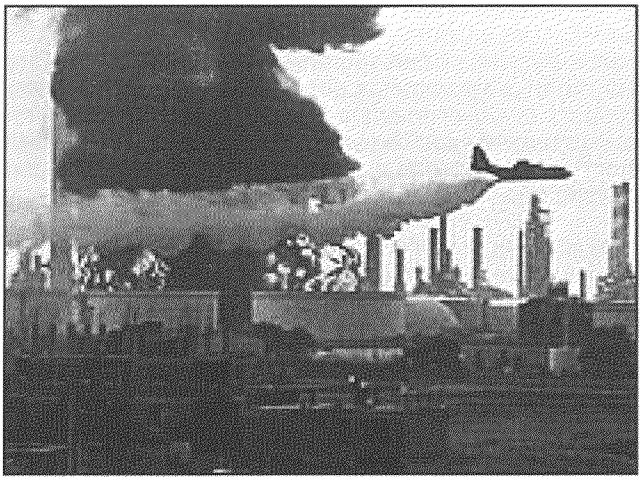
Fire Risk – As an Aftermath of Natural Disasters

SK Dheri
Chief
PC Misra
Dy. Chief
Fire Services, Delhi

In a country like India, where 55 to 60% of the total area is vulnerable to natural hazards which often turn into disasters resulting into heavy loss of life and property. The risk varies from region to region. The hilly terrain, coastal area, rural belt and urban area pose different threats. The Ministry of Agriculture, Government of India is the nodal agency for disaster management. Also, there exists a national policy on disaster mitigation that mainly concentrates on the natural disasters like floods, earthquakes, cyclones and tornado. Its role is limited to policy making and disbursement of relief. The experience concerning disasters in the country and management thereof has not been very encouraging. In an urban situation, these natural disasters like earthquake, volcano would only have a match box role of igniting, more dangerous and uncontrollable disasters like Fires .(example is triggering off fires in oil refinery in Turkey as an aftermath of recent earthquake. During the Kobe earthquake in Japan, a large number of buildings, which could resist seismic forces, were largely damaged due to post disaster fires.



Fire in Oil Refinery - Turkey

Disaster Management is lot more than a paper policy and relief disbursement The experience of earthquakes at Latur, hills of Uttar Pradesh and Himachal Pradesh and cyclones in coastal areas of Andhra Pradesh or floods in Assam and Bihar, does not reflect the full dimension of a natural disaster. Disaster in urban areas, God forbid – if any, will play havoc. High population density, high-rise structures, overhead electrical installations, presence of hazardous industries, cross country natural gas pipe lines, nuclear installations, poor state of preparedness of the emergency services are some of the factors likely to influence the complete post disasters scenario

The variety of fires one, like large oil pool fires, explosions of varying intensities, gas fires, fire balls emanating from liquefied petroleum gases, electrical installation fires, residential and industrial fires would be practically seen at number of places. Disrupted electricity and water supply, blocked roads due to fallen trees and debris of collapsed structures, crisis arising due to natural disaster in urban areas. The losses would be astronomical for both life and property Fire services are hardly, well equipped and adequately trained to accept the challenge of such a large magnitude of crisis to be handled in short span of time. With the available resources today, they can be no better than a silent and helpless spectator to devastating fires.

Challenges before Fire Services in Urban Context

To get the feel of the city we need to look at the dwellings of the people and their life styles, the roads to their homes, the environment in which they raise their families, the opportunities for the future generations to grow the number of fire incidents which are multiplying, increasing crime rates, crippled electricity, water, sewage, health and education services The concerns of these aspects provide us with a vision of our safety in our homes. Where have we gone wrong? Where are we going wrong? Where are we going to be wrong? These are some pertinent questions we must answer to our ownselves if at all we are interested in fire safety in urban areas.

Urban Landuse Planning and Fire Safety

Insensitive Planning to Cover Fire Risks

The planning process begins with an indepth study of the physical, social economic and political setup. Any imbalance in the planning parameters for any reason, the plan would either be too gentle and too idealistic, and will respond to the requirements of the people at large and changing dynamics To be meaningful, the plan must cover a much wider range of participation by all concerned

Fire safety in urban area in general pose a complex situation Many of the problems found in urban fires are caused by population pressures and cultural factors which are beyond the scope of urban planning and fire safety regulations Though the urban areas are divided in to different zones such as residential, commercial and agricultural Which are further subdivided depending upon local requirements.

Mixed use occupancy in buildings as well as in clusters of residential areas,has been allowed under the law because of both-the limited land resources and changed social circumstances. It poses conflicting issues in the planning and design of the buildings and layouts and are cause of many problems in buildings and fire safety management. Under the existing building bye laws, mixed use building occupancies are considered a single occupancy. This does not present problems at the design stage. But, when they are occupied and when they undergo a change in occupancy and internal geometrical character eating up open spaces and, even the escape routes, that the fire safety is at stake. Population density and fire load increases with the time, These are difficult to be adjusted from fire safety and environment point of view. The buildings are designed and constructed to use fullest permissible limits of space with no extra scope for making any changes

To be meaningful, the plan must cover a much wider range of participation of all concerned. It requires, a far sighted approach which anticipates needs and requirements of the community, provides guidelines for preparation of specific area development plans based on highly specialized data analysis and research inputs from experienced professionals.

From the fire safety point of view, lack of consideration for fire safety, in planning process, in an urban area or

failure of physical planning for one reaosn or the other adversely affect the efficiency of fire services.

Issues related to Landuse – A Case of Delhi

In Delhi there has been a substantial increase in population and industrialisation, since independence Well over 1,50,000 small scale industrial units in identified industrial pockets (in addition to industries running illegally), over 1200 J.J. Clusters providing shelter to nearly 1/3 of the population over 3 5 million automotive vehicles have choked infrastructural services. The fast changing scenarios has not been provided for. *(Tables annexed)*

Master plan Delhi had been created as an instrument to control the use of land in urban area and protect the welfare of people. The concept of zoning has not yielded desirable results Mixed occupancy, authorized as well as unauthorized, like banquet halls in residential areas, cottage industries in congested areas, trade of hazardous chemicals from the highly congested residential/ commercial areas, hazardous and non hazardous industries in close vicinity are few to mention This has certainly added to the fire risk already inherited by a particular occupancy As a result losses due to fire are increasing to both the life and property This is developing a dangerous trend. Man made disasters are not unlikely in these areas.

Lal kuan tragedy that claimed 58 lives has not faxed from our memories. Zoning is a vital part of urban design. However, it can fail through abuse, misuse, and resistance to changes in urban pattern essential for the general welfare of the population. The price which is being paid is high. It needs to be understood, appreciated and accepted, that the solution to complex problems is not always simple and widely acknowledged. Many a times they are complex and hard and unpopular in a democratic setup.

The recent fire incident data as provided in the table can provide a clear assessment of the fire incidents in Delhi and their increase. In order to contain these rising trends sometimes hard unpopular decisions need to be taken. However, unpopular these decisions could be, they are the need of the hour and shall have to be taken at the earliest.

Urban Development Management

High population density, crowded streets, unmatching mixed occupancies, inadequate water supply, poor electrical services, unplanned siting of fire stations, encroachment are few examples of ineffective planning which adversely affect the fire response time. Under the present circumstances, a response time of 3 minutes in urban areas and 5 minutes in rural areas is very difficult to achieve if not impossible. Mobilizing a large quantity of water to the fire scene in walled city area is more than fire fighting. After every fire, as a customary, fire service is blamed for one thing or the other but public, planners as well as beaurocracy are least bothered to analyze the constraints under which services perform. Fire safety should therefore be an integral part of urban planning process rather than a after thought

The developmental activities are in full swing in the sub-urban area, with complete disrespect to environment and fire safety aspects in absence of regulatory laws. In times to come they will form the part of the urban areas with the problems they are creating today and as a customary all the agencies concerned shall wake up to discuss the problems with the active support of the media. Also as customary, they, probably, will not find a solution to resolve the problem It may not affect the planners but it puts pressure on the emergency services who are also by now accustomed to the criticism for no faults of theirs

Inquiry committees and commissions will continue to be appointed incidents after incident but the recommendations will have the same fate like in the past for simple reasons that it may require hard political decisions to which any elected body would be hesitant.

It should not be mistaken that all this is happening onl due to failure of planning or enforcement of a plan. Man of the problems are attributable to the lack of awareness and knowledge about the concept of fire safety. The designers of the buildings and the planners of the town have no formal education in the fire safety management Fire services has also failed to participate in urban planning process ,either due to the fact that they are not the part of the urban affairs or due to the fact that they too, do not possese adequate and reliable data base to project their concern in the planning process. They have also failed in providing an interactive forum for the architects planners, citizens and the fire professionals to discuss and resolve the issues causing concern to each other.

Public education programmes by and large, have been monotonous and generat) a generalistic response in the entire community, though the requirements are different for different groups in the community I am sure no one will be able to find a solution in isolation to the problems fire services ,are facing today due to chaotic conditions prevailing in the urban areas which are relevant and necessary for "fire safety". NGOs must come forward to prepare the grounds for comprehensive planning proces and a continued review thereof. They must also participate in organizing the community fire safety education programmes at different levels, with the active support of government agencies Fire safety is every-body's business and requires every ones' involvement in creating a safe urban environment for the existing and coming generations.

Fire safety in urban areas should not be confused with opening up of more number of fire stations, constructing underground water storage tanks, importing state-of-art fire fighting equipment and appliances, bringing out a legislation to control some active and passive measures for fire protection in the built environment It has lot more to do. The establishment of fire services in India with a motto "serve to save" has a two pronged strategy – one by "preventing the fires" and second by "fighting the fire" However, like any other disaster management approach in the country, fire services are also trained with focus on "fighting fires" and not "preventing fires".

Urban development is accomplished through activities of many agencies and authorities though the extent of involvement may vary at different levels and stages of the process. Lack of interaction, absence of data, lack of participation by any of the agency affects the development management.

Fire Safety in High Rise Building

Fire is one of the major deterrents to the developmental activities. Small fires incidents are washed away quickly from our memories but the major ones remain. Ou experience shows that the percentage of injuries/deaths and property damage associated with fires in high-rise buildings are small. When fire incidents do happen in such buildings they are quickly controlled/extinguished. However, the large fires in these buildings, though, relatively few, often, have consequences related to nature of buildings themselves i e , design creatures that may result extensive spreading of fire and smoke thereby affecting the evacuation. Fire in Gopala Towers, Sidhartha hotel, Ansal Bhawan, krishi Bhawan, Chandralok Building Indian Express building are few to be mentioned tha taxed the Delhi Fire Service, giving rise to legislative

changes and legal actions, concerning fire safety in high rise buildings

In high rise building: safety of occupants can be ensured by quickly detecting the signal emanating from the fire altering the people and by providing protected escape routes to a place of comparative safety and finally to the place of ultimate safety

Pressurization of escape routes and smoke extraction system helps a great deal and providing passive protection can ensure the safety to structure. These primarily aim at containing, limiting the fire, smokes, and heat to the origin of compartment. This helps in creating an environment for the occupants to escape safely and for the fire fighters to do their job efficiently and effectively.

Passive measures support smoke management system. The eating up of open space around building land and within building; addition of fire load and change in the floor partitioning, the change in geometry with the passage of time and use of the combustible materials, all lead to the failure of passive measures. This is the order of the day in almost all the buildings in Delhi - a dangerous trend.

The fire resistance rating of elements of building construction give assurance that they will survive the fire conditions for a specified period before failing and allowing fire/smoke /heat to spread Fire resistance rating of structure is determined with reference to the fire load and the maximum temperature likely under the fire conditions

The structural stability is a big morale booster for the occupants and the fire fighters as well, if they understand that they are not exposed to the risk of structural collapse.

The safety of built environment is ensured by providing the active measures. These include,

a) first aid fire fighting arrangements like hose reel,

b) extinguishers for use by the occupants,

c) manually/automatically operated fixed detection and alarming devices,

d) manually operated fixed installations like wetriser, drenchers, yard hydrants and automatically actuated sprinklers,

e) water spray projectors,

f) carbon dioxide/Dry chemical installations,

g) smoke extraction and pressurization systems

The **active and passive** fire protection measures are complimentary to each other Even though a high rise building may incorporate active and passive measures in its design, yet it does not provide a guarantee of safety due to some of the factors that can not be characterized. These include: the complex human behavior, lack of concern to maintenance of systems, lack of training and awareness of the occupants and most importantly the work culture. All the investment on active and passive measures shall be a criminal waste of financial resources if these measures are provided under compulsion of the legal requirement and without any respect to the cause of fire safety

Periodic testing of active and passive measures, continued training and evacuation drills helps a great deal in developing the confidence. It also assures a correct response of the occupants that would avoid panic during real emergency In absence of these laid down procedures nothing more than a total chaos can be expected which is often witnessed

Fire Services

As provided in the constitution of India, Fire Service to the community is a state subject and under section 243 W are placed under the control of **local bodies** with a view that it is more of an urban affair, rather than a law and order activity. However, the growths of fire services in independent India has been termed it as a **law and order** activity. As a result, these services have become more of a fire fighting services , and aspect of prevention has been long ignored. Services are therefore, concentrated on fighting the fires only. **The biggest draw back in considering the fire services as a law and order activity has been in their isolation or less participation in the policy making body of the state and that regulates the urban affairs. Which is otherwise essential in view of fire prevention.** It may not be unfair to draw an inference that fire services are executing only half of their responsibility. Should the fire services be organized under the authority of the urban affairs or should this remain with authority controlling the home affairs, is a million dollar question Obviously, there are two schools of thought; one favours the continuance force under law and in order to observe discipline which is of utmost requirement of fire fighting/fire ground management. While the other arguments is, that fire services, under a law and order activity, are escaping from their primary responsibility **of fire prevention** and the training provided to them is not bringing out adequate results.

It is firmly believed that discipline in any organization is a key to success Discipline is a work culture. It is imbibed by virtue of training, conventions, traditions, motivation and is long lasting.

General Perception of Fire Risk and Communication

The peoples perception about fire risk are correlated with social, cultural and psychological factors. The fire services has since long addressed this issue with a most generic view. The message about fire safety is "the same" for entire population. The public has also reciprocated in the same generic way. No single shot therapy is possible in risk communication. Fire service personnel must learn how to reach them and how to listen to them. Having spent so long working on reactive response i.e dispatching appliances on a call, the fire professionals are making job more difficult by developing into "fire fighting "culture in the organisation instead of desired combination of "fire prevention" and "fire fighting". There are a large number of groups within and outside the fire department who can work together to make a difference before the event. What government is not doing is not the issue but the real issue is what we can do and what we are not doing.

As far as the technological issues concerning public safety in urban areas, is concerned, the fire professionals, have failed miserably in making the architects and planners to understand the problems faced by the fire services in the buildings designed by them or an area developed by them. All are in their wisdom. Every one is doing what he feels like resulting in a fire safety chaos Under these circumstances, we should not expect better results than what we are getting

Conclusion

Disaster management is more technical than perceived. It needs comprehensive study in risk evaluation of each single area, preparation of risk mapping plans for each zone, study of preparedness level in terms of especial equipment and training of personnel, fool proof communication system and periodic mock drills. Plan alone without technical analysis and budget allocation is

unlikely to yield positive results. Pooling of resources available with fire services from all over the country could be thought of through careful planning and co-ordination to meet the challenge posed.

Should the disaster management policy be an issue of concern in the post disaster affairs or should it be a continued concern of the Ministry of Urban Affairs? – is a question that needs to be debated more honestly than organizing few seminars and workshops and be proud of having a so called "Disaster Management Plan" like what is existing today. Whosoever may regulate the affairs, multiplicity of agencies with different objectives should be avoided as far as practicable so that a better work strategy can be evolved for the management of crisis.

The fire safety management in urban areas is not as simple as it appears. It is a complex mechanism. There is no general solution. It calls for honest interaction between the architects, interior designers, structural engineers and fire professionals Inflexible regulations have neither helped nor will they help in future. If cost effective and flexible fire safety regulations are the need of the time, a proper platform for interaction can not be left behind Before fire safety can be regulated due attention be pa ~ to changed social circumstances, experience from the pa fires and reliable data base A balanced application of land use concepts, the urban problems, trends in mixed use occupancies, human behavior, density of occupants and nature of occupancy and storages, should find place in our approach towards safer cities. A lone battle fought by fire services through the safety norms prescribed in Building Bye-laws and the National Building Code has not yielded any results. Fire Safety in urban area is much more than few legislations and calls for honest involvement of all concerned.

FIRE INCIDENTS IN DELHI

Year	Total Calls	Fire Calls	**Deaths**	Injured	Property Loss (in Crores)
1989	8199	6453	**287**	1860	5 16
9177	9177	7304	**309**	1617	6.38
1991	9955	7815	**308**	1797	14 13
1992	10558	8154	**317**	1504	16.04
1993	10821	8424	**297**	1427	20.11
1994	12178	9943	**319**	1406	24.12
1995	13334	10664	**318**	1357	46.20
1996	15519	12609	**389**	1504	57.87
1997	14866	12201	**398**	1704	49.89
1998	14254	11286	**399**	1967	24 39

FIRE INCIDENTS IN J.J. CLUSTERS IN DELHI

Year	Total Calls	Medium Fires	Serious Fires	**Deaths**	Injured	No. of Juggies Gutted	Loss (Lakh)
1987	157	3	3	**5**	22	3999	42 30
1988	142	6	1	**5**	14	2766	26.17
1989	168	8	2	**15**	49	5856	52.79
1990	180	11	8	**13**	39	17286	86.43
1991	150	6	4	**44**	44	10202	62.60
1992	168	6	3	**15**	5	9634	58.40
1993	163	10	-	**8**	37	45.57	57 93
1994	150	3	1	**20**	32	5277	67 28
1995	173	4	1	**20**	32	5277	67.28
1996	130	6	-	**9**	45	2891	54.18
1997	115	2	-	**8**	28	1985	8.72
1998	108	5	2	**10**	38	5820	82.80

"We must learn to be compassionate, to be content with little, and to seek wisdom, for only then can there be the true salvation of mankind".