District of Columbia
Fire & Emergency Medical Services Department

Report from the Reconstruction Committee

Fire at
3146 Cherry Road, NE
Washington, DC

May 30, 1999

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In Memory and Honor of Fire Fighters
Anthony Phillips and Louis Matthews

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EXECUTIVE SUMMARY

On May 30, 1999, District of Columbia Fire Fighters Anthony Phillips and Louis Matthews sustained critical injures in the line of duty that resulted in their deaths. Three additional fire fighters sustained injuries ranging from critical to minor. Fire Chief Donald Edwards (now retired) appointed a Reconstruction Committee to investigate and evaluate the emergency response activities at this fire. This report is the result of extensive interviews, independent investigation, and evaluation of the reports of other investigators. The Reconstruction Committee has found that the District of Columbia Fire and EMS Department (Department) has several deficiencies, particularly in training, staffing, equipment, and administration. The mere knowledge of these shortcomings and recommended actions does nothing. Many of the recommendations contained in this report are the same recommendations made in a report of the investigation of the death of Sergeant John Carter in the Kennedy Street fire of October 24, 1997. Further inaction on these recommendations cannot be tolerated.

The Cherry Road fire was initially considered by most of the personnel to be a "routine" fire. The events that took place demonstrate the serious consequences that result from failure to train, equip, and staff appropriately. At 00:17:00 on May 30, 1999, the District of Columbia Fire and Emergency Medical Services Communications Center (Communications) received a 9-1-1 telephone call reporting a fire at 3150 Cherry Road, NE. In response, Communications dispatched Box Alarm 6178, consisting of engine companies E-26, E-17, E-10 and E-12, truck companies T-15 and T-4, a battalion fire chief (BFC-1) and a rescue squad (RS-1). A second 9-1-1 call at 00:18:40 provided a corrected address of 3146 Cherry Road, NE, and reported that there was fire in the basement. Communications announced this new information, but only one of the responding companies acknowledged the address change. The first units were on the scene within approximately four minutes of dispatch.

Several initial actions were taken within the next five to six minutes.

- The first due engine company, E-26, arrived to find heavy smoke pouring from the front door of the structure and advanced a 200-foot 1-1/2 inch attack line into the first floor area.

- The first due truck company, T-15, arrived one minute later and began placing a ladder and ventilating at the front of the structure.

- The second due truck company, T-4, arrived and prematurely began forcible entry and ventilation of the rear basement sliding glass door without an attack line in position for entry. The T-4 officer was informed by the occupant of the building that no one remained inside the structure, but T-4's officer failed to report this information to the Incident Commander. Truck 4's officer also failed to give a rear size-up report.

- Rescue Squad 1 arrived and, failing to follow SOPs, reported to the rear with one team entering along with a member of T-4. The RS-1 officer was informed by the occupant of the building that no one remained inside the structure, but RS-1's officer failed to report this information to the Incident Commander.

- The second due engine company, E-17, advanced a 350-foot 1-1/2 inch attack line to the rear and reported to the Incident Commander, BFC-1 that they were in position to extinguish the fire.

- The third due engine company, E-10, supplied E-26 with water and advanced a 400-foot 1-1/2 inch attack line into the first floor to back up E-26.

- The fourth due engine company, E-12, supplied E-17 with water, then, failing to follow SOPs, advanced a 200-foot 1-1/2 inch line into the front of the building.

- The Incident Commander, BFC-1, requested additional resources while en route, based upon the initial report from E-26. After observing the fire location and conditions in the rear, BFC-1 reported to the front of the building. Battalion Fire Chief 1 failed to establish a fixed command post and relied on a hand-held radio for communications, rather than the stronger radio mounted in his vehicle.

Conditions quickly deteriorated after the first six minutes of operations. Companies operating in the front of the building were unaware that fire was growing in the basement because of inadequate communications and improper ventilation activities. A failure to sound a "Mayday" alarm resulted in a failure to realize immediately that there were missing fire fighters and a delayed rescue response.

- Fire Fighter Matthews (E-26) and F/F Morgan (E-26) advanced their attack line into the structure's front door, followed by their officer. Fire Fighter Phillips (E-10) and E-10's officer advanced their hose line to back up E-26. During the initial entry, personnel indicated that they felt only moderate heat.

- Truck 4 forced entry and ventilated the rear basement sliding glass door, and soon after, E-17's officer requested permission to attack the fire from the rear. Battalion Fire Chief 1 was unsuccessful in an attempt to contact E-26 and E-10 to determine their location, and denied E-17 permission to attack.

- Intense heat then traveled out of the basement and up the stairway to an inadequately ventilated first floor, severely burning the fire fighters. At this point, the fire fighters attempted to exit the building. Fire Fighters Phillips (E-10) and Matthews (E-26) were critically injured and unable to exit.

- Engine 26's officer informed BFC-1 that F/F Matthews did not exit the building. Engine 10's officer noted that F/F Phillips did not exit the building but did not report this to BFC-1.

- The seriousness of the situation was not fully realized until critically injured F/F Morgan (E-26) exited the building. BFC-1 then organized a rescue effort to search for F/F Matthews.

Rescue activities were also characterized by a lack of organization, effective communication, and personnel accountability. The rescue efforts also demonstrate the importance of each fire fighter wearing an automatically activated PASS (personal alarm safety system) integrated with the self-contained breathing apparatus.

- When rescuers entered the building, they heard a PASS alarm. They found F/F Phillips face down on the first floor without his facepiece, apparently removed because it had started melting. It was difficult to extricate F/F Phillips from under a table; personnel noted that the first floor was extremely spongy and there were extreme heat conditions.

- When F/F Phillips was brought outside, it was apparent that F/F Matthews was still inside the structure and rescue efforts for F/F Matthews were resumed.

- After a short search, F/F Matthews was located and evacuated. A total of approximately 21 minutes had elapsed from the time that the fire fighters were burned until all the fire fighters were evacuated from the building.

Fire Fighter Phillips died at 01:08. Fire Fighter Matthews died the following day. Fire Fighter Morgan is still recovering from his burns.

Evidence has shown that the fire, started in an electrical junction box in the space between the basement ceiling and the first floor, initially smoldered and consumed most of the air in the basement. The fire grew rapidly when the basement sliding glass door was broken, producing large amounts of super-heated fire gases. The fire gases traveled extremely quickly up the basement stairway to the first floor. The injured fire fighters were in the path of the super-heated gases and were burned almost instantly.

The Reconstruction Committee determined that the deficiencies in operations and equipment resulting in these deaths fall into the following categories.

- **Fire fighter accountability** (e.g., company officers failed to keep personnel together and operate as a team; personnel did not use the "Mayday" alert when fire fighters were discovered missing)

- **Fireground command** (e.g., the Incident Commander failed to establish a fixed command post; did not have an aide and was thus unable to coordinate front and rear teams; failed to sector the incident)

- **Communications** (e.g., no size-up report of the rear was provided; interior companies did not make radio transmissions of their initial attack and progress; it was impossible for injured fire fighters to communicate information because they did not have radios)

- **Company/unit operations** (e.g., actions of companies were not coordinated, so the actions of some companies threatened the safety of others; some officers and fire fighters worked alone or with other companies instead of staying with their own companies; truck companies were inadequately staffed)

- **Safety** (e.g., PASS devices that help locate fire fighters who are immobile were not in use by each fire fighter; the Department's Safety Office lacks the staffing and authority to conduct appropriate investigations and follow-up on safety recommendations)

- **Administration** (e.g., nearly identical recommendations, made following the Kennedy Street fire were not acted upon, resulting in many of the same problems at this incident; personnel do not receive adequate training in live fires because the Department's fire training building is unusable)

Each of the identified problems has a solution, described in detail in this report. Some solutions are relatively easy, involving equipment and its use. Some are more complicated, and involve changing behaviors in individuals and attitudes throughout the Department. Proper training and staffing are key to solving many of the problems. It is clear, however, that none of these solutions are possible with the neglect, insufficient funding, and mismanagement that has characterized the Department. The Department's budget must adequately support staffing, equipment and training. Additionally, the Department must no longer tolerate the notion that SOPs and proper fireground behaviors are only important for "major" fires and not as important for "routine" fires. The Department must vigorously enforce SOPs and demand professionalism at all levels of the fire department and at all emergency incidents.

Reconstruction Committee

The following individuals were appointed to the D.C. Fire and EMS Department's Reconstruction Committee by Fire Chief Donald Edwards, now retired:

Chairman

- Joseph Herr, Assistant Fire Chief, Washington D.C. Fire and EMS Department. (Appointed Chairman February 2000, Committee member May 1999 - January 2000)

Members

- Robert Bingham, Deputy Fire Chief (retired), Washington D.C. Fire and EMS Department
- Alexander Bullock, Assistant Fire Chief (now retired), Washington D.C. Fire and EMS Department. (Chairman May 1999 - January 2000, Committee member January - May 2000)
- Richard Duffy, Director, Department of Occupational Health and Safety, International Association of Fire Fighters
- Robert Duvall, Fire Investigator, National Fire Protection Association
- Kenneth Ellerbe, Battalion Fire Chief, Washington D.C. Fire and EMS Department.
- Timothy Gerhart, Captain, Safety Officer, Washington D.C. Fire and EMS Department.
- Richard Gould, Assistant Fire Chief (now retired), Washington D.C. Fire and EMS Department
- Thomas Herlihy, Battalion Fire Chief, Washington D.C. Fire and EMS Department.
- Andrew Levinson, Occupational Health and Safety Department, International Association of Fire Fighters

The Reconstruction Committee acknowledges the following individuals and organizations who assisted the committee in completing this report.

- Lisa Aaron, Department of Occupational Health and Safety, International Association of Fire Fighters
- Mike Bashore, Sergeant, Fire Investigation Unit, Washington D.C. Fire and EMS Department
- D.C. Fire and EMS Safety Office (Lt. Bruce Faust, Lt. Rick Johnson, Lt. Michael Thompson, Lt. Jeffery Stauffer, and Lt. Carooq Taylor)
- Patricia Freeman, Globe Firefighters Suits
- Diane Hess, Celanese Acetate Corporation
- Gregg Hine, Washington Field Division, US Department of Treasury, Bureau of Alcohol, Tobacco and Firearms
- Marion Jordan, M.D., Medstar Burn Unit, Washington Hospital Center
- Paul Jones and James Seavey, Lieutenants, Washington D.C. Fire and EMS Department
- Randall Lawson, Building and Fire Research Laboratory, National Institute of Standards and Technology
- Daniel Madrzykowski, Building and Fire Research Laboratory, National Institute of Standards and Technology
- Timothy Merinar, Respirator Certification and Quality Assurance Branch, National Institute for Occupational Safety and Health
- Jerry Nickens, Lead Fire Investigator, Washington D.C. Fire and EMS Department
- Kevin Tighe, Detective, Washington D.C. Metropolitan Police Department
- Sue Tribble, Southern Mills, Inc.

- John Thumann, Battalion Fire Chief, Washington D.C. Fire and EMS Department.
- U.S. Park Police Helicopter Unit
- Robert Vettori, Building and Fire Research Laboratory, National Institute of Standards and Technology
- Don Williams, Computer System Analyst, Communications Division, Washington D.C. Fire and EMS Department

INTRODUCTION

In the early morning hours of May 30, 1999, the District of Columbia Fire and EMS Department (Department) responded to a basement fire in a townhouse at 3146 Cherry Road, N.E. Occupants were outside the structure when responders arrived approximately four minutes after dispatch. Personnel interviewed after the incident stated that they considered the alarm to be a "routine" call. Yet, this fire claimed the lives of two D.C. fire fighters, Anthony Phillips, a 3-year veteran from E-10, and Louis Matthews, an 7-year veteran from Engine 26. Fire Fighter Morgan, a 8-year veteran from E-26, sustained second and third degree burns to 60 percent of his body; Lieutenant Redding, a 17-year veteran from E-26, sustained second degree burns to his face, hands, and back; and, Fire Fighter Stanley Taper, a 7-year veteran from E-12, suffered minor injuries.

Fire Chief Donald Edwards (now retired) appointed a Reconstruction Committee to investigate the circumstances contributing to these fire fighter deaths and injuries. Chief Edwards requested the participation of: the International Association of Fire Fighters (IAFF); the International Association of Fire Chiefs (IAFC); the National Fire Protection Association (NFPA); Hoechst/Celanese Acetate (PBI fabrics); Globe Fire Fighter Suits; Southern Mills, Inc.; and, the National Institute of Standards and Technology (NIST). The IAFC was unable to participate on the Committee. It should also be noted that the National Institute for Occupational Safety and Health (NIOSH) conducted an independent investigation of this incident. Their findings are available at www.cdc.gov/niosh/pdfs/face9921.pdf.

The Reconstruction Committee interviewed all personnel directly involved in the critical phases of this incident, as well as other personnel who felt that they might have pertinent information. The Committee also reviewed written records of the incident, audiotapes of radio transmissions, and incident photographs. The self-contained breathing apparatus worn by Fire Fighters Phillips, Matthews, and Morgan were field tested at the scene and later tested by NIOSH. A computer-generated model produced by NIST depicted the fire dynamics at this incident.

The Reconstruction Committee has determined that several factors contributed to the deaths and injuries at this incident. Many of these factors were deficiencies identified earlier in the Department's investigation of the October 1997 Kennedy Street fire that claimed the life of Sgt. John Carter. The Committee has made specific recommendations regarding each of these contributing factors.

To place the Reconstruction Committee's recommendations in context, this report begins with a description of the Cherry Road structure, followed by a synopsis of events at the fire. Photographs and schematic representations of the structure and fireground are included for clarity. Events are reported in chronological order, with reference to actual time, where applicable. Standard operating procedures (SOPs) are referenced as appropriate.

The findings and recommendations of the Reconstruction Committee are presented last and address the following areas.

- Fire fighter accountability
- Fireground command
- Communications
- Company/Unit operations
- Safety
- Administration

The D.C. Fire and EMS Department has implemented some of the Committee's recommendations prior to publication of this report. Actions that have already been taken are noted. Each recommendation must be considered carefully by the Department. Passive acceptance of the status quo characterized the Department's response to the report that followed Sgt. Carter's death in the Kennedy Street fire. The Committee is encouraged that the Department appears to be actively seeking to avoid further fire fighter deaths and injuries; however, the Committee strongly encourages that all recommendations be implemented to prevent further fire fighter deaths or injuries.

The District of Columbia Fire and EMS Department

The District of Columbia Fire and EMS Department protects the lives and property of the 604,000 residents of the District of Columbia as well as the approximately 1.5 million visitors and workers who are in the city each business day. The area served by the DC Fire and EMS Department covers 69 square miles and is bordered by the states of Maryland and Virginia. The Department had 115,948 incidents in fiscal year 1999, requiring 178,009 responses by fire units and 127,079 responses by EMS units.

The DC Fire and EMS Department is comprised of 1,264 professional fire fighters and 390 EMS personnel. The District of Columbia maintains 34 fire stations with 33 engine companies, 16 aerial ladder truck companies, 3 heavy-duty rescue squads, 1 hazardous materials company, 2 fireboats, and 35 EMS units. At the time of the incident, engine companies and ladder companies were each staffed with an officer and 3 fire fighters. Each heavy-duty rescue squad is staffed with an officer and 4 fire fighters.

There are four shifts (platoons) providing coverage, with each platoon working a 24-hour day that begins at 7:00 a.m. On each platoon there are six Battalion Fire Chiefs and a Deputy Fire Chief assigned to the Fire Fighting Division. A lieutenant or a captain is assigned to each engine, truck, and rescue squad on each shift. A sergeant is assigned to each of the six battalions to replace a regularly assigned officer who is on leave, such as annual leave, training, or sick leave.

Alarm Responses

The standard local alarm for a report of smoke with no additional information and a first alarm (box alarm) for confirmed reports of

smoke and/or a specific address or a report of a structural fire are as follows:

- Local Alarm – 1 engine and 1 aerial ladder truck
- First Alarm (Box Alarm) - 4 engines, 2 aerial ladder trucks, 1 battalion fire chief and 1 heavy duty rescue squad

The request for additional resources by the Incident Commander may be as follows:

- Working Fire Dispatch – Safety Officer, 1 engine assigned as a safety company, 1 Air Unit, 1 Ambulance, 1 Fire Investigator and EMS Supervisor
- Task Force Alarm - 2 engine companies, 1 aerial ladder truck and 1 battalion fire chief (BFC only dispatched on first requested Task Force)
- Second Alarm - 4 engines, 2 aerial ladder trucks and 1 battalion fire chief
- Third Alarm - 4 engines, 2 aerial ladder trucks and 1 battalion fire chief
- Special Alarm - Any specific additional assistance the Incident Commander requests

Radio Communications

The DC Fire and EMS Department uses the following four frequencies for emergency communications.

- Channel 1 (154.190) Main fire channel
- Channel 2 (154.400) Medical channel
- Channel 3 (154.280) Mutual Aid
- Channel 4 (154. 205) Fire ground channel

Personnel Accountability

The DC Fire and EMS Department uses a personal accountability system that requires each member at the beginning of each shift to carry the Personnel Accountability Tag (PAT) assigned to that member. The PAT displays the member's picture, name, rank, height, weight, blood type, and allergies. The PAT for each crew member is attached to a Unit Designator Card that normally remains on the dashboard of the apparatus.

The DC Fire and EMS Department specifies that the Incident Commander must conduct a "roll call" 20 minutes after the arrival of the first unit, then every 20 minutes thereafter. Rolls calls are also taken following a change in strategy, such as changing from offensive to defensive operations. In addition, roll calls may be taken for any reason upon the request of the Incident Commander (i.e., missing fire fighter).

If the operation changes from an offensive mode to a defensive mode, all PATs are collected from the vehicles and brought to the Command Post. A roll call is taken immediately to ensure that all personnel have exited from the structure.

Standard Operating Procedures

The DC Fire and EMS Department standard operating procedure's specify placement of apparatus and company assignments for structure fires. On a Box Alarm assignment for a structure fire, the order of dispatch determines the assigned position and task for each company.

The first and third due engines report to the front of the building to form the Attack Sector. The first due engine lays a supply line from a hydrant going into the fire block, and the third due engine connects their apparatus to the hydrant to supplement the first due engine's water supply. The first due engine then attacks the fire and the third due engine provides a back-up line.

The second and fourth due engines report to the rear of the structure for basement fires. The second due engine lays a supply line from

a hydrant and the fourth due engine supplements the water supply. The second due engine is responsible for checking the basement and reporting findings to the Incident Commander. If possible, the second due engine also shuts off utilities and notifies Incident Command of their actions.

The first due truck company places their apparatus in the front of the building and is responsible for the control of utilities and for laddering the front of the building. If the aerial ladder is not needed for rescue work, the truck company raises the aerial ladder to the roof for ventilation purposes.

The second due truck company places their apparatus in the rear of the building and is responsible for the laddering the rear. The second due truck company likewise raises the aerial ladder to the roof if no other tasks take priority.

The Rescue Squad reports to the front of the building, unless ordered to a different location by the Incident Commander. Four of the Rescue Squad's five personnel form Search Teams A and B, each with two members. One team advances to the fire floor, and the other team goes to the floor above. The Rescue Squad driver assists the search teams by forcing entry, venting the structure from the outside, monitoring the Rescue Squad Search Team's progress in locating victims, and assisting with first aid, if necessary.

Ideally, the Battalion Fire Chief positions the Command Post so he can have an unobstructed view of the entire incident. The Battalion Fire Chief uses his vehicle, as the Command Post until the arrival of the Field Command Unit.

Many buildings in the District of Columbia have a main entrance on the street level and direct exterior access to the basement at the rear. When a basement fire is discovered, the DC Fire and EMS Department's standard operating procedures specify that the first due engine company will protect rescue operations on upper floors, if this can be accomplished from a tenable position. An attack line should then enter on the basement level, rather than from the first floor and then down the interior basement stairway. The Incident Commander must verify that the first and third due engine companies can maintain tenable positions before directing the second due engine to attack the basement fire from the rear. If the Incident Commander orders an attack by the second due engine, the fourth due engine provides a back-up line.

The Structure

The structure at 3146 Cherry Road, N.E. was a row townhouse, built into a hillside with two stories visible in the front and three stories visible in the rear. The building was approximately 33 feet long and 19 feet wide. The structure consisted of wood frame construction with non-combustible masonry firewalls and energy-efficient features, specifically, double-paned windows and sliding glass doors. The flooring was supported by an open web wooden truss of 2 x 4 lightweight assembly that was held together with gusset plates. The basement trusses were enclosed by plywood on top and combustible ceiling tile below. Two steel I-beams and multiple columns supported the first floor. The dimensions of the basement, first and second floors are the same. The most notable feature of the exterior of the building is that it appears to be a two-story structure from the front and a three-story structure from the rear.

Photo 1 Front of 3146 Cherry Road, N.E.

Basement

A six-foot wooden and masonry fence enclosed a small brick patio in the rear of the structure. The finished basement was accessible through either an interior stairwell or through a rear sliding glass door that opened to the patio. The double-paned sliding glass door had locked security bars in place. There were no windows in the basement. The basement had a combustible drop ceiling with both cellulose and fiberglass insulation in the space between the drop ceiling and the first floor.

A junction box wired to a fluorescent light fixture affixed to the basement ceiling was identified as the origin of the fire by investigators. The fire origin and cause report is included in Appendix C.

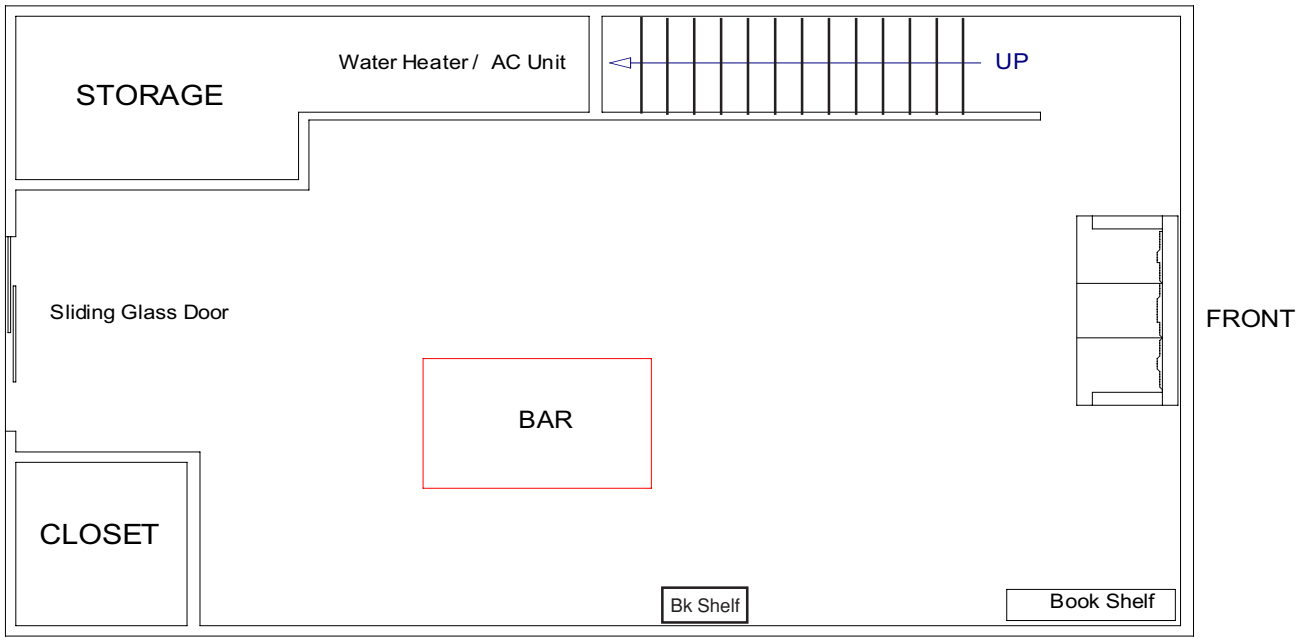

Figure 1 Basement floor plan *(Not to scale)*

Photo 2 Rear of building as viewed from outside the patio fence.

Photo 3 Sliding glass doors and security bars as viewed from inside the patio fence.

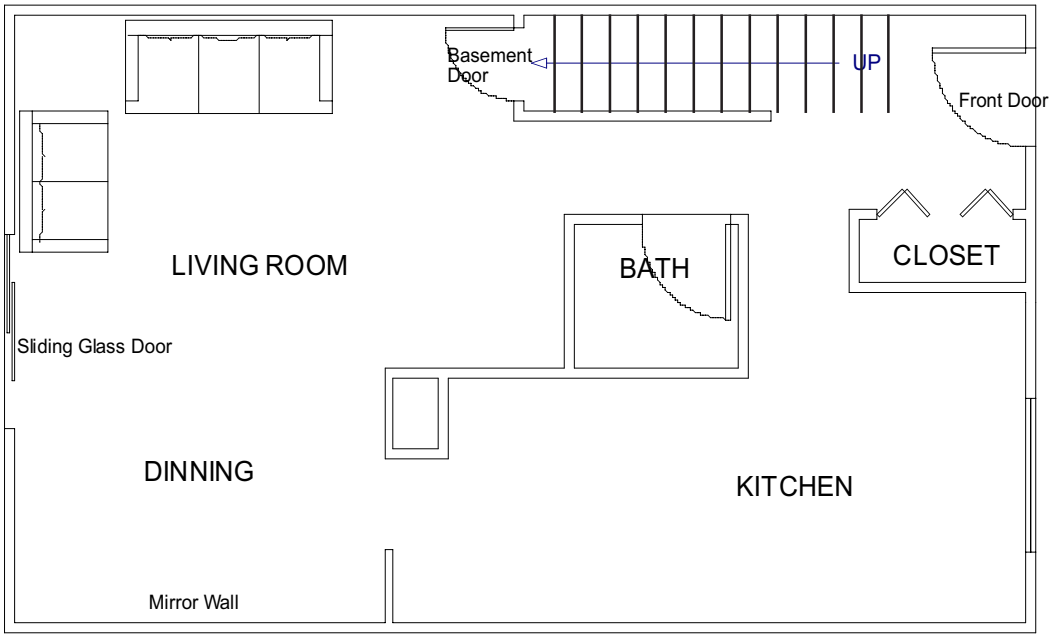

Figure 2 First floor plan *(Not to scale)*

Photo 4 First floor living room and furniture

First Floor

The first floor of the structure is accessible by a short flight of stairs in the front. A hallway leads to a living room at the rear. Against the rear wall is a double-paned sliding glass door of the same size as that in the basement. There is only a railing outside the sliding glass door.

Second Floor

The second floor was not extensively involved in the incident. Ventilation activities on the second floor did not contribute adversely to this incident.

Synopsis of Events

The Fire Alarm

In the first hour of May 30, 1999 the owner-occupants of 3146 Cherry Road, N.E. were awakened by the smoke detector alarm. The female occupant noticed smoke coming from the floor vents on the second floor. She proceeded downstairs and opened the front door of the house, then proceeded back down the hallway on the first floor and encountered thick smoke and heat. The male and female occupants left the building and went next door but did not receive an answer when they knocked on the door. They went back into their residence to get their coats and shoes, located in a closet just inside the front door. They returned next door, this time the occupant answered the door and notified the Fire Department. At 00:17:00, the D.C. Fire and EMS Department Communications Division received a 9-1-1 call reporting a townhouse fire at 3150 Cherry Road, N.E.. Communications dispatched Box Alarm 6178 at 00:17:50. The box alarm consisted of the following units.

- Engine Co. 26 (first due engine)
- Engine Co. 17 (second due engine)
- Engine Co. 10 (third due engine)
- Engine Co. 12 (fourth due engine)
- Truck Co. 15 (first due truck)
- Truck Co. 4 (second due truck)
- Battalion Fire Chief 1
- Rescue Squad 1

All box alarm units, with the exception of E-26, responded from their regularly assigned quarters. Engine 26 was returning to quarters from a previous alarm and acknowledged the Cherry Road alarm at 00:18:50 hours. All of the responding units with the exception of T-4 were normally assigned to this location. Truck Co. 4 replaced T-13, which was out of service for an extended period of time due to mechanical problems. This substitution increased the travel distance and, therefore, the response time for the second due truck company.

At 00:18:40, Communications received a second 9-1-1 call that reported fire in the basement of 3146 Cherry Road, N.E. At 00:19:30, Communications transmitted an address change and a report of smoke coming from the basement. Later, interviews revealed that few companies heard the message. Acknowledgment was only received from E-26 on the address change information.

Initial Activities

As E-26 approached the scene, E-26's officer noticed smoke billowing across Bladensburg Road. At 00:22:00, E-26's officer reported that they were on the scene, advised that there was smoke showing, and gave E-26's layout location as the hydrant at the intersection of Banneker Drive and Cherry Road, N.E. At 00:23:00, E-26's officer gave a second size-up report of a two-story row house with heavy smoke showing from the front. Fire Fighter Morgan (E-26's layout person) laid a 3-inch supply line. After E-10 approached the hydrant, F/F Morgan returned to E-26's apparatus located in front of the building. At 00:23:20, BFC-1 requested a Working Fire Dispatch (WFD) and a Special Alarm for the Hazardous Materials Unit (HMU) based on E-26's officer's size-up report. The units assigned to the WFD were the following:

- E-14
- BFC-2
- Medic 17 and EMS Supervisor
- DC Fire and EMS Fire Investigators and ATF Fire Investigators
- Metro Support Unit (air supply)
- Safety Officer

Following SOPs, E-26's officer and F/F Matthews (E-26's line person) advanced a 200-foot, 1-1/2-inch pre-connected attack line to the front door. As the line advanced, F/F Morgan stopped at the apparatus to get his self-contained breathing apparatus (SCBA). Fire Fighter Matthews and E-26's officer donned their SCBA facepieces. Fire Fighter Matthews experienced an equipment problem with his Scott AV-2000 facepiece, later identified to be a missing retainer. Fire Fighter Matthews immediately exchanged facepieces with E-26's driver.

After the facepiece exchange, at 00:24:00, F/F Matthews and F/F Morgan entered the front door together with a charged attack line. Engine 26's officer entered seconds later. Following SOPs, the third due engine company, E-10, advanced a 400-foot, 1-1/2-inch line from their own apparatus to the front door. Fire Fighter Phillips (E-10's line person) and E-10's officer advanced the charged hose line immediately behind E-26's crew.

Also, at 00:24:00, E-17 (the second due company) arrived. Department SOPs require the second and fourth due engine companies to the rear of the structure. Engine 17 dropped a supply line at the same intersection as E-26 and positioned their apparatus, just past the parking lot entrance to 3146 Cherry Road, N.E.. Engine 17 advanced a 350-foot, 1-1/2-inch pre-connected attack line to the rear of the building.

Truck 15 arrived at 00:24:20 hours and took a position behind E-26, near the front of the building. Truck 15's officer and a T-15 fire fighter began to ventilate the first floor windows in the front of the building. During this time, T-15's driver and a T-15 tiller-person began to place a ground ladder at the front of the building.

At 00:24:50 hours, as BFC-1 approached Cherry Road from Banneker Drive, he noticed a small amount of fire showing in the basement and radioed to direct T-4 to the rear position. Battalion Fire Chief-1 then proceeded to the front of the building and parked his vehicle near the front of the building. However, he was unable to see the incident from that location and proceeded on foot to the front of the fire building. By leaving his vehicle, BFC-1 could not use the stronger car-mounted mobile radio and was forced to communicate using a weaker portable radio. A fixed command post was not established nor were sectors established. Use of a weaker radio, lack of a fixed command post, and failure to establish sectors adversely affected both safety and communications at this incident.

Truck 4's officer and a T-4 fire fighter proceeded to the rear of the structure, as required by department SOPs. When T-4's officer stopped to speak with a civilian, the T-4 fire fighter continued to the rear of the structure to the sliding glass door with security bars. The T-4 officer joined the T-4 fire fighter and noticed what appeared to be a number of small fires in the basement at floor level. The evidence has shown that these small fires were caused by flaming pieces of ceiling tile dropping as the fire spread from its point of origin in the ceiling area. Truck 4's officer did not give a size-up report, nor did he relay other important information to BFC-1, specifically that:

- Occupants were out of the building,
- Fire was in the basement, and
- The structure had three stories in the rear.

Additional information regarding the fire's cause and origin is provided in Appendix C.

The T-4 crew noted that the fire appeared to be running out of air. Truck 4's officer and fire fighter removed the security bars and broke the sliding glass door. At that time, T-4's driver and tiller person placed a ground ladder at the rear of the structure in an unsuccessful attempt to ventilate the rear second floor windows. No attempt was made by T-4, or any other units, to ventilate through the first floor sliding glass door. The evidence has shown that the ventilation through the basement sliding glass door was a premature and uncoordinated action because it was done before a rear hose line could be advanced into the structure and before receiving permission to attack the fire from the Incident Commander.

Rescue Squad 1 arrived just after T-4 at 00:26:30 and reported to the rear of the building. Department SOPs require the rescue squad report to the front of the structure. The Rescue Squad crew is divided into two search teams, with two fire fighters on each team. Typically, one team is assigned to search the fire floor and the other team is assigned to search the floor above the fire. The male owner of the fire building stopped RS-1's officer to inform him that all of the occupants were out of the building; however, RS-1's officer did not report this information to BFC-1. While RS-1's officer was talking to the owner, RS-1's Team B proceeded to the rear of the structure. After the sliding glass door was broken, T-4's crew and RS-1's Team B noted smoke rushing into the doorway.

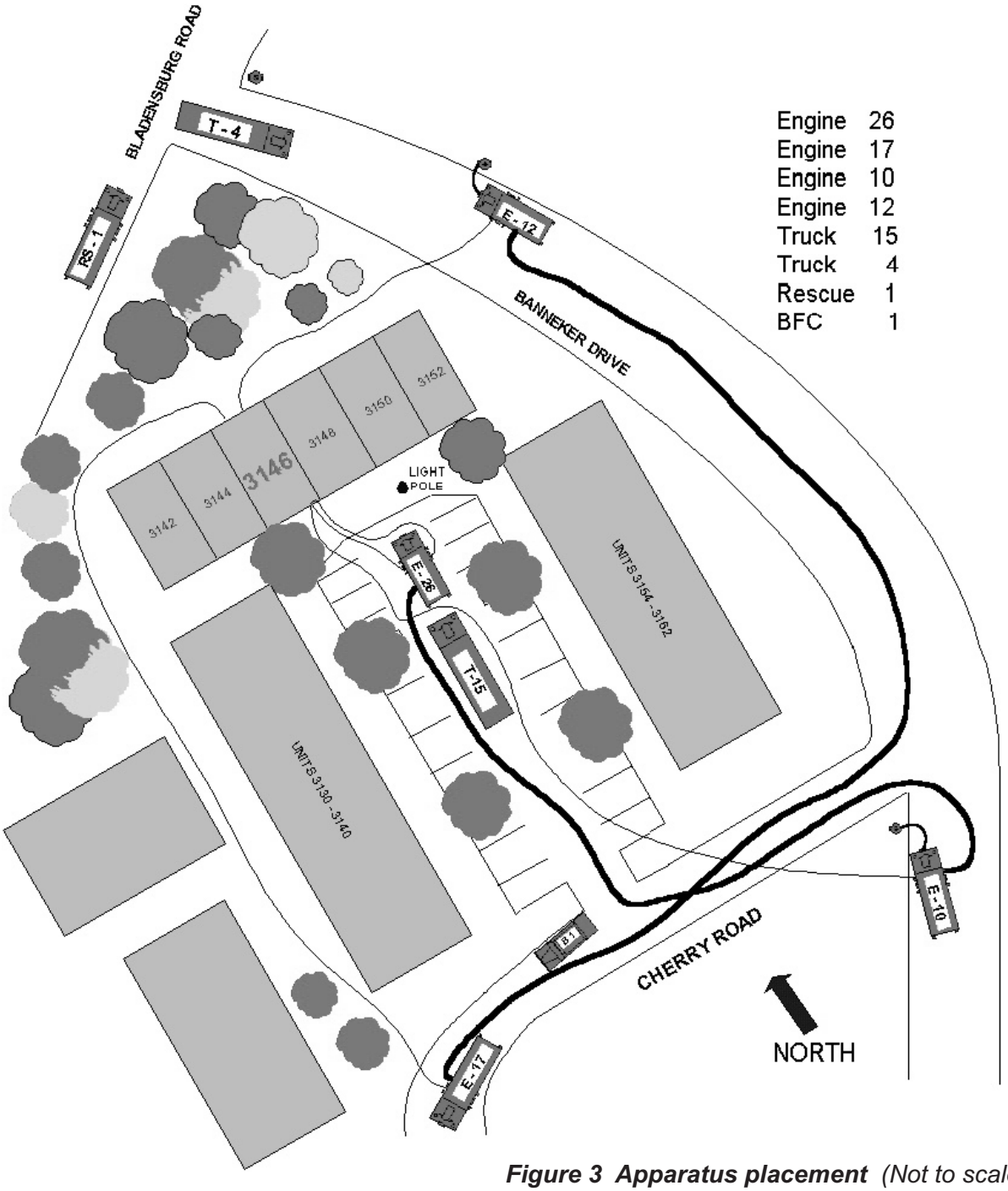

Figure 3 Apparatus placement *(Not to scale)*

During the time that the rear basement door was being ventilated, hose lines were advanced into the front of the structure. The fire fighters from E-26 and E-10 advanced charged hose lines through the hallway to the rear living room area, in search of the fire. These companies encountered heavy smoke conditions and moderate heat levels.

Engine 12, the fourth due company, picked up E-17's supply line and completed the layout to the hydrant located on Banneker Drive, northeast of the townhouse complex. Engine 12's crew advanced a 200-foot, 1-1/2-inch pre-connected line from E-26's apparatus and entered just inside the front door. The result was that E-17's crew in the rear had no back-up hose line.

Fire fighters from RS-1's Team B entered the basement from the rear of the building without the protection of hose line, while RS-1 Team A remained outside the basement entrance. Additionally, a / T-4 fire fighter, working alone, followed RS-1's Team B part of the way into the building. Rescue Squad 1's Team B hoped to find the interior basement stairs that led to the first floor to search above the fire for trapped occupants. At this time, E-17's crew arrived near the fenced gate with a hose line. However, the hose line was too short to advance into the building and they added hose to their line.

Conditions Deteriorate

As RS-1's Team B entered the basement, they observed that the fire appeared to be burning only in the middle of the room. As RS-1's Team B neared the stairs, they felt the heat building in the basement and could see the super-heated gases near the ceiling begin to ignite. At that point, a T-4 fire fighter and RS-1's Team B rapidly exited through the rear basement sliding glass door just before the basement became fully involved. Both RS-1 Teams A and B met outside the rear basement entrance and relocated to the front of the building.

At approximately 00:27:40, E-17's officer, with additional hose now added to their line, made the first of several requests to BFC-1 for permission to attack the fire from the rear. BFC-1 denied permission because he had no radio contact with E-26 or E-10, did not know their positions, and did not want to create opposing hose lines.

Conditions on the first floor began to deteriorate. Engine 10's officer and F/F Phillips (E-10) separated as they searched for the fire location. Engine 10's officer returned to the hallway from the living room in the belief that they had gone past the fire. At this point, F/F Morgan (E-26) noticed fire over his left shoulder in what appeared to be a doorway. The fire quickly disappeared and everything went dark. Engine 26's officer also noticed a small

amount of fire to his rear and observed that someone extinguished the visible fire with two quick bursts from a hose line. Seconds thereafter, E-26's officer observed that temperatures rose dramatically and his face started to burn. Engine 26's officer hurriedly exited the building without notifying the E-26 crew or command that he was leaving the building. As E-26's officer exited the building, he knocked down E-10's officer who was in the hallway. Engine 10's officer, confused about what was happening, also decided to exit the building.

Photo 5 Front of building as conditions deteriorate

When E-10's officer got outside the building, he questioned the E-10 fire fighter positioned at the front door whether F/F Phillips (E-10) had left the building. This fire fighter had not seen F/F Phillips leave the building. At this point, E-10's officer ordered this fire fighter to pull E-10's attack line from the building in an attempt to

alert F/F Phillips to leave the building. This unacceptable tactic was not successful and the line was removed from the building without encountering any resistance. Engine 10's officer never reported to BFC-1 that F/F Phillips was missing. Engine 26's officer notified BFC-1 that F/F Matthews (E-26) was still in the building. Battalion Fire Chief 1 did not know, however, that F/F Matthews might need assistance to exit. Engine 26's officer did not report that F/F Morgan remained in the building as well.

The evidence has shown that it was F/F Phillips (E-10) who extinguished the visible fire on the first floor with two quick hose line bursts. Fire Fighter Phillips was unknowingly located in close proximity to the open basement stairway door. Fire Fighters Morgan and Matthews from E-26 were located toward the rear of the building and approximately in line between the open basement door and the first floor sliding glass door (see Figure 4). The super-heated fire gases in the basement ignited and traveled up the basement stairs at a high speed to an inadequately ventilated first floor. The basement stairway acted as a chimney for the fire, which had evolved from a smoldering state to a free burning, fully involved basement fire within seconds. For further information on the fire dynamics, see the NIST report in Appendix D.

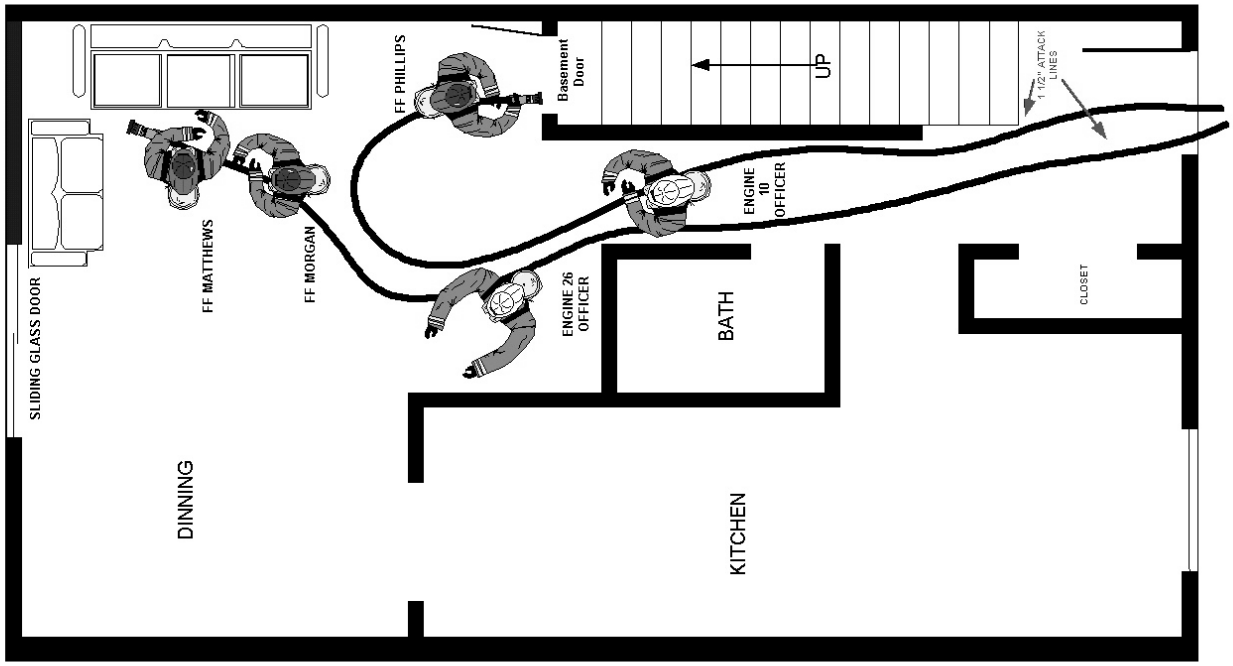

Figure 4 Position of fire fighters at time of rapid heat release *(Not to scale)*

Evidence indicates that F/F Phillips (E-10) was in direct contact with flame as well as with super-heated gases. Fire Fighter Morgan (E-26) recalled that he and F/F Matthews were not exposed to direct flames; however, he does recall seeing flames fill the doorway before the room went dark and became extremely hot. As extreme heat blanketed Fire Fighters Morgan and Matthews, they became separated from their hose line. F/F Morgan recalled that he asked F/F Matthews "where is the line?" and stated "we've got to get out of here." The Reconstruction Committee has concluded that the fire fighters were burned at approximately 00:28:00.

The E-17 crew was still in position to attack the now fully-involved basement fire from the rear. At 00:28:40, E-17's officer again requested permission from BFC-1 to attack the fire. Engine 17's officer mistakenly informed BFC-1 that there was no basement entrance and that E-17 was in a position to attack the fire from the first floor. Engine 17's officer also reported that the fire was extending to the second floor, unaware that E-17's crew was positioned at a walkout basement entrance, not on the first floor. Since BFC-1 was aware of E-17's true position, these misstatements did not impact decision making. Battalion Fire Chief 1 received the second request from E-17 for permission to attack the fire and again unsuccessfully attempted to locate E-26 and E-10. Battalion Fire Chief 1 did not allow E-17 to attack the fire without knowing the location of E-26 and E-10.

Also at that time, T-4's driver and tiller person returned to their apparatus for additional ground ladders. Upon their return to T-4's apparatus, they noticed the rapid fire growth and decided to advance a 350-foot, 1-1/2-inch line from E-12's apparatus to the rear of the fire building. This line was advanced because E-12's crew failed to report to their assigned position with a back-up line.

At 00:26:30, BFC-1 assigned BFC-2, who responded with the Working Fire Dispatch, to the rear of the building. An EMS Supervisor also responded on the working fire dispatch. He established an EMS command structure that was not integrated in any way with the incident command structure established by BFC-1. It should also be noted that the EMS Supervisor believed the incident to involve hazardous materials because the special alarm dispatch included the Hazardous Material Unit.

At 00:29:20, BFC-1 requested a Task Force Alarm, bringing an additional two engine companies, a truck company and a third battalion fire chief.

Photo 6 Fire conditions at the rear basement entrance as conditions deteriorate

During this time, the three critically injured fire fighters remained in the first floor of the structure. Apparently, F/F Phillips (E-10) attempted to retreat from his untenable position; he also removed his facepiece, which had begun to melt from exposure to high heat and flame. Fire Fighter Phillips was able to travel only a short distance, possibly in a standing position, before he collapsed from thermal burns and inhalation of super-heated gases. Fire Fighter Morgan (E-26) was in the living room area and later reported hearing a loud scream to his left, followed by a thud, as if someone had fallen. Fire Fighter Morgan found the attack line and, fearing that the living room was about to flash over, opened the nozzle twice in a straight stream pattern. He then made his way out of the building by following the attack line. The evidence has indicated that the actions of F/F Morgan probably prevented the first floor from flashing over.

Rescue Squad 1's Team B saw F/F Morgan struggle out of the building's front door at about 00:30:00. Rescue Squad 1's Team B then entered the structure to perform their routine search and rescue operations. Rescue Squad 1's Team B crawled down the hallway toward the living room area, noted the open basement stairway door, and attempted to close it. Rescue Squad 1's Team B was unable to fully close the basement door, and they noted the floor was now spongy. Rescue Squad 1's officer ordered Team B to exit the building. Instead, RS-1's Team B returned to the front door briefly, then decided to search the second floor. Due to extreme heat conditions, RS-1's Team B was unable to complete a search of the second floor.

The Incident Commander, BFC-1, and the majority of personnel at the incident did not recognize the urgency of the situation until a critically injured F/F Morgan exited the building. At this time, E-26's officer reported again to BFC-1 (this time more emphatically) that F/F Matthews was in trouble. Fire conditions continued to deteriorate and E-17's officer made a final request to BFC-1 for permission to attack the fire. By this time, BFC-1 was aware of one missing fire fighter (F/F Matthews) and he believed that the fire might have extended to the first floor. Battalion Fire Chief 1 gave permission to E-17 to attack the basement fire from the rear using a straight stream. As E-17 attacked the fire using a straight stream, T-4 provided a back-up line for E-17. Members from T-15 assisted T-4 in advancing the backup line in the basement. At 00:32:20, BFC-2 reported to BFC-1, "the fire is darkening down."

Rescue Activities

Battalion Fire Chief 1, unaware that F/F Phillips (E-10) was also missing, ordered E-10 back into the building to locate F/F Matthews (E-26). Engine 10's officer then ordered an E-10 fire fighter to remain at the front door to continue to look for F/F Phillips. Engine 10's officer reentered the building alone to conduct a search, without notifying BFC-1 that F/F Phillips was missing or that he was conducting a search alone. Simultaneously, BFC-1 ordered RS-1's Team A to search the first floor for F/F Matthews. Rescue Squad 1's Team A entered through the front door and followed a single hose line (Engine 26's attack line) to the rear living room area until they encountered the first floor sliding glass door.

Battalion Fire Chief 1 requested a second alarm assignment at 00:34:10. At 00:36:20, BFC-1 directed BFC-2 to order E-17 and T-4 to search for F/F Matthews (E-26) in the basement. Rescue Squad 1's Team A and E-10's officer observed that the floor was sagging and the temperature was high at that time. As E-10's officer searched, he heard the shrill sound from an integrated PASS alarm and quickly located F/F Phillips. Fire Fighter Phillips was unconscious, lying on the floor under a table, with his helmet and protective hood removed, and his facepiece at his side. Engine 10's officer, unable to move F/F Phillips by himself, unsuccessfully attempted to notify BFC-1 by radio. He then went for assistance.

The Deputy Fire Chief, Fire Fighting Division (DFC) arrived on the scene at approximately 00:43:00 and exchanged command with BFC-1. The DFC established a fixed command post at E-26's apparatus. At approximately 00:43:00, BFC-4 arrived on the scene and assisted with rescue operations. In addition to the units previously assigned (E-6 and HMU), BFC-1 also committed E-4 and E-14 to search for F/F Matthews (E-26).

While E-10's officer sought assistance, Rescue Squad 1's Team A located F/F Phillips. Fire Fighter Phillips was then removed from the building by Engine 10's officer, RS-1's Team A, E-6's crew, and the Hazardous Materials Unit at approximately 00:45:00, about 17 minutes after he was critically injured. Once outside the building, it was discovered that the rescued fire fighter was F/F Phillips and that F/F Matthews was still missing. Until this time, BFC-1 was not aware that F/F Phillips was missing. At 00:45:40, BFC-1 ordered the Safety Officer to conduct an accountability check. The Safety Officer attempted to conduct company accountability checks by

radio; however, he was unsuccessful because none of the companies answered the roll call.

Fire Fighter Matthews, was located simultaneously by several fire fighters. Fire Fighter Matthews was found unconscious, leaning over a couch near the rear of the living room, his SCBA operating. Fire Fighter Matthews had not activated his manually activated PASS Alarm. At 00:49:40 hours, personnel from E-4, E-14, and the HMU removed F/F Matthews from the building, about 21 minutes after he was injured. Figure 5 shows the approximate locations in which the fatally injured fire fighters were found.

The DFC initiated a second accountability check at 00:53:30, ordering BFC-2 to conduct a face to face accountability check of the companies in the rear and BFC-4 to do the same with the companies in the front.

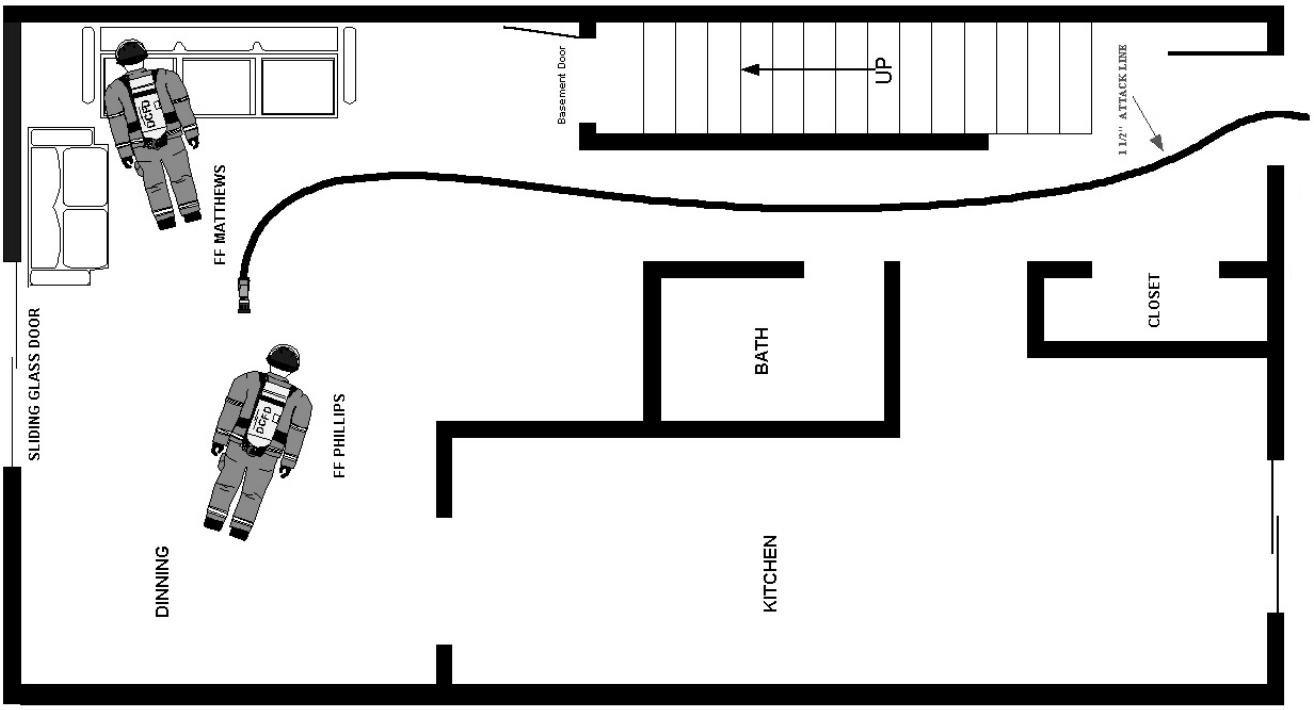

Figure 5 Location of downed fire fighters *(Not to scale)*

EMS personnel treated the critically injured fire fighters in the field to the extent authorized by the local Medical Director. There were some additional medical procedures that may have been effective in treating the injured fire fighters, but EMS personnel were not authorized to perform these procedures. The U.S. Department of Transportation's National Standard Curriculum for EMT-Ps allows paramedics to perform such procedures with the approval of the local Medical Director, however, the Departments' paramedics do not have such authority.

Fire Fighter Phillips was transported by Ambulance 4 to the Medstar Unit of The Washington Hospital Center with CPR performed en route. Fire Fighter Phillips was pronounced dead at 01:08 hours on May 30, 1999. Following autopsy, the cause of death reported for F/F Phillips was "Thermal injuries involving 60% of total body surface area and airways." Fire Fighter Matthews was transported by Medic 18 to the Medstar Unit where he died from his injuries on the following day. Following autopsy, the cause of death reported for F/F Matthews was "Thermal injuries involving 90% of total body surface area and airways."

Fire Fighter Morgan was transported to the Medstar Burn Unit in critical condition, with second and third degree burns to 60 % of his body. Fire Fighter Morgan was released from the hospital on August 23, 1999, and is continuing rehabilitation to return to duty.

Engine 26's officer was transported to the Medstar Burn Unit with second degree burns to his face, hands and back and was released two days later. In addition a fifth fire fighter was treated for smoke inhalation and released later that day.

Fire Department operations at this incident continued until 14:54 hours on May 30, 1999. The evidence has shown that the activities after the transport of the injured fire fighters did not affect the outcome of the incident, and therefore, have not been included in this report.

Findings and Recommendations

Findings

The fire at 3146 Cherry Road, N.E. started in an electrical junction box located in the space between the basement ceiling and the first floor. The fire spread to the combustible ceiling tiles and the lightweight open web wooden floor trusses. Some ceiling tiles later dropped to the basement floor and started small secondary fires. The basement fire initially smoldered and consumed most of the air in the basement. The fire started to grow when fire fighters prematurely broke out the right side of the basement sliding glass door. The fire grew rapidly when the left side of the sliding glass door was broken out.

Factors influencing the heat spread were the fire load and the smoldering ceiling tiles and trusses that produced large amounts of combustible gases. The combination of extreme amounts of such combustion by-products and an abundance of outside air produced a large amount of super-heated fire gases. The basement stairway acted as a chimney, directing the fast-moving super-heated fire gases up the basement stairway to the first floor. The speed at which these gases moved was accelerated by the improper ventilation activities.

The fatally and critically injured fire fighters were caught in the path of super-heated fire gases. Computer modeling of the fire estimates that the extreme heat build-up on the first floor occurred over a period of approximately two seconds. This sudden burst of heat prevented the fire fighters from using their attack lines. The first floor sliding glass door was still intact when this burst of heat occurred, so the heat had no place to vent. The first floor sliding glass door shattered later, caused by fire from the basement, impinging on the outside of the door and extreme heat on the inside of the door. Fire Fighter Phillips was near the open basement stairway at the time of the sudden heat. Fire Fighters Matthews and

Morgan were located toward the rear of the building, approximately in line between the open basement door and the sliding glass door when the sudden heat burst occurred. Medical and physical evidence indicate that F/F Phillips was exposed to direct flame and super-heated gases and that E-26's officer and F/Fs Matthews and Morgan were exposed only to super-heated gases.

After the fire, F/F Matthews' helmet was found at the bottom of the stairs, leading to the misconception that fire fighters were on the stairs at the time of the heat buildup. The Committee is convinced that all the fire fighters were on the first floor when the heat built up. This conclusion was based upon:

- Testimony from F/F Morgan;

- The fact that F/F Phillips was the only fire fighter whose burns were caused by flame; and

- The fire fighter burns were consistent with the fire fighter operating on the first floor

The Committee has concluded that the helmet was most likely kicked down the stairs during the rescue efforts. A second misconception was that E-17 improperly operated their hose line without permission from BFC-1. The Committee has found that E-17's hose line operations were consistent with Department SOPs throughout this incident.

Many of those interviewed thought that this incident was just a "routine" fire until they learned that fire fighters were injured. The Committee found that there was a general lack of understanding in the field as to what actually happened on the fire scene. During the interviews it appeared that many fire fighters and officers did not realize that some of their actions contributed to this tragedy.

Insufficient Department resources, particularly understaffed truck companies and the lack of battalion chief's aides also adversely impacted this incident. Many fire fighters and officers interviewed believed that a five person truck company and a battalion chief aide would have changed the outcome of this incident.

This fireground was very disorganized and chaotic. Company officers did not report that fire fighters were missing, and once this became known it took too long to react, locate and remove the injured fire fighters.

The Committee has found that poor fireground behavior by both officers and fire fighters were factors that contributed to the deaths and injuries. Such poor behaviors included:

- Not following established SOPs;
- Not managing and coordinating the incident through the established Incident Command System;
- Not effectively communicating tactical information;
- Not operating as a company unit; and
- Freelancing.

Additionally, the Committee found through this investigation, that many fire incidents in the District of Columbia are poorly managed with companies, officers and fire fighters operating outside of established systems and procedures. Fire incidents are usually brought under control in very little time. However, when fires escalate, poorly disciplined fire operations become chaotic, which can result in fire fighter and civilian fatalities. Accordingly, the Department must no longer tolerate this behavior at any level.

The behavior of fire companies and fireground operations exhibited at this fire reflect years of neglect, insufficient funding and mismanagement by both the City and the Department. The Department's budget must adequately support staffing, equipment and training. Additionally, the Department must no longer tolerate the notion that SOPs and proper fireground behaviors are only important for "major" fires and not as important for "routine" fires. The Department must vigorously enforce SOPs and demand professionalism at all levels of the fire department at all emergency incidents.

The Kennedy Street fire of October 24, 1997, which killed District of Columbia Fire Sergeant John Carter, was remarkably similar to the Cherry Road incident. Most of the recommendations following the Kennedy Street fire also apply to the Cherry Road fire. Unfortunately many of these recommendations were not implemented. The Committee found that the City and Department have learned little from Sergeant Carter's death.

Recommendations

The Committee makes its recommendations with the goal of preventing future deaths or injures. The recommendations are divided into the following critical areas associated with fire fighting.

- Fire Fighter Accountability
- Fireground Command
- Communications
- Company/Unit Operations
- Safety
- Administration

The committee focused on changes that address problems that directly or indirectly contributed to the outcome of this incident. In some areas, the Department has already taken actions consistent with the recommendations, and this is noted with appropriate follow-up measures. The recommendations are listed below.

Fire Fighter Accountability

Company Integrity

Problem

Many company officers did not keep company personnel together and provided little or no supervision of their companies. In addition, many company officers did not stay with their companies and entered and exited as individuals rather then company teams.

Recommendation

The company officer is responsible for managing and directing the members of the company. Companies must enter, exit and operate together. It must be impressed upon company officers and members

of the Department that they must operate as one unit so that all members are accounted for at all times.

The Training Academy must emphasize the importance of crew accountability in all initial and ongoing training. Company level drills on crew accountability must be undertaken and refreshed on an annual basis. The Department must enforce the use of the Incident Command System and SOPs using disciplinary action if necessary.

Problem

Mayday Alerts

No "Mayday" alerts were broadcast during this incident even though company officers were aware that fire fighters were missing. In addition, there was no notification (Phillips and Morgan) or delayed notification (Matthews) to BFC-1 that fire fighters were missing. As a result, BFC-1 and fireground personnel were unaware of missing fire fighters. Even after BFC-1 became aware of missing fire fighters, a "Mayday" alert was not transmitted.

Recommendation

The Incident Commander must be informed immediately when fire fighters are missing or otherwise need assistance. The Department has a "Mayday" policy that must be followed. The "Mayday" transmission must be made immediately when a member is missing, trapped, or otherwise needs immediate assistance. The Department must review use of the "Mayday" transmission after each incident to determine whether appropriate transmissions are made. This review can be done in the context of an incident critique.

Problem

Rescue Time

The time from recognizing that fire fighters were missing until their removal was excessive and minimized the likelihood of survival. It was approximately 17 and 21 minutes, respectively, from the time that F/Fs Phillips and Matthews were critically injured until they

were removed from the building. In the case of F/F Phillips, it took approximately 9 minutes from the time that he was first found until he was removed from the building.

Recommendation

The Department must establish and implement SOPs for Rapid Intervention. Additionally, the Department must equip each fire fighter on the fireground with a portable radio to allow faster communication if conditions change or emergency assistance is necessary.

The Department must enforce existing SOPs that:

- Maintain company integrity
- Require strict accountability
- Maintain proper radio communications
- Use "Mayday" procedures
- Establish rescue sectors
- Improve rapid intervention skills

Problem

Roll Calls

Battalion Fire Chief 1 ordered the Safety Officer to conduct a roll call approximately 22 minutes into the incident, rather than when he first realized that a fire fighter was missing. This action was unsuccessful because company officers failed to answer the roll call due to poor organization, general confusion, and a lack of discipline on the fireground.

Recommendation

Incident Commanders must follow the current Personnel Accountability System requirements, which require taking roll call when there is a report of a missing or trapped fire fighter.

Incident Commanders need to follow the Incident Command System and sector every incident immediately upon arrival. This will reduce fireground confusion and allow the Incident Commander to quickly contact sector leaders to determine the locations of companies in their sectors.

The Safety Officer should not conduct roll calls. Instead, a member of the Incident Command Staff (e.g., a battalion chief aide) should conduct roll calls.

The Training Academy must conduct ongoing training and evaluation of fire fighters and fire officers to ensure that all Department personnel respond properly to roll calls. Roll call training must be part of recruit training, company level drills and training academy refresher courses.

Fireground Command

Command Post Location

Problem

Battalion Fire Chief 1's vehicle was not in a position to allow him an adequate view of the incident. Battalion Fire Chief 1 unsuccessfully attempted to relocate the vehicle to obtain a better view, then left his vehicle and proceeded to the front of the building. Battalion Fire Chief 1 never established a fixed command post.

By leaving his vehicle, BFC-1 abandoned the stronger car-mounted mobile radio and was forced to communicate using a weaker portable radio. The use of a single portable radio also caused missed messages, due to switching back and forth between fireground and dispatch channels. In addition, it was impossible to maintain the command chart from a roving position.

Recommendation

Incident Commanders must establish fixed command posts. A fixed position allows for better communication, tracking of companies and a better environment for decision making. The Incident

Commander should use either his/her vehicle or another emergency vehicle that is more suitably located for this task. The command post should allow a view of the building that includes at least one, and preferably two, sides. The use of a fixed command post allows the Incident Commander to simultaneously monitor multiple radio channels at greater signal strength as well as access to both mobile and portable radios.

Changing Tactics

Problem

Extinguishing this fire involved a change in tactics from a front to a rear oriented attack. This change in tactics required close coordination and communication between BFC-1 and the front and rear fire suppression teams. Battalion Fire Chief 1 was unable to coordinate front and rear teams because he lacked information, particularly the location of engine company crews.

Recommendation

Proper management of the fireground requires the assistance of a battalion chief's aide. This position was restored on December 19, 1999. Department should continue the position of battalion chief's aide and their role includes the following:

- Assist in the coordination of fireground activities
- Gather critical information for the Incident Commander
- Allow the Incident Commander to sector the incident sooner
- Handle specific tasks, such as accountability, as directed by the Incident Commander
- Improving fireground communications

The position of battalion chief's aide is important to firegound safety. All personnel should understand the function of this and other command staff positions through training in the Department's Incident Command System.

Problem — Sectoring

Battalion Fire Chief 1 never sectored the fire or properly used a tactical worksheet. He was quickly overwhelmed trying to manage this escalating incident. BFC-2 was assigned to the rear, however, he was never assigned any companies nor were specific companies directed to report to him.

Recommendation

Incident Commanders must follow the Department's Incident Command System procedures on sectoring an incident and use command charts at all incidents. Sectors must be established in the early stages of all emergency incidents. Sector leaders must be assigned companies for which they are responsible. Sector leaders must give progress reports to the Incident Commander every five minutes or more frequently, as necessary. The Department must ensure that all officers are trained to serve as sector leaders.

Mandatory use of sector assignments will reduce the risk of exceeding the span-of-control and increase the Incident Commander's effectiveness. Command Staff should also be increased to facilitate the sectoring process. Restoration of the battalion chief's aide will also help alleviate this problem.

Problem — EMS Command

The EMS Supervisor established a separate EMS command structure at this incident.

Recommendation

EMS operations must be incorporated into the overall fireground operational plan as a sector that reports to the Incident Commander.

Problem — Mobile Command Unit

It was too long into the incident before the Mobile Command Unit arrived on the scene. Consequently, the command process was

hindered because the additional resources afforded by the Mobile Command Unit were not available.

Recommendation

The Mobile Command Unit should respond automatically to any incident that the DFC responds or if requested by the Incident Commander.

Communications

Problem

Relaying Important Information

After the Box Alarm was dispatched, Communications Division received an additional phone call, correcting the incident address and reporting that the fire was in the basement. This information was announced on the Fire Channel 1 at the end of a long transmission. Few companies heard this message and the information was not properly acknowledged. Acknowledgment was only received from E-26 on the address change information.

Recommendation

Communications must follow the established SOPs for relaying pertinent information. Communications Division must require that all responding units acknowledge all pertinent information.

The Department should also conduct a thorough evaluation of the Communications Division to ensure that its operations meet the Department's needs. Such an evaluation must also include recommendations to improve the Communications Division's performance during emergency incidents.

Problem

Size-up Reports

There was no size-up report from the rear. As a result, personnel did not have a description of the building and the conditions found. Also, BFC-1 and company officers did not request important information, which caused them to act without sufficient information.

Recommendation

Company officers must be trained to give immediate and accurate size-up reports at every incident. Company officers must receive ongoing training in effective fireground communication and SOPs. In addition, Incident Commanders and company officers must be trained to request information, such as size-up or progress reports, in the absence of this information. The use of Battalion Chief's Aides greatly improves size-up information.

Problem

Progress Reports

The officers from E-26 and E-10 made no radio transmissions during their initial attack, nor did they give progress reports. These companies did not respond to repeated attempts by BFC-1 to contact them by radio. As a result, BFC-1 was not fully aware of the interior conditions or the location of these companies in the building. Accordingly, Battalion Fire Chief 1 delayed a rear fire attack out of concern for the safety of these interior crews.

Company officers were unable to hear all radio transmissions at all times. It is likely that the inability of some officers to hear radio transmissions was due in part to the position of the portable radios on the officers. This contributed to the poor communications at this incident.

Recommendation

The Incident Commander must be aware of the location, activities and conditions encountered by the companies at an incident. Department SOPs for the Incident Command System requires that companies provide regular progress reports to the Incident Commander. The Department must train personnel through in-service drills and annual training and enforce the existing SOPs for communications at all emergency incidents.

Speaker microphones should be used or radio pockets should be added to the Department's turnout clothing specification to improve effectiveness of radio transmissions.

Problem

Deteriorating Conditions

During rescue operations, personnel noticed that the living room floor was deteriorating, becoming spongy and sloping. This critical information was not relayed to BFC-1.

Recommendation

Personnel must be trained to immediately relay any information about deteriorating structural integrity of fire buildings to the Incident Commander.

Problem

Radio Interference

Fire Channel 1 (154.190MHz) and Fire Channel 4 (154.205MHz) are too close in frequency, creating interference when either channel is operated simultaneously. The Channel 4 radio transcript shows many unintelligible transmissions and microphone clicks that could not be identified. Fireground personnel may have missed important Channel 4 transmissions when Channel 1 was active. Identical problems were documented during the Kennedy Street reconstruction.

Recommendation

As a short term solution, the Department should replace Fire Channel 4 with Fire Channel 2 as the fireground channel. There should be a minimum bandwidth separation of at least 25 MHz between fire channels. There is an insufficient bandwidth separation between Fire Channels 1 and 4 to ensure clear communications capability. Fire Channel 2 is a significantly stronger frequency compared to Fire Channel 4 due to greater bandwidth separation. Fire Channel 2 is currently used by fire units responding on medical calls.

Replacing Fire Channel 4 with Fire Channel 2 will not eliminate the problem of insufficient bandwidth separation. Rather, it will shift the communication problems from fire units responding on fire calls to fire units responding on medical calls. EMS units will not be affected by this change because they use a different communications system. It is the Committee's belief that it is

necessary to have sufficient communications capability at fire incidents for the safety of fire fighters.

The Department must implement the 800 MHz radio system as planned to ensure adequate communications capability for all personnel. Any additional delays or extension of implementation dates must not be tolerated.

Problem

Portable Radios

When the officers from E-26 and E-10 left the building, there was no way for the fire fighters left in the building to alert their officers or BFC-1 that they were in trouble because they were not equipped with portable radios.

Recommendation

Portable radios are a vital piece of safety equipment and must be provided to each member on the fireground. It is likely that if F/Fs Phillips, Matthews, and Morgan each had portable radios with an emergency alert button, then BFC-1 and other fire fighters would have recognized the dire situation and the need for immediate rescue efforts.

Problem

Effective Radio Communication

Radio communications, both on the fireground and by the Communications Division, were generally poor. Important information was not communicated effectively and members did not ensure that their messages were received and acknowledged. For example, because BFC-1 communicated face-to-face with several companies about missing fire fighters, follow-up radio transmissions were not made and many companies on the fireground were not aware that fire fighters were missing.

Recommendation

The Department must train all personnel in effective radio communication techniques. Targeted training in communications should be conducted as soon as feasible. The Department also must enforce SOPs for radio communication procedures.

Company/Unit Operations

Apparatus Placement

Problem

Some apparatus were poorly positioned at the fire scene, limiting company effectiveness and equipment accessibility. Specifically, E-17 should have been positioned on Banneker Drive near Bladensburg Road to enable a shorter and quicker hose line advance, and T-4 should have been repositioned on Banneker Drive in a location to enable the crew to raise the aerial ladder to the roof of the townhouse complex.

Recommendation

The Department must stress the importance of good apparatus placement. Company officers and apparatus operators/drivers must have extensive knowledge of their response area. Company officers must conduct training on response procedures, apparatus position and knowledge of proper response routes to ensure that apparatus are properly positioned.

Further, the Department should equip all apparatus with mobile data terminals (MDTs). MDTs can help companies find an incident location and assist with apparatus placement, resulting in improved company effectiveness on the fireground.

Ventilation

Problem

The sliding glass door was broken out by T-4 before a size-up report was given from the rear of the building and before E-17 was in position to attack the fire from the rear. Further, the basement was ventilated before any upper level ventilation of the structure. This improper and poorly coordinated ventilation provided an abundant supply of air to the fire, allowed the basement to become fully involved, and was a major factor contributing to fire growth and spread.

Computer modeling of this incident indicates that, had the first floor sliding glass door been ventilated prior to the basement sliding glass

door, conditions on the first floor at the fire fighter's level would have changed significantly. Such a change may have either prevented or reduced the extent of injuries to the fire fighters. For additional information, see the NIST report reproduced in Appendix D.

Recommendation

The Department must retrain all members on SOPs addressing proper ventilation procedures. The following points must be covered in such training.

- Effective ventilation is done from the structure's highest points (e.g., upper floor windows and roof).
- Truck companies must coordinate ventilation of the fire floor with engine companies to ensure that a hose line is in position and the Incident Commander has given permission to attack the fire.
- Sliding glass doors are unlike standard doors; once the glass is broken, a sliding door cannot be closed to limit air flow.
- The consequence of prematurely breaking doors and windows is the uncontrollable growth of fire.

Problem

Freelancing

Individual fire fighters and companies were "freelancing" on the fireground, that is, acting outside the direction of SOPs or the Incident Commander. Some officers and fire fighters separated from their companies and worked either alone or with other companies. Separation of company members is an unsafe and unprofessional practice that resulted in all of the following.

- The failure to recognize that a fire fighter was missing, trapped or down
- Reduced company and operational effectiveness
- Increased fireground confusion
- Accountability problems

In addition, some companies were not positioned where they were assigned, and some companies who were in their assigned positions did not perform their assigned duties. On the Box Alarm assignment, most companies freelanced at some point during the incident.

Recommendation

Company officers must ensure that companies stay together at all times. Incident commanders and company officers must ensure that members under their command perform their assigned duties according to the SOPs. Any deviation from established SOPs or the Incident Command System must be approved by the Incident Commander. The Department must enforce the use of the Incident Command System and SOPs using disciplinary actions if necessary.

Problem

Missing Fire Fighters

Engine 26's officer did not notify the other members of his company of his decision to leave the building. He did not immediately convey to BFC-1 with sufficient urgency that F/F Matthews was still in the building. Engine 26's officer never reported that F/F Morgan was still in the building. When E-10's officer exited the building, he was unaware of the location or welfare of F/F Phillips and never reported that F/F Phillips was missing.

Recommendation

The Department must retrain personnel regarding the importance of company accountability, especially the need for companies to enter, exit and operate as a team. When a member of the company leaves the hazard zone, the entire company must leave together. The Sector Officer and Incident Commander must be notified of the company's action and location. The Sector Officer and Incident Commander must also be notified immediately of missing, trapped, or unaccounted fire fighters or company officers using a "Mayday" transmission.

Problem

Removal of Hose Line

Engine 10's officer ordered E-10's layout person to pull their attack line out of the building in an attempt to notify F/F Phillips to exit

the building. Fire fighters are trained to follow hose lines out of buildings if they become lost or disoriented. The removal of this hose line eliminated this method of fire fighter self rescue.

Recommendation

Hose lines must never be removed from a structure until the location all company members have been accounted for. In the event of trapped or disoriented fire fighters, a hose line may provide the only path to safety. Hose lines advanced into a structure also serve as a reference point during rescue operations, indicating the last known location of fire fighters. The Training Academy must continue drills that simulate a downed fire fighter and train fire fighters how to react in these situations.

Problem

Truck Company Staffing

Current staffing of the Department's truck companies is inadequate. Working fires require truck company members to perform more work tasks then can be accomplished by four fire fighters in a timely manner. At this incident, improper and insufficient ventilation by truck companies was a critical factor contributing to the deaths and injuries. Other operational deficiencies include the following.

- Aerial ladders were not raised to the roof of the townhouses, even though it was possible to do so.
- An insufficient number of ground ladders were placed on both the front and rear of the structure.
- Truck companies did not turn off the gas or electric utilities at the fire building. Although not a factor in this incident, this certainly could have been catastrophic.

In part, the failure of truck companies in completing assigned operations resulted from truck company officers performing fire fighter tasks as well as the role of officer. Management of their companies was, necessarily, a secondary consideration to the primary task of carrying out vital fire fighter operations, such as placing ladders, ventilation, and forcible entry.

Recommendation

The Department must properly staff and train truck companies to ensure that vital fireground operations are accomplished in a timely manner. Truck companies must be staffed with a minimum of 5 or 6 fire fighters. Such a staffing level is nationally recognized by NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (scheduled for adoption May 2001), for all jurisdictions with tactical hazards, high-hazard occupancies, high incident frequencies, or geographical restrictions. This applies to all fire responses in the District of Columbia. Restoration of such staffing levels on truck companies will allow truck company officers to properly manage the overall operation of their company and ensure that critical tasks are accomplished. *Note: December 1999, the Department restored truck company staffing to 4 fire fighters and an officer.*

Safety

Integrated PASS Devices

Problem

Fire Fighter Phillips wore an SCBA with an integrated PASS device that was automatically activated. Fire Fighter Matthews wore a manually activated PASS device, which he did not activate. Department personnel who entered the building in search of a missing fire fighter reported that they were able to rapidly locate F/F Phillips because they heard his PASS alarm. They were not able to locate F/F Matthews as quickly because his PASS device was not activated. In later interviews, the majority of fire fighters with manually activated PASS devices reported that they had not activated their devices before entering the building.

Recommendation

The Department must maintain SCBA units with integrated PASS devices for all fire fighters. *Note: In December 1999, the Department provided every on duty fire fighter and officer with an SCBA with integrated PASS device.*

SCBA Program

Problem

The National Institute for Occupational Safety and Health's Respirator Branch identified several deficiencies in the Department's current SCBA program, particularly in the areas of inspection, maintenance, and recordkeeping.

Recommendation

The Department must upgrade the SCBA Maintenance Program to comply with all of the NIOSH recommendations. The full NIOSH report is included in Appendix H.

Chieftan 911 Helmet

Problem

The inner impact liner of the Safeco Chieftain 911 helmet worn by E-26's officer had significant damage. The outer shell of the helmet sustained no damage and only moderate soot accumulation, however, the impact liner showed signs of melting and discoloration. The adjustable sizing band also showed signs of damage. A summary of the protective clothing inspection is contained in Appendix F.

Recommendation

The Safety Office tested the Safeco Chieftain 911 helmet under live fire conditions in the summer of 1998. These tests identified many of the same deficiencies that were found with E-26's officer's helmet. The Safety Office recommended removing this helmet model from service following the 1998 tests. This recommendation was never implemented. The Department has ordered removal of all helmets of this model from service as of March 2000. The Safety Office must follow-up to ensure that none of these helmets remain in service at this time. Additionally, the Safety Office must evaluate and update protective clothing specifications and make appropriate recommendations on an annual basis.

Problem

Hand-Lights

Lack of hand-lights may have hampered rescue efforts at this incident. During the interviews, many members reported that they do not have a Department-issued hand-light and used either their own hand-light or no hand light at all.

Recommendation

As of February 2000, the Department provided Streamlight Vulcan hand-lights that are approved for hazardous atmospheres for each riding position. The Department must ensure that these hand-lights are used routinely and are maintained in good working order.

Problem

Protective Clothing Issues

The Department does not have a program to ensure the regular inspection of protective clothing and equipment. After the incident, the Safety Office was responsible for identifying the personal protective equipment at the scene, determining who had worn the equipment, and photographing all equipment. It was impossible, however, to make comparisons about the protective clothing's condition before and after the incident because there was no data regarding pre-incident condition of equipment.

During the inspection of protective clothing it was discovered that F/F Morgan's helmet sustained significant damage, including the separation of the outer shell from the impact liner. It is unknown whether the helmet was damaged in any way before the incident. A summary of the protective clothing inspection is contained in Appendix F.

Recommendation

The Department must adopt a system to track and identify all protective clothing and equipment. An equipment tracking system would help to ensure that each piece of protective clothing and equipment is inspected and maintained in accordance with OSHA regulations, NFPA standards, and manufacturers' recommendations. The Department should comply with proposed NFPA 1851, *Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles*.

The Committee recommends that the Department use a "Total PPE" or "Complete Care" program for procurement of fire fighter protective clothing. Such a program is a comprehensive package of support for the continued protective performance of the PPE product over its useful life span. Under this program, a professional clothing management firm provides not only the Department's choice of protective clothing and equipment, but also all cleaning, inspection, repair, tracking, and reporting services for a fixed price.

This program offers the following advantages:

- Asset cost is spread over the useful life of the product. This makes specification upgrades and multiple sets per member very affordable.
- Multiple sets per member (typically two sets per member) allow cost effective maintenance and cleaning and the availability of a properly fitted spare protective garment if the first is damaged or contaminated.
- Professional NFPA 1851 compliant cleaning practices, with tracking systems to ensure that cleaning/inspections are done as required over the clothing's and equipment's life.
- Professional NFPA 1851 compliant repair practices with tracking of all repairs on each garment or piece of equipment.
- Professional inspection services.
- Full garment tracking and reporting capabilities.

Safety Office

Problem

The Safety Office did not have the resources to conduct this fatality investigation. Additionally, the Department's SOPs regarding fire fighter fatality and significant injury investigations did not adequately address all aspects of the investigation, which resulted in some delay.

Recommendation

The Department must reorganize and properly staff and fund the Safety Office to have an effective fire department occupational safety

and health program. This reorganization should include the consolidation of a number of programs and personnel that are currently scattered throughout the Department. The Committee recommends an expanded Health and Safety Division.

This Division would be headed by a Deputy Fire Chief, reporting directly to the Chief of the Department. Four Battalion Chiefs should be assigned to this Division working 24-hour shifts, thus assuring a Battalion Safety Chief on each platoon. The Battalion Safety Chiefs would respond to working fires and serve as the on-scene safety sector commander. They would also be responsible for Department investigations, including investigations of accidents, fatalities, injuries and safety complaints. Support staff, including clerical and database management personnel, must be included in the new Division.

The expanded Health and Safety Division should be responsible for:

- Determining the Department's compliance with recognized fire fighter safety standards, laws and regulations;
- Responding to emergency incidents and serving as the safety sector leader;
- Investigating fire fighter accidents, fatalities and injuries;
- Investigating Department vehicle accidents;
- Conducting regular inspections of worksites and equipment;
- Establishing and administering the respiratory protection program;
- Administering the wellness-fitness program;
- Managing EMS safety;
- Administering the infection control program;
- Managing the injury prevention program;
- Managing the Medical Services for Department personnel;

- Managing the Workers Compensation program as it relates to the prevention, treatment and rehabilitation services provided to Department members;

- Researching and testing of new safety and protective clothing and equipment;

- Preparing specifications for purchase of safety and protective clothing and equipment and apparatus;

- Administering fire department facility safety;

- Providing curriculum and safety training in coordination with the Training Division; and,

- Keeping Department members informed of the status of safety programs and issues.

Additionally, the Health and Safety Division must have the resources to properly conduct fatality and serious injury investigations. The Department must revise their Standard Operating Procedures for such occurrences. The SOPs should designate an investigation team, by position, prior to the incident. Outside experts should be included for objectivity. The team must be formed immediately after the incident and they must complete the investigation report as soon as feasible to assist Department members and families with closure and ensure safety of future operations. To facilitate a timely investigation:

- When necessary, the investigation team members should be relieved of other duties;

- Department personnel involved in the incident should be interviewed as soon as possible. If necessary, off-duty personnel must be called back; and

- The Department should assign additional support staff, including clerical personnel, to assist in the investigation.

Problem

Lightweight Construction

The first floor was spongy and sloping when rescuers re-entered to look for a downed fire fighter. This condition was caused by the failure of several lightweight wood truss floor joists. After the fire, it was discovered that the first floor was near collapse.

Recommendation

Company officers and fire fighters must be aware of the potential hazards of lightweight wood truss construction. Company officers must immediately notify the Incident Commander when they observe lightweight wood truss construction. Incident Commanders must conduct a risk assessment prior to committing personnel to interior fire fighting activities involving lightweight construction.

The Department should continue their building construction training program and require annual refresher training. The Department must give special emphasis to lightweight construction in this training.

In addition, the Department must work with the City government to establish an identification system for structures with truss construction.

Problem

Energy Efficient Construction

The fire building was of energy efficient construction, including double-paned windows and double-paned sliding glass doors. This resulted in high heat build-up and difficulty in ventilation. These building components require much more effort to ventilate than single-paned windows.

Recommendation

Personnel must be aware of the potential hazards of energy efficient structures during fire emergencies. Truck companies must ensure that such structures are properly ventilated. Additional truck company personnel are required to ventilate these structures.

Administration

Problem

Kennedy Street Fatality

Recommendations from the 1997 Kennedy Street fire fighter fatality investigation were not implemented. Consequently, deficiencies in operations and equipment evident in the Kennedy Street fire were also seen at the Cherry Road incident, contributing to these fatalities and injuries.

Recommendation

The Department must review the Kennedy Street report, determine which recommendations have not been implemented, and act on them.

Problem

Fire Training Building

In interviews, fire fighters indicated the need for live fire training. The D.C. fire training building is not usable and has been condemned. Since condemnation, the Department has been able to schedule only limited live fire training at neighboring fire department facilities.

Recommendation

The Department must build its own fire training building. All fire fighters must participate in live fire training in order to improve both safety and operational effectiveness at emergency incidents. *Note: In April 2000, the old training building was demolished and construction began on the new training building.*

Problem

Incident Critiques

Interviews with Department members indicate that fires are not routinely critiqued; limiting what can be learned from previous incidents.

Recommendation

All working fires or other significant incidents must be critiqued. Critiquing allows members to learn from the positive and negative actions taken at each incident; allowing fire fighters to identify early indications of problems with tactics, procedures, or equipment.

The Department must create a post-incident analysis program. Elements of such a program must include the following.

- A standardized method of conducting battalion-level critiques;
- A review by senior Department personnel;
- Written reports and recommendations; and
- Dissemination of reports to all companies

The program objective is the improvement of operational effectiveness based upon shared experiences of all Department members.

Problem

Reserve Apparatus

Truck 4 replaced T-13 as the second due truck company on this incident. Normally, T-13 would have been assigned to this incident but it was not in service for several months due to long standing mechanical problems and procurement conflicts. This substitution increased the travel distance and, therefore, the response time for the second due truck company.

Recommendation

The Department must maintain an adequate reserve fleet fully equipped and maintained

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Problem

Working Fire Dispatch SOPs

The Department lacks well-defined SOPs for companies dispatched on a Working Fire Dispatches or Special Alarms.

Recommendation

The Department must develop or clarify SOPs for companies responding to Working Fire Dispatches or Special Alarms.

Problem

EMS Protocols

The Department's paramedics who treated the injured fire fighters do not have authority to perform a number of advanced life support procedures. The Department's advanced life support (ALS) protocols are more restrictive than National and surrounding jurisdictions' protocols.

Recommendation

Appendix I contains the EMS Operations Analyst's review of the emergency medical response to the injured fire fighters. This review contains recommendations to improve EMS advanced life support capabilities. The U.S. Department of Transportation's National Standard Curriculum for EMT-P allows paramedics to perform these additional procedures with the approval of the local Medical Director. The Department's Medical Director must review the allowable medical procedures and, if acceptable, make recommendations to the authority having jurisdiction. If approved, the Department must train paramedics to these procedures. As a minimum, the Department's paramedics must have the authority to immediately administer advanced life-saving procedures, including invasive airway maneuvers and the administration of necessary controlled medications, under standing protocol.

Problem

Sprinklers

Newly-constructed single-family homes in the District of Columbia are required, by law, to be equipped with sprinklers. The presence of a sprinkler system at 3146 Cherry Road may have avoided this tragedy.

Recommendation

The Department must work with the Mayor and the City Council to ensure that sprinklers are installed in all new construction, as well as all buildings undergoing major renovation. Smoke detectors saved the residents; sprinklers probably would have saved the fire fighters.

Implementation of Recommended Changes

The Reconstruction Committee has determined that a failure to implement recommendations made in the October 1997 Kennedy Street fire fighter fatality investigation contributed to the deaths and injuries at the Cherry Road incident. Many recommendations made in this report are virtually identical to those made in the Kennedy Street report.

To make the necessary improvements, it is critical that changes are supported at the highest levels of the Department. Standard Operating Procedures must be enforced. The Department's culture must no longer permit a lack of professionalism and lack of responsibility for improper actions.

The Department must appoint an Implementation Committee charged with making the recommended changes contained in this report. This Committee must recommend completion dates for each recommendation contained in this report.

Implementation must include:

- Developing or modifying standard operating procedures;
- Enforcement of existing standard operating procedures;
- Training;
- Budgeting for and hiring personnel;
- Procurement of equipment; and
- Capital construction.

APPENDIX A INCIDENT TIMELINE

The Reconstruction Committee has developed a chronological timeline of the incident at 3146 Cherry Road using audiotapes from the Communications Division, photographs, physical evidence, interviews with members of the Department and the professional opinion of the Committee. *Note: An "*" indicates that the time for the action is estimated*.

May 30, 1999

00:17:00	Initial 9-1-1 call reported fire at 3150 Cherry Road, N.E.
00:17:50	Vocalarm dispatched E-26, E-17, E-10, E-12, T-15, T-4, BFC-1, and RS-1
00:18:40	Second 9-1-1 call reported "fire in the basement" at 3146 Cherry Road, N.E.
00:18:50	Fire Channel 1 dispatch re-announced same assignment as above to those companies not in quarters.
	E-26, returning from a previous call, acknowledged the dispatch.
00:19:30	Communications announced on Fire Channel 1 the address change and reported that fire was in the basement. Communications received acknowledgment from E-26 of the address change only.
00:22:00	E-26 approached the scene and gave a report of smoke showing and the hydrant layout location.
00:23:00	E-26 arrived on scene at the front of the building and reported "heavy smoke showing from a two-story row" on Fire Channel 1.
00:23:10	E-10 arrived on scene and secured E-26's water supply.
00:23:20	En route, BFC-1 requested a Working Fire Dispatch and a Special Alarm for the Haz-Mat Unit.
00:24:00	E-17 arrived on scene and gave their layout information as "same intersection as E-26."
	*E-26 and E-10 entered the front door with charged hose lines.

00:24:20 T-15 arrived on scene and reported to the front.

00:24:30 *E-17 was began advancing their hose line to the rear of the building.

00:24:50 BFC-1 and T-4 arrived on scene. BFC-1 directed T-4 to the rear of the building before he proceeded to the front of the building.

00:25:10 Communications announced the Working Fire Dispatch, which consisted of E-14, BFC-2, Fire Investigation Unit, Air Unit, Safety Officer, EMS Supervisor and an EMS unit, on Fire Channel 1.

00:26:00 *RS-1 arrived in the rear.

*About this time the rear basement sliding glass door was broken out by T-4.

00:26:30 *RS-1 Team B entered the basement in an unsuccessful attempt to reach the interior stairway to the first floor. A fire fighter from T-4 also entered the basement.

00:26:40 *E-17's officer recalled making a radio transmission that the fire was small.

00:27:00 E-17's officer requested that their attack line be charged.

00:27:20 *Fire fighters from RS-1 and T-4 exited the basement, which was now becoming almost fully involved.

00:27:40 *E-17's officer made the first request for permission to attack the fire from the rear. This request was denied by BFC-1.

00:28:00 *Fire fighters from E-26 and E-10 were burned on the first floor.

00:28:30 *E-26's officer exited the building.

00:28:40 The basement was fully involved. E-17's officer made an additional request for permission to attack the fire from the rear. He reported to BFC-1 that he was on the "first floor" and fire was extending to the "second floor".

00:28:50 *E-10's officer exited the building.

00:29:00 *BFC-1 unsuccessfully attempted to locate E-26 and E-10 by radio.

*BFC-1 is informed face-to-face by E-26's officer that F/F Matthews is still in the building.

00:29:20 BFC-1 requested a Task Force Alarm.

00:30:00 *Fire fighter Morgan struggled out of building.

00:31:00 Communications announced the Task Force Alarm that consisted of: E-4, E-24, T-7, BFC-4 on Fire Channel 1.

00:31:20 *E-17 received permission to attack the fire from the basement entrance using a straight stream.

00:31:30 Communications dispatched E-6 as first due unit on the Task Force Alarm and returned E-24.

00:31:40 E-17 reported that the fire attack had begun and "we're trying to get to it now."

00:32:10 DFC responded on the box alarm.

00:32:20 BFC-2 reported the fire was "darkening down."

00:32:50 BFC-2 reported the fire was "darkening down quite a bit."

00:34:10 BFC-1 requested a Second Alarm.

00:36:10 BFC-2 reported all visible fire in the rear was extinguished.

00:36:20 BFC-1 ordered BFC-2 to have E-17 and T-4 work together to look for Fire fighter Matthews (E-26).

00:36:30 Unidentified radio transmission of a priority message believed to be reporting a fire fighter down on the first floor.

00:36:40 BFC-1 acknowledged the priority message and began to attempt to organize a rescue effort.

00:38:10 Unidentified fire officer reported fire fighter down on the first floor.

00:38:20 BFC-1 responded that HMU was on the way to assist with rescues.

00:38:30 Communications announced the Second Alarm, which consisted of: E-8, E-18, E-24, E-11, T-6, T-17, Mobile Command Unit, Canteen Unit, and Rehab Unit.

00:38:50 BFC-1 ordered E-4 to disregard protection of exposures and assist with rescues.

00:43:00 *DFC arrived on scene and exchanged command with BFC-1. BFC-4 arrived on scene.

00:45:00 *F/F Phillips was removed from the building and CPR was initiated. BFC-1 was informed that the rescued fire fighter was Phillips, and that F/F Matthews was still missing.

00:45:40 BFC-1 ordered the On-Duty Safety Officer to initiate the first roll call, which was unsuccessful.

00:49:40 *F/F Matthews was removed from the building.

00:53:30 DFC ordered BFC-2 to conduct a face to face accountability check of all companies in the rear.

00:54:00 DFC ordered BFC-4 to conduct a face to face accountability check of all companies in the front.

01:08:00 F/F Phillips pronounced dead.

14:54:00 Fire department ceased operations at the scene.

May 31, 1999

14:50:00 F/F Matthews was pronounced dead.

	Time	00:17	00:18	00:19	00:20	00:21	00:22	00:23	00:24	00:25	00:26
Fire Conditions		Fire starts in basement ceiling electrical junction box									
Communications Division		9-1-1 call	Dispatch of the box alarm	Announce address change and report fire in basement							
Box Alarm	E-26			E26 responding			First Size-up Report	Advance hose line to front door	Enter building		
	E-17			E17 responding					Give layout location		
	E-10			E10 responding				Advance hose line to front door	Enter building		
	E-12			E12 responding						Supply E17 with water source	
	T-15			T15 responding							
	T-4			T4 responding							
	RS-1			RS1 responding							Report to rear and Team B enters and exits basement
	BFC-1			BFC1 responding and requests WFD&HMU while en route							
WFD	E-14, HMU, BFC-2, Safety Officer										
Task Force	E-6, E-4, T-7, BFC-4, DFC										

Figure A-1 Incident Matrix

Time		00:27	00:28	00:29	00:30	00:31	00:32	00:33	00:34	00:35	00:36
Fire Conditions		*Con't* -Small fires	**Basement rolls over and burns fire fighters**				Fire knocked down				
Communications Division						Task Force Alarm Dispatched					
Box Alarm	**E-26**	*Con't* -Search for location of fire on the first floor	E26 officer exits		F/F Morgan exits						
	E-17	Request to attack fire denied	Additional requests to attack fire denied			E17 attacks basement fire from rear					
	E-10	Search for fire location on first floor		E10 officer exits		E10 officer enters for search and rescue of fire fighters					
	E-12	*Con't* -Advance hose line to front door from E26	Enter just inside the front door and then exit								
	T-15	Place a ground ladder to roof and ventilate windows			One team to the roof for ventilation activities and one team to rear		Assist T4 with back-up hose line in rear				
	T-4	A fire fighter enters rear and a ground ladder is placed		T4 advances attack line to rear from E12 apparatus			T4 provides back-up hose line for E17 in rear				
	RS-1	Con't-Report to rear and Team B enters and exits basement	Both teams move to front and attempt to remove security bars		Team B enters front door for normal search and rescue activities	Team A enters front of the building for search and rescue of missing fire fighters and some time later Team B exits front door and moves to rear to search basement					
	BFC-1	Attempts to contact and locate E26 and E10		Requests Task Force Alarm		Tells E17 to attack fire from rear and initiates rescue activities in front of the building					
WFD	**E-14, HMU, BFC-2, Safety Officer**	*Con't* -Working Fire Dispatch Units Responding					BFC-2 reports that the rear fire has "Darkened Down"				
Task Force	**E-6, E-4, T-7, BFC-4, DFC**						Task Force Units Responding				

Figure A-2 Incident Matrix

Time		00:37	00:38	00:39	00:40	00:41	00:42	00:43	00:44	00:45	0:46
Fire Conditions											
Communications Division			Second Alarm Dispatched								
Box Alarm	**E-26**										
	E-17										
	E-10	*Con't* -E10 officer enters for search and rescue of fire fighters								F/F Phillips is rescued from the building	
	E-12										
	T-15			Roof team reports roof is open							
	T-4										
	RS-1	*Con't* -Team A enters for search and rescue of missing fire fighters and some time later Team B exits and moves to rear to search basement									
	BFC-1	*Con't* -Assigns additional units to rescue effort									Orders roll call
WFD	**E-14, HMU, BFC-2, Safety Officer**	*Con't* -BFC-2 reports that all visible fire in rear extinguished and E17 and T4 search for F/F Matthews in the rear	HMU enters front and assists with rescue of F/F Phillips								
Task Force	**E-6, E-4, T-7, BFC-4, DFC**	*Con't* -Task Force Units Responding		E6 and E4 enter front and assist with rescue of F/F Phillips							

Figure A-3 Incident Matrix

Time		00:27	00:28	00:29	00:30	00:31	00:32	00:33	00:34	00:35	00:36
Fire Conditions		*Con't* -Small fires	**Basement rolls over**				Fire knocked down				
Communications Division						Task Force Alarm Dispatched					
Box Alarm	**E-26**	*Con't* -Search for location of fire on the first floor	E26 officer exits		F/F Morgan exits						
	E-17	Request to attack fire denied	Additional requests to attack fire denied			E17 attacks basement fire from rear					
	E-10	Search for fire location on first floor		E10 officer exits		E10 officer enters for search and rescue of fire fighters					
	E-12	*Con't* -Advance hose line to front door from E26	Enter just inside the front door and then exit								
	T-15	Placed a ground ladder to roof and ventilated windows			One team to the roof for ventilation activities and one team to rear		Assist T4 with back-up hose line in rear				
	T-4	A fire fighter enters rear and a ground ladder is placed		T4 advances attack line to rear from E12 apparatus			T4 provides back-up hose line for E17 in rear				
	RS-1	Con't-Report to rear and Team B enters and exits basement	Both teams move to front and attempt to remove security bars		Team B enters front door for normal search and rescue activities	Team A enters front of the building for search and rescue of missing fire fighters and some time later Team B exits front door and moves to rear to search basement					
	BFC-1	Attempts to contact and locate E26 and E10		Requests Task Force Alarm		Tells E17 to attack fire from rear and initiates rescue activities in front of the building					
WFD	**E-14, HMU, BFC-2, Safety Officer**	*Con't* -Working Fire Dispatch Units Responding					BFC-2 reports that the rear fire has "Darkened Down"				
Task Force	**E-6, E-4, T-7, BFC-4, DFC**						Task Force Units Responding				

Figure A-4 Incident Matrix

Appendix B Radio Transcripts

Key

B = Battalion Fire Chief

CD = Communications Division

CM1 = Incident Commander

DFC = Deputy Fire Chief

E = Engine

FC = Fire Chief

FCU = Field Command Unit

HMU = Hazardous Materials Unit

MSU = Metro Support Unit (air supply)

RS = Rescue Squad

SO = Safety Officer

T = Truck

Fire Channel One - Main Fire Channel

00:18:20	CD	*Single Tone*
00:18:20	T4	Truck 4.
00:18:30	CD	Okay, Truck 4.
00:18:40	CD	Engine 26, are you responding?
00:18:40	E12	Engine 12.
00:18:40	E26	Ah, you didn't give us, give us the run.
00:18:50	CD	Communications to Engine 26, respond on Box Alarm 6178. Smoke coming from the house. 3150 Cherry Road, NE. First Due, okay?

00:19:00	E26	26 copies.
00:19:00	E17	Engine 17, are you responding?
00:19:00	E17	17's goin'.
00:19:10	E12	12's respondin'
00:19:10	CD	Okay, Engine 12.
00:19:10	CD	Truck 15, are you responding?
00:19:10	T15	Truck 15's responding.
00:19:20	CD	Rescue Squad 1?
00:19:20	RS1	Squad 1.
00:19:30	CD	Box Alarm, Engines 26, 17, 10 and 12, Truck 15, Truck 4, Battalion 1 and Rescue Squad 1 are repor…..are responding for a report of smoke coming from the basement of 3146 Cherry Road, NE, Box Alarm 6178.
00:19:40	CD	Engine 26 did you copy the ah, new address?
00:19:50	E26	Copied, Engine 26 copies.
00:19:50	***	*Tape Advanced.*
00:22:00	E26	26 on the scene, got smoke showing.
00:22:00	CD	Engine 26 is on the scene reports smoke showing. You have a layout?
00:22:00	E26	Uh, not yet.
00:22:00	E26	...6 laid out at the driveway at Banneker and Cherry.
00:22:20	CD	Engine 26 is laid from the driveway at Banneker and Cherry Road.
00:22:30	***	*Tape Advanced.*
00:22:30	CD	Engine 10, are you okay on that layout?
00:23:00	E26	26 on the scene, we got ah, two story row…fi…uh, heavy smoke showing, side 1.
00:23:00	CD	Engine 26 is on the scene, a two story row with heavy smoke showin'….double zero, twenty-two.

00:23:10	E1	Put Engine 1 on the scene.
00:23:10	B1	Yeah, Battalion 1 on channel 1…….
00:23:20	CD	*Cuts B1 off amid transmission* Go ahead.
00:23:20	B1	…..working fire dispatch and the Haz-Mat Unit.
00:23:30	CD	I cut you off, you got a working fire dispatch, plus the Haz-Mat?
00:23:30	CD	Okay, double zero, twenty-three.
00:23:40	***	*Tape Advanced.*
00:23:40	???	Move 17.
00:24:00	???	…..split at…….
00:24:00	CD	17, do you have a lay out?
00:24:00	E17	Same, uh, intersection as Engine uh, 26.
00:24:10	CD	17 lay out from Banneker and Cherry. Engine 12 okay?
00:24:20	E12	12 copy. 12 pickin' up 17's line.
00:24:20	T15	Truck 15's on the scene.
00:25:10	E6	Engine 6 is …….
00:25:10	CD	*Single Tone* Working Fire Dispatch being sounded for Box 6178, Engine 14, Battalion 2, Fire Investigations Unit, Air Unit 2, the Safety Officer and the Haz-Mat Unit respond, 3146 Cherry Road, NE. Double zero, twenty-four.
00:25:30	CD	Engine 6, you have Ambulance 2.
00:25:30	E6	6 okay……*Cuts off*
00:26:00	CD	Engine 14, are you responding?
00:26:00	E14	Engine 14 responding. *Note: time stamp repeats itself*
00:26:10	CD	Okay Engine 14. Battalion 2 are you responding?
00:26:10	B2	Battalion 2's responding.

00:26:10	CD	Safety Officer?
00:26:20	B1	Battalion 1 to Communications.
00:26:20	CD	Come in Battalion 1.
00:26:30	B1	Have Battalion 2 take charge of the rear sector at Banneker and Bladensburg Road.
00:26:30	CD	Communications to Battalion 2.
00:26:40	B2	Battalion 2 bye.
00:26:40	CD	Battalion 1 advises he'd like you to take command of the rear sector at Banneker and Bladensburg.
00:26:50	B2	Battalion 2 copy.
00:27:00	***	*Tape Advanced.*
00:27:00	CD	…….you responding?
00:27:10	CD	Haz-Mat are you responding?
00:27:10	HMU	Haz-Mat's responding.
00:27:10	CD	Metro Unit?
00:27:30	E26	Engine 26 to Communications.
00:27:30	CD	Come in Engine 26.
00:27:30	E26	Uh, 26's wagon, would you have the, uh, the third due company supply me, uh……*Remainder is unintelligible*
00:27:40	CD	Communications to Engine 10, charge Engine 26's supply line, acknowledge.
00:27:50	***	*Tape Advanced.*
00:27:50	MSU	Metro and Safety.
00:27:50	???	…..the air.
00:28:00	CD	Okay Metro Unit and Safety Officer, double zero, twenty-seven. The other unit?
00:28:00	E33	33's off the air.

00:28:??	B1	Battalion to Communications.
00:28:??	CD	Come in Battalion 1.
00:28:??	B1	Give me a Task Force……*Drops off at that point*
00:28:??	CD	Okay sir, a Task Force Alarm will be sounded. Double zero, twenty-nine.
00:28:??	???	…..mmunications……
00:28:??	CD	Ah, unit calling, all I'm getting is the siren.
00:29:??	SO	Safety Officer, have Metro Support Unit turn on his running lights.
00:29:??	CD	Metro Unit check your running lights.
00:29:??	T16	Truck 16 off the air.
00:29:??	CD	Okay, Truck……*Cut off by other transmission*
00:29:??	???	…to Communications.
00:29:??	CD	Come in Engine 10.
00:29:20	E10	Yeah, can you have MPD, uh, block off Banneker Drive at, uh, 26th Place.
00:30:20	CD	Okay, double 0, thirty.
00:31:00	CD	*Single Tone* Task Force Alarm, Engines 4, 24, Truck 7, Battalion 4 responding on Box Alarm 6178, 3146 Cherry Road, NE. Double zero, thirty.
00:31:10	E4	Engine 4's respondin'.
00:31:10	CD	Okay Engine 4.
00:31:10	***	*Tape Advanced.*
00:31:10	CD	Engine 18 are you res…….*Cuts off amid transmission*
00:31:20	CD	Engine 6 did you advise you're ready?
00:31:30	E6	That's correct.
00:31:30	CD	Okay, go ahead and respond, ah, first due on the Task Force, okay?

00:31:40	E6	Engine 6 okay.
00:31:40	E14	Engine 14 on the scene.
00:31:40	CD	Okay, Communications to Engine 4.
00:31:40	E4	4 bye.
00:31:50	CD	Your gonna' be the second engine, okay?
00:31:50	E4	Copy.
00:31:50	CD	Communications to Engine 24.
00:31:50	E24	24 copy, we're ready, you can take us off the air.
00:32:00	CD	Double zero, thirty-one. Truck 7 are you responding?
00:32:00	T7	Truck 7's on tha' way.
00:32:00	CD	Battalion 4?
00:32:00	B4	Battalion 4's responding.
00:32:00	CD	Engine 18 are you responding?
00:32:10	DFC	Firefighting Deputy on the Box.
00:32:10	CD	Okay Firefighting Deputy, double zero, thirty-two.
00:32:10	CD	*Single Tone* Firefighting Deputy responding on Box 6178, 3146 Cherry Road, NE, double zero, thirty-two.
00:34:10	B1	Battalion 1 on channel 1.
00:34:10	CD	At this time at ten dura……in……A ten minute duration on your incident. Ah, also, will you need the Canteen Unit.
0034:10	B1	Uh, we will need the Canteen Unit. Give me a, uh, Second Alarm. I have one injured fire fighter, I need a Medic Unit, possibly another one.
00:34:30	CD	Okay, double zero, thirty-four. Are you ready for the companies on your, ah, Task Force.
00:34:30	B1	Battalion 1's ready.

00:34:30	CD	Engine 4…..uh, Engine 6, Engine 4, Truck 7 and Battalion 4.
00:34:40	B1	Okay.
00:34:40	CD	Fire Fighting Deputy did you copy the request for the Second Alarm?
00:34:50	DFC	Copy, dispatch the, uh, Mobile Command Unit.
00:34:50	CD	Okay.
00:34:50	B1	Battalion 1 to Communications.
00:35:00	CD	Come in Battalion 1.
00:35:00	B1	Have the Second Alarm stage on Bladensburg Road. And have the Task Force units report to Engine 26's wagon in front of the building with all their gear.
00:35:10	CD	Okay, double zero, thirty four. All units on the Task Force 3146 Cherry Road, NE, all Task Force units are to report to Engine 26 in full running gear.
00:35:30	E26	Engine 26 to Battalion 2.
00:35:40	***	*Tape Advanced.*
00:35:40	CD	Okay
00:36:20	CD	*Single Tone* Communications to Engine 8 and Engine 18, respond on the Second Alarm. You are to stage out on Bladensburg Road. 3146 Cherry Road, NE, Box Alarm 6178. Engine 8, you'll be first due, okay?
00:36:30	E8	Engine 8 copy.
00:36:40	CD	Engine 18, you're second due, okay?
00:36:40	???	*Siren Noise*
00:37:00	B1	Battalion 1 to Communications.
00:37:00	CD	Come in Battalion 1.
00:37:10	B1	We'll need a total of two Medic Units and one Basic Unit. We have two fire fighters injured and burned at this time.
00:37:10	CD	Okay, so far you have Medic 17 on the scene and an additional Basic and Medic will be sent.

00:37:20	T17	Truck 17.
00:37:20	T17	Truck 17.
00:37:30	CD	Okay Truck 17. Engine 24 are you responding?
00:37:30	E24	24 responding.
00:37:30	CD	Engine 11?
00:37:30	E11	Engine 11.
00:37:30	CD	Truck 6?
00:37:30	T6	Truck 6.
00:37:40	CD	Engine 27 are you responding?
00:37:40	E27	27 on the way.
00:37:40	CD	27 you're in service and transfer to the quarters of Engine 26, okay?
00:37:50	E27	27 transferrin' to 26.
00:37:50	CD	Engine 22 are you responding?
00:37:50	E22	22.
00:38:00	CD	Local Alarm, Engine 22's responding for an automat…….*Transmission cuts off at this point*
00:38:10	MSU	Metro Unit on the fireground.
00:38:10	CD	And your position?
00:38:10	MSU	Bladensburg and Earl Place.
00:38:10	CD	Okay.
00:38:30	CD	Second Alarm is being sounded on Box 6178, 3146 Cherry Road, NE. Units are to stage out on Bladensburg Road. Engines 8, 18, 24 and 11, Truck 6 and 17, the Mobile Command Unit, the Canteen Unit and the Rehab Unit's respond, double zero, thirty-eight.
00:39:00	E22	Engine 22 to Communications, 5917…..*unintelligible*

00:41:20	E18	Engine 18 is in staging.
00:41:20	B1	Can I have the units that are in staging?
00:44:10	B1	Battalion 1 to Communications, ready to copy the Second Alarm units.
00:44:20	CD	Okay it'll be Engines 8, 18, 24 and 11, Truck 6 and Truck 17, the, ah, Mobile Command Unit, and the Canteen and Rehab Units.
00:44:20	B1	Repeat the Engines again, please.
00:44:30	CD	Be Engines 8, 18, 24 and 11.
00:44:30	B1	Okay.
00:44:40	CD	And also, the Metro Unit is at Blandensburg Road and Earl Place.
00:44:40	B1	Okay.
00:44:40	***	*Tape Advanced.*
00:45:??	CD	Mobile Command Unit are you responding?
00:45:??	***	*Tape Advanced.*
00:45:??	???	……is in the staging area.
00:45:??	***	*Tape Advanced.*
00:46:10	T17	Truck 17's in staging.
00:46:10	CD	Engine 32 are you responding?
00:46:20	B1	…..front of the fire building immediately, at the EMS unit!!!
00:46:20	CD	Chief, I covered you. Try it again please.
00:46:30	E32	32's goin'.
00:46:30	CD	Okay, Battalion 3 are you responding?
00:47:??	***	*Tape Advanced.*
00:47:10	C43	43 and 83 on Bladensburg Road.

00:47:20	CD	Car 43 and 83.
00:47:20	T16	Truck 16 off the air.
00:47:20	CD	Okay Truck 16.
00:47:30	***	*Tape Advanced.*
00:47:40	CD	Communications to the Mobile Command Unit, are you responding?
00:47:50	???	*unintelligible*…… has arrived on the scene.
00:48:00	***	Tape Advanced.
00:48:20	???	*unintelligible*…….. to Communications.
00:48:20	CD	Command, come in.
00:48:20	CM1	Need another EMS unit in the front of the building, uh, the one that's staged on Bladensburg Road, you copy?
00:48:30	CD	Okay, also Chief there are, ah, three ambulances coming from the County, we've, uh, advised them to, ah, grab them as they come up the road.
00:48:30	CM1	Okay.
00:48:40	***	*Tape Advanced.*
00:54:10	FC	The Fire Chief is responding on the Second Alarm.
00:54:10	CD	The last unit, you were breaking up. Is that Fire Chief responding?
00:54:10	FC	That's affirmative. (time stamp repeats itself)
00:54:10	CD	Okay Fire Chief, double zero, fifty-three.
00:54:10	CD	*Single Tone* Fire Chief did you copy the message I put on your pager?
00:54:10	FC	Ah, as in reference to the Mutual-Aid units?
00:54:20	CD	Yes sir.
00:54:20	FC	That's affirmative.

00:54:20	CD	Okay, thank you.
00:54:20	CD	Fire Chief is responding on the Second Alarm, 3146 Cherry Road, NE, Box Alarm 6178. Double zero, fifty-four.
00:54:30	***	*Tape Advanced.*
00:56:00	CD	Communications to the Fire Chief.
00:56:00	FC	Fire Chief bye.
00:56:00	CD	Ah Chief, at this time we do have, ah, reports of, ah, several fire fighters injured, okay?
00:56:00	FC	Fire Chief copy. Uh, could you get, uh, Command 1 to give me a duration update?
00:56:10	CD	Okay.
00:56:20	CD	Fire Chief can you contact the Watch Commander, immediately?
00:56:20	FC	Fire Chief copy.
00:56:20	***	*Tape Advanced.*
00:56:30	FCU	Field Command Unit on the Second Alarm.
00:56:40	CD	Okay, Field Command Unit. Double zero, fifty-six.
00:56:40	***	*Tape Advanced.*
00:58:00	CD	Communications to the Fire Chief.
00:58:00	FC	Fire Chief bye.
00:58:10	CD	Chief, at this time Command advises the fire is knocked down, they continue to have some hot spots. Uh, they have, uh, evacuated the building, three injuries at this time.
00:58:10	FC	Fire Chief copy.
00:58:20	***	*Tape Advanced.*
01:01:30	CD	Rehab or, uh, Canteen Unit responding?
01:01:40	***	*Tape Advanced.*

01:26:20	RU	Rehab unit responding to the Second Alarm.
01:26:20	CD	Okay, Rehab Unit.
01:26:20	***	*Tape Advanced.*
01:??:??	CD	Unit repeat please.
01:31:40	CM1	Command to Battalion 4.
01:31:40	CD	The last unit repeat please.
01:31:50	***	*Tape Advanced.*
01:3?:??	FC	The Fire Chief is at MedStar.
01:3?:??	CD	Okay Fire Chief.
01:3?:??	***	*Tape Advanced.*
01:40:40	CM1	Command 1 to Communications.
01:40:50	CD	Come in Command 1.
01:41:00	CM1	Returning some companies here off the, uh, Task Force and Second Alarm, they'll call you when ready, Engine 8 will be the first company released.
01:41:00	CD	Okay, one, forty.

Fire Channel Four - Fireground Channel

00:23:10	E10	10's got 26's line.
00:23:20	???	…..fire's in tha' basement.
00:23:20	CD	Battalion 1, are you callin'?
00:23:30	***	*Tape Advanced.*
00:24:30	B1	Battalion 1 to the second due truck.

00:24:40	B1	Battalion 1 to Truck 4. Stop right there Truck 4.
00:24:50	T4	Truck 4 to the Chief.
00:24:50	B1	Yeah, that's where the, ah, back window is, right there.
00:25:00	CD	*Tone bleedover from Channel One*
00:26:00	B1	Battalion 6, uh, Battalion 1 to Truck 15.
00:26:10	***	*Tape Advanced.*
00:26:50	E17	17's wagon bye. *Wagon driver*
00:27:00	E17	Charge the three fifty. *Officer*
00:27:00	???	*Unintelligible transmission*
00:27:00	***	*Tape Advanced.*
00:27:30	E12	Engine 12 to Engine 17's wagon. Charge that second line. *Transmission is made through SCBA*
00:27:50	CD	Communications to Engine 10, charge Engine 26's supply line. Acknowledge.
00:27:50	???	Mic click.
00:28:00	E8	Engine 8 on the scene with a ……(tape advances)
00:28:20	???	*Unintelligible transmission through SCBA*
00:28:20	E12	Engine 12 to Engine 17, you ready for water? (wagon driver)
00:28:20	???	*Unintelligible transmission*
00:28:30	???	*Mic click.*
00:28:30	???	…..to the rear of the first floor……*Unintelligible transmission through SCBA*
00:28:40	E17	We ah, we can knock it down from here Chief, there's no basement entrance. We can hit from the first floor side…..ah,…….fire, ah, is extending to the second floor.
00:28:40	???	*Unintelligible transmission*
00:28:50	???	*Mic click.*

00:29:00	???	*Mic click.*
00:29:00	???	…..Engine 26….*unintelligible*
00:29:10	CD	Communications to Battalion 1.
00:29:20	???	*Mic click.*
00:29:30	***	*Tape Advanced.*
00:30:20	???	*Mic click.*
00:30:30	???	*Unintelligible transmission*
00:30:30	CD	*Tone bleedover from Channel One*
00:30:40	???	*Unintelligible transmission*
00:30:50	B2	Battalion 2's on the scene.
00:30:50	CD	*Tone bleedover from Channel One*
00:31:00	B2	Battalion 2 to Command 1.
00:31:00	B2	Where do you need some help Damian?
00:31:10	B2	Battalion 2 to Command 1.
00:31:10	???	*Mic click.*
00:31:20	???	*Mic click.*
00:31:30	???	*Mic click.*
00:31:40	E17	We can see, ah,…. we're trying to get to it now, but….*Transmission is made through SCBA and cuts off*
00:31:50	???	*Mic click.*
00:32:00	???	*Mic click.*
00:32:00	B2	Battalion 2….Command.
00:32:10	???	*Mic click.*

00:32:20	B2	…..line on it now, Damian, ‘cause it’s darkenin’ down.
00:32:30	B2	Did you copy Command 1?
00:32:30	???	*Unintelligible transmission*
00:32:40	???	*Mic click.*
00:32:50	B2	….looks like they’re getting’ to it now. Uh, it’s darkenin’ quite a bit.
00:33:00	???	*Mic click.*
00:33:00	CD	*Tone bleedover from Channel One*
00:33:10	CD	Communications to Battalion 1.
00:33:20	???	*Mic click.*
00:33:30	CD	Communications to Battalion 1.
00:33:30	???	*Mic click.*
00:33:40	***	*Tape Advanced.*
00:35:30	CD	……Task Force…..*Transmission is cut off*
00:35:30	CD	Units on the Task Force are to report to Engine 26 in full gear.
00:35:30	E6	Engine 6 okay.
00:35:40	B1	Battalion 1 to Battalion 2.
00:35:40	B2	Go ahead Battalion 1.
00:35:40	B1	What’s the status back there?
00:35:50	B2	Looks like they’re getting’ a good lick on it right now Chief, uh,……..*unintelligible*……if you would.
00:36:00	B1	Okay, I got ‘em already staged on Bladensburg. I got Task Force reporting to the front of the building here.
00:36:10	B2	Okay, ah, all visible fi….*unintelligible*….down. I believe they’re inside, ah, checkin’ for extensions.

00:36:20	B1	Okay, at this point don't worry about the extension. I want you to have Engine 17 and Truck 4 work together and look for Fire Fighter Matthews of Engine twe, ah, twenty-six.
00:36:20	???	*Mic click.*
00:36:30	???	*Mic click.*
00:36:40	B1	Go ahead, Priority!
00:36:40	B1	Okay, what's your location?
00:36:50	???	First floor!! *Transmission is made through SCBA*
00:36:50	B1	First floor?
00:36:50	???	Yeah!!! *Transmission is made through SCBA*
00:37:00	B1	All right.
00:37:00	???	*Mic click.*
00:37:10	???	Several mic clicks.
00:37:20	E4	Engine 4 on the channel.
00:37:20	B1	Battalion 1 to Engine 4.
00:37:20	E4	4 bye.
00:37:20	B1	I want you to go into Exposure 2.
00:37:30	???	*Mic click.*
00:37:30	B1	Is that at the first floor?
00:37:30	B1	Okay, Battalion 1 to Engine 10!
00:37:40	B1	Battalion 1 to Engine 12!
00:37:50	B1	Battalion 1 to Engine 6!
00:37:50	B1	Battalion 1 to Engine 6!
00:37:50	???	*Several mic clicks.*

00:37:50	B1	Engine 6 repeat.
00:38:00	???	*Several mic clicks.*
00:38:00	B1	Battalion 1 to the Haz-Mat officer.
00:38:00	???	*Mic click.*
00:38:10	B1	Battalion 1 to the Haz-Mat officer!
00:38:10	???	Got a man down, send somebody to the first floor now!!! *Transmission is made through SCBA*
00:38:20	???	…..*Unintelligible transmission cut off by Battalion 1*
00:38:20	B1	Haz-Mat unit's on the way in there now. What do you need on the first floor?
00:38:20	???	Give me some firemen to pull a fire fighter out..*unintelligible*!! *Transmission is made through SCBA*
00:38:30	B1	Repeat?
00:38:30	???	……a fire fighter out…*unintelligible*!! *Transmission is made through SCBA*
00:38:30	B1	Okay, we got the Haz-Mat Unit on the way in right now!
00:38:40	???	*Mic click.*
00:38:40	B1	Command bye.
00:38:40	???	*Several mic clicks.*
00:38:50	B1	Okay, Battalion 1 to Engine 4.
00:38:50	???	*Mic click.*
00:38:50	B1	Disregard the Exposure……*cut off*……you can make it any one of these one's in the front yard and a line into the first floor. Watch out they're gonna' be carrying people ou……they're carrying somebody out.
00:39:10	E6	Engine 6 to Battalion 1, your instructions?
00:39:20	B1	Assist on the first floor with carrying the, ah, fire fighter out.
00:39:20	E6	Okay.

00:39:30	T4	This is Truck 4's roof team to Command 1.
00:39:30	B1	Unit calling Command 1?
00:39:40	T4	Truck 4's roof team to Command 1. The roof is open.
00:39:40	B1	Okay, what do you got up there?
00:39:40	T4	Got heavy smoke conditions on the roof, we've got it open *unintelligible*
00:39:50	B1	Heavy smoke all the way, you say?
00:39:50	T4	T4……..*unintelligible*
00:39:50	B1	Cannot copy.
00:40:00	T7	Truck 7's on the scene.
00:40:10	***	*Tape Advanced.*
00:41:10	T15	Truck 15, to ah, Command 1.
00:41:10	???	*Unintelligible transmission*
00:41:10	B1	You'll have to try again. Battalion 1 to the Safety Officer.
00:41:20	E18	Engine 18's in staging.
00:41:30	CD	Communications to Command 1, I have your Second Alarm units when you're ready.
00:41:40	***	*Tape Advanced.*
00:42:10	???	……..front of the building, 26's wagon want an accountability check now.
00:42:30	CD	*Single Tone* Communications to Command 1. A twenty minute duration on your incident. Twenty minutes.
00:42:30	CM1	Command copies.
00:42:30	CD	And Chief when you're ready, I have the Second Alarm units for you.
00:42:40	B2	Battalion 2 to Command.
00:42:50	B1	Who's this?

00:43:00	B1	The hall across from the front door.
00:43:00	???	*Mic click.*
00:43:10	***	*Tape Advanced.*
00:43:40	???	Go ahead Battalion 2.
00:43:40	B2	*Unintelligible*…..since most of the fire is knocked down in the…….shut it down.
00:43:50	???	*Mic click.*
00:44:00	???	What do you need in the rear again?
00:44:10	???	*Mic click.*
00:44:10	***	*Tape Advanced.*
00:44:50	???	*Unintelligible transmission*
00:45:00	???	*Unintelligible feedback*
00:45:00	***	*Tape Advanced.*
00:45:00	***	*At this point tape time stamp begins to go awry with incorrect timing. Times until 00:46:00 are approximations.*
00:45:20	???	Get stretchers out here quickly!!
00:45:20	???	……been told at this time…..*Unintelligible feedback*
00:45:30	CM1	Unit calling command?
00:45:30	???	Numerous unintelligible mic clicks.
00:45:30	CD	*Tone bleedover from Channel One*
00:45:40	SO	Safety Officer to Communications.
00:45:40	CD	Safety Officer come in.
00:45:40	SO	Announce on Channel 4, Roll Call.
00:45:40	CD	Okay.

00:45:50	CD	*Single Tone* Units on Box 6178, Cherry Road, units prepare for Roll Call.
00:45:50	RS1	Squad 1, A to B.
00:46:00	???	*Mic click.*
00:46:00	???	Need a stretcher, need a stretcher!!!
00:46:10	???	Stretcher side one!!!
00:46:20	???	*Several mic clicks.*
00:46:20	CM1	Command to 8 and 18.
00:46:20	E18	Engine 18.
00:46:30	CM1	What is your location?
00:46:30	E18	Staged up sir.
00:46:40	CM1	Front of the building, 26's wagon, command post.
00:46:40	E18	Ten – four.
00:46:40	CM1	Command to 24.
00:46:40	E24	Engine 24 bye.
00:46:50	CM1	Rear of the building, report to Battalion 2.
00:46:50	E24	Is Banneker a better shot at 2?
00:47:00	???	No, Bladensburg Road.
00:47:00	E24	Okay.
00:47:10	CM1	Command to Engine 8.
00:47:10	E8	Engine 8 bye.
00:47:10	CM1	Your location?
00:47:10	CM1	Front of the building, command post.
00:47:20	E8	Engine 8 copy.

00:47:20	B1	Battalion 1 to Battalion 2.
00:47:20	B1	The second ambulance is comin' from the County. Grab 'em when they come off Bladensburg Road so we can bring 'em up between the buildings with the cot.
00:47:30	B2	Okay, either or?
00:47:40	B1	We'll need the stretcher…..*Unintelligible transmission*
00:47:50	E6	Engine to Battalion 1.
00:47:50	???	*Several mic clicks.*
00:48:00	CM1	Command to communications on Channel 4.
00:48:00	CD	Unit callin', go ahead.
00:48:10	???	Yes, be advised we got a second fire fighter on side one in front of, the uh, Engine 26, EAB unit, a.s.p.
00:48:10	CD	Okay, they've been advised.
00:48:20	***	*Tape Advanced.*
00:49:00	???	……copy….
00:49:00	***	*Tape Advanced.*
00:49:40	CM1	Unit calling?
00:49:40	CM1	Go ahead Battalion 4.
00:49:40	B4	We've located an extra…… fire fighter. Copy?
00:49:40	***	*At this point, the time stamp repeats at 00:49:00 and the following minute thereafter.*
00:49:00	SO	Accountability, Engine 26?
00:49:10	SO	Accountability, Engine 26?
00:49:10	SO	Engine 17?
00:49:20	???	*Mic click.*
00:49:20	SO	Engine 17, Accountability?

00:49:30	SO	Engine 10?
00:49:30	???	*Several mic clicks*.
00:49:30	SO	Engine 12?
00:49:30	???	*Several mic clicks.*
00:49:40	B3	Unit calling Battalion 3?
00:49:40	???	Truck fiftee….25.
00:49:40	B3	Go ahead 25.
00:49:50	???	All units calling were stepping on each other……
00:49:50	???	Go ahead 17.
00:49:50	B3	I couldn't copy 25.
00:49:50	E25	Engine 25's on th….*unintelligible*
00:50:00	***	*Tape Advanced.*
00:50:40	CM1	Command to Battalion 2.
00:50:40	???	*Unintelligible transmission*
00:50:40	CM1	Do you have enough companies in the rear.
00:50:50	???	*Mic clicks.*
00:50:50	***	*Tape Advanced.*
00:51:00	CM1	24's also coming to your location, copy?
00:51:00	CM1	Command to Engine 11. *Time stamp repeats at 00:51:00*
00:51:00	CM1	Front of the building, 26's wagon, command post.
00:51:10	E11	…….26's wagon?
00:51:10	CM1	That's correct.
00:51:20	***	*Tape Advanced.*

00:52:20	???	Go ahead back there.
00:52:30	***	*Tape Advanced.*
00:52:50	CM1	Command to Battalion 2.
00:52:50	CM1	Chief, there's fresh companies if anyone don't want in from the rear. You copy?
00:52:50	???	*Several mic clicks.*
00:53:00	CM1	Command to Battalion 2, did you copy?
00:53:10	CM1	Only, ah, allow these fresh companies back in there, the one's that I've assigned to ya'.
00:53:10	B2	Okay
00:53:20	???	*Mic click.*
00:53:20	???	*Unintelligible transmission*
00:53:30	???	*Mic click.*
00:53:30	CM1	Get 'em outside, get a good accountability check, uh, for the companies you can get back there face to face and, uh, let me know which companies.
00:53:40	???	*Mic click.*
00:53:50	CM1	Command to Battalion 4.
00:54:00	CM1	Billy, how 'bout trying to get me an accountability check, face to face with the officers from companies in the front here.
00:54:00	???	*Mic click.*
00:54:10	CD	*Tone bleedover from Channel One*
00:54:10	CM1	Command to Engine 11.
00:54:20	CM1	Command to Engine 11 and Truck 6.
00:54:30	T6	Truck 6 bye.
00:54:30	CM1	Your location?

00:54:30	T6	Bladensburg Road.
00:54:30	CM1	Bring your people to the command vehicle, Engine 26's wagon, in front of the building.
00:54:40	T6	Truck 6 copy.
00:54:40	???	*Mic click.*
00:54:40	CM1	Go ahead Engine 10.
00:54:40	???	…..just you.
00:55:00	???	*Mic click.*
00:55:00	???	…..to staging officer.
00:55:40	???	*Several mic clicks.*
00:55:50	CD	Communications to Command 1.
00:55:50	CD	Communications to Command 1.
00:56:30	???	*Mic click.*
00:56:30	CM1	Command to Communications on Channel 4.
00:56:40	CD	Come in Command.
00:56:40	CM1	Were you calling me?
00:56:50	CD	Ah, yes sir, a thirty minute duration on your incident. Also, the, um, Fire Chief is responding and requesting an update.
00:56:50	CM1	Fire is knocked down, uh, we got some hot spots. All fire fighters are evacuated the building. We do have three injured being transported now.

Appendix C Cause and Origin

The Reconstruction Committee was not responsible for determining cause and origin of the fire and did not evaluate any conclusions developed by the fire investigators.

Investigators from the Fire Department, ATF, Metropolitan Police Department, and Mr. George McDuffie P.E., (an electrical engineer who provided technical assistance) determined the cause and origin of the fire at 3146 Cherry Road, N.E.

It is the opinion of the investigators that the fire was caused by an electrical malfunction in a junction box wired to a fluorescent light fixture in the basement. This junction box was the point of origin. The investigators' conclusions are supported by physical evidence at the fire scene, the buckling in of the ceiling at the area of origin, the lack of any significant low burn pattern in the basement, and statements of the first arriving fire fighters. Investigators classified the fire as accidental in the cause and origin report.

The full cause and origin report can be obtained from the Department's Fire Prevention Division.

APPENDIX D NIST COMPUTER MODEL OF FIRE

As part of the investigation, the Department requested the assistance of the United States Department of Commerce, National Institute of Standards and Technology (NIST) to simulate the dynamics of the fire using computer simulations. The Committee requested that NIST model the fire behavior with the first floor sliding glass door fully closed (as existed during the fire) and with this door fully ventilated (as required by Department SOPs). The models demonstrated a significant change in fire conditions in the first floor area where the fire fighters were operating. The differences are illustrated in Figures 10 and 16 of the following report.

The full report follows. Additionally, a compact disc (CD) is being provided with each copy of this report. The CD contains the NIST report, as well as NIST's computer animations demonstrating the fire dynamics at this incident.

NISTIR 6510

Simulation of the Dynamics of the Fire at 3146 Cherry Road NE Washington D.C., May 30, 1999

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NIST National Institute of Standards and Technology • Technology Administration • U.S. Department of Commerce

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April 2000

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William M. Daley, Secretary

Technology Administration
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National Institute of Standards and Technology
Raymond G. Kammer, Director

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May 30, 1999

Daniel Madrzykowski
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1. ABSTRACT

This report describes the results of calculations using the NIST Fire Dynamics Simulator (FDS) that were performed to provide insight on the thermal conditions that may have occurred during the fire at 3146 Cherry Road NE, Washington D.C. on May 30, 1999. Input to the computer model was developed from 3 sources; the District of Columbia Fire and Emergency Medical Services Department Reconstruction Committee, photographs and measurements taken by NIST staff during a June 3, 1999 site visit, and from material properties taken from the FDS database.

An FDS model scenario was developed that best represented the actual building geometry, material thermal properties, and fire behavior based on information from the Reconstruction Committee and physical evidence. The results from this model scenario are provided with this report. Results from an additional model scenario, which included the opening of the sliding glass door on the first floor prior to opening of the sliding glass door in the basement, are also presented.

The FDS calculations that best represent the reported fire conditions indicate that the opening of the basement sliding glass doors provided outside air (oxygen) to a pre-heated, under ventilated fire compartment, which then developed into a post-flashover fire within 60 s. Some of the resulting fire gases flowed up the basement stairwell with high velocity and collected in a pre-heated, oxygen depleted first floor living room with limited ventilation.

Key Words: cfd models; computer graphics; fire dynamics; fire fatalities; fire fighters; fire investigations; fire models; fire simulations; ventilation

2. INTRODUCTION

Part of the mission of the Building and Fire Research Laboratory (BFRL) at the National Institute of Standards and Technology (NIST) is to conduct basic and applied fire research, including fire investigations, for the purposes of understanding fundamental fire behavior and to reduce losses from fire.

On May 30, 1999 a fire in a townhouse at 3146 Cherry Road NE, Washington D.C. claimed the lives of two District of Columbia firefighters and burned other firefighters. The District of Columbia Fire and Emergency Medical Services Department Reconstruction Committee requested the assistance of NIST for the purpose of examining the fire dynamics of this incident. NIST has performed computer simulations of the fire using the newly developed, NIST Fire Dynamics Simulator (FDS) and Smokeview, a visualization tool, to provide insight on the fire development and thermal conditions that may have existed in the townhouse during the fire. This document describes the input and the results of the NIST FDS calculations.

3. FIRE INCIDENT SUMMARY

This account of the events relevant to the fire at 3146 Cherry Road NE is based on information provided to NIST by the Reconstruction Committee. Shortly after midnight, on May 30th, 1999, occupants at 3146 Cherry Road, NE awoke to a smoke alarm that had activated in the residence. The occupants went downstairs to the first floor, found hot smoky conditions, and exited the residence via the front door, leaving the front door open. At 00:17:00 hrs, the first 911 call was received. The first engine arrived on the fire scene in approximately 6 minutes. At approximately 00:24:00, firefighters began entering the first floor via the front door. Conditions on the first floor were described as "heavy smoke," with thick black smoke coming from the doorway. Within two minutes, the front window on first floor was taken out by firefighters to provide ventilation. The window was removed from the inside, due to obstructions from security bars on the outside. Firefighters were also opening the second story windows on the front of the house. The occupants had left the second story windows on the backside of the house open.

Firefighters positioned by the sliding glass doors on the basement level reported that the basement was fully charged with smoke and that upon arrival a few flames appeared briefly. The sliding glass door was broken out in two stages. First, the right half was taken out at approximately 00:26:20. Then the left side was removed approximately 20 s later, due to obstructions from security bars. After the sliding glass door was broken out, firefighters entered the basement to conduct a search. They reported that there were a number of small fires on the floor of the basement, and that the fires began to increase in size after the sliding glass door was opened. The firefighters were ordered out of the basement as the fire rapidly increased in size. The firefighters reported that a tunnel or path was open in the smoke that enabled them to find their way out of the basement to the exterior, just prior to the basement becoming fully involved with fire. Within two minutes after entering the basement, flames from the basement extended up the backside of the townhouse. Seconds later there was a report that a firefighter was down. Firefighters that were working on the first floor reported that they felt an intense blast of heat prior to exiting the building. Two of the firefighters working on the first floor, one positioned near the open doorway to the basement stairs and the other located near the sofa on the back

wall of the townhouse, died from injuries caused by the fire. A third firefighter, positioned between the two firefighters that died, survived the fire, but sustained substantial burn injuries.

The post fire investigation determined that the fire started near an electrical fixture in the ceiling of the basement. The basement had severe fire damage throughout, indicating a well-mixed, post-flashover fire environment. The stairway from the basement to the first floor also showed signs of flame impingement on the ceiling and walls. The door at the top of the basement stairs was open during the fire and had been partially burned away. The basement stairway opened into the living room on the first floor. The living room had significant deposits of soot throughout, with limited thermal damage. Most of the paper on the gypsum board walls and ceiling remained intact and sofas in the room only showed signs of pyrolization or limited burning on the upper portions of the back cushions and top surfaces of the seat cushions. Areas in the living room away from the basement door opening had less thermal damage.

4. NIST FIRE DYNAMICS SIMULATOR (FDS)

NIST has developed a computational fluid dynamics (CFD) fire model using large eddy simulation (LES) techniques [1]. This model, called the NIST Fire Dynamics Simulator (FDS), has been demonstrated to predict the thermal conditions resulting from a compartment fire [2,3]. A CFD model requires that the room or building of interest be divided into small rectangular control volumes or computational cells. The CFD model computes the density, velocity, temperature, pressure and species concentration of the gas in each cell, based on the conservation laws of mass, momentum, and energy, to model the movement of fire gases. FDS utilizes material properties of the furnishings, walls, floors, and ceilings to simulate fire growth and spread. A complete description of the FDS model is given in reference [1].

In large scale fire tests reported in [2], FDS temperature predictions were found to be within 15 % of the measured temperatures and the FDS heat release rates were predicted to within 20 % of the measured values [2]. For relatively simple fire driven flows, such as buoyant plumes and flows through doorways, FDS predictions are within experimental uncertainties [3]. Therefore the results are presented as ranges to account for this uncertainty.

5. SMOKEVIEW

Smokeview is a visualization program that was developed to display the results of a FDS model simulation. Smokeview produces animations or snapshots of FDS results [4].

6. FDS INPUT

FDS requires as inputs the geometry of the building compartments being modeled, the computational cell size, the location of the ignition source, the ignition source, thermal properties of walls and furnishings, and the size, location, and timing of vent openings to the outside which critically influence fire growth and spread. The timing of the vent openings, Table 2, used in the simulation is based on an approximate timeline of the fire fighting activities in Table 1.

Table 1. Approximate Timeline Based on Reconstruction Committee Input

Incident Time	Actions	Simulation Time (s)
00:17:00	First call reporting fire.	
00:18:40	Second call – "fire in basement"	
00:23:00	Engine 26 on scene – "heavy smoke showing"	
00:24:00	Engine 26 and Engine 10 firefighters enter front door. Engine 17 layout.	0
00:24:50	Battalion Chief 1 directs Truck 4 to rear.	50
00:26:00	First floor front window removed.	120
00:26:20	Basement sliding glass door half out.	140
00:26:30	Firefighters from Rescue Squad 1 and Truck 4 enter basement.	150
00:26:40	Basement sliding glass door completely out.	160
00:26:50	Engine 17 firefighters in the rear, "fire small in basement"	170
00:27:20	Firefighters from Rescue Squad 1 and Truck 4 exit basement. "basement almost fully involved"	200
00:28:00	Estimated time that firefighters from Engine 26 and Engine 10 are burned on first floor	240
00:28:40	Engine 17 in rear, "fire extending to first floor"	280
00:29:00	(End of simulation time)	300

Note: Direct comparison of simulation conditions with the actual incident conditions begin at approximately 100 s of simulation time.

6.1. Geometry

The floor plans of the basement and first floor of the townhouse are shown in Figures 1 and 2. The two levels of the townhouse are modeled by a 10.0 m (32.8 ft) x 6.0 m (19.7 ft) x 5.1m (16.8 ft) tall rectangular volume. For the FDS simulation this volume was divided into 76,500 computational cells. Each cell has dimensions 0.2 m (7.9 in) x 0.2 m (7.9 in) x 0.1 m (3.9 in). The placement and size of the interior walls, doorways, and windows were taken from the dimensioned floor plans drawn by personnel of the DC Fire and EMS Department. FDS adjusts the dimensions to the nearest computational cell. Therefore the cell size is the resolution limit of vents, openings, furnishings, or walls within the model. The cell size was selected to give the best approximation of the actual dimensions of the townhouse geometry.

6.2. Vents

The basement was vented to the outside by a sliding glass door 1.7 m (5.6 ft) x 2.0 m (6.6 ft) high. For the simulation, the door vent was divided into two parts. The right half of the sliding glass door was opened at 140 s into the simulation and the left half was opened at 160 s into the simulation.

The basement was open to the first floor by a 0.8 m (2.6 ft) x 2.0 m (6.6 ft) high doorway at the top of the stairs. As in the fire incident, this door was fully open during the simulation. The front door to the first floor was also fully open during the fire and the simulation. The door was 0.9 m (3.0 ft) wide and 2.0 m (6.6 ft) high. The front window on the first floor was 1.7 m (5.6 ft) wide and 0.9 m (3.0 ft) high with a 0.9 m (3.0 ft) sill height. This window was opened at 120 s into the simulation. The other opening to the outside from the first floor was a sliding glass door at the rear of the house. This sliding glass door was located directly above the basement sliding glass door. This door remained closed and intact during the entire simulation.

The stairway opening from the first floor to the second floor was 0.9 m (3.0 ft) wide and 3.4 m (11.2 ft) deep. This vent remained open during the entire simulation due to the windows in the front and rear of the second floor being open. The exact position of the open rear windows on the second floor is not known; therefore the stairway opening was used to represent the assumed area of the open second floor windows. The details of the second floor were not modeled in this simulation.

At the time of the fire there was no wind, therefore for the simulation it was assumed that openings to the exterior were at ambient pressure.

Table 2. Time of Ventilation Events for FDS Simulation

	Time of Event			
Vent	Initial Conditions	120 s	140 s	160 s
Front Door	Open	Open	Open	Open
Front Window	Closed	Open	Open	Open
First half of basement sliding glass door	Closed	Closed	Open	Open
Second half of basement sliding glass door	Closed	Closed	Closed	Open
Stairway door between basement & first floor	Open	Open	Open	Open
Stairway opening between first and second floor	Open	Open	Open	Open

6.3. Material Properties

The ceiling of the basement was composed of wood fiber ceiling tiles attached to wood furring strips, which were attached to the bottom of open wood trusses. Given the multiple surfaces in the ceiling floor system, several different approximations were used for the ignition temperature (320 °C to 390 °C) and the heat release rate per unit area (200 kW/m^2 to 400 kW/m^2). The assumptions used for the basement ceiling materials are shown in Table 3.

The walls of the townhouse were painted gypsum board, assumed 12 mm (0.5 in) thick. The sub-flooring was plywood and was covered with carpeting in the living room area of the house. The ceiling on the first floor was also painted gypsum board. Several large furniture items were included in the scenario; a bookcase, bar, desk and sofa in the basement as well as a door and sofa on the first floor. The model inputs utilized for each material type are given below in Table 3 and the size of the furnishings are given in Table 4.

Table 3. Thermal Properties Data [1,4]

Material	Thickness (m)	Ignition Temperature (° C)	Heat Release Rate (kW/m^2)	Thermal Conductivity (W/m K)	Thermal Diffusivity (m^2/s)
Basement Ceiling	0.025	330	300	0.14	8.3E-8
Gypsum Board	0.013	400	100	0.48	4.1E-7
Pine	0.013	390	200	0.14	8.3E-8
Upholstered Cushion	0.10	370	700	0.20	1.2E-6

Table 4. Furniture Materials and Size

Item	Material	Size
Bookcase	Pine	2 m wide, 0.3 m deep, 2.4 m high
Bar	Pine	2 m wide, 1 m deep, 1.2 m high
Desk	Pine	1.5 m wide, 0.75 m deep, 0.75 m high
Sofa	Upholstered cushion	2 m wide, 0.75 m deep, 0.9 m high
First floor door to basement	Pine	0.85 m wide, 0.05 m thick, 2.05 m high

7. MODEL RESULTS

7.1. Heat Release Rate of Fire

For the FDS simulation, a small fire with a specified heat release rate was used to start the fire growth. In this case a 30 kW source, 0.2 m (8 in) square, located 0.1 m (4 in) below the basement ceiling, served as the FDS fire source. Starting the simulation with a flaming ignition enabled fire development to be modeled within a reasonable computational time. The actual fire may have taken several hours to develop to the flaming stage. As the simulated fire spreads from the ignition source, first along the ceiling and then to other items in the basement, it develops quickly, but depletes its supply of oxygen for combustion. This rapidly decreases the heat release rate or energy that is being produced by the fire. This produced a pre-heated oxygen depleted condition similar to that described by firefighters upon their arrival at the Cherry Road fire.

A time history of the fire's heat release rate, as predicted by FDS, is shown in Figure 3. Annotations on the figure highlight the venting activities and the resulting impact on the development of the fire. As shown in the graph, venting the basement results in a heat release rate increase of more than 10,000 kW or 10 MW within approximately one minute.

7.2. Fire Simulation 1 - Reported Fire Events - Temperature, Velocity, and Oxygen Concentration Predictions

Figure 4 shows a perspective view of the three-dimensional townhouse simulation. The basement level and first floor levels are shown with furnishings. Figure 5 provides a side view of the townhouse. The grid depicting the computational cell size is also shown. The simulation results in Figures 6 through 15 have had all of the walls and other obstructions removed to provide a clear view. The horizontal clear area is the floor between the basement and the first floor level. The results are shown as a "slice" or a "plane" with a color bar that represents the corresponding numerical quantities. The results presented are taken at 200 s of the simulation. At that time, the heat release rate and the thermal conditions have reached a quasi-steady state condition. These figures provide a snapshot of the calculated fire environment conditions that the firefighters may have been exposed to at approximately 00:27:20.

Figures 6 and 7 show the plane of temperatures and velocities that align with the center of the first sliding glass panel that was taken out on the basement level. This plane is located 3.4 m (11.2 ft) into the townhouse from the front of Figures 6 and 7. The upper portions of the figures represent the kitchen area on the left and the living room area on the right. In Figure 6, temperatures in excess of 820 °C (1500 °F) are shown throughout the basement, with the exception of the cool air entering the basement through the open sliding glass doorway at the right of the figure. Similar hot gas temperature conditions exist in the living room area. The maximum temperatures in the kitchen are in the 500 °C to 660 °C (932 °F to 1220 °F) range. The velocity vector plot in Figure 7 provides gas flow direction as well as the approximate velocities. The dominant flows in this plane are the fresh air entering the open basement doorway at approximately 4 m/s (10 mph) and the hot gas flow exiting the upper portion of the doorway at approximately 7 m/s (16 mph).

Figures 8 and 9 show the plane of temperatures and velocities aligned with the center of the front door and the hallway, 1.4 m (4.6 ft) into the townhouse from the front of the figure. The upper portions of the figures represent the hallway and living room areas and the lower portions represent the open area in the basement on the left and an area in the storage room (cooler temperatures) on the right. Predicted temperatures in the open area of the basement are in excess of 820 °C (1500 °F), from the ceiling to the floor level in some areas. On the first floor, hot gases can be seen along the ceiling, cooling as the gases move from the back of the townhouse to the front. Outside air at approximately 20 °C (68 °F) can be seen entering the front door from the left. The gas moving into the townhouse, along the floor, from the front door increases from 180 °C to 260 °C (350 °F to 500°F) by the time it reaches the back of the townhouse (right side of figure).

The flow direction of the gases can be seen in Figure 9. On the first floor, outside air is entering the lower portion of the open front doorway in the range of 4 m/s to 5.6 m/s (10 mph to 12.5 mph). Hot gases are exiting the upper portion of the same doorway with maximum velocities in the range of 5.6 m/s to 6.4 m/s (12.5 mph to 14 mph). Toward the rear of the townhouse on the first floor, hot gas flows from the basement doorway in excess of 8 m/s (18 mph).

Figures 10 and 11 show the plane of temperatures and velocities that align with the center of the basement stairway, 0.4 m (1.3 ft) into the townhouse from the front of the figure. The temperature plot shows hot gases in excess of 820 °C (1500 °F) filling the stairwell, flowing out into the living room, across the living room ceiling and down the back wall. The clear-notched area on the right side is the outline of the sofa. Between the doorway to the basement and the sofa, the temperatures approximately 0.5 m (1.6 ft) above the floor, to floor level are in the range of 180 °C to 260 °C (350 °F to 500 °F). The areas near the floor where the temperatures were the highest, were near the doorway to the stairs and near the sofa on the back wall. These locations correspond to the areas where the two firefighter fatalities were believed to have occurred.

Figure 11 shows the effect of the stairway on channeling the hot gases up to the first floor. The speed at which the fire gases flow up the stairway and across the ceiling of the first floor exceed 8 m/s (18 mph). At these velocities, the travel time for the gases from the front of the basement (left side of figure) to the back of the first floor (right side of figure) is less than 2 s. Between the doorway to the basement and the sofa, the velocities from approximately 0.5 m (1.6 ft) above the floor to floor level are in the range of 0 m/s to 1.6 m/s (0 mph to 3.5 mph). The right side of the basement shown is the storage area under the stairs.

Figures 12 and 13 show oxygen concentrations. Even though the previous temperature plots have indicted temperatures that are consistent with flaming conditions, that cannot be assumed. In addition to fuel and heat, oxygen is needed for flaming combustion to be present. These figures provide some insight on the amount of oxygen that was available in different parts of the townhouse. The upper, hot gas layers in the basement and on the first floor in the living room area contained less than 6 % oxygen (all gas percents are on a volumetric basis). These are areas where the fire may not have had enough oxygen to produce visible flames.

Figure 12 shows the slice aligned with the center of the right side of the basement sliding glass door. Again the outside air can be seen entering the basement through the open doorway from the lower right

side of the plot. A thin layer of 16 % to 19 % oxygen can be seen close to the floor on the first floor. This airflow is coming from the front door.

Figure 13 gives a view of the oxygen conditions along the centerline of the basement stairway. The hot gases that are flowing up from the basement are oxygen depleted, ranging from 14 % to 16 % oxygen at the base of the stairs and decreasing to 6 % to 11 % oxygen at the top of the stairs. The high velocity hot gas layer that flows across the living room ceiling and down the back wall of the townhouse (right side of figure) contains less than 6 % oxygen. Given the oxygen depleted conditions, little if any flaming combustion would be taking place in the living room area at this time. The right portion of the basement represents the storage area under the steps.

Figures 14 and 15 show the velocity flow patterns near the ceiling of the first floor and at approximately 1.6 m (5.2 ft) above the floor, respectively. The velocities in front of the doorway to the basement are in the range of 8 m/s (18 mph). Figure 15 shows the circulation of gases from the doorway to the basement, across the back wall of the townhouse and then out the front window. Velocities flowing through the house in this U– shaped pattern range from 0.80 m/s to 4.8 m/s (2 mph to 11 mph) at this level. These velocities coupled with the high gas temperatures will increase the rate of convective heat transfer to people or objects in that area.

7.3. Fire Simulation 2 - Opening of the Sliding Glass Door on the First Floor Prior to the Opening of the Sliding Glass Door in the Basement - Temperature and Velocity Predictions

At the request of the Reconstruction Committee, a second fire simulation was conducted. All of the input to the second simulation was the same as the first, with one exception; the sliding glass door in the living room on the first floor of the house was opened at 120 s into the simulation. In the basement, results of the second simulation were similar to the first. On the first floor the hot gases were not as confined as in simulation 1 resulting in cooler temperatures near the floor.

Figure 16 shows the plane of temperatures that align with the center of the basement stairway, 0.4 m (1.3 ft) into the townhouse from the front of the figure. The temperature plot shows hot gases in excess of 820 °C (1500 °F) filling the stairwell, flowing out into the living room, across the living room ceiling and down the back wall. The clear-notched area on the right side is the outline of a sofa. This hot gas ceiling jet is similar to the hot gas conditions shown in Figure 10. The significant difference is in the region close to the floor. Between the doorway to the basement and the sofa, the temperatures from approximately 0.6 m (2 ft) above the floor, to floor level are in the range of 20 °C to 100 °C (68 °F to 212 °F). This is at least an 80 °C (176 °F) temperature reduction in this area with the open sliding glass doorway on the first floor.

Figure 17 shows the velocity field at the ceiling of the first floor. Comparing this to Figure 14 shows that the velocity range is similar, approximately 8.5 m/s (19 mph) vs. 8 m/s (18 mph). The flow pattern at the ceiling is wider for the second simulation because part of the flow stream is going out of the open sliding glass doorway.

8. SUMMARY

The NIST FDS computer simulation predicted fire conditions and events that correlate well with information from the Reconstruction Committee and the damage, or lack of damage, to portions of the townhouse. The model simulated a fire that started in a combustible ceiling assembly in the basement of the townhouse. The fire grew and spread across the ceiling and into other fuels in the basement until it exhausted the available oxygen supply in the basement. While the fire's heat release rate was being constrained by the lack of oxygen, firefighters made entry on the first floor of the building. Venting of the windows on the front of the townhouse on the first and second floors had no noticeable immediate impact on the fire development.

However, the venting of the sliding glass doors in the basement increased the heat release rate of the fire very rapidly. The FDS calculation indicates that the opening of the basement sliding glass doors provided outside air (oxygen) to a pre-heated, under-ventilated fire compartment, which then developed into a post-flashover fire within 60 s. The fire filling the basement forced high temperature gases (approximately 820 °C (1500 °F)) up the basement stairwell at velocities in excess of 8 m/s (18 mph). The high velocity gas stream flowed into a pre-heated, oxygen depleted first floor living room. The FDS predictions show the hot gas flow moving across the living room ceiling and banking down the back wall of the townhouse. Between the doorway to the basement and the sofa on the back wall of the townhouse, the temperatures from approximately 0.5 m (1.6 ft) above the floor, to floor level are in the range of 180 °C to 260 °C (350 °F to 500 °F). These thermal conditions developed within seconds of the rapid fire growth in the basement.

Even though the upper layer hot gases have predicted temperatures that are consistent with flaming conditions, that cannot be assumed. In addition to fuel and heat, oxygen is needed for flaming combustion to be present. The upper, hot gas layers in the basement and on the first floor in the living room area contained less than 6 % oxygen when the basement fire was fully developed and extending up the stairs. These are areas, particularly the living room, where the fire may not have had enough oxygen to produce visible flames.

A second NIST FDS simulation was performed. The only difference was the opening of the sliding glass door on the first floor at 120 s of the simulation or 20 s prior to opening the basement sliding glass door. The most significant difference in the predictions is in the region close to the living room floor. Between the doorway to the basement and the sofa, the temperatures from approximately 0.6 m (2 ft) above the floor, to floor level are in the range of 20 °C to 100 °C (68 °F to 212 °F). This is at least an 80 °C (176 °F) temperature reduction in this area with the open sliding glass doorway on the first floor as compared to the first simulation with the door closed.

9. REFERENCES

1. McGrattan, Kevin B., Baum, Howard R., Rehm, Ronald G., Hamins, Anthony, Forney, Glenn P., Fire Dynamics Simulator – Technical Reference Guide, National Institute of Standards and Technology, Gaithersburg, MD., NISTIR 6467, January 2000.
2. McGrattan, Kevin B., Hamins, Anthony, and Stroup, David, Sprinkler, Smoke & Heat Vent, Draft Curtain Interaction – Large Scale Experiments and Model Development, National Institute of Standards and Technology, Gaithersburg, MD., NISTIR 6196-1, September 1998.
3. McGrattan, Kevin B., Baum, Howard R., Rehm, Ronald G., Large Eddy Simulations of Smoke Movement, *Fire Safety Journal*, vol 30 (1998), p 161-178.
4. McGrattan, Kevin B., Forney, Glenn P., Fire Dynamics Simulator – User's Manual, National Institute of Standards and Technology, Gaithersburg, MD., NISTIR 6469, January 2000.

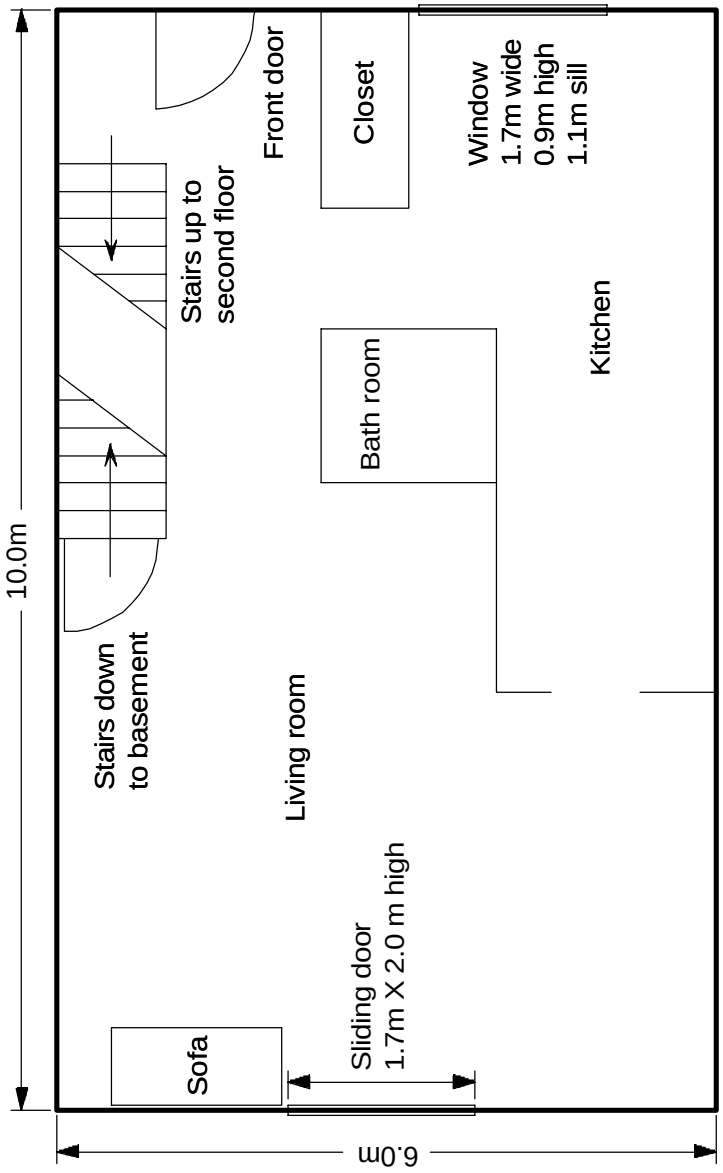

Figure 1. Plan view of first floor.

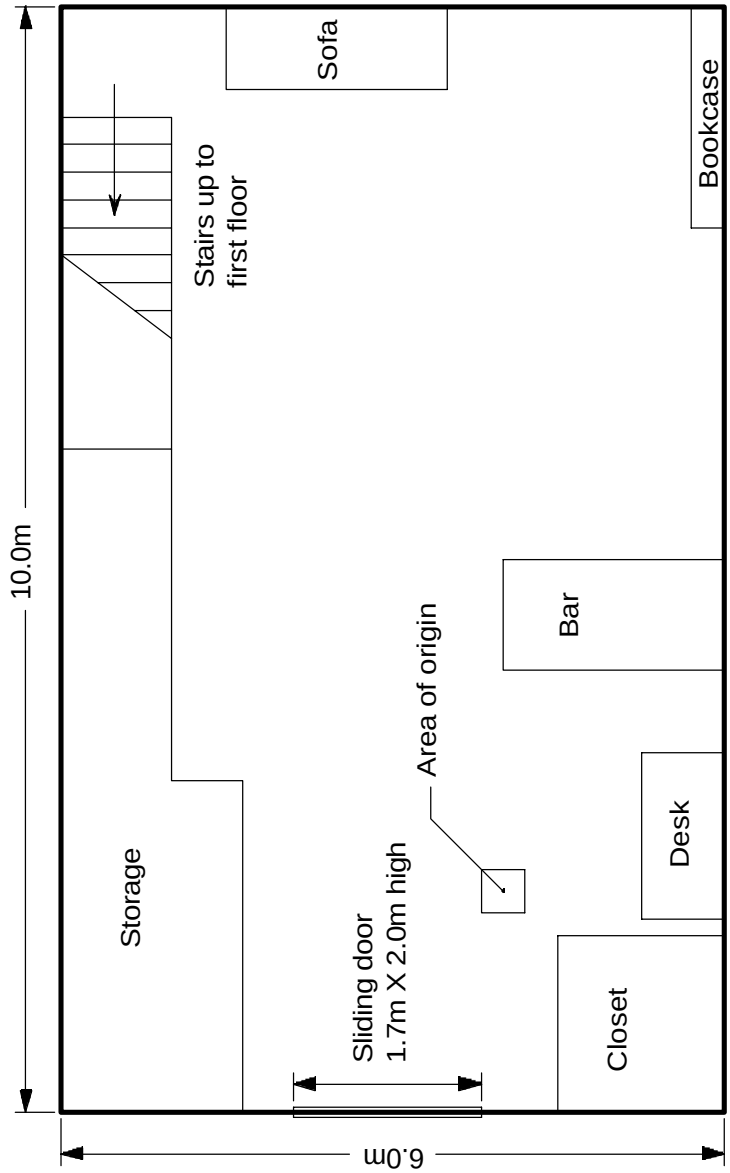

Figure 2. Plan view of basement.

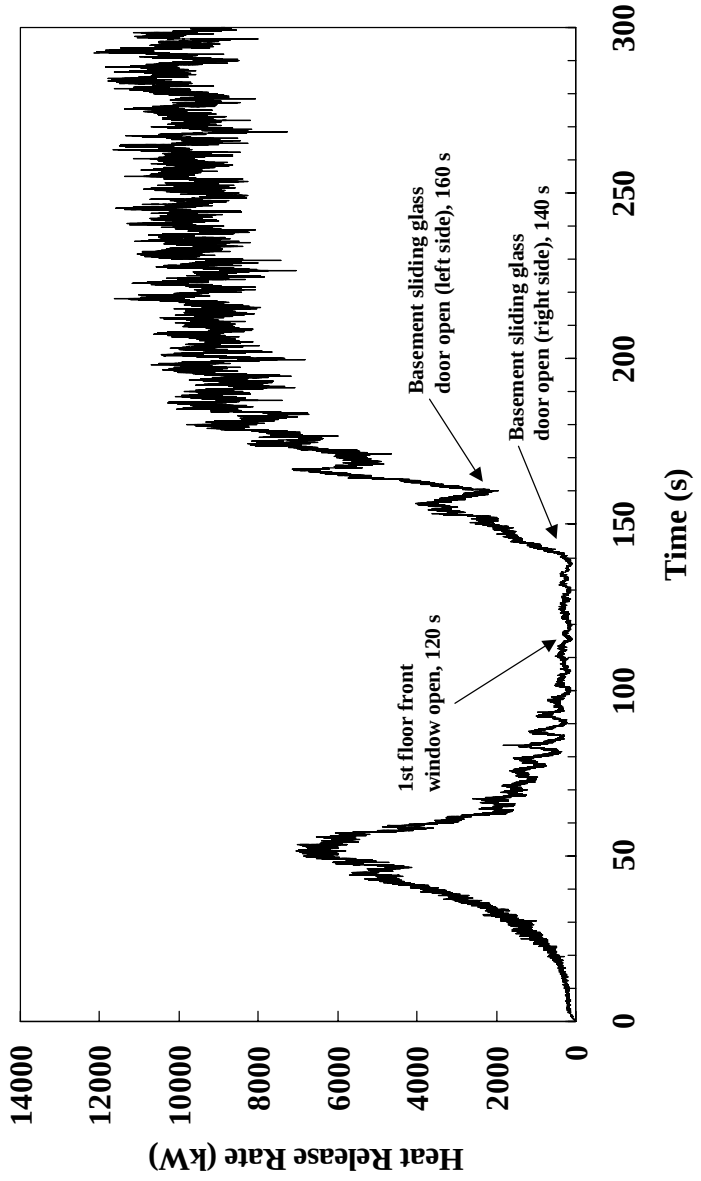

Figure 3. Heat release rate from FDS simulation.

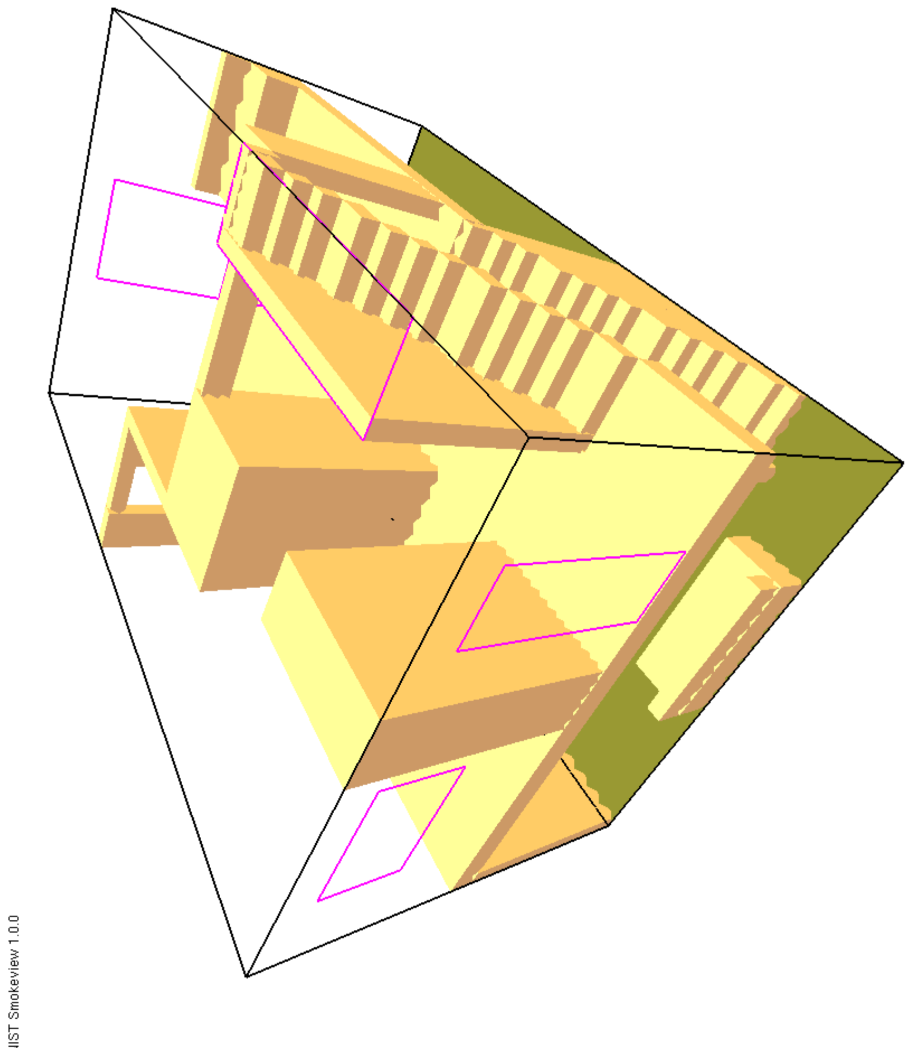

Figure 4. Perspective view of townhouse.

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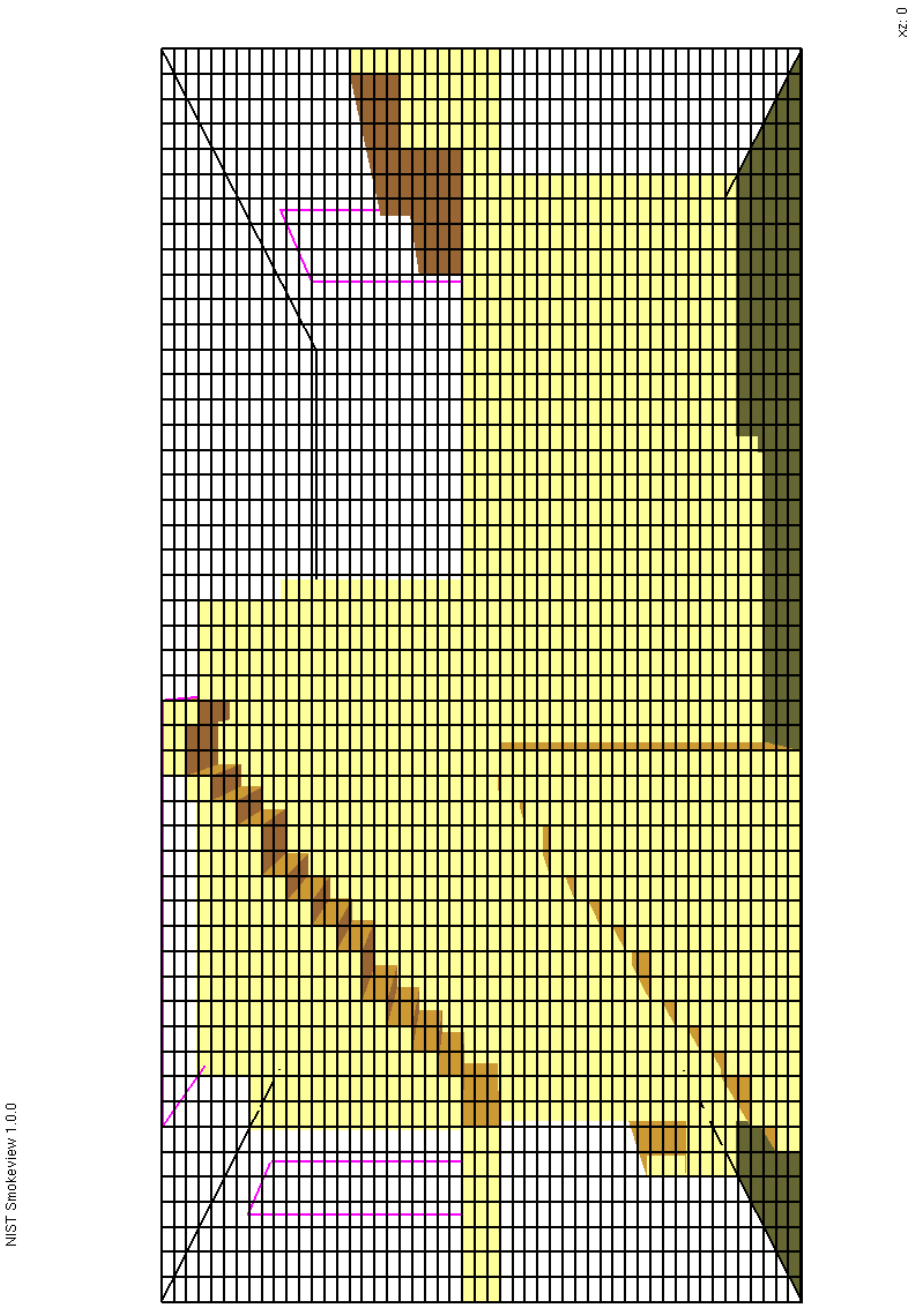

Figure 5. Grid layout in the xz plane.

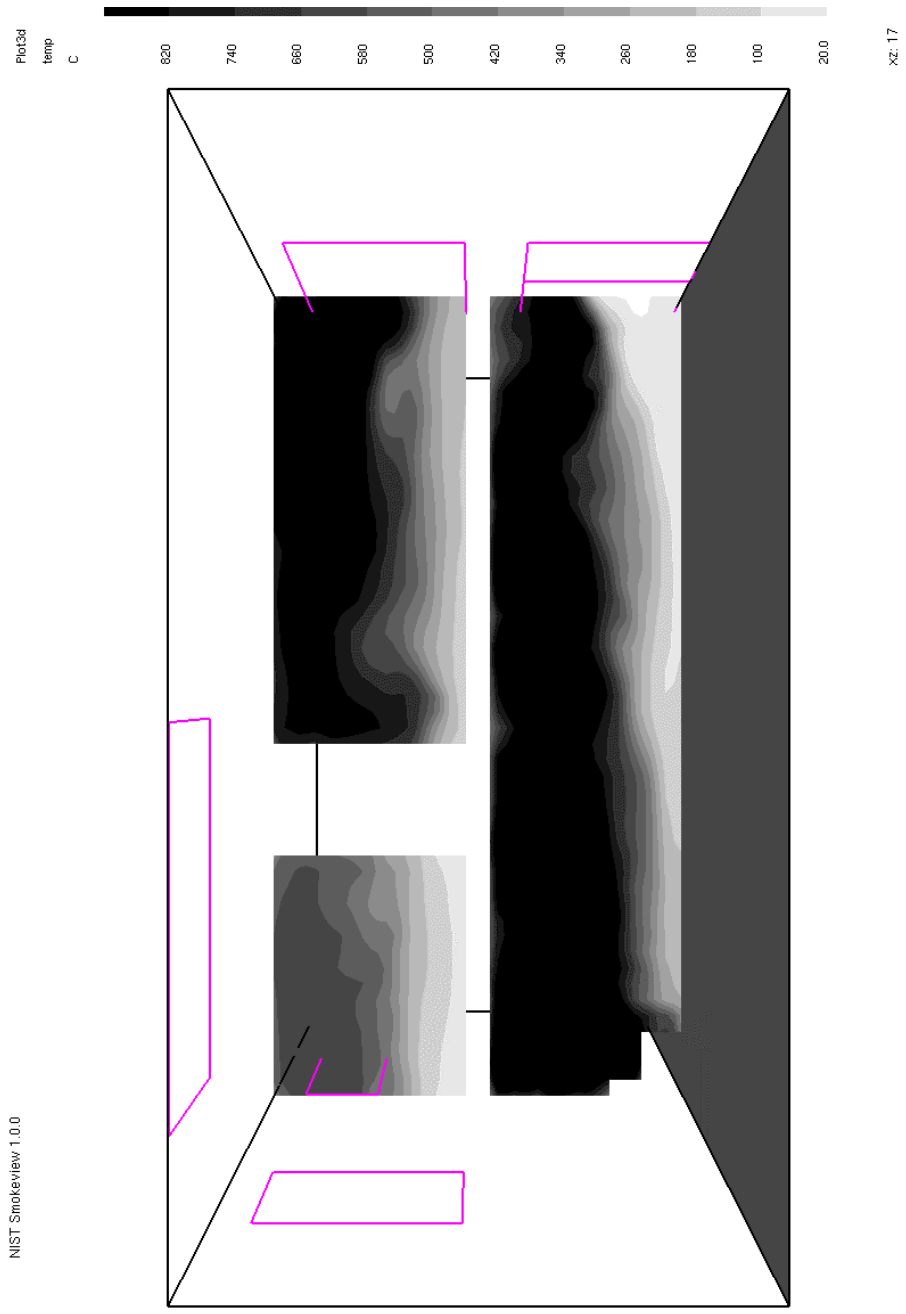

Figure 6. Temperature slice along basement sliding glass door, at 200 s of simulation.

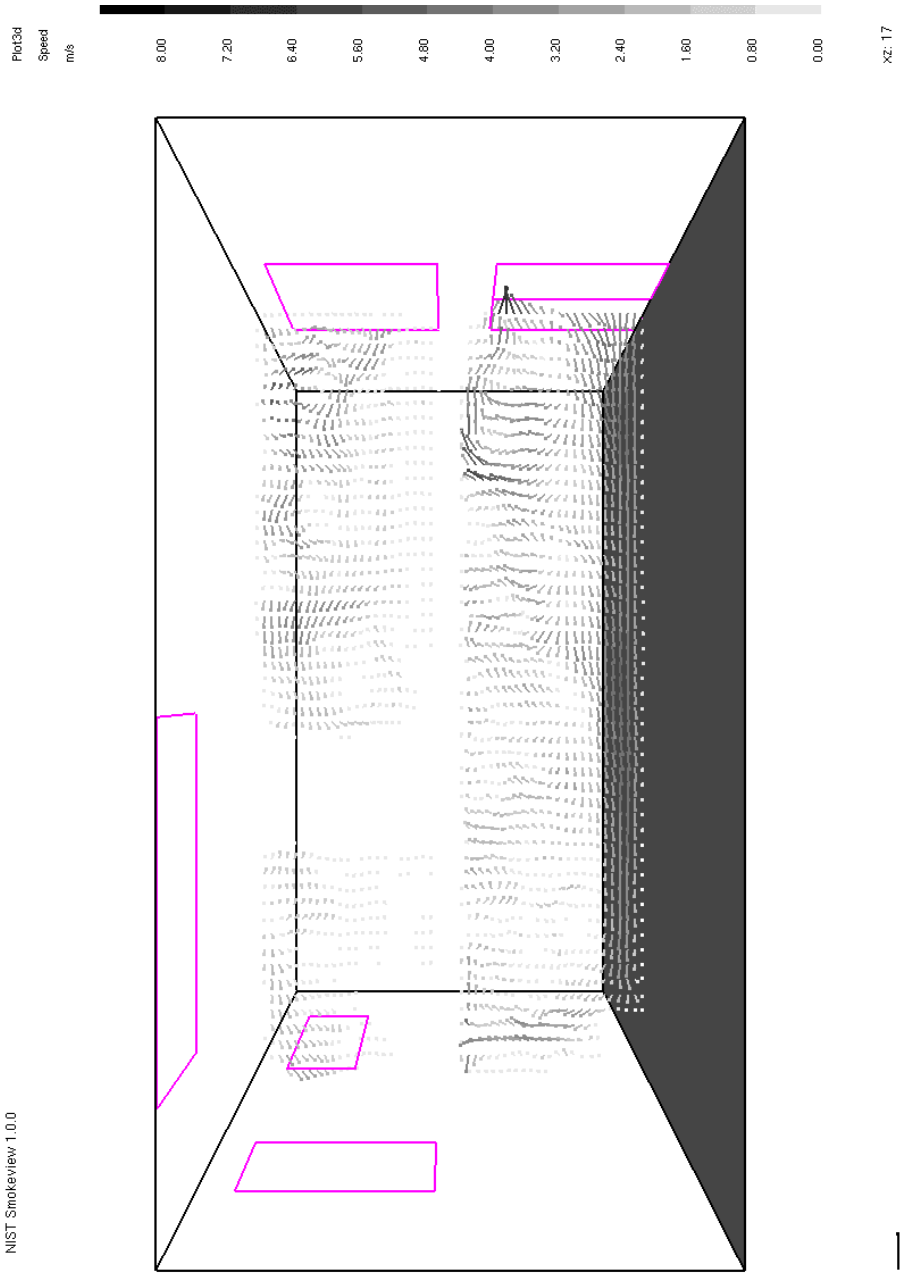

Figure 7. Vector representation of velocity slice along basement sliding glass door, at 200 s of simulation.

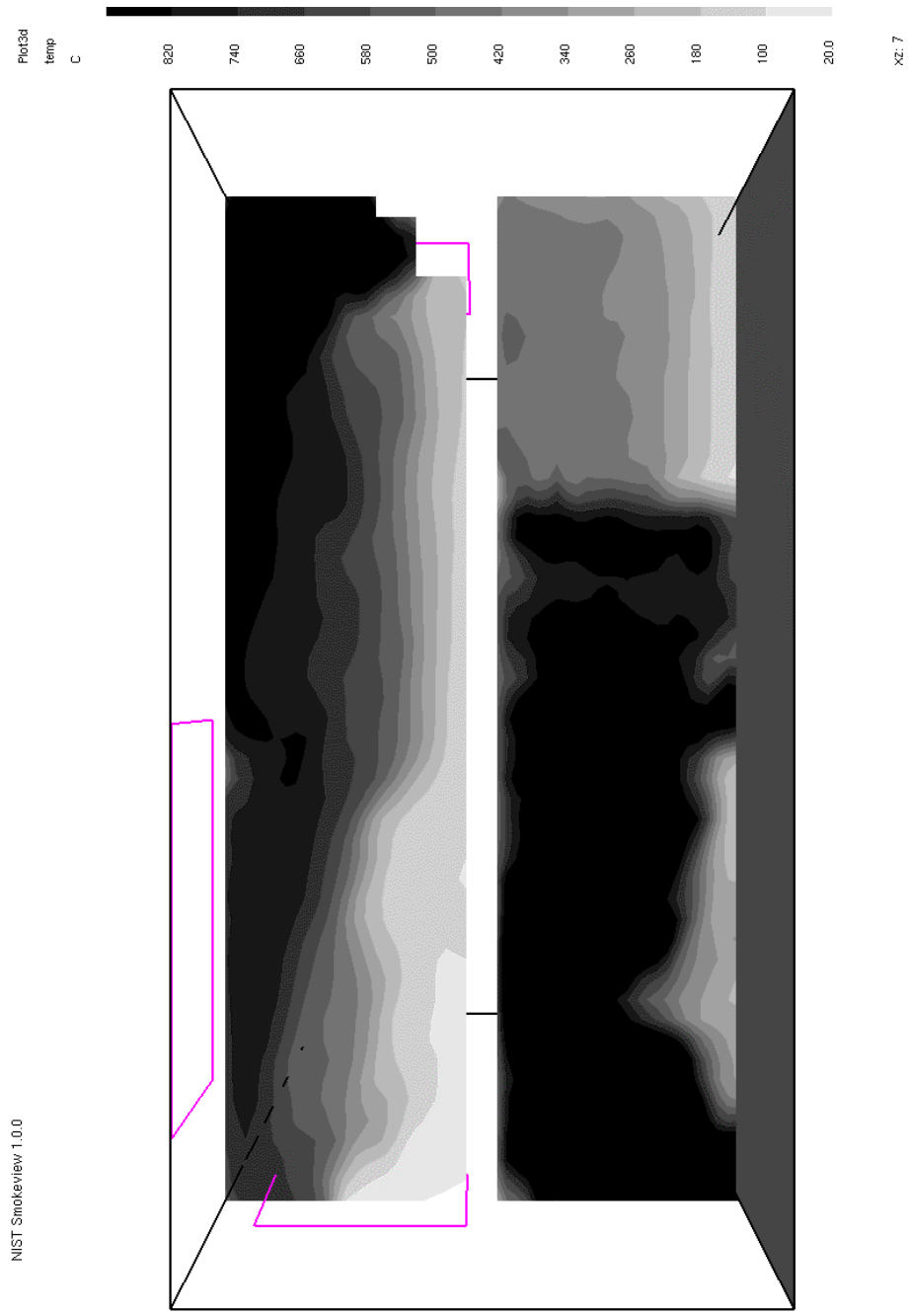

Figure 8. Temperature slice along front door, at 200 s of simulation.

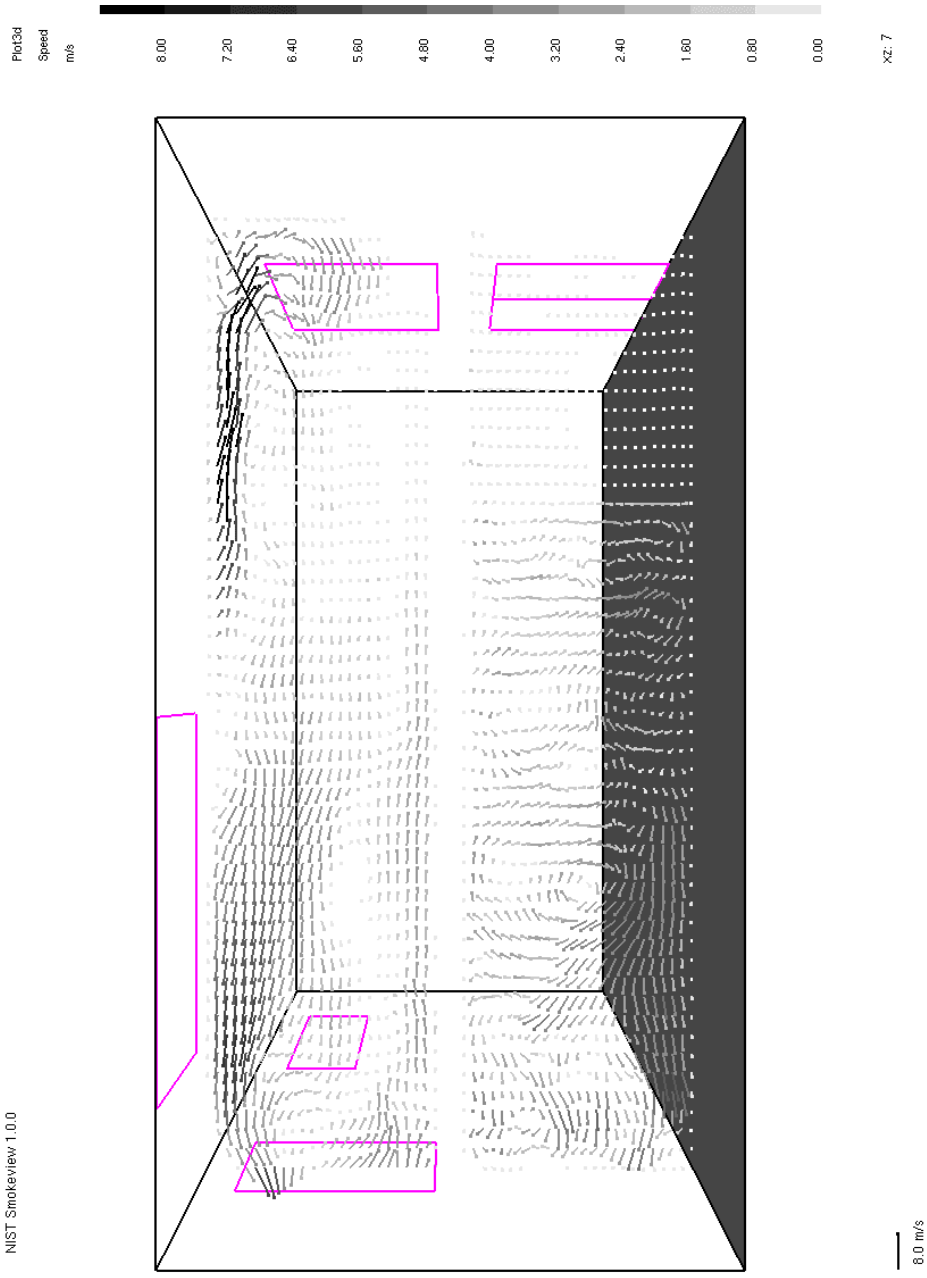

Figure 9. Vector representation of velocity slice along front door, at 200 s of simulation.

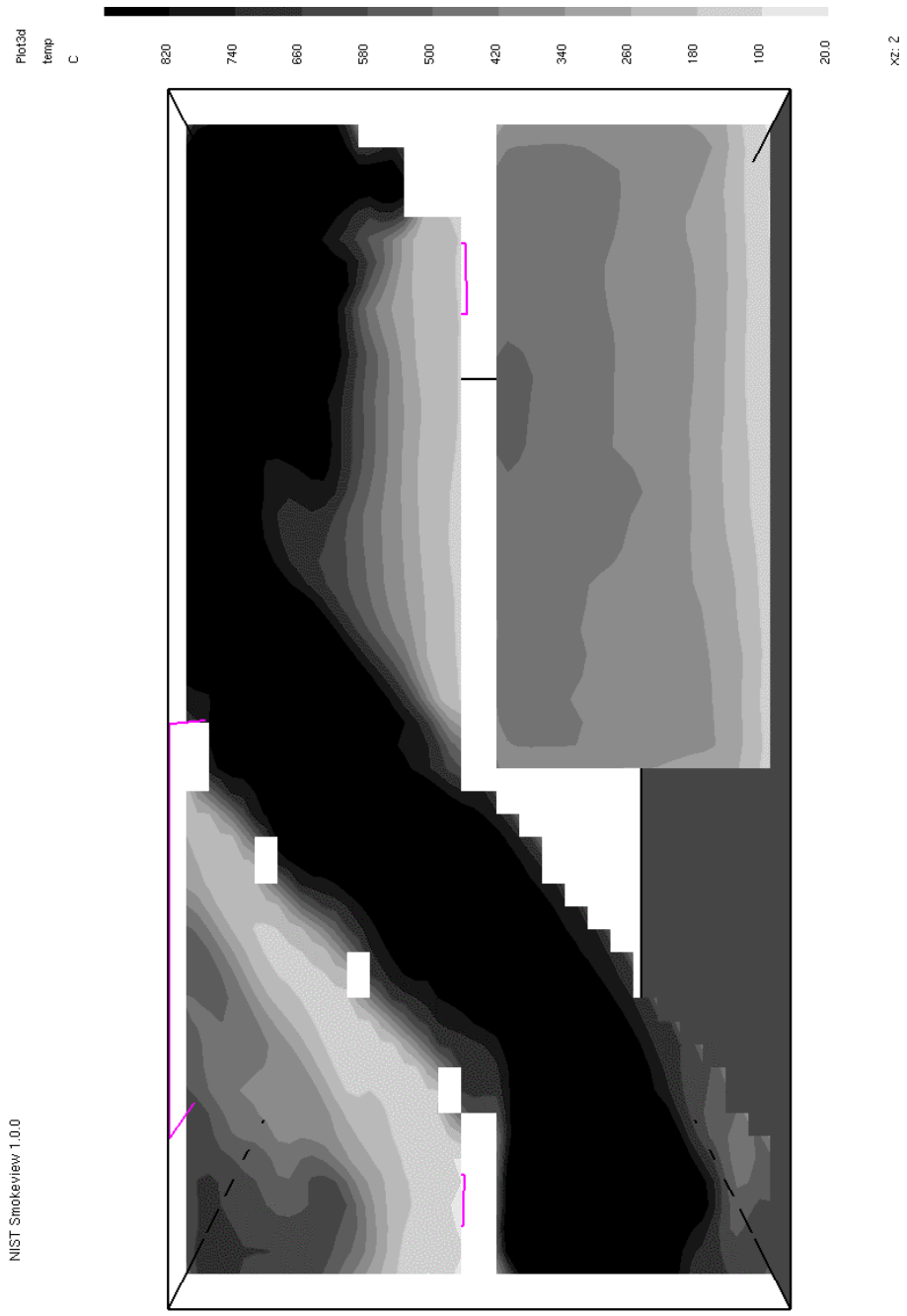

Figure 10. Temperature slice along centerline of stairway, at 200 s of simulation.

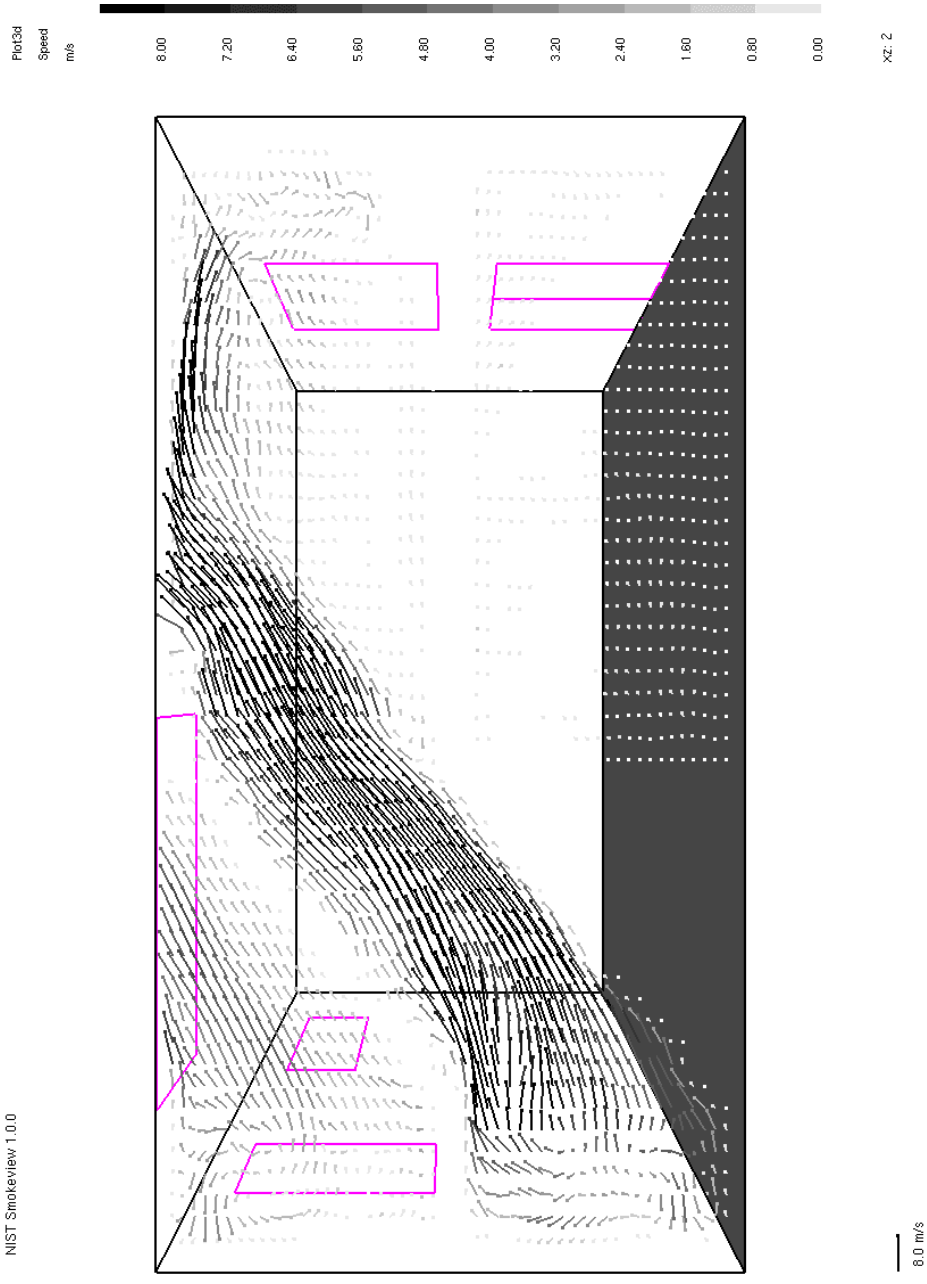

Figure 11. Vector representation of velocity along centerline of stairway, at 200 s of simulation.

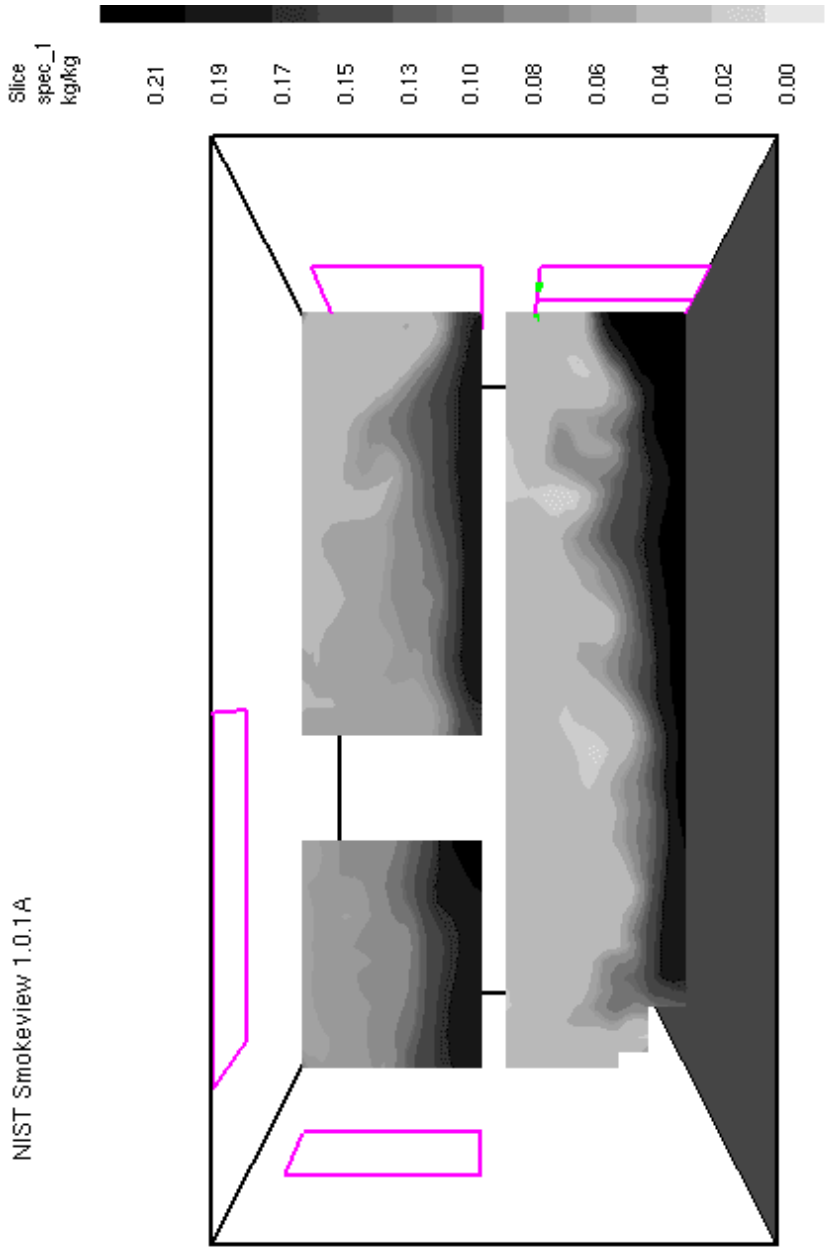

Figure 12. Percent oxygen along basement sliding glass door, at 200 s of simulation.

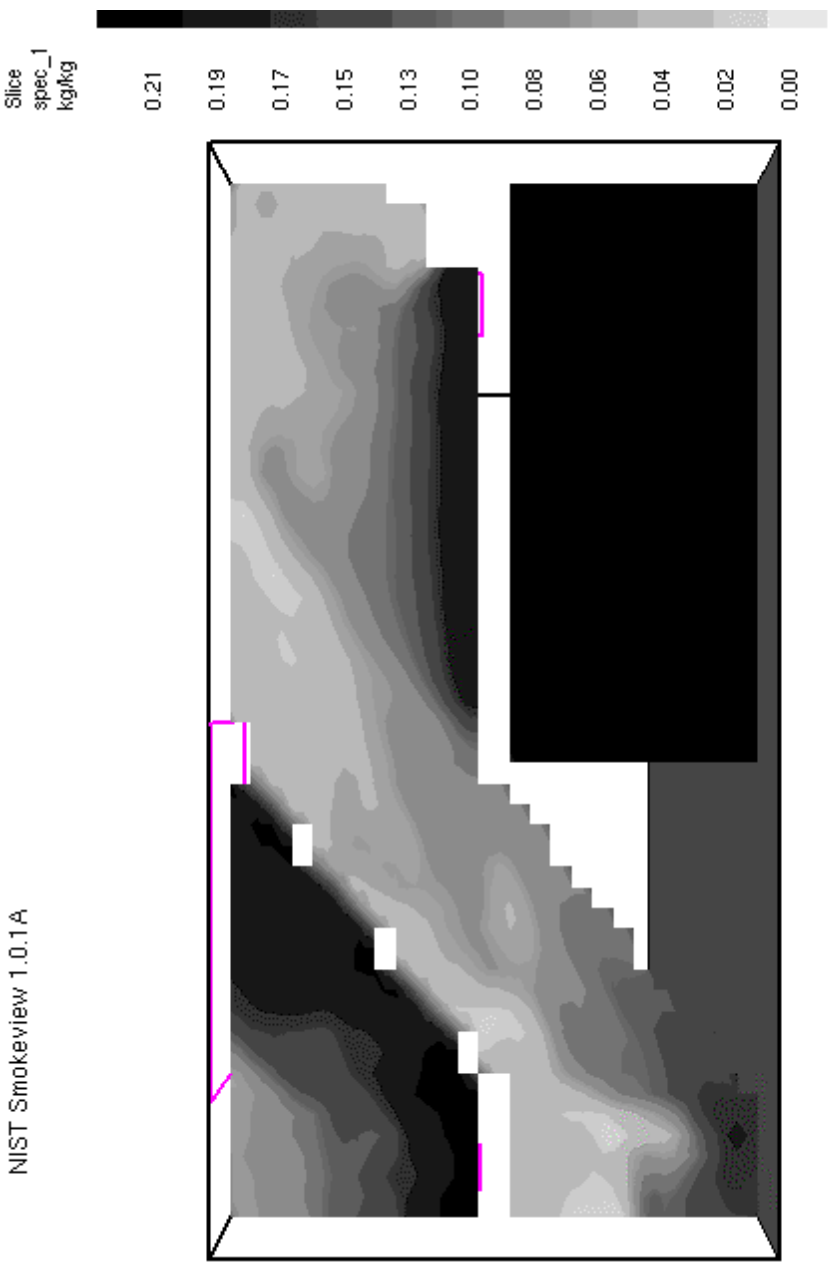

Figure 13. Percent oxygen along centerline of stairway, at 200 s of simulation.

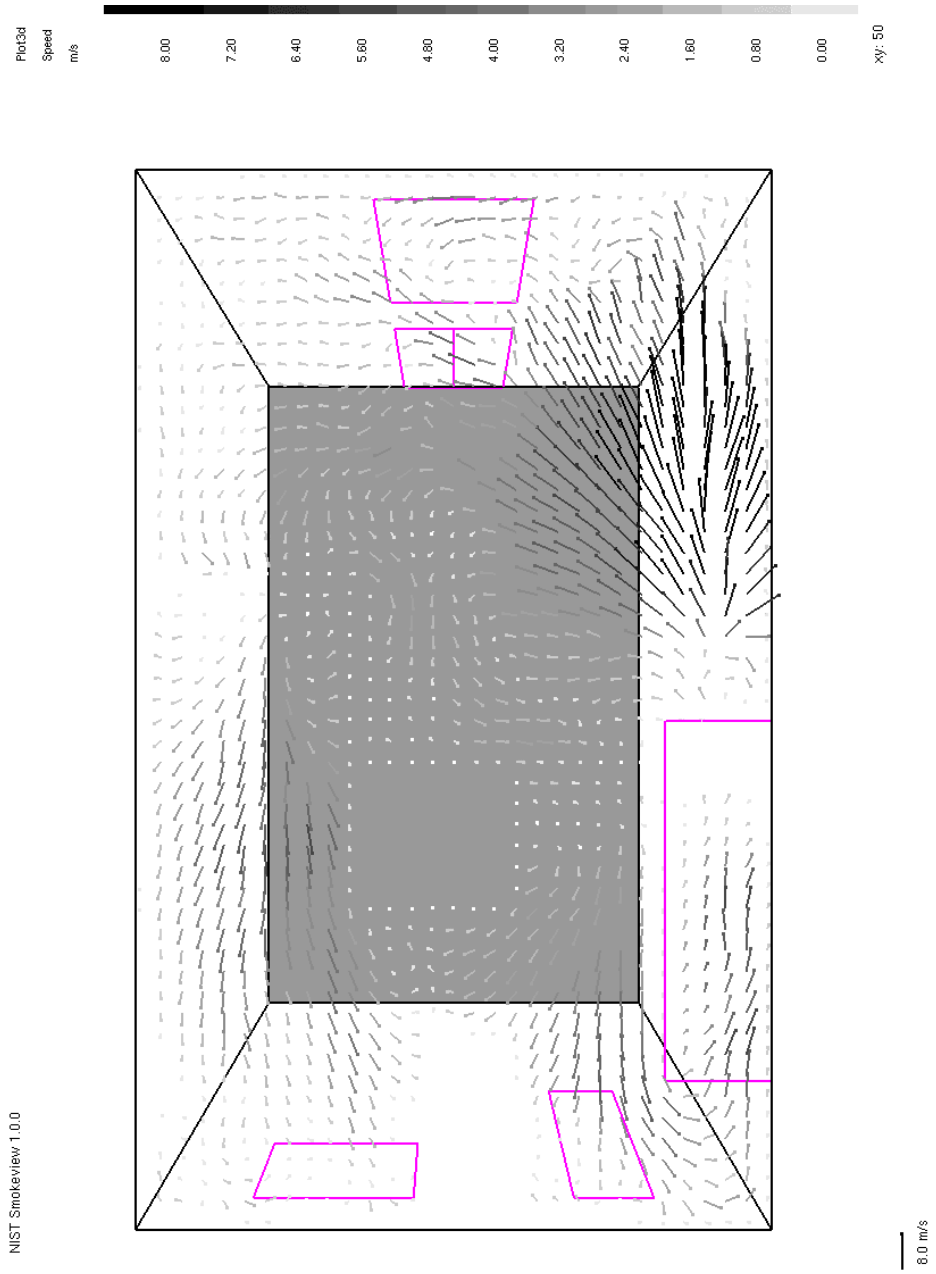

Figure 14. Vector representation of velocity at the ceiling, at 200 s of simulation.

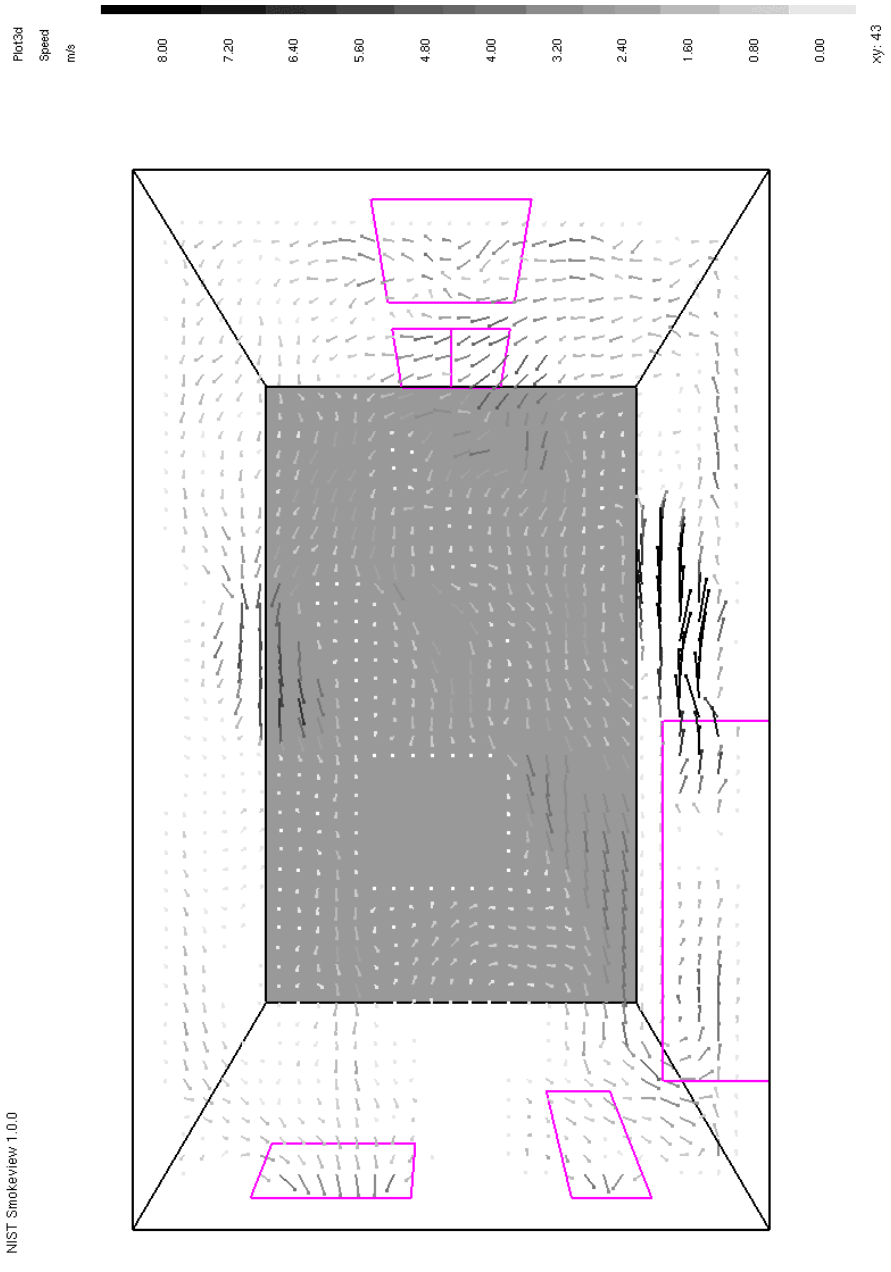

Figure 15. Vector representation of velocity at first floor window, 1.6 m off the floor, at 200 s of simulation.

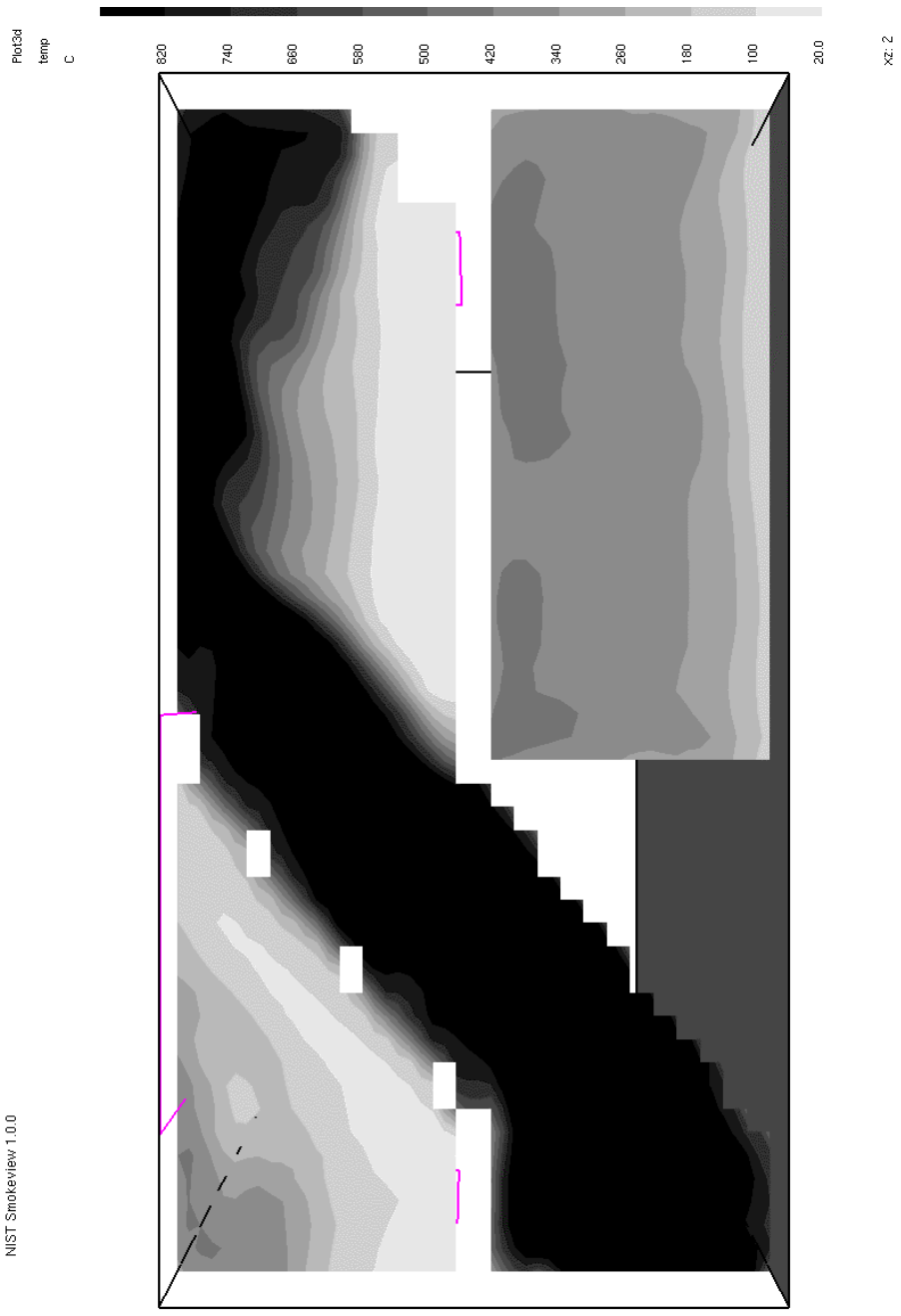

Figure 16. Temperature slice along centerline of stairway with first floor sliding glass door vented, at 200 s of simulation.

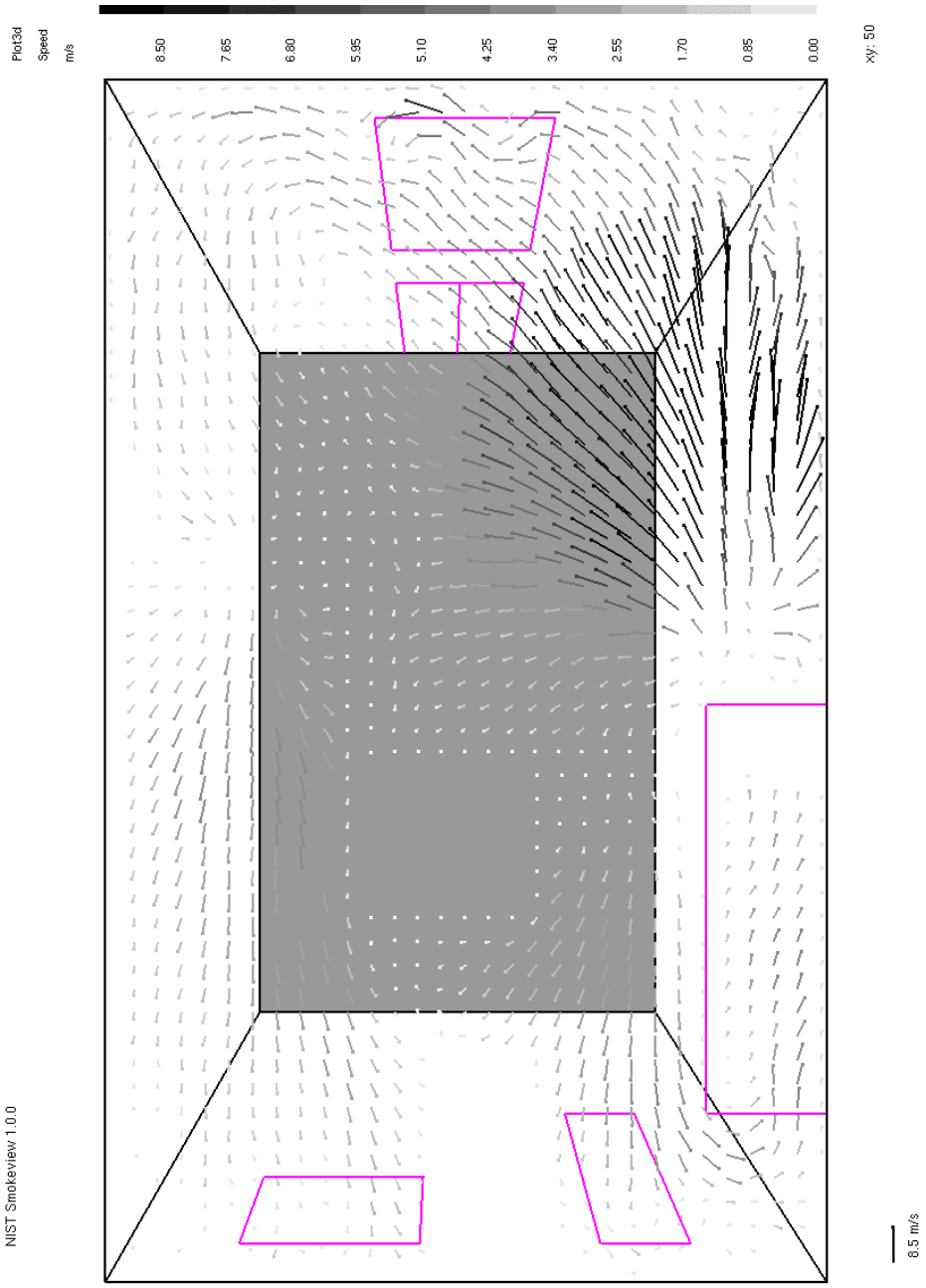

Figure 17. Vector representation of velocity at the ceiling with first floor sliding glass door vented, at 200 s of simulation.

Appendix E Fire Department Systems and Procedures

Incident Command System

Accountability System

Standard Operating Procedures

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7. General Engine Company Operations
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9. Terrorist Attacks (not included)
10. Hazardous Materials Standard Operating Procedures (not included)
11. Mass Casualty Incident Procedures (not included)

Note: This appendix contains the relevant sections of the Washington DC Fire and EMS Department's Standard Operating Procedures, Incident Command System and Personnel Accountability System as they currently exist. The items that are omitted from this report are noted above.

SECTION I - INCIDENT COMMAND SYSTEM

Introduction

The Incident Command System (ICS) is a tool used to manage emergency incidents. The District of Columbia Fire and Emergency Medical Services Department's ICS is designed to effectively manage and control resources at the scene of emergencies, without interfering with the operation. The Standard Operating Procedures (SOP) will not change for any unit unless directed by the Incident Commander. The ICS has several primary features that make it an effective management system for the fire service. Understanding the concepts of the ICS will allow for smooth deployment of the system at the scene of emergencies.

The Primary Features of the Incident Command System

Accountability - Utilizing the ICS increases accountability for every member of the Fire and EMS Department on the scene of an incident. The Personnel Accountability System (Section II of this manual) will be in place on every incident and the Incident Commander will have primary responsible for its implementation and use.

Adaptability - The ICS is used on all emergency situations. i.e., fires, haz-mat, mass casualty incidents, etc.

Flexibility - ICS can be adapted to both simple and complex operations. The ICS is easily expandable. The Incident Commander activates only those elements of the ICS necessary to effectively manage the emergency.

Span of Control - Span of control refers to the number of persons that can be effectively supervised by one (1) individual. When the span of control is exceeded, operational areas can be compromised. When an Incident Commander's span of control exceeds five (5), it is time to consider dividing the situation into manageable segments and delegating specific responsibilities. The Incident Commander can divide an incident by using sectors, branches, groups and/or divisions. This will allow the Incident Commander to concentrate on managing the overall incident.

Unity of Command - This management principle allows for accountability. Orders shall be given to employees by their officers/supervisors, and officers/supervisors shall receive their orders from the Incident Commander, branch leaders, group, division or sector leaders. To violate this principle causes severe disruption to an operation and unnecessarily endangers lives and property. All on-scene personnel must clearly understand and perform their function as defined in the Standard Operating Procedures.

The Five (5) Major Functions of the Incident Command System

The five major functions of the Incident Command System are:

1. Command
2. Operational Section
3. Logistics Section
4. Planning
5. Finance Section

Command

The Incident Commander is in charge of the incident. The Incident commander assigns and controls the four other functions. The Incident Commander retains the responsibility of each of the other four functions until he delegates them. Staff positions can be assigned to assist the Incident Commander, i.e. Public Information Officer, Safety Officer, and Liaison Officer. The first due battalion chief will normally be considered the Incident Commander until relieved by a senior officer.

Incident Commander Function Responsibilities: Command _____ (Battalion Number) is in charge of the incident.

1. Establishes a command post.
2. Retains responsibility of each of the four functional positions until delegated.
3. Assigns and controls the four other functions.
4. Assesses the situation and/or obtains a briefing from the prior Incident Commander.
5. Determines the incident objectives and strategy.
6. Establishes immediate priorities.
7. Ensures adequate safety measures are in place.
8. Coordinates activities for all Command and Senior Staff.
9. Assigns Command Staff when needed (Public Information Officer, Safety Officer, Liaison Officer).
10. Authorizes release of information to the news media.
11. Approves the request for additional resources or for the release of resources.
12. Gives status reports to Communications Division.
13. Assigns someone to produce a diagram of the incident site.

The Incident Staff Positions

Public Information Officer Responsibilities

1. Responsible for establishing and maintaining media contact.
2. Determines from the Incident Commander if there are any limits on information release.
3. Obtains Incident Commanders approval of media releases.

4. Examples of information provided to the media would be:

    a. Time of dispatch
    b. Conditions found upon arrival
    c. Number of deaths and/or injuries
    d. Time the incident is brought under control or possible time it will take to bring the incident under control.
    e. Resources committed to controlling the incident (personnel and equipment).
    f. Extent of damage and possible loss from the incident.

Safety Officer Responsibilities

1. Assumes command of Safety Sector, when established.
2. Assesses hazardous situations.
3. Attempts to remedy hazardous situations.
4. Has authority to suspend or correct immediate unsafe operations.
5. Notifies the Incident Commander of actions, as necessary.

Liaison Officer Responsibilities

1. Serves as a contact point for Agency Representatives.
2. Maintains a list of assisting and cooperating agencies and Agency Representatives.
3. Monitors incident operations to identify current or potential inter-organization problems.
4. Provides current resource status, including limitations and capability of assisting resources.
5. Keep agencies supporting the operation aware of incident status.

Operations Section Function Responsibilities

1. Manages the incident's tactical operations.
2. Implements plans and strategies to safely resolve the incident.
3. Utilizes resources as necessary to handle the incident (i.e. companies, sectors, or branches, including EMS resources).
4. Sectors all incidents unless units are level 1 staged.
5. Determines need and requests additional resources (through the Incident Commander).
6. Establishes and maintains the Rehabilitation Sector, if necessary. Directs EMS Supervisor and others to establish and maintain the Rehabilitation Sector. (See Rehab - Section III - 50)
7. Establishes and utilizes Staging Area, if necessary.

Logistics Section Function Responsibilities

1. Provides facilities, services and material in support of the incident (i.e. fuel, foam, cave-in equipment, etc.).

2. Assigns work locations and work tasks to Logistic Section personnel.
3. Identifies service and support requirements for planned and expected operations.
4. Advises Command on the current service and support capabilities.
5. Provides input and review into communication plans (coordinates and assigns radio equipment and channels on multi jurisdiction/agency incidents).

Planning Section Function Responsibilities

1. Collects, evaluates, and disseminates incident information.
2. Gathers and analyzes incident data.
3. Develops alternative tactical operation plans.
4. Conducts planning meetings.
5. Prepares action plans.
6. Prepares the incident demobilization plan.
7. Utilizes four (4) primary assistance units:
   a. Resources Unit - Compiles the arrival, location, and availability of resources.
   b. Situation Unit - Collects, processes, organizes information.
   c. Documentation Unit - Maintains accurate incident files.
   d. Technical Specialists - People or groups who possess special technical expertise related to incident.
8. Determines the need for specialized resources in support of the incident.
9. Establishes special information collection activities as necessary, (i.e. weather, environmental, toxic materials, etc.).
10. Provide periodic predictions on incident potential.

Finance Section Function Responsibilities

1. Establishes Time Unit - Keeps personnel/equipment time records.
2. Establishes Procurement Unit - Expedites vendor supplies.
3. Creates Claim Unit - Handles injury, death, civilian claims.
4. Creates Cost Unit - Provides cost estimates/summaries of the incident, cost effectiveness analysis.
5. Manage all financial aspects of the incident.
6. Develop an operating plan to fill supply and support needs.

Sectors - Companies Operating on Fires and Other Emergencies

The Incident Commander will establish sectors comprised of companies on all fire responses and other emergency responses, unless Level 1 staging is utilized.

The Incident Commander shall assign chief officers or company officers as sector and/or branch leaders when needed. Units assigned to these responsibilities shall retain and use their company number and/or sector leader assignment when calling the Incident Commander who will be called Operations.

Example: "Operations to Truck 6 and Truck 9. Truck 6 you are the Vent Leader and you have Truck 9 under you." Truck 6 is now the Vent Leader. This is a responsibility, and when Truck 6 calls the Incident Commander the transmission wording would be, "Truck 6 Vent to Operations," and when the Incident Commander calls Vent the transmission wording would be, "Operations to Vent." The sectors Vent, Attack, Rescue, etc., are responsibilities to be performed, and will be the leaders' radio designations following their unit number. In cases where a company or sector leader needs to contact another sector leader, they would call that sector by name, i.e. "Engine 1 Attack to Vent," the response from the Vent Leader would be, Truck 6 Vent, Bye."

It is imperative that companies perform their duties as described in the Standard Operating Procedures, unless directed by, or with notification to and approval of the Incident Commander.

Example: "Engine 11 to Operations, we are involved in ladder rescues, side 2, second floor, quadrant A. We can not cover the exposures".

"Rescue to Operations, primary search complete and negative, we are located on the second floor quadrant B, and even."

In addition, Operations can assign companies to sectors or tasks, based on the needs of the incident. For example, Operations can assign companies to a Roof Sector, Safety Sector, or Evacuation Sector if there is a need to perform such tasks.

In all cases, Operations will be responsible to assign companies to sectors and will designate all sector and branch leaders.

Incident Commanders should be aware that some Departments, as well as some Federal Agencies that might be called upon to assist us on major incidents, do not use the terminology of Sectors in their Incident Operations System. The terms Groups and Divisions are used instead of Sectors. The term Group is utilized to designate functional responsibilities such as Attack, Vent, etc. and the term Division is utilized to designate geographical responsibility such as side 1 or the 5th floor.

Sector Accountability

Operations will provide sector leaders with the companies assigned to their sectors.

When Command assigns companies to sectors, company officers report to sector leaders.

Sector leaders must be accountable for companies assigned to their sectors.

Sector Leader Responsibilities

Battalion Chiefs and Company Officers assigned as sector leaders will have the authority required to manage their sectors.

Responsibilities of sector leaders

1. Monitor work progress.
2. Redirect activities within the sector.
3. Coordinate sector activities with other related activities.
4. Monitor safety and welfare of sector personnel.
5. Request additional resources as needed.
6. Communicate with Operations or other sector leaders as necessary. Responsible for accountability report when requested by Operations. (Give progress reports every 5 minutes during interior structure fire fighting and every 10 minutes on other emergencies.)
7. Reallocate resources within the sector.

Communications

Individual companies will communicate with the Incident Commander until they are assigned to a sector or branch. When sectors are assigned by Operations, the sector leaders will communicate with Operations using their sector assignment. Communication within sectors should be face to face. Radio use in sectors should be a last resort.

Status reports from sector leaders to Operations should occur at approximately five (5) minute intervals for interior structural fire fighting and at approximately ten (10) minute intervals on other incidents or when:

1. Information is requested by Operations.
2. Assigned objectives or tasks are completed.
3. Assigned objectives or tasks can not be completed, along with the reason why.
4. Request for additional resources.
5. There is a safety problem.

Any company or sector officer can communicate with the Incident Commander when an emergency exists or it is necessary to communicate significant information. These will be considered priority messages.

Priority messages will be directed to Operations, using the word "PRIORITY" before the message.

> *Example: "PRIORITY! ENGINE 6 TO OPERATIONS! A LARGE CRACK HAS DEVELOPED IN THE EXTERIOR WALL ON SIDE 4, QUADRANT D OF THE FIRE BUILDING." "OPERATIONS TO ENGINE 6, YOUR PRIORITY MESSAGE WAS RECEIVED."*

At this time, Operations would notify Engine 6 and other companies of the steps being taken to deal with the problem. All companies should remain off the radio while the priority message is being handled. Operations will notify companies when normal radio traffic can resume.

Mayday Policy

Fireground communications can become very hectic and confusing when a fire fighter is in **DISTRESS**, becomes **LOST**, or **TRAPPED.** The term "MAYDAY" is the international radio distress signal and shall only be used when a member is in trouble and needs immediate assistance. All radio traffic shall cease except EMERGENCY TRAFFIC. Upon notification by the Incident Commander, Communications shall designate that channel as the Fire Fighter Rescue Channel and immediately switch all units, with the exception of units assigned to the Fire Fighter Rescue Sector, to another radio channel. These units will remain on the alternate channel until the Incident Commander advises Communications that the "MAYDAY" is cleared, and units may resume normal radio operation.

Example of radio traffic:

*E-99: "E-99 to Operations, **MAYDAY, MAYDAY**!"*
Operations: "Operations copies E-99's MAYDAY, what is your location and nature of Mayday?"
E-99: "E-99 to Operations, we are on the 2nd floor, Quadrant C. One fire fighter is trapped by a collapsed roof joist. We need lifting tools."
Operations: "Operations copies. E-99 is located on the 2nd floor, Quadrant C with a trapped fire fighter and you need lifting tools. Help is on the way. Operations to all units, a MAYDAY has been declared, emergency radio traffic only!"
Operations: "Operations is establishing a Fire Fighter Rescue Sector and assigning (list units) to the sector with (name of Co./BFC) as Sector Leader."
Operations: "Command___ to Communications, a MAYDAY has been declared at (give the address) by E-99. They have a fire fighter trapped by a roof joist on the 2nd floor Quadrant C. Fire Fighter Rescue Sector has been established on channel _____ consisting of _____ (list units assigned to the sector). Switch all other units to another radio channel."

Communication Division shall repeat Command's last message on all channels and the Vocalarm.

Communications: "Communication to all units, a MAYDAY has been declared at (give the address) by E-99. They have a fire fighter trapped by a roof joist on the 2nd floor Quadrant C. Fire Fighter Rescue Sector has been established on channel_____. All units on the fireground not assigned to the Fire Fighter Rescue Sector switch to channel _____."

NOTE: It is important to understand the difference between MAYDAY, PRIORITY, and 10-33 messages.

MAYDAY: Is used to notify the Incident Commander (and/or other units on the scene) of reported trapped or missing fire fighter(s) or crew.

PRIORITY: Is used to transmit an urgent message to Operations, which does NOT involve trapped or missing personnel.

10-33: Is a code message to inform Communications that immediate police assistance is needed.

Communications Division

The transmittal of a MAYDAY from any unit shall require Communications Division to operate in an emergency mode.

1. The Watch Commander shall direct the radio operators to transmit the MAYDAY information on all channels and the Vocalarm.

2. The Watch Commander shall strictly enforce radio discipline and limit department radio traffic to EMERGENCY TRAFFIC ONLY. Units shall go "Off the air" by telephone during the emergency.

3. NO ACTIVITY SHALL TAKE PRECEDENCE OVER ASSISTING THE INCIDENT COMMANDER IN RESOLVING THE MAYDAY!

Command Procedures

Command is defined as: "taking charge of an emergency incident, in a positive manner, developing strategy, identifying goals, and making decisions to implement specific actions that will bring the emergency under control."

Every incident requires a strong command role and an organized system for Command to function.

During emergency operations, not knowing the role of the Incident Commander creates more confusion than any other management problem.

Lack of a strong centralized command coupled with unreported deviation from standard operating procedures (SOP's) will cause the incident to quickly deteriorate into an unsafe, out of control, and chaotic situation which cannot be tolerated.

In order to develop a plan or strategy for the incident the Incident Commander must be aware of the available resources and have a complete overview of the incident, and receive information from the companies, sectors or branches.

Effective Command requires:

1. Receiving a complete size-up report from the first arriving companies in the front and rear. (Sides 1 and 3, respectively.)
   a. Company (type and number) on the scene.
   b. Side 1,2,3, or 4
   c. Height of building in stories
   d. Type of building and occupancy
   e. Type of construction
   f. Fire location with quadrant A,B,C,D, or E
   g. Any life hazards or other necessary information, (Layout information for engine companies, building dimensions if remarkable).
2. Having adequate resources to develop a plan. (Resources are the personnel and equipment that are responding on the emergency.)
3. Developing the strategy.
4. Directing companies when necessary to utilize specific tactics. (Something outside their normal SOP for the type of emergency.)
5. Maintaining control and coordination of companies until they are assigned to sectors.

For example, if the first arriving unit reports fire in the basement of a two-story rowhouse, the responding battalion chief could direct the second and fourth due engines to a rear attack position. However, if the size-up report is incomplete, such as fire showing, no plan can be started by either the battalion chief or other responding units. It is critical that the Incident Commander gets a fast and accurate size-up report. Preliminary reports from companies are also critical to the Incident Commander for deployment of companies. i.e., "Engine 11 to Operations, the fire is in apartment 920 and the ninth floor is full of smoke". This information assists the battalion chief in directing of companies for tasks of search and rescue, exposure protection, fire attack and extinguishment, ventilation, salvage and overhaul.

Establishing Command

Command at the scene of an emergency commences with the first officer to reach the scene, and passes to the first arriving officer of superior rank.

There will be no formal transfer of command between company officers and battalion chiefs, with one (1) exception: When a company officer is placed in command of a working incident by a battalion chief due to the battalion chief having a prolonged response.
Battalion chiefs must assign a company officer to the position of Incident Commander when it appears their arrival on the scene will be delayed, and that a delay in establishing command would cause safety problems for companies on the scene.

If this should occur the officer of the company given the responsibility of Incident Commander will use the procedures for establishing command of the incident and will use the word Command followed by

the number of the battalion chief who placed the officer in command. For example; Truck 6 was placed in command, because of a prolonged response by Battalion Four. When Truck 6 arrives on the scene they would notify Communications. The transmission to Communications would be, "Truck 6 is on the scene and will be establishing Command 4 on 14th Street in front of the incident." When the battalion chief arrives and assumes command the name of the Command would remain the same. Truck 6's radio designation would be "Operations" until relieved by the responding battalion chief.

The battalion chief will normally be considered the Incident Commander.

COMMAND POST - the Command Post should be in a position to provide the Incident Commander with an overall view of the emergency. The Command Post should have a view of the front entrance and two sides of the building if possible. The Command Post is the unit or location where the Incident Commander is located.

Prior to leaving the Command Post, the Incident Commander must first have the Command Post staffed with another officer. The Incident Commander is still in command and must maintain radio contact with the Command Post.

A tactical work sheet will be maintained in the Command Post. It will be used to record the incident information and allows the Incident Commander to account for companies. The tactical work sheet will be part of the process when the incident command is transferred to a Senior Department Official.

The Command Post should meet the following requirements in the following order:

1. Be situated in a position to observe the incident.

2. Have minimum communications capabilities of a mobile radio with all fire channels, telephone, and at least two (2) portable radios with chargers.

3. Have sufficient lighting to allow for writing and recording information.

4. Provide adequate isolation to allow for decision making.

On an expanding incident, a stationary Command Post allows for smoother implementation of the Operations Section, Logistics Section, Planning Section, and Finance Section. The stationary Command Post improves coordination with the Medical Sector.

Transfer of Command

Transferring Command from a battalion chief to a Senior Department Official can only be accomplished through a face to face meeting. Some items to be discussed in the face to face meeting would be:

1. Fire location, extent and condition. Success of control efforts.

2. Deployment and assignment of operating companies and recommendation of needs for additional resources.

3. Tactical work sheet will be explained and turned over to the new Incident Commander.

4. Communications will be notified when the transfer of command process is completed. When the transfer of command is completed the person assuming command would become Command __ (battalion number of initial battalion chief). The initial battalion chief will normally be retained as Operations.

   Example: The Deputy Fire Chief - FFD assumes command of a fire from Battalion 4. The Deputy Fire Chief - FFD would now have the radio designation of Command 4. Battalion 4 would retain the designation of Operations, unless he/she is reassigned to other duties.

5. Communications will announce the transfer of command on all radio channels being utilized.

Working Fire Dispatch

On working structure fires the Incident Commander should request a Working Fire Dispatch (WFD). The response will consist of a Battalion Fire Chief, Engine Company, Truck Company, Air Unit, Fire Investigator and EMS Supervisor and a BLS Unit. Unless otherwise notified, personnel responding on a Working Fire Dispatch should report to the Command Post upon arrival.

The **engine company** dispatched on a WFD shall serve primarily as the Safety Company but will be assigned other duties as the Incident Commander deems necessary. This engine company will:

1. Select an independent hydrant and lay a supply line to the front of the building.
2. The technician will remain with the apparatus, all other members will report to the Command Post with full personal protective gear including SCBA, forcible entry tools, and their Unit Designator Card with all PAT's attached. **(Note: The technician will keep his PAT with him at this time.)**
3. Remain at the Command Post until given an assignment by the Incident Commander.

Calling for Assistance

When calling for assistance on an emergency, the Incident Commander should establish a **Staging Area**. The Staging Area will be used to control and manage units in an escalating emergency. The Staging Area should be somewhat remote from the operational area of the incident, and large enough to allow fire apparatus and EMS units sufficient room to maneuver for gaining access and departing the incident scene. **Only one (1) Task Force Alarm may be requested per incident. Special Unit Task Forces, such as Haz-Mat, Cave-in, Foam Unit, etc. will not be governed by this limit, and may be requested as needed.**

Staging

The three (3) levels of staging are defined as follows:

Level I Staging:

The first and second due engines will layout and report to their assigned positions unless directed otherwise by the Incident Commander ("Operations"). The first due truck will take a position in front of the building. These companies will follow Standard Operating Procedures. The second due truck will position their apparatus to cover the rear position. The personnel of the 2nd due truck company will monitor both Fire channel 1 and the fireground channel, and remain on their apparatus unless directed otherwise by the Incident Commander ("Operations"). The 3rd and 4th due engine companies will slow their response and position their apparatus at the hydrant of, or complete the split lay of the 1st and 2nd due engine companies respectively. The personnel of these companies will remain on their apparatus, and monitor both Fire Channel 1 and the Fireground Channel for assignment and/or progress reports from other units or the Incident Commander ("Operations"). Rescue squads will slow their response and position their apparatus to allow for proper positioning should normal SOP's be resumed. The personnel assigned to the rescue squad will remain with their apparatus and monitor both Fire Channel 1 and the fireground channel for assignment and/or progress reports.

In order for Level I staging to be effective, company officers must give complete and accurate size up reports, preliminary reports, and progress reports as they acquire information.

A size-up report of an odor of food, trash outside of a building, or fire out on arrival are examples of situations where the Incident Commander ("Operations") may utilize "Level I Staging."

Until the Incident Commander ("Operations") advises companies of "Level I Staging", it is imperative that companies perform their duties as described in the Standard Operating Procedures. Deviation by companies from the SOP's is only acceptable when directed by, or with notification to, and approval of, the Incident Commander ("Operations").
If Level I staging is in effect, the Incident Commander ("Operations") will advise companies via the Fireground Channel when they should resume Standard Operating Procedures, giving a verified location of the fire, and if necessary directing companies to specific assignments.

Level II Staging

The Incident Commander designates a staging area where companies are to report. Companies arriving at the staging area will notify Operations by radio of their arrival, on the Fireground Channel, and await instructions from Operations.

Level III Staging

The Incident Commander assigns a location and staging officer. When Level III Staging is in place Communications will be notified, and an announcement will be made on the Vocalarm, Fire Channel 1,

and the Fireground Channel that Level III staging is in effect for the incident and giving the location of the Staging Area. In Level III Staging companies arriving at the staging area will make no radio transmissions. Companies should monitor the Fireground Channel. The officers of companies dispatched to the staging area will report in person to the Staging Officer.
The Staging Officer will perform the following duties:

1. Notify the Incident Commander that they are at the Staging Area, and verify the companies and units available at the staging area.
2. Determine if the Incident Commander would like a minimum complement of units maintained in the Staging Area. If so the Staging Officer will contact Communications on Fire Channel 1 for additional companies and units.
3. Give assignments to companies and units. Companies and units should be given the following information:
   a. Where and to whom they are to report.
   b. The sector or branch to which they are assigned.
   c. Other special instructions.
4. Maintain a list of companies currently in the staging area, and a list of companies (and their instructions) sent to the incident from the staging area.

Staging Officers should be aware that certain emergencies may indicate that separate staging areas for firefighting units and EMS units is the most appropriate configuration. The EMS Supervisor (or Triage/ Transportation Officer) should coordinate alternate staging sites with Operations.

Third Alarm Call Back of Senior Department Officials

After the dispatch of a Third Alarm (or equivalent), a call back of the following Senior Department Officials will take place and they will be assigned the following responsibilities:

Training Deputy	Planning
A/Fire Chief Services	Logistics
Communications Director	Communications
Fire Prevention Deputy	Fire Investigation
Chief Financial Officer	Finance
Professional Standards Officer	Safety and Quality Control

Conclusion

Standard Operating Procedures must be followed to allow the Incident Command System to be implemented smoothly on the scene of any incident.

The Incident Command System is not designed to hinder operations. It is designed to allow for improved safety and accountability on the scene regardless of whether the incident is escalating or winding down. Using the Incident Command System allows the Department to have an easier transformation from the normal intra-agency operation to a multi-agency or multi-jurisdictional operation.

SECTION II - PERSONNEL ACCOUNTABILITY

INTRODUCTION

This procedure identifies a system for incident site fire fighter accountability. The purpose is to account for all fire fighters, operating within the geographic area known as the "Hazard Zone" of an incident. Use of the system will provide enhanced personal safety for the individual fire fighter, and will provide the Incident Command staff an improved means to track and account for all personnel working in the hazard zone.

The hazard zone will be defined as: "any area that requires a SCBA or in which a fire fighter is at risk of becoming lost, trapped, or injured by the environment or structure." This would include entering a structure reported to be on fire, operating in close proximity to the structure during exterior operations, confined space or trench rescue, etc.

The Personnel Accountability System will be implemented when the first unit arrives on the scene and continue until the incident commander determines it is no longer necessary. Accountability responsibilities will expand with the Incident Command System. During the course of an incident the Incident Commander should be able to account for all personnel at any given time.

The accountability system will in no way reduce the company officers primary responsibility to closely supervise crew members, provide for their safety, and maintain communication with sector leaders/ Operations. **A minimum crew operating in a HAZARD ZONE shall be two fire fighters with a portable radio.**

PURPOSE

To establish a procedure to efficiently account for personnel at the scene of an emergency incident.

SCOPE

The Personnel Accountability system gives incident commanders a fast and efficient means to account for all Fire/EMS personnel at the scene of an emergency.

DEFINITIONS

Hazard Zone: Any area requiring SCBA, or any additional area designated by the Incident Commander.

PAT(s): Personnel Accountability Tag

UDC: Unit Designator Card

OIC: Member in charge of a unit

SYSTEM COMPONENTS

1. The system will be implemented on all emergency incidents where command is formally established.

2. Every member of the Fire & EMS Department that could be called to an emergency incident will be issued a Personnel Accountability Tag (PAT) constructed similar to the departments I.D. Card. Each PAT will have a photograph of the member and information about the member.

PATs will be color coded in the following manner:

White - Suppression and EAB Officers, P.I.0., and Chief Officers
Yellow - Fire Fighters
Orange - EMS
Blue - Fire Inspector
Red - Other members of the Department or as directed by Fire Chief

UNIT DESIGNATOR CARD (UDC's)

The Unit Designator Cards are approximately 2" X 4" 3/32" plastic cards imprinted with the unit number (i.e. Engine Co. 3, and Truck Co. 1). A metal ring will be attached for each position on that unit, and each member's PAT will be placed on the appropriate ring while he/she is on duty with that unit. The UDC will be located on a hook inside the cab on the officers side of all apparatus.

COLOR DESIGNATION OF UDC's

Red - Engine Company
Green - Truck Company
Black - Rescue Squad
Orange - EAB Units, BLSs & ALSs
Gold - Chief Buggy's, EAB Supers and Misc. Units, i.e., Haz-Mat, Fire Boat, Air Unit.

CHIEF OFFICER'S COMMAND BOARD

The Command Boards have hooks to hang the UDC's in the proper sectors.

MAKE-UP PAT

In the event that a member does not have his/her PAT, (i.e. lost, stolen, forgotten) then their official Fire Department I.D. card shall be used in place of the PAT. An Official Journal Entry will be made by the Platoon Commander and that member will be ordered to submit a special report with the particulars regarding the loss of the PAT. It will be the responsibility of the member to replace his/her PAT by the next scheduled tour of duty. Members are allowed to purchase additional PATs.

RESPONSIBILITY

1. Unit accountability will be required within ten minutes, after the arrival of the first company on the scene of the incident. The Communications radio operator will announce the duration of the incident at that point and every subsequent ten minutes during the incident. *Example: Communications to Command 1, incident duration 10 minutes.*

   Operations will contact each company to ascertain their position and determine their progress. This can be done as units are sectored (or reassigned) in different areas or tasks.

2. A formal "Roll Call" to account for each individual on the fireground will be conducted at the 20 minute interval of the incident, and at each subsequent 20 minute interval. **Prior to returning units on any incident where command has been established, a Roll Call will be conducted.**

   a. The Incident Commander shall acknowledge the 20 minute notification and initiate a roll call. (example: "Operations to all sectors, prepare for roll call.")

NOTE: To further enhance the safety of personnel, Sector leaders and unit commanders should give their accountability and location during roll call.

   b. Sector leaders shall then order roll call from unit commanders assigned to their sectors. **Sector leaders will give their location along with their accountability report.** *Example: "Engine 8 to Operations, the attack sector Engine 8 and 6 are even, and operating on the first floor, quadrant B.*

   c. Unit commanders shall account for personnel operating under their supervision in the hazard area and report roll call to their sector leader. **Unit commanders will give their location along with their accountability report.** *Example: "Engine 4 to Engine 5 (Exposure Sector) we are even , operating in Exposure 2, third floor."*

   d. Any member whose normal job is to operate outside of the hazard area is NOT to enter the hazard area without express permission of the member's OIC. The member's OIC shall give specific instructions as to the unit's position within the Hazard Zone. The member shall proceed directly to the location given by his/her OIC, and shall perform no task within the Hazard Zone prior to joining up with his/her unit.

   e. Any unit not assigned to a sector will be contacted by Operations during roll call.

3. After All sectors have been heard from, the Incident Commander will document the time and note on the command board that all personnel were accounted for or which personnel were not accounted for.

An unaccounted person/crew will not stop roll call from other sectors. This is because more than one crew or person may be unaccounted for. If any personnel cannot be accounted for, the sector officer will report the status of the missing person as unknown and give the last known location. The sector leader will then initiate search procedures within their own sector. *Example: "Truck 9 Vent to Operations, Truck 2 in vent Sector is minus 1, last seen in the fire building, third floor, quadrant C."*

When the Incident Commander's roll call indicates a fire fighter or fire fighters are missing, he will transmit a **MAYDAY** to the units on the fireground and establish a Fire Fighter Rescue Sector to locate the missing personnel. The **MAYDAY** procedures will remain in effect until the **MAYDAY** operations are completed and the Incident Commander reports the results of the **MAYDAY** operations and returns to normal fireground operations.

All other sectors operating on that incident will maintain their current positions and assignments unless otherwise directed by the Incident Commander.

The Incident Commander may call for a roll call report to check the welfare of personnel at any time. Some situations in which this shall be done include (but are not limited to):

1. When a **MAYDAY** report is received from any unit on the fireground.

2. Any report of a member or crew missing or trapped.

3. When a unit/crew cannot be contacted in the Hazard Zone after three consecutive attempts by radio contact.

4. Sudden hazardous change on the incident scene such as vapor release, collapse, etc.

5. Incident conditions deteriorate to a point that evacuation is ordered.

LEVELS OF ACCOUNTABILITY

LEVEL I OIC's shall insure that all PAT's on the UDC reflect the names of all personnel assigned to that unit for that tour of duty.

LEVEL II At the order of the Incident Commander, all UDC's are to be collected from the apparatus and delivered to the command post.

1. The Incident Commander may designate a company to collect all UDC's and bring them to the command post.
2. If abandoning the building, each company officer shall bring his/her company's UDC to the command post.

LEVEL III When the Incident Commander determines that the incident requires more stringent accountability, they will implement **"ENTRY CONTROL"** (i.e. metro tunnel, haz-

mat, hi-rise, confined space, bombings, structural collapse, trench rescue, before mop-up operations, after heavy duty operations, etc.).

Entry Control at LEVEL III . When Level III accountability has been ordered, the Incident Commander will notify Communications to implement "Entry Control" and advise the point(s) of entry. Communications will then sound an EXTENDED ALERT TONE and announce that LEVEL III Accountability has been implemented along with the entry location(s).

Example: ALERT TONE SOUNDED. "Attention units operating on 3rd St., Command 1 has implemented LEVEL III Accountability. All units will enter through the main lobby located on Side 1".

Once LEVEL III Accountability has been established, all units will bring their UDC's with PAT's attached to the entry control point where they will enter AND exit, except in an emergency. The Incident Commander **MUST** be immediately informed in the event of an emergency (out of air, injury, etc.) requiring members to exit a hazard zone through other than an entry control point.

COMPLIANCE

The mechanism to quickly account for personnel must be available to the Incident Commander at any point during the incident. In order to insure the effectiveness of this system and the subsequent safety of all personnel, accountability procedures will be strictly adhered to at all times.

1. The PAT's shall be considered an issued item of personal protective equipment. **MEMBERS ARE NOT ALLOWED TO ASSUME DUTY OR RIDE APPARATUS WITHOUT THEIR PAT and/or FIRE and EMS DEPARTMENT I.D. CARD.**

2. Unit Designator Cards will be considered part of the apparatus inventory and will be maintained as such.

THE FOLLOWING RULES WILL BE ADHERED TO AT ALL TIMES

1. No one is to operate alone in the hazard zone.
2. No crew is to operate without a portable radio.
3. Crews always go in and come out together.
4. All personnel will be in contact with their OIC by either:
   a. Voice.
   b. Touch.
   c. Sight.

MAYDAY POLICY

Fireground communications can become very hectic and confusing when a fire fighter is in DISTRESS, becomes LOST or TRAPPED. The term "MAYDAY" is the international radio distress signal and shall only be used when a member is in trouble and needs immediate assistance. All radio traffic shall cease except EMERGENCY TRAFFIC. Upon notification by the Incident Commander, Communications shall designate that channel as the Fire Fighter Rescue Channel and immediately switch all units, with the exception of units assigned to the Fire Fighter Rescue Sector, to another radio channel. These units will remain on the alternate channel until the Incident Commander advises Communications that the MAYDAY is cleared, and units may resume normal radio operation.

Example of radio traffic:

E-99: "E-99 to Operations, ***MAYDAY, MAYDAY!"***

Operations: "Operations copies E-99's MAYDAY, what is your LOCATION & NATURE of MAYDAY?

E-99: "E-99 to Operations, we are on the 2nd floor, Quadrant C. One fire fighter is trapped by a collapsed roof joist. Need lifting tools."

Operations: "Operations copies. E-99 is located on the 2nd floor, Quadrant C, with a trapped fire fighter and you need lifting tools. Help is on the way. Operations to all units, a MAYDAY has been declared, ***emergency radio traffic only!****"*

Operations: "Operations is establishing a Fire Fighter Rescue Sector and assigning (list units) to the sector with (name of Co./BFC) as Sector Leader.

Operations: "Command___ to Communications, a MAYDAY has been declared at (give the address) by E-99. They have a fire fighter trapped by a roof joist on the 2nd floor Quadrant C. Fire Fighter Rescue Sector has been established on channel ___ consisting of _____(list units assigned to the sector). Switch all other units to another radio channel.

Communication Division shall repeat Command's last message on all channels and the Vocal-alarm.

Communications: "Communication to all units, a MAYDAY has been declared at (give the address) by E-99. They have a fire fighter trapped by a roof joist on the 2nd floor Quadrant C. Fire Fighter Rescue Sector has been established on channel ___. All units on the fireground not assigned to the Fire Fighter Rescue Sector, switch to Channel ___."

NOTE: It is important to understand the difference between MAYDAY, PRIORITY, and 10-33 messages.

MAYDAY is to notify the Incident Commander (and/or other units on the scene) of reported trapped or missing fire fighter(s) or crew**.**

PRIORITY is to transmit an urgent message to Operations which does NOT involve trapped or missing personnel.

10-33 is a code message to inform Communications that immediate police assistance is needed.

Communications Division

The transmittal of a MAYDAY from any unit shall require Communications Division to operate in an emergency mode.

1. The Watch Commander shall direct the radio operators to transmit the MAYDAY information on all channels and the Vocalarm.

2. The Watch Commander shall strictly enforce radio discipline and limit department radio traffic to EMERGENCY TRAFFIC ONLY. Units shall go "Off the air" by telephone during the emergency.

3. NO ACTIVITY SHALL TAKE PRECEDENCE OVER ASSISTING THE INCIDENT COMMANDER IN RESOLVING THE MAYDAY!

SECTION III - STANDARD OPERATING PROCEDURES

RESPONDING

Response to alarms shall be made by companies when they receive the alarm over the Vocalarm, telephone or printer. Companies will be dispatched in the order in which they are due on the box alarm assignment.

Companies operating by radio shall not respond to alarms unless directed by Communications.

Company officers shall insure that all members are seated in the jump seats before responding (if not equipped with a crew cab). All members are responsible for using seat belts while vehicle is in motion.

Before responding, officers should check with drivers so that both know the address and the position due. If there is a doubt verify with Communications.

First due units that are responding from locations where they cannot arrive first shall promptly change their position due.

POSITIONING APPARATUS

The first due engine should layout and assume a position in the front of the building allowing room for the truck company.

If it is known that the truck company will enter the block from the opposite direction as the first due engine, the engine should stop short of the building.

Engines responding to rear positions should leave room for truck companies. Hoses will bend, ladders will not.

Engines and rescue squads should leave room for truck companies to remove ground ladders from the rear of the apparatus.

Responding rescue squads shall not block companies.

FIREGROUND RADIO COMMUNICATIONS

The first arriving unit in the front of a building or incident site will give a size-up report to Communications on Fire Channel 1 and then switch to the Fireground Channel for all subsequent fireground communications.

> *Example: (Fire Channel 1) "Engine 1 (first due) on the scene side 1 of a three story brick detached apartment building, ordinary construction, with heavy smoke showing from one window on the second floor, side 1, quadrant A".*

At this time, all responding units will monitor the Fireground Channel to hear reports between units on the scene and the responding battalion chief. The responding units will be aware of the fireground situation before arrival. Also, responding units shall monitor the Fireground Channel because it's possible that they may be contacted by the battalion chief or a "Sector Leader" for assignment prior to arrival on the fireground.

The first arriving unit in the rear of a building or incident site will give the required size-up report to Communications on the Fireground Channel.

Example: (Fireground Channel) "Engine 2 (second due) on the scene side 3, fire showing from a second floor window, quadrant B."

The Fireground Channel is an informal radio channel to report what you see, what you don't see and what you think. It is to be used for fireground communications between units, between units and sector leaders, and between sector leaders and the Incident Commander ("COMMAND").

On large, complex incidents, Fire Channel 5 can be utilized among the Incident Command Staff.

Radio communications between EMS units will be conducted on 800 MHz channels, as per established procedures.

Except in cases of emergency, all communications from the incident site to Communications on Fire Channel 1, exclusive of layout information and the first arriving unit's size-up report, will be made by the Incident Commander.

Units dispatched to an incomplete or incorrect address shall give correct information on Fire Channel 1 for the use of other responding units.

Example: "The corrected address is 2622 13th Street, N.W."
"The fire is on the odd side of the 1600 block of Monroe Street, N.W."
"The fire is on the N.W. corner of 14th and Girard Streets. N.W."

The first company arriving on the scene gives a complete "size-up" report including any possible life or rescue problems.

Example: "Engine 11 on the scene, side 1, with a three-story row brick, ordinary construction, fire showing on the top floor and a report of people trapped."

If the first arriving company does not give a complete "size-up" the next arriving company is responsible for giving the necessary "size-up" report, but in every case, the first unit to arrive in the rear of an address shall report what is observed from that location, even if the report is "nothing evident", as this may assist in determining the location or extent of a fire problem when combined with other reports.

Report all known or possible life problems.

Example: "People are evacuating the building."
"People are at the windows."
"People are on the balconies."

While any single report may not be significant, multiple reports may indicate a rescue problem.

Report when assistance is needed and what is needed.

Examples: "Engine 12 to Operations, we need a back up line."
"Engine 10 to Engine 8, we need help extending our line."
"Truck 9 to Operations, we need another truck for ventilation."
"Truck 1 to Truck 2, we have rescues in front, open the roof."
"Rescue Squad 2 to Operations, we need another unit for searching."

Examples of Informal size-up reports:
"It smells like trash."
"There is an electrical odor."
"We have smoke."
"Nothing found, we are checking."
"I think we have an apartment off."

It is better to report a possible condition immediately than a confirmed report later (but do both).

If upon reaching the reported fire floor, you find no smoke or odor, notify Operations. It is obvious to you what the conditions are, but Operations doesn't know if you're crawling down the hall or looking for an apartment number. This is an example of reporting what you don't see.

If you are to check the top floor of a building and work your way down, checking for smoke conditions, report the conditions on the top floor as soon as you know. Other floors can be grouped. Do not wait until all floors are checked to give a report.

Examples: "Truck 2 to Truck 1, the top floor, number 9, has light smoke" (always report the number of the top floor).
"Truck 1 to Operations, floors 6, 7, and 8 are clear."

If you are assigned as the "Exposure Sector Leader", notify Operations as soon as you complete each primary check. If you are assigned to the Exposure Sector, notify the Exposure Sector Leader of each primary check of exposures. In either case, give progress reports at least every ten (10) minutes.

It is the company officer's responsibility to report their location and progress to their sector leader or Operations. Operations should not have to ask for status reports.

Sector leaders will report the status of all units in their sector.

Example: "Engine 1 to Operations, Engine 1 and Engine 2 are attacking the fire, and appear to be making progress".

Always report to Operations or your sector leader when you change position or function, or if you leave the building for air, breaks, etc.

Notify Operations or your sector leader when you complete your assignment and are available for another.

After the fire is knocked down:

1. Notify Operations. Example: "Engine 22 to Operations, fire appears to be knocked down"
2. Keep SCBA on
3. Vent the area
4. Always check and report on:
   a. Ceilings
   b. Ducts
   c. Attic
   d. Walls
   e. Smoke conditions on <u>all</u> <u>floors</u>

<u>BE SURE:</u> If you do not know all the above, call in what you do know.

Before notifying Operations that you can handle it alone or with the truck, consider the rest of the building. The fact that you have trash in the basement with little smoke doesn't mean there is no smoke on the upper floors. Always be sure of conditions throughout the building before returning units.

Example: "We have trash in the basement and can handle it with the truck, but we don't know about the smoke conditions on the upper floors".

When reporting that you can handle a situation, be specific.

Examples: "Engine 1 can handle it with Truck 1."
"We can handle it with Truck 1 only."
"We can handle it alone."
***<u>NOT</u>** - "We can handle it."*

It is imperative that companies perform their duties as described in the Standard Operating Procedures unless directed by, or with notification to, and approval of, Operations.

When emergencies arise making it necessary to deviate from Standard Operating Procedures (SOPs) or directives, company officers shall take action and report that they are not doing what they are normally expected to do. Operations can then have another unit cover the assignment.

Example: "Engine 4 to Operations, we are unable to back up attack. We are involved in a rescue on the first floor rear, quadrant C."

Typical Working Fire Radio Sequence, after layout information is given on Fire Channel 1:

"Engine 1 on the scene, side 1, of a two story row brick, ordinary construction, with smoke showing from the second floor, quadrant A" (Fire Channel 1).
"Engine 2 on the scene in the rear with fire showing 2nd floor, quadrant B" (Fireground Channel).
"Engine 4 to Operations, we're on the scene, 4th due."
"Operations to Engine 4, take command of the Exposure Sector and cover exposure 4. The fire is in quadrant B, second floor of the fire building. Engine 2 is covering exposure 2."
"Engine 2 to Operations, the basement is clear. We're covering exposure 2."
"Operations to Engine 2, Engine 4 is your Exposure Sector Leader."
"Engine 2 OK."
"Engine 2 to Engine 4, the 1st floor of exposure 2 is clear. We are covering the second floor. Heavy smoke."
"Roof team to Truck 1. The hatch is open, heavy smoke is coming out. Both sides look OK."
"Rescue Squad 1 to Operations, primary search complete. Results negative."
"Truck 1 to Truck 2 we've got the fire floor, check below for salvage operations."
"Truck 2 to Truck 1, we're throwing covers on the first floor, there is a lot of water."
"Engine 2 to Engine 4, exposure 2 cockloft has smoke but no heat."
"Engine 4 to Operations, exposure 4 has only light smoke. Exposure 2 has heavy smoke but no heat."
"Engine 1 to Operations, fire appears knocked down, checking overhead."
"Rescue Squad 1 to Operations, secondary search complete. Results negative."
"Engine 1 to Operations, sending Engine 3 out for a break."
"Operations to Rescue Squad 1, come out for a break also."
"Engine 4 to Operations, exposure 4 is clear."
"Operations to all units, Drager results negative. 'All clear'. OK to take masks off."
"Truck 2 to Truck 1, 1st floor's covered, basement OK."
"Truck 1 to Operations, no extension."
"Engine 4 to Operations, exposures 2 and 4 clear."

Portable Radios

On the fireground report any portable radio problems immediately to Operations.

Examples: No radio, no Roof Team radio, reception/transmission problems, etc.

EXPOSURE DESIGNATIONS AND COVERAGE

Normally, side 1 of a structure will be the address (street) side. Facing side 1 of the structure, sides 2, 3, and 4 are numbered in a clockwise manner.

Interior Quadrants

Interior quadrants are identified by a standard identification system to show portions of a fire building. Utilizing interior quadrants allows the exact fire location to be identified and assists in determining magnitude. It also greatly enhances rescue efforts and improves personnel safety. Better knowledge of the location of the fire or other emergency is important to every sector working on the incident. Company officers shall report the quadrant in their radio transmissions.

Examples: "Fire showing top floor quadrant B."
"We have a room off in quadrant C."
"We have located several trapped civilians, 3rd floor, quadrant D, need assistance".

ELEVATOR OPERATIONS

When elevators are equipped with a fireman's control feature, the elevator will be operated using the fireman's control key.

It will be necessary to enter the building with the Fire Alarm Box Key in order to gain access to the box containing the fireman's control key for the elevator.

Elevators shall not be used during initial attack in buildings having known working fires or where there are indications of a working fire based upon dispatch information, occupant information, or size-up.

When Entering an Elevator

1. Notify Operations that you are using the elevator.
2. Check for the location of the stairway(s) and apartment number in relation to the elevator.
3. Everyone on the elevator must be wearing self contained breathing apparatus (SCBA) with cylinder valve open. Activate PASS Device.
4. At least one (1) member must have a portable radio.
5. Do not overcrowd the elevator.
6. Carry forcible entry tools. They can be used to pry open elevator doors if the elevator fails to stop or controls don't work. Tools may be necessary for locked doors and other functions.
7. Shine a strong light up the shaft between the outer and inner doors to determine if smoke is entering the shaft at some point above.
8. When going up an elevator, stop the car at the halfway point in order to:
   a. Test the elevator controls.
   b. Determine where the exits are in relation to the car doors.
   c. Shine light back up into the shaft to check for smoke.

9. Stop the elevator two (2) floors below the reported fire floor. If the elevator will not stop, use the emergency stop button or force open the door to stop it.
10. When getting off an elevator, don't let the elevator go until you are sure you will no longer need it.
11. After ascending the stairs to the reported fire floor, promptly report the conditions to Command.

SELF CONTAINED BREATHING APPARATUS POLICY

Self Contained Breathing Apparatus (SCBA) and Personal Alert Safety System (PASS) devices shall be promptly placed in service for smoke, electrical fires, hazardous materials incidents, or unknown odors located inside or outside structures, (IDLH).

During mask operations, Drager readings will be taken as quickly as possible. Following the Drager tests, Operations will notify all units that either:

1. The atmosphere is "all clear" or;
2. Continue to keep SCBA and facepieces on because of the hazardous atmosphere.

For safety and protection of all members, SCBA and facepieces will not be removed until the "all clear" has been broadcast.

Insulation in ceilings, walls and around pipes should be considered to contain asbestos. When opening up these areas or handling this material in an overhaul operation, SCBA will be worn.

It is the personal responsibility of each member to comply with the SCBA policy. Command officers shall insure compliance.

GENERAL ENGINE COMPANY OPERATIONS

Engine companies will operate as one team towards the goals of rescue, water supply, exposure protection, and extinguishment. In general, engine companies perform rescues by placing their hoselines in a position to protect rescue operations, and/or by extinguishing the fire. **RECEO,** an acronym coined by author Lloyd Laymon, stands for Rescue, Exposure Protection, Confinement, Extinguishment, and Overhaul. These functions, **in the order listed**, along with salvage and ventilation, are the priorities which should be considered to successfully mitigate fire situations.

When an engine company is operating on the fireground, the pump operators will remain with their apparatus.

Command ("Operations") will be notified of any water supply problems immediately.

Engine companies will be considered as having their own hydrant if their soft sleeve is connected to a hydrant. Having your own hydrant, is **not** one that you have laid out to or hand laid to with a 3" supply line.

Due to the possibility of the 2nd and 4th due engine companies being unable to get to the location of a split lay or middle of the block hydrant because of parked vehicles, prior arriving apparatus, etc. the use of these type layouts by the 1st and 2nd due engine companies will only be used when the use of a straight (hydrant to fire) layout is not practical.

An engine company may back up their 1st attack line with a 2nd attack line, if necessary, provided that both lines are operating together in the same attack area and are under the direct control of the officer in charge of that company. Engine companies will operate as one team in one location.

If an engine company's apparatus is in an advantageous position to allow advancement of an attack line from their own apparatus, this should be considered. Engine companies advancing a 2nd attack line off another engine company's apparatus should be aware that this attack line may not be charged until a constant water supply has been established by that company's wagon.

The first and second due engine companies will hook up to the standpipe and/or sprinkler system if the building is so equipped. These systems will be charged when ordered, or if there are indications of fire. (See "Pump Manual" for proper pressure information). Pre-planned buildings and Metro incidents will require engine companies to make connections to these systems.

Companies will not go blindly to the reported fire floor. Use judgement. Smoke will usually rise, not seek lower areas. Check lower floors as the line is being advanced to upper floors.

BACKUP HOSE LINES

Most fires can be extinguished with one hose line, however, it is a good practice to back up the first attack line with an additional line to the same position. The backup line provides protection for the initial attack line's crew, increases knockdown power, and is an assurance of a constant water supply, should a line burst or other problem arise.

As stated in the opening paragraph of this section, "Engine companies will operate as one team towards achieving their goals. **An engine company providing a backup line will assist the initial attack line's crew by performing whatever tasks are needed, to ensure the initial attack line is in position and operating at it's intended position.** Problems which prevent the initial attack line from getting in service will be relayed to Operations as soon as possible.

COMPANIES UNABLE TO CONNECT SOFT SLEEVE

If a company is unable to connect it's soft sleeve to the hydrant valve because a hydrant is blocked and the soft sleeve will not reach, there are two options to solve the problem:

First Option - The preferred method of getting in service requires the company with water supply responsibilities to connect their supply line to the intake of the hydrant valve, layout to a different hydrant, and then pump back into and through the hydrant valve.

NOTE: This will require a higher discharge pressure by the water supply company depending on the length of the layout.

Second Option: - The less favorable method would be to extend the reach of the soft sleeve using hard sleeves.

SAFETY FOR ENGINE COMPANIES

When smoke conditions obscure visibility and heat conditions exist, opening hoselines will increase the protection level of members by cooling the combustibles gases in the area where members are operating.

When hose lines are not advancing and conditions are deteriorating, then back out.

Never operate above a fire without a hose line for protection, and never operate above a fire without having assurance that the fire below is being attacked.

On known basement fires, **the primary purpose of the first due engine company's hose line is to protect the search and rescue operation.** To accomplish this task, risk assessments and incremental advancement of hoselines will be based on an evaluation of the smoke and heat conditions encountered. For example, if conditions allow, the first priority will be to protect the stairs between the 1st. and 2nd. floors. If conditions allow further advancement, the next priority will be to locate the basement stairs and provide protection for the rescue operation from this position by closing the basement door and / or using the hose line. Conditions must be constantly evaluated. If conditions deteriorate, notify "Operations," incrementally begin to back-out of the building using the hose line for protection, and ensure that protection is maintained for the search operation. The removal of this hose line from the building will not take place until all members involved in the search and interior operations on the floors above the basement have exited the building and been accounted for.

Do not operate in unvented attics.

Do not pass fire by and never let fire get behind you.

It is always a sign of true professionalism to follow orders promptly. It becomes increasingly important as conditions at the incident deteriorate, to communicate and maintain fireground discipline.

Communications between companies, sector leaders, and command officers; both face to face and via radio; regarding conditions found, changing conditions, safety concerns, actions being carried out as well as recommendations for additional resources or the need for a change in tactics are critical reports for the success and safety of our operations. For example, if there has been a partial collapse, notify Operations and take what actions you feel are immediately necessary, advising Operations of those actions, their results, and your recommendations for further action.

Example: "Engine 5 to Operations, we have had a partial collapse on the 2nd floor in quadrant C. We have positioned our handline to protect the search operation above. Recommend the removal of all personnel from the building. We will be exiting the building as soon as companies searching above have returned to our position and been accounted for."

In this case Operations knows Engine 5 wants to abandon the building when the search is completed. He/she can start removing those units not involved in the search operations.

Remember that many cases of improper action occur when there is no life to be saved, and most of the property loss has already occurred. Frustration and excitement can lead to poor decisions. Before recommending or taking action on problem fires, weigh the consequences of offensive vs. defensive modes. If a fire has gained considerable headway in a vacant building, and there is a question about its structural stability, the risk/benefit ratio of an aggressive interior attack is extremely high. In this instance, the only acceptable course of action is to initiate a defensive, exterior attack.

Personnel should always be aware of the potential for collapse. This risk assessment must be an on going process that is carried out throughout an incident, including the overhaul and salvage stages. Initial apparatus and handline/monitor pipe placement should be based on an evaluation of collapse potentials, and should be parked/set up outside of the collapse zone. (Minimum: 1 _ times the height of the building.) Deteriorating conditions may force re-evaluations of initial placements of apparatus, lines and personnel. Relocating these can be time consuming and manpower intensive and should be initiated early with adequate personnel.

Here are some other examples of actions where the risks do not match the gains:

1. Operating within the collapse zone of a building during exterior operations.
2. Operating hoselines from the exterior without permission.
3. Not leaving the structure when ordered out.
4. Taking hoselines into windows for firefighting purposes, when other companies and "Operations" are unaware of this action, leading to the possibility of opposing hose streams.
5. Members separating from their companies for independent action or to attach to another company.
6. Attacking basement fires by going down the basement stairs.
7. Operating handlines from a roof position down into the roof area, when the opening is for ventilation.

When taking these types of risks, companies or individuals are risking their lives and/or those of their fellow fire fighters, as well as the lives of those who may have to rescue them when they get in trouble.

MAYDAY POLICY

Fireground communications can become very hectic and confusing when a fire Fighter is in DISTRESS, becomes LOST or is TRAPPED. The term "MAYDAY" is the international radio distress signal and shall only be used when a **fire fighter** is in trouble and needs immediate assistance. All radio traffic shall cease, except **EMERGENCY RADIO TRAFFIC**. Upon notification by the Incident Commander, Communications shall designate the fireground channel being utilized by the units on the incident as the "Fire Fighter Rescue Channel," and immediately switch all units not assigned to the "Fire Fighter Rescue Sector," to an alternate channel for fireground communications. These units will remain on the designated alternate fireground channel until the Incident Commander advises Communications that the MAYDAY emergency has been resolved. At that time, units may resume normal radio operations.

Example of "MAYDAY" radio transmissions:

E-99: "E-99 to "Operations, MAYDAY, MAYDAY ! "
OPERATIONS: "Operations copies E-99's MAYDAY. What is your LOCATION & the NATURE OF YOUR MAYDAY?"
E-99: "E-99 to OPERATIONS, we are on the 2nd. floor, Quadrant C. One fire fighter is trapped by a collapsed floor joist. We need lifting tools."
OPERATIONS: "OPERATIONS copies. E-99 is located on the 2nd floor, Quadrant C, with a trapped fire fighter, and you need lifting tools. Help is on the way. OPERATIONS to all units, a MAYDAY has been declared, ***emergency radio traffic only !"***
OPERATIONS: "OPERATIONS is establishing a FIRE FIGHTER RESCUE SECTOR and assigning the following units (list units) to that sector with (name of co. officer/BFC) as the sector leader.
OPERATIONS: "OPERATIONS to Communications, a MAYDAY has been declared at (give address) by E-99. They have reported a fire fighter trapped by a floor joist on the 2nd floor, Quadrant C. A FIRE FIGHTER RESCUE SECTOR has been established on channel ___ consisting of the following units,___, (list units assigned to the sector.) Switch all other radio traffic to an alternate channel.

Communications Division will repeat Operations last message on all channels and the Vocalarm.

"Communications to all units, a MAYDAY has been declared at (give address) by E-99. They have a fire fighter trapped by a floor joist on the second floor, Quadrant C. A FIRE FIGHTER RESCUE SECTOR has been established on channel ___. All units on the fireground not assigned to the FIRE FIGHTER RESCUE SECTOR, switch to channel ___ for fireground communications."

NOTE: It is important to understand the difference between a MAYDAY, a PRIORITY, and a "10-33" message.

MAYDAY is used to notify the Incident Commander and / or other units on the fireground, of a reported or confirmed missing, trapped, or fire fighter in distress.

PRIORITY message is used to transmit an urgent message to Operations which does not involve trapped, missing, or fire fighter(s) in distress.

"**10-33**" message is a coded message used to inform Communications Division that immediate police assistance is needed.

Communications Division

The transmittal of a MAYDAY from any unit, shall require Communications Division to operate in an emergency mode.

1. The Watch Commander shall direct the radio operators to transmit the MAYDAY information on all channels and the Vocalarm.
2. The Watch Commander shall strictly enforce radio discipline to see that departmental radio traffic is limited to EMERGENCY TRAFFIC only.
3. Units shall go "off-the-air" by telephone during a MAYDAY emergency.
4. NO ACTIVITY SHALL TAKE PRECEDENCE OVER ASSISTING THE INCIDENT COMMANDER IN RESOLVING THE MAYDAY.

ABANDON BUILDING PROCEDURE

When the Incident Commander ("Operations") has determined that all members must abandon the building because of unsafe conditions, such as an anticipated collapse, or because of a tactical change from an interior to a exterior defensive mode, the following procedure will be used:

1. "Operations" will notify all sectors via the Fireground Channel, indicating the safest way out. Example: "Operations to all sectors, abandon the building, do not exit via the rear because of an unstable wall."
2. All sector leaders will notify all companies assigned to their sectors, using "face to face" communications if possible.
3. After all radio announcements have been made and acknowledged, "Operations" will order all apparatus to sound their air horns continuously for 30 seconds.

Companies ordered out of the building will promptly leave, and units leaving will stay together with all members reporting to the company's apparatus for an "Accountability Check. Company officers will verify the location of all members assigned to their unit. "The Incident Commander will place "Level II Accountability" in place and all units "Unit Designator Cards" (UDC's) will be delivered to the Command Post by the company officer.

NOTE: DO NOT TAKE THE WHEREABOUTS OF ANY MEMBER FOR GRANTED. VERIFY EVERYONE.

Company officers will notify their Sector Leader or "Operations" when their company is out and give the results of the accountability check.

No exterior operations will begin until all companies and all members are verified out of the building and accounted for.

EXPOSURE COVERAGE

When a company is assigned to check exposures, they will work as one team, staying together and checking each assigned exposure in turn. The company will:

1. Check the exposure adjacent to or closest to the fire quadrant first. Check for both horizontal and vertical extension of fire. (Consider: hose line, ceiling hook, halligan bar, light, and a stepladder to check directly above the fire, pipe chases, utility poke-throughs, vent shafts, etc.).
2. Report conditions to "Operations" or sector leader, if applicable. If the situation is not critical in the first exposure checked, proceed to the other exposure.
3. Give periodic progress reports (at least every 10 minutes) and remain covering exposures.

1st Due Engine Company Operations

Engine companies responding in the first due position will layout or position their apparatus so they can utilize their soft sleeve directly off of the hydrant. This engine company will position their apparatus so that the truck company assigned to the front position can best utilize their aerial ladder, cord reels, etc. This is usually accomplished by pulling past or stopping short of the fire building, based on the direction from which the truck company is approaching the fire building.

Give a complete size up report on Fire Channel 1. Information contained in this size-up report will be:

1. Hydrant information, laid out from, split lay at, or if the unit has their own hydrant (soft sleeve connected to a hydrant.)
2. Engine (?) on the scene.
3. Side 1, 2, 3, 4
4. Height (in stories)
5. Type of building and it's occupancy.
6. Type of construction.
7. Conditions evident from exterior, including floor(s) and quadrant.
8. Other pertinent information. (persons trapped, building in a hazardous condition, building dimensions, etc.)

Example: "Engine 6 laid out at 4th. & H Streets., N.W. on the scene side 1, of a 2 story rowhouse, ordinary construction, fire showing first floor, quadrant A. Be advised we have a report of occupants trapped on the second floor." (This report is on Fire Channel 1.)

Example: "Engine 16 laid out in the middle of the 1000 block of Ninth St., N.W., on the scene side 1, of an 8 story brick apartment building, fire resistive, smoke showing fourth floor, quadrant D."

Advance a pre-connected line or standpipe racks into the building to attack the fire or provide exposure protection. Always consider a larger diameter attack line, if heavy fire conditions are evident. Also, consider the need for a standpipe rack(s) to extend the length of pre-connected lines for buildings that are large and / or located a long distance from your wagon's position.

Preliminary reports from companies to the Incident Commander ("Operations") are critical for tactical deployment of companies. (i.e.,: "Engine 11 to Operations 4, the fire is in Apartment 920 and the ninth floor has heavy smoke conditions.") This information assists the Incident Commander ("Operations") in the direction of companies for the tasks of search and rescue, exposure protection, fire attack and confinement, ventilation, and salvage and overhaul operations.

Give "Operations" a report if necessary of any changing conditions.

Example: "Engine 6 to Operations, we have a report of people trapped on the second floor."
"Engine 4 to Operations, the fire is extending into Exposure 2."
"Engine 1 to Operations, we have a pile of trash around the window, it appears to be out, we are checking for extension, I'll call you back."

These reports will be given on the Fireground Channel. These are the reports that help both "Operations" and other units to take appropriate actions and are very valuable.

The first due engine will notify "Operations" when the fire is knocked down or when conditions change.

Example: "Engine 4 to Operations, the fire appears to be knocked down, we are checking for extension."
"Engine 12 to Operations, we need a back-up line on the 2nd floor, quadrant D."

2nd Due Engine Company Operations

Second due engine companies will layout, take a rear position, and not pass the front of the fire building or enter the block that is in front of the fire building.

Exceptions

1. The street is wide and the first due unit(s) are on the scene.

2. The second due unit has circled the block and found no rear access.

3. Unusual situations (Pre-planned buildings, critical rescue problem requiring immediate action, etc.)

The second due engine company will give their layout information on Channel 1, then switch to the fireground channel and give their size-up report from the rear position. This size-up report should include the number of floors above ground, floor number and quadrant of any visible fire indications, and any other information you feel "Operations" may need to determine the tactics and deployment of units.

NOTE: The 2nd due engine company gives their size-up report on the Fireground Channel. Consider changes in the topography and how this may effect the tactical decisions to be made in deploying companies. For example, fire showing from the ground floor in the rear, may be coming from the basement, ground floor, or another floor. Notify the first due engine company on the fireground channel of this information if "Operations" cannot copy your radio transmissions.

Attack from the rear position will not be made with- out communication and coordination with "Operations" and/or the 1st. due engine company.

Example: "Engine 11 is split laying at 13th. & Spring Rd., N.W." This transmission will be given on Fire Channel 1. Switch to the Fireground Channel and give your size-up report from the rear, i.e.: "Engine 11 on the scene, side 3, four floors above ground, fire showing on the 2nd floor, quadrant B.

This method ensures the companies operating from the front positions are aware of the conditions present in the rear, which may be totally different those evident from the front.

The second due engine company is responsible for **CHECKING THE BASEMENT ON ALL STRUCTURE FIRES** regardless of where the fire is or seems to be. The report on the status of the basement must be given right away to "Operations." If the second due engine company is unable to check the basement from a rear position, they must notify "Operations."

A pre-connected attack line and/or standpipe rack(s) will be advanced into the building. The supply line should be charged as soon as possible. If, there are indications of fire, or when ordered, sprinkler and/or standpipe connections will be charged.

On known working fires, while the responsibility for utility control ultimately rests with the truck companies, the second due engine company will quickly attempt to locate any utility shutoffs in the basement, and shut off those utilities. "Operations" will be notified when utilities have been shutoff, or if the shutoffs could not be located.

If the fire is above the first floor, the second due engine company (after checking the basement) will start advancing towards the reported fire floor. Each floor between the basement and the fire floor will be checked and the status of these floors will be relayed to "Operations."

Example: "Engine 2 to Operations - the basement is clear, the gas and electric have been shutoff, we are advancing are line upward." "Engine 2 to Operations - floors 1,2,3 are clear." (group floors above the basement in blocks of 3 when reporting identical conditions.)

If the fire is on the first floor, the 2nd due engine company will first check the basement and report conditions to Operations. They will then provide a backup line to the 1st floor only after assessing the conditions and clearing these actions with Operations.

If the fire is above the first floor, the second due engine company may provide the backup line if they have checked the basement and all floors below the fire, and the third due engine company has not backed up the first due engine company's attack line. In this case, the second due engine company shall advise "Operations" of their position taken.

3rd Due Engine Company Operations

On box alarms the third due engine company will report to the hydrant of the first due engine company, or the location of it's split lay, and will be responsible for the water supply to the first due engine company. The crew will then report to the front of the building. Connect the apparatus' soft sleeve to the 4" male connection of the hydrant valve and a 3" line to the 2 1/2" female intake on the hydrant valve. The third due engine will engage their pumps and operate the valve only when requested by the first due engine company. Pump at an engine discharge pressure of 150 psi, unless otherwise ordered.

If the first due engine has their own hydrant on a box alarm (soft sleeve connected to a hydrant), the third due engine company will lay out from an independent hydrant and report to the front of the building. Notify, Communications of the hydrant you laid from on Channel 1, then switch to the fireground channel, and report to the front of the building to resume normal S.O.P.s for the type of structure involved.

If the third due engine company has responded on a Local Alarm, they will monitor the lay out locations for the first and second due engine companies and remain flexible to cover the water supply requirements for either one of these companies. Notify "Operations" when you arrive on the scene and await orders.

The third due engine company will operate a majority of the time to provide a backup line or exposure protection. However, "Operations" can assign this company to any sector if needed.

When operating in an attack mode sector, the third due engine company will provide a back- up line to the position of the first due engine company.

When operating in a sector providing exposure protection, the third due engine company may be assigned to the fire floor, floors above or below the fire, or to exposures 2 and / or 4.

4th Due Engine Company Operations

On box alarms the fourth due engine company will report to the hydrant or split-lay location of the second due engine company. Connect the apparatus' soft sleeve to the 4" male connection and a 3" supply line to the 2 1/2" female intake on the hydrant valve and report to the rear of the building. The fourth due engine will engage the pumps and supply the second due engine company, through the hydrant valve, only when requested by the second due engine company. Pump at an engine discharge pressure of 150 psi, unless otherwise ordered.

If the second due engine company has split their layout, the fourth due engine company will complete the split layout and charge the supply line when requested by the second due engine company.

If the second due engine company has their own hydrant on a box alarm assignment, the fourth due engine company will layout from another hydrant and report to the rear of the building. Notify Communications on Channel 1 of the hydrant from which you laid out, then switch to the fireground channel and report to the rear of the building to backup and /or assist the second due engine company.

If the response is on a **Box Alarm** that was filled out after units had responded on a local alarm, the fourth due engine company shall get the layout information necessary to complete the water supply needs of the second due engine company.

The fourth due engine company will then report to the rear of the building to backup and or assist the second due engine company, unless given another assignment by "Operations."

If the fourth due engine company is reassigned from the rear position of the building to sector providing exposure protection, the fourth due engine company may be assigned to the fire floor, floors above or below the fire, or to exposures 2 and / or 4.

The following are examples of exposure assignments:

1. Row houses - cover exposures 2 and 4 in turn as one team. (DO NOT SPLIT THE COMPANY).
2. Semi-detached - cover exposure 2 or 4.
3. High rise/apartment building - cover floor/apartment above the fire.
4. Detached building - cover adjacent exposures.

When operating in a sector attacking the fire, the fourth due engine company will supply a backup line to the position of the engine company they are backing up's attack line.

Fourth due engine companies should consider using their own apparatus' pre-connected attack lines if in a location that is advantageous.

On high rise buildings, the fourth due engine company may have to bring their own standpipe racks and/or several lengths of 3" supply line, along with a gated wye. This may be necessary to establish a water supply independent of the standpipe system.

STAGING

Level I Staging

The first and second due engines will layout and report to their assigned positions unless directed otherwise by the Incident Commander ("Operations"). The first due truck will take a position in front of the building. These companies will follow Standard Operating Procedures. The second due truck will position their apparatus to cover the rear position. The personnel of the 2nd due truck company will monitor both Fire channel 1 and the fireground channel, and remain on their apparatus unless directed otherwise by the Incident Commander ("Operations"). The 3rd and 4th due engine companies will slow their response and position their apparatus at the hydrant of, or complete the split lay of the 1st and 2nd due engine companies respectively. The personnel of these companies will remain on their apparatus, and monitor both Fire Channel 1 and the Fireground Channel for assignment and/or progress reports from other units or the Incident Commander ("Operations"). Rescue squads will slow their response and position their apparatus to allow for proper positioning should normal SOP's be resumed. The personnel assigned to the rescue squad will remain with their apparatus and monitor both Fire Channel 1 and the fireground channel for assignment and/or progress reports.

In order for Level I staging to be effective, company officers must give complete and accurate size up reports, preliminary reports, and progress reports as they acquire information.

A size-up report of an odor of food, trash outside of a building, or fire out on arrival are examples of situations where the Incident Commander ("Operations") may utilize "Level I Staging."

Until the Incident Commander ("Operations") advises companies of "Level I Staging", it is imperative that companies perform their duties as described in the Standard Operating Procedures. Deviation by companies from the SOP's is only acceptable when directed by, or with notification to, and approval of, the Incident Commander ("Operations").

If Level I staging is in effect, the Incident Commander ("Operations") will advise companies via the Fireground Channel when they should resume Standard Operating Procedures, giving a verified location of the fire, and if necessary directing companies to specific assignments.

Level II Staging

The Incident Commander designates a staging area where companies are to report. Companies arriving at the staging area will notify Command by radio of their arrival at the staging area, via the Fireground

Channel, and will await instructions from the Incident Commander ("Operations) on the fireground channel.

Level III Staging

The Incident Commander designates a staging location and assigns a Staging Officer, when Level III Staging is placed in effect. When Level III staging is in place, Communications will be notified, and an announcement will be made on the Vocalarm, Fire Channel 1, and the Fireground Channel, that Level III staging is in effect for the incident, giving the location of the staging area. In Level III Staging, companies arriving at the staging area will make no radio transmissions. Radios shall monitor the Fireground Channel. The officers of companies dispatched to the staging area will report in person to the Staging Officer.

The Staging Officer will perform the following duties:

1. Notify the Incident Commander upon arrival at the staging area, and verify the companies and units available thereat.
2. Determine if the Incident Commander would like a minimum complement of units to be maintained in the staging area. If so, the Staging Officer will contact Communications on Fire Channel 1 for additional companies and units when the number of companies in the staging area falls below the requested minimum.
3. Give assignments to companies and units. Companies and units should be given the following information:
   a. Where and whom to report to.
   b. The sector or branch to which they will be assigned.
   c. Other special instructions.
4. Maintain a list of units currently in the staging area, and a list of units (and their instructions) sent to the incident from the staging area.

FIRE ABOVE THE FIRST FLOOR OF ROW OR DETACHED DWELLINGS WITH EXPOSED FLOORS ABOVE.

The first due engine company attacks the fire.

The second due engine company covers the rear, checks the basement, advises "Operations" on the conditions found, and the status of utilities. If the fire is not in the basement, the second due engine company will check each floor as they go up, and notify "Operations" of the status of the lower floors. After checking the basement and lower floors, the second due engine will backup the first due engine company, if they have not already been backed up. The engine company not backing up the attack line (either the 2nd. or 3rd. due engine) will cover the floor or floors above the fire, providing the stairway is tenable. This company will be operating in the Exposure Sector. Before attempting to go up the stairs, they will observe the fire's location, size, and progress of the attack line(s).

If the stairway is not tenable, this company will prepare to backup the two lines operating, advance as necessary, and notify "Operations" that they will be working with the 1st and 2nd due engine companies in their assigned sector. When they can safely ascend to the floor above, they will notify and be directed by "Operations."

The third and fourth due engine companies will take care of the water supply for the first and second due engines respectively. After completing the water supply requirements, resume Standard Operating Procedures. The third due engine will backup the 1st due engine company or cover the floor(s) above the fire. The fourth due engine company will report to the rear of the building to backup the second due engine company unless they are directed by "Operations" to another assignment.

FIRE ON TOP FLOORS (NOT ATTIC) OF ROW HOUSES AND DETACHED DWELLINGS

The first due engine company attacks the fire on the top floor.

The second due engine company covers the rear, checks the basement, and reports conditions found, as well as the status of utilities to "Operations."

If the fire is not in the basement, the second due engine company will check each of the lower floors as they work their way upward, and notify "Operations" of the status of the lower floors.

After checking the basement and lower floors, the second due engine company will backup the 1st due engine company, if they have not already been backed up notifying "Operations" they are doing so.

The engine company not providing the backup line (either 2nd or 3rd due engine) will cover exposures, row or detached, unless the fire is of such magnitude that an additional line may be needed. It is a good idea to remain flexible on a lower floor of the fire building to assist with an additional line, if needed or directed by "Operations." In all cases where a third engine company is going to operate with two other engine companies in attacking the fire, "Operations must be notified.

The third and fourth due engine companies will take care of the water supply needs of the first and third due engine companies, respectively. After completing this assignment, the officers in charge shall report to their assigned positions unless directed otherwise by "Operations."

ATTIC AND COCKLOFT FIRES

The first due engine company goes to the top floor and looks for an inside entrance/stairway to the attic or cockloft area.

The second due engine company covers the rear, checks the basement, and reports to "Operations" the conditions found and the status of the utilities.

Engine companies should consider bringing a revolving distributor nozzle with an extension pipe and a ceiling hook to the top floor on attic and cockloft fires. Having the equipment available early on in a

fire, could prove valuable in containing a working fire involving an attic or cockloft, if an attack line is unable to be advanced into these areas.

If there is no fire in the basement, the second due engine company will check each floor as they go up. When they have reached the top floor, they will thoroughly check this floor because many attic/cockloft fires originate on the top floor and extend into the attic. The second due engine company will notify "Operations" of the status of the top floor and floors below.

After checking the basement and lower floors, the second due engine company will backup the first due engine company, if this has not already been done.

The engine company not providing the backup line (either the 2nd or 3rd due engine) will cover **interior exposures**, row or detached, operating on the top floor. This engine company's job will be to monitor the top floor for possible fires caused by burning material falling from the attic or cockloft. It will also be responsible for maintaining a clear stairway for attacking forces in the attic. "Operations" may assign this company to the sector with the engine companies attacking the fire, or may assign them to another sector such as the Exposure Sector. Their assignment is to provide a controlled and safe operation for the engine companies attacking the fire.

The key to attic fires is roof ventilation. If the roof is not vented quickly, interior attack lines will generally not be able to advance.

When conditions are such that attack lines are not advancing, back out. DO NOT OPERATE IN UNVENTED ATTICS. Attack lines will regroup on the top floor and prepare to attack from below with revolving distributors and extension pipes, unless conditions warrant abandoning the building.

The fourth due engine company will normally be assigned to a sector covering exposures in a confirmed fire involving an attic or cockloft of a row or detached building. If there are no exposures, or the exposures are already covered, notify "Operations" of availability.

DEFINITIONS

ATTIC: Will be considered to have a stairway that ascends from the top floor and is of a height sufficient for most people to stand.

COCKLOFT: Will be considered to be an area above the top floor ceiling and the underside of the roof. This area will not have a stairway, and will not be of sufficient height for most people to stand.

BASEMENT FIRES IN ROW AND DETACHED BUILDINGS

Basement fires are extremely dangerous. Basement fires require coordination and team- work between companies and "Operations. "Radio reports must be given by both the first and second due engine companies, before the fire can be attacked. Officers should give these required reports as soon as possible to allow "Operations" to coordinate the attack on the basement fire.

Engine companies will operate as one team towards the goal of extinguishment or exposure protection.

The first due engine company will advance a charged hose line onto the first floor of the fire building if an assessment of smoke and heat conditions provides that this can be accomplished safely. **The primary purpose of the first due engine company's hose line is to protect the search and rescue operation.** To accomplish this task, risk assessments and incremental advancement of hoselines will be based on an evaluation of the smoke and heat conditions encountered. For example, if conditions allow, the first priority will be to protect the stairs between the 1st and 2nd floors. If conditions allow further advancement, the next priority will be to locate the basement stairs and provide protection for the rescue operation from this position by closing the basement door and / or using the hose line. Conditions must be constantly evaluated. If conditions deteriorate, notify "Operations," incrementally begin to back-out of the building using the hose line for protection, and ensure that protection is maintained for the search operation. The removal of this hose line from the building will not take place until all members involved in the search and interior operations on the floors above the basement have exited the building and been accounted for.

The first due engine company will not attack the fire using the interior stairs, unless the stairway is free of smoke and the fire is obviously of a minor nature. **Notification of conditions found must be relayed to and permission received from "Operations" before descending the interior stairs.**

NOTE: THE PURPOSE OF FIRST DUE ENGINE COMPANY'S HOSE LINE IS TO PROTECT THE SEARCH AND RESCUE OPERATION, AND TO CONFINE THE FIRE TO THE BASEMENT.

If conditions allow the first due engine company to reach the interior basement stairway, they shall close the door to confine the fire. If they are unable to close the door and the fire is coming out of the doorway, they shall position themselves to the side of the opening for protection and place the hose stream at the ceiling of the stairway to prevent the fire from spreading upward into the first floor.

The first due engine company will not direct a line into the basement or attempt to extinguish the basement fire via the basement stairs.

If the first due engine company is unable to hold a position on the first floor, notify "Operations" for the protection of units that may be operating above the fire.

If the **primary search and rescue operation is completed**, and the basement fire is not under control (basement units have not reported knockdown), the first due engine company will back out of the building and remain ready to advance from a safe position.

The second due engine company shall attempt to locate a rear or side basement entrance. The fact that an exterior basement entrance does not exist or problems encountered in gaining entry will be relayed to "Operations." Upon finding an entrance, they shall **prepare** to attack the fire.

The second due engine company will not attack the fire without clearing it through "Operations," or in his / her absence, by coordinating with the first due engine company. When attacking through an outside basement entrance, consider using the nozzle on a straight stream, which will have more penetration into the fire area. Also, it will not push as much heat or fire onto the units operating upstairs.

The fourth due engine company takes care of the water supply requirements for the second due engine company and reports to the rear of building. From a rear position, they will back up the 2nd due engine company.

As the fire is attacked, windows on the sides of the house should be opened. This will allow the fire and heat to be vented to the outside, and not up the interior steps.

Basement fires involving basements with a front entrance (English style basement) often present the first and third due engine companies with the temptation to attack the fire from the front. This will only be done when conditions dictate this as the best course of action, i.e.: second due engine cannot make entrance or is greatly delayed in making basement entrance from their position, heavy fire conditions in the front portion of the basement prevent the first and third due engine companies from making entrance to the first floor, etc. In **all cases,** any deviation from our Standard Operating Procedures must be strictly coordinated with all units and "Operations," before actions are taken.

If the fire building has a front basement entrance (English basement), and it is determined by "Operations" that this is the best route of attacking the fire, it will not begin until:

1. The first due engine company has secured a position on the first floor that provides protection for the search operation.

2. It has been determined the second due engine company cannot attack, or will be greatly delayed in gaining entrance from the rear.

3. The attack is coordinated by and / or through "Operations."

The third due engine company will take care of the water supply needs of the first due engine company. From a position in the front, the third due engine company shall advance a line to the front of the fire building and remain flexible. **This line is to protect any ongoing firefighting operations in the front of the building.** It can be used in several ways:

1. It can be used as a backup line in the fire building.

2. It can be used to extinguish any fire that comes out of the basement in the front and endangers escape routes for companies inside the building. (Caution: this line should not be directed directly into the basement from the front, as to push the fire and heat back onto the 2nd due engine company, which may be advancing through the basement towards the front of the building.)

3. It can be used to attack the fire through the front basement entrance if ordered by "Operations." (Bear in mind that when this type of attack is made, there will be not be an engine company available to provide a backup line on a standard box alarm assignment.)

4. This line can be used to cover exposures as the fire is brought under control.

If the third due engine company commits to one of these assignments, "Operations" must be notified, so that another protection line can replace the third due engine company's line.

REAR PORCH FIRES - ROW HOUSES

There are generally two options for attacking fires involving the rear porches of row houses.

The **first option** is to initiate the fire attack from a front position through the interior of the row house.

The first due engine company will advance a line through the interior to attack the fire. This is the preferred method since this strategy also represents the best option to prevent extension of the fire from the back porch into the interior of the structure.

The second due engine company will position in the rear of the building. A check of the basement is still required if conditions allow the company to do this safely. The 2nd. due engine company will report to "Operations" if a basement check can be performed from the rear, and if so, the conditions found and the status of utilities when completed. If the rear of the house is too involved to check the basement, notify "Operations" immediately. This will allow "Operations" to assign the basement check to another company or delay it until it can be performed safely. The second due engine company will notify "Operations" of which exposure(s) are in jeopardy and which exposure(s) they are able to cover. Frequent updated progress reports will be given to "Operations" of changing conditions in the rear, and of the need for additional resources to accomplish their assignment.

Example: "Engine 24 to Operations, we cannot check the basement due to the heavy fire involvement and collapse potential of the back porches on the first floor. The fire is extending to Exposure 2 and to Exposure 4. We will cover Exposure 2. Two more additional engine companies and a truck company will be required to cover Exposure 4 in the rear."

"Operations" now knows the fire is extending to Exposures 2 and 4, and that additional units (2 engine companies and a truck company) will be required in the rear to cover Exposure 4.

The third due engine company will cover the water supply requirements of the first due engine company and backup the first due engine company in the front of the building in attacking the fire from the interior.

The fourth due engine company will cover the water supply requirements of the second due engine company. The officer in charge of the fourth due engine company will take his crew to the rear of the building to assist the second due engine company in preventing the horizontal extension of fire into the exposures.

The **Second Option** is to attack the fire from the exposures. This option will require strong coordination between "Operations" and companies. Care must be taken when the attack is made from the exposures that **NO** companies are inside the building or on the roof.

The first due engine company will position themselves to be protected from an attack from the exposure. (The best position is most likely in front and outside, so when the fire is knocked down and when ordered by "Operations", they can initiate an interior attack from the front of the fire building.)

The 2nd due engine company will take a position in the rear of the building and give a detailed size-up report to "Operations" as to conditions in the rear, predicted path of travel of the fire into the exposures and / or upper floors, where they are positioning themselves to stop fire spread to the exposures, and the need for additional resources. The 2nd due engine company will report to "Operations" if a basement check can be performed from the rear, and if so, the conditions found and the status of utilities when completed. If the rear of the house is too involved to allow the basement to be safely checked, notify "Operations" immediately. This will allow "Operations" to assign the basement check to another company, or delay it until it can be performed safely.

The third due engine company will cover the water supply requirements of the first due engine company. They will then report to the front of the building to backup the first due engine company in an interior attack, after companies in the rear have knocked down the fire enough to allow an attack from the front.

The fourth due engine company will cover the water supply requirements of the second due engine company. The officer in charge of the fourth due engine company will take his crew to the rear of the building to backup the second due engine company in attacking and confining the fire from the rear position by operating from the flanks of the involved buildings.

The rear engine companies will position and utilize their hoselines to keep the fire from extending horizontally into the exposures, and to knockdown the rear porches involved in fire without driving the fire into these buildings. This can usually be best accomplished by directing their hoselines at an angle from the side boundaries or flanks of the fire into the involved buildings.

It may be necessary for these engine companies to direct their hose streams onto the exposed exterior surfaces of the exposures, keeping the surface of these structures coated with a film of water to prevent horizontal extension.

It may be necessary for these engine companies to use their lines in a sweeping action to permit removal of trapped occupants.

NOTE: NEVER DIRECT EXTERIOR LINES OR HOSE STREAMS INTO ANY FIRE WHERE MEMBERS ARE INVOLVED IN INTERIOR FIREFIGHTING OPERATIONS.

Always keep in mind that on fires involving rear porches, companies in the rear of the building must give accurate and detailed reports to "Operations" as to what they see, what they are doing, and what resources they require to accomplish their assignments. These reports should be done at frequent intervals to keep Operations informed of changing conditions and the success or failure of current strategies and tactics to contain the fire.

HIGH RISE APARTMENT AND OFFICE FIRES (Four or More Floors In Height)

The first due engine company will go to the fire floor and promptly report conditions found to "Operations." As you ascend the stairs, quickly check the conditions in each of the lower floor's hallways, by opening the stairwell doors. Be certain to close the doors after checking conditions on each floor. This will preserve the integrity of the stairwell for evacuation, smoke removal, etc.

The second due engine company reports to the rear, checks the basement, and reports conditions found there and the status of the utilities to "Operations." If the basement is not accessible via the rear entrance, find an entrance (using the front if necessary), and perform the same duties as listed above.

If the basement is clear, the second due engine company will check each floor between the basement and the reported fire floor as they go up. The conditions found on the lower floors can be grouped together in groups of 3 when reporting identical conditions. (Example: "E-99 to Operations, floors 4,5, & 6 are clear, we are continuing upward.") Upon reaching the fire floor, the second due engine company will then backup the attack line (if not already done), or cover exposures on the fire floor, notifying "Operations" of which sector they will operate in.

The third due engine company will complete the water supply requirements for the first due engine company. After this task has been completed, they will report to the fire floor. The third due engine company will either backup the attack line (if not already done) or cover exposures on the fire floor, as directed by "Operations."

Examples of covering exposures:

1. *Fire in an apartment - Cover the apartments on both sides.*
2. *Fire in the hallway - Cover apartments on both sides of the hall.*

The fourth due engine company will complete the water supply requirements for the second due engine company. After completing this task, they will report to the rear of the building to backup the second due engine company unless they are given another assignment by "Operations. "If the fire does not involve the basement, the fourth due engine company will normally operate in a sector assigned to protect exposures on the fire floor or floor(s) above.

"Fall Back Position" Within a High - Rise Building

In some situations it may be decided to have companies retreat to a safe position within the fire building (usually two floors below the fire) while a rapid exterior knockdown is attempted.

The "Fall Back Position" is **NOT USED** in buildings of ordinary construction.

When companies are ordered to a "Fall Back Position", they will notify their sector officer or "Operations" that all personnel are accounted for, as well as their location within the building.

* The "Fall Back Position" is not an option when units are ordered out of the building.

HEAVY DUTY OPERATIONS

Engine companies should lay dual or large diameter supply lines if they suspect an incident will require heavy duty devices. Laying dual or large diameter supply lines initially, early into a fire, allows for greater and faster flexibility for supplying heavy duty devices (wagon pipes, monitor nozzles, ladder pipes, 2 1/2" handlines, etc.) when ordered.

It is important to remember that having adequate water supply in the front and rear of a building will greatly aid in the quick deployment of heavy duty operations.

Consider using the wagon pipe supplied from the apparatus tank for a quick knockdown in unoccupied structures that are heavily involved with **NO EXPOSURE PROBLEMS.**

The portable wagon pipe / monitor nozzle is usually used where a heavy duty device is needed in a location where apparatus cannot be positioned.

When setting up for "Heavy Duty Operations", anticipate the possibility of a structural collapse. Do not work in the potential "collapse zone", **a distance from the building of at least 1 1/2 times the building height.** In an incident that is going from an interior, offensive mode, to a defensive, exterior operation, it may be necessary to reposition apparatus and/or hoselines to remove them from the "collapse zone." Collapse zones should be marked with yellow barrier tape.

Example: A 40' high building can collapse out to a distance of 60' from the base of the walls. Do not operate or work within this area.

When heavy duty appliances are operating, do not use exterior handlines at the same time unless:

1. Heavy duty devices cannot reach the area.

2. There are no risks to members on the handlines.

3. Protecting exposures.

In heavy duty operations on exposures, a key factor is to get well ahead of the fire and stop the progression of extension.

When involved in heavy duty operations in one story commercial buildings having a **wide roof span** (such as supermarkets, large stores, auto repair shops and dealerships, etc.), anticipate and beware of the possibility of a rapid roof collapse due to the use of unprotected, lightweight, steel trusses or bar joist construction. If there is fire impingement on these types of buildings, do not enter the building. Take a position on the exterior, outside the "collapse zone" and setup for heavy duty operations.

TRUCK COMPANY OPERATING PROCEDURES

Introduction

The following information is intended as a guideline to help standardize and improve the operations of our truck companies, both on the fireground, and on the scene of other emergencies. Preparation is the key to successful truck operations. Preplanning and drilling are essential for a truck company to become proficient in performing their assigned tasks. Since truck company operations are difficult and demanding, all members must understand their assignments, be capable of independent judgment, and must always operate at maximum effort to accomplish their assigned mission.

GENERAL TRUCK COMPANY PROCEDURES

The primary responsibilities of the Truck Company are as follows:

1. Size-up by all members of the truck company
2. Rescue
3. Forcible entry
4. Laddering
5. Ventilation
6. Exposures
7. Utilities
8. Overhaul and salvage

This list does not establish priorities since each function may have its importance change. Depending on the particular set of circumstances, an on-scene size-up by all members of the truck company may determine that laddering the building or ventilation may, in fact, cause a rescue to be made that otherwise would not have been possible. On working fires, truck company officers should not have to give detailed orders. Truck personnel should know in advance what is expected of them and must be able to think as individuals, **work as a team,** and be prepared to initiate any task that is necessary. While a truck officer cannot directly supervise all members on the fireground at the same time, he/she must be aware of where the members are, what they are doing and when he/she should expect to see or hear from them. The type of construction and size of the building involved, can cause major differences in the way that truck companies accomplish their primary responsibilities. Truck Company operations on

fires are divided into two (2) main categories, low rise (three floors or less) and high rise (four or more floors). The occupancy and use of the structure will also require some special considerations.

TYPE OF OCCUPANCIES

Residential (usually low rise)

a. Rowhouse
b. Semi - detached
c. Detached
d. Low-rise apartment buildings (3 floors or less), garden style apartments

Apartment buildings, Office buildings, Government buildings, Museums, Dormitories and Hospitals (usually high rise)

Commercial buildings (may be low or high rise)

a. Warehouses
b. Manufacturing plants
c. Repair facilities
d. Retail stores

Truck companies will respond to other types of incidents that will require varying tasks. The procedures for these calls are discussed in other Fire Department publications.

NOTE: A thorough knowledge of building construction is an invaluable tool for truck company personnel in assisting with all areas of truck operations.

RESIDENTIAL FIRES, LOW-RISE CONSIDERATIONS

SIZE-UP

Size-up should begin by all members upon receipt of the alarm. The type of alarm, time of day, type of construction, reported fire location, address, etc. are all considerations the truck company personnel should be considering. Upon arrival, members should combine initial size-up information with the on-scene conditions, and continue their size-up throughout the incident. Truck company personnel should use the RECEO model (rescue, exposures, confine, extinguish and overhaul) when conducting on-scene size-up to set the truck company's operational priorities.

RESCUE

While all occupied building fires can have multiple rescue problems, more people die in residential fires. They have a high probability of occupants being asleep or otherwise more vulnerable to becoming trapped in a fire. In residential fires, if the occupants are cut off from the interior stairs (the first option

for rescue) because of fire on a lower floor, the trapped occupants may be rescued from windows (via ladders) or fire escapes. Houses often have front and/or rear porch roofs that could give the occupants temporary refuge from the fire.

NOTE: Many porches have been renovated, so the porch stability should always be considered for safety reasons by members conducting rescues or laddering in these areas. No area of a house should be overlooked at any time, but the time of day may play a role in where the rescue operations initially should be focused; i.e. at night - the occupants would be in the bedroom, etc.

FORCIBLE ENTRY

If the Engine companies are having trouble gaining entry, the truck company must assist with this task. Forcible entry problems are generally encountered in gaining access to the building itself (i.e. bars on windows and doors, multiple locks on exterior doors, etc.); however, once inside, forcible entry into individual rooms usually can be accomplished by the Engine company attacking the fire.

NOTE: Some dwellings are often changed from their original use and this poses some additional life hazards for responding units. An example of this can be seen in some single family houses that have been converted into rooming homes with compartmentalized floor plans, partition walls, etc. In these cases, multiple interior door locks and a greater number of occupants can be expected. An observant truck company can recognize these unusual dwellings by observing such clues as multiple gas meters either in front of the house or possibly in the hallway, multiple mail boxes or even multiple door bells at the entrance. This valuable information can be acquired by routine inspection of the dwelling and by observing these features while on other calls.

LADDERING

Laddering will depend on many factors, such as height of the building, type of construction, location of the fire, apparent rescues, position of the truck, etc. The truck company personnel must compare their initial size-up information from the dispatcher with on scene conditions, and then decide why, when, where and how to ladder the structure.

VENTILATION

Venting a residential building fire usually involves taking out the windows and removing roof hatches or skylights. Sometimes the roof must be opened by either natural openings (skylights, vents, hatches, etc.) , mechanical means (saws, pry bars, axes, etc.) or a combination of both. Truck company personnel should determine and verify where ventilation needs to be performed and then carry tools and/or saws with proper cutting blades to position early to have a quick impact on firefighting operations. Ventilation, either natural or mechanical is usually not a problem in house fires because of the large number of natural openings. Natural ventilation generally occurs in the early stages of the fire by opening up windows and mechanical occurring after the fire has been brought under control. When planning for

ventilation, consideration should be given to wind direction if possible. A more detailed study of ventilation operations, including horizontal and vertical, can be found in the Training Manual.

EXPOSURES

Covering interior exposures above a fire can usually be accomplished through a variety of access points to the upper floors. Exterior exposures are attached or detached structures whose conditions should also be taken into consideration by the truck company. The location and projected path of the fire along with the wind speed and direction are crucial factors to the truck officer to consider in order to accurately check and report any exposure problems. When checking exposures, keep in mind that fire will find void spaces and channels in which to travel. Opening up areas in an exposure (accompanied by a charged hose line) where fire has possibly extended is the key to stopping fire spread. Damage to an uninvolved structure must be based on good judgement and the probability of fire spread. When checking for fire spread, feel the baseboards, walls, floors and ceilings for heat. It is always good practice to open up a concealed area if there is a chance of extension of the fire.

UTILITIES

The 1st due truck company is ultimately responsible for utility cut-off. However, the engine company SOP's provide for the 2nd due engine company to attempt to shut them off while checking the basement and notify Operations. This task is sometimes easier for the engine company because of their early entry into the basement. Usually in row, semi-detached, detached houses as well as low rise and garden apartments, the electric panel is located in the basement. The gas meter may be found either be in the basement or in the front of the building.

OVERHAUL AND SALVAGE

Overhaul and salvage during single family/low rise apartment building fire operations includes opening up concealed spaces in the fire building and exposures (in conjunction with charged hose lines) around baseboards, walls, floors, pipe chases and ceilings where fire has impinged or thought to have spread and reporting this to Operations. Remember to always get ahead of the fire when opening up concealed spaces and work your way back to the fire. Salvage operations include protecting property from unnecessary damage from the fire, water, smoke, etc, through the use of salvage covers, furniture removal, etc. A more detailed study of Overhaul and Salvage operations can be found in the Training Manual.

APARTMENT /OFFICE BUILDING FIRES, 4th FLOOR OR HIGHER (USUALLY HIGH RISE)

SIZE-UP

Size-up for apartment/office buildings, as in any other structure, by truck company personnel begins at the receipt of the alarm. The type of alarm, address, type of building, occupancy use and construction, number of floors, the reported fire floor and apartment number, etc., are all important pieces of

information needed to begin the size-up. The truck personnel must combine this information with the on scene conditions and continue their size-up throughout the incident. The size-up conditions will dictate the truck company's strategy based on the RECEO model.

RESCUE

Consideration should be given by the truck or rescue squad officer to designate a stairwell that is clear of hazardous conditions for evacuation when necessary and notifying Operations of these actions so that other means of egress can be used for attack and smoke removal. The designated evacuation stairwell should then be pressurized with fans or blowers to maintain a clear environment. If the stairwells are not accessible due to smoke or fire, the occupants may be found at the windows.

When multiple rescues are presented, start with those that are at greatest risk (i.e. fire floor, floor above the fire, top floor and then the roof). In some large buildings with good compartmentalization, areas within the structure can be used as a safe refuge to keep trapped occupants without removing them through hazardous environments. If this is done, Operations must be notified and a team must be assigned to stay with them in the safe area to reassure them of their safety and report any change in conditions in the area.

FORCIBLE ENTRY

Apartment and office buildings present many forcible entry problems. If the engine company is having trouble gaining entry to the building, the truck company will need to assist with this task. Entry to the building itself could be a problem because of the various security measures (i.e. barricades, plexiglass doors and windows, electronic surveillance, revolving doors, etc.) being utilized today. The use of preplanning, management provided keys, etc. can save companies much time and reduce building damage by allowing quick, clean access to buildings, hallways, offices and/or apartments. Sometimes a ladder to an upper floor will provide access that allows a team to unlock the door from the inside. If these aids are not available, the rabbit tool, rams, power saws, sledge hammer and haligan bar will allow companies to access these blocked entrances.

NOTE: Keep in mind that many apartment and office buildings may have interior and/or stairwell doors that are kept locked at all times.

LADDERING

Laddering apartment/office high-rise buildings depends on many factors, such as height of the building, type of construction, location of the fire, apparent rescues, position of the truck, etc. The truck company personnel must combine their initial size-up information with on scene conditions, and then decide why, when, where and how to ladder the structure. Laddering a high rise fire (above the 3rd floor) usually involves utilizing the aerial ladder. Ground ladders reaching the 4th floor and above are not normally carried on truck companies. The proper placement of the apparatus will be crucial in order to gain the full benefit of the aerial ladder.

VENTILATION

Truck company personnel should determine where, when and how the ventilation of apartment/ office buildings needs to be accomplished. The officer should notify Operations of these intentions to insure that their tactics do not conflict. Ventilation of these types of structures usually requires removal of windows and may require roof venting. Good judgement and experience will be necessary before deciding to break glass in high rise building fires since it can sail great distances and endanger those below (Clear with Operations before starting this procedure). Consider the wind conditions by checking with roof team, communications, other outside units, etc. before starting any ventilation procedures. Additionally, relayed information about the location of elevator shafts and/or stairwells from the roof team can assist the truck officer with ventilation and evacuation. In large buildings, the use of existing ventilation systems may be used to remove smoke, or can be shut down to stop the spread of smoke.

Many modern buildings have fire control rooms that enable remote operation of all built in ventilation systems. Building engineers, inspections and pre-planning will be needed to effectively use these controls. Also, if the building has operating sprinkler systems, they should be shut down once the fire is brought under control due to their negative effect on smoke removal.

NOTE: The sprinkler system should be placed back (by the Rescue Squad) in service prior to leaving the scene if possible. If this is not possible, then proper notification has to be made to communications.

Apartment and office high-rise building fires are difficult to ventilate due to their size, configuration, etc., and positive pressure ventilation, if used correctly, can be effective in the removal of smoke without spreading it to other areas of the building.

EXPOSURE

Apartment and office buildings can offer exposure problems, both horizontally and vertically. Checking these interior exposures (adjacent apartments as well as those above and below) is vital to controlling the spread of the fire. Fire spread can occur to the upper floors and adjacent units via an exterior path of travel (i.e. soffit) or through interior openings (i.e. pipe chases and void spaces) The truck company must ensure that a continuing size-up is done during firefighting operations. If on-scene resources can not meet the demands of the situation, additional assistance must be requested with enough lead time to meet those demands. The roof team can be very instrumental in providing up to date reports on fire spread. A view of the rear and all sides of the building is often available from the roof giving the roof team a unique perspective. The determining factor in stopping most fires is to get ahead of it. The roof team can also provide the truck officer information about load hazards on the roof. The size and location of air conditioning and/or chiller plants can be vital information to Operations when fire is spreading to the upper floors of apartment and office buildings. In addition, the roof team should be alert for any accumulation of water, snow and ice that can create a dangerous load on a structure.

UTILITIES

Although the 1st due truck company is ultimately responsible for utility shut-off, the 2nd due engine company is required to attempt to shut them off while checking the basement and notify Operations. In apartment buildings, the utilities are **normally** located in a utility room in the basement (meter room). In this room, the apartment gas and electric meters are required to be individually marked. Due to the 2nd due engine company's early access to the basement, it is sometimes easier for them to accomplish this task. However, in the event that the 2nd due engine is unable to get the utilities, that task can be delegated to the 2nd due truck company by the 1st due truck company officer/vent leader. Shutting off the gas to the entire building should not be performed unless agreed to by Operations.

OVERHAUL AND SALVAGE

Overhaul and salvage operations at high rise apartment and office buildings involves the same tactics as in other structures. Opening up concealed spaces with charged hose lines in place, getting ahead of the fire and reporting progress and conditions to Operations, are truck company procedures for overhaul. Salvage should include checking multiple floors above and specifically below the fire floor, for water damage and/or smoke conditions.

COMMERCIAL BUILDINGS (CAN BE LOW RISE OR HIGH RISE)

SIZE-UP

Size-up for commercial buildings begins for the truck company at the time the alarm is received and should continue throughout the incident. The type of alarm and occupancy, address, building construction and contents, reported location of the fire, time of day, etc. are important elements for the truck company to begin setting up their tactical plan. On scene conditions should be combined with dispatch information to set up for RECEO. Any change in conditions should be monitored and reported to Operations.

RESCUE

While commercial buildings may have rescue problems during business hours, they are normally unoccupied at night. However, some small neighborhood stores are sometimes the exception when a residence is on the premises. These family owned businesses may have family members or employees actually residing in or above the store depending on the type of structure. In larger commercial buildings, there may be security and/or cleaning personnel in the building. Look for clues that these occupants may be inside after working hours, i.e. cars in the parking lot, lights on in the building, elevators not in the lobby or cleaning equipment in the hallways. Also, pre-plans of the structure may detail this type of information.

NOTE: Large office buildings present a danger to companies in low visibility because they often contain a maze of partitions. While searching these large open areas for victims, use a rope or do not leave the hose line.

FORCIBLE ENTRY

If the engine company is having trouble gaining entry into this type of structure, the truck will need to assist in this effort. Forcible entry problems in commercial buildings are usually found at the entrances, because of security measures (bars, grates, multiple locks, metal roll-up doors, etc.) It is common practice to find barricades in front of egress points throughout these types of buildings, and this could hinder the ability of members to abandon the structure, should this be necessary. With this in mind, clear these pathways and take the necessary steps to ensure that all forced openings are made wide and long enough to allow for a possible quick exit. Selection of the proper tools to gain entry in these cases is essential. The rescue saw with proper blade, rabbit tool, sledge hammer, slice pack and halligan bar would be effective tools that can be utilized.

NOTE: Remember, the larger the opening the better for advancing hose lines, for rescue operations and ventilation.

LADDERING

Laddering commercial buildings will depend on many factors, such as height of the building, type of construction, location of the fire, apparent rescues, position of the truck, etc. The truck company personnel must combine their initial size-up information with on scene conditions, and then decide why, when, where and how to ladder the structure.

VENTILATION

Venting commercial buildings may involve taking out showcase or plate glass windows, regular windows and/or roof venting. Sometimes larger businesses have existing mechanical systems that can be utilized to help ventilate. Due to the large span of roofs in many commercial buildings, bar joists and truss construction is common. This type of roof structure should be recognized and reported to Operations ASAP because they often fail in the early stages of a fire (approximately 5-10 minutes) and may offer no warning of a collapse. Roof teams should exercise extreme caution and prior knowledge of these features can save lives.

EXPOSURES

Exposure coverage in commercial buildings usually involves internal coverage on the fire floor, adjacent floors as well as protecting external exposures. A high dollar loss can sometimes result from smoke and water damage to merchandise in areas of commercial buildings not directly involved in the fire. Protecting exposures and their property that are not damaged from fire, water and smoke is more important than the contents involved in the fire and may require calling for additional units for assistance.

UTILITIES

Although the 1st due truck company is ultimately responsible for utility shut-off, the 2nd due engine company is required to attempt to shut them off while checking the basement, and notify the vent leader and/or Operations. In office buildings, the utilities may be located in the basement electric room/ meter room. It is not unusual, however for the gas and electric cut-offs to be located in the individual offices or even outside the building. Because of the early access by the 2nd due engine company to the basement, it is sometimes easier for them to address this task and report to Operations. In those cases where the 2nd due engine cannot get to the utilities, this task can be delegated to the 2nd due truck company by the 1st due truck company officer/vent leader.

OVERHAUL AND SALVAGE

As previously mentioned, commercial buildings present the possibility of high dollar loss to merchandise and/or equipment such as computers, communications equipment, furniture, etc. from smoke and water damage. Covering and/or removing these products in exposed, uninvolved areas will help prevent serious losses.

GENERAL TRUCK COMPANY RULES FOR PORTABLE LADDER PLACEMENT

The prompt and proper placement of ground ladders is vital for fireground rescue and ventilation. When placing a ladder, have a reason for placing it. Ladders are generally placed for civilian rescue, however, they are also there for Fire department members to make entry into or exit from a building. They can also be used to help ventilate from the outside or, in some cases, used to assist in advancing hose lines.

NORMAL ORDER OF LADDERS (FOR RESCUE)

1. Fire Floor
2. Floor above the Fire
3. Top Floor
4. Roof

NOTE: Generally, truck teams should place the largest needed ladder first so that if a second smaller ladder is needed, one member might be able to place it. When ventilating multiple windows with a ladder, start with the window above the door (check for companies working below the window first) and work away from that opening so that the last window ventilated will not allow the ladder to block the entrance.

GENERAL TRUCK COMPANY RESPONSIBILITIES

Truck work is rarely predictable, always physically demanding, and requires constant re-evaluation. Many activities need to be carried out simultaneously and close supervision by one person is not always

possible. Size-up and personnel safety assessments must be an ongoing process done by all members, but particularly by the officer in charge.

NOTE: Upon assuming duty, it is vital that all truck company personnel make a complete and thorough check of all tools an appliances, as per article XX of the Order Book, to be sure that they are in good working condition.

First Due Truck Company Responsibilities

- Officer and members listen to initial response information and first arriving companies reports
- Take front position, give complete size-up report if not given
- Rescue
- Forcible entry
- Laddering and venting of the front, sides, (if possible), roof, rear (if only one truck responding)
- Truck operations on the fire floor, with the exception of basement fires. (When the fire is in the basement, 1st due truck is normally responsible for the floor(s) above the fire
- Checking for extension in the walls, ceilings and attic areas. (Concealed spaces must be opened up and checked as quickly as possible to prevent the spread of undetected fire)
- Lighting and ventilation
- Utility shut-off, if not done by 2nd due engine
- Perform salvage on the fire floor
- Notify Operations of any deviation from normal position and/or operations

Lead the Vent Sector, if assigned by Operations

The term Vent sector is used to indicate truck work in general and is not necessarily limited to ventilation. The Vent sector officer's responsibilities include:

- Communicate with Operations and units assigned to his/her sector
- Monitor work progress and make adjustments as needed to accomplish goals
- Coordinate sector assignments
- Monitor safety, accountability and welfare of sector personnel

Second Due Truck Company Responsibilities

- Listen to on scene reports then accurately size-up and report the conditions as they arrive on scene
- Cover the rear position. (If coverage will be delayed, notify Operations)
- Operate within assigned sector
- Rescue
- Rear forcible entry
- Laddering and venting the rear, and sides if possible
- Assist the 1st due truck with roof ventilation if needed. Listen for reports from the 1st due roof

team concerning their progress. If they report the roof open then assist in other needed areas. If no report has been given, contact them and ask if they need assistance.
- Check on status of utilities if not covered, coordinate with vent leader/2nd due engine.
- Operate on the floor(s) above the fire, except basement fires when the 2nd due truck is usually responsible for truck operations in the basement.
- Check for extension in the walls, ceilings and attic areas. Be in contact with the vent sector leader to insure proper coverage when opening up above the fire.
- Lighting and ventilation where needed. (Check with vent leader).
- Perform salvage on the floors below the fire.
- Notify Operations and/or sector leader of any deviation from normal position and/or company operations.

Truck companies operating under the Vent Sector leader should communicate with each other in order to coordinate:

- Rescue operations
- Roof ventilation
- Evacuation
- Ventilation of the building
- Utility shut-off

NOTE: Truck companies responding on Task Force Alarms, Multiple Alarms or Special Alarms will be assigned positions and tasks by Operations.

USE OF TEAMS - TRUCK COMPANY OPERATIONS

In order to use truck company manpower in the safest and most efficient manner, two teams are used; **the ventilation team and the roof team.** Although Truck Company officers are responsible for the overall truck operations, they will work with the 4th and 5th person, if so assigned, to form the **ventilation team.** The Truck technicians (driver and tillerperson/tipperator) will form the **roof team.** These two teams can operate separately or together, depending on the situation. Many times the type of structure involved will dictate how the two teams will perform.

NOTE: When truck companies are at a level of 5 members, the truck officers will assign the 5th person to the ventilation team, raising that compliment to three members. These members will work together performing outside and inside tasks as directed by the officer, entering and exiting the building as a team. The responsibility of ensuring that all members of the truck company work in teams, each team operating with a portable radio, should be adhered to by the truck officer at all times while conducting truck company operations. No member should operate alone.

NOTE: When conducting truck company operations, Truck teams must not get ahead of hose lines, for the following reasons:

1. **Conditions may rapidly change, and there would be no hose line protection.**

2. **The fire may get between the truck company team and the attacking hose line, causing the fire to be driven onto the truck team.**

3. **They may become disoriented or lost.**

TRUCK COMPANY PROCEDURES

The following truck company standard operating procedures apply to the type of occupancies described earlier, i.e. **Residential (low-rise detached, semi-detached, and row houses & garden apartments) and high-rise (apartment buildings, government buildings, dormitories, hospitals, museums, etc.). Commercial buildings can be either low-rise or high-rise.**

STRUCTURE FIRE - RESIDENTIAL (low rise 3 floors or less) AND HIGH RISE BUILDINGS, FIRE BELOW THE 4TH FLOOR

The steps below meet most typical situations. Adjustments may need to be made depending on the experience and good judgment of the truck company, and the conditions presented at the scene.

FIRST DUE TRUCK COMPANY - (front position)

NOTE: When the fire is in the basement, the 2nd due truck assumes the duties of the 1st due truck and vise versa.

VENTILATION TEAM

The ventilation team will be comprised of the Truck Officer and the 4th /and 5th persons if so assigned.

Responsibilities

- All members must know basic information from the dispatcher (address, position due, location of fire within the building, people trapped, etc.).
- The truck officer will start generator (enroute if possible).
- All members will assist with positioning the truck and the truck officer will report on scene conditions to Operations, if not previously done.
- The truck officer must communicate with Operations and make recommendations when necessary, i.e. changing conditions, rescue problems, structure problems, etc.
- The truck officer will be the vent sector leader when assigned by Operations.
- The truck officer must constantly evaluate the safety of personnel and make adjustments when necessary.

- The truck officer must ensure forcible entry is completed and the fire is located, assisting if necessary.
- The team will ladder the building and perform rescues if necessary (consider ladder placement for fire fighter exit). The location of the fire will determine when and where horizontal ventilation in the fire area should be done, using the RECEO model for guidance.
- After entering the structure, the team will attempt to locate entrapped victims, perform rescues as needed, conduct horizontal ventilation and check for extension, reporting these actions to Operations.
- Once the fire is knocked down, the team will begin overhaul and salvage by checking for extension in concealed spaces.
- The truck officer will ensure that utilities are cut off and that Operations is notified.
- The truck officer will supervise with interior overhaul and salvage on the fire floor, and coordinate other floors with companies assigned to the vent sector.

ROOF TEAM

The Roof Team will be comprised of the Truck Driver and Tillerperson/Tip-operator

Responsibilities

- The team (technicians) must know the address, position due and running route to the incident.
- All members will assist in positioning the truck in the front of the building.
- All members will size up the structure on-scene (front, sides and rear if possible) and the truck officer will report conditions to Operations with recommendations as necessary, unless previously reported.
- The team will set chocks, toe plates and jacks for safe operation of the truck.
- The team will perform obvious rescues with aerial and/or ground ladders as needed.
- The team will go to the roof via aerial or ground ladders (carry SCBA, radio and proper tools). The team will check all four (4) sides of the building, if possible. They will perform vertical and/or horizontal ventilation as needed, following the RECEO model for reference, clearing and relaying this information to Operations and/or the truck officer. They will perform vertical ventilation by removing hatches, skylights, etc. and report this information and any vertical extension of fire to the truck officer.

NOTE: If it becomes necessary to break out skylights, notify Operations first so that notification can be made to members inside. (Remove as much glass as possible out onto the roof.)

Once the roof operations are complete, the team will check with the truck officer for additional assignments, i.e. setting up lights, fans, and opening up concealed spaces.

SECOND DUE TRUCK COMPANY - (rear position)

VENTILATION TEAM

The Ventilation Team will be comprised of the Truck officer and the 4th / and 5th persons if so assigned.

Responsibilities

- All members must know the basic information provided by the dispatcher, (address, position due, location of fire, people trapped, etc.).
- The truck officer will start generator (enroute if possible).
- All members will assist with positioning truck in rear if possible (if not feasible park the truck clear of the alley to allow easy access by other units).
- All members will size-up the structure and the truck officer will report conditions to Operations, if not previously reported.
- All members will listen for on scene reports by 1st due truck officer and roof team.
- The truck officer must constantly evaluate the safety of personnel.
- The team will ensure forcible entry in the rear is complete, assist if needed.
- The team will ladder the rear, perform rescues as needed and coordinate ventilation needs with the Vent Leader.
- The truck officer will verify with the Vent Leader that the utilities are shut off.
- The team will check for extension above the fire, report conditions to Operations and the Vent Leader.

ROOF TEAM

The Roof Team will be comprised of the Truck Driver and Tillerperson / Tip-operator

Responsibilities

- The team (technicians) will know the address and rear position due response route.
- All members will assist with the positioning of the truck in the rear if possible (If not feasible, park the truck clear of the alley to allow other units access).
- The Team will set chocks, toe plates and jacks for safe operation of the truck
- The Team will perform rescues as needed in the rear via aerial and/or ground ladders.
- The team will contact the 1st due truck's roof team to see if they need assistance on the roof. If not needed, they will check with the 2nd due truck officer for additional assignments in other areas, i.e. setting up lights, fans, etc.

HIGH-RISE BUILDINGS - FIRES ABOVE THE 3RD FLOOR

These steps will meet most typical situations in high rise buildings for fires above the 3rd floor. However, conditions presented at the scene may cause some adjustments to be made. The truck company must use experience and good judgment to overcome these conditions.

<u>FIRST DUE TRUCK COMPANY-</u> (front position)

VENTILATION TEAM

The Ventilation team will be comprised of the Truck Officer and the 4th/ and 5th person if so assigned.

Responsibilities

- All members must know the basic information provided by the dispatcher, (address, position due, report of people trapped, etc.).
- The truck officer will start generator (enroute if possible)
- All members will assist with positioning the truck.
- All members will size-up the structure on scene (front, sides and rear if possible), and the truck officer will report conditions to Operations with recommendations as necessary, if not previously reported.
- The truck officer must constantly evaluate the safety of personnel.
- The team will bring SCBAs, light bag, 2 hooks, rabbit tool, sledge hammer, haligan bar, radio and enter as a team.
- The team will ensure forcible entry to the building has been accomplished, assist if necessary.
- The team will use the stairway to reach the fire floor, and the truck officer will advise Operations of the conditions of the lower floors as the team advances.

NOTE: While checking the lower floors, the team should also check their layout for quick reference and to assist them in locating the apartment on the reported fire floor, as well as other stairs, etc. The team should then ascend to the fire floor and attempt to locate the fire, checking the hallways for victims.

The team will ensure refuge areas are created on the fire floor, then forcing entry to the apartment and/ or room of origin (with a charged hose line in place) and the fire is located **<u>prior</u>** to performing horizontal ventilation, and the truck officer will advise Operations of these steps. The team should search the fire area for victims, only if safe to do so. If the room is heavily involved, wait for a charged hose line. If the door is found open, close the door to the involved area until lines are ready to advance. The truck officer must keep Operations informed of the teams progress and fire floor conditions.

NOTE: Risk assessment and incremental advancement of teams will be based on an evaluation of the smoke and heat conditions encountered.

NOTE: The team must consider the wind direction when venting high-rise building fires. DO NOT ventilate ahead of charged hose lines.

After the fire is knocked down, the team will check for extension in concealed spaces by opening up walls, ceilings and floors with a charged line present. The truck officer will report the results of these actions to Operations, giving recommendations as necessary.

The Vent Leader will coordinate sector assignments on the fire floor and floors above and below the fire. The truck officer will ensure that the utilities are cut-off. The truck officer will supervise overhaul and salvage operations of truck company personnel. If the 1st due truck officer is the Vent Leader, he/she will supervise all units assigned to the vent sector.

ROOF TEAM

The roof team will be comprised of the Truck Driver and the Tillerperson/Tip Operator

Responsibilities

- The team must know the address, and the front position running route.
- All members will assist with positioning the truck.
- All members will size-up the on scene conditions from the front, and sides if possible.
- The team will set chocks, toe plates and jacks for safe operation of the truck.
- The team will perform rescues using the aerial ladder and notifying Operations of their actions.
- The team will go to the roof with SCBA via the aerial ladder or inside non- contaminated stairwell, if possible, for vertical ventilation and roof report.
- The team will perform vertical ventilation and report the specifics of these actions to Operations and/or the sector leader, i.e. which stairwell is open and the conditions of each opening, etc.
- The team will check all 4 sides of the building and report the conditions to Operations and/or sector leader with recommendations for assistance as necessary.
- Once the roof operations are complete, the team will contact the truck officer for additional assignments.

SECOND DUE TRUCK COMPANY - (rear position)

VENTILATION TEAM

The ventilation team will be comprised of the Truck Officer and the 4th/ and 5th person if assigned.

Responsibilities

- All members must know the basic information provided by the dispatcher, (address, rear position due running route, reported location of the fire, if people are reported trapped, etc.).
- The truck officer will start generator (enroute if possible).
- All members will assist with positioning the truck in the rear if possible. (If not feasible, park the truck clear of the alley so other units have access).
- All members must listen to on scene reports from first arriving units.
- All members must size-up the rear, and sides if possible, and the truck officer will report conditions to Operations, if not previously reported.
- The truck officer must constantly evaluate the safety of personnel.
- The team will bring SCBAs, light bag, 2 hooks, rabbit tool, sledge hammer, haligan bar, radio and report to the rear entrance.

- The team will ensure forcible entry to the rear has been accomplished, assist if needed.
- The truck officer will report conditions in the basement, including utility shut off, to Operations if not already done.
- The team will use a stairway to advance and check the floor above the fire, and the truck officer will report the conditions to the vent leader.
- The team will perform rescues if needed and report these actions to Operations, along with recommendations for assistance.
- The team will assist with evacuation of civilians, if needed, and the truck officer will report these actions to Operations.
- The team will check for extension above the fire and perform horizontal ventilation if needed, reporting these actions to the vent sector leader.
- Once these tasks are completed, the team will advance to the top floor and the truck officer will report the floor number and its condition to the vent leader. The team will then work their way down checking lower floors and the truck officer will report their conditions in groups of 2 or 3 to the vent leader.
- After completing this task, the team will contact the vent leader for additional assignments, i.e. salvage and overhaul on floors above and below the fire floor.

ROOF TEAM

The roof team will be comprised of the Truck Driver and the Tillerperson/Tip Operator

Responsibilities

- The team must know the address and rear position due running route.
- All members will assist with positioning the truck in the rear, if possible (If not feasible, park the truck clear of the alley to allow easy access for other units).
- The team will set chocks, toe plates and jacks for safe operation of the truck
- The team will conduct a size-up of the rear position.
- The team will check, via radio, with the 1st due truck's roof team to see if they need assistance, and what is the best possible access to their location. When going to the roof to assist, the team will take SCBAs, radio and proper tools and advise the 2nd due truck officer of these actions.
- If assistance on the roof is not needed, the team will check with truck officer, and report to the floor above the fire wearing SCBA, and bring fans and axes to assist where needed.
- The team will assist with overhaul and salvage where needed.

NOTE: To eliminate duplication of effort and to conserve resources, members of truck companies must coordinate their activities. On incidents, the driver and tillerperson/tip operator of the second due truck will have some latitude depending on the situation. This freedom to choose should be directed to the overall goals of Operations. All members should immediately assist other members as soon as they have completed their assignments. Any time a team is going into the area involved they should carry some hand tools they believe may be needed rather than wait until the tools are called for.

EMERGENCY INCIDENT REHABILITATION

The Department recognizes that the physical and mental demands associated with emergency service operations, coupled with the environmental dangers of extreme heat, humidity and cold with wind chill conditions, creates an adverse working environment for department members. Those members who are not provided adequate rest and hydration during emergency operations and training are at increased risk for illness or injury, and may jeopardize the safety of others on the incident scene. When emergency responders become fatigued, their ability to operate safely is impaired. As a result, their reaction time is reduced and their ability to make critical decisions is diminished. Rehabilitation is an essential element at the incident scene to prevent more serious conditions such as heat exhaustion or heat stroke from occurring.

The need for emergency incident rehabilitation is cited by several standards. Recent studies have concluded that emergency rehab will result in fewer accidents and injuries. Emergency responders who are given prompt and adequate time to rest and re-hydrate and receive medical screening for abnormal vital signs, may safely re-enter the operational scene, after being cleared by the Rehab Officer.

The following Standard Operating Procedures will enable the Incident Commander to provide the required emergency services and ensure adequate safety precautions are being followed.

Scope

This procedure shall apply to all emergency operations and training exercises where strenuous physical activity or exposure to heat or cold ha occurred.

Responsibilities

1. **Incident Commander** - The Incident Commander shall consider the circumstances of each incident and make adequate provisions early in the incident for rest and rehabilitation for all members operating at the scene. These provisions shall include medical evaluation, monitoring, treatment and transportation, if indicated. The IC should also consider requesting the Canteen unit to assist with fluid replenishment and/or food at extended operations and ensuring that members are given relief from extreme climatic conditions.

2. **Company and EMS Officers -** All supervisors shall maintain an awareness of the condition of each member operating within their span of control and ensure that adequate steps are taken to provide for each members safety. The company or EMS officers shall utilize the Incident Command structure to request relief.

3. **Personnel -** During hot weather, members shall be encouraged to drink water throughout the work day. If members participate in physical training they are to pay strict attention to their intake of fluids and ensure that they are properly hydrated. If a member believes that their level of fatigue or exposure to the environment is approaching a level that could affect themselves, their crew, or tasks they are working on, they are to immediately notify their Company or EMS Officer.

Establishment of a Rehabilitation Sector

1. **Responsibility -** The Incident Commander will establish a **Rehab Sector** when the duration of the incident reaches 30 minutes or conditions indicate that rest and rehabilitation is needed for personnel operating at an incident scene, i.e. Multiple alarm fires, prolonged rescue operations or training exercises. The Rehab Officer will be a Paramedic and have the authority of the Safety Officer where the medical condition of the members is in question. The Rehab Officer will report to the EMS Control Officer.

2. **Location -** The location for the Rehab area will be designated by the Incident Commander. If the IC has not designated an area, the Rehab Officer shall select an appropriate location based on the site characteristics.

3. **Site Characteristics**

    a. It should be in a location that will provide physical rest by allowing the body to recuperate from the demands of the incident.

    b. It should be far enough away from the scene that members may safely remove personal protective equipment (PPE).

    c. It should provide suitable protection from the environmental conditions (Consider the Rehab bus).

    d. If a structure is being used, it should be large enough to accommodate a maximum of 12 members.

    e. It should be easily accessible by EMS units, the Canteen unit and the Rehab bus.

4. **Site Designations**

    a. A nearby structure, building lobby, etc.

    b. Several floors below the fire floor in a high rise building.

    c. The Rehab bus.

    d. Fire apparatus, ambulance or other emergency vehicle on the scene.

    e. An open area in which a Rehab area can be created, by using tarps, fans, etc.

5. **Resources -** The Rehab Officer shall secure all the necessary resources required to adequately staff and supply the Rehab area. The supplies should include the items below:

a. Medical supplies, i.e. B/P cuffs, stethoscopes, EKG monitors, Oxygen, ALS, Meds.

b. Fluids, i.e. water, activity beverage, ice, etc.

c. On extended incidents provide food, i.e. soups, broths or stew, etc.

6. **Guidelines**

a. **Rehab Sector Establishment -** The Rehabilitation should be considered by the IC during the initial planning stages of an emergency response.

b. **Medical Evaluation -** The Rehab Officer shall ensure that sufficient personnel are available to provide medical monitoring (ALS personnel). They shall evaluate vital signs, examine members, and make proper disposition (return to duty, continued rehab, or medical treatment and/or transportation. Continued rehab should consist of additional monitoring of vital signs, providing rest and fluids for re-hydration. Medical treatment and transport shall be in accordance with the guidelines below.

i. **Appears to need assessment -** Members who walk with an unsteady gait, show signs of exhaustion or have medical complaints will receive an assessment first.

ii. **Critical Vital Signs -** A B/P greater than 150/100, pulse greater than 110, or respirations greater than 20 for members without symptoms shall be given up to two (2), twenty (20) minute recovery periods. If at the end of this period, the critical vital signs still persist, that member will be transported to an appropriate medical facility for potential serious medical condition.

iii. **Chief Complaint** - If a member presents to the Rehab Officer with any complaint that would indicate emergency care, the personnel will follow established protocols.

iv. **Rest/Recovery -** Members entering the Rehab area are generally given 20 minutes of rest (depending on the weather/activity, this may be longer). During this time the members vital signs are given a chance to recover to an acceptable level, if they do not appear exhausted or injured and/or have no complaints. After a member has exhausted on (1) bottle of air or has a work time of 45 minutes, they shall be rotated through Rehab. This practice will remove the member from the scene to ensure that no member will be pushed beyond his/her limit.

v. **Hydration -** A critical factor in the prevention of heat injury is the maintenance of water and electrolytes. Water must be replaced during exercise periods and at emergency incidents. During high heat index days members should consume at least one quart of water per hour. Hydration is important during cold weather operations. This is due to the heat stress produced by wearing protective equipment. **Carbonated beverages**

and beverages with caffeine should be avoided. Recommended beverages are water, a 50/50 mixture of water and a commercially prepared activity beverage.

vi. **Nourishment -** When the IC establishes the need for Rehab, he/she will request the Canteen Unit. The mission of the Canteen unit is to report to an extended incident and provide Hydration and nourishment to members working the incident. It is recommended by national standards that fast foods be avoided. Recommended foods are soups, stews and fruit.

7. **Accountability -** Members directed to the Rehab Sector shall report as a company unless otherwise directed by the IC. The company or unit designation number and time of entry and Exit shall be recorded on the company check list sheet. The Emergency Incident Rehabilitation Report shall be forwarded to the EMS Control Officer. These reports shall be maintained at the EMS Bureau for future reference as needed.

APPENDIX F PROTECTIVE CLOTHING SUMMARY

The Department provides protective equipment that meets applicable National Fire Protection Association (NFPA) Standards. The protective ensemble includes:

- Fire fighters protective coat
- Fire fighters protective trouser
- Fire fighters protective helmet
- Fire fighters protective suspenders
- Fire fighters protective hood
- Fire fighters protective glove
- Fire fighters protective boot

The protective clothing worn by the injured fire fighters was visually inspected on the scene by: Captain Tim Gerhart, Lt. Bruce Faust, Lt. Rick Johnson, and Lt. Michael Thompson who were all members of the Department's Safety Office. The protective clothing was then turned over to the Metropolitan Police Department Evidence Technician Curtis E. Lancaster who entered the protective clothing into evidence.

After inspection by the Fire Department and Metropolitan Police Department, the protective clothing manufacturers were asked to provide technical assistance. The manufacturers were Globe Fire Fighter Suits, Southern Mills Inc., and Celanese Acetate. Their inspection was conducted under the supervision of fire department and police department personnel at all times. The manufacturers did take sample swatches of the garments for testing and analysis at their laboratories. The Department's inspection of the protective clothing was consistent with the manufacturer's observations. The manufacturer's protective clothing report is included in this Appendix.

The following is a summary of the protective clothing worn by the fatally and critically injured fire fighters not evaluated by the clothing and textile manufacturers. It was impossible to positively identify some protective hoods and gloves due to the large number of hoods and gloves retrieved from the scene. The lack of an equipment tracking system contributed to the identification problem.

F/F Anthony Phillips' Protective Clothing:

Fire Fighter Phillips was wearing Department issued and NFPA compliant protective rubber boots, size 12. The boots were found in very good condition. Fire Fighter Phillips' protective hood and protective gloves were unable to be positively identified. Fire Fighter Phillips was wearing a non-Department issued leather helmet that was NFPA compliant. The Department permits fire fighters to purchase their own helmets, provided that they are annually inspected by the Safety Office. The helmet showed signs of significant heat damage to the outer shell and deterioration of the brim.

F/F Louis Matthews' Protective Clothing

Fire Fighter Matthews was wearing a Department issued NFPA compliant Cairns 660C Fire Fighters helmet. Fire Fighter Matthews' helmet was found at the bottom of the basement stairs and was severely damaged. The brim of the helmet was melted and burned to the extent that much of it was missing. The inner impact liner melted into the outer shell. The evidence has shown that F/F Matthews' helmet was dislodged from his head and inadvertently knocked down the open basement stairs.

Fire Fighter Matthews was wearing Department issued NFPA compliant protective rubber boots. The boots were found in very good condition. Fire Fighter Matthews' protective hood and gloves were unable to be positively identified.

Fire Fighter Matthews' non-department issued hand light was found on the first floor, near the top of the basement stairs. It was severely melted, to the extent that the battery came out of the casing. Material melted onto his protective clothing was later determined to be from the hand light casing.

F/F Joseph Morgan's Protective Clothing

Fire Fighter Morgan was wearing Department issued NFPA compliant protective boots. The boots were found in generally good condition, although somewhat darkened by soot and heat. Fire Fighter Morgan's protective gloves were identified and found to be in good condition. His protective hood was unable to be positively identified.

Fire Fighter Morgan was wearing a Department issued NFPA compliant Cairns 660C Fire Fighters helmet. The helmet is marked on both sides with "Fire Fighter" and the number "3". Fire Fighter Morgan's helmet was knocked off of his head at some point and the outer shell and the inner impact liner separated. After the helmet was knocked off, F/F Morgan located just the inner impact liner and put it back on his head. The inner impact liner was severely burned around the area where the earflaps are attached. Burn patterns indicate the earflaps were rolled and bunched up during the severe heat exposure. The outer shell was located after the fire was extinguished in the far corner of the living room next to the mirrored wall. The impact liner retention clips were broken off on one side and cracked on the other side. There is no indication or evidence of a chinstrap. There was no melting or distortion of the poly-carbonate face-shield attached to the outer shell of the helmet. Most of the heat damage to the outer shell occurred on the back of the head area. This indicates that F/F Morgan's helmet was on his head with his back turned to the basement stairs when the heat hit the fire fighters on the first floor.

Lt. Charles Redding's Protective Clothing

Lt. Redding's protective trousers and boots were obtained from Washington Hospital Center - Medstar Unit. There was no significant damage to the pants. The Safety Office made several attempts to locate Lt. Redding's protective coat. Members of E-26 took the coat back to the fire station and the Safety Office could not locate the protective coat after it left the scene.

Lt. Redding's protective helmet was retrieved from the quarters of Engine 26. His helmet was a Department issued NFPA compliant helmet, Safeco model "Chieftain 911". The helmet was inspected and the outer shell of the helmet sustained no damage and only moderate soot accumulation. However, the impact liner had significant heat damage including melting and discoloration. Furthermore, the adjustable sizing band also showed signs of damage.

Additional Protective Clothing

Two of the three unidentified Department issued NFPA compliant protective hoods retrieved from the scene sustained damage. One of the hoods showed signs of severe heat damage, charring and discoloration to the top and back of the head area. The other hood showed heat damage and discoloration to the rear neck area and right face area. The Committee was unable to positively identify who was assigned these hoods.

Some of the gloves retrieved from the scene showed significant signs of heat exposure or damage. However, the Committee was unable to positively identify who was assigned these gloves.

CLOTHING EVALUATION
PREPARED FOR THE
WASHINGTON, D.C. FIRE DEPARTMENT

INTRODUCTION:

Technical and sales representatives from Celanese Corporation, Southern Mills, and Globe Firefighters Suits were asked to evaluate clothing belonging to the Washington D.C. Fire Department. Southern Mills is the fabric manufacturer who constructed the PBI outer shell fabric and the Aralite thermal liner used in the suits. Celanese Corporation produces the PBI fibers from which the outer shell is woven. Globe Firefighters Suits cuts and stitches protective clothing. The garments to be evaluated were involved in a fire-fighting incident on Sunday, May 30, 1999.

PROCEDURE:

GARMENTS LABELED #3:

Coat serial #1554481, produced 5/99, size 42 x 35, was identified as being worn by Firefighter Matthews. The coat and trouser were manufactured using a 7.5 oz. gold PBI outer shell, an Aralite thermal liner, and a Crosstech on E-89 moisture barrier, and were constructed to the Washington D.C. Fire Department specifications, in accordance with the 1997 edition of NFPA 1971.

Visual examination of the suit showed a very even discoloration over the entire coat and trouser. There was melted debris clinging to the upper left shoulder, which also has a small tear in the PBI shell fabric, directly along the outer seam line. In examining this area, the second row of stitching on the seam is intact, identifying this as a tear rather than any seam damage. It appears that the shell material must have "caught" on some object, but since the individual fibers were not scorched or dirtied, a reasonable assumption would be that the tear happened after the exposure, perhaps during extraction. There was extreme

shrinkage and embrittlement to the leather elbow reinforcement on the left sleeve, with some shrinkage to a lesser degree apparent on the right leather elbow.

The middle band of trim on the right back of the coat has been consumed and the PBI fabric beneath the trim severely darkened. The Crosstech on E-89 moisture barrier in this same area was discolored in the same general shape and location as the trim, but no discoloration of the thermal layer was discerned. The appearance of the back of coat suggests that the SCBA bottle had twisted towards the left side. Following the visual examination, Celanese took a sample of the PBI outer shell, cut from the right side of the lower back. The fabric was laundered in an attempt to determine if the color change is the result of soiling or of thermal exposure, and to try and simulate the resulting color change.

The trouser, serial #1556365, produced 5/99 and labeled a size 36 x 28, was constructed from the same three layers as the coat, and was also manufactured to the Washington D.C. specification and in accordance with NFPA 1971. The padded suede leather knees are slightly stiff, but do not exhibit the same shrinkage as the leather on the coat elbows. The leather cuffs on the trousers are still supple. In spite of the discoloration of the PBI layer, no color change to the thermal liner or moisture barrier was discerned. Celanese cut a swatch of the PBI outer shell fabric from the front left upper torso of the trouser, for laundering purposes in an attempt to determine if the color change is the result of soiling or of thermal exposure, and to try and simulate the resulting color change.

It was not possible to determine the exact position the firefighter was in when the incident occurred. Given the condition of the leather elbows on the coat and the relatively "clean" marks on the PBI material located inside bend of the arm, it is reasonable to assume that the firefighter's arms could have been in a raised position, thus exposing the leather elbows and protecting the PBI material at the inside of the elbow bend.

GARMENTS LABELED #2:

Coat serial #1291921, produced 1/97, size 46 x 35, was identified as being worn by Firefighter Morgan. The coat and trouser were manufactured using a 7.5 oz.

gold PBI outer shell, an Aralite thermal liner, and a Crosstech on E-89 moisture barrier, and were constructed to the Washington D.C. Fire Department specifications, in accordance with the 1991 edition of NFPA 1971.

Visual examination of the coat suggests that the back had seen more heat than the front. Although the upper left leather elbow reinforcement has slight shrinkage, overall the leather is not nearly as degraded as that on the coat identified as Garment #3. The overall appearance of the coat suggests that the uppermost portion of the garment saw the majority of the exposure. Celanese took a sample of the PBI fabric from the upper right shoulder for laundering purposes. No samples were taken from the trouser.

GARMENTS LABELED #1:

Coat serial #1121997, produced 9/95, was identified as having been worn by Firefighter Phillips and consisted of 7.5 oz. gold PBI outer shell, an Aralite thermal liner, and a Goretex on E-89 moisture barrier. This coat was also constructed to the Washington D.C. specifications, in accordance with the 1991 edition of NFPA 1971.

Visibly, this coat appears to have seen more heat energy than the other two garments, although we noted that the back of the coat was not as discolored as the front. The damage to the front of the coat in the form of scorching and discoloration is drastic. The left inside front panel of PBI had scorched as had the stormflap. A further indication of the amount of heat to which this coat had been exposed, is the fact that the neoprene filler inside the stormflap has been degraded and scorched. Celanese took a sample of the PBI shell fabric from the area just adjacent to the stormflap. Although it was noted that the left upper portion of the trouser just below the pocket appeared more discolored than other areas of the trouser, no sample was taken.

LAUNDERING METHODOLOGY:

The samples taken from the garments were subjected to five machine launderings, using a liquid Tide, and were allowed to air dry following each cycle. The laundering was performed to remove dirt and soot in order to better determine the garment's heat exposure. Following laundering, each of the

individual swatches of PBI materials were again examined and compared to laboratory samples of the same three basic layers: 7.5 oz. PBI, Aralite, and Crosstech on E-89. These samples were laboratory tested at different exposures and at different exposure times.

LABORATORY TESTING SECTION:

Numerous laboratory tests were conducted on material composites of the same materials as in the garments. Attempts were made to replicate the color changes and/or charring of the firefighter garments.

The first series of tests were conducted using a Thermal Protective Performance (TPP) Tester.

The outershell fabric was not laundered. Fabric samples consisted of PBI Gold outer shell, Crosstech moisture barrier, and Aralite thermal liner. The TPP apparatus was utilized for the standard 2 cal/cm^2/sec. exposures. The TPP apparatus was modified slightly to render 1 and 0.5 cal/cm^2/sec exposures. The times were chosen to give a broad range of thermal exposures while enabling a comparison of samples that were exposed to the same total energy input. The results indicate that for the same energy delivered to the samples, there is a distinct visual difference between samples that had a higher exposure temperature and shorter time versus a sample that had a lower exposure temperature and longer time.

A second series of tests were conducted using a forced air oven for heating samples. Composite samples were prepared in proper layered order and secured on two sides. An insulated marinite board backed the thermal liner side (backside). The marinite board was placed on the backside to better simulate actual heat flow delivery through the outershell fabric direction. The oven temperature and exposure times varied to simulate longer thermal exposure with no flame impingement.

It should be noted that it is difficult to pinpoint exactly what each garment experienced as far as temperature exposure because of the uncertainty of time of exposure. The above two laboratory tests offer the opportunity for visual comparison to the actual garment samples. The moisture barrier layer, of

which we did not take samples or evaluate, may also offer similar results after visual comparison.

CONCLUSIONS:

Examination of the samples after laundering support that the coat identified as Garment #1, that belonging to Firefighter Phillips, had been subjected to the greatest thermal exposure which was directed primarily to the front of the clothing. Although the laundering did remove a great deal of the surface discoloration, there is still notable discoloration evident on the underside of the PBI fabric. We are unable to conclude if past exposures or staining may have had a cumulative effect on discoloration. It is also unclear if carbon byproduct, from some source, has penetrated and stained the fiber/garment.

With regards to the samples taken from the coat and trouser identified as #3, that worn by Firefighter Matthews, laundering removed a great deal of the surface discoloration. However, from a laboratory test viewpoint, the amount of color change and the even distribution of that color change to the backside of the PBI fabric is believed significant to the determination of the "amount" of heat to which the garments were exposed. This color change is only evident when the laundered samples are compared to pristine samples of unworn PBI fabric. The color change observed indicates that there had to have been a significant amount of thermal exposure to this new garment (produced 5/99).

Finally, in evaluating the laundered samples taken from the coat identified as number 2, worn by Firefighter Morgan, it was also observed that a large amount of the discoloration has been modified by the laundering procedures. Even though this garment appears to have had the least exposure, there was still discoloration to the surface of the PBI.

On the basis of the results described herein, it is believed that only Garment #1 may have experienced any flame impingement as measured by discoloration. Unfortunately, since it is not possible to isolate the exact time frames involved, the information presented herein is simply a best judgement, given the existing data.

Therefore, based solely upon the visual examination of these garments, it is simply not possible to determine if the incident involved both heat and flame. Since, thus far, it has not been possible to establish an exact time frame, it is also impossible to conclusively determine the precise temperatures to which the firefighters were exposed.

Respectfully submitted:

Patricia A Freeman 8/3/99
For: Globe Firefighters Suits Date

Diane L Hess 8/3/99
For: Celanese Corporation Date

Sue Dubble 8/4/99
For: Southern Mills Date

APPENDIX G INSPECTION OF SCBA

The Department provides NFPA compliant self-contained breathing apparatus (SCBA) to each fire fighter. Every fire fighter is issued a personal, individually sized facepiece. At the time of the incident, the Department was phasing in new SCBA. Some companies at this incident had the new units with integrated Personal Alert Safety System (PASS) devices. Others had the older SCBAs and were issued manually activated PASS devices.

The following are the types of SCBAs used by the Department at the time of this incident:

- Scott Air-Pak Fifty (AV-2000 Face-piece or Scott-O-Vista Face-piece), 60 minute Self-contained Breathing Apparatus (SCBA) with Pak-Alert SE Distress Alarm;

or

- Scott 4.5 (AV-2000 Face-piece or Scott-O-Vista Face-piece), 60 minute SCBA, with a manually activated Surpass 88 PASS device.

On May 30, 1999, the SCBAs worn by the Fire Fighters Phillips, Matthews, and Morgan were secured by the Metropolitan Police Department and a chain-of custody maintained. The same day, members of the Safety Office inspected the SCBAs. Following is a summary of the Safety Office's inspection and the Reconstruction Committee's findings. For more detailed information, contact the Safety Office for their full report.

F/F Phillips' SCBA

Fire Fighter Phillips was assigned and used a Scott Air-Pak Fifty, 60 minute SCBA with Pak-Alert SE Distress Alarm. The evidence has shown that F/F Phillips donned his SCBA prior to entering the

building. Fire Fighter Phillips was found face down without his facepiece on. When found, the facepiece was not attached to the mask mounted regulator. Fire Fighter Phillips' integrated PASS alarm was sounding, his cylinder valve was fully open, and his cylinder was empty.

Fire Fighter Phillips' facepiece lens showed considerable evidence of heat exposure. There was buckling, blistering, and cracking of the lens material. However, there were no places where the lens was melted completely through. The exterior of the mask mounted regulator assembly displayed considerable evidence of exposure to heat. The edges of the air saver switch cover were melted. This SCBA is equipped with a console that contains a remote cylinder pressure gauge. The remote gauge lens had a large bubble due to heat exposure. This console also houses components of the PASS device. When tested by the Safety Office, the PASS Alarm operated properly. The cylinder that was attached to the SCBA showed substantial evidence of heat exposure.

F/F Matthews' SCBA

Fire Fighter Matthews was assigned and used a Scott 4.5, 60 minute SCBA. The evidence has shown that F/F Matthews donned his SCBA prior to entering the building. As F/F Matthews donned his facepiece the temple retainer, that serves as an attachment point for the webbing system, broke, rendering the facepiece useless. Engine 26's driver gave his facepiece to F/F Matthews, which allowed him to enter the building. There is no evidence that F/F Matthews experienced trouble with his SCBA while in the building. Furthermore, medical evidence conclusively demonstrated that F/F Matthews did not inhale combustion by-products. The evidence has shown that the facepiece exchange did not contribute to his injuries.

Fire Fighter Matthews was found face down with his facepiece on, and slightly angled to the side of his face. The facepiece that F/F Matthews used was a retrofitted Scott-O-Vista facepiece with the lens retaining clips installed. The facepiece lens showed some evidence of exposure to heat, but not to the extent of the facepieces worn by F/F Phillips and F/F Morgan. The exterior of the facepiece mounted pressure regulator assembly displayed some evidence of exposure to heat. The remote cylinder pressure gauge lens was

blackened and blistered. The rubber gauge guard showed considerable evidence of exposure to heat. The high-pressure cylinder showed substantial evidence of exposure to heat. The cylinder valve assembly displayed extensive damage due to heat exposure. The damage to this assembly is more extensive than the damage found on the cylinders worn by F/F Phillips and F/F Morgan.

Fire Fighter Matthew's Personal Alert Safety System (PASS) device was attached to the SCBA harness shoulder strap. The PASS device was discolored and showed considerable heat damage and deformation. The PASS device functioned properly when tested after the incident. The evidence has shown that F/F Matthews did not activate his PASS device.

F/F Morgan's SCBA

Fire Fighter Morgan was assigned and used a Scott 4.5, 60 minute SCBA. The evidence has shown that F/F Morgan donned his SCBA prior to entering the building. Fire Fighter Morgan exited the building under his own power and only removed his facepiece after exiting the fire building.

Fire Fighter Morgan's facepiece was a Scott AV-2000. The facepiece lens showed considerable evidence of exposure to heat, however it does not exhibit the deformity of the facepiece worn by F/F Phillips. The exterior of the facepiece mounted pressure regulator displays some evidence of heat exposure. The remote cylinder pressure gauge guard also shows evidence of heat exposure. The cylinder valve assembly shows extensive heat exposure.

Fire Fighter Morgan's Personal Alert Safety System (PASS) device was attached to the SCBA harness shoulder strap. The PASS device is discolored and shows considerable heat damage and deformation. Fire Fighter Morgan did not turn on his PASS device prior to entering the structure. The PASS device functioned properly when tested after the incident.

NIOSH SCBAs Summary

Fire Fighters Phillips, Matthew and Morgan's SCBAs were sent to the National Institute for Occupational Safety and Health (NIOSH) for independent testing and evaluation. The Metropolitan Police Department maintained custody of the SCBAs and delivered them to NIOSH's Division of Respiratory Disease Studies, Respirator Branch, Quality Assurance Team.

The following is quoted from the NIOSH evaluation conclusion:

"The status of the SCBA with regard to their conformance to the performance standards prior to the incident cannot be determined. It is quite possible that the test failures observed during this evaluation are a result of damage sustained by the SCBA after the fire fighters were injured while fighting the fire on May 30, 1999. It is also not known what effects, if any, non-conforming SCBA performances would have had at the fire scene. While all three units failed to maintain positive pressure during the Rated Service Time test, the possibility of inward leakage into a fire fighter's facepiece would be dependant upon the face to facepiece seal, the ventilation rate at the time of use, as well as other factors such as age, weight and physical condition of the fire fighter. Test results indicate that air was flowing to each of the facepieces in a sufficient quantity to support moderate ventilation requirements."

NIOSH has concluded that the three SCBA they examined displayed considerable evidence of exposure to heat. The SCBA worn by F/F Phillips failed five of the thirteen performance tests conducted by NIOSH. The SCBA worn by F/F Matthews failed three of the thirteen performance tests conducted, and the SCBA worn by F/F Morgan also failed three of the thirteen performance tests conducted.

For additional information contact NIOSH for the SCBA evaluation-NIOSH Task # TN-11004 or the Fire Department Safety Office.

Appendix H NIOSH Evaluation of the Department's SCBA Program

As part of NIOSH's investigation of this incident, they evaluated the Department's SCBA Program. Attached is their report.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
and Prevention (CDC)
National Institute for Occupational
Safety and Health - ALOSH
1095 Willowdale Road
Morgantown, WV 26505-2888
PHONE: (304) 285-5907
FAX: (304) 285-6047

November 22, 1999

Captain Timothy H. Gerhart
Safety Officer
District of Columbia
Fire & Emergency Medical Services
Fire & EMS Safety Office
2531 Sherman Ave. N.W.
Washington, DC 20001

Dear Captain Gerhart:

During our recent visit to the District of Columbia Fire and Emergency Medical Services Safety Office on July 21, 1999, Thomas McDowell and I had the opportunity to evaluate your fire department self-contained breathing apparatus (SCBA) maintenance program. One of the objectives of our visit was to evaluate your SCBA maintenance program and to make recommendations for improvement. This evaluation was conducted on July 21, 1999, and consisted of visiting the SCBA maintenance area, reviewing maintenance records, evaluating the compressed-air and oxygen cylinder refilling stations as well as discussions with available fire department personnel involved in the SCBA maintenance program.

Your current SCBA maintenance program was evaluated against the respirator and SCBA maintenance requirements listed in the following recognized national standards:

> *Title 29, Code of Federal Regulations (CFR) Part 1910.134* known as *The OSHA Respirator Standard.*
>
> *National Fire Protection Association (NFPA) 1404 Standard for a Fire Department Self-Contained Breathing Apparatus Program, 1996 Edition.*
>
> *National Fire Protection Association (NFPA) 1500 Fire Department Occupational Safety and Health Program, 1997 Edition*

These standards are recognized national standards and as such, specify the minimum benchmark requirements that all good respirator programs should strive to meet or exceed. Compliance with these standards is considered to be essential to maintain your SCBA in a condition meeting the certification requirements of the National Institute for Occupational Safety and Health (NIOSH) found in *Title 42, Code of Regulation, Part 84, Subpart H*, as well as the *National Fire Protection NFPA 1981 Standard on Open-Circuit Self-Contained Breathing Apparatus for the Fire Service, 1997 Edition*. Failure to maintain your SCBA in an approved condition voids the NIOSH approval until such time as each affected SCBA can be inspected, serviced, and returned to an approved condition.

The following areas were identified within the District of Columbia Fire & Emergency Medical Services SCBA maintenance program as areas where improvement is needed in order to comply with the referenced national standards:

1) The SCBA maintenance program should be under the direct control of one designated individual who is a District of Columbia Fire and Emergency Medical Services employee and who has no other fire fighting or administrative responsibility. In general, this individual's area of responsibility could be tailored to meet each departments needs, but should include supervision of the SCBA preventive maintenance program, record keeping, and auditing.

> Title 29, Code of Federal Regulations (CFR) Part 1910.134 (the OSHA Respirator Standard) at 1910.134(c) requires each respirator program to be administered by a suitably trained program administrator.

2) A preventive maintenance program should be established to ensure regularly scheduled preventative maintenance is conducted on each SCBA at least annually. It is noted that the District of Columbia Fire and Emergency Medical Services does not operate a preventive maintenance program but rather attempts to repair defective SCBA on an as-needed basis. It was reported that at one time the SCBA maintenance program consisted of an officer and eight fire fighters devoted to SCBA maintenance but that the program has dwindled to only one fire fighter who is fully devoted to SCBA maintenance in a department utilizing over 300 SCBA.

> *OSHA 1910.134(c)(1)(v); 1910.134(C)(1)(vi); and 1910.134(h)* require the employer to develop and implement a written respiratory protection program that includes specific procedures and schedules for cleaning and disinfecting, storage, inspection, maintenance, and repair of respirators used by employees.
>
> *NFPA 1404, Chapter 6-1.2 and 6-1.3* require annual inspection and servicing of SCBA by qualified personnel. *Chapter 6-1.3* requires annual servicing to be conducted following the manufacturer's recommendations and should include :
>
> a) Disassembly of the SCBA into major components.
> b) Flow testing of the regulator.
> c) Disassembly and cleaning of the regulator.
> d) Replacement of worn parts, or those recommended by the manufacturer in the regulator assembly.
> e) Disassembly of the low-air alarm and cleaning and replacement of component parts as necessary.
> f) Cleaning and replacement of components of the facepiece and harness assembly, and replacement of component parts as necessary.
> g) Reassembly of the entire SCBA and testing for proper operation of all components.
> h) Proper recording of all performed maintenance on record keeping forms.
>
> *NFPA 1404, Chapter 6-2.1* specifies that a preventative maintenance program shall be established by the authority having jurisdiction for all SCBA used in the organization.
>
> *NFPA 1404, Chapter 6-2.2* specifies that the SCBA preventative maintenance program shall be conducted in order to prevent SCBA malfunction and failures of equipment during use.

NFPA 1500, Chapter 5-3.1 specifies the fire department shall adopt and maintain a respiratory protection program that addresses the selection, inspection, safe use, and maintenance of respiratory protection equipment, training in its use, and the assurance of air quality testing.

3) Air quality analysis should be performed every 3 months and a certificate of compliance maintained at the filling station for all filling stations used to fill SCBA cylinders. During our visit, you verbally stated that this requirement was being complied with. However, evidence of an air quality test conducted within the past 3 months was not posted at the cylinder refilling station located at Station 4.

OSHA 1910.134(i)(1)(ii); NFPA 1500, Chapter 5-3.6; and *NFPA 1404, Chapter 7-1.1 and Chapter 7-2.2* require that compressed air used to fill SCBA cylinders meet or exceed the requirements for Type 1-Grade D breathing air specified in the *Compressed Gas Association (CGA) Commodity Specification for Air, G-7.1.*

NFPA 1500, Chapter 5-3.7.1 and *NFPA 1404, Chapter 7-1.2* specify that breathing air used to fill SCBA cylinders should be tested every 3 months by an accredited laboratory. *Chapter 7-1.3* specifies that records shall be maintained for each air quality test.

4) A preventative maintenance program should be established to cover the breathing air compressor, air purification filters, and other equipment used to generate breathing air.

OSHA 1910.134(i)(5), and *NFPA 1404, Chapter 7-2.12 thru Chapter 7-2.14* specify requirements for the operation and maintenance of breathing air compressors and cylinder fill stations.

5) Records should be maintained for each SCBA, facepiece, and cylinder at the department. During our visit, the only available records were those indicating the last time an SCBA pneumatic assembly had been repaired. Permanent records should be maintained which contain the following information:

NFPA 1404, Chapter 2-2.3 specifies that an individual record of each SCBA regulator and harness assembly shall be maintained. This record shall include the inventory or serial number, date of purchase, date of manufacture, date placed into service, location, maintenance and repairs, replacement parts used, upgrading, and test performance.

NFPA 1404, Chapter 2-2.4 specifies that an individual record of each SCBA cylinder shall be maintained. This record shall include the inventory or serial number date of purchase, date of manufacture, date placed into service, location, hydrostatic test pressure and dates, and any inspection and repairs. The hydrostatic test dates shall appear on each cylinder according to the manufacturer's instructions and applicable government agencies.

NFPA 1404, Chapter 2-2.5 specifies that an individual record of each SCBA facepiece shall be maintained. This record shall include the inventory or serial number, date of purchase, location, maintenance and repairs, replacement parts, upgrading, and test performance.

NFPA 1500, Chapter 2-7.5 specifies that each fire department shall assure that inspection, maintenance, repair, and service records are maintained for all vehicles and equipment used for emergency operations and training.

In addition, the *OSHA Respirator Standard 1910.134(c); 1910.134(h)(3)(iv)(A and B);* and *1910.134(m)* specify general requirements for record keeping within a respirator program.

6) Inspections should be conducted at least weekly and preferably at the beginning of each work shift to ensure each SCBA is checked for proper function. During our visit, you indicated that each SCBA is inspected at the beginning of each work shift but that a written record detailing cylinder pressure, hardware condition, name, date, and other pertinent information regarding the inspection of each SCBA is not kept.

> The *OSHA Respirator Standard 1910.134(h)(3) lists* the requirements for respirator inspections. *1910.134(h)(iv)(A and B)* list the requirements for documenting each inspection.
>
> *NFPA 1404, Chapter 5-1.2* specifies that where fire apparatus is in daily use, an inspection of all respiratory protection equipment and reserve cylinders on each apparatus shall be conducted at least daily.

7) Annual evaluations of the SCBA Maintenance Program should be conducted to monitor and evaluate the effectiveness of the overall SCBA maintenance program.

> The *OSHA Respirator Standard 1910.134(h)(3)*(1)(ix) requires the employer to develop and maintain as part of the overall written respiratory protection program, procedures for regularly evaluating the effectiveness of the program.
>
> *NFPA 1404, Chapter 8-1.1* specifies that the authority having jurisdiction shall review the organization's respiratory protection program annually for the purposes of determining the need to upgrade or change various aspects of the program.

These recommendations are based upon the premise that all SCBA are life-saving devices which will only perform as well as they are maintained. Since they are expected to function and perform properly each time they are used, it is important that SCBA maintenance and inspection be given the utmost priority at the department level.

During our visit, you were provided with a copy of the peer-reviewed document Respirator Maintenance Program Recommendations for the Fire Service developed by NIOSH and published in the Journal of the International Society for Respiratory Protection. You were also provided with draft copies of generic standard operating procedures and record keeping forms that may assist you in developing improvements to your overall SCBA maintenance program.

During our visit, we also inspected and evaluated the oxygen cylinder refilling station located at Station 4. Oxygen cylinders are typically refilled for use in oxygen resuscitators and other emergency medical equipment used to administer oxygen therapy. The *OSHA Respirator Standard 29 CFR 1910.134* as well as the *NFPA 1404 Standard for a Fire Department Self-Contained Breathing Apparatus Program,* do not specifically address these types of medical devices. However, safe handling practices dictate that oxygen refilling systems as well as oxygen equipment be stored in a clean, dry, air-conditioned location that is locked to limit access only to those individuals who have been properly trained and qualified to work with oxygen equipment. All cleaning, repair, and refilling operations should be conducted using the appropriate special tools which are cleaned, maintained, and dedicated only for use on oxygen equipment. The oxygen cylinder refilling station located at Station 4 does not meet these safe handling practices and is not solely

dedicated for this purpose. The *Compressed Gas Association pamphlet CGA G-4 (1996 revision) Oxygen* (especially chapter 4) and the *NFPA 53 Guide on Fire Hazards in Oxygen-Enriched Atmospheres, 1994 Edition* are excellent sources of information on oxygen cylinder storage and safe handling procedures. Additional information about oxygen system safety is enclosed.

I trust this information is beneficial to your needs. If you have any questions or require additional information, please contact me at (304) 285-5965.

Sincerely yours,

Timothy R. Merinar

Timothy R. Merinar
General Engineer
Respirator Branch
Division of Respiratory Disease Studies

Enclosure

cc:
Frank Washenitz, NIOSH, DSR

APPENDIX I EMS SUPERVISOR'S REVIEW

As part of the investigation of this incident, the District of Columbia Fire And EMS Department's EMS Supervisor evaluated the pre-hospital care given to the injured fire fighters. Attached is this report.

D.C. - 44
APRIL 1980

Memorandum • Government of the District of Columbia

TO:	Alexander Bullock Assistant Fire Chief-Services	Department, Agency, Office:	Fire EMSB
FROM:	Timothy L. Campbell, NREMT-P E.M.S. Operations Analyst	Date:	September 22, 1999

SUBJECT: Fire Fatality Investigation Committee

In reference to the unfortunate set of circumstances, relating to the double firefighter fatality, which occurred at 3146 Cherry Rd., N.E., I have been asked by Deputy Fire Chief Herr to write an opinion, regarding the paramedic medical protocols.

Paramedics trained to National Registry standards go through approximately seven hundred (700) hours of didactic time and nine hundred (900) hours of clinical time, or about sixteen hundred (1600) hours combined.

Paramedics are extensively trained in advanced airway management skills. Among some of the airway skills that they are trained in are:

- Orotracheal and nasotracheal intubation, the passing of breathing tube from the mouth or nose, past the trachea and into the lungs (used primarily for patients in respiratory or cardiac arrest without airway complications),
- Needle cricothyroidotomy, the passing of a needle into the neck directly and in the upper airway or trachea [used as the most basic advanced method for providing an airway for an obstructed airway or laryngeal edema (swelling of the upper airway)],
- Nu-Trake® kit (or similar device), which is a more advanced airway procedure where a significantly larger needle is entered into the neck through the cricothyroid membrane into the trachea (creating a hole similar to a tracheotomy) and is also used for obstructed airways or laryngeal swelling,
- Surgical cricothyroidotomy which is an emergency surgical intervention, requiring the active incision into the neck to place an endotracheal tube through the hole created and into the trachea,
- Conscious sedation in which a conscious patient with severe airway compromise and laryngeal swelling [due to heat inhalation, or anaphylaxis (a severe allergy reaction)] requires heavy sedation with benzodiazepines and,

or narcotics through intravenous access, prior to the complete occlusion of the upper airway, and the airway is secured through intubation,

- Rapid sequence intubation (R.S.I.), is used for the same circumstances as conscious sedation and is a similar procedure, but additionally temporarily paralyzes the patient through pharmacological means.

The last two skills are used as proactive measures while the patient is conscious, prior to the patient lapsing into respiratory or cardiac arrest and before the airway completely closes. Currently most major cities and our surrounding jurisdictions either have in their protocols as a regular measure or are using them as a pilot programs, Conscious Sedation or Rapid Sequence Intubation. Additionally most cities are using at least one of the above skills for unconscious patients with an obstructed airway.

These advanced airway maneuvers are invaluable and their implementation and use in a timely manner saves countless lives, civilians, public safety, and in particular firefighters. Once an airway starts closing up, whether from an extreme allergy reaction, a heat, or a smoke inhalation injury, there are only minutes or seconds before the airway completely occludes and the patient lapses into cardiac arrest or death.

Additionally, there is a bill pending, allowing paramedics to carry and administer narcotics. Every paramedic system throughout the United States sanctions and permits the use of narcotics in the prehospital environment, except Washington D.C.. Paramedics are trained extensively in these agents during their basic paramedic and American Heart Association's Advanced Cardiac Life Support courses. In order to use Conscious Sedation or Rapid Sequence Intubation paramedics must have in their advanced medical protocols the ability to administer narcotics and benzodiazepines. Passage of this bill is a must!

The argument that the D.C. Fire & E.M.S. Department's, E.M.S.-Bureau's, ambulances are five (5) minutes or less to a hospital does not hold any merit in situations where apnea or breathless has occurred, nor when a patient has suffered laryngeal trauma whether from a severe allergy attack, smoke or heat inhalation. Seconds count and waiting until the ambulance arrives at the hospital to properly treat the patient, is a costly policy, which will cost lives, and perhaps some of them may be firefighter lives.

Unfortunately, even though the D.C. Fire & E.M.S. Department has a Medical Director, who is responsible for the quality of care to our patients, protocols are developed and approved through the Med-Control sub-committee, which is chaired by Dr. Smith. The committee currently has representatives from the following hospitals: Children's Hospital, D.C. General, Providence Hospital, Washington Hospital Center, and The George Washington University Hospital, additionally there is a representative from the Department of Health, D.C. Fire & E.M.S. Department, and Mr. Pittman (a representative for the citizens of Washington D.C.).

This committee was established when the D.C. Fire & E.M.S. Department had no medical doctor on staff, and needed medical oversight in order to function. This sub-committee through the E.M.S.– Advisory Council took a progressive step in taking on the role of medical oversight and was a valuable asset in the E.M.S. chain. However, all E.M.S. agencies, including the D.C. Fire & E.M.S. Department have since hired

qualified physicians on staff. Traditionally, the Department of Health provides the scope of practice for all levels of providers, and will occasionally provide some general state level protocols, which can be modified by the local agency Medical Director. While most urban E.M.S. systems and agencies have very progressive medical protocols with similar transport times, our medical protocols are unusually restrictive and conservative. The standing comment throughout the area is D.C. has paramedics, which work as intermediates. The current protocols are so restrictive that paramedic students at some institutions are not allowed to do their paramedic internship within the District of Columbia.

Further, the Med-Control sub-committee answers to the E.M.S.- Advisory Council, which is an advisory committee to the Mayor's Office, regarding E.M.S. matters. It is no longer a necessary body, but an additional bureaucratic step in hindering and slowing progress.

Unfortunately, Firefighter Phillips primarily cause of death was of traumatic asphyxia due to heat and fire inhalation injuries and significant burns sustained at 3146 Cherry Rd., N.E.. Although there were valiant efforts to successfully resuscitate and intubate him in the field, they were in vain due to the soot and laryngeal edema. Should there have been more aggressive advanced airway protocols there may have been a chance for him, but waiting to adequately manage his airway at the hospital is, and was, a disaster in the making. Even though paramedics are trained to provide these advanced measures, the D.C. pre-hospital protocols prevent their application. Our surrounding jurisdictions allow their Paramedics to provide these measures, either in standing protocol, or as a pilot.

The recommendations that should be considered by this committee are to recommend a more proactive and progressive approach to advanced airway management, to assist future citizens and firefighters in the future. These should include the following;

- Nu-trake® (or similar device), a skill and device which is used on unconscious, apnic (non-breathing) patients with laryngeal swelling and a completely occluded airway or trachea. This would provide access to the airway to ventilate the patient after a severe allergic reaction, or after a heat or smoke inhalation injury,
- Conscious sedation, which allow the paramedics to intubate a conscious patient who larynx is inflamed and in the process of closing. This procedure is a proactive procedure allowing the paramedics to aggressively treat the patient and not wait till the patient loses their airway and consciousness.
- Further, make the above procedures standing orders, and not a medical control option. Time is critical with these patients, and the time lost calling telemetry to get orders would make a difference in most of the outcomes.
- Lobbying for the expeditious passage of the narcotics bill, allowing paramedics to carry and administer narcotics and benzodiazepines in the prehospital environment, so that they can perform Conscious Sedation, assist patients with pain management, and perform other life saving measures.
- Lastly, the question of the effectiveness and necessity of the Med-Control Sub-Committee should be answered. Although, at the time of its creation it was an essential and progressive step, it has outlasted its usefulness in the system. It has become an additional bureaucratic step, slowing the progress

for state of the art paramedic protocols, and possibly contributing to the low success rate in pre-hospital cardiac arrests.

Although a change in the outcome of D.C. Firefighter Phillips is questionable, the above changes will definitely improve the quality of care in the prehospital environment and save civilian and firefighter lives. Attached are some paramedic protocols from the surrounding jurisdictions and cities throughout the United States. Should you need additional information or have any questions please feel free to contact me.

Primary endorsement

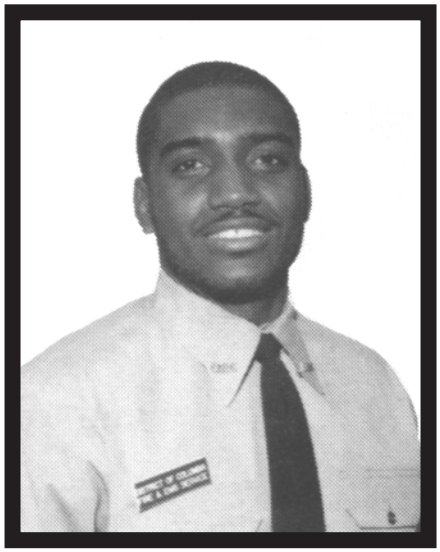
Timothy L. Campbell, NREMT-P
E.M.S. Operations Analyst

Secondary endorsement

Fernando Daniels III, M.D.
E.M.S.- Bureau Medical Director

Appendix J Fire Fighter Biographical information

Fire Fighter Louis M. Matthews



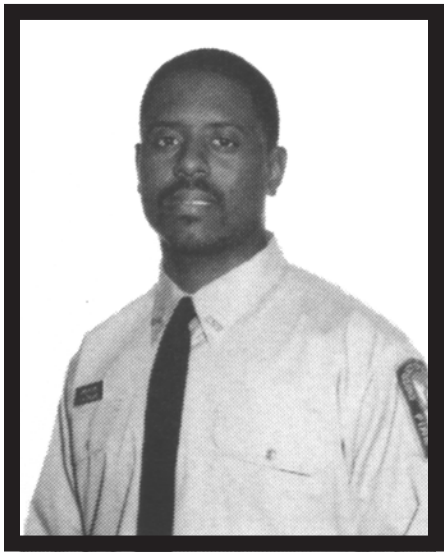
Biographical Information:

Assignment:	Engine Company 26
DCFD Appointment Date:	5-4-92
Training Academy Class:	#311
Date of Birth:	7-1-69
Date of Death:	5-31-99
Age:	29
Height:	5’8”
Weight:	179 lbs.
Children:	Nicholas C. and LaChrisia L.

Autopsy Results:

Pronounced:	May 31, 1999 at 1450 Hours
Cause of Death:	Thermal Injuries involving 90% of Total Body Surface Area and Airways
Manner of Death:	Accident
Carboxyhemoglobin:	Less than 1%
Drugs and Alcohol:	None found

Fire Fighter Anthony S. Phillips



Biographical Information:

Assignment:	Engine Company 10
DCFD Appointment Date:	10-30-95
Training Academy Class:	#316
Date of Birth:	10-19-68
Date of Death:	5-30-99
Age:	30
Height:	5’8”
Weight:	230 lbs.
Wife:	Lysa
Children:	Anthony Jr. and Arzel

Autopsy Results:

Pronounced:	May 30, 1999 at 0108 Hours
Cause of Death:	Thermal Injuries involving 60% of Total Body Surface Area and Airways
Manner of Death:	Accident
Carboxyhemoglobin:	7%
Drugs and Alcohol:	None found