



Paul GRIMWOOD

OPERATIONAL ASPECTS OF HIGH-RISE FIREFIGHTING

A REVIEW OF MAJOR INCIDENTS & SOPs

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UK Fire Officer Paul Grimwood has researched firefighting experience in high-rise buildings since 1975 and his 28 page report in FOG ATTACK (1991) demonstrates that many incident command systems and Standard Operating Procedures (SOPs) for tall structures are based on out-of-date policies. The author worked on detachment with ten big city fire departments in the USA in 1990 and attended fires in five of the world's tallest buildings including the World Trade Center, New York City and the Sears Tower in Chicago. He also visited the scenes of past conflagrations at the Interstate Bank in Los Angeles and the Churchill Plaza in the UK where he discussed firefighting operations with firefighters and chiefs who attended these incidents. Using several case histories he explains how incident command systems, a detailed pre-plan (SOP), manpower and equipment logistics are key factors in any successful operation.



SEARS TOWER CHICAGO

[CLICK HERE](#) TO VIEW THE WORLD'S 100 TALLEST BUILDINGS

World's Top 10 Buildings

Rank	Name	City	Country	Feet	Metres	Stories
1	Petronas Tower 1	Kuala Lumpur	Malaysia	1483	452	88
2	Petronas Tower 2	Kuala Lumpur	Malaysia	1483	452	88
3	Sears Tower	Chicago	USA	1450	442	110
4	Jin Mao Tower	Shanghai	China	1380	421	88
**5	Citic Plaza	Guangzhou	China	1,283	391	80
6	Shun Hing Square	Shenzhen	China	1,260	384	69
7	Empire State Building	New York	USA	1250	381	102
8	Central Plaza	Hong Kong	China	1227	374	78
9	Bank Of China	Hong Kong	China	1209	369	70
10	The Center	Hong Kong	China	1148	350	79
11	T & C Tower	Kaohsiung	Taiwan	1140	348	85
12	Aon Center	Chicago	USA	1136	346	80
13	John Hancock Center	Chicago	USA	1127	344	100
14	Burj al Arab Hotel	Dubai	UAE	1,053	321	60
15	Baiyoke Tower II	Bangkok	Thailand	1050	320	90

NOTE: Height is measured from sidewalk level of main entrance to structural top of building. Antennas and flag poles are not included

**The twin World Trade Center towers, New York, 110 stories, 1368 feet, ranked 5 and 6 prior to their destruction by terrorist attack on September 11, 2001.

Source: Council on Tall Buildings and Urban Habitat, Lehigh University.

[CLICK HERE](#) TO VIEW THE WORLD'S 100 TALLEST BUILDINGS

Skyscrapers



LONDON HIGH-RISE DISTRICT

LATEST NEWS

- France National CFBT Program
- South Carolina Flashover
- St Louis Flashover
- Texas Flashover
- UK Firefighter Dispute
- NRC Research into 3D Water-Fog

This database currently lists 60,201 skyscrapers.

FLASHOVER PHENOMENA

- Flashover
- Backdraft
- Fire Gas Ignitions

52,532		completed
3,273		under construction
1,411		proposed
1,159		approved
892		demolished
554		never built
180		on hold
134		vision
51		under reconstruction
15		under demolition

3D WATER-FOG TACTICS

- 3D Gas-Phase-Cooling
- NRC Research
- US Naval Research
- Other Research

LIVE FIRE TRAINING

- Principles of CFBT
- Flashover Observation
- Entry & Attack
- Backdraft Demonstration
- Multi-compartment Training



TACTICAL FIREFIGHTING

- Tactical Ventilation
- Positive Pressure Ventilation (PPV)
- Compressed Air Foam (CAFS)
- High-rise Firefighting
- Rapid Intervention
- Tactical Objectives
- 3D Size-ups



GENERAL TOPICS

- Urban Search & Rescue (USAR)
- Biological & Chemical Hazards
- Accountability & Incident Command
- Download Library
- UK Fire Cover Review
- International Firefighting Links
- Auto-extrication & Safety
- Respiratory Protection (Overhaul)
- Arson Task Force
- NIST World Trade Center Reports
- UK Health & Safety - Firefighters

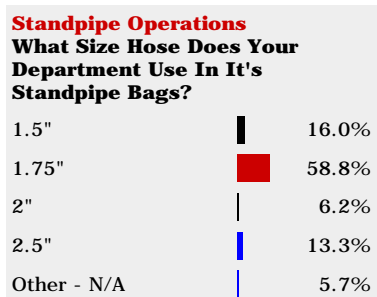
PYROGEN - METAL STORM TECHNOLOGY

Aerosol Fire Extinguishment Agents have been under development for the last ten years. PyroGen aerosol is a widely accepted direct replacement for HALON 1301. In high rise buildings above the reach of ladder or aerial apparatus the fire departments are reduced to relying on stairwells to reach fires above the thirty ninth floor. Sprinklers have historically provided suppression in these structures. If PyroGen flooding systems are not installed in these higher floors, Metal Storm technology may provide a method to deliver enough aerosol agent into burning buildings to suppress the fire until fire fighters can gain access and extinguish the fire. Pyrogen grenades have proven to be effective in structural fires in rooms less than 20 cubic meters. The agent is effective at suppression and extinguishment, the problem has been the ability to get enough aerosol forming compound into the space to reach extinguishing concentrations. Metal Storm with its high fire rates and Pyrogen with its exceptional suppression and distribution PyroGen Generator and Metal Storm launchers mounted on a military or law enforcement helicopter can provide advanced suppression and buy time for the fire fighters to confront a fire in upper floors preventing a reoccurrence of the World Trade Center structural collapse.

Prior to metal storm technology the ability to get enough Pyrogen into a structural fire limited the use of aerosols to total flooding applications. Suppression or extinguishment of large structural fires was just too hard. Metal Storm now allows the ability to introduce up to one thousand kilos of aerosol forming compound into a building floor in less than 10 seconds from hovering aircraft.

[DOWNLOAD THE PYROGEN REPORT HERE](#)

RESULTS OF RECENT FIREHOUSE.COM SURVEY - 7000 VOTES



Firefighters in New York City, Boston, Chicago and Houston all run low-friction 2.5" or 2" hose-lines into high-rise fire floors. The lengths also vary with 100' lengths more popular than 150' runs that may congest stair-shafts and corridors. Whilst weight reduction is important in transporting hose to the fire floors, flow-rate is also important. 1.75" lines usually flow around 150 gpm compared to 250 gpm from the 2.5" lines. Some departments run the first 'feeder line in from the stand-pipe as a 2.5" with 1.5" extending to the fire to cut friction losses and increase available flows.

GARLEY FIRE - HONG KONG 1996 - 39 KILLED

During welding work in an elevator shaft in the 16-storey Garley Building in Hong Kong district on **21st November 1996**, a fire broke out which killed 39 people and seriously injured around 80 others. More than 90 people were rescued, some of them in daring scenes in which a helicopter pilot risked his own life.

Maintenance and repair work was in progress in the office and business tower when highly flammable material caught fire during welding work in the basement. The fire made its way up through the elevator shafts and spread like lightning through the top three floors of the building. The immense heat and smoke made these floors a death trap for the people working there: the windows could not be opened to let the heat and smoke out, and escape routes were filled with smoke or impassable on account of the fire. As a result, 22 charred bodies were subsequently found in a single office on the 15th floor.

REPORT AVAILABLE HERE

MOST SKYSCRAPERS		
#	City	Buildings
1.	Hong Kong	7,059
2.	New York City	4,803
3.	Singapore	2,374
4.	Istanbul	2,102
5.	Toronto	1,740
6.	São Paulo	1,610
7.	Buenos Aires	1,422
8.	Chicago	1,362
9.	London	1,228
10.	Seoul	710
11.	Kuala Lumpur	588
12.	Sydney	573
13.	Tokyo	563
14.	Shanghai	543
15.	Mumbai	542
16.	Vancouver	521
17.	Melbourne	428
18.	Ankara	402
19.	Honolulu	402
20.	Los Angeles	386
21.	Bangkok	354
22.	Houston	342
23.	Benidorm	318
24.	Curitiba	312
25.	Recife	311

MOST SKYSCRAPERS PER POPULATION				
#	City	Population	Buildings	People*
1.	Benidorm	51,873	318	163
2.	Miami Beach	87,933	130	676
3.	Honolulu	371,657	402	924
4.	Hong Kong	6,724,900	7,059	952
5.	Arlington	189,453	187	1,013
6.	Vancouver	578,153	521	1,109
7.	Fort Lauderdale	152,397	128	1,190
8.	Tel Aviv	380,100	270	1,407
9.	Toronto	2,481,494	1,740	1,426
10.	Santa Cruz	220,700	153	1,442
11.	Singapore	3,490,356	2,374	1,470
12.	New York City	8,008,278	4,803	1,667
13.	Miami	362,470	196	1,849
14.	Newark	273,546	144	1,899
15.	Atlanta	416,267	219	1,900
16.	Gold Coast City	418,438	216	1,937
17.	Cuiabá	433,355	220	1,969
18.	Minneapolis	382,618	189	2,024
19.	Buenos Aires	2,965,403	1,422	2,085
20.	Frankfurt	652,412	309	2,111
21.	Chicago	2,896,016	1,362	2,126
22.	Kuala Lumpur	1,401,400	588	2,383
23.	Valladolid	319,805	133	2,404
24.	St. Louis	348,189	144	2,417
25.	Washington D.C.	572,059	217	2,636

FDNY HIGH-RISE STRATEGY IN TERRORIST SITUATIONS - POST WTC

When faced with a terrorist attack on a high-rise building involving a large amount of explosives or the use of an airliner as a weapon, the IC must assess the risk prior to implementing a rescue, evacuation or defensive plan. In incidents involving severe damage to a building and fire spreading to multiple floors, an offensive extinguishment strategy is not an option.

[NEW FDNY RISK ASSESSMENT DETAILS AVAILABLE HERE](#)

ATLANTA HIGH-RISE FIRE - 1989

At 1029, June 30, 1989, in Atlanta, Georgia an electrical fire originating on the sixth floor of a 10-story office building killed five people, and injured 23 civilians and six firefighters. One woman had jumped from a sixth floor window prior to the Fire Department's arrival and was seriously injured. Firefighters removed approximately 14 people over aerial ladders and rescued five others from the interior of the building. The electric closet where the fire started opened directly onto the exit corridor. When the fire erupted, it immediately blocked the corridor, keeping most victims away from the two exits serving the floor.

This fire was reported to be the first multiple death U.S. high-rise office building fire in over 10 years. The fire demonstrates the need for automatic sprinkler protection for high-rise buildings and illustrates the impact that occupant behavior can have on survival in fire situations. All of the trapped survivors broke windows to offices and waited for rescue. Four of the people who died were overcome by smoke and toxic gases in the corridor or in offices where windows weren't broken. The fifth fatality was an electrician who was seriously injured by the initial electrical arc, then died from the effects of the fire.

The 10-story fire resistive office building was constructed in 1968 and was not required to be equipped with automatic sprinklers. The building evacuation plan, which had been practiced regularly, was credited with the successful evacuation of occupants on floors other than the fire floor. The building was occupied by a large number of federal workers who were required to practice evacuations, and also several private firms who were not obligated to and only occasionally participated in these evacuation drills.

[DOWNLOAD THE 66 PAGE REPORT HERE](#)

Comments on this report may be e-mailed to USFA's [Ken Kuntz](#), Fire Studies Specialist.

FLORIDA HIGH-RISE FLASHOVER

The Clearwater (FLORIDA) Fire Department's training and ability to fight high-rise fires were questioned after criticisms were made concerning tactics at a fatal high-rise fire.

CLEARWATER - City firefighters responding to a deadly condo fire in a waterfront high-rise violated department guidelines and failed to follow basic firefighting techniques, a St. Petersburg Times review has found.

The tactics that June morning were so flawed, it raises serious questions about Clearwater's readiness to combat high-rise fires, according to two veteran fire commanders - former chiefs from Miami and New York - who studied the department's operations at the newspaper's request. The fire resulted in a 'flashover' where firefighters became trapped and injured.

[NEWS REPORT AVAILABLE HERE](#)

HIGH-RISE SAFETY IN THE LIGHT OF TERRORIST ATTACKS IN USA

More than a year after terrorists destroyed two of the tallest skyscrapers in the world, few physical or structural changes have been made to strengthen tens of thousands of other high-rises in America.

Cities, developers and building owners have focused on safety measures such as evacuating people more quickly, but the nation's high-rises remain largely as vulnerable to catastrophic attack as they were on Sept. 11, 2001.

Major changes in design and construction that would retard fire and help evacuations — two critical issues in the disaster at New York's World Trade Center — won't show up soon, if at all, as requirements for new tall buildings. That's because revisions in building codes, which are controlled by state and local governments, could take years to draft. Major physical alterations of the same sort to existing high-rises might be impossible, impractical or prohibitively expensive.

[FULL REPORT HERE](#)

FDNY OFFICE HIGH-RISE FIREFIGHTING SOPs MANUAL

48 page manual describing New York City's approach to high-rise office firefighting. This manual of FDNY SOPs is detailed in the techniques and procedures used by experienced big-city firefighters.

[DOWNLOAD HERE](#)

HIGH-RISE FIREFIGHTING MANUAL OF OPERATIONS

[DOWNLOAD HERE](#)

or [ANOTHER VERSION HERE](#)

Fires in high-rise buildings everywhere have the potential to be one of the most challenging incidents to which we respond. The potential for loss of life is high. Fires can burn for extended periods of time before operations can begin. The reflex time involved is extended due to the additional time required to reach the fire area. It is not uncommon for 15 or 20 minutes to elapse after the arrival of the first unit before fire attack can actually commence.

A fire in a high-rise building requires a high level of coordination. Members should anticipate a large commitment of resources. High-rise fires have historically proven to be some of the most demanding a department can face. Members must realize that the majority of high-rise buildings in Northern Virginia have built-in fire protection systems. These systems include sprinkler systems, standpipes, fire detection systems, and fixed fire suppression systems. Only with proper preplanning, will familiarity with the response district be possible. There are still a significant number of high-rise buildings, both residential and commercial, that have nothing more in terms of fire protection than a standpipe. Northern Virginia alone has several thousand high-rise buildings, and many more are under construction or in the planning stage. Each of these presents its own set of problems and challenges in the event of a fire.

STAIR-SHAFT NEGATIVE PRESSURES CAUSED THROUGH STACK EFFECTS MAY LEAD TO LODD!

An event that will most certainly take firefighters by surprise is the negative pressure that often exists BEHIND them as they advance into a fire involved floor of a high-rise structure causing the fire to be 'sucked' out of the apartment or floor to head directly into the stair-shaft. This negative pressure may be substantial and is a by-product of natural stack effects in the stairway itself. On occasions this effect can cause a negative pressure in the fire area itself to cause outside windows to break inwards, allowing exterior winds to intensify fire conditions.

At a high-rise apartment fire in Houston, Texas where a Fire Captain was killed in 2001, it was reported -

'They exited the apartment and headed down the hall, but a nasty thing happened when they opened the stairwell door, sources say. The stairwell acted like a ferocious maw, sucking heat and smoke down from the burning apartment. For Jahnke and Green the effect was overwhelming. The smoke grew thick as a blindfold; a torrent of hot air whirled past. The captains reportedly tried to beat a retreat by following their hose out of the apartment and down the hallway, a task made brutally complicated by the coiled, irregular pathway of their lifeline.

The violent shift in the air current created high confusion by sucking the heat away from the fire. To Jahnke it seemed as if they were headed toward the fire, not away from it, as they followed the path of the hose, Hauck says'.....

In July 1990 FDNY firefighters experienced similar effects ([FOG ATTACK-1992 p263](#)) when a fire on the 51st floor of the Empire State building created a reversal of smoke and super-heated fire gases as firefighters approached from the *vented* fire-tower stairs. The natural stack effect in the stairway, coupled with an exterior wind estimated to be gusting to 60 mph, caused the outside windows to fail with a subsequent reversal of fire, heat and smoke into the stairs behind the advancing firefighters.

In 1988 a team of firefighters in London were caught as they approached a high-rise fire from the stair-shaft. As firefighters began to attack the fire in a five-roomed apartment on the 16th floor the opening of two stairway lobby doors on the fire floor allowed the negative pressure to reverse flows, drawing superheated gases and fire into the stairway. The fire extended three levels above and two levels below the fire floor in

the stairway! Several firefighters were burned. During the mid-1980s another fire in the UK took a firefighter's life under extremely similar circumstances as midlands firefighters battled a high-rise blaze.

On December 18, 1998, tragedy struck the NYC Fire Department a mere 7 days before Christmas claiming the lives of 3 fire fighters. At 0454 hours Brooklyn transmitted box 4080 for a top floor fire at 17 Vandalia Avenue in the Starrett City development complex. The sprawling complex is located on Brooklyn's south shore in the Spring Creek section. The 10 story 50 x 200 fireproof building is used as a senior citizen's residence. 'As the Lieutenant and fire fighters arrived at the door, a sudden change in the wind direction forced an estimated 29-MPH wind gust into the apartment, and a 2,000 degree fireball into the hallway'.

With the memory of 3 fire fighter's funerals fresh in their minds, NYC's Bravest were called upon yet again to battle a 4 alarm hi-rise fire in the posh Upper West Side of Manhattan. This time, 4 civilians were to lose their lives. In a virtual repeat of the fire that killed 3 fire fighters 5 days prior, the hallway and stairwell were converted into a 2000-degree smokestack. Within minutes fire was showing through the 19th floor apartment's windows; clouds of black smoke billowed up along the buildings 51-story facade. Unlike the fire on Vandalia Avenue, this building was not required to have sprinklers in the hallways, only a firehose and standpipe in the stairwell. Many residents on the upper floors were lucky in their attempt to leave the building. They took the stairway early enough to avoid being disabled by smoke and heat. But for 4 others the timing just wasn't right. Between the 27th and 29th floor, 4 people died of smoke inhalation.

In 2001 several tower occupants were rescued from the roof of a UK high-rise fire as the fire was reportedly 'sucked' out of an apartment and into the stair-shaft, causing firefighters to retreat and re-group.

[Houston Fire Captain Killed In High-Rise Blaze - ACCESS REPORTS](#)

[NIOSH REPORT ON HOUSTON HIGH-RISE FIRE](#) **NEW 10/2002**

THE LOGISTICAL DEMANDS OF A FIRE FORCE OPERATING 20 STOREYS ABOVE GROUND!

UK Fire Officer Paul Grimwood has researched firefighting experience in high-rise buildings and his 28 page report in FOG ATTACK demonstrates that many incident command systems and Standard Operating Procedures (SOPs) for tall structures are based on out-of-date policies. The author worked with ten big city fire departments in the USA and attended fires in the World Trade Center, New York City and the Sears Tower in Chicago. He also visited the scenes of past conflagrations at the Interstate Bank in Los Angeles and the Churchill Plaza in the UK where he discussed firefighting operations with firefighters and chiefs who attended these incidents. Using several case histories he explains how incident command systems, a detailed pre-plan (SOP), manpower and equipment logistics are key factors in any successful operation.

A 12,000 Cu.Metre fire located high up within the confines of a downtown office high-rise structure is a lot different to the same fire located on the second floor! The logistical demands placed on firefighters have demonstrated that Incident Command needs to function well in advance of actual needs for as a plan is initiated there is a lengthy time delay prior to actioning! At two fires in 1988 (Interstate Bank) and 1991 (Churchill Plaza), US and UK firefighters were faced with office fires on upper levels that demanded a fresh 30 minute SCBA cylinder every 33 seconds for the entire duration of the Interstate fire and similar requirements for a fresh 45 minute cylinder every 80 seconds in the Plaza fire! Similarly in both fires, hundreds of firefighters were required to undertake a wide range of duties, estimated at both incidents as one firefighter for every 60 Cu.m of fire involvement.

It was in FOG ATTACK that he researched and initiated debate on *reaction times* - the time taken by firefighters to respond to an incident and get water flowing onto the fire on the upper levels of a high-rise. His research demonstrated 'reaction times' ranging from 9 to 40 minutes for fires located between the 10th and 33rd levels!

Air and smoke movement influenced by internal stack effects and exterior wind movements constantly catch firefighters out and negative pressure differences caused by internal fire towers or stairshafts have resulted in firefighter fatalities both in the UK and the USA. The effects on water flows and fire streams in tall structures present unique challenges for the firefighting force and the difficulties of laying interior hose-lines are all discussed in the report, as are communication problems - "which stairway are we in guys - they wanna know".....! From 'lobby control' to 'staging' to 'search and rescue'.....[IT'S ALL HERE](#).

Reports in [FOG ATTACK](#) and [FIRE MAGAZINE UK](#)

MERIDIAN PLAZA FIRE - PHILADELPHIA 1991

A fire on the 22nd floor of the 38-story Meridian Bank Building, also known as One Meridian Plaza, was reported to the Philadelphia Fire Department on February 23, 1991 at approximately 2040 hours and burned for more than 19 hours. The fire caused three firefighter fatalities and injuries to 24 firefighters. The 12-alarms brought 51 engine companies, 15 ladder companies, 11 specialized units, and over 300 firefighters to the scene. It was the largest high-rise office building fire in modern American history -- completely consuming eight floors of the building -- and was controlled only when it reached a floor that was protected by automatic sprinklers. A table summarizing the key aspects of the fire is presented on the following pages.

The Fire Department arrived to find a well-developed fire on the 22nd floor, with fire dropping down to the 21st floor through a set of convenience stairs. (For an elevation drawing of the building and the 22nd floor plan see Appendix A.) Heavy smoke had already entered the stairways and the floors immediately above the 22nd. Fire attack was hampered by a complete failure of the building's electrical system and by inadequate water pressure, caused in part by improperly set pressure reducing valves on standpipe hose outlets.

[114 PAGE REPORT ON THIS FIRE AVAILABLE HERE \(PDF\)](#)

FURTHER LINKS -

<http://www.sgh.com/expertise/hazardsconsulting/meridian/meridian.htm>

WORLD TRADE CENTER - NEW YORK CITY - 1993 BOMBING AND FIRE

The bombing of the WTC was an event of immense proportions, the largest incident ever handled in the City of New York Fire Department's 128-year history also complex that it was effectively several major multiple-alarm fires combined into one. In terms of the number of fire department units that responded, it was the equivalent of a 16-alarm fire. It was the firefighters' tremendous efforts and courage that brought this incident to a successful conclusion.

The statistics are staggering: Six people died and 1,042 were injured. Of those injured, 15 received traumatic injuries from the blast itself. Nearly 20 people complained of cardiac problems, and nearly 30 pregnant women were rescued. Eighty-eight firefighters (one requiring hospitalization), 35 police officers, and one EMS worker sustained injuries. It is estimated that approximately 50,000 people were evacuated from the WTC complex, including nearly 25,000 from each of the two towers. Fire alarm dispatchers received more than 1,000 phone calls, most reporting victims trapped on the upper floors of the towers. Search and evacuation of the towers finally were completed some 11 hours after the incident began.

[170 PAGE REPORT ON THE 1993 WTC FIRE AVAILABLE HERE](#)

FURTHER LINKS -

http://www.nfpa.org/Research/summaries/world_trade_center.html

WORLD TRADE CENTER 1993 FIRE - FIRE MODELING EVACUATION

Data from the fire & explosion at WTC in 1993 is used to create a fire model for evacuation from high-rise structures. A study of people's behaviour during the evacuation is also presented.

[54 page report by NFPA available HERE](#)

EMPIRE STATE BUILDING FIRE 1990

Some facts on the Empire State building fire. This building is 102 stories 1/4 mile high. It is 50,000sq ft.area at street level. Walls 8 inches thick floors 8 inches thick. Class 1 construction. The fire was a 5th alarm on July 16,1990.(250 firefighters 70 units.)Fire on the 51 floor, alarms: 712 at 1830 hrs,10-76 at 1837; 22-712 at 1843; 33-712 at 1859; 33-1859; 44-1915 and 55-712 at 1926; pwh at 2032 hrs. Under control 2208. It took 2 hours to get the fire under control. Another 1 1/2 hours for the secondary search.

<http://www.workingfire.net/misc4.htm>

USFA 1996 REPORT ON OPERATIONAL ASPECTS OF HIGH-RISE FIREFIGHTING

Fires in high-rise buildings generally require more complicated operational approaches than most structure fires.

Tasks that are normally considered routine for most fire departments, such as locating and attacking the fire, evacuating occupants, and performing ventilation can become very difficult in high-rises. Operations are affected by several specific challenges:

- Access to floor levels that are beyond the reach of aerial apparatus is generally limited to the interior stairways. The use of elevators is usually restricted or prohibited because of safety concerns.
- Hundreds or even thousands of occupants may be exposed to the products of combustion while they are evacuating or unable to descend past a fire on a lower floor. Their exits may be limited to two narrow stairways, which are also the only access for firefighters coming up to assist with evacuation and to fight the fire.
- The ability to contain and control the fire is increasingly dependent on the construction of the building and the ability of sprinkler and/or standpipe systems to deliver water to the fire area.
- Ventilation can be much more complicated and critical in high-rises than in other types of structures. Vertical ventilation is often limited to stairways or elevator shafts, both of which may also have to be used to evacuate occupants. Horizontal ventilation, by breaking out windows, presents the risk of falling glass to those outside the building. The stack effect causes smoke to rise rapidly through the vertical passages and accumulate on upper floors.

[66 PAGE REPORT AVAILABLE HERE](#)

INTERSTATE BANK FIRE - LOS ANGELES - 1988

On Wednesday, May 4 and continuing in to May 5, 1988, the Los Angeles City Fire Department responded to and extinguished the most challenging and difficult high-rise fire in the city's history. The fire destroyed four floors and damaged a fifth floor of the modern 62 story First Interstate Bank building in downtown L.A., claimed one life, injured approximately 35 occupants and 14 fire personnel, and resulted in a property loss of over \$50 million.

A total of 383 Los Angeles City Fire Department members from 64 companies -- nearly one-half of the on-duty force of the entire city -- were involved in fighting the fire, mounting an offensive attack via four stairways. This operation involved many unusual challenges, but is most notable for the sheer magnitude of the fire and the fact that the fire was successfully controlled by interior suppression efforts. To cover areas of the city protected by units called to the fire, 20 companies from Los Angeles County and four companies from surrounding jurisdictions were brought in under mutual aid agreements.

[USFA 44 PAGE REPORT AVAILABLE HERE](#) or get the official LAFD report at -

http://lafire.com/famous_fires/880504_1stInterstateFire/exsummary/LAFD-ExecutiveSummary.htm

New York City Bank Building Fire: January 1993 Compartmentation vs. Sprinklers

A high-rise office complex in the heart of midtown Manhattan was the scene of a major fire on the night of January 31, 1993. It was the most destructive high-rise fire in New York City in more than a decade, resulting in direct property damage of more than \$10 million and a much larger loss due to business interruption and secondary effects.

The fire, which originated on the sixth floor, spread to the seventh and was extending into the eighth floor before it was controlled. These floors are at the maximum reach of outside aerial equipment and elevated master streams, which were used successfully to control upward propagation of the fire. If the fire had originated at or above the tenth floor, it would have been much more difficult, if not impossible, to stop the successive involvement of higher floors, even with the rapid response of more than 400 fire suppression personnel.

This fire is particularly significant as an evaluation of the effectiveness of Local Law 5, the retroactive requirements that were enacted for all high-rise office buildings in New York City, after a series of destructive fires in the 1960s and 1970s. It suggests that the compartmentation option offered by Local Law 5 may be inadequate to prevent fires from growing to extremely destructive proportions and placing both occupants and firefighters in danger of death or injuries. Although the extent of the fire was not as great as similar fires that occurred in Los Angeles and Philadelphia in recent years, it could have equalled or exceeded their magnitude if it had originated on a higher floor. This result reinforces the opinion of many fire experts and authorities having

jurisdiction that automatic sprinklers should be required in all existing high-rise buildings, as well as new construction.

[48 Page Report Available here](#)

Comments on this report may be e-mailed to USFA's [Ken Kuntz](#), Fire Studies Specialist.

WORLD RENOWNED EXPERT ON HIGH-RISE FIREFIGHTING



Vincent Dunn
Deputy Chief F.D.N.Y. (Ret.)
For lecture information call 1-800-231-3388



The mission of the Skyscraper Safety Campaign is to ensure the safety and security of all persons who live, work, or fight fires in hi-rise buildings. This mission is also concerned with evacuation procedures and fire fighting techniques for skyscrapers, as well as national building code reform. The need for quality, safety, security and code compliance as a hallmark for all future buildings is paramount. We oppose the construction of any building that does not have to comply with local codes. Educating the public and the Fire Service to become proactive to achieve these goals is a primary aim in the aftermath of September 11, 2001.