CHAPTER 6

THERE ARE TO BE NO VILLAINS, JUST HUMAN ERROR

6.1 Introduction

An analysis of the aftermath of the Summerland fire in August 1973 (chapter 5) revealed a number of faults in the building's design and management that were responsible for the high number of deaths. At this stage, it may appear to the reader that the 'facts' of the disaster have already been established and there is little more to add. However, it would be wrong to draw this conclusion because the complete picture of what happened at Summerland only emerged at the public inquiry. This chapter will present in a non-technical manner the main findings of that inquiry, and its implications for the design and management of public buildings. In doing so, attention will be drawn to differences between the press coverage and what was emphasised in the immediate aftermath of the fire and the findings of the public inquiry. In particular, this chapter will bring to the reader's attention a number of additional faults in Summerland's design and management that only became known during the public inquiry.

6.2 The public inquiry process

On 3rd September 1973, the Lieutenant Governor of the Isle of Man appointed a three-man commission to investigate the Summerland fire. The Chairman of the *Summerland Fire Commission* (SFC) was The Hon. Mr Justice Joseph Cantley OBE, a presiding English judge of the Northern Circuit and a former Judge of Appeal in the Isle of Man. The other two members of the Commission were Mr P.S. Wilson-Dickson, the second in

command of the UK Home Office Fire Inspectorate; and Professor Denis Harper, the Head of the Department of Building at the University of Manchester's Institute of Science and Technology (UMIST). The Commission held a preliminary public meeting at the Villa Marina on Douglas seafront on 9th October 1973 to explain procedures and to take applications for legal representation. There were ten parties to the inquiry (**table 6.1**). The parties encompass those persons and organisations involved in the design and management of Summerland as well as those affected by the tragedy.

Table 6.1: Parties represented at the Summerland inquiry

Architects	James Philipps Lomas (Principal Architect)
	Gillinson, Barnett and Partners (Associate Architect)
Local Authorities	Douglas Corporation
	Isle of Man Local Government Board
Suppliers/manufacturers	Rohm and Haas (manufacturers of Oroglas)
	W J Cox (fabricators of Oroglas)
	Robertsons (suppliers of Galbestos)
Management of building	Trust House Forte
Victims	Relatives of the dead and injured
Cause of fire	The three Liverpool schoolboys

Each party was represented by a lawyer and had the right to cross-examine witnesses. These witnesses included representatives of the other parties, survivors of the fire and expert witnesses who were called upon to

provide valuable background information against which the facts could be set. During the inquiry, the Commission would have thus heard several different takes on the same subject, be it the adequacy of escape routes or the use of Oroglas acrylic sheeting. As *Summerland Fire Commission* member Wilson-Dickson (1974: 8) commented: "There is much more to a public inquiry than getting at the facts; there is the difficulty of establishing what *construction* to put upon the facts". The Treasury Solicitor was responsible for organising the inquiry and ensuring the Commission was adequately briefed about the matters that would be dealt with when the parties gave their evidence. The inquiry's Chairman decided that the Commission was not responsible for allocating liability to the different parties in a numerical sense, e.g. architects x%, Trust House Forte y%. That would be the function of any later civil court procedures.

The hearing of the evidence began on 19th November 1973 and ended on 13th February 1974 (with a break for Christmas). Over the course of 49 days, the Commission heard evidence from 91 witnesses (which amounted to two million words of testimony), inspected the site of the fire several times and watched cine films of the tragedy. Each witness was asked "about what they wrote, about what they said and about what they thought" often right back to 1965 when the Summerland project was on the drawing board. Wilson-Dickson (1974: 10) recalled:

> "People were shown to have short memories, careless habits, inefficient office procedures, and all sorts of attitudes towards their job, towards the public and towards safety from fire… When a disaster occurs and a public inquiry is held, one begins to realise how riddled with potential failures the average human being is."

The Commission's 40,000 word report into the disaster was released for publication on Friday, May 24th, 1974, and that morning's newspapers carried reports of the main findings of the inquiry. The cost of the inquiry was around £400,000.

6.3 Factors in the loss of life

What are the three most important reasons for the appalling loss of life at Summerland? Answering this question solely from interviewing survivors of the fire and looking at newspaper reports from August 1973 (chapter 5) would probably yield the following response:

1. The evacuation of the building was delayed.
2. Several fire exit doors were locked.
3. The fire spread rapidly because the building's roof and promenade wall were built out of Oroglas.

The public inquiry also identified "delayed, unorganised and difficult" evacuation (SFC Report, Paragraph 156, Page 55) as being one of the two most important causes of the high number of deaths. On this matter, the findings of the public inquiry largely corroborate the eyewitness testimony

and the August 1973 press reports of the fire. The SFC identified "the very rapid development of the fire" as being the other reason for the large loss of life at Summerland. From the previous chapter, it would be logical to conclude from the press reports of the fire that Oroglas was primarily responsible for the very rapid development of the fire. The following statements follow on logically from this position:

1. Plastic Oroglas caused the Summerland disaster.
2. If Summerland had not been built out of Oroglas, then the disaster would never have happened.

   Deduction: plastic Oroglas killed 50 men, women and children.

Statements employing this logic are still being made to the present-day. For example, in an article to coincide with the 25th anniversary of the fire, the *Isle of Man Examiner* (Leverton, 1998, page 10) echoed public perception about the causes of the disaster:

> "Many said the tragedy would not have occurred if the building had not been built largely of plastic Oroglas."

In the same article, Manx journalist Terry Cringle made similar comments when interviewed about his recollections of the fire (quoted in Leverton, 1998, page 11):

> "….you could see the flames coming out of this strange structure and black smoke coming from the cladding, which was clear Oroglas. This melted and set off the fumes that killed most of the people."

In March 2006, the *Isle of Man Examiner* repeated the same line: "Summerland was rebuilt without the lethal plastic dome, which had been responsible for so many deaths".

To what extent is this theory supported by the facts? We saw in chapter 5 how the Fire Research Station (FRS) Team was convinced that Oroglas was only a *secondary* factor in the spread of the fire. The team believed that most of the deaths had occurred before the Oroglas had even caught fire because of the massive internal fire at Summerland's eastern end. The *Summerland Fire Commission*, whose conclusions drew heavily on the Fire Research Station's investigation, confirmed that Oroglas was **NOT** the main cause of the disaster. Moreover, Oroglas would probably not even make it into a list of the three most important causes.

> "The stage at which Oroglas become involved in the fire deserved and received special attention, particularly as there was at one time a widespread public impression that Oroglas played the primary role in the development and spread of fire within the building. This is contrary to the evidence. We are satisfied by clear and positive evidence of eye-witnesses that the Oroglas was ignited from fire within the building and was not ignited until there was a very substantial fire in the Amusement Arcade."
>
> (SFC Report, Paragraph 108, Page 39).

Whilst Oroglas played a *significant* factor in the disaster once alight, the material was a *secondary* factor in the spread of the fire. It played no role in the initial spread and development of the fire inside the building.

Indeed, the growth of the fire in its earlier stages was due to two other new building materials (Galbestos and Decalin) that had not even received a one line mention in any of the newspaper reports of August 1973. It would therefore be factually incorrect to regard Summerland *solely* as being a disaster in the misuse of Oroglas acrylic sheeting to create an artificial sunshine centre. The reason for the appalling death toll was the synergistic (combined) effect of delayed evacuation, the misuse of new building materials (Oroglas, Galbestos and Decalin), the building's internal layout (open plan design) and defects in the means of escape (staircases, exits and signage). The widely held belief that locked fire exits contributed to the large number of deaths is also not borne out by the facts because most of the fire's victims had already died on the upper-level terraces before they had the chance to reach any exit door locked or unlocked.

It is interesting to note that the findings of the public inquiry have been largely unable to overturn people's perceptions of the causes of the disaster. Summerland vividly illustrates the danger of drawing definitive conclusions about the causes of disasters from what was said or appeared to be "common sense visual logic" in the immediate aftermath of the tragedy. The implications of disasters for the design and management of public buildings can and should only be comprehended after the public inquiry process has been completed. Premature responses based solely on the evidence available in the public domain in the ten days after the disaster should be strenuously avoided.

Whilst remembering that the Summerland fire disaster was the result of a number of design and management faults that proved deadly when acting in combination, the following discussion will distinguish between:

(i) events from the time when the three boys lit the fire on the crazy-golf terrace (section 6.4); and
(ii) events from the time that flames first appeared in the Amusement Arcade inside the building (section 6.5).

Each section will be sub-divided into faults in the building's management and faults in the building's design.

6.4 The events before the fire entered the building

6.4.1 What were the actions of the staff of Summerland on discovering a fire on the crazy-golf course outside the building?

It has already been established that the fire was started by three boys smoking in the kiosk on the crazy-golf course outside the front of Summerland at Solarium floor level (section 5.10). Whereas the boys told the police that the fire was started by a discarded cigarette, the boys' Counsel admitted to the Commission that ignition was in fact caused by a lighted match. The boys were thus smoking and possibly playing with matches inside the kiosk.

An examination of the August 1973 newspaper reports suggests there was a 5-10 minute time window between the boys starting the kiosk fire at 7.50-7.55pm and the fire entering the building at around 8pm. For instance, *New Civil Engineer* magazine (9th August, 1973) reported that the fire

began “about 10 minutes before the flare-up of the walls and barrel roof” (Taylor, 1973, page 12). However, evidence presented at the public inquiry showed the kiosk fire started *much earlier*, with the Commission fixing the time as “shortly before 7.40pm” (SFC Report, Paragraph 112, Page 41). This timing was partly based on evidence from Miss Susan Appleton (19), who worked in a shop unit on the Solarium floor. When Miss Appleton saw smoke from the crazy-golf course drifting into the Amusement Arcade through an open window, she looked at her watch and it said twenty minutes to eight. There are no reasons to doubt the reliability of Miss Appleton’s evidence. The staff of Summerland thus had a much longer period (~20 minutes) to deal with the developing crisis than the August 1973 reports suggest. It is their actions that form the focus of the remainder of this section.

Mr William Roberts (30), a PE teacher from Winsford in Cheshire, saw black smoke emanating from what he initially thought was an incinerator on the crazy-golf terrace. The kiosk was also mistaken to be a ventilation shaft by another eyewitness, who claimed he saw youths stuffing paper into it. The same witness said that seconds later he saw the same youths allegedly playing with matches and setting the paper alight. As it was approaching dusk, one nine-year-old eyewitness standing close to the Hilton Hotel on Douglas seafront thought the fire “was someone with a torch”. Mr Roberts ran into the building and spoke to Mr Lawrence Shaffer, the House Manager, at the main entrance about the fire. At first, Mr Roberts’ concerns were met with indifference. He told the public inquiry: “I shook the man [Mr Shaffer] violently and told him ‘There is a bloody fire out there. Can’t you stop it?’” Mr Roberts was later reassured when he saw

the doorman speaking to another member of staff who then spoke into a walkie-talkie radio. Other holidaymakers also saw the fire and reported it to members of staff. Summerland's Technical Services Manager and Fire Officer was Mr Ken Harding (46). He was leaving Summerland by a rear entrance around 7.50-7.55pm when a security man drew his attention to smoke coming from the crazy-golf terrace. Mr Harding re-entered the building and ran to the terrace, where Mr Roberts was trying to extinguish the fire. Mr Roberts tried to use a chemical fire extinguisher as well as water, but could not get the extinguisher to work. Mr Harold Brown, a fireman from Warrington in Cheshire, also tried to find an extinguisher without success. Mr Brown had visited Summerland in 1971 and had expressed concerns at the time about safety standards inside Summerland. He told *The Warrington Guardian* (10th August, 1973): "I noticed…when the Summerland centre opened that there did not appear to be any firepoints, and when I pointed this out to an attendant I was told: 'It is fire-proof. We don't need them'." There were, in fact, 14 standard rubber fire hose reels (diameter = 0.75 inches) inside the building. Mr Harding ran back into the building and spoke to Mr Mack Keith McEarchern (26), the Bar Manager and Acting Deputy Manager, who died in the fire. When Mr McEarchern told the Technical Services Manager that the fire brigade had been called, Mr Harding unrolled a fire hose reel in the Amusement Arcade and passed it through an open window to people on the terrace outside. Their firefighting attempts were unsuccessful partly because the fire had spread into the Galbestos wall and the concealed gap behind it (section 6.4.2). In addition, the firefighting operation was hindered by low water pressure, which may have been caused by the hose becoming trapped or kinked. Indeed, Mr Roberts said the water pressure in the hose was lower than the one he

regularly used in his garden. “A man was using what appeared to be a garden hose with a special end like the spray of a watering can. The sprinkle of water was totally inadequate”, he said. The police had received complaints of low pressure in the hoses before the fire and sent an engineer from the Isle of Man Water Authority to investigate. The engineer Mr Henry Cannell said each hose was capable of supplying at least 50 gallons of water per minute, but this amount could be reduced if the valves were not set correctly. At the public inquiry, it emerged that members of staff had been using the hose reels for washing cars and watering plants. This practice was allowed to continue despite advice from the local water board warning of the limited supply capacity. However, it could be argued that limited use of the hose reels for such purposes was a *good* thing. It would have at least given the staff familiarity with using the equipment. Furthermore, the staff would probably have reported any problems encountered to Summerland’s fire officer that would otherwise have gone unnoticed. It is a matter of conjecture whether the misuse of fire hose reels at an earlier time had contributed to the low water pressure on the evening of the fire.

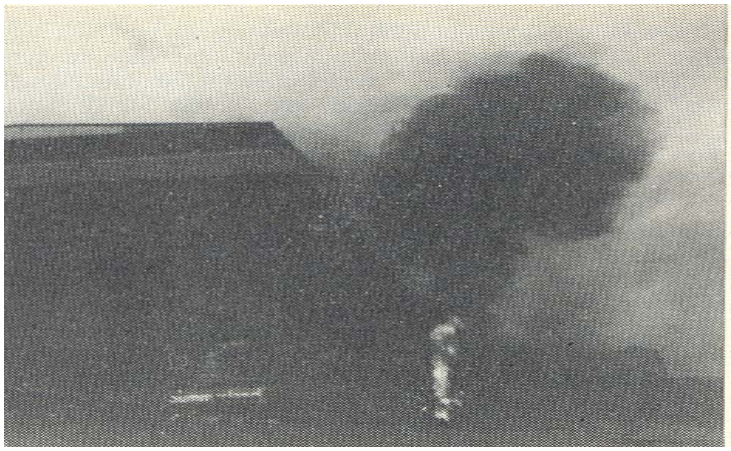

Figure 7.1: Smoke and flames rising from the kiosk fire (Source: *Royal Institute of British Architects Journal*, July 1974, page 16)

At this stage, Mr Harding and his team thought they were dealing merely with an *external* fire (**figure 7.1**); in reality, unknown to everybody, the kiosk fire had started an *internal* fire in a concealed gap between Summerland's internal and external walls. The properties of these walls will be considered in detail in section 6.4.2. Mr Harding thought the external wall was built out of standard steel and would prevent an external fire breaking through into the building. "The flames were…licking the *steel* cladding", he told reporters. The fact that the fire was *only visible outside the building* between 7.40-8.00pm must always be remembered when evaluating the response of the staff to the situation. If the fire had started *inside* the building, then the staff would undoubtedly have reacted in a completely different manner.

Shortly before 8pm, Summerland's General Manager Mr Anthony De Lorka (34) was working in his office on the floor below the crazy-golf course (the Upper Downstairs Level). When he left his office around 8pm,

he heard a radio message from the House Manager, Mr Shaffer (25), about the fire on the golf course. The tone of Mr Shaffer's message suggested to Mr De Lorka that the fire was a minor incident outside the building. Consequently, Mr De Lorka felt it was unnecessary to telephone the Control Room and instruct Miss Hardy to make an announcement over the public address system. As the General Manager usually switched off his radio when he was working in his office, it may be that Mr De Lorka had missed earlier messages about the fire. Mr Lorka went to the golf terrace, where flames more than six feet high were causing the Galbestos wall to become discoloured. When Mr Lorka arrived at the scene, Mr Harding and other members of staff were attempting to pull the burning kiosk away from Summerland's external wall, and were tackling the fire with a hose and two extinguishers. A small crowd had gathered by this time and was watching the fire. The crowd was reluctant to move when instructed to do so, with Mr De Lorka having physically to push them off the golf course and back into the building. A few seconds later, Mr De Lorka saw thick black smoke and flames in the Amusement Arcade: the fire had broken through into the building.

Two questions logically emerge after members of staff discovered the fire on the crazy-golf course:

1. When did they call the fire brigade?
2. Did they operate the building's fire alarm system?

The call to the fire brigade

It has already been noted that the Bar Manager, Mr McEarchern, told Mr Harding, the Technical Services Manager, that the fire brigade had already been called. In fact, this was not the case. The fact that the staff had not been trained in emergency evacuation procedures meant that individuals were unsure of their own responsibilities and assumed tasks such as calling the fire brigade would naturally just happen and be taken care of by others. The first 999 call from Summerland was not made until 8.01pm, when the House Manager called the brigade from a public telephone near the building's main entrance. The delay in calling the fire brigade was remembered by Mr Jonathan Corkill (12), who at the time was about a mile and a half away from Summerland near the ferry terminal at the other end of Douglas Promenade. He said (personal communication):

> "I alerted my parents to a small plume of smoke visible from Summerland's sea-facing wall…My parents thought little of it until flames shot up [Summerland's promenade wall]. They then spread rapidly across the roof and then it appeared the whole upper volume of the building was ablaze. Shortly after, we heard the first explosion. It seemed at least 25 minutes (or more) from seeing that first plume of smoke until the first [fire engine] turned on to the promenade from our position near Strand Street. We could hear its two-ton siren coming. The pumper extinguished the siren once on the promenade because of the horse-drawn trams."

Mr Corkill's mother summarised the situation well: "It was a matter of where were they [the fire brigade]? We were looking around for them and they were nowhere to be seen". The call from Summerland was too late because Douglas Fire Station had already received calls about the blaze from two sources outside Summerland: Duggans Radio Cabs and the harbourmaster (section 4.5). People were thus still arriving and paying to enter Summerland more than 20 minutes after smoke was first seen on the crazy-golf course. Holidaymaker Mr William Roberts, who was one of the first persons to see the fire, said: "My wife, Carol, thought it was crazy. When she ran from the fire they were still taking money at the turnstiles". Meanwhile, Mr George Gibson, an ex-policeman from Leeds, told the public inquiry that he saw a man leaving Summerland with a cash-till minutes after the fire broke out. He later saw the man drive away from the building in a sports car with the till on the back seat.

The first major error – referred to as being "of cardinal importance" by the *Summerland Fire Commission* – that led to the large loss of life was the failure to call the fire brigade until 21 minutes after the discovery of the fire. The SFC (Paragraph 121, Page 43) described this delay as being "symptomatic of the general unawareness of the management of Summerland…of the importance of making proper provision for a possible fire emergency by practical organisation and training of staff". Furthermore, this delay is partially explained by the fact that members of staff thought they were only dealing with an *external* fire before 8pm. "The fire is outside, and walls resist fire, don't they?" (Barlay, 1976, page 39) must have gone through the minds of Mr Harding and his team as they fought the kiosk blaze. One major danger inherent in any firefighting party

is that the members become so preoccupied with the job in hand that they forget to call the fire brigade. "This is one of the things which happened at Summerland. The members of staff who tried to extinguish the fire were individually zealous but their efforts were useless and no-one thought of calling the fire brigade in time", said the *Summerland Fire Commission* (Paragraph 120, Page 43). The SFC then asks the question: when *should* members of staff have called 999? The Commission concludes this call should have been made one minute after water was first applied to the fire and it was evident it was not going to be extinguished quickly. FRS investigator John Webb felt the SFC should have clarified this statement by adding that the fire brigade should been called as soon as Summerland's staff had realised there was a *real* fire. "If the brigade had been summoned then, it is our view that the building might have been saved" (SFC Report, Paragraph 122, Page 44).

The fire alarm system

Summerland had both bells and sirens to warn the public of an emergency (**the public signal**). At least two fire alarm glasses (**break glass units: BGUs**) had been smashed in public areas before the fire invaded the building at about 8pm and several more were smashed by members of the public when the fire became visible inside the building. However, no public signal was given inside Summerland even when the building was completely engulfed in flames. This led to the evacuation of the building being delayed, with some people on the upper-level terraces looking down at the smoke and not realising the danger of the situation (section 5.8). The absence of any bells and sirens undoubtedly contributed to the appalling loss of life at

Summerland. It is now necessary to consider the reasons why no alarm sounded inside the building.

Summerland had a two-stage fire alarm system: **the public system and the staff system**. There were 20 break glass call points in public areas of the building. When a person smashed one of these glasses, it did not sound the bells and sirens throughout the building but instead sounded a buzzer on an indicator panel in the Control Room. It was the responsibility of the person in the Control Room to investigate the cause of the alarm and then sound the bells and sirens throughout the building if necessary. This allowed members of staff to investigate for false alarms, so avoiding the unnecessary sounding of the fire alarm. After the sounding of the buzzer, the Control Room operative could sound the alarm in two ways:

1. By holding down a 'Test' button on the alarm panel. Paradoxically, the panel's 'Sound Alarm' switch did not do this.
2. By smashing a staff fire alarm glass outside the door to the Control Room.

Whilst there was a delay built into the system to investigate for false alarms, Douglas Fire Station should have been alerted *immediately* when a public fire alarm glass had been smashed. This delay factor could be changed easily by a Summerland employee simply turning a knob on a dial on the indicator board in the Control Room. The Island's Chief Officer Mr Pearson claimed that the building's fire alarm system was geared to a two-minute time delay (chapter 5). Some people speculate wildly that the delay was only one-minute, but this seems rather unlikely for a building the size of Summerland. Larger buildings usually have longer delay times to allow

people to check around it for outbreaks of fire. In reality, it is not possible to be certain what the actual time delay was because the control panel was badly damaged in the fire and FRS investigator John Webb could "get no sensible evidence directly from it". As a result of earlier false alarms, the management of Summerland had altered the system so the call to the fire brigade was also on the delay. The management of Summerland must have employed an electrician to do this because it required altering connections *inside* the panel (John Webb FRS, Personal Communication). This modification had been made without seeking the permission of the Island's Chief Fire Officer, who would undoubtedly have vetoed such a move.

After the fire, John Webb from the Fire Research Station examined the building's alarm system to see whether it complied with the British Standard Code of Practice applicable at the time of installation. Summerland's fire alarm system "did not appear to comply" (Webb, 1974a, page 10) with the Code in two respects. Firstly, using the Cancel/Reset switch in the Control Room put too much of the alarm system out of action. Secondly, the system's power supply arrangements were unsatisfactory. There were two circuits, which were both connected to the public mains supply. One circuit fed the alarm system and the other fed the 'System Off' circuit. An emergency generator could be turned on to feed the two circuits in the event of a failure of the mains supply. The second stage of the building's fire alarm system will be considered in section 6.5.1. Mr Gordon Smith, the manager of the Aquadrome swimming baths, told the public inquiry the alarm system had initially been tested weekly, but the tests became more infrequent when Mr Harding took over as Summerland's Technical Services Manager in March 1972. In the light of the party wall

between Summerland and the Aquadrome, activation of Summerland's fire alarm system would have also triggered the Aquadrome's separate fire alarm system and vice-versa.

It is now necessary to consider the actions of the person in the Control Room on the night of the fire. This glass-fronted room (**figure 6.2**) was reached by a single flight of stairs at the western end of the first terrace. The person in the Control Room had an uninterrupted view of the Solarium floor and the three terraces at the other end of the building.

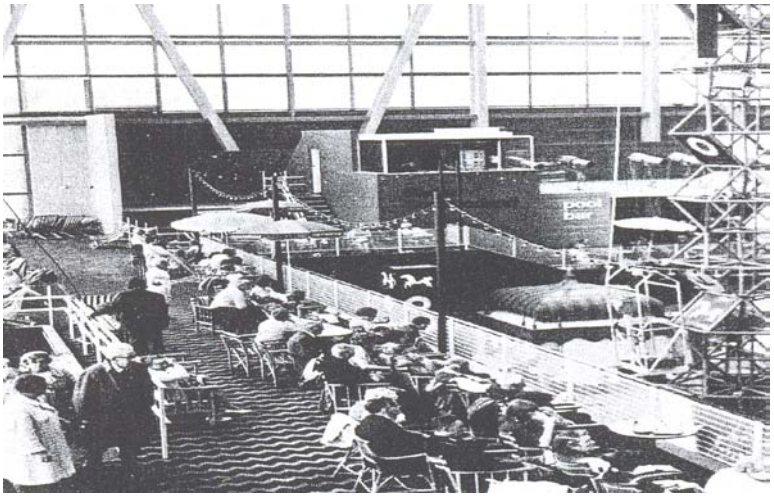

Figure 6.2: The Control Room is the glass-fronted room immediately above where 'Radio Summerland' is written
(Source: *The Summerland Story,* 1972, page 20)

As well as containing Summerland's central fire alarm panel, the Control Room operative had control of the building's public address system (PAS). The PAS could be heard throughout Summerland, with the exception of completely enclosed areas (e.g. the Marquee Showbar). The Control Room operative had the ability to over-ride other users of the system to make announcements to the public or members of staff. The room also had a

telephone, which could be used to communicate with other members of staff inside the building as well as the fire brigade.

On the evening of the fire, the Control Room was occupied by Miss Angela Hardy (19) from Newmarket in Suffolk. She had worked in the Control Room for around one month and had been on Summerland's payroll for three and half months. Miss Hardy's duties included controlling the sound and lighting equipment for the main stage on the Solarium floor; making announcements about forthcoming entertainment events in Summerland; and playing a selected programme of background music inside the building. Despite the Control Room's fundamental importance in a fire emergency, it is most disturbing that Miss Hardy "had no idea of anything to do with the fire alarm system" (SFC Report, Paragraph 167, Page 58). Although she was aware there was a fire alarm panel in the room, she had not been trained how to operate it. She had also not been told what to do in the event of an emergency. The fact that Miss Hardy reported to the Entertainments Manager and not Summerland's Fire Officer (Mr Ken Harding) sheds further light on the role of the Control Room at the time of the fire. When Summerland opened in July 1971, it is clear from the directives issued by the building's first general manager (Mr Beetles) that the Control Room had an important function in a fire emergency. Yet, by the summer of 1973, "that function seems to have been wholly lost sight of" (SFC Report, Paragraph 167, Page 58). Mr De Lorka, the General Manager at the time of the fire, told the Commission that Miss Hardy's entertainment duties amounted to a full time job and she was unaware of any additional responsibilities. Miss Hardy had received no formal training in emergency procedures from Mr Harding. Mr Harding told the Commission he had told

Miss Hardy to read a small notice on the wall in the Control Room. However, at the public inquiry, it was apparent Miss Hardy was "unaware of its contents" (SFC Report, Paragraph 167, page 58).

Miss Hardy was aware of the fire on the crazy-golf terrace outside the building and saw staff running about trying to contain the external fire. However, she was unconcerned about the situation because no fire alarm had sounded. Yet, after the first public fire alarm glass had been smashed, a buzzer should *in theory* have sounded and a light illuminated on the indicator panel directly in front of her. As Miss Hardy did not report seeing a light on the fire alarm panel, it is likely the public fire alarm system had already been put of action by fire damage to the wiring even before a break-glass unit had been smashed by the doors to the crazy-golf course (John Webb, Personal Communication). Nonetheless, when Miss Hardy realised the gravity of the situation, she could have sounded the fire alarm immediately throughout Summerland from the 'Test' button on her control panel or from a staff BGU outside the door to the Control Room. At the public inquiry, a lawyer's description of the Control Room as being the 'nerve centre of the complex' was thus immediately dismissed as being laughable by the inquiry's Chairman. He interrupted the lawyer to "observe that this was a high-sounding name for a place which was occupied by a nineteen-year old girl who did not even know what most of the switches on the alarm boxes were for" (Turner and Toft, 1989, page 193).

6.4.2 How did the fire outside Summerland enter the building?

Colour Galbestos steel sheeting

The fire was able to enter Summerland because the building's external wall by the ruined crazy-golf course kiosk did not possess two hours' fire resistance. This wall, together with the entire eastern elevation of Summerland at Solarium floor level and above, was built out of Colour Galbestos, a rolled steel sheet (**figures 6.3** and **6.4**). The Galbestos sheeting, which was supplied by H. H. Robertson (UK), was coated with a mixture of bitumen and asbestos to keep the rain out. The decision to use Galbestos was taken by the architects largely to reduce costs when two other building materials proved to be too expensive. It was originally intended to use reinforced concrete. This plan was abandoned, with steel sheeting being substituted in its place. When the architects received a quote for *conventional* steel sheeting and a plasterboard lining, they also rejected the plan on cost grounds. As a result, the decision was taken to use Colour Galbestos steel sheeting. The Chief Fire Officer was not consulted over the use of Galbestos (section 3.3).

The Colour Galbestos used at Summerland consisted of a zinc coated steel core, which was "covered with asbestos felt saturated with bitumen and then faced [on both sides] with [300 g/m^2 of] polyester resin coating" (SFC Report, Paragraph 152, Page 53; Rasbash, 1991, page 86). When the burning kiosk collapsed against Summerland, the Galbestos wall rapidly became red hot and ignited the material's combustible coating (polyester resin and bitumen) probably after around 80 seconds (Sam Webb, RIBA, Personal Communication). Rasbash (1991) estimated that the heat transfer

from the burning kiosk to the Galbestos wall was around 60 kW/m^2. This vastly exceeded the 10 kW/m^2 threshold that the material had passed in a test. Since the core (steel and zinc) of the Colour Galbestos has a high thermal conductivity, fumes were soon given off on the inner **side** of the wall after two-and-a-quarter minutes. "Strong flames" were coming from the Galbestos one minute later. The fire behind the wall could have started in two ways: by the vapours reaching ignition temperature; or by a flame coming through a gap in the Galbestos from the kiosk fire as a result of differential thermal expansion of the metal. FRS investigators noted that the site of the kiosk fire might have been close to one of the overlap joints between two sheets of the Galbestos. This might have allowed the fire to break through into the interior more easily. On ignition, flames spread more rapidly up the Galbestos sheeting than across it.

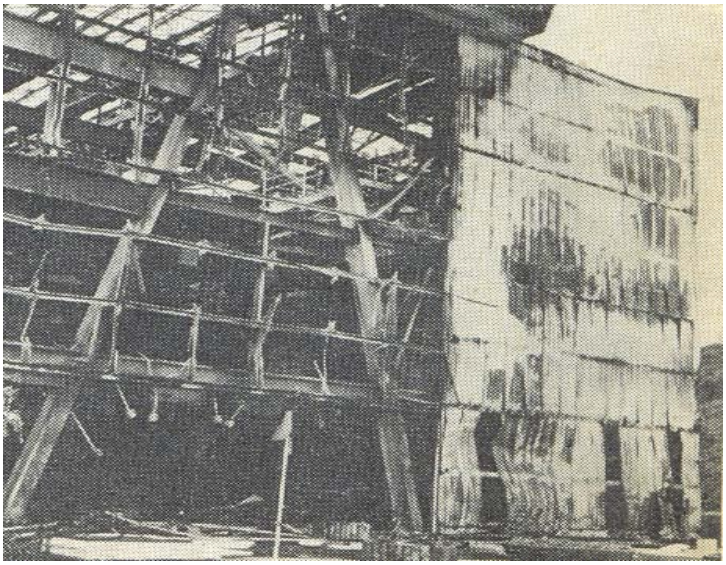

Figure 6.3: The deformed Galbestos wall after the fire can be seen on the right-hand side of this photograph

(Source: Royal *Institute of British Architects Journal*, July 1974, page 16)

Summerland was the first multi-storey public building in the British Isles to use Colour Galbestos steel sheeting. Summerland was thus unique in terms of its use of Oroglas *and* Galbestos. Despite this, Galbestos did *not* receive a single mention in the August 1973 newspaper reports of the fire (chapter 5), when attention was understandably directed at Oroglas acrylic sheeting which covered a much larger area of the complex. When Colour Galbestos was used in place of conventional steel, the architects and suppliers (Robertsons) failed to give adequate consideration of the possible fire risk. At the public inquiry, the architects "seemed to hold the view that the material [Colour Galbestos] was virtually non-combustible" (SFC Report, Paragraph 151, Page 53). The architects drew this conclusion from advertising literature from Robertsons, which the firm's managing director conceded did not set out the material's limitations clearly enough. Galbestos is combustible, has no fire resistance, and requires a suitable lining if fire resistance is required. The firm's advertising material "was not in itself clear", and "could be misinterpreted during a rather superficial and not well-informed examination" (SFC Report, as above). The *Summerland Fire Commission* continues:

> "We [concluded] that the architects who made the decision were not sufficiently knowledgeable about…Colour Galbestos to ask the right questions. It would have been helpful if Robertsons had realised this, and volunteered their assessment of the risk situation. They had the plans and they worked on the site."

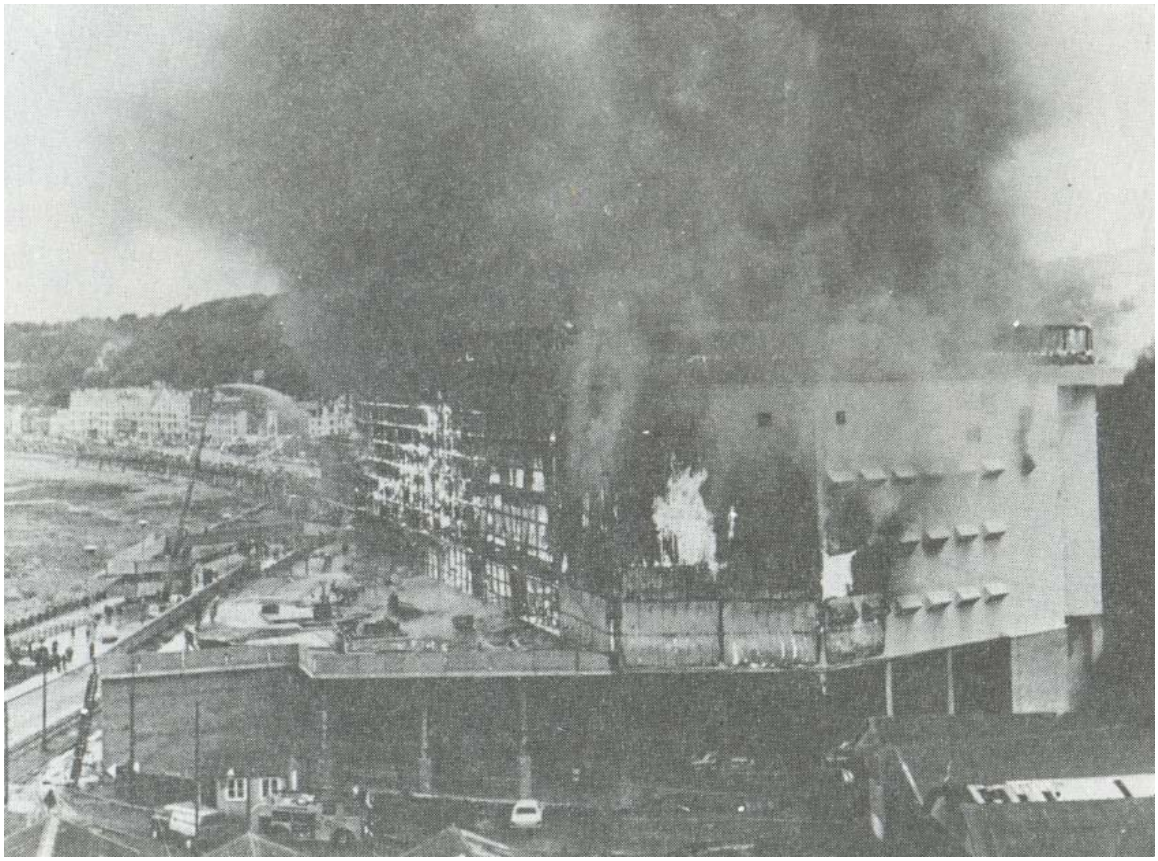

Figure 6.4: Burning Galbestos (the big flame in the foreground)
(Source: Pym, 1977, page 84)

Was the use of Colour Galbestos at Summerland a mistake? Certainly, if the external wall near the disused kiosk had been constructed out of reinforced concrete or conventional steel sheeting, then the disaster would never have happened. In the light of this, the layman would invariably conclude that the use of Galbestos *was* a mistake. However, according to the *Summerland Fire Commission* (Paragraph 123, Page 44), "it does not necessarily follow that the granting of the waiver [of Bye-law 39] and the use of Galbestos were wrong decisions". Barlay (1976: 46) commented how the Commission "produced an impressive tight-rope-tiptoeing act" when commenting on the lack of two hours' fire resistance in Summerland's

external walls. “Determined to be considerate to all and sundry, they [the SFC] gave us an example of how to have it both ways”, Barlay claimed. The argument that the lack of two hours’ fire resistance in the Galbestos wall was justified on the grounds Summerland was adequately separated from other buildings was rejected by the Commission. In particular, the Commission pointed out that a well-developed fire in the Manx Electric Railway depot could have posed a hazard to Summerland. In addition, the architects and the Manx authorities did not consider the possibility of an accidental fire on the crazy-golf terrace when they allowed the use of Galbestos for the building’s external wall. Whilst the Commission recognised it is impossible to guard against all possible external fire risks, it concluded that the use of Galbestos “was an error of judgment although it would be harsh not to concede that it was an understandable one” (SFC Report, Paragraph 124, Page 44). The Commission continued: “[Summerland] was not isolated from accidental or intentional interference by irresponsible persons and to have no fire resistance in its external wall…was in our view to take an unnecessary risk”.

During the process of designing Summerland, each decision taken could be viewed as producing either a ‘safety deficit’ or a ‘safety surplus’ inside the building. If a decision is taken that jeopardises the safety of people inside the building (a safety deficit), then at least one compensating measure (a safety surplus) should be taken to leave no overall detrimental effect on standards of public safety. Waiving Bye-law 39 (section 3.3) to allow the use of Colour Galbestos for Summerland’s external wall jeopardised standards of public safety inside the building (a safety deficit). Yet, the Commission found no compensatory measures (safety surpluses),

such as increasing the number of exits or installing a deluge system (chapter 5), had been taken to compensate for the 'safety deficit' of the Galbestos wall.

The concealed gap or void

Why did people inside Summerland not see that a fire had started on the inside face of the Galbestos wall? The simple answer to this question is that the Galbestos wall was not visible to people inside the building. This is because an internal wall had been erected that ran parallel to the external Galbestos wall. Trust House Forte (THF) was unhappy at plans to use plasterboard for this wall and demanded a material that would prevent noise in the Amusement Arcade from spreading so easily in the building.

Mr Frank, an assistant interior designer employed by Summerland's Associate Architects Gillinson, Barnett and Partners, suggested that **Decalin** (a form of fibreboard) could be used in place of plasterboard to produce a more sound-absorbent finish. Decalin is a combustible material and has the most rapid rate of flame spread (Class 4) in the British Standard 476: part 7 test. The Decalin wall was coated with plastic for easy cleaning. The decision to use Decalin was then agreed between Mr Frank and THF representatives. The use of Decalin "may well have been the biggest structural contribution to the disaster" (SFC Report, Paragraph 128, Page 46) because it created a 12 inch wide (Rasbash, 1991) **concealed gap or void** with a combustible surface on both sides: Galbestos on the outside and Decalin on the inside. Furthermore, there were inadequate fire stopping measures inside the void. The only fire stop (sprayed asbestos on expanded metal lathing) visible to FRS investigators was in a horizontal plane at

Marquee Showbar level (Summerland's fifth floor). This stop helped to prevent fire from spreading up the void for some time (Silcock and Hinkley, 1974), but "there is ample evidence that the fire stopping both horizontally and vertically as required by the Byelaws was certainly not complete in the months before the fire, though it may have been originally" (SFC Report, Paragraph 45, Page 15). It is thought the Decalin wall was fitted to fairly standard softwood studding.

Combustible voids are "a dangerous fire hazard and a serious breach of good building practice" (SFC Report, Paragraph 127, page 45) because a **fuel rich fire** of great intensity can develop in a void without anyone being aware of it. This is what happened at Summerland, when the kiosk fire breached the Galbestos wall and spread into the void behind it. It is estimated that the fire in the void started around 4-6 minutes after the external fire had become established in the remains of the crazy-golf course kiosk. This internal fire then gained intensity – but at all times being confined to the void – over the next ten minutes between about 7.45pm and 7.55pm (Time estimate by Professor Rasbash; see SFC Report Paragraph 106, Page 38). It is not known what temperatures were reached in the void, but they may have reached 1000^{o}C close to and after the Decalin wall gave way and more air became available for the combustion process (John Webb, Personal Communication). In the void itself, there was little air available for combustion (Rasbash, 1991).

In the case of the Summerland disaster, fire entered the void from outside the building. This is, however, not the only mechanism by which fire can enter a concealed void. Indeed, in August 1973, some supposed

'experts' thought the fire was caused by an electrical fault in a slot machine in the Amusement Arcade earlier in the day (section 5.3) rather than the external kiosk fire. Although this theory did not fit the clear evidence seen on site by the Fire Research Station team, it demonstrates that a concealed void is also dangerous from a safety perspective because it could conceal an electrical fire. This was a plausible scenario at Summerland because slot machines lined the Decalin wall (the inner face of the void), and there may have been electrical wiring and circuits in the void itself. As the fire developed in the void, it ignited the Decalin lining and its wooden supports, thus increasing the intensity of the fire and the combustible gases within the void.

The choice of Decalin for the internal wall of the Amusement Arcade provides one clear example of how "procedures verged on the irresponsible" (SFC Report, Paragraph 226, Page 73) during the rush to get Summerland open for the 1971 summer season. With the fitting-out work 'telescoped' into five months, the decision to use Decalin was taken in a most extraordinary *ad hoc* manner (SFC Report, Paragraph 128, Page 46):

> "Mr Frank [the interior designer] did not know the properties of Decalin and did not know that it was combustible. He had in fact seen Decalin for the first time the previous day when a trade representative produced a sample to him."

Mr Frank did not discuss the decision to use Decalin with his immediate superior, Mr Owen, an industrial designer employed by associate architects Gillinson, Barnett and Partners. Although Mr Owen noticed Decalin was being used in the revised plans, "he did not think about its fire properties"

(SFC Report, Paragraph 128, Page 46). Mr Alan Green, a senior architect at Gillinson, Barnett and Partners, was not even aware that Decalin was being used. When Mr Green compiled a list of the alterations made to the building's design in June 1971, the significance of the use of Decalin "did not register in his mind" (SFC Report, as above). The decision to use Decalin provides one illustration of how "too many important decisions [in the design of the building] were taken 'down the line' at job architect (or lower) level without ever being reviewed by the senior partners" (SFC Report, Paragraph 204, Page 68). Although Trust House Forte representatives agreed to the use of Decalin, Mr Owen and Mr Green acknowledged that it would be wrong to blame THF for that decision. This is because the company was "entitled to rely on their architects to tell them if a material was not safe to be incorporated in the building" (SFC Report, Paragraph 129, Page 46).

6.5 The events after the fire entered the building

6.5.1 The actions of Summerland staff

When Mr De Lorka, the General Manager, re-entered the building after viewing the firefighting operation on the crazy-golf terrace (section 6.4.1), he noticed smoke had entered the Amusement Arcade. Mr Harold Brown, a fireman from Warrington, was in Summerland's Restaurant with his five-year-old daughter Tracy. Mr Brown gave Tracy 2p for a hobbyhorse ride in the Amusement Arcade, but within seconds she had returned to her father holding her nose. Mr Brown went to investigate and saw black smoke billowing from a pinball machine. He recalled:

> "It smelled like an electrical fault and I asked the attendant to put out the lights and get a fire extinguisher. The lights went out, but the girl attendant did not return with an extinguisher. I decided to look for one myself, but there just wasn't an extinguisher to be found. When I returned to the machine there was a crack and a sudden surge of flame. Within seconds, fire was *racing along the ceiling* beneath the Marquee Bar."

Tracy commented recently on the BBC Isle of Man website: "I will never forget the screams and people climbing over each other to get out…I still have nightmares". Hence, the first visible sign of fire inside the building were rolling flames seen beneath the ceiling of the Amusement Arcade (Silcock and Hinkley, 1974). Miss Judith Quayle (18) said: "We noticed smoke coming from…the Amusement Arcade. It gathered in the *top near the roof* and a couple of minutes later there was a red glow which suddenly burst into flames". The flames probably broke through to the interior at the level of the Amusement Arcade's ceiling because the fire stop at Marquee Showbar level prevented the fire from rising much further up the void (John Webb, Personal Communication). The fire spread rapidly under this insulated ceiling because "the sprayed asbestos ceiling finish would [have resulted] in a minimum of cooling of the hot gas layer and a maximum flame length" (Silcock and Hinkley, 1974, page 4). One eyewitness said: "the fire burst through the [Decalin] wall and into our faces. It was like a dam bursting". When the Decalin fibreboard gave way, "a large volume of fuel rich gases was ejected into the arcade, followed by continuous flame from inside the [void]. This could have acted as a powerful ignition source for the

combustible wall surfaces…in the arcade" (Rasbash, 1991, page 87). It was estimated the flame might have been over 1 m (3 feet 4 inches) thick and capable of transferring 100 kW/m^2 to neighbouring surfaces (Rasbash, 1991). The fire invaded the building so quickly that some people were unable to escape, being overwhelmed in-situ by the smoke and flames. The *Summerland Fire Commission* reported three deaths at the back of the Amusement Arcade, but a map in the Fire Research Station report (figure 1 of Silcock and Hinkley, 1974) only shows two deaths in the Arcade (**figure 6.5**). Flames spread along the Arcade within tens of seconds. Even assuming that all the Arcade's combustible surfaces had become involved in the fire by this stage, fire investigators were puzzled by the amount of flame that poured out of the Arcade and thus on to upper-level terraces. Rasbash (1991) suggested the burning of gloss paint that may have been present on sprayed asbestos under the Arcade's ceiling might provide one possible explanation.

As Mr Lorka, the General Manager, was shouting to everyone to leave the area, the fire shot across the Amusement Arcade and into the Restaurant "as if a flame thrower had been used". Eight bodies were found in the Restaurant (**figure 6.5**). He then ran across the Solarium floor, shouting to those people who were sitting with their backs to the fire to clear the building. He then arrived at the stage, where only seconds earlier the compere (Mr Laurie Adams) had made light-hearted references (section 5.8) to the smoke in the Amusement Arcade. The compere had then told the organist Mr Mannion to play another song to reassure the audience and prevent them from panicking. Scottish holidaymaker Mr Hugh Bryce (28) said:

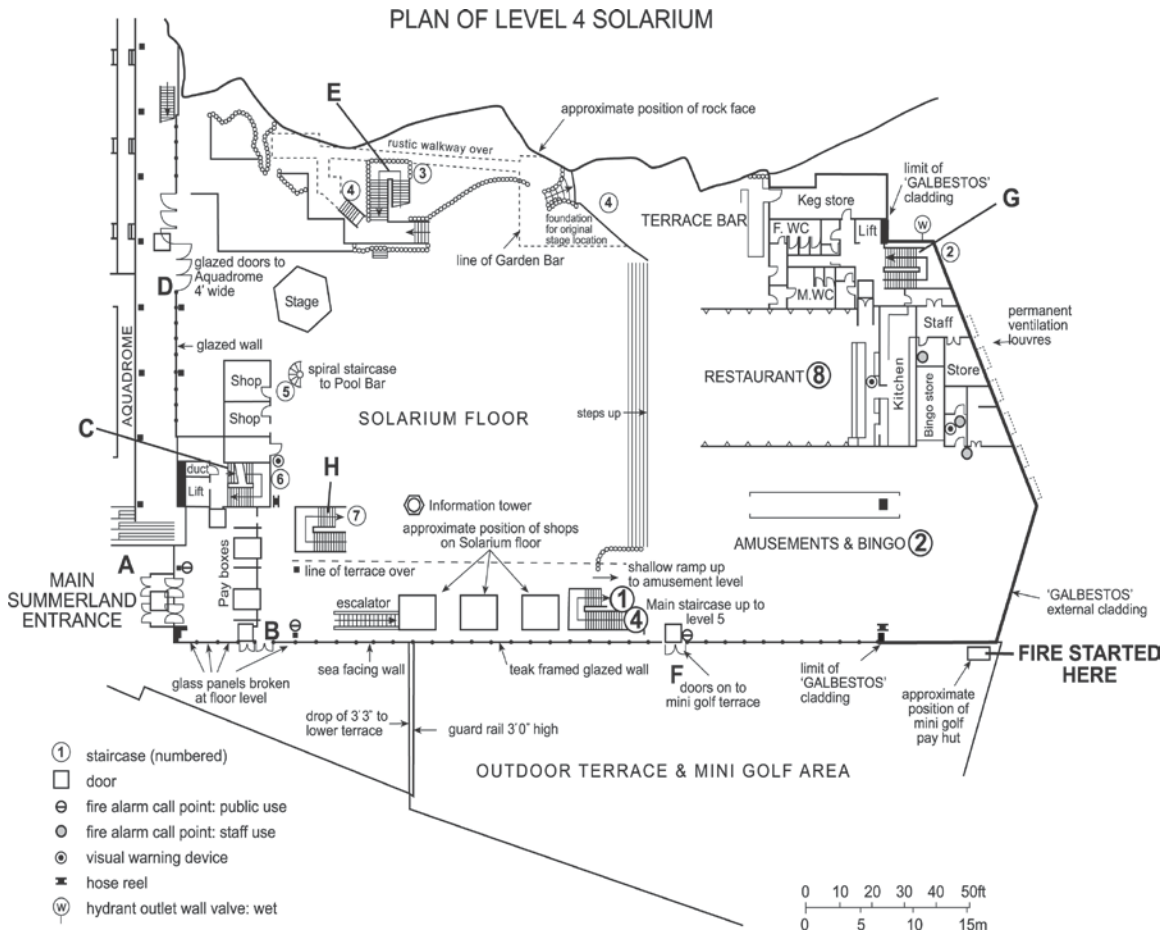

Figure 6.5 Location of the 14 bodies on the Solarium floor (bold circles) It is not known whether the four bodies near the flying staircase were on the Solarium level when the fire broke out or were descending from the terraces
(Source of figures: Silcock and Hinkley, 1974; plan embellished by Kevin Burkhill, University of Birmingham, from the original version in the SFC Report, 1974)

> "[The organist] began to play [another song], but the flames were beginning to show through the base of the column of smoke. Suddenly, without any advance warning, the compere picked up the mike and screamed: 'Everybody run! Everybody get out of here' [His announcement also contained words to the effect of: "My God, it's burning – get out."]. Total pandemonium broke out. People scattered in panic screaming, shouting and milling around. Tables loaded with glasses, many of them still full, crashed over."

The compere's words were the only public announcement made to evacuate the building. The General Manager (or indeed other senior members of staff) did not make an announcement and he certainly did not have time to climb the Administration Staircase from level 4 to level 5 to use the public address system in the Control Room. Meanwhile, in the Control Room, Miss Hardy realised the situation was serious when she saw the smoke in the Amusement Arcade turn to flames. However, she felt that it would be pointless to make an announcement because the fire was so evident in the building by this stage. She picked up her handbag and left the Control Room immediately: "there was nothing more she could do at that stage" (SFC Report, Paragraph 167, Page 58).

The fire alarm system

As people fled the inferno, bells or sirens had still not sounded inside the building. The public fire alarm system failed because the fire had damaged the wiring before a break-glass unit (BGU) had been smashed.

Miss Hardy, the Control Room operator, had also not been trained how to operate the system (section 6.4.1).

It is now necessary to consider the second stage of Summerland's fire alarm system. This consisted of seven break-glass call points (known as the **staff system**), which were generally situated in parts of the building frequented by staff only. The staff fire alarm call points could be identified by a white ring around the glass. The staff call points were not zoned, which meant it was impossible for the Control Room operative to see which one had been operated. Unlike the public system, smashing one of these glasses sounded the fire alarm immediately throughout Summerland and supposedly alerted the fire brigade without delay. For instance, as was noted earlier, there was a staff call point by the door into the Control Room, which Miss Hardy could have smashed to sound the bells and sirens. The *Summerland Fire Commission* (Paragraph 94ii, Page 35) claimed that operating a staff BGU should have resulted in a light appearing on Miss Hardy's control panel. However, FRS investigator John Webb found this was not the case when he examined a circuit diagram.

Despite the fire entering the building at around 8pm, a staff fire alarm glass was not smashed until 8.05pm by either Mr Harding in the Marquee Showbar (Level 5) or Miss Bisson in the underground disco (Level 1). This was around five minutes after the fire burst out of the void and into the Amusement Arcade. Even then, no fire alarm sounded and "it would have been too late if it had" (SFC Report, Paragraph 166, Page 57). An explanation needed to be sought as to why smashing a staff fire alarm glass had sent a signal to Douglas Fire Station at 8.05pm, but had failed to sound

the alarm inside Summerland. "The probable explanation of this [failure] is that fire had attacked the wiring in the building so that a short circuit was caused", the Commission concluded (SFC Report, Paragraph 166, Page 57). This explanation makes sense because the wiring to the smashed fire alarm call points had been damaged by the fire, whereas the wiring generally remained intact to the call points that had not been smashed. John Webb (personal communication) added:

> "It is possible that the application of voltage to the sounders may have encountered a partial short due to the damaged wiring, causing the circuit fuses to trip out, but not before the relay tripping the system to the fire station had operated."

Mr Webb believes the fire alarm system would have operated regardless of damage to the wiring if it had been battery-powered at, say, 12 or 24 Volts. In this case, the carbonised insulation would not have shorted out in the same way as it probably did for the full mains voltage used at Summerland. It can be seen that the management of Summerland made "no effective use" of the building's "elaborate" fire alarm and public address system "either to inform the occupants of the building or to sound an alarm" (SFC Report, as above). *The Summerland Fire Commission* recommended:

1. Manufacturers should try to design a fire alarm system so that the alarm always sounds even after the wiring has been damaged.
2. It must be impossible for a member of staff to turn the knob on the fire alarm's control panel to delay the sounding of the fire alarm or call to the fire station. The fire brigade should be the only people capable of turning the knob.

Locked exits on the Solarium floor

Mr De Lorka, the General Manager, ran from the stage area to the row of six glass doors (**figure 6.6**) separating Summerland from the adjoining Aquadrome swimming baths. Since Summerland and the Aquadrome were under different management systems (Trust House Forte and Douglas Corporation respectively), with separate admission charges being introduced in 1972, these doors were usually kept locked. On some occasions before the fire, chains had even been seen around the handles of these doors. Mr Harry Cole, a handyman and joiner, had been asked to make boxes for the Summerland/Aquadrome door keys in April 1973. Despite the boxes having been fixed into position by the doors, Mr Cole said no keys had been placed in the boxes before the blaze. Moreover, each box was 7 feet from the ground, which made it difficult for most people even to reach and obtain the key. As the heat was increasing rapidly, Mr De Lorka did not have time to obtain and use the key for the Aquadrome doors (which may not have even been in the box in the first place), but instead rammed the doors with a carpenter's wooden trestle. He was helped by two members of the Doncaster-based pop group *The Dave Lee Set* (Mick Kent and Mick Fletcher), who were performing at Summerland on the night of the fire. The band said:

> "We battered and battered but for nearly two minutes it refused to give. Then suddenly it shattered like a car windscreen. Behind us 400 people who had stood there almost too frightened to move poured through the shattered doors."

The *Dave Lee Set* took part in a charity concert after the fire to raise money for the Summerland disaster fund. The force of the crowd pushing through these doors was such that Mr De Lorka fell down one of the spectators' terraces of the swimming pool. He then tried to return to the doors, but was prevented from doing so because of the heat and the flames. At this stage, half of the roof was on fire, and people were throwing themselves off the terraces and on to the Solarium floor. Mr De Lorka was thus forced to leave the complex through the swimming pool entrance.

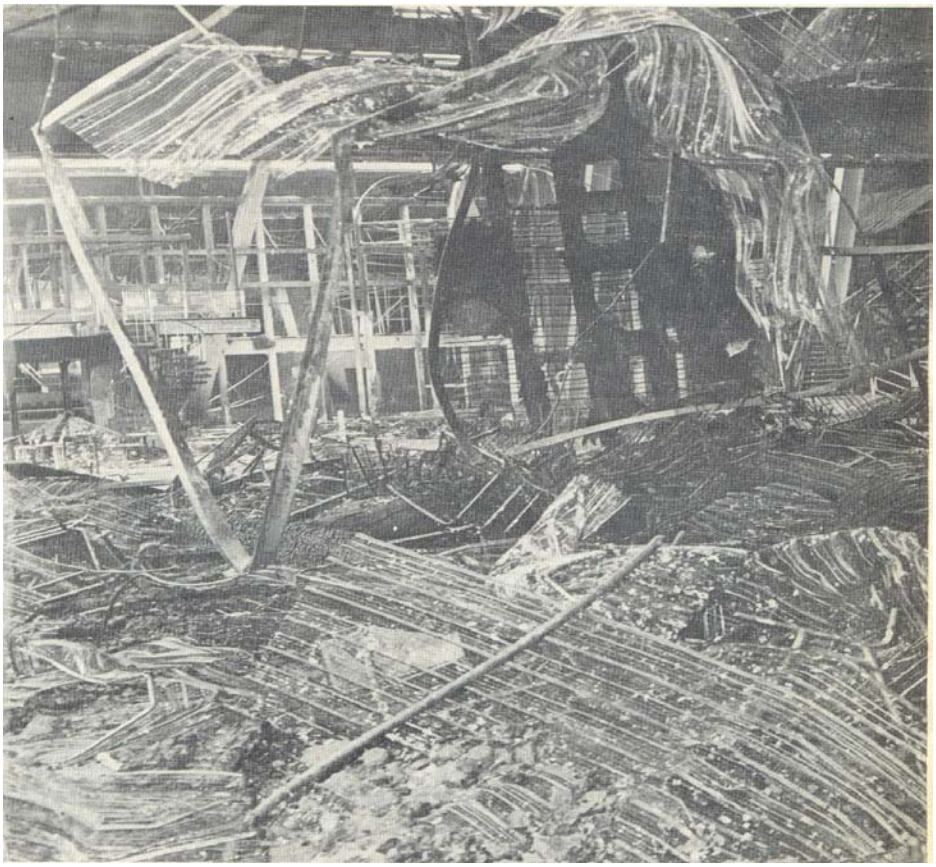

Figure 6.6: The effects of intense heat in the Solarium
The row of glass doors giving access to the Aquadrome is to the right of the spiral staircase that descends from the Pool Bar
(Source: RIBA Journal, July 1974, page 20)

Survivors' accounts attest to scenes of pandemonium around Summerland's main entrance (section 4.2), which consisted of two pairs of double doors. Mr Shaffer, the House Manager, was responsible for this area, with the members of staff in the pay boxes reporting directly to him. However, when the fire broke out, two of the three doors for which Mr Shaffer was responsible for were locked. These were one of the two pairs of main entrance doors (**figure 6.7**) and a fire exit at right angles to the main doors. Holidaymaker Mr Hugh Bryce said:

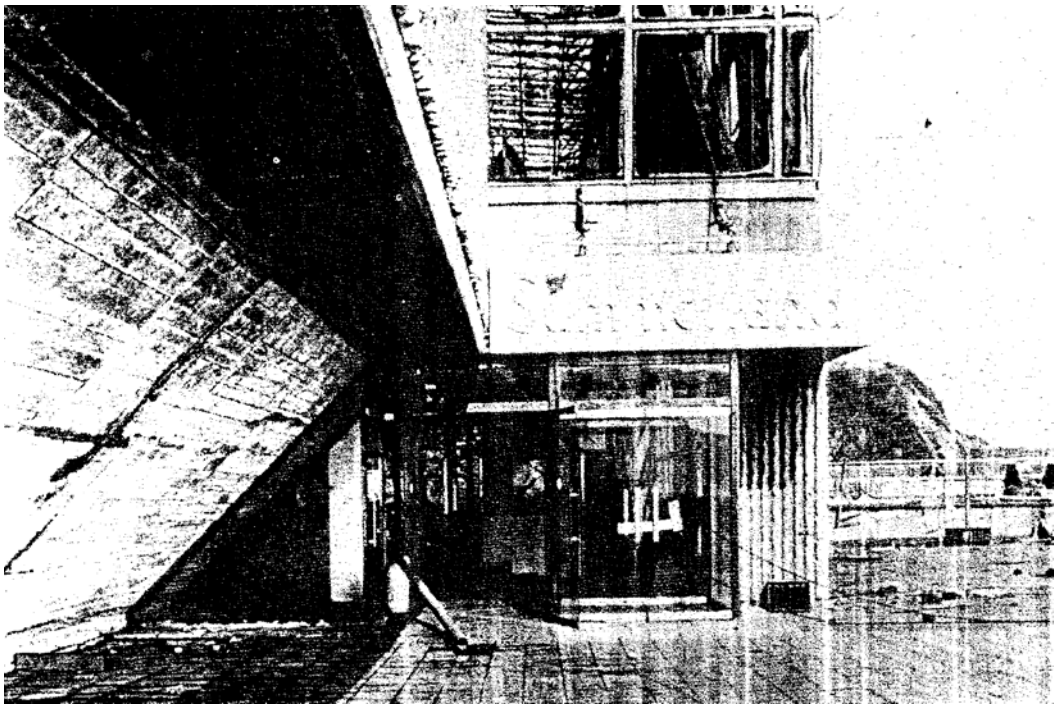

Figure 6.7: The main entrance doors after the fire
(Source: Wilson-Dickson, 1974, page 13)

> "To my horror the fire exits were padlocked and chained. A man…grappled with the chain on one of the double doors. He managed to snap off a section of it so that half the door opened. It was still too narrow for all the people to get through at once."

Mr Bill Gaynor was one of the Lancashire policemen sent to the Isle of Man to investigate the fire. During the police investigation, he said it was evident that "attempts had been made to cover up" the fact that some exit doors had been chained and padlocked at the time of the fire. Mr Gaynor even discovered some of the chains and padlocks at the home of a security officer who worked at Summerland. The security officer had apparently received instructions from the building's management to take the chains and padlocks home and clean them up (Bill Gaynor, Personal Communication). The chains and padlocks were later examined by the North West Forensic Science Laboratory at Chorley in Lancashire.

After contacting the fire brigade at 8.01pm (section 6.4.1), Mr Shaffer told the cashiers in the pay boxes to close them down. He then ran down the Administration Staircase from the Solarium floor (Level 4) to the General Manager's office (Level 3) to obtain keys for the locked doors. When he returned up the staircase to the Solarium floor, he found it difficult to open the door from the stairs because of the pressure of a pile of living bodies. As Mr Shaffer fumbled with "a handful of keys" to find the correct one, he was swept out of the building by the sheer numbers of people: the other main entrance door had finally been broken open. He then fought his way back into the building and tried without success to direct people down the

Administration Staircase in order to relieve the pressure on the main entrance doors. This attempt proved unsuccessful because people were unwilling to be shunted into an unfamiliar staircase when they could see Summerland's main entrance doors right in front of them (less than 30 feet away). Consequently, only one person out of a sample of 123 members of the public (0.8 per cent) in the Solarium descended this staircase and left Summerland via the enclosed south service yard (Sime, 1984).

Meanwhile, the Technical Services Manager had by this time arrived in the main entrance foyer. Mr Harding could see that the fire exit at right angles to the main entrance doors was locked. Accordingly, he broke the glass box containing the key and managed to open one of these two doors. With the assistance of others, Mr Harding then smashed windows alongside these doors to provide additional passage for the crowd. Contrary to the initial press reports of the fire (section 4.2), no deaths resulted from the crushing and mayhem around the building's main entrance. Most of the deaths and serious injuries occurred on or near the staircases that descended from the terraces (flying staircase and NE service staircase: see section 6.5.2). It is common practice today, and indeed for many decades prior to the Summerland tragedy, for emergency exits to be secured by panic bolts. In other words, a person pushes down a bar on the inside in order to open the door. However, this system was not used for the Solarium floor's fire exits probably on the grounds of cost and the perception of them being a security risk (John Webb, Personal Communication) with gatecrashers sneaking into the building without paying. The doors were instead secured with mortice locks, with the keys for the locks being kept in glass-fronted boxes by the doors. This system for locking doors had been approved by the Isle of

Man's Chief Fire Officer, who naturally assumed members of staff would unlock the doors immediately in the event of an emergency. Indeed, in 1973, this system was commonplace in public entertainment buildings, and was generally regarded as being satisfactory. In the light of the events at Summerland, the *Summerland Fire Commission* (Paragraph 180ii, Page 61) strongly condemned this system: "We do not find this system acceptable", it asserted. The system is unsatisfactory because it does not allow people to exit the building immediately; precious seconds are wasted in obtaining the key and then turning the key in the lock. Furthermore, as the experience of Mr De Lorka showed, it is often difficult even to obtain the key in the first place when crowds of people are pushing against the doors.

Whilst the locked doors were the main cause of the pandemonium around the main entrance, there were other factors involved. Firstly, the presence of two pay boxes only 16 feet from the main entrance narrowed the escape width to the main doors by nearly 50%. Secondly, by the pay boxes, turnstiles impeded people's escape from the building (section 4.2). Miss Appleton, who ran a shop unit on the Solarium Floor, said:

> "People were trying to get through the pay boxes and the turnstiles and there was a pile of bodies by the doors. People were being pushed up against the pay boxes and becoming trapped between the turnstiles and the pay boxes."

There were five turnstiles and a pair of swing gates, which allowed prams, pushchairs and wheelchairs to enter the building. The turnstiles and the swing gates could not be dismantled, with the swing gates being fixed to a steel post set in concrete. A woman from Hazel Grove near Manchester had

visited Summerland with her husband in June 1973 and was alarmed to see turnstiles inside the building. The coupled decided not to go into Summerland because they thought the admission charge was "daylight robbery". In a letter to the *Manchester Evening News* (9th August, 1973) published after the fire, she commented:

> "The first horrible thing I saw in Summerland were the turnstiles at the entrance after mounting concrete steps or ramps, so the entrance was well above ground level to begin with…I shuddered [when I saw the turnstiles]. I didn't want to go in anyway. I've always had a dread of turnstiles inside buildings. There used to be these things in toilets and difficulty getting out, or getting jammed."

Thirdly, the fire exit at right angles to the main set of doors was not completely effective because it was positioned only 22 feet away from the main entrance doors. This fire exit thus did little to relieve the pressure of people in the area around the pay boxes. Fourthly, there were other defects in Summerland's means of escape, which increased the numbers of people trying to escape through the main doors. In short, most people raced towards the main entrance doors because of faults elsewhere in the building's design and management. As Sime (1983: 36) noted:

> "The rapid movement to the exits was a consequence of a serious delay in people becoming aware of the potentially serious fire threat. The flight to the exit reflected a realistic appraisal of the encroaching fire threat."

Quantitatively, the flight to the main entrance is confirmed by the 145 witness statements given by people in the Solarium to the Manx police. 104 of these 145 individuals (72%) said they left Summerland through the main entrance doors or the glass fire exit doors positioned 22 feet away from the main entrance (Sime, 1983). It is not known precisely how many people were in the Solarium when the fire broke out, but the numbers certainly ran into several hundreds. Given that the architects claimed the Solarium level had been designed to accommodate 1,150 persons (*Summerland Fire Commission*, paragraph 217, page 71), it can be estimated that over 800 people may have been trying to escape through these doors. The behaviour of people on the Solarium floor during the fire was consistent with what is termed "the affiliative model" in psychology literature, which argues that "in an emergency people are even more likely to be drawn toward the familiar than under normal circumstances" (Sime, 1985, page 701). That is, a person has a tendency to leave the building by the same exit as they entered the building rather than using shorter alternative routes. This is confirmed by the fact that 72% of holidaymakers retraced their steps to the main entrance compared to only 50% of staff members (Sime, 1984). Butcher and Parnell (1983: 307) go as far as to suggest that people unfamiliar with a building's layout will only use alternative escape routes which they can see lead directly out into the open air:

> "People normally try to leave a building by the way they came in unless there are strong visual clues to an alternative – such as a door in a wall which also has windows through which the ground outside can be seen. Even if the need to escape is not felt to be urgent people seem to prefer to do the 'normal' [i.e. retrace their steps and return to the main entrance]"

Combined with inadequate fire exit signage, this explains why few holidaymakers used the three staircases leading down from the western end of the Solarium floor (Carousel, Cinema and Administration staircases) to the safety of the Upper Downstairs level as escape routes from the fire. *New Civil Engineer* magazine (9th August, 1973) reported that many fire exit signs were "fairly indistinguishable" because of the richly decorated interior. The crazy-golf course exit and the fire exit at right angles to the main entrance led directly out into the open air and thus were more popular escape routes from the blaze. Mr Harding acknowledged that members of staff should have directed people to other escape routes away from the main entrance doors. However, he added:

> "The biggest number of staff were girls. You cannot expect them to stand their ground and be burnt to death. Everybody ran; everybody; and there was no one left. The staff reacted like I would expect girls to react – they ran."

In the light of Mr Harding's comments, it is rather ironic that the person receiving the most praise from the *Summerland Fire Commission* was the female manageress of the Marquee Showbar (section 8.2). Mrs Wynne-

Smythe showed exceptional bravery, delaying her own departure to ensure the safety of others.

6.5.2 Defects in the means of escape

> "We've been doing enough shouting. We think there's never been enough escape routes put into that building. [Staircases were needed] for people to go down from floor to floor, and out onto the main road…We've heard lots of people saying that it's been badly made as far as [the means of escape] are concerned. Because the means of exit in case of an emergency were limited."
>
> (A man interviewed by an ITN reporter and quoted on News at Ten, 3rd August, 1973)

The *Summerland Fire Commission* (Paragraph 171, Page 58) identified three main areas where the means of escape from the building were inadequate. These were the main entrance (section 6.5.1), the flying staircase and the NE Service Staircase. Whilst most of the deaths occurred as people escaped from the three terraces by the flying staircase and the NE Service Staircase (**figure 6.8**), ten or eleven deaths still occurred at the eastern end of the Solarium floor in the Amusement Arcade and the Restaurant (section 6.5.1).

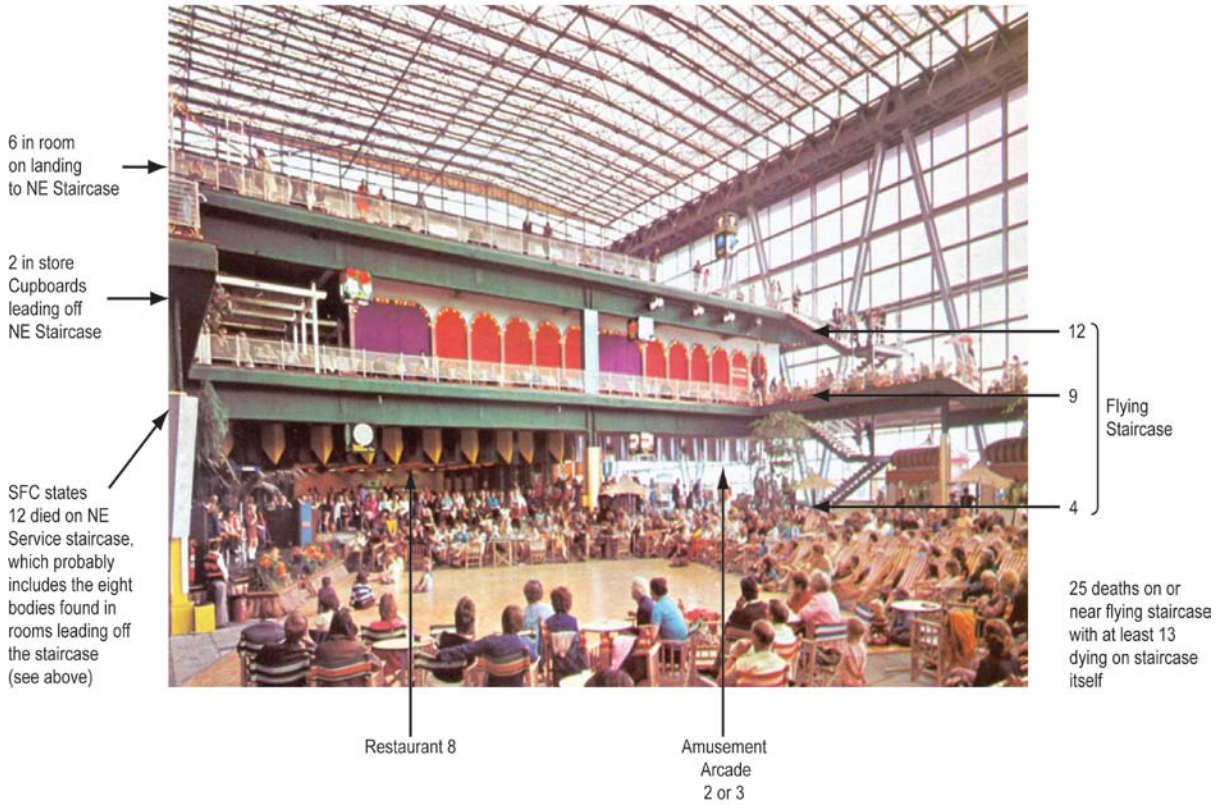

Figure 6.8: The distribution of bodies
The Fire Research Station report (Silcock and Hinkley, 1974) shows the approximate location of 43 out of 48 bodies (two died later in hospital). The *Summerland Fire Commission* (SFC) states at least 13 died on the flying staircase and 12 died on the NE Service Staircase.
(Source of Photograph: Trust House Forte Promotional Booklet; annotations by Kevin Burkhill, University of Birmingham)

Escape routes from the Solarium floor

It is now necessary to consider the exits available to people on the Solarium floor when the fire broke out (**figure 6.9** and **table 6.2**). In the NE corner of the floor was a covered staircase (the NE Service Staircase) that was reached by a double set of doors from the Restaurant. Sime (1984) estimated 6% of the public and 14% of Summerland employees at Solarium

Floor level used this escape route (**table 6.3**). Few people used this staircase for two reasons.

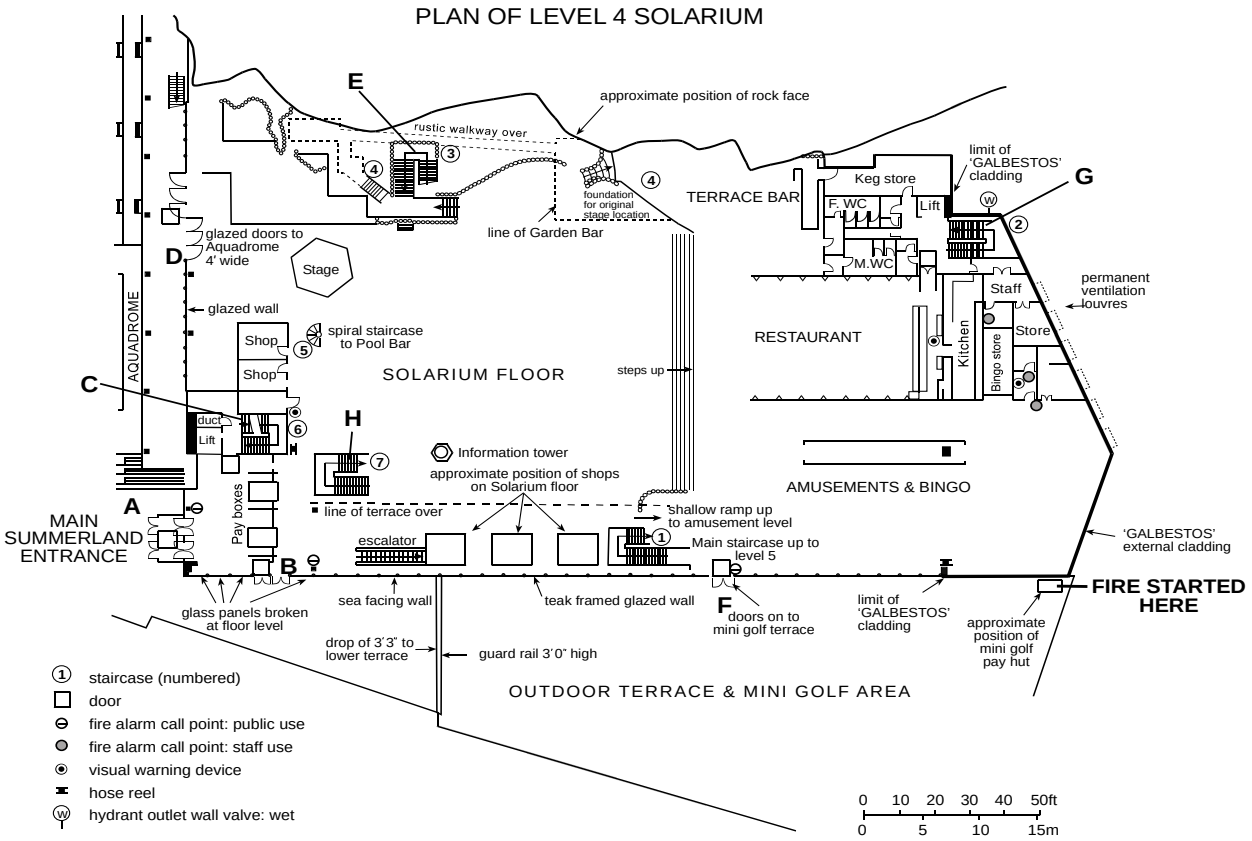

Figure 6.9: Escape routes (A, B, C, D, E, F, G and H) from the Solarium floor (Level 4). Note how six of the eight exits are at one end of the building

Table 6.2 Escape routes from the Solarium floor

The letters show the location of each escape route on figure 6.9

Exit	Description	Availability at time of fire
Main entrance (A)	Two double pairs of doors each measuring 5 feet 8 inches wide	One pair of doors was locked. Mr Shaffer (House Manager) ran downstairs for key but doors had been forced open by the time he returned
Fire exit at right angles to the main entrance (B)	Two glass doors providing a total escape width of 9 feet 4 inches	Locked Mr Harding (Technical Services Manager) broke glass box containing key and opened one of these two doors. Windows alongside these doors were smashed to provide additional passage for the crowd.
Administration Staircase (C)	Intended largely for staff usage Reached from Summerland's main entrance foyer by a door marked 'Private'	Mr Shaffer and doorman tried to persuade people to use this staircase to relieve the pressure on the main entrance doors Attempts proved unsuccessful because people were unwilling to be shunted into an unfamiliar staircase when they could see Summerland's main entrance doors only 30 ft in front of them
Aquadrome doors (D)	A row of six glass doors providing a total escape width of 24 feet	Locked Mr De Lorka (General Manager) and others smashed these doors with a carpenter's trestle General Manager said he did not have time to obtain and use a key to open these doors Doubts expressed at the public inquiry as to whether a key was actually available for these doors
Carousel staircase (E)	Like the Cinema staircase (H), but descends from the northern side of the Solarium floor near the cliff.	Not marked as an emergency exit Would have appeared risky to descend to a lower floor not knowing the extent and location of fire inside the building

Crazy-golf course exit (F)	Marked as an emergency exit Small capacity, only 4 feet 8 inches wide	Escape route closest to the source of the fire. Consequently, exit would have quickly become unavailable
NE Service Staircase (G)	Reached by a set of fire doors from the Restaurant	Not marked as an emergency exit Most holidaymakers would have been unaware of this staircase. Might have been used by some members of staff, e.g. kitchen staff
Cinema staircase (H)	A concrete stairway that descended from the Solarium floor to the Upper Downstairs level	Not marked as an emergency escape route. Furthermore, people on the Solarium floor would not have known that the floors below them were unaffected by the fire. Using this staircase would have thus seemed a risky option when the main entrance doors were only 55 feet away

Firstly, this staircase was at the end of the building where the fire started and at the opposite end to the main entrance, meaning that a person would have had to walk in the direction of the fire to reach it. Secondly, the doors from the Restaurant were not marked as providing access to an emergency escape route. The people in the Restaurant were at most 65 feet away from this emergency staircase, yet most would have been unaware that this staircase even existed. This is the reason why this stairwell was more heavily used by members of staff (e.g. kitchen staff, the band) than by holidaymakers. Consequently, most people in the Restaurant raced across the Solarium floor to either the main entrance around 200 feet away or, to a lesser extent, to the row of glass doors providing access to the Aquadrome swimming baths. The Aquadrome doors were used by 12 persons (8.3%) in Sime's sample of 145 people whom were in the Solarium when the blaze first became visible inside Summerland. The fact that these 12 persons were evenly divided

between holidaymakers and staff members (6:6) means that proportionally more Summerland employees than holidaymakers used the Aquadrome doors as their escape route from the blaze.

Table 6.3: The exits used by holidaymakers and staff on the Solarium floor when the fire became evident inside the building (Source of figures: Sime, 1984, page 285: sample size = 148. See text for details)

Exit	Members of public	Staff	Is there a significant difference?
Main entrance (A)	44%	32%	Yes, used more by public
Fire exit at right angles to the main entrance (B)	32%	18%	Yes, used more by public
Administration Staircase (C)	1%	0%	No significant difference
Aquadrome doors (D)	5%	27%	Yes, used more by staff
Carousel (E) and Cinema (H) staircases to Lower Downstairs	5%	0%	Yes, used more by public
Mini-golf exit (F)	8%	9%	No significant difference
NE Service Staircase (G)	6%	14%	Yes, used more by staff
Total number in sample	126 (Exit unknown in three cases)	22	

The NE Service Staircase was not the only example of occasions where Summerland staff used escape routes that holidaymakers could not find or did not think were emergency escape stairs. In particular, there were concrete staircases at both the northern (the Carousel staircase: E) and southern (the Cinema staircase: H) ends of the Solarium floor that could have been used as escape routes from the fire. Regrettably, these staircases were not marked as fire escapes, increasing further the pressure on the main entrance. In a sample of 145 persons in the Solarium, only 6 (4.1%) – all members of the public – descended either the Carousel or Cinema staircase to leave the building via the children's play area on the Lower Downstairs floor (Level 2). Some of these persons were parents who went downstairs to find their children. In the light of their greater familiarity with the building, it is likely that some staff members would have also used these two staircases. These employees simply fail to show up in Sime's sample, which represents less than 50% of those persons present in the Solarium when the fire broke out. The Administration Staircase (section 6.5.1), which was reached from the main entrance foyer by a door marked 'Private', was also underused. The only escape route at the eastern end of the Solarium floor marked 'Emergency Exit' were the doors on to the crazy-golf course (F). However, this exit would have soon become unavailable because it was positioned only 60 feet from where the fire entered the Amusement Arcade from the void in the wall. Consequently, only 12 persons (8.3%) from Sime's sample of 145 in the Solarium left the building by this exit (Sime, 1983). This exit was equally likely to be used by holidaymakers and members of staff. The people that escaped on to the crazy-golf terrace faced the added complication of having to climb over a fence (height = 3 feet 10 inches) in order to get away from the burning building. As the fence had

been erected on top of a concrete wall (3 feet 2 inches) (**figure 6.10**), the total drop from the top of the fence to the ground was 7 feet. The fence had been erected without the permission of the Manx fire chief to prevent people from sneaking along the terrace and entering the building without paying (**figure 6.10**).

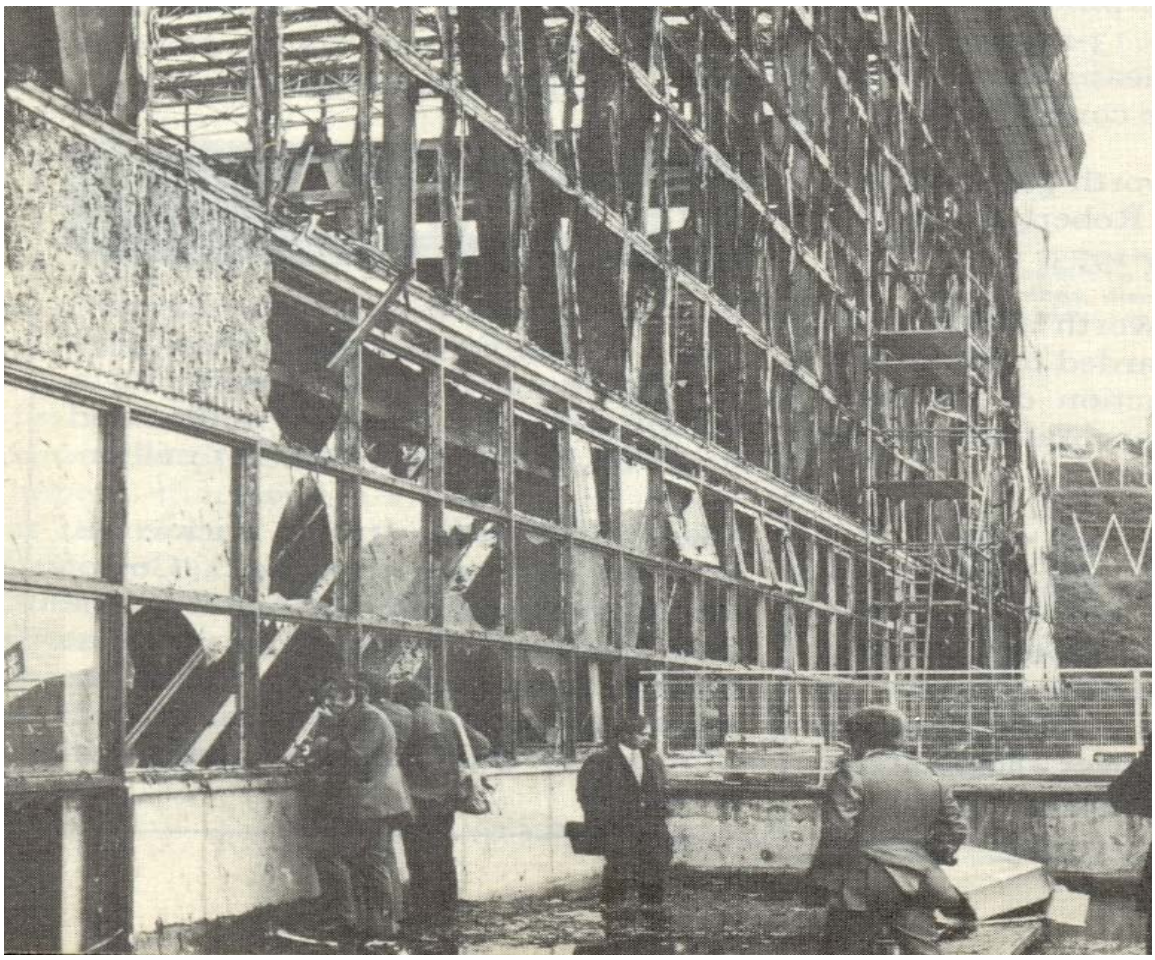

Figure 6.10: Some people escaping from the burning building had to climb over a fence that had been erected on the terrace. Note the drop of 3 feet 2 inches between the mini-golf terrace and where the press photographers are standing. The smashed windows used to escape from the fire can also been seen.

(Source: *New Civil Engineer*, 9th August 1973, page 12)

There were eight possible escape routes from the Solarium floor level (**table 6.2** and **figure 6.9**): two exits were locked when the fire broke out and another four were not signed as emergency escape routes. It is now easy to account for the scenes of pandemonium around Summerland's main entrance doors.

Escape behaviour in the Solarium

There were differences in a person's behaviour in the Summerland fire depending on whether he was alone inside the building; separated from family or friends; or in a group of family members and/or friends when the fire broke out. Sime (1983) analysed the police witness statements of 148 Summerland survivors, who were on the Solarium floor when the fire started. Twenty of these statements were excluded from his analysis because they did not contain sufficient information for Sime (1983) to deduce whether a particular individual was at Summerland that evening with family and/or friends or by himself. He found that a person had typically gone into Summerland that evening with three family members and/or friends; the largest group in the sample contained nine individuals. Sime (1983) began by investigating whether a person was first alerted to the fire by:

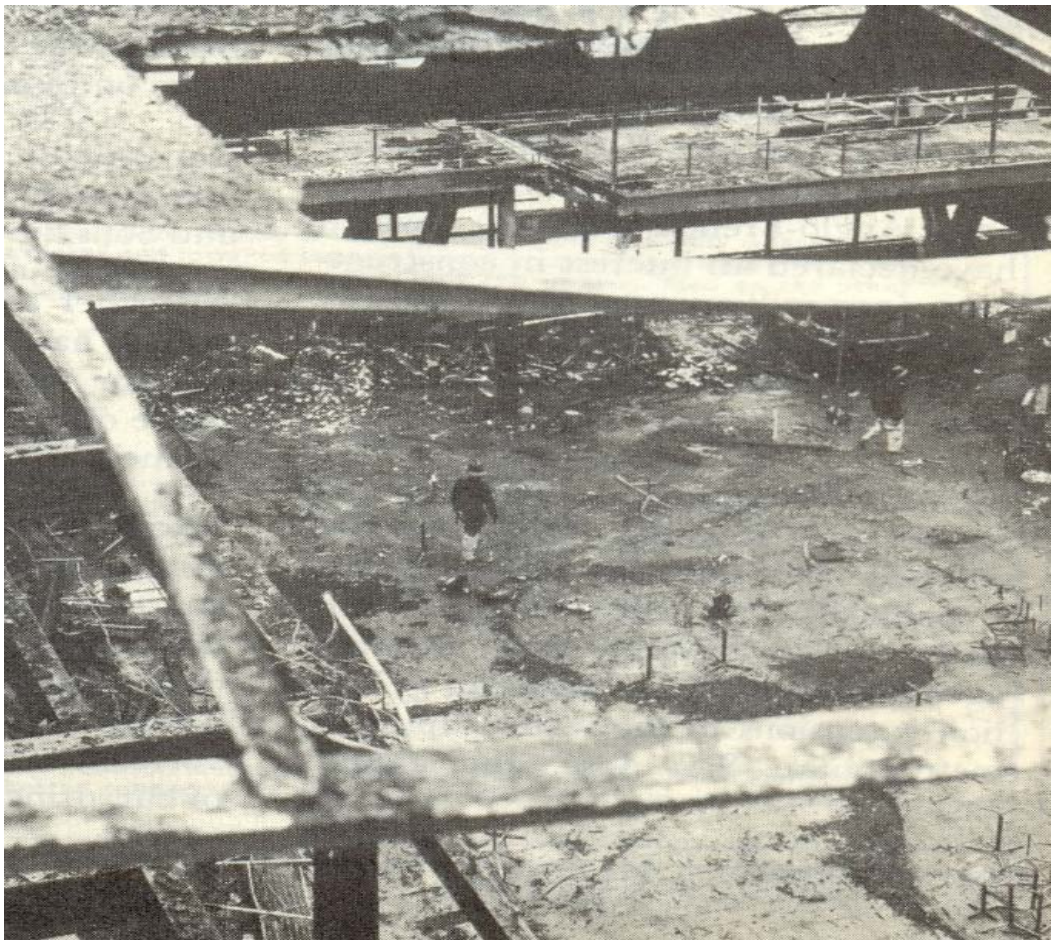

Figure 6.11: Scene of complete devastation: the Solarium viewed through the Oroglas roof after the fire. Note how the metal tables survived the fire. The main entrance is near the top right-hand corner of the photograph.

(Source: *New Civil Engineer*, 9th August 1973, page 12)

(i) *an unambiguous signal* (saw smoke and/or flames, behaviour that could not be misinterpreted, e.g. a man running with a fire extinguisher);

(ii) *an ambiguous signal* (heard noise and other people shouting and running); or

(iii) *a verbal signal* (an announcement from the stage, or from another family member or friend).

Individuals separated from other members of their group were more likely to realise that something was wrong firstly through an ambiguous signal than their group counterparts. Sime (1983: 37) attributed this difference to the fact that separated individuals would have been more "anxious for their own safety and/or group members located elsewhere in the building", and thus read more heavily into an ambiguous signal and recall it more readily in their witness statement. It may also reflect the fact that a person in a group may have been absorbed in conversation with another group member, resulting in them paying less attention to their surroundings. Similar numbers of separated and attached (with all members of their group) were first alerted to the fire by verbal means.

Sime (1983) then considers which factors influenced whether an individual was with all members of his group when he *exited* the building. The best predictor was a family group that was altogether when first alerted to the fire. 68% of these individuals managed to reach an exit and remain united with all members of their family. There were two reasons why some family groups (32%) did not remain together. Firstly, the sheer pressure of numbers meant it was inevitable that some individuals would become separated from some or all members of their family. Secondly, some parents took the conscious decision to sub-divide, with the mother and father heading off in different directions in the hope that this would increase the chance of finding their unattached children. Even among individuals separated from one or all members of their family when first alerted to the

fire, 50% (15 out of 30) still managed to reach an exit door united with their *whole family*. For Sime (1983), the high proportion of people reaching an exit with other group members demonstrates that people were not showing the selfish and animalistic traits that would be expected of "panic behaviour", where people show "an every man for himself and blow everybody else" type of attitude. Psychological ties were less strong in mixed groups (a combination of family and friends). Only 27% of mixed groups that were united when the fire became visible in the Solarium were still united when they exited the building (compare to family groups at 68%). Moreover, none of the 19 individuals that were separated from a mixed group left the building together with *all* their friends and family. The people leaving the building alone were also disproportionately (61%) from mixed groups. Sime (1983: 36) concludes mixed groups "appear to have been less concerned with maintaining group ties during flight to the exits than they might under normal circumstances".

Escape routes from the upper-level terraces

As people escaped from the Solarium floor, they were joined by hundreds of holidaymakers, together with members of staff, descending the three staircases from the terraces at the eastern end of the building (flying staircase, NE Service Staircase and Rustic Walkway). Deaths occurred on the Marquee Showbar Floor (first terrace: **figure 6.12**) and Leisure Floor (second terrace: **figure 6.13**). No bodies were found on the Cruise Deck (third terrace: **figure 6.14**), but it may be that some of the bodies found on the lower floors and staircases may have been on the top floor of

Summerland when the fire entered the building. One survivor said there were “about 30 people” in the table tennis

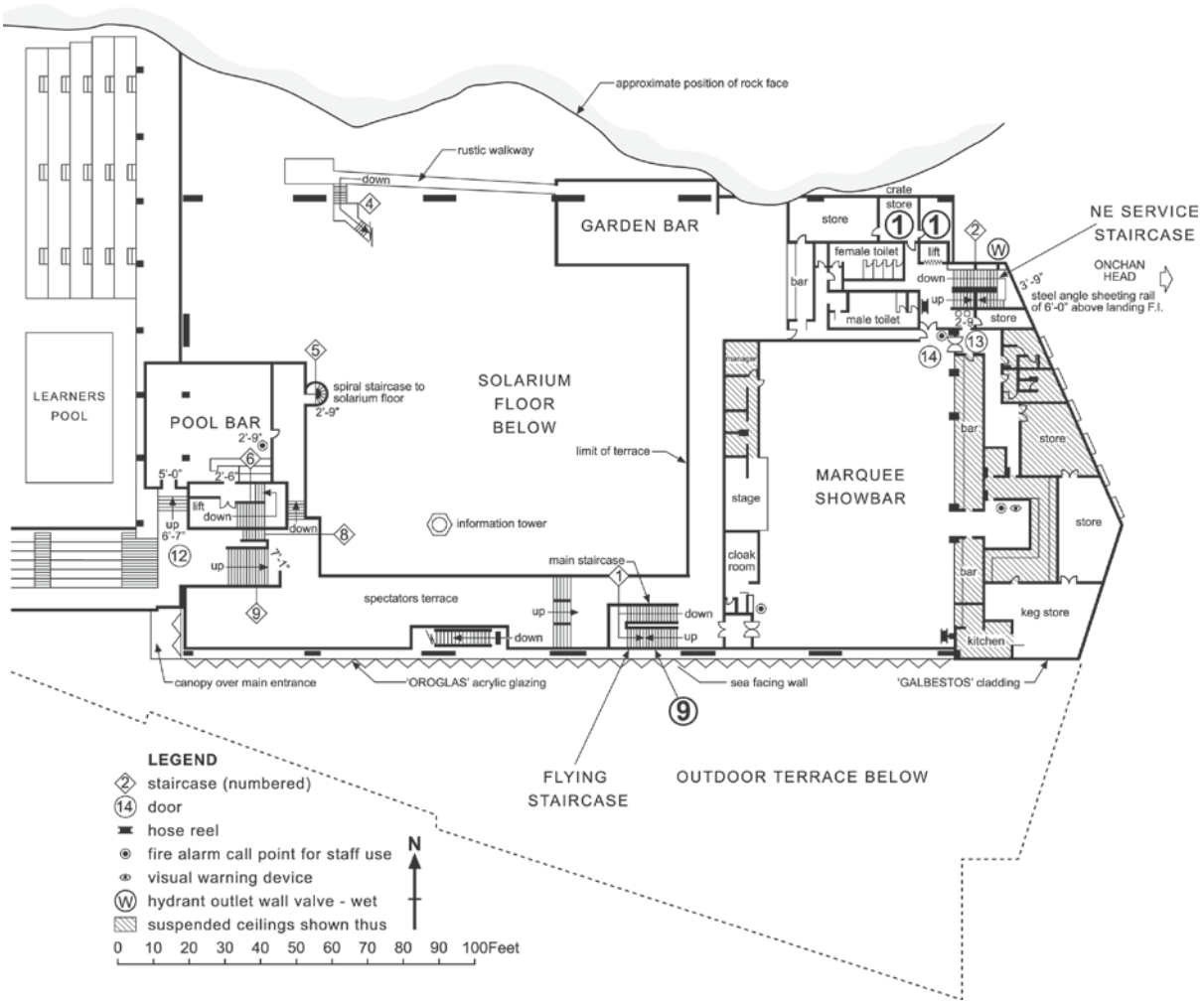

Figure 6.12: Location of bodies (bold circles) on the first terrace (Marquee Showbar). Figures obtained from Silcock and Hinkley, 1974); diagram redrawn by Kevin Burkhill, University of Birmingham, from the original version in the SFC Report (1974).

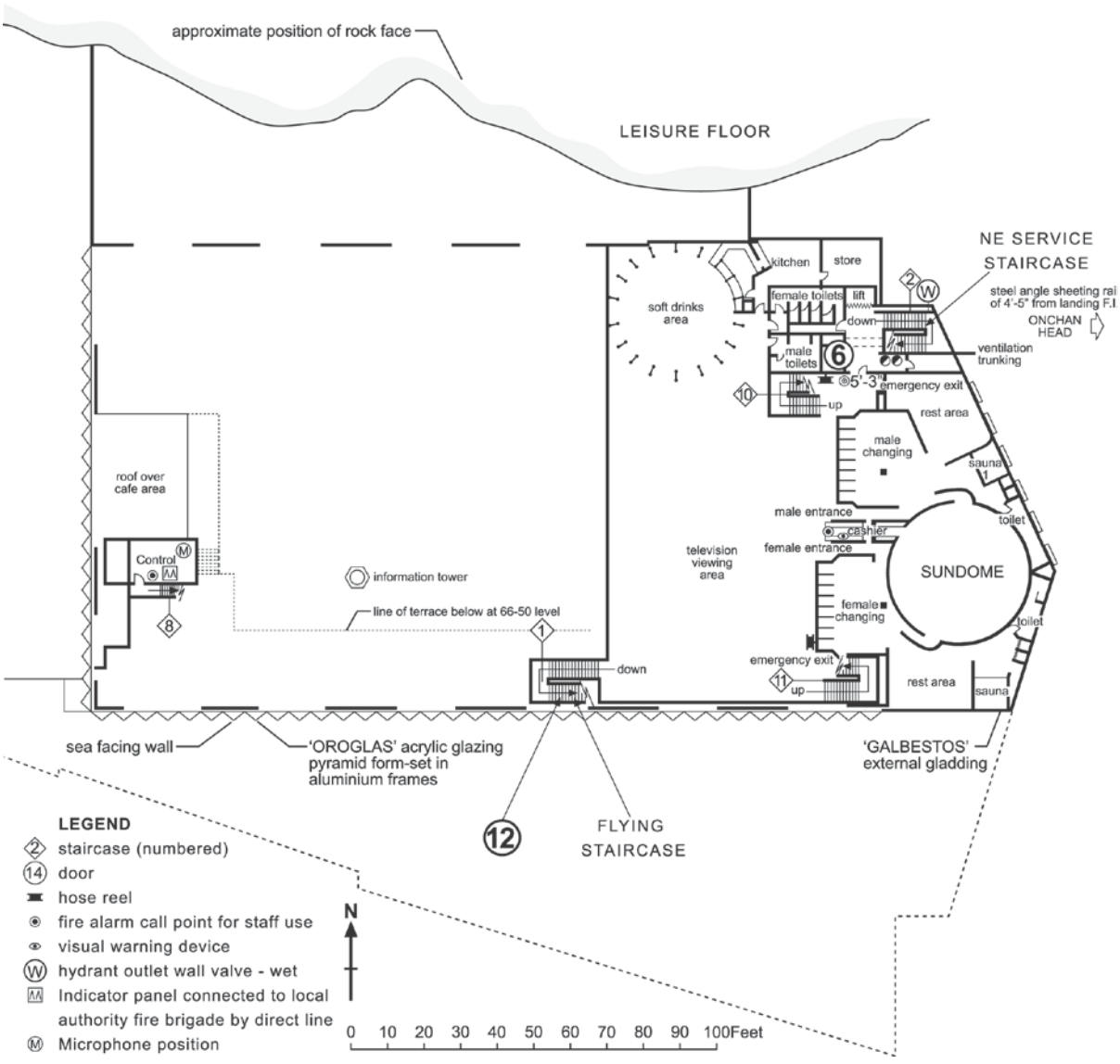

Figure 6.13: Location of bodies (bold circles) on the second terrace (Leisure Floor). Figures obtained from Silcock and Hinkley, 1974); diagram redrawn by Kevin Burkhill, University of Birmingham, from the original version in the SFC Report (1974).

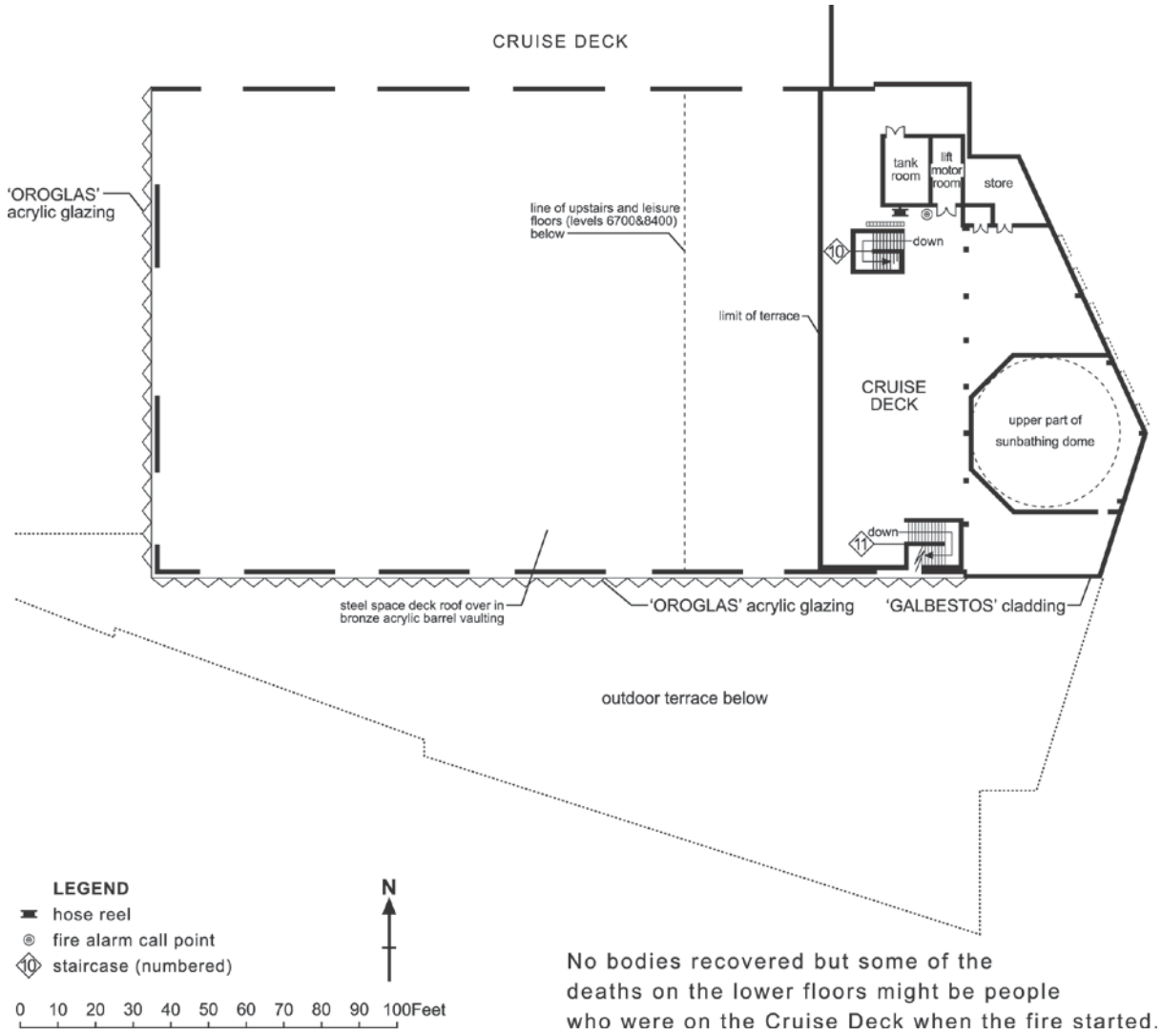

Figure 6.14: The Cruise Deck (Summerland's top floor). Diagram redrawn by Kevin Burkhill, University of Birmingham, from the original version in the SFC Report (1974).

area of the Cruise Deck when the fire broke out. A person descended from the Cruise Deck to Level 6 by using one of two open plan staircases that were positioned at either end of the floor (labelled 10 and 11 on **figure 6.14**). Once on the Leisure floor (Level 6), he had a choice of either the flying staircase or the NE Service Staircase. Two of the staircases serving

the first and second terraces (the flying staircase and the Rustic Walkway) emptied out on to the Solarium floor; the third staircase (the NE Service Staircase) was the only staircase from the terraces that descended directly into the open air.

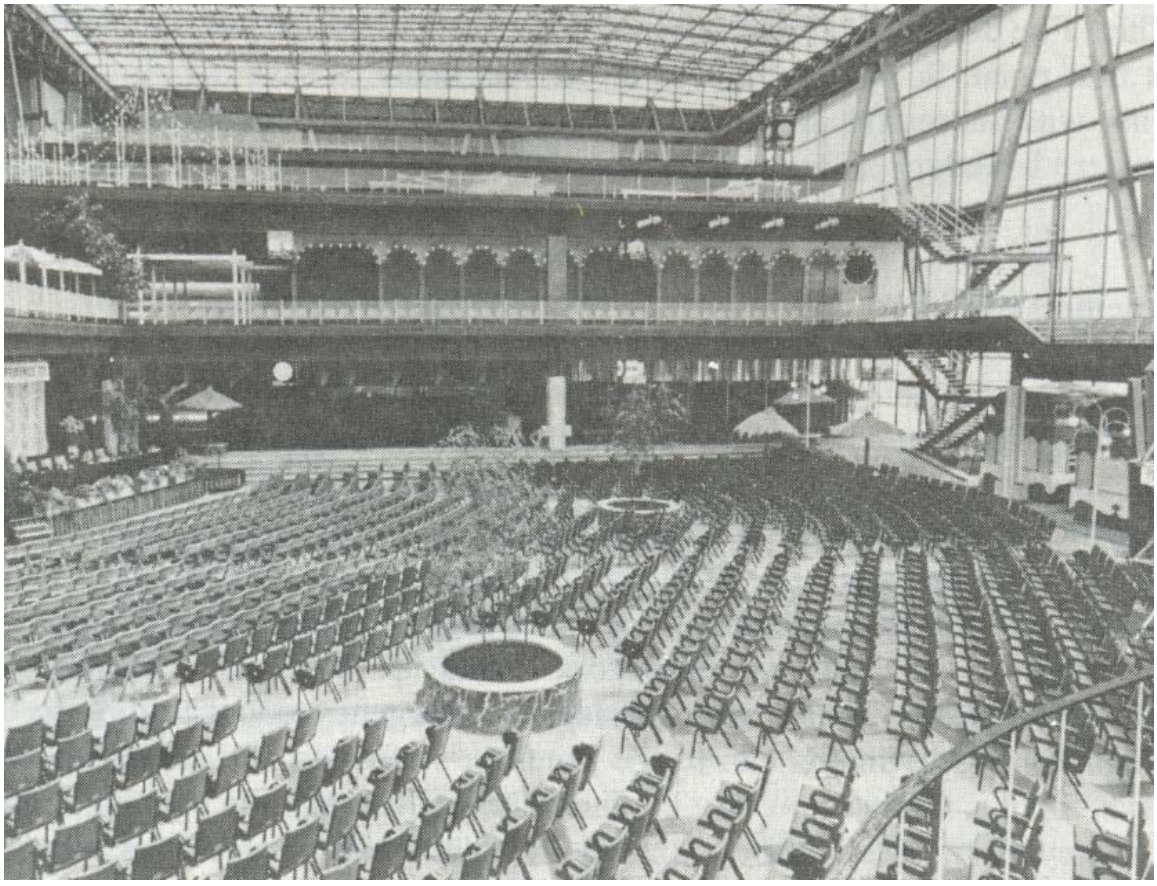

Figure 6.15: The Solarium and the three terraces

The flying staircase can be seen on the right-hand side of the photograph. The NE Service Staircase (not visible) is in the top left-hand corner of the photograph. The Rustic Walkway descends from the Garden Bar on the first terrace, where the umbrellas can be seen on the left-hand side of the photograph, to the Solarium floor.

It can thus be seen that the numbers of people on the main entertainment floor (the Solarium) were greatly swelled by people from the terraces having to pass through the Solarium in order to escape from the building.

The flying staircase

The original plans for Summerland had double escalators connecting the Solarium floor (Level 4) to the Marquee Showbar (Level 5) and Leisure floors (Level 6). In July 1968, an open plan staircase (the notorious flying staircase) measuring 4 feet 2 inches wide was substituted in place of the escalators. The flying staircase is labelled as stairway number 1 on **figures 6.9, 6.12** and **6.13**) and was constructed out of hardwood open treads on steel bearers. If the Manx Theatre Regulations (1923) had been followed, then this staircase should have been at least 5 feet wide. The flying staircase is central to understanding the high number of deaths in the Summerland fire disaster. When fire breaks out, there is a natural tendency for people to try and escape by using the same route as they entered the building. As most people on the terraces would have already climbed the flying staircase, there was a natural tendency for them to return to that staircase when the fire started. The flying staircase had already been highlighted in Mr Byrd's on-the-spot investigation into the Summerland disaster in August 1973 (chapter 6). Indeed, the largest number of deaths occurred on or near the flying staircase. According to the *Summerland Fire Commission*, at least 13 people died on this staircase as they were overwhelmed by flames and hot gases rising from the Amusement Arcade, or were pushed off by other people in the congestion and panic. However, the SFC's figure seems to be an underestimate because floor plans in the Fire Research Station's report into the disaster show there were 25 deaths on or near the flying staircase (**figure 6.8**). "It is doubtful if much – or any – of the Oroglas walling was involved" at this stage of the fire (Silcock and Hinkley, 1974, page 7). Mr Roberts, who was on the Solarium floor, said: "I shouted to them telling them not to

jump for fear they would injure themselves, especially the elderly. The danger was from the people, not from the fire". Miss Judith Quayle (18) said: "People were jumping from [the flying staircase] – some of them into a mass of flames". More deaths occurred as those people unable to get down the staircase jumped or threw themselves off the terraces. Some people were persuaded to jump on to the roof of a shop on the Solarium floor and were caught by at least one shopkeeper. Mr Terence Sandiford (28), the manager of the Amusement Arcade, soaked himself with water from a fire hose to try to reach people who were on fire as they jumped from the Marquee Showbar level on to the Solarium floor. He said: "Two children jumped from the Marquee Bar and they were on fire…and I couldn't get near them".

The *Summerland Fire Commission* (Paragraphs 172, 176 and 178, Pages 58, 59 and 60) criticised the flying staircase on a number of grounds:

> "[The flying staircase] did not constitute a satisfactory means of escape. For such a purpose it was wrong in type, position and dimensions…On the grounds of travel distance and situation alone, it created a wholly unnecessary hazard…There was undoubtedly grave overcrowding on the flying staircase and this, combined with exposure to the worst of the fire, accounted for the deaths which occurred on or near this staircase."

Primarily, the flying staircase was an unsatisfactory means of escape because its open plan design offered no protection from the fire – hence, the staircase was 'wrong in type'. The staircase was in the wrong position

because it was situated adjacent to the combustible Oroglas promenade wall (**figure 6.16**).

Figure 6.16: The flying staircase viewed from the Garden Bar. This photograph shows the staircase's proximity to the combustible Oroglas wall (Source: *The Summerland Story*, 1972, page 17)

The SFC report also refers to 'travel distance'. By this, the Commission is referring to the excessive distance that a person would have to walk if he used the flying staircase to escape from the building. For example, consider a woman in the soft drinks area on the second terrace (the Leisure floor). She would firstly have to run up to 110 feet to reach the flying staircase. She would then use the staircase to descend 31 feet to the Solarium floor

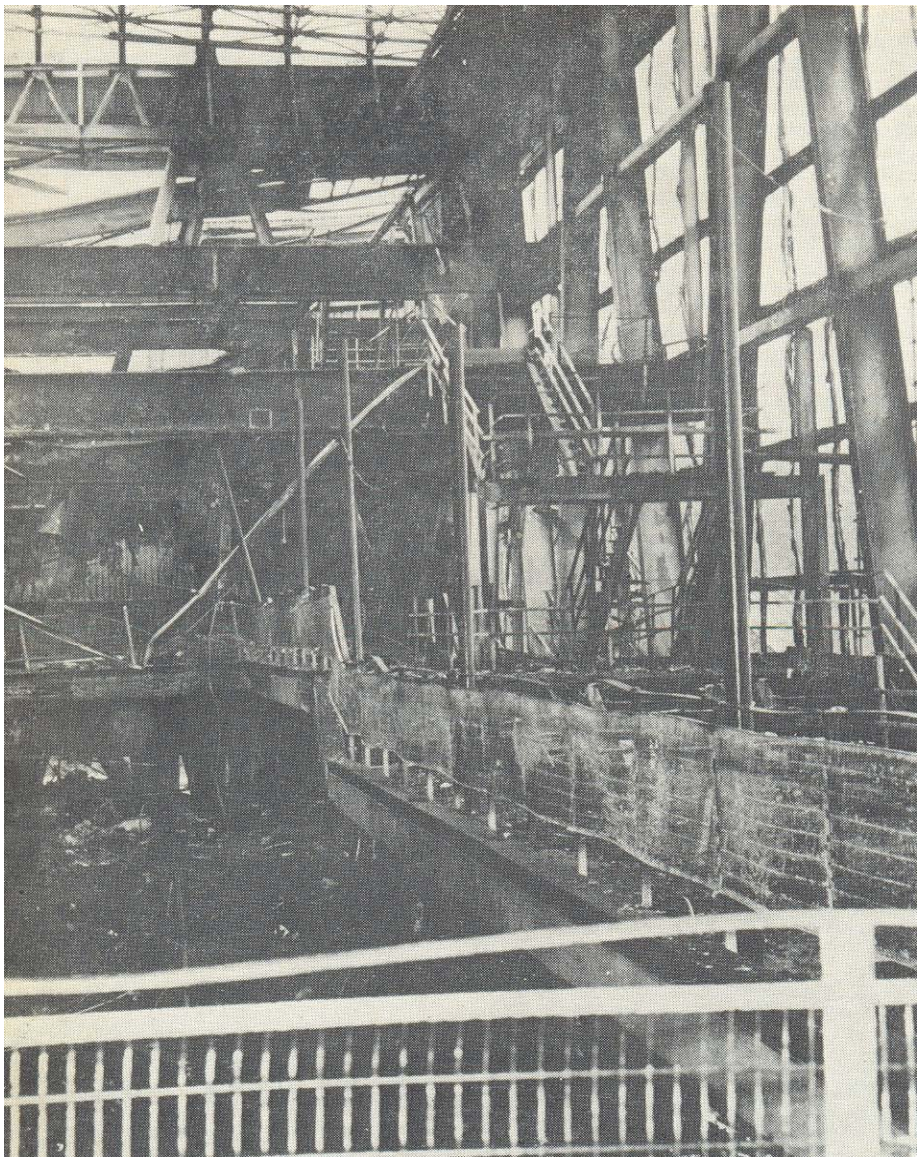

Figure 6.17: The flying staircase viewed after the fire from the Marquee Showbar level. Note how the treads have been completely burned away. (Source: *Royal Institute of British Architects Journal*, July 1974, page 19)

before running another 145 feet to reach the main entrance, a total distance of around 286 ft. The SFC thus comments (Paragraph 175, Page 59):

> "The distance a person might have to travel to reach the main entrance could be up to 350 feet, exposed all the time to the effects of fire within the building. Such distances along open escape routes are in our view grossly excessive."

How should the defects of the flying staircase be remedied? The SFC recommended that 'proper safety standards' in Summerland could only be ensured by replacing the flying staircase with a protected staircase with self-closing fire doors on all floors. That is, the terraces should have been served by a minimum of two enclosed staircases; having only one enclosed stairwell (NE Service Staircase) was thus inadequate. It is interesting to note that with hindsight Mr Pearson, the Isle of Man's Chief Fire Officer, would have "strongly urged" the construction of such a staircase if he had considered the building's means of escape "at the right time" (see SFC Report, Paragraph 233, Page 75).

Other open escape routes from the terraces

As the flying staircase rapidly became engulfed in flames, Mr Harding (Technical Services Manager) directed people 50 feet along the seaward-facing terrace to the escalator. Mr Harding ran down the escalator (which was travelling upwards) and stopped it (**figure 6.18**), before assisting people to escape from the building. Those people who did not run down the escalator might have run further along the terrace and down the spiral Pool Bar stairs (**figure 6.6**) to reach the Solarium floor.

Figure 6.18: People unable to use the flying staircase to descend to Solarium floor level ran along the terrace and instead went down the upward moving escalator

(Source: *Royal Institute of British Architects Journal*, July 1974, page 21)

Some of the people on the terraces, especially those in the Garden Bar, would have used the Rustic Walkway (**figure 6.12**) to reach the Solarium floor. Like the flying staircase, this was an open escape route (section 3.4), which had been constructed at the last minute on the orders of the Chief Fire Officer to improve the number of escape routes from the first terrace. The distance from the Garden Bar to the main entrance via the Rustic Walkway is 230-300 feet: note again the excessive travel distance for an open escape route. No deaths occurred on the Rustic Walkway, parts of which were undamaged by the fire because it lay underneath the flat bituminous felt roof adjacent to the cliff face rather than the Oroglas panelling (Silcock and Hinkley, 1974). The felt roof was damaged by the blaze but remained in position. At the western end of the building, some people in the Pool Bar would have used the narrow spiral staircase (width = 2 feet 9 inches) to reach the Solarium floor.

The NE Service Staircase and behaviour of people in the Marquee Showbar

The NE Service Staircase was the only 'enclosed' staircase serving the terraces (excluding the Cruise Deck: Level 7). The staircase descended from the Leisure Floor (Level 6) and served the Marquee Showbar floor (Level 5) and Solarium floor (Level 4) before descending out into the yard by the Manx Electric Railway depot (Level 2: street level). Most persons using this staircase came from the Marquee Showbar under the instruction of the bar's manageress (**figure 6.12**). It is likely some of the people on the Cruise Deck also used this stairwell because the top of the NE Staircase at Level 6 (figure 6.13) was close to the bottom of one of the two open plan staircases that descended from Level 7 to Level 6 (stairway 10). Few people

entered the stairwell at Solarium floor level largely because of non-existent signage from the Restaurant; in addition, it is likely that most of the occupants of the Leisure Floor (Level 6) would have retraced their steps and used the flying staircase (**figure 6.13**).

The Marquee Showbar

Sime (1985) used police witness statements to assess the factors that determined whether a person left the Marquee Showbar by the NE Service Staircase (the emergency fire escape) or by the flying staircase (i.e. in the direction of the main entrance): see **figure 6.12**. The Marquee Showbar was one of the areas of Summerland where people were most seriously exposed to the fire. This was because it was located one floor above where the fire entered the building at Solarium floor level. Furthermore, given that the Bar was an enclosed area and no fire alarm sounded, there was a delay in the Bar's occupants becoming aware of the smoke and flames on the Solarium floor below. As a result, more people (as a percentage of those persons present) were seriously injured in the Marquee Showbar than in the Solarium where most injuries were minor in comparison (e.g. cuts and bruises caused by crushing and trampling at the main entrance). Seventy-five (75) witness statements were collected by the police from people who had been in the Showbar on the night of the fire. This represents about one-third of the total number – estimated to be around 200 to 300. In this sample, eight persons sustained serious injuries (detained in hospital) and six slight injuries (treated in hospital on the night of the fire and then allowed home). If the sample of 75 persons is representative, a person had typically come into the Bar with three other family members or friends. There was an

approximately even split between those persons using the Bar's main entrance (38) to escape the fire and those using the fire exit (37) to the NE Staircase. The assertion by the *Summerland Fire Commission* (Paragraph 178, Page 60) that "nearly all the occupants of the Marquee Showbar [used the NE Staircase]" is thus not supported by the evidence of these police witness statements. Thirteen of the 14 members of staff in the sample all left via the emergency fire escape (**table 6.3**); the only exception was the ticket collector positioned at the entrance to the Bar. The reason why almost all staff members used the NE Service Staircase is twofold. Firstly, the majority of staff members (11 out of the 14 in the sample) were located at that end of the room. Secondly, some members of staff used the NE Staircase as their route to work and so were aware that it provided a more direct route out into the open air than the flying staircase. Whilst holidaymakers were likely to be at either end of the Bar, around 60% (37 persons out of 61) headed towards the main entrance and hence the flying staircase. They thus moved in *the direction of the familiar* and tried to retrace their steps. In the sample of 75, nine holidaymakers still headed towards the main entrance despite being closer to the clearly signed fire exit door on to the NE Service Staircase. The proportion using the fire exit was even lower amongst the members of public in the half of the room nearest to the Bar's entrance, with only three persons leaving via the NE Staircase. The number of people using the flying staircase would have been even higher had it not been for Mrs Pauline Wynne-Smythe, the Bar's manageress (chapter 8), directing patrons into the emergency NE Staircase. This was the correct decision to take because it took the fire longer to reach the NE Service Staircase than the flying staircase at the front of the building. However, Sime (1985) argued that the ability of Mrs Wynne-Smythe to

counteract the natural tide of people heading towards the main entrance was comparatively limited. It appears that the manageress was nearer to the doorway into the fire escape staircase when people became aware of the blaze. Accordingly, she managed only to influence significantly the behaviour of holidaymakers in that half of the room nearest to the fire exit. Nineteen of these 32 holidaymakers (59%) remembered hearing instructions from staff members telling them to use the fire escape. By contrast, these instructions were only heard by one holidaymaker out of 31 (3%) in the half of the room nearest the main entrance. At least five other Summerland employees in the Bar recalled giving instructions to holidaymakers on the evening of the fire. However, in most cases, these instructions were less helpful than Mrs Wynne-Smythe's because they simply told holidaymakers to leave the Bar as opposed to pointing them explicitly in the direction of the fire exit.

Table 6.3: Escape behaviour of holidaymakers and members of staff in the Marquee Showbar in the Summerland fire

(Source: adapted from Sime, 1985, page 712)

*Of the 75 individuals in the sample, 72 used the exit that they first moved towards when they became aware of the fire. The other three persons were forced to use the fire escape after finding the route to the flying staircase blocked by smokes and flames.

	Holidaymakers	Staff	Total
Flying Staircase (headed towards main entrance)	37	1	38
NE Service Staircase (headed towards fire escape)	24	13	37
Total	61	14	75

Interestingly, people that had entered the Showbar alone without family or friends (i.e. separated individuals) disproportionately sat at the end of the room nearest to the entrance (13 out of 19). It is a matter of speculation why this was the case. They were perhaps waiting for someone else to arrive and so positioned themselves near the entrance so they would be more easily seen by a relative or friend entering the Bar. Alternatively, they were perhaps unsure whether they wanted to spend the whole evening in the Bar, and so they positioned themselves near the main entrance in order to make a quick and discreet exit should the entertainment not live up to their expectations. The latter explanation is less likely because these individuals would have paid an additional charge to enter the Marquee Showbar only minutes earlier. These individuals may have concentrated themselves around the Bar's main entrance because they were nervous or insecure about other persons inside the building. For instance, in Sime's sample, parents whose children were playing in other areas of the building all located themselves in the half of the room nearest to the Bar's entrance. With one exception, all separated individuals headed towards the flying staircase. Conversely, 96% of the holidaymakers using the fire exit (25 out of 26) were in groups (family, friends or mixed). **Thirteen (13) people from the Showbar died in the fire** (Sime, 1983). Using the above argument, it is tempting to conclude that these 13 victims largely consisted of separated individuals because of their greater propensity to use the flying staircase. However, this was not the case because these 13 deaths were limited to seven groups of people in the Bar. Of these 13 persons, nine had other relatives or friends who died (Sime, 1984). There are two reasons why deaths occurred exclusively amongst group members and not separated individuals. Firstly, deaths occurred on the NE Service Staircase as well as

on the flying staircase; hence, neither of these routes ensured people's safety. Secondly, separated individuals had a tendency to move more quickly to the Bar's exits. "People concerned about the safety of others were quicker to respond", noted Sime (1984, page 292). In particular, on the first signs of the fire, two mothers left the Marquee Showbar quickly to find their children. Sime (1983: 38) continues:

> "The most interesting finding was that *all* of those from the Marquee Showbar who died were attached to their groups when alerted by a cue [i.e. became aware of the fire]. These groups evidently delayed their departure. In trying to escape in groups by whatever route they chose, these people were caught by the encroaching smoke and flames. This finding suggests that affiliative behaviour [searching for relatives and friends] can increase the danger to the groups if people are slow to respond."

The separated individuals in the Bar all survived the fire and it is quite remarkable that none of these individuals sustained serious injuries. Of the 12 seriously injured persons, 11 had tried to leave Summerland in a single group with all their relations and/or friends (Sime, 1984). Whilst 76% of these groups were together when leaving the Marquee Showbar, the number had declined to only 45% by the time the groups had reached an exit into the open air (Sime, 1984). Fortunately, 62% of these groups did manage to escape without sustaining any serious injuries.

Sime (1984) analysed the exit choices of those persons in the Marquee Showbar that had used the flying staircase to descend to the Solarium floor. The most popular escape route (19%) was by the door on to the crazy-golf course, which was positioned about 15 feet from the base of the flying staircase, and so provided the quickest way out of the building. This door was more heavily used by persons descending from the terraces than it was by persons already in the Solarium. The other most widely used escape routes were the main entrance and the glass fire exit doors nearby (16%: exits A and B on **figure 6.9**), and the row of glass doors into the Aquadrome (11%: exit D on **figure 6.9**). Fewer Marquee Showbar occupants than Solarium floor occupants used these two escape routes. Sime (1984) did not detect a significant difference in exit choice between Marquee Showbar groups containing all family members or all friends or groups containing a mixture of family and friends.

The NE Service Staircase

The NE Service Staircase was supposedly an enclosed protected stairway; hence, all persons entering that stairway should theoretically have survived the fire. However, 12 people died on this staircase or rooms that were accessed from the landing of the staircase such as crate stores (**figure 6.8**); some bodies were found at the bottom of the stairs only about eight feet from the exit. When Sam Webb started teaching architecture at the University of Kent in Canterbury in 1975, he invited some outside speakers to talk about Summerland to his students. Dr Webb particularly remembered Alan Parnell's presentation. He recalled (personal communication):

> "His first slide was a black and white picture of what looked liked a Jackson Pollock painting. If you looked closely you could make out the bottom of a door and what you were looking at was the charred remains of a number of people trapped behind an escape door which had been nailed shut with wooden wedges. They were 50mm from safety."

It is highly likely that some of these victims would have been severely incapacitated before they had even reached this staircase. Their deaths were most likely due to asphyxia or carbon monoxide poisoning. In the light of these 12 deaths, it can be seen that the NE Service Staircase had a number of major design faults that jeopardised its function as a protected escape route. The NE Service Staircase was far from being the satisfactory escape route implied by Mr Byrd in his investigation in the week after the fire (chapter 5). The most serious fault stemmed from a decision taken by the management of Summerland and not its architects, and reflected the staircase's rather unsatisfactory dual function as a fire escape and a goods entrance. Amongst other things, crates of beer were brought up these stairs and in the lift to the three bars (Terrace Bar, Marquee Showbar and Garden Bar) at the eastern end of the complex. As members of staff were fed up with the extra effort involved in carrying the crates through the Marquee Showbar to reach the stores behind, an opening was cut onto this stairway to allow members of staff direct access to the keg stores. No doorway was ever provided: a permanent opening had thus been created on to a supposedly enclosed fire escape. This opening resulted in considerable quantities of smoke entering the staircase when the fire reached the northern side of the Marquee Showbar floor at around 8.12pm. Permission for this opening had not been

sought from the Isle of Man byelaw authorities or from higher management in Trust House Forte.

There were also defects in the staircase's original design that provided additional pathways for smoke to enter the stairway:

1. The walls of two sides of the stairwell were constructed out of combustible Colour Galbestos steel sheeting (section 6.4.2). This violated Manx Theatre Regulation Number 8.
2. The seal between the Galbestos sheeting and the brick wall on the staircase's southern side was not effective in preventing the spread of smoke and flames.
3. The landings of the stairwell contained a lift shaft and a refuse chute. These provided two further vertical transmission routes for the spread of fire.
4. Some of the doors that provided direct access to store cupboards, toilets and staff rooms from the stairwell's landings were not fire resistant or self-closing.
5. A ventilation duct with combustible jointing crossed over the stairwell's landing at the Leisure Floor level from the outside wall to the toilet block.
6. The ceiling of the stairwell was an extension of the softwood floor of the Cruise Deck (Level 7) and thus was not fire resistant.

The plethora of design faults led the *Summerland Fire Commission* to question whether the NE Staircase was designed as an emergency escape route from the outset. The Commission's conclusions make for disturbing reading (SFC Report, Paragraph 219, Page 72):

> "The Commission is not convinced that this stair was designed [as a protected emergency escape route]. In fact it was a service stair designed to serve the upper levels…the firm impression [is given] that this stair…was not designed primarily [as an] emergency exit. The architects could have designed it very satisfactorily if they had so regarded it, and they cannot shift design responsibility on to local authorities and fire officers."

Alarmingly, the three terraces lacked a properly designed enclosed fire escape. The original plans for the building are most revealing in terms of the light they shed on the primary function of the NE Staircase. These plans show this staircase descending into a covered yard that could be closed from the street by a sliding shutter and gate. It can be seen that the Commission's conclusion about the NE Staircase being primarily designed as a service stairwell was well founded. The architects' case was not helped when the principal architect (Mr Lomas) flatly contradicted the evidence given by the associate architects Gillinson, Barnett and Partners at the public inquiry. Whilst the associate architects were adamant that the NE Staircase had been explicitly designed from the onset as a protected fire escape, Mr Lomas referred to this staircase as being "a notional fire escape at the time [the design stage]…*an earnest of intention*" (SFC Report, Paragraph 185, Page 63). The fact that one landing of this staircase was partly obstructed by a deep freezer containing ice cream when the fire broke out adds further credence to the SFC's conclusion about the primary function of the NE Staircase. An employee of MacKeith Dickinson and Partners, the Blackpool architects that redesigned Summerland after the fire, commented (personal

communication): “I visited Summerland before the fire and what struck me was how staff used staircases as storage areas for things like beer barrels. The staff said they had a good relationship with the local fire brigade!” [On the latter point, the man’s voice was one of incredulity.] He also added that many members of staff were casually dressed in T-shirts and jeans, which possibly meant that the holidaymakers did not even know whom they were or who was in charge at the time of the fire.

People using the NE Service Staircase faced further difficulties in their attempts to escape from the building. The geography at the bottom of this staircase was peculiar (**figure 6.19**). Coming down the staircase one was always turning to the right to go down the next flight. However, at the bottom of the stairs, you had to turn *left* to reach the fire exit doors. If you had turned right at the foot of the stairs, you would have encountered a pair of doors that were locked by a chain and padlock through the handles that were in fact the entrance to a beer cellar underneath the staircase. In the light of the doors’ positioning and the darkness and confusion that existed, Summerland fire investigator John Webb strongly believes a number of people mistook the locked beer cellar doors as the fire escape doors. The *Summerland Fire Commission* did not comment on this possibility.

It has already been established (chapters 4 and 5) that the set of doors nearest to the foot of the NE Staircase was chained and padlocked when the fire broke out. This set of doors was also obstructed by a parked car. The padlock was eventually taken off and the car moved, but “not before people escaping down the stairs had found themselves unable to open these doors (*Summerland Fire Commission*, Paragraph 183, Page 62). It is extremely

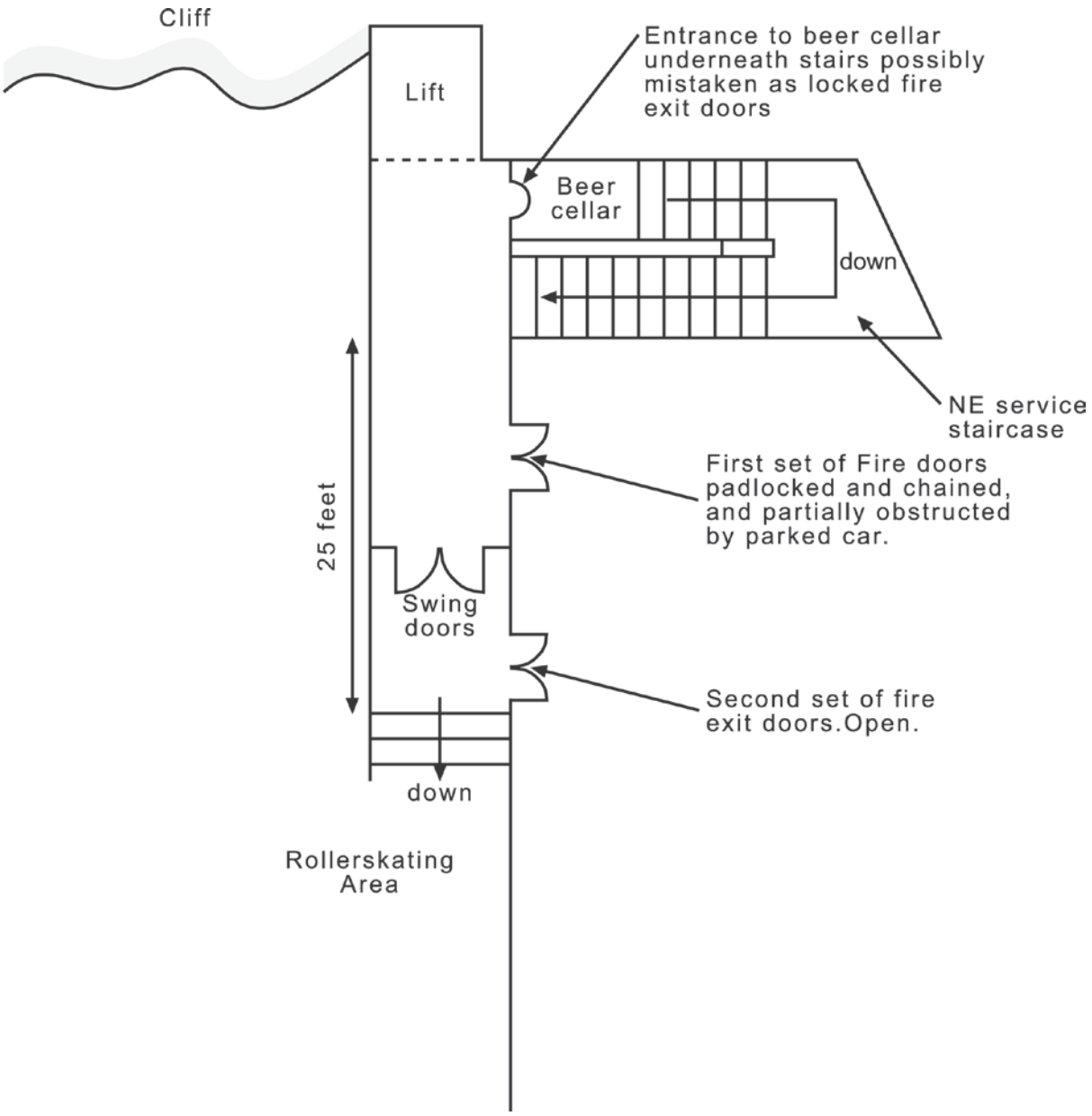

Figure 6.19: The geography of the bottom of the NE Service Staircase (Enlarged from the original plan in the SFC Report; drawn by Kevin Burkhill, University of Birmingham)

fortunate that a pair of swing doors near the locked doors gave access to another set of doors only 15 feet away in the Rollerskating area that was unlocked. Nonetheless, the padlocking of the first set of doors "was a

particularly grave disregard of safety precautions" (SFC Report, Paragraph 183, Page 62) and may have partly contributed to some of the deaths on this staircase.

The Chief Fire Officer was not the only person to find emergency exit doors locked during the 1973 summer season (section 5.2). Around one month after Summerland's General Manager had given a written assurance to the fire chief that this would never happen again (chapter 5), Douglas Police received a tip-off from a member of the public about locked fire exits. When Mr Ventre, an officer at Douglas Fire Station, went to investigate, he found three locked exits. These included a door from the children's play area on the Lower Downstairs level (Level 2) and the exit onto the crazy-golf terrace by the base of the flying staircase (exit F on **figure 6.9**). The fire exit doors at right angles to the main entrance (exit B on **figure 6.9**) were also locked and their keys were nowhere to be seen. Again, another written assurance was given that this would not happen again. At the public inquiry, Mr Harding, the building's fire prevention officer, said he had fought "a running battle" with another member of staff about locked emergency exits. Mr Harding alleged Mr Keith Maceachern (who died in the fire), the Bar Manager, persisted in locking the fire exits at the eastern end of the building. Mr Harding even asked a member of the fire brigade for assistance over the locked doors. "I am jeopardising myself in my manager's [The General Manager Mr De Lorka] eyes by telling you this, but I did", he said. Mr Harding added that the problem of locked doors resurfaced when the General Manager was away on the British mainland. Norman Campbell (9) from Belfast was at Summerland with his parents exactly one week before the fire on Thursday, July 26th 1973. Mr Campbell

(personal communication) said the Troubles in Northern Ireland had made him very conscious of escape routes. "The first thing someone from Northern Ireland does is to look for the fastest way out in case of a bomb scare", he said. He continued:

> "All was well until I noticed the emergency exit doors. The emergency doors [from the Lower Downstairs floor containing the funfair and children's play area] had a very heavy chain wrapped around the panic bolt [the bar that is pushed to open the door], restricting the operating mechanism. [I knew this] to be wrong so I headed up to Dad. Dad inspected the chain and called for the manager."

The manager explained that the chain was to prevent children entering the complex without paying. They had noticed that one child would pay to enter Summerland, run downstairs, open the fire exit door and let their friends in for nothing. When Mr Campbell's father asked for the chain to be removed, the manager insisted that the chain remain on the door. Mr Campbell persisted in pursuing the matter, but when things "got a little heated" between himself and the manager (who was flanked by two security men), the family decided to leave Summerland.

The issue of whether the NE Service Staircase was wide enough was raised at the public inquiry. Measurements taken on the staircase after the blaze showed it was as narrow as 3 feet 3 inches in places (the nominal width was 5 feet). Mr Michael Ogden, QC for Trust House Forte, quoted the Manx Theatre Regulations (1923) and the 1963 Local Government Act. Regulation 9 of the Theatre Regulations states that all staircases should be at

least 5 feet wide in places of entertainment accommodating more than 400 people. The width of the staircase should then be increased by six inches for every additional 100 persons to a maximum of 7 feet 6 inches. If Theatre Regulation 9 had been applied to Summerland, then the width of the NE Service Staircase should have been 7 feet 6 inches. However, the principal architect Mr Lomas said the 1923 Theatre Regulations were out-of-date. He said it had been agreed with the Isle of Man authorities that the width of the NE Staircase was "acceptable".

People's escape attempts were significantly hindered when Mr Shaffer (the House Manager) switched off the building's main electricity supply at 8.11pm. The NE Service Staircase (a windowless stairway) was thus thrown into darkness at the height of the crisis. Whilst Mr Shaffer had not received instructions to do this, he believed it was a sensible thing to do because it would prevent possible electrical fires. This was the wrong course of action because full lighting should have been kept on. When Summerland's main electricity supply had been switched off, an emergency generator should have come into operation to maintain a limited but adequate amount of lighting in the building. The emergency lighting failed on the night of the fire. Three theories were advanced for its failure (**table 6.4**). The Commission could not be completely sure of the cause, but favoured the second theory: that is, the switch for isolating the generator having been left in the OFF position. It is possible that the SFC favoured theory two over theory one because important observations about the state of the starter batteries were omitted from the Fire Research Station's report (Silcock and Hinkley, 1974) and thus were not conveyed to the SFC (John Webb, Personal Communication). Mr Harding instructed Mr Worsley to strip down

Table 6.4: Theories for the failure of the emergency lighting

Theory	Evidence in support	Evidence against
The starter batteries were not properly maintained by Douglas Corporation	The batteries were found to be in a poor condition two days after the fire and were unable to start the motor for the generator. Four days after the fire, John Webb from the Fire Research Station found low electrolyte levels in the cells and corrosion on the terminals.	Mr Worsley (an electrician employed by THF) and Mr Harding (Summerland's Technical Services Manager) found that the batteries were capable of starting the motor when tested on the day after the fire.
The switch for isolating the generator had been left in the OFF position	Mr Worsley found the switch in the OFF position on the day after the fire. There had been problems with the electrical system in Summerland the week before the fire. Maintenance of system required the switch to be in the OFF position	An employee of the Electricity Board may have turned the switch off at 8am on the morning after the fire.
The fire had attacked the wiring of the emergency lighting circuit so creating a short circuit	An eyewitness on the NE Service Staircase (Mr Gibson) said the lights went out, came on again briefly and then finally went out, consistent with a short circuit The wiring in the NE Staircase came through from adjacent areas of each floor, so it is possible that the wiring to the stairwell was damaged outside the staircase (John Webb, Personal Communication).	Wiring survived the fire. With one possible exception, Mr Gibson's evidence about the behaviour of the lighting was not corroborated by other eyewitnesses.

and replace a fusebox on the day after the fire. There was no practical reason for doing this.

Evaluating the means of escape from the terraces

> "The main escape problem was associated with the upper floors. [The three terraces] were in effect balconies in the same volume as the Solarium."
>
> (Silcock and Hinkley, 1974, page 7)

There were three escape routes from the terraces at the eastern end of the building. Two of the routes (the flying staircase and the Rustic Walkway) entailed excessive travel distances on open routes, during which a person would have been exposed to the effects of smoke and flames inside Summerland for an excessive length of time. The third route was via a supposedly protected enclosed stairwell (the NE Service Staircase), which possessed a number of serious design faults. The overcrowding on the flying staircase logically raises the question as to whether the number of escape routes was adequate for the number of persons inside the building.

Architects talk about matters of 'occupancy': that is, the maximum number of persons that might be present in different parts of the building at any one time. A building's occupancy is then used to devise a "schedule of the means of escape". This schedule lists all the staircases and escape routes, drawing attention to their width and capacity. Alarmingly, the architects of Summerland had never prepared a schedule of the means of escape or even considered in "proper detail" matters of occupancy before the fire (chapter 2). Mr Gelling (the other architect in Mr Lomas' practice) told

the public inquiry that the staircases were not designed with specific numbers of people in mind. The architects were only provided with a *general indication* of the numbers likely to use the building *as a whole*.

Table 6.5: Occupancy figures for Summerland's three upper floors (Source: SFC Report, Paragraph 217, Page 71)

		Architects (Mr Green)	SFC	Chief Fire Officer
Third terrace	Cruise Deck	40	340	80
Second terrace	Leisure Floor	160	550	200
First terrace	Marquee Showbar Floor	680	400	500
Total		880	1290	780

Using the figures of the architects and the Chief Fire Officer (**table 6.5**), the three escape routes from the terraces should have been able to accommodate around 800 people in 2.5 minutes (the maximum escape time allowed on an open route). It can be seen immediately that the capacity of all the escape routes combined is inadequate for the maximum occupancy of the terraces (**table 6.6**). The shortfall in capacity becomes even more alarming when the architects' plans (with no Rustic Walkway) are considered. The Chief Fire Officer's intervention reduced the capacity deficit from 230-740 (330 if the architect's figures are used) to 30-540 (130 if using the architects' figures). These capacity deficits can be lowered slightly (perhaps by 100) because the above calculations have not allowed for the fact that some people on the first

Table 6.6: Capacity of the escape routes from the eastern terraces (1 unit of escape width = 100 persons in 2.5 minutes)

Escape routes	Width	Units of escape width	Capacity
OPEN			
Flying staircase	4 feet 2 inches	Nominally 3 but narrower than NE Service Staircase	About 250
Rustic Walkway (not in architects' plans but built on the order of the Chief Fire Officer)	Not given	2	200
ENCLOSED			
NE Service Staircase (with serious design faults)	5 feet (but less in several places)	3	300

Type of escape route	Capacity
Open	450
Enclosed (with serious design faults)	300
Total capacity of escape routes	750
Total capacity of escape routes if the Chief Fire Officer had not ordered the construction of the Rustic Walkway)	550
Occupancy figures (Architects, Chief Fire Officer, Commission)	780-1290

terrace might have used the escalator or the Pool Stairs to reach the Solarium floor. The architects should have appreciated that the occupancy of the three terraces was at least 2.6 times greater than the capacity of the 'enclosed' NE Service Staircase (Capacity = 300). This meant it was inadequate to have only one enclosed staircase with a capacity of 300 to serve three floors with a capacity of around 800. These calculations assume that people will behave in a predictable manner when the fire breaks out. This is known as the physical science model of escape behaviour (Sime, 1985), whereby individuals behave rationally and use the nearest escape route. At the time of the Summerland fire, this principle underpinned the design of buildings in terms of travel distances and the location and width of staircases and exit doors. However, people's behaviour in a fire is far from predictable, with an individual having a tendency to show affiliative behaviour in which he is attracted to familiar places (the route by which he entered the building, *viz*. the flying staircase) and people (family and friends). This affiliative behaviour means the physical science model of escape behaviour is unrealistic, and that the capacity shortfall figures quoted above for the terraces (30-540) are probably on the conservative side when human behaviour in fire situations is viewed more realistically. We have already seen that some people in the Marquee Showbar headed for the main entrance doors despite being nearer to a clearly signed fire exit into the NE Service Staircase. In public buildings, most fire escape staircases are unfamiliar backstage routes that are never seen by members of the public. This was certainly the case with the NE Staircase at Summerland. Applying the affiliative model of escape behaviour, such routes are naturally unattractive. They send out the message "I am unfamiliar, do not risk moving in my direction" (Sime, 1985, page 720). Sime (1985) goes on to suggest that

members of the public would have a greater tendency to use (internal) escape staircases if they formed part of the normal circulation routes of people inside a building. If people use more routes as part of their everyday usage of a building, the argument follows that they are more likely to use these routes in the event of a fire. The validity of this argument is amply demonstrated by members of Summerland staff, who used a greater variety of escape routes than members of the public. Sime's (1983) proposition of free circulation seems highly attractive at first; it is, however, rarely used in reality because it would present building managers with a security nightmare.

Returning to the capacity of Summerland's staircases, Mr Alan Theaker, employed by associate architects Gillinson, Barnett and Partners, conceded at the public inquiry there should have been a second enclosed staircase serving the terraces. His view was echoed by Mr Pearson, who "believes he would have strongly urged…a further enclosed stair [to be built] in the south-east corner" had he "carefully reviewed the problems of escape" at the right time (SFC Report, Paragraph 233, Page 75). It is most shocking to learn that Mr Bertorelli, a former General Manager of Summerland, considered the number of staircases connecting the Solarium floor to the terraces to be inadequate. Noting the bottleneck around the flying staircase, he had suggested further staircases would have to be built. It is not known whether he passed on his concerns to Trust House Forte or the Isle of Man authorities.

The Fire Research Station's report into the disaster claims there were approximately 300 people on the terraces at the time of the fire (Silcock and

Hinkley, 1974). This information was based on information supplied to the FRS investigating team by either the police or the fire service. However, the figure of 300 might be on the low side, given that Mrs Pauline Wynne-Smythe (chapter 8) estimated there were around 200-250 people in the Marquee Showbar alone when the fire started. Later estimates will naturally tend to be more accurate than those provided immediately after the fire because they are based on a broader range of evidence.

6.5.3 Reasons for the rapid spread of the fire

Two pieces of the three-piece jigsaw for explaining the appalling death toll at Summerland have now been slotted into position: delayed evacuation and inadequate means of escape. In order to complete the picture, it is necessary to consider the reasons for the rapid spread of the fire inside the building.

As explained earlier (section 6.4.2), the fire gained intensity in a concealed gap between the building's external Galbestos wall and internal Decalin fibreboard wall before breaking through into the Amusement Arcade at around 8pm. The high temperatures reached in this gap explain why the Arcade's wall "erupted" (SFC Report, Paragraph 106, Page 39), that is, giving way over a short period of time. The use of a combustible material for the inner wall (Decalin) explained why the fire invaded the Amusement Arcade so rapidly. It is important to note the fire would have still entered the building a few minutes later if the original plans for a plasterboard wall (virtually non-combustible) for the Amusement Arcade had been followed through. However, the use of Decalin meant the fire invaded the building much more violently than it would have done so if plasterboard had been

used. The use of Decalin thus partially explains why two or three people died in the Amusement Arcade.

The *Summerland Fire Commission* identified a number of reasons why the fire spread rapidly once it had broken out of the void. Firstly, Summerland's open plan design allowed the fire to roam freely because there were no effective measures to stop it spreading either horizontally and vertically. In particular, the three terraces were open on one side, which meant they were exposed to fire on the Solarium floor below. The contribution of the building's open plan design to the disaster had already been highlighted by the Island's Chief Fire Officer and a UK fire expert in August 1973 (section 5.2.2). Open plan buildings are said to lack 'compartmentation'. The objective of compartmentation is to contain the fire to one part of the building, whilst allowing people in the other parts of the building to escape. In other words, compartmentation separates people from the fire risk. Promotional literature for the building (*The Summerland Story*, page 26) claimed the risks of fire spread had been 'overcome': clearly, they had not and the building's design was conducive to rapid fire spread. As Summerland had almost no compartmentation, the people inside the building and the fire risk were mixed up together on the Solarium floor and the three terraces (**figure 6.20**). In the light of the defects in the design of the NE Service Staircase (section 6.5.2), the Solarium and the terraces can essentially be regarded as one 'compartment'. At Summerland, faults in the building's management (i.e. delayed evacuation; see section 6.5.1) and design (i.e. excessive travel distances on open escape routes; see section 6.5.2) resulted in hundreds of people occupying the same 'compartment' as

the fire. It is now easy to account for the high death toll in the Summerland fire.

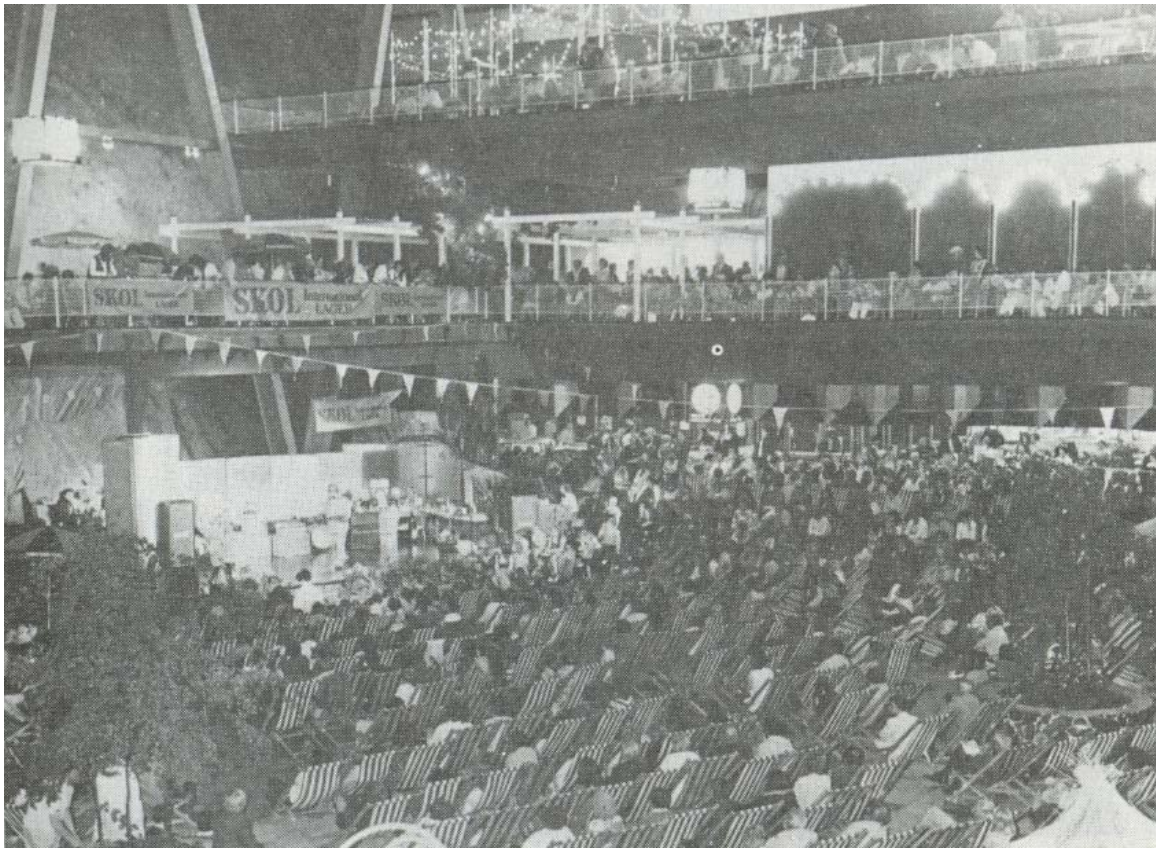

Figure 6.20: Summerland's open plan design provided a free ticket for the fire to roam freely

(Source: Pym, 1977, page 83)

Secondly, there was a gap between the floors of the terraces and the external Oroglas wall. This gap would have acted like a chimney – and facilitated the coanda effect, so drawing the flames up to Summerland's acrylic barrel roof (see chapter 5; Wednesday, August 8th). Again, this design fault had already been identified in the week following the fire. A polythene sheet had been used in the Amusement Arcade to prevent window draughts and to reduce the spread of noise. This sheet (together with curtains) would have aided the spread of fire to the Marquee Showbar level.

As the fire spread out of the Amusement Arcade, the Oroglas promenade wall between the Galbestos sheeting and the flying staircase ignited after being exposed to flames for less than two minutes. Flames rapidly spread up the Oroglas wall to the roof. Thirdly, the sides of at least one of the terraces were exposed to holes in a gap enclosed by combustible surfaces. The building's design thus provided three routes for the fire to reach the terraces from the Solarium floor below: under the front edges of the open terraces; out of the side of the Amusement Arcade up through the chimney between the terraces and the Oroglas wall; and up through the void surrounding the Galbestos wall. These pathways resulted in smoke rising on the inside of the building to the terraces before the fire entered the Amusement Arcade at Solarium floor level at around 8pm.

The fire's rapid spread shows the complex's fire-stopping measures were far from effective or adequate. The underside of the softwood floor of each terrace and its supporting steelwork was sprayed in Limpet asbestos to provide a fire resistance of two hours. It played a very unfortunate role in actually assisting the spread of the fire, which was identified in the *Fire Research Station's* report (Silcock and Hinkley, 1974, page 4) but which is not even mentioned by the *Summerland Fire Commission*. If the floors had been constructed out of concrete, their conductivity and mass would have cooled the flames running under the ceiling of each terrace (especially in the Amusement Arcade) and reduced the rate at which the flame front moved and its temperature to some degree. However, the low mass and high insulation value of the Limpet asbestos did not cool the flame, and thus maximised both its temperature and speed of movement (John Webb, Personal Communication). In the light of Summerland's open plan design,

this fire-stopping measure would not have prevented the spread of fire by the first route: under the front edges of the terraces. As the Summerland design concept (chapter 3) was the antithesis of direct compartmentation, additional fire-stopping measures were required to stop the upward spread of fire from the Solarium floor. One measure that could have been employed would have been to replace the front railing of each terrace with a fire resistant wall of the same height that also extended at least one foot below floor level. Implicit in the two hours' fire resistance byelaw is the recognition that there should be no gap between the edge of each terrace and the external Galbestos wall through which fire could pass. During the completion of the building's shell (i.e. prior to December 1970), sub-contractors were instructed to work asbestos into the corrugations of the Galbestos cladding to provide the necessary two hours' fire resistance. However, at the time of the fire, this fire-stopping measure was not wholly effective. It is believed some of the asbestos had either fallen off or had been removed when furniture and fittings were added to the building in early 1971.

Furniture and Fittings

It is now appropriate to examine the contribution made by the furniture and fittings on the Solarium floor and the terraces to the fire. The floors of the terraces were constructed out of softwood (**figure 6.21**) laid on steels, which has a flame spread rating of 3 or 4 (class 4 is the most rapid flame spread). It is estimated that there were around 30 tons of wood in the three terraces, which would have contributed significantly to the fire. Mr Norman Campbell, who has worked in Fire Protection in the Irish construction industry since 1989, said (personal communication): "I spoke to

a man [who] had worked as a carpenter during the construction of the building. His main concern at that time was the amount of wood used in the building". He also claimed some of Summerland construction workers were concerned about the flammable nature of many of the building's internal linings. Mr Dixon, THF's UK Fire and Safety Officer, mistakenly assumed that the terraces were constructed out of concrete when he visited Summerland before the building opened in July 1971.

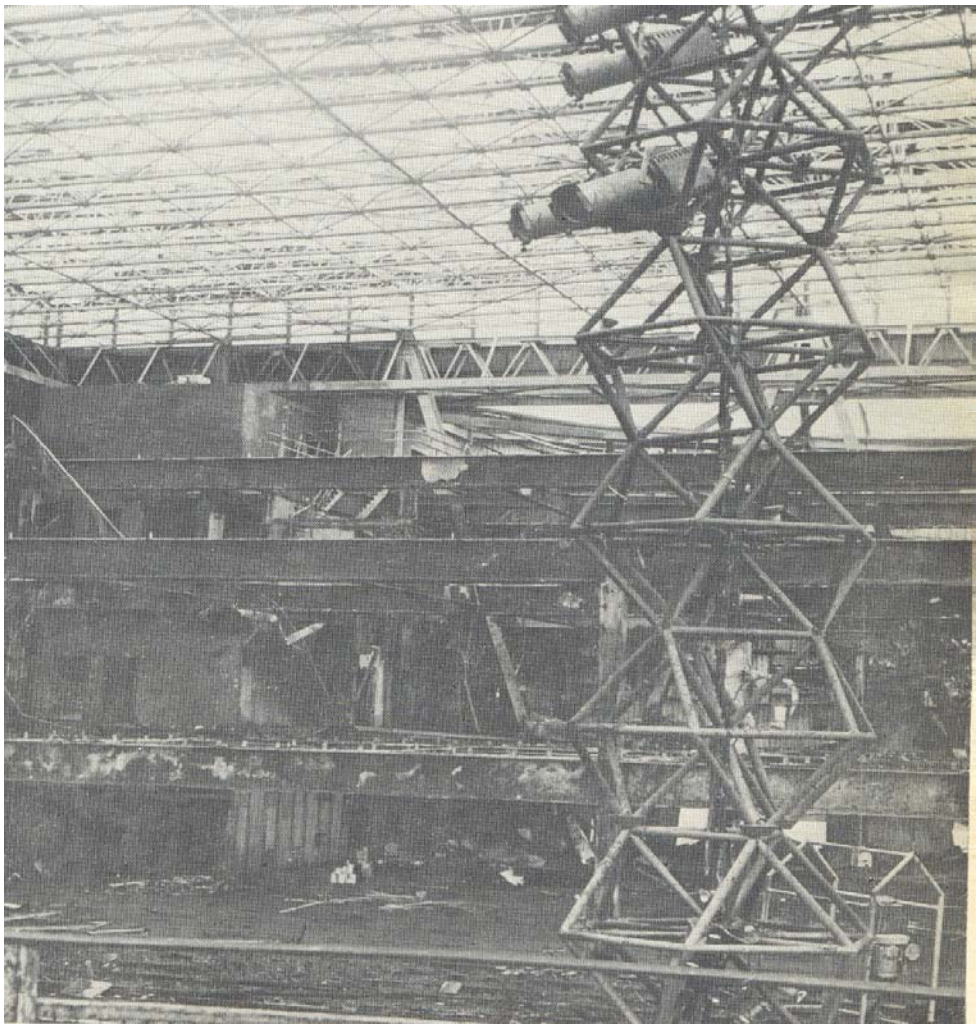

Figure 6.21: The fire completely stripped away the terraces' softwood floors

(Source: RIBA Journal, July 1974, page 18)

Around 15% of the lower two terraces (Marquee Showbar and Leisure Floor) were covered in plastic tiles, which would have had a similar flame spread rating to the softwood floors. Fortunately, good quality woollen carpets had been used for the remaining 85%, a material with low flammability. Other sources of combustible material came from the large number of partitions erected to screen one area of the building from another (e.g. between the Restaurant and the Amusement Arcade); and to create staff offices and store cupboards. An unknown combination of plasterboard (virtually incombustible), fibreboard and plywood (both entirely combustible) was used for these partitions. In addition, the walls of the Sundome's changing rooms (Level 6) were probably polystyrene, an extremely flammable material.

With one exception (a polythene curtain in the Amusement Arcade), all drapes were flame resistant, meaning they would only burn when a flame was applied to them. Together with the woollen carpets, "no criticism can be made of the selection of materials for drapes and carpets" (SFC Report, Paragraph 138, Page 49). However, the Commission adds:

> "Whilst many materials on these upper floors [Solarium and terraces] would resist small sources of ignition, most of them would contribute readily to a substantial fire if one should start. Hence, although the contents of the terraces had not been chosen irresponsibility, a huge, violent fire could burn them all out in a short time."

The fire load of buildings (the amount of available fuel per unit area) can be graded into three classes: low, moderate and high. On average, the floors of

Summerland had a low fire load. The fire load is more important in determining the duration of a fire than its intensity. Consequently, a violent fire is still possible with a low fire load. This was the case at Summerland: the fire lasted a relatively short time but it was an extremely violent fire. With the large volume of air already inside Summerland, the fire was able to burn with considerable intensity in its early stages (John Webb, Personal Communication).

The role of Oroglas in the fire

> "First judgments must be revised. We shall invite the [Summerland Fire] Commission to say loud and clear that the initial snap information must be rewritten, and the first judgment be reversed to find that Oroglas was not a substantial cause of the spread of the fire."
>
> (Mr Robert Alexander, QC for Rohm and Haas, the manufacturers of Oroglas)

In section 6.3, it was noted that Oroglas had a less important role in the fire than had been previously assumed. In particular, more than 20 minutes elapsed from the lighting of the kiosk fire by the Liverpool schoolboys before a single Oroglas panel ignited. Mr Pearson, the Chief Fire Officer, said: "Oroglas became involved at a late stage". The Oroglas promenade wall "was not ignited until there was a very substantial fire in the Amusement Arcade" (SFC Report, Paragraph 108, Page 39). The Oroglas was ignited by the products of combustion from the fire on the terraces. The large-scale release of hot gases and flames from this internal fire brought the surface of the adjacent Oroglas up to its ignition point before the whole mass

of each Oroglas panel was sufficiently heated to soften and fall out of its frame (John Webb, Personal Communication). In other words, the Oroglas burnt out so rapidly because it was heated by other combustible material close to it, so causing a flashover. Consequently, the acrylic ceiling panels did not have chance to soften and fall out of their frames before ignition. It is believed the roof first caught fire from flames that had travelled vertically up the sea-facing Oroglas wall. Once alight, the roof burnt out in perhaps only ten minutes. At the public inquiry, Mr Watson, the UK sales director of Rohm and Haas, claimed the use of Oroglas at Summerland had probably *saved* many lives in the fire. This is because it allowed thick black smoke to escape from the building, which would otherwise have been trapped inside the building. However, the ignition of the Oroglas turned the blaze into a holocaust because of the venting effect caused by the destruction of the Oroglas promenade wall around the end of the terraces and the flying staircase. It should *not*, however, be concluded that the fire's oxygen supply was enriched by the destruction of the Oroglas *roof*. With the strong upward movement of hot gases and flames (the fire plume), all the oxygen required for combustion needed to come into Summerland at a relatively low level. It cannot move *against* the flow of the fire plume (John Webb, Personal Communication). There was already enough air inside Summerland to sustain the fire in its early stages. The oxygen to sustain the fire in its later stages came not only from the venting of the sea-facing Oroglas wall (**figure 6.22**) but also probably from the opening of the main entrance doors and the adjoining broken windows and the row of doors into the Aquadrome's swimming pools (John Webb, Personal Communication). Burning debris from the roof also ignited combustible furniture and fittings on the floors below as well as injuring people. The roof fire was particularly instrumental

in setting fire to the Pool Bar at Summerland's western end and the Control Room.

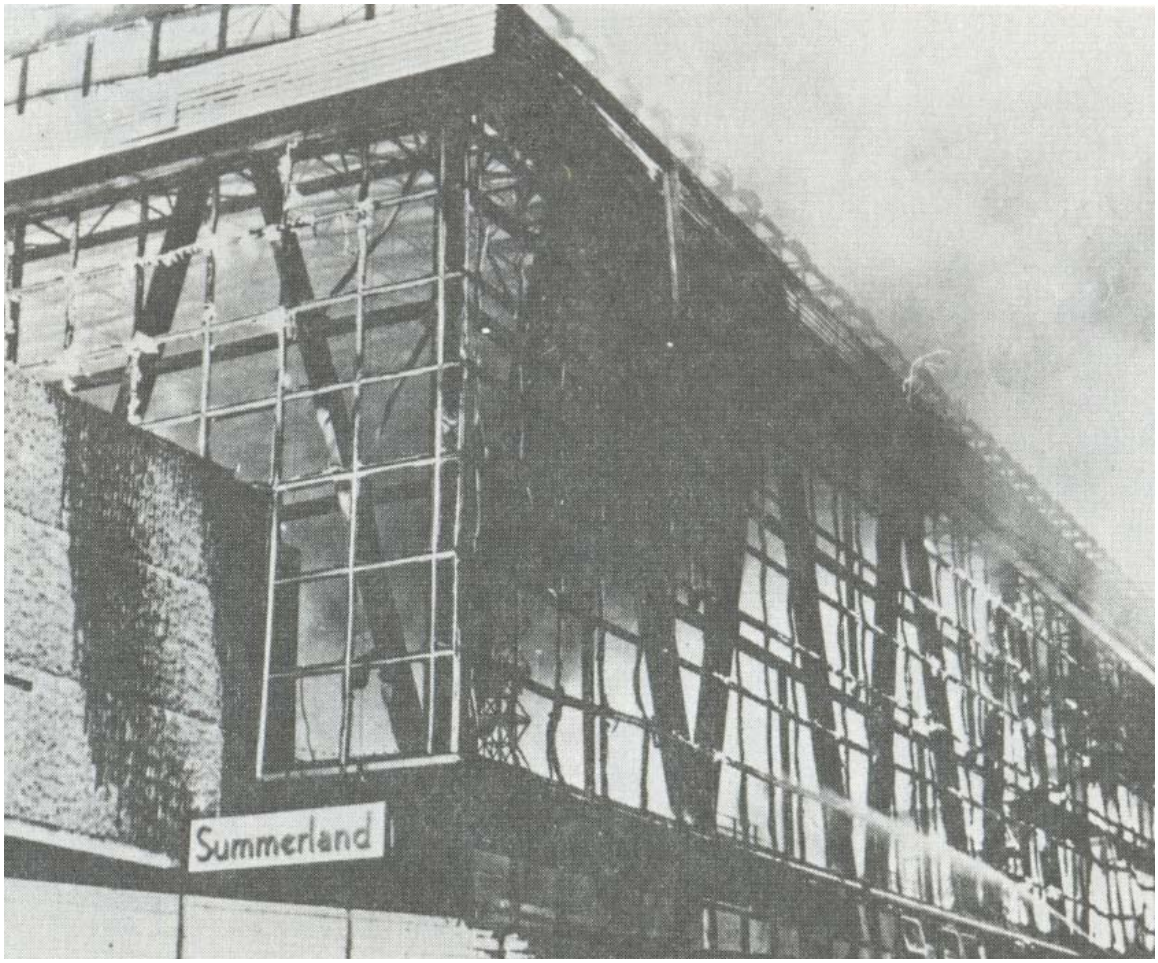

Figure 6.22: Venting of the fire caused by the destruction of the Oroglas promenade wall (Source: Pym, 1977, page 88)

The roof burnt out more quickly than the Oroglas wall. Whilst this may suggest a weakness in its design, the fire would have spread rapidly under the roof regardless of the method used to fix the Oroglas panels in position. This is because the roof was subjected to the enormous volume of hot gas and flames reaching it from the burning terraces and the flames travelling vertically up the Oroglas wall. The architects claimed that in a

fire the Oroglas panels would soften and fall out of their frames before igniting. This is known as the 'fall-out' principle. However, the behaviour of Oroglas in a fire is far from predictable. The material's behaviour is determined by its thickness, the rate of heating, the source of the ignition and the method of panel fixing. These factors help explain why the panels at Summerland did not drop out of their frames before ignition, with people on the staircases and floors below being showered with molten debris. Whilst this caused many injuries, it is conceivable that more serious injuries would have been sustained had flaming sheets dropped down on to the Solarium floor rather than just fragments and droplets of Oroglas (John Webb, Personal Communication). Survivor Mr Hugh Bryce said:

> "Only a few minutes had gone since the smoke started to fill the building. But suddenly there was a vast roar and the [promenade] wall [by the terraces] went up in a solid sheet of flame. The roof flared up and then began to melt, and red hot drops of the stuff splashed down from above…debris and the hot liquid was falling on those still trying to get out."

The context of Oroglas' usage at Summerland is extremely important. The material covered an extensive area and was not adequately separated from other combustible materials inside the building. That is how it was set alight in the first place. The Summerland fire showed the rate at which Oroglas burns increases rapidly when it has been heated by other materials close to it. Setting fire to one Oroglas panel in a laboratory situation will thus reveal little about its behaviour during a real fire. Secondly, as was noted by Mr Ken Taylor in his *New Civil Engineer* article in August 1973

(section 5.7), the panels were held too tightly in their frames, which meant they were less likely to soften and fall out of their frames before ignition. The fact that the long edges of the Oroglas panels had not been protected against ignition was irrelevant to the speed at which the fire spread. It was the fact that the roof was one large combustible surface exposed to an intense internal fire below that is the key to understanding the dynamics of Oroglas' involvement in the Summerland fire.

The Summerland disaster provides an excellent example of the misuse of a new building material. The *Summerland Fire Commission* (Paragraph 149, Page 52) noted: "It is, we believe, quite possible to clad a building in acrylic safely, but the way it was used and the extent of its use made Summerland a vulnerable building". The Commission made a number of recommendations for the *safe* use of acrylic sheeting (**table 6.7**). It is interesting to note that many of these stipulations had already been laid down by the UK authorities for the Hunstanton Leisure Centre Project in Norfolk in 1971 (section 5.3). The Commission also stressed the need for manufacturers to provide the fullest information to parties intending to use their materials.

Table 6.7: The Summerland Fire Commission's recommendations for the safe usage of acrylic sheeting

1	Use only for small areas of the roof and walls of multi-storey buildings
2	Place at least 20 feet away from any combustible material
3	Place at least 11 feet 8 inches away from any point which could be reached by a person inside or outside the building
4	The edges of the panels must always be protected against ignition
5	If an extensive area of the building is clad or roofed in acrylic, then the number and width of exits should be increased by 50% and distances on open escape routes should be reduced by one third
6	Acrylic buildings should be adequately separated from neighbouring buildings
7	Installation of a sprinkler system [a deluge system] may prove invaluable depending on the context

After the disaster**,** Oroglas was never used on a large-scale in the UK to clad the side of a building or an entire roof. However, PMMA Coxdomes are still widely used for small areas such as skylights and other non-structural applications. Oroglas is now clearly labelled as heat resistant, emphasising its limited fire resistance. When large-scale transparent structures are built, ETFE polymers are generally used. These have a similar composition to Perspex but are more flexible. In a fire, they behave like clingfilm: that is, they shrink away from the flame and only the residue ignites and then only with difficulty. The Eden Project biodomes in Cornwall are constructed of this material (George Maxwell, Personal Communication).

6.6 Issues in the management of Summerland

The actions of Summerland staff to the emerging crisis were described in previous sections. It now becomes necessary to account for these actions by analysing the building's management structure.

The General Manager at the time of the fire was Mr Anthony De Lorka (34); he was Summerland's third general manager. Mr De Lorka's previous job had been at an amusement arcade in Blackpool, "where he learned cashier procedure and how to look out for troublemakers" (Turner and Toft, 1989, page 183). He had also worked in catering. Mr De Lorka arrived in Douglas in May 1973, and worked alongside the retiring manager Mr Bertorelli for one month before taking charge in June 1973. Note, therefore, that Mr De Lorka had only been the General Manager of Summerland for two months at the time of the fire. Mr De Lorka had been told Summerland contained a large quantity of acrylic material; but this was never discussed with him in the context of fire risk. As Mr De Lorka knew nothing about the building's fire characteristics, it is hardly surprising he thought that the building had a low fire risk. Mr De Lorka did not receive any written instructions from Mr Bertorelli about the scope of his duties and responsibilities. That raises the question as to whether Mr De Lorka had been briefed adequately about his job by higher management in Trust House Forte. The company had prepared a document about fire safety for all General Managers. The document stated that the General Manager must ensure that all members of staff know the fire routine and take place in evacuation drills. Mr De Lorka had not read this document. Indeed, it is possible that THF's higher management had not even given him a copy to

read in the first place. Consequently, no fire drill had been held at Summerland in the months before the fire. Furthermore, the staff had not been briefed about emergency evacuation procedures. These facts sit uncomfortably with the written assurance that THF had given to the Isle of Man's Chief Fire Officer.

> "My company wish to assure you that staffing levels and standard of training will be sufficient to ensure that every first stage alarm will be given immediate attention and the fire brigade will be called at the first stage."

Mr De Lorka thought Mr Harding (Summerland's Technical Services Manager) was responsible for holding a fire drill and briefing staff about evacuation procedures. Whilst Mr De Lorka raised fire safety matters with Mr Harding in a general way, he did not check whether their chat had translated into an organised plan of action on the ground. Mr De Lorka said no further action regarding drills and training had been taken because it was the height of the summer season and they were very busy, meaning there was insufficient time to hold a fire drill or discuss evacuation plans. This was a most illogical position to take because the presence of thousands of people inside Summerland during the school holidays made it even more vital that a fire drill *was* held. The fire alarm had sounded only once during Mr De Lorka's short time as General Manager and then it was a false alarm as opposed to an organised drill. At the public inquiry, Mr De Lorka said he relied on members of staff to use their own initiative to get people out of the building safely in the event of a fire. He had made no plans to inform the public in the event of an emergency. While Mr Dr Lorka thought it was the

Technical Services Manager's responsibility to arrange an evacuation procedure, Mr Harding thought this should have been done by Heads of Departments, that is, the most senior member of staff in each area of the building. Responsibility for fire safety inside the building was thus ambiguous and blurred, with the General Manager, the Technical Services Manager and Heads of Departments mistakenly believing the fire routine had already been take care of by other people. They relied too much on improvisation and the belief that things such as calling the fire brigade, sounding the alarm and evacuating the building would just happen during an emergency.

The safety of the occupants of Summerland was not solely the responsibility of the local management on the ground, but also Trust House Forte's senior management in the UK. There is evidence to suggest that senior managers on the mainland could not even agree on the roles that the local managers should have been performing at Summerland. For instance, Mr Joseph Dixon (THF's Fire and Safety Officer for the UK) had interviewed Mr De Lorka before and after his appointment. Mr Dixon mentioned fire precautions at these meetings, but he did not give Mr De Lorka any written instructions or tell him that it was his responsibility to arrange an evacuation plan for the building. Mr Dixon (56) said: "He must have realised he was responsible for the fire arrangements." However, when Mr Dixon visited Summerland on subsequent occasions, he did not check whether Mr De Lorka had an evacuation plan in place. Mr Dixon merely confined himself to checking amongst other things the state of the firefighting equipment and the exits. "It may be that…Mr Dixon was not properly instructed in the scope of his duties", noted the Commission

(Paragraph 245, Page 77). Mr Dixon's assumption that the General Manager was responsible for evacuation procedures was flatly contradicted by a more senior UK THF manager. Mr Paxton (Deputy Manager Director of THF Leisure) "thought it was for Mr Harding to organise an evacuation procedure and for Mr De Lorka to make sure that he did it" (SFC Report, Paragraph 56, Page 161).

Despite the blurring of responsibilities and inadequate briefings from higher Trust House Forte management, "Mr De Lorka lacked appreciation of what he should have realised was among his duties as General Manager, to make proper provision for dealing with a fire emergency" (SFC Report, Paragraph 244, Page 76). Mr De Lorka's deficiencies in this area become even more apparent when he is compared to Summerland's first General Manager Mr Beetles. In 1971, Mr Beetles issued "good and practical instructions" to his staff about the fire routine. The instructions told staff how to operate the building's fire alarm system and contact the fire brigade. Mr Beetles' directives also stressed the importance of the Control Room in an emergency, a clear difference to August 1973 (section 6.4.1). Moreover, he designated a 'Duty Manager' in the building. The Duty Manager would take the decision to evacuate the building. After the evacuation order had been given, a standard set of announcements would have been made to begin evacuation. Members of staff were instructed to position themselves at the nearest exit, controlling people 'quickly and calmly'. Mr Beetles' actions *suggest* fewer people *may* have been killed at Summerland had an identical fire occurred in 1971. This can be no more than a suggestion because, as is noted by the Commission, "the establishment of a proper system [fire routine] is not enough. The Commission notes caustically: "A

proper evacuation system is not established or maintained merely by putting up notices…It must be maintained by training and practice" (SFC Report, Paragraphs 164 and 243, Pages 57 and 76). Certainly, there was no fire training or practice during the summer of 1973. This is clearly demonstrated by the members of staff called to the public inquiry. With one exception (Marquee Showbar Manageress Mrs Pauline Wynne-Smythe), no employees could recall ever receiving any instructions from senior members of staff about fire procedures. They were also largely oblivious to the contents of fire action notices around the building. In the light of this, the Commission noted:

> "In this thoroughly unsatisfactory state of affairs it is not surprising that the fire found the entire staff completely unprepared and at a loss. In the emergency there were errors of judgment, errors of action and errors of inaction. They were all human errors and failings and are not to be derided by us who were not involved at the time. In the absence of prior thought and organisation and training, all this was to be expected." (SFC Report, Paragraph 162, Page 56)

Ideally, crisis decision-making at Summerland needed to be centralised from the outset and follow a pre-defined path. In reality, the actions of members of staff were almost completely de-centralised, with no one assuming overall control when the fire was first seen on the crazy-golf course. The development of centralised evacuation plans was hindered by the shifting nature of the staff, both at management and ordinary level. For instance, two of Summerland's most senior members of staff (the General Manager

and House Manager) had only been appointed in June 1973. In the two months before the fire, there had been a 300% turnover of staff, which is common in tourist-related employment. Mr Harding and Mr Shaffer felt this rapid staff turnover would not make it feasible to hold fire drills or maintain a regular firefighting party. Mr Harding said: "We had virtually a continuous turnover of staff. You never knew what department a person would be in from day to day".

Turner (1978) identified a number of pre-conditions for a man-made disaster. One of these pre-conditions is the introduction of 'strangers': that is, people who are not trained to recognise and deal with an emergency in a building within which they happen to find themselves. Holidaymakers were not the only 'strangers' in Summerland on the night of the fire. "In an institution with such a high staff turnover, the staff, too, behaved in some ways like 'strangers' (Turner and Toft, 1989, page 190). It is therefore unsurprising the evacuation of Summerland was "delayed, unorganised and difficult" (SFC Report, Paragraph 156, Page 55). The behaviour of holidaymakers and staff was unforeseen in several ways. Mothers and fathers went against the flow of people looking for their children rather than making good their own escapes; some members of the door staff gave greater attention to securing and removing cash tills than helping members of the public.

Many people believe anecdotally that the separation of parents from children was an important contributor to the high number of deaths. "Parents died searching desperately for their children in the flames. Children died trying to find their parents. Some families found each other

too late and died anyway", reported *The Daily Telegraph* (4th August 1973, page 6). This commonly held perception was challenged by Sime (1983), who said this conclusion was largely a myth that had been perpetuated over time. Sime (1983) argued this seemingly correct theory is wrong because of the fact that parents separated from their children responded more rapidly to ambiguous signals (section 6.5.2) about the fire and made their way more quickly to the lower floors of the building (e.g. children's play area, rollerskating area, funfair) than those in groups. There is, however, one major flaw in Sime's argument. If it is assumed that the mother has a greater tendency than the father to look around for their children in an emergency situation rather than making good their own escape, Sime's argument does not tally with the fact that significantly more women (31) than men (19) died in the fire. As shown by using the Chi-Square test of statistical association, this gender imbalance is statistically significant at the 99% confidence level. That is, the difference between the number of male and female fatalities is real and is highly unlikely to have arisen by chance alone.

In the psychology literature, it is now recognised that people in a disaster situation often try to find their family and friends first before leaving the building as one group: attachment to familiar persons often takes precedence over escaping from the building (Sime, 1983, 1985). People are thus attracted to both familiar places (i.e. the main entrance) and familiar people in a crisis.

The Summerland fire disaster illustrates that crisis decision-making must be taken before a disaster; it certainly cannot be improvised during the

actual emergency. The *Summerland Fire Commission* made a number of recommendations to managers of public buildings (**table 6.8**).

Table 6.8:

The Summerland Fire Commission's recommendations for the managers of public buildings

1A	Managers must review fire routines and evacuation procedures
1B	Fire routines and evacuation procedures must be regularly checked and practiced
1C	Members of staff should be instructed and trained in fire routines and evacuation procedures
2A	Some or all of the staff should be trained in how to use the building's firefighting equipment
2B	A staff firefighting party must hold regular practices
2C	The fire brigade must be called to every fire alarm
3A	Test the fire alarm system regularly and keep a record of the tests
3B	Test emergency lighting regularly; keep a record
4A	Have clear signage to emergency exits and display plans showing escape routes
4B	Doors must never be locked whilst the public is on the premises.
4C	Fire exit doors must been openable inside immediately (e.g. by panic bolts)
4D	It is unacceptable to secure a fire exit door with a mortice lock and have the key for the lock in a box alongside the door.

6.7 Issues in the design of Summerland

Architects

Summerland was largely the brainchild of its principal architect Manxman Mr James Lomas. Yet, Mr Justice Cantley, the Chairman of the *Summerland Fire Commission*, expressed puzzlement at his role in the design of the building. Mr David Neill, QC for the relatives of the dead and injured, accused Mr Lomas of "washing his hands" of a subject every time he was asked a difficult question. Mr Lomas denied this, and said the architects from Gillinson, Barnett and Partners (the associate architects) were more competent to answer certain questions because they had carried out much of the detailed design work for the building. Despite being the principal architect, Mr Lomas admitted in evidence that, at some stages, he merely acted as a 'conduit' or 'letterbox' between the Leeds-based associate architects and the Manx authorities. The Isle of Man authorities placed great faith in Mr Lomas and consequently failed to scrutinise adequately the architects' plans for design mistakes. "We relied upon the architects", was the repeated mantra of many of the local planning officials called to the public inquiry. The *Summerland Fire Commission* was unimpressed by the architects' repeated attempts to offload responsibility for the tragedy on to other parties. After all, according to SFC member Wilson-Dickson: "It is the duty of those who prepare the plans [i.e. the architects] to get them right; the duty of those who scrutinise or accept or reject them should only be to check that they are right already and not to accept the responsibility for wholesale correction" (Wilson-Dickson, 1974, page 12).

Table 6.9:

The Summerland Fire Commission's recommendations for architects

1A	A named person should be in charge from the beginning and make all the major design decisions.
1B	Groups involved in a building project (e.g. manufacturers) should agree their responsibilities in writing from the outset.
1C	Architects must know how the space inside a building will be used before submitting any plans.
1D	Architects must consult the authorities with regard to byelaws, fire regulations and town planning as soon as possible.
1E	Architects must be given more instruction on fire protection and precautions during their training.
2A	Escape routes and fire stopping measures must be adequate to ensure the building is safe when it is full to capacity.
2B	Architects must prepare a schedule of the means of escape showing all escape routes and detailing their width, capacity and distance.
3	Install a sprinkler system if a building contains large quantities of flammable materials unless special reasons apply, e.g. museum.
4A	Avoid creating voids with combustible interior surfaces inside a building. If they are essential, they must be adequately fire-stopped.
4B	Be aware that the fire behaviour of a material in a real building may be completely different from a single sample in a small-scale test.
4C	When using sheet steel cladding materials for multi-storey buildings (e.g. Colour Galbestos), an architect must consider the instability that may result from the material's thermal and vibratory movements.

Even amongst the architects, there was inadequate co-ordination and overall guidance. No one ever stood back and looked at the project as a whole. Furthermore, too many important decisions in the design of Summerland were taken by junior (job) architects without being reviewed by the senior partner in each firm. **Table 6.9** summarises the *Summerland Fire Commission's* recommendations for the architectural profession.

After the report's publication, the Policy Committee of the *Royal Institute of British Architects* (RIBA) began a review of the training and practice of architects. The RIBA advised its members to read the *Summerland Fire Commission's* report in full; the Institute reproduced a condensed version of the report in the July 1974 edition of the RIBA Journal. In addition, the RIBA promoted a booklet called *Fire and the Architect* in Schools of Architecture to improve students' knowledge of fire protection and precautions. The RIBA was happy with most of the Commission's recommendations because they represented existing good practice in the industry in the UK, although they acknowledged that improvements would still be needed. However, the RIBA was sceptical of the Commission's recommendation that one person should take all of the major design decisions because this would fundamentally alter the role of the job architect.

In an article in the April 1981 edition of *Consulting Engineer*, Basil Gillinson told how the Isle of Man fire had changed his firm's approach to building design:

> "Before the [Summerland] disaster, I suppose we were average in our approach to fires. We felt that if we consulted properly with the fire authority and complied with the regulations and so on, that was it. There was not the priority in our minds when designing buildings that there has been since. The disaster at Summerland has concentrated our minds on that aspect of design of public buildings. In fact I wish it had influenced other people half as much as it has influenced us, in relation to every sort of building, not just leisure buildings and buildings of public assembly."

Gillinson, Barnett and Partners designed the Rhyl Sun Centre, which opened in the North Wales seaside town in 1980. During the design stage, a former chief fire prevention officer liaised with the architects and made recommendations as the design evolved. Unlike Summerland, fire safety was thus factored into every stage of the design process rather being regarded somewhat as an afterthought. As *Consulting Engineer* noted, this process "concentrated the designer's mind on…public safety and escape routes; detailed design; materials; the way materials are assembled together and relate to each other; and finally methods of fire warning and control of fire fighting". The design of Summerland was criticised because the main assembly floor (the Solarium) was not at street level and *direct* escape routes were limited due to the presence of the cliff and the Aquadrome. In contrast, the large undivided spaces where people assemble at the Sun Centre are near to ground level, with fire exits on all sides of the building providing direct escape routes into the open air. This makes it less likely that a person will retrace their steps to the main entrance, something that happened at

Summerland with tragic consequences. During the Summerland fire, many parents tried to find their children first instead of leaving the building immediately. The designers of the Sun Centre have "taken into account [this aspect of human behaviour] as far as humanly possible". The architect's role in fire safety did not end with the physical completion of the Sun Centre, but continued with them briefing the centre's management about good practice and maintenance of equipment. The Summerland fire proved so deadly because poor building management interfaced with poor building design, something that the Sun Centre's architects were trying strenuously to avoid.

Building Inspections

Mr Powell, Douglas' Borough Engineer, admitted he did not inspect Summerland after its completion or send a building inspector to do so. There were also no inspections during the fitting out stage by Trust House Forte. This was one reason why the concealed gap (section 6.4.2) between the Galbestos and Decalin walls had not been spotted. Mr Powell believed the presence of a Clerk of Works and supervision by the architect at the site would cover the remit of the Corporation's inspector. This was an unwise act of delegation because the Clerk and the architect were appointees of a private company (Trust House Forte) and so would not seek to uphold the more exacting standards of a formal inspection. The building was also not inspected by the fire brigade whilst holidaymakers were on the premises. Sam Webb, an architect and member of the RIBA Council in 1973, said (personal communication):

> "The regulations cannot guard against incompetence on the part of architects, designers, engineers or builders unless there is an adequate system of independent inspection by Building Control Officers. This was certainly not the case in the Isle of Man".

Mr Wilson-Dickson (1974: 12) of the *Summerland Fire Commission* commented: "It does seem from the Summerland experience that there is no real substitute for a close and careful watch over what is done by way of ensuring public safety in such places". Consequently, *The Summerland Fire Commission* recommended:

1. Building inspections should be conducted formally and precisely, both by architects and local authority inspectors, during the construction phase.
2. A building must be built precisely to the specification of the plans.
3. No public building should be opened until a satisfactory official inspection has taken place and a completion certificate issued.
4. If a building byelaw is waived, compensatory measures must be taken in the building's design to ensure that standards of safety are maintained.

Mr Wilson-Dickson analysed whether a similar disaster might have happened in the UK in a paper in the *Fire Engineers' Journal*. Wilson-Dickson (1974: 12) felt the UK system of building control and enforcement made it "unlikely that most of the errors of design could have been made" on the mainland. He referred to the UK's regulations as being "more soundly based" on an up-to-date study of fire technology, whereas the Manx

provisions were “somewhat antiquated”. Wilson-Dickson (1974) strongly believed the large-scale use of Oroglas would not have been permitted in the UK because it would have violated Regulation E.15 that specifies the fire properties of the interior surfaces of a building. Summerland was unusual in the sense that the external cladding (Oroglas) was also the building’s *interior* surface. Despite the superior UK legislative framework, novel design concepts like Summerland do not always fit comfortably with even the most up-to-date building regulations. This point was also emphasised by Basil Gillinson, Summerland’s associate architect, at a press conference held three days after the fire (chapter 5: Sunday, August 5th). Wilson-Dickson criticised the means of escape guidance available to architects that existed in the UK at the time of the Summerland tragedy. He felt the guidance – which was scattered “throughout a number of codes and documents” – needed to be rewritten in a unified manner to leave architects “in no doubt as to what is good practice”.

6.8 Reaction to the Summerland report

The *Summerland Fire Commission* report “did not shirk from naming names, spotlighting weaknesses and pointing an accusing finger at the origins of mistakes and unpreparedness” (Barlay, 1976, page 59). It is particularly critical of the architects and the building’s senior staff. However, the report ends on a more conciliatory note (SFC Report, Paragraph 246).

> "In all the above inadequacies and failings, it seems to the Commission that there were no villains. Within a certain climate of euphoria at the development of this interesting concept, there were many human errors and failures and it was the accumulation of these, too much reliance upon an 'old boy' network and some very ill-defined and poor communications which led to the disaster. It would be unjust not to acknowledge that not every failure which is obvious now would be obvious before the disaster put structure and people to the test."

The *Royal Institute of British Architects Journal* (July 1974, page 4) commented how this paragraph was "humanely intended to soothe the numerous recipients of the commission's censure". The 'no villains' verdict caused considerable consternation at the time, with many accusing the Commission of conducting a "whitewash job". In a leader column entitled *Really no villains?* the anti-establishment *Manx Star* (27th May, 1974) argued:

> "It seems strange…to people who have read the Summerland report, that those who wilfully disregarded basic fire precautions in public building design and management have not been judged directly responsible for the 50 deaths which occurred there as a result of their incompetence. 'There were no villains' concluded the Commission. But if this is not villainy, what is?"

Billy Aves (18) died in the Summerland fire (section 1.4). Mr Aves' father said:

> "I have read the Commission's report. We have seen that fire precautions were not adhered to, that the management didn't instruct the staff, that the architects didn't know all they should have done…To my mind they must have known the place was dangerous, and if they didn't they were guilty of criminal disregard for the safety of others. My son was murdered – there can be no other word for it. Why do these people pay no penalty?"

Mr Pearson, the Manx Fire Chief, said: "No villains? That is not my opinion, but I don't think I can say any more. I don't want to leave the island [Mr Pearson retired in 1974] with an atmosphere of being against the [Isle of Man] Government". A letter writer (unnamed) to the *Manx Star* (3rd June, 1974) argued:

> "It is inconceivable that any properly designed building could have burned so fast and with such appalling results…There were villains, the villains who tried to build Summerland the easy way, and on the cheap…We cannot bring back those who died, but I for one feel that those responsible should be made to pay for their deaths. I sign myself – ASHAMED."

Mr Tyrone Byrd, the technical editor of *Construction News*, wrote:

> "The conclusion that there were 'no villains' was a serious error of judgment…The report presented a clear picture of incompetence and irresponsibility far beyond the bounds of professional good practice."

An editorial in the *Architects' Journal* (29th May, 1974) argued: "…it is the ignorance and cynicism of the [Summerland] architects and the chaotic communications within the design team that are most frightening". It goes on to say that many of the mistakes made in the design of Summerland are "so ordinary and casual that many of them could have occurred in any architect's office".

> "Who has not specified a new material – even on occasion a whole string of untried components – without being fully aware of the problems that are likely to ensue? What architect has not delegated design to inexperienced assistants or accepted work for which he was not qualified?"

Many people passed judgment on the *Summerland Fire Commission's* report based solely on the final 'no villains' paragraph; it was almost as if the Commission's first 245 paragraphs did not matter. In an editorial to introduce its coverage of the report, the *Royal Institute of British Architects Journal* (July 1974, page 4) commented:

> "The Summerland report is most emphatically not a whitewash job. Few of those people or bodies responsibly involved in the disaster escape whipping: a calm and brave bar manageress [Mrs Pauline Wynne Smythe], a conscientious earlier general manager [Mr Beetles] – how many of the professional, commercial or official parties?"

Whilst it is understandable that some people wanted to attach blame for the tragedy to a handful of individuals, others thought this approach would be counter-productive in the long term. In a letter to the *Manx Star* (3rd June, 1974), G D Moore of Douglas argued:

> "If we load all the guilt onto one or two people it may make us feel easier, but it will not prevent us being lax in the future, and it is this which we must guard against…I think we should forego retribution, but devote all our efforts to being more efficient and more responsible in the future."

The *Isle of Man Courier* (24th May, 1974) took a similar line in its editorial:

> "Certain individuals are named, and whilst many people expected a witch-hunt, the Commission has been careful to lay the emphasis on its recommendations – to try and see that there is no similar occurrence in the future…We earnestly hope that the world will forgive and in turn apply itself to the task, as we hope the Island will, of constructing buildings that are safe and sound under any circumstances."

A senior Isle of Man civil servant described the Summerland report as being "gentle in its condemnation and generous in its praise".

When evaluating the Summerland report, it is important to examine the remit and terms of reference of the Commission. The *Summerland Fire Commission* was appointed "to inquire into, and report on, all the circumstances of, and leading up to, the fire at [Summerland], and to make recommendations" (SFC Report, Paragraph 3, Page 1). As Barlay (1976: 61) noted, it is not for the Commission "to apportion blame, pass judgment, exonerate, let alone mete out punishment". It is for the Isle of Man High Court to deal with any retribution.

6.9 The inquest

The inquest into the Summerland disaster was held on 27th August 1974. Mr Michael Moyle, representing the Manx Attorney General's department, announced he was not contemplating bringing criminal charges against any individual or organisation involved in the design and management of Summerland. This was because the *Summerland Fire Commission* had found "inadequacies and failings" but "no villains". In other words, the disaster could not be traced back to a single act of negligence by one or two individuals. Instead, the fire was the result of "a seemingly-unrelated series of errors and omissions, each of which was not in itself fatal", which had then snowballed into a disaster (*The World's Worst Disasters of the Twentieth Century*, 1983). Mr Henry Callow, the coroner, said: "The evidence which has been disclosed in this inquiry would not justify a finding of criminal negligence and committal for that on a charge of manslaughter". As instructed by the coroner, the seven-person jury returned

after three hours and delivered a unanimous verdict of **death by misadventure** (essentially a 'death by accident' verdict). *The Times* (28th August, 1974) reported: "Ten relatives of some of the 50 people who died sat grim-faced and silent when the verdict was announced. One girl burst into tears and several other people showed emotion". Mr Aves, whose son Billy died in the fire, said after the inquest:

> "I came here to represent a number of relatives, and I believe I speak for a lot more in my efforts to get justice…I have now been in touch with more relatives and there will soon be eight MPs working on this. I will pursue this until the day I die; I have the rest of my life to devote to it."

Mr Aves added that the Commission "went beyond [its] terms of reference in saying there were no villains". Mr David Barber, whose mother Ann (69) died in the fire, said: "There are villains responsible for this disaster. They are still in the Island. They should be brought to court".

6.10 Law Suits

On 21st January 1974, Trust House Forte and its Manx subsidiary Summerland Ltd filed a suit for damages against the architects Mr Lomas and Partners in the Isle of Man High Court. The plaintiffs alleged the loss and damage caused by the fire was the result of "the negligence and/or breach of contract of the defendants in charge of the design and supervision of the erection of the building".

On 16th July 1974, four people seriously injured in the fire brought a claim for damages against Trust House Forte and Summerland Ltd. The people were Mrs Catherine Bain of Leith, Edinburgh; Mrs Ellen Palfrey of St Helens, Lancashire; Mrs Eileen Wilson of Jordanstown, County Antrim; and Mr Alan Williams of Upton, Wirral, Cheshire.

6.11 Changes to fire safety legislation and practice

Isle of Man

Basnett (1991) summarises the changes to Isle of Man legislation and practice that occurred because of the Summerland disaster. He notes that the changes meant the fire service would be involved to a much greater extent in ensuring adequate levels of public safety are maintained. Mr Brian Myles (32), a former Blackpool fireman, was appointed as the Isle of Man's first fire prevention officer in January 1974. A Manx Government spokesman said: "He is experienced in the inspection of hotel premises in Blackpool under the [1971 UK] Fire [Precautions] Act". Whilst the appointment was made only five months after the disaster, the Isle of Man Government maintained that the two events were unrelated and moves to make such an appointment dated back to 1972. However, the investigating team from the UK *Fire Research Station* said they had formed the impression from talking to Mr Pearson that the Manx fire chief had requested such an appointment for years but the Isle of Man Government had repeatedly blocked his requests (John Webb, Personal Communication). In October 1974, the fire brigade was given the power to enter buildings and inspect their exits. This paved the way for the Manx **1975 Fire Precautions Act**, which was closely modelled on the UK's 1971 Fire Precautions Act. The 1975 Isle of Man Act

covers public buildings, hotels, guesthouses and some residential buildings. Owners were given three years to carry out improvements. The 1975 Act replaced the Manx Theatre Regulations (1923) and the Fire Escapes Act (1950). The 1975 Act meant that fire certificates became mandatory for certain types of premises. The Island's 1963 building byelaws were also revised, with new laws that were practically identical to UK byelaws coming into effect in April 1976. The new byelaws emphasised the need for barriers to prevent the vertical and horizontal spread of fire inside a building, a clear lesson learnt from the Summerland fire.

United Kingdom

> "Summerland had a huge impact on building in the UK - perhaps the same impact that the Great Fire of London had in 1666. It was at the time the worst peacetime fire since the Second World War."
>
> (Sam Webb, Member of the Council of the Royal Institute of British Architects at the time of the Summerland disaster)

Changes to UK Building Regulations (known as the *Summerland Amendments*) were gradually introduced following the disaster. These new regulations were largely concerned with means of escape from a building and fire spread. The whole of Part E of the *1972 Building Regulations* dealing with Structural Fire Precautions was amended by *The Building (First Amendment) Regulations 1974*, which came into force on 31st July 1974. In December 1975, further amendments followed in the *No. 1370 Building and Buildings: The Building (Third Amendment) Regulations*. This amendment specified that the external walls of public buildings must always be fire

resistant. The legislation also prevented flammable materials being used for the lower levels of a building, where they would be in contact with the building's floors or could be reached by a human being. These walls must be non-combustible and fire resistant throughout, and use materials such as brick, stone and concrete.

A guidance document was issued by the UK Home Office (Circular 32/1975) on 12th March 1975. The document stated it would be beneficial for the fire brigade to inspect leisure and holiday centres whilst the public is on the premises (SFC Report, Recommendation 23) to ensure regulations, conditions of licence and good practice are being observed. Circular 32/1975 provides guidance to the licensing and fire authorities on implementing the SFC's recommendations. The SFC report (Recommendation 34) states:

> "In places of public assembly and entertainment doors intended for use in an emergency should never be locked while the public are on the premises even if keys for the locks are provided in adjacent boxes. All exit doors should be readily openable from within at all such times…"

Many buildings make use of a **padlock board** to ensure exit doors can always be opened quickly from inside when the public are on the premises. Before the building is opened, the padlocks are removed from the doors and hung on the board. The building is not opened until the board is complete. In recent years, exit doors have been monitored and controlled electrically to prevent misuse. The simplest form is to fit the door with a local alarm system to deter misuse, extending to remote monitoring and finally "hold-

shut" magnet door holders. The latter hold the door shut until the fire alarm or local break-glass release is operated; they are designed always to fail in the safe mode, with the door being released if the mains electrical supply fails (John Webb, Personal Communication).

Summerland was designed to provide separate entertainment areas for children and their parents. When the fire broke out, many children were separated from their parents, some by as many as five floors (the Cruise Deck was five floors above the funfair). Instead of making good their own escape, many parents (especially mothers) searched for their children rather than going directly to the exits. In fire safety and accident literature, this is still referred to as *The Summerland Effect*. It is highly likely that this factor explains why significantly more women then men died or were seriously injured in the fire (chapter 1). In 1989, the UK Home Office issued a document entitled *A Guide to Fire Precautions in existing places of entertainment and like premises*, which dealt with the design and management of buildings where children are engaged in different activities from their parents. The document recommended:

1. Children's accommodation should be at ground floor level or as close to the ground floor as possible.
2. Children's accommodation must never be on a higher floor than the parents' accommodation, unless the escape routes are through the upper level.
3. The housing of children's accommodation in a basement is only acceptable when parents are also accommodated in the same basement.
4. Children's accommodation should be adjacent to an external wall.

5. One of the exits from the children's accommodation should be a final exit and hence led directly out into the open air.
6. If a children's room is next to a parents' room (with connecting door(s) between the two rooms), then the width of the exits from both rooms should be sufficient for the combined number of children and adults.
7. There should be a notice prominently displayed in the area where children are deposited telling parents that children will be escorted by members of staff in the event of an emergency to the assembly point outside the building.
8. There should be an adequate number of properly trained attendants.

The more recent *Regulatory Reform (Fire Safety) Order 2005* and the various Guides issued to complement it make similar comments about the fire precautions needed when family members are in different parts of a building. This order states that any childcare facility should be on the same level as the parents or guardians and on the same route to escape. In addition, exit doors that are to be used by more than 60 persons must open in the direction of travel to the escape point (David Walton, West Midlands Fire Service Headquarters, Personal Communication).

Persons involved in the design of new buildings in the UK are legally bound by the CDM (Construction, Design and Management) Regulations, which came into force in April 2007. The CDM 2007 places legal duties on virtually everyone involved in construction work (UK Health and Safety Executive, 2007). The CDM system deals more with the paper plans than the actual building. Under this system, it can be difficult even to discuss a scheme informally with a Building Control Officer; full plans must firstly be

submitted, which often results in time and money being wasted. To get around this problem, some architects try serving a Building Notice on the District Surveyor or Building Control Officer, giving them three clear working days' notice that the architect intends to start.

The Corporate Manslaughter Act became law in July 2007. This was the result of many unsuccessful prosecutions, such as the 1987 Zeebrugge ferry disaster. If a disaster like Summerland happened today, this Act means that the building's management could be held liable.

6.12 Summary

The fire was started shortly before 7.40pm by three schoolboys smoking in the remains of a disused kiosk outside Summerland. Since the fire was outside, staff did not call the fire brigade for 21 minutes or evacuate the building, believing an external fire would not endanger Summerland itself. However, Summerland's external wall was built out of plastic coated steel sheeting (Galbestos), which did not possess two hours' fire resistance. As staff fought the external kiosk fire, there were unaware that the kiosk fire had spread to a concealed gap behind the Galbestos wall. The fire gained intensity in the void before erupting violently through the combustible Decalin fibreboard wall and into the building at around 8pm. No fire alarm was activated because the fire had probably short-circuited the wiring and the Control Room operative had not been trained to sound the bells and sirens after a fire alarm glass had been broken. The fire spread rapidly because the building was open plan (lacked compartmentation) and contained large amounts of wood; a gap between the floors of the terraces

and the external wall also facilitated chimney and coanda effects, so drawing the flames up to Summerland's acrylic barrel roof. Oroglas became involved in the fire at a late stage: it did not cause the fire's initial spread and ignited in the flashover because it was too close to other combustible materials. Escape routes from the terraces were inadequate (two open plan staircases that offered no protection against fire and a poorly designed enclosed staircase). Some exits were locked and the main entrance was poorly designed; some deaths on the upper floors were caused by people delaying their departure by looking for family/friends. The Commission is critical of the architects and senior staff, but concludes there were no 'villains'. No criminal charges were ever brought and a verdict of death by misadventure was returned at the inquest. New fire safety legislation became law on the Isle of Man in 1975.