 1 *Fire Brigade Interv =* 0

STATS: [1] Prob. of AFO & Stair Doors being open; Proportions of fire during Awake (7am-10pm)

AFO Door open (AFOD) = 0.01 *Stair Door open (SD) =* 0.10

Effective AFO Door open (AFOD) = 0.010 *Effective Stair Door open (SD) =* 0.100

Awake: Kitchen (K) = 0.77 *Bedroom (B) and Lounge (L) =* 0.65

[2] Fire: ***Aust. Data***

	Proportions of SM Fire	FL Fire	FO Fire		SM Fire	FL Fire	FO Fire
No	*kitchen (K)*	48.6%	48.3%	3.1%			
Sprks	**bedroom (B)**	16.8%	67.4%	15.8%	**Sprks**		
	lounge (L)	23.1%	63.8%	13.1%			

[3] Fire	***Aust. Data***	*Proportions of fire in K, B & L*	
kitchen (K)	**No**	64.0%	
bedroom (B)	**Sprks**	21.8%	**Sprks**
lounge (L)		14.2%	

[4] SG	*SG in SM, FL & FO fires during Aw/As*		
2	*SM Fire*	*FL Fire*	*FO Fire*
Awake	0.1%	0.3%	13.0%
Asleep	0.1%	0.5%	13.0%

[5] SG	*multiplier for Aw & As*	
2	*Awake*	*Asleep*
	1.2	1.5

[6] SG	*% in RFO & RNFO*	
	RFO	*RNFO*
	65%	35%

[1] Conditions for Occps, AFOD & SD

Occupants (Occps)	AFO Door (AFOD)	Stair Door (SD)
Awake (Aw)	Open	Open
Awake	Open	Closed
Awake	Closed	Open
Awake	Closed	Closed
Asleep (As)	Open	Open
Asleep	Open	Closed
Asleep	Closed	Open
Asleep	Closed	Closed

Fatality for 1000 SM, FL & FO fires (data fr Fire-Risk Prog.)

SM Fire - TD	FL Fire - TD	FO Fire - TD
0.00	0.00	560.00
0.00	149.13	560.00
0.00	0.00	122.64
0.00	0.00	122.64
0.00	0.00	500.0000
0.00	165.83	500.0000
0.00	0.00	138.7000
0.00	0.00	138.7000

(Note: TD: Time Dependent path)

Weighted Proportion for [1] Aw/As, AFOD, SD

Kitchen	Bedroom/Lounge
0.001	0.001
0.007	0.006
0.076	0.064
0.686	0.579
	Total Aw:
0.000	0.000
0.002	0.003
0.023	0.035
0.205	0.312
	Total As:
	Totals (Aw & As):

Weighted Fatality per 1000 Fires (incl. [1])

Kitchen (K)			Bedroom (B) & Lounge (L)		
SM Fire	FL Fire	FO Fire	SM Fire	FL Fire	FO Fire
0.00	0.00	0.43	0.00	0.00	0.36
0.00	1.03	3.88	0.00	0.87	3.28
0.00	0.00	9.35	0.00	0.00	7.89
0.00	0.00	84.14	0.00	0.00	71.03
0.00	1.03	97.80	0.00	0.87	82.56
0.00	0.00	0.12	0.00	0.00	0.18
0.00	0.34	1.04	0.00	0.52	1.58
0.00	0.00	3.16	0.00	0.00	4.81
0.00	0.00	28.42	0.00	0.00	43.25
0.00	0.34	32.73	0.00	0.52	49.81
0.00	1.38	130.53	0.00	1.39	132.37

Weighted Fatality per 1000 Fires (incl. [1] & [2])

	SM Fire	FL Fire	FO Fire	Total	Tot (Aw & As)
kitchen (K) - Aw	0.00	0.50	3.03	3.53	
- As	0.00	0.17	1.01	1.18	4.71
bedroom (B) - Aw	0.00	0.59	13.04	13.63	
- As	0.00	0.35	7.87	8.22	21.85
lounge (L) - Aw	0.00	0.56	10.82	11.37	
- As	0.00	0.33	6.53	6.86	18.23

Proportions of Fatality Rate per 1000 SM, FL & FO Fires (incl. [1], [2], [3], [4], [5] & [6])

	SM Fire	FL Fire	FO Fire	Total
kitchen (K) - Aw	0.00	0.00	0.11	0.11
- As	0.00	0.00	0.04	0.04
bedroom (B) - Aw	0.00	0.00	0.16	0.16
- As	0.00	0.00	0.12	0.12
lounge (L) - Aw	0.00	0.00	0.08	0.08
- As	0.00	0.00	0.06	0.06
Total (Aw & As):	0.00	0.00	0.57	**0.5706**
%SM, %FL & %FO fatalities (Aw & As):	0%	0%	100%	

Apartments (ANFO)

TableC1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
	Building Geometry / Alarms and Detection / Active and Passive Protection																	
1	Apartsize > 9.5x5	0.00	15.04	0.00	0.00	0.00	0.01	0.00	0.00	1158.1	100.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8353**
2	Apartsize > 9.5x10	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
3	Apartsize > 9.5x15	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
4	Apartsize > 9.5x20	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
5	Apartsize > 12x10	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
6	Apartsize > 12x15	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
7	Apartsize > 12x20	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
8	RFOsize > 5x4	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
9	RFOsize > 5x6	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	837.5	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8261**
10	RFOsize > 5x8	0.00	1.96	0.00	0.00	0.00	0.01	0.00	0.00	782.2	56.98	0.00	50.19	0.00	34.76	0.00	34.74	**0.8249**
11	RFOsize > 6x4	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	841.1	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8262**
12	RFOsize > 6x6	0.00	1.96	0.00	0.00	0.00	0.01	0.00	0.00	783.7	55.69	0.00	50.19	0.00	34.76	0.00	34.74	**0.8249**
13	RFOsize > 6x8	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	779.4	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8248**
14	RNFOsize > 5x10	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
15	RNFOsize > 7.5x10	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
16	RNFOsize > 10x10	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	837.5	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8261**
17	RNFOsize > 20x10	0.00	1.14	0.00	0.00	0.00	0.01	0.00	0.00	821.7	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8257**
18	RFOwindw > 2.4x4	0.00	1.14	0.00	0.00	0.00	0.01	0.00	0.00	757.5	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8242**
19	CorrLen > 10	0.00	1.02	0.00	0.00	0.00	0.01	0.00	0.00	886.1	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8272**
20	CorrLen > 20	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	906.9	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
21	CorrLen > 40	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
22	CorrLen > 80	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	853.7	54.10	0.00	50.19	0.00	34.76	0.00	34.74	**0.8265**
23	CorrLen > 160	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	907.3	54.06	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
24	RoomH > 2.4	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
25	RoomH > 2.6	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	837.5	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8261**
26	RoomH > 2.8	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	836.1	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8261**
27	RoomH > 3.0	0.00	2.24	0.00	0.00	0.00	0.01	0.00	0.00	779.4	55.76	0.00	50.19	0.00	34.76	0.00	34.74	**0.8248**
28	RoomH > 3.2	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	779.4	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8248**
29	Alarms > alr1	0.00	5.47	0.00	0.02	0.00	0.06	0.00	0.01	7493.4	55.95	0.00	50.23	0.00	34.81	0.00	34.74	**0.9808**
30	Alarms > alr2	0.00	5.47	0.00	0.02	0.00	0.06	0.00	0.01	153.5	58.47	0.00	50.23	0.00	34.81	0.00	34.74	**0.8112**
31	Alarms > alr3	0.00	5.47	0.00	0.02	0.00	0.06	0.00	0.01	153.5	58.47	0.00	50.23	0.00	34.81	0.00	34.74	**0.8112**
32	Alarms > alr4	0.00	1.70	0.00	0.00	0.00	0.02	0.00	0.00	908.3	55.36	0.00	50.20	0.00	34.78	0.00	34.74	**0.8279**

TableC1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
33	Alarms > alr5	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
34	Alarms > alr6	0.00	0.79	0.00	0.00	0.00	0.01	0.00	0.00	148.7	53.85	0.00	50.19	0.00	34.76	0.00	34.69	**0.8092**
35	Alarms > alr7	0.00	0.79	0.00	0.00	0.00	0.01	0.00	0.00	148.7	53.85	0.00	50.19	0.00	34.76	0.00	34.69	**0.8092**
36	NoAptOg1 > 4	0.00	1.17	0.00	0.00	0.00	0.01	0.00	0.00	607.8	2.99	0.00	0.01	0.00	0.03	0.00	0.01	**0.0145**
37	NoAptOg1 > 6	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**
38	NoAptOg1 > 8	0.00	1.01	0.00	0.00	0.00	0.01	0.00	0.00	1726.7	2.34	0.00	0.01	0.00	0.02	0.00	0.00	**0.0402**
39	NoAptOg1 > 10	0.00	1.05	0.00	0.00	0.00	0.01	0.00	0.00	2273.3	2.38	0.00	0.01	0.00	0.02	0.00	0.00	**0.0528**
40	NoAptOg1 > 12	0.00	1.12	0.00	0.00	0.00	0.01	0.00	0.00	2854.4	2.48	0.00	0.01	0.00	0.03	0.00	0.00	**0.0663**
41	NoAptOg4 > 6	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**
42	NoAptOg5 > 6	6720.0	183.73	0.00	245.39	0.00	196.04	0.00	194.66	6000.0	322.16	0.00	376.01	0.00	300.37	0.00	298.17	**17.095**
43	SmkDetRel > 0.9	0.00	1.24	0.00	0.00	0.00	0.01	0.00	0.00	1069.3	54.14	0.00	50.19	0.00	34.76	0.00	34.74	**0.8315**
44	SmkDetRel > 0.99	0.00	1.09	0.00	0.00	0.00	0.01	0.00	0.00	786.6	54.04	0.00	50.19	0.00	34.76	0.00	34.74	**0.8249**
45	SprRel > 0.85	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.533**
46	SprRel > 0.90	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.5007**
47	SprRel > 0.95	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.4685**
48	SmkMngRel > 0.7	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8104**
49	SmkMngRel > 0.8	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.808**
50	SmkMngRel > 0.9	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8055**
51	StrPresRel > 0.5	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8171**
52	StrPresRel > 0.95	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8075**
53	StrPresRel > 1.0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8065**
54	StatDat > Aus	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
55	StatDat > US	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**1.5357**
56	FRLs > 30	0.00	40.91	0.00	1.04	0.00	1.04	0.00	0.99	908.3	322.94	0.00	188.28	0.00	187.55	0.00	187.27	**4.4046**
57	FRLs > 60	0.00	3.85	0.00	0.05	0.00	0.05	0.00	0.03	908.3	80.55	0.00	67.68	0.00	52.99	0.00	52.93	**1.2498**
58	FRLs > 90	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00	908.3	14.73	0.00	11.90	0.00	3.32	0.00	3.31	**0.0997**
59	FRLs > 120	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	908.3	12.41	0.00	9.91	0.00	1.71	0.00	1.70	**0.0623**
60	FRLs > 180	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	908.3	12.38	0.00	9.91	0.00	1.71	0.00	1.70	**0.0623**
61	FRLs > 240	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	908.3	12.38	0.00	9.91	0.00	1.71	0.00	1.70	**0.0623**
62	StrDrOpng > 1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	836.1	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8084**
63	StrDrOpng > 5	0.00	1.14	0.00	27.53	0.00	0.01	0.00	0.00	1681.9	34.96	12.53	141.08	0.00	34.76	0.00	34.74	**0.8615**
64	StrDrOpng > 10	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
65	StrDrOpng > 25	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.849**

Apartments (ANFO)

TableC1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
66	AptDrOpng > 0.1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	837.5	54.12	0.00	50.19	0.00	34.76	0.00	34.74	**0.8053**
67	AptDrOpng > 1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
68	AptDrOpng > 10	0.00	1.73	0.00	0.00	0.00	0.01	0.00	0.00	1686.8	40.51	748.51	31.11	0.00	34.76	0.00	34.74	**2.7445**
69	AptDrOpng > 20	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	1836.7	31.75	996.01	28.31	0.00	34.76	0.00	34.74	**5.7685**
	Human Behaviour																	
70	3ptEvac > Asp > 0_0_1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	941.2	56.18	0.00	50.19	0.00	34.76	0.00	34.74	**0.8285**
71	3ptEvac > Asp > 0_1_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	53.70	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
72	3ptEvac > Asp > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	53.70	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
73	3ptEvac > Awk > 0_0_1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
74	3ptEvac > Awk > 0_1_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
75	3ptEvac > Awk > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
76	3ptInEv > Asp > 0_0_1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	1060.0	54.23	0.00	50.19	0.00	34.76	0.00	34.74	**0.8312**
77	3ptInEv > Asp > 0_1_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	1060.0	53.97	0.00	50.19	0.00	34.76	0.00	34.74	**0.8312**
78	3ptInEv > Asp > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.04	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
79	3ptInEv > Awk > 0_0_1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
80	3ptInEv > Awk > 0_1_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
81	3ptInEv > Awk > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
82	InitAct > Alarm > 05_05_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
83	InitAct > Alarm > 05_0_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.09	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
84	InitAct > Alarm > 0_05_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
85	InitAct > Alarm > 0_0_1	0.00	5.47	0.00	0.02	0.00	0.06	0.00	0.01	1135.9	58.11	0.00	50.23	0.00	34.81	0.00	34.74	**0.8339**
86	InitAct > Alarm > 0_1_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
87	InitAct > Alarm > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.09	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
88	InitAct > Smoke > 05_05_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	885.0	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8272**
89	InitAct > Smoke > 05_0_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	885.0	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8272**
90	InitAct > Smoke > 0_05_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
91	InitAct > Smoke > 0_0_1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	1060.0	54.00	0.00	50.19	0.00	34.76	0.00	34.74	**0.8312**
92	InitAct > Smoke > 0_1_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
93	InitAct > Smoke > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	885.0	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8272**
94	InitAct > Warn > 05_05_0	0.00	1.92	0.00	0.01	0.00	0.02	0.00	0.00	908.3	54.79	0.00	50.19	0.00	34.76	0.00	34.74	**0.8279**
95	InitAct > Warn > 05_0_05	0.00	2.68	0.00	0.01	0.00	0.03	0.00	0.00	908.3	55.53	0.00	50.23	0.00	34.76	0.00	34.74	**0.828**
96	InitAct > Warn > 0_05_05	0.00	3.44	0.00	0.01	0.00	0.03	0.00	0.00	946.2	56.26	0.00	50.23	0.00	34.76	0.00	34.74	**0.829**
97	InitAct > Warn > 0_0_1	0.00	4.20	0.00	0.01	0.00	0.04	0.00	0.01	946.2	57.00	0.00	50.23	0.00	34.76	0.00	34.74	**0.8292**

Apartments (ANFO)

TableC1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
98	InitAct > Warn > 0_1_0	0.00	2.68	0.00	0.01	0.00	0.03	0.00	0.00	908.3	55.53	0.00	50.23	0.00	34.76	0.00	34.74	**0.828**
99	InitAct > Warn > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
100	InvgAct > HSmk > 05_05_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
101	InvgAct > HSmk > 05_0_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
102	InvgAct > HSmk > 0_05_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
103	InvgAct > HSmk > 0_0_1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
104	InvgAct > HSmk > 0_1_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
105	InvgAct > HSmk > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
106	InvgAct > LMSmk > 05_05_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
107	InvgAct > LMSmk > 05_0_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
108	InvgAct > LMSmk > 0_05_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	1060.0	54.00	0.00	50.19	0.00	34.76	0.00	34.74	**0.8312**
109	InvgAct > LMSmk > 0_0_1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	1060.0	54.00	0.00	50.19	0.00	34.76	0.00	34.74	**0.8312**
110	InvgAct > LMSmk > 0_1_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	1060.0	54.00	0.00	50.19	0.00	34.76	0.00	34.74	**0.8312**
111	InvgAct > LMSmk > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
112	InvgAct > NoSmk > 05_05_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
113	InvgAct > NoSmk > 05_0_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
114	InvgAct > NoSmk > 0_05_05	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.09	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
115	InvgAct > NoSmk > 0_0_1	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.09	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
116	InvgAct > NoSmk > 0_1_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.09	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
117	InvgAct > NoSmk > 1_0_0	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	908.3	54.07	0.00	50.19	0.00	34.76	0.00	34.74	**0.8277**
118	OGType > AllOG1	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**
119	OGType > AllOG2	0.00	1.17	0.00	0.00	0.00	0.01	0.00	0.00	1347.0	2.53	0.00	0.01	0.00	0.03	0.00	0.00	**0.0315**
120	OGType > AllOG3	0.00	1.38	0.00	0.00	0.00	0.01	0.00	0.00	937.6	6.82	0.00	0.02	0.00	0.06	0.00	0.01	**0.0224**
121	OGType > AllOG4	0.00	1.15	0.00	0.00	0.00	0.01	0.00	0.00	627.0	4.56	0.00	0.01	0.00	0.04	0.00	0.01	**0.015**
122	OGType > AllOG5	6720.0	183.73	0.00	245.39	0.00	196.04	0.00	194.66	6000.0	322.16	0.00	376.01	0.00	300.37	0.00	298.17	**17.095**
123	OGType > AllOG6	0.00	1.31	0.00	0.00	0.00	0.01	0.00	0.00	881.9	4.64	0.00	0.01	0.00	0.05	0.00	0.01	**0.0209**
124	Recogn > Base > OG1	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**
125	Recogn > OG1-As > AptAlarm > 0.0	0.00	0.56	0.00	0.00	0.00	0.01	0.00	0.00	4637.7	3.34	0.00	0.01	0.00	0.05	0.00	0.01	**0.1076**
126	Recogn > OG1-As > AptAlarm > 0.5	0.00	0.56	0.00	0.00	0.00	0.01	0.00	0.00	1940.4	2.68	0.00	0.01	0.00	0.03	0.00	0.00	**0.0452**
127	Recogn > OG1-As > AptAlarm > 0.8	0.00	0.56	0.00	0.00	0.00	0.01	0.00	0.00	886.1	2.41	0.00	0.01	0.00	0.03	0.00	0.00	**0.0208**
128	Recogn > OG1-As > AptAlarm > 0.9	0.00	0.56	0.00	0.00	0.00	0.01	0.00	0.00	535.4	2.31	0.00	0.01	0.00	0.02	0.00	0.00	**0.0126**
129	Recogn > OG1-As > AptAlarm > 1.0	0.00	0.56	0.00	0.00	0.00	0.01	0.00	0.00	193.2	2.22	0.00	0.01	0.00	0.02	0.00	0.00	**0.0047**
130	Recogn > OG1-As > BldAlarm > 0.0	0.00	1.32	0.00	0.00	0.00	0.01	0.00	0.00	4637.7	3.34	0.00	0.01	0.00	0.05	0.00	0.01	**0.1077**

Apartments (ANFO)

TableC1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
131	Recogn > OG1-As > BldAlarm > 0.5	0.00	1.32	0.00	0.00	0.00	0.01	0.00	0.00	1940.4	3.19	0.00	0.01	0.00	0.04	0.00	0.01	**0.0453**
132	Recogn > OG1-As > BldAlarm > 0.7	0.00	1.32	0.00	0.00	0.00	0.01	0.00	0.00	1240.3	3.15	0.00	0.01	0.00	0.03	0.00	0.00	**0.0291**
133	Recogn > OG1-As > BldAlarm > 0.9	0.00	1.32	0.00	0.00	0.00	0.01	0.00	0.00	535.4	3.11	0.00	0.01	0.00	0.03	0.00	0.00	**0.0128**
134	Recogn > OG1-As > BldAlarm > 1.0	0.00	1.32	0.00	0.00	0.00	0.01	0.00	0.00	193.2	3.09	0.00	0.01	0.00	0.03	0.00	0.00	**0.0049**
135	Recogn > OG1-As > CmbAlarm > 0.0	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	4637.7	3.34	0.00	0.01	0.00	0.05	0.00	0.01	**0.1077**
136	Recogn > OG1-As > CmbAlarm > 0.5	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1940.4	2.68	0.00	0.01	0.00	0.03	0.00	0.00	**0.0452**
137	Recogn > OG1-As > CmbAlarm > 0.9	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	535.4	2.31	0.00	0.01	0.00	0.02	0.00	0.00	**0.0127**
138	Recogn > OG1-As > CmbAlarm > 1.0	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	193.2	2.22	0.00	0.01	0.00	0.02	0.00	0.00	**0.0048**
139	Recogn > OG1-As > Smoke > 0.0	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1470.0	2.33	0.00	0.01	0.00	0.03	0.00	0.00	**0.0343**
140	Recogn > OG1-As > Smoke > 0.05	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1198.8	2.45	0.00	0.01	0.00	0.03	0.00	0.00	**0.0281**
141	Recogn > OG1-As > Smoke > 0.1	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**
142	Recogn > OG1-As > Smoke > 0.2	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1009.1	2.52	0.00	0.01	0.00	0.03	0.00	0.00	**0.0237**
143	Recogn > OG1-As > Smoke > 0.4	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	756.5	2.61	0.00	0.01	0.00	0.03	0.00	0.00	**0.0179**
144	Recogn > OG1-As > Warn > 0.0	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1655.0	2.43	0.00	0.01	0.00	0.03	0.00	0.00	**0.0386**
145	Recogn > OG1-As > Warn > 0.5	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1379.8	2.45	0.00	0.01	0.00	0.03	0.00	0.00	**0.0323**
146	Recogn > OG1-As > Warn > 1.0	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**
147	Recogn > OG1-Aw > AptAlarm > 0.0	0.00	3.28	0.00	0.01	0.00	0.03	0.00	0.00	266.7	2.24	0.00	0.01	0.00	0.02	0.00	0.00	**0.0069**
148	Recogn > OG1-Aw > AptAlarm > 0.5	0.00	1.67	0.00	0.00	0.00	0.02	0.00	0.00	266.7	2.24	0.00	0.01	0.00	0.02	0.00	0.00	**0.0066**
149	Recogn > OG1-Aw > AptAlarm > 0.8	0.00	0.99	0.00	0.00	0.00	0.01	0.00	0.00	266.7	2.24	0.00	0.01	0.00	0.02	0.00	0.00	**0.0065**
150	Recogn > OG1-Aw > AptAlarm > 0.9	0.00	0.76	0.00	0.00	0.00	0.01	0.00	0.00	266.7	2.24	0.00	0.01	0.00	0.02	0.00	0.00	**0.0064**
151	Recogn > OG1-Aw > AptAlarm > 1.0	0.00	0.54	0.00	0.00	0.00	0.01	0.00	0.00	266.7	2.24	0.00	0.01	0.00	0.02	0.00	0.00	**0.0064**
152	Recogn > OG1-Aw > BldAlarm > 0.0	0.00	3.28	0.00	0.01	0.00	0.03	0.00	0.00	1132.3	3.15	0.00	0.01	0.00	0.03	0.00	0.00	**0.0269**
153	Recogn > OG1-Aw > BldAlarm > 0.5	0.00	1.87	0.00	0.01	0.00	0.02	0.00	0.00	1132.3	3.15	0.00	0.01	0.00	0.03	0.00	0.00	**0.0267**
154	Recogn > OG1-Aw > BldAlarm > 0.7	0.00	1.48	0.00	0.00	0.00	0.02	0.00	0.00	1132.3	3.15	0.00	0.01	0.00	0.03	0.00	0.00	**0.0267**
155	Recogn > OG1-Aw > BldAlarm > 0.9	0.00	1.08	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	3.15	0.00	0.01	0.00	0.03	0.00	0.00	**0.0266**
156	Recogn > OG1-Aw > BldAlarm > 1.0	0.00	0.89	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	3.15	0.00	0.01	0.00	0.03	0.00	0.00	**0.0266**
157	Recogn > OG1-Aw > CmbAlarm > 0.0	0.00	3.28	0.00	0.01	0.00	0.03	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0269**
158	Recogn > OG1-Aw > CmbAlarm > 0.5	0.00	1.67	0.00	0.00	0.00	0.02	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0266**
159	Recogn > OG1-Aw > CmbAlarm > 0.9	0.00	0.76	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**
160	Recogn > OG1-Aw > CmbAlarm > 1.0	0.00	0.54	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**
161	Recogn > OG1-Aw > Smoke > 0.0	1392.0	0.50	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0957**
162	Recogn > OG1-Aw > Smoke > 0.05	1104.0	0.61	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0814**
163	Recogn > OG1-Aw > Smoke > 0.1	1040.0	0.63	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0782**

Apartments (ANFO)

TableC1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
164	Recogn > OG1-Aw > Smoke > 0.2	695.20	0.76	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0611**
165	Recogn > OG1-Aw > Smoke > 0.4	695.20	0.76	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0611**
166	Recogn > OG1-Aw > Warn > 0.0	0.00	1.16	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0266**
167	Recogn > OG1-Aw > Warn > 0.5	0.00	1.10	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**
168	Recogn > OG1-Aw > Warn > 1.0	0.00	1.03	0.00	0.00	0.00	0.01	0.00	0.00	1132.3	2.47	0.00	0.01	0.00	0.03	0.00	0.00	**0.0265**

NB:
(1) Sensitivity Case
(2) Occupants Awake or Asleep
(3) open-open AFO door open - LFO stair door open
open-closed AFO door open - LFO stair door closed
closed-open AFO door closed - LFO stair door open
closed-closed AFO door closed - LFO stair door closed
(4) Time Dependent part fatalities
(5) Non-Time Dependent part fatalities

Apartments (AFO)

TableC2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
	Building Geometry / Alarms and Detection / Active and Passive Protection																									
1	SG1RFO > Apartsize > 9.5x5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
2	SG1RFO > Apartsize > 9.5x10	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
3	SG1RFO > Apartsize > 9.5x15	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
4	SG1RFO > Apartsize > 9.5x20	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
5	SG1RFO > Apartsize > 12x10	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
6	SG1RFO > Apartsize > 12x15	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
7	SG1RFO > Apartsize > 12x20	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
8	SG1RFO > RfoSize > 5x4	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
9	SG1RFO > RfoSize > 5x6	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
10	SG1RFO > RfoSize > 5x8	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
11	SG1RFO > RfoSize > 6x4	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
12	SG1RFO > RfoSize > 6x6	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
13	SG1RFO > RfoSize > 6x8	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
14	SG1RFO > RFOwindw > 2.4x4	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1128**
15	SG1RFO > RoomH > 2.4	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
16	SG1RFO > RoomH > 2.6	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
17	SG1RFO > RoomH > 2.8	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
18	SG1RFO > RoomH > 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
19	SG1RFO > RoomH > 3.2	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
20	SG1RFO > Alarms > alr1	0	0	0	0	0	0	0	0	0	0	0	0	4.99	6.51	10	4.99	6.51	10	4.99	6.51	10	4.99	6.51	10	**1.8976**
21	SG1RFO > Alarms > alr2	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
22	SG1RFO > Alarms > alr3	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
23	SG1RFO > Alarms > alr4	0	0	0	0	0	0	0	0	0	0	0	0	4.54	4.7	5.3	4.54	4.7	5.3	4.54	4.71	5.3	4.54	4.71	5.3	**1.4288**
24	SG1RFO > Alarms > alr5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
25	SG1RFO > Alarms > alr6	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
26	SG1RFO > Alarms > alr7	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
27	SG1RFO > SmkDetRel > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.54	0.71	1.09	0.54	0.71	1.09	0.54	0.71	1.09	0.54	0.71	1.09	**0.2068**
28	SG1RFO > SmkDetRel > 0.99	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.13	0.2	0.1	0.13	0.2	0.1	0.13	0.2	0.1	0.13	0.2	**0.0378**
29	SG1RFO > SprRel > 0.85	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1027**
30	SG1RFO > SprRel > 0.90	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1025**
31	SG1RFO > SprRel > 0.95	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1022**
32	SG1RFO > SmkMngRel > 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**

Apartments (AFO)

TableC2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
33	SG1RFO > SmkMngRel > 0.8	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
34	SG1RFO > SmkMngRel > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
35	SG1RFO > StrPresRel > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
36	SG1RFO > StrPresRel > 0.95	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
37	SG1RFO > StrPresRel > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
38	SG1RFO > StatDat > Aus	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
39	SG1RFO > StatDat > US	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1177**
40	SG1RNFO > Apartsize > 9.5x5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
41	SG1RNFO > Apartsize > 9.5x10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
42	SG1RNFO > Apartsize > 9.5x15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
43	SG1RNFO > Apartsize > 9.5x20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
44	SG1RNFO > Apartsize > 12x10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
45	SG1RNFO > Apartsize > 12x15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
46	SG1RNFO > Apartsize > 12x20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
47	SG1RNFO > RfoSize > 5x4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
48	SG1RNFO > RfoSize > 5x6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
49	SG1RNFO > RfoSize > 5x8	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
50	SG1RNFO > RfoSize > 6x4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
51	SG1RNFO > RfoSize > 6x6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
52	SG1RNFO > RfoSize > 6x8	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
53	SG1RNFO > RFOwindw > 2.4x4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.07	0.21	0	0	0	0	0	0	**9E-05**
54	SG1RNFO > RoomH > 2.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
55	SG1RNFO > RoomH > 2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
56	SG1RNFO > RoomH > 2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
57	SG1RNFO > RoomH > 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.03	0.25	0	0	0	0	0	0	**6E-05**
58	SG1RNFO > RoomH > 3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0.25	0	0.07	0.25	0	0	0	0	0	0	**1E-04**
59	SG1RNFO > Alarms > alr1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1.66	4.96	0	0	0.01	0	0	0.01	**0.0022**
60	SG1RNFO > Alarms > alr2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
61	SG1RNFO > Alarms > alr3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
62	SG1RNFO > Alarms > alr4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
63	SG1RNFO > Alarms > alr5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
64	SG1RNFO > Alarms > alr6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
65	SG1RNFO > Alarms > alr7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**

Apartments (AFO)

TableC2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
66	SG1RNFO > SmkDetRel > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.55	0	0.18	0.54	0	0	0	0	0	0	**0.0002**
67	SG1RNFO > SmkDetRel > 0.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0	0	0	0	0	0	0	**3E-05**
68	SG1RNFO > SprRel > 0.85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**1E-04**
69	SG1RNFO > SprRel > 0.90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**1E-04**
70	SG1RNFO > SprRel > 0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**9E-05**
71	SG1RNFO > SmkMngRel > 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**4E-05**
72	SG1RNFO > SmkMngRel > 0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**3E-05**
73	SG1RNFO > SmkMngRel > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**2E-05**
74	SG1RNFO > StrPresRel > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
75	SG1RNFO > StrPresRel > 0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
76	SG1RNFO > StrPresRel > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
77	SG1RNFO > StatDat > Aus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0001**
78	SG1RNFO > StatDat > US	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0	0.1	0.25	0	0	0	0	0	0	**0.0002**
79	SG2RFO > Apartsize > 9.5x5	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
80	SG2RFO > Apartsize > 9.5x10	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
81	SG2RFO > Apartsize > 9.5x15	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
82	SG2RFO > Apartsize > 9.5x20	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
83	SG2RFO > Apartsize > 12x10	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
84	SG2RFO > Apartsize > 12x15	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
85	SG2RFO > Apartsize > 12x20	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
86	SG2RFO > RfoSize > 5x4	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
87	SG2RFO > RfoSize > 5x6	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
88	SG2RFO > RfoSize > 5x8	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
89	SG2RFO > RfoSize > 6x4	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
90	SG2RFO > RfoSize > 6x6	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
91	SG2RFO > RfoSize > 6x8	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
92	SG2RFO > RFOwindw > 2.4x4	142	289	700	142	289	700	142	289	700	142	289	700	499	650	1000	499	650	1000	499	650	1000	499	650	1000	**7.2906**
93	SG2RFO > RoomH > 2.4	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
94	SG2RFO > RoomH > 2.6	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
95	SG2RFO > RoomH > 2.8	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
96	SG2RFO > RoomH > 3.0	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
97	SG2RFO > RoomH > 3.2	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
98	SG2RFO > Alarms > alr1	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**

Apartments (AFO)

TableC2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
99	SG2RFO > Alarms > alr2	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
100	SG2RFO > Alarms > alr3	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
101	SG2RFO > Alarms > alr4	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
102	SG2RFO > Alarms > alr5	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
103	SG2RFO > Alarms > alr6	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
104	SG2RFO > Alarms > alr7	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
105	SG2RFO > SmkDetRel > 0.9	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
106	SG2RFO > SmkDetRel > 0.99	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
107	SG2RFO > SprRel > 0.85	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**5.1022**
108	SG2RFO > SprRel > 0.90	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**4.8323**
109	SG2RFO > SprRel > 0.95	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**4.5624**
110	SG2RFO > SmkMngRel > 0.7	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
111	SG2RFO > SmkMngRel > 0.8	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
112	SG2RFO > SmkMngRel > 0.9	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
113	SG2RFO > StrPresRel > 0.5	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
114	SG2RFO > StrPresRel > 0.95	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
115	SG2RFO > StrPresRel > 1.0	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
116	SG2RFO > StatDat > Aus	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**7.295**
117	SG2RFO > StatDat > US	142	292	700	142	292	700	142	292	700	142	292	700	499	651	1000	499	651	1000	499	651	1000	499	651	1000	**12.755**
118	SG2RNFO > Apartsize > 9.5x5	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
119	SG2RNFO > Apartsize > 9.5x10	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
120	SG2RNFO > Apartsize > 9.5x15	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
121	SG2RNFO > Apartsize > 9.5x20	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
122	SG2RNFO > Apartsize > 12x10	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
123	SG2RNFO > Apartsize > 12x15	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
124	SG2RNFO > Apartsize > 12x20	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
125	SG2RNFO > RfoSize > 5x4	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
126	SG2RNFO > RfoSize > 5x6	0	105	560	0	149	560	0	0	0	0	0	0	0	119	500	0	166	500	0	0	0	0	0	0	**0.0245**
127	SG2RNFO > RfoSize > 5x8	0	105	560	0	149	560	0	0	0	0	0	0	0	119	500	0	166	500	0	0	0	0	0	0	**0.0245**
128	SG2RNFO > RfoSize > 6x4	0	0	560	0	149	560	0	0	0	0	0	0	0	0	500	0	166	500	0	0	0	0	0	0	**0.0244**
129	SG2RNFO > RfoSize > 6x6	0	105	560	0	149	560	0	0	0	0	0	0	0	119	500	0	166	500	0	0	0	0	0	0	**0.0245**
130	SG2RNFO > RfoSize > 6x8	0	146	560	0	149	560	0	0	0	0	0	0	0	165	500	0	166	500	0	0	0	0	0	0	**0.0245**
131	SG2RNFO > RFOwindw > 2.4x4	0	0	560	0	105	479	0	0	0	0	0	0	0	0	500	0	119	428	0	0	0	0	0	0	**0.021**

Apartments (AFO)

TableC2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
132	SG2RNFO > RoomH > 2.4	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
133	SG2RNFO > RoomH > 2.6	0	0	560	0	149	560	0	0	0	0	0	0	0	0	500	0	166	500	0	0	0	0	0	0	**0.0244**
134	SG2RNFO > RoomH > 2.8	0	0	560	0	149	560	0	0	0	0	0	0	0	0	500	0	166	500	0	0	0	0	0	0	**0.0244**
135	SG2RNFO > RoomH > 3.0	0	0	560	0	149	560	0	0	0	0	0	0	0	0	500	0	166	500	0	0	0	0	0	0	**0.0244**
136	SG2RNFO > RoomH > 3.2	0	105	560	0	149	560	0	0	0	0	0	0	0	119	500	0	166	500	0	0	0	0	0	0	**0.0245**
137	SG2RNFO > Alarms > alr1	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
138	SG2RNFO > Alarms > alr2	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
139	SG2RNFO > Alarms > alr3	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
140	SG2RNFO > Alarms > alr4	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
141	SG2RNFO > Alarms > alr5	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
142	SG2RNFO > Alarms > alr6	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
143	SG2RNFO > Alarms > alr7	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
144	SG2RNFO > SmkDetRel > 0.9	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
145	SG2RNFO > SmkDetRel > 0.99	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
146	SG2RNFO > SprRel > 0.85	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.3853**
147	SG2RNFO > SprRel > 0.90	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.3614**
148	SG2RNFO > SprRel > 0.95	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.3375**
149	SG2RNFO > SmkMngRel > 0.7	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5574**
150	SG2RNFO > SmkMngRel > 0.8	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5555**
151	SG2RNFO > SmkMngRel > 0.9	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5537**
152	SG2RNFO > StrPresRel > 0.5	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5707**
153	SG2RNFO > StrPresRel > 0.95	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5707**
154	SG2RNFO > StrPresRel > 1.0	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5708**
155	SG2RNFO > StatDat > Aus	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**0.5706**
156	SG2RNFO > StatDat > US	0	0	560	0	149	560	0	0	123	0	0	123	0	0	500	0	166	500	0	0	139	0	0	139	**1.0556**
	Human Behaviour																									
157	SG1RFO > 3ptEvac > Asp > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
158	SG1RFO > 3ptEvac > Asp > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
159	SG1RFO > 3ptEvac > Asp > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
160	SG1RFO > 3ptEvac > Awk > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
161	SG1RFO > 3ptEvac > Awk > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
162	SG1RFO > 3ptEvac > Awk > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
163	SG1RFO > InitAct > Alarm > 05_05_0	0	0	0	0	0	0	0	0	0	0	0	0	2.64	3.45	5.3	2.64	3.45	5.3	2.64	3.45	5.3	2.64	3.45	5.3	**1.0057**

Apartments (AFO)

TableC2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
164	SG1RFO > InitAct > Alarm > 05_0_05	0	0	0	0	0	0	0	0	0	0	0	0	2.64	3.45	5.3	2.64	3.45	5.3	2.64	3.45	5.3	2.64	3.45	5.3	**1.0057**
165	SG1RFO > InitAct > Alarm > 0_05_05	0	0	0	0	0	0	0	0	0	0	0	0	4.99	6.51	10	4.99	6.51	10	4.99	6.51	10	4.99	6.51	10	**1.8976**
166	SG1RFO > InitAct > Alarm > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	4.99	6.51	10	4.99	6.51	10	4.99	6.51	10	4.99	6.51	10	**1.8976**
167	SG1RFO > InitAct > Alarm > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	4.99	6.51	10	4.99	6.51	10	4.99	6.51	10	4.99	6.51	10	**1.8976**
168	SG1RFO > InitAct > Alarm > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
169	SG1RFO > InitAct > Smoke > 05_05_0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
170	SG1RFO > InitAct > Smoke > 05_0_05	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
171	SG1RFO > InitAct > Smoke > 0_05_05	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
172	SG1RFO > InitAct > Smoke > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
173	SG1RFO > InitAct > Smoke > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
174	SG1RFO > InitAct > Smoke > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
175	SG1RFO > Recogn > AS > AptAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
176	SG1RFO > Recogn > AS > AptAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
177	SG1RFO > Recogn > AS > AptAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
178	SG1RFO > Recogn > AS > BldAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
179	SG1RFO > Recogn > AS > BldAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
180	SG1RFO > Recogn > AS > BldAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
181	SG1RFO > Recogn > AS > CmbAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	2.62	3.42	5.25	2.62	3.42	5.25	2.62	3.42	5.25	2.62	3.42	5.25	**0.9962**
182	SG1RFO > Recogn > AS > CmbAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.72	0.94	1.45	0.72	0.94	1.45	0.72	0.94	1.45	0.72	0.94	1.45	**0.2751**
183	SG1RFO > Recogn > AS > CmbAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0.33	0.5	0.25	0.33	0.5	0.25	0.33	0.5	0.25	0.33	0.5	**0.0949**
184	SG1RFO > Recogn > AS > Smoke > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	14.9	19.4	29.8	14.9	19.4	29.8	14.9	19.4	29.8	14.9	19.4	29.8	**5.6547**
185	SG1RFO > Recogn > AS > Smoke > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	2.97	3.87	5.95	2.97	3.87	5.95	2.97	3.87	5.95	2.97	3.87	5.95	**1.129**
186	SG1RFO > Recogn > AS > Smoke > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**7E-13**
187	SG1RFO > Recogn > AW > AptAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
188	SG1RFO > Recogn > AW > AptAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
189	SG1RFO > Recogn > AW > AptAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
190	SG1RFO > Recogn > AW > BldAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
191	SG1RFO > Recogn > AW > BldAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
192	SG1RFO > Recogn > AW > BldAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
193	SG1RFO > Recogn > AW > CmbAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
194	SG1RFO > Recogn > AW > CmbAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
195	SG1RFO > Recogn > AW > CmbAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
196	SG1RFO > Recogn > AW > Smoke > 0.5	3.54	7.31	17.5	3.54	7.31	17.5	3.54	7.31	17.5	3.54	7.31	17.5	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**5.4322**

TableC2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
197	SG1RFO > Recogn > AW > Smoke > 0.9	0.71	1.46	3.5	0.71	1.46	3.5	0.71	1.46	3.5	0.71	1.46	3.5	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**1.1768**
198	SG1RFO > Recogn > AW > Smoke > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	0.3	0.39	0.6	**0.1129**
199	SG1RNFO > 3ptEvac > Asp > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
200	SG1RNFO > 3ptEvac > Asp > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
201	SG1RNFO > 3ptEvac > Asp > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
202	SG1RNFO > 3ptEvac > Awk > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
203	SG1RNFO > 3ptEvac > Awk > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
204	SG1RNFO > 3ptEvac > Awk > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
205	SG1RNFO > InitAct > Alarm > 05_05_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.65	0	0.88	2.64	0	0	0.37	0	0	0.37	**0.0055**
206	SG1RNFO > InitAct > Alarm > 05_0_05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.65	0	0.88	2.64	0	0	0.37	0	0	0.37	**0.0055**
207	SG1RNFO > InitAct > Alarm > 0_05_05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1.66	5	0	0	1.39	0	0	1.39	**0.0188**
208	SG1RNFO > InitAct > Alarm > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1.66	5	0	0	1.39	0	0	1.39	**0.0188**
209	SG1RNFO > InitAct > Alarm > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1.66	5	0	0	1.39	0	0	1.39	**0.0188**
210	SG1RNFO > InitAct > Alarm > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
211	SG1RNFO > InitAct > BGlass > 05_05_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
212	SG1RNFO > InitAct > BGlass > 05_0_05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
213	SG1RNFO > InitAct > BGlass > 0_05_05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
214	SG1RNFO > InitAct > BGlass > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
215	SG1RNFO > InitAct > BGlass > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
216	SG1RNFO > InitAct > BGlass > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
217	SG1RNFO > InitAct > Smoke > 05_05_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
218	SG1RNFO > InitAct > Smoke > 05_0_05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
219	SG1RNFO > InitAct > Smoke > 0_05_05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
220	SG1RNFO > InitAct > Smoke > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
221	SG1RNFO > InitAct > Smoke > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
222	SG1RNFO > InitAct > Smoke > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
223	SG1RNFO > Recogn > AS > AptAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
224	SG1RNFO > Recogn > AS > AptAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
225	SG1RNFO > Recogn > AS > AptAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
226	SG1RNFO > Recogn > AS > BGlass > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0	0.1	0.24	0	0	0.04	0	0	0.04	**0.0006**
227	SG1RNFO > Recogn > AS > BGlass > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0.01	0	0	0.01	**0.0002**
228	SG1RNFO > Recogn > AS > BGlass > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
229	SG1RNFO > Recogn > AS > BldAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**

Apartments (AFO)

TableC2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
230	SG1RNFO > Recogn > AS > BldAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
231	SG1RNFO > Recogn > AS > BldAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
232	SG1RNFO > Recogn > AS > CmbAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.63	0	0.87	2.61	0	0	0.01	0	0	0.01	**0.0011**
233	SG1RNFO > Recogn > AS > CmbAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.73	0	0.24	0.72	0	0	0	0	0	0	**0.0003**
234	SG1RNFO > Recogn > AS > CmbAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.08	0.2	0	0	0	0	0	0	**0.0001**
235	SG1RNFO > Recogn > AS > Smoke > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.9	0	4.94	14.7	0	0	0.04	0	0	0.04	**0.0065**
236	SG1RNFO > Recogn > AS > Smoke > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.98	0	0.99	2.95	0	0	0.01	0	0	0.01	**0.0013**
237	SG1RNFO > Recogn > AS > Smoke > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5E-16**
238	SG1RNFO > Recogn > AW > AptAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
239	SG1RNFO > Recogn > AW > AptAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
240	SG1RNFO > Recogn > AW > AptAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
241	SG1RNFO > Recogn > AW > BGlass > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
242	SG1RNFO > Recogn > AW > BGlass > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
243	SG1RNFO > Recogn > AW > BGlass > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
244	SG1RNFO > Recogn > AW > BldAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
245	SG1RNFO > Recogn > AW > BldAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
246	SG1RNFO > Recogn > AW > BldAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
247	SG1RNFO > Recogn > AW > CmbAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
248	SG1RNFO > Recogn > AW > CmbAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
249	SG1RNFO > Recogn > AW > CmbAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**
250	SG1RNFO > Recogn > AW > Smoke > 0.5	0	0	14	0	3.73	13.5	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0119**
251	SG1RNFO > Recogn > AW > Smoke > 0.9	0	0	2.8	0	0.75	2.7	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0025**
252	SG1RNFO > Recogn > AW > Smoke > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.1	0.3	0	0	0	0	0	0	**0.0001**

NB:
(1) Sensitivity **Case**
(2) Occupant **Awake** or **Asleep**
(3) open-open AFO door open - LFO stair door open
open-closed AFO door open - LFO stair door closed
closed-open AFO door closed - LFO stair door open
closed-closed AFO door closed - LFO stair door closed
(4) Smouldering fire
(5) Flaming fire
(6) Flash over fire

Sensitivity of some building parameters to economic losses as predicted by CESARE-RISK

Building Dimensions

	RFO Size					
$Cost/Losses	**5x4**	**5x6**	**5x8**	**6x4**	**6x6**	**6x8**
Expected Losses x no of floors	4891.62	4931.36	4935.89	4887.53	4935.41	3164.22
Cost of Fire Prot - Passive	30257.87	30257.87	30257.87	30257.87	30257.87	30257.87
" - Active	30935	30935	30935	30935	30935	30935
PW of Maintenance	86999.07	86999.07	86999.07	86999.07	86999.07	86999.07
Fire Cost Expectation (TOTAL$)	153083.56	153123.3	153127.83	153079.47	153127.34	151356.16

	AFO Size					
$Cost/Losses	**9.5x10**	**9.5x15**	**9.5x20**	**12x10**	**12x15**	**12x20**
Expected Losses x no of floors	4891.62	6447.94	11397.34	4617.7	10254.08	18033.66
Cost of Fire Prot - Passive	30257.87	34437.32	38277.2	34222.59	38670.1	42735.96
" - Active	30935	43760	92975	37685	88475	115475
PW of Maintenance	86999.07	125560.08	164121.09	107294.34	156002.98	204711.64
Fire Cost Expectation (TOTAL$)	153083.56	210205.33	306770.63	183819.64	293402.19	380956.25

	RFOWin Size		Enclosure Height				
$Cost/Losses	1.6x2.4	2.4x4	2.4	2.6	2.8	3	3.2
Expected Losses x no of floors	4891.62	4891.56	4891.62	2936.66	2936.75	2936.73	2936.71
Cost of Fire Prot - Passive	30257.87	30257.87	30257.87	30257.87	30257.87	30257.87	30257.87
" - Active	30935	30935	30935	30935	30935	30935	30935
PW of Maintenance	86999.07	86999.07	86999.07	86999.07	86999.07	86999.07	86999.07
Fire Cost Expectation (TOTAL$)	153083.56	153083.5	153083.56	151128.59	151128.69	151128.66	151128.66

	No of Apts w/OG1					w/OG4	w/OG5
$Cost/Losses	4	6	8	10	12	6	6
Expected Losses x no of floors	4070.1	4891.62	5711.62	6530.95	7403.57	4891.62	4891.62
Cost of Fire Prot - Passive	22964.21	30257.87	37274.26	44113.46	50826.8	30257.87	30257.87
" - Active	22385	30935	39485	48035	92975	30935	30935
PW of Maintenance	61291.73	86999.07	112706.41	138413.75	164121.09	86999.07	86999.07
Fire Cost Expectation (TOTAL$)	110711.03	153083.56	195177.3	237093.16	315326.44	153083.56	153083.56

Detectors/Alarms

				Alarms			
$Cost/Losses	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Expected Losses x no of floors	4858.11	4873.09	4887.7	4864.18	4891.62	4891.62	4891.62
Cost of Fire Prot - Passive	30257.87	30257.87	30257.87	30257.87	30257.87	30257.87	30257.87
" - Active	12802.4	20904.2	28813.1	16081.7	30935	30935	30935
PW of Maintenance	32624.65	84280.34	89717.78	81561.63	86999.07	86999.07	86999.07
Fire Cost Expectation (TOTAL$)	80543.02	140315.5	153676.45	132765.38	153083.56	153083.56	153083.56

Fire Protection Systems - Passive

	FRLs			
$Cost/Losses	**30**	**60**	**90**	**120**
Expected Losses x no of floors	5991.02	4979.24	4724.12	4748
Cost of Fire Prot - Passive	3000	12229.13	30257.87	49424.79
" - Active	30935	30935	30935	30935
PW of Maintenance	86999.07	86999.07	86999.07	86999.07
Fire Cost Expectation (TOTAL$)	126925.09	135142.44	152916.06	172106.86

APPENDIX D
SENSITIVITY ANALYSIS RESULTS – CLASS 3 (HOTELS AND MOTELS)

Results of Sensitivity Studies v4.5 for Class 3 (Hotels)

This sensitivity study is similar to that done for Class 2 buildings. The main differences being that the apartment now consists of a single room and statistical data used is based on US fire records due to lack of sufficient data from Australian hotel fires.

The results are tabulated and at the end of each table an explanation of the column headings can be found. The row headings are explained in the list of sensitivity study parameters. It is assumed that the reader is familiar with the basic concepts used in the model.

Note: see inset in the list of sensitivity study parameters for a brief description of the alarm types used

This document contains:

List of Sensitivity Study Parameters

Building Dimensions								
[Apartment Size]	*Aptm Size	9.5x5	9.5x10	9.5x15	9.5x20	12x10	12x15	12x20
[Room of Fire Origin Size]	*RFO Size	5x4	5x6	5x8	6x4	6x6	6x8	
[RFO Window Size]	RFOWin Size	1.6x2.4	2.4x4					
	Corridor Length	10	20	40	80	160	*(only ANFOs)*	
	Enclosure Height	2.4	2.6	2.8	3	3.2		

Dimensions: meters

*ApartSize RFOSize = 9 x 4 [Base]

No of Apts w/OG							
[No. of apartments per level with single OG type]	No of Apts w/OG1	4	6	8	10	12	
	No of Apts w/OG4	4	6	8	10	12	
	No of Apts w/OG5	4	6	8	10	12	

Alarm Types:
1 No Alarms
2 Smoke Detectors
3 Interconn. Smoke Detectors
4 Corridor Alarms only
5 Building Alarm - Corridor
6 Building Alarm - Apartments
7 Building Alarm - Interconn. Apart

Detectors/Alarms							
	Alarms	1	2	3	4	5	6	7
	Smoke Detector Reliability	0.9	0.95	0.99				

Fire Protection Systems - Active			
	Sprinkler Reliability.	0.85	0.9	0.95
	Smoke Management Reliability.	0.7	0.8	0.9
	Stair Pressurisation Reliability	0.5	0.95	1

Fire Protection Systems - Passive (only ANFOs)							
	FRLs	30	60	90	120	180	240

Dimensions: minutes

** The base FRL is a combination of 60 and 90 minute barrier elements

Scenario Probabilities (only ANFOs)				
	Stair Door Opening Probability	1	5	10	25
	Apartment Door Opening Probability	0.1	1	10	20

Non Base Case

Base Case

Occupant Behaviour							
3point Evacuation	**- Awake**	**0_0_1**	**0_1_0**	**1_0_0**			
	- Asleep	**0_0_1**	**0_1_0**	**1_0_0**			
3point Investigate & Evacuate	**- Awake**	**0_0_1**	**0_1_0**	**1_0_0**			
	- Asleep	**0_0_1**	**0_1_0**	**1_0_0**			
Initial Action	**- Alarms**	**05_05_0**	**05_0_05**	**0_05_05**	**0_0_1**	**0_1_0**	**1_0_0**
	- Smoke	**05_05_0**	**05_0_05**	**0_05_05**	**0_0_1**	**0_1_0**	**1_0_0**
	- Warnings	**05_05_0**	**05_0_05**	**0_05_05**	**0_0_1**	**0_1_0**	**1_0_0**
Investigate and Act	**- Heavy Smoke**	**05_05_0**	**05_0_05**	**0_05_05**	**0_0_1**	**0_1_0**	**1_0_0**
	- Light or Medium Smoke	**05_05_0**	**05_0_05**	**0_05_05**	**0_0_1**	**0_1_0**	**1_0_0**
	- No Smoke	**05_05_0**	**05_0_05**	**0_05_05**	**0_0_1**	**0_1_0**	**1_0_0**
Occupant G roup Type		**All OG1**	**All OG2**	**All OG3**	**All OG4**	**All OG5**	**All OG6**
Recognition OG1(Asleep) *[Cue Recognition with single OG type = OG1]*	**-Apartment Alarms**	**0.0**	**0.5**	**0.8**	**0.9**	**1.0**	
	Building Alarms	**0.0**	**0.5**	**0.7**	**0.9**	**1.0**	
	Combined Alarms	**0.0**	**0.5**	**0.9**	**1.0**		
	Smoke	**0.0**	**0.5**	**0.1**	**0.2**	**0.4**	
	Warnings	**0.0**	**0.5**	**1.0**			
Recognition OG1(Awake) *[Cue Recognition with single OG type = OG1]*	**-Apartment Alarms**	**0.0**	**0.5**	**0.8**	**0.9**	**1.0**	
	Building Alarms	**0.0**	**0.5**	**0.7**	**0.9**	**1.0**	
	Combined Alarms	**0.0**	**0.5**	**0.9**	**1.0**		
	Smoke	**0.0**	**0.5**	**0.1**	**0.2**	**0.4**	
	Warnings	**0.0**	**0.5**	**1.0**			

Evacuation Probability:

'0_0_1	100% Evacuate at time3
'0_1_0	100% Evacuate at time2
'1_0_1	100% Evacuate at time1
'05_05_0	50% Evacuate at time1 50% Evacuate at time2
'05_0_05	50% Evacuate at time1 50% Evacuate at time3
'0_05_05	50% Evacuate at time2 50% Evacuate at time3

Initial Action Probability:

'0_0_1	100% Do Nothing
'0_1_0	100% Investigate
'1_0_1	100% Direct Evacuate
'05_05_0	50% Direct Evacuate + 50% Investigate
'05_0_05	50% Direct Evacuate + 50% Do Nothing
'0_05_05	50% Investigate + 50% Do Nothing

Investigate & Act Probability:

'0_0_1	100% Trapped
'0_1_0	100% Return
'1_0_1	100% Evacuate
'05_05_0	50% Evacuate + 50% Return
'05_0_05	50% Evacuate + 50% Trapped
'0_05_05	50% Return + 50% Trapped

Recognition Probability:
0 = No Recognition
1 = 100% Recognition

Recognition Probability:
0 = No Recognition
1 = 100% Recognition

Non Base Case

Base Case

Hotels (ANFO)

TableD1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
	Building Geometry / Alarms and Detection / Active and Passive Protection																	
1	Apartsize > 9.5x10	0.0	0.82	0.0	0.002	0.0	0.008	0.0	0.001	2077.3	70.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.688**
2	Apartsize > 9.5x15	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	2077.3	70.	0.0	68.3	0.0	47.3	0.0	47.3	**2.688**
3	Apartsize > 9.5x20	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	2077.3	70.	0.0	68.3	0.0	47.3	0.0	47.3	**2.688**
4	Apartsize > 12x10	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	2077.3	70.4	0.0	68.3	0.0	47.3	0.0	47.3	**2.688**
5	Apartsize > 12x15	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	2077.3	70.	0.0	68.3	0.0	47.3	0.0	47.3	**2.688**
6	Apartsize > 12x20	0.0	1.291	0.0	0.002	0.0	0.008	0.0	0.001	2071.6	70.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.688**
7	rfosize > 5x4	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3677.	1.9	0.0	68.3	0.0	47.3	0.0	47.3	**2.771**
8	rfosize > 5x6	0.0	1.657	0.0	0.002	0.0	0.008	0.0	0.001	3420.4	12.6	0.0	68.3	0.0	47.3	0.0	47.3	**2.758**
9	rfosize > 5x8	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	11.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
10	rfosize > 6x4	0.0	4.89	0.0	0.002	0.0	0.008	0.0	0.001	3452.5	28.9	0.0	68.3	0.0	47.3	0.0	47.3	**2.760**
11	rfosize > 6x6	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3440.9	11.8	0.0	68.3	0.0	47.3	0.0	47.3	**2.759**
12	rfosize > 6x8	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3549.5	11.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
13	RFOwindw > 2.4x4	0.0	60.506	0.0	0.002	0.0	0.008	0.0	0.001	1901.8	196.9	0.0	68.3	0.0	47.3	0.0	47.3	**2.691**
14	CorrLen > 10	0.0	0.738	0.0	0.002	0.0	0.008	0.0	0.001	3357.8	12.8	0.0	68.3	0.0	47.3	0.0	47.3	**2.754**
15	CorrLen > 20	0.0	0.812	0.0	0.002	0.0	0.008	0.0	0.001	3357.8	12.8	0.0	68.3	0.0	47.3	0.0	47.3	**2.754**
16	CorrLen > 40	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
17	CorrLen > 80	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3555.5	11.5	0.0	68.3	0.0	47.3	0.0	47.3	**2.765**
18	CorrLen > 160	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3279.4	11.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.750**
19	RoomH > 2.4	0.0	0.82	0.0	0.002	0.0	0.008	0.0	0.001	2077.3	70.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.688**
20	RoomH > 2.6	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3385.4	11.8	0.0	68.3	0.0	47.3	0.0	47.3	**2.756**
21	RoomH > 2.8	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3361.8	11.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.754**
22	RoomH > 3.0	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	1897.0	70.	0.0	68.3	0.0	47.3	0.0	47.3	**2.678**
23	RoomH > 3.2	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3382.3	11.5	0.0	68.3	0.0	47.3	0.0	47.3	**2.755**
24	NoAptOg1 > 4	0.0	1.12	0.0	0.004	0.0	0.012	0.0	0.002	1735.4	1.6	0.0	0.007	0.0	0.021	0.0	0.003	**0.095**
25	NoAptOg1 > 6	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
26	NoAptOg1 > 8	0.0	1.056	0.0	0.003	0.0	0.01	0.0	0.001	5237.7	1.3	0.0	0.004	0.0	0.017	0.0	0.002	**0.284**
27	NoAptOg1 > 10	0.001	1.106	0.0	0.002	0.0	0.01	0.0	0.001	6808.1	1.3	0.0	0.004	0.0	0.017	0.0	0.002	**0.370**
28	NoAptOg1 > 12	0.001	1.186	0.0	0.002	0.0	0.01	0.0	0.001	8385.7	1.7	0.0	0.003	0.0	0.017	0.0	0.002	**0.455**
29	NoAptOg4 > 6	0.0	0.535	0.0	0.002	0.0	0.005	0.0	0.001	1907.5	2.9	0.001	0.003	0.001	0.011	0.001	0.001	**0.104**
30	NoAptOg5 > 6	11395.	34.484	0.0	358.0	0.0	286.0	0.0	284.0	16280.	49.3	0.0	512.0	0.0	409.0	0.0	406.0	**52.727**

Hotels (ANFO)

TableD1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
31	Alarms > alr1	0.	7.98	0.0	0.023	0.0	0.081	0.0	0.011	23495.	12.	0.0	68.4	0.0	47.4	0.0	47.3	**3.848**
32	Alarms > alr2	0.0	7.98	0.0	0.023	0.0	0.081	0.0	0.011	1842.9	21.	0.0	68.4	0.0	47.4	0.0	47.3	**2.675**
33	Alarms > alr3	0.0	7.98	0.0	0.023	0.0	0.081	0.0	0.011	1842.9	21.	0.0	68.4	0.0	47.4	0.0	47.3	**2.675**
34	Alarms > alr4	0.0	0.767	0.0	0.002	0.0	0.047	0.0	0.006	3549.5	11.6	0.0	68.3	0.0	47.368	0.0	47.3	**2.766**
35	Alarms > alr5	0.	0.77	0.	0.	0.	0.01	0.	0.	3548.1	12.1	0.	68.3	0.	47.3	0.	47.3	**2.764**
36	Alarms > alr6	0.0	0.158	0.0	0.0	0.0	0.002	0.0	0.0	1327.4	12.2	0.0	68.3	0.0	47.3	0.0	47.2	**2.639**
37	Alarms > alr7	0.0	0.153	0.0	0.0	0.0	0.002	0.0	0.0	1327.7	11.7	0.0	68.3	0.0	47.3	0.0	47.2	**2.639**
38	SmkDetRel > 0.9	0.0	0.923	0.0	0.003	0.0	0.009	0.0	0.001	4016.8	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.790**
39	SmkDetRel > 0.99	0.0	0.659	0.0	0.002	0.0	0.007	0.0	0.001	3196.3	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.745**
40	SprRel > 0.85	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**0.945**
41	SprRel > 0.90	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.	68.3	0.0	47.3	0.0	47.3	**0.838**
42	SprRel > 0.95	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.	68.3	0.0	47.3	0.0	47.3	**0.731**
43	SmkMngRel > 0.7	0.	0.8	0.	0.	0.	0.	0.	0.	3548.1	12.1	0.	68.3	0.	47.3	0.	47.3	**2.624**
44	SmkMngRel > 0.8	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.604**
45	SmkMngRel > 0.9	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.584**
46	StrPresRel > 0.5	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.670**
47	StrPresRel > 0.95	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.584**
48	StrPresRel > 1.0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.575**
49	FRLs > 30	0.0	27.353	0.0	0.695	0.0	0.694	0.0	0.658	3548.1	116.4	0.0	253.0	0.0	252.0	0.0	252.0	**13.912**
50	FRLs > 60	0.0	2.573	0.0	0.031	0.0	0.03	0.0	0.018	3548.1	20.8	0.0	92.	0.0	72.0	0.0	72.0	**4.104**
51	FRLs > 90	0.0	0.564	0.0	0.002	0.0	0.002	0.0	0.0	3548.1	4.	0.0	16.2	0.0	4.52	0.0	4.51	**0.443**
52	FRLs > 120	0.0	0.49	0.0	0.001	0.0	0.001	0.0	0.0	3548.1	3.4	0.0	13.5	0.0	2.32	0.0	2.31	**0.323**
53	FRLs > 180	0.0	0.486	0.0	0.001	0.0	0.001	0.0	0.0	3548.1	3.4	0.0	13.5	0.0	2.32	0.0	2.31	**0.323**
54	FRLs > 240	0.0	0.486	0.0	0.001	0.0	0.001	0.0	0.0	3548.1	3.4	0.0	13.5	0.0	2.32	0.0	2.31	**0.323**
55	StrDrOpng > 1	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3381.2	11.8	0.	68.3	0.0	47.3	0.0	47.3	**2.593**
56	StrDrOpng > 5	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3385.4	12.	0.	68.3	0.0	47.3	0.0	47.3	**2.665**
57	StrDrOpng > 10	0.0	0.82	0.0	0.002	0.0	0.008	0.0	0.001	2077.3	70.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.688**
58	StrDrOpng > 25	0.0	0.82	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.4	0.0	68.3	0.0	47.3	0.0	47.3	**3.048**
59	AptDrOpng > 0.1	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	1897.0	70.3	0.0	68.3	0.0	47.3	0.0	47.3	**2.575**
60	AptDrOpng > 1	0.0	0.82	0.0	0.002	0.0	0.008	0.0	0.001	2077.3	70.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.688**
61	AptDrOpng > 10	0.0	1.249	0.0	0.002	0.0	0.008	0.0	0.001	3897.3	29.1	1778.0	9.843	0.0	47.3	0.0	47.3	**13.157**
62	AptDrOpng > 20	0.0	0.828	0.0	0.002	0.0	0.008	0.0	0.001	4163.9	4.3	1479.3	9.843	0.0	47.3	0.0	47.3	**21.098**

Hotels (ANFO)

TableD1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
	Human Behaviour																	
63	3ptEvac > Asp > 0_0_1	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	4233.5	19.2	0.0	68.3	0.0	47.3	0.0	47.3	**2.802**
64	3ptEvac > Asp > 0_1_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	4212.6	15.8	0.0	68.3	0.0	47.3	0.0	47.3	**2.801**
65	3ptEvac > Asp > 1_0_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3571.5	10.3	0.0	68.3	0.0	47.3	0.0	47.3	**2.766**
66	3ptEvac > Awk > 0_0_1	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
67	3ptEvac > Awk > 0_1_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
68	3ptEvac > Awk > 1_0_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
69	3ptInEv > Asp > 0_0_1	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3584.8	12.8	0.0	68.3	0.0	47.3	0.0	47.3	**2.766**
70	3ptInEv > Asp > 0_1_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3584.8	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.766**
71	3ptInEv > Asp > 1_0_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	11.9	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
72	3ptInEv > Awk > 0_0_1	0.0	0.779	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
73	3ptInEv > Awk > 0_1_0	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
74	3ptInEv > Awk > 1_0_0	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
75	InitAct > Alarm > 05_05_0	0.0	0.777	0.0	0.002	0.0	0.008	0.0	0.001	3565.4	11.8	0.0	68.3	0.0	47.3	0.0	47.3	**2.765**
76	InitAct > Alarm > 05_0_05	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3565.4	11.9	0.0	68.3	0.0	47.3	0.0	47.3	**2.765**
77	InitAct > Alarm > 0_05_05	0.0	0.777	0.0	0.002	0.0	0.008	0.0	0.001	3599.7	13.5	0.0	68.3	0.0	47.3	0.0	47.3	**2.767**
78	InitAct > Alarm > 0_0_1	0.0	7.98	0.0	0.023	0.0	0.081	0.0	0.011	6878.6	19.7	0.0	68.4	0.0	47.4	0.0	47.3	**2.948**
79	InitAct > Alarm > 0_1_0	0.0	0.787	0.0	0.002	0.0	0.008	0.0	0.001	3599.7	13.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.767**
80	InitAct > Alarm > 1_0_0	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	11.6	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
81	InitAct > Smoke > 05_05_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3229.4	12.3	0.0	68.3	0.0	47.3	0.0	47.3	**2.747**
82	InitAct > Smoke > 05_0_05	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3229.4	12.3	0.0	68.3	0.0	47.3	0.0	47.3	**2.747**
83	InitAct > Smoke > 0_05_05	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
84	InitAct > Smoke > 0_0_1	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3583.7	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.766**
85	InitAct > Smoke > 0_1_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
86	InitAct > Smoke > 1_0_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3229.4	12.3	0.0	68.3	0.0	47.3	0.0	47.3	**2.747**
87	InitAct > Warn > 05_05_0	0.0	2.139	0.0	0.006	0.0	0.021	0.0	0.003	3548.1	13.7	0.0	68.3	0.0	47.3	0.0	47.3	**2.765**
88	InitAct > Warn > 05_0_05	0.0	3.314	0.0	0.01	0.0	0.034	0.0	0.005	3950.4	14.7	0.0	68.4	0.0	47.3	0.0	47.3	**2.787**
89	InitAct > Warn > 0_05_05	0.001	4.689	0.0	0.013	0.0	0.047	0.0	0.006	4619.1	16.7	0.0	68.4	0.0	47.3	0.0	47.3	**2.824**
90	InitAct > Warn > 0_0_1	0.0	5.864	0.0	0.017	0.0	0.06	0.0	0.008	5170.1	17.6	0.0	68.4	0.0	47.3	0.0	47.3	**2.854**
91	InitAct > Warn > 0_1_0	0.0	3.505	0.0	0.01	0.0	0.034	0.0	0.005	3548.1	15.7	0.0	68.4	0.0	47.3	0.0	47.3	**2.765**
92	InitAct > Warn > 1_0_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**

Hotels (ANFO)

TableD1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
93	InvgAct > HSmk > 05_05_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
94	InvgAct > HSmk > 05_0_05	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
95	InvgAct > HSmk > 0_05_05	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
96	InvgAct > HSmk > 0_0_1	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
97	InvgAct > HSmk > 0_1_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
98	InvgAct > HSmk > 1_0_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
99	InvgAct > LMSmk > 05_05_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
100	InvgAct > LMSmk > 05_0_05	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
101	InvgAct > LMSmk > 0_05_05	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3583.7	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.766**
102	InvgAct > LMSmk > 0_0_1	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3583.7	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.766**
103	InvgAct > LMSmk > 0_1_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3583.7	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.766**
104	InvgAct > LMSmk > 1_0_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
105	InvgAct > NoSmk > 05_05_0	0.0	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
106	InvgAct > NoSmk > 05_0_05	0.	0.771	0.0	0.002	0.0	0.008	0.0	0.001	3548.	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
107	InvgAct > NoSmk > 0_05_05	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3549.5	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
108	InvgAct > NoSmk > 0_0_1	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3549.5	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
109	InvgAct > NoSmk > 0_1_0	0.0	0.767	0.0	0.002	0.0	0.008	0.0	0.001	3549.5	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
110	InvgAct > NoSmk > 1_0_0	0.0	0.775	0.0	0.002	0.0	0.008	0.0	0.001	3548.1	12.1	0.0	68.3	0.0	47.3	0.0	47.3	**2.764**
111	OGType > AllOG1	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
112	OGType > AllOG2	0.0	1.284	0.0	0.004	0.0	0.013	0.0	0.002	4091.6	1.4	0.0	0.006	0.0	0.021	0.0	0.003	**0.222**
113	OGType > AllOG3	0.0	0.208	0.0	0.001	0.0	0.002	0.0	0.0	2857.8	4.3	0.0	0.005	0.0	0.016	0.0	0.002	**0.155**
114	OGType > AllOG4	0.0	0.535	0.0	0.002	0.0	0.005	0.0	0.001	1907.5	2.9	0.001	0.003	0.001	0.011	0.001	0.001	**0.104**
115	OGType > AllOG5	11395.	34.484	0.0	358.0	0.0	286.0	0.0	284.0	16280.	49.3	0.0	512.0	0.0	409.0	0.0	406.0	**52.727**
116	OGType > AllOG6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	**0.000**
117	Recogn > Base > OG1	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
118	Recogn > OG1-As > AptAlarm > 0.0	0.0	0.237	0.0	0.001	0.0	0.002	0.0	0.0	14490.	0.9	0.0	0.02	0.0	0.069	0.0	0.009	**0.786**
119	Recogn > OG1-As > AptAlarm > 0.5	0.0	0.237	0.0	0.001	0.0	0.002	0.0	0.0	5913.8	1.	0.0	0.009	0.0	0.03	0.0	0.004	**0.321**
120	Recogn > OG1-As > AptAlarm > 0.8	0.0	0.237	0.0	0.001	0.0	0.002	0.0	0.0	2705.4	1.	0.0	0.004	0.0	0.014	0.0	0.002	**0.147**
121	Recogn > OG1-As > AptAlarm > 0.9	0.0	0.237	0.0	0.001	0.0	0.002	0.0	0.0	1632.6	1.1	0.0	0.002	0.0	0.008	0.0	0.001	**0.089**
122	Recogn > OG1-As > AptAlarm > 1.0	0.0	0.237	0.0	0.001	0.0	0.002	0.0	0.0	581.8	1.4	0.001	0.001	0.001	0.003	0.001	0.0	**0.032**
123	Recogn > OG1-As > BldAlarm > 0.0	0.0	1.03	0.0	0.003	0.0	0.031	0.0	0.004	14490.	0.9	0.0	0.02	0.0	0.069	0.0	0.009	**0.787**
124	Recogn > OG1-As > BldAlarm > 0.5	0.0	1.03	0.0	0.003	0.0	0.031	0.0	0.004	5913.8	0.9	0.0	0.009	0.0	0.057	0.0	0.008	**0.322**
125	Recogn > OG1-As > BldAlarm > 0.7	0.0	1.03	0.0	0.003	0.0	0.031	0.0	0.004	3769.6	1.	0.0	0.006	0.0	0.053	0.0	0.007	**0.206**

Hotels (ANFO)

TableD1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
126	Recogn > OG1-As > BldAlarm > 0.9	0.0	1.03	0.0	0.003	0.0	0.031	0.0	0.004	1632.6	1.	0.0	0.002	0.0	0.05	0.0	0.007	**0.090**
127	Recogn > OG1-As > BldAlarm > 1.0	0.0	1.03	0.0	0.003	0.0	0.031	0.0	0.004	581.8	1.	0.001	0.001	0.0	0.048	0.0	0.006	**0.033**
128	Recogn > OG1-As > CmbAlarm > 0.0	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	14490.	0.9	0.0	0.02	0.0	0.069	0.0	0.009	**0.787**
129	Recogn > OG1-As > CmbAlarm > 0.5	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	5913.8	1.	0.0	0.009	0.0	0.03	0.0	0.004	**0.321**
130	Recogn > OG1-As > CmbAlarm > 0.9	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	1632.6	1.1	0.0	0.002	0.0	0.008	0.0	0.001	**0.089**
131	Recogn > OG1-As > CmbAlarm > 1.0	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	581.8	1.4	0.001	0.001	0.001	0.003	0.001	0.0	**0.032**
132	Recogn > OG1-As > Smoke > 0.0	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3881.5	0.8	0.0	0.005	0.0	0.018	0.0	0.002	**0.211**
133	Recogn > OG1-As > Smoke > 0.05	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3645.7	0.9	0.0	0.005	0.0	0.018	0.0	0.002	**0.198**
134	Recogn > OG1-As > Smoke > 0.1	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
135	Recogn > OG1-As > Smoke > 0.2	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3067.4	1.2	0.0	0.005	0.0	0.018	0.0	0.002	**0.167**
136	Recogn > OG1-As > Smoke > 0.4	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	2298.0	1.5	0.0	0.005	0.0	0.018	0.0	0.002	**0.125**
137	Recogn > OG1-As > Warn > 0.0	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	4491.2	1.	0.0	0.006	0.0	0.021	0.0	0.003	**0.244**
138	Recogn > OG1-As > Warn > 0.5	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3958.1	1.	0.0	0.006	0.0	0.02	0.0	0.003	**0.215**
139	Recogn > OG1-As > Warn > 1.0	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
140	Recogn > OG1-Aw > AptAlarm > 0.0	0.001	4.79	0.0	0.014	0.0	0.049	0.0	0.007	803.4	1.4	0.0	0.001	0.0	0.004	0.0	0.001	**0.045**
141	Recogn > OG1-Aw > AptAlarm > 0.5	0.0	2.09	0.0	0.006	0.0	0.021	0.0	0.003	803.4	1.4	0.0	0.001	0.0	0.004	0.0	0.001	**0.044**
142	Recogn > OG1-Aw > AptAlarm > 0.8	0.0	0.957	0.0	0.003	0.0	0.01	0.0	0.001	803.4	1.4	0.0	0.001	0.0	0.004	0.0	0.001	**0.044**
143	Recogn > OG1-Aw > AptAlarm > 0.9	0.0	0.578	0.0	0.002	0.0	0.006	0.0	0.001	803.4	1.4	0.0	0.001	0.0	0.004	0.0	0.001	**0.044**
144	Recogn > OG1-Aw > AptAlarm > 1.0	0.0	0.199	0.0	0.001	0.0	0.002	0.0	0.0	803.4	1.4	0.0	0.001	0.0	0.004	0.0	0.001	**0.044**
145	Recogn > OG1-Aw > BldAlarm > 0.0	0.	4.79	0.0	0.014	0.0	0.049	0.0	0.007	3454.7	1.	0.0	0.005	0.0	0.053	0.0	0.007	**0.189**
146	Recogn > OG1-Aw > BldAlarm > 0.5	0.	2.09	0.0	0.006	0.0	0.036	0.0	0.005	3454.7	1.	0.0	0.005	0.0	0.053	0.0	0.007	**0.189**
147	Recogn > OG1-Aw > BldAlarm > 0.7	0.	1.34	0.0	0.004	0.0	0.032	0.0	0.004	3454.7	1.	0.0	0.005	0.0	0.053	0.0	0.007	**0.189**
148	Recogn > OG1-Aw > BldAlarm > 0.9	0.	0.578	0.0	0.002	0.0	0.029	0.0	0.004	3454.7	1.	0.0	0.005	0.0	0.053	0.0	0.007	**0.189**
149	Recogn > OG1-Aw > BldAlarm > 1.0	0.	0.199	0.0	0.001	0.0	0.027	0.0	0.004	3454.7	1.	0.0	0.005	0.0	0.053	0.0	0.007	**0.189**
150	Recogn > OG1-Aw > CmbAlarm > 0.0	0.001	4.79	0.0	0.014	0.0	0.049	0.0	0.007	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.189**
151	Recogn > OG1-Aw > CmbAlarm > 0.5	0.0	2.09	0.0	0.006	0.0	0.021	0.0	0.003	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
152	Recogn > OG1-Aw > CmbAlarm > 0.9	0.0	0.578	0.0	0.002	0.0	0.006	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
153	Recogn > OG1-Aw > CmbAlarm > 1.0	0.0	0.199	0.0	0.001	0.0	0.002	0.0	0.0	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
154	Recogn > OG1-Aw > Smoke > 0.0	2296.2	0.0	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.419**
155	Recogn > OG1-Aw > Smoke > 0.05	1948.3	0.215	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.384**
156	Recogn > OG1-Aw > Smoke > 0.1	1842.6	0.258	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.373**
157	Recogn > OG1-Aw > Smoke > 0.2	1636.9	0.344	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.353**
158	Recogn > OG1-Aw > Smoke > 0.4	1226.8	0.516	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.311**

Hotels (ANFO)

TableD1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
159	Recogn > OG1-Aw > Warn > 0.0	0.0	1.24	0.0	0.004	0.0	0.013	0.0	0.002	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
160	Recogn > OG1-Aw > Warn > 0.5	0.0	1.14	0.0	0.003	0.0	0.012	0.0	0.002	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**
160	Recogn > OG1-Aw > Warn > 1.0	0.0	1.03	0.0	0.003	0.0	0.011	0.0	0.001	3454.7	1.	0.0	0.005	0.0	0.018	0.0	0.002	**0.188**

NB:
(1) Sensitivity Case
(2) Occupants Awake or Asleep
(3) open-open AFO door open - LFO stair door open
open-closed AFO door open - LFO stair door closed
closed-open AFO door closed - LFO stair door open
closed-closed AFO door closed - LFO stair door closed
(4) Time Dependent part fatalities
(5) Non-Time Dependent part fatalities

TableD2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
	Building Geometry / Alarms and Detection / Active and Passive Protection																									
1	SG1RFO > Apartsize > 9.5x5	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
2	SG1RFO > Apartsize > 9.5x10	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.545	0.595	0.537	0.545	0.595	**0.3284**
3	SG1RFO > Apartsize > 9.5x15	0	0	0	0	0	0	0	0	0	0	0	0	0.014	0.229	0.595	0.014	0.229	0.595	0.46	0.545	0.595	0.46	0.545	0.595	**0.3143**
4	SG1RFO > Apartsize > 9.5x20	0	0	0	0	0	0	0	0	0	0	0	0	0	0.227	0.595	0	0.227	0.595	0.133	0.539	0.595	0.133	0.539	0.595	**0.2525**
5	SG1RFO > Apartsize > 12x10	0	0	0	0	0	0	0	0	0	0	0	0	0.014	0.229	0.595	0.014	0.229	0.595	0.537	0.545	0.595	0.537	0.545	0.595	**0.3283**
6	SG1RFO > Apartsize > 12x15	0	0	0	0	0	0	0	0	0	0	0	0	0	0.227	0.595	0	0.227	0.595	0.133	0.545	0.595	0.133	0.545	0.595	**0.2543**
7	SG1RFO > Apartsize > 12x20	0	0	0	0	0	0	0	0	0	0	0	0	0	0.226	0.595	0	0.226	0.595	0	0.539	0.595	0	0.539	0.595	**0.2282**
8	SG1RFO > rfosize > 5x4	0	0	0	0	0	0	0	0	0	0	0	0	0.057	0.229	0.595	0.057	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
9	SG1RFO > rfosize > 5x6	0	0	0	0	0	0	0	0	0	0	0	0	0.057	0.229	0.595	0.057	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
10	SG1RFO > rfosize > 5x8	0	0	0	0	0	0	0	0	0	0	0	0	0.057	0.229	0.595	0.057	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
11	SG1RFO > rfosize > 6x4	0	0	0	0	0	0	0	0	0	0	0	0	0.057	0.229	0.595	0.057	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
12	SG1RFO > rfosize > 6x6	0	0	0	0	0	0	0	0	0	0	0	0	0.057	0.229	0.595	0.057	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
13	SG1RFO > rfosize > 6x8	0	0	0	0	0	0	0	0	0	0	0	0	0.057	0.229	0.595	0.057	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
14	SG1RFO > RFOwindw > 2.4x4	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.227	0.595	0.049	0.227	0.595	0.537	0.545	0.595	0.537	0.545	0.595	**0.3284**
15	SG1RFO > RoomH > 2.4	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.545	0.595	0.537	0.545	0.595	**0.3284**
16	SG1RFO > RoomH > 2.6	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
17	SG1RFO > RoomH > 2.8	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
18	SG1RFO > RoomH > 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
19	SG1RFO > RoomH > 3.2	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
20	SG1RFO > Alarms > alr1	0	0	0	0	0	0	0	0	0	0	0	0	0.831	3.85	10	0.831	3.85	10	9.025	9.175	10	9.025	9.175	10	**5.5261**
21	SG1RFO > Alarms > alr2	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
22	SG1RFO > Alarms > alr3	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
23	SG1RFO > Alarms > alr4	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	9.025	9.175	10	9.025	9.175	10	**5.5045**
24	SG1RFO > Alarms > alr5	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
25	SG1RFO > Alarms > alr6	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
26	SG1RFO > Alarms > alr7	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
27	SG1RFO > SmkDetRel > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.091	0.42	1.09	0.091	0.42	1.09	0.984	1	1.09	0.984	1	1.09	**0.6023**
28	SG1RFO > SmkDetRel > 0.99	0	0	0	0	0	0	0	0	0	0	0	0	0.017	0.077	0.199	0.017	0.077	0.199	0.18	0.183	0.199	0.18	0.183	0.199	**0.11**
29	SG1RFO > SprRel > 0.85	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3272**
30	SG1RFO > SprRel > 0.90	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3271**
31	SG1RFO > SprRel > 0.95	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.327**
32	SG1RFO > SmkMngRel > 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3302**

Hotels (AFO)

TableD2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
	Building Geometry / Alarms and Detection / Active and Passive Protection																									
33	SG1RFO > SmkMngRel > 0.8	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3304**
34	SG1RFO > SmkMngRel > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3305**
35	SG1RFO > StrPresRel > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
36	SG1RFO > StrPresRel > 0.95	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
37	SG1RFO > StrPresRel > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
38	SG2RFO > Apartsize > 9.5x5	45.9	225	700	45.9	225	700	499	551	700	499	551	700	83.11	384.2	1000	83.11	384.2	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
39	SG2RFO > Apartsize > 9.5x10	45.9	225	700	45.9	225	700	499	544	700	499	544	700	83.11	384.2	1000	83.11	384.2	1000	902.5	915.4	1000	902.5	915.4	1000	**12.185**
40	SG2RFO > Apartsize > 9.5x15	12.8	225	700	12.8	225	700	427	544	700	427	544	700	23.2	384.2	1000	23.2	384.2	1000	773.4	915.4	1000	773.4	915.4	1000	**12.148**
41	SG2RFO > Apartsize > 9.5x20	0	214	700	0	214	700	123	511	700	123	511	700	0	381.1	1000	0	381.1	1000	222.9	905.9	1000	222.9	905.9	1000	**11.934**
42	SG2RFO > Apartsize > 12x10	12.8	225	700	12.8	225	700	499	544	700	499	544	700	23.2	384.2	1000	23.2	384.2	1000	902.5	915.4	1000	902.5	915.4	1000	**12.185**
43	SG2RFO > Apartsize > 12x15	0	214	700	0	214	700	123	544	700	123	544	700	0	381.1	1000	0	381.1	1000	222.9	915.4	1000	222.9	915.4	1000	**11.989**
44	SG2RFO > Apartsize > 12x20	0	210	700	0	210	700	0	511	700	0	511	700	0	380	1000	0	380	1000	0	905.9	1000	0	905.9	1000	**11.87**
45	SG2RFO > rfosize > 5x4	52.5	228	700	52.5	228	700	499	551	700	499	551	700	95	385	1000	95	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
46	SG2RFO > rfosize > 5x6	52.5	228	700	52.5	228	700	499	551	700	499	551	700	95	385	1000	95	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
47	SG2RFO > rfosize > 5x8	52.5	228	700	52.5	228	700	499	551	700	499	551	700	95	385	1000	95	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
48	SG2RFO > rfosize > 6x4	52.5	228	700	52.5	228	700	499	551	700	499	551	700	95	385	1000	95	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
49	SG2RFO > rfosize > 6x6	52.5	228	700	52.5	228	700	499	551	700	499	551	700	95	385	1000	95	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
50	SG2RFO > rfosize > 6x8	52.5	228	700	52.5	228	700	499	551	700	499	551	700	95	385	1000	95	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
51	SG2RFO > RFOwindw > 2.4x4	45.9	214	700	45.9	214	700	499	544	700	499	544	700	83.11	381.1	1000	83.11	381.1	1000	902.5	915.4	1000	902.5	915.4	1000	**12.185**
52	SG2RFO > RoomH > 2.4	45.9	225	700	45.9	225	700	499	544	700	499	544	700	83.11	384.2	1000	83.11	384.2	1000	902.5	915.4	1000	902.5	915.4	1000	**12.185**
53	SG2RFO > RoomH > 2.6	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
54	SG2RFO > RoomH > 2.8	45.9	225	700	45.9	225	700	499	551	700	499	551	700	83.11	384.2	1000	83.11	384.2	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
55	SG2RFO > RoomH > 3.0	45.9	225	700	45.9	225	700	499	551	700	499	551	700	83.11	384.2	1000	83.11	384.2	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
56	SG2RFO > RoomH > 3.2	45.9	225	700	45.9	225	700	499	551	700	499	551	700	83.11	384.2	1000	83.11	384.2	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
57	SG2RFO > Alarms > alr1	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
58	SG2RFO > Alarms > alr2	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
59	SG2RFO > Alarms > alr3	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
60	SG2RFO > Alarms > alr4	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
61	SG2RFO > Alarms > alr5	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
62	SG2RFO > Alarms > alr6	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
63	SG2RFO > Alarms > alr7	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
64	SG2RFO > SmkDetRel > 0.9	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**

TableD2		Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
	Case[1]	SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
	Building Geometry / Alarms and Detection / Active and Passive Protection																									
65	SG2RFO > SmkDetRel > 0.99	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
66	SG2RFO > SprRel > 0.85	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**5.789**
67	SG2RFO > SprRel > 0.90	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**5.4121**
68	SG2RFO > SprRel > 0.95	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**5.0351**
69	SG2RFO > SmkMngRel > 0.7	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.207**
70	SG2RFO > SmkMngRel > 0.8	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.208**
71	SG2RFO > SmkMngRel > 0.9	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.21**
72	SG2RFO > StrPresRel > 0.5	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
73	SG2RFO > StrPresRel > 0.95	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
74	SG2RFO > StrPresRel > 1.0	45.9	228	700	45.9	228	700	499	551	700	499	551	700	83.11	385	1000	83.11	385	1000	902.5	917.5	1000	902.5	917.5	1000	**12.197**
	Human Behaviour																									
75	SG1RFO > 3ptEvac > Asp > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
76	SG1RFO > 3ptEvac > Asp > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
77	SG1RFO > 3ptEvac > Asp > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
78	SG1RFO > 3ptEvac > Awk > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
79	SG1RFO > 3ptEvac > Awk > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
80	SG1RFO > 3ptEvac > Awk > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
81	SG1RFO > InitAct > Alarm > 05_05_0	0	0	0	0	0	0	0	0	0	0	0	0	0.44	2.041	5.3	0.44	2.041	5.3	4.783	4.863	5.3	4.783	4.863	5.3	**2.9288**
82	SG1RFO > InitAct > Alarm > 05_0_05	0	0	0	0	0	0	0	0	0	0	0	0	0.44	2.041	5.3	0.44	2.041	5.3	4.783	4.863	5.3	4.783	4.863	5.3	**2.9288**
83	SG1RFO > InitAct > Alarm > 0_05_05	0	0	0	0	0	0	0	0	0	0	0	0	0.831	3.85	10	0.831	3.85	10	9.025	9.175	10	9.025	9.175	10	**5.5261**
84	SG1RFO > InitAct > Alarm > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0.831	3.85	10	0.831	3.85	10	9.025	9.175	10	9.025	9.175	10	**5.5261**
85	SG1RFO > InitAct > Alarm > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0.831	3.85	10	0.831	3.85	10	9.025	9.175	10	9.025	9.175	10	**5.5261**
86	SG1RFO > InitAct > Alarm > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
87	SG1RFO > InitAct > Smoke > 05_05_0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
88	SG1RFO > InitAct > Smoke > 05_0_05	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
89	SG1RFO > InitAct > Smoke > 0_05_05	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
90	SG1RFO > InitAct > Smoke > 0_0_1	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
91	SG1RFO > InitAct > Smoke > 0_1_0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
92	SG1RFO > InitAct > Smoke > 1_0_0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
93	SG1RFO > Recogn > AS > AptAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.436	2.021	5.25	0.436	2.021	5.25	4.738	4.817	5.25	4.738	4.817	5.25	**2.9012**
94	SG1RFO > Recogn > AS > AptAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.121	0.558	1.45	0.121	0.558	1.45	1.309	1.33	1.45	1.309	1.33	1.45	**0.8013**
95	SG1RFO > Recogn > AS > AptAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.042	0.193	0.5	0.042	0.193	0.5	0.451	0.459	0.5	0.451	0.459	0.5	**0.2763**

Hotels (AFO)

TableD2

	Case[1]	Awake[2] open-open[3] SM[4]	FL[5]	FO[6]	open-closed SM	FL	FO	closed-open SM	FL	FO	closed-closed SM	FL	FO	Asleep open-open SM	FL	FO	open-closed SM	FL	FO	closed-open SM	FL	FO	closed-closed SM	FL	FO	Fat/ 1000 fires
	Building Geometry / Alarms and Detection / Active and Passive Protection																									
96	SG1RFO > Recogn > AS > BldAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.436	2.021	5.25	0.436	2.021	5.25	9.025	9.175	10	9.025	9.175	10	**5.5152**
97	SG1RFO > Recogn > AS > BldAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.121	0.558	1.45	0.121	0.558	1.45	9.025	9.175	10	9.025	9.175	10	**5.5064**
98	SG1RFO > Recogn > AS > BldAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.042	0.193	0.5	0.042	0.193	0.5	9.025	9.175	10	9.025	9.175	10	**5.5043**
99	SG1RFO > Recogn > AS > CmbAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.436	2.021	5.25	0.436	2.021	5.25	4.738	4.817	5.25	4.738	4.817	5.25	**2.9012**
100	SG1RFO > Recogn > AS > CmbAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.121	0.558	1.45	0.121	0.558	1.45	1.309	1.33	1.45	1.309	1.33	1.45	**0.8013**
101	SG1RFO > Recogn > AS > CmbAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.042	0.193	0.5	0.042	0.193	0.5	0.451	0.459	0.5	0.451	0.459	0.5	**0.2763**
102	SG1RFO > Recogn > AS > Smoke > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	2.477	11.47	29.8	2.477	11.47	29.8	26.89	27.34	29.8	26.89	27.34	29.8	**16.468**
103	SG1RFO > Recogn > AS > Smoke > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.495	2.291	5.95	0.495	2.291	5.95	5.37	5.459	5.95	5.37	5.459	5.95	**3.288**
104	SG1RFO > Recogn > AS > Smoke > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	3E-13	1E-12	4E-12	3E-13	1E-12	4E-12	3E-12	3E-12	4E-12	3E-12	3E-12	4E-12	**2E-12**
105	SG1RFO > Recogn > AW > AptAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
106	SG1RFO > Recogn > AW > AptAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
107	SG1RFO > Recogn > AW > AptAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
108	SG1RFO > Recogn > AW > BldAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	9.025	9.175	10	9.025	9.175	10	**5.5045**
109	SG1RFO > Recogn > AW > BldAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	9.025	9.175	10	9.025	9.175	10	**5.5045**
110	SG1RFO > Recogn > AW > BldAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	9.025	9.175	10	9.025	9.175	10	**5.5045**
111	SG1RFO > Recogn > AW > CmbAlarm > 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
112	SG1RFO > Recogn > AW > CmbAlarm > 0.9	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
113	SG1RFO > Recogn > AW > CmbAlarm > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**
114	SG1RFO > Recogn > AW > Smoke > 0.5	1.15	5.69	17.5	1.15	5.69	17.5	12.5	13.8	17.5	12.5	13.8	17.5	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**16.065**
115	SG1RFO > Recogn > AW > Smoke > 0.9	0.23	1.14	3.5	0.23	1.14	3.5	2.49	2.76	3.5	2.49	2.76	3.5	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**3.4761**
116	SG1RFO > Recogn > AW > Smoke > 1.0	0	0	0	0	0	0	0	0	0	0	0	0	0.049	0.229	0.595	0.049	0.229	0.595	0.537	0.546	0.595	0.537	0.546	0.595	**0.3288**

NB:
(1) Sensitivity **Case**
(2) Occupant **Awake** or **Asleep**
(3) open-open AFO door open - LFO stair door open
open-closed AFO door open - LFO stair door closed
closed-open AFO door closed - LFO stair door open
closed-closed AFO door closed - LFO stair door closed
(4) Smouldering fire
(5) Flaming fire
(6) Flash over fire

APPENDIX E
SENSITIVITY ANALYSIS RESULTS – CLASS 3 (AGED-CARE)

Results of Sensitivity Studies v4.5 for Class3 (Aged Care Accommodation)

The Sensitivity study done on this class of buildings are similar to those of apartments and hotels. The building occupant types used and the inclusion of the staff interaction function are the main differences. Sensitivity to occupant behaviour parameter are not done here because the response of a large percentage of the occupant population is dependent only on the actions of staff members. Super groups SG1 and SG2 and their proportions used in the AFO runs are different from those in apartments and hotels. SG1 here consists of OG2 occupants (>70) and SG2 is the group of OG5 (dependent).

The results are tabulated and at the end of each table an explanation of the column headings can be found. The row headings are explained in the list of sensitivity study parameters. It is assumed that the reader is familiar with the basic concepts used in the model.

Note: see inset in the list of sensitivity study parameters for a brief description of the alarm types used

This document contains:

List of Sensitivity Study Parameters

Building Dimensions								
[Apartment Size]	*Aptm Size	9.5x5	9.5x10	9.5x15	9.5x20	12x10	12x15	12x20
[Room of Fire Origin Size]	*RFO Size	5x4	5x6	5x8	6x4	6x6	6x8	
[RFO Window Size]	RFOWin Size	1.6x2.4	2.4x4					
	Corridor Length	10	20	40	80	160	*(only ANFOs)*	
	Enclosure Height	2.4	2.6	2.8	3	3.2		

Dimensions: meters

*ApartSize RFOSize = 9 x 4 [Base]

No of Apts w/OG (only ANFOs)						
[No. of apartments per level with single OG type]	No of Apts w/OG1	4	6	8	10	12
	No of Apts w/OG4	4	6	8	10	12
	No of Apts w/OG5	4	6	8	10	12

Alarm Types:
1 No Alarms
2 Smoke Detectors
3 Interconn. Smoke Detectors
4 Corridor Alarms only
5 Building Alarm - Corridor
6 Building Alarm - Apartments
7 Building Alarm - Interconn. Apart

Detectors/Alarms							
	Alarms	1	2	3	4	5	6	7
	Smoke Detector Reliability	0.9	0.95	0.99				

Fire Protection Systems - Active			
	Sprinkler Reliability.	0.85	0.9	0.95
	Smoke Management Reliability.	0.7	0.8	0.9
	Stair Pressurisation Reliability	0.5	0.95	1

Fire Protection Systems - Passive (only ANFOs)							
	FRLs	30	60	90	120	180	240

Dimensions: minutes

** The base FRL is a combination of 60 and 90 minute barrier elements

Scenario Probabilities (only ANFOs)				
	Stair Door Opening Probability	1	5	10	25
	Apartment Door Opening Probability	0.1	1	10	20

Non Base Case

Base Case

Aged Care (ANFO)

TableE1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
	Building Geometry / Alarms and Detection / Active and Passive Protection																	
1	Apartsize > 9.5x5	7300.	26.45	0.0	0.0	0.0	0.0	0.0	0.0	11441.	29.9	0.0	70.6	0.0	72.2	0.0	70.3	**1.7029**
2	Apartsize > 9.5x10	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11496.	26.6	0.0	70.6	0.0	72.2	0.0	70.3	**1.6941**
3	Apartsize > 9.5x15	7880.	17.16	0.0	30.151	0.0	31.136	0.0	30.139	11434.	15.8	0.0	70.6	0.0	72.2	0.0	70.3	**2.7218**
4	Apartsize > 9.5x20	7880.	17.16	0.0	42.5	0.0	43.7	0.0	42.3	11373.	16.2	0.0	70.6	0.0	72.2	0.0	70.3	**3.1244**
5	Apartsize > 12x10	7300.	26.45	0.0	0.0	0.0	0.0	0.0	0.0	11496.	26.6	0.0	70.6	0.0	72.2	0.0	70.3	**1.7038**
6	Apartsize > 12x15	7727.	19.30	0.	42.5	0.	43.7	0.	42.3	11427.	15.95	0.	70.6	0.	72.2	0.	70.3	**3.1204**
7	Apartsize > 12x20	7801.	18.28	0.0	42.5	0.0	43.7	0.0	42.3	11436.	14.7	0.0	70.6	0.0	72.2	0.0	70.3	**3.1230**
8	rfosize > 5x4	7000.	31.07	0.0	0.0	0.0	0.0	0.0	0.0	11723.	26.4	0.0	70.6	0.0	72.2	0.0	70.3	**1.6981**
9	rfosize > 5x6	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11455.	29.7	0.0	70.6	0.0	72.2	0.0	70.3	**1.6934**
10	rfosize > 5x8	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.6931**
11	rfosize > 6x4	7000.	31.07	0.0	0.0	0.0	0.0	0.0	0.0	11723.	26.4	0.0	70.6	0.0	72.2	0.0	70.3	**1.6981**
12	rfosize > 6x6	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.6931**
13	rfosize > 6x8	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.6931**
14	RFOwindw > 2.4x4	6746.	34.37	0.0	0.0	0.0	0.0	0.0	0.0	11359.	31.4	0.0	70.6	0.0	72.2	0.0	70.3	**1.6834**
15	CorrLen > 10	7000.	28.97	0.0	0.	0.0	0.0	0.0	0.0	11847.	25.2	0.0	0.	0.0	0.0	0.0	0.0	**0.4445**
16	CorrLen > 20	7000.	30.90	0.0	0.0	0.0	0.0	0.0	0.0	11847.	25.3	0.0	0.0	0.0	0.0	0.0	0.0	**0.4445**
17	CorrLen > 40	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.6931**
18	CorrLen > 80	7372.	25.41	0.0	42.5	0.0	43.7	0.0	42.3	22195.	163.8	0.0	891.5	0.0	423.0	0.0	419.0	**9.5949**
19	CorrLen > 160	17574.	166.64	0.0	929.6	0.0	311.0	0.0	307.0	20277.	189.2	0.0	938.7	0.0	423.0	0.0	419.0	**18.8625**
20	RoomH > 2.4	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	29.9	0.0	70.6	0.0	72.2	0.0	70.3	**1.6931**
21	RoomH > 2.6	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	29.9	0.0	70.6	0.0	72.2	0.0	70.3	**1.6931**
22	RoomH > 2.8	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	27.1	0.0	70.6	0.0	72.2	0.0	70.3	**1.6931**
23	RoomH > 3.0	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	27.1	0.0	70.6	0.0	72.2	0.0	70.3	**1.6931**
24	RoomH > 3.2	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	27.1	0.	70.6	0.0	72.2	0.0	70.3	**1.6931**
25	Alarms > alr1	17782.	351.58	0.0	1.553	0.0	174.39	0.0	171.11	26672.	133.8	0.0	70.9	0.0	316.72	0.0	312.52	**12.2358**
26	Alarms > alr2	16457.	442.43	0.0	1.553	0.0	174.39	0.0	171.11	20377.	293.2	0.0	70.9	0.0	316.72	0.0	312.52	**12.0855**
27	Alarms > alr3	16457.	442.43	0.0	1.553	0.0	174.39	0.0	171.11	20377.	293.2	0.0	70.9	0.0	316.72	0.0	312.52	**12.0855**
28	Alarms > alr4	7000.	30.74	0.0	0.0	0.0	174.36	0.0	171.11	11441.	27.1	0.0	70.6	0.0	316.42	0.0	312.41	**11.5915**
29	Alarms > alr5	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.6931**
30	Alarms > alr6	7000.	11.13	0.0	0.0	0.0	0.0	0.0	0.0	10150.	38.2	0.0	70.5	0.0	71.9	0.0	70.2	**1.6675**
31	Alarms > alr7	7000.	11.13	0.0	0.0	0.0	0.0	0.0	0.0	10150.	33.9	0.0	70.5	0.0	71.9	0.0	70.2	**1.6674**
32	SmkDetRel > 0.9	7000.	33.97	0.0	0.0	0.0	0.0	0.0	0.0	11609.	28.8	0.0	70.6	0.0	72.2	0.0	70.3	**1.6962**

Aged Care (ANFO)

TableE1

	Case[1]	Awake[2]								Asleep								Fat/1000 fires
		open-open[3]		open-closed		closed-open		closed-closed		open-open		open-closed		closed-open		closed-closed		
		TD[4]	NTD[5]	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	TD	NTD	
33	SmkDetRel > 0.99	7000.	28.18	0.0	0.0	0.0	0.0	0.0	0.0	11309.	30.8	0.0	70.6	0.0	72.2	0.0	70.3	**1.6907**
34	SprRel > 0.85	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**0.6490**
35	SprRel > 0.90	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**0.5876**
36	SprRel > 0.95	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**0.5262**
37	SmkMngRel > 0.7	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.3878**
38	SmkMngRel > 0.8	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.3442**
39	SmkMngRel > 0.9	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.3006**
40	StrPresRel > 0.5	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.4734**
41	StrPresRel > 0.95	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.2756**
42	StrPresRel > 1.0	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.	70.6	0.0	72.2	0.0	70.3	**1.2537**
43	FRLs > 30	7000.	328.84	0.	0.	0.	0.	0.	0.	11441.	321.2	0.	805.	0.	805.	0.	803.	**14.7612**
44	FRLs > 60	7000.	62.93	0.0	0.0	0.0	0.0	0.0	0.0	11441.	61.4	0.0	148.0	0.0	148.0	0.0	145.0	**3.0279**
45	FRLs > 90	7000.	30.07	0.0	0.0	0.0	0.0	0.0	0.0	11441.	29.4	0.0	70.1	0.0	70.1	0.0	69.8	**1.6814**
46	FRLs > 120	7000.	27.60	0.0	0.0	0.0	0.0	0.0	0.0	11441.	26.9	0.0	64.3	0.0	64.3	0.0	64.0	**1.5779**
47	FRLs > 180	7000.	27.50	0.0	0.0	0.0	0.0	0.0	0.0	11441.	26.8	0.0	64.0	0.0	64.0	0.0	63.7	**1.5726**
48	FRLs > 240	7000.	27.50	0.0	0.0	0.0	0.0	0.0	0.0	11441.	26.8	0.0	64.0	0.0	64.0	0.0	63.7	**1.5726**
49	StrDrOpng > 1	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	30.	0.0	70.6	0.0	72.2	0.0	70.3	**1.2976**
50	StrDrOpng > 5	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	29.953	0.0	70.6	0.0	72.2	0.0	70.3	**1.4734**
51	StrDrOpng > 10	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11496.	26.604	0.0	70.6	0.0	72.2	0.0	70.3	**1.6941**
52	StrDrOpng > 25	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11455.	29.748	0.0	70.6	0.0	72.2	0.0	70.3	**2.3530**
53	AptDrOpng > 0.1	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11441.	29.939	0.0	70.6	0.0	72.2	0.0	70.3	**1.3006**
54	AptDrOpng > 1	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11496.	26.604	0.0	70.6	0.0	72.2	0.0	70.3	**1.6941**
55	AptDrOpng > 10	7300.	26.45	0.0	0.0	0.0	0.0	0.0	0.0	11729.	25.775	0.0	70.6	0.0	72.2	0.0	70.3	**5.7670**
55	AptDrOpng > 20	7000.	30.74	0.0	0.0	0.0	0.0	0.0	0.0	11723.	25.819	0.0	70.6	0.0	72.2	0.0	70.3	**10.0791**

NB:
(1) Sensitivity Case
(2) Occupants Awake or Asleep
(3) open-open AFO door open - LFO stair door open
open-closed AFO door open - LFO stair door closed
closed-open AFO door closed - LFO stair door open
closed-closed AFO door closed - LFO stair door closed
(4) Time Dependent part fatalities
(5) Non-Time Dependent part fatalities

Aged Care (AFO)

TableE2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed		
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
	Building Geometry / Alarms and Detection / Active and Passive Protection																									
1	SG1RFO > Apartsize > 9.5x5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.48	1.56	0.0	0.48	1.56	0.0	0.85	1.41	0.0	0.85	1.41	0.2449
2	SG1RFO > Apartsize > 9.5x10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.46	1.35	0.0	0.46	1.35	0.0	0.85	1.41	0.0	0.85	1.41	0.2448
3	SG1RFO > Apartsize > 9.5x15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.46	1.35	0.0	0.46	1.35	0.0	0.85	1.41	0.0	0.85	1.41	0.2448
4	SG1RFO > Apartsize > 9.5x20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.46	1.42	0.0	0.46	1.42	0.0	0.85	1.41	0.0	0.85	1.41	0.2448
5	SG1RFO > Apartsize > 12x10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3E-12
6	SG1RFO > Apartsize > 12x15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2E-12
7	SG1RFO > Apartsize > 12x20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.46	1.42	0.0	0.46	1.42	0.0	0.85	1.41	0.0	0.85	1.41	0.2448
8	SG1RFO > rfosize > 5x4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.63	4.18	0.0	1.63	4.18	0.0	4.13	4.2	0.0	4.13	4.2	1.1158
9	SG1RFO > rfosize > 5x6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.63	4.18	0.0	1.63	4.18	0.0	4.13	4.2	0.0	4.13	4.2	1.1158
10	SG1RFO > rfosize > 5x8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	0.89	1.55	0.0	0.89	1.55	0.2636
11	SG1RFO > rfosize > 6x4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.63	4.18	0.0	1.63	4.18	0.0	4.13	4.2	0.0	4.13	4.2	1.1158
12	SG1RFO > rfosize > 6x6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
13	SG1RFO > rfosize > 6x8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.48	1.56	0.0	0.48	1.56	0.0	0.85	1.41	0.0	0.85	1.41	0.2449
14	SG1RFO > RFOwindw > 2.4x4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
15	SG1RFO > RoomH > 2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
16	SG1RFO > RoomH > 2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.46	1.56	0.0	0.46	1.56	0.0	0.89	1.55	0.0	0.89	1.55	0.2601
17	SG1RFO > RoomH > 2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.46	1.42	0.0	0.46	1.42	0.0	4.08	4.06	0.0	4.08	4.06	1.0969
18	SG1RFO > RoomH > 3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.46	1.42	0.0	0.46	1.42	0.0	0.85	1.41	0.0	0.85	1.41	0.2448
19	SG1RFO > RoomH > 3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.48	1.56	0.0	0.48	1.56	0.0	0.85	1.41	0.0	0.85	1.41	0.2449
20	SG1RFO > Alarms > alr1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.58	41.38	0.0	16.58	41.38	0.0	41.81	41.56	0.0	41.81	41.56	11.276
21	SG1RFO > Alarms > alr2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
22	SG1RFO > Alarms > alr3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
23	SG1RFO > Alarms > alr4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	41.81	41.56	0.0	41.81	41.56	11.229
24	SG1RFO > Alarms > alr5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
25	SG1RFO > Alarms > alr6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
26	SG1RFO > Alarms > alr7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
27	SG1RFO > SmkDetRel > 0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	6.0	0.0	2.4	6.0	0.0	6.06	6.03	0.0	6.06	6.03	1.635
28	SG1RFO > SmkDetRel > 0.99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.99	2.47	0.0	0.99	2.47	0.0	2.49	2.48	0.0	2.49	2.48	0.672
29	SG1RFO > SprRel > 0.85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.0693
30	SG1RFO > SprRel > 0.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.0675
31	SG1RFO > SprRel > 0.95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.0656
32	SG1RFO > SmkMngRel > 0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1047

Aged Care (AFO)

TableE2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed			
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
	Building Geometry / Alarms and Detection / Active and Passive Protection																									
33	SG1RFO > SmkMngRel > 0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1053
34	SG1RFO > SmkMngRel > 0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1059
35	SG1RFO > StrPresRel > 0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
36	SG1RFO > StrPresRel > 0.95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
37	SG1RFO > StrPresRel > 1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.62	4.04	0.0	1.62	4.04	0.0	4.08	4.06	0.0	4.08	4.06	1.1005
38	SG2RFO > Apartsize > 9.5x5	66.	321.	1000.	66.	321.	1000.	611.	788.	1000.	611.	788.	1000.	83.	384.	1000.	83.	384.	1000.	773.	918.	1000.	773.	918.	1000.	6.1577
39	SG2RFO > Apartsize > 9.5x10	18.	321.	1000.	18.	321.	1000.	176.	777.	1000.	176.	777.	1000.	23.	384.	1000.	23.	384.	1000.	223.	915.	1000.	223.	915.	1000.	5.8046
40	SG2RFO > Apartsize > 9.5x15	18.	321.	1000.	18.	321.	1000.	176.	777.	1000.	176.	777.	1000.	23.	384.	1000.	23.	384.	1000.	223.	915.	1000.	223.	915.	1000.	5.8046
41	SG2RFO > Apartsize > 9.5x20	0.	305.	1000.	0.	305.	1000.	0.	729.	1000.	0.	729.	1000.	0.	381.	1000.	0.	381.	1000.	0.	906.	1000.	0.	906.	1000.	5.612
42	SG2RFO > Apartsize > 12x10	0.	321.	1000.	0.	321.	1000.	0.	777.	1000.	0.	777.	1000.	0.	384.	1000.	0.	384.	1000.	0.	915.	1000.	0.	915.	1000.	5.6664
43	SG2RFO > Apartsize > 12x15	0.	305.	1000.	0.	305.	1000.	0.	777.	1000.	0.	777.	1000.	0.	381.	1000.	0.	381.	1000.	0.	915.	1000.	0.	915.	1000.	5.6662
44	SG2RFO > Apartsize > 12x20	0.	300.	1000.	0.	300.	1000.	0.	729.	1000.	0.	729.	1000.	0.	380.	1000.	0.	380.	1000.	0.	906.	1000.	0.	906.	1000.	5.6119
45	SG2RFO > rfosize > 5x4	75.	325.	1000.	75.	325.	1000.	713.	788.	1000.	713.	788.	1000.	95.	385.	1000.	95.	385.	1000.	903.	918.	1000.	903.	918.	1000.	6.2378
46	SG2RFO > rfosize > 5x6	18.	325.	1000.	18.	325.	1000.	611.	788.	1000.	611.	788.	1000.	23.	385.	1000.	23.	385.	1000.	773.	918.	1000.	773.	918.	1000.	6.1574
47	SG2RFO > rfosize > 5x8	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963
48	SG2RFO > rfosize > 6x4	66.	325.	1000.	66.	325.	1000.	713.	788.	1000.	713.	788.	1000.	83.	385.	1000.	83.	385.	1000.	903.	918.	1000.	903.	918.	1000.	6.2377
49	SG2RFO > rfosize > 6x6	28.	325.	1000.	28.	325.	1000.	278.	788.	1000.	278.	788.	1000.	35.	385.	1000.	35.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8964
50	SG2RFO > rfosize > 6x8	66.	325.	1000.	66.	325.	1000.	611.	788.	1000.	611.	788.	1000.	83.	385.	1000.	83.	385.	1000.	773.	918.	1000.	773.	918.	1000.	6.1578
51	SG2RFO > RFOwindw > 2.4x4	18.	305.	1000.	18.	305.	1000.	278.	777.	1000.	278.	777.	1000.	23.	381.	1000.	23.	381.	1000.	352.	915.	1000.	352.	915.	1000.	5.8844
52	SG2RFO > RoomH > 2.4	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963
53	SG2RFO > RoomH > 2.6	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963
54	SG2RFO > RoomH > 2.8	66.	321.	1000.	66.	321.	1000.	176.	788.	1000.	176.	788.	1000.	83.	384.	1000.	83.	384.	1000.	223.	918.	1000.	223.	918.	1000.	5.8167
55	SG2RFO > RoomH > 3.0	66.	321.	1000.	66.	321.	1000.	611.	788.	1000.	611.	788.	1000.	83.	384.	1000.	83.	384.	1000.	773.	918.	1000.	773.	918.	1000.	6.1577
56	SG2RFO > RoomH > 3.2	66.	321.	1000.	66.	321.	1000.	611.	788.	1000.	611.	788.	1000.	83.	384.	1000.	83.	384.	1000.	773.	918.	1000.	773.	918.	1000.	6.1577
57	SG2RFO > Alarms > alr1	66.	325.	1000.	66.	325.	1000.	713.	788.	1000.	713.	788.	1000.	83.	385.	1000.	83.	385.	1000.	903.	918.	1000.	903.	918.	1000.	6.2377
58	SG2RFO > Alarms > alr2	66.	325.	1000.	66.	325.	1000.	713.	788.	1000.	713.	788.	1000.	83.	385.	1000.	83.	385.	1000.	903.	918.	1000.	903.	918.	1000.	6.2377
59	SG2RFO > Alarms > alr3	66.	325.	1000.	66.	325.	1000.	713.	788.	1000.	713.	788.	1000.	83.	385.	1000.	83.	385.	1000.	903.	918.	1000.	903.	918.	1000.	6.2377
60	SG2RFO > Alarms > alr4	66.	325.	1000.	66.	325.	1000.	713.	788.	1000.	713.	788.	1000.	83.	385.	1000.	83.	385.	1000.	903.	918.	1000.	903.	918.	1000.	6.2377
61	SG2RFO > Alarms > alr5	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963
62	SG2RFO > Alarms > alr6	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963
63	SG2RFO > Alarms > alr7	0.	325.	1000.	0.	325.	1000.	102.	788.	1000.	102.	788.	1000.	0.	385.	1000.	0.	385.	1000.	129.	918.	1000.	129.	918.	1000.	5.7581
64	SG2RFO > SmkDetRel > 0.9	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963

Aged Care (AFO)

TableE2

	Case[1]	Awake[2]												Asleep										Fat/ 1000 fires
		open-open[3]			open-closed			closed-open			closed-closed			open-open			open-closed			closed-open			closed-closed			
		SM[4]	FL[5]	FO[6]	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	SM	FL	FO	
	Building Geometry / Alarms and Detection / Active and Passive Protection																									
65	SG2RFO > SmkDetRel > 0.99	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963
66	SG2RFO > SprRel > 0.85	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	3.5138
67	SG2RFO > SprRel > 0.90	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	3.3736
68	SG2RFO > SprRel > 0.95	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	3.2335
69	SG2RFO > SmkMngRel > 0.7	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.9047
70	SG2RFO > SmkMngRel > 0.8	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.9059
71	SG2RFO > SmkMngRel > 0.9	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.9071
72	SG2RFO > StrPresRel > 0.5	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963
73	SG2RFO > StrPresRel > 0.95	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963
74	SG2RFO > StrPresRel > 1.0	18.	325.	1000.	18.	325.	1000.	278.	788.	1000.	278.	788.	1000.	23.	385.	1000.	23.	385.	1000.	352.	918.	1000.	352.	918.	1000.	5.8963

NB:
(1) Sensitivity **Case**
(2) Occupant **Awake** or **Asleep**
(3) open-open AFO door open - LFO stair door open
open-closed AFO door open - LFO stair door closed
closed-open AFO door closed - LFO stair door open
closed-closed AFO door closed - LFO stair door closed
(4) Smouldering fire
(5) Flaming fire
(6) Flash over fire

APPENDIX F
USA AND AUSTRALIAN STATISTICS FOR APARTMENT BUILDINGS

Abbreviations

rfo	-	room of fire origin
rci	-	rate of civilian injuries (injuries/1000 fires)
rcf	-	rate of civilian fatalities (fatalities/1000fires)
k	-	kitchen
b	-	bedroom
l	-	lounge

CESARE Risk: Apartment Statistics

Australia

- Four years 1989 to 1993
- 5568 fires (about 1.7 fires/1000 apartments/year)
- 38 civilian fatalities (6.8 fatalities /1000 fires)

USA

- Ten years 1983 to 1993 (excluding 1986)
- 420,315 fires (about 1.4 fires/1000 apartments/year)
- 3111 civilian fatalities (7.4 fatalities /1000 fires)

CESARE Risk: Apartment Statistics

Melbourne and London Coroners

- 254 fatality cases examined
- ~10% suicide, ~4% arson (of known)
- ~37% smoking, etc
- ~10% lighting fires, stoves, cooking
- 180 single fatalities (71%), 16 double fatalities (13%), 4 triple fatalities (5%) and 2 each 4, 5 and 6 fatalities (total 12%)
- males 40% > females, very young and very old over represented

CESARE Risk: Apartment Statistics

Melbourne and London Coroners

- rfo: bedroom 31%, lounge 29%, kitchen 18%
- bedroom 1.1 fatalities, lounge 1.5, kitchen 1.3
- alertness (accidental fires) : 70+% asleep, young and old less likely to be asleep (start fire by playing, lighters, cooking)
- > 0.05 blood alcohol 52% of assessed (generally not young or old; 77% of 18-69 years)

CESARE Risk: Apartment Statistics

Fires and Fatalities by Fatalities per Fire (USA)

Civilian Fatalities per Fire	Fires	Fatalities	% Fatal Fires	% Fatalities
0	417895	0		
1	2000	2000	82.6	64.3
2	273	546	11.3	17.6
3	91	273	3.8	8.8
4	23	92	1.0	3.0
5	22	110	0.9	3.5
6	3	18	0.1	0.6
7	4	28	0.2	0.9
8	1	8	0.0	0.3
10	2	20	0.1	0.6
16	1	16	0.0	0.5
	420315	**3111**		
Fatal Fires	2420			
Fatal Fires per 1000 Fires	5.8			

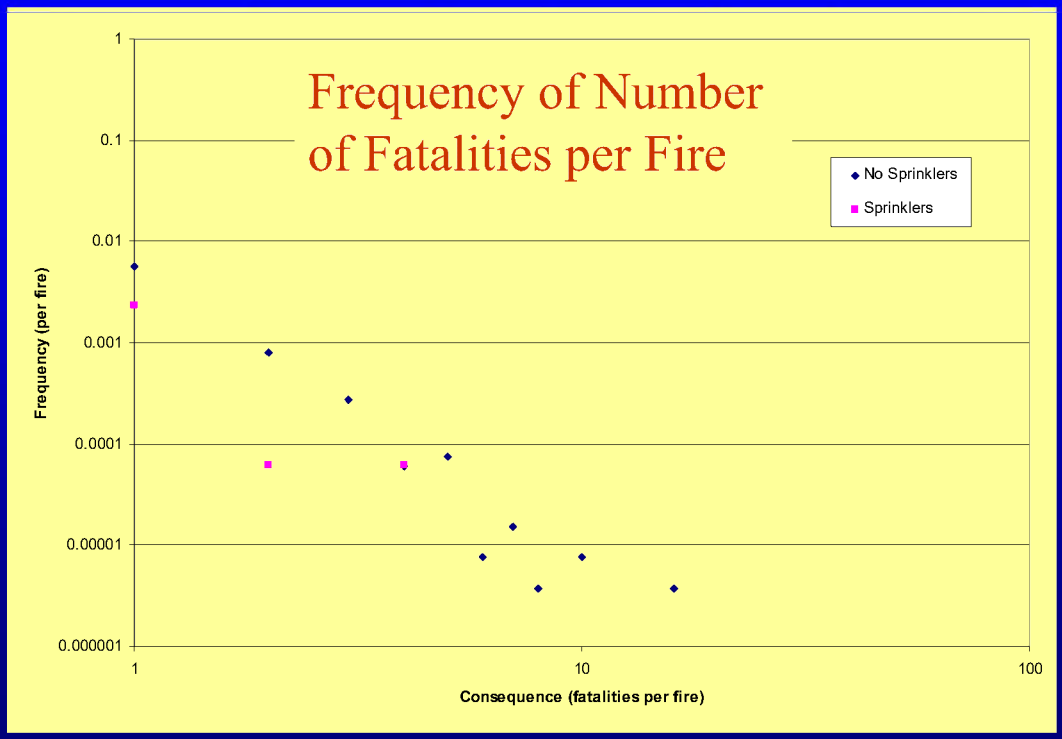
CESARE Risk:
Apartment Risk Data (USA)

USA 1 am to 4 am (no sprinklers):

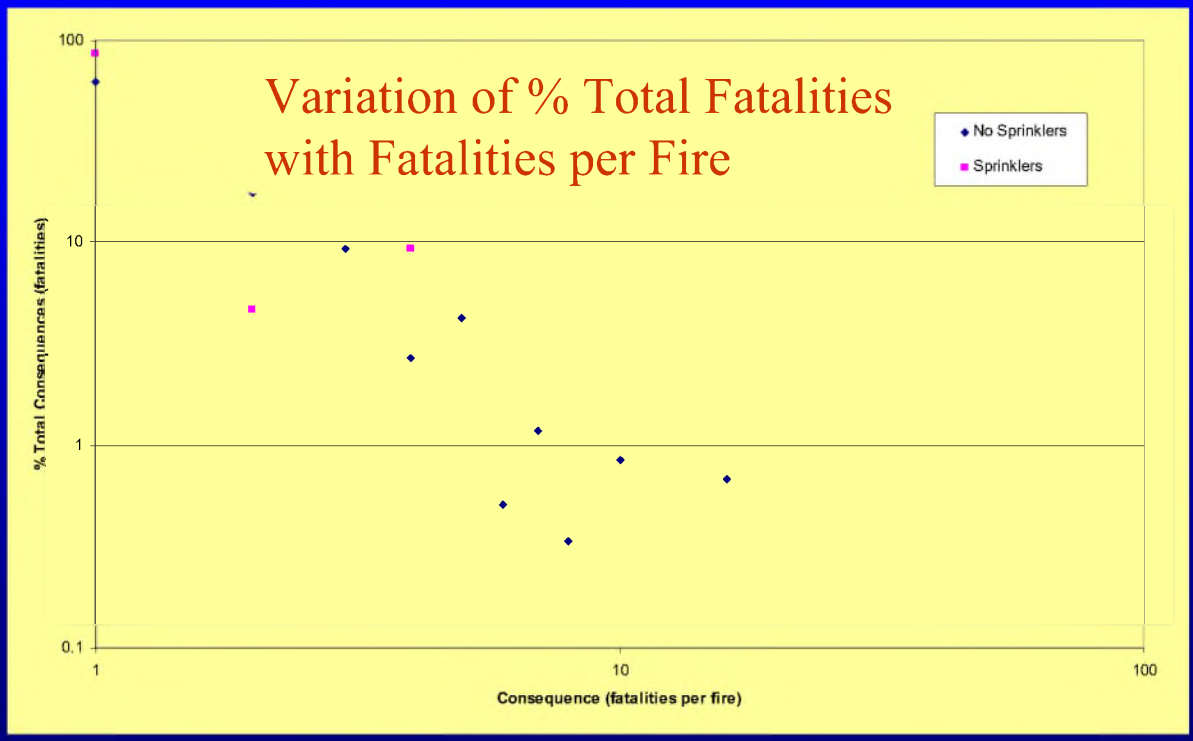
- 25,497 fires over ten years
- 395 resulted in one or more fatalities
- 573 fatalities (nearly 1.5 fatalities per fatal fire)
- in 98.5% of fires reported to fire brigade - no fatalities

Over 24 hours in 99.3% of reported fires - no fatalities

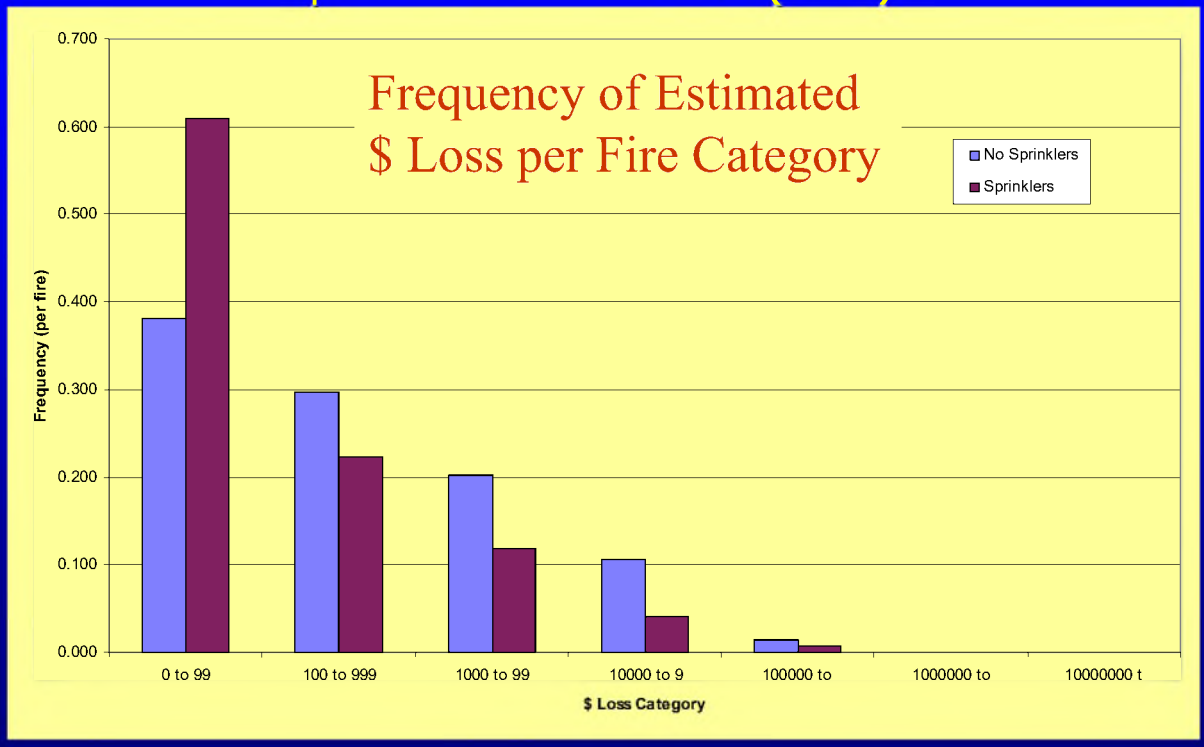
CESARE Risk:
Apartment Risk Data (USA)



CESARE Risk: Apartment Risk Data (USA)



CESARE Risk: Apartment Risk Data (USA)



CESARE Risk: Apartment Risk Data (USA)

USA

- no sprinklers ~ $US 7500 loss/fire
- sprinklers ~ $US 4000 loss/fire

CESARE Risk: Apartment Statistics

Fire Fighter Fatalities (USA)

- a single fatality in 10 fires
- two fatalities in two fires
- a total of fourteen fatalities
- 420,303 fires without a fire fighter fatality
- fire fighter fatality rate 0.03 per 1000 fires

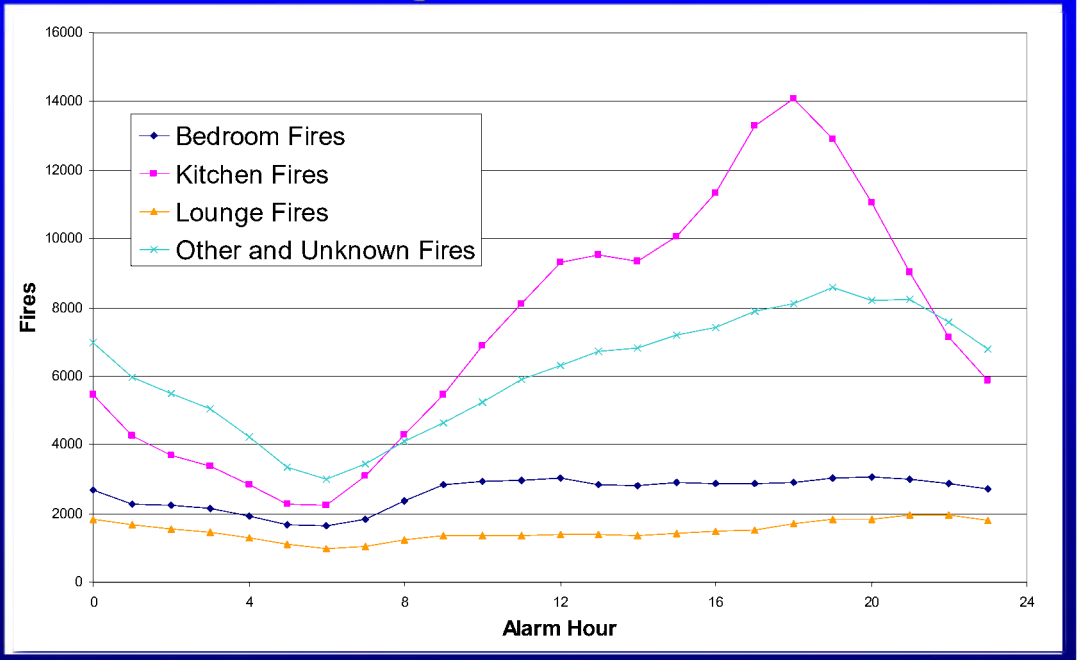
CESARE Risk: Apartment Statistics

Fires and Fatalities by Area of Fire Origin (USA)

Civilian Fatalities per Fire	Bedroom		Kitchen		Lounge		Other & Unknown	
	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities
0	61660	0	174526	0	35070	0	146639	0
1	666	666	267	267	662	662	405	405
2	82	164	23	46	88	176	80	160
3	20	60	9	27	27	81	35	105
4	6	24	1	4	7	28	9	36
5	2	10	3	15	11	55	6	30
6	2	12	0	0	0	0	1	6
7	1	7	1	7	0	0	2	14
8	0	0	0	0	0	0	1	8
10	0	0	1	10	0	0	1	10
16	1	16	0	0	0	0	0	0
Totals	62440	959	174831	376	35865	1002	147179	774
Fatalities per 1000 Fires		15.4		2.2		27.9		5.3
Fatal Fires per 1000 Fires	12.7		1.7		22.7		3.7	

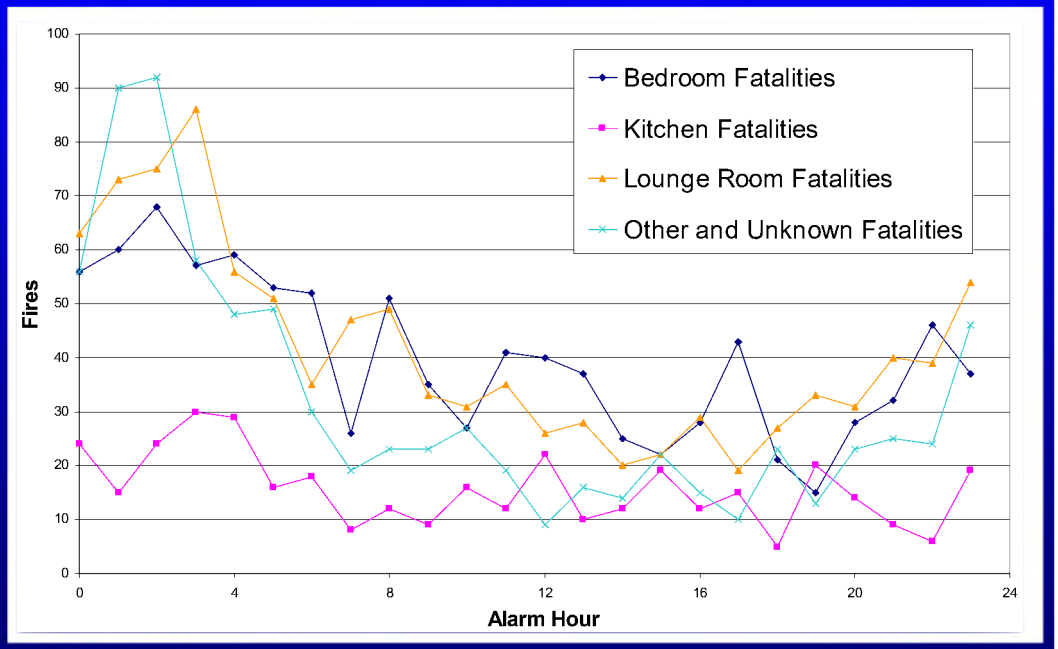
CESARE Risk: Apartment Statistics

Fires by Area of Fire Origin (USA)



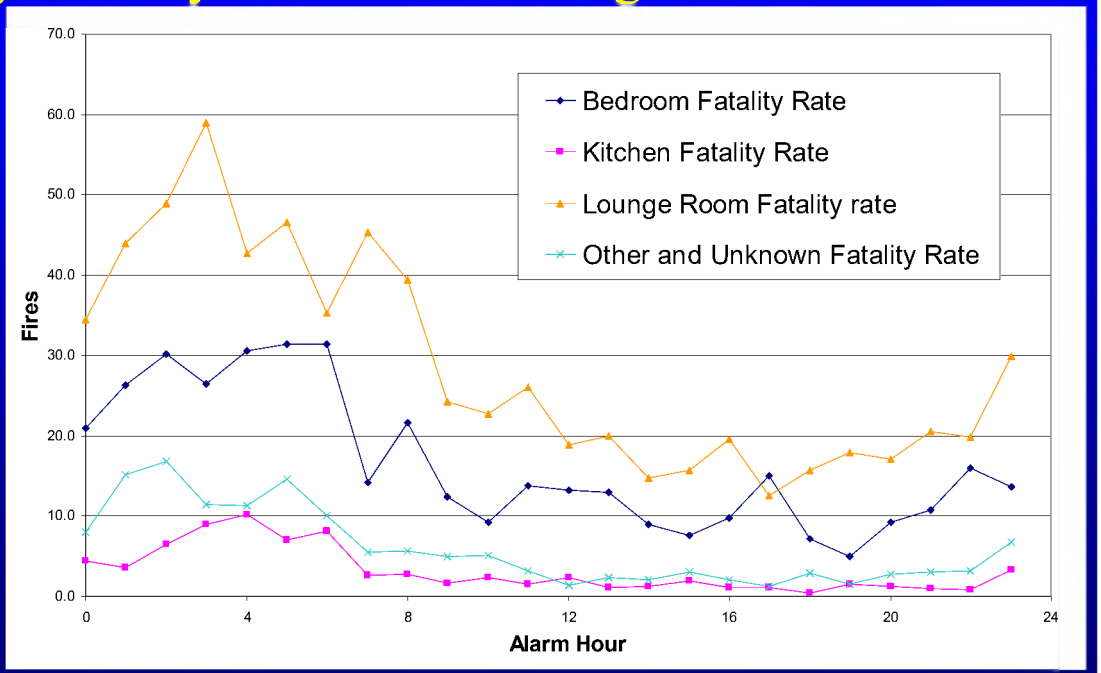
CESARE Risk: Apartment Statistics

Fatalities by Area of Fire Origin (USA)



CESARE Risk: Apartment Statistics

Fatality Rate by Area of Fire Origin (USA)



CESARE Risk: Definitions

Fire Type:

- Smouldering

  flame damage confined to object of origin, smoke damage confined to room of origin

- Flaming

  all fires between smouldering and flashover

- Flashover

  flame damage beyond room of origin

CESARE Risk: Definitions

Fire Type

		Extent of Flame Damage						
		Object	Area	Room	Compart-ment	Storey	Building	Beyond Building
Extent of Smoke Damage	None	Smoulder-ing	Flaming	Flaming	Flashover	Flashover	Flashover	Flashover
	Object							
	Area							
	Room							
	Compart-ment							
	Storey							
	Building							
	Beyond Building							

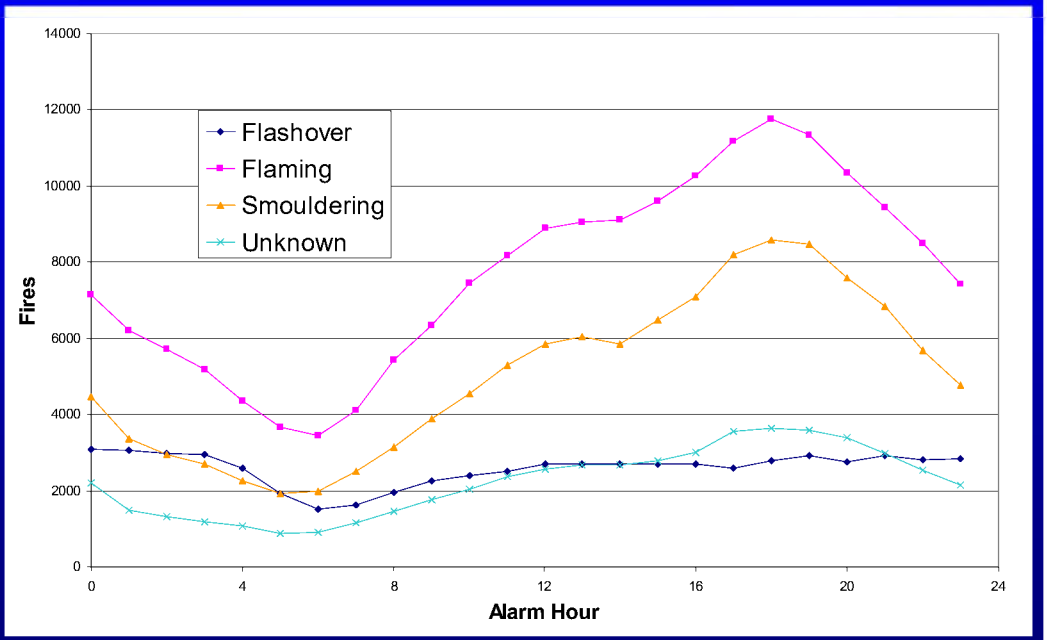
CESARE Risk: Apartment Statistics

Fires and Fatalities - Fire Type (USA)

Civilian Fatalities per Fire	Flashover		Flaming		Smouldering		Unknown	
	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities
0	60566	0	183431	0	120544	0	53354	0
1	1198	1198	691	691	56	56	55	55
2	220	440	44	88	2	4	7	14
3	78	234	11	33	0	0	2	6
4	21	84	1	4	0	0	1	4
5	20	100	2	10	0	0	0	0
6	3	18	0	0	0	0	0	0
7	3	21	1	7	0	0	0	0
8	1	8	0	0	0	0	0	0
10	2	20	0	0	0	0	0	0
16	1	16	0	0	0	0	0	0
Totals	62113	2139	184181	833	120602	60	53419	79
Fatalities per 1000 Fires		34.4		4.5		0.5		1.5
Fatal Fires per 1000 Fires	24.9		4.1		0.5		1.2	

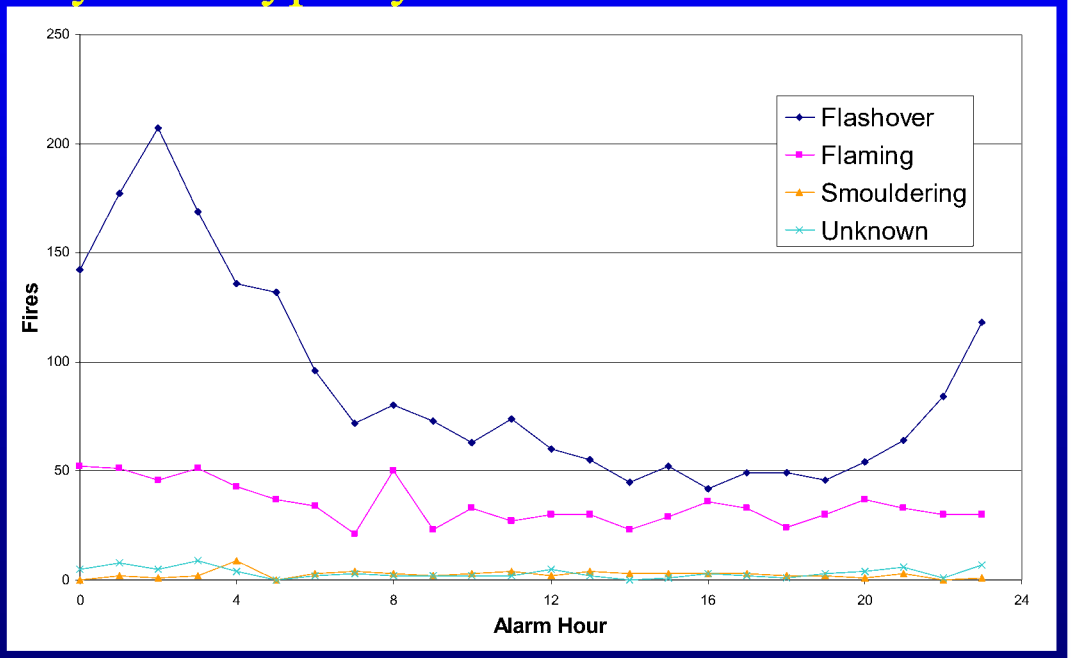
CESARE Risk: Apartment Statistics

Fires by Fire Type by Alarm Hour (USA)



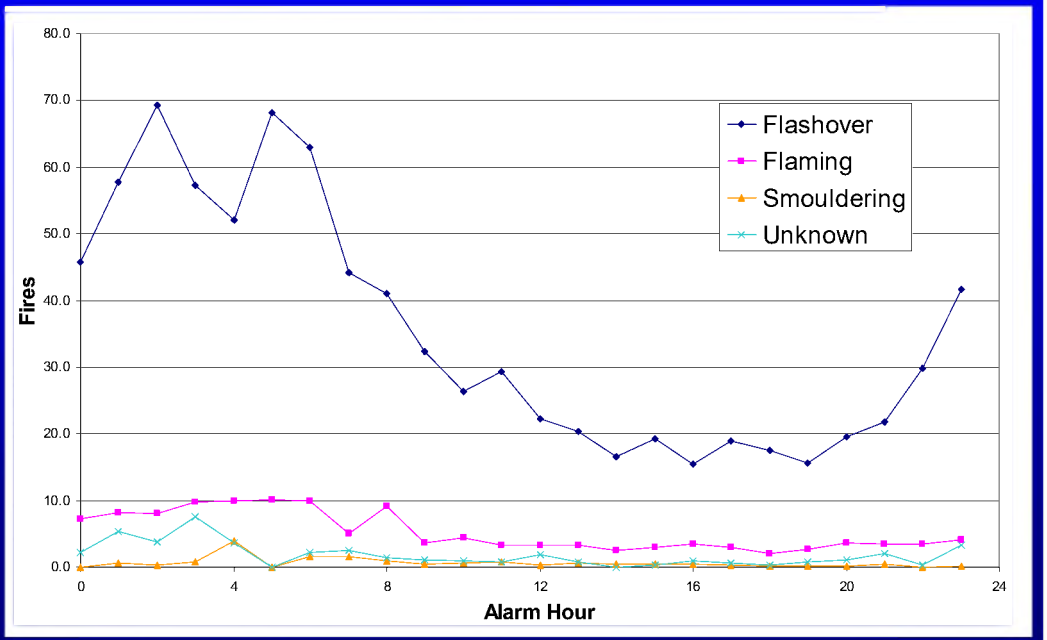
CESARE Risk: Apartment Statistics

Fatalities by Fire Type by Alarm Hour (USA)



CESARE Risk: Apartment Statistics

Rate of Fatalities by Fire Type by Alarm Hour (USA)



CESARE Risk: Apartment Statistics

Fires and Fatalities by Ignition Factor (USA)

Ignition Factor	Fires	Civilian Fatalities	Rate of Civilian Fatalities
Other or unknown	102195	946	9.3
Abandoned, discarded matl	44251	586	13.2
Children playing, etc	22948	291	12.7
Incendiary	34234	285	8.3
Falling asleep	16799	244	14.5
Suspicious	25935	209	8.1
Misuse of heat of ignition	16277	107	6.6
Comb too close to heat	17712	106	6.0
Unattended	85225	91	1.1
Short circuit, etc	22875	74	3.2
Unconscious, etc	2340	59	25.2
Other electrical failure	7855	49	6.2
Part failure, leak, etc	10161	18	1.8
Fuel spilled	1977	17	8.6
Inadeq cont open fire	4861	12	2.5
Cutting, welding	3760	9	2.4
Collision, etc	910	8	8.8

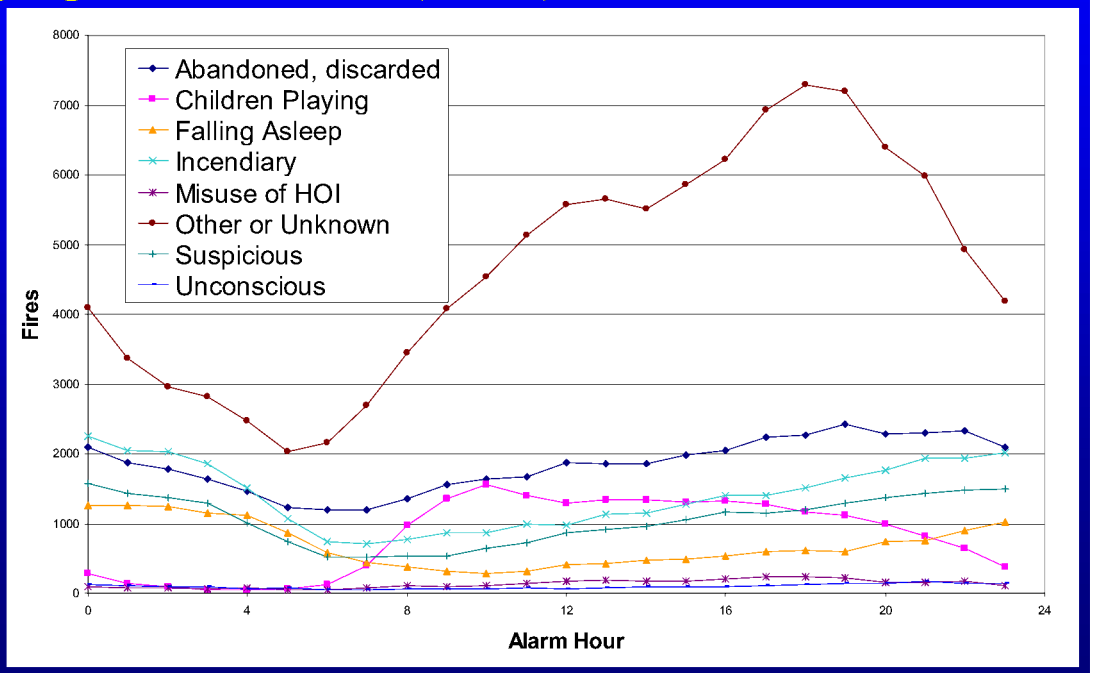
CESARE Risk: Apartment Statistics

Fatalities by Ignition Factor (USA)

Ignition Factor	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	% Known Fatalities
Other or unknown	5230	886	14.5	
Abandoned, etc	3817	581	13.2	26.2
Incendiary	2023	300	12.9	13.5
Children playing	3193	290	8.3	13.1
Falling asleep	1803	244	11.9	11.0
Suspicious	1878	205	9.8	9.2
Misuse of heat of ignitic	1063	107	9.1	4.8
Comb too close	1239	103	7.7	4.6
Unattended	3707	90	2.4	4.1
Short circuit, etc	1147	73	6.0	3.3
Unconscious, etc	362	59	14.0	2.7
Other electrical failure	500	49	8.9	2.2
Part failure, leak, etc	385	18	4.5	0.8
Fuel spilled	314	17	5.1	0.8

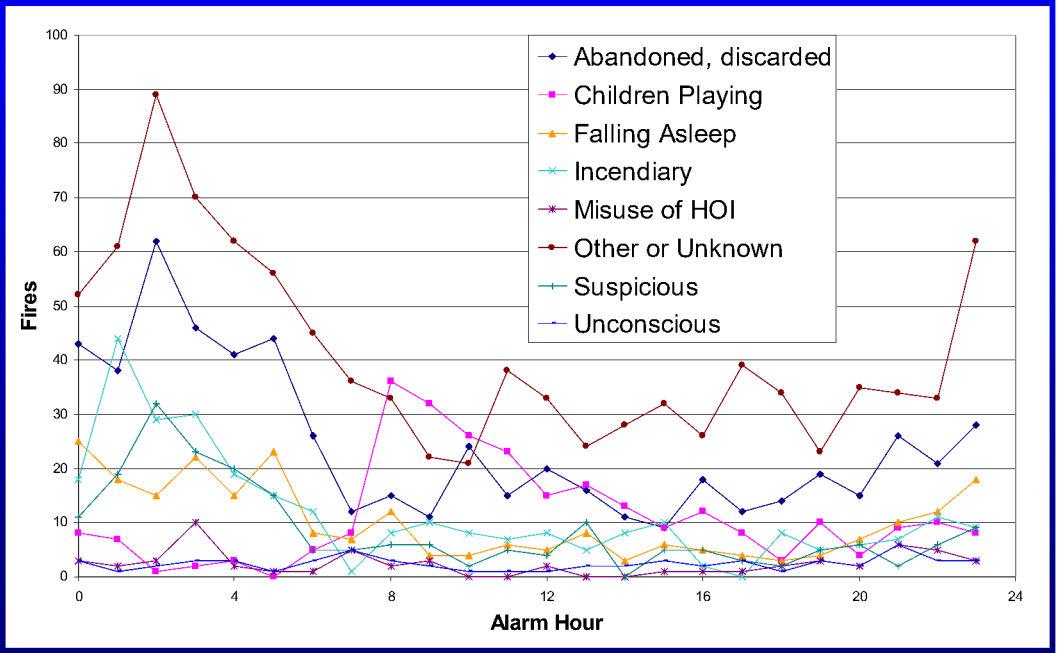
CESARE Risk: Apartment Statistics

Fires by Ignition Factor (USA)



CESARE Risk: Apartment Statistics

Fatalities by Ignition Factor (USA)



CESARE Risk: Apartment Statistics

Casualty Severity by Gender (USA)

Sex	Civilian Injuries	Civilian Fatalities	Civilian Unknown Severity	Fatalities as % Casualties
Female	11280	1074	6	8.7
Male	12753	1633	9	11.3
Unknown	4498	400	4	8.2

- males over-represented by >52%
- male fatality % ~31% > female fatality %

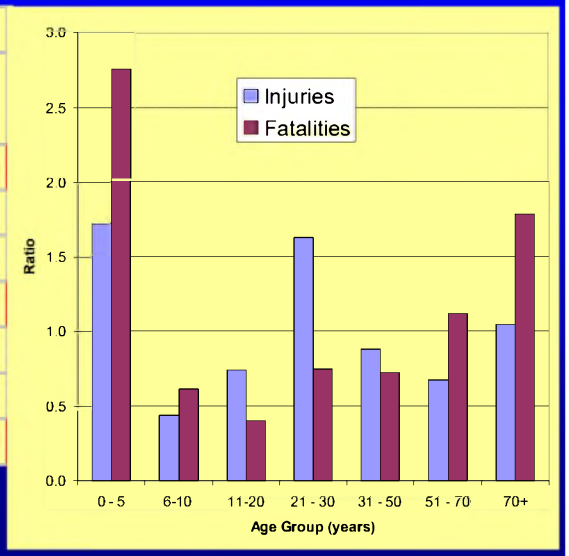
CESARE Risk: Apartment Statistics

Casualty Severity by Age (USA)

CESARE Risk: Apartment Statistics

Casualty Proportions by Age (USA)

Age Group	(1) % US Population	(2) % injuries	(3) % fatalities
0 - 5	8.8	15.2	24.3
6-10	7.2	3.1	4.4
11-20	14.1	10.5	5.6
21 - 30	16.3	26.4	12.2
31 - 50	28.8	25.3	20.7
51 - 70	16.9	11.4	18.8
70+	7.8	8.1	13.9



CESARE Risk: Apartment Statistics

Casualty Severity by Location at Ignition (USA)

Location at Ignition	Civilian Injuries	Civilian Fatalities	Civilian Unknown	Fatalities as % of Casualties	Fatalities as % of Known Fatalities
intimately involved	3259	539	3	14.2	22.1
in room	5971	657	6	9.9	26.9
on storey	5615	663	2	10.6	27.2
in building	5357	562	3	9.5	23.0
off property	1239	19	1	1.5	0.8
unknown	7090	667	4	8.6	

- 49% intimately involved or in room

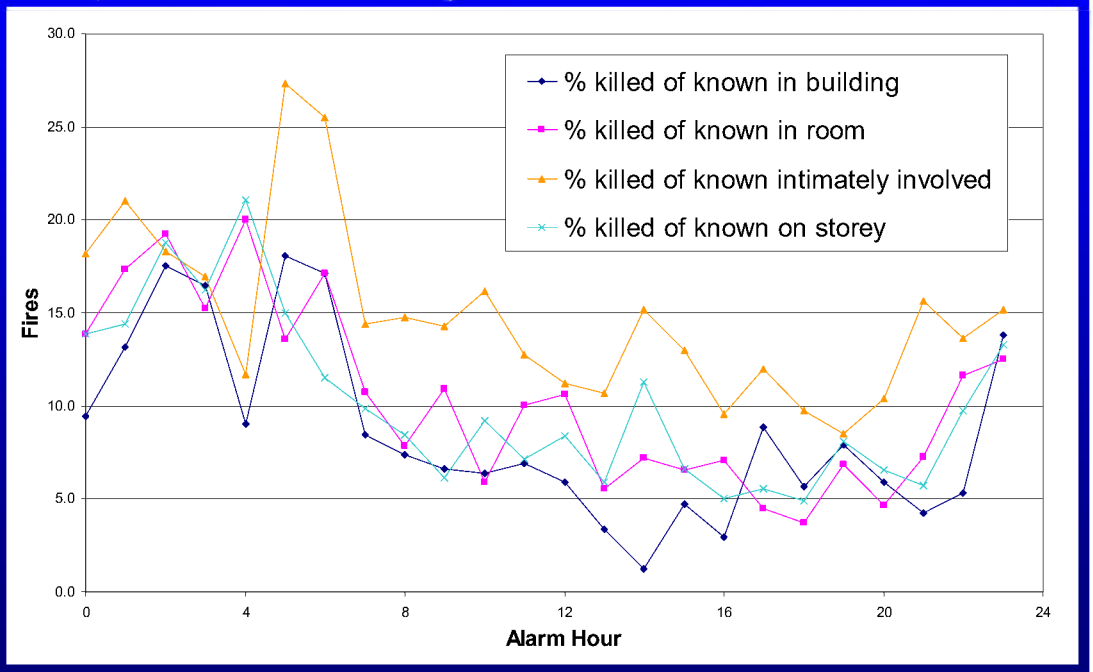
CESARE Risk: Residential Statistics

Fatalities (Coroners: Melbourne and London)

- 73% (of known) in room of fire origin (rfo)
- overall we estimate 70 - 80% in rfo
  and 80 - 90% in afo

CESARE Risk: Apartment Statistics

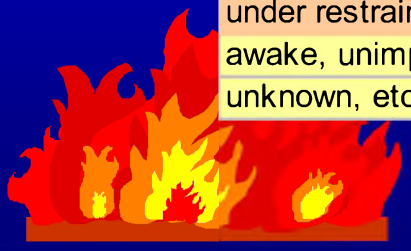
Fatalities by Location at Ignition (USA)



CESARE Risk: Apartment Statistics

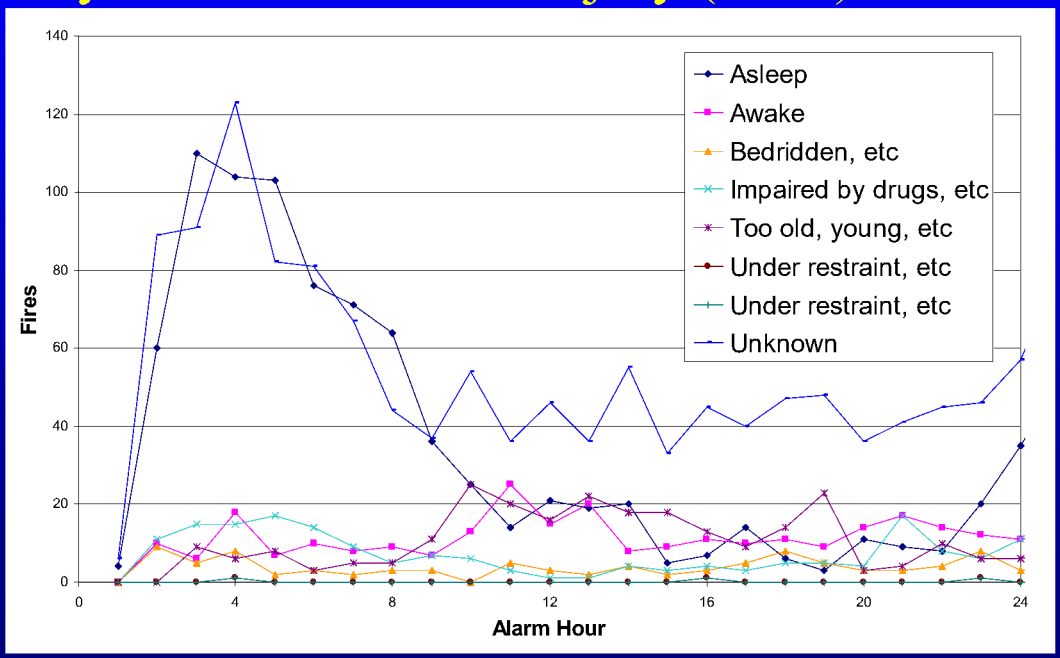
Casualty Severity by Condition Before Injury (USA)

Condition before injury	Civilian Injuries	Civilian Fatalities	Fatalities % of Known Casualties	Fatalities as % of Known Fatalities
asleep	6845	898	11.6	51.6
bedridden, etc	296	97	24.7	5.6
impaired by drugs, etc	878	194	18.1	11.1
too young, old, etc	1085	262	19.5	15.0
under restraint	20	3	13.0	0.2
awake, unimpaired	10352	287	2.7	16.5
unknown, etc	9055	1366	13.1	



CESARE Risk: Apartment Statistics

Fatalities by Condition before Injury (USA)



CESARE Risk: Apartment Statistics

Casualty Severity by Activity at Time of Injury (USA)

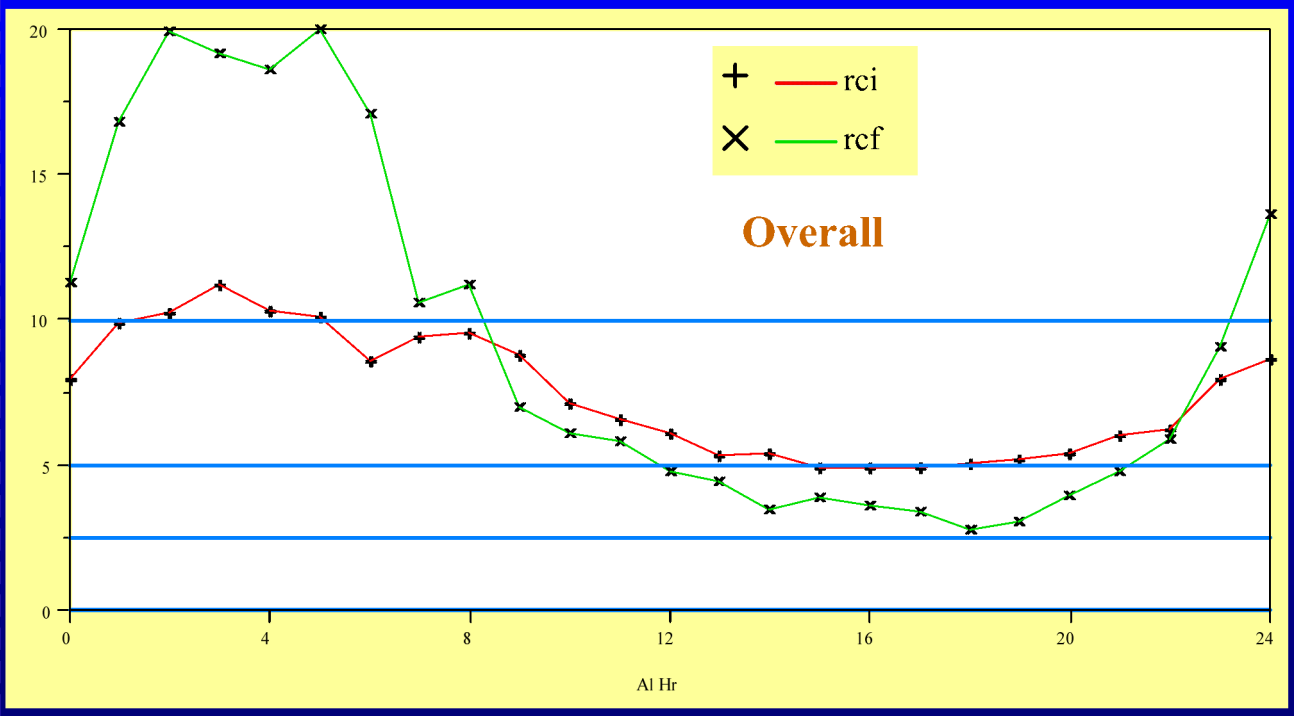
Activity at Time of Injury	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
unknown	10104	1414	12.3	
sleeping	4190	756	15.3	44.7
escaping	5151	511	9.0	30.2
unable to act	1056	245	18.8	14.5
irrational action	919	88	8.7	5.2
rescue attempt	1619	44	2.6	2.6
fire control	5304	39	0.7	2.3
response/return	86	9	9.5	0.5
cleanup, etc	102	1	1.0	0.1

CESARE Risk: Apartment Statistics

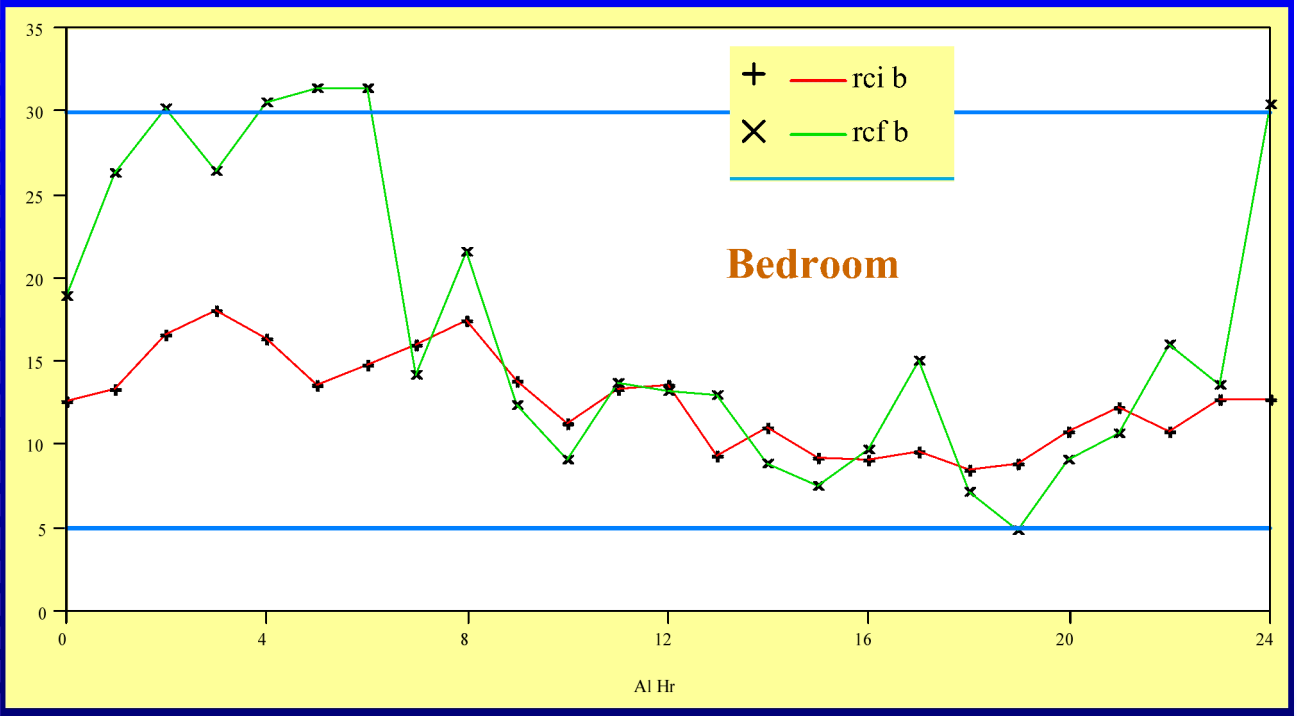
Fatalities (USA)

- sleeping at ignition and/or sleeping (activity) at time of injury: 1054 out of 1436 "known" fatalities (~73%)

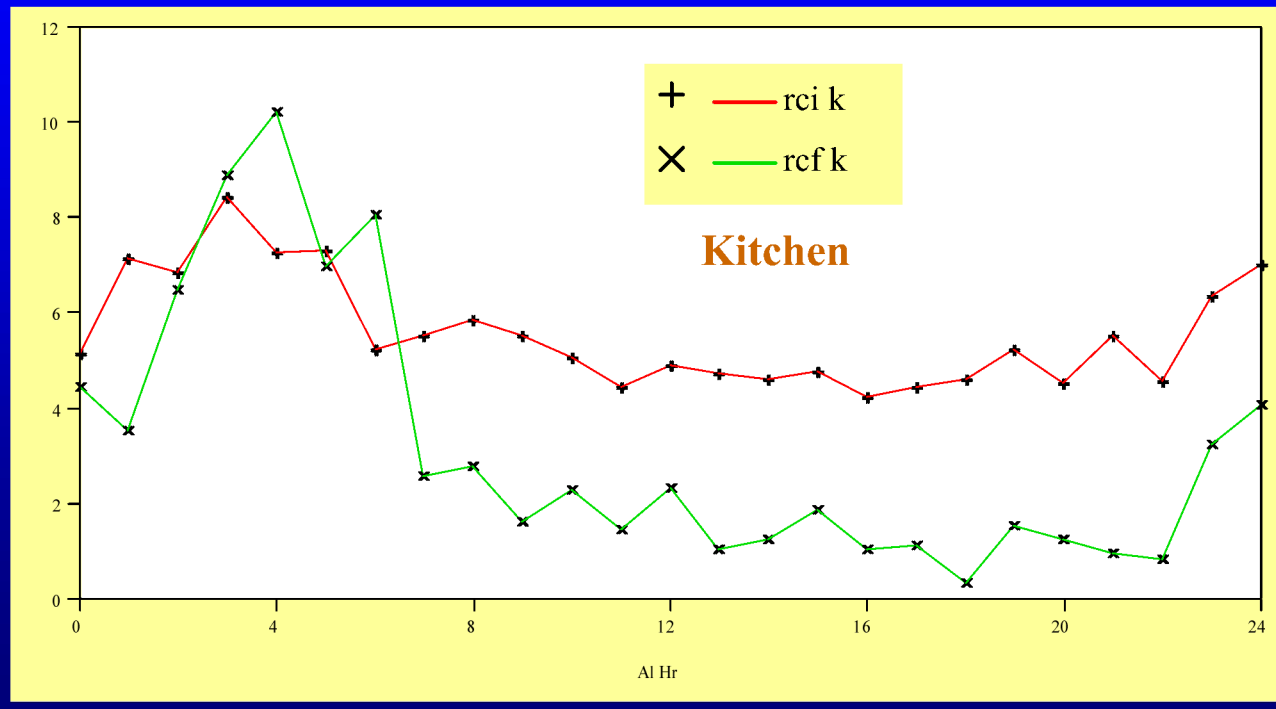
CESARE Risk: Apartment Statistics



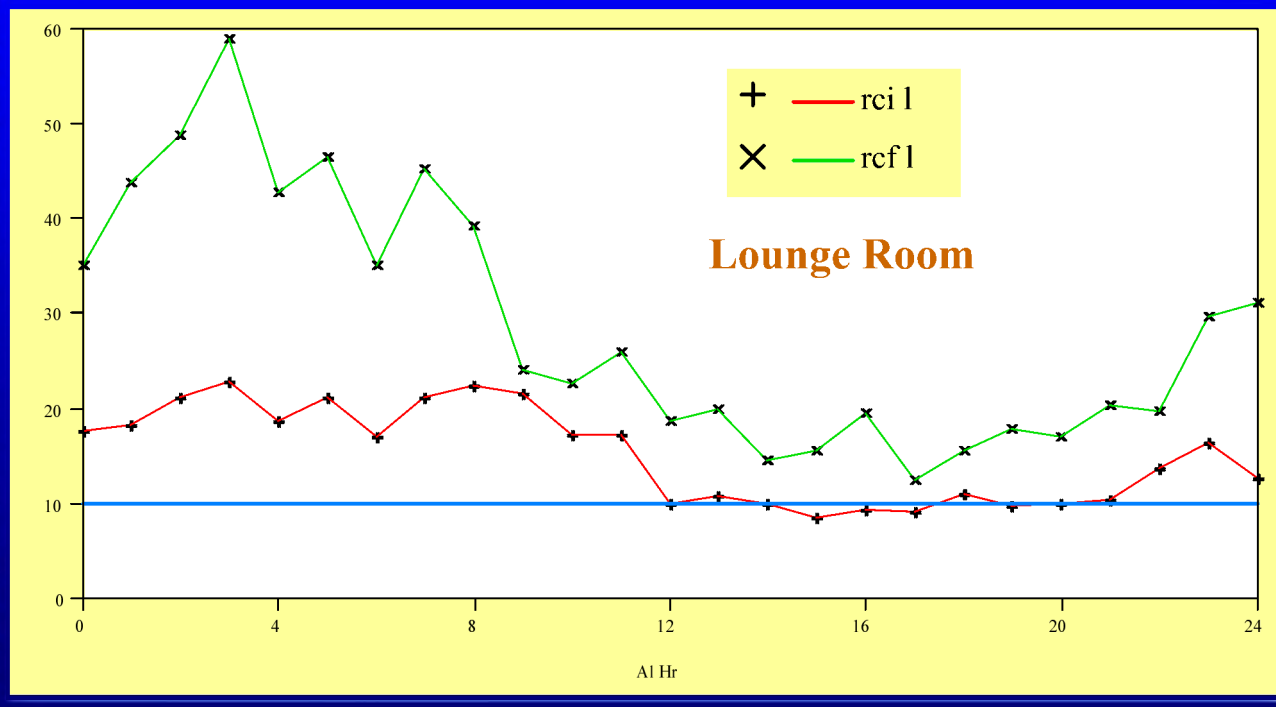
CESARE Risk: Apartment Statistics



CESARE Risk: Apartment Statistics



CESARE Risk: Apartment Statistics



CESARE Risk: Apartment Statistics

Casualties by Condition Preventing Escape (USA)

Condition preventing escape	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
unknown	8195	1365	14.3	
fire before exit	2413	468	16.2	26.9
no time, etc	1926	441	18.6	25.3
incap prior ignition	1007	265	20.8	15.2
nothing	13358	248	1.8	14.2
too slow	1054	153	12.7	8.8
clothing burning	340	122	26.4	7.0
locked door, etc	238	45	15.9	2.6

CESARE Risk: Apartment Statistics

Casualty Severity by Cause of Injury (USA)

Cause of injury	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities	Total Known Civilian Casualties
Exposed to fire prod	18443	2237	10.8	90.3	20680
Unknown, etc	6346	630	9.0		6976
Caught in, etc	408	163	28.5	6.6	571
Not applicable	226	26	10.3	1.0	252
Fell, etc	968	19	1.9	0.8	987
Exposed to chemicals,	269	13	4.6	0.5	282
Rubbed by, etc	1287	8	0.6	0.3	1295
Overexertion	274	7	2.5	0.3	281
Struck by	310	4	1.3	0.2	314

CESARE Risk: Apartment Statistics

Casualty Severity by Area of Fire Origin (USA)

Area of fire origin	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Lounge	5317	994	15.8	32.0
Bedroom	7660	960	11.1	30.9
Other	3199	496	13.4	16.0
Kitchen	8965	373	4.0	12.0
Corridor	731	81	10.0	2.6
Int Stair	274	70	20.3	2.3
Closet	505	27	5.1	0.9
Lobby	115	22	16.1	0.7
Lavatory, etc	441	21	4.5	0.7
Ext Stair	103	15	12.7	0.5
Heating equ	301	14	4.4	0.5
Storage	298	14	4.5	0.5
Laundry	299	10	3.2	0.3
Structural	122	5	3.9	0.2
Trash	161	4	2.4	0.1

CESARE Risk: Apartment Statistics

Casualty Severity by Equipment Involved in Ignition (USA)

Equipment involved in ignition	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
None	13872	1873	11.9	83.8
Other or unknown	6609	872	11.7	
Stove, etc	5698	172	2.9	7.7
Portable local heater	270	61	18.4	2.7
Cord, plug	496	45	8.3	2.0
Fixed local heater	341	30	8.1	1.3
Central heater	157	13	7.6	0.6
TV, etc	213	12	5.3	0.5
Portable stove	209	9	4.1	0.4
Water heater	303	7	2.3	0.3
Power switch gear	36	5	12.2	0.2
Vehicle	52	5	8.8	0.2
Central ac, refrig	22	2	8.3	0.1
Dryer	120	1	0.8	0.0

CESARE Risk: Apartment Statistics

Casualty Severity by Form of Heat of Ignition (USA)

Form of heat of ignition	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Other or unknown	16678	1782	9.7	
Cigarette	4436	743	14.3	56.1
Match	2515	285	10.2	21.5
Heat from gas fueled	2372	98	4.0	7.4
Short circuit, arc	814	61	7.0	4.6
Candle, etc	673	52	7.2	3.9
Open flame	210	26	11.0	2.0
Heat from direct flame	114	25	18.0	1.9
Spark, etc from gas fu	422	18	4.1	1.4
Heat from liquid fueled	216	13	5.7	1.0
Cutting torch	13	3	18.8	0.2
Exposure	24	1	4.0	0.1

CESARE Risk: Apartment Statistics

Casualty Severity by Form of Material Ignited (USA)

Form of material ignited	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Other or unknown	14447	1268	8.1	
Upholstered chair, etc	3573	671	15.8	36.5
Bedding	2155	320	12.9	17.4
Mattress, pillow	2662	283	9.6	15.4
Multiple forms	901	118	11.6	6.4
Structural timber, framing	822	118	12.6	6.4
Gas or liquid from pipe or con	797	86	9.7	4.7
Wearing apparel on person	274	78	22.2	4.2
Wearing apparel not on person	919	66	6.7	3.6
Electrical wire, insulation, e	615	40	6.1	2.2
Fuel	776	38	4.7	2.1

CESARE Risk: Apartment Statistics

Casualty Severity by Familiarity (USA)

Familiarity	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
< one day	1161	53	4.6	3.3
1 to 7 days	449	54	12.0	3.3
8 to 30 days	538	67	12.5	4.1
1 to 2 months	709	82	11.6	5.1
3 to 6 months	1680	206	12.3	12.7
7 to 12 months	1603	155	9.7	9.6
> one year	8069	1003	12.4	61.9
other	14322	1487	10.4	

CESARE Risk: Apartment Statistics

Casualty Severity by Type of Casualty (USA)

Type of casualty	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Fireground, before FB arrival	20894	2559	12.2	98.2
Fireground, after FB arrival	1989	34	1.7	1.3
During response or return	484	13	2.7	0.5
other or unknown	5164	501	9.7	

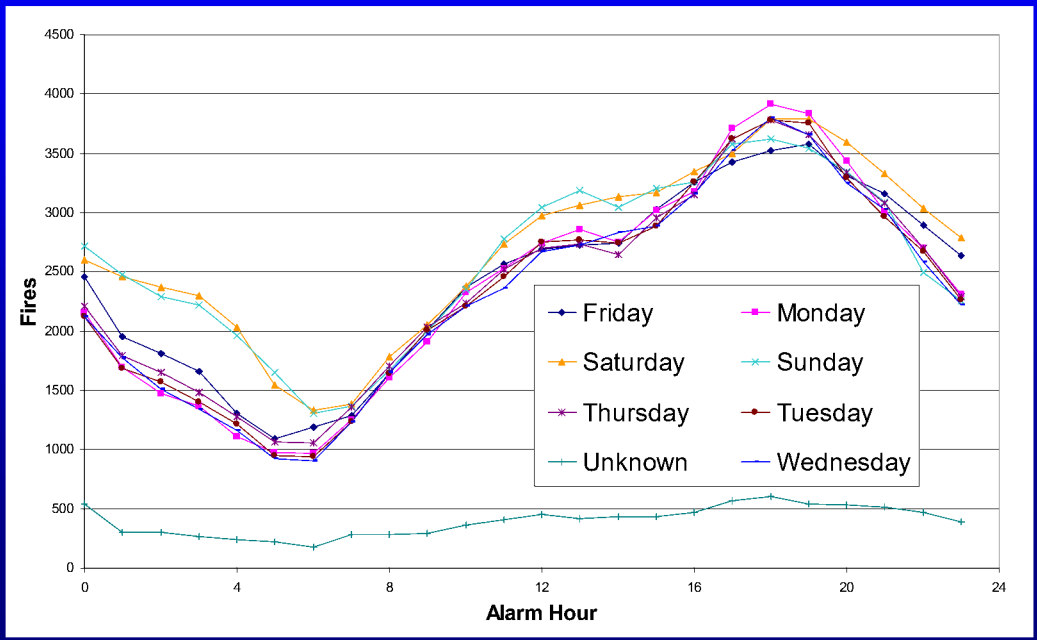
CESARE Risk: Apartment Statistics

Casualty Severity by Part of Body Injured (USA)

Part of body injured	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Multiple body parts	3384	1562	31.6	63.0
Internal	12130	747	5.8	30.1
Other or unknown	5624	629	10.1	
Body, trunk, back	754	88	10.5	3.6
Head, neck	1070	63	5.6	2.5
Arm	1283	9	0.7	0.4
Foot	681	5	0.7	0.2
Leg	765	3	0.4	0.1
Hand	2840	1	0.0	0.0

CESARE Risk: Apartment Statistics

Fires by Day of Week and Alarm Hour (USA)



CESARE Risk: Apartment Statistics

Fires and Casualty Rates by SDC (USA)

SDC

- stands for the presence of Sprinklers, Detectors and Protected Construction
- S = sprinklers present in room of fire origin
- D = detectors present in room or not in room of fire origin, as specified
- C = protected construction (ie fire rated construction)

CESARE Risk: Apartment Statistics

Fires and Casualty Rates by SDC (USA)

SDC

- combinations of sprinklers, detectors and protected construction present are given by Y = yes and N = no in the respective positions
- so YYY = all three present, NNN = none of them present, YNN = just sprinklers present

CESARE Risk: Apartment Statistics

Fires and Casualty Rates by SDC (USA)

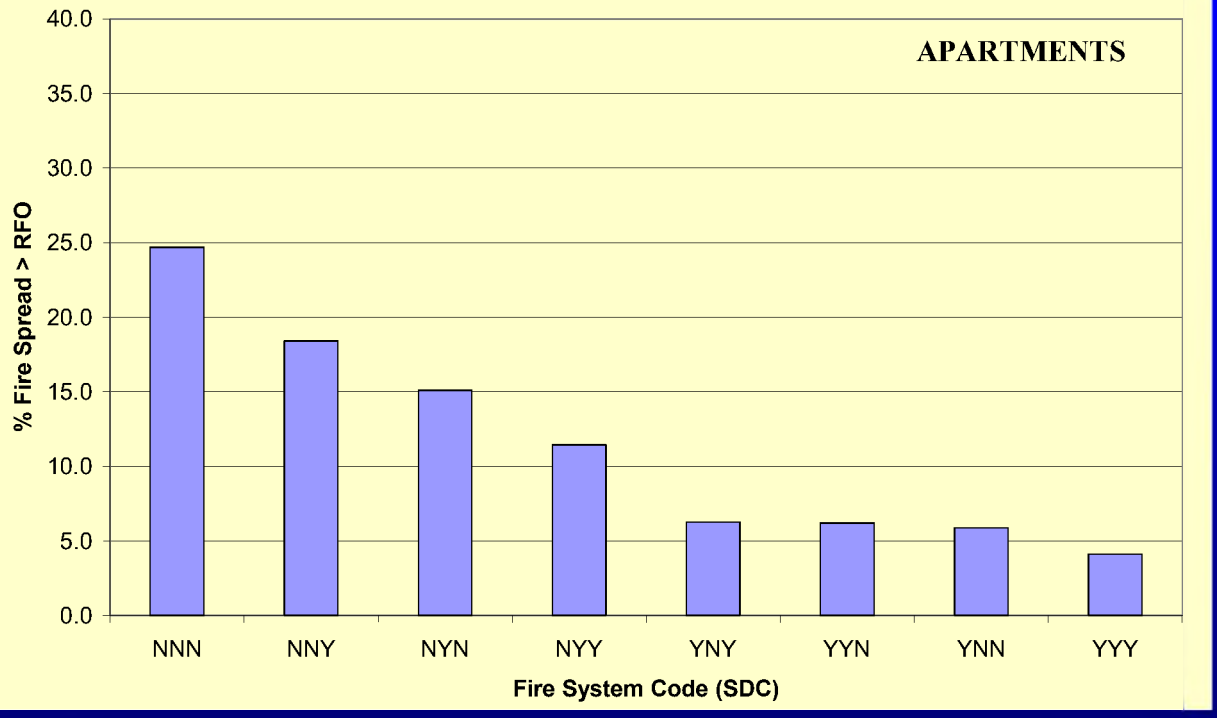
SDC	Fires	Rate of Fire Fighter Injuries	Rate of Civilian Injuries	Rate of Civilian Fatalities	Average Estimated $ Loss
NNN	42666	54.9	65.5	9.4	8451
YNN	389	36.0	28.3	2.6	3613
NYN	51988	59.5	86.8	8.7	6808
NNY	53075	43.3	71.4	7.4	5520
NYY	78795	35.9	84.1	6.8	5428
YYN	3134	17.2	36.1	1.3	5160
YNY	1290	24.8	30.2	2.3	1847
YYY	9070	14.6	55.2	2.8	2713

CESARE Risk: Statistics (USA)

Sprinkler and Detector Operation

% of Fires Reported to Fire Brigade When Detector or Sprinkler Did Not Operate			
Occupancy	Detectors in Room	Detectors Not in Room	Sprinklers
Public Assembly	49	57	72
Educational	36	51	81
Institutional	34	37	87
1&2 Family Dwellings	~40	~50	~60
Apartments	36	39	60
Rooming and Boarding	31	34	70
Hotels and Motels	30	38	78
Dormitories	18	24	70
Home Hotels, etc	31	37	77
Retail	50	56	69
Offices	35	52	78
Factories	30	56	52
Warehouses	37	55	51

CESARE Risk: Apartment Statistics (USA)



APPENDIX G
USA STATISTICS FOR HOTELS AND MOTELS

CESARE Risk:
Hotel and Motel Statistics

Australia

USA

- Thirteen years 1983 to 1995
- 39,874 fires (about 0.9 fires/1000 rooms/year)
- 244 civilian fatalities (6.1 fatalities /1000 fires)

CESARE Risk:
Hotel and Motel Statistics

Fires and Fatalities by Fatalities per Fire (USA)

Civilian Fatalities per Fire	Fires	Fatalities	% Fatal Fires	% Fatalities
0	39683	0		
1	166	166	86.9	68.0
2	18	36	9.4	14.8
3	4	12	2.1	4.9
4	1	4	0.5	1.6
5	1	5	0.5	2.0
21	1	21	0.5	8.6
	39874	**244**		
Fatal Fires	191			
Fatal Fires per 1000 Fires	4.8			

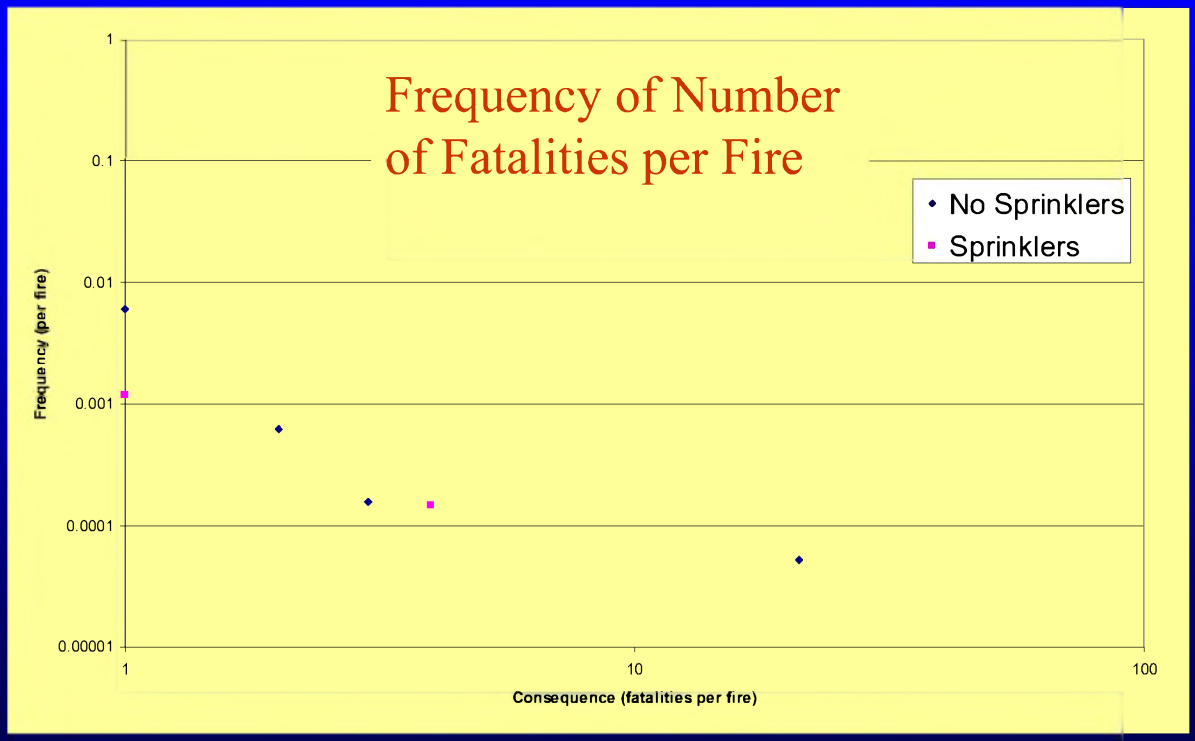
CESARE Risk:
Hotel and Motel Risk Data (USA)

USA 1 am to 4 am (no sprinklers):

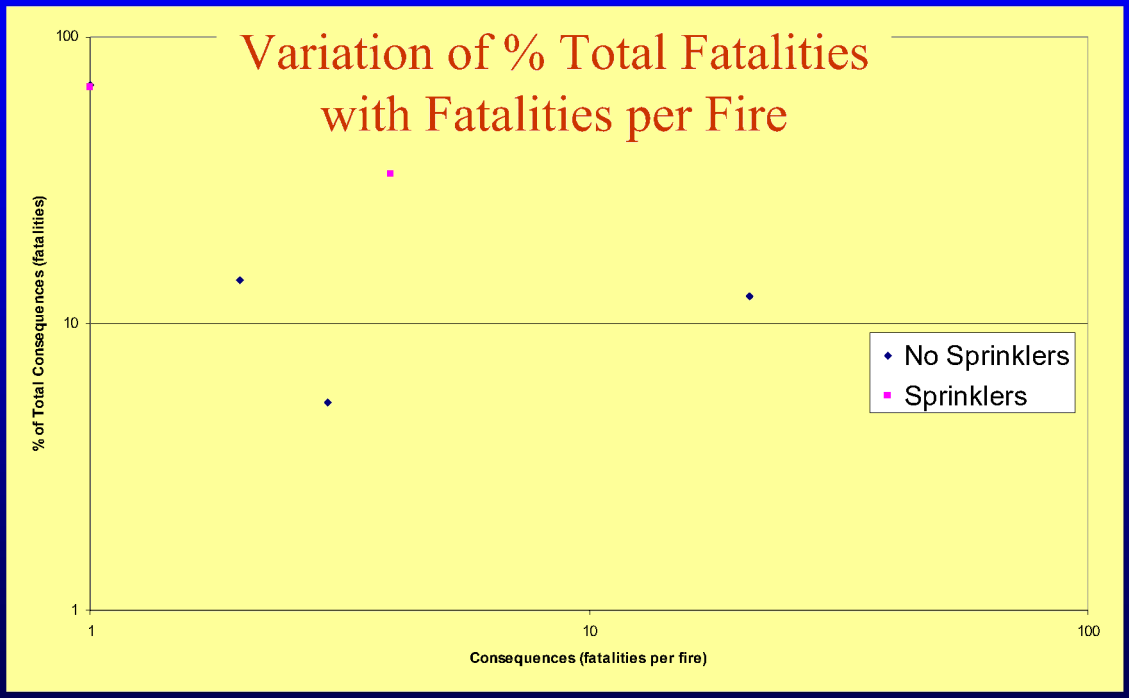
- 2329 fires over thirteen years
- 33 resulted in one or more fatalities
- 43 fatalities (about 1.3 fatalities per fatal fire)
- in 98.6% of fires reported to fire brigade - no fatalities

Over 24 hours in 99.5% of reported fires - no fatalities

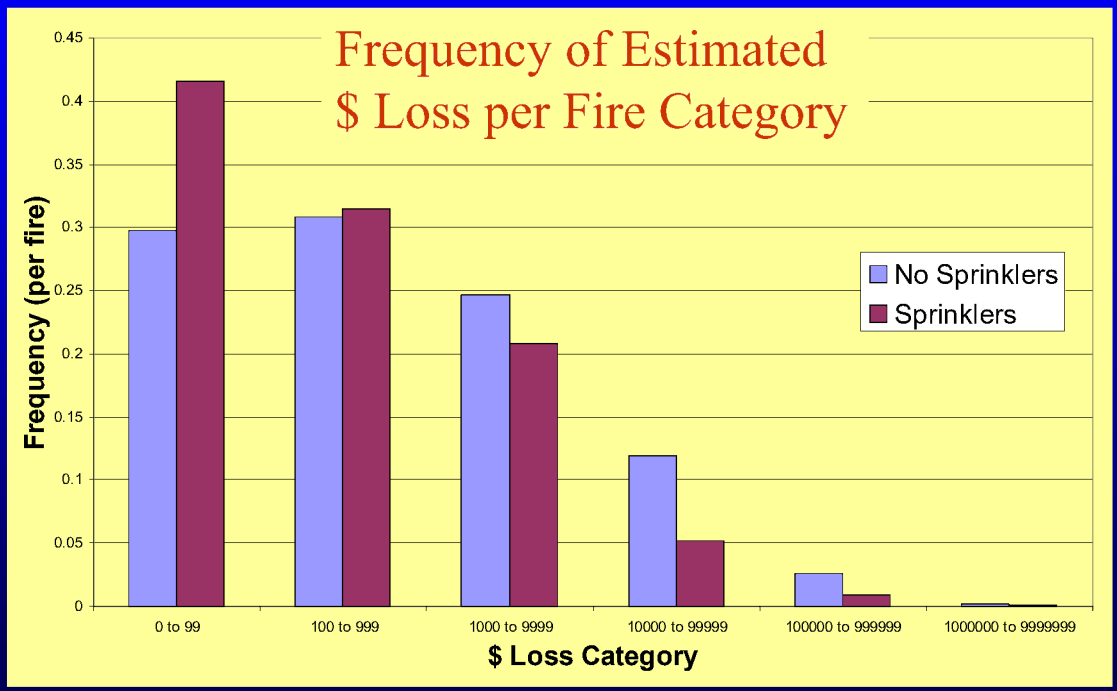
CESARE Risk:
Hotel and Motel Risk Data (USA)



CESARE Risk:
Hotel and Motel Risk Data (USA)



CESARE Risk:
Hotel and Motel Risk Data (USA)



CESARE Risk:
Hotel and Motel Risk Data (USA)

USA

- no sprinklers ~ $US 13,900 loss/fire
- sprinklers ~ $US 5300 loss/fire

CESARE Risk:
Hotel and Motel Statistics

Fire Fighter Fatalities (USA)

- a single fatality in three fires
- a total of three fatalities
- 39,871 fires without a fire fighter fatality
- fire fighter fatality rate 0.08 per 1000 fires

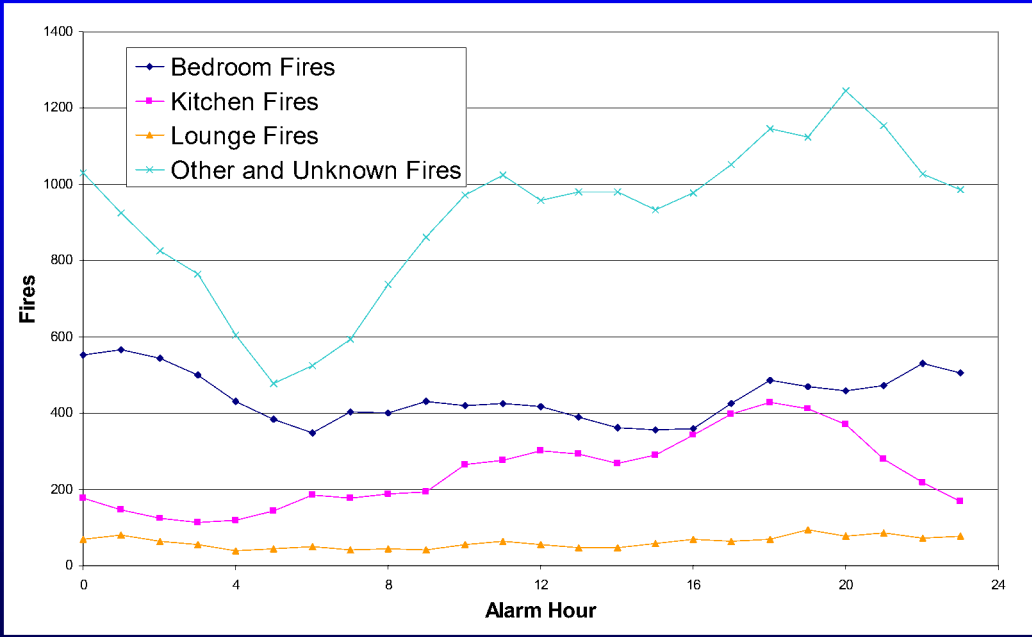
CESARE Risk: Hotel and Motel Statistics

Fires and Fatalities by Area of Fire Origin (USA)

Civilian Fatalities per Fire	Bedroom		Kitchen		Lounge		Other & Unknown	
	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities
0	10518	0	5868	0	1438	0	21859	0
1	113	113	3	3	19	19	31	31
2	8	16	2	4	1	2	7	14
3					1	3	3	9
4							1	4
5							1	5
21							1	21
Totals	10639	129	5873	7	1459	24	21903	84
Fatalities per 1000 Fires		12.1		1.2		16.4		3.8
Fatal Fires per 1000 Fires	11.4		0.9		14.1		2.0	

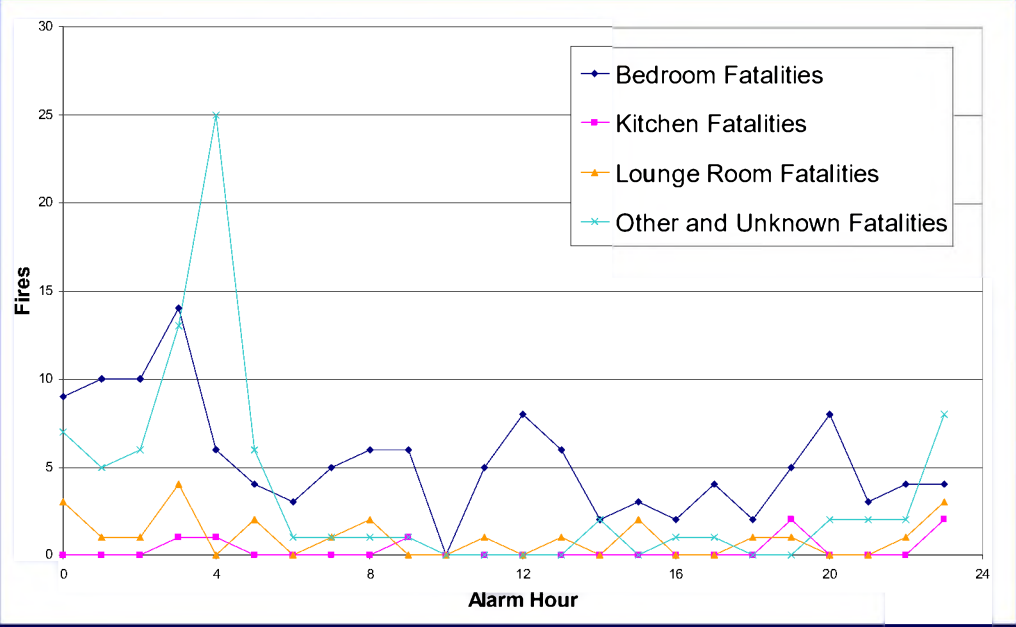
CESARE Risk: Hotel and Motel Statistics

Fires by Area of Fire Origin (USA)



CESARE Risk: Hotel and Motel Statistics

Fatalities by Area of Fire Origin (USA)



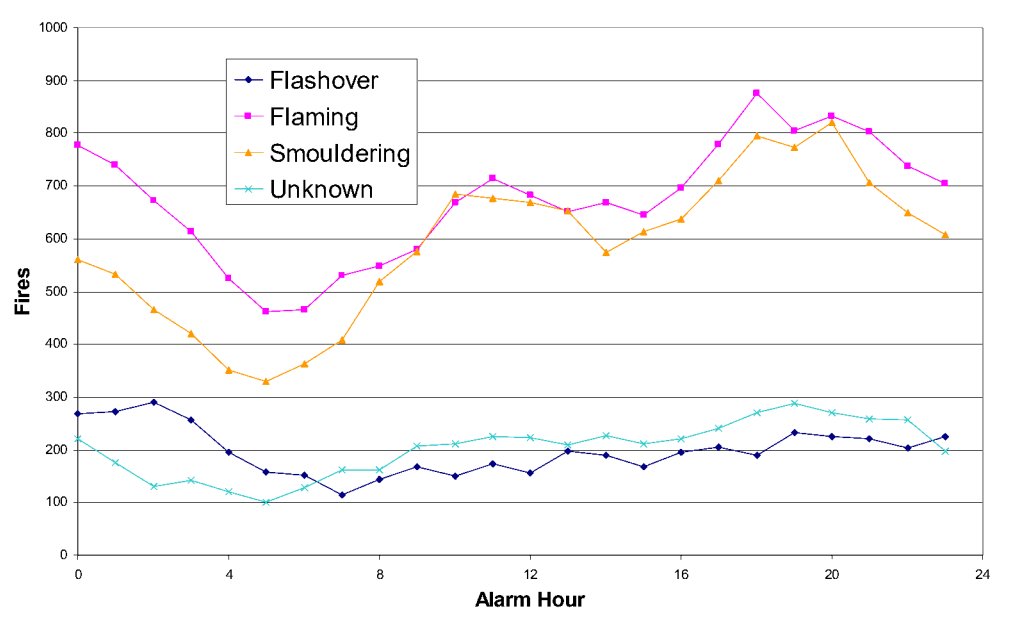
CESARE Risk: Hotel and Motel Statistics

Fires and Fatalities - Fire Type (USA)

Civilian Fatalities per Fire	Flashover		Flaming		Smouldering		Unknown	
	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities
0	4658	0	16091	0	14083	0	4851	0
1	66	66	85	85	8	8	7	7
2	16	32	1	2	1	2	0	0
3	4	12	0	0	0	0	0	0
4	1	4	0	0	0	0	0	0
5	1	5	0	0	0	0	0	0
21	1	21	0	0	0	0	0	0
Totals	4747	140	16177	87	14092	10	4858	7
Fatalities per 1000 Fires		29.5		5.4		0.7		1.4
Fatal Fires per 1000 Fires	18.7		5.3		0.6		1.4	

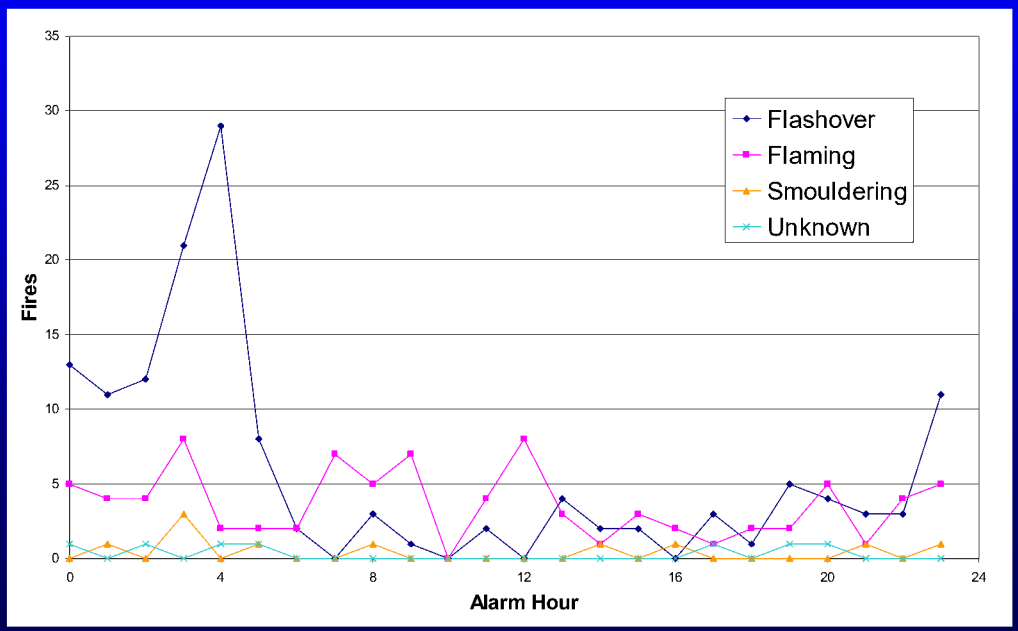
CESARE Risk:
Hotel and Motel Statistics

Fires by Fire Type by Alarm Hour (USA)



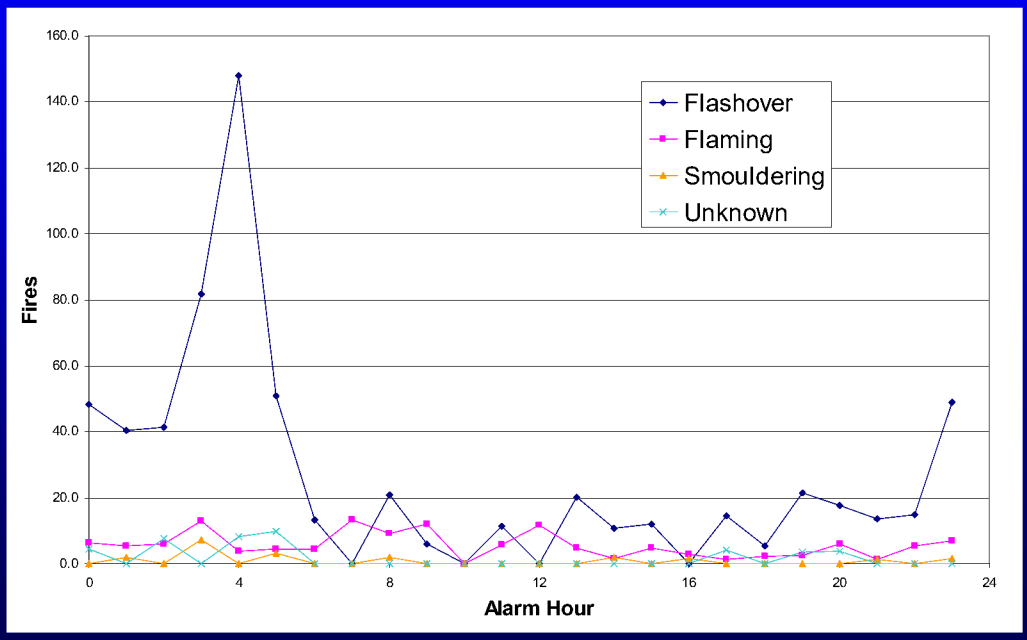
CESARE Risk:
Hotel and Motel Statistics

Fatalities by Fire Type by Alarm Hour (USA)



CESARE Risk: Hotel and Motel Statistics

Rate of Fatalities by Fire Type by Alarm Hour (USA)



CESARE Risk: Hotel and Motel Statistics

Fires and Fatalities by Ignition Factor (USA)

Ignition Factor	Fires	Civilian Fatalities	Rate of Civilian Fatalities
Other or unknown	8778	79	9.0
Abandoned, etc	6318	35	5.5
Suspicious	3110	29	9.3
Falling asleep	1251	19	15.2
Incendiary	3653	17	4.7
Comb too close	1843	11	6.0
Unconscious, etc	221	9	40.7
Short circuit, etc	3107	8	2.6
Misuse of Ht of Ign	777	7	9.0
Part failure, leak, etc	1262	7	5.5
Children playing	477	6	12.6
Misuse of heat of ignition	271	4	14.8
Other electrical failure	1317	3	2.3
Unattended	2338	3	1.3
Improper fueling	101	2	19.8
Washing, painting, etc	75	2	26.7
Children playing, etc	109	1	9.2
Cutting, welding	636	1	1.6
Misuse matl ign	305	1	3.3

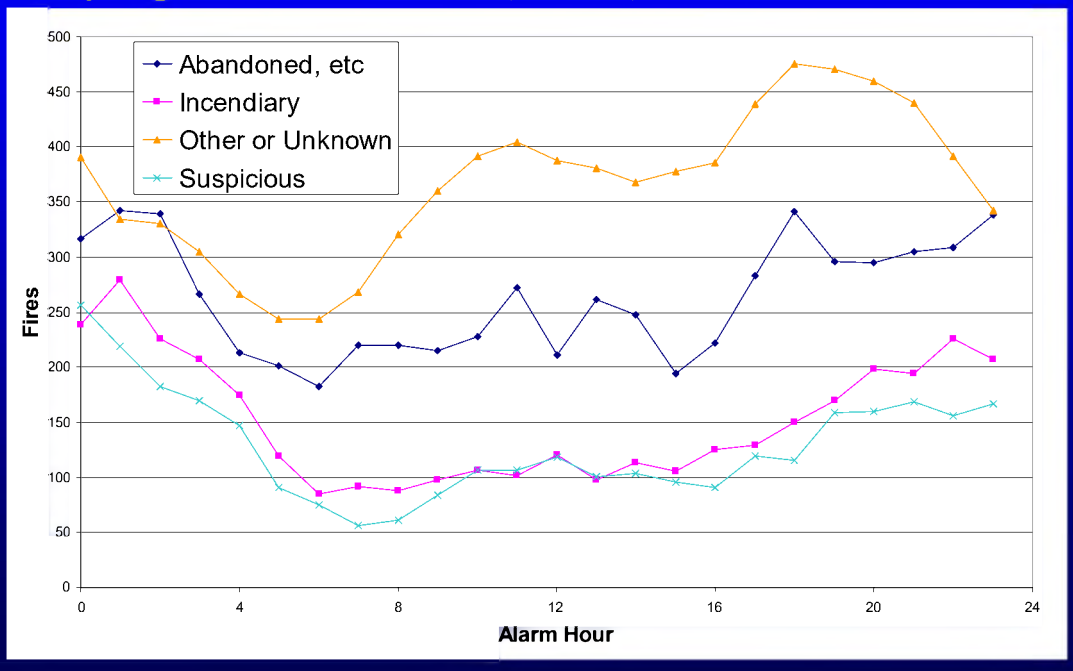
CESARE Risk: Hotel and Motel Statistics

Fatalities by Ignition Factor (USA)

Ignition Factor	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	% Known Fatalities
Other or unknown	554	77	12.2	
Abandoned, etc	389	35	8.3	21.1
Suspicious	293	30	9.3	18.1
Falling asleep	186	19	9.3	11.4
Incendiary	266	17	6.0	10.2
Comb too close	90	11	10.9	6.6
Unconscious, etc	44	9	17.0	5.4
Short circuit, etc	162	8	4.7	4.8
Children playing	66	7	9.6	4.2
Misuse of Ht of Ign	74	7	8.6	4.2
Part failure, leak, etc	95	7	6.9	4.2
Misuse of heat of ignition	12	4	25.0	2.4
Other electrical failure	76	3	3.8	1.8
Unattended	110	3	2.7	1.8
Improper fueling	14	2	12.5	1.2
Washing, painting, etc	[illegible]	2	11.1	1.2

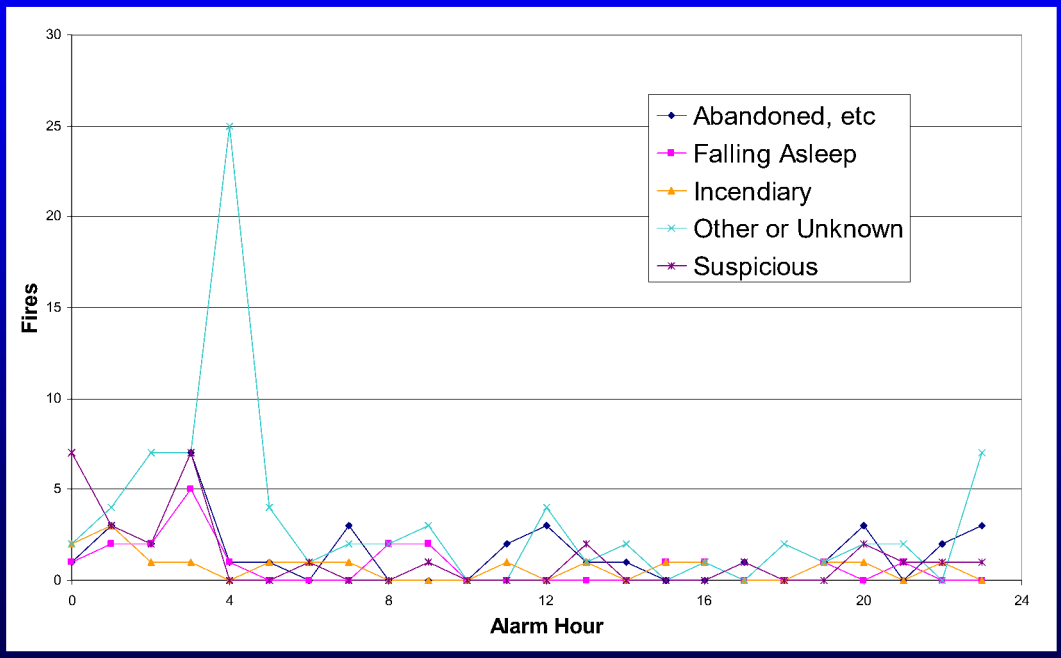
CESARE Risk: Hotel and Motel Statistics

Fires by Ignition Factor (USA)



CESARE Risk:
Hotel and Motel Statistics

Fatalities by Ignition Factor (USA)



CESARE Risk:
Hotel and Motel Statistics

Casualty Severity by Gender (USA)

Sex	Civilian Injuries	Civilian Fatalities	Civilian Unknown Severity	Fatalities as % Casualties
Female	713	49	0	6.4
Male	1482	163	1	9.9
Unknown	464	31	0	6.3

- males over-represented by >107%
- males over-represented by >230%
- male fatality % ~55% > female fatality %

CESARE Risk: Hotel and Motel Statistics

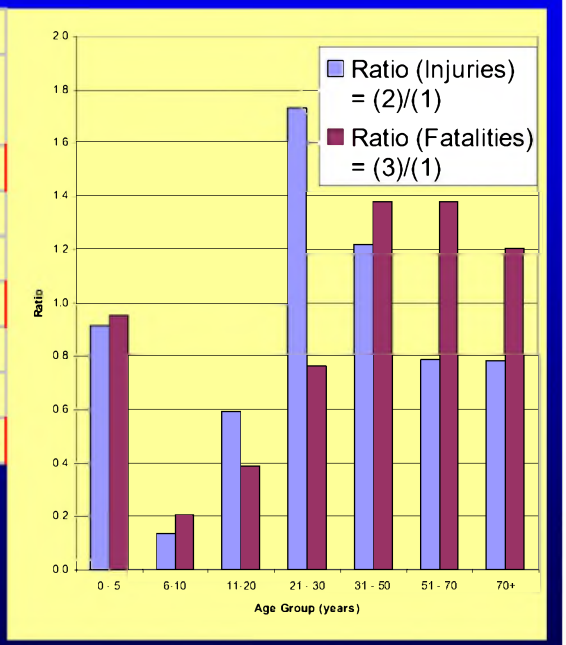
Casualty Severity by Age (USA)

Age Group	Civilian Injuries	Civilian Fatalities	Civilian Unknown Severity	Fatalities as % Casualties
0 - 5	168	17	0	9.2
6 - 10	20	3	0	13.0
11-20	174	11	0	5.9
21 - 30	587	25	0	4.1
31 - 50	731	80	0	9.9
51 - 70	277	47	1	14.5
70+	127	19	0	13.0
unknown	575	41	0	6.7

CESARE Risk: Hotel and Motel Statistics

Casualty Proportions by Age (USA)

Age Group	(1) % US Population	(2) % injuries	(3) % fatalities
0 - 5	8.8	8.1	8.4
6-10	7.2	1.0	1.5
11-20	14.1	8.3	5.4
21 - 30	16.3	28.2	12.4
31 - 50	28.8	35.1	39.6
51 - 70	16.9	13.3	23.3
70+	7.8	6.1	9.4



CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Location at Ignition (USA)

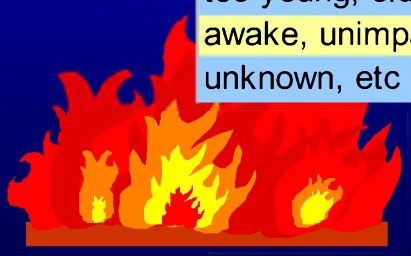
Location at Ignition	Civilian Injuries	Civilian Fatalities	Civilian Unknown	Fatalities as % of Casualties	Fatalities as % of Known Fatalities
intimately involved	303	43	1	12.4	24.2
in room	519	60	0	10.4	33.7
on storey	449	38	0	7.8	21.3
in building	547	36	0	6.2	20.2
off property	107	1	0	0.9	0.6
unknown	734	65	0	8.1	

- 58% intimately involved or in room

CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Condition Before Injury (USA)

Condition before injury	Civilian Injuries	Civilian Fatalities	Fatalities % of Known Casualties	Fatalities as % of Known Fatalities
asleep	566	53	9.4	46.1
bedridden, etc	11	5	45.5	4.3
impaired by drugs, etc	124	33	26.6	28.7
too young, old, etc	37	5	13.5	4.3
awake, unimpaired	1046	19	1.8	16.5
unknown, etc	875	128	14.6	



CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Activity at Time of Injury (USA)

Activity at Time of Injury	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
unknown	1003	123	10.9	
sleeping	341	54	13.7	45.0
escaping	467	28	5.7	23.3
unable to act	67	18	21.2	15.0
irrational action	93	13	12.3	10.8
rescue attempt	154	3	1.9	2.5
fire control	517	3	0.6	2.5
response/return	7	1	12.5	0.8
cleanup, etc	10	0	0.0	0.0

CESARE Risk: Hotel and Motel Statistics

Fatalities (USA)

- sleeping at ignition and/or at time of injury: out of "known" fatalities (~74%)

CESARE Risk: Hotel and Motel Statistics

Casualties by Condition Preventing Escape (USA)

Condition preventing escape	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
unknown	833	120	12.6	
no time, etc	249	34	12.0	27.6
fire before exit	119	27	18.5	22.0
incap prior ignition	80	21	20.8	17.1
nothing	1248	21	1.7	17.1
too slow	78	10	11.4	8.1
clothing burning	27	6	18.2	4.9
locked door, etc	25	4	13.8	3.3

CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Cause of Injury (USA)

Cause of injury	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Exposed to fire prod	1720	154	8.2	93.3
Unknown, etc	640	78	10.9	
Caught in, etc	31	9	22.5	5.5
Exposed to chemicals,	41	1	2.4	0.6
Fell, etc	52	1	1.9	0.6
Not applicable	23	0	0.0	0.0
Overexertion	24	0	0.0	0.0
Rubbed by, etc	104	0	0.0	0.0
Struck by	24	0	0.0	0.0

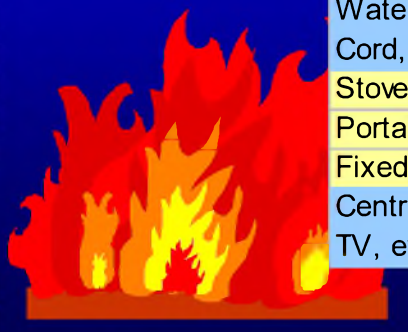
CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Area of Fire Origin (USA)

Area of fire origin	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Bedroom	1111	128	10.3	52.7
Other	366	45	10.9	18.5
Lounge	145	24	14.2	9.9
Corridor	150	9	5.7	3.7
Kitchen	306	7	2.2	2.9
Storage	81	5	5.8	2.1
Heating equ	42	4	8.7	1.6
Int Stair	33	4	10.8	1.6
Closet	43	3	6.5	1.2
Lavatory, etc	68	3	4.2	1.2
Structural	6	3	33.3	1.2
Trash	18	3	14.3	1.2
Lobby	35	2	5.4	0.8
Office	16	2	11.1	0.8
Ext Stair	17	1	5.6	0.4

CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Equipment Involved in Ignition (USA)



Equipment involved in ignition	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
None	1390	141	9.2	82.0
Other or unknown	651	71	9.8	
Water heater	37	7	15.9	4.1
Cord, plug	39	6	13.3	3.5
Stove, etc	146	6	3.9	3.5
Portable stove	76	5	6.2	2.9
Fixed local heater	59	3	4.8	1.7
Central heater	14	2	12.5	1.2
TV, etc	17	2	10.5	1.2

CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Form of Heat of Ignition (USA)

Form of heat of ignition	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Other or unknown	963	101	9.5	
Cigarette	562	60	9.6	42.6
Match	170	23	11.9	16.3
Open Flame, spark	113	17	13.1	12.1
Smoking material	64	8	11.1	5.7
Heat from gas fueled equip	181	7	3.7	5.0
Lighter	77	5	6.1	3.5
Short circuit, arc	138	5	3.5	3.5
Properly op elec equip	166	4	2.4	2.8
Arcing, etc	36	2	5.3	1.4
Candle, etc	28	2	6.7	1.4
Heat from overload	33	2	5.7	1.4
Hot ember, ash	8	2	20.0	1.4
Short circuit, worn insul	52	2	3.7	1.4
Spark, etc	2	2	50.0	1.4

CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Form of Material Ignited (USA)

Form of material ignited	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Other or unknown	805	70	8.0	
Mattress, pillow	410	40	8.9	23.1
Bedding	287	37	11.4	21.4
Upholstered chair, etc	126	20	13.7	11.6
Fuel	93	11	10.6	6.4
Gas or liquid from pipe or con	90	9	9.1	5.2
Int wall covering, etc	69	8	10.4	4.6
Wearing apparel on person	22	8	26.7	4.6
Multiple forms	68	7	9.3	4.0
Structural timber, framing	88	7	7.4	4.0
Packing, wrapping matl	1	5	83.3	2.9
Trash, etc	145	5	3.3	2.9
Wearing apparel not on person	61	5	7.6	2.9

CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Familiarity (USA)

Familiarity	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
< one day	327	34	9.4	26.6
1 to 7 days	191	22	10.3	17.2
8 to 30 days	73	9	11.0	7.0
1 to 2 months	78	5	6.0	3.9
3 to 6 months	151	11	6.8	8.6
7 to 12 months	92	13	12.4	10.2
> one year	458	34	6.9	26.6
other	1289	115	8.2	

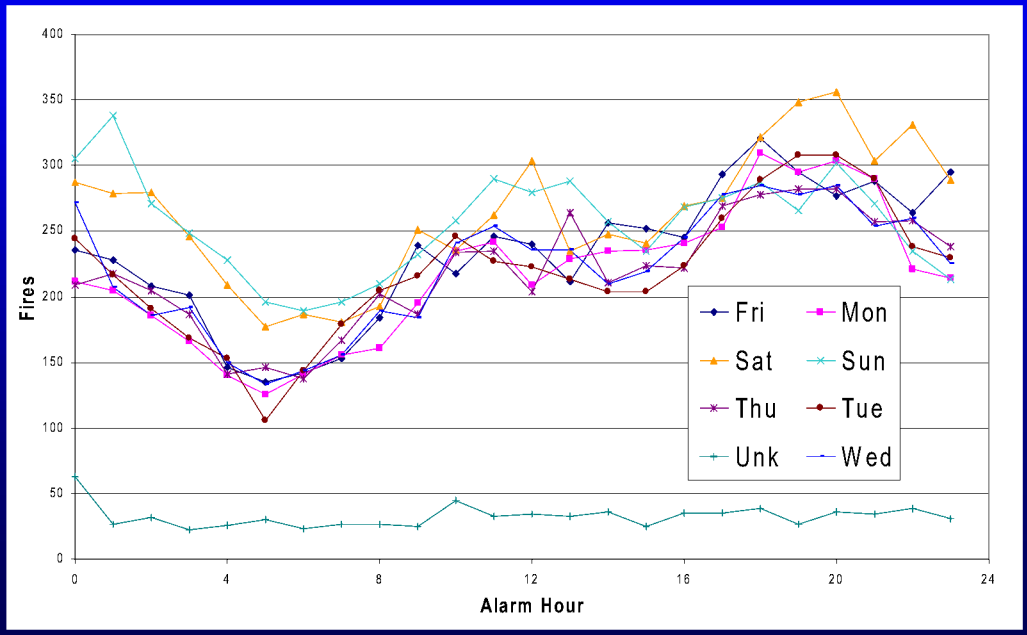
CESARE Risk: Hotel and Motel Statistics

Casualty Severity by Type of Casualty (USA)

Type of casualty	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Fireground, before FB arrival	1904	196	10.3	98.0
Fireground, after FB arrival	213	1	0.5	0.5
During response or return	57	3	5.3	1.5
other or unknown	485	43	8.9	

CESARE Risk:
Hotel and Motel Statistics

Fires by Day of Week and Alarm Hour (USA)

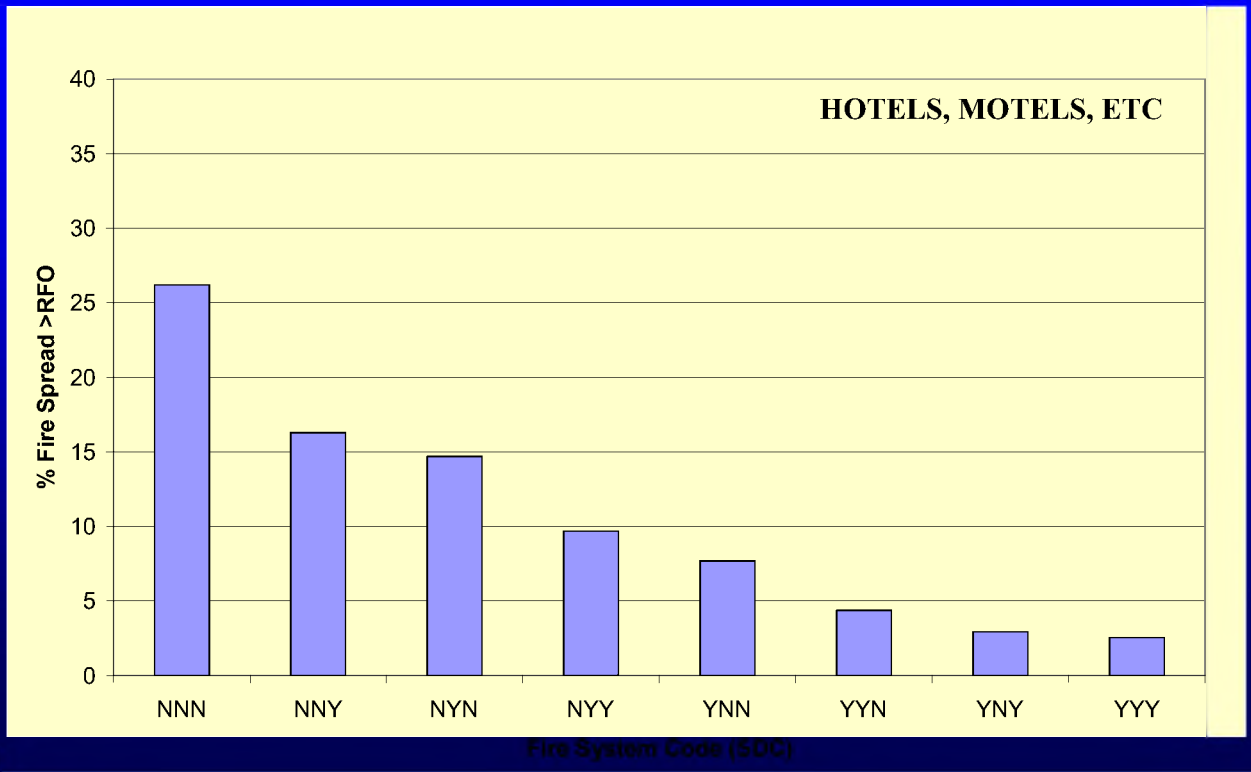


CESARE Risk:
Hotel and Motel Statistics

Fires and Casualty Rates by SDC (USA)

SDC	Fires	Rate of Fire Fighter Injuries	Rate of Civilian Injuries	Rate of Civilian Fatalities	Average Estimated $ Loss
NNN	3091	43.7	60.2	4.2	12836
YNN	120	50.0	0.0	0.0	3702
NYN	3236	57.5	97.7	10.8	16627
NNY	3753	34.4	65.0	5.1	7170
NYY	5951	40.2	92.4	6.6	10107
YYN	677	19.2	47.3	3.0	3575
YNY	493	16.2	44.6	0.0	5669
YYY	4509	15.7	69.2	1.3	3260

CESARE Risk: Hotels, Motels, etc Statistics (USA)



Statistics

Extent of flame damage is a measure of the degree of development and spread of a fire:

EFD 1	Confined to the object of origin
EFD 2	Confined to the part of room or area of origin
EFD 3	Confined to the room of origin
EFD 4	Confined to the fire-rated compartment of origin
EFD 5	Confined to the floor of origin
EFD 6	Confined to the structure of origin
EFD 7	Extended beyond the structure of origin

APPENDIX H
USA STATISTICS FOR AGED CARE

CESARE Risk: Aged Care Statistics

USA

- Thirteen years 1983 to 1995
- 20,718 fires (about ?? fires/1000 rooms/year)
- 108 civilian fatalities (5.2 fatalities /1000 fires)
- 15,895 fires and 67 civilian fatalities (4.2 fatalities per 1000 fires) with nursing staff
- 2357 fires and 20 fatalities (8.5 fatalities per 1000 fires) with no nursing staff
- 2466 fires and 21 fatalities (9.3 fatalities per 1000 fires) staffing unknown

CESARE Risk: Aged Care Statistics

Fires and Fatalities by Fatalities per Fire (USA)

Civilian Fatalities per Fire	Fires	Fatalities	% Fatal Fires	% Fatalities
0	20630	0		
1	76	76	86.4	70.4
2	9	18	10.2	16.7
3	1	3	1.1	2.8
4	1	4	1.1	3.7
7	1	7	1.1	6.5
	20718	**108**		
Fatal Fires	88			
Fatal Fires per 1000 Fires	4.2			

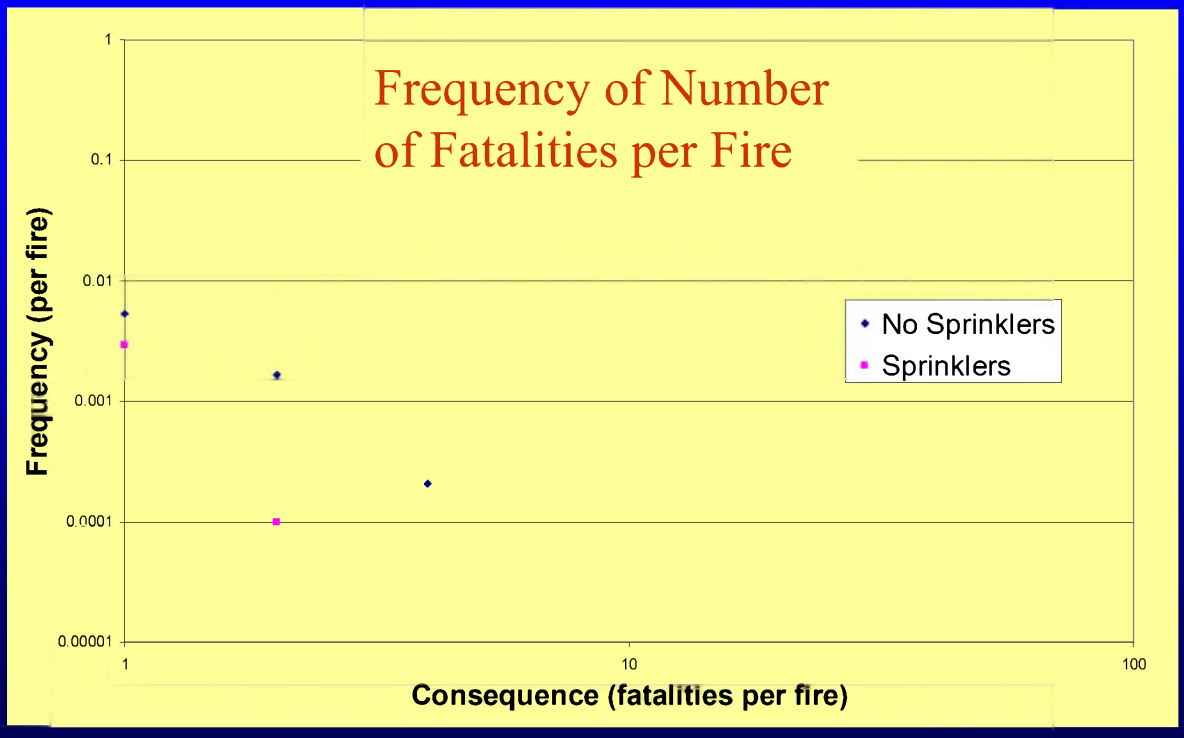
CESARE Risk:
Aged Care Risk Data (USA)

USA 1 am to 4 am:

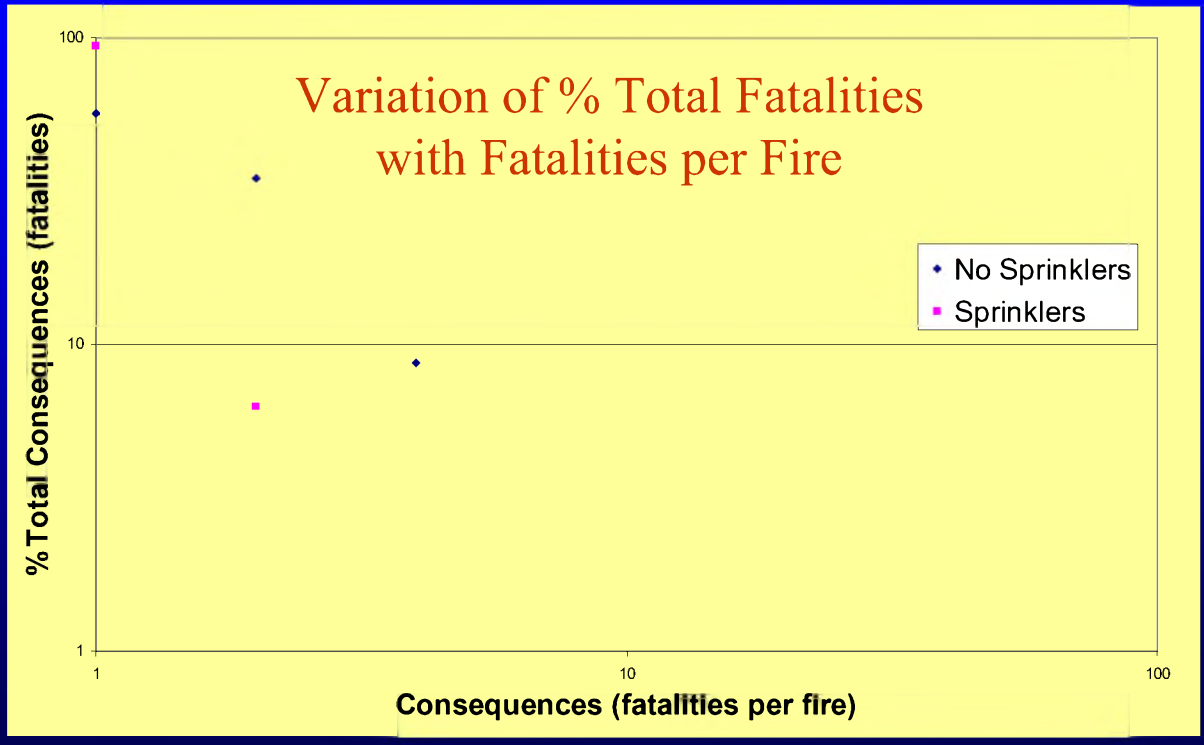
- 1433 fires over thirteen years
- six resulted in one or more fatalities
- 8 fatalities (about 1.3 fatalities per fatal fire)
- in 99.6% of fires reported to fire brigade - no fatalities

Over 24 hours in 99.6% of reported fires - no fatalities

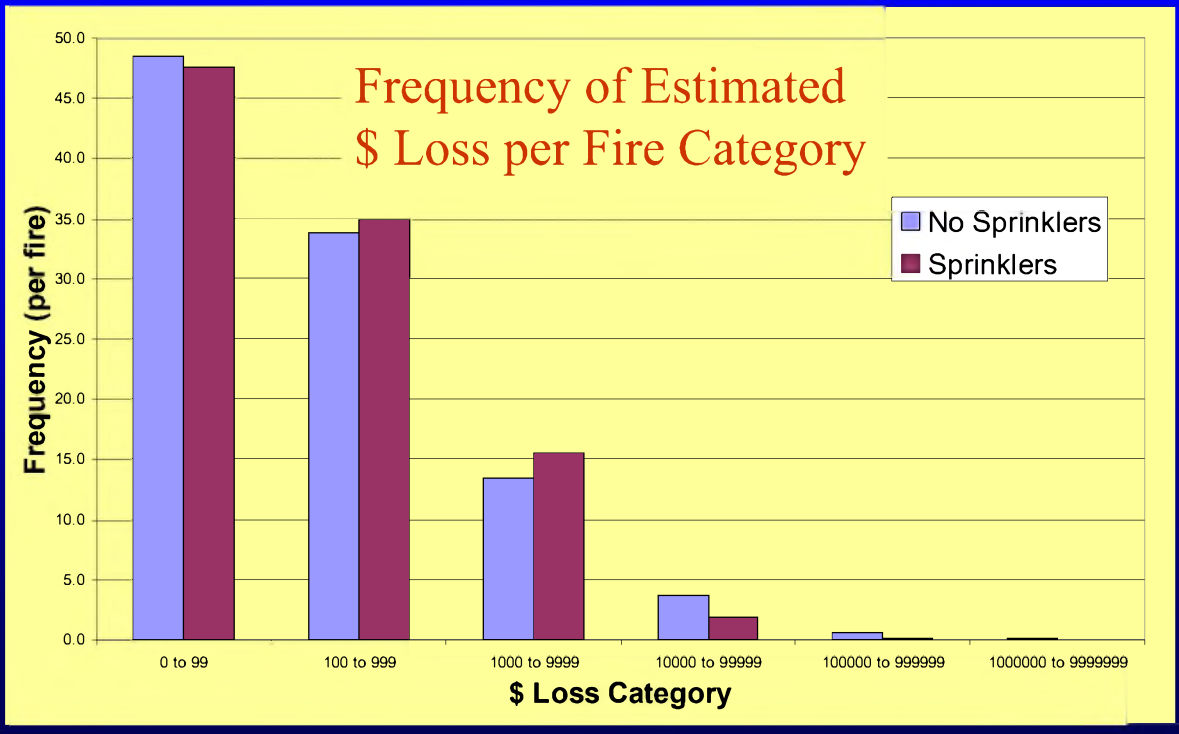
CESARE Risk:
Aged Care Risk Data (USA)



CESARE Risk:
Aged Care Risk Data (USA)



CESARE Risk:
Aged Care Risk Data (USA)



CESARE Risk:
Aged Care Risk Data (USA)

USA

- no sprinklers ~ $US 3870 loss/fire
- sprinklers ~ $US 1670 loss/fire

CESARE Risk:
Aged Care Statistics

Fire Fighter Fatalities (USA)

- a single fatality in two fires
- a total of two fatalities
- 20,717 fires without a fire fighter fatality
- fire fighter fatality rate 0.1 per 1000 fires

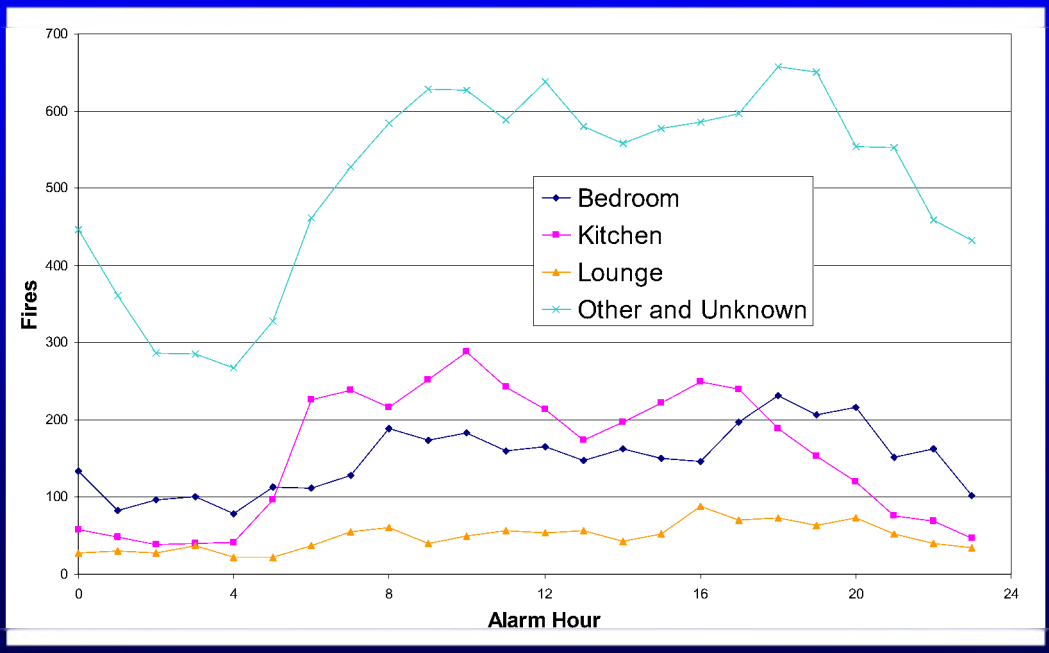
CESARE Risk: Aged Care Statistics

Fires and Fatalities by Area of Fire Origin (USA)

Civilian Fatalities per Fire	Bedroom		Kitchen		Lounge		Other & Unknown	
	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities
0	3542	0	3730	0	1143	0	12215	0
1	40	40	5	5	17	17	14	14
2	4	8	0	0	3	6	2	4
3	0	0	0	0	1	3	0	0
4	0	0	0	0	1	4	0	0
7	0	0	0	0	1	7	0	0
Totals	3586	48	3735	5	1166	37	12231	18
Fatalities per 1000 Fires		13.4		1.3		31.7		1.5
Fatal Fires per 1000 Fires	12.3		1.3		19.7		1.3	

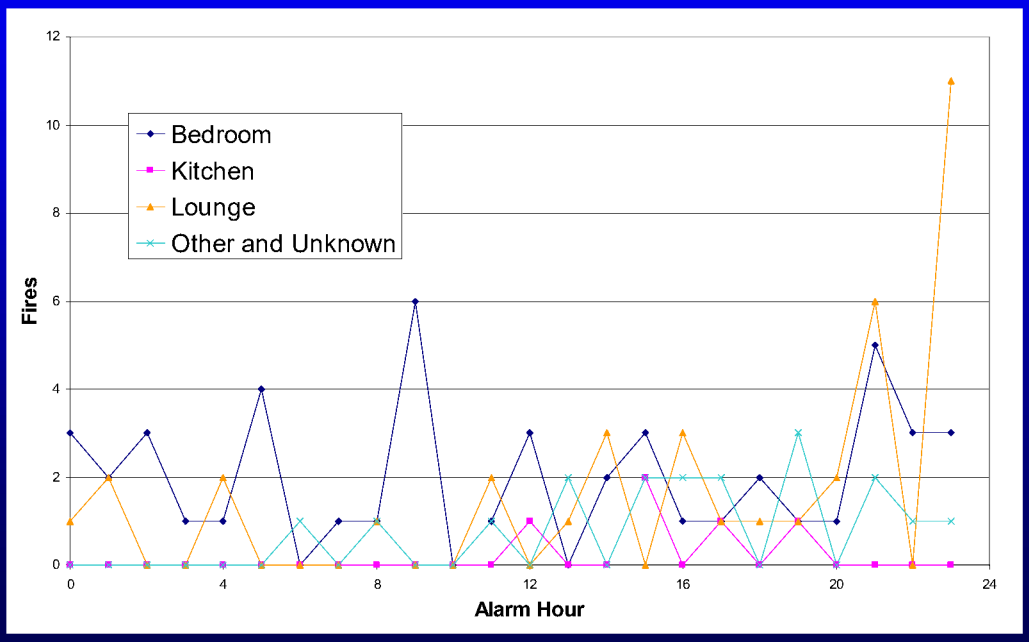
CESARE Risk: Aged Care Statistics

Fires by Area of Fire Origin (USA)



CESARE Risk: Aged Care Statistics

Fatalities by Area of Fire Origin (USA)



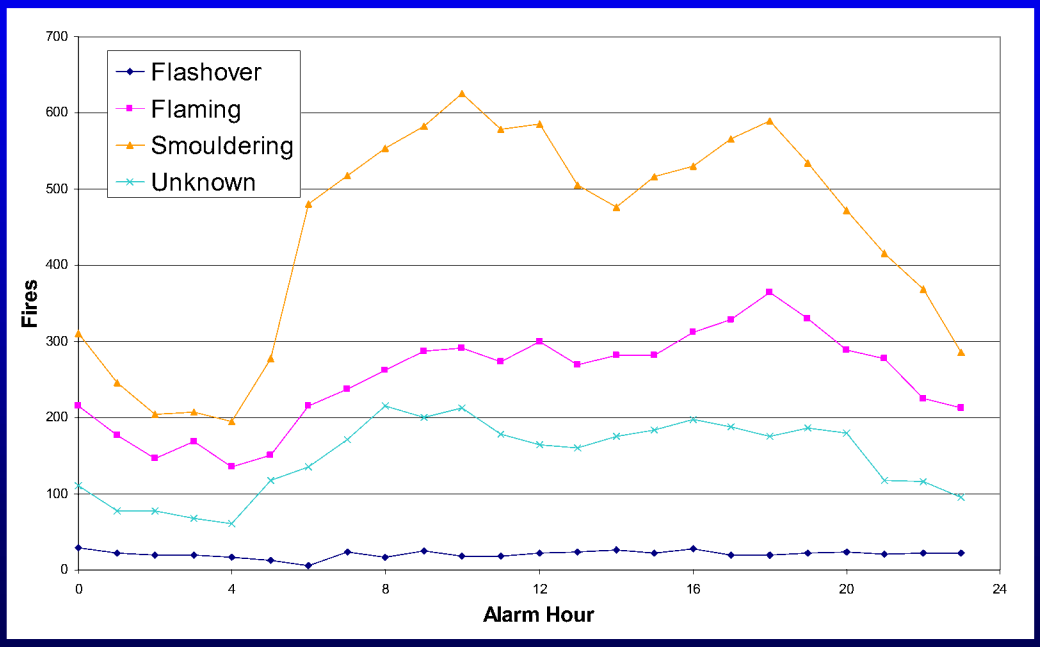
CESARE Risk: Aged Care Statistics

Fires and Fatalities - Fire Type (USA)

Civilian Fatalities per Fire	Flashover		Flaming		Smouldering		Unknown	
	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities	Fires	Fatalities
0	475	0	5989	0	10609	0	3557	0
1	15	15	40	40	16	16	5	5
2	6	12	3	6	0	0	0	0
3	1	3	0	0	0	0	0	0
4	1	4	0	0	0	0	0	0
7	1	7	0	0	0	0	0	0
Totals	499	41	6032	46	10625	16	3562	5
Fatalities per 1000 Fires		82.2		7.6		1.5		1.4
Fatal Fires per 1000 Fires	48.1		7.1		1.5		1.4	

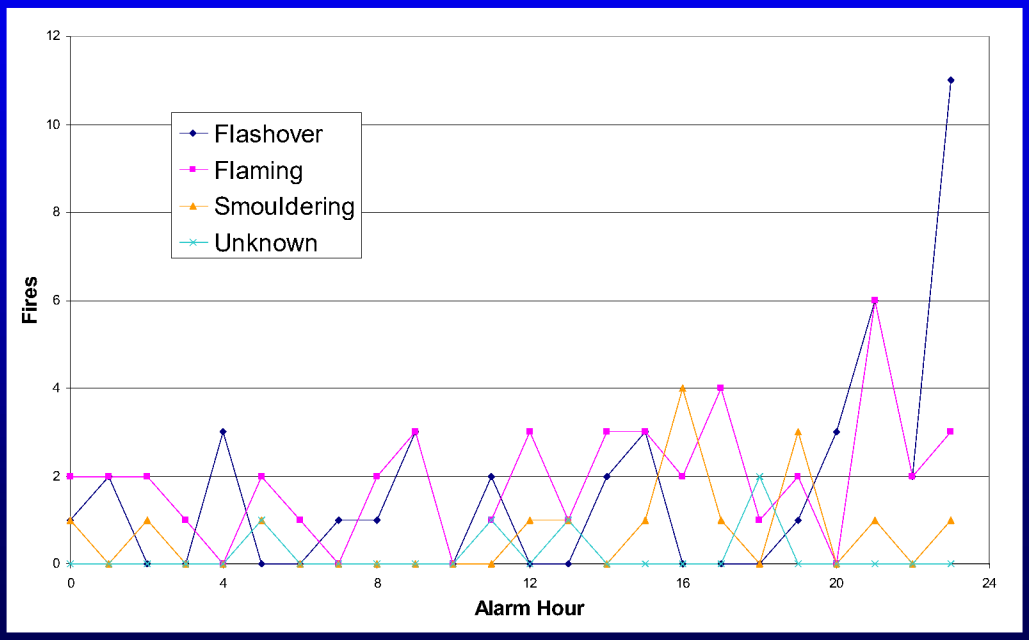
CESARE Risk: Aged Care Statistics

Fires by Fire Type by Alarm Hour (USA)



CESARE Risk: Aged Care Statistics

Fatalities by Fire Type by Alarm Hour (USA)



CESARE Risk: Aged Care Statistics

Fires and Fatalities by Ignition Factor (USA)

Ignition Factor	Fires	Civilian Fatalities	Rate of Civilian Fatalities
Abandoned, etc	2810	31	11.0
Other or unknown	4872	23	4.7
Falling asleep	208	9	43.3
Comb too close	1156	8	6.9
Short circuit, etc	2420	8	3.3
Unconscious, etc	198	7	35.4
Incendiary	572	4	7.0
Misuse of heat of ignitio	557	4	7.2
Suspicious	598	4	6.7
Accid turned on, etc	223	2	9.0
Misuse of Matl Ign	270	2	7.4
Other electrical failure	1212	2	1.7
Children playing, etc	20	1	50.0
Operational deficiency	713	1	1.4
Overloaded	288	1	3.5
Part failure, leak, etc	1297	1	0.8

CESARE Risk: Aged Care Statistics

Fatalities by Ignition Factor (USA)

Ignition Factor	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	% Known Fatalities
Abandoned, etc	404	30	6.9	35.7
Other or unknown	380	23	5.7	
Falling asleep	62	9	12.7	10.7
Comb too close	93	8	7.9	9.5
Short circuit, etc	134	8	5.6	9.5
Unconscious, etc	89	7	7.3	8.3
Incendiary	112	4	3.4	4.8
Misuse of heat of ignit	91	4	4.2	4.8
Suspicious	107	4	3.6	4.8
Accid turned on, etc	18	2	10.0	2.4
Misuse of Matl Ign	43	2	4.4	2.4
Other electrical failure	102	2	1.9	2.4
Children playing, etc	5	1	16.7	1.2
Operational deficiency	28	1	3.4	1.2
Overloaded	36	1	2.7	1.2
Part failure, leak, etc	62	1	1.6	1.2

CESARE Risk: Aged Care Statistics

Casualty Severity by Gender (USA)

Sex	Civilian Injuries	Civilian Fatalities	Civilian Unknown Severity	Fatalities as % Casualties
Female	1125	56	1	4.7
Male	576	42	0	6.8
Unknown	166	9	0	5.1

- females over-represented by >95%
  - females over-represented by >33%
- male fatality % ~45% > female fatality %

CESARE Risk: Aged Care Statistics

Casualty Severity by Age (USA)

Age Group	Civilian Injuries	Civilian Fatalities	Civilian Unknown Severity	Fatalities as % Casualties
0 - 5	29	3	0	9.4
6 - 10	3	1	0	25.0
11-20	77	0	0	0.0
21 - 30	290	2	0	0.7
31 - 50	450	2	0	0.4
51 - 70	213	24	1	10.1
70+	460	63	0	12.0
unknown	345	12	0	3.4

CESARE Risk: Aged Care Statistics

Casualty Severity by Age (USA)

Age Group	% injuries	% fatalities
0 - 5	1.9	3.2
6-10	0.2	1.1
11-20	5.1	0.0
21 - 30	19.1	2.1
31 - 50	29.6	2.1
51 - 70	14.0	25.3
70+	30.2	66.3

CESARE Risk: Aged Care Statistics

Casualty Severity by Location at Ignition (USA)

Location at Ignition	Civilian Injuries	Civilian Fatalities	Civilian Unknown	Fatalities as % of Casualties	Fatalities as % of Known Fatalities
intimately involved in ignition	173	50	0	22.4	53.8
in room	384	20	0	5.0	21.5
on storey	693	18	1	2.5	19.4
in building	228	5	0	2.1	5.4
off property	31	0	0	0.0	0.0
unknown	358	14	0	3.8	

- 75% intimately involved or in room

CESARE Risk: Aged Care Statistics

Casualty Severity by Condition Before Injury (USA)

Condition before injury	Civilian Injuries	Civilian Fatalities	Fatalities % of Known Casualties	Fatalities as % of Known Fatalities
asleep	161	19	10.6	24.4
bedridden, etc	178	28	13.6	35.9
impaired by drugs, et	12	3	20.0	3.8
under restraint	11	0	0.0	0.0
too young, old, etc	133	18	11.9	23.1
awake, unimpaired	872	10	1.1	12.8
unknown, etc	500	29	5.5	

CESARE Risk: Aged Care Statistics

Casualty Severity by Activity at Time of Injury (USA)

Activity at Time of Injury	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
escaping	122	10	7.6	
rescue attempt	357	1	0.3	1.5
fire control	336	1	0.3	1.5
response/return	5	0	0.0	0.0
cleanup, etc	4	0	0.0	0.0
sleeping	164	24	12.8	36.4
unable to act	204	26	11.3	39.4
irrational action	52	4	7.1	6.1

CESARE Risk: Aged Care Statistics

Fatalities (USA)

- sleeping at ignition and/or at time of injury: out of "known" fatalities (~42%)

CESARE Risk: Aged Care Statistics

Casualties by Condition Preventing Escape (USA)

Condition preventing escape	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
no time, etc	67	7	9.5	8.3
fire before exit	13	4	23.5	4.8
locked door, etc	12	3	20.0	3.6
clothing burning	49	33	40.2	39.3
too slow	70	6	7.9	7.1
incap prior ignition	208	23	10.0	27.4
nothing	1001	8	0.8	9.5
unknown	447	23	4.9	

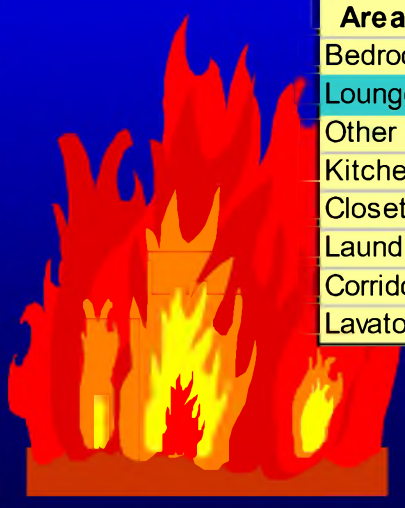
CESARE Risk: Aged Care Statistics

Casualty Severity by Cause of Injury (USA)

Cause of injury	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Exposed to fire prod	1357	84	5.8	91.3
Unknown, etc	337	15	4.3	
Caught in, etc	11	6	35.3	6.5
Exposed to chemica	27	1	3.6	1.1
Fell, etc	34	1	2.9	1.1
Not applicable	6	0	0.0	0.0
Overexertion	35	0	0.0	0.0
Rubbed by, etc	51	0	0.0	0.0
Struck by	9	0	0.0	0.0

CESARE Risk: Aged Care Statistics

Casualty Severity by Area of Fire Origin (USA)



Area of fire origin	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Bedroom	890	47	5.0	49.5
Lounge	141	37	20.8	38.9
Other	168	12	6.7	12.6
Kitchen	155	5	3.1	5.3
Closet	116	2	1.7	2.1
Laundry	217	2	0.9	2.1
Corridor	25	1	3.8	1.1
Lavatory, etc	36	1	2.7	1.1

CESARE Risk: Aged Care Statistics

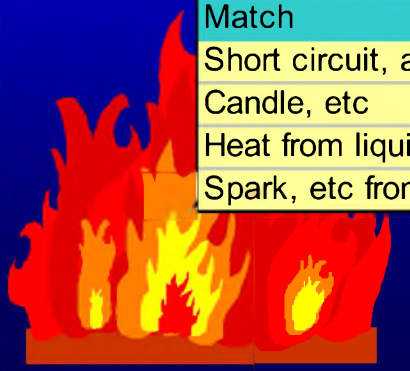
Casualty Severity by Equipment Involved in Ignition (USA)

Equipment involved in ignition	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
None	865	56	6.1	82.4
Other or unknown	523	39	6.9	
Cord, plug	44	3	6.4	4.4
Stove, etc	74	3	3.9	4.4
Fixed local heater	73	2	2.7	2.9
Power switch gear	23	2	8.0	2.9
Cutting, welding et	12	1	7.7	1.5
Portable stove	7	1	12.5	1.5

CESARE Risk: Aged Care Statistics

Casualty Severity by Form of Heat of Ignition (USA)

Form of heat of ignition	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Other or unknown	986	49	4.7	
Cigarette	447	36	7.5	62.1
Match	108	12	10.0	20.7
Short circuit, arc	124	4	3.1	6.9
Candle, etc	5	3	37.5	5.2
Heat from liquid fu	8	2	20.0	3.4
Spark, etc from ga	10	1	9.1	1.7



CESARE Risk: Aged Care Statistics

Casualty Severity by Form of Material Ignited (USA)

Form of material ignited	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Other or unknown	1288	75	5.5	
Upholstered chair, etc	82	19	18.8	59.4
Mattress, pillow	213	7	3.2	21.9
Electrical wire, insulation, et	129	2	1.5	6.3
Multiple forms	57	2	3.4	6.3
Fuel	29	1	3.3	3.1
Gas or liquid from pipe or co	22	1	4.3	3.1

CESARE Risk: Aged Care Statistics

Casualty Severity by Familiarity (USA)

Familiarity	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
< one day	40	2	5.0	3.1
1 to 7 days	10	1	10.0	1.5
8 to 30 days	23	2	8.7	3.1
1 to 2 months	39	4	10.3	6.2
3 to 6 months	74	2	2.7	3.1
7 to 12 months	77	8	10.4	12.3
> one year	655	46	7.0	70.8
other	949	42	4.4	

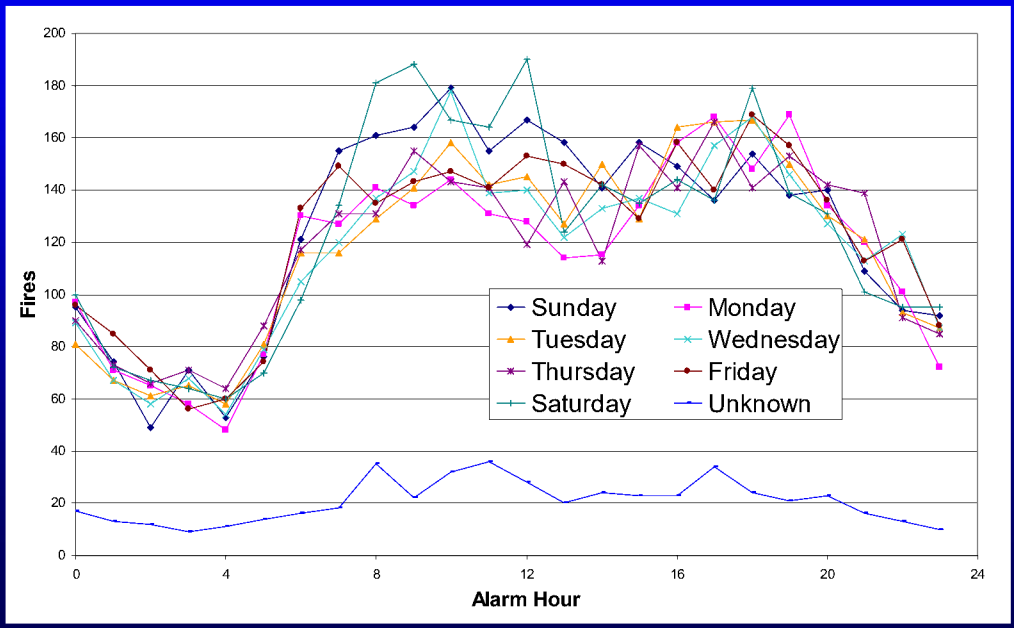
CESARE Risk:
Aged Care Statistics

Casualty Severity by Type of Casualty (USA)

Type of casualty	Civilian Injuries	Civilian Fatalities	Fatalities as % of Known Casualties	Fatalities as % of Known Fatalities
Fireground, before FB arrival	1321	90	6.8	100.0
Fireground, after FB arrival	264	0	0.0	0.0
During response or return	102	0	0.0	0.0
other or unknown	180	17	9.4	

CESARE Risk:
Aged Care Statistics

Fires by Day of Week and Alarm Hour (USA)



CESARE Risk: Aged Care Statistics

Fires and Casualty Rates by SDC (USA)

SDC	Fires	Rate of Fire Fighter Injuries	Rate of Civilian Injuries	Rate of Civilian Fatalities	Average Estimated $ Loss
NNN	337	8.9	47.5	3.0	4370
YNN	94	42.6	63.8	10.6	599
NYN	736	9.5	131.8	19.0	2605
NNY	512	25.4	37.1	5.9	2074
NYY	2382	12.6	92.4	8.0	2092
YYN	1188	10.9	90.1	3.4	1216
YNY	478	12.6	94.1	0.0	1001
YYY	7022	12.4	129.9	3.1	1444