Line of Duty Death

Enhanced Report

Oscar Armstrong III

March 21, 2004

Independent Report by the
Laidlaw Investigation Committee
in cooperation with
City of Cincinnati Fire Department
And
Cincinnati Fire Fighters - Local 48

ENHANCED REPORT
OSCAR ARMSTRONG LINE OF DUTY DEATH
1131 LAIDLAW AVENUE, CINCINNATI, OHIO
MARCH 21, 2004

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Chapter 1

DEDICATION

On March 21, 2003, Oscar Armstrong III was tragically killed in the line of duty. The Cincinnati Fire Department and the Armstrong family suffered a tremendous loss. This report is dedicated to Fire Fighter Armstrong, his mother, Annette Armstrong, his fiancée, Sakina Devereaux, his three children, Isaiah, Oscar IV, and Imani, and his brother and sister fire fighters within the Cincinnati Fire Department. Our goal is to ensure that his death was not in vain by enhancing the operations of the Cincinnati Fire Department.

The committees commissioned by the Fire Chief have dedicated hundreds of hours of time since Oscar's death to improve the Cincinnati Fire Department. Without his ultimate sacrifice, it would have taken many years to accomplish the mission of this report.

Oscar's contribution as a fire fighter and friend of the Cincinnati Fire Department will never be forgotten. Fire fighters from this point forward will benefit from the knowledge and experience gained as a result of this tragic event. Those that knew Oscar personally have forever been enriched by his energetic and caring dedication to life, his co-workers and the citizens he served. Every fire fighter should receive a great sense of pride in believing that Oscar's great sacrifice will help prevent other fire department family members from experiencing this same type of tragic loss not only in Cincinnati, but nationwide.

The Cincinnati Fire Department extends its sincere thanks to all those who supported and assisted us immediately following this event and during the investigation and recovery phase of preparing this report. The Cincinnati Police Department and The National Institute of Occupational Safety and Health assisted in completing their own independent investigations. The Vernon Manor Hotel allowed us to utilize their facility to conduct interviews. The International Association of Fire Fighters and the Ohio Association of Professional Fire Fighters supported us during planning and execution of the memorial services. Without the support of our brother and sister fire fighters from Columbus, Hamilton, Middletown, Anderson Township, Green Township, Norwood, Delhi Township, Sycamore Township and Cincinnati/Northern Kentucky International Airport covering our fire stations we would not have been able to lay our brother Oscar Armstrong III to rest with most of the fire department uniformed personnel attending the services. We would also like to thank those fire service organizations nationwide that provided this committee with information on how their organizations function and operate. Finally we would like to thank the tri-state community for their support during this difficult time.

We dedicate this report to you, Oscar, our fallen brother. We will never forget.

In Memory

Oscar Armstrong III

July 22, 1977 to March 21, 2003

"WE WILL NEVER FORGET"

Chapter 2

OVERVIEW

The focus of this report is to identify the facts pertaining to the Line of Duty Death of Oscar Armstrong III and to recommend actions that could prevent the risk of similar events in the future of the Cincinnati Fire Department.

On March 21, 2003, Fire Fighter Oscar Armstrong III died in the line of duty after becoming trapped in a flashover while battling a residential structure fire. The fire started in the first floor kitchen of a two-story, single-family residence. The Cincinnati Fire Department had not experienced a line of duty death since January 28, 1981.

This report was developed and completed by a joint commitment from the Cincinnati Fire Department Training, Administration, and Operations bureaus, the Cincinnati Fire Fighters Local 48 Safety Committee, as well as representatives of the City of Cincinnati Risk Management Division, Solicitor's Office, and a private safety consultant.

Following the flashover, all fire department personnel on the scene of the fire performed at exceptional levels. There were numerous displays of heroism demonstrated by members of the fire department during rescue and resuscitation of fire fighter Armstrong. All fire department members were afforded the opportunity to participate in the various sub-committees formed to review and make recommendations surrounding this incident. Additionally, all fire department members were given the opportunity to visit the fire scene on the day of the incident and the immediate days following the incident.

The National Institute of Occupational Safety and Health completed a simultaneous investigation of the incident. Over 30 fire fighters were interviewed during the initial NIOSH investigation and their recollections of the events that occurred were utilized in conjunction with video, radio transcripts, and still photographs to develop a timeline of the events that occurred on March 21, 2003.

This report analyzes the tasks of fire companies and command officers at the incident scene. In an effort to provide a thorough analysis of the events that occurred, various sub-committees were formed, they were:

- Procedures
- Training
- Equipment and Technology
- OSHA Review
- Driving and Pumping Operations
- Command Officers
- Legal Review

Each of the areas evaluated by the sub-committees produced a list of recommendations for action by the department. A synopsis of the recommendations for the Fire Department to help prevent a similar outcome at a future incident are listed below:

1. Personnel Recommendations:

   For detailed information please refer to Chapter 8, section A.

   a. District Chief Aides

      1. To provide important incident command support, personnel tracking and accountability, communications support and scene safety functions. Additionally coordinate district training and minimum company standards evaluations. Accountability, incident safety, communications support and basic fire fighting proficiency played an important role in this incident.

         Budget Implication: $1,182,662.92 annually

   b. Department Training Personnel

      1. Personnel to provide current and new department training functions to ensure fire fighting and emergency response proficiency, command and company officer supervision effectiveness, and driver/operator efficiency.

         Budget Implication: $662,350.40 annually

   c. Incident Safety Officer Personnel

      1. To provide invaluable incident safety supervision to recognize crew integrity issues, line deployment issues, over commitment of resources, smoke and fire condition evaluation, including flashover and backdraft recognition. Persons trained specifically for this task provide an important role in safety and survival of fire fighters.

         Budget Implication: $394,227.64 annually

   d. Personal Protective Equipment Maintenance and Cleaning Technician

      1. A civilian position to enable a dedicated individual in the Cincinnati Fire Department to be able to track, maintain, and clean Personal Protective Equipment at least every six months.

         Budget Implication: $60,000.00 annually

2. Equipment Recommendations:

   For detailed information please refer to Chapter 8, section C.

   a. Improvements in equipment are needed to improve safety of fire fighters operating at emergency incidents.

      Budget Implication: $4,088,265.00 (one time cost)

3. Standard operating procedures

   a. Standard operating procedures need updating, revision, and frequent training. Improvements are needed to enhance operations, improve safety and effectiveness and to provide additional control of personnel during emergency operations.

4. Technology Enhancements

   a. Current and future technology innovations in fire fighting safety equipment need to continuously be monitored for improved and safer equipment. The technology advancements to watch in the immediate future are:

      1. Ultrasound fire fighter locating equipment
      2. Integrated SCBA communications systems for inter-company command and control.
      3. Accountability and personnel tracking enhancements.

5. Training Improvements

For detailed information please refer to Chapter 8, section B.

Improvements in delivery of required training programs, record keeping of training sessions, and promoted position training are needed to enhance fire-fighting safety.

a. Basic Fire Fighting Reinforcement Training and Minimal Company Standards Training
b. Fire Behavior and Flashover Training
c. Initial Company Officer Training
d. Annual Company Officer Training Updates
e. Initial Command Officer Training
f. Annual Command Officer Training Updates
g. Initial Driver / Operator Training
h. Annual Driver / Operator Training Updates
i. Standard Operating Procedure Maintenance and Training
j. Fire Fighter Survival Training
k. Rapid Assistance Team Initial and In-Service Training

Budget Implication: $25,000.00 (capital – for materials)
$662,350.40 (personnel annual same as item "b" on page 7)

6. Command Improvements

Incident command enhancements are needed to ensure personnel safety, tracking, proper deployment, training, and effective tactical operations.

a. Chief's Aides to assist in management of the incident scene serving as accountability, communications, or sector officers.
b. Incident safety officers to manage incident scene safety.
c. Command officer training to enhance command effectiveness.
d. Improved personnel tracking systems for ease of accountability on the incident scene.
e. Tactical incident benchmarks to assist command in tracking incident progress.
f. Reinforcement of command transfer and command presence.

The completion of this report signifies a substantial achievement by the Cincinnati Fire Department. The report identifies the facts surrounding the events that took place on March 21, 2003 at 1131 Laidlaw Avenue, and outlines actions to take to help prevent similar events from occurring again. The committee's recommendations provide a positive plan of action for the Cincinnati Fire Department to proactively follow in helping to prevent another Line of Duty Death. The ultimate tribute to Oscar Armstrong III and his family would be to learn from our operations on March 21, 2003, and aggressively pursue the recommendations this report has created. The main goal of this report is to ensure all future fire fighters in the Cincinnati Fire Department return home after work each and every day. Never again do we want a preventable circumstance to leave a family without a father, mother, child, or spouse.

Recommendations have been included to clearly lay the groundwork for safer operations within the Cincinnati Fire Department while providing outstanding service to the City of Cincinnati.

Chapter 3

INVESTIGATION TEAM OVERVIEW / MEMBERS

Following Fire fighter Armstrong's funeral, the Cincinnati Fire Department formed a committee to independently investigate the events surrounding Oscar's death. The following mission statement was created and utilized by this committee.

"The focus of this investigation shall be to identify the facts pertaining to the Line of Duty Death of Oscar Armstrong III and to recommend actions to prevent the risk of similar events."

District Chief Thomas Lakamp of the Fire Training Bureau and Assistant Chief Chris Corbett of the Fire Prevention Bureau chaired the Investigation Committee.

The investigation team coordinated with the National Institute of Occupational Safety and Health (NIOSH) efforts in the early phase of the investigation. These efforts assisted in completing the preliminary report of the investigation which was released on May 22, 2003. This report concentrated on a timeline of events that occurred on March 21, 2003, at 1131 Laidlaw, to release the facts of what actually occurred that tragic day. During completion of this initial report, over 30 fire fighters were interviewed in a two-day interview process. These interviews were completed at a remote location while members were off duty from their regular work schedule. The fire scene was recreated with the assistance of the Cincinnati Fire Department, Fire Investigative Unit, and the Cincinnati Police Department. Live video footage, still and digital photographs, and audiotapes were analyzed to place all of the facts that were discovered into a timeline of what occurred on the day Oscar died.

This report is intended to expand upon that information and utilize the facts obtained from the incident and take a closer look at operations within the Cincinnati Fire Department to make recommendations for improvements to help prevent a similar tragedy in the future.

Following the release of the preliminary report, three sub-committees were formed allowing open involvement of the entire fire department into the evaluation and recommendation phase of the process. The three sub-committees formed reviewed only the items directly related to the death of Fire Fighter Armstrong and this information was utilized to compile information, which is included as final recommendations in this report. A fourth internal committee was also formed to review the legal and OSHA implications of the death of Fire Fighter Armstrong.

Investigation Team Members:

Lieutenant Dan Wolf	CFD Fire Investigation
Captain Dan Rottmueller	CFD Fire Investigation
District Chief Glenn Coleman	CFD Fire District 3 / Local 48 Safety Committee
Captain Jack Klosterman	CFD Ladder 19 / Local 48 Safety Committee
Lieutenant Mike Kirby	CFD Fire District 3 / Local 48 Safety Committee
Fire Fighter Joseph Cassetta	CFD Ladder 29 / Local 48 Safety Committee
District Chief Thomas Lakamp	CFD Training Bureau
Lieutenant Grant Light	CFD Training Bureau
Lieutenant Michael Cayse	CFD Training Bureau / Local 48 Safety Committee
Lieutenant Kevin McMullen	CFD Training Bureau
Captain Michael Zimmerman	CFD Training Bureau
District Chief Ronald Texter	CFD Health and Safety Officer
District Chief Will Jones	CFD Operations
Attorney Julie Bissinger	City Solicitors Office
District Chief Howard Reed	CFD Fire District 1
Assistant Chief Chris Corbett	CFD Fire Prevention Bureau
FAO George Drieling	CFD Engine 34
FAO Robert Anderson	CFD Engine 5
Safety Supervisor Patrick Cook	City Risk Management Department
Safety Specialist Michael Gunn	Private Consultant

Sub-Committee Team Members

A. Procedures Sub-Committee

1. Lieutenant Dean Molitor – District 3
2. Fire Fighter Barry Nichols – Engine 20
3. Fire Fighter Matt Flagler – Rescue 14
4. Fire Fighter Doug Baker – Engine 17
5. District Chief Roy Winston – Communications
6. FAO Mike Kruer – Ladder 18
7. Lieutenant Mike Cayse – Fire Training
8. Captain Jack Klosterman – Ladder 19
9. District Chief Thomas Lakamp – Fire Training
10. Lieutenant Kevin McMullen – Fire Training
11. District Chief Howard Reed – District 1
12. Lieutenant Mike Kirby – District 3
13. District Chief Glenn Coleman – District 3

B. Training Sub-Committee

1. Lieutenant Thomas Maynor – District 1
2. Fire Fighter Matt Konnerman – Engine 35
3. Fire Fighter Steve Hoog – Engine 23
4. Lieutenant Mike Cayse – Fire Training
5. Lieutenant Grant Light – Fire Training
6. Lieutenant Mike Kirby – District 3
7. Lieutenant Kevin McMullen – Fire Training
8. District Chief Ron Texter – Health and Safety
9. District Chief Tom Lakamp – Fire Training
10. Fire Fighter Jeff McDonough – Engine 32
11. Fire Fighter Mike Gregorio – Ladder 32
12. Fire Fighter Bret Dew – Rescue 24
13. Fire Fighter Nate Cash – Ladder 17

C. OSHA / Legal Committee

1. District Chief Howard Reed – District 1
2. Attorney Julie Bissinger – City Solicitor Office
3. Lieutenant Mike Kirby – District 3
4. Safety Manager Pat Cook – City Risk Management
5. Safety Consultant Michael Gunn

D. Equipment and Technology Sub-Committee

1. FAO David Harris – Engine 2
2. Fire Fighter Bret Dew – Rescue 24
3. Fire Fighter Nick Pennington Jr. – Engine 37
4. Fire Fighter Jeff McDonough – Engine 32
5. Fire Fighter Nate Cash – Ladder 17
6. Fire Fighter Mike Gregorio – Ladder 32
7. Fire Fighter Steve Hoog – Engine 23
8. Lieutenant Mike Kirby – District 3
9. District Chief Thomas Lakamp – Fire Training
10. Captain Mike Zimmerman – Fire Training
11. Lieutenant Mike Cayse – Fire Training
12. Lieutenant Kevin McMullen – Fire Training
13. Lieutenant Grant Light – Fire Training

Chapter 4

OVERVIEW OF THE CINCINNATI FIRE DEPARTMENT

The Cincinnati Fire Department is a career fire department with 791 uniformed personnel and 50 civilian personnel. The Cincinnati Fire Department was founded in 1853 and was the first professionally paid fire department in the nation. The department protects 331,285 residents of Cincinnati within the 78.8 square miles that comprise the city limits. The city is located in Southwest Ohio within the county of Hamilton. The geographic layout of the city provides a central core on the banks of the Ohio River and branches out 12 miles to the East and West and approximately 10 miles to the North. The department provides protection to a central business district with high-rise office structures, housing, shopping, convention, entertainment, hotel, and sporting establishments. Throughout the remainder of the city, the department provides services to four major interstate highway systems, a major rail yard, multiple manufacturing and warehouse occupancies, a moderate size municipal airport, and various residential and commercial properties. Within the city boundaries, the department also provides protection to two large universities and several small community colleges. There are 8 major hospitals located within the city limits.

The Cincinnati Fire Department provides fire protection, emergency medical, hazardous material, technical rescue, fire prevention, and support services. The fire department staffs the following units daily:

26 – Engine Companies (13 ALS and 13 BLS capable)
13 – Ladder Companies
6 – Ambulances providing Basic Life Support transport
4 – Rescues providing Advanced Life Support transport
1 – Heavy Rescue / Haz-Mat Response Unit
4 – District Chief – Incident Command Units
1 – Aircraft Fire Fighting Vehicle
1 – Bomb Disposal Unit
1 – Fire Boat
1 – Rescue Boat
1 – Water Tanker
1 – Mobile Air Unit
1 – Mobile Generator / Light Unit
2 – Foam Units

A total of 186 fire fighters are on duty each day.

In 2003, the Cincinnati Fire Department responded to a total of 82,302 emergency incidents. Of these incidents, 50,977 were medical emergencies, 23,546 were special or other fire emergencies, and 6,126 were structural fires. Cincinnati Fire Department ambulances and rescues transported 45,000 patients to the hospital.

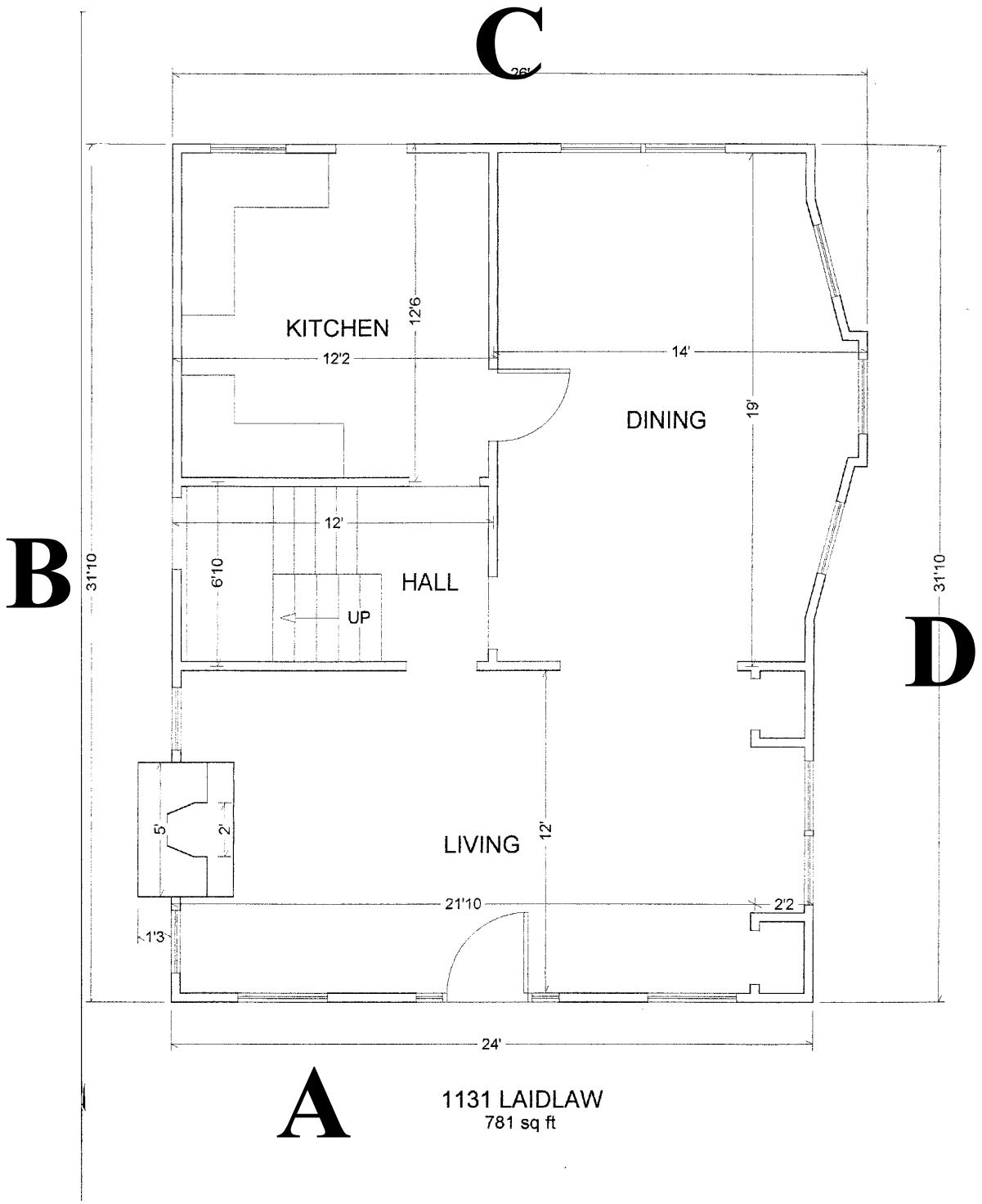
The average response time from the dispatch of fire fighters to a fire emergency until their arrival on the scene was 4 minutes and 4 seconds. The average time for the first full one-alarm assignment to arrive on scene was 6 minutes and 52 seconds without a chief officer, seven minutes and 49 seconds with a chief officer. The average time from dispatch of fire fighters to a medical emergency to their first arrival on the scene was 4 minutes and 9 seconds. The average time for an advanced life support transport unit to arrive was 7 minutes and 45 seconds and 8 minutes and 22 seconds for a basic life support transport unit to arrive on the scene. The average preparation time to initially respond after receiving an emergency incident was 84 seconds.

Chapter 5

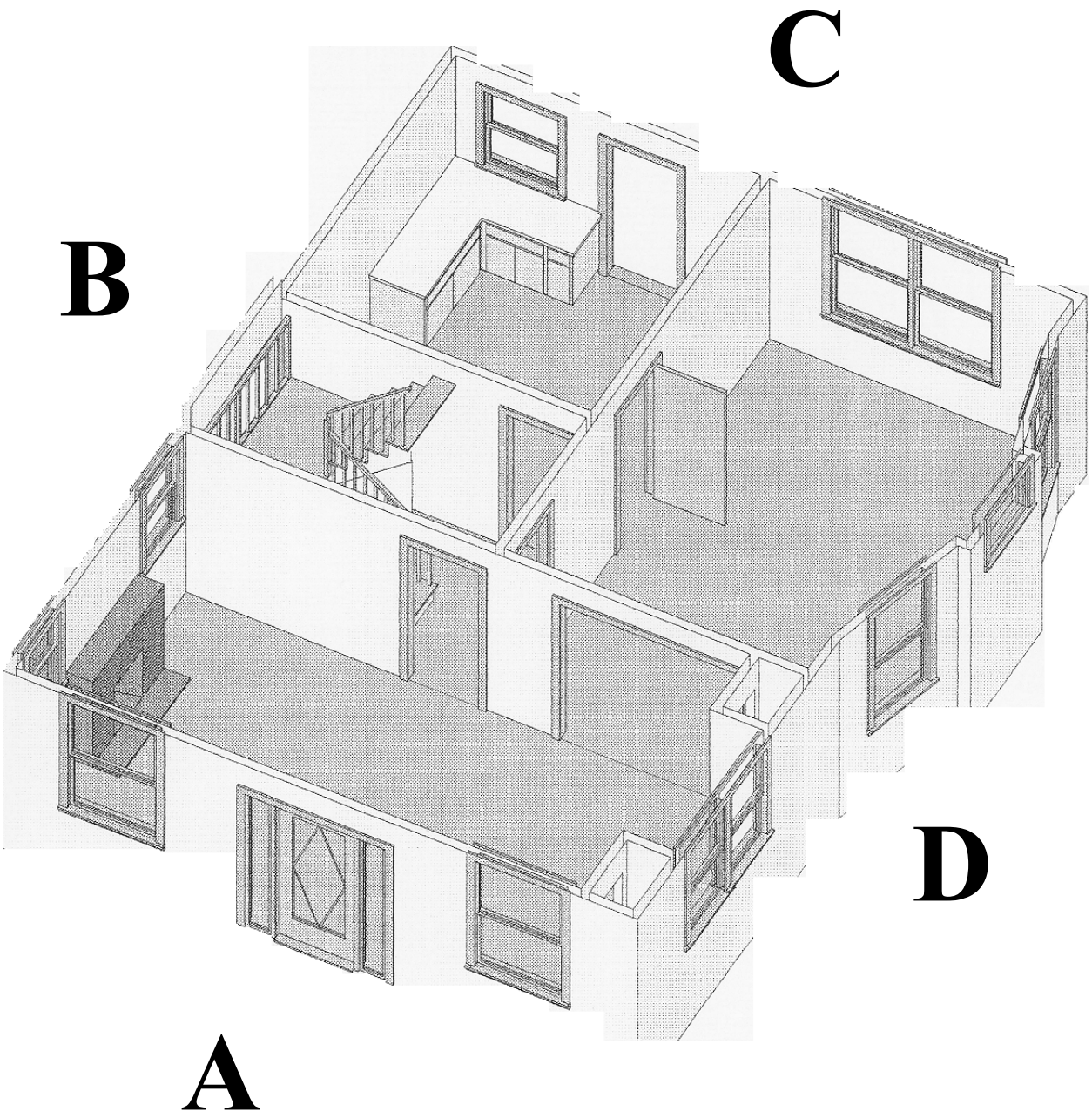
The Structure

The two-story house at 1131 Laidlaw Avenue is located in the Bond Hill neighborhood of Cincinnati between Paddock and Corinth Avenues. The house is approximately 90 years old. It is of ordinary unprotected construction with brick exterior walls and wooden interior members. The structure contains 2 stories and a basement. The entire structure contains 6 rooms and 1 bathroom. There are entrance and exit doors on the front "A" side, left side "B" side, and rear "C" side of the structure. The entrance on the "B" side led directly to the main stairwell, which allowed access to the first floor, second floor, and basement. Additionally, the interior walls were covered with a thin wood paneling throughout the areas on the first floor where the flashover occurred.

The temperature outside was approximately 50 degrees on the day of the incident with an overcast sky without liquid precipitation.


C
26'
KITCHEN
12'6
12'2
14'
DINING
19'
12'
HALL
6'10
UP
B
31'10
31'10
D
5'
2'
LIVING
12'
21'10
2'2
1'3
24'
A
1131 LAIDLAW
781 sq ft

First Floor



First Floor

Chapter 6

The Fire – Overview

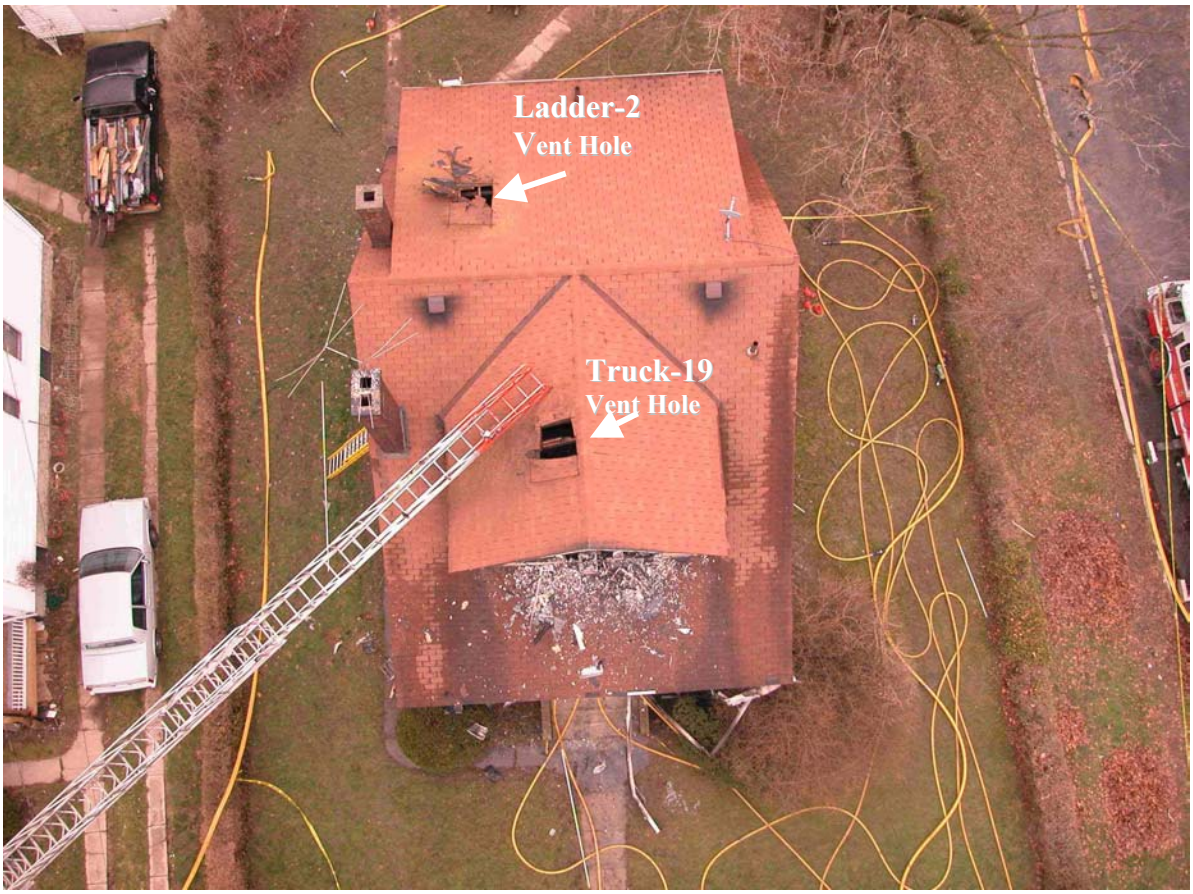
The fire originated in the kitchen of the two-story single-family residence. It was determined to have started on the stovetop from a burner that was left on with grease in the cooking pot. There was heavy fire showing from the first floor rear (side "C") of the structure. The fire progressed to the flashover stage in approximately 3 minutes 40 seconds after the arrival of Engine 9, the first engine company on the scene. One fire fighter, Oscar Armstrong III, was killed during the flashover event and two other fire fighters were injured, as they were a few feet inside the front door of the structure when the flashover occurred.

The Cincinnati Fire Department Fire Investigation Unit determined the fire to be accidental in origin as a result of food products left unattended on the stovetop. This cause was confirmed by a third party firm, Unified Investigations and Sciences, Incorporated.

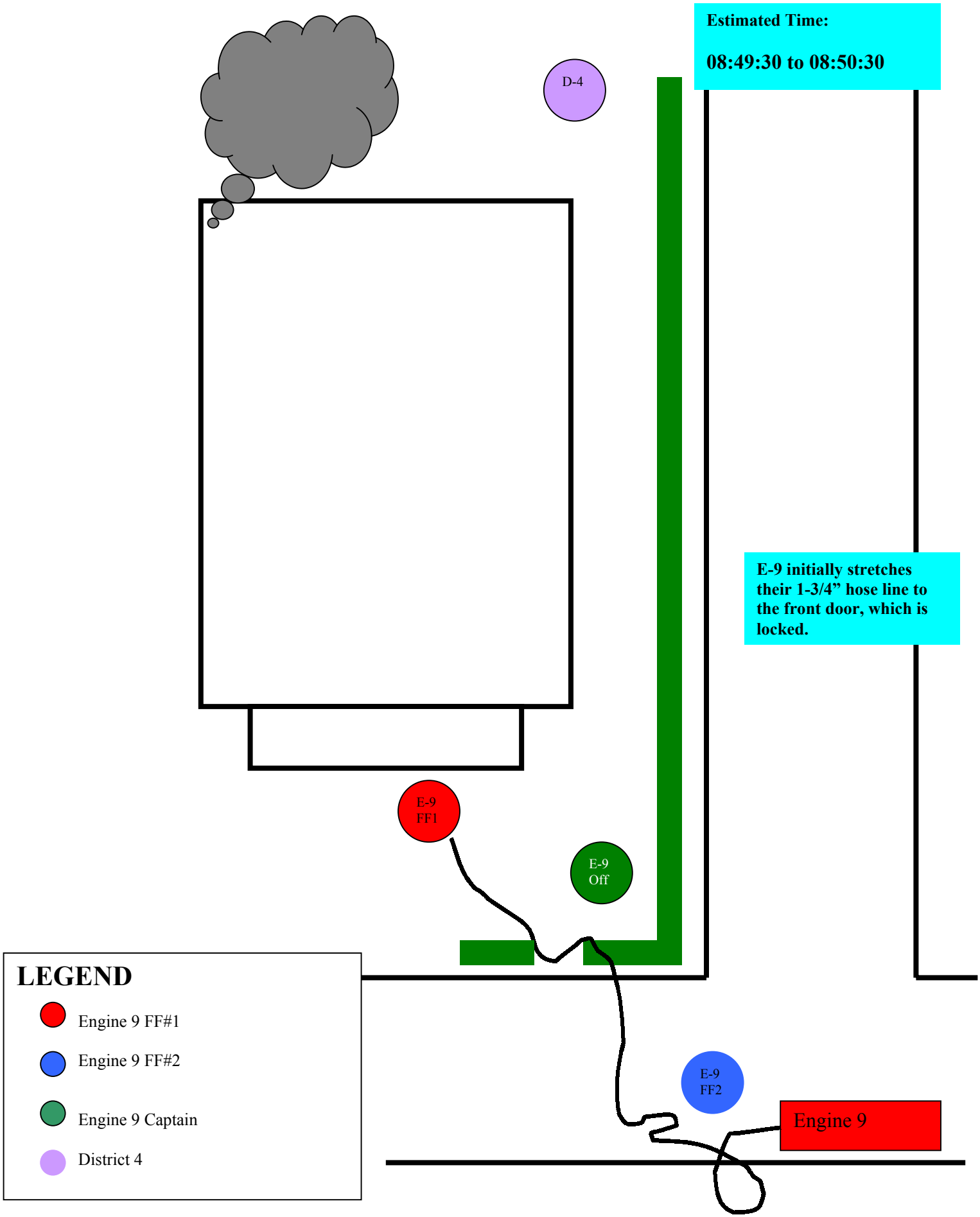
- The initial call was received at Cincinnati Fire Dispatch at 08:45:00 on March 21, 2003, from a male occupant via a 9-1-1 telephone call.
- The initial 1-alarm assignment was dispatched at 08:45:50 with Engine 2, Engine 9, Truck 2, Truck 32, and District 3 assigned to the incident by the CAD system.
- At the time of the dispatch, Engine 2 and Truck 2 were drilling on Steger Drive with District 4 on hose and nozzles. Engine 2 broke down their supply line and fire line prior to responding. Engine 2 advised the fire dispatcher they would be delayed. Engine 9 was performing a driving drill and was out of quarters when the fire was dispatched. Ladder 32 was in quarters performing a drill at the time of dispatch.
- District 4 was closer to the incident because he was performing a drill with Engine 2 and Truck 2 and responded to the incident in place of District 3.
- The incident was upgraded to a confirmed fire response after District 4 reported heavy smoke in the area prior to his arrival. This added RAT 20, Rescue 38, and District 3 to the response.
- District 4 was the first to arrive at the scene at 08:48:10 and reported heavy fire from the first floor rear of a one family dwelling and District 4 assumed "Laidlaw Command".
- Engine 9 arrived on the scene at 08:49:00.
- Ladder 2 arrived on the scene at 08:50:15.
- Engine 2 arrived on the scene at approximately 08:50:30 hours (no status message terminal depression for on-scene time).
- Ladder 32 arrived at the scene at 08:51:00.
- At 08:52:00 hours Engine 9 began asking for the water to be started in their hand-line.
- The fire progressed to flashover on the first floors at approximately 08:52:40 hours.
- Following the flashover, the two injured fire fighters were cared for in the front of the structure and the rescue efforts were initiated to recover fire fighter Armstrong.

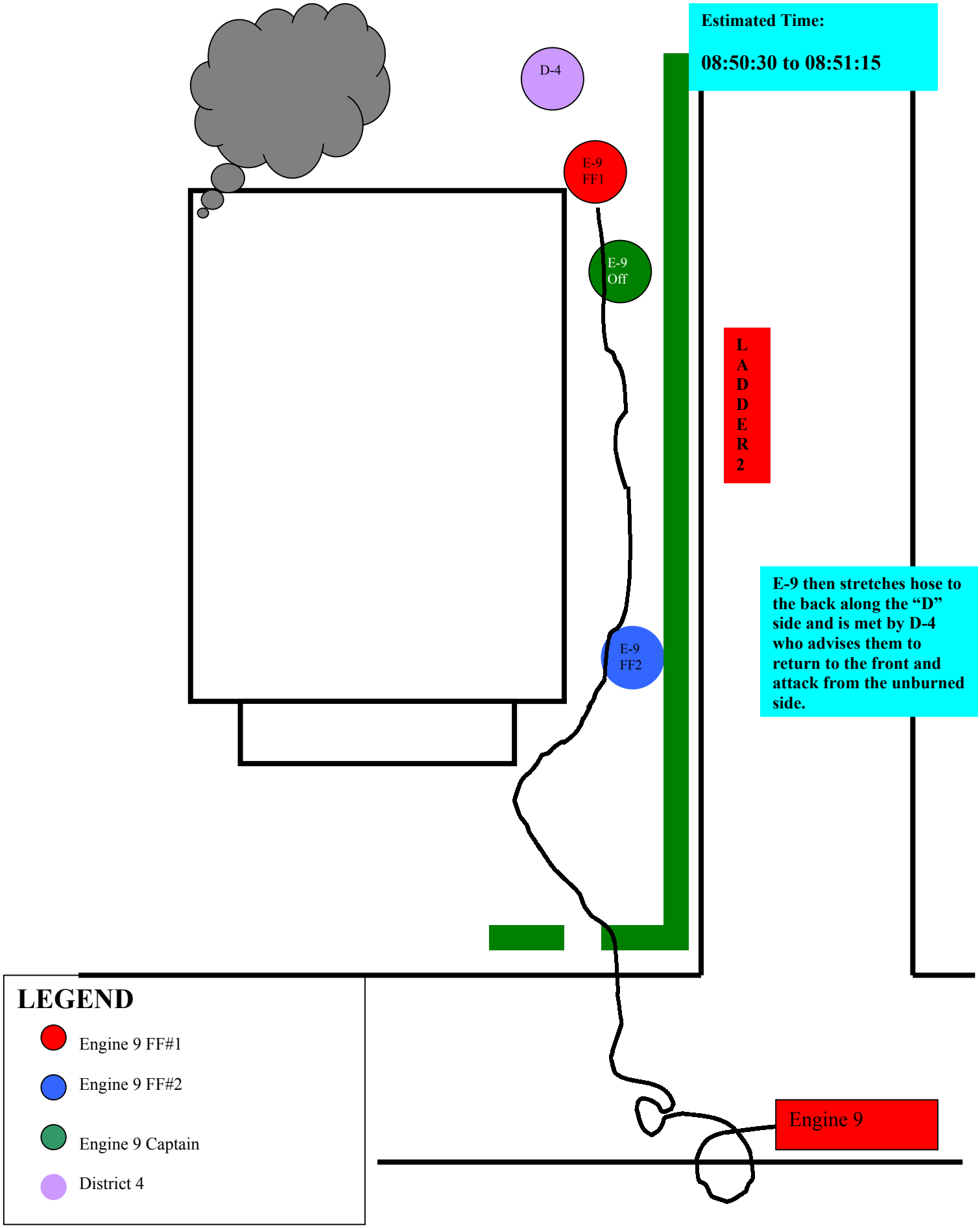
Details of individual company actions are reported later on the following pages of this document.

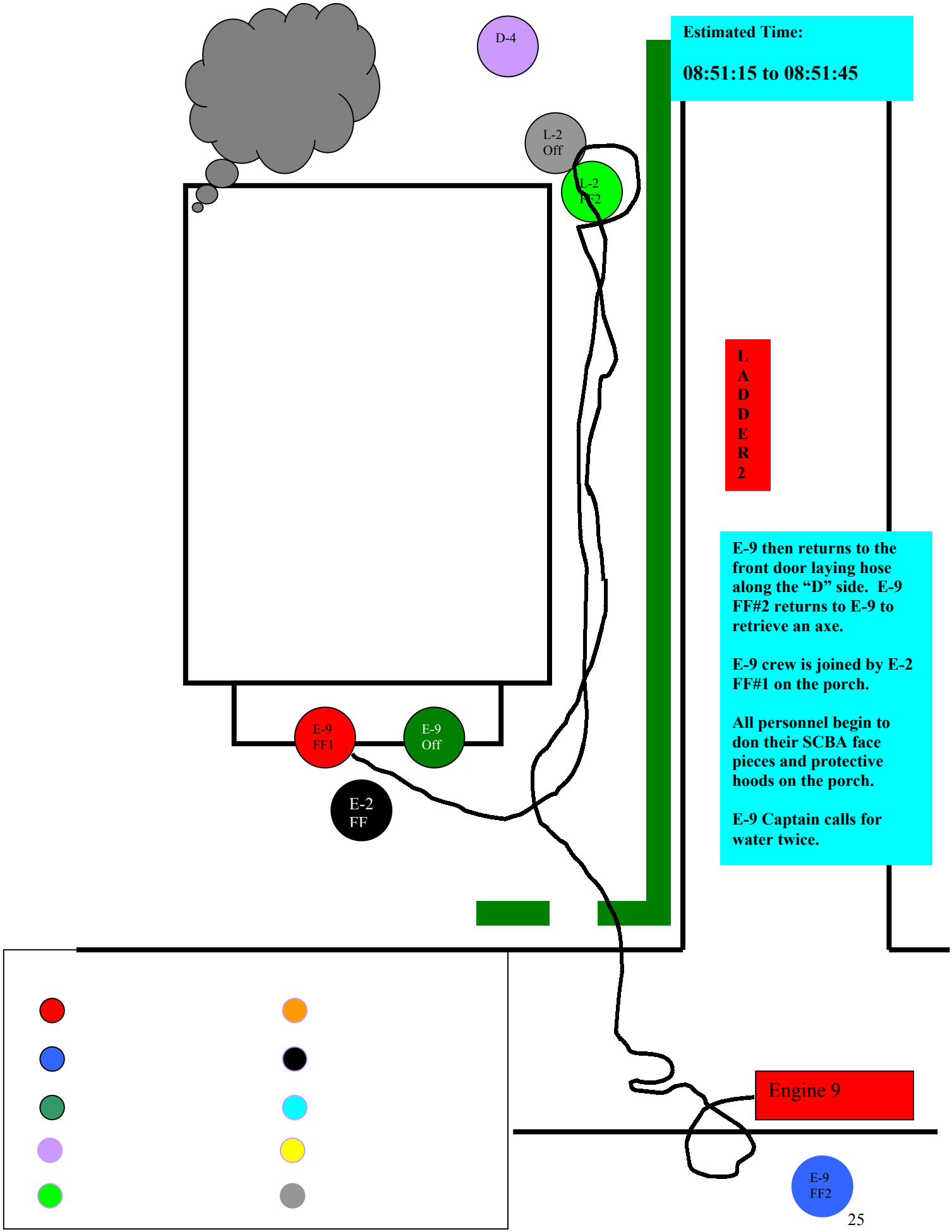
Occupant status was unknown to the responders during response and upon arrival at the incident scene. The caller reported to the dispatcher that all occupants were out of the building during his conversation with the 911 operators. This vital information was not relayed to responding companies. This information was also not obtained by first arriving companies. Therefore, the first arriving companies began aggressive interior fire operations.

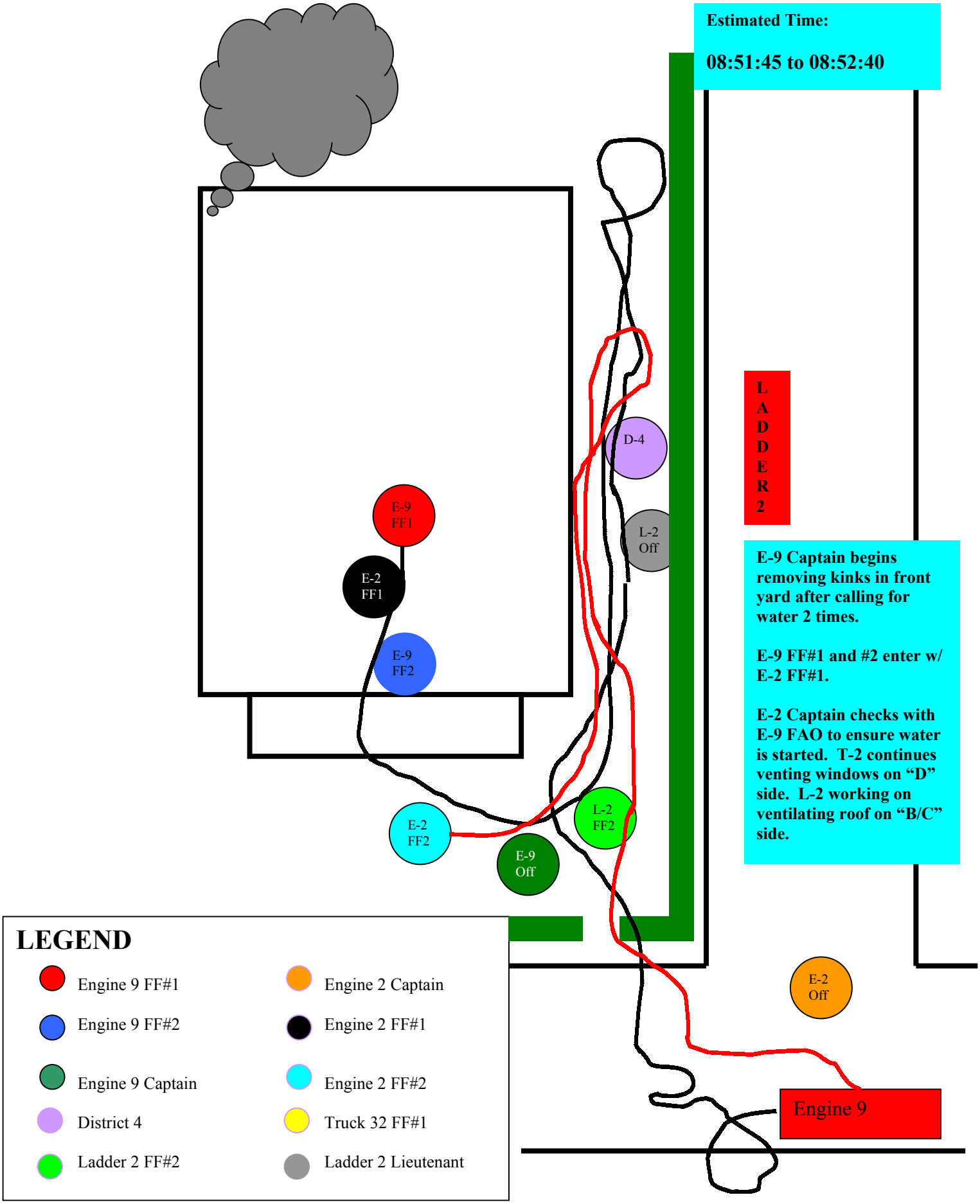

Ladder-2
Vent Hole
Truck-19
Vent Hole

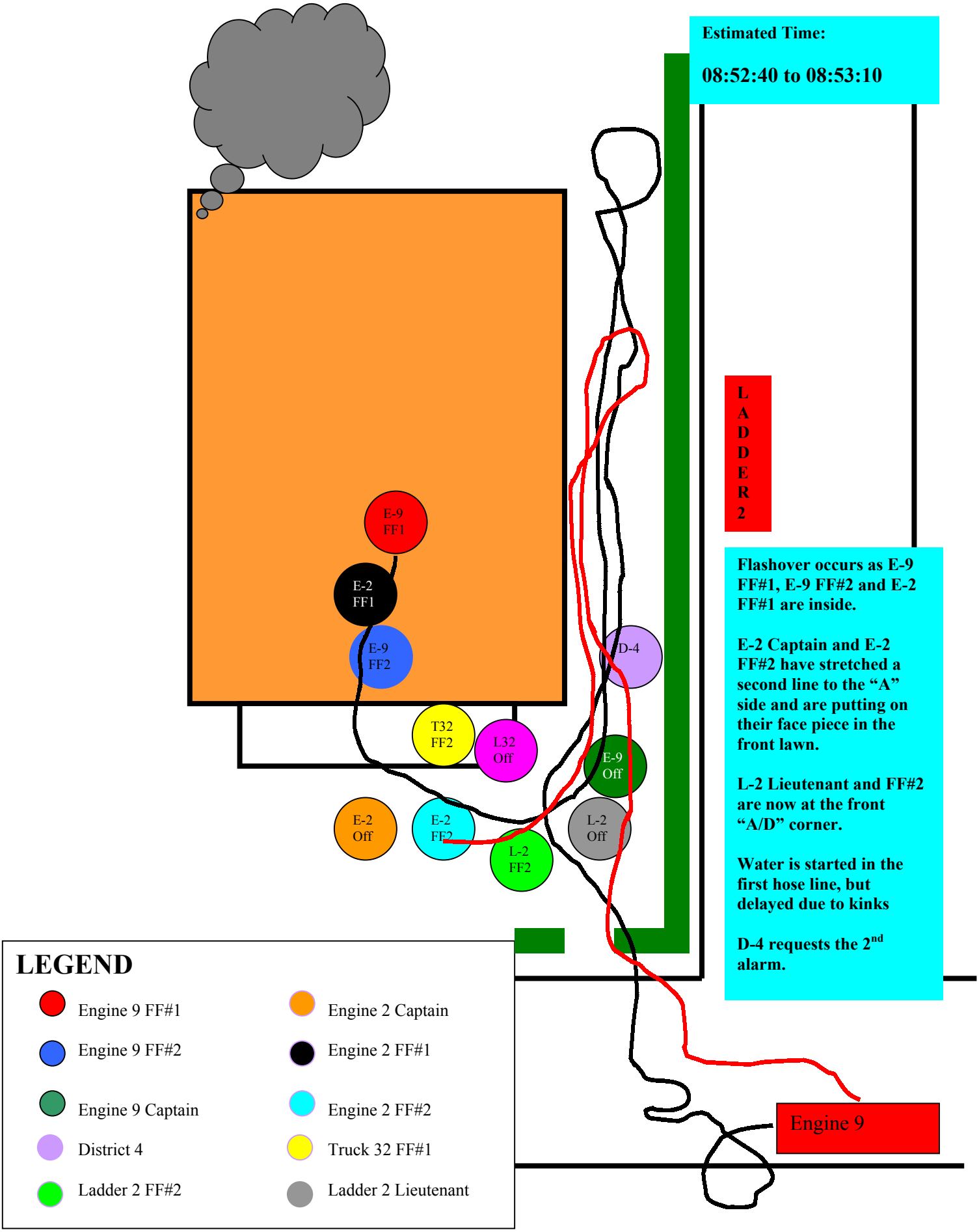
Engine-9
1st Hose
Deployed

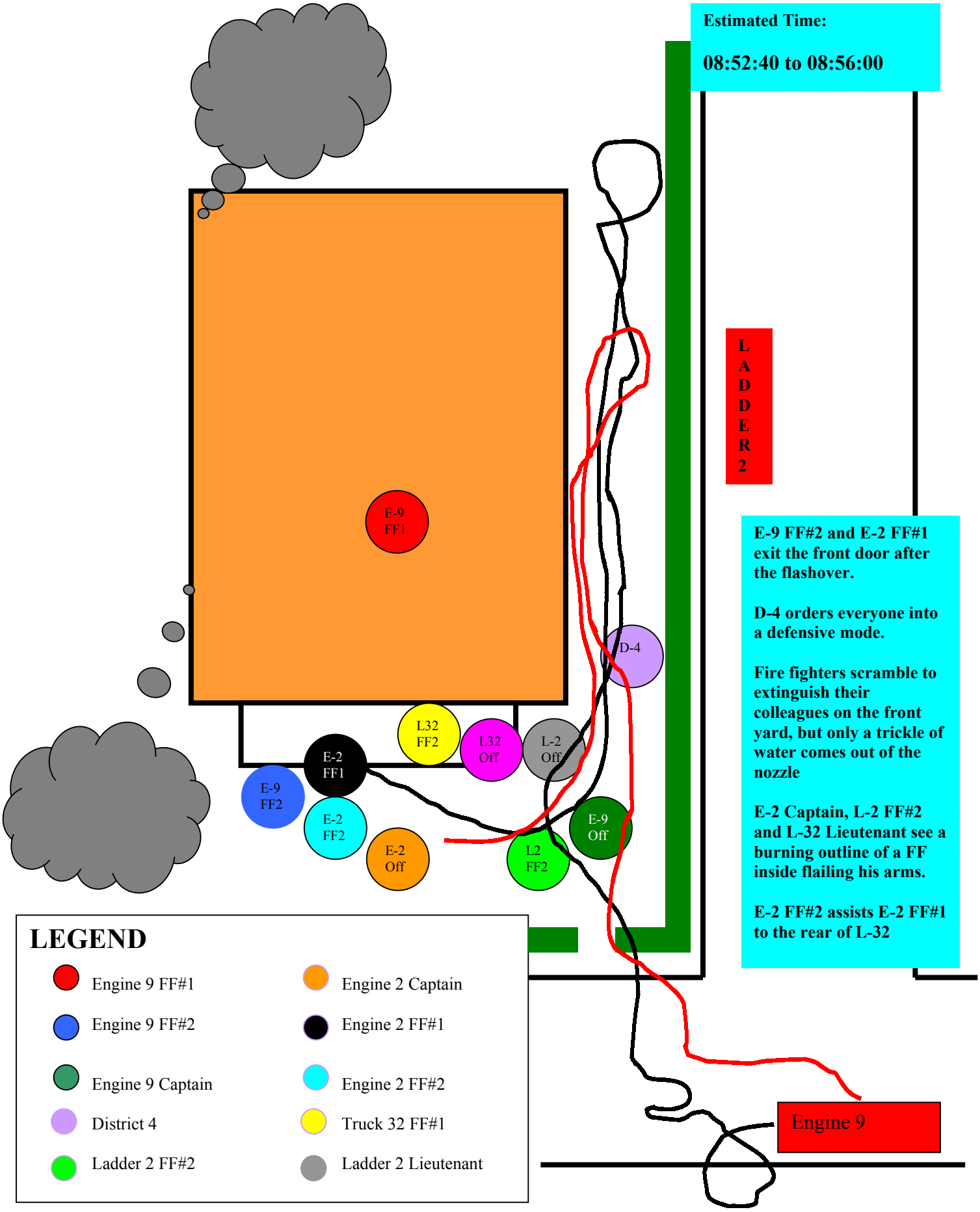

Estimated Time:
08:49:30 to 08:50:30
D-4
E-9 initially stretches their 1-3/4" hose line to the front door, which is locked.
E-9 FF1
E-9 Off
E-9 FF2
Engine 9
LEGEND
Engine 9 FF#1
Engine 9 FF#2
Engine 9 Captain
District 4

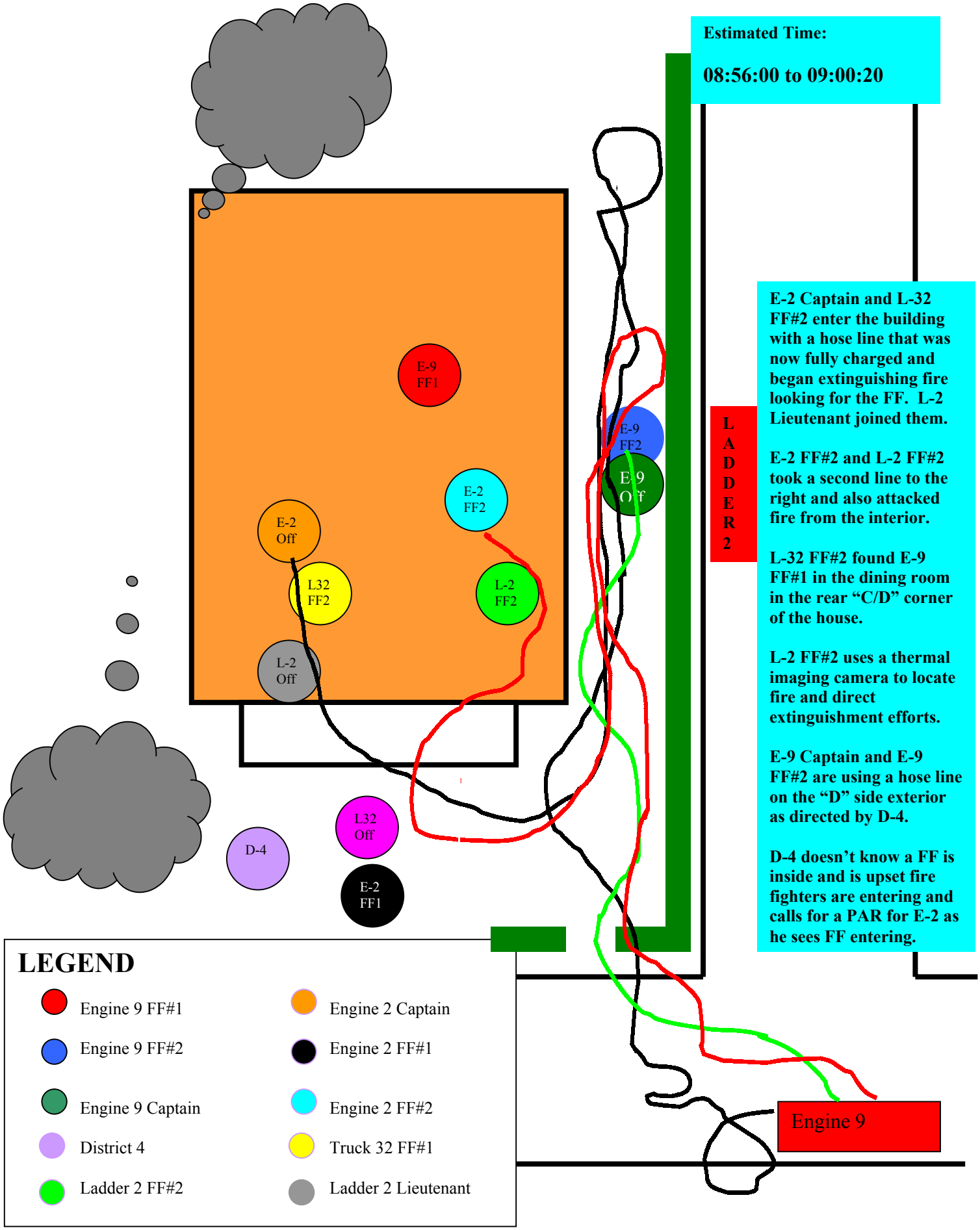

Estimated Time:
08:50:30 to 08:51:15
D-4
E-9
FF1
E-9
Off
E-9
FF2
LADDER 2
E-9 then stretches hose to the back along the "D" side and is met by D-4 who advises them to return to the front and attack from the unburned side.
Engine 9
LEGEND
Engine 9 FF#1
Engine 9 FF#2
Engine 9 Captain
District 4

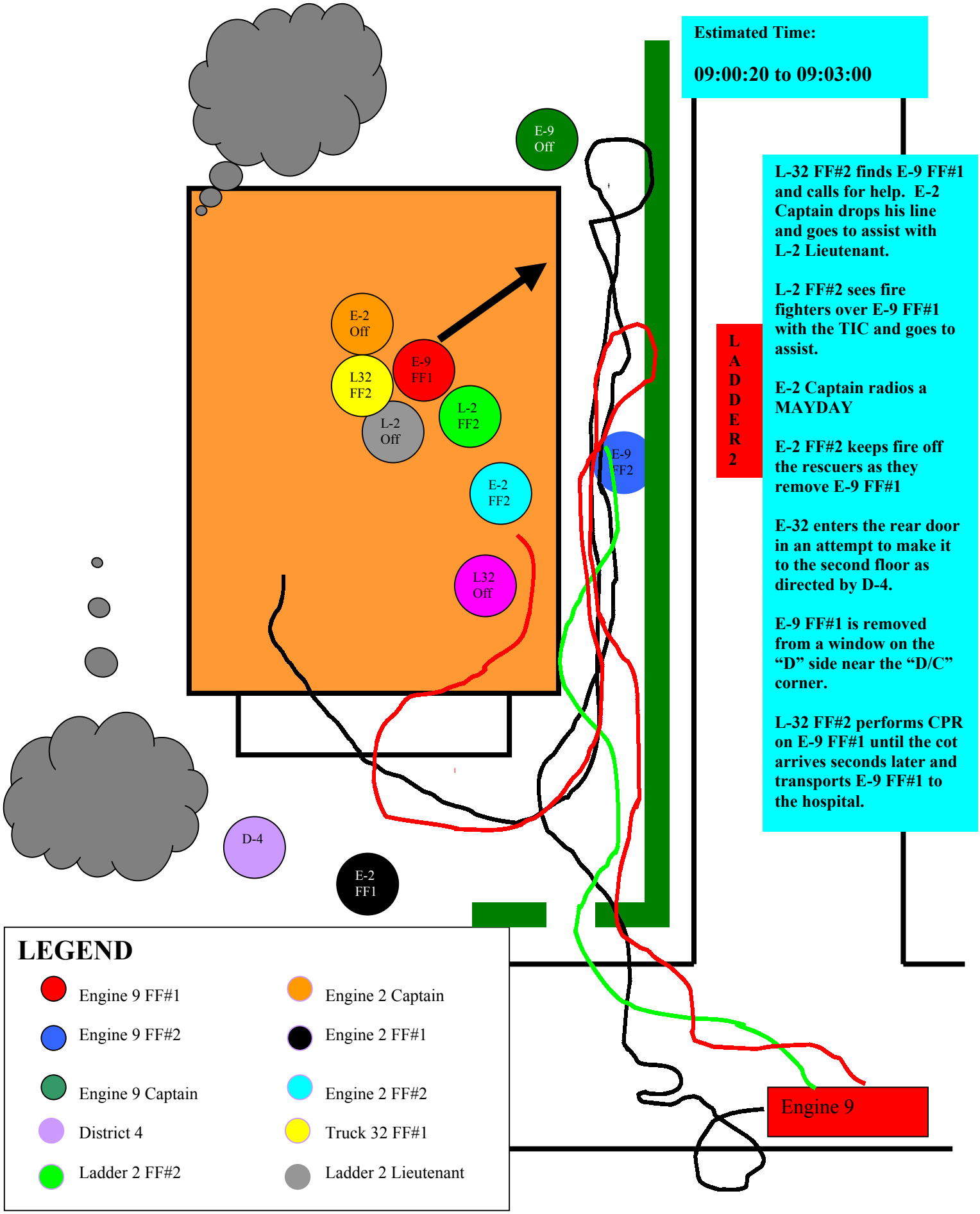

Estimated Time:
08:51:15 to 08:51:45
D-4
L-2
Off
L-2
FF2
LADDER 2
E-9 then returns to the front door laying hose along the "D" side. E-9 FF#2 returns to E-9 to retrieve an axe.
E-9 crew is joined by E-2 FF#1 on the porch.
All personnel begin to don their SCBA face pieces and protective hoods on the porch.
E-9 Captain calls for water twice.
E-9
FF1
E-9
Off
E-2
FF
Engine 9
E-9
FF2


Estimated Time:
08:51:45 to 08:52:40
LADDER 2
E-9 Captain begins removing kinks in front yard after calling for water 2 times.
E-9 FF#1 and #2 enter w/ E-2 FF#1.
E-2 Captain checks with E-9 FAO to ensure water is started. T-2 continues venting windows on "D" side. L-2 working on ventilating roof on "B/C" side.
D-4
L-2 Off
E-9 FF1
E-2 FF1
E-9 FF2
E-2 FF2
E-9 Off
L-2 FF2
E-2 Off
Engine 9
LEGEND
Engine 9 FF#1
Engine 9 FF#2
Engine 9 Captain
District 4
Ladder 2 FF#2
Engine 2 Captain
Engine 2 FF#1
Engine 2 FF#2
Truck 32 FF#1
Ladder 2 Lieutenant


Estimated Time:
08:52:40 to 08:53:10
LADDER 2
Flashover occurs as E-9 FF#1, E-9 FF#2 and E-2 FF#1 are inside.
E-2 Captain and E-2 FF#2 have stretched a second line to the "A" side and are putting on their face piece in the front lawn.
L-2 Lieutenant and FF#2 are now at the front "A/D" corner.
Water is started in the first hose line, but delayed due to kinks
D-4 requests the 2nd alarm.
E-9 FF1
E-2 FF1
E-9 FF2
D-4
T32 FF2
L32 Off
E-9 Off
E-2 Off
E-2 FF2
L-2 FF2
L-2 Off
Engine 9
LEGEND
Engine 9 FF#1
Engine 9 FF#2
Engine 9 Captain
District 4
Ladder 2 FF#2
Engine 2 Captain
Engine 2 FF#1
Engine 2 FF#2
Truck 32 FF#1
Ladder 2 Lieutenant


Estimated Time:
08:52:40 to 08:56:00
LADDER 2
E-9 FF1
D-4
L32 FF2
L32 Off
L-2 Off
E-2 FF1
E-9 FF2
E-2 FF2
E-2 Off
L2 FF2
E-9 Off
E-9 FF#2 and E-2 FF#1 exit the front door after the flashover.
D-4 orders everyone into a defensive mode.
Fire fighters scramble to extinguish their colleagues on the front yard, but only a trickle of water comes out of the nozzle
E-2 Captain, L-2 FF#2 and L-32 Lieutenant see a burning outline of a FF inside flailing his arms.
E-2 FF#2 assists E-2 FF#1 to the rear of L-32
Engine 9
LEGEND
Engine 9 FF#1
Engine 9 FF#2
Engine 9 Captain
District 4
Ladder 2 FF#2
Engine 2 Captain
Engine 2 FF#1
Engine 2 FF#2
Truck 32 FF#1
Ladder 2 Lieutenant


Estimated Time:
08:56:00 to 09:00:20
E-2 Captain and L-32 FF#2 enter the building with a hose line that was now fully charged and began extinguishing fire looking for the FF. L-2 Lieutenant joined them.
E-2 FF#2 and L-2 FF#2 took a second line to the right and also attacked fire from the interior.
L-32 FF#2 found E-9 FF#1 in the dining room in the rear "C/D" corner of the house.
L-2 FF#2 uses a thermal imaging camera to locate fire and direct extinguishment efforts.
E-9 Captain and E-9 FF#2 are using a hose line on the "D" side exterior as directed by D-4.
D-4 doesn't know a FF is inside and is upset fire fighters are entering and calls for a PAR for E-2 as he sees FF entering.
E-9 FF1
E-9 FF2
E-9 Off
E-2 FF2
E-2 Off
L32 FF2
L-2 FF2
L-2 Off
L32 Off
D-4
E-2 FF1
LADDER 2
Engine 9
LEGEND
Engine 9 FF#1
Engine 9 FF#2
Engine 9 Captain
District 4
Ladder 2 FF#2
Engine 2 Captain
Engine 2 FF#1
Engine 2 FF#2
Truck 32 FF#1
Ladder 2 Lieutenant


Estimated Time:
09:00:20 to 09:03:00
L-32 FF#2 finds E-9 FF#1 and calls for help. E-2 Captain drops his line and goes to assist with L-2 Lieutenant.
L-2 FF#2 sees fire fighters over E-9 FF#1 with the TIC and goes to assist.
E-2 Captain radios a MAYDAY
E-2 FF#2 keeps fire off the rescuers as they remove E-9 FF#1
E-32 enters the rear door in an attempt to make it to the second floor as directed by D-4.
E-9 FF#1 is removed from a window on the "D" side near the "D/C" corner.
L-32 FF#2 performs CPR on E-9 FF#1 until the cot arrives seconds later and transports E-9 FF#1 to the hospital.
LADDER 2
E-9 Off
E-2 Off
L32 FF2
E-9 FF1
L-2 Off
L-2 FF2
E-9 FF2
E-2 FF2
L32 Off
D-4
E-2 FF1
Engine 9
LEGEND
Engine 9 FF#1
Engine 9 FF#2
Engine 9 Captain
District 4
Ladder 2 FF#2
Engine 2 Captain
Engine 2 FF#1
Engine 2 FF#2
Truck 32 FF#1
Ladder 2 Lieutenant

Preliminary Fire Investigation Report
1131 Laidlaw Ave.
Date of Fire: 3/21/03
Dispatch Time: 08:45
Prepared By: Lt Dan Wolf, Fire Investigative Unit

Property Description:

Single family brick dwelling, with three rooms on the first floor and three bedrooms on the second floor. The basement is finished and used as a bedroom / recreational room.

Origin and Cause:

The fire originated in the kitchen. At the time of the fire, there were three occupants home; two people on the second floor and one person in the basement. Also, a fourth occupant left the house through the rear kitchen door, approximately twenty minutes prior to the fire being reported.

One occupant, on the second floor, smelled smoke and alerted the others. All occupants met in the first floor hall that connected the living room, dining room and kitchen. The occupants noticed fire only in the kitchen, on and above the stove. The occupants exited the house, except for one who used the phone in the basement to call 911. All occupants escaped uninjured, prior to the Fire Department's arrival.

District 4 was the first Fire representative on the scene. District 4 noticed heavy fire on the first floor rear kitchen area (southeast corner of the house). The rear kitchen door was fully involved with fire, extending to the porch.

District 4 had the Fire companies fight the fire from the front, intending to push the fire out the back of the house. Engine 9 forced entry through the front door. District 4 stated that, shortly

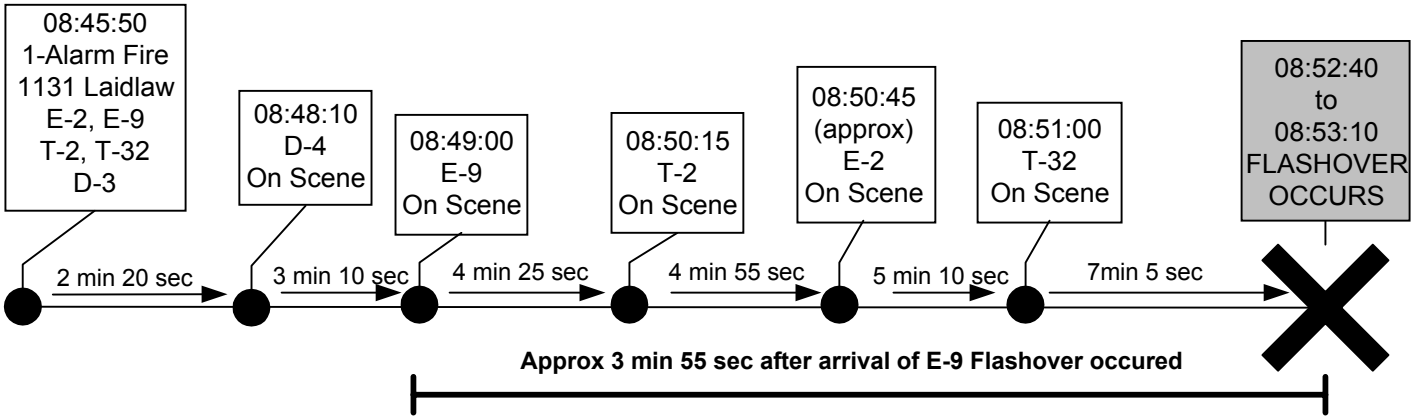
after the firefighters entered the front door, the fire flashed over (all exposed combustibles burst into flame from floor to ceiling, temperatures can reach 2000 degrees F).

The Fire Investigation Unit's investigation reveals that the fire started in the kitchen; and, more specifically, on top of the stove. The burn patterns were evaluated, along with early witness statements and evidence. The stove was taken as evidence, and tested by a representative of the insurance company. The testing revealed that the rear left burner was in the on position. On top of this burner was a 9 inch cast iron skillet, which was used to fry freedom fries about three hours earlier on the front left burner. When the fries were done, the skillet was moved to the left rear burner to cool. The skillet was about 2 inches deep and contained about an inch of oil. The skillet was moved to that rear burner, no later than 0530 on the morning of March 21, 2003. At that time, there were four occupants in the house. One occupant had to take a bus downtown, was up at 0730, and left the house approximately 0820, March 21, 2003. That occupant left through the rear kitchen door, and did not notice anything unusual in the kitchen at that time. Within 20 minutes, an occupant on the second floor smelled smoke and alerted the others. They discovered fire on the stove and the cabinets above the stove. All occupants escaped unharmed.

Based on the investigation, witness statements, and evidence, the cause of the fire is determined to be a pan of oil left unattended on the stove. The rear left burner was the ignition source. The oil in the pan was the first material ignited, which spread to the cabinets above the stove. With time, the fire extended out from the kitchen to the rest of the house. The Fire Investigation Unit believes this fire to be accidental.

(Available data shows that food left unattended on stoves has been the leading cause of structure fires in Cincinnati from 1997-2001, averaging over one fire a day. Note: A structure fire is defined as any burning inside a structure or building whether or not there was structural damage to the building.)

Pre-Flashover Company Actions



District 4 – PRE-FLASHOVER

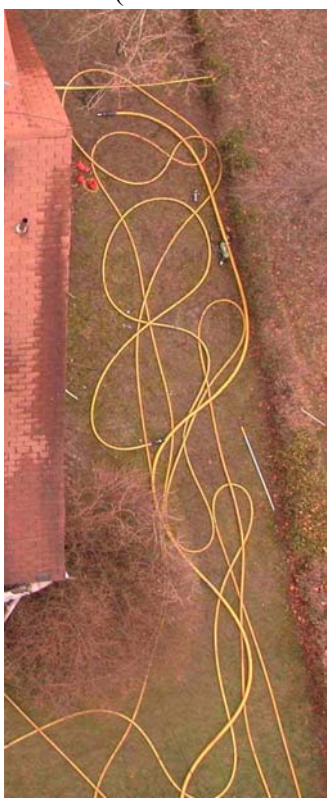
Staffing: Traveling Operations District Chief

- District 4 was drilling with Engine and Truck 2 on Stegar Drive at the time of the alarm.
- District 4 was not initially dispatched but placed himself on the run in place of District 3 due to his closer proximity.
- District 4 stated he could see smoke approximately ½ mile away.
- District 4 notified the dispatch center at 08:47:40 that there was heavy smoke in the area.
- At that time, the dispatch center upgraded the response to a working fire response and dispatched RAT-20, Rescue 38, and District 3 at 08:48:00.
- District 4 arrived on Laidlaw Avenue from southbound Paddock and could not see the fire building due to the smoke conditions upon arrival.
- District 4 noticed heavy fire showing from the "B/C" side of the building.
- District 4 walked around the building starting on the "A" side, progressed along the "D" side, to the "C" side where he was met by the Engine 9 crew as they were stretching hose to the rear of the fire building on the "D" side.
- District 4 advised Engine 9's officer to return to the front door and enter and attack the fire from the unburned side.
- Engine 2 arrived on the scene and also began stretching to the rear of the structure and was advised by District 4 to go through the front and back up Engine 9.
- District 4 was at the "A/D" side of the building when the flashover occurred.

Engine 9 – PRE-FLASHOVER

Staffing: The regularly assigned Captain
Regular assigned FF riding in an out of classification position as Fire Apparatus Operator
Regular assigned FF #1 (Oscar Armstrong III)
A detailed FF #2 from Engine 21.

- Engine 9 arrived on the scene at 08:49:00 (Approximately 1 minute prior to any other company). Approximately 3 minutes and 55 seconds prior to the flashover.
- Engine 9 proceeded past the fire building and went into front suction at the hydrant located at 1124 Laidlaw across the street from the fire building.
- The Acting FAO began hooking up his supply lines and preparing for pumping operations.
- E-9 Captain advised the fire fighters to take a line. E-9 FF #1 and E-9 FF #2 proceeded to take the rear 1-3/4" pre-connected hose line to the front door through the bushes near the sidewalk. E-9 FF#2 remained at the rear of the pumper flaking hose out while E-9 FF#1 advanced hose. (The bushes were between the house and the pumper near the sidewalk).
- Upon arrival at the front door, the door was locked and they proceeded to the rear of the structure with the Captain of E-9 joining them.
- District 4 advised them to return to the front and enter there to attack the fire.
- E-9 FF #2 returned to the apparatus and retrieved an axe.
- There were a total of 7 sections of hose (350 feet) between the apparatus and the front door on the ground. The hose was initially stretched towards the front door, then to the rear, and then to back to the front. See figure to right.
- E-9 FF #2 returns as E-9 FF #1 and E-9 Captain are donning their SCBA masks to force the front door.
- E-9 FF #2 forces open the front door with the axe.
- E-2 FF #1 meets E-9 crew on the front porch and also dons his mask.
- The E-9 Captain calls for water 2 times on Channel 1 (fireground channel) and one time by hand signals from the porch. The Acting FAO started the water in the fire hose line. This occurred at 08:52:00 and 08:52:15.



- After not receiving water, E-9 Captain removes his face-piece and exits the porch to determine what the water problem is. He notices the crosslay that E-2 was stretching was charged and his line was charged and severely kinked. He discovers the water is coming from the pumper but is delayed due to extreme kinking of the hose. He begins flaking hose in the side/front yard and removing kinks from the bushes near the sidewalk and yard.
- In the meantime, E-9 FF#1, Engine 2 FF #1 and E-9 FF#2 enter the building with E-9 FF#1 on the nozzle with a dry hose line.
- The line is charged at the apparatus, but there is still no water to the nozzle due to kinks so at this time they progress into the structure with the inability to discharge water.
- Upon entering the structure, there was heavy smoke with visibility 2 to 3 feet from the floor in the front room. There was not visible fire at this time.
- Smoke and heat conditions rapidly became unbearable. Smoke became dark and banked down to the floor in the front room. There was still no visible fire. E-9 FF#2 states they were yelling for water to be started.
- E-9 FF #2 returned to the front door to call for water and saw water coming and also saw E-9 Captain straightening out the kinks from the hose line.
- E-9 FF #2 follows the hose back into the building and is at the rear of E-2 FF #1 who is towards the end of the hose line. E-9 FF #2 recalls the room becoming increasingly hot and unbearable and he could see "fingers" of fire coming from the floor. E-9 FF#2 states he could only see the backside of the fire fighter in front of him on the hose line.
- At this time, the front room becames fully involved in fire and E-9 FF #2 grabbed the shoulder of E-2 FF #1 and pulled. They were able to exit the building.
- E-9 Captain was making his way back to the "A/D" side as the flashover occurred.

The flashover occurred approximately 1 minute 30 seconds after the initial call for water on the fire ground channel.

Ladder 2 – PRE-FLASHOVER

Staffing: A relief Lieutenant from D-4 was in charge
Regular assigned Fire Apparatus Operator
Regular assigned FF #1
Regular assigned FF#2

Standard operating procedures divide the ladder companies into two teams on the fire ground. Ladder 2 divided into two teams upon arrival, Team "A" and Team "B".

- Ladder 2 arrived on the scene at 08:50:15, approximately 3 minutes prior to the flashover.
- Ladder 2 divided into 2 teams. The Lieutenant and L-2 FF #2 were team "A" and the FAO and L-2 FF #1 were team "B".
- Smoke conditions prevented Ladder 2 from seeing exactly which building was on fire until they turned South on Corinth to set up on the "D" side of the structure.

Ladder 2 – Team A

- Upon exiting the apparatus, the L-2 Lieutenant and L-2 FF #2 vented two windows on the "C/D" corner of the building and moved towards the front along the "D" side to vent the windows closer to the front porch. They were unable to ventilate all the windows because one was too high and the other had a window air conditioner mounted within it.
- While working on the "D" side of the building, the L-2 Lieutenant and L-2 FF #2 noticed a large amount of hose kinked in the side yard "D" side leading to the "C" side and spent time in the yard to stretch out the hose line before proceeding on with their tasks.
- Upon making it to the front "A/D" corner of the structure, L-2 FF #2 was ordered by the L-2 Lieutenant to go to pull another line.
- L-2 FF #2 went to Engine 9 and assisted E-2 FF #2 in stretching the second line.
- L-2 FF#2 returned to the front porch area and donned his SCBA facepiece with the L-2 Lieutenant at the front of the building when the flashover occurred.

Ladder 2 – Team B

- Upon exiting the apparatus, Ladder 2 FAO and FF #1 began setting up the aerial ladder for access to the roof to vertically ventilate the structure.
- Once the aerial was in place, L-2 FF #1 ascended the ladder with a chainsaw and began cutting a hole in the roof on the "B/C" side of the roof, directly over the largest portion of the fire.
- L-2 FAO finished donning his gear and grabbed a ceiling hook and was preparing to ascend the ladder.

- As L-2 FAO was ready to ascend the ladder, the first floor flashed over and a large portion of fire began emitting from the “D” side windows directly impinging upon the aerial ladder.
- At the time of the flashover the vent hole was cut, but the ceiling membrane below the hole cut into the roof was unable to be pushed through without a ceiling hook.
- District 4 orders L-2 FF #1 off the roof at this time. L-2 FF#1 descends the ladder through the flames.

Engine 2 – PRE-FLASHOVER

Staffing: The regularly assigned Captain
Regular assigned Fire Apparatus Operator
Regular assigned FF #1
Detailed FF #2 from Engine 50

- E-2 arrived on the scene at approximately 08:50:45. Approximately 2 minutes 30 seconds prior to the flashover.
- They approached from the north and passed Laidlaw. Their plans were to take the hydrant at 1124 Laidlaw.
- E-2 Captain ordered the E-2 FAO to stop and back up and the Captain dismounted the apparatus to spot the pumper. The E-2 FAO backed up and turned down Laidlaw leaving the E-2 Captain standing on Paddock at Laidlaw. The E-2 Captain ran to Engine 2, which was now in front of the fire building.
- E-2 FF #1 left Engine 2 and joined Engine 9 crew on the front porch to assist them.
- The E-2 Captain recalls smoke banking down into the street on Laidlaw and heavy fire showing from the "C" side of the structure. E-2 Captain originally thought that the rear porch was on fire.
- The E-2 Captain orders E-2 FF #2 to take a 1-3/4" line from Engine 9 and advance it to the building.
- E-2 Captain obtains the E-2 FAO helmet because his was damaged in the drill minutes prior to the fire.
- T-2 FF #2 assists E-2 FF #2 with his initial hose stretch.
- E-2 Captain ordered the E-2 FAO to back up, go around the block and utilize the hydrant located at 4900 Corinth at the intersection of Regent.
- The E-2 Captain and E-2 FF #2 began stretching the hose to the rear of the house and District 4 met them at the "C/D" corner and advised them to back up Engine 9 at the front and not to have opposing hose lines. They then turn around and stretch back to the front of the house.
- As they near the front of the house, the E-2 Captain can hear the E-9 Captain calling for water several times on the radio and saw the E-9 Captain step off the porch yelling and motioning for water.
- The E-2 Captain ran to the E-9 FAO to see if he could assist in getting water started.
- Upon arrival, he was told by the E-9 FAO the lines were charged and after looking down at the lines from the pumper he could see this was correct and ran back to the front porch area.
- E-2 Captain met with his E-2 FF #2 and they began to mask up in the yard at the base of the steps to the front porch. At this time, the first floor flashed over.

Ladder 32 – PRE-FLASHOVER

Staffing: The regularly assigned Lieutenant
Regular assigned Fire Apparatus Operator
Regular assigned FF #1
Detailed FF#2 from Ladder 17

Standard operating procedures divide the ladder companies into two teams on the fire ground. Ladder 32 divided into two teams upon arrival, Team "A" and Team "B".

- Ladder 32 arrived on the scene at 08:51:00. Approximately 2 minutes prior to the flashover.
- Ladder 32 parked on Laidlaw directly in front of the building on the "A" side.
- Ladder 32 divided into 2 teams. The Lieutenant and FF #2 were Team "A" and the FAO and FF #1 were Team "B"

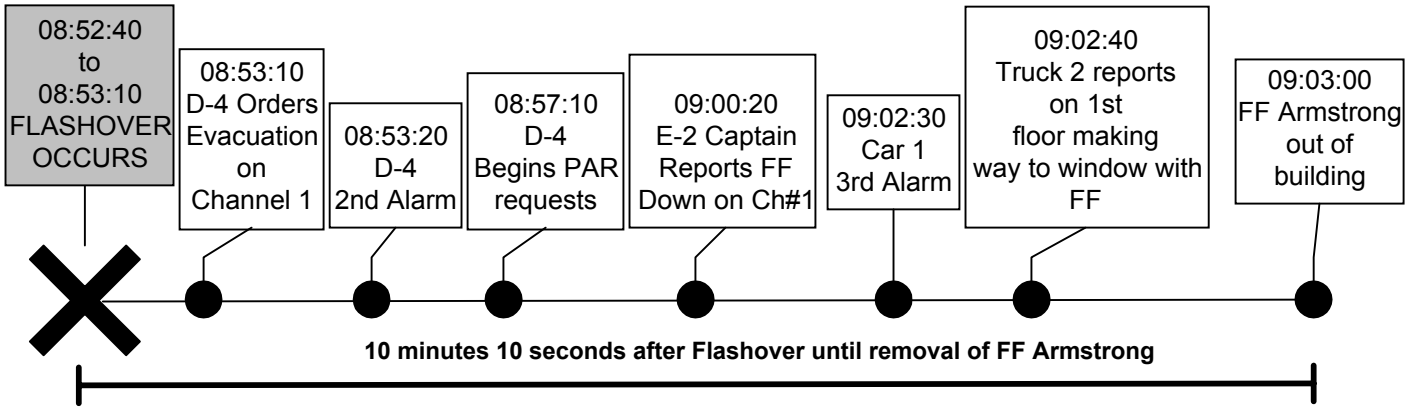
Ladder 32 - Team A

- The L-32 Lieutenant and L-32 FF #2 went to the front porch and began to don their SCBA facepiece with tools and thermal imaging camera. L-32 FF #2 broke out a window on the right side of the front door.
- The fire flashed over as FF #2 donned his SCBA on the front porch and L-32 Lieutenant was near the front steps.

Ladder 32 – Team B

- L-32 FAO and L-32 FF #1 prepared the aerial for vertical ventilation and had to move the aerial to the right after the fire flashed over on the first floor and engulfed the second floor and impinged upon the aerial ladder.

Post-Flashover Company Actions



District 4 – POST FLASHOVER

THE FLASHOVER OCCURED AT APPROXIMATELY 08:52:40

- District 4 saw 3 fire fighters on the front porch after the flashover event.
- District 4 broadcast the evacuation on Channel 1 at 08:53:10
- District 4 ordered the 2nd alarm at 08:53:20 after conditions changed with the flashover and full involvement of the first floor.
- District 4 ordered evacuation of the building and ordered the fire fighters from Ladder 2 off the roof at 08:54:00
- District 4 then calls E-2 for a PAR and receives no answer.
- Ladder 2 Fire Fighter 2 informs District 4 in a face-to-face message that "we could not go defensive because there is still a fire fighter inside."
- District 4 broadcasted to all companies to prepare for a PAR and began PAR requests on Channel 1 at 08:57:10
- District 4 sees E-2 crew enter the building from the front porch on the "A" side. He is upset because E-2 is disobeying his evacuation order.
- District 4 calls again for a PAR from E-2 without response at 08:58:00
- District 4 hears a voice Mayday called
- District 4 assigned District 3 and RAT 20 to the Mayday.
- When the flashover occurred the electric power lines fell from the "A/B" corner of the building and District 4 requested Cincinnati Gas and Electric on emergency status for the fire.
- District 4 ordered Engine 32 into the fire building through the rear door on the "C" side of the building at 09:00:00
- Engine 2 Captain notified command of a fire fighter down on the first floor via radio after they had entered and located E-9 FF#1 at 09:00:20
- District 4 notices Engine 2 FF#1 in the front yard with PPE smoking and asked Engine 2 FF #1 if the Mayday was for him via face-to-face communications, and Engine 2 FF #1 stated "yes". At this time District 4 assumed everything was OK.

- District 4 met with the Fire Chief upon his arrival and relayed information to him.
- When E-9 FF#1 is carried by the command officers on the ambulance cot, the Fire Chief asked District-4 if that was a fire fighter, District-4 advised it was not a fire fighter.
- The Training Bureau District Chief advised them it was a fire fighter severely burned and relieved District 4 of command after removal of Engine 9 FF#1 from the building.

Engine 9 – POST FLASHOVER

- E-9 Captain returned to the porch after removing kinks in the hose and saw 2 fire fighters exit the building and then saw another fire fighter on the porch and assumed all 3 of the fire fighters he left on the porch prior to the flashover had successfully exited the building.
- The 2 fire fighters exiting were E-2 FF #1 and E-9 FF #2. The 3rd fire fighter was believed to be L-32, FF#2. One FF was lying on the front steps and the other was walking about dazed in the front yard.
- At this time District 4 ordered the operation into a defensive mode and the E-9 Captain and E-9 FF #2 utilized an exterior 1-3/4" hand line to attack the fire from the exterior. Initial line direction was on the "C/D" corner and then on the "A/D" corner.
- The E-9 Captain left the line on the exterior with E-9 FF #2 and then went to the rear to direct and assist Engine 32 in their line advancement into the rear door kitchen area on side "C".
- The E-9 Captain was out of breathing air at this time due to his SCBA bleeding down after removing his mask to remove kinks in the hose during the initial stages of the fire pre-flashover.
- The E-9 Captain returned to Engine 9 to change his SCBA bottle.
- E-9 Captain asked the E-9 FAO where E-9 FF #1 was located.
- E-9 Captain while at E-9 changing his air cylinder saw a body come out of the window. E-9 Captain thought it was a civilian and didn't know that E-9 FF#1 had entered the building.
- E-9 FF #2 saw the fire fighters exit the window on the "D" side and set down his exterior line.
- E-9 FF#2 assisted in the carrying of Engine 9 FF #1 who had been removed through a window on the "D" side of the building to Rescue 38 for transport to the hospital.

- At 09:04:30, the E-9 Captain advised the accountability officer that he was at E-9 with his FAO. The E-9 Captain was not aware of the location of E-9 FF #2 or E-9 FF #1 at this time.
- At 09:09:40, The Captain reports that E-9 FF #1 (FF Armstrong) is missing from his company.

Ladder 2 – POST FLASHOVER

Ladder 2 – Team A

- The L-2 Lieutenant after witnessing 3 fire fighters exit the building saw someone utilize a hand line located at the front porch to extinguish E-2 FF #1 who was lying on the front steps and received only a "trickle of water".
- L-2 FF#2 stated he asked the E-9 Captain if everyone was out of the building multiple times. He stated that the E-9 Captain stated that everyone did get out.
- L-2 FF #2 stated he saw what he thought was a fire fighter still in the building and notified District 4 of this information via face-to-face communication. L-2 FF#2 also reported hearing a scream from the window on the "D" side closest to the "A/D" corner.
- The Lieutenant entered the fire building with the line utilized by E-2 Captain and L-32 FF #2. Upon reaching the downed E-9 FF#1 he assisted in the removal out the window on the "D" side.
- E-2 FF #2 and L-2 FF #2 progressed through the front door into the front room in the dining room area in the "A/D" side of the house and began attacking fire as they progressed.
- The L-2 FF#2 utilized a thermal imaging camera to locate the fire and direct fire fighting efforts with E-2 FF#2 on a 1-3/4" hand line upon initial entry.
- After locating the fire fighters from the other rescue team assisting the downed E-9 FF #1, L-2 FF#2 sat down the imager and L-2 FF #2 met E-2 Captain, L-32 FF #2 and L-2 Lieutenant on the interior in the rear dining room on the "C/D" side and assisted in moving Engine 9 FF #1 to the window on the "D" side of the building for removal.
- L-2 Lieutenant notified command they were on the first floor removing a fire fighter from the "C" side window.

Ladder 2 – Team B

- L-2 FAO and L-2 FF #1 began setting up for ladder pipe operations after the initial report to go defensive.
- L-2 FF #1 noticed L-32 FF #2 exit the window on the "D" side of the building and went to assist in the removal of E-9 FF #1.
- L-2 FF #1 went to the "A" side of the building where Rescue 38 personnel were assisting E-2 FF #1 and told them a fire fighter was down on the side of the building.
- L-2 FF #1 returned to the "D" side and assisted in the transfer of E-9 FF #1 to Rescue 38 and then drove Rescue 38's apparatus to the hospital.

Engine 2 – POST FLASHOVER

- E-2 Captain recalls fire out of all windows and the door on the "A" side of the building.
- After the flashover, E-2 FF #2 assisted E-2 FF #1 who was laying on the front steps, to the rear of T-32 and returned to the hose line he stretched from Engine 9 at the front steps.
- E-2 Captain looked back into the building and seeing E-9 FF#1 standing up with the outline of his body totally engulfed in flames running towards the door. Just before exiting the door, E-9 FF#1 turns to the right 90 degrees with his arms flailing. He then turns 90 degrees and runs back into the fire building.
- E-2 Captain grabbed a 1-3/4 line on the porch and entered the front door and proceeded straight back. He recalls an extreme amount of pressure on the line. L-32 FF #2 followed right after E-2 Captain and the L-2 Lieutenant proceeded shortly thereafter. They proceeded through the front room into the stairwell area next to the kitchen where the fire originated on the "B" side.
- The E-2 Captain recalls a large volume of fire above him in the stairwell and the kitchen. At this time L-32 FF#1 left the hose line and found E-9 FF #1.
- L-32 FF#2 called out "Help, FF Down" and was joined by E-2 Captain, and the L-2 Lieutenant.
- E-2 Captain reports the smoke was very dense and they were unable to see anything. There were no SCBA straps or gear remaining on E-9 FF#1 to grab on to. They worked as a team utilizing the "1, 2, 3 – LIFT" method to move E-9 FF#1 to the exit window.
- E-2 FF #2 stretched his line with the L-2 FF #2 into the front door through the front room into the dining room area. FF #2 stayed on the line. L-2 FF#2 noticed the fire fighters over E-9 FF#1 through the Thermal Imaging Camera. L-2 FF #2 separated and left to assist the E-2 Captain and L-32 FF #2 in the removal of E-9 FF #1.
- Engine 2 FF #2 protected the rescuers by keeping the fire from the kitchen area off of the 4 rescuers as they removed E-9 FF #1.
- After removal of E-9 FF#1, the E-2 Captain exits the same window as E-9 FF #1. E-2 FF #2 leaves the structure when his low air alarm sounds, which is after the fire fighter is removed and assists in the transfer of Engine 9 FF #1 from the ground on the "D" side of the building to Rescue 38.
- E-2 Captain immediately gets his company together at his apparatus and reports he has a PAR.

Ladder 32 – POST FLASHOVER

Ladder 32 – Team A

- L-32 FF #2 saw a burning person inside the structure and grabbed a line that had water in it but wasn't fully charged.
- L-32 FF#2 then followed the E-2 Captain into the structure with a 1-3/4" line. He left off the line and found E-9 FF #1 in the dining room and called out for help where the E-2 Captain and L-2 Lieutenant joined him to assist. L-32 FF#2 stated his personal PASS alarm started sounding; however, he doesn't remember activating it and he was moving too much to allow the automatic mode to set off the alarm.
- The L-32 Lieutenant stated he also saw a burning person running in the building and verbally relayed this information to District 4.
- The L-32 Lieutenant initially assisted in moving E-2 FF#1 to the bumper of Ladder 32. He then picked up a hose on the porch that was charged but without adequate pressure, it had just a little water flow.
- L-32 Lieutenant then entered after the crew of E-2 FF #2 and L-2 FF #2 and performed a right hand search with a TIC.
- L-32 FF #2 after assisting in pulling E-9 FF#1 to the window was in the way of the exit. L-32 FF#2 jumped out of the window prior to removal of E-9 FF #1 to "catch or assist in removal" of FF #1.
- After removal of E-9 FF #1, the L-32 FF#2 performed mouth to mouth breathing and CPR on E-9 FF#1 in the yard on the "D" side.

Ladder 32 – Team B

- L-32 FF #1 guarded downed power lines as directed by District 4
- L-32 FAO moved the aerial clear of the flames from the second floor after the flashover and began setting up the ladder pipe for defensive operations.

Engine 32 – POST FLASHOVER

E-32 arrived as the first Engine Company on the 2nd alarm approximately 5 minutes after the flashover.

Staffing: Relief Lieutenant from District 3 was in charge
Regular assigned FF#1
Detailed FF#2 from Engine 5,
Regular assigned Fire Apparatus Operator.

- E-32 Lieutenant had a face-to-face meeting with District 4 and was ordered to enter the rear door and proceed to the second floor and attack the fire.
- The Lieutenant, FF #1, and FF #2 took an 1-3/4" line off Engine 2 and went into the rear of the structure on the "C" side at the kitchen as directed by District 4.
- They were struck by the stream from the handline operated by E-2 FF#2 who was keeping fire off the rescuers in the dining room on the "C/D" side.
- E-32 crew proceeded to go upstairs and attack the fire in that area. This was occurring as fire fighters were on the first floor removing Fire Fighter Armstrong.
- E-32 FAO donned his PPE and assisted in line advancement into the structure.
- E-32 knocked down fire on the 2nd floor until ordered to evacuate after the removal of E-9 FF#1.

Note: E-32 Lieutenant heard the MAYDAY call from E-2 when they were preparing to enter the structure and instructed his fire fighters to continue with their assigned tasks, because there was a RAT company already on the scene.

RAT 20 – POST FLASHOVER

Staffing: Detailed Lieutenant from Engine 20 who was on overtime
Detailed FF#1 from Engine 20
Regular Assigned FF#2
Relief Fire Apparatus Operator from District 3

RAT 20 arrived after the flashover occurred at approximately 08:56:00 and were ordered to assist in the MAYDAY efforts.

- Rat 20 FF #1 and FF #2 entered the structure with their RAT packs and performed a primary search.
- They could hear a PASS alarm sounding and during their search they found the group of fire fighters already removing the downed E-9 FF#1.
- Rat 20 FF #1 exited after he determined he couldn't assist in the rescue and went to the "D" side of the building to assist in removal.
- RAT 20 FF #2 found a melted PASS alarm in the front room and tossed it into the front yard so it wouldn't be confused with anyone on the inside.
- RAT 20 Lieutenant and FAO entered the front door and stated they searched the front room with the TIC and then exited after they heard on the radio that the FF was being removed. As they exited the structure they could see Engine 9 FF #1 being carried past the front of the building on an ambulance cot.
- After removal of the fire fighter all RAT-20 members exited, initially they went to the "D" side and then regrouped together and set a ladder on the "B" side of the structure to the second floor as a secondary means of egress.

NOTE: Car 405, the Fire Training Captain assumed duties of accountability officer after his arrival on the scene around the same time of RAT 20. A member of the RAT company usually would have assumed the duties of accountability.

Rescue 38 – POST FLASHOVER

Rescue 38 was staffed by a regularly assigned FF / Paramedic #1, a detailed FF / Paramedic #2 from an Engine Company, and was assisted by a Fire Investigator who is also a paramedic and arrived on the scene as E-9 FF#1 was being carried to Rescue 38.

- Rescue 38 arrived at 08:56
- Fire Fighter / Paramedic #1 and Fire Fighter / Paramedic #2 arrived on the scene and recall not being able to see the structure or roadway due to smoke conditions upon their arrival at the scene.
- They initially assisted Engine 2 FF #1 who was thought to have been the fire fighter affected by the initial mayday
- They were met by L-2 FF #1 on the "A" side and informed there was a FF down on the "D" side. FF/Medic #1 and #2 took their cot to the "D" side and placed Engine 9 FF #1 on the cot and rapidly transported to the ambulance.
- Ladder 2 FF #1 drove Rescue 38's apparatus to the hospital while FF/Medic #1 and #2 assisted by Fire Investigation Specialist #1 performed basic life support and advanced life support procedures during transportation. Advanced airway intervention procedures were attempted without success.

1131 Laidlaw Investigation Time Line

	8:45:00	Received call from 1131 Laidlaw - House on Fire CAD
	8:45:15	
	8:45:30	
	8:45:50	*DISPATCH 1st ALARM E-2 E-9 T-2 T-32 D-3 CAD*
	8:46:00	Enroute E-9 SMT
	8:46:15	
	8:46:30	
	8:46:45	
	8:47:00	Enroute T-32 D-3 E-2 SMT
	8:47:00	Dispatch confirms the fire on CAD
	8:47:40	D-4 Reports Heavy Black Smoke area of Paddock and Laidlaw Ch-4
	8:47:45	
	8:48:00	*DISPATCH RAT 20 D-4 R-38 CAD*
	8:48:00	Engine 2 and Truck 2 inform other companies they will be first in. Ch-4
	8:48:10	ON SCENE D-4 via SMT - Assumes Laidlaw Command Ch-4
	8:48:30	Enroute T-2 SMT
	8:48:40	D-4 Reports heavy Fire in first floor rear of single family dwelling Ch-4
	8:49:00	ON SCENE E-9 SMT
	8:49:15	
	8:49:30	
	8:49:45	
E-2 On Scene	8:50:00	ENROUTE R-38 via SMT
	8:50:15	ON SCENE T-2 SMT
	8:50:30	Enroute RAT 20 - Ch-4
	8:50:45	
	8:51:00	ON SCENE T-32 via SMT
	8:51:15	
	8:51:30	
	8:51:50	"E-9 You Ready" Ch-1
	8:52:00	"Start the water" Ch-1
	8:52:15	FAO "Start the Water" Ch-1
	8:52:40	"Here Comes the Water" Ch-1
	8:52:40	***** FLASHOVER OCCURS *****
Tone	8:53:00	**1st Emergency Tone Broadcast Ch-1**
	8:53:10	D-4 Orders everyone out of the building Ch - 1 / Car 405 Enroute Ch-4
	8:53:20	D-4 Request 2nd Alarm CH - 4
	8:53:30	2 ALARM PUT IN CAD
	8:53:30	*DISP E-32 E-38 T-19 Sq52 R-2 Mac 1 CAD*
	8:53:50	Car 1 adds to alarm Ch-4
	8:54:00	D-4 Orders Truck 2 off the roof CH - 1
	8:54:00	ENROUTE T-19 E-32 via SMT and Ch-4
	8:54:10	Car 3 Car 401 add to the alarm Ch-4
	8:54:20	E-2 FAO reports heavy fire at the rear of the building Ch-1
	8:54:30	Unrecognizeable talking Ch-1
Tone	8:54:30	**2nd Emergency Tone Broadcast Ch-1**
	8:54:50	ON SCENE D-3 via SMT and Ch-4 - Report Heavy Fire on First Floor
	8:55:00	ENROUTE R-2 Sq 52 via SMT
	8:55:10	CG & E requested for live wire on ground Ch-4

	8:56:00	ENROUTE E-38 MAC 1 via SMT - ON SCENE R-38 via SMT
	8:56:10	ON SCENE Car 405 - Ch-4
	8:56:30	RAT 20 - Approximate Time On Scene
	8:56:45	"Hey Chief" Ch-1
	8:57:00	"Engine 32 to command" Ch-1
Tone	8:57:10	**3rd Emergency Tone Ch-1 - District 4 informs all companies to prepare for PAR**
	8:57:20	Command to Engine 2
	8:57:45	Command to Engine 2
	8:58:00	Car 511 Lt. Wolf FIU Sent to scene Ch-4
	8:58:15	*ON SCENE R-2 E-32 via SMT*
	8:58:30	
	8:58:40	D-4 request CG&E respond emergency Ch-4
	8:59:00	Car 405 to Engine 2 asking for a PAR
	8:59:20	"Engine 32 to District 4" Ch-1
	8:59:30	D-4 asks E-32 if they can make it to the second floor
	8:59:45	
	9:00:00	ON SCENE E-38 via SMT / Command calls E-32 and they reply on Ch-1
	9:00:00	E-32 replies to D-4 We are going to give it a try Chief - Ch-1 and Video Time Stamped
	9:00:20	E-2 Captain Reporting - "We have a FF down on first floor" Ch-1
Tone	9:00:30	**4th Emergency Tone - D-4 confirms firefighter down Ch-1**
Tone	9:00:40	**5th Emergency Tone Ch-1 Multiple radio calls and transmissions walked on**
	9:00:40	E-32 request water Ch-1
	9:00:50	"Here comes your water" Ch-1
	9:01:00	D-4 states lets get the firefighter out and then go defensive Ch-1
	9:01:00	RAT 20 goes to Ch-2 on Ch-1
	9:01:30	
	9:01:50	R-2 Request 2nd Rescue Unit Ch-4
	9:02:00	*DISPATCH R-46 on air ENROUTE R-46 via SMT*
	9:02:00	*ON SCENE T-19 via SMT*
	9:02:20	E-32 reports on second floor fighting fire making headway CH-1
	9:02:30	Car 1 Request 3rd Alarm Ch-4
	9:02:40	Truck 2 reports they are on first floor middle taking out a window c-side of building Ch-1
	9:02:50	Engine 2 reports a firefighter is coming out of building Ch-1
	9:03:00	Open Mic - Who is this Guy? Ch-1
	9:03:15	Open Mic - Who is this? Ch-1
	9:03:30	Open Mic - Hey we got somebody down here - Damn Ch-1
	9:03:40	E-32 reports they are on 2nd floor all fire but 1 room knocked down Ch-1
	9:03:50	Accountability to Engine 2 "Your Location"
	9:04:00	
	9:04:10	Accountabilty to Engine 9 "Your Location"
	9:04:15	
	9:04:20	Accountabilty to Engine 9 "Your Location"
	9:04:30	E-9 reports that the officer and FAO are located at E-9 pumper outside of building Ch-1
	9:04:40	Accountability ask E-9 where rest of their crew is and if your exterior? - No answer from E-9 Ch-1
	9:04:40	E-32 request another line to rear and ventilation of 2nd floor Ch-1
	9:05:00	*DISPATCH E-23 E-17 T-23 CAD*
	9:05:15	*ENROUTE E-23 E-17 and T-23 via SMT*
	9:05:30	
	9:06:00	
	9:06:20	D-4 tells all to evacuate the building Ch-1
	9:06:30	Car 1 Notifies of FF Down Possible Fatality and units going defensive Ch-4

	9:06:40	T-19 ordered off roof Ch-1
	9:07:00	Car 1 orders all staff members to scene Ch-4
	9:07:15	
	9:07:40	Car 1 orders all out of building Ch-1
	9:07:45	
	9:08:20	Someone orders FF Mullins and Buster to the "C" side of building Ch-1
	9:08:50	Accountability ask for a Location of T-19 Ch-1
	9:09:40	E-9 OIC Reports to accountability that FF Armstrong is missing
	9:10:00	*DISPATCH A-9*
	9:10:15	
	9:11:00	*ON SCENE R-46*
	9:11:15	
	9:12:00	*ON SCENE E-17*
Tone	9:12:40	**6th Emergency Tone - No voice afterwards Ch-1**
	9:13:00	*ON SCENE T-23 E-23*
	9:16:00	*CAR 1 goes to UC*
	9:33:00	*CISD Team responding to University Hospital*
	10:05:00	*NIOSH/OSHA Notified*
	10:14:00	*DISPATCH R-14*
	10:27:00	*DISPATCH RAT 17*
	10:33:00	*ENROUTE RAT 17*
	10:40:00	*ON SCENE RAT 17*
	12:40:00	*D-3 Assumes Command*

Chapter 7

LESSONS LEARNED AND REINFORCED

Most importantly, basic fire fighting skills and tactics were reinforced at the 1131 Laidlaw fire. Many of the skills are basic operational functions that are performed on a daily basis with little consideration of their impact on fire fighter safety and operational outcomes.

The tactics and actions employed at this fire have become standard practices in the Cincinnati Fire Department for many years. Fire fighters, company officers, and command officers cannot be faulted for the actions that occurred on March 21, 2003. These tactics and actions have been common practice for many years within the Cincinnati Fire Department. Until March 21, 2003, these actions had not resulted in the loss of a fire fighters life; however, similar actions have resulted in previous injuries. In order to improve the operations of the Cincinnati Fire Department as a result of this tragic event, a close examination of the Cincinnati Fire Department must occur to ensure fire ground operations represent acceptable safe practices within the American Fire Service.

These basic skills, tasks, functions, and operations are key to fire fighter safety and survival and should be reinforced at all levels of this organization and frequently reviewed. The Cincinnati Fire Department also needs to implement an enhanced approach to training because fire fighter lives depend upon adequate and appropriate training.

1. Basic fire fighting skills are critical. These skills should be reinforced at every opportunity.

   Fire fighters at this incident from the first two engine companies initially began stretching their hose lines to the rear of the structure and were ordered to attack from the unburned area in the front by the incident commander. Fire fighters also improperly stretched the initial hand line resulting in piles of hose and kinks, restricting the flow of water to the nozzle. Ventilation of the structure began without a charged attack line in place. A coordinated fire attack (coordinating ventilation with hose deployment and discharge of water) is essential to limit fire spread. Fire fighters need continual training and reinforcement of basic fire fighting skills after their recruit-training period to enforce these skills throughout their entire career.

2. Proper hose deployment is crucial to saving lives and protecting fire fighters during interior operations. A well placed; appropriately staffed attack line putting water on a fire saves more lives than any other single fire ground function.

   If fire fighters initially entering the structure had deployed the hose line appropriately then they could have applied sufficient water onto the fire, thus limiting its size, thermal output, and preventing the flashover from occurring.

3. The hose line is the only means of orientation while operating in a smoke charged environment when not following a left or right hand search pattern. Hose Line = EXIT. Additionally, ladder companies searching without a hose line for orientation should utilize a search line.

   The two fire fighters that exited the building were able to orient themselves to the exit by utilizing the hand line they had stretched into the building.

   Ladder companies traditionally do not use search lines to orient themselves. Fire fighters utilizing a thermal imaging camera are taught to employ a standard right or left handed oriented search while utilizing the camera. To ensure the ability to exit in chaotic situations such as a flashover, collapse, or other significant fire ground event, they should utilize a search line.

   Fire fighters should always try to maintain a sense of direction when performing interior fire fighting operations. When structures become smoke-filled and the visibility is poor, fire fighters can become easily disoriented. A hose line, rope, or some other type of guide or reference point can assist fire fighters in maintaining a sense of direction in case an evacuation becomes necessary. Fire fighters should always make a mental note of the location of the closest hose line, rope, or other type of a guide or reference points in case conditions change.

4. Crews must stay together at all times on the fire ground.

   Crews did not stay together on the incident. Most importantly, prior to the flashover event, the company officer of Engine 9 separated from his crew to perform task level functions in the front yard. FF#1 from Engine 2 separated from his crew to assist Engine 9. Ladder 2, FF#2 was ordered to assist Engine 2 in their hose stretch, separating him from his crew. After the flashover occurred, while acting heroically to rescue a trapped fire fighter, FF#2 from Ladder 32 also separated from his crew when he entered the structure with the officer of Engine 2 during the rescue effort. When the officer of Engine 2 and Ladder 2 entered the structure they separated themselves from their crews of E-2 FF#2 and L-2 FF#2. These actions involve freelancing and separate personnel, making personnel tracking and accountability impossible. Personnel are tracked as an entire company, collectively working to complete a task. Not a single line stretched by the first alarm companies, was made up of a single collective company as they arrived on the incident scene. When personnel are separated or switch crews without notification to the incident commander, accountability cannot be ensured.

5. Crews must be supervised by a company officer. Company officers properly supervising fire fighters during operations are the key to achieving the mission of the fire department. Without appropriate supervision from a company officer, freelancing will occur.

   The initial crew entering the structure was without supervision by a company officer. The officer was performing task level functions in the front yard by stretching out kinked hose lines, instead of supervising his personnel. The fire fighters entered the structure and ultimately were caught in a flashover.

6. Inexperienced fire fighters must be under the direct supervision of a company officer at all times on the fire ground.

   Fire fighters in their first years on the fire department should never be out of direct supervision of a company officer. Most often peer pressure and pride place fire fighters in dangerous situations. An officer correctly supervising inexperienced personnel could prohibit this from occurring.

   The crew on Engine 9 was a young crew. The driver and FF#1 entered the fire department in January of 2000 giving them 2-1/2 years experience as line fire fighters and FF#2 entered in January of 2001, giving him 1-1/2 years of experience as a line fire fighter

7. All fire fighters must have a portable radio.

   The fire fighters on this incident each had portable radios. They were proven beneficial in communicating. Proper radio discipline should be reinforced and every radio should have a shoulder microphone to make communications in full PPE more efficient.

8. Crews must not advance or commit themselves into the fire environment without the protection of a charged hose line. A thorough risk versus benefit analysis leads to the following conclusion: No life or low life hazard = risk little to save little.

   The fire fighters advanced without a charged hose line into a very hostile superheated environment. If they had had the ability to discharge water, the flashover might have been prevented.

9. Crews must maintain their assigned fire fighting functions throughout a mayday and rescue effort.

Once a Mayday was actually declared by Engine 2, the fire fighters assigned to begin suppression efforts on the second floor maintained their assigned function even though they had the desire to help with the Mayday. Additionally, the fire fighter who initially entered the first floor after the flashover continued to keep the fire off the rescuers with his hose line as the rescue was performed. It is essential to the safety and survival of the rescuers and victim that fire-fighting functions be maintained.

10. A strong command presence is needed in the very beginning of the incident and must be maintained throughout. Command transfer to subsequent arriving command officers needs to be performed according to procedure and accepted national practices.

A stationary command post would have better enabled the incident commander to recognize what was transpiring on the incident scene. When chaotic events transpire a strong command presence in a controlled environment would have enabled the incident commander to better track and control resources. When subsequent arriving chief officers arrive, proper command procedures must be followed and command must be transferred and broadcasted up and down as command transfer occurs.

The Incident Command System (ICS) defines the roles and responsibilities to be assumed by personnel and the operating procedures to be used in the management and direction of emergency incidents and other functions. The Incident Commander (IC) is the individual with overall responsibility to implement and oversee the system.

The following functions are the responsibility of the IC, which include, but are not limited to:

Assumption, confirmation, and position of command: *After the IC arrives on the fire ground and assumes command, a stationary command post on the exterior of the fire building should be established. Command positioning becomes a critical factor in the overall effectiveness of the incident. A strategic level of command can only be produced if the IC is in a stationary command-post position. The command post should be situated in a conspicuous location which affords the IC a good view of the fire building and surrounding area. Ideally, it would offer a view of two sides of the fire building. Advantages of a command post are (1) stationary position, (2) a relatively quiet place in which to think and make decisions, and (3) a vantage point to oversee the operation. A stationary command post also offers the potential for improved lighting, protection from weather, space for additional staff, and access to more powerful mobile radios, reference and preplanning materials, and portable computers (in some instances).*

Situation evaluation: *The IC is the only person who has the exterior, stationary, command-post-position advantage that allows current and forecasted information to be received, processed, evaluated, and then translated into a series of decisions that control the position and function of the fire fighters working in and around the hazard zone. This information management function becomes a major reason why the IC should stay at the command post. It is difficult for an IC to receive, decipher, and then react effectively to reports from all over the incident site if he/she is moving around, in proximity to operational noise, distracted by direct face-to-face communications with fire fighters, and limited to a portable radio as opposed to a more powerful mobile radio.*

Initiate, maintain, and control communications: *It is the IC's responsibility to initiate, maintain, and control effective incident communications. This communications function is critical to safe and effective incident operations because it is the means by which the IC and all the other incident participants stay connected. Being able to effectively communicate becomes the major tool the IC uses to exchange information and to create effective action. The IC should use the stationary command-post advantage to maintain continuous and clear communications.*

Deployment: *The deployment function requires the IC to provide and manage a steady, adequate, and timely stream of appropriate resources. Typically, the IC logs the arriving units into the inventory and tracking system on a tactical worksheet in the stationary command post. The IC also enters the units into a standard accountability system that track where companies/crews are located in the hazard zone.*

Strategy/incident action planning: *A critical responsibility of the IC is to identify and manage the overall incident strategy (offensive or defensive). The IC must continually evaluate the relationship between the level of hazards present and the basic capability of the safety system to protect fire fighters from those hazards. The hazards present at structural fires involve structural collapse, thermal and toxic insult, becoming trapped and running out of air, and becoming disoriented, lost, and running out of air. The conditions present at this incident included a seemingly occupied building with two levels, multiple accessible openings to the outside, and energized overhead power lines on the A/B side. These conditions, combined with an active fire, created an environment with numerous hazards.*

11. Unnecessary communications must be eliminated on the fire ground and dispatch channels.

    Fire fighters should utilize proper discipline to eliminate unnecessary radio traffic which ties up the radio, dispatcher, and also leads to confusion and diversion of attention from pertinent incident details.

    Fire fighters should allow the dispatcher to transmit the companies assigned to an incident prior to notifying the dispatcher that they may be closer. When emergency traffic is declared current procedures state that all traffic should cease until the dispatcher clears emergency traffic. It took 3 minutes to assign companies to the 3rd alarm assignment after it was requested.

    Automatic vehicle locating devices would assist in more timely assignment of the closest resources and limit unnecessary radio traffic.

12. Companies must follow assignments from command, no matter what the circumstance may be.

    Fire fighters acted heroically in entering the structure and performing a rescue when they realized their colleague was still inside. However, the incident commander ordered them out of the building into a defensive mode and they entered the building without communicating the situation to the incident commander. In numerous fire fighter fatality studies, fire fighters have died while disobeying a direct order and entering a building to save one of their own.

    The incident commander sees the larger picture and if he orders a defensive operation or change of strategy, those orders should be followed. Fire fighters should consult with the incident commander of their findings and allow the incident commander to make a decision based on his findings and a thorough risk versus benefit analysis.

13. Crews must communicate all findings to the incident commander and operate within the command structure.

    When fire fighters notice an event or a fire fighter in peril, these findings should be communicated to the incident commander in the form of emergency traffic or a mayday. A couple of fire fighters verbally told the incident commander of their sighting of a fire fighter in the structure; however, it was confused with a fire fighter who exited after the flashover. The initial crew that entered the structure was concentrating on their rescue effort and did not relay any findings to the incident commander, thus the incident commander didn't know what was occurring until it was too late.

14. Fires should be attacked from the unburned side whenever possible.

The first engine company attempted entering the structure from the rear where the fire was located instead of entering from the unburned portion and protecting the unburned areas while pushing the fire in that direction. The second engine company thought there was an exterior fire and started their stretch to the rear, until directed otherwise by the incident commander.

15. Opposing fire attack lines are dangerous and must be avoided.

The fire fighters assigned to advance to the second floor entered the "C" side of the structure where the fire originated and combated fire there and then attempted to find the stairs. While entering the structure they were getting hit with hand line streams from the interior that were pushing the fire off those members performing the rescue of Engine 9 FF #1. This causes the potential for physical injury from the hose stream and thermal injury from the fire. Fire fighters sent to the second floor should have advanced their line into another entrance on the "A" or "B" side.

16. Reinforcement of the initial and ongoing size-up is critical for fire fighter safety.

Initial size-up of an incident should allow the incident commander to determine the best course of action. Because situations change rapidly, as occurred at this incident, size-up should be an ongoing process. The incident strategy and the tactics utilized to achieve the tactics should all come from the initial and ongoing size-up. The initial size-up should have revealed that any trapped civilians would have already succumbed to the effects of the fire and not allowed for fire fighters to commit themselves into a dangerous environment without the protection of a charged hose line. There are no procedures in the Cincinnati Fire Department on performing initial or ongoing size ups on the incident scene.

17. The incident commander must maintain an accurate account of all fire fighters operating on the incident scene. A strong accountability system is necessary on all incidents. Accountability should be started on initial arrival with a person assigned to that responsibility.

Actual incident accountability wasn't initiated until approximately 4 minutes after the flashover occurred or 8 minutes after arrival of the first companies. It was not known that Oscar Armstrong was unaccounted for until 20 minutes into the incident, approximately 6 minutes after he was removed from the building. In order to be effective and provide for a safer operation, incident accountability must be initiated immediately upon arrival of the incident commander with a person dedicated to manage that function.

18. Command should establish and designate a safety sector early in the incident.

No person was designated as the safety officer for the incident. The theory of each company officer acting as a safety officer proved highly ineffective at this incident. The company officer is task driven and cannot look at the large picture on the incident scene and determine unsafe fire conditions, actions by personnel, or unsafe building conditions and then take actions to remedy those problems. A staff member dedicated to the sole position of incident safety officer should arrive early in the incident to supervise and immediately correct unsafe acts such as inappropriate line deployment, crew integrity, changing fire conditions, and company officer supervision. Additionally they will ensure key roles such as a RAT team and Rehabilitation are filled. The incident commander cannot manage the overall incident and also supervise the overall safety of those operating on the fire ground or within the fire perimeter from a stationary command position. The safety officer performs in a manner that allows movement around the incident scene, away from the stationary command post to analyze incident activities to ensure continual safety of personnel.

19. Time elapse increments are crucial for command to determine if a change in strategy is needed to improve the outcome of the incident and ensure safety of fire fighters.

Currently incident commander receive time benchmarks every 20 minutes. These benchmarks allow the incident commander to determine fire progress, company air usage and working time, and assist in evaluating effectiveness of operations. It is recommended in NFPA 1500, that these benchmarks should start from initial dispatch and occur every 10 minutes until the fire is declared to be under control by the incident commander.

20. All companies operating on the fire ground should have a thermal imaging camera (TIC).

Currently all of the 13 ladder companies in the Cincinnati Fire Department have a thermal imaging camera assigned. Funding has been obtained for issuance of a thermal imaging camera to each engine company and the heavy rescue company. There should also be spare Thermal Imaging Cameras available for replacement of broken or lost cameras. Additionally a thermal imaging camera will be assigned to the training bureau. Fire fighters were able to utilize a camera to locate the downed fire fighter, the initial rescuers and also locate the fire to keep the fire away from the rescuers. Procedures for uniform deployment of thermal imaging cameras should be implemented.

21. The effective staffing of fire companies is an important factor in fire fighter safety, fire ground activities, and overall fire ground success.

    Currently all fire companies in the Cincinnati Fire Department are staffed with 4 fire fighters. Staffing with 4 fire fighters should allow for improved performance on the incident scene. Training in minimum company standards should educate fire fighters and allow them to maximize their effectiveness in a variety of operating conditions.

22. District Chiefs must take an active role in district level training exercises. Fire fighting skills reinforcement and evaluation should be included in District Level Training and Minimum Company Standards Performance Evaluations

    Fire fighters need to train on basic fire fighting evolutions continually to maintain proficiency. This was demonstrated through the improper hose deployment, fire attack strategy, and crew integrity situations that existed at this incident. Currently due to workloads and non-emergency task assignments district level training does not occur with consistent frequency. With the addition of "aides" to assist the District Chief, fire fighters would be evaluated in maintenance of basic fire fighting skills through Minimum Company Standards Evaluations.

23. Frequent training on and adherence to Standard Operating Procedures on the fire ground is key for incident scene success. New Standard Operating Procedures should be implemented to improve operational effectiveness. Old Standard Operating Procedures should be re-evaluated to compensate for changes in our operation and to allow for improved safety in operations.

    Fire fighters should be trained in Standard Operating Procedures on a frequent basis. Fire fighters should be trained on all new procedures that affect emergency operations before they are implemented. Fire fighters should adhere to standard operating procedures at all times. For example, fire fighters in this incident did not initially begin their attack from the unburned side.

    The Cincinnati Fire Department currently does not have procedures addressing crew integrity, engine company functions, chief officer functions, assignment of safety personnel to incidents below a third alarm, company officer supervision on the fire ground, incident size-up, or training requirements for various ranks within the organization.

    In our current standard operating procedures it states not to flow water into smoke. If the fire fighters had water in their hose line, flowing short bursts of water into the smoke may have prevented the flashover until the seat of the fire could have been located.

24. Company officer training and evaluation is critical to the overall success of the fire department.

Company officer supervision and direction of personnel played an important role in the incident. Fire officers should be trained prior to promotion or following promotion within the Cincinnati Fire Department. Company officers should be trained appropriately for the position they are expected to perform to enable them to recognize and deal with situations that could prevent a similar circumstance.

25. Driver / Operator training is critical to ensure proper pump operation and hose deployment.

Driver / Operator functions and recognition of a water problem from the exterior of the building played a role in the incident. Drivers / Operators should be trained prior to promotion or following promotion in the Cincinnati Fire Department. Driver / Operators should be trained appropriately for the position they are expected to perform to enable them to recognize and deal with situations that could prevent a similar circumstance.

26. Infrequent experience in an out of classification position assignments without adequate refresher training is ineffective and unsafe. Personnel expected to perform in positions above their rank should be appropriately trained.

The driver / operator of Engine 9 was a fire fighter riding in an out of classification assignment. This incident was his first fire as an acting driver / operator. Water was started in the hose line; however, there were hose deployment issues between the apparatus and the house that can be addressed by the driver / operator if fire fighters stretching the hose perform an ineffective stretch. As stated in lessons 24 and 25, personnel must be trained for the out of classification position they are expected to perform.

27. Command officer training and development is crucial to ensure tactical objectives and fire fighter safety is maintained throughout the command process.

Command Officer incident management, tracking personnel, and continual size-up of the incident played an important role in the incident. Command Officers should be trained prior to promotion or following promotion in the Cincinnati Fire Department. Command Officers should be trained appropriately for the position they are expected to perform. Command Officers should be trained in incident management, safety, accountability, fire conditions and building construction in order to recognize and manage situations that could prevent a similar circumstance.

28. Personal Protective Equipment (PPE) is your life link on the fire ground and needs to be maintained, cleaned, and properly inspected at least every six months.

    Personal protective equipment inspection, cleaning, and repair has not consistently occurred in the Cincinnati Fire Department due to manpower constraints and additional tasks placed upon the individual responsible for this job. FF Armstrong's helmet, gloves, boots, and protective hood had never been cleaned or inspected as required. His protective coat had not been inspected or cleaned by a qualified inspector in 27 months (4 times the national standard). His protective pants had not been inspected or cleaned by a qualified inspector in 35 months (6 times the national standard).

29. Personal Protective Equipment (PPE) should be retired after its life expectancy has been met.

    The protective pants worn by FF Armstrong were manufactured in May 1992. This placed them in service for over 10 years with no cleaning or maintenance in the last 35 months of their in service status.

30. Command transfer to subsequent arriving command officers needs to be performed according to procedure. Command must be maintained throughout the incident.

    Current Cincinnati Fire Department procedure states that when a higher-ranking officer in the fire department arrives he/she must assume command. Command transfer with passing of information must be maintained. Ranking officers should not assume command, make decisions, or request resources without consulting with the current commander and formally transferring command. It must be remembered that the initial commander can function as the operations officer and run the incident functions, while the ranking officer acts as the incident commander overseeing the overall operations at the incident scene. Commonly incident command and operations functions are confused in the command structure at smaller scale incidents.

31. Rapid Assistance Team Training is critical to the future survival of fire fighters. Members of the companies that assisted in the rescue of fire fighter Armstrong were RAT trained and this training assisted in his timely removal. Rescue of a downed fire fighter often requires more personnel than a single company.

    All Cincinnati fire fighters are being trained in Rapid Assistance Team training. Those personnel that rescued FF Armstrong were previously trained in Rapid Assistance training. This training has also proven beneficial in other rescue or fire fighter assistance circumstances in the fire department. After initial training, this training should be refreshed periodically to maintain the skills and knowledge required for these tasks. The addition of an additional fire company to act as a RAT assist team should also be added to all one-alarms after confirmation of a fire. This was reinforced in the recent year end review of Rapid Assistance Team Operations in the Cincinnati Fire Department.

32. Standardization of equipment location, hose loads, and riding position assignments are crucial to enhancing the timely delivery of service on the fire ground.

    At this incident fire fighters left the apparatus without forcible entry tools, hose was deployed inappropriately, and personnel didn't follow a standard job task assignment on the incident scene. Fire fighters should know what their job is based on their riding position on the apparatus and what tools and equipment they are responsible for when they arrive. This should be standard among all companies in the fire department. Fire fighters should also know how hose is loaded and how much is loaded along with standard equipment locations on each company through a formal standardization process.

33. Computerized personal training records are important to track each fire fighters individual involvement in the overall drill and skill proficiency evaluations.

    Following this incident in attempts to retrieve training records for the involved companies and fire fighters, it was proven highly difficult and inefficient to look through old company log pages that are hand written and also track where personnel were working due to inter-company details. The fire department should have a standard database that all company drills, district drills, minimum company standard evaluations, and formal training academy training can be entered in a format to allow for easy retrieval and evaluation of each individual's training status.

34. More advanced skill training in advanced airway procedures is crucial to the potential survival of injured fire fighters in the future. Due to the extent of the injuries of FF Armstrong, this would not have made a difference in his survival; however, it could make a significant difference in future events.

Specific skill maintenance training in realistic conditions does not exist for Paramedics or EMT's in advanced or basic airway procedures. The fire fighters providing medical care in this incident attempted to utilize a cricothyrotomy device on the victim without success. These skills should be reinforced periodically to ensure proficiency of all personnel in providing basic and advanced medical care. A system similar to the Minimum Company Standards Training for fire fighting should be utilized for Emergency Medical Servcies.

35. Drivers should stay with their apparatus if in a pumping capacity to ensure the safety of those operating on the hose lines deployed from their apparatus. Aerial ladder operators should stay with their apparatus at the aerial turn-table to control the aerial ladder if personnel are working from an elevated position.

At this incident an FAO left his apparatus to assist with medical care of an injured fire fighter while interior crews were operating in a hostile environment on the second floor with a hose line from his apparatus. Fortunately no problems were encountered; however, to lessen the likelihood of a problem in the future, FAO"s should stay with their apparatus when in a pumping capacity.

The aerial ladder operator of Ladder 2 was still at the turntable preparing to ascend the ladder to assist the fire fighter in vertical ventilation when the flashover occurred. When the flashover occurred, the aerial was engulfed in flames, blocking the exit of the fire fighter on the roof. Fortunately the fire fighter was able to descend the ladder without difficulty. It is imperative that the FAO stay on the turntable to control the aerial to allow for replacement if the original exit pathway is cut off by fire or another situation.

36. Every serious injury or close call should be investigated to ensure that actions are taken to improve our operations to prohibit similar circumstances from occurring again. In the past 10 years, two fire fighters were similarly injured during separate incidents with situations such as occurred on March 21, 2003.

After this incident the Cincinnati Fire Department formed an independent committee to investigate the facts and then recommend corrective actions to help prevent similar circumstances from occurring again. There have been other circumstances that have occurred severely injuring fire fighters in the Cincinnati Fire Department in the past, including a career ending injury of one fire fighter. Situations that occurred prior to March 21, 2003 should have been evaluated and corrective actions taken to lessen the likelihood of a similar occurrence. If we learn from what happens in the past, we will be better prepared to SAFELY go to work in the future.

37. Fire fighters should receive fire behavior and flashover training periodically to reinforce the dangers of fire fighting and to enable recognition of the warning signs of this type of event prior to it occurring.

    This technology and training has been available for over 10 years. Its need was recognized in other incidents that severely injured fire fighters in the past. In the future fire fighters should receive this training on a periodic basis.

38. Fire fighters are trained not to spray water into smoke without visualizing fire. In superheated environments, where there is high heat and the inability to see fire, fire fighters should remember to spray short bursts of water at the ceiling. If water falls back to the fire fighters it is not too hot to continue. If no water falls the temperature in the environment is at a lethal stage and sufficient water must be applied to prohibit a flashover from occurring. Fire fighters should also be trained to recognize the signs of a flashover.

    If fire fighters would have advanced into this environment, knowing this information, they may have been able to prevent the flashover. Fire fighters according to current procedure are advised not to spray water into smoke. These procedures need updating and fire fighters need training on prevention of flashover.

39. Standard operating procedures should be reviewed and updated on regular intervals to ensure they are consistent with the changes in the fire service and our internal operations. Outdated procedures should not be utilized.

    As described in Chapter 8, Section E several procedures in the Cincinnati Fire Department need to be updated and re-evaluated. There are no procedures outlining actions of engine companies, command officers, and other personnel in the fire department currently. Procedures are not regularly reviewed and updated.

40. As new procedures are developed and implemented, personnel should be thoroughly trained in their impact on emergency operations.

    Personnel were operating under fairly new accountability and MAYDAY procedures at this incident. Adequate training on operational procedure changes to ensure that fire fighters are prepared to operate in accordance with procedures during emergency incidents. The procedures outlining the actions to take when a MAYDAY occurs were not completely followed.

41. Training on the limitations of Personal Protective Clothing should occur frequently on existing equipment and on any new equipment to ensure fire fighters understand the actual levels of protection it is designed to provide.

    Fire fighters are not trained on the actual thermal limitations of their personal protective equipment. This should occur to allow fire fighters to develop a sense of the actual protection levels to allow them not to advance into a hostile environment further than their gear will allow protection.

42. Fire fighters should be interviewed immediately following an incident to ensure information is obtained in a manner that allows for better recollection of the facts just occurred.

    No fire fighter was interviewed until approximately 2 weeks following the incident. Information was gathered for the Fire Department Independent Investigation through the NIOSH interviews. Personnel should be interviewed immediately following the incident prior to being released from duty in order to gather the facts that occurred when they are fresh in the minds of those who were involved in the incident.

43. Updated procedures are needed for appropriate handling of a fire fighter death. Family notification, dispersing of personal effects, timely investigation procedures, and procedures for funerals need to be implemented.

    There are currently limited procedures for use by the fire department. To limit stress during already troubling times, standardized procedures need to be implemented to assign responsibility and outline exactly what needs to occur to handle these circumstances.

44. When tragic events occur, all Cincinnati Fire Fighters should be afforded the opportunity to visit the incident scene in a structured and controlled manner to allow for realization of what occurred and to provide initial explanation of what occurred.

    This occurred following the incident at the recommendation of the Fire Training Staff. Procedures need to be implemented to outline the details of how and why this is to occur after a significant event.

45. Arrival of rapid intervention or rescue personnel was delayed due to their dispatch sequence at this fire. At the time of this incident, rapid intervention teams were not dispatched until a working fire was confirmed upon arrival of the first company. Since this incident, a rapid assistance team is dispatched on the initial one alarm response to provide for more timely arrival at the incident scene.

NIOSH statistics prove that most MAYDAY situations occur very early in the incident. A review of the four MAYDAY situations declared by Cincinnati Fire Department after March 21, 2003 shows that all were declared within the first 10 minutes of the dispatch. Dispatching of the Rapid Assistance Team on the initial dispatch is critical to the survival of fire fighters.

46. Fire fighting forces should not begin stretching additional fire lines until the initial fire line is in service and flowing water on the fire. Two fire fighters are often an ineffective number to safely, effectively, and promptly stretch a hand line from the apparatus to the seat of the fire. This is especially important when operating around or over obstacles and above the ground floor.

    a. Incident benchmarks should be established so when the first line is actually flowing water on the fire that the company flowing water states: "Engine "X" applying water to the fire". The initial companies should work together to get the first water on the fire. After hoses are in place and water is being applied, then personnel can focus on the backup line.

    b. Examples of Incident benchmarks:

        i. On the Scene
        ii. Applying water to the fire
        iii. Primary Search Clear
        iv. Fire Under Control
        v. Loss Stopped

Fire fighters are traditionally driven by pride in their fire company. Fire fighters typically rush to get to the fire first and apply first water on the fire. In our current system where two engines arrive on a standard one-alarm, the two engines work individually instead of together to get the first hose line in place flowing water on the fire. Each of the engine companies that day worked independently of each other. If fire fighters knew upon arrival of the second engine company that they were to assist in stretching the initial hose line, then the line may have been deployed more effectively.

47. Dispatchers should relay all information obtained from the caller during or immediately after dispatch of fire companies.

The fire was reported by one of the structure's owners and they stated to the dispatcher that they were vacating the structure. The fire fighters were unaware that the structure was vacant. Dispatchers or emergency call takers should always try to obtain all information available from the caller. This would include any information regarding the condition, the possible location of the fire, the use of the structure, address of the incident, nature of the emergency, callback numbers, and any names. Because of the time of this incident, fire fighters suspected that the structure could have been occupied. Dispatchers need to relay pertinent information obtained from the caller to the responding fire companies.

Chapter 8

FIRE DEPARTMENT RECOMMENDATIONS

The following recommendations were compiled during the investigation and sub-committee research process. Hundreds of man-hours were involved in the research, testing, and development of the following recommendations. A thorough review of all Cincinnati Fire Department polices, equipment, staffing, training, and overall operations occurred for their relevance to this report.

Prior to any recommendations being made, the following policy from the City of Cincinnati Employee Safety policy manual must be understood.

In 1990, the City of Cincinnati, under the direction of City Manager, John Shirey, enacted rules for city employee safety. Work related standards for Occupational Safety and Health were promulgated to protect all workers in the United States from recognized hazards in workplaces that may cause injury or death. However, these standards are not enforced by the Federal Occupational Safety and Health Administration (OSHA) in most public work areas. This is because of an exemption paragraph added to the Public Law by Congress. A few cities in the U.S. have adopted the OSHA standards as minimum protection for their employees and because these safe practices provide an economic benefit to them through savings in Worker's Compensation and other indirect costs due to injuries. The City of Cincinnati is one of the cities that have adopted the OSHA standards for their employees by management policy at the encouragement of the local business committee (CBC in 1987.)

The following is the language of this policy:

CITY OF CINCINNATI EMPLOYEE SAFETY MANUAL
SECTION 1. SAFETY AND HEALTH MANAGEMENT

NO. 100 CITY OF CINCINNATI EMPLOYEE SAFETY AND HEALTH POLICY

It is the policy of the City of Cincinnati that no person shall ever be required or allowed to work in unsafe conditions. All employees, supervision and management must support this policy at all times as a condition of employment.

Departmental management is responsible and accountable for assuring safety at their work sites and for the safe work practices of their employees.

Employee performance evaluations, at all levels, will include a specific component related to safety and health performance.

All City operations will adhere to the Occupational Safety and Health Standards as defined in CFR 1910 and CFR 1926, as minimum workplace requirements.

Each City Department will submit an annual safety and health action plan to the City Manager. Departments with no significant field forces may include their safety and health plans as components of their annual operating plans. This plan will include an analysis of the past year's performance and the specific steps to be taken to improve performance in the coming year. The plan will include measurable performance goals which shall be developed by the Department in conjunction with the Safety and Health program.

Job classification descriptions/specifications of all supervisors will include knowledge of and responsibility for appropriate safety and health practices, as contained in the minimum requirements of 29 CFR 1910, 20 CFR 1926, NEC, NFPA 1500, OAC 4121, or other appropriate sources identified by the Employee Safety/Environmental Compliance Division.

Basic safety and health training will be required for all supervisors, and for new supervisors at the outset of their duties. Questions testing an individual's knowledge of safety and health will be part of all promotional examinations for supervisory positions.

A Citywide Safety and Health Data Management Committee is hereby created to establish appropriate Citywide standards for health and safety data collection and analysis, including the baselines or standards against which performance is judged, and the types of data analyses required by departments. The Committee will be chaired by the Director of the Office of Environmental Management. The Committee will be composed of seven members (including the Chair), appointed by the Manager, at least three of whom represent line departments.

An Employee Safety Division (ES) employee safety specialist is authorized to immediately halt work and remove City workers from unsafe conditions until all necessary safety controls are in place, if in his or her professional opinion, conditions exist that represent an imminent and substantial threat of serious injury to an employee. The ES Division will notify the appropriate department director as soon as possible of this action. Within 48 hours of such stoppage, the appropriate department director shall submit a written report to the City Manager explaining the causes for the unsafe situation, and what steps will be taken to prevent a recurrence. A copy of this report will be sent to the Employee Safety/Environmental Compliance Division.

City personnel are expected to develop and implement safe practices and eliminate all unsafe practices and conditions.

These rules enacted for employee safety by the City of Cincinnati City Manager adopted the standard for the Cincinnati Fire Department to follow NFPA 1500 as outlined in paragraph six above. Paragraph #6 describes the manner by which these OSHA standards will apply to the fire service operations within the City of Cincinnati, (National Fire Protection Association) NFPA 1500. This is because of the unusual work procedures that are required to provide protection to the public during emergency events such as fires, medical emergencies, chemical emergencies, etc. Other than the direct applicability of those such as Respiratory Protection Standard 1910.134, the protection of Firefighters is best provided in the NFPA consensus compendium, as described in section NFPA 1500.

Since the inception of this policy, no formal implementation plan has been created for utilization of the NFPA 1500 standard in the Cincinnati Fire Department. The following recommendations to improve the operations of the Cincinnati Fire Department will reference the applicability to NFPA 1500.

The recommendations in this report are grouped into the following categories:

A. Personnel
B. Training
C. Equipment
D. Technology
E. Standard Operating Procedures

Finally an implementation plan, budget estimation, and evaluation process for the above recommendations are included as the final step in this recovery process.

A. Personnel

1. District Chief Aides

Relationship to the death of Oscar Armstrong:

Early incident accountability and tracking of personnel was not adequately performed. Personnel on the scene utilized their company passports; however, no person was assigned to the role of Accountability Officer upon initial arrival on the scene. Personnel tracking was not performed in a systematic method as is evidenced by the fact that for over 20 minutes Oscar Armstrong was unaccounted for .

The Captain of Training, who arrived on his own and not as a part of the dispatch procedure, assumed the role of the accountability officer.

Furthermore, early in the incident there was no assignment of an individual to the role of Incident Safety Officer. The flashover event, hose deployment issues, and freelancing could have been recognized by a properly trained individual assigned to the role of Incident Safety Officer.

Recommendations by the committee to limit similar occurrences:

Currently in the Cincinnati Fire Department, the two closest available District Fire Chiefs respond to every reported fire in the city as initial incident commanders. The first arriving District Chief assumes the role of the incident commander and the subsequent arriving District Chief assumes a sector officer role in the incident command structure operating within and supervising a forward position as the eyes and ears of the incident commander.

By assignment of an "aide" to each district chief as outlined in NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, Section 5.2.1.2.5 it would provide our operation with additional critical command personnel to assume the support roles of either Accountability Officer, Safety Officer, Sector Officer, or Communications to enhance fire fighter safety. Additionally, they could manage the company level training in their respective districts on each shift to ensure fire fighting competency as required in NFPA 1500, *Standard on Fire Department Safety and Health Programs*, 5.3.1 to 5.3.7 and NFPA 1410, *Standard on Training for Initial Scene Operations.*

During emergency operations, the "aides" could be utilized in the following manner: The first arriving District Chief with an "aide" would have that member always assume the role of Accountability Officer. This person would become proficient in this role and fire fighter safety and tracking on the scene would be enhanced.

The second arriving District Chief with an "aide" would support command functions by a multitude of means, including: pairing with their chief as an interior command team (allowing the chief to safely enter the building), supporting communications on the scene, assisting in scene safety or commanding a sector. The Aide would also become proficient in working within the command structure as the eyes and ears of the incident commander monitoring fire conditions, personnel functions, and building conditions as they relate to fire fighter safety.

A staff aide is defined 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* as a member assigned to a supervisory chief officer who assists at incident scene operations, which can include personnel accountability, communications, and other logistical and administrative support. In addition, this member can assist in coordinating training activities, respond to citizen inquiries, coordinate staffing issues and sick leave follow up, and resource allocations for facilities and apparatus under the supervisory chief officer's jurisdiction. Staff aides may be known as field incident technicians, staff assistants, battalion fire fighters, or battalion adjuncts.

During the periods of time where emergency response functions are not needed, the "aides" will be assigned to coordinate and provide necessary training based on the minimum company standards evolutions for their respective fire companies. Additionally these aides would coordinate all company level and district training as outlined in this report. Aides will also assist the District Chief in various administrative and staffing issues related to the successful management of a fire district.

Additionally, as included in Appendix "C" of this document a letter, dated August 20, 2001, to City Manger John Shirey from the acting Safety Director Gregory Baker proposed compliance with the NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.* The recommendation called for an increase in fire department staffing of personnel to be assigned to the role of a chief's "aide".

The "aide" position should be the rank of a Captain's position. This would require 12 new positions within the Cincinnati Fire Department's table of organization. If these positions were filled by Captains, they would also receive valuable hands on training from the District Chief in their roles and in turn become better prepared to function in an above grade command position.

Manpower Requirements: 12 – District Chief "Aides"

2. Incident Safety Officer Personnel

Relationship to the death of Oscar Armstrong

The function of an on-scene Incident Safety Officer did not occur during the initial phases of the incident until after the arrival of the third alarm companies and department staff officers.

There were company continuity, hose deployment, and fire behavior issues that needed to be evaluated as they were occurring for their effect on the overall safety of operations. Personnel should not have been committed to a forward location on the interior of a structure without charged hose lines. A person on the scene designated as the Incident Safety Officer may have realized this was a concern and issued an order to eliminate these unsafe practices. This person could have also assured operations within a designated risk management plan and read the fire and smoke conditions precipitating flashover.

NFPA 1500, *Standard on Fire Department Safety and Health Programs,* section 8, NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments,* NFPA 1521, *Standard on Fire Department Occupational Safety and Health Officer* and NFPA 1561, *Incident Command Standard*, states that the position of Incident Safety Officer should be assigned on all working fires and other various types of emergency incidents.

Recommendations by the committee to limit similar occurrences:

The Incident Safety Officer position should be staffed by a minimum of a Lieutenant, preferably a Captain working on a tour system to provide 24 hour initial response for incident safety monitoring on all working fires. This would require 4 additional positions to be added to the table of organization for the fire department.

These positions would be under the direct supervision of the department Health and Safety Officer, much like the current Rescue 2 position is under the control of Rescue 1. Rescue 1 is the supervisor of EMS, supervising 4 lieutenants who are EMS supervisors much like the current District Chief of Health and Safety would supervise 4 officers who are Safety supervisors.

Only those personnel specifically trained in the emergency and non-emergency functions of this position would fill openings in these positions as a result of Kelly days, vacation, or other leaves.

Additional duties would be initial accident and injury investigation, response to non-fire events such as hazardous materials, water, technical rescue, and emergency medical as the Incident Safety Officer. This individual could also

perform safety training for personnel, assist in completion of incident critiques, and assist in Health and Wellness issues and respirator FIT testing.

Manpower Requirements: 4 – Captains

3. Department Training Personnel

Relationship to the death of Oscar Armstrong:

History of Training Within the Cincinnati Fire Department: Currently there are 4 personnel to perform fire instruction and 2 personnel to perform emergency medical instruction within the Cincinnati Fire Department. Due to the limited training staff, internal training has been prioritized to instruct each of the department's personnel in a 24-hour fire fighter survival and self-rescue training. In addition, the training staff has completed emergency medical continuing education training, CPR training, hazardous materials training, and weapons of mass destruction training. These instructors are also responsible for new recruit training. Several of these training sessions have relied on outside agencies to assist or deliver the training packages. Additionally, the fire department is only permitted to take 4 companies out of service daily to perform training, limiting the total number of personnel a training session can be delivered to requiring more time to deliver a training program to 800 personnel.

Several of the issues discussed in Chapter 7, *Lessons Learned and Reinforced*, require the need for additional training to the fire fighters in the Cincinnati Fire Department to prevent similar circumstances from occurring again. Basically, the training recommendations are:

1. Basic Fire Fighting Skills
2. Hose Deployment
3. Interior Fire Fighting Operations
4. Company Officer Functions and Company Supervision
5. Company Officer Training
6. Command Officer Training
7. Over commitment of personnel in hostile environments
8. Maintenance of fire fighting functions throughout catastrophic events.
9. Thermal Imaging Camera Deployment
10. Inter-Company Training
11. Driver / Operator Training
12. Company Officer, Command, and Driver / Operator "Above Grade" Position Training
13. Rapid Assistance Team Training Utilization
14. Equipment Familiarity
15. Appropriate Training Record Tracking
16. Airway Management Training
17. Fire Behavior and Flashover Training
18. Personal Protective Equipment Use, Care, and Limitations

Recommendations by the committee to limit similar occurrences:

A. Basic fire fighting skills are instructed in initial drill school training according to the NFPA 1001, *Standard on Fire Fighter Professional Qualifications* and State of Ohio professional certification requirements at the Fire Fighter II level. After drill school, fire fighting skills are not formally taught, reinforced or evaluated by fire department instructors. Company officers, not trained in proper instruction techniques, are required to teach company drill each day. This is usually accomplished through utilization of a drill outline produced by the training staff. Fire fighters need to receive frequent training in basic fire fighting skills and these skills need to be evaluated and reinforced through a formal evaluation process as is outlined in NFPA 1500, *Standard on Fire Department Safety and Health Programs,* sections 5.3.1 to 5.3.7 and NFPA 1410, *Standard on Training for Initial Scene Operations*.

Chief's "aides", as mentioned on previous pages, could perform the majority of the minimum company standard training and individualized training reinforcement as required with assistance from the training bureau staff as needed. The training bureau staff will develop company and individual standards based on NFPA 1410, *Standard on Training for Initial Scene Operations* and internal Cincinnati Fire Department specialized functions or equipment for utilization by the District "aides".

Manpower Requirements: 12 – District Chief "Aides" (requested under personnel request on p43-44)

B. No training is provided either prior to or following promotion from a fire fighter to company officer (Lieutenant) level in the Cincinnati Fire Department. Additionally, no training is provided to continually reinforce key officer training issues or concerns on a periodic basis after promotion and throughout their career as company officers.

No training is provided either prior to or following promotion from a Captain to a command officer (District Chief) in the Cincinnati Fire Department. Additionally, no training is provided to continually reinforce key command officer training issues or concerns on a periodic basis after promotion and throughout their career as company officers.

Additionally, no training is provided to those members expected to function in an "above-grade" position as company officers, or command officers.

Members should be provided this training prior to being expected to perform in a supervisory position on the fire ground.

NFPA 1500, *Standard on Fire Department Safety and Health Programs,* section 5.2.5, states that all officers shall meet the requirements of NFPA 1021, *Standard on Fire Officer Professional Qualifications*.

Manpower Requirements: 2 – 40 hour Training Staff Members

C. No training is provided either prior to or following promotion from a fire fighter to driver/operator (Fire Apparatus Operator) level in the Cincinnati Fire Department. Additionally no training is provided to continually reinforce key driver/operator training issues or concerns on a periodic basis after promotion and throughout their career as fire apparatus operators.

Additionally no training is provided to those members expected to function in an "above-grade" position as driver / operators.

Members should pass a Drivers Training Course prior to riding above grade or taking the promotional exam for Fire Apparatus Operator.

NFPA 1500, *Standard on Fire Department Safety and Health Programs*, section 5.2.2, states that all fire apparatus operators shall meet the requirements of NFPA 1002, *Standard on Fire Apparatus Driver/Operator Professional Qualifications*. Additionally, the State of Ohio Administrative Code, section 4121-1-21-04 states that only members who have successfully completed an established or recognized driver-training program shall operate fire department vehicles.

Manpower Requirements: 2 – 40 hour Training Staff Members

D. No appropriate maintenance, review, and revision of current and future fire department procedures, operations, general orders or pertinent reference material are performed in the Cincinnati Fire Department. Additionally no training is performed on these procedures after initial recruit training or after revisions or creation of new procedures. These duties are not performed due to decreased staffing in the Training Bureau. As a result of the thorough analysis of this incident many procedures were found to be outdated or non-existent.

Additionally no appropriate database management, record keeping, or tracking of personnel training needs or requirements is maintained for the fire department. Current company drill training is recorded with handprint into company record books. It is virtually impossible to track complete training records when maintenance is maintained in various formats and places within the fire department. A centralized, universal, and reportable database system needs to be developed and maintained.

NFPA 1500, *Standard on Fire Department Safety and Health Programs*, section 5.3.3, 5.3.7 and 5.1.6 state that all members shall be trained on standard procedures periodically and when they are initially created. NFPA 1500, *Standard on Fire Department Safety and Health Programs*, section 4.6 addresses the needs for training record management. NFPA 1401, *Recommended Practice For Fire Service Training Reports and Records*.

Manpower Requirements: 1 – 40 hour Training Staff Member

E. Fire fighters need to continue to receive Rapid Assistance Team Training due to its demonstrated importance in enhancing fire fighter safety. At this particular incident it allowed those fire fighters who rescued FF Armstrong to expeditiously remove him from the hostile environment. All fire fighters have not received this initial training at this time. After initial training, fire fighters need periodic enhancement training to prevent degradation of skills and knowledge.

Fire fighters need to receive more training in fire behavior and flashover training due to its extreme importance in the events that occurred at this incident. Fire fighters have never been physically trained in the warning signs of a flashover during live fire training. This training needs to be performed for all personnel initially and periodically thereafter to prevent degradation of knowledge.

Fire fighter survival training is needed to prepare fire fighters to avoid circumstances that lead to disorientation in a fire environment and ultimately injuries and fatalities. Fire fighters need to receive training in their actions if they find themselves as the victim of a Mayday situation.

The training recommendations must be emphasized following graduation from fire recruit school. This should occur after initial fire fighter training at the NFPA 1001 level throughout a fire fighter's career.

NFPA 1500, *Standard on Fire Department Safety and Health Programs*, sections 5.1, 5.3 and NFPA 1410, *Standard on Training for Initial Scene Operations* cover the requirements for training related to preventing occupational deaths and injuries, fire fighter survival training, and incident operation training.

Manpower Requirements: 7 – 40 hour Training Staff Members

F. Members need more training and education on the specialized functions and use of equipment assigned for emergency medical treatment of fire fighters following a catastrophic event. While the extent of the injury to FF Armstrong was immediately fatal, a similar, less lethal event in the future could require advanced airway intervention for survival. Fire fighter / paramedics are trained initially in advanced airway procedures; however, frequent and efficient on-going training is not performed.

Fire fighters should be evaluated annually on EMS skills and protocols to ensure continual effectiveness in delivery of care.

Manpower Requirements: 2 - 40 hour EMS Training Personnel

Training Personnel Summary:

This recommendation calls for a total of (14) personnel to be assigned to the function of performing fire and emergency medical service training to the Cincinnati Fire Department.

Total Training Personnel Needed:	14
Total Current Training Personnel:	- 6

Total NEW Training Personnel Needed: 8

4. Personal Protective Equipment Maintenance and Cleaning Technician

Relationship to the death of Oscar Armstrong

The personal protective equipment of the personnel involved in this incident had not been inspected, cleaned or maintained for 2 to 3 years. Since there is no record of cleaning or inspection it is assumed the time frame greatly exceeded the 6-month inspection and cleaning recommendation. It is impossible to know the condition of FF Armstrong's PPE prior to destruction in the fire.

The protective coat in this incident was issued in January 2001 and manufactured in March of 1999. The protective pants in this incident had not been evaluated or cleaned since April 27, 2000. They were issued to FF Armstrong in January 2000. The date of manufacture of the turnout pants was May 1992. The turnout pants worn by FF Armstrong were in service for over 10 years without record of cleaning or inspection for 35 months prior to the incident.

Recommendations by the committee to limit similar occurrences:

Create a dedicated position responsible for the cleaning, maintenance, tracking, and issuance of PPE. This position is essential in order to track personal protective equipment issuance, maintenance, and cleaning. This individual will also perform routine inspections and perform minor repairs. Ensure that inspection, cleaning, and care of protective coat is in accordance with *NFPA 1851 Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles*. All PPE needs inspection and cleaning every 6 months regardless of use.

B. Training

1. **Minimum Company Standards Training, Individualized Basic Training Reinforcement, and Fire Company Training**. NFPA 1500, *Standard on Fire Department Safety and Health Programs*, section 5.3 and NFPA 1410, Standard on Training for Initial Scene Operations.

   A. This training needs to be performed to reinforce the basic skills and tactics necessary to improve effectiveness and limit injury and death during emergency operations. Currently, company training is performed by the company officer, most of whom are not qualified instructors, on a daily basis during shift work. This training is non-structured and ineffective for required skill reinforcement and fire fighter safety.

   This training could be coordinated, performed, and eventually evaluated by the "aide" assigned to each fire district in conjunction with the District Chief.

   Each company will be required to perform drill training as directed by the drill outline issued by the Fire Training Bureau. Formal evaluation on the practical evolutions will be performed on those skills required under NFPA 1410, *Standard on Training for Initial Scene Operations*, either as an entire company or as an individual pertaining to functions assigned to a member of a company.

   Companies will demonstrate proficiency in:

   1. Supply Line and Attack Line Deployment (company task)
      a. Standard and Complicated Stretches
   2. Master Stream Deployment (apparatus and portable mounted) (company task)
   3. Elevated Master Stream Deployment (company task)
   4. Sprinkler / Standpipe Supply and Operation (company task)
   5. Ground Ladder Deployment (company task)
   6. Knots Tying (individual task)
   7. Personal Protective Gear Donning (PPE and SCBA) (individual task)
   8. Generator and Lights (individual task)
   9. Positive Pressure Fans (individual task)
   10. Power Saws (individual task)
   11. Thermal Imaging Camera (individual task)
   12. Foam Operations (company operations)
   13. Stokes Basket Rescue (company operations)
   14. CPR, AED, and Bag-Valve Mask (individual tasks)

2. **Officer Training**, NFPA 1500, *Standard on Fire Department Safety and Health Program,* Section 5.1.2 and NFPA 1021, *Standard on Professional Qualifications for Fire Officers*.

A. Lieutenants

This training needs to be performed either prior to or immediately following promotion from fire fighter to Lieutenant to ensure adequate knowledge in fire tactics, personnel management, supervision, accountability, and administrative functions. Officer training is vital to the safety of fire fighters.

Prior to any promotion on an eligible list, personnel should be placed into an instructional course to meet the requirements of NFPA 1500 and 1021.

Additionally, this training needs to be provided to function in an above grade position as a company officer.

All above grade assignments into an out of classification position of Fire Lieutenant should cease until personnel can receive adequate training to appropriately carry out the duties and functions they are expected to perform.

This training needs to be prioritized for implementation. All individuals who expect to be promoted based on retirement projections, all existing officers, and then all persons who can ride in an above grade format should receive instruction to meet the intent of NFPA 1500 and NFPA 1021.

B. Captains and District Chiefs

Command officer training is also a vital portion of this training. Captains need to be trained either prior to or immediately following promotion from Captain to District Chief to ensure adequate knowledge of incident command, management of large incidents, personnel safety and accountability, building construction, and various administrative functions. This training is vital to the safety of fire fighters.

Prior to any promotion on an eligible list personnel should be placed into an instructional course to meet the requirements of NFPA 1500 and 1021.

Additionally, this training needs to be provided to function in an above grade position as a District Chief.

All above grade assignments into an out of classification position of District Chief should cease until personnel can receive adequate training to appropriately carry out the duties and functions they are expected to perform.

This training needs to be prioritized for implementation. All individuals who expect to be promoted based on retirement projections, all existing officers, and then all persons who can ride in an above grade format should receive instruction to meet the intent of NFPA 1500 and NFPA 1021.

3. **Driver Training**, NFPA 1500, *Standard on Fire Department Safety and Health Program,* Section 5.2.2 and NFPA 1002, *Standard on Professional Qualifications for Fire Apparatus Operator* and Ohio Administrative Code 4121-1-21-04.

This training needs to be performed either prior to or immediately following promotion from fire fighter to Fire Apparatus Operator to ensure adequate knowledge in driving, operating and pumping, fire line deployment, and management. This training is vital to the safety of fire fighters.

Additionally, this training needs to be provided to function in an above grade position as a fire apparatus operator.

All above grade assignments into an out of classification position of Fire Apparatus Operator should cease until personnel can receive adequate training to appropriately carry out the duties and functions they are expected to perform.

Driver/Operators will demonstrate proficiency annually in standard pumping scenarios and driving/maneuvering apparatus. Additionally driver/operators will remain proficient in engine and ladder operation.

This training needs to be prioritized for implementation. All individuals who expect to be promoted based on retirement projections, all existing drivers, and then all persons who can ride in an above grade format should receive instruction to meet the intent of NFPA 1500 and NFPA 1002.

4. **Flashover and Fire Behavior Training, Fire Fighter Survival Training, Rapid Assistance Team Training, and In-service Training on Fire Fighting Skills and Protective Equipment and Initial Recruit Training**. NFPA 1500, *Standard on Fire Department Safety and Health Program,* Sections 5.1, 5.3 and NFPA 1410, *Standard on Training for Initial Scene Operations,* and NFPA 1001, *Standard on Professional Qualifications for Fire Fighter.*

   A. Flashover training needs to be performed to ensure understanding of fire behavior and flashover recognition. After initial training, periodic training is needed to ensure proficiency and retention of knowledge.

      Fire Fighter Survival and Rapid Assistance Team Training needs to be performed to ensure fire fighters can recognize dangerous situations, take actions to remove themselves from these situations, and also search for and rescue fire fighters in Mayday situations. Minimum standards training on fire fighter rescue techniques also need to be implemented into this training on a continual basis.

      Fire fighting skill training is needed to ensure continual proficiency after initial recruit training and to update on new topics that affect the fire service and the operations within the Cincinnati Fire Department.

      Training in the use, care, maintenance, and limitations of personal protective equipment to ensure proper safety and protection of our fire fighters in the hostile environments they operate within. This includes personal protective clothing and self-contained breathing apparatus.

5. **Standard Operating Procedure Update and Training**. NFPA 1500, *Standard on Fire Department Safety and Health*, Section 5.3.3, 5.3.7 and 5.1.6

   A. Periodic review, update and then new and continual training on Standard Operating Procedures needs to be completed to ensure knowledge and proficiency in operating safely in the emergency operations of the department.

6. **EMS Training**. NFPA 1500, *Standard on Fire Department Safety and Health*, Section 5.1.7

   A. Periodic training on new and existing specialized equipment utilized for advanced procedures not covered in regular continuing education. This will ensure competency of all medical personnel in completing these tasks on similarly or less injured fire fighters in the future.

C. Equipment

1. Personal Protective Ensemble

a. Helmet: The outer shell of the fire-fighting helmet was destroyed and the chinstrap was completely burnt through. The impact liner remained relatively intact, considering the magnitude of the heat exposure. The committee recommends the following actions with fire protective helmets in the future:

1. Ensure all helmets are inspected every six months on the same rotation as the fire coat, pants, gloves, and hood. As outlined in *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.
2. Ensure that all helmets are of a newer polycarbonate style and not made of an "older" style fiberglass.
3. Ensure that all helmets have reflective trim.
4. Ensure that chinstraps are functional and worn properly.
5. Helmets should to be color coded to distinguish between personnel ranks: Probationary fire fighter, fire fighter, FAO, Company Officer, Chief Officer. The current system of "Red Helmet=Engine" and "Black Helmet=Truck" does not allow easy distinction on the incident scene of the rank and capability of personnel. This is important for incident accountability and personnel tracking issues. Additionally, with the detailing of personnel for manpower requirements personnel are often on different companies without the current correct helmet color correspondence, making it ineffective.

Helmet

b. Protective Hood: The protective hood worn received minimal damage in areas that were protected by overlapping personal protective equipment (coat and helmet). Those areas immediately exposed to the fire environment where the hood to mask seal is established and at the ears and chin were destroyed. The committee recommends the following actions with fire protective hoods in the future:

1. Replace all existing hoods with new style two-layer hood utilized in this incident.
2. All fire fighters should have 2 protective hoods.
3. New hoods should be color-coded differently to distinguish old style hoods from newly issued hoods.
4. Ensure all hoods are inspected every six months on the same rotation as the fire coat, pants, gloves, and helmet. As outlined in *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.

HOOD

c. Personal Protective Coat: The coat was almost completely destroyed with minimal remnants of the protective ensemble remaining. The committee recommends the following actions with the personal protective coat:

1. Ensure all current coats in the CFD meet or exceed the current *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.
2. Ensure that coats are fitted to each fire fighter to ensure proper fit and protection. "Off the Rack" sizing is not an acceptable method of issuance. Custom fitting will allow for a proper coat / glove and coat / pant interface as outlined in: *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.
3. Ensure that inspection, cleaning, and care of protective coat is in accordance with *NFPA 1851 Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles*. All PPE needs inspection and cleaning every 6 months regardless of use. The protective coat in this incident was issued in January 2001 and manufactured in March of 1999. The protective coat in this incident had not been evaluated or cleaned since it was issued. Since there is no record of cleaning or inspection the committee has to assume the time frame exceeded the 6-month inspection and cleaning recommendation. It is impossible to know the condition of FF Armstrong's PPE prior to destruction in the fire.
4. Tracking of personal protective equipment will ensure appropriate cleaning schedules are maintained.
5. Personnel names need to be placed on the rear of the protective coat near the bottom rear so personnel working in a fire environment following or working with other firefighters can see and notice the names of those working around them. Rank identification may also prove valuable. This assists in visualizing fire fighters names and rank when everyone looks the same in personal protective equipment and also assists in incident accountability.
6. Fire fighters should be issued two protective coats to allow for a spare if one becomes wet, damaged, or needs to be inspected or cleaned.

COAT

d. Personal Protective Pants: The personal protective pants were completely destroyed with minimal remnants of the protective ensemble remaining. The committee recommends the following actions with the protective pants:

1. Ensure all current pants in the CFD meet or exceed the current *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.
2. Ensure that pants are fitted to each fire fighter to ensure proper fit and protection. "Off the Rack" sizing is not an acceptable method of issuance. Custom fitting will also ensure a proper boot / pant interface and pant / coat interface as outlined in: *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.
3. Ensure that inspection, cleaning, and care of protective pants is done in accordance with *NFPA 1851 Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles*. All PPE needs inspection and cleaning every 6 months regardless of use. The protective pants in this incident had not been evaluated or cleaned since April 27, 2000. They were issued to FF Armstrong in January 2000. This time frame exceeded the 6-month inspection and cleaning recommendation. It is impossible to know the condition of FF Armstrong's PPE prior to destruction in the fire. The date of manufacture of the Turnout pants was May 1992. FF Armstrong's pants were in service for over 10 years with no record of inspection or cleaning in over 35 months.
4. Fire fighters should be issued two protective pants to allow for a spare if one becomes wet, damaged, or needs to be cleaned.

PANTS

e. Boots: FF Armstrong's boots were of the rubber type and were completely destroyed by the fire environment. The committee recommends the following actions concerning the protective boots:

1. Ensure all current boots in the CFD meet or exceed the current *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.
2. Ensure that boots are fitted to each fire fighter to ensure proper fit and protection. Custom fitting would also ensure a proper boot / pant interface as outlined in: *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.
3. Ensure that inspection, cleaning, and care of protective boots is done in accordance with *NFPA 1851 Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles*. All PPE needs inspection and cleaning every 6 months regardless of use. The protective boots in this incident had not been evaluated or cleaned. Since there is no record the committee has to assume this time frame exceeded the 6-month inspection and cleaning recommendation. It is impossible to know the condition of FF Armstrong's PPE prior to destruction in the fire.

BOOTS

f. Gloves: The fire environment destroyed the protective gloves. The committee recommends the following actions with the protective gloves:

1. Ensure all current gloves in the CFD meet or exceed the current *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.
2. Ensure that gloves are fitted to each fire fighter to ensure proper fit and protection. Custom fitting would also ensure a proper glove / coat interface. As outlined in: *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program and NFPA 1971 Standard on Protective Ensemble for Structural Fire Fighting*.
3. Ensure that inspection, cleaning, and care of protective gloves is done in accordance with *NFPA 1851 Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles*. All PPE needs inspection and cleaning every 6 months regardless of use. The protective gloves in this incident had not been evaluated or cleaned. Since there is no record the committee has to assume this time frame exceeded the 6-month inspection and cleaning recommendation. It is impossible to know the condition of FF Armstrong's PPE prior to destruction in the fire.
4. Utilize gloves with better dexterity for utilization of radios on the fire-ground. There were issues with "mayday" communications due to the difficulty in depressing the transmit button on the radio microphone extensions.
    a. Training evolutions conducted internally by the Cincinnati Fire Department have found serious problems with the dexterity of the current gloves used and the ability to utilize items such as radios, PASS alarms, and shoulder microphones. Similar fires have also shown a similar dexterity issue. Immediate testing and evaluation of gloves that offer better dexterity should be conducted.

g. Personal Protective Equipment Inspection and Tracking: The current system of tracking, inspecting, and cleaning of PPE in the fire department has proven to be ineffective in ensuring the best PPE is on the streets. The Protective Turnout Coat for FF Armstrong was issued in January 2001 and had never been cleaned or inspected. His Protective Turnout Pants had been issued in January 2000 and were inspected and cleaned on April 27, 2000. These pants were manufactured in May 1992. These pants were over 10 years old at the time of the incident. Without adequate records on the PPE coat it is impossible to determine its age; however it had not been inspected or cleaned 26 months after its issuance. The protective pants had not been cleaned for over 35 months.

1. Ensure the function of tracking, inspecting, and cleaning of PPE is a single employee's sole responsibility in the organization chart of the Cincinnati Fire Department.
2. This may involve the addition of a Full Time Employee or utilization of a 3rd service agency.
3. Ensure that training and equipment to track, maintain, and clean PPE is available for the employee tasked with this responsibility as outlined above.
4. Ensure that this program is in accordance with *NFPA 1851 Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles*.
5. Ensure that members are not wearing PPE that is out of date and unfit for service. It is impossible to determine in this instance the status of FF Armstrong's PPE prior to the incident due to the lack of adequate records. We do know that he had PPE pants that exceeded the recommended service life by many years.
6. Two other fire fighters were on the interior of the structure at the time of the flashover. Both of these fire fighters had newer gear; however, neither of these fire fighters gear had been inspected or cleaned in over 2 years.

2. Work Uniforms

Currently Cincinnati Fire Fighters utilize a "cotton / polyester" blend of work uniforms consisting of t-shirts, fatigue shirts and pants, and zip sweatshirts.

In the past, older technology of protective work uniforms that met the intent of *NFPA 1975 Standard on Station/Work Uniforms for Fire and Emergency Personnel* were "Itchy" and "Stiff" making them uncomfortable for the wearer; thus, they were not used.

Currently, new technology has allowed these garments to be as soft and easy to wear as our current uniforms. These garments are now available in fatigues, t-shirts, zip sweatshirts, jackets, and polo shirts. These items of clothing have a life expectancy that is 3 to 4 times that of the standard cotton/polyester currently utilized.

The protection that could have been provided in the situation at 1131 Laidlaw cannot be scientifically measured due to the extent of the thermal exposure; however, it may have made a difference in other "close-call" situations in the past.

The committee recommends the following actions with the work uniforms:

a. Immediately begin phasing out the current style fatigue uniforms used in the Cincinnati Fire Department and provide all personnel with flame resistant work uniforms in accordance with *NFPA 1975 Standard on Station/Work Uniforms for Fire and Emergency Personnel*.
b. Ensure that these garments are of the newer technology of flame resistant garments to ensure comfort and compatibility.
c. Ensure these garments are cleaned, inspected, and maintained in accordance with *NFPA 1975 Standard on Station/Work Uniforms for Fire and Emergency Personnel*

3. **Self Contained Breathing Apparatus**:

The SCBA is one of the most important pieces of safety equipment for the fire fighter. This piece of equipment literally means the difference between life and death in a hazardous atmosphere. Several improvements are needed in the equipment utilized by the CFD. Oscar Armstrong's SCBA was completely destroyed. The straps were burned down to the metal inner straps, the air cylinder began to disintegrate, the air cylinder gauge burned off, and the MMR was completely destroyed.

a. FF Armstrong had been FIT tested for sealing and compatibility in wearing of his SCBA face piece. He had no record of medical evaluation in conjunction with the physical FIT testing procedure. This is required under OSHA 29 CFR 1910.134 and Ohio Administrative Code 4123-21-07, section E. It is recommended that the full FIT test evaluation with medical review be performed on all fire fighters in the future.
b. The SCBA worn by FF Armstrong was a MSA, MMR 4500 last bench tested on June 13, 2001. This exceeded the testing schedule of once per year. The SCBA worn by FF Armstrong had not been tested or inspected in 20 months by a trained mask service technician. It is recommended that the SCBA be inspected as outlined in NFPA 1852 once per year at the minimum.
c. Mask repair technicians should be trained and certified by the SCBA manufacturer to conduct maintenance and testing on our SCBA. This training must also remain current for all members required to complete these tasks.
d. Integrated PASS alarms are necessary to ensure this device stays with the fire fighter on his/her SCBA and automatically is activated when the SCBA is in use. In this situation, the PASS alarm was separated from the fire fighter after being burned off his coat mounted strap system. The PASS alarm was found activated; however, when located, it was not with FF Armstrong. This caused a momentary delay in the RAT team finding FF Armstrong. They focused on the PASS alarm sounding, which was not with FF Armstrong.
e. PASS alarm annunciation should also be on the front and rear of the SCBA for maximum decibel annunciation no matter the position of the downed fire fighter.
    i. NIOSH studies and inter-department research from training shows that most fire fighters that are found down are found face down, muting the pass device. The SCBA should have a second remote annunciator on the rear of the SCBA to emit sound no matter the position of the fire fighter.
f. Improvements to the flame and heat resistance of the components making up the harness, gauge, face-piece, and head harness to ensure they maintain their intended function when exposed to high levels of heat. All "materials" making up the SCBA including Flame and Heat Resistant Strap Fabric and Facepiece, were destroyed, leaving only the metal frame and strap wires.
g. Integrate a strobe light system on the SCBA harness to illuminate on the front and rear when the PASS alarm is activated to assist in locating a downed fire fighter by visual means as well as audible notification.

4. Accountability Equipment System

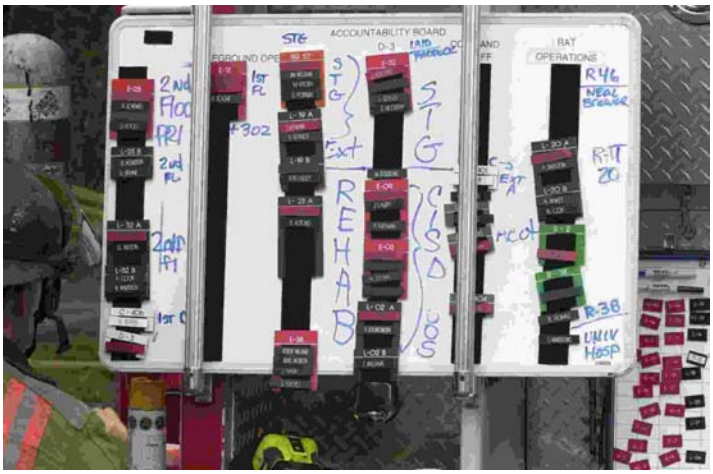
Fire fighter accountability is paramount and essential to ensure tracking of personnel on the incident scene. Both NFPA 1500 and NFPA 1561 require personnel tracking. Our current system allows for a PASSPORT system of company identification on all helmets and company PASSPORTS listing all members assigned to a company by Velcro nametags. In order to further the effectiveness of the system, the following improvements are needed:

a. Helmets should be color-coded to distinguish between personnel ranks: Probationary FF, FF, FAO, Company Officer, Chief Officer. The current system of "Red=Engine" and "Black=Truck" does not allow easy distinction on the incident scene of the rank and capability of personnel. While investigating the fire and looking at still photographs along with video footage it was virtually impossible to determine rank structure when everyone looks the same wearing full PPE. The different color helmet identifiers are not effective in determining rank from a distance.

b. The following color coding system is recommended for ease of identification of rank structure during fire and emergency operations:
    1. RED Helmet = Officer (Lieutenant or Captain)
    2. BLACK Helmet = Firefighter (engine or ladder) & FAO
    3. WHITE Helmet = Command Officer (District Chief, Assistant Chief, or Fire Chief)
    4. YELLOW Helmet = Probationary Fire Fighter
    5. BLUE Helmet = Paramedic or EMS Field Supervisor
    6. ORANGE Helmet = Support Staff (photographer/chaplain/Box 13)
    7. GREEN Helmet = Safety Officer

c. The accountability procedure needs to be re-evaluated to include the importance of having adequate individual nametags. It should be emphasized about their importance to remain on the underside of the helmet of the fire fighter when not in use.

d. In order for any equipment to work effectively, an individual exclusively assigned to the role of accountability officer must be utilized early in the incident.



5. Hose

Hose deployment and water flow played an important factor in the outcome of this tragic incident. The initial hose load consisted of 7 sections of 1-3/4" hose (350 feet). The second hose consisted of 5 sections of 1-3/4" hose (250 feet). Several improvements are needed:

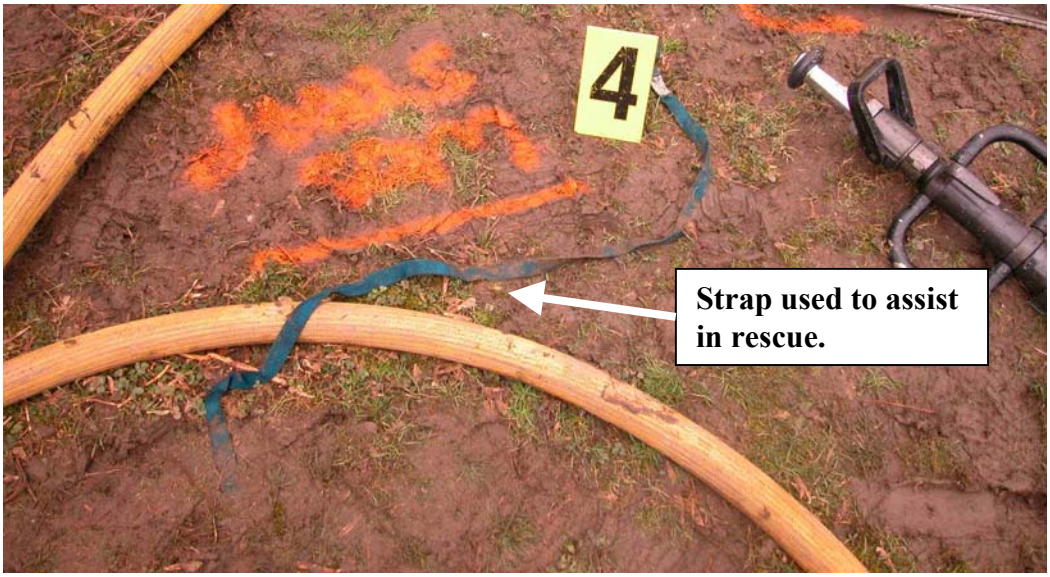
a. Evaluation and utilization of "kink-resistant" or "non-kinking" hose to solve some issues with deployment over, between, through and around obstructions. Obstructions in this fire were on the exterior with the landscape bushes, corner of the house, and front porch railings.
    i. When obtaining kink-resistant hose priority needs to be placed upon purchasing hose that will enable each pre-connected hose line to be identified by a separate color. While color-coding didn't play a direct role in the death of Fire Fighter Armstrong, it did make the investigation of the fire difficult. Differing color hoses allow for hose crews to call to the driver and specify to start the water in a specific hose color, thus limiting confusion.
b. Utilization of shorter pre-connected hose loads to ensure adequate fire flow and to lessen opportunity for improper deployment. Current maximum standards of 5 sections of 1-3/4" hose are being utilized to ensure adequate flow can be delivered during initial attack without exceeding the flow test requirements of the hose. Personnel are instructed to utilize larger diameter hose such as 2-1/2" hose reduced or gated to 1-3/4" hose for longer lays. Companies are not permitted to utilize more than 5 sections of 1-3/4" hose.
c. Standard hose load methods need to be utilized to ensure uniform deployment on every company. Hose in long beds should be laid so that is doesn't drag the ground in the front or rear of the fire fighter as it is being dragged into and around the incident scene. To achieve this, on the rear pre-connected hose load, this system should involve a split load with the front of the bed (towards the apparatus cab) laid flat and the rear of the bed (after the split towards the tailboard) laid in the "minuteman" method for ease of deployment.
d. On companies with long hose lay requirements, utilization of 2-1/2" hose with a reducer or gated wye system should be utilized and pre-established to ensure rapid deployment. This layout should also be standardized in the CFD for ease of deployment. Reducers or gated wyes without valves that are exposed and easily shut off should be utilized. Gated wyes should also have a pressure gauge.

6. Personal Issued Tools

The fire fighters that located FF Armstrong were having trouble moving him due to the condition of his body and a lack of adequate handholds. One fire fighter attempted to utilize a self-purchased strap to place around FF Armstrong to assist in dragging him across the room to a window. In order to ensure our personnel are carrying the appropriate equipment to assist in rescuing a downed fire fighter, we must issue equipment as part of their PPE.

The following are recommended for personally issued tools:

a. 20 foot of 1 inch tubular nylon webbing tied with a water knot.
b. 1 non-locking "D" ring for use with the 1 inch tubular webbing.
c. Metal cutting "dikes" for cutting wires that may be entangling a fire fighter or SCBA harness straps.
d. Folding spanner wrench. Most fire fighters should have this piece of equipment. An inventory will need to be taken to determine quantity.
e. A 4-foot section of 1" tubular nylon webbing with sewn loops at each end for utilization as a hose strap.
f. Two Hand Lantern "Orange Litebox Flashlights". These are currently issued to the RAT companies and being purchased with new engine companies. This is a company issue, not a personal issued tool.



7. Radios

Every fire fighter should have a radio with a properly charged battery and newer style shoulder microphone (with larger transmit button) for ease of communications while in complete personal protective equipment. Communications were broken and not transmitted because of the difficulty in depressing the older style paddle wheels on portable radios. An important "MAYDAY" communication was not transmitted for this reason.

a. Shoulder microphones should be provided on all portable radios and newer style shoulder microphones with paddle wheel buttons should be provided to ease in depressing the talk activation switch while wearing PPE gloves.
b. Radio batteries should be replaced with new batteries that are capable of discharging and recharging each time they are placed into a charging bay to avoid creating "battery memory". This also eliminates the need to allow your current battery to deplete itself prior to recharging, thus ensuring all personnel can utilize a fully charged battery.

8. SCBA Communications

Effective communications while wearing an SCBA is an important issue on the fire ground. This issue, along with hose deployment, was an important factor in the death of FF Armstrong. The Captain had to leave to porch of the structure where his fire fighters were donning their SCBA's to figure out the problem with the inability to get water to the nozzle. While the Captain left the porch, his fire fighters along with a fire fighter from the second engine company entered the building. The Captain could not effectively communicate with his fire fighters. New technology allows for communication between company members through their SCBA. The committee recommends the following actions:

a. Investigate an inter-company communication system in the SCBA for communication between company members on the incident scene. This would allow for the company to communicate on routine issues while working without tying up radio traffic. This also makes communications clearer between personnel operating in hostile environments. Truck officers could communicate with their crew that traditionally splits up into 2 teams operating at various portions of the structure without interference or additional radio traffic. Personnel accountability and notification of emergency situations is also enhanced between each crew.
b. Utilize voice amplification for easier radio communications over radio channels while operating within the fire environment in SCBA.

9. Hose Exit Arrows

When sudden catastrophic events, such as a flashover, collapse, or backdraft, occur and personnel need to find their way out of a structure immediately or if they become disorientated on the hose line, valuable time could be lost while trying to determine direction of travel by hose coupling recognition alone.

a. Nomex sleeves can be placed on the hose line at each coupling with a reflective arrow pointing the way out of the structure. These inexpensive directional assistance devices could save valuable seconds as a fire fighter is running out of air or trying to escape a dangerous event on the fireground.

10. GPM Gauges

At this incident, the fire fighter acting as the Fire Apparatus Operator started the water in the initial attack line off of his engine company and because he had discharge pressure on his pump and at the discharge gauge was satisfied he had started the water. Due to the lack of training and experience as an FAO he did not look around the fire ground on the exterior of the building to notice kinked hose and straighten it out after realizing his fire fighters weren't getting water. The following recommendations are being made to eliminate this occurrence in the future.

a. Install GPM (Gallons Per Minute) gauges on all apparatus so the FAO can actually determine if water is flowing from the hose line and also determine how much water is flowing. If the FAO had been utilizing GPM gauges in conjunction with his PSI gauges, he would have realized after there was pressure on the system and no flow on the GPM gauge there was a problem somewhere in the hose system from the pump discharge to the nozzle.
b. GPM gauges would allow the FAO to set a rate of flow based on fire conditions or officers directions for various nozzles without wasting time pondering confusing calculations on friction loss in the field. This could be done for multiple attack lines.

11. Thermal Imaging Cameras

A Thermal Imaging Camera would have been beneficial to the first arriving fire fighters at this incident in locating the fire, the fire size, and approximate temperature of the fire environment as entry was made into the structure. Those fire fighters who initially entered the structure to knock down the fire and locate FF Armstrong were without a thermal imaging camera, delaying their ability to locate FF Armstrong. A ladder company fire fighter assisted the second line into the fire attack with a Thermal Imaging Camera. These rescuers were able to determine the location of the fire and the location of first rescuers and protect the rescuers with their hose line as they affected rescue operations. The committee recommends the following actions with the Thermal Imaging Cameras:

a. One camera to be purchased and issued for each engine company to assist in locating the fire, determining heat levels in the structure, and evaluating effectiveness of fire attack. They could also be used to assist in rescue situations if their primary function is not fire control.

b. One camera to be purchased for each District Chief to be utilized as a tool to assist in exterior size-up, a backup camera or additional camera in multi-company operations. This would also allow the second or later arriving District Chiefs to have a camera if assigned to interior operations upon arrival at the fire to assist in command and control and safety when on the interior.

c. Spare cameras to be used as loaner cameras in the event of mechanical failure, breakage, or other mishap making them unusable. Additionally spare cameras should be available for the training bureau for in-service training and recruit training.

The Cincinnati Rotary Club funded 28 thermal imaging cameras. Doug Adams from the Rotary Club coordinated the fund raising efforts and the generous donations from local business and private donors. Additionally the City of Cincinnati purchased 12 cameras, bringing our total number of cameras within the department to 52. It is recommended that these cameras be distributed as outlined above.

12. Tools

Fire fighters should have adequate tools available to them to complete the tasks that they are expected to be able to complete. Along with these tools, procedures need to be developed to direct personnel as to which tools are necessary to be carried to complete the tasks expected of their assignments on the fire ground. Traditionally it is the company officer's responsibility to assign task and tool assignments; however, as proven in this incident it does not always occur.

D. Technology

Technology evaluations and recommendations are focused on new and existing equipment as it is related to the death of FF Armstrong. The committee looked at what is available today in the fire service that related to this incident and also envisioned new technology that could assist in lessening the likelihood of a similar occurrence.

1. Self Contained Breathing Apparatus / Integrated Communications

The ability of fire fighters within a company to communicate with each other is a concern of all members of the committee.

The inability to communicate between members of the same company had serious and grave consequences. There was an inability of company officers to account for all of their members operating at the scene. This is a serious issue and has both fire fighting and safety concerns.

There are two types of integrated SCBA communications systems:

The first type deals with fire ground communications over assigned fire department frequencies that all companies on the fire ground can hear. These transmissions are higher powered and have the ability to hit repeaters and also communicate with the fire dispatcher. This is no different than the radios currently in use, with the exception that the microphone and controls are integrated into the face piece for clear and precise communications.

The second type deals with a small radio with a frequency specific to a single company. This enables a fire officer to talk with his crew on the fire ground and keep track of their location, needs, and progress while in a hazard area. This is an important aspect in a smoke environment when visualization of crew members cannot be made and integrity and accountability is required. This small radio also has a second frequency that is common to all crews on the fire ground and can be monitored if one or more crews are working together on the same task. The use of these small, low powered radios allows for less distractions and confusion on the radio channels on the fire ground.

These types of systems are being evaluated by several major metropolitan cities for use within their department. A few of these tests are the direct result of a fire fighter death.

a. A communications system integrated into the SCBA to assist in clear and precise communications between the fire fighting crew operating at the emergency. This will allow for better crew effectiveness, integrity, and assist in accountability and notification of emergency situations.

2. Accountability Equipment:

Prior to this incident, the Cincinnati Fire Department evaluated a radio transmitted PASS alarm system to aid in knowing if a fire fighter was troubled. After testing, this system was found to be highly unreliable in multiple buildings and situations and the decision was made not to purchase this equipment. With major improvements in this technology, a similar system may prove to be valuable.

a. As new equipment becomes available it needs to be evaluated and implemented to allow for better tracking of personnel locations on the incident scene.

3. Ultrasound Equipment:

The development of ultrasound equipment for locating lost or trapped fire fighters is new technology being developed and tested nationwide. The Cincinnati Fire Department Training Staff evaluated the effectiveness of this current technology after the death of Fire Fighter Armstrong and found it to be unreliable in performing as it is intended. This technology may prove to be a great improvement in pinpointing the location of a lost fire fighter; however, its reliability and accuracy needs some improvement prior to investment as a fire-fighting tool. The recommendation is to follow this technology and re-evaluate as improvements in design and reliability are developed.

a. This technology needs to be monitored and as improvements are made from the current design it needs to be reevaluated and implemented to assist in more rapid locating of lost or trapped fire fighters.

b. This system would be more beneficial if it was incorporated onto the SCBA like a PASS alarm.

E. Standard Operating Procedures

The entire Cincinnati Fire Department procedures and operations manuals that related to the death of Oscar Armstrong were systematically reviewed to recognize those procedures that need to be improved to help prevent similar circumstances from occurring again.

These reviews will recommend changes and updates to existing Cincinnati Fire Department procedures and also allow for implementation of new procedures to enhance fire fighter safety and incident operations.

The most important areas of concern that occurred on this incident that need improvement to help prevent the likelihood of a similar circumstance are:

1. Crew Integrity
2. Company officer supervision and direction of fire fighting operations
3. Supervision of inexperienced fire fighters on the fire ground
4. Portable radio usage and availability
5. Risk management profiles
6. Maintenance of fire fighting and emergency scene functions throughout a mayday operation
7. Accountability
8. Incident Safety Operations
9. Incident benchmarks, including time markers, water flow on the fire, fire control, and loss stopped.
10. Thermal imaging camera deployment
11. Training
    a. Initial Recruit Training
    b. Basic Fire Fighting Reinforcement Training
    c. Minimum Company Standards Training and Formal Evaluation
    d. New Company Officer Training
    e. Company Officer Annual In-Service Training
    f. New Command Officer Training
    g. Command Officer Annual In-Service Training

h. New Driver / Operator Training

i. Driver / Operator Annual In-Service Training

j. Above Grade Assignments as Officer or Fire Apparatus Operator

k. Fire Behavior and Flashover Training

l. Standard Operating Procedures Training

m. Fire fighter Survival and Rapid Assistance Team Training

n. Training Database management

12. Personal protective equipment maintenance, testing, and cleaning

13. Riding position assignments

14. Accident, Injury, Fatality, PPE Failure and "close-call" investigation

15. Standard operating procedure maintenance and revision

16. Line of Duty Death Procedures

17. Critical Incident Stress Debriefing and Counseling

18. Rapid Assistance Team

19. Structure Fires – Engine company operations, ladder company operations, and command officer responsibilities. Including Fire Attack principles, strategies and tactics.

20. Incident Command

21. Incident Size-Up

22. Apparatus Standardization

1. Crew Integrity:

Crew integrity is important when entering an IDLH atmosphere. Lack of crew integrity is extremely dangerous. At 1131 Laidlaw, the first alarm fire companies mixed personnel with other companies when entering the fire building, both during initial attack and rescue efforts. The Cincinnati Fire Department, General Order #24 states you must have at least 2 fire fighters, using the buddy system, before entering an IDLH atmosphere and then remain in visual or voice contact with one another at all times. Crews entered following this standard; however, they were not working with their original crews and were without supervision of a company officer. There are not written procedures on crew integrity in the Cincinnati Fire Department. The following additions to the Standard Operating Procedures are recommended to outline procedures for crew integrity:

a. GO #24 to be implemented into written procedures.
b. Company accountability to state all companies will operate under the direct supervision of the company officer and continuously operate together.
c. Procedures on crew integrity and notification to command and accountability if the crews are split or divided up.

<u>Applicable Procedures needing revision</u>:

202.01 - Incident Command
202.07 - Accountability
203.01 - Structure Fires
202.01 – Safety (Included in Command Procedures)

2. Company officer supervision and direction of fire fighting operation

Entry was made into the fire building without the direct permission or supervision of a company officer. Unfortunately, permission is often assumed or implied during this chaotic period of attacking the fire. The Cincinnati Fire Department does not have written procedures on direct supervision of fire fighters by company officers. Therefore, the following items should be addressed in standard operating procedures:

a. The company officer should be in direct contact with company members before entering the IDLH atmosphere and during all operations in the IDLH atmosphere.
b. The 2 in 2 out procedure is to be followed and 1 member should include the company officer *or an experienced fire fighter, trained as an officer.*
c. Define experienced fire fighter.

Applicable Procedures needing revision:

202.01 - Incident Command
202.07 - Accountability
203.01 - Structure Fires
202.01 – Safety (Included in Command Procedures)

3. Supervision of inexperienced fire fighters on the fire ground

The two fire fighters on Engine 9 had approximately 4 years of total fire fighting experience. Their lack of experience possibly led to the risks taken by advancing the hose line without water, not identifying the signs of a flashover, and not staying low in a high heat environment. Close supervision of inexperienced fire fighters is needed in order to instruct and teach them the proper knowledge and experience during operations. The following additions to the SOP's are recommended:

a. New section in the procedures manual to define an inexperienced fire fighter and specific goals and procedures to supervise them. While this will not actually determine experience levels, it provides an avenue for the fire department to monitor and ensure supervision until a time when it is determined they require less direct supervision.
b. Easy identification on the fire ground of inexperienced fire fighters. Color-coded helmets covered in the *Equipment section C.1 (a.5)*.
c. Additions of the SOP's covering the crew integrity and fire ground operations covered in the above sections 1 & 2.

<u>Applicable Procedures needing revision</u>:

202.01 - Incident Command
203.01 - Structure Fires
202.01 – Safety (Included in Command Procedures)

4. Portable radio usage and availability

Excellent communication is necessary in order for incident command and accountability systems to function properly. At this incident, during critical periods, broken or "garbled" communication transmissions could not be identified as to who was transmitting information. The procedures for a "MAYDAY" need to be strictly followed and updated to address the communication problems encountered at this incident. The physical and mechanical problems with the radios are covered in the Equipment section C, #7. The following additions to the SOP's are recommended:

a. Incident Commander should acknowledge all "MAYDAY" transmissions with a confirmation of receipt.
b. Proper radio discipline to be maintained during emergency periods and review of the radio traffic during the incident be included in the after action reports. Fire fighters should refrain from unnecessary radio traffic.
c. Additional training or testing of radio, emergency and MAYDAY procedures.

<u>Applicable Procedures needing revision:</u>

202.08 - Mayday
202.07 - Accountability
203.01 - Structure Fires
202.01 - Incident Command
701.15 - Fire Ground Communication via Portable Radios
GO #38, #48 and #49 - Portable Radio Usage and Channel #1 and #2 use
701.03 – Radio Procedures and 701.05 – Emergency Traffic

5. Risk management profiles

Fire fighting is inherently dangerous. The assessment of these risks have been taught or implied over the years but no actual risk management procedure exists. Due to the risks associated with fire fighting possibly leading to injury and, in this case, death, the following additions should be added to the Standard Operating Procedures:

a. A procedure is needed defining the risk policy during operations of any kind.
b. Once the risk policy is established, this should be reflected in the operations section to determine fire ground strategy and attack modes of the IC.
c. Risk policies should be as basic as:
    a. We may risk our lives a lot to protect savable lives.
    b. We may risk our lives a little to protect savable property.
    c. We will not risk our lives at all to save what is already lost.

<u>Applicable Procedures needing revision</u>:

202.01 - Incident Command
203.01 - Structure Fires
202.01 – Safety (Included in Command Procedures)

Safety and Risk Management Procedure needs to be created

6. Maintenance of fire fighting and emergency scene functions throughout a mayday operation

In order to mitigate an emergency situation during an incident, proper discipline and procedures must be strictly followed. The Incident Commander must maintain focus on the overall incident and allow the subordinate personnel to focus on individual tasks. Likewise, the task level personnel must maintain discipline on their task at hand. The operation of the RAT units was a recent addition to the Cincinnati Fire Department at the time of this incident along with new training and operating procedures. Some of the newly instituted procedures were not implemented at the incident and the following recommendations should increase focus on them:

a. Procedures to allow for increased training with incident commanders on RAT, Mayday, and Accountability procedures.
b. Additional training with fire fighters on RAT, Mayday, and Accountability procedures.
c. Transmission of additional alarms for personnel at the incident when a "Mayday" is declared.
d. Fire fighters must adhere to the orders of the incident commander when a "Mayday" situation exists. Fire fighters act on their instincts and in this incident went beyond an evacuation order and entered the structure to attempt rescue of a colleague. These actions were heroic; however, if there was a situation within the structure that the Incident Commander knew about from his perspective, additional personnel could have been lost. The incident commander must approve all tactical functions.

<u>Applicable Procedures needing revision:</u>

202.01 - Incident Command
202.07 - Accountability
203.01 - Structure Fires
202.08 – Mayday
202.09 – Rapid Assistance Teams
701.05 – Emergency Traffic
701.03 – Radio Procedures

7. **Accountability**

Accountability is a system that provides the command staff a means to track and account for all fire fighters. It takes proper management and early intervention in order to keep account of members. The short period during the initial attack on a fire is best described as controlled chaos. To have a catastrophic event occur during this period adds turmoil to an already chaotic scene. This magnifies the need for an immediate "aide" to the Incident Commander and Standard Operating Procedures to be strictly followed. A person designated to this role after the first 10 minutes has lost vital time in tracking of what is actually occurring and where personnel are operating. The following additions are recommended:

a. Incident accountability measures need to be implemented earlier in the incident to accurately track the operations of personnel during the initial chaotic stages of the operation. This would be best accomplished by utilization of enhanced procedures and a "Chiefs Aide".
b. Additional training on Standard Operating Procedures for unusual events during incidents to ensure the intended actions becomes second nature during this chaotic period.

<u>Applicable Procedures needing revision:</u>

202.01 - Incident Command
202.07 - Accountability

8. Incident Safety Operations

Incident scene safety is the most important component of the Incident Command System. Often due to the lack of manpower and insufficient operating procedures, this vital assignment is often not performed on one and two alarm incidents. Without incident safety procedures and an individual specifically assigned to the role of Incident Safety Officer during the initial phases of an incident additional injury and potentially deaths may occur.

Currently a 40 hour District Chief manages the Safety and Health program for the Cincinnati Fire Department. This District Chief responds to fires at his discretion during his working day and to all 3 alarm or greater incidents after hours if he is available. A safety position is not staffed or assigned on a 24 hour per day basis in the Cincinnati Fire Department. Company officers are not trained and their primary responsibility is to manage the operations of their company on a task level basis. Company officers cannot see the big picture of the incident scene from their forward position in the hot zone.

a. An incident safety officer needs to be assigned early in the incident to monitor issues such as crew integrity, freelancing, smoke and fire conditions, building conditions, crew movement, and equipment deployment.
b. Procedures need to be implemented to cover the assignment of an Incident Safety Officer, his/her roles, authority, and actions.

<u>Applicable Procedures needing revision:</u>

202.01 - Incident Command

Procedures on Safety and Risk Management and Incident Safety Officer Response need created.

9. Incident Benchmarks

Benchmarks are utilized by the Incident Commander to signify important tactical priorities have been performed on the incident to stabilize the fire situation. Benchmarks also establish priorities for completion of basic fire ground objectives. Currently the following benchmarks are used in the Cincinnati Fire Department: Primary Search Complete, Fire Under Control, and Fire Out. These benchmarks are used without any Standard Operating Procedures referenced. In order to facilitate improvement of fire ground operations, the following procedures need implementation:

a. Tactical benchmarks need to be added to the procedures to allow an incident commander to have a standard format of accurately tracking incident progress. The following benchmarks should be incorporated.
    i. On the scene
    ii. Water on the fire
    iii. Ventilation Complete
    iv. Primary Search Clear
    v. Fire Under Control
    vi. Loss Stopped

<u>Applicable Procedures needing revision:</u>

202.01 - Incident Command
203.01 - Structure Fires

10. Thermal Imaging Camera Deployment

Currently, there are no procedures on the use, deployment, and limitations of Thermal Imaging Cameras in the Cincinnati Fire Department. The Cincinnati Fire Department Drill Manual outlines the basic operation and mechanical features of these devices; however, it does not state who carries it, when it should be carried, and its limitations.

a. Procedures need to be created to indicate appropriate deployment of thermal imaging cameras, which person is responsible for carrying it, and its intended functions on the incident scene.

<u>Applicable Procedures needing revision:</u>

203.01 - Structure Fires

11. Training

Currently the Cincinnati Fire Department procedures outline basic guidelines for recruit training, in-service training, and driver training. The importance of basic training reinforcement, command and company officer training, and fire behavior training were reinforced at this incident. The need for improvements in training also requires procedures to be developed to outline the target audiences, delivery method, frequency, and evaluation to ensure effective management and adherence to policy. If fire fighters are expected to perform to a level of effectiveness and/or are required to participate in training sessions, then procedures outlining attendance and actions for failure need to be implemented.

Additionally, tracking of company drill records and in-service training needs to be updated to allow for easier identification of training obtained, training needed, and to track training records for individual fire fighters. With additional training requirements as a result of this investigation, the need for improved tracking with a computer database cannot be over emphasized. Therefore procedures on the training database utilization and management need to be implemented.

a. Procedures need to be updated to include the objectives, target audiences, and delivery frequency of all existing and new training programs as a result of this incident. These procedures include:

   Initial Recruit Training
   Basic Fire Fighting Reinforcement Training
   Minimum Company Standards Training and Formal Evaluation
   New Company Officer Training
   Company Officer Annual In-Service Training
   New Command Officer Training
   Command Officer Annual In-Service Training
   New Driver / Operator Training
   Driver / Operator Annual In-Service Training
   Above Grade Assignments as Officer or Fire Apparatus Operator
   Fire Behavior and Flashover Training
   Standard Operating Procedures Training
   Fire fighter Survival and Rapid Assistance Team Training

b. Procedures need to be implemented to outline a review and revision schedule for all procedures.
c. Appropriate documentation in the form of a database needs implemented to accurately track individual training and proficiency records related to training as it relates to the training areas outlined in “A” above.

Applicable Procedures needing revision:

801.05 – In-Service Training
801.07 – Driver Training
601.15 – Out of Classification Assignments

12. Personal Protective Equipment Maintenance, Testing, and Cleaning

Improved personal protective equipment maintenance is a fairly recent development in the fire service. Initially the Cincinnati Fire Department was ahead of the curve nationally in maintenance, cleaning, and care of personal protective equipment. Recently, due to manpower constraints and workload requirements, maintenance and inspection of personal protective equipment has been neglected. Due to the total destruction of Fire Fighter Armstrong's personal protective equipment it is impossible to see if contaminants played a part in the combustion of the gear or if damage lead to thermal injuries suffered during the flashover. The other two fire fighters involved in the flashover did not receive similar thermal injury during the flashover. Their personal protective equipment was damaged, but held to the point of providing its intended protection. The frequency of cleaning for FF Armstrong's personal protective equipment exceeded the NFPA 1500 and manufacturer's recommendations. Therefore the following additions to the department's procedures are recommended:

a. Procedure updates are needed to include the actual PPE issued to every fire fighter and responsibilities for the cleaning and maintenance.
b. Procedures are needed on cleaning frequency.
c. Procedures are needed on specific damage that requires repair, testing, or replacement by a qualified individual.
d. Procedures are needed on minimizing contamination and damage from everyday usage.

<u>Applicable Procedures needing revision</u>:

401.05 – Fire Clothing
401.17 – PPE Inspection

13. Riding Position Assignments

Freelancing, leaving the apparatus without a forcible entry tool, hose deployment issues, and crew integrity concerns recommend the need to specify in procedures the actual tasks expected of companies and fire fighters based on their assignment on the apparatus. Fire fighters and officers should know who is carrying which tool and completing which task, especially before arrival on the fire ground. This is especially important with inexperienced fire fighters and firefighters detailed from another company.

a. Personnel should know their job based on their riding position on an apparatus.
b. Procedures need to be implemented for task and tool assignment for standard company operations for first and second due fire companies.

Applicable Procedures needing revision:

203.01 Structure Fires

14. Accident, Injury, PPE Failure, and Close-Call Investigation

There have been a number of incidents within the Cincinnati Fire Department where there has been an injury, PPE failure, or a "close-call" and no formal investigation was performed. The events of the past are valuable to learn from in order to prevent another circumstance in the future. Additionally, personnel need to be interviewed immediately following an incident to ensure proper recollection of the events that occurred. The following additions are recommended:

a. Procedures need to be implemented to thoroughly investigate and recommend improvement actions for all serious accidents, injuries, or deaths on the fire ground.
b. These procedures should also include an investigation of all PPE failures.
c. Additionally procedures should be written to investigate all "close call" and "mayday" situations, even if they didn't result in an injury or death.
d. A procedure needs to be included for the interview methods of personnel directly involved in the incident. Timely investigation needs to be a priority to allow for accurate recollection of events that occur.
e. A form should be included as a post incident critique for all fires to outline actions taken, events encountered, and recommended improvements in operations.

<u>Applicable Procedures needing revision:</u>

903.13 – Accident Investigation

15. Standard Operating Procedures Maintenance and Revision

Standard Operating Procedures need frequent review and revision to remain an effective management tool in the emergency response environment. Changing work conditions, additional responsibilities for response, and command and control issues all need to be updated at periodic intervals. Additionally, when procedures are updated, adequate training is needed to ensure proficiency.

a. Procedures need to be developed to provide for periodic review and updating of the current and new procedures utilized in the Cincinnati Fire Department.

Applicable Procedures needing revision:

103.00 – Preparation of Policies

16. Line of Duty Death Procedures

This death caught the members of the Cincinnati Fire Department by surprise. Just as individual members of society don't like to plan their own funerals, the fire department wasn't preparing for the death of one of their own. Fortunately with the support of local and outside agencies and the family of Fire Fighter Armstrong, we were able to provide appropriate services and support for our departed brother. In order to ensure we are prepared for future occurrences, the following procedures must be developed.

a. Line of duty death procedures need revision and incorporation of funeral planning and coordination of funeral events needs to be added.
b. Procedures for notification of pertinent city personnel without utilization of the radio dispatch channels are critical.
c. Procedures for proper and timely notification of the family of a deceased fire fighter.
d. Procedures for handling of personal effects of a deceased fire fighter.
e. Procedures for continuance of fire fighting service during periods of mourning.

<u>Applicable Procedures needing revision</u>:

601.24 – Death of an Active Member

17. Critical Incident Stress Debriefing and Stress Counseling

The brother and sister fire fighters of Oscar Armstrong suffered an extreme loss on March 21, 2003. Those directly involved in the incident who witnessed the horrific events that transpired will forever be affected. After a traumatic event, proper support, stress debriefing, and counseling needs to be available to assist fire fighters. Critical Incident Stress Debriefing teams were called to provide immediate assistance; however, long-term emotional assistance has not occurred. The following procedures are needed:

a. Procedures need to be developed to address critical mental health issues following the tragic events such as occurred on March 21, 2003.
b. Procedures for continual support of fire fighters affected by the outcomes of incidents needs to be addressed.
c. Procedures for timely incorporation of critical incident response teams need to be incorporated.
d. Fire fighters directly involved in critical fire fighter death incidents should be given ample mental recovery time prior to engaging in regular work duties.

Applicable Procedures needing revision:

907.05 Public Employees Assistance Program

18. Rapid Assistance Team

Rapid Assistance Teams and Rapid Assistance Training are important to the survival of fire fighters in the future of the Cincinnati Fire Department. It was proven that the training obtained during classes assisted in the removal of Fire Fighter Armstrong. Enhancements in the following procedures will enable better utilization of these resources:

a. Issues need to be addressed with the staffing, deployment, and readiness of Rapid Assistance Teams in the Cincinnati Fire Department.
b. Dispatch procedures have been revised to include the Rapid Assistance Team on the initial dispatch for any potential fires.
c. Rapid Assistance Team dispatching needs to include an additional company after confirmation of a working fire to assist in the proactive RAT company operations on the fire ground.
d. Recommendations published by the Cincinnati Fire Training Bureau for improvement in the entire rapid intervention, accountability, and mayday procedures should be implemented

Applicable Procedures needing revision:

202.09 – Rapid Assistance Teams
703.01 – Dispatch Procedures

19. STRUCTURE FIRES - Engine Company Operations and Ladder Company Operations and Command Officer Responsibilities

Basic fire fighting functions, engine company operations, ladder company operations, and command officer responsibilities all played an important role in the outcome of this incident. The following procedures need to be revised:

a. Standard engine company operations need to be revisited and updated to include the first due, second due, and third due company responsibilities.
b. Engine companies need to focus on getting the initial fire line in service in a timely manner. The first two engine companies need to focus on the initial line deployment working together.
c. One engine needs to be added to all 1-alarm assignments.
d. Standard ladder company operations need to be revisited and updated to include first due and second due responsibilities.
e. Ladder company operations and crew splitting need to be evaluated for effectiveness and issues related to crew integrity, safety and supervision.
f. General Orders need to be incorporated into new revisions to procedures.
g. Procedures need to be included for line selection, engine pressure and gallon per minute requirements, water supply, and hose operations.
h. Responsibilities of command officers, first and second due engines and ladder, Squad 52 and other specialized companies need to be outlined in procedures.
i. Crews are advised in current procedures not to operate hose lines into smoke.

<u>Applicable Procedures needing revision</u>:

202.01 - Incident Command
203.01 - Structure Fires
202.01 – Safety (Included in Command Procedures)
302.13 – Ladder Company Operations
703.09 – 1 alarm dispatch
703.15 – Extra Alarms
General Order #24 – Structural Fire Fighting
General Order #28 – Ladder Company Operations
General Order #45 – Change in 1-Alarm Response

20. Incident Command

Incident command procedures related to accountability, safety, mayday, emergency traffic, and rapid assistance teams collectively play an important role in fire fighter safety and were reinforced at this incident. Our current incident command procedures need to be updated to include these revisions:

a. Incident command procedures need evaluation and updating to meet the current operations in the fire department related to accountability, safety, mayday, emergency and rapid assistance teams.
b. Staff officer, sectoring of the fire ground, and incident safety officer and accountability officer issues need to be evaluated and changes in procedures need to be implemented to better manage the incident and provide for improved fire ground safety.

Applicable Procedures needing revision:

202.01 - Incident Command
202.01 – Safety (Included in Command Procedures)

21. Incident Size-Up

Appropriate size-up upon arrival at the incident sets the groundwork for appropriate actions to be taken by the incident commander to ensure proper tactical actions are taken to achieve success at the incident. The incident commander must identify critical factors and make decisions based upon those factors. Procedures need to be implemented into the incident command portion of the fire departments procedures to address these essential factors:

a. Size-up procedures need to be added into the Incident Command procedures. Currently procedures for size up are not included in the procedure.
b. Utilization of similar guidelines that are used in the Cincinnati Fire Department Drill Manual could be re-evaluated and utilized.
c. Appropriate Size-Up procedures will allow for the Incident Commander to better determine incident strategy and crew deployment.
d. Utilization of benchmark reports to assist in tracking of incident scene progress.

<u>Applicable Procedures needing revision</u>:

202.01 - Incident Command
203.01 - Structure Fires

22. Apparatus Standardization

Fire fighters need to know how hose is loaded on every apparatus and where vital equipment is located. Proper hose deployment, especially for new fire fighters and detailed fire fighters from another fire company, depends upon uniformity of hose loads. The following recommendations related to apparatus standardization are crucial:

a. Apparatus need to be standardized to allow for improved effectiveness on the fire ground. Procedures to accomplish this will allow for uniformity, especially for detailed fire fighters and officers.
b. Most importantly, hose loads need to be standardized in layout and length of hose per load.
c. Equipment locations and minimum equipment needed for in-service status.

Applicable Procedures needing revision:

No applicable procedures exist; these need to be created.

Chapter 9

Implementation, Budget Plan and Evaluation of Effectiveness

In order to ensure complete implementation of the recommendations an implementation plan has been created. To ensure the recommendations implemented are truly effective in their intended purpose a formal evaluation needs to occur one year after completion of this report. The recommendations are based on priority.

Immediate Priority

- Procedure revision and training improvements
- Flashover and Fire Behavior Training
- Additional Training Personnel
- PPE Cleaning and Inspection scheduled and completed every 6 months
- District Chief's Aides
- Incident Safety Officer Personnel
- Minimum Company Standard Training Program Development and Implementation
- Company Officer Training Program Development and Implementation
- Command Officer Training Program Development and Implementation
- Driver / Operator Training Program Development and Implementation
- Thermal Imaging Camera for each company (completed)
- 20 foot nylon webbing (rescue strap)
- Locking "D" ring (rescue strap)
- Medical Evaluations

Secondary Priority

- Personal Protective Equipment (Coat and Pants) New Issue w/ name and rank on coat
- PPE Hood New Issue
- Color Coded Helmets
- Accountability System Improvements
- SCBA with integrated PASS alarm
- Computerized Training Database Creation and Implementation
- Standard Operating Procedure Training
- Metal Cutting Dikes
- Folding Spanners
- 4' webbing with loops at each end
- 2 – Orange hand lanterns per company
- Hose Exit Arrows
- Improved shoulder microphones with larger transmit buttons
- Kink Resistant Fire Hose
- Fire Resistant Work Uniforms
- Gallon Per Minute Gauge Installation
- Gated Wye
- SCBA Integrated Communications Systems

IMPLEMENTATION TRACKING

Personnel

____ 12 - District Chief "Aides"
____ 8 – Department Training Personnel
____ 4 -Incident Safety Officer Personnel

Equipment

____ Second set PPE coat and PPE pant for each fire fighter
    ____ Name and Rank on Coat
____ Two new hoods for each fire fighter
____ New color-coded helmet for each fire fighter
____ PPE Maintenance, Cleaning, and Tracking
____ Fire Resistant Work Uniform Shirt
____ Fire Resistant Work Uniform Pants
____ Fire Resistant Work Uniform T-Shirt
____ Fire Resistant Work Uniform Job Shirt
____ 20 foot Nylon Webbing
____ Locking "D" Ring
____ Metal Cutting Dikes
____ Folding Spanner
____ 4' Webbing with loop at each end
____ Hand Lantern Lights (2) per company
____ Shoulder Microphone Transmit Button Upgrades
____ Hose Exit Arrows
____ Gallon Per Minute Gauges
____ Gated Wye
____ Thermal Imaging Cameras
____ Accountability System / Equipment Improvements
____ Kink Resistant Fire Hose – color coded per discharge
____ SCBA Inter-company Communications Equipment
____ SCBA Integrated PASS alarms

Training

____ Minimum Company Standards Training Program Development and Implementation
____ Company Officer Training Program Development and Implementation
____ Command Officer Training Program Development and Implementation
____ Driver / Operator Training Program Development and Implementation
____ Flashover / Fire Behavior Training Program Development and Implementation
____ Rapid Assistance and Fire Fighter Survival Training Program Instruction
____ Training Database Creation and Implementation
____ Standard Operating Procedures Revision and Training

Technology

____ SCBA Integrated Communications
____ Ultrasound Technology
____ Accountability System Improvements

Standard Operating Procedures

____ Crew Integrity
____ Company Officer Supervision and Direction of Fire Fighting Efforts
____ Supervising Inexperienced Fire Fighters
____ Portable Radio Usage and Availability
____ Risk Management
____ Maintenance of fire fighting operations throughout a Mayday
____ Accountability
____ Incident Safety Officer
____ Incident Benchmarks
____ Thermal Imaging Camera
____ Training
____ PPE Maintenance, Testing and Cleaning
____ Riding Position Assignments
____ Accident, Injury, Death, PPE Failure, and "Close-Call" Investigation
____ Standard Operating Procedures Maintenance and Revision
____ Line of Duty Death Procedures
____ Critical Incident Stress Debriefing and Counseling
____ Rapid Assistance Teams
____ Structure Fires: Engine Company Operations, Ladder Company Operations, and Incident Commander Responsibilities.
____ Incident Command
____ Incident Size-Up
____ Apparatus Standardization

Command Improvements

____ Chief Aides or Field Incident Technicians
____ Command Officer Training
____ Improved personnel accountability and tracking
____ Tactical benchmark improvement
____ Command Transfer and Command Presence Reinforcement

Budget Forecast

The following budget forecast includes all anticipated costs to improve the operations within the Cincinnati Fire Department to include

	Recommendation	Report Page	Personnel or Capital	Quantity	Price Each	Total Price
1	District Chief Aides (Capt)	42	Personnel	12	$98,556.91	$1,182,682.92
1	Incident Safety Officers (Capt)	44	Personnel	4	$98,556.91	$394,227.64
1	Training Personnel	45-52	Personnel			
1	Lieutenant			4	$86,644.72	$346,578.88
1	Fire Apparatus Operator			2	$81,510.16	$163,020.32
1	Fire Fighter			2	$76,375.60	$152,751.20
1	Training Supplies, Equipment, and Student Manuals for New Programs	52-54	Capital			$25,000.00
2	Fire Helmets	55	Capital	800	$200.00	$160,000.00
2	Protective Hoods	55	Capital	1600	$40.00	$64,000.00
2	Protective Coat	56	Capital	800	$800.00	$640,000.00
2	Name Identifiers on Coat	56	Capital	800	$50.00	$40,000.00
2	Protective Pants	56-57	Capital	800	$800.00	$640,000.00
1	PPE Maintenance (Civilian)	58	Personnel	1	$60,000.00	$60,000.00
2	NFPA 1975 - Work Uniform Shirt and Pant - 4 per person	59	Capital	3200	$150.00	$480,000.00
2	NFPA 1975 - Work Uniform T-Shirt - 6 per person	59	Capital	4800	$45.00	$216,000.00
1	SCBA Medical Evaluation	60	Capital	800	$440.00	$352,000.00
2	SCBA Intercompany Communications System	60 & 64	Capital	160	$1,000.00	$160,000.00
2	Kink Resistant Hose - Yellow (10 Sections per company - 5 primary, 5 spare)	62	Capital	1020	$352.00	$359,040.00
2	Kink Resistant Hose - Orange (10 Sections per company - 5 primary, 5 spare)	62	Capital	1020	$352.00	$359,040.00
2	Kink Resistant Hose - Red (10 Sections per company - 5 primary, 5 spare)	62	Capital	1020	$352.00	$359,040.00
1	Locking "D" and 20’ webbing	62	Capital	800	$23.00	$18,400.00
2	Metal Cutting Dikes	62	Capital	800	$10.00	$8,000.00
2	Folding Spanner	62	Capital	400	$10.00	$4,000.00
2	4' section of Webbing	63	Capital	800	$5.00	$4,000.00

2	Orange Hand Lanterns - 2 per apparatus (minus 10 new engines and 4 RAT trucks)	63	Capital	60	$100.00	$6,000.00
2	Radio – Shoulder Microphones	63	Capital	25	$100.00	$2,500.00
2	Hose Exit Arrows	64	Capital	510	$14.50	$7,395.00
2	Gallon Per Minute Gauges	65	Capital	272	$675.00	$183,600.00
2	Gated Wye	65	Capital	52	$175.00	$9,100.00

TOTAL $6,782,375.96

Yearly Personnel $2,299,260.96

One Time Equipment $4,483,115.00

Note: Personnel costs included all employer paid benefits, employer pension contribution, certification pay under the negotiated contract price effective June 2004.

Chapter 10

Conclusion

The Cincinnati Fire Department responded to the fire at 1131 Laidlaw Avenue on March 21, 2003, as we have to many fires in the past and continue to respond today. Fire fighters in Cincinnati are trained to be aggressive interior fire fighters. Cincinnati fire fighters will continue to aggressively fight structure fires however that aggressiveness will be reinforced with enhanced training and improved procedures.

To truly learn from the occurrences on March 21, 2003, the Cincinnati Fire Department must move forward in a progressive manner to lessen the likelihood of this type of situation occurring again. In order to move forward we must first step back and look at our current practices as outlined in this report and then make a conscious decision to alter and to improve our operations. Only by aggressive pursuit of these goals will we improve the Cincinnati Fire Department.

Traditionally, the Cincinnati Fire Department, like most of the fire service, doesn't embrace change very well. Several key components of this report will result in major changes in the Cincinnati Fire Department. These changes need to be embraced by <u>every</u> member of the fire department.

The largest and most comprehensive change to face the Cincinnati Fire Department will focus on reinforcement of basic fire fighting skills, fire behavior, and flashover recognition. Training will focus on the tasks and skills to be utilized every day to aggressively and safely combat structural fires. No longer will daily drill training by a company officer be sufficient. Fire fighters need to receive more formalized training in the next several months than they have received most of their career. This training will focus on efficient engine company and ladder company operations. Once those skills are refined, frequent re-evaluation will occur. The training bureau and district chiefs will play a vital role in company level training. This will be accomplished through training on incident command, scene size-up, fire scene operations, risk management, and forecasting and predicting the outcome of an incident, focusing not only on individual assignments, but other companies assignments as well.

Adequate staffing of fire fighters, command, and safety positions are necessary on the incident scene. The incident commander cannot be expected to perform an adequate size-up, determine a strategy, assign tasks, and also track company location and perform safety monitoring of the entire fire ground. The incident commander needs an assistant to initially track fire companies and their locations in a building. This assistant also serves as an additional set of eyes and ears while monitoring the fire ground to ensure fire fighter safety and provide communications support. In late 2003, an incident commander missed a Mayday call when a fire fighter fell through a floor at a structure fire. The incident commander was over saturated with his duties upon initial arrival and missed the call. Command staff responding in an "aide" position will greatly enhance the capability of the incident commander. An incident safety officer who is specifically trained to perform that function is needed to enhance safety. No longer can the idea that every company officer is a safety officer be accepted. Someone needs to be looking at the "big" picture to ensure fire fighter safety.

Company officers must focus on supervision of their company during emergency operations. When a company officer's focus changes from a supervisory role to a position of assisting in the task at hand, the company leader is lost as well as his or her focus on the safety of the fire fighters.

Rapid Assistance Team training and deployment is critical for the future survival of fire fighters. This vital resource needs to continue to be dispatched initially on all one-alarm assignments. As has been proven time and again in Cincinnati and nationally, when fire fighter injury or fatality situations occur, they often occur early in the incident. Rapid Assistance Teams will continue to be proactive in providing access to the structure, opening up windows and doors, and provide secondary means of egress. This training undoubtedly assisted in the timely removal of fire fighter Armstrong.

Each year approximately 100 fire fighters die nationally in the line of duty and another 100,000 are injured. Fire fighting is dangerous and sometimes deadly. However, the loss of a fire fighter cannot be accepted as a "casualty of war". The Cincinnati Fire Department must be proactive and learn from the death of Fire Fighter Armstrong.

Improvements made since March 21, 2003:

1. Obtained funding for deployment of a thermal imaging camera on every fire company and every command officer vehicle. The City of Cincinnati and the Cincinnati Rotary Club made this possible through private funding and donations.
2. The process of personal protective equipment evaluations and RFP's has been started.
3. Limited the total number of sections of 1-3/4" hose allowed to be carried pre-connected on the apparatus. This assists in deployment and more importantly ensures adequate gallon per minute flow. This recommendation will be reinforced in newly developed training.
4. Removed all gated "wye" appliances from pre-connect hose discharges on apparatus to eliminate the possibility of accidental shut-off and flow restriction.
5. Began dispatching a second District Chief, Rapid Assistance Team and Paramedic Rescue Unit on all one-alarm dispatches on the initial alarm assignment.

The heroic actions of those members who entered the structure and removed fire fighter Armstrong, those who kept rescue personnel safe from fire with interior hose lines, the fire fighter that provided immediate CPR, and to those who transported him to the hospital exemplify the dedication fire fighters have to one another. It is now time to focus that dedication into improving the Cincinnati Fire Department to ensure the death of Oscar Armstrong was not in vain.

Chapter 11

Glossary

Ambulance: A basic life support transport unit in the Cincinnati Fire Department

Accountability: Function of tracking personnel on the incident scene.

Aide: A staff aide is defined 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* as a member assigned to a supervisory chief officer who assists at incident scene operations, which can include personnel accountability, communications, and other logistical and administrative support. In addition, this member can assist in coordinating training activities, respond to citizen inquiries, coordinate staffing issues and sick leave follow up, and resource allocations for facilities and apparatus under the supervisory chief officers jurisdiction. Staff aides may be known as field incident technicians, staff assistants, battalion fire fighters, or battalion adjuncts.

CAD: Computer Aided Dispatch Terminal

Captain: Company officer rank within the Cincinnati Fire Department above the rank of Lieutenant and below the rank of District Chief.

Channel 1: Cincinnati Primary Fire Ground Channel

Channel 2: Cincinnati Secondary Fire Ground Channel

Channel 3: Cincinnati Secondary Dispatch Channel

Channel 4: Cincinnati Primary Dispatch Channel

Close Call: Incident where a fire fighter was injured seriously

Command: Term to designate the location and function of the person in charge of the incident operations

CPR: Cardiopulmonary Resuscitation

Defensive: Operations at an incident scene where forces work from a site that is out of the immediate danger area. At a structure fire this is an exterior position.

District Chief: Also (DC) Supervisor within the Cincinnati Fire Department above the rank of Captain and below the rank of Assistant Chief. The primary responsibility of the District Chief in the Cincinnati Fire Department is to manage a fire district and incident command functions.

Engine: A fire company with hose and water whose primary job on a fire is to extinguish the fire.

Fire Apparatus Operator: Also (FAO) The rank in the Cincinnati Fire Department whose primary function is to drive and operate engine and ladder companies.

Fire Fighter: Also (FF) Lowest rank in the Cincinnati Fire Department whose primary responsibility is fire fighting and emergency medical operations.

Fire Environment: The environment where smoke is present or an IDLH atmosphere exists requiring an SCBA.

Flashover: Flashover is the transition between growth and the fully developed fire stages and is not a specific event such as ignition. Generally all the combustible articles in a room become involved in fire simultaneously.

GPM: Gallons Per Minute – measurement of the amount of water flowing through a water discharge device.

Hand Line: A hose line that is designed to discharge water from an engine company.

Hydrant: A device to discharge water from the public water system to an engine company for fire fighting purposes.

Incipient Phase: Beginning phase of a fire when products begin to burn in a fire environment.

Kink: A bending or twisting of the hose which causes water to not discharge appropriately.

Ladder: A device used by fire fighters to access upper portions of a structure.

Lieutenant: The rank in the Cincinnati Fire Department above the rank of fire fighter and below the rank of Captain. This individual usually occupies the position of company officer on a fire apparatus.

NFPA National Fire Protection Agency – agency that promulgates standards for utilization across the country for fire protection and fire fighter safety.

NIOSH	National Institute of Occupational Safety and Health – agency that is a branch of OHSA that studies and makes recommendations on fire fighter injuries and fatalities.
Offensive:	Operations at an incident scene where forces work from a site that is in the immediate danger area. At a structure fire this is an interior position.
Opposing Lines:	Fire lines that are working against each other in a position that places them in direct opposition of each other.
OSHA:	Occupational Safety and Health Administration – federal agency that regulates worker safety.
PAR	Personal Accountability Report – term used to communicate the need for companies to report status of all members assigned to a company or function.
PASS:	Personal Alert Safety System – device utilized to assist in located a disoriented or trapped fire fighter. It automatically activates when a fire fighter becomes motionless.
PPE:	Personal Protective Equipment – equipment designed to protect a fire fighter from thermal injury from fires. Includes helmet, gloves, coat, pants, boots, and protective hood.
RAT:	Rapid Assistance Team – team of fire fighters on a specially trained ladder company in Cincinnati to respond to incident scenes for the purpose of fire fighter safety and rescue.
Rescue:	Removing or assisting someone from a dangerous environment.
SCBA:	Self Contained Breathing Apparatus – device used by fire fighters to supply breathing air in a hostile environment.
Side "ABCD":	Clockwise reference identifier for incident command and communication functions on the fire ground. Side "A" is the front facing the street and then referenced as sides "B", "C" and "D" clockwise around the building.
SMT:	Status Message Terminal – communications device used by the Cincinnati Fire Department to notify dispatch of status such as: "en route", "on scene", "available on radio", "available in quarters", etc.
SOP:	Standard Operating Procedures – written procedures providing a detailed guide to operations in the Cincinnati Fire Department.

TIC: Thermal Imaging Camera – device used by fire fighters to assist in visualizing while in a smoke filled environment

Tool: Equipment such as an axe, pry bar, or other tool used by fire fighters to force entry into a structure or to cut holes for access or ventilation.

Unburned: The area of a structure where damage is not occurring currently and where entry is made to attack the burning side.

Ventilate: To release the products of combustion (smoke, heat, fire, and dangerous gases) from an enclosed structure.

Wye: A water discharge device that allows the splitting of one hose into two hoses.

APPENDIX A

National Institute of Occupational Safety and Health (NIOSH) Final Report

TO BE INSERTED WHEN IT IS DELIVERED TO THE CINCINNATI FIRE DEPARTMENT

Appendix B

National Institute of Occupational Safety and Health (NIOSH) - SCBA Report

This SCBA report is for the Engine 9, FF#2 who was injured at the incident. Engine 9, FF#1 had near total destruction of the SCBA that prohibited this type of testing.

National Personal Protective Technology Laboratory

Respirator Branch

Quality Assurance Section

Status Investigation Report of One Self-Contained Breathing Apparatus Submitted by the Cincinnati Fire Department Cincinnati, Ohio

NIOSH Task No. TN-12892

October 24, 2003

Disclaimer

The purpose of Respirator Status Investigations is to determine the conformance of each respirator to the NIOSH approval requirements found in Title 42, *Code of Federal Regulations,* Part 84 (42 CFR 84). A number of performance tests are selected from the complete list of Part 84 requirements and each respirator is tested in its **"as received"** condition to determine its conformance to those performance requirements. Each respirator is also inspected to determine its conformance to the quality assurance documentation on file at NIOSH.

In order to gain additional information about its overall performance, each respirator may also be subjected to other recognized test parameters, such as National Fire Protection Association (NFPA) consensus standards. While the test results give an indication of the respirator's conformance to the NFPA approval requirements, NIOSH does not actively correlate the test results from its NFPA test equipment with those of certification organizations which list NFPA-compliant products. Thus, the NFPA test results are provided for information purposes only.

Selected tests are conducted only after it has been determined that each respirator is in a condition that is safe to be pressurized, handled, and tested. Respirators whose condition has deteriorated to the point where the health and safety of NIOSH personnel and/or property is at risk will not be tested.

Investigator Information

The SCBA inspection and performance tests were conducted by and this report was written by Vance Kochenderfer, Quality Assurance Specialist, Respirator Branch, National Personal Protective Technology Laboratory, National Institute for Occupational Safety and Health, located in Bruceton, Pennsylvania.

Status Investigation Report of One Self-Contained Breathing Apparatus Submitted By the Cincinnati Fire Department Cincinnati, Ohio

NIOSH Task No. TN-12892

Background

As part of the ***National Institute for Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program,*** the Respirator Branch agreed to examine and evaluate one Mine Safety Appliances 4500 psi, 45-minute, self-contained breathing apparatus (SCBA). The Cincinnati Fire Department reported that the SCBA was last used on March 21, 2003 **(Appendix I).**

This SCBA status investigation was assigned NIOSH Task Number TN-12892. The Cincinnati Fire Department was advised that NIOSH would provide a written report of the inspections and any applicable test results.

The SCBA, sealed in a corrugated cardboard box, was delivered to the NIOSH facility in Bruceton, Pennsylvania on April 24, 2003. Upon arrival, the sealed package was taken to the Firefighter SCBA Evaluation Lab (Building 108) and stored under lock until the time of the evaluation.

SCBA Inspection

The package from the Cincinnati Fire Department was opened and the SCBA inspection was performed on August 28, 2003. The SCBA was inspected by Vance Kochenderfer, Quality Assurance Specialist, of the Respirator Branch, National Personal Protective Technology Laboratory (NPPTL), NIOSH. The SCBA was examined, component by component, in the condition as received to determine its conformance to the NIOSH-approved configuration. The entire inspection process was videotaped. The SCBA was identified as the Mine Safety Appliances (MSA) Custom 4500 MMR model.

The complete SCBA inspection is summarized in **Appendix II.** The condition of each major component was also photographed with a digital camera. Images of the SCBA are contained in **Appendix V.**

The unit overall is very sooty. Parts of the harness have been damaged by exposure to heat. The remote pressure gauge hose also has experienced heat damage. The cylinder was found to be covered with soot, and appears to have been exposed to fire. While some air pressure remained in

the cylinder, it was determined that it was not safe to re-pressurize and a substitute cylinder was used for testing.

SCBA Compressed Air Cylinder Contents

During the inspection, it was noted that the compressed air cylinder was partially pressurized. An air sample was collected from the cylinder and forwarded to an accredited laboratory for analysis. The laboratory, Dräger Lab Services, analyzed the sample in accordance with the standards and methodologies found in the Compressed Gas Association's standard, ANSI/CGA G-7.1, *Commodity Specification for Air.*

The test report, attached as **Appendix III,** indicates that the sample met the standard for Grade D air. The sample also met OSHA's moisture content requirement in 29 CFR 1910.134(i)(4)(iii) as well as the more stringent moisture content guidelines published in NFPA 1500, *Fire Department Safety and Health Program,* 2002 Edition.

SCBA Testing

The purpose of the testing was to determine the SCBA's conformance to the approval performance requirements of Title 42, *Code of Federal Regulations,* Part 84 (42 CFR 84). Further testing was conducted to provide an indication of the SCBA's conformance to the National Fire Protection Association (NFPA) Air Flow Performance requirements of NFPA 1981, *Standard on OpenCircuit Self-Contained Breathing Apparatus for the Fire Service,* 1997 Edition.

The following performance tests were conducted on the SCBA:

NIOSH SCBA Certification Tests (in accordance with the performance requirements of 42 CFR 84):

1. Positive Pressure Test [§ 84.70(a)(2)(ii)]
2. Rated Service Time Test (duration) [§ 84.95] 3. Static Pressure Test [§ 84.91(d)]
4. Gas Flow Test [§ 84.93]
5. Exhalation Resistance Test [§ 84.91(c)]
6. Remaining Service Life Indicator Test (low-air alarm) [§ 84.83(f)]

National Fire Protection Association (NFPA) Tests (in accordance with NFPA 1981, 1997 Edition):

7. Air Flow Performance Test [Chapter 5, 5-1.1]

Testing was conducted on August 29, 2003. All testing was videotaped with the exception of the Exhalation Resistance Test and Static Pressure Test.

The SCBA met the requirements of all tests, except the Positive Pressure Test and the NFPA Air Flow Performance Test. The facepiece pressure dropped below ambient during both tests.

Appendix IV contains the complete NIOSH and NFPA test reports for the SCBA. **Tables One and Two** summarize the NIOSH and NFPA test results.

Summary and Conclusions

An SCBA was submitted to NIOSH by the Cincinnati Fire Department for evaluation. The SCBA was delivered to NIOSH on April 24, 2003 and inspected on August 28, 2003. The unit was identified as an MSA Custom 4500 MMR 45-minute, 4500 psi, SCBA (NIOSH approval number TC-13F-302). The cylinder was judged to be too heavily damaged to be pressurized. The rest of the SCBA was determined to be in a condition safe for testing.

The unit was subjected to a series of seven performance tests. Testing was conducted on August 29, 2003. The unit did not meet the requirements of the Positive Pressure Test and NFPA Air Flow Performance Test. The SCBA successfully completed all other tests. No maintenance or repair work was performed on the unit at any time.

In light of the information obtained during this investigation, the Institute has proposed no further action at this time. Following inspection and testing, the SCBA was returned to the package in which it was received and stored under lock in Building 108 at the NIOSH facility in Bruceton, Pennsylvania, pending return to the Cincinnati Fire Department.

If the SCBA is to be placed back in service, it must be repaired, inspected, and tested by a qualified service technician to bring it back into conformance with NIOSH requirements. The cylinder should be condemned as it appears to have suffered heat damage.

Appendix I

Letter from the Cincinnati Fire Department

Appendix II

SCBA Inspection Report

National Personal Protective Technology Laboratory / Respirator Branch / Quality Assurance Section

Respirator Field Problem
Incoming Inspection Report Summary

Task Number:	TN-12892	**Requestor:**	Cincinnati Fire Department
Date Received:	24 April 2003		
Date Inspected:	28 August 2003	**Description:**	Fatality
Manufacturer:	Mine Safety Appliances	**Inspected by:**	Vance Kochenderfer
Approval Number:	TC-13F-302	**SCBA Type:**	Open Circuit, Pressure-Demand

Components and Observations NOTE: All

references to "right" or "left" are from the user' s perspective. **1. Facepiece (Refer to Figures**

3 through 6 in Appendix V):

The facepiece is an MSA Ultra Elite facepiece assembly which consists of a black rubber facepiece seal, lens, lens frame, and yellow mesh head harness. As received, the air pressure regulator was attached to the facepiece; it is easily removed. There is a nosecup assembly installed in the facepiece. Overall the facepiece appears to be in good to very good condition.

The facepiece lens exterior is very dirty and has a few minor scratches, but no cracks, deformation, or gouges are present. Visibility through the lens is good to fair. The gray lens frame is in very good condition and is tightly fitted to the faceseal. There are no gaps between the frame and the faceseal or between the lens and the faceseal, and the screws securing the two clamp halves appear to be fully tightened. The marking **"610"** is hand-engraved on the left and right sides of the frame.

The facepiece seal is in very good condition. The rubber is pliable and there are no holes or tears evident. At the top center of the seal is molded an MSA logo along with **"Large"** and **"Ultra Elite."** The lower left head harness attachment point is marked **"7-935-6"** and the lower right point **"LG."** Molded into the interior right side of the seal is **"U.S. PAT. 5020193,"** a circular date code indicating the seal was molded in **April 2000,** and **"M1 C1."**

A gray rubber nosecup assembly is installed in the facepiece. It is slightly dislodged from its mounting point inside the facepiece. The nosecup material is in excellent condition. Both inhalation valves are fully seated and in good shape. The text **"ASSY P/N 7-901-1"** is molded into the interior on the right side, and on the left side is a circular-shaped date code indicating that the assembly was manufactured in **November 1999** along with **"C2."**

The yellow mesh head harness is slightly dirty, but has no tears and is in very good condition. The harness straps have retained their elasticity, and the adjustment buckles work smoothly. The mesh fabric and straps are very pliable. The head harness is secured to the facepiece assembly at five attachment points.

The assembly that houses the second-stage regulator port, speech diaphragm, and exhalation valve is dirty but in very good condition. The speech diaphragm is installed and appears undamaged. The regulator easily couples to and releases from the housing. The exhalation valve is in place and appears to be properly seated. There is some surface rust on the horseshoe-shaped metal piece surrounding the regulator attachment point. The clamp securing the housing to the faceseal is undamaged.

2. Mask-Mounted Regulator and Hose (Refer to Figures 7 through 9 in Appendix V):

The exterior of the mask-mounted regulator assembly shows signs of use and is overall in good condition. The four screws holding the regulator body together appear to be fully tightened. The right side of the regulator is marked **"812857"** and **"HP226011."**

The two latching mechanisms which secure the regulator to the facepiece function properly. However, some corners of the plastic near where the latches are gripped have been damaged. The donning switch was found to be engaged, and it appears to operate normally. A segment of the plastic ring protecting the donning switch is broken off. The bypass valve operator was found to be fully closed, and operates smoothly. The red rubber cover of the bypass is dirty and has a few cuts, but it is not heavily damaged.

A hose runs from the regulator through the left shoulder strap to the pressure reducer. The rubber jacket of the hose is worn, but has no cuts and remains flexible. There is a swivel connection which attaches the hose to the regulator. It is undamaged and operates freely. The connection at the pressure reducer is secure and also swivels freely.

3. Air Pressure Reducer (Refer to Figure 10 in Appendix V):

The air pressure reducer is very dirty, but does not appear to be damaged. The reducer housing is securely fastened to the backframe. The back side of the housing is marked **"ZP213017"** and **"483885."** Also stamped into the housing is the letter **"Y"** inside a circle.

4. Remote Air Pressure Gauge (Refer to Figures 11 and 12 in Appendix V):

This SCBA is equipped with a remote cylinder air pressure gauge. The gauge lens is very dirty and visibility of the gauge face is poor. The gauge currently reads empty. The rubber boot protecting the gauge is slightly dislodged. The text **"SP 0398"** is marked on the back of the gauge. The gauge is connected to a tee with a high-pressure male quick-fill fitting marked **"Aeroquip FD17-1002-10-04."** A rubber dust cap protects the fitting.

The gauge hose runs through the left shoulder strap and is securely fastened to the pressure reducer. A black fabric outer braid covers the hose. There is some charring of the cover near the top of the backframe.

5. <u>High Pressure Hose, Audi-larm Assembly and Cylinder Coupling Nut</u> (Refer to Figures 13 and 14 in Appendix V):

The high pressure hose which leads from the compressed air cylinder to the air pressure reducer is covered with an unmarked black braided fabric jacket. The hose is flexible and the jacket is somewhat worn. The hose assembly is securely fastened to the reducer and is free to swivel.

The Audi-larm housing is scratched and sooty, but not seriously damaged. There is some dirt trapped around the alarm adjustment plug. A label on the housing is printed with the MSA logo and the partially-legible number ª **492?82**.º The opposite side of the housing is marked with the letter ª **C**º and ª **P201041**.º The bell gong is securely fastened to the housing and emits a clear tone when struck. The cylinder coupling nut is tightly connected to the cylinder and can be easily removed. The internal threads of the nut are clean and undamaged. The internal sealing nipple and o-ring are slightly dirty, but otherwise appear normal.

6. <u>Carrier and Harness Assembly</u> (Refer to Figures 15 through 18 in Appendix V):

The carrier is made of formed black sheet metal and is overall in fair to good condition. A thin metal cylinder retention band runs across the frame, and the tightening mechanism works properly. The back of the carrier is very sooty. A flat round disc is attached to the left side which reads ª **CARRIER & HARNESS 814371**º—near this disc, ª **03 P**º is stamped into the carrier. The inside of the right side of the carrier is heavily scraped, but this does not appear to have weakened the carrier. A NIOSH approval label is affixed to the back of the carrier; soot makes it difficult to read, but it can be determined that the SCBA was manufactured under approval number **TC-13F-302.** The front of the carrier is somewhat scratched and worn. There is a label on the front of the carrier at the bottom which is heavily defaced and almost totally illegible. It indicates that the SCBA complies with the requirements of **NFPA 1981, 1992 Edition.** The designation ª **ENG 9 3**º is hand-engraved on the outer right side of the carrier near the top.

The harness consists of two padded shoulder straps, a sternum strap which goes across the chest, and a waistbelt. The left shoulder strap is securely fastened to the carrier at the top. The upper portion of the fabric covering the padding is discolored, likely as a result of exposure to excessive heat. Though somewhat worn, the fabric and webbing portions of the strap have maintained their integrity. The adjustment buckle works smoothly and the adjustment strap is securely fastened to the waistbelt at the bottom.

The right shoulder strap is securely fastened to the carrier at the top. The fabric has been

charred and damaged, exposing the padding in the upper portion of the strap. There is discoloration of the fabric on the edges of the shoulder pad. The webbing portions of the strap are dirty and somewhat worn, but have no cuts or tears. The adjustment buckle works smoothly. There is one full twist in the adjustment strap, and it is securely fastened to the waistbelt at the bottom.

The waistbelt consists of a wide material which wraps around the hips of the wearer with narrower straps extending to the buckle. The waistbelt is securely fastened to the carrier. The webbing is somewhat dirty worn, and the edges of the narrow webbing are discolored in places, but there are no cuts or tears evident. A regulator storage point is located on the right side of the narrow webbing. It is undamaged and marked with the number **"812837."** Also attached to the right side is the male half of the buckle; it smoothly adjusts on the webbing. The female half of the buckle is attached to the left side of the webbing, and the two halves couple and release easily.

7. <u>Compressed Air Cylinder</u> (Refer to Figures 19 through 26 in Appendix V):

The cylinder is a fully-wound composite type. Much of the exterior is black with soot. There are a number of scratches on the exterior consistent with normal wear, but in one spot the epoxy layer has been worn away exposing the reinforcing fibers. The cylinder is rated for a pressure of **4500 psi** and was manufactured by **EFIC** under Department of Transportation (DOT) exemption **E 10147.** The DOT label indicates that the cylinder is EFIC part number **"7013-001-01,"** MSA model number **"7-1348-1,"** serial number **"MC 139967,"** and was manufactured in **July 1996.** Three hydrostatic retest labels are affixed to the cylinder. One of these is completely illegible, another indicates the cylinder was tested in **August 1998** but the retester number is illegible, and the third indicates the cylinder was tested in **December 2001** by the retester holding the identification number **A783.** The number **"14"** is handwritten in marker near the neck.

The cylinder valve handwheel is fully closed and operates smoothly. When opened, the cylinder was found to still contain some pressure. The pressure gauge lens is melted and charred, and the gauge is not visible. The rubber end bumper and gauge guard is slightly charred. A burst disc assembly is installed in the valve. Some of the anodizing is worn from the cylinder outlet threads, but they are not damaged or deformed.

Appendix III

Air Analysis Results

Lab Services-ITR 2121
S. Imboden Drive Suite
#1310
Decatur, IL 62521

Technology for life Dräger

Zephyr-Air™ Test Report

Sample Report for Breathing Air Analysis

Sample Information: NIOSH/NPPTL –Ref. TN-12892

Customer Name:	**Mr. Vance Kochenderfer**	**Sample Collection Date:**	**08/28/2003**
Customer ID#	**7001**	**Sample Analysis Date:**	**09/05/2003**
Standard Type	**ANSI/CGA 7.1-1997**	**Standard Grade**	**D**
Gas Sample ID#	**2002355**	**Gas Sample Container #**	**01017**
Part. Sample ID#	**2002355**	**Part. Sample Container #**	**00720**

Analytes	**O_2 %**	**CO** (ppm)	**CO^2** (ppm)	**Ar %**	**CH^4** (ppm)	**Odor**	**Oil mist** (mg/m^3)	**Moisture** (dewpoint °F)*	**Result**
Sample Analysis	**20.6**	**<1.0**	**530**	**0.7**	**2.2**	**None**	**<0.1**	**-65.0**	**PASS**

***SCBA Only**

Summary:

This breathing air sample supplied by the above named customer was analyzed by Lab Services-ITR, using gas chromatography, calorimetric and gravimetric analysis in accordance with the standards and methodologies found in ANSI/CGA 7.1, "Commodity Specification for Air." No other representations or warranties are expressed or implied other than the analysis results shown above.

Performed by: _____
Lab Technician

Reviewed by: _____
Director-Chemistry & QC or (delegate)

NOTE This sample which contained an air/gas substance was tested ONLY against a specific air standard, and may contain undetected items which are beyond the purpose and scope of this analysis. More extensive reporting can be conducting upon request. This does not guarantee the condition or the safe application of the analyzed air/gas substance. Results reported relate only to the items tested above. This report shall not be reproduced except in full, without the expressed written consent of Lab ServicesITR.

DrägerService

217-428-7551 Phone
217-428-1005 Fax

Appendix IV

SCBA Test Results

National Personal Protective Technology Laboratory / Respirator Branch / Quality Assurance Section

SCBA Test Report

Task Number: TN-12892

Manufacturer: Mine Safety Appliances

NIOSH Approval Number: TC-13F-302

Tests Performed by: Vance Kochenderfer

Date of Report: October 24, 2003

I. Background

On April 24, 2003, a package from the Cincinnati Fire Department was delivered to NIOSH. The package was taken to the Firefighter Self-Contained Breathing Apparatus (SCBA) Evaluation Lab in Building 108 for secured storage. The SCBA was removed from its box and inspected on August 28, 2003. The SCBA inspection process was videotaped. It was determined that the SCBA was manufactured by Mine Safety Appliances under NIOSH Approval Number TC-13F-302. Except for the cylinder, the unit was found to be in a condition to be safely pressurized and tested. A cylinder of the same capacity was substituted where needed. A series of performance tests was conducted on August 29, 2003. All performance tests, with the exception of the Exhalation Resistance Test and Static Pressure Test, were also videotaped. The Positive Pressure Test and Rated Service Time Test are conducted simultaneously.

II. Test Outlines

A. POSITIVE PRESSURE TEST – NIOSH Test Procedure No. 120 42 CFR Part 84 Reference: Subpart H, § 84.70 (a)(2)(ii)

Requirement:

The pressure inside the facepiece in relation to the immediate environment is positive during both inhalation and exhalation.

Procedure:

A breathing machine with a 622 kg.-m./min. cam operating at 24 RPM with a 40 liters per minute flow rate (115 liters per minute peak flow) is connected to an anthropometric head for cycling. A pressure tap in the head is connected to a transducer which in turn is connected to a strip chart recorder for determining the pressure in the facepiece.

Results – Tested on August 29, 2003, using a substitute air cylinder.

The inhalation portion of the breathing curve dropped below ambient during the rated service time test. The SCBA **did not** meet the test requirement.

B. RATED | Inhalation Breathing Resistance: **-0.05** INWC | **SERVICE TIME**

TEST – NIOSH Test Procedure No. 121

42 CFR Part 84 Reference: Subpart F, § 84.53 (a) and Subpart H, §§ 84.95 (a) and (b)

Requirement:

Service time will be measured while the apparatus is operated by a breathing machine as described in § 84.88. The open-circuit apparatus will be classified according to the length of time it supplies air or oxygen to the breathing machine. Classifications are listed in § 84.53.

Procedure:

A breathing machine with a 622 kg.-m./min. cam operating at 24 RPM with a 40 liters per minute flow rate is connected to an anthropometric head for cycling. A pressure tap in the head is connected to a transducer which in turn is connected to a strip chart recorder for determining the pressure in the facepiece. The breathing machine is run until the inhalation portion of the breathing curve falls below the minimum requirement.

Results – Tested on August 29, 2003, using a substitute air cylinder.

The measured service time (adjusted to correspond with the recorded breathing cycles) was greater than the rated service time of 45 minutes. The SCBA met the test requirement.

C. STATIC PRESSURE TEST – NIOSH Test Procedure No. 122 42 CFR Part 84 Reference:

Subpart H, § 84.91 (d)

Measured Service Time: **49** Minutes **40** Seconds

Requirement:

The static pressure (at zero flow) in the facepiece shall not exceed 38 mm. (1.5 inches) water-column height.

Procedure:

The facepiece is fitted to an anthropometric head for testing. A pressure tap in the head is connected to a calibrated manometer. Full cylinder pressure is applied to the unit at zero flow and a reading from the manometer is recorded.

Results – Tested on August 29, 2003, using a substitute air cylinder. The unit met the

NIOSH requirement for static facepiece pressure.

Facepiece Static Pressure:	**0.85**	INWC

D. GAS FLOW TEST – NIOSH Test Procedure No. 123

42 CFR Part 84 Reference: Subpart H, §§ 84.93 (b) and (c)

Requirement:

The flow from the apparatus shall be greater than 200 liters per minute when the pressure in the facepiece of demand apparatus is lowered by 51 mm. (2 inches) water column height when full container pressure is applied. Where pressure demand apparatus are tested, the flow will be measured at zero gage pressure in the facepiece.

Procedure:

A pressure tap in the anthropometric head is connected to a manometer for determining when the pressure inside the facepiece is at zero. A mass flow meter is connected in line between the anthropometric head and an adjustable vacuum source to measure flow. The SCBA cylinder is replaced by a test stand which is adjusted initially to full cylinder pressure. The vacuum source is adjusted during the test to maintain the desired pressure inside the facepiece. Once the proper facepiece pressure has stabilized, a flow reading is recorded. The procedure is then repeated with the test stand adjusted to 500 psig.

Results – Tested on August 29, 2003, with SCBA in as-received condition. The unit achieved the

required flow rate at both test points.

Applied pressure	Flow
4500 psig	**212** liters per minute
500 psig	**201** liters per minute

E. EXHALATION RESISTANCE TEST – NIOSH Test Procedure No. 122 42 CFR Part 84 Reference:

Subpart H, § 84.91 (c)

Requirement:

The exhalation resistance of pressure-demand apparatus shall not exceed the static pressure in the facepiece by more than 51 mm. (2 inches) water-column height.

Procedure:

The facepiece is mounted on an anthropometric head form. A probe in the head form is connected to a slant manometer for measuring exhalation breathing resistance. The air flow through the apparatus is adjusted to a rate of 85 liters per minute and the exhalation resistance is recorded.

Results – Tested on August 29, 2003, using a substitute air cylinder.

The difference between the exhalation breathing resistance and static pressure for the SCBA fell within the NIOSH required range.

Exhalation Breathing Resistance:	**1.90** INWC
Static Pressure:	**0.85** INWC
Difference:	**1.05** INWC

F. REMAINING SERVICE LIFE INDICATOR TEST – NIOSH Test Procedure No. 124 42 CFR Part 84 Reference:
Subpart H, § 84.83 (f) and Subpart G, § 84.63 (c)

Requirement:

Each remaining service life indicator or warning device shall give an alarm when the remaining service life of the apparatus is reduced within a range of 20 to 25 percent of its rated service time or pressure.

This requirement is modified under § 84.63(c) as follows: *For apparatus which do not have a method of manually turning off remote gage in the event of a gage or gage line failure the remaining service life indicator is required to be set at 25% ± 2% of the rated service time or pressure.*

Procedure:

A calibrated gauge is connected in line between the air supply and the first-stage regulator. The unit is then allowed to gradually bleed down. When the low-air alarm is activated, the pressure on the gauge is recorded. This procedure is repeated six times. The average of the six readings is calculated and recorded.

Results ± Tested on August 29, 2003, with SCBA in as-received condition. As this unit does not have a remote gauge shutoff, the test requirement is 25% ± 2%.

The alarm activated within the required range (between 1035 and 1215 psig).

Test #	Alarm Point (psig)
1.	1090
2.	1075
3.	1090
4.	1070
5.	1065
6.	1070
Avg.	**1077**

G. NFPA AIR FLOW PERFORMANCE TEST

NFPA 1981 (1997 Edition) Reference: Chapter 5, Performance Requirements, Sec. 5-1.1

Requirement:

SCBA shall be tested for air flow performance as specified in Section 6-1, Air Flow Performance Test, and the SCBA facepiece pressure shall not be less than 0.0 INWC nor greater than 3.5 INWC above ambient pressure from the time the test begins until the time the test is concluded.

Procedure:

A model 327-6 breathing machine as specified in Paragraph 6-1.12 operating at 30 ± 1 RPM with a 103 ± 3 liters per minute flow rate is connected to an anthropometric head for cycling. A pressure tap in the head is connected to a transducer which in turn is connected to a flatbed chart recorder for determining the pressure in the facepiece.

Results ± Tested on August 29, 2003, using a substitute air cylinder.

The facepiece pressure dropped below 0.0 INWC during the test. The SCBA **did not** meet the NFPA test requirements.

Maximum Facepiece Pressure: **2.95** INWC
Minimum Facepiece Pressure: **-0.20** INWC

III. Disposition:

Following testing, the SCBA was returned to the package in which it was shipped to NIOSH. It was secured in Building 108 of the NIOSH facility in Bruceton, Pennsylvania pending return to the Cincinnati Fire Department.

The results of all tests are summarized in Tables One and Two which follow.

TABLE ONE – Summary of NIOSH Test Results Task Number: TN-12892

Manufacturer: Mine Safety Appliances TC-

NIOSH Approval Number: 13F-302 Vance Kochenderfer

Tests Performed By: August 29, 2003

Date of Tests:

TEST / 42 CFR PART 84 REFERENCE	STANDARD	RESULT	PASS	FAIL
A. POSITIVE PRESSURE TEST **Reference:** Subpart H, § 84.70 (a)(2)(ii)	> 0.00 INWC	-0.05 INWC		**X**
B. RATED SERVICE TIME TEST **Reference:** Subpart F, § 84.53 (a), Subpart H, § 84.95 (a) and (b)	~ 45 min.	49 min, 40 s	**X**	
C. STATIC PRESSURE TEST **Reference:** Subpart H, § 84.91 (d)	~ 1.50 INWC	0.85 INWC	**X**	
D. GAS FLOW TEST (at Full Cylinder Pressure) **Reference:** Subpart H, § 84.93 (b) and (c)	~ 200 lpm	212 lpm	**X**	
D. GAS FLOW TEST (at 500 psig) **Reference:** Subpart H, § 84.93 (b) and (c)	~ 200 lpm	201 lpm	**X**	
E. EXHALATION RESISTANCE TEST **Reference:** Subpart H, § 84.91 (c)	Difference ~ 2.00 INWC	1.05 INWC	**X**	
F. REMAINING SERVICE LIFE INDICATOR TEST **Reference:** Subpart H, § 84.83 (f) and Subpart G, § 84.63 (c)	Between 1035 and 1215 psig	1077 psig	**X**	

NOTE: The Positive Pressure Test and Rated Service Life Test are run simultaneously. TABLE TWO – Summary of NFPA Test Results

TEST / REFERENCE	STANDARD	RESULT	PASS	FAIL
G. NFPA AIR FLOW PERFORMANCE **Reference:** NFPA 1981 (1997 Edition), Section 5-1.1	~ 3.50 INWC Exhalation Resistance	2.95 INWC	**X**	

G. NFPA AIR FLOW PERFORMANCE **Reference:** NFPA 1981 (1997 Edition), Section 5-1.1	~ 0.00 INWC Inhalation Resistance	-0.20 INWC		**X**

Appendix V

Images

National Institute for Occupational Safety and Health

National Personal Protective Technology Laboratory / Respirator Branch / Quality Assurance Section

IMAGES

One Self-Contained Breathing Apparatus
Submitted by the Cincinnati Fire Department
Cincinnati, Ohio

NIOSH Task No. TN-12892

List of Figures:

Figure 1: Package as Received from the Cincinnati Fire Department
Figure 2: SCBA Ready for Inspection
Figure 3: Facepiece
Figure 4: Visibility through Facepiece Lens
Figure 5: Interior View of Nosecup
Figure 6: Facepiece Regulator Attachment Point
Figure 7: Mask-Mounted Regulator
Figure 8: Side View of Regulator
Figure 9: Side View of Regulator
Figure 10: Pressure Reducer
Figure 11: Remote Air Pressure Gauge
Figure 12: Charring of Gauge Hose Jacket
Figure13: Audi-larm Bell and Housing
Figure 14: Audi-larm Bell and Cylinder Coupling Nut
Figure 15: Damage to Carrier
Figure 16: NIOSH Approval Label
Figure 17: NFPA Certification Label
Figure 18: Right Shoulder Strap
Figure 19: Cylinder
Figure 20: Cylinder
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Figure 22: Cylinder Retest Label
Figure 23: Cylinder Retest Label
Figure 24: Cylinder Retest Label
Figure 25: Damage to Cylinder Composite Layer

Figure 26: Cylinder Valve

Figure 1 – Package as Received from the Cincinnati Fire Department

Figure 2 – SCBA Ready for Inspection

Cincinnati Fire Department – Images – Page 2

Figure 3 - Facepiece

Figure 4 – Visibility through Facepiece Lens

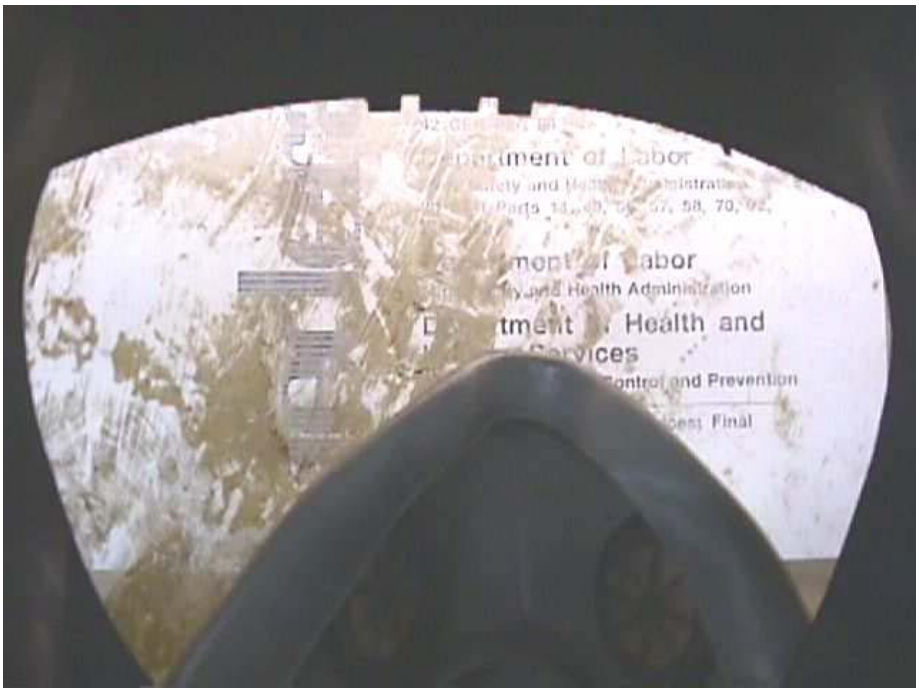


Figure 5 – Interior View of Nosecup

Figure 6 – Facepiece Regulator Attachment Point

Figure 7 – Mask Mounted Regulator

Figure 8 – Side View of Regulator

Figure 9 – Side view of Regulator

Figure 10 – Pressure regulator

Figure 11 – Remote Air Pressure Gauge

Figure 12 – Charring of Gauge Hose Jacket

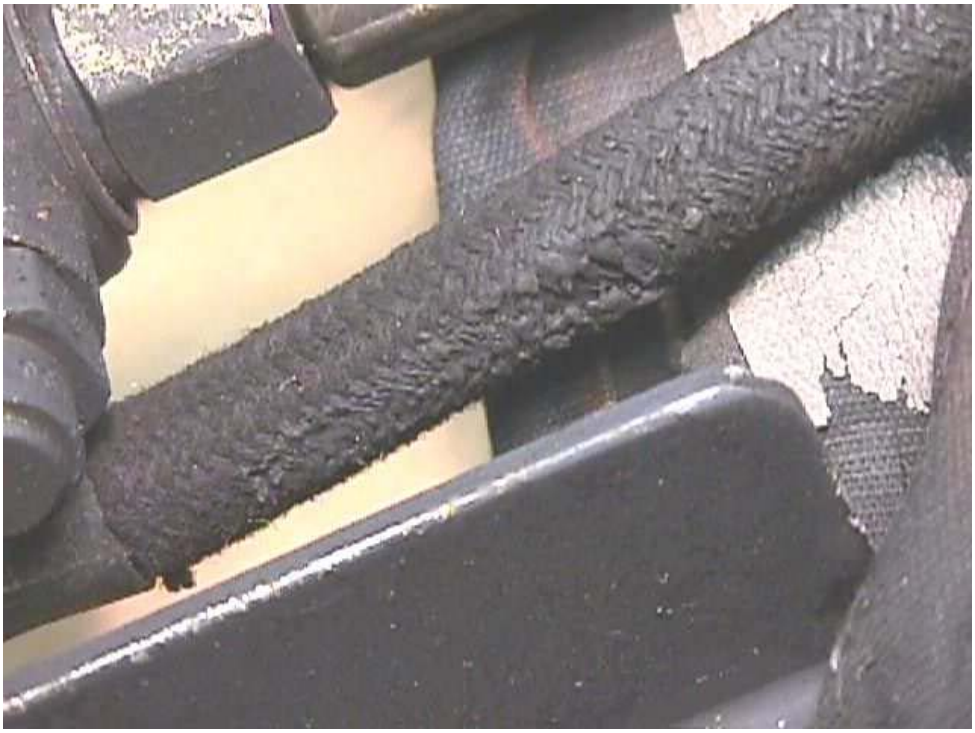


Figure 13 – Audi-larm Bell and Housing

Figure 14 – Audi-larm Bell and Cylinder Coupling Nut

Figure 15 – Damage to Carrier

Figure 16 – NIOSH Approval Label

Figure 17 – NFPA Certification Label

Figure 18 – Right Shoulder Strap

Figure 19 – Cylinder

Figure 20 – Cylinder

Figure 21 – Cylinder DOT Label

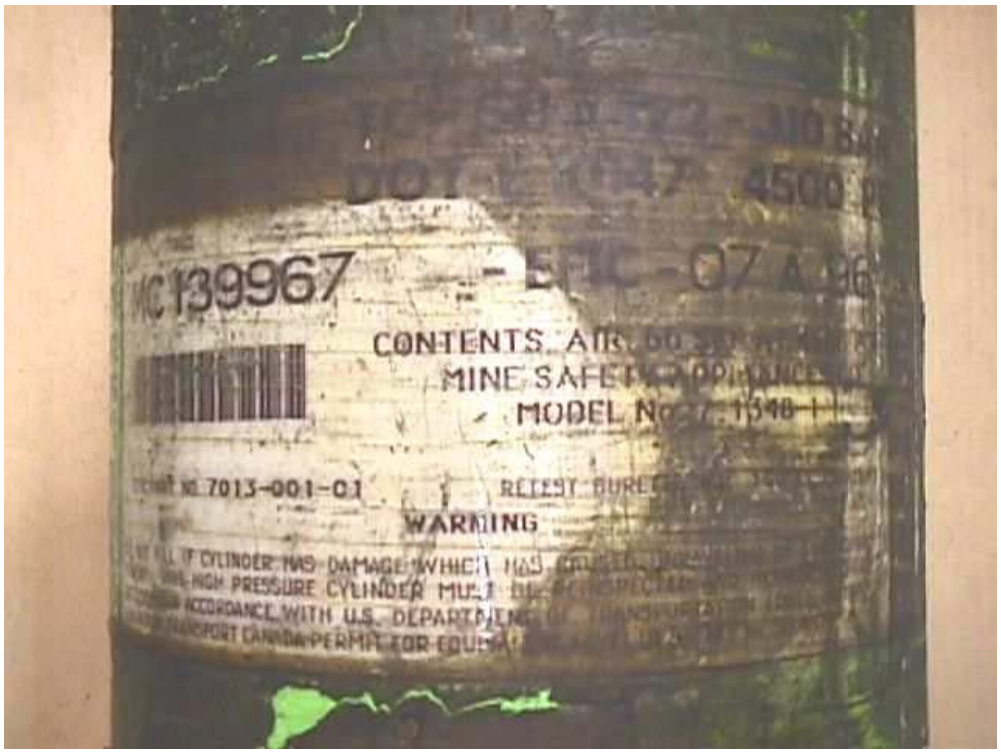


Figure 22 – Cylinder Retest Label

Figure 23 – Cylinder Retest Label

Figure 24 – Cylinder Retest Label

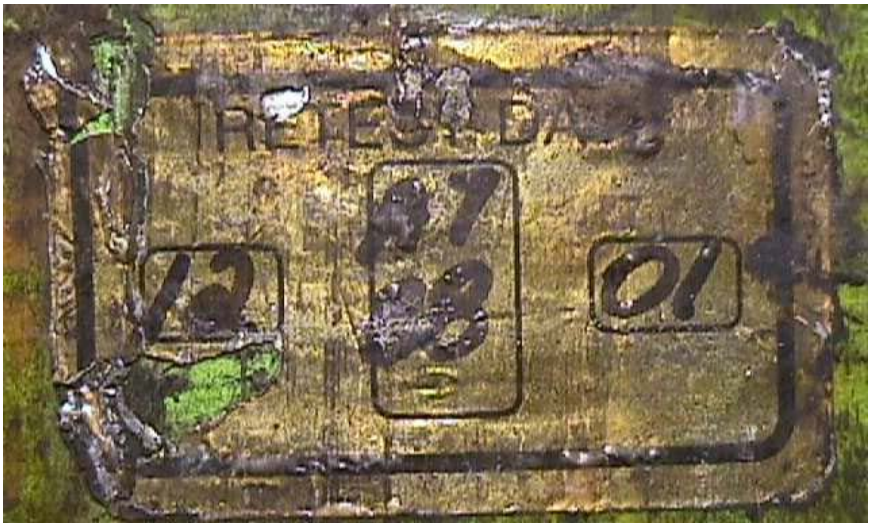


Figure 25 – Damage to Cylinder Composite Layer

Figure 26 – Cylinder Valve

Appendix C

City of Cincinnati Proposal for NFPA 1710 implementation from Safety Director Baker to City Manager Shirey

Interdepartment
Correspondence

City of Cincinnati

Date: August 20, 2001

To: John Shirey, City Manager

From: S. Gregory Baker, Acting Safety Director

Copy To: Tim Riordan, Director of Finance

Subject: NFPA Proposed Standard 1710

There is not a huge contrast in the Cincinnati Fire Division's current operating measures and the National Fire Protection Association 1710 (NFPA 1710), **Standard for the Organization and Deployment of Fire Suppression, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.** However, the Cincinnati Fire Division does not have the resources to meet a very narrow interpretation of the requirements of NFPA 1710. While the Fire Division very closely approximates the preferred outcomes of certain sections of the standard, the Fire Division would need additional resources to achieve compliance, in the strictest sense, with all the sections of the standard. The most challenging issues regard the sections that concentrate on response time objectives, staffing considerations, and, to a lesser degree, training.

Response Time Objectives

In regards to meeting the 90 % benchmark for response times to fire suppression incidents and medical emergencies, our analysis shows that the Fire Division performance is as follows:

First engine on the scene within four minutes (structure fires)..... 89%
Full first alarm complement on the scene within eight minutes.....92%
First ALS on the scene within eight minutes.....82%
First BLS unit on the scene within four minutes.....86%

It is highly probable that the application of additional resources to improve response times would not make a substantial difference in the saving of lives and property. There are no empirical data or scientific studies to indicate otherwise.

Under the NFPA 1710, the Fire Division's average fire station turnout time exceeds the 60 seconds benchmark and, therefore the Fire Division fails to comply, under any interpretation of the standard. The Fire Division's station turnout time average is about 95 seconds for fire and 97 seconds for emergency medical incidents. Fire station turnout time is the time beginning when units acknowledge notification or receipt of the alarm to the beginning point of response time. The Fire Division has been informed that its station turnout time is in line with the experience of the majority of fire departments around the country. There is a strong possibility that the turnout time requirement will be increased to the national experience before NFPA 1710 is finalized. It is important to note that station turnout time has not had a devastating effect on the Fire Division's ability to assemble full first alarm complements within compliance with NFPA 1710.

Staffing Considerations

Under a worst-scenario, the Fire Division would need to substantially increase the staffing of the Fire Division. This would be the direct result of needing additional daily staffing to meet the staffing requirements for engine and ladder

companies responding to high hazard occupancies under NFPA 1710-section 3.1.2.1. That section of the standard defines high hazard occupancies as structures with high hazard materials, processes, or contents. It goes on to include high-risk residential occupancies, neighborhoods with structures in close proximity to one another, special medical occupancies, and high-rise occupancies. Such a broad definition fits numerous occupancies that the Fire Division responds to on a daily basis. Using the NFPA definition, one would conclude that every engine and ladder company responds to high hazard occupancies. Strict compliance with this section could add as many as 40 extra firefighters per day to The Fire Division's current staffing scheme. Using a staffing factor of 3.6813, the number of new FTEs would be 147 and that would add $7,284,736 to the Fire Division's budget. This cost would escalate, on an annual basis, due to inflationary factors and the increase in the new employees' accumulated benefits.

Within NFPA 1710, there is a requirement that supervisory chief officers (i.e., District Fire Chiefs) shall have staff aides available to them for the purposes of incident management and accountability at emergency incidents. That is the equivalent of four extra firefighters per pay, which equates to about 12 FTEs, at Fire Lieutenant's pay grade, to cover the additional positions. That would eventually add an additional $694,142 dollars of new annual costs to the Fire Division's budget.

Also, there is a requirement to produce annual reports and a quadrennial report that explains the predictable consequences of any response and deployment deficiencies to incidents. Additionally, there is a requirement to develop a plan to achieve compliance. These reports and plans would be public documents for the use of public officials, labor representatives and private citizens to assess the Fire Division's efficiency, effectiveness, and compliance with NFPA 1710. This reporting requirement would give rise to the need to an additional staff person to handle all the details surrounding this issue. That would mean additional FTE at a cost of $57,845 per year.

Training

The special operations portion of NFPA 1710 underscores the need to certify the skills, training and proficiency levels of specialized units. The Fire Division has two such units, the Hazardous Devices Unit, commonly known as the bomb unit, and the Hazardous Materials Unit. It is estimated that it would cost the Fire Division an additional $30,000 per year to be in strict compliance with that section of the standard.

Recommendations

The Fire Division recommends that resources required for compliance with NFPA 1710 are applied in the following manner:

1. Convert an additional company (Engine Company 49) to a paramedic engine company and convert all current BLS transportation units to ALS transportation units. These steps will reduce ALS response times. This will call for additional personnel training as paramedics. Accordingly, there will be increased costs for initial training, certification pay, continuing education, and equipment.
2. Provide 12 FTEs to act as aides to the District Fire Chiefs to improve incident management, personnel safety, and accountability.
3. Provide one FTE to manage the compliance and reporting issues associated with NFPA 1710.
4. Provide the level of training and certification for specialized units as discussed in NFPA 1710.

The total costs would be around $1,000,000.

Summary

Notwithstanding the training costs for additional recruit classes, the cost to be in strict compliance with NFPA 1710 would add 160 FTEs and at least $8,066,723 to the expenses of the Fire Division.

We are all aware of the fact that the NFPA only promulgates consensus standards. The intended outcome of such standards is to solicit and secure voluntary compliance. However, as all public officials are aware, those consensus standards quickly become the industry standard of care when litigation occurs. Thus, compliance is the only prudent thing to do.

The Fire Division's interpretation of the standard would allow the City of Cincinnati to avoid the increased costs and still be in compliance with the standard. Such an interpretation of NFPA 1710 provides the citizens with prompt response to deal with their personal emergencies. It also provides the firefighters with a safe working environment and the City with a defensible position in case of litigation.

SGB/RW/glr

Appendix D

Cincinnati Fire Department – Preliminary Line of Duty Death Report – May 22, 2003

CINCINNATI FIRE DEPARTMENT
LAIDLAW INVESTIGATIVE COMMITTEE
PRELIMINARY REPORT

May 22, 2003

The following report is a product of the Laidlaw Investigative Committee. The Committee was formed to ensure that all factors leading to the death of firefighter Oscar Armstrong III would be fully investigated and appropriate actions taken to lesson the chance of similar occurrence. The data contained in this report has been compiled through interviews conducted in conjunction with the National Institute of Occupational Safety and Health (NIOSH) on April 15th and 16th, 2003, as well as investigative efforts of committee members. The contents of this report are the facts of the event as agreed upon by all members of the Team. This report is the preliminary report and is only concerned with the timeline of events of the fire at 1131 Laidlaw Ave on March 21, 2003.

A second more comprehensive report will generated by various subcommittees within the investigation committee. These sub-committees will be open to all Cincinnati Fire Department members for their input and contribution. This comprehensive report will examine all standard operating procedures, training and experience levels of personnel, equipment and technology and many other factors that may be relevant to the Death of Fire Fighter Oscar Armstrong III and the injuries sustained by the other fire fighters. This report will also address the factors to possibly prevent the death or injury to fire fighters in the future. The investigation committee anticipates the comprehensive report may take a year to complete.

Respectfully Submitted,

The Laidlaw Investigative Committee

Committee Chair

Asst. Chief Chris Corbett CFD/Fire Prevention Bureau

Committee Coordinator

District Chief Tom Lakamp CFD/Training Bureau

Committee Members

F.A.O. Robert Anderson	CFD/Engine 5
Julie Bissinger	Office of the City Solicitor
F.F. Joseph Cassetta	CFD/Ladder 29
Lt. Mike Cayse	CFD/Training Bureau
D.C. Glenn Coleman	CFD/District 3
Pat Cook	City Risk Management
F.A.O. George Dreiling	CFD/Engine 34
Mike Gunn	Safety Specialist
D.C. Will Jones	CFD/Operations Bureau
F.F. Michael Kirby	CFD/Engine 35
Capt. John Klosterman	CFD/Ladder 19
Lt. Grant Light	CFD/Training Bureau
Lt. Kevin McMullen	CFD/Training Bureau
D.C. Howard Reed	CFD/District 1
Capt. Dan Rottmueller	CFD/Fire Investigative Unit
D.C. Ronald Texter	CFD/Health and Safety
Lt. Dan Wolf	CFD/Fire Investigative Unit
Capt. Michael Zimmerman	CFD/Training Bureau

SUBJECT:	MULTIPLE ALARM FIRE 1131 Laidlaw - March 21, 2003	
BOX ALARM	2553	
1st ALARM 0845 hours	Engine Companies: Ladder Companies District	2 & 9 2 & 32 3
CONFIRMED FIRE 0847 hours	RAT Rescue District	20 38 4
2nd ALARM 0853 hours	Engine Companies Ladder Company Squad Company MAC Rescue	32 & 38 19 52 1 2
3rd ALARM 0902 hours	Engine Companies Ladder Company All Command Staff	17 & 23 23
STRUCTURE	25 X 33 2 Story brick and frame, Cape Cod style. Approximately 825 square feet per floor.	
OCCUPANCY	Single-family residence.	
DISCOVERY OF FIRE	911 Call from resident.	
DEATHS AND INJURIES	1 Firefighter fatality. 2 Firefighters injured.	
EXPOSURES EXTERNAL	None.	
FIRE CONDITIONS ON ARRIVAL	Heavy fire showing from the first floor, southeast (B/C) corner of the structure with heavy smoke showing throughout.	

INITIAL ACTIONS

District 4 (District Chief) *:

District-4 was first to arrive on the scene at 0848. District-4 parked on the west side of Corinth at Laidlaw and established Laidlaw command. District-4 then performed a 360-degree size up of the building in a clockwise manner and reported "heavy fire in the first floor rear of a single family dwelling". (Note: District 3 was initially dispatched on this run, however, District 4 was training with Engine 2 at the time of alarm and placed himself on the run as he was closer.)

Engine 9:

Engine 9 arrived on the scene about one minute after District-4 and went into front suction on the hydrant at 1228 Laidlaw just west of the fire building. Engine 9's officer (*OIC) and his firefighters took a 1 ¾" hose line from the rear hose bed and advanced toward the front door while the FAO connected to the hydrant. Finding the front door locked they proceeded to take the hose line to the rear of the building along the "D" side yard. Near the "C/D" corner they met with District-4 who instructed them to make entry through the front as the fire was in the rear of the structure. While repositioning the line to the front door, Engine 9's firefighter #2 broke off to retrieve an axe from the apparatus to force entry. When the crew arrived on the front porch and prepared to enter they were met by E-2's firefighter #1 who assisted them in making entry. Prior to entering the building, E-9's OIC called for water over the radio. The door is forced open and all members donned their SCBA in preparation to enter the structure. Engine 9's OIC called for water a second time and then proceeded to remove his face piece and walked to E-9 to determine the problem and called out to his FAO to start the water. The FAO replied that the water was started and the OIC saw that the line was charged with water, however there was a pile of hose in the bushes that was severely kinked. E-9's OIC began to flake out the hose and remove the kinks. While Engine 9's OIC was correcting the water and hose problem, E-9 firefighters #1 and #2 and E-2 firefighter #1 advanced into the structure with the dry hose line and called again for water. E-9's firefighter #2 returned to the front door to assess the water problem and saw E-9's OIC stretching out the line and water coming up the hose toward the porch. E-9 FF32 then returns toward the nozzle and informed the crew that water was on the way. At this time the first floor became fully involved in fire and E-9's firefighter #2 and E-2's firefighter #1 were able to make their way out of the front door. It is believed that at some point E-9's Fire Fighter #1 became separated from the hose line. As E-9's OIC made his way back toward the front porch he witnessed the flashover and saw the two men come out the front door with another member on the porch. Unaware that this third firefighter was the OIC of E-2, the OIC of E-9 assumed all three members that he had left on the porch while he went to un-kink the line had successfully exited. At this time District-4 ordered all members to exit the building and called for all crews to begin setting up for defensive operations.

Ladder 2:

Ladder 2 arrived on the scene about two minutes after District-4. Ladder 2 divided into two teams – L-2 OIC and FF #1 and L-2 FAO and FF#2. Smoke conditions prevented Ladder 2 from seeing exactly which building was on fire until the apparatus passed the fire building and turned south onto Corinth to set up on the "D" side of the structure. L-2's FAO and L-2's firefighter #2 began setting up the truck to make access to the roof for vertical ventilation. Once the aerial ladder was placed to the roof, L-2's firefighter #2 proceeded up the ladder with the chainsaw and cut a large vent hole in the "B/C" portion of the roof, directly over the largest volume of fire. L-2's FAO completed donning hisfire gear and began to ascend the ladder with a ceiling hook when the first floor flashed over and fire erupted out the "D" side windows and impinged the ladder. At this time the vent hole was cut but the ceiling below had not been penetrated and the L-2 FF#2 is ordered off the roof by District-4. Upon arrival, L-2's officer and L-2's firefighter #1 vented the two windows on the "C/D" corner of the building and moved toward the front along the "D" side to vent windows closer to the front porch. While working on the "D" side, L-2's OIC and FF#1 noticed a large amount of hose kinked in the yard and spent some time to stretch out the line and work out the kinks. As the crew approached the "D/A" corner, L-2's firefighter #1 went to Engine 9 and pulled the rear cross lay toward the front door. At this time the first floor flashed over. Just after the flashover, L-2 FF #1 stated that he saw a firefighter still in the building moving through the front of the house toward the "D" side. L-2's firefighter #1 proceeded to the "D" side yard to see if the fire fighter had exited through a window. As no one exited the window, L-2's OIC and firefighter #1 prepared to make entry and search for the missing member. Meanwhile L-2's FAO and firefighter #2 set up for ladder pipe operations, unaware that a firefighter may still be inside.

Engine 2:

Engine 2 arrived on the scene shortly after Ladder 2 and planned to connect to the hydrant that Engine 9 was using as a water supply. Realizing E-9 had secured the hydrant on Laidlaw, and Corinth was blocked by L-2, Engine 2's crew dismounted and the FAO backed out to Paddock and went around the block and secured the hydrant at 4900 Corinth at Regent. Engine 2 FF #1 went to the front porch to assist E-9 in advancing the initial fire line while Engine 2's OIC and E-2 FF#2 went to E-9 and pulled the front cross lay. Engine 2's OIC and E-2's FF# 2 began to take this line to the rear of the building because Engine 2's officer thought this might be an exterior porch fire on the "C" side of the building. Engine 2's officer and E-2's FF#2 are met at the "C/D" corner by District-4 who instructed them to take the line in the front door and back up E-9. As they near the front of the house, E-2's OIC heard E-9's OIC call for water several times and Engine 2's OIC went to E-9's pumper to see if he could assist. At this time E-2's OIC is told by E9's FAO that the lines are charged and, looking down, he saw this to be correct and proceeded back toward the front porch. As Engine 2's officer and E-2's FF#2 neared the front door and began to mask up, E-9's firefighters #1 and #2 and E-2's firefighter #1 had already entered the building. At this time the first floor flashed over and two members on the initial attack line exited the front door with their hose line and their gear burning or smoldering. While assisting the members in the front yard the OIC of E-2 saw another person through the front door in the fire. This individual came toward the front door and then turned and went back toward the rear of the house. Feeling that this must be a firefighter, E-2's officer took a hose line from the front porch and advanced through the front door in the direction of the victim. Shortly after making entry, E-2's OIC is joined by L-32's firefighter #1 and L-2's OIC and advanced the line.

Ladder 32:
Ladder 32 arrived on the scene three minutes after District-4 and set up on Laidlaw on the "A" side of the fire building. L-32's OIC and firefighter #1 grabbed their tools and proceeded toward the front porch. L-32's FAO and L-32's firefighter #2 set up the apparatus to place the aerial to the roof for vertical ventilation. The flashover occurred very shortly after L-32's arrival and the FAO was forced to swing his ladder away from the flame impingement before making access to the roof. As the flashover occurred the electric service to the house burned through and the wires fell to the front yard. At this time District-4 assigned L-32's firefighter #2 to stand guard over the live wires. L-32's officer and L-32's firefighter #1 also saw the firefighter inside, post flashover, and proceeded into the structure. L-32 FF#1 went with the officer's from Engine 2 and Ladder 2 on the hose line and L-32's OIC performed a right hand search with the thermal imaging camera.

RESCUE EFFORTS

Immediately after the flashover, District-4 requested the second alarm and ordered all members out of the building and off the roof for defensive operations. The apparatus air horns were sounded indicating retreat, however the only fire fighter remaining in the structure is Engine 9 FF#1. (This Fire Fighter is later identified as Oscar Armstrong III) Several members on the scene reported hearing a mayday. At this time, except those that had seen FF Armstrong in the building, everyone thought that the mayday was for the firefighters that had exited after the flashover. District-4 asked E-2 firefighter #1 who exited the building if the mayday was for him, Engine 2's firefighter #1 replied "yes". While companies began setting up for defensive operations and attended to the members involved in the flashover, the members that had seen FF Armstrong still in the building; Engine 2's OIC, Ladder 32's OIC, Ladder 2's firefighter #1 and Ladder 32's firefighter #1 as well as Ladder 2's OIC (who had not seen firefighter Armstrong) began to make entry and perform a search. At this time C-405 arrived on the scene and established accountability and District-4 began to request a PAR to ensure all members were out of the building. (District 4 was not aware at this time that FF Armstrong was still in the building) Crews who witnessed fire fighter Armstrong in the building were now working in the building operating two hose lines as well as searching with and without thermal imagers. A mayday was declared upon locating FF Armstrong and RAT 20 and District-3 were assigned to assist interior crews with search efforts and defensive fire operations were suspended. Engine-32 arrived on the scene and was ordered by District-4 to take a line in the rear door and try to advance to the second floor. This action unknowingly assisted interior crews in their rescue efforts by keeping the fire in check in the kitchen area. FF Armstrong was found in the dining room by members of E-2, L-2 and L-32 and they were joined by members of RAT 20 in moving him to the rear window of side "D" for removal. Once FF Armstrong was removed out the window to the "D" side yard, CPR was begun and R-38 was requested to bring their cot to the scene. FF Armstrong was immediately transferred to the cot and taken to R-38 for transport to University Hospital. Firefighter Armstrong was removed from the building 10 minutes after making his initial entry.

CONTINUING OPERATIONS

A third alarm was requested by Car 1 at 0902, shortly after his arrival on the scene. As the extent of the injuries to FF Armstrong became apparent, all first alarm companies were removed from the scene and sent to Engine 32's quarters for Critical Incident Stress Debriefing (CISD). Second and third alarm companies extinguished the remaining fire on the second floor and checked for hot spots. Once this task was completed the fire companies were removed from the building and the Fire Investigative Unit (FIU) along with members of the Cincinnati Police Department Homicide Unit began investigation and documentation of the scene. Members from the FIU remained on the scene until 2300 that evening and returned at 0800 the next morning to complete their investigation. A fire watch was maintained throughout the night to ensure security of the scene. The "on scene" portion of the investigation was completed and the building returned to the owners at approximately 1800 on March 22, 2003.

ADDITIONAL INJURIES

Engine 9 FF #2 sustained second degree burns to the ears.
Engine 2 FF#1 sustained a hip injury exiting the structure.

COMMENTS

- **Crew Integrity**

All companies are staffed with four members at all times. Company officers must make every effort to keep companies intact when operating on emergency scenes. All members must remain with their assigned company to allow company officers to maintain accountability. Separating a single member from a crew to assist another crew in a task is not a safe or accepted practice.

- **Hose Deployment**

Proper deployment of fire lines is vital. The first two attack lines pulled at this fire were severely kinked causing a delay in water to the nozzles. Time must be spent in flaking out the hose while advancing toward a fire to ensure the water is there when needed. Also keep in mind that one attack line was 350' long; (7 sections of 1 ¾" hose), this not only becomes an issue during deployment but, greatly reduces gpm's due to friction loss. Companies should strongly consider using 2 ½" hose with a wye for hose deployment over 250' or 5 sections.

- **Fire Attack**

While it is common practice to advance a dry line into a structure when conditions are clear we must never advance into high heat or a smoke filled room before ensuring an adequate flow of water at the nozzle. Fire fighters are instructed not to open the nozzle until the fire can be seen; however, interior conditions must be taken into account before advancement. A short burst of water toward the ceiling of a hot, smoke charged room can reveal information concerning fire conditions. If water comes back down it is considered safe to advance, however, if nothing comes down the room must be cooled before advancing. Remember "A cool ceiling never flashes".

- **RAT Operations**

RAT 20 arrived on the scene just after the flashover and working to deploy their gear and size up the building as events unfolded. Several members of the crews that advanced to search for FF Armstrong had attended RAT training and used this training to their advantage. All companies that searched found and removed FF Armstrong did an outstanding job under very difficult conditions as can be attested to by the short amount of time taken in removing him from the structure. E-32 stated that upon hearing the mayday their first instinct was to put down their attack line and assist in the search. They continued their attack after remembering RAT training where all companies are taught to continue their last given assignment and allow the RAT team to perform their job. Continued fire attack in relation to search operations protects the search teams and extinguishment ultimately makes the operations go more effectively.

Interventions

Flashover Recognition:

The Cincinnati Fire Department will be receiving a flashover simulator on May 28, 2003 as a result of the 2002 Federal Fire Act Grant. All fire department members will be trained in flashover recognition and prevention and fire behavior.

Hose line length and deployment:

All fire companies have been ordered to carry a maximum of 250' of pre-connected hose per hose bed. Any hose line that must exceed 250' must be preceded by 2 ½" hose and a gated wye.

2 ½" to 1 ½" wye:

All fire companies have been ordered to remove the 2 ½" to 1 ½" wye from all preconnected hose lines.

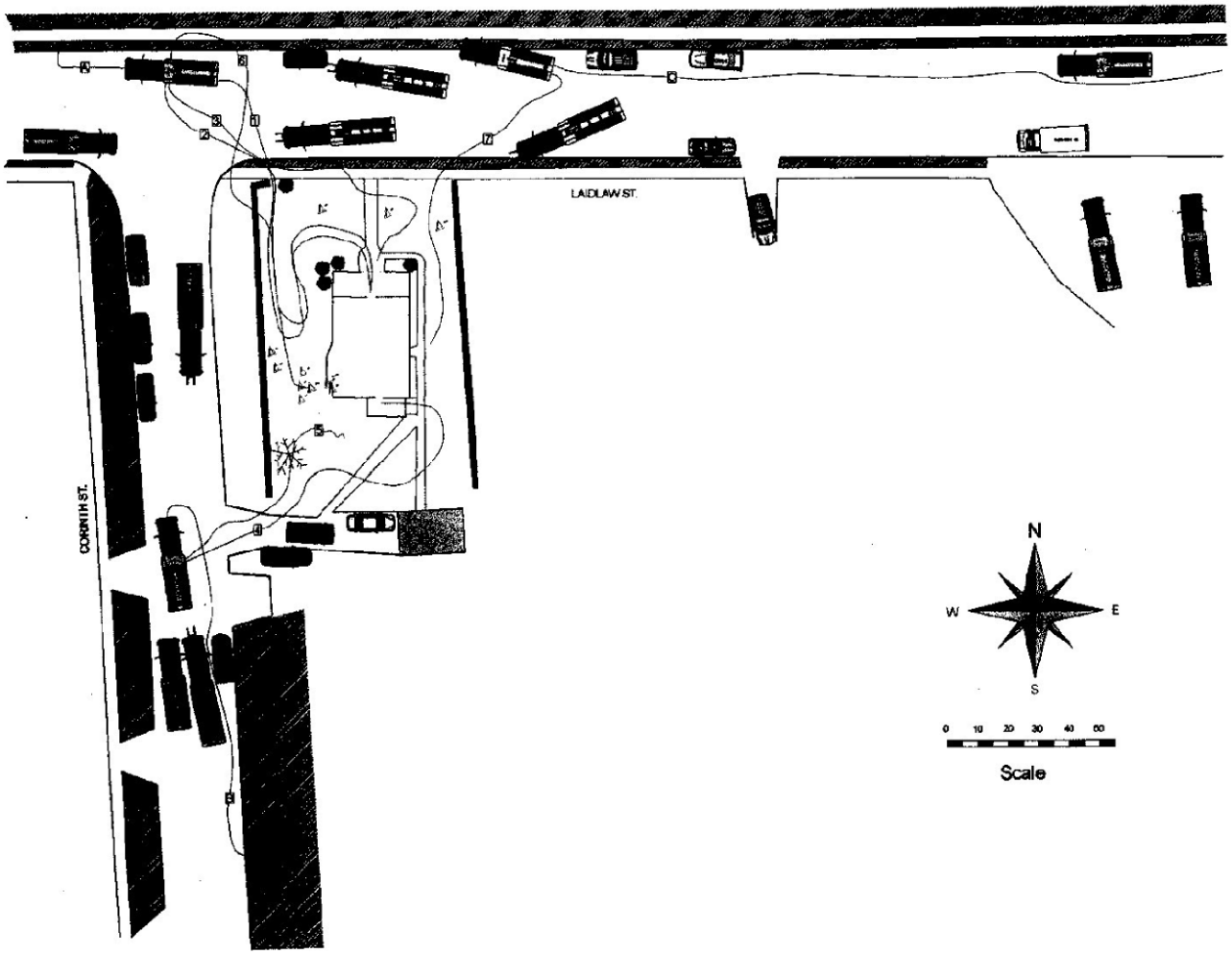
Rapid Assistance Team (RAT) dispatch:

The Rapid Assistance Team will be immediately dispatched on the first alarm and not wait for confirmation of a working fire.

This list is not all inclusive and will expand as the Comprehensive Report and Investigation is completed.

GLOSSARY

- **A,B,C,D**: The Cincinnati Fire Department has adopted the method of using letters to designate the sides of a building, thus eliminating the need to know geographic locations on an emergency scene. The Address side of the building is always the A side of the building with B,C,D etc. following in a clockwise manner. This method allows members to respond to orders given on a scene without having to determine which way is north, for instance, in the middle of the night. Therefore the "D" side would be the right side of a building as seen from the front or "B/C" corner would be the left rear etc.
- **CISD**: Critical Incident Stress Debriefing. This is a process where members involved in a particularly trying incident will meet with a specially trained group of their peers and discuss the actions of the incident. This method allows members to work through the events of the incident very quickly after they occur.
- **Cross Lay:** A pre-connected bed of 1 ¾" hose, usually 250' in length that is mounted just behind the crew cab on an engine company. There are normally two of these on our apparatus, mounted side by side, thus a front and rear cross lay.
- **District Chief**: There are four fire districts within the City of Cincinnati. Each District is commanded by a District Chief and numbered 1 through 4. The District Chief responds in a S.U.V. to establish incident command at the emergency.
- **FAO:** Fire Apparatus Operator. The member responsible for the apparatus on a given tour of duty. This person is tasked with driving the apparatus as well as operating the pumps or aerial device on a scene.
- **GPM's:** Gallons per Minute. A calculation of the amount of water flowing through hoses attached to an engine company.
- **Ladder Pipe Operations**: The method of flowing large volumes of water through a nozzle attached to the tip of an aerial ladder. This method is normally used in defensive operations after all crews have been removed from a structure.
- **PAR:** Personnel Accountability Report. A process whereby the Incident Commander calls all company officers and ensures that all members are visually accounted for on an incident scene. The PAR is used at various times in an incident; when going from offensive to defensive operations, at the 20-minute mark of an incident, after any unexpected occurrence (building collapse, flashover etc.)
- **RAT**: Rapid Assistance Team. A company of members specially trained in rescuing firefighters in peril. A RAT company is dispatched upon the confirmation of any working fire.
- **TIC**: Thermal Imaging Camera. A device used by firefighters in searching a structure for victims or hidden fire. These units allow firefighters to "see" through smoke by showing the heat differences in a given space or room.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