Office of the Director General of Police
Commandant General, Home guards &
Director of Civil Defence &
Director General
Karnataka State Fire & Emergency Services,
No.1, Annaswamy Mudaliar Road,
Bangalore 560 042

Phone: 25570733
22971501
Fax : 22971512

No.GBC(3)37/2010 29-3-2010

To,

The Secretary to Government,
Home Department,
Vidhana Soudha,
Bangalore.

Sir,

Sub: Fire Accident in High Rise Commercial Carlton Towers, Airport Road, Bangalore on 23-02-2010 – constitution of a technical committee to investigate the cause of fire, work done and lapses.

Ref: This office order No.GBC(3)37/2010 dated 2-3-2010.

****

In this office order cited above (copy enclosed), a committee headed by the IGP and Additional Director General with 2 more officers of the department and 2 external experts have been constituted to investigate the cause of fire, assess the work done by the department and also to ascertain the lapses.

Accordingly the committee members have visited the site of incident on 3-3-2010 and submitted their report dated 27-3-2010 which has been enclosed herewith.

In this report the committee members have covered the following aspects:

- The procedure followed to issue NOC/clearance certificate,
- Lapses notice during the inspection,
- Summary of the fire incident,
- Cause and origin of fire,
- Extent of fire and smoke travel,
- Findings and recommendations.

In this regard I request you to peruse the report and take suitable action against the implementation of some of the suggestions.

Yours faithfully,

Sd/- 29-03-2010
Director General of Police
and Director General,
Karnataka Fire & Emergency Services

KARNATAKA STATE FIRE & EMERGENCY SERVICES

FIRE ACCIDENT IN HIGH RISE COMMERCIAL BUILDING (Carlton Tower) ON 23-02-2010

INVESTIGATION REPORT OF THE COMMITTEE, CONSTITUTED BY THE DGP, FIRE & EMERGENCY SERVICES, IN OFFICE ORDER NO.GBC(3)37/2010 DATED 02-03-2010

SCOPE OF THE COMMITTEE

- Inspect the incident site and building
- Determine the probable cause and origin of fire
- Review the compliance and adequacy of Fire Prevention and Fire Fighting Measures in the building
- Review operational safety lapses in the building on the part of builders and occupants

INVESTIGATION PLAN

The investigation plan consisted of the following tasks:

1. Task 1 – Review of the fire incident
   - Develop an overview of the fire incident
   - Inspect the fire incident site
   - Determine the probable cause and origin of fire

2. Task 2 – Review compliance of the building design to codes and adequacy of fire prevention and fire fighting measures in the building.
   - Review Carlton Towers design to appropriate building codes to determine compliance with respect to fire safety and prevention measures as well as adequacy of fire firefighting measures.

3. Task 3 - Review operational safety lapses in the building
   - Review building operations that may have increased the potential for a fire event as well as impeded fire egress.

HISTORY OF THE BUILDING

- No Objection Certificate, as per the provisions made in the Building Bye-laws 1983 of the City of Bangalore Municipal Corporation was issued from the Fire & Emergency Services Department on 03-04-1993 in No.GBC(1)653/92 to Sri.Prabat Kamal Gupta of Southern Investment (SI) Property Development Ltd.,

- This building has been constructed in 2 parts, Part-1 of 27 mtrs. height comprising common basement, ground and 7 upper floors AND Part-2 of 23.95 mtrs. height comprising common basement, ground and 6 upper floors. The ground & 1st floors were designed for shopping and upper floors to use as offices.

- One of the conditions in the NOC was to take the clearance certificate as per the provisions made in clause 5.5.1 of the Building Bye-laws 1983. Accordingly clearance certificate was issued on 27-07-1999 after arranging an inspection and confirming the compliance of all the recommendations fully.

- In the absence of any provision for re-inspection in the Building Bye-laws, neither the builder has subsequently approached the department for re-inspection nor the department had suo moto powers to inspect the fire prevention and fire fighting measures provided in the building.

STATUS OF FIRE PREVENTION AND FIRE MEASURES IN THE BUILDING BEFORE AND AFTER THE INCIDENT

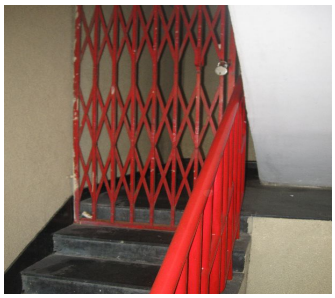
- The members of the committee, headed by Sri.P.S.Sandhu, IPS., IGP & Addl.Director General, Fire & Emergency Services have inspected the Carlton Tower site and the building on 03-03-2010.

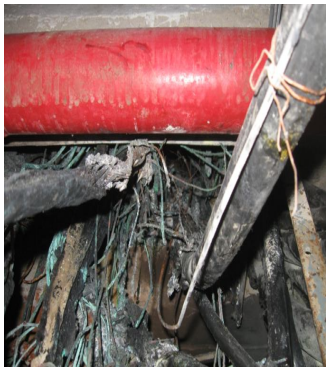
- The comparative chart of the fire prevention and fire fighting measures, communicated while issuing the NOC / confirmed the compliance while issuing the clearance and the finding by the members at the time of visit to the site on 03-03-2010 are as follows:

Details	**As per the NOC issued on 3-4-1993 and CC issued on 27-7-1999**	**Observations / lapses as noticed during the inspection of the site and building on 3-3-2010**
Height of the building and No. of floors	Part-1 of 27.00 mtrs. height comprising common basement, ground and 7 upper floors AND part-2 of 23.95 mtrs. height comprising common basement, ground and 6 upper floors.	The building has been constructed as per the approved plan confining to the height and No. of floors in each part.

Details	As per the NOC issued on 3-4-1993 and CC issued on 27-7-1999	Observations / lapses as noticed during the inspection of the site and building on 3-3-2010
Type of occupancy of both the parts.	Ground & 1st floor for shopping and upper floors for offices. The terrace floor was open.	4 restaurants at ground floor and 63 offices in 92 compartments in the upper floors from 1st floor to 7th floor of Part-1, (which is affected by the fire). Further 4 mobile towers with independent diesel generators and 7 separate diesel generators have been installed at terrace level with spare diesel in cans. The floor wise occupancy breakup is shown in Annexure-I.
No. of entrances from the road to reach the premises	2 entrances, each of 6.00 mtrs. width, one from southern side and one from northern side.	As planed 2 entrances have been provided, one from southern side and one from northern side. But the width of the entrances have been reduced by erecting the steel poles, which has hampered and delayed the entry of fire fighting vehicles to the premises.
Setbacks (open space) all around the building	Front (South)- 8.00 mtrs. Rear (North) – 9.00 mtrs. Side (East) - 9.00 mtrs. Side (West) - 9.00 mtrs.	By installing 2 big hoardings on the southern side, generators/ transformers on the south-east & north-east corners and 2 LPG gas bunks on the northern side, the allowed setbacks have been encroached / reduced. This has caused considerable problems for the Fire Service vehicles to enter the premises and position the vehicles at strategic points to organize fire fighting and rescue operation.

Details	As per the NOC issued on 3-4-1993 and CC issued on 27-7-1999	Observations / lapses as noticed during the inspection of the site and building on 3-3-2010
No. of staircases	3 staircases in Part-1 (affected by the fire) and 2 staircases in Part-2.	Even though 3 staircases, one at the centre and one each on both the flanks (southern & northern sides) (Total 3) have been provided, the Management have provided collapsible gates at ground floor level and locked the exit path of 2 staircases on both the flanks. Further the Fire check doors provided at each staircase landing to prevent the possible travel of smoke and fire both horizontally and vertically to the staircase area have been locked. Apart from these the common passage between the staircases at 2nd, 3rd & 4th floor level have been modified and blocked with additional constructions/ alterations and shutters. This has totally prevented the occupants of upper floors from moving horizontally from smoke filled areas to smoke free areas and out of the building. Added to these, the doors of each staircase, leading to the terrace, were also locked, restricting the possible escape of the occupants of the upper floors to the terrace. **Objective evindence** 

Details	As per the NOC issued on 3-4-1993 and CC issued on 27-7-1999	Observations / lapses as noticed during the inspection of the site and building on 3-3-2010
		  
No. of lifts	2 passenger lifts and 1 service lift in Part-1 and 2 passenger lifts in Part-2.	In the absence of clear instructions, not to use the lifts in an emergency, a few occupants have attempted to use the lifts and got stuck when the main electric supply failed and the alternative supply (common generator) did not work.

Details	As per the NOC issued on 3-4-1993 and CC issued on 27-7-1999	Observations / lapses as noticed during the inspection of the site and building on 3-3-2010
Service ducts	All the service ducts are to be enclosed by walls of 2 hour fire resistance capability with inspection panel doors of 2 hour fire resistance capability of each landing. Further all the ducts are to be sealed at every alternative floor level with non-combustible materials of 2 hours fire resistance capability. Compliance of this was confirmed while issuing clearance certificate by the department.	At the time of clearance compliance of these requirements have been confirmed. But later, along with the original cabling, few new ones were added in an unprofessional manner. Some of these were of small diameter wires joined with ordinary insulation tapes. To lay these additional cables for different applications by the different occupants the sealing at every alternative floor level have been removed and not refixed. This has allowed the dense smoke to travel upward in the beginning, thereafter horizontally resulting in mushrooming of the smoke. **Objective evindence**  

Details	As per the NOC issued on 3-4-1993 and CC issued on 27-7-1999	Observations / lapses as noticed during the inspection of the site and building on 3-3-2010
		
Air conditioning	Direction was to approach the department and obtain the details of safety measures if central air condition system is proposed.	Central air condition system was not designed at the time of clearance. But later unit air condition systems by each individual have been installed along with UPS and other electrical gadgets. It is not clear whether the load requirements have been worked out and clearance from the Electrical Inspectorate have been taken.
Wet riser-cum-down comer system	Installation of 1 Wet riser-cum-down comer system in each part was recommended, connected to an overhead tank of 20,000 ltrs. and an underground tank of 1,00,000 ltrs. with pumps, capable of delivering 2400 LPM in each system. Compliance of this was confirmed while issuing clearance certificate.	Even though the wet riser systems have been installed with required quantity of water and pump & these systems were tested at the time of issue of clearance to the building, the systems have not been maintained, found defective and non-functional at the time of incident. Further the doors of the wet riser system at each landing, should have been kept in a openable position, found locked, preventing the access. **Objective evindence** 

Details	As per the NOC issued on 3-4-1993 and CC issued on 27-7-1999	Observations / lapses as noticed during the inspection of the site and building on 3-3-2010
Fire Detection System	Installation of smoke detectors to cover all the floors from ground floor to 7th floor with its control point at ground level was recommended was found complied with while issuing the clearance certificate.	The detection system, provided in the building, has not been maintained and at few places has been either covered with false ceiling or removed. **Objective evidence** 
Sprinkler system	Installation of automatic sprinkler system in the basement parking area and shopping area at ground and 1st floor level of the building was recommended and was found complied with while issuing the clearance certificate.	Even though the sprinkler system with 378 sprinkler heads have been installed with required quantity of water and pump & these systems were tested at the time of issue of clearance to the building, the system installed at ground and 1st floor level were found removed. Further the system installed at basement level was defunct. **Objective evidence** 

Details	As per the NOC issued on 3-4-1993 and CC issued on 27-7-1999	Observations / lapses as noticed during the inspection of the site and building on 3-3-2010
Portable fire extinguishers	Installation of suitable type of portable fire extinguishers covering the basement parking area, main switch board rooms, transformer yard, generator rooms, inside each lift room, at each staircase landing was insisted. This was found complied while issuing clearance certificate.	Installation of portable fire extinguishers, as recommended, was confirmed during the final inspection at the time of clearance. But most of these extinguishers were found missing and a few available extinguishers were found defective. **Objective evidence**  
Escape route	Marking of the escape routes was insisted and got complied with.	This was available at the time of issue of clearance, but found missing at the time of incident.
Public Address System	Public Address System with two way communication facility near each staircase landing was recommended and got complied with.	This system, installed by the builder and found functional at the time of clearance, was not functional at the time of the incident.

Details	As per the NOC issued on 3-4-1993 and CC issued on 27-7-1999	Observations / lapses as noticed during the inspection of the site and building on 3-3-2010
Fire Safety Plan	Fire safety plan with instructions about Do's and Don'ts in an emergency for the occupants and with the telephone No. of Fire Control at each landing was recommended and got displayed while issuing clearance certificate.	This was found displayed at each staircase landing at the time of clearance, but were found missing at the time of incident. This plan would have made a few occupants to call the Fire Control when the fire broke out around 15.45 hrs. Unfortunately the first call at the Fire Control Room was received at 16.30 hrs. from Sri.Akhil Uday, one of the 9 occupants, who perished in the incident.
Training of the occupants	Training of 40% of the occupants in fire prevention and fire fighting was insisted.	Since at the time of clearance at the building was without occupants, on 05-06-1999 the builder had furnished an undertaking to train 40% of the employees and occupants with in 6 months from the date of occupation. This requirement has not been attended to. The presence of a few trained staff / occupants would have changed whole scenario.

INVESTIGATION REPORT OF THE COMMITTEE

SUMMARY OF FIRE INCIDENT

- On 23-02-2010 at 4.30 pm the Central Fire Control Room received the call about a Fire at Carlton tower. Accordingly 3 fire fighting vehicles including Mist Technology Motor Cycle and 1 rescue van have been sent to the spot from South Fire Station, located at a distance of 6 kms. When these vehicles reached the spot at about 4.40 PM all the floors of the building were found engulfed in dense smoke. This has prevented the location of the actual seat of the fire by the Fire Fighting & Rescue Team in the beginning.

- The Management and Building Security, even after noticing smoke spreading outside of building, did not open any of exits, which were locked for the reasons not known.

- The occupants of each floor of the building have not heard any alarm / warning communication and were initially ignorant of the smoke. Some, who tried to get evacuated, were trapped due to locked fire exits / staircases.

- 112 Fire & Emergency Services officers and staff, reached the spot in the beginning with 3 vehicles and subsequently with 12 more vehicles, have rescued about 300 occupants. Police and some of the members from public have also helped in rescue operation.

- Due to modification and additional constructions at 2^{nd}, 3^{rd} and 4^{th} floor levels, resulting the blockage of the common corridors, the occupants of these floors and that of 5^{th}, 6^{th} and 7^{th} floors were left with only one central staircase to escape out.

- Most of the occupants were not aware of topography of building and the location of fire exits. This has hampered their movement and were stranded in the affected areas/floors.

- 7 out of the 9 occupants have jumped from the building before the reaching of Fire & Emergency Services. 2 have died, probably due to inhalation of carbon monoxide and suffocation. About 68 occupants injured and were treated as in and out patients in the near by Manipal Hospital. The response from Police & 108 Ambulance Service was excellent.

- Crowd, watching the incident, jammed traffic and made the movement of Fire Tenders and Ambulances more difficult, adversely affecting the response time. A better crowd control and traffic management system needs to be established for such emergencies.

- Several modifications done in building and the removal of horizontal sealing in the ducts at alternative floor level allowed the fire /smoke to travel from lower floors to upper floors.
- No one (Building Security or occupant) seemed to have attacked the fire at its initial stage, which allowed the fire and smoke to travel to the upper floors.

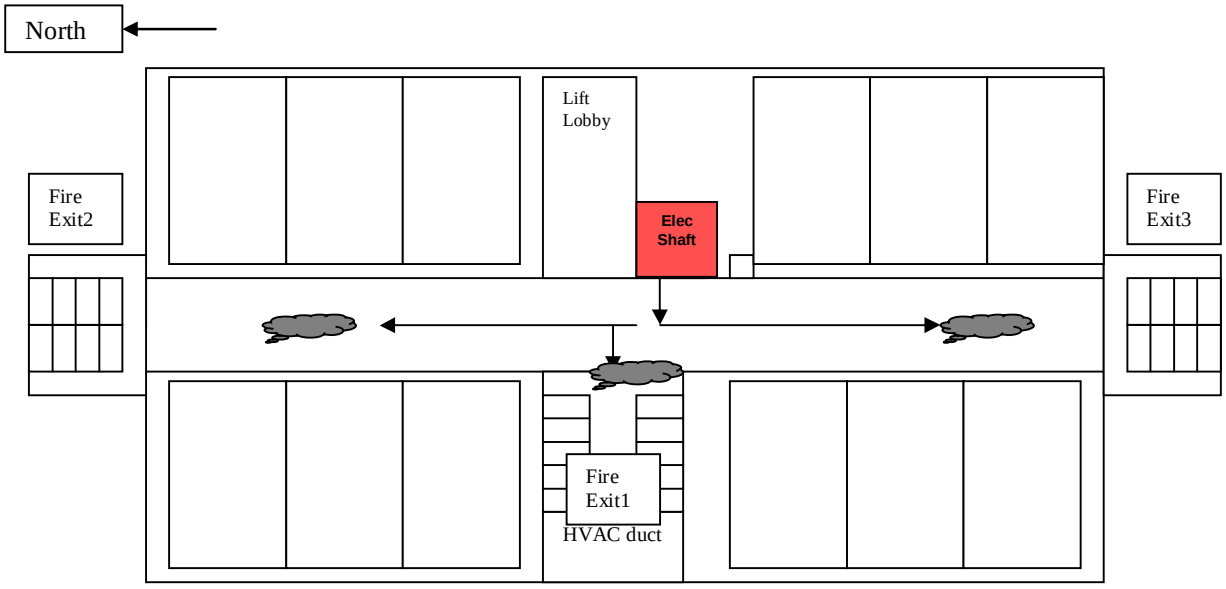
CAUSE AND ORIGIN OF FIRE

- The fire appears to have started between the first and second floors in the electrical shaft based upon the patterns of smoke travel and color of walls and ceiling.
- The heat source appears to be electrically induced heating and ignition of power cables.

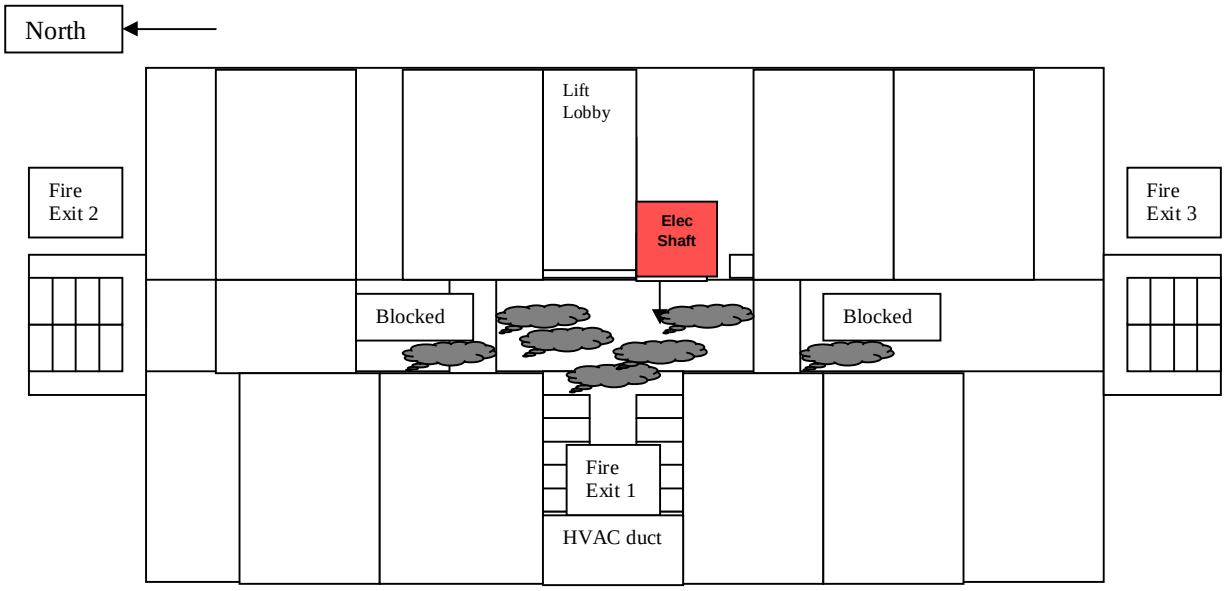
EXTENT OF FIRE AND SMOKE TRAVEL (FLOOR WISE)

The extent of smoke travel was inspected on each floor and provided in the following illustrations:

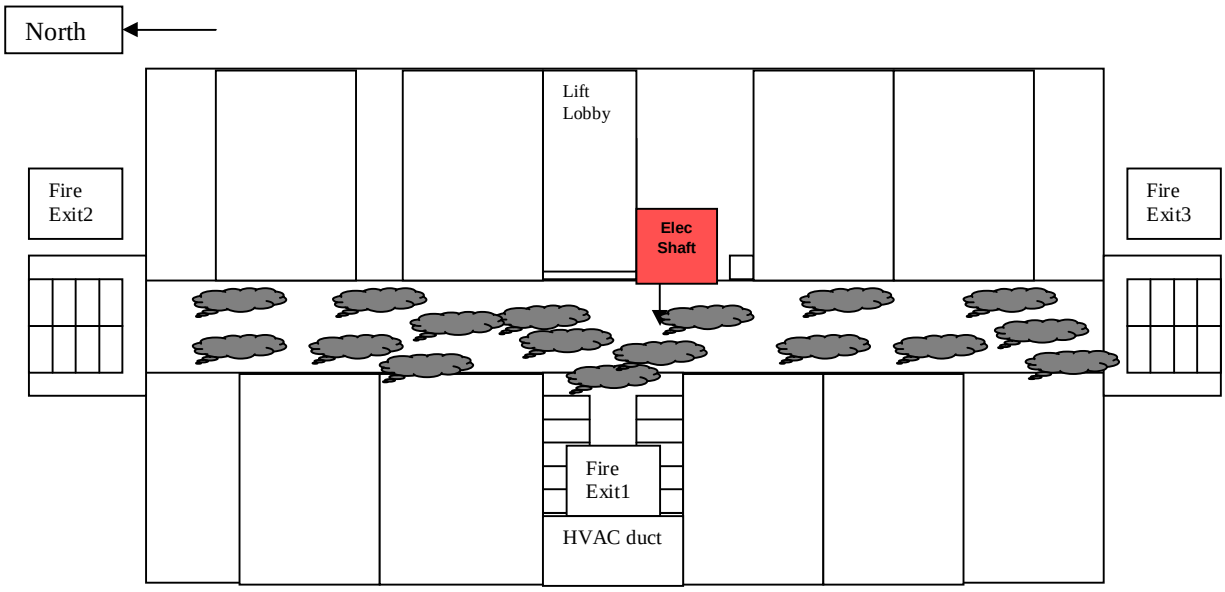
FIRST FLOOR – Fire Exit number 2 and 3 were locked at ground floor.



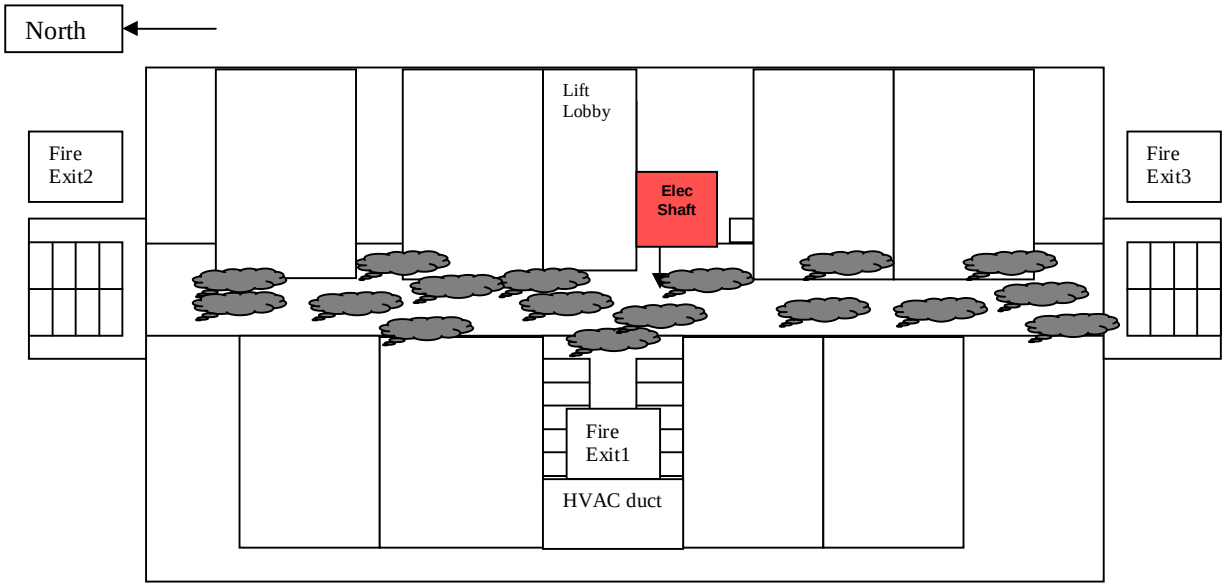
SECOND, THIRD AND FOURTH FLOORS – Two fire exits were blocked due to interior work.



FIFTH & SIXTH FLOORS – Smoke traveled in lobby as well as staircase. The occupants above fifth floor were left with only one Fire exit number 1 to escape, which was full of smoke.



SEVENTH FLOOR – Smoke traveled in lobby as well as staircase. The occupants were left with only one Fire exit number 1 to escape, which was full of smoke. Access to terrace locked. Fire Service Staff had to break terrace door after reaching the seventh floor from fire exit 3.



FINDINGS OF THE COMMITTEE

The fire appears to have started between the 1st and 2nd floor in the electrical shaft. Apart from the original cables, quite a few extra tapping were visible. As per the report dated 01-03-2010 of the Dy.Chief Electrical Inspector, Bangalore East the fire was caused due to Electrical Arcing, may be due to fracture in the internal conductor/ deterioration of conductor / abrasion.

The fire did not spread beyond the vertical cable shaft. It was the thick smoke that spread fast to cause a panic reaction among some of the occupants. It was natural for the smoke to flow upwards and hence the distress appears to have been relatively strong in the upper floors viz. 5th, 6th & 7th.

The building, in its original version, has had all the required fire prevention and fire fighting measures and adequate exits. However, when the need arose for the people to go out unfortunately the passages were either blocked or the fire exit doors kept locked. At 2nd, 3rd & 4th floors the common corridor had been blocked by a makeshift construction by the occupants. The building had smoke detectors in all the floors and sprinklers in the basement, ground and 1st floors. The detectors did not work and the sprinklers at ground and 1st floor level were found removed. In one office room the smoke detector was found hanging, being pulled out by the occupants while removing previous false ceiling material.

On the whole the accident was avoidable if the intervention in the original electrical wiring had been handled professionally instead of cut and paste work. To account for any unforeseen Fire events, the building in its original plan had all the required fire prevention and fighting measures. Apart from the main staircase, two fire exits in each floor leading to the outer corridor would have been sufficient for all the occupants to go out of the building in reasonable time of about 5-6 minutes. This would have happened if the occupants were made aware of the exits nearest to them and trained how not to panic during emergency. There were no sketches on the walls/doors in any of the offices indicating the location of the fire exit doors. The most serious lapse on the part of the management of the building was to have kept the exit doors locked and to have permitted blocking of the corridor in 3 floors. Allowing the Hotel management at ground floor level to convert the common passage leading from the staircase to the exterior of the building as locker room and storage areas was a grave blunder.

As per the version of some of the rescued occupants the fire might have started at about 15.45 hours (3.45 PM), whereas the Fire Control received the call at 16.30 hours. (4.30 PM). It is not clear how the management/ occupiers / on lookers did not think of intimating the Fire Control immediately after the outbreak of fire. In the process

about 45 minutes of precious time was lost. As per the report dated 05-03-2010 of the COO / Director of the Manipal Hospital, Bangalore the first dead body reached the Hospital at 16.30 hours (4.30 PM). This clearly indicates that the 7 out of 9 deceased, have jumped out of the building before the reaching of Fire & Emergency Services. The timely communication about the incident would have prevented deaths.

RECOMMENDATIONS BY THE COMMITTEE

The National Building Code, covering the requirements for Fire Prevention, Life Safety in relation to fire and fire protection of buildings is advisory in nature. This has attained statutory status because of its inclusion in the local Building Bye-laws and Zoning Regulations. No where in the NBC or Building Bye-laws/Zoning Regulations re-inspection provision by various authorities have been incorporated. In this case the officers of Karnataka State Fire & Emergency Service Department have not visited / inspected the building since its clearance for occupation on 27-07-1999. The Authorized Signatory of the builder, in his undertaking letter dated 05-06-1999, has committed to train at least 40% of the employees/occupants of the building in fire prevention and fire fighting and safety operations with in 6 months of occupation of the building. There is no document proof about the compliance of this requirement. In this regard the following suggestions may be considered keeping in view the life and safety of the occupants of all the buildings in general and High Rise buildings in particular.

For the owners and occupants

1) Introducing a legislation to re-inspect all the High Rise buildings every year or once in two years to ensure the compliance of all fire prevention and fire fighting measures after collecting a self appraisal report from the owner/occupiers of the building. The officer's strength of the department will have to be augmented before the implementation. Penal provisions have to be incorporated to act as deterrent.
2) Penal provisions to charge for Fire Fighting equipment, where violations of Building Bye-laws, fire safety provisions as per various Acts are noticed, after an incident especially in Commercial and High Rise Buildings.
3) Training of management and security personnel of the building on fire prevention, fire fighting and evacuation measures as per the Govt. notification dated 20th Sept. 1971 to be implemented, subject to penalties.
4) Regular conduct of evacuation drills (at least once in 6 months), involving all the occupants irrespective of the nature and type of work / activities in the building by a team of Management/ Security personnel.
5) Given that electrical short circuit is one of the major causes for fires, suitable steps may have to be initiated to study and arrest the causes by short circuit etc. by concerned authorities and remedial measures initiated.

Action planned by the department

1) Revamping of the existing training system for skill development in specialized areas of Fire & Rescue.

2) Procurement of more specialized vehicles suitable for High Rise structures (Procurement of Aerial Ladder platform of 52-54 mtrs. is finalized. Budget to procure 3 more Aerial ladders during 2010-11 is earmarked).

3) Opening of already sanctioned 10 Fire Stations with minimum 30 Fire Fighting vehicles. To increase the No. of Fire Stations in Bangalore from the present 12 to 22 and No. of vehicles in Bangalore from the present 45 to 75.

4) Upgradation of Control Room with state of art communication and monitoring facilities.

Sd/-
(PROF:DR.R.N.IYENGER)
Director –Center for Disaster Mitigation
Jain Global Campus, Bangalore
(Former Professor IISc.,
and Director CBRI-CSIR, Roorkee)
Member of the Committee

Sd/-
(P.S.SANDHU, IPS.)
IGP & Addl.Director General,
Karnataka Fire & Emergency Services,
No.1, Annaswamy Mudaliar Road,
Bangalore
Chairman of the Committee

Sd/-
(R.A.VENKITACHALAM)
Vice President & Managing Director,
UL India Pvt. Ltd.,
Kalyani Platina, Block-I, 3rd Floor,
No.24, EPIP Zone, Phase-II,
Whitefield, Bangalore.
Member of the Committee

Sd/-
(B.K.HAMPPAGOL)
Dy.Director (Technical),
Karnataka Fire & Emergency Services,
No.1, Annaswamy Mudaliar Road,
Bangalore
Member of the Committee

Sd/-
(B.G.CHANGAPPA)
Director,
Karnataka Fire & Emergency Services,
No.1, Annaswamy Mudaliar Road,
Bangalore
Member Secretary of the Committee