

Loudoun County Department of Fire, Rescue, and Emergency Management

SIGNIFICANT INJURY INVESTIGATIVE REPORT 43238 MEADOWOOD COURT MAY 25, 2008



September 2008



Loudoun County, Virginia
Department of Fire, Rescue, and Emergency Management

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On May 25, 2008 a significant fire occurred in a single family home at 43238 Meadowood Court in Leesburg, Virginia. Over the course of the incident, seven Loudoun County Fire and Rescue System personnel were injured, with four receiving serious burns. The entire Loudoun County Fire and Rescue System has been affected by this incident and resulting personnel injuries.

In response, I assembled an independent review panel to examine all aspects of the incident. Since May 27, 2008 a dedicated team of fire service professionals from Loudoun County, Montgomery County (MD), Prince William County, and Arlington County have worked together to gather all the facts associated with the events that occurred on Meadowood Court.

This *Investigative Report* is the most comprehensive, detailed incident analysis our System has ever undertaken. The *Report* identifies findings, conclusions, and recommendations on how the System can improve day-to-day operations to ensure firefighter safety and effectively serve the citizens of and visitors to Loudoun County. I want to acknowledge the cooperation, coordination and support that the entire System provided immediately after this incident and during the investigative process.

I would like to highlight several key challenges, which face our System as we implement the *Report's* recommendations. These include communications, building design, construction, materials, fire behavior, and an effective firefighting force.

Based on a preliminary recommendation from the Investigative Team, we have changed how our Communications Center provides supplemental information to emergency responders in the field. This will provide responding personnel with critical incident information as quickly as possible.

Newly constructed homes are larger than many of the older homes in our community. These homes tend to incorporate open floor plans, with large spaces that contribute to rapid fire spread. The challenge of rapid fire spread is exacerbated by the use of lightweight roof trusses, vinyl siding, and combustible sheathing. The result is that more personnel are required to safely and effectively mitigate incidents in these structures.

The size of the initial arriving fire suppression force on Meadowood Court severely limited the ability of personnel to complete critical, initial fireground operations. The lack of adequate qualified staffing places personnel in a position to have to function beyond their expected responsibilities, compromising personnel and citizen safety.

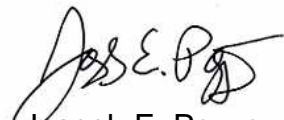
I am proud of all of the System personnel who responded to Meadowood Court.

In particular, I want to recognize the four personnel who were in the structure at the time of the flashover. These firefighters demonstrated the highest degree of professionalism in the face of extreme, life-threatening conditions. Their protective equipment functioned as designed and proved to be a critical component in their survival. These personnel reacted instinctively and intuitively, based on their training and demonstrated tremendous courage and heroism.

I also want to acknowledge the Command Staff, who reacted immediately and decisively to the life threatening changes in fire conditions and redirected resources to care for the injured firefighters.

To avoid future tragedies, I encourage each and every member of the System to review the *Report* and learn from its findings, conclusions and recommendations.

Finally, as our System moves forward, we must embrace and implement the *Report's* recommendations together, to protect our responders and ensure that we continue to provide the highest quality service to the citizens of Loudoun County.



Joseph E. Pozzo
Chief of Department

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Loudoun County Fire and Rescue System

Chief of Department Joseph E. Pozzo
Doug Rambo, Chairman – Fire and Rescue Commission
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Deputy Chief Scott Cullers (Retired, August 22, 2008)
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Cheryl Warren, Administrative Assistant, Office of Emergency Management
Dave Weddle, Mechanic, Ashburn Volunteer Fire and Rescue Department

All of the employees of the Loudoun County Department of Fire, Rescue, and Emergency Management who provided information, assisted the Team, and took on additional responsibilities so that Team members could focus on this *Report*. The Team especially thanks the crews from Fire Stations 6, 13, and 20 for their assistance during the course of the investigation.

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Board of Supervisors
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Bullard
Snap-Tite

EXECUTIVE SUMMARY

On May 25, 2008, fire and rescue personnel from Loudoun County responded to a structure fire at 43238 Meadowood Court in Leesburg, Virginia. During the course of the incident, seven responders were injured. Of those injured, four firefighters received significant burn injuries, two firefighters sustained orthopedic injuries, and one EMS provider was treated for minor respiratory distress. Given the severity of the injuries and magnitude of the event, an independent Investigative Team was assembled to review the incident.

Specifically, the Team was tasked with reviewing “the events leading up to the incident, the incident operation(s), the firefighter MAYDAY(s), and incident mitigation.”

The Department of Fire, Rescue, and Emergency Management – Fire Marshal’s Office and the Virginia Occupational Safety and Health Compliance Program (VOSH) also performed separate, independent, investigations into the Meadowood Court incident.

This *Investigative Report* contains the results of the Team’s comprehensive review and analysis. All of the information presented is factual and was validated by multiple sources prior to inclusion in this document. It is important to note that the Investigative Team had months to examine the incident and develop recommendations. In contrast, the first personnel to arrive on the scene had only seconds to make critical decisions and take action.

The Team determined that several major factors adversely affected the sequence of events on Meadowood Court, including:

- Supplemental Information
- Situational Awareness
- Strategy and Tactics
- Effective Firefighting Force
- Lightweight Building Construction and Materials
- Fire Behavior

Supplemental Information: Personnel in the Emergency Communications Center (ECC) obtained information from the 911 caller indicating that there was fire on the first floor and that it appeared nobody was inside the structure. This critical supplemental information was not provided to responding units or command officers.

Situational Awareness: The first arriving officer did not complete a full, 360° walk around/size-up of the structure nor did personnel observe the fire on the first floor as they entered the structure.

Strategy and Tactics: Based on the officers' perception of conditions, first-arriving crews initiated an offensive fire attack and primary search on the second floor of the structure, which allowed the fire to grow unchecked on the first floor.

Effective Firefighting Force: The first arriving units, Reserve Engine 6 and Tower 6, were at minimum staffing and responded with three personnel each. These units operated on scene for nearly six minutes prior to the arrival of a command officer or another tactical unit. During this time, personnel had numerous fireground tasks to complete, as quickly as possible. As a result, personnel were required to complete multiple tasks, which diverted their attention from their primary assignment.

Specifically, both apparatus operators were involved with laddering and ventilating the structure, leaving the pump panel unattended. In addition, both the Reserve Engine and Tower Officer were engaged in tactical operations, which diminished their ability to supervise, observe changes in the fire conditions, maintain overall situational awareness, and provide command with ongoing status reports.

Building Construction/Fire Behavior: The combination of lightweight building materials, vinyl siding, combustible sheathing, and the significant interior fire load on the first floor of the structure contributed to rapid fire spread. The fire quickly developed to the point of flashover, which trapped the personnel on the second floor of the structure.

The Team also determined several key factors that favorably affected the incident's outcome:

Firefighter Self-Rescue and Situational Awareness

- The Reserve Engine Officer recognized deteriorating interior conditions and rapidly led personnel out of the structure.
- The Tower Officer persevered under extreme circumstances to exit the structure.
- The Tower Firefighter maintained composure, in deteriorating conditions, and transmitted critical directions regarding ladder placement from the interior of the structure.
- The Reserve Engine Firefighter maintained composure and stayed with the crew during the exit from the structure.
- The four injured firefighters' Personal Protective Equipment (PPE) and Self-Contained Breathing Apparatus (SCBA) performed properly under extreme conditions, protecting them against more severe thermal or respiratory injuries.

Fireground Operations

- The first-arriving apparatus driver/operators placed ladders quickly, which provided a means of escape for interior personnel.

Command and Control

- The Incident Commander immediately acknowledged the firefighter MAYDAY.
- Command recognized the need to evacuate the structure.

Training

- All four of the firefighters operating inside the structure had successfully completed the Virginia Department of Fire Programs' MAYDAY Firefighter Down! curriculum.
- All four firefighters operating on the interior of the structure had participated in the Montgomery County (MD) Department of Fire and Rescue Services flashover simulator training program.

Building Construction

- The dimensional lumber floor joists supporting the second floor remained intact throughout the incident, which avoided a floor collapse, allowing firefighters to escape.

Finally, recommendations are provided throughout the *Report* in an effort to provide a framework to enhance and improve the Loudoun County Fire and Rescue System as well as protect responder and citizen safety.

INTRODUCTION

This *Significant Injury Investigative Report* is a comprehensive and factual review of the response to the May 25, 2008 fire incident on Meadowood Court. Specifically, the Investigative Team was asked to:

“Obtain all available incident facts/information and communicate a detailed, validated factual incident review report to the Loudoun County Fire and Rescue system. All information contained in the report will be factual documentation of the events leading up to the incident, the incident operation(s), the firefighter MAYDAY(s) and incident mitigation to include treatment and transport of the injured personnel. The results of the findings and recommendations will be used as lessons learned for the Loudoun County Fire and Rescue system, the region, the State, and the National Fire Service.”

Personnel from the Department of Fire, Rescue, and Emergency Management – Fire Marshal’s Office (FMO), Loudoun County Sheriff’s Office (LCSO), and the U.S. Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATFE), worked cooperatively to investigate the fire’s origin and cause. Investigators determined that the fire originated outside the structure, on the first floor deck and was accidental, caused by discarded smoking materials.

The Virginia Occupational Safety and Health Compliance Program (VOSH) also performed a separate, independent investigation into the Meadowood Court incident. As of September 2008, the VOSH investigation was ongoing.

METHODOLOGY

The Investigative Team gathered a wide variety of data and conducted dozens of interviews during the course of the investigation.

Data gathered included:

- Policies
- Procedures
- Manuals
- Pictures
- Videos
- Written statements from personnel who responded to the incident
- Radio tapes
- Gear worn by injured personnel
- Incident reports
- Fire Marshal’s Office origin and cause investigation
- Training records

- Apparatus and equipment specifications
- Building material information

Members of the Investigative Team obtained statements from and/or interviewed the majority of personnel who responded to Meadowood Court.

Over the course of the investigation, the Team determined that specific medical treatment was outside the scope of this *Report*. Rather, the *Report* addresses the management and coordination of EMS resources on the scene and the process by which additional resources were requested and obtained.

Finally, the Investigative Team worked closely with the Montgomery County (MD) Fire Modeling Team to develop a model of the incident. The results of their analysis were not available as of the printing of this document.

TERMINOLOGY

All of the times used in this document are expressed using the 24-hour clock.

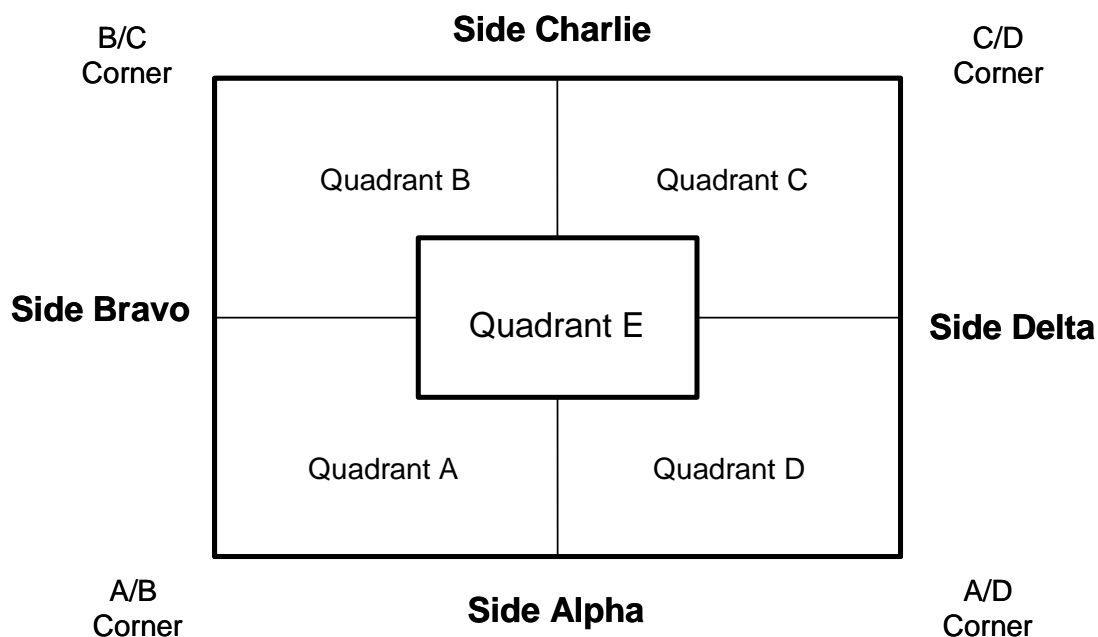
In December 2007, the System adopted International Phonetic Alphabet, which assigns a word to each letter of the alphabet, as listed below:

A – Alpha	H – Hotel	O – Oscar	V – Victor
B – Bravo	I – India	P – Papa	W – Whiskey
C – Charlie	J – Juliet	Q – Quebec	X – X-ray
D – Delta	K – Kilo	R – Romeo	Y – Yankee
E – Echo	L – Lima	S – Sierra	Z – Zulu
F – Foxtrot	M – Mike	T – Tango	
G – Golf	N – November	U – Uniform	

These words are used whenever it is necessary to identify any letter of the alphabet over the 800 MHz radio system or refer to the sides and interior quadrants of a building (see Figure 1).

Exposures are commonly identified with a letter and a number to describe the location of the structure relative to the fire building. The term “exposure” refers to a structure that is attached or adjacent to the fire building.

Note: All of the quoted text in the document was taken directly from recorded radio transmissions or phone calls. As a result, there are deviations from the phonetic alphabet listed above.

Figure 1: Terms used to Describe Building Sides and Interior Quadrants

ORGANIZATION OF THIS REPORT

This *Report* is organized into 13 Chapters and seven Appendices.

Each Chapter is divided into various sections, which include relevant background information, specific discussion pertaining to the incident on Meadowood Court, and, where applicable, recommendations for future action.

The Appendices include a table that summarizes the Report's recommendations, transcribed radio traffic, a timeline of critical events, diagrams, and analyses of equipment used by the injured personnel.

BACKGROUND

This Chapter provides an overview of Loudoun County and its combination Fire and Rescue System.

LOUDOUN COUNTY, VIRGINIA

Located 25 miles from Washington, D.C., Loudoun County is 517 square miles in area and contains seven incorporated Towns: Hamilton, Hillsboro, Leesburg, Lovettsville, Middleburg, Purcellville, and Round Hill. Loudoun is a member of both the Metropolitan Washington Council of Governments (MWCOC) and the National Capital Region. See Figure 2 for a geographical overview of the area.

Loudoun is widely known for its beautiful scenery, rich history, and strong sense of community. As the home of Dulles International Airport and America Online, the County has established a reputation as an international center for technology, communications, and transportation. The County also enjoys a reputation for high-quality services, particularly its educational system.

Since 2000, Loudoun's population has increased by over 60 percent to 279,082,¹ making Loudoun the fifth-fastest growing county in the nation.² The County's population growth has been accompanied by prosperity. In 2007, Loudoun had the nation's highest median household income at \$107,207.³

The County is governed by a nine-member Board of Supervisors. The Chairman of the Board of Supervisors is elected by the voters at large; the other eight supervisors are elected by district. All nine members serve concurrent terms of four years. The Board of Supervisors appoints the County Administrator, who directs and supervises the day-to-day operations of all County departments and agencies.

¹ <http://www.loudoun.gov/Default.aspx?tabid=1345>, Accessed August 25, 2008.

² U.S. Census Bureau, *Population Estimates for the 100 Fastest Growing U.S. Counties with 10,000 or More Population in 2007: April 1, 2000 to July 1, 2007*.

³ U.S Census Bureau, *Income, Earnings, and Poverty Data From the 2007 American Community Survey*. Washington, D.C.: August 2008, 7.

Figure 2: Regional Map

COMBINATION FIRE AND RESCUE SYSTEM

Loudoun County uses a combination system, comprised of career employees and volunteer members, to provide fire, rescue, and emergency medical services (EMS) to its citizens.

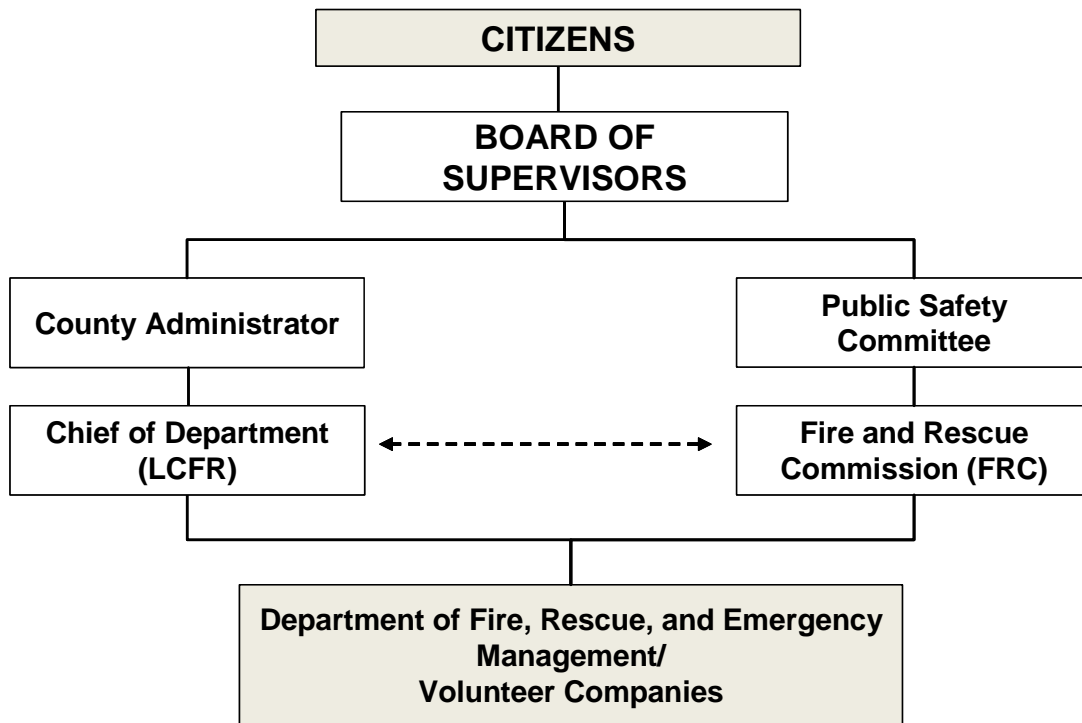
Throughout the 1980s and much of the 1990s, Loudoun's fire/rescue services were provided by volunteers supplemented by career Firefighter/Emergency Medical Technicians (EMTs). Over time, increased demand for service coupled with fewer volunteers available during daytime hours necessitated hiring additional career personnel.

Between Fiscal Year (FY) 93 and FY09, the number of career personnel has grown from 56.95 Full-Time Equivalent Employees (FTEs) to 504.01 FTEs.⁴ The volunteer component of the System comprises an estimated 1,476 total volunteers, approximately 770 of whom are active either operationally and/or administratively.⁵

Figure 3 illustrates the organizational structure of the System; the components of the System are explained more fully later in this section.

⁴ Loudoun County Government, *Adopted FY09 Budget*, 2-43.

⁵ Loudoun County Government, *Adopted FY09 Budget*, 2-57.

Figure 3: Organizational Structure – Fire and Rescue System**Figure 4: Loudoun County Battalions**

As shown in Figure 4, the County is broadly divided into three geographical areas, known as battalions.

Figure 5 illustrates the location of the County's 19 strategically located fire and rescue stations.

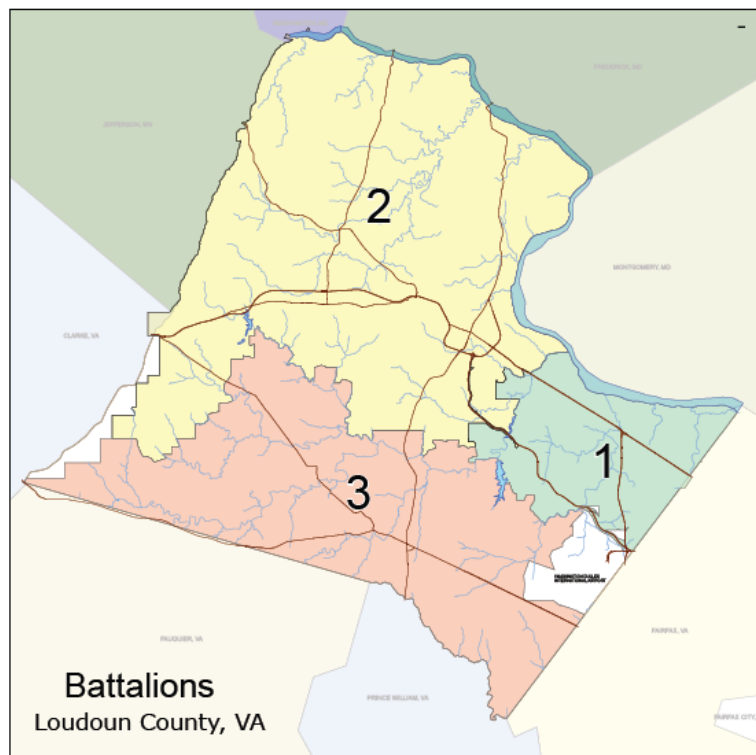
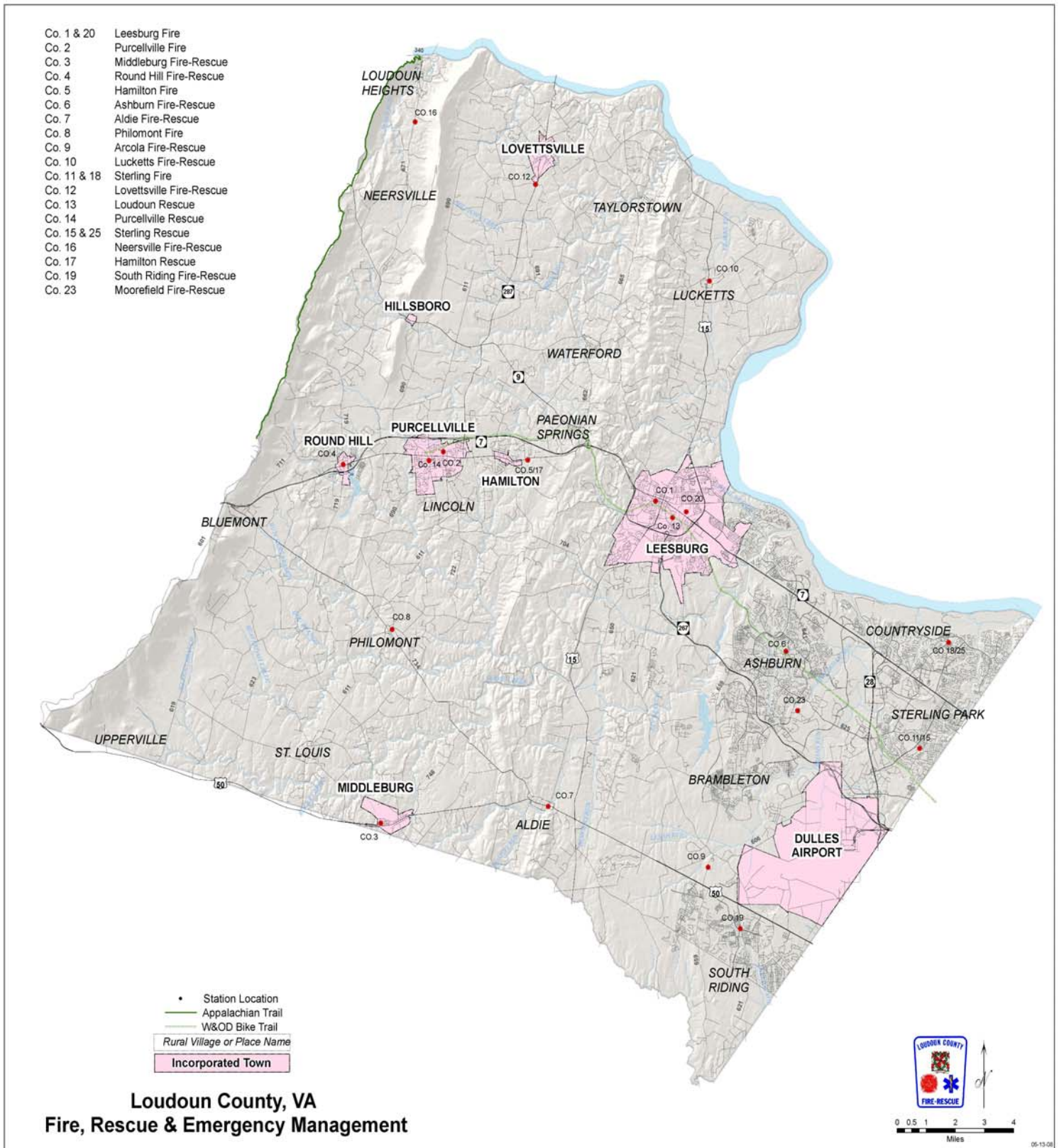


Figure 5: Map of Loudoun County Fire and Rescue Stations



Fire and Rescue Commission

The Loudoun County Fire and Rescue Commission (FRC) derives its authority from the Board of Supervisors. The FRC is responsible for developing a combined fire, rescue, and emergency medical service system for the County. The Commission was designed to serve as the Board of Directors for the fire and rescue system; establishing the framework for development and improvement of the system. The Commission's authority extends to career and volunteer personnel.

The FRC has seven voting members; three representing volunteer rescue services, three representing volunteer fire services; and the Chief of the Department of Fire, Rescue, and Emergency Management. The County's Operational Medical Director (OMD) and a member of the Board of Supervisors serve as non-voting members of the Commission.

The FRC has delegated certain authorities, tasks, and responsibilities to its two advisory committees, the Loudoun County EMS Advisory Council, Inc. and the Loudoun County Fire Council.

Specifically, the Loudoun County EMS Advisory Council, Inc. is responsible for the following:

- Appointment of the Loudoun County Fire and Rescue System OMD and Assistant Medical Directors, as may be required.
- Adoption of medical protocols, policies, and procedures in conjunction with the OMD.
- Appointment of delegates and alternate delegates to the Northern Virginia Regional Emergency Medical Services Council.
- Management and distribution of the local portion of the Four-For-Life program funding.
- Development of local requirements for training of Loudoun County EMS providers.

The Fire Advisory Council has the following responsibilities:

- Development of local requirements for training of Loudoun County firefighters and hazardous materials operations staff.
- Development and maintenance of a fire suppression and hazardous materials operations quality assurance program.
- Management and distribution of the County portion of Department of Fire Programs Aid to Locality funding.

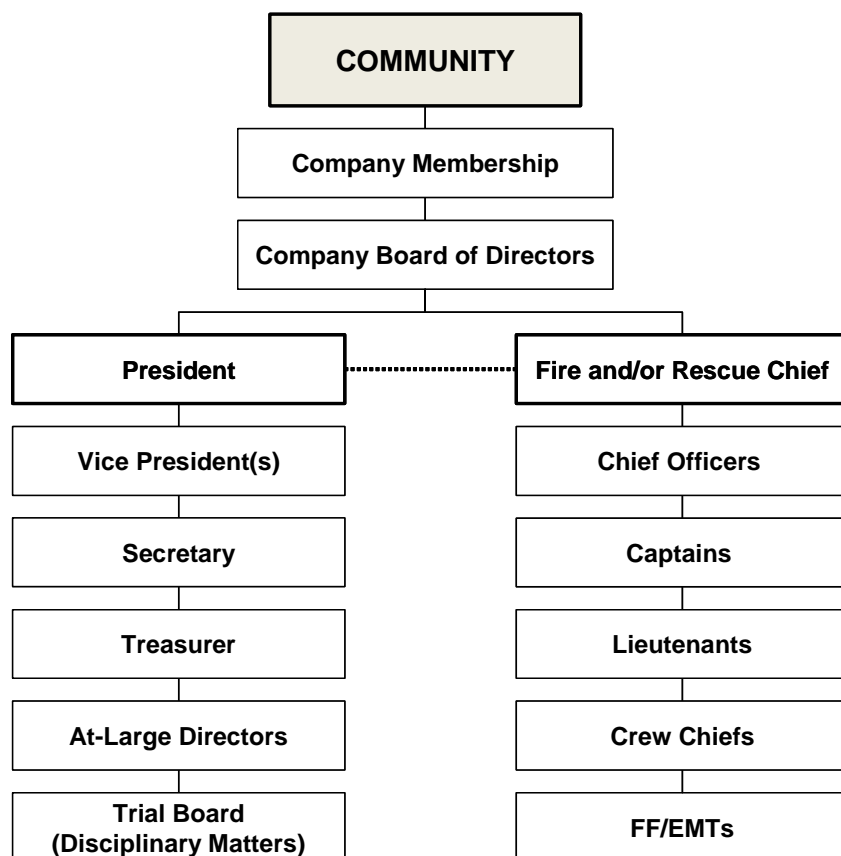
Fire and Rescue Companies

There are 17 independent volunteer fire and rescue companies in the County, as listed below. These companies own the majority of the County's operational fire/rescue facilities and much of the fire/rescue apparatus.

- Aldie Volunteer Fire Department
- Arcola-Pleasant Valley Volunteer Fire Department
- Ashburn Volunteer Fire and Rescue Department
- Hamilton Volunteer Fire Department
- Hamilton Volunteer Rescue Squad
- Leesburg Volunteer Fire Company
- Loudoun County Volunteer Rescue Squad
- Lovettsville Volunteer Fire-Rescue Company
- Lucketts Volunteer Fire Company
- Middleburg Volunteer Fire Department
- Neersville Volunteer Fire and Rescue Company
- Philomont Volunteer Fire Department
- Purcellville Volunteer Fire Department
- Purcellville Volunteer Rescue Squad
- Round Hill Volunteer Fire Department
- Sterling Volunteer Fire Company
- Sterling Volunteer Rescue Squad

Companies are organized as 501(c)(3) or 501(c)(4) corporations in the Commonwealth of Virginia and are recognized by the Board of Supervisors. Each has its own operational and administrative structure, bylaws, policies, and procedures.

Figure 6 illustrates the organizational structure of a typical volunteer fire or rescue company.

Figure 6: Organizational Structure of a Typical Volunteer Company

Department of Fire, Rescue, and Emergency Management (LCFR)

The Department is organized into six Divisions, as illustrated by Figure 7. LCFR is responsible for the day-to-day management and operation of the System in accordance with Commission guidelines and applicable County policies and procedures. The Chief of Department is responsible for all system-wide operations.⁶

The Office of Emergency Management (OEM) is responsible for a comprehensive emergency management program to mitigate, prepare for, respond to, and recover from natural, technological and terrorist-related emergencies that may impact the residents of Loudoun County. OEM develops and maintains the County's Emergency Operations Plan (EOP) and is responsible for maintaining, activating and managing the Emergency Operations Center (EOC).

The Department's Volunteer Coordination Program works in conjunction with the Department, the Fire and Rescue Commission, and the volunteer community to enhance volunteer participation in the combination system.

⁶ Loudoun County Fire and Rescue Commission Charter, ratified by the Board of Supervisors May 20, 2002.

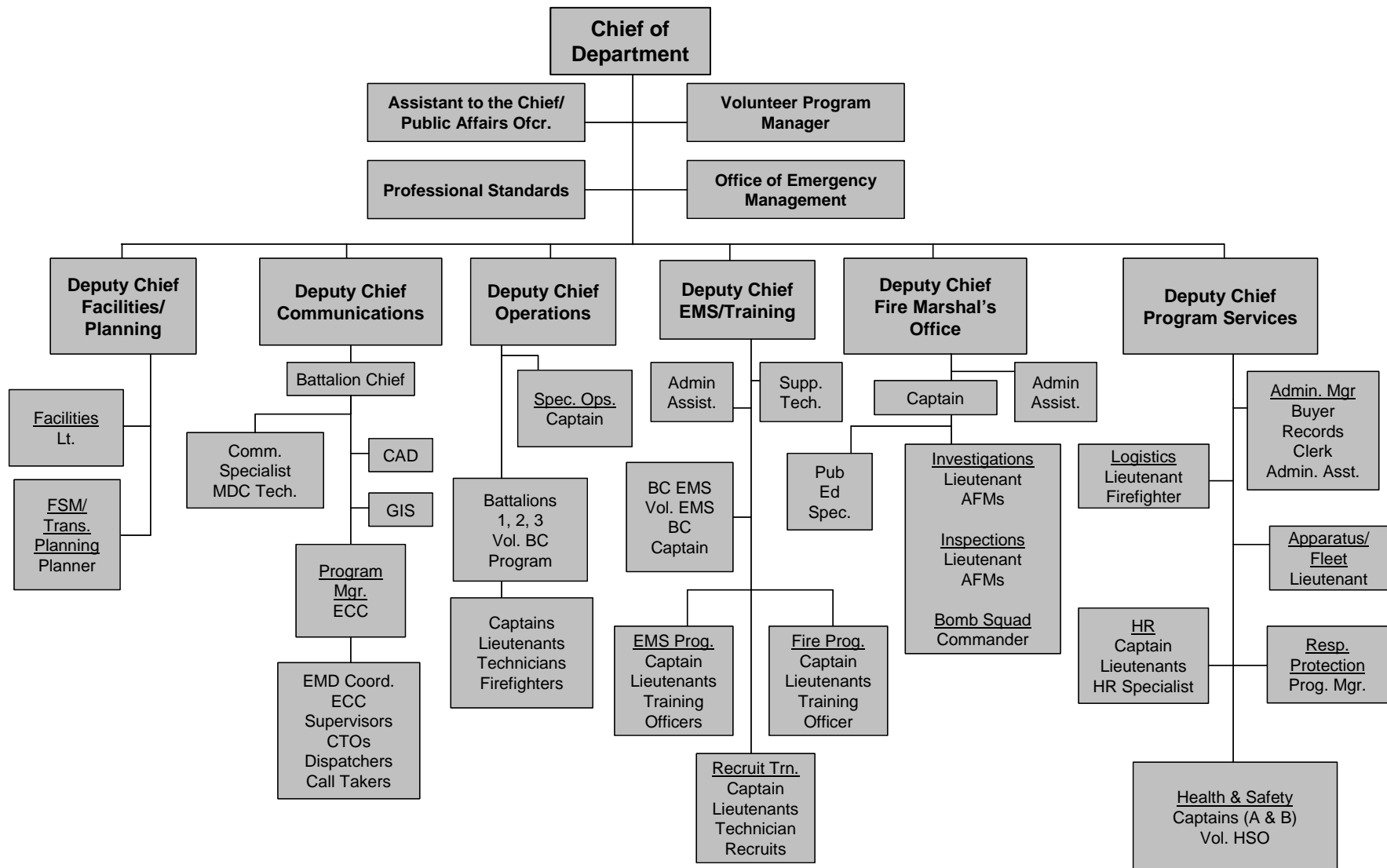
Personnel in the Communications Division answer all of the County's 911 calls for assistance. Communications personnel process and dispatch requests for fire/rescue assistance and transfer requests for law enforcement to the appropriate agency. Personnel in the Communications Division are also responsible for maintaining the Computer-Aided Dispatch (CAD) system and public safety Geographical Information System (GIS) data.

The FMO conducts all code-related fire inspections and investigates fires, explosions, hazardous material incidents, environmental crimes, and all fire-related criminal law violations. The FMO is responsible for fire safety plan reviews and coordinating the Department's public education/community outreach program.

Planning and Facilities performs strategic risk and trend analysis, development application referrals and plans review, management of Department capital construction projects, and coordinates facility-related maintenance, repair, renovation, and asset replacement.

The EMS and Training Division works closely with the OMD to oversee the System's provision of EMS and ensure compliance with applicable regulations. The Division provides a wide range of educational and training programs to members of the System, through daytime, evening, and weekend courses.

Figure 7: LCFR Organizational Chart (September 2008)



Personnel assigned to the Operations Division respond to and mitigate emergency incidents in conjunction with members of the County's volunteer fire and rescue companies. Personnel also perform child safety seat installations, public education programs, tactical pre-incident planning, and fire safety inspections for commercial and multi-family occupancies. All operational personnel are cross-trained in fire suppression and EMS, at either the EMT-Basic or EMT-Intermediate/Paramedic level.

Employees are assigned to one of three work schedules, depending on the station to which they are assigned and the level of operational support requested by the volunteer company (see Table 1).

- 5/12 – 12 hour shifts (0600-1800), Monday-Friday, with rotating days off.
- 7/12 – 12 hour shifts (0600-1800), Monday-Sunday, with rotating days off.
- 24/72 – 24 hour shifts followed by 72 hours off (0600-0600), Monday-Sunday.

Table 1: LCFR Minimum Staffing, by Station

STATION	MINIMUM STAFFING			WORK SCHEDULE
	Officer(s)	Medic(s)	Firefighter(s)	
Station 2	1		4	7/12
Station 3	1		3	7/12
Station 3 (Medic)	1	1		24/72
Station 4	1		4	24/72
Station 5	1	1	6	5/12
Station 6	2		5	7/12
Station 6 (Medic)	1	1		24/72
Station 7	1		4	24/72
Station 8	1		3	7/12
Station 9	1	1	3	7/12
Station 10	1		5	24/72
Station 11	2		5	5/12
Station 12	1		4	5/12
Station 13 (Rescue and Medic)	1	1	4	7/12
Station 13 (Medic)	1	1		24/72
Station 16	1		4	24/72
Station 18	1		2	5/12
Station 19	2		7	24/72
Station 20	2		5	7/12
Station 23	1	1	5	7/12
Battalion Chief 601	One LCFR Command Officer			7/12
Battalion Chief 602	One LCFR Command Officer			24/72
Battalion Chief 603	One LCFR Command Officer			7/12
EMS Battalion Chief	One ALS Command Officer			7/12
Safety Officer 601	One LCFR Officer			7/12

POLICY AND GOVERNANCE

The System is bound by various local, regional, state, and federal policies, procedures, ordinances, and regulations. Many of these policies and procedures are discussed at length elsewhere in this document.

Local

The Board of Supervisors maintains ultimate approval authority over all policies and procedures.

The FRC has established a hierarchical framework for the development and distribution of System administrative and operational policies and guidelines. The Commission's principal decisions are documented as Fire and Rescue Guidelines (FRGs).

The OMD is responsible for maintaining the System's Operational Medical Policies and Protocols.

Each volunteer company and the Department of Fire, Rescue, and Emergency Management have developed internal policies, procedures, and guidelines. Specifically, LCFR has developed an extensive collection of Standard Operating Procedures (SOPs) and General Orders (GOs).

Regional

Loudoun is a member of MWCOG, which is a regional organization, composed of 21 local governments surrounding Washington, D.C., as well as members of the Maryland and Virginia legislatures, the U.S. Senate, and the U.S. House of Representatives.

Loudoun is also a member of the NCR, which was established by the National Capital Planning Act of 1952 (Title 40, U.S.C., Sec. 71) and includes jurisdictions across the Metropolitan Washington area. Through its committees, the NCR works to advance preparedness in the region.

Loudoun County is a signatory to the *Northern Virginia Emergency Services Mutual Response Agreement*. The Fire and Rescue Commission approved FRG Admin 2.1.2, *NOVA Emergency Services Mutual Aid Agreement*, in April 2004.

Under the *Agreement*, jurisdictions participate in a mutual response system that will automatically dispatch the most appropriate response resource(s) available, to an incident location without regard to jurisdictional boundary lines. The *Agreement* also requires jurisdictions to participate in the development of operational guidelines to be used during mutual response incidents. These guidelines address areas such as apparatus response, tactical operations, and incident command. To this end, the Fire & Rescue Departments of Northern Virginia have developed a series of *Procedural Manuals*. The Fire and Rescue Commission has formally adopted some of these

Procedural Manuals while others have become the de facto standard over time, through practice as well as through their inclusion in various training courses and promotional processes.

State

The Virginia Occupational Safety and Health Compliance Program (VOSH) enforces occupational safety and health laws, standards and regulations.

The County must comply with the rules, regulations, and procedures disseminated by the Virginia Office of Emergency Medical Services, which address the licensure and certification of Emergency Medical Services providers.

Federal

Chapter 29 of the Code of Federal Regulations (CFR), Part 1910 establishes Occupational Safety and Health Standards, which apply to public and private employers. Specifically, 29 CFR 1910.134 addresses respiratory protection requirements for firefighters and others.

INCIDENT OVERVIEW

This Chapter describes the sequence of events on the afternoon of Sunday, May 25, 2008, beginning with the initial 911 calls for service and ending when the last units cleared the scene on Meadowood Court. The overview was developed using data gathered from personnel statements, post-incident interviews, radio transmissions, photographs, and video.

SEQUENCE OF EVENTS

Sunday, May 25, 2008 was a Memorial Day holiday weekend. At approximately 1252 hours, the weather was fair, with a temperature of 71 degrees Fahrenheit and 42 percent humidity. Winds were variable at three miles per hour.⁷

911 Call Received from the Ross Department Store

12:59:52 – The Loudoun County Emergency Communications Center (ECC) received a 911 call reporting a fire at the Ross Department Store, located at 1023 Edwards Ferry Road in Leesburg, Virginia. The 911 caller stated there was smoke in the electrical room, but no visible fire.

13:01:59 – ECC dispatched a commercial structure fire assignment (Table 2), with responding units assigned the tactical radio channel 6-Charlie.

Table 2: Ross Department Store Dispatch Complement

Resource	Companies
Engines	1
	10
	6
	5
Truck	1
Tower	6
Rescue	13
Ambulance	13
Command Officer	Battalion Chief 601
Safety Officer	Safety Officer 601
EMS Battalion Chief	EMS601

⁷ National Oceanic and Atmospheric Administration (NOAA), "Weather Observations for the Past Three Days, Washington Dulles International Airport," May 26, 2008.

911 Callers Report House Fire on Meadowood Court

13:01:00 – The ECC received a 911 call reporting a structure fire at 43238 Meadowood Court.

The initial 911 caller indicated that the “house...is on fire,” and described seeing fire on the first floor, in the Sunroom, with smoke coming from the roof. The caller also stated that it appeared nobody was inside the home. Additional callers reported heavy smoke in the vicinity of River Creek Parkway; in total, the ECC received seven 911 calls reporting the fire on Meadowood Court.

13:03:56 – ECC dispatched a house fire assignment (Table 3), with responding units assigned the tactical radio channel 6-Delta.

Table 3: Meadowood Court Initial Dispatch Complement

Resource	Companies
Engines	18
	23
	11
	439
Truck	11
Rescue	439
Ambulance	13 (second call)
Command Officer	Battalion Chief 601

Note: A unit from Rescue Station 13 had already been dispatched to the incident at the Ross Department Store. As a result, the Dispatcher noted that the fire on Meadowood Court was the station’s “second call.” It is common practice in Loudoun for the ECC to dispatch multiple units (staffed and un-staffed) from the same station.

Also, the first General Announcement included Battalion Chief 602 (BC602). In the second General Announcement the Dispatcher corrected the assignment to include Battalion Chief 601 (BC601), who diverted to Meadowood Court from the incident at the Ross Department Store.

Ross Department Store – Units Arrive on the Scene

13:03:52 – Wagon 1 on 6-Charlie:

"Wagon 1's on the scene, single story commercial strip center, nothing evident on the outside, building is NOT evacuated - we'll be investigating - I'll have command until the arrival of the Battalion Chief - we'll have our own water in front of the store."

Reserve Engine 6 Diverts from Ross Department Store to Meadowood Court

13:04:23 and 13:04:36 – Reserve Engine 6 attempted to contact BC602 on 6-Charlie to request permission to divert from the Ross Department Store to the house fire on Meadowood Court. Both times, the Reserve Engine's radio traffic was covered by ECC and the unit received no response.

13:05:29 – Reserve Engine 6 switched to 6-Delta, attempting to contact the ECC directly.

13:05:52 – After being acknowledged by the dispatcher on 6-Delta, Reserve Engine 6 advised:

"OK, we are diverting off of the fire in Leesburg to the secondary structure fire in the 22 box. We do have smoke on the horizon."

Tower 6 Diverts from Ross Department Store to Meadowood Court

13:07:07 – ECC contacted BC601 on 6-Delta with cross-streets for Meadowood Court. The dispatcher added:

"Also, Battalion Chief 601, Tower 6 was requesting to divert to this call."

13:07:20 – BC601 replied on 6-Delta:

"Clear that through Battalion 602, Loudoun. I'm not sure what's going on there with that."

13:07:35 – ECC contacted BC602 on 6-Charlie:

"OK, the Reserve Engine 6 has diverted to the house fire - the Tower at 6 is requesting permission to do the same. Your discretion."

13:07:50 – BC602 agreed:

"Yeah, let's go ahead with that."

13:08:25 – ECC contacted Tower 6 on 6-Delta:

"Just wanted to make sure that you were OK, and that you can respond on this."

13:08:30 – Tower 6 responded:

"OK, we got three."

Ross Command Terminated – Units Released

13:08:46 – Ross Command advised Loudoun on 6-Charlie:

"OK. Ross Command to Loudoun. Isolated to an electrical - we're gonna hold Truck 1, Wagon 1, clear everybody else."

Once released from the incident at the Ross Department Store, Safety Officer 601 (SO601), Rescue 13, and BC602 added on to the call on Meadowood Court, marking their response on 6-Delta.

Meadowood Court – Units Arrive on the Scene

13:09:19 – Reserve Engine 6 arrived on the scene and positioned on Side Alpha of the structure. The Officer transmitted the following on-scene report on 6-Delta:

"Reserve Engine 6 to Loudoun. We're on the scene, got a two story single family dwelling. Got a fire that looks like it's in the attic or running Side Charlie. I'll get a situation report to you in a minute."

13:09:33 – ECC replied:

"OK, Reserve Engine 6 on the scene. Smoke showing, possible fire in the attic."

13:09:56 – Reserve Engine 6's officer went direct to Tower 6 on 6-Delta:

"Reserve Engine 6 to Tower 6. Nobody out here to meet us. Gonna need to do a search."

13:10:04 – Tower 6 acknowledged the order, replying:

"Tower's OK"

The Reserve Engine Officer performed a size-up by conducting a partial walk around of the structure, walking across the front of the house (Side Alpha), to the side yard (Side Delta), through the fence gate to the rear of the house (Side Charlie). The Officer positioned about 15 feet inside of the gate at the C/D corner, then turned around and returned to Side Alpha.

13:10:16 – The Reserve Engine Officer provided the following situation report on 6-Delta:

"Two story single family dwelling, confirming a working structure fire number two floor. I'll go ahead and establish command. Need to transfer it ASAP."

13:10:40 – Tower 6 arrived on the scene. Note: Tower 6 did not mark on the scene over the radio; the Team determined the Tower's on-scene time based on video footage of the incident.

Personnel Enter the Structure

The Reserve Engine 6 Driver/Operator and Firefighter deployed a 200 foot, 1 ¾ inch hoseline and brought forcible entry tools to the front door on Side Alpha of the structure. The two personnel forced entry through the front door. The Reserve Engine Officer and Firefighter prepared to enter the structure, donning their SCBA facepieces and connecting their SCBA regulators.

Tower 6 arrived on the scene and positioned on Side Alpha between the house and Reserve Engine 6. The Tower Officer and Firefighter joined the crew from Reserve Engine 6 on the front stoop. The Tower Firefighter donned an SCBA facepiece, connected the SCBA regulator, and entered the structure slightly after the crew from Reserve Engine 6.

Upon entry, personnel reported moderate smoke with low heat in the two-story foyer and on the first floor. The smoke was thick enough that the crews had difficulty locating the interior staircase.

The crew from Reserve Engine 6 advanced the attack hoseline up the stairs, with no change in conditions (moderate smoke, low heat). They made a hard right at the top of the interior stairs and began to advance down the hallway towards the Master Bedroom.

The Tower Firefighter followed the crew from Reserve Engine 6 up the staircase and conducted a primary search of Bedroom 1, ventilating a window on Side Alpha.

The Tower Officer donned an SCBA facepiece, connected the SCBA regulator, and made entry through the front door. Once inside, the Officer activated the thermal imaging camera, observing the three-person crew ascending the interior staircase to the second floor. The Tower Officer met the Tower Firefighter at the top of the stairs where the Tower Firefighter advised the Tower Officer that the search of Bedroom 1 was negative. The two proceeded down the hall to Bedroom 2.

The crew from Reserve Engine 6 entered the Master Bedroom and observed heavy smoke conditions, moderate heat conditions, and fire to the rear of the room towards Side Charlie. The Officer moved ahead of the firefighter to ventilate a window on Side Charlie. After being directed by the Officer, the Firefighter opened the nozzle in an attempt to confine and extinguish the fire.

Chief 11 Assumes Command

13:13:33 – Chief 11 (Sterling Volunteer Fire Company) arrived on the scene, reporting on 6-Delta:

"Chief 11's on scene, looks like I'm the first command officer on scene, Side Alpha. Engine 6 I'm direct on all your traffic - I'm ready to take command when you're ready to transfer."

13:13:43 – The Reserve Engine Officer responded:

"Go ahead, take it. Reserve Engine 6 to the driver, start feeding some hose. Chief it is in the attic."

13:14:06 – Chief 11 contacted the ECC on 6-Delta to confirm the transfer of command:

"Chief 11 to Loudoun: I'll go ahead and assume Command on Side Alpha of the structure. Confirm we have heavy fire in the attic at this time."

The Command Post was located on Side Alpha of the fire structure, directly in front of 43239 Meadowood Court. BC601 arrived on the scene at 13:15:15 and reported to Chief 11 at the Command Post. Chief 11 requested that BC601 go to Side Charlie to provide a report on the conditions to the rear of the structure.

Interior Operations

After searching Bedroom 2, the Tower Firefighter and Tower Officer moved down the hallway, past the crew from Reserve Engine, and into Bedroom 3 to continue their search. The primary search of Bedroom 3 was negative. The crew then determined the need to open the ceiling. Given the height of the ceiling, the Officer's hook was not long enough to be effective, so the crew decided to exit the bedroom and return to the Tower to acquire longer hooks.

13:15:27 – The Reserve Engine Officer queried Command on 6-Delta:

"Any progress from the outside? We have visibility of zero."

13:15:33 – Command replied:

"Alright, sir, you were starting to get a hit on it. Looks like you still got heavy fire through the attic ridge vents, visible from both sides."

13:15:49 – Command continued:

"Command to Reserve Engine 6 - I have 23 pulling a second line to you."

There was no acknowledgment from Reserve Engine 6.

MAYDAY

On the interior of the structure, Reserve Engine and Tower 6's crews experienced a rapid increase in heat and smoke conditions and observed fire coming up the open foyer, through and over the banister, and partially up the interior staircase. From the Master Bedroom, the Reserve Engine crew attempted to attack the fire behind them, which was blocking their means of egress.

The Reserve Engine Officer's portable radio had become inoperable. In post-incident interviews, the Officer reported hearing the low battery alert when attempting to transmit. Analysis of the radio also revealed thermal damage and a separation of the lapel microphone from the radio. It is undetermined which of these factors led to the Officer's inability to transmit. As a result, the Officer directed the Tower Firefighter to transmit a MAYDAY.

13:16:43 – The Tower Firefighter transmitted on 6-Delta:

"MAYDAY, MAYDAY, MAYDAY, Engine 6, Tower 6 second floor."

13:16:47 – Command replied:

"Command acknowledged MAYDAY, Engine 6, second floor. Rescue, need you in there for RIT activation ASAP."

13:16:55 – BC601 advised Command:

"Battalion 601 to Command - evacuate, structure collapse rear, evacuate."

13:17:14 – ECC queried Command:

"Loudoun to Chief 11, did you copy everything?"

13:17:18 – Command replied:

"Sir - I'm trying to get radio traffic. Command to all Loudoun - all units operating on the fireground, evacuate the structure ASAP, we do have a RIT activation from Engine 6. Need an accountability on Reserve Engine 6."

At this point, the Reserve Engine Officer, Reserve Engine Firefighter, Tower Firefighter, and Tower Officer were in the hallway, outside the Master Bedroom. The Reserve

Engine Firefighter opened the nozzle in an attempt to attack the fire in the staircase and immediately lost pressure. In an attempt to diagnose the problem, the Reserve Engine Officer took the line from the Firefighter and opened the nozzle. Again, the line immediately lost pressure. It was later determined that the inner and outer layers of the hoseline had burned through approximately 10 feet from the nozzle, dramatically reducing the water pressure available at the nozzle.

The Reserve Engine crew and Tower Firefighter abandoned the non-functioning hoseline and moved down the hallway toward Bedroom 2 in an effort to locate a secondary means of egress.

13:17:30 – From the interior, the Tower Firefighter transmitted on 6-Delta:

"Second floor's cut off, get a line up here!"

13:17:39 – Command acknowledged:

"10-4 we got ladders. Gonna be on Side A, David Quadrant, Side A, David Quadrant."

13:17:47 – The Tower Firefighter replied:

"Negative, need 'em Side Baker, Charlie."

13:18:50 – Command queried Reserve Engine 6:

"Command to Reserve Engine 6, your status? I got units en route to you."

13:18:54 – The Tower Firefighter replied:

"(Unintelligible), Side Charlie out the 2nd floor ground ladder."

Reserve Engine Officer, Firefighter, and Tower Firefighter Exit the Structure

Due to fire conditions and interior collapse, the Tower Officer had become separated from the Reserve Engine crew and Tower Firefighter (for further, see page 60).

The Reserve Engine Officer, Reserve Engine Firefighter, and Tower Firefighter entered Bedroom 2 and the Tower Firefighter partially shut the door behind them, which provided some relief from the intense heat. The Reserve Engine Officer heard glass breaking and located a window. The Reserve Engine 6 Driver/Operator had already positioned a 24-foot extension ladder at the window. The Officer broke out the remaining glass and directed the Reserve Engine Firefighter to perform an emergency ladder bail.

13:19:02 – As the Firefighter exited the structure, the Firefighter's hand became stuck in the window and the following was transmitted on 6-Charlie:

"Hold on, hold on - You have to get my hand, it's stuck (open mic)."

The Reserve Engine Officer removed the Firefighter's hand from the window and the Firefighter slid down the ladder. Once the Reserve Engine Firefighter cleared the ladder, the Tower Firefighter bailed out the window and slid down the ladder. The Reserve Engine Officer made several attempts to shout for the Tower Officer; hearing no response and faced with increasing heat, the Reserve Engine Officer exited the structure via the ground ladder and joined the two firefighters already on the ground. The three personnel exited the backyard and walked down the driveway, along Side Bravo, toward Side Alpha. While walking, the injured firefighters encountered SO601 and other personnel, who began to render initial emergency medical care.

Tower Officer Exits the Structure

The Tower Officer attempted to break out a window in the Master Bathroom to escape the intense fire, smoke, and heat. Unable to break the window, the Tower Officer exited the Master Bathroom in search of an alternate means of escape.

Ultimately, the Officer was able to exit the structure on Side Charlie and, according to witnesses was on fire when the Officer landed in the backyard.

13:19:39 – The Reserve Engine 23 Officer transmitted on 6-Charlie:

"We got firemen down - Charlie side - bailing out the window. Need EMS now."

13:19:39 – BC601 transmitted the following on 6-Delta:

"Division Charlie to Command, need a medic unit back here, firefighter down."

Multiple personnel rendered aid to the Tower Officer, extinguishing parts of the Officer's PPE that were on fire, first with their gloved hands, then with a hoseline. EMS personnel began to assess and treat the Officer's injuries.

Command Requests a Second Alarm and EMS Task Force

13:19:46 – Command transmitted the following request on 6-Delta:

"Command to Loudoun - go ahead and strike a second alarm, give me an EMS task force with at least 2 ALS units. At this time, pre-alert a helicopter."

13:19:54 – ECC replied:

"You got it sir, and I got Medic 13-1 is on the scene."

FM607 Reports Personnel on Side Bravo

13:20:10 – Fire Marshal 607 (FM607) attempted to contact Command on radio channel 6-Delta with “emergency traffic.”

13:20:51 – Getting no response on 6-Delta, FM607 switched to the Fire Marshal's Investigations Channel (FINVS), stating:

"Sir, I know you're extremely busy - let Command know that three firefighters have bailed out, are on Side Baker. I need a medic over here ASAP."

13:21:01 – ECC replied on FINVS:

"Three firefighters bailed out on Side Baker - need a medic unit ASAP?"

13:21:06 – FM607 confirmed:

"That's correct."

The Dispatcher on FINVS relayed the message to the Dispatcher on 6-Delta.

13:21:08 – Command broadcasted the following message on 6-Delta:

"Command to all units operating on the fireground, we are evacuating the structure, we are going defensive at this time."

13:21:14 – The ECC notified Command on 6-Delta:

"Loudoun to Chief 11, Chief 11, be advised I got firefighters diving out to the rear of the structure."

13:21:22 – Command replied:

"Copy that, sir."

Evacuation Tones

13:21:25 – The ECC queried Command on 6-Delta:

"Also sir, whenever you're ready, I'm ready to drop the evac tones."

13:21:32 – Command replied:

"Drop 'em."

13:21:35 – The ECC transmitted the evacuation tones on 6-Delta, which consisted of a 15 second "warble" tone followed by:

"Attention all units, attention all units operating at Meadowood Court, evacuate the building immediately. All units evacuate the building immediately. 1321 hours."

Personnel Accountability

13:21:53 – Command contacted Division Charlie (BC601) on 6-Delta:

"Command to the Charlie Division, what's the status of the firefighters down to the rear. Do I have accountability on all personnel?"

13:22:02 – Division Charlie responded:

"Division Charlie to Command. I have the Tower 6 officer back here. That's all I have right now."

13:22:09 – Command queried again:

"Alright sir, how many personnel are still reported missing?"

13:22:30 – Division Charlie replied:

"Can you account? All I have is [name redacted, Tower Officer]."

13:22:43 – SO601 added:

"I have two from Reserve Engine 6, the firefighter from Tower 6 at the Alpha/Bravo corner of the house on the exterior. I need to get EMS for them and a crew on this side to assist with this exposure."

13:23:00 – Command acknowledged:

"Alright sir. I have a secondary RIT team. Do we still have a report of anybody left inside the structure? I can account for two personnel from Rescue Engine, Reserve Engine 6 who were interior - one from the Tower who was interior. What do we have otherwise?"

13:23:35 – Division Charlie advised:

"OK, the Tower 6 Officer is right behind you. That's all I have on Division Charlie at this time."

13:23:43 – Command acknowledged and replied:

"Alright, looks like we may still have one unaccounted for. We got the roof coming in. I'm gonna have the Tower deck gun it shortly and we're gonna go ahead and send the RIT team in so we can do a search."

13:24:04 – Division Charlie queried Command:

"Command, do you have Firefighter [name redacted, Tower Firefighter] accounted for? Division Charlie to Command - do you have Firefighter [name redacted, Tower Firefighter] accounted for?"

13:24:12 – Command replied by querying SO601:

"Command to Safety, do you have Firefighter [name redacted, Tower Firefighter]?"

There was no reply from SO601.

13:24:55 – ECC advised Command on 6-Delta:

"Loudoun to Command - 12 minutes, 12 minutes into command."

13:24:59 – Command replied:

"Copy 12 minutes. Status right now: I have several firefighters that were removed from the structure. Attempting an accountability at this time."

13:25:35 – Division Charlie queried Command:

"Do you have anyone further unaccounted for?"

13:25:40 – Command answered:

"Sir, at this time I have [name redacted, Reserve Engine Firefighter], [name redacted, Reserve Engine Driver/Operator] was exterior, and [name redacted, Reserve Engine Officer] from the Reserve Engine 6. Also have [name redacted, Tower Firefighter] from Reserve Engine 6. You have [name redacted, Tower Officer]. That should be accountable for all personnel at this time. Copy?"

13:26:00 – Division Charlie affirmed the information:

"That's correct. [name redacted, Tower Firefighter] would have been for the Tower. [name redacted, Reserve Engine Firefighter], [name redacted, Reserve Engine Officer] and [name redacted, Reserve Engine Driver/Operator] would have been for the Engine. We're only running three on the Tower today."

13:26:30 – Command confirmed that all personnel were accounted for and transmitted the following on 6-Delta:

"Command to Loudoun - we have all firefighters accounted for and we are going defensive on the structure at this time."

Units continued to operate in a defensive mode until the bulk of the fire had been extinguished. Personnel from Fairfax County's Technical Rescue Operations Team assessed the integrity of the structure and established exclusion zones in case of additional structural collapse. Personnel entered the structure to extinguish "hot spots" and perform salvage and overhaul.

Three additional personnel were injured during the course of the incident. None of their injuries were related to the MAYDAY event.

As units cleared the scene, they were ordered to report to Fire Station 6 for debriefing by the Critical Incident Stress Management (CISM) team. The Team was not able to determine exactly how this order was communicated to personnel as not all units received this information. Instead, some units returned to quarters after leaving Meadowood Court or clearing the hospital.

The last fire department units left the scene at approximately 2200 hours; the Loudoun County Sheriff's Office (LCSO) maintained scene security pending the FMO's origin and cause investigation.

ORIGIN AND CAUSE

Personnel from the Loudoun County Fire Marshal's Office (FMO), Loudoun County Sheriff's Office (LCSO), and the U.S. Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATFE), worked cooperatively to investigate the fire's origin and cause.

Investigators determined that the fire originated outside on the first floor deck and was accidental, caused by discarded smoking materials.

SUMMARY OF UNITS – MEADOWOOD COURT

Due to the diversion of units from the incident at the Ross Department Store, the actual order of units' arrival to 43238 Meadowood Court varied considerably from the initial dispatch complement.

Table 4 illustrates the arrival order of units on Meadowood Court, as determined by radio traffic, video, witness, and personnel statements. It is important to note that the table includes only those units that were on the scene immediately before, during, and after the MAYDAY.

Table 4: Meadowood Court, First Alarm Units in Order of Arrival

Unit
Reserve Engine 6
Tower 6
Chief 11
Medic 13-1
Battalion Chief 601
Reserve Engine 23
Rescue 13
Safety Officer 601
Fire Marshal 607
Engine 18
Engine 10
Truck 11
Wagon 1
Truck 1
Battalion Chief 602

Table 5 includes all units that were dispatched on the second alarm, EMS Task Force, or self-dispatched and added-on to the incident, but were not included in Table 4.

Table 5: Meadowood Court, All Other Units

Resource	Companies
Engines	Tanker 1
	Engine 1
	Wagon 5
	Rescue Engine 6
	Wagon 18
	Engine 439
	Engine 6
Trucks/Towers	Truck 1
	Tower 19
Rescue	Rescue 439
Air Unit	AU623
Ambulances	Medic 6-3
	Ambulance 13-2
	Medic 13-3
	Medic 13-4
	Medic 13-5
	Medic 17-1
LCFR Chief Officers	Loudoun 1
	Loudoun 3
	Loudoun 6
	Loudoun 8
	Loudoun 9
	Battalion 603
	Volunteer Chief 6
	Volunteer Rescue Chief 13
	Admin 1
	Command Post 699
Fire Marshals	601
	604
	612
Helicopters	MedSTAR 1
	MedSTAR 4

DESCRIPTION OF THE STRUCTURE

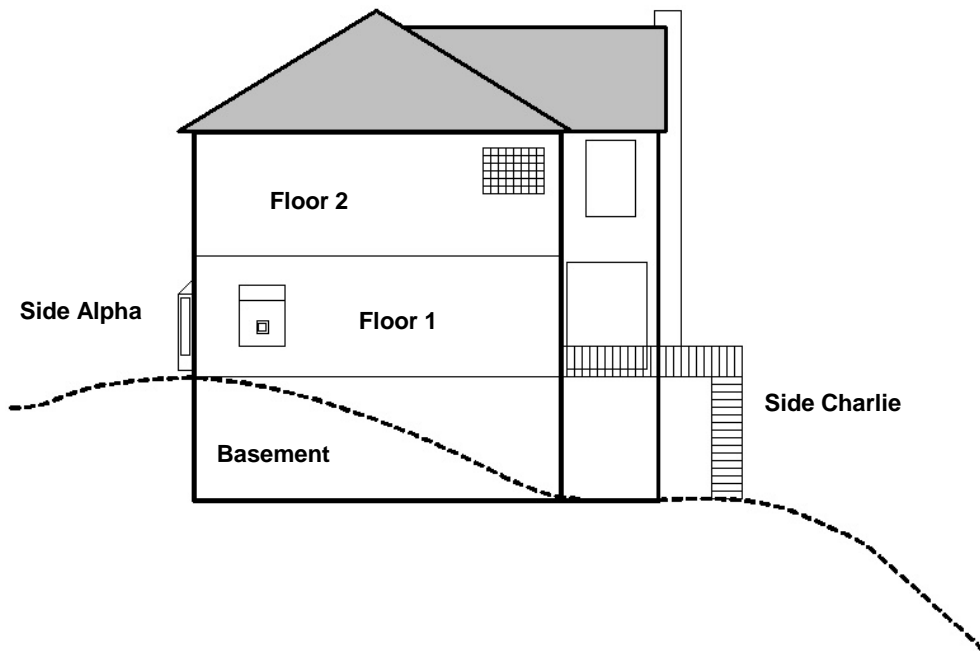
This Chapter provides a detailed description of 43238 Meadowood Court, including the topography of the lot, floor plans, building construction and features, and how these factors impacted the incident.

TOPOGRAPHY

From Side Alpha, the structure had two stories above grade while from Side Charlie, there were three levels visible above grade (Figure 8).

The first floor was approximately five feet above the street level with 37 feet of setback, for a slope of 14 percent. The rear of the lot dropped off sharply 11 feet from the rear basement wall at a slope of 47 percent.

Figure 8: Topography of 43238 Meadowood Court (dotted line indicates grade)



43238 MEADOWOOD COURT

On September 11, 1998, the Loudoun County Department of Building and Development issued a building permit for a single family dwelling to be located at 43238 Meadowood Court, in the Potomac Station subdivision. Construction was completed in the spring of 1999. The house consisted of two floors of finished living space totaling 3,304 square feet on a 1,522 square foot poured walkout basement. The structure also had a 400 square foot attached garage on Side Bravo.

Figure 9 provides an illustration of the structure, pre-fire. Figure 10 is an aerial view of Side Alpha taken after the incident. Note: the chain link fence was installed post-fire for site security.

Figure 9: 43238 Meadowood Court



Figure 10: Post-Fire Photo



The house was of an “open” design with large spans of unencumbered space and little compartmentalization. The first floor entry foyer was open to the second floor above.

Figure 11 illustrates the layout of the first floor; Figure 12 provides the layout of the second floor. (For larger versions of these figures, see Appendix 2.)

Figure 11: First Floor

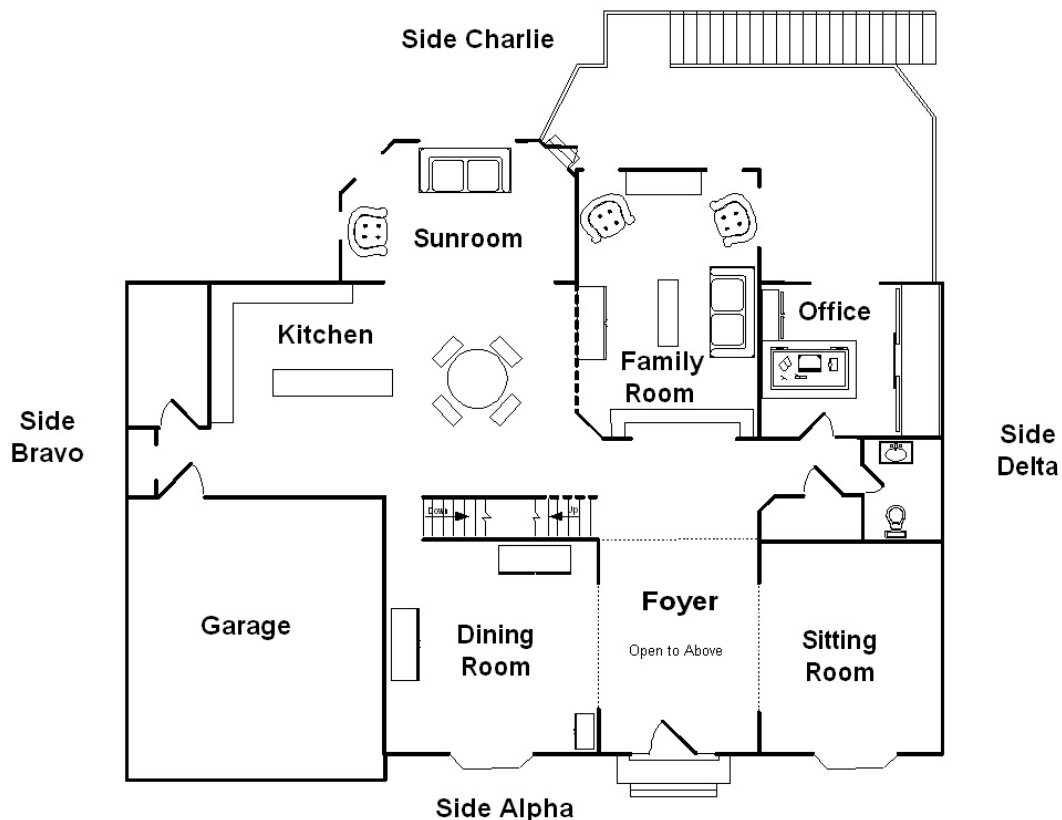
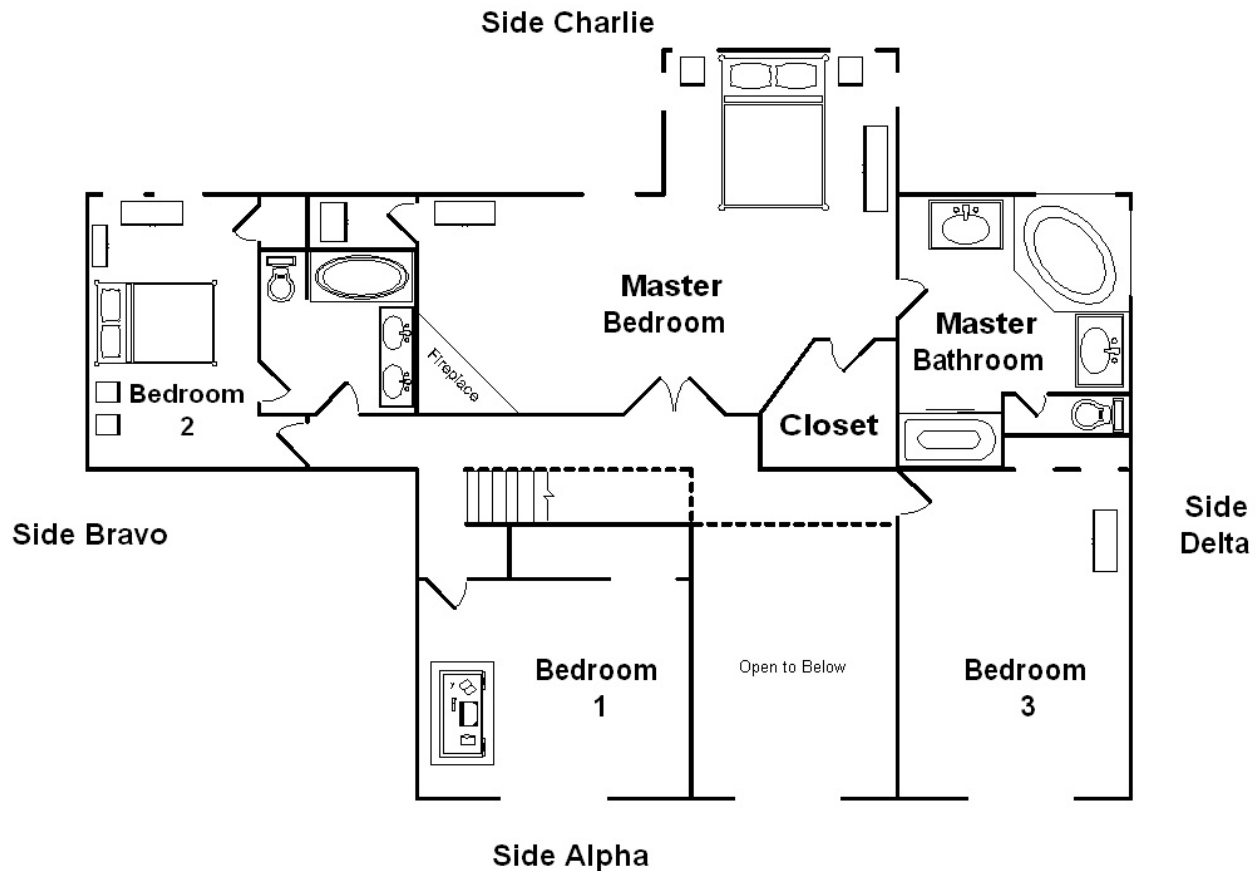


Figure 12: Second Floor

BUILDING CONSTRUCTION AND FEATURES

In the fire service, the term “building construction” refers to the type of construction of the structure, as well as the combustibility and the fire resistance rating of a building's structural elements. To classify buildings consistently, the National Fire Protection Association (NFPA) has developed five “Types” of construction.

The structure on Meadowood Court was of Type V construction, which means that its structural members consisted entirely of wood. As stated in the NFPA Handbook, Type V construction is “probably more vulnerable to fire, both internally and externally, than any other building type.”⁸

The house was of standard, stick-built construction with a lightweight truss roof. Side Alpha had an exterior masonry veneer over 2x4 walls. The remaining three sides were vinyl siding over a composite material, either Energy Brace or Intermediate Sturdy Brace, supported by 2x4 walls, as shown in Figure 13 and Figure 14.

⁸ NFPA Handbook, 20th Edition, 19-8.

Figure 13 and Figure 14: Exterior Wall Construction



The floor joists supporting the first and second floors were constructed of 2x10 dimensional lumber (Figure 15).

Figure 15: Floor Joists (Second Floor)



Floor Coverings

The majority of the flooring material on the first floor was hardwood, with the exception of the Sunroom, which had ceramic tile and the living room, which was carpeted. The dining room had a combination of hardwood and carpet. The stairs and entire second floor were carpeted.

Ceiling Height

The ceiling height on the first floor was 9 feet with the exception of three areas. The living room had a 10 foot flat ceiling, the Sunroom had a vaulted 10 foot ceiling, and the front door entry foyer was 20 feet in height. The ceiling height on the second floor was 8 feet.

Windows

Windows throughout the house consisted of double-paned thermal glass, except for those in the Master Bathroom, which were Herculite® K, double paned, tempered safety glass.

Figure 16 illustrates the Master Bathroom pre-fire; Figure 17 shows the highlighted window, post-fire.

Figure 16: Master Bathroom (Pre-Fire)



Figure 17: Master Bathroom (Post-Fire)



Roof

The lightweight truss roof assembly consisted of 2x4 stringers connected by gusset plates. The attic space contained blown-in insulation. Both are visible in Figure 18.

Figure 18: Roof Assembly, Attic Space, and Insulation



The first floor Sunroom had an independent hip roof, similarly constructed and perpendicular to the main roof. The roof of the Master Bedroom had a separate peaked roof, which was perpendicular to and attached to the main roof.

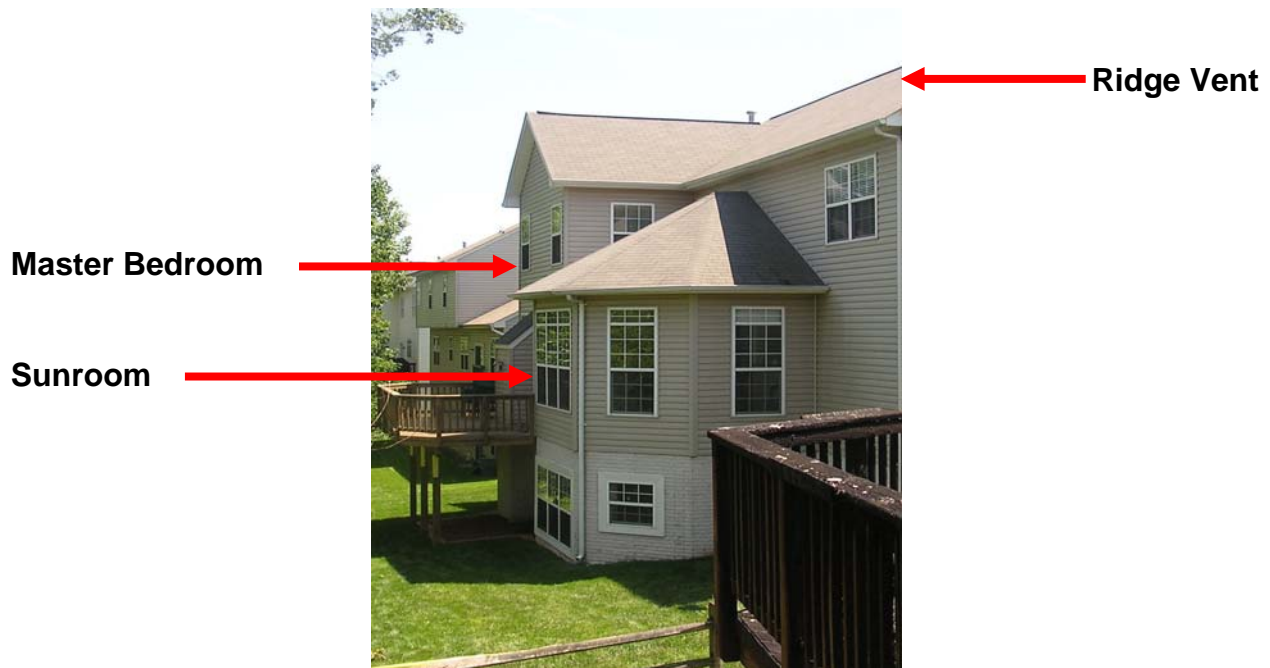
The roof sheathing was Oriented Strand Board (OSB), covered by standard tarpaper and asphalt/fiberglass shingles. A ridge vent spanned the entire length of the roof from Side Bravo to Side Delta.

Side Charlie

The entire back yard was enclosed by a four foot high, split-rail fence.

The rear of the house had several projections, or “bump outs,” where the Family Room, Sunroom, and Master Bedroom extended approximately nine feet from the main body of the structure (Figure 19).

**Figure 19: Similar Construction Features
(Delta Exposure, 43242 Meadowood Court)**



An attached, 290 square foot deck spanned approximately two-thirds of Side Charlie, projecting over a brick patio and the basement walkout (Figure 20). The deck was constructed of 5/4 deck boards over 2x10 joists on 6x6 posts. There was a staircase leading from the deck to the ground, which joined the deck in the vicinity of an exterior door leading to the Sunroom.

There was approximately two feet of space between the deck stairs and the hedgerow, which hid the fence and the beginning of a nearly 47 percent slope down to a creek.

Figure 20 illustrates the deck and hedgerow, pre-fire. Figure 21 provides an aerial view of Sides Charlie and Delta, post-fire.

Figure 20: Side Charlie Deck (Pre-Fire)



Figure 21: Aerial View of Sides Charlie and Delta



EXPOSURES

The Bravo Exposure, 43 feet away, was a two story single family dwelling of similar construction, with a two car garage facing the fire building. The exposed surfaces of the structure consisted of vinyl siding and wood garage doors, both of which sustained radiant heat damage.

The Delta Exposure was a nearly identical single family dwelling, 45 feet from the fire building. The exposed surface of the structure consisted of vinyl siding, which sustained radiant heat damage.

IMPACT ON INCIDENT

The construction features and building materials, in particular the vinyl siding and combustible sheathing, contributed to the rapid spread of the fire.

The fire expanded beyond the point of origin vertically and horizontally along the siding and into the attic through the vented soffits. Once in the attic, the fire continued to grow, compromising the integrity of the lightweight roof trusses, which led to the partial collapse of the roof components over the Master Bedroom.

The combustible sheathing allowed the fire to enter the interior of the house through the structural wall components.

The Reserve Engine Officer viewed Side Charlie from a position inside the fence, near the C/D corner; the Officer did not complete a full, 360° walk-around size-up. From that vantage point, the topography of the lot, the large deck, and construction features of the structure limited the Officer's ability to view portions of the first floor, particularly from the Sunroom toward Side Bravo.

OPERATIONS

This segment of the report addresses factors that impacted on-scene operations, including the number of personnel on the scene, strategy and tactics, and the incident command structure. This Chapter also addresses the initial treatment and transport of injured personnel.

EFFECTIVE FIREFIGHTING FORCE

Fire and rescue work is task-oriented and labor intensive, performed by personnel wearing heavy, bulky Personal Protective Equipment (PPE). Many critical fireground tasks require the skillful operation and maneuvering of heavy equipment.

The speed, efficiency, and safety of fireground operations are dependent upon the number of firefighters performing the tasks. If fewer firefighters are available to complete critical fireground tasks, those tasks will require more time to complete. This increased time is associated with elevated risk to both firefighters and civilians who may still be trapped in a structure.

To ensure civilian and firefighter safety, fireground tasks must be coordinated and performed in rapid sequence. Without adequate resources to control the fire, the structure and its contents continue to burn. This increases the likelihood of a sudden change in fire conditions, the potential for failure of structural components leading to collapse, and limits firefighters' ability to successfully perform a search and potential rescue of any occupants.

Two factors drive the availability of resources; individual unit staffing and the number of units dispatched to an incident. The National Fire Protection Association (NFPA) develops consensus-based codes and standards, which provide guidance with regard to both unit staffing and appropriate dispatch complements.

NFPA 1500, *Fire Department Occupational Safety and Health Program* recommends that "a minimum acceptable fire company staffing level should be four members responding on or arriving with each engine and each ladder company responding to any type of fire."⁹

NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, applies principles of fire behavior and emergency medicine to the basic resource requirements for effective fire and emergency service deployment. The *Standard* does not define the composition of the initial alarm assignment. Rather, it lists the tasks the initial alarm assignment should be able to complete for a 2,000 square foot structure without a basement or exposures (e.g., "establishment of an

⁹ NFPA 1500 A.8.5.1.1.

uninterrupted water supply”).¹⁰ Based on the list of tasks required, the *Standard* recommends fire suppression units to be staffed with a minimum of four personnel.¹¹ Additionally, the *Standard* recommends that departments also set specific response time goals, including having the capability to deploy a full structural alarm assignment within eight minutes, 90 percent of the time.

NFPA 1720 is the *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments*. This *Standard* does not include specific staffing recommendations. Instead, NFPA 1720 places the onus of determining the staffing and response time capabilities that ensure a sufficient number of members are available to operate safely and effectively on the local jurisdiction.¹²

On December 6, 2005, the Loudoun County Board of Supervisors adopted the *Loudoun County Fire and Rescue Service Plan*. The *Plan* is primarily a budget and planning tool, but it defines Countywide levels of service and associated resource requirements. At the time, the County determined that the Fire and Rescue System aligned more closely with NFPA 1720 than with NFPA 1710 and adopted the staffing levels, response times, and expected achievement goals shown in Table 6. Note that “response time” begins when the incident is dispatched and ends when the first unit actually arrives on the scene. Demand zones are determined based on population density.

Table 6: Adopted Response Time Goals¹³

Response Time per Demand Zone	Staffing Level	Response Time	Achievement %
Urban	15 firefighters	9 minutes	90
Suburban	10 firefighters	10 minutes	80
Rural	6 firefighters	14 minutes	80
Remote	4 firefighters	*	90
Special Risk	TBD	TBD	90
* (Remote) Upon assembling the necessary resources at the emergency scene, the fire department should have the capability to safely commence an initial attack within two minutes.			

Minimum Staffing Requirements

FRG 1.2.1, *Minimum Apparatus Staffing*, defines staffing requirements for the Countywide Fire and Rescue System, as outlined below. Units responding with fewer personnel than the minimum must notify the ECC that they are understaffed.

¹⁰ NFPA 1710, 5.2.4.2.

¹¹ NFPA 1710, 5.2.3.

¹² NFPA 1720, 4.3.

¹³ *Loudoun County Fire and Rescue Service Plan*, 23.

Engine Company: Three firefighters certified at the level of Firefighter I or greater. The driver must be certified as an Emergency Vehicle Operator.

Truck Company: Three firefighters certified at the level of Firefighter I or greater. The driver must be certified as an Emergency Vehicle Operator.

Medic Unit (Advanced Life Support – ALS): Two personnel; one certified as an Emergency Medical Technician – Basic, and one certified, locally authorized ALS provider. The driver must be certified as an Emergency Vehicle Operator.

Ambulance (Basic Life Support – BLS): Two personnel; one certified as an Emergency Medical Technician – Basic, and a driver certified as an Emergency Vehicle Operator.

Rescue: Three personnel, trained to the standards of the host volunteer company. The driver must be certified as an Emergency Vehicle Operator.

General Order 2008-007, *Minimum Staffing Guidelines*, establishes staffing requirements for the Department of Fire, Rescue, and Emergency Management (see page 18). In May 2008, the minimum staffing complement for engine, truck, and rescue companies was three personnel, to include at least one officer (Lieutenant or above), one driver/operator, and one firefighter.

On August 12, 2008, LCFR issued General Order 2008-019, *Emergency Staffing Changes*, which increases the minimum staffing complement for truck and rescue companies from three personnel to four.

Meadowood Court Response

The initial dispatch complement for Meadowood Court included four engines, one aerial apparatus, one rescue squad, one Basic Life Support (BLS) unit, and one command officer. This is consistent with the recommended minimum resource complement defined by the NOVA *Fires in Single Family Dwellings Manual*. Additionally, no unit indicated that they were “understaffed.”

The first-arriving fire suppression units initiated fireground operations with only six personnel. Within the first 10 minutes of their arrival on the scene, the three-person crew of Reserve Engine 6 was required to complete multiple, critical fireground tasks, as listed below:

- Established a water supply (Driver/Operator)
- Transmitted an on-scene report, building description, situation report, and developed initial action plan (Officer)
- Established incident command (Officer)
- Directed tasks to be performed by subsequent arriving crews (Officer)
- Carried firefighting tools (Firefighter)

- Performed forcible entry (Firefighter and Driver/Operator)
- Calculated fire flow, established, and maintained pump operations (Driver/Operator)
- Deployed and advanced an initial hoseline to the second floor of the structure (Driver/Operator deployed, Officer and Firefighter advanced)
- Initiated fire attack on the second floor of the structure (Officer and Firefighter)
- Ventilated a Master Bedroom window (Officer)
- Deployed a back-up hoseline to the front door for use by incoming units (Driver/Operator)
- Deployed an exposure hoseline to Side Bravo for use by incoming units (Driver/Operator)
- Placed a ground ladder on Side Charlie (Driver/Operator)
- Maintained situational awareness, formulated an alternate escape route, and self- rescued from a life threatening environment (Officer and Firefighter)

Within the first nine minutes of their arrival on the scene, the three-person crew of Tower 6 was also required to complete multiple, critical fireground tasks, as listed below:

- Entered the structure and advanced to the second floor to initiate a primary search for victims (Officer and Firefighter)
- Carried tools (Officer and Firefighter)
- Performed ventilation of the second floor windows (Firefighter)
- Checked for fire extension (Officer and Firefighter)
- Placed ground ladders on Side Alpha of the structure (Driver/Operator)
- Performed ventilation of windows on Side Alpha (Driver/Operator)
- Placed the aerial ladder in operation (Driver/Operator)
- Maintained situational awareness, formulated an alternate escape route, and self- rescued from a life threatening environment (Officer and Firefighter)

Despite the dispatch complement, lack of understaffed units, and tremendous efforts by the crews from Reserve Engine and Tower 6, there were insufficient personnel on the scene to accomplish critical tasks. The following are just two examples that illustrate this point.

1. Both the Reserve Engine and Tower Officer were engaged in tactical operations which diminished their ability to supervise, observe the changes in the fire conditions, maintain overall situational awareness, and provide command with ongoing status reports. The Reserve Engine Officer was heavily involved in moving the attack hoseline through the structure, which limited the Officer's ability to evaluate rapidly changing environmental conditions.
2. The Reserve Engine and Tower Driver/Operators performed critical fireground tasks (e.g., ground ladder placement) due to insufficient staffing levels on the fireground. This is consistent with standard practice in Loudoun County. While these tasks were critical to the successful firefighter self-rescue effort, the pump panel was

unattended. In the event of an unexpected or catastrophic event (e.g., hoseline rupture, interruption of water supply, pump failure, etc.), corrective action would have been delayed until the Driver/Operator returned to the apparatus.

Recommendation: Increase the System-wide minimum staffing level to at least four qualified firefighters on all fire suppression units, including engine, truck, and rescue companies. There are many factors that must be considered in determining unit staffing levels and dispatch complements. Regardless, the goal is to have an adequate amount of personnel, apparatus, and equipment on the scene to assure responder and citizen safety and accomplish necessary tasks. The first-arriving units to Meadowood Court had to complete multiple, critical, fireground tasks simultaneously. Increasing the number of personnel per unit to align with national standards will increase the efficiency of task completion, improve personnel and civilian safety, and support an officer's ability to direct operations and provide necessary personnel supervision.

STRATEGY AND TACTICS

Officers use industry-accepted guidelines, collectively known as “strategy and tactics,” to mitigate emergency incidents. *Strategies* are overall objectives, initially determined by the first arriving officer and subsequent command officers until the incident is successfully mitigated. *Tactics* are specific actions that support the overall strategy.

Officers determine appropriate strategies and tactics based on industry-accepted incident priorities. These are:

1. Searching for and rescuing threatened occupants.
2. Stabilizing the incident.
3. Conserving property.

One commonly used mnemonic to remind officers of these priorities is “RECEO-VS,” which stands for Rescue, Exposures, Confinement, Extinguishment, Ventilation, and Salvage.

Strategy and Tactics on Meadowood Court

On arrival, the Reserve Engine Officer made the strategic decision to implement an offensive fire attack, whereby personnel would enter the structure to search for victims, confine, and extinguish the fire. To support this strategy, the Officer made the tactical decision to advance a 1 ¾ inch hoseline to the second floor and directed the Tower to perform a primary search to look for victims that may still have been inside the house.

The Reserve Engine Officer did not detect the fire in the Sunroom and personnel bypassed fire on the first floor, advancing to the second floor for fire attack. As a result, the fire on the first floor progressed unchecked until it reached flashover. In post-incident interviews, the Officer stated that if the fire on the first floor had been

recognized, the Officer would have implemented an alternative strategic and tactical plan.

Prior to the evacuation, personnel from various units ventilated the structure, as described below. The ventilation of the windows on the second floor supported the search and fire attack operations. With the exception of the opening of the front door to allow entry into the structure, no other ventilation of the first floor was initiated prior to flashover.

1. The Tower Driver/Operator placed an extension ladder to the second floor bedroom window on Side Alpha (Bedroom 3), removing approximately 2/3 of the glass from the window opening.
2. From the interior, the Tower Firefighter ventilated a window in Bedroom 1 to facilitate search and rescue operations.
3. The Reserve Engine Officer moved ahead of the hoseline and ventilated a window in the Master Bedroom to facilitate fire suppression efforts and improve visibility.
4. The Reserve Engine Driver/Operator placed an extension ladder to the second floor bedroom window on Side Charlie (Bedroom 2), which broke, but did not remove, the glass.

SIMULTANEOUS INCIDENTS – UNITS OUT OF ORDER

The *NOVA Manuals* identify assignments based on the order in which apparatus are expected to arrive on the scene, expressed by the order units are dispatched.

Due to the diversion of units from the Ross Department Store and add-on units to Meadowood Court, the order in which apparatus arrived on Meadowood Court did not match the original dispatch order. As an example, ECC advised Engine 18 that they would probably be first due; in fact, they arrived third.

Personnel indicated that they were not aware of the actual order that units arrived on the scene. As a result, unit officers were unclear about which assignment to assume.

Recommendation: Develop and implement System-wide procedures that address modifications to the arrival sequence and/or original dispatch complement. Eventually, Automatic Vehicle Locator (AVL) technology may eliminate this problem by providing real-time data on the location of apparatus and anticipated arrival order. Until AVL technology is in place, alternative solutions, such as units verbalizing their assigned task upon arriving on the scene (e.g., water supply, RIT) should be implemented.

EMS – INITIAL TREATMENT AND TRANSPORT OF INJURED PERSONNEL

There were a total of seven personnel injured during the course of the incident on Meadowood Court; five of the six personnel were transported to local and regional hospitals; one was treated on the scene, but was not transported. The seventh was injured during the incident, but did not report the injury until after the incident concluded.

The specific medical treatment provided to injured personnel is outside the scope of this *Report*. This section addresses the management and coordination of EMS resources on the scene and the process by which additional resources were requested and obtained.

Initial EMS Response to Meadowood Court

An ambulance from Station 13 was dispatched on the first alarm assignment. Medic 13-1 responded with four personnel, including two ALS providers, and was the first EMS transport unit to arrive on Meadowood Court.

13:13:55 – Upon Medic 13-1's arrival, the driver positioned the apparatus out of the way on McConnell Way near Parkers Ridge Drive. All four personnel stayed with the unit to provide traffic control. The following transmission was made on 6-Delta:

"Medic 13-1's on the scene, staging."

Coordination of EMS Resources

EMS601 cleared the Ross Department Store incident and responded to the Meadowood Court incident.

13:18:54 – EMS601 arrived at Meadowood Court and began trying to coordinate EMS activities on the scene, transmitting the following on 6-Alpha:

"EMS601 Loudoun, go ahead and assign me another channel for medical. Get all the medical units (unintelligible) over to that channel."

13:19:02 – ECC replied:

"OK"

Requests for Additional EMS Units

Analysis of radio transmissions revealed that multiple personnel on the scene of Meadowood Court contacted the ECC on various radio channels to request additional EMS resources. Field units also contacted the ECC to add on to the call.

13:19:15 – EMS601 requested a second medic unit on 6-Alpha:

"Also start me a second medic unit."

13:19:19 – ECC replied:

"OK"

13:19:46 – In response to reports of injured firefighters, Command also requested additional EMS resources:

"Command to Loudoun - go ahead and strike a second alarm, give me an EMS task force with at least 2 ALS units. At this time, pre-alert a helicopter."

13:19:54 – ECC responded:

"You got it sir, and I got Medic 13-1 is on the scene."

13:20:31 – ECC dispatched a second EMS unit, Medic 6-3, on 6-Alpha:

"Medic 6 respond, 6-(pause), 6-David, Box 22-03 to assist on the house fire, 4-3-2-3-8 Meadowood Court."

13:20:53 – Medic 13-5 added onto the call on 6-Bravo. Medic 13-5 was the third EMS unit to respond to the incident.

"Loudoun, Medic 13-5. We're responding to the EMS Task Force. We're going to switch over to Delta - there's too much traffic."

13:21:51 – ECC dispatched the second alarm assignment on 6-Alpha. The assignment included a medic unit, which was the fourth EMS unit dispatched to Meadowood Court.

"Engine companies 5, 11, Medic 13, Air Unit 23, respond 6-David, Box 22-03, assist on the house fire, 4-3-2-3-8 Meadowood Court."

13:23:29 – ECC dispatched the EMS Task Force on 6-Alpha, which included two medic units, for a total of six EMS units.

"Medics 13-4, Medic 13-3, respond 6-David, Box 22-03, to assist on the house fire 4-3-2-3-8 Meadowood Court."

Requests for Helicopters and Contact with Medical Control

As discussed previously, Command requested that the ECC pre-alert at helicopter at 13:19:46. Loudoun County's *Advanced Life Support General Protocol #8* requires providers to obtain approval from medical control prior to transporting patients via helicopter.

13:25:53 – EMS601 continued attempting to coordinate EMS resources, transmitting the following on 6-Alpha:

"EMS601 to Loudoun, I need Mike and I need you to listen to it, OK?"

13:26:53 – EMS601 contacted INOVA Loudoun Hospital on 6-Mike:

"Hey [name redacted, INOVA Employee], it's [name redacted, EMS601] - we're working a 2 alarm structure fire. We got one definitely burned, several others we're evaluating right now. I'm going to call for helicopters to fly the burned ones out so I'll be giving you a more detailed report a little bit later. We may have up to 5 patients."

13:27:09 – INOVA Loudoun Hospital responded:

"We copy [name redacted, EMS601]. Just let us know - keep us informed."

13:27:45 – EMS601 contacted ECC on 6-Alpha:

"EMS601 to Loudoun on Adam, on Alpha."

13:27:49 – ECC replied:

"EMS601, we copied your traffic on 6-Mike, we are contacting MedSTAR. They did have a helicopter on standby."

13:27:58 – EMS601 acknowledged:

"OK - put 'em in the air and find me a second helicopter to start this way."

13:32:36 – ECC queried Command on 6-Echo:

"[W]hat channel would you like to give for the helicopter LZ? We do not want to do it on Delta, would you like to use this channel or you want us to use Charlie?"

13:33:09 – Command replied:

"That's fine - have them handle and make that a separate incident. Go ahead and start me a second helicopter - second helicopter - we are going to have two flyouts. Loudoun covers: That's correct - they've already requested that."

Deployment of EMS Resources on the Scene

After hearing the MAYDAY over the radio, the crew from Medic 13-1 gathered their EMS equipment and reported to the Command Post. At the time they arrived, the Tower Officer was receiving initial care and was located in the yard at the C/D corner of the house. The Reserve Engine Officer, Reserve Engine Firefighter, and Tower Firefighter were also receiving initial treatment and were located in front of 43226 Meadowood Court.

EMS601 reported to the Command Post shortly after Medic 13-1. The Incident Commander assigned EMS601 to be the EMS Group Supervisor and requested that EMS601 triage the injured firefighters to determine if additional resources would be required.

Simultaneously, the following radio transmission occurred:

13:29:17 – Medic 6-3 Officer on 6-Delta:

"Medic 6-3 to Command: [name redacted, Medic 6-3 Officer]'s gonna take EMS Command, I'm moving all patients - or, all patients moved to the driveway at 43227 Meadowood Court. I'm gonna move all patients there."

13:29:32 – Command replied:

"OK - I copy. EMS601 is doing a quick lap - he's going to come back and you can have EMS Group at this time."

EMS601 initiated a scene survey to determine the number of patients and the severity of their injuries. While performing the survey, EMS601 encountered personnel from Medic 13-1, who were caring for the Tower Officer on the C/D corner of the structure. None of these personnel were wearing PPE, so EMS601 ordered them away from the structure until the Tower Officer could be moved to a safer location. Personnel from Engine 18, Truck 11 and Rescue 13 worked to move the Officer away from the structure, into the front yard. At that point, providers from Medic 13-1 began their assessment of the Officer. The severity of the Tower Officer's condition required

immediate transport to the regional burn center by helicopter. The Officer was placed into the medic unit for treatment and transport to the helicopter landing zone.

Concurrently, crews from Medics 6-3, 13-3, 13-4, and 13-5 moved the Reserve Engine Officer, Reserve Engine Firefighter, and Tower Firefighter from their location in front of 43227 Meadowood Court into various medic units for treatment and transport. The Tower Firefighter's condition also required immediate transport to the regional burn center by helicopter. The Reserve Engine Officer and Reserve Engine Firefighter were transported to the local hospital by medic units. The Reserve Engine Officer was later transferred from the local hospital to the regional burn center by medic unit.

In addition to the four firefighters injured during initial interior fire suppression operations, three other personnel required medical evaluation and/or transport. These injuries occurred later in incident operations and were unrelated to the MAYDAY event. Their injuries are described below:

- An EMS provider from Medic 13-5 was treated on the scene for respiratory distress, but was not transported to the hospital.
- The Engine 11 Officer sustained a shoulder injury during salvage and overhaul and was transported to the hospital by Ambulance 13-2.
- The Reserve Engine 23 Driver/Operator sustained a wrist injury during the course of the incident, but did not seek medical attention until several days later.

Table 7 summarizes all of the injured personnel by hospital destination and mode of transportation.

Table 7: Injured Personnel by Hospital Destination and Mode of Transportation

Injured Member	Hospital Destination	Transported By
Tower 6 Officer	Burn Center at Washington Hospital Center	Helicopter
Tower 6 Firefighter	Burn Center at Washington Hospital Center	Helicopter
Reserve Engine 6 Officer	Initially, INOVA Loudoun Hospital. Transferred by ground to Burn Center at Washington Hospital Center.	Medic Unit
Reserve Engine 6 Firefighter	INOVA Loudoun Hospital	Medic Unit
Engine 11 Officer	INOVA Loudoun Hospital	Medic Unit
Medic 13-5 Provider	N/A	N/A
Reserve Engine 23 Driver/Operator	N/A	N/A

Impact on Incident

The first EMS unit to arrive on Meadowood Court (Medic 13-1) did not report to the Command Post until after hearing the MAYDAY. Outside of the *NOVA Operations Manuals*, there are no System-wide policies, procedures, or guidelines that address the actions of EMS units on fire incidents.

Recommendation: Develop and implement System-wide policies and procedures that address the actions required of EMS units upon arrival at a structure fire. Such policies should include the following:

- Don PPE.
- Report to the Command Post with EMS equipment.
- Recommended complement of EMS equipment.
- Notify the Incident Commander whether personnel are qualified to enter an environment that is Immediately Dangerous to Life or Health (IDLH).
- Position apparatus for rapid egress from the scene to transport injured civilians or personnel.

During incident operations, multiple personnel requested EMS resources. As a result, neither the Incident Commander nor EMS601 knew how many EMS resources had been requested, which units were dispatched, or which units were responding.

Prior to or immediately following the MAYDAY, the ECC dispatched a total of six EMS units to Meadowood Court, which resulted in five ALS units (Medics 13-1, 13-3, 13-4, 13-5, and 6-3) available on the scene to treat the four personnel injured during interior operations. Additional EMS units responded later in the incident to support personnel who continued to operate on the scene.

Recommendation: Develop and implement System-wide training that addresses the roles and responsibilities of EMS officers during fire incidents.

As the command structure expands to include divisions and groups, it is imperative that personnel direct resource requests and progress reports through the appropriate supervisor. Supervisors must funnel those requests up to the Incident Commander. This process ensures that resources are requested in a coordinated manner, assigned appropriately, and helps to maintain personnel accountability.

The requirement to contact medical control prior to transporting patients by helicopter can complicate coordination efforts and contribute to delays in the rapid transport of patients.

Recommendation: Review the County's EMS protocols, specifically those related to helicopter transports and burns. In particular, the review should address:

- Establishing standing orders authorizing when patients can be transported by helicopter without receiving on-line medical control permission.
- Evaluate transport criteria to include destination determinations (i.e. burn center) for burned firefighters.

INCIDENT COMMAND SYSTEM

According to NFPA 1561, *Standard on Emergency Services Incident Management System*, an Incident Command System (ICS) “defines the roles and responsibilities to be assumed by responders and the standard operating procedures to be used in the management and direction of emergency incidents and other functions.”

Command Officers in Loudoun County

The County's current dispatch algorithms include one command officer, the EMS Battalion Chief, and a Safety Officer on all structure fires.

The career Battalion Chiefs have developed a practice where the next closest Battalion Chief will self-dispatch and respond on structure fire calls. This practice has its limitations. First, Battalion Chiefs are required to self-dispatch so there is no assurance a second chief will be available or geographically positioned to respond. Second, this practice does not extend beyond 1800 hours, when only one career Battalion Chief is on duty.

In addition, Loudoun County encompasses 517 square miles, so it is not uncommon for command officers to have extended response times. Initial Incident Commanders may be required to operate alone for a prolonged period of time at the Command Post.

On the Meadowood Court incident, the Incident Commander (IC) had to accomplish multiple critical tasks.

Within two minutes of assuming command from the Reserve Engine Officer, Chief 11 was responsible for:

- Directing and controlling incident operations.
- Maintaining personnel accountability.
- Monitoring radio transmissions.
- Managing a MAYDAY with multiple firefighters trapped.
- Managing the Emergency Evacuation of personnel from the structure after a reported structural collapse.
- Assigning and activating the RIT.

Over the next five minutes, the IC (Chief 11) was responsible for:

- Responding to an Emergency Activation from Rescue 13.
- Requesting additional resources, to include EMS for the injured personnel.
- Maintaining situational awareness, including changing fire conditions and incident priorities.

It is impossible for a single individual to process such a large volume of information and effectively manage so many concurrent tasks without missing critical information and/or adversely impacting fireground operations. Supplementing the Command Post with additional personnel who function as an incident management team would assist the Incident Commander and help to ensure that critical tasks are accomplished.

Recommendation: Increase staffing at the Command Post by developing incident management teams. This can be accomplished in a variety of ways, including:

- Assigning a Command Aide to all command officers in the County.
- Adding a second command officer to all structure fire assignments.
- Using on-scene resources, such as the first-arriving EMS unit, to assist the Incident Commander.

FIREFIGHTER SAFETY

This Chapter discusses several closely related topics, all of which pertain to the issue of firefighter safety.

Two-In/Two-Out

The Virginia Occupational Safety and Health Commission (VOSH) establishes staffing parameters for interior fire suppression operations. Commonly referred to as “Two-In, Two-Out,” 29 CFR 1910.134(g)(4) states that:

“At least two employees enter an atmosphere that is Immediately Dangerous to Life or Health (IDLH) and remain in visual or voice contact with one another at all times; At least two employees are located outside the IDLH atmosphere; and, All employees engaged in interior structural firefighting use SCBAs.”

The Code further states one of the individuals located outside the IDLH atmosphere can be assigned an additional role (e.g., a driver/operator), so long as the individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident. Finally, the Code notes that firefighters are permitted to enter an IDLH atmosphere and perform “emergency rescue activities” prior to assembling a complete Two-Out team.

Two-In/Two-Out Compliance

Upon arrival, the Reserve Engine Officer noted that no one had met fire department personnel to confirm that no one was still inside the house. As a result, the Officer transmitted the following:

"Reserve Engine 6 to Tower 6. Nobody out here to meet us. Gonna need to do a search."

Loudoun County has no policies or procedures that require a unit officer to verbalize compliance with the Two-In/Two-Out requirement.

Recommendation: Develop and implement formal, System-wide policies and procedures related to Two-In/Two-Out compliance. Such policies and procedures should address the following:

- Require verbalization of Two-In/Two-Out compliance over the tactical radio channel.
- Require the “Two-Out” crew to accept that assignment over the tactical radio channel or face-to-face.
- Provide direction, which clarifies acceptable practice with regard to entering an IDLH without a Two-Out team as well as when multiple teams are operating in an IDLH prior to establishing a Rapid Intervention Team.

CREW INTEGRITY

Maintaining crew integrity is critical to ensuring firefighter safety. As discussed previously, 29 CFR 1910.134 requires that crews operating in an IDLH maintain visual or voice contact with one another at all times. Commonly accepted practice in Loudoun County allows for touch, or physical contact, as a third method of maintaining crew integrity. The deciding factor(s) in determining the method of integrity include the crew’s experience level and environmental conditions. As either variable changes, crews may elect to switch modes.

Reserve Engine 6

The Reserve Engine Officer and Firefighter entered the structure together and remained together as they advanced the hoseline up to the second floor. After moving a few feet into the Master Bedroom, the Officer physically separated from the Firefighter on two occasions, remaining in voice contact both times. The first time was to ventilate a window in the Master Bedroom and the second was to check on the status of the search by the Tower crew.

Tower 6

The Tower Officer and Firefighter entered the structure separately, with the Firefighter entering first, along with the Reserve Engine crew. The Tower Officer entered the structure and activated the Thermal Imaging Camera (TIC) at the base of the staircase and reported seeing the three other personnel advancing up the stairs. The Tower Officer followed the three up to the second floor, made contact with the Tower Firefighter, and maintained crew integrity throughout the search of the second floor. After completing the search of Bedroom 3, the Tower crew noted an increase in heat conditions. They also realized the need to exit the structure to obtain additional tools. The crew moved down the hallway, toward the stairs. As they passed the Master Bedroom, they encountered the crew from Reserve Engine 6.

Personnel reported experiencing a rapid increase in heat and smoke conditions and observed fire coming from the open foyer, over the banister, and partially up the interior

staircase. Personnel from the Tower report that they retreated to the Master Bedroom, seeking refuge from the intense heat in the hallway. The Tower Firefighter transmitted a MAYDAY, as directed by the Reserve Engine Officer. The Reserve Engine crew moved out of the bedroom and attempted to attack the fire in the staircase, which was blocking their means of egress. The Tower crew followed them into the hallway, with personnel lined up in the doorway outside the Master Bedroom. The Tower Officer was the last in line, located in the vicinity of the door to the Master Bedroom.

Tower Officer Separated

Following the MAYDAY, neither the Reserve Engine crew nor the Tower Firefighter had any additional contact with the Tower Officer. Given the Tower Officer's location in the hallway, the Officer was exposed to intense heat and fire. The Officer reported retreating back into the Master Bedroom to seek refuge from the heat. There is evidence that a partial ceiling and structural collapse occurred, which physically separated the Tower Officer from the personnel in the hallway.

During the investigation, the Officer's helmet light was found in the Master Bedroom in the area of the collapse, under a pile of ceiling debris. Additionally, BC601 reported a structural collapse on Side Charlie shortly after the MAYDAY and prior to the Officer exiting the structure.

Tower Firefighter Follows the Reserve Engine Crew

The Tower Firefighter followed the Reserve Engine crew down the hall. The three personnel stayed together and exited the structure via a ground ladder.

SITUATIONAL AWARENESS

Situational awareness can be described as having knowledge of the surrounding environment. Personnel must be aware of what is happening around them and understand how information, events, and their actions or inactions may impact operations throughout an emergency incident. The ability to understand these relationships when confronted with complex and multiple factors is critical in making decisions during emergency incidents.

General

Personnel arrived on scene prepared to initiate tactical operations. They entered the structure with tools and equipment appropriate to confine and extinguish a fire in a single family dwelling. These tools included hooks, irons, and an attack hoseline. The term "irons" typically refers to the combination of a flat-head axe and Halligan bar, which is a multipurpose tool that has a claw at one end and a blade and tapered pick at the other end. In this case, the Tower Firefighter carried a set of "commercial" irons, which consisted of an 8-lb sledgehammer and a Halligan bar. In post-incident interviews, the

Tower Firefighter indicated that, in retrospect, the sledgehammer was not the most appropriate tool for a residential structure fire.

Personnel recognized the need to don their Personal Protective Equipment (PPE), to include their Self Contained Breathing Apparatus (SCBA).

Awareness of Incident Priorities

Nobody met fire department personnel before they made entry into the structure to inform them that the house was empty. The Reserve Engine Officer had not received any of the information ECC had obtained from the 911 caller, indicating the location of the fire or that the occupants were out of the house. As a result, the Reserve Engine Officer recognized the need to perform a primary search to locate potential victims and directed the Tower to accomplish that task.

Concurrently, the Reserve Engine Officer recognized the need to confine and extinguish the fire, ordering the Reserve Engine crew to advance an attack hoseline.

The Reserve Engine Officer recognized the need to engage in tactical operations, rather than take Command on the exterior. As such, the Officer voiced the need to transfer Command "ASAP."

Awareness of Fire Conditions Prior to Entry

On arrival, the Reserve Engine Officer performed a partial walk around size-up of the structure, walking across the front of the house (Side Alpha), to the side yard (Side Delta), through the fence gate toward the rear of the house (Side Charlie). The Officer positioned about 15 feet inside of the gate on Side Charlie near the C/D corner, then turned around and returned to Side Alpha.

From the Officer's vantage point at the C/D corner, the topography of the lot, the large deck, and construction features of the structure limited the Officer's ability to view portions of the first floor, particularly from the Sunroom toward Side Bravo (see Figure 22). Since the Officer was unable to see all of Side Charlie, the Officer did not observe the fire in the Sunroom on the first floor.

Figure 22: Side Charlie



Recommendation: Reiterate the importance of visualizing the entire structure prior to making entry. Clearly, this will not always be feasible, particularly with larger homes, odd lots, and different types of occupancies (e.g., multi-family, commercial, educational, industrial, etc.). In instances where the first-arriving officer cannot visualize all sides of the structure, interior fire suppression operations should not commence until the officer receives a report from the opposite side of the structure, unless an obvious life safety issue exists (e.g., visible victims requiring immediate assistance).

Awareness of Fire Conditions on Entering the Structure

If firefighters encounter smoke conditions on a floor, further investigation must be performed to ensure fire is not present on that floor or on a floor below them.

On entering the structure, the Reserve Engine Officer and Firefighter, along with the Tower Firefighter, all noted moderate to heavy smoke conditions on the first floor; the Tower Officer noted a “crackling” sound toward Side Charlie and smoke banked down nearly to the floor. None of the personnel recognized the signs indicating that there was fire on the first floor.

Recommendation: Develop a System-wide training program that focuses on situational awareness, particularly how to “read” interior and exterior smoke conditions to identify the location and predicted spread of a fire.

Awareness of Changing Fire Conditions

While in the Master Bedroom, the Reserve Engine Officer requested an assessment of conditions from the Incident Commander. Shortly thereafter, crews experienced a rapid increase in heat and smoke conditions and observed fire coming up the open foyer,

through and over the banister, and partially up the interior staircase. Personnel quickly recognized that conditions were life threatening, initiated an evacuation of the structure, and transmitted a MAYDAY.

Awareness of Self-Rescue Techniques

After calling the MAYDAY, personnel remained calm, and attempted to exit down the stairs to the front door. When this became impossible, personnel modified their egress plan and retreated to Bedroom 2.

While moving towards Bedroom 2, the Reserve Engine Officer opened the first door personnel encountered. The Officer swept the floor with a gloved hand, noting that the floor felt like some type of tile, which meant that the room was probably a bathroom. The Officer recognized that the bathroom was unlikely to contain an exterior opening for egress and continued to lead personnel down the hallway toward Bedroom 2.

Once all three personnel were inside Bedroom 2, the Tower Firefighter attempted to close the door behind them, providing some relief from the intense heat. The Reserve Engine Officer began searching the room for a means of egress from the structure. The Officer reported hearing glass break, at which point the Officer moved in that direction and located a window, leading to Side Charlie. The Officer and the Tower Firefighter cleared the blinds and glass from the window frame and instructed the Reserve Engine Firefighter to perform an emergency ladder bail.

During the ladder bail, the Reserve Engine Firefighter's hand was caught between the ladder and the window; the Firefighter also partially overshot the ladder. The Reserve Officer recognized that there was a problem, freed the Firefighter's hand and assisted the Firefighter back on the ladder. The Tower Firefighter then performed a ladder bail.

Once both Firefighters had exited the structure, the Reserve Engine Officer made several attempts to contact the Tower Officer before being forced out by the high heat and fire conditions. The Officer climbed down the ladder and joined the two Firefighters in the yard on Side Charlie.

Awareness of Crew Integrity

Personnel maintained crew integrity until being physically separated due to fire conditions and a structural collapse.

After exiting the structure, the Reserve Engine crew and Tower Firefighter notified personnel on Side Bravo that the Tower Officer was still missing.

MAYDAY

The fire service uses the term "MAYDAY" to indicate that firefighters have experienced some type of life-threatening emergency. There is a narrow window of opportunity for

survival when a firefighter is trapped, disoriented, or low on air. Individual firefighters must not delay reporting their need for assistance. Similarly, officers must not delay reporting the fact that they cannot account for members of their crew.

A MAYDAY situation requires a strategic change in the Incident Action Plan. After a MAYDAY is issued, the incident has a known rescue situation. The Incident Commander has a monumental task keeping personnel on the scene focused on their specific role, whether it be firefighting operations or firefighter rescue.

MAYDAY Timeline

Interior units transmitted one MAYDAY transmission along with several related transmissions, as discussed below.

13:16:43 –Tower Firefighter:

"MAYDAY, MAYDAY, MAYDAY, Engine 6, Tower 6 second floor."

13:16:47 – Command:

"Command acknowledged MAYDAY, Engine 6, second floor. Rescue, need you in there for RIT activation ASAP."

13:16:55 – Battalion Chief 601:

"Battalion 601 to Command - evacuate, structure collapse rear, evacuate."

13:17:14 – ECC:

"Loudoun to Chief 11, did you copy everything?"

13:17:18 – Command:

"Sir - I'm trying to get radio traffic. Command to all Loudoun - all units operating on the fireground, evacuate the structure ASAP, we do have a RIT activation from Engine 6. Need an accountability on Reserve Engine 6."

13:17:30 – Tower Firefighter:

"Second floor's cut off, get a line up here!"

13:17:39 – Command:

"10-4 we got ladders. Gonna be on Side A, David Quadrant, Side A, David Quadrant."

13:17:47 –Tower Firefighter:

"Negative, need 'em Side Baker, Charlie."

13:18:50 – Command:

"Command to Reserve Engine 6, your status? I got units en route to you."

13:18:54 –Tower Firefighter:

"(Unintelligible), Side Charlie out the 2nd floor ground ladder."

MAYDAY Template

The following MAYDAY template is taken from the NOVA *Rapid Intervention Team (RIT) Manual*:

- MAYDAY, MAYDAY, MAYDAY
- Unit number repeated three times, (Engine 699, Engine 699, Engine 699)
- Location (Floor 2, Quadrant Bravo)
- Nature of emergency (Cut off by collapse, down to 1500 lbs. of air)
- MAYDAY, MAYDAY, MAYDAY, Command acknowledge

After the radio transmission, the *Manual* directs that the firefighter is to activate the microphone on his/her radio portable and briefly transmit the PASS device alarm to get the attention of other firefighters or Command.

From the recorded radio traffic, it is not possible to determine whether the Tower Firefighter's MAYDAY fully conformed to the template above, as the latter portion of the transmission is unintelligible. Regardless, the Firefighter effectively communicated that the crew had experienced some type of emergency and that the crew was on the second floor.

A post-incident review of the SCBA worn by the four interior firefighters did not reveal whether or not a PASS device had been activated. During post-incident interviews, none of the firefighters recalled activating their PASS device, intentionally or unintentionally, which is inconsistent with the NOVA guidelines.

Recommendation: Implement ongoing, mandatory, System-wide training on NOVA MAYDAY procedures and self-survival techniques. In post-incident interviews, all four interior personnel credited their escape from the structure with ongoing self-survival training.

Command Reaction to the MAYDAY

Following a MAYDAY, the *NOVA Rapid Intervention Team Command and Operational Procedures Manual* (NOVA RIT Manual) requires the Incident Commander to do the following:

- Perform a Personnel Accountability Report (PAR) check.
- Have the dispatch center initiate an emergency fire ground announcement that a MAYDAY event has occurred.
- Redirect the Incident Action Plan and incident priorities to a high priority search & rescue operation.
- Have the ECC and/or command post monitor all radio channels.
- Assign the RIT to search and rescue operations in the known area or last known area where firefighters need assistance.
- Assign relief crews to the RIT Group.
- Immediately request additional appropriate resources.
- Initiate and/or maintain fire attack positions and reinforce with extra alarm companies as needed.
- Expand the command organization.
- Withdraw and control unassigned resources from the search and rescue area;
- Maintain strong supervision in all work areas.
- Maintain an ALS capability for ready treatment of the trapped firefighter.

Immediately after the MAYDAY transmission, the Incident Commander acknowledged the MAYDAY and began to assign resources to firefighter rescue (see Rapid Intervention Team, Page 70). The Incident Commander then requested “an accountability on Reserve Engine 6,” but did not initiate a PAR Check.

Recommendation: Develop System-wide quick-reference guides for all command vehicles that address low-frequency, high-risk incidents, including MAYDAY situations, building collapse, etc. Quick-action guides and other reference materials ensure that Incident Commanders achieve necessary benchmarks.

EMERGENCY SIGNAL ACTIVATION (EA)

Loudoun County utilizes the 800 MHz radio system for both mobile and portable radios; all radios are equipped with an Emergency Activation (EA) button. When depressed, the Emergency Activation button transmits an emergency signal to all dispatch consoles that have been programmed for that talkgroup, regardless of the jurisdiction to which the talkgroup is assigned or whether the talkgroup is monitored. If the user changes talkgroups during an EA, the emergency signal will move to, and continue on, the newly selected talkgroup without having to depress the EA button again. Most importantly, the EA gives the user priority over all other radios on the channel for as long as the EA remains active (also known as “ruthless pre-emption”).

Recommendation: Reprogram the portable radios so that the microphone is automatically open for a period of time after the EA is depressed. If personnel are attempting to exit the IDLH, the “hot mic” feature would help them to transmit key information while moving.

Rescue 13 Emergency Activation

The only EA on the Meadowood incident was transmitted by Rescue 13.

13:20:13 – EA received from Rescue 13-Officer portable.

Consistent with Standard Operating Procedure 04.00.05, *Response to Emergency Signal Activations*, the ECC notified the Incident Commander of the affected unit's alias or numerical radio via tactical radio channel. The Incident Commander quickly took action to determine the nature of the EA.

13:20:30 – Command:

"Command to Rescue 13 Officer, confirm or deny?"

In post-incident interviews, the Incident Commander indicated being able to visually confirm that the EA transmission was unintentional. It is not clear whether the EA was reset, but there were no further data or verbal transmissions about the EA on any of the monitored radio channels.

Lack of Additional EAs on Meadowood Court

In post-incident interviews, numerous personnel on the scene reported frustration over the volume of radio traffic and their subsequent inability to transmit critical messages. Transmitting an EA would have helped interior personnel avoid the “busy” tone.

Recommendation: Develop ongoing, System-wide training programs to reiterate the importance of transmitting an EA as soon as firefighters realize they are in trouble.

EMERGENCY EVACUATION

There are two modes by which personnel are ordered to leave a structure during fire suppression operations – withdrawal or emergency evacuation. The withdrawal of firefighters occurs when personnel are no longer able to safely control a situation, due to fire spread, building compromise, etc. or when personnel decide to switch from offensive to defensive operations. Personnel exit the structure in a relatively orderly manner, taking their tools and equipment with them.

Conversely, an emergency evacuation is ordered when some type of emergency has occurred or is about to occur, such as a MAYDAY, explosion, or collapse. In an emergency evacuation, personnel abandon their tools and equipment and immediately exit the structure as quickly as possible. Many departments have adopted policies that require apparatus driver/operators sound their air horns after a radio announcement ordering an emergency evacuation. Sounding the apparatus air horns helps to alert personnel operating on the fireground who may not be able to hear the radio transmissions.

Emergency Evacuation Policies and Procedures

Neither the Department nor the System has formally adopted any policies, procedures, or guidelines regarding the emergency evacuation or withdrawal of firefighting personnel from structures during incident operations. Further, none of the NOVA operations manuals contain specific procedures in the event of an emergency evacuation or withdrawal.

The only mention of an emergency evacuation is under Section 4.4.5.13 of the NOVA *Command Officer Operations Manual*, which discusses the need for a Personnel Accountability Report (PAR) check after an emergency evacuation.

Within the System, there is a lack of a consistent definition or interpretation of actions to take during a withdrawal versus emergency evacuation. During post-incident interviews, personnel were asked specifically what actions they would take during an emergency evacuation. Some personnel replied they would take the hoselines with them while others answered that they would abandon the hoselines, unless needed for protection to exit the structure.

Further, there is no standard mechanism available to Incident Commanders to call for the orderly withdrawal of personnel due to changes in tactical operations. As a result, Incident Commanders are forced to use the emergency evacuation tones as the sole mechanism to withdraw or evacuate personnel, with no clear delineation between withdrawal and an emergency evacuation.

Recommendation: Develop and implement formal, System-wide policies and procedures addressing the withdrawal and emergency evacuation of firefighters from structures during emergency incident operations. At a minimum, such policies should:

- Define withdrawal and emergency evacuation.
- Identify situations which warrant a withdrawal or emergency evacuation.
- Identify the procedures to execute a withdrawal and emergency evacuation.
- Identify terminology to be used over the radio.
- Identify how personnel on the scene are to react, specifically including the sounding apparatus air horns.
- Identify how personnel in the ECC are to react to a withdrawal or emergency evacuation order, including transmitting evacuation tones.

Evacuation Orders on Meadowood Court

There were multiple evacuation orders issued on Meadowood Court. In post-incident interviews, personnel from several units indicated that they did not hear the verbal evacuation orders and evacuated the structure only after hearing ECC “drop” the evacuation tones.

13:16:55 – Division Charlie (BC601) advised Command of the need to evacuate the structure:

“Battalion 601 to Command, evacuate, structure collapse – rear, evacuate.”

13:17:14 – ECC queried Command:

“Loudoun to Chief 11, did you copy everything?”

13:17:18 – Command acknowledged:

“Sir - I'm trying to get radio traffic. Command to all Loudoun - all units operating on the fireground, evacuate the structure ASAP, we do have a RIT activation from Engine 6. Need an accountability on Reserve Engine 6.”

13:21:08 – Command transmitted the following:

“Command to all units operating on the fireground, we are evacuating the structure, we are going defensive at this time.”

13:21:25 – ECC advised Command:

“Also sir, whenever you're ready, I'm ready to drop the evac tones.”

13:21:32 – Command replied:

"Drop 'em."

13:21:35 – The ECC transmitted the evacuation tones, which consisted of a 15 second “warble” tone followed by:

"Attention all units, attention all units operating at Meadowood Court, evacuate the building immediately. All units evacuate the building immediately. 1321 hours."

In post-incident interviews, the Incident Commander indicated the reason for not asking the ECC to “drop” the evacuation tones immediately after the request from Division Charlie was to avoid covering potential radio transmissions from the MAYDAY firefighters. It is important to note that at least one unit remained inside the structure until the evacuation tones were transmitted by the ECC.

Recommendation: Reiterate that Incident Commanders must take care not to issue conflicting orders on the fireground (e.g., evacuating the structure while sending in a Rapid Intervention Team).

RAPID INTERVENTION TEAM (RIT)

The function of a Rapid Intervention Team (RIT) is to locate and rescue lost, trapped, and/or injured firefighters. When firefighters face MAYDAY situations, rescuing them may require more than basic rescue techniques and training. Firefighters assigned to rescue their fellow firefighters are asked to place themselves in extraordinarily dangerous conditions. For a RIT to be successful, it is essential that team members receive training in rescue tactics, self-survival, self-rescue, and forcible ingress/egress techniques.

The NOVA *RIT Manual* identifies three levels of RIT response.

RIT-Level 1: An Engine Company assigned from the initial alarm on an emergency event to achieve the initial RIT capability. The trigger is an incident dispatch potentially requiring the use of SCBA, to include structure fires, confined space incidents, or hazardous materials incidents.

The initial RIT capability is immediately achieved by the assignment of the 4th Engine Company on all box alarms, or the assignment of one of the first alarm Engine Companies based on the Incident Commander’s strategic priorities to the RIT function. This engine’s primary function is as the RIT assignment. The only deviation to this standard is high-rise fire incidents, when the 1st alarm Rescue Company will normally serve as the initial RIT.

RIT-Level 2: The RIT-Level 2 Task Force consists of an Engine Company, Truck Company, Rescue Company (or a unit with heavy rescue capabilities), Battalion Chief or Command Officer, and one ALS unit.

The purpose of the RIT-Level 2 Task Force is to have an enhanced rescue capability available to the Incident Commander during significant and/or difficult fireground incidents, prior to a lost-trapped event occurring.

RIT-Level 3: The RIT-Level 3 Collapse Rescue Task Force consists of at least two Rescue Companies or units with structural collapse rescue capabilities, a response unit with shoring capabilities, and support resources to include additional rescue tools, technical search equipment, and additional personnel trained in collapse rescue.

RIT Assignment

As dispatched, the 4th due engine to Meadowood Court was Fairfax County Engine 439. Realizing that they were closer than Engine 439, Engine 10 contacted the ECC on 6-Alpha and added on to the Meadowood call. At the time of the MAYDAY, neither engine had arrived on the scene. The only resources available to the Incident Commander were Reserve Engine 23 and Rescue 13. Medic 13-1 was also on the scene but was not staffed with qualified firefighters and could not be utilized for a RIT assignment.

When the Incident Commander acknowledged the MAYDAY, the Incident Commander verbally assigned RIT to Rescue 13, saying:

“Rescue, need you in there for RIT Activation ASAP.”

In post-incident interviews, the Incident Commander noted that it appeared as though the Rescue Officer visually acknowledged the RIT assignment. Photographic evidence indicates that the Rescue Officer was not in the line of sight of the Command Post nor does the Rescue Officer remember hearing or acknowledging the RIT assignment.

Rescue 13 was staffed with a total of five personnel. Two volunteers joined the Rescue’s crew as they were preparing to respond to the Ross Department Store incident. Since the two volunteer members (Firefighter 2 and 3) had not completed Firefighter I, the Officer assigned them to the Rescue Driver/Operator and ordered them to throw ladders on the exterior of the structure.

The Rescue Officer attempted to make entry through a window in Bedroom 3 via a ground ladder but was pushed back by high heat. The Rescue Officer and Rescue Firefighter 1 entered the house through the front door with a water can. After realizing that the water can was ineffective, the crew exited the structure and obtained a hoseline. The crew advanced approximately halfway up the stairs to the second floor

before hearing the emergency evacuation tones, at which point they exited the structure.

The crew from Reserve Engine 23 also attempted to enter the structure through the window in Bedroom 3, but could not due to high heat.

In the midst of Rescue 13 and Reserve Engine 23's efforts to enter the structure, Engine 10 arrived on the scene.

13:17:59 – Engine 10:

"Loudoun, show Engine 10 with three on the scene. We'll be taking RIT."

The Engine 10 Officer proceeded to the Command Post to confer with the Incident Commander, where they decided to position Engine 10's crew in the front yard as a secondary RIT, to protect the primary RIT and other personnel operating on the scene. Upon their arrival, the crew from Wagon 1 joined Engine 10's Officer and Firefighter, for a total of five personnel.

Recommendation: Develop ongoing, System-wide training programs that reinforce the actions expected of units assigned RIT, which are consistent with the NOVA RIT Manual.

Recommendation: Adopt policies and procedures that require the formation of a RIT Group as soon as the RIT is activated. The use of a Group helps to ensure accountability for RIT personnel and coordinate their activities.

RIT Activation

Rescue 13 marked on the scene at 13:16:29, only 14 seconds prior to the MAYDAY; personnel had little time to react to either the MAYDAY or the RIT activation.

Ultimately, the RIT activation had little effect on the incident outcome, as all four firefighters were able to self-rescue from the structure.

ACKNOWLEDGING TASK ASSIGNMENTS

When fireground tasks are assigned, an acknowledgement echoing the message ensures that the communication has been received and understood.

During the Meadowood Court incident, tasks were assigned to units, but not acknowledged, either face-to-face or over the radio, causing a lack of coordination among the units on the fireground.

Recommendation: Develop ongoing, System-wide training programs that reinforce the importance of acknowledging assignments on the fireground by echoing the transmission over the radio or face-to-face.

PERSONNEL ACCOUNTABILITY

The term “personnel accountability” has several meanings in the fire service, which mirror the levels of the Incident Command System (ICS). At its most basic level, accountability refers to a unit officer’s responsibility to supervise personnel, provide for their safety, and maintain communication with Command.¹⁴ At higher levels, accountability requires Division, Group, and Branch supervisors to keep track of the units assigned to their area of responsibility. Finally, at a strategic level, the Incident Commander is responsible for tracking the assignment of units to Divisions, Groups, and Branches.

Personnel Accountability Report (PAR) checks are another component of personnel accountability. PAR checks are radio reports, initiated by the Incident Commander, at predetermined points in the incident. The first PAR check is initiated at the 20-minute mark, followed by PAR checks at the 40- and 60- minute marks. However, the Incident Commander may initiate a PAR check at any time it is deemed necessary, including, but not limited to the following:

- Report of a member or crew missing or trapped.
- When a unit/crew cannot be contacted in the Hazard Zone.
- Sudden hazardous change on the incident scene.
- Incident conditions deteriorate to a point that evacuation is ordered.
- A change from an offensive to a defensive mode.

During PAR checks, unit officers report the total number and accountability of members assigned to their unit, the area they are operating in, and indicate the number of people operating outside of the hazard zone.

Personnel Accountability Systems in Loudoun County

The NOVA *Command Officer Operations Manual* dedicates an entire chapter to Personnel Accountability Systems. Consistent with this *Manual*, the Loudoun County Fire and Rescue System uses a passport-based Personnel Accountability System. All career and volunteer personnel are issued plastic, Velcro-backed, name tags, which are engraved with the member’s name and rank, and color-coded to identify the member’s level of training.

Each apparatus is equipped with a “Passport,” constructed of flexible Velcro (2" x 4") with one removable and one permanently affixed unit designator tag. Apparatus are

¹⁴ NOVA Command, 4.1.3

also equipped with “Unit Rosters,” which consist of 2" x 4" pieces of hard-backed Velcro that have one removable and one permanently affixed unit designator tag.

At the beginning of the shift, or as assigned throughout the day, personnel riding a particular apparatus affix their nametags to the Passport and Unit Roster. The officer's nametag is placed top, followed by the driver/operator, and any other personnel. The nametags of members who typically remain outside the hazard area, such as vehicle drivers, are placed upside-down on the passport.

The Unit Roster should be affixed to the dashboard or a strip of Velcro on the Officer's door. The unit officer generally carries the Passport on his/her portable radio case.

The Department of Fire, Rescue, and Emergency Management also uses TeleStaff as a third tier accountability system. TeleStaff is a software program the Department uses to manage staffing and personnel scheduling. The TeleStaff roster reflects all of the Department's on-duty personnel, their station assignment, and the hours they are expected at work. If necessary, Incident Commanders can use the TeleStaff roster to confirm the staffing reflected by the Passports collected on the scene.

Personnel Accountability on Meadowood Court

Outside of the *NOVA Command Officer Operations Manual*, there are no Department or System policies or procedures requiring personnel to utilize or implement the Personnel Accountability System.

In post-incident interviews, the Investigative Team determined that some unit officers left their passport on the driver's door of their apparatus, some brought their passports to the Command Post, and some maintained possession of the passports until requested by Command.

In particular, the Tower 6 passport was not initially collected and brought to the Command Post. As a result, the Incident Commander was not aware that the Tower was staffed with three personnel rather than four until it was confirmed by Battalion Chief 601.

Recommendation: Develop and implement System-wide policies and procedures related to personnel accountability. Such policies should address the following:

- Requiring personnel verify the Passport and Unit Roster as quickly as possible after arriving for duty.
- Requiring personnel to drop their Passports off at a predetermined location, consistent with the *NOVA Manuals*, immediately after arriving on the scene of an incident.
- Standardize the location of Unit Rosters and Passports.

COMMUNICATIONS

The Loudoun County Emergency Communications Center (ECC) is staffed by personnel from the Loudoun County Department of Fire, Rescue, and Emergency Management (LCFR) and the Loudoun County Sheriff's Office (LCSO).

ORGANIZATION AND STAFFING

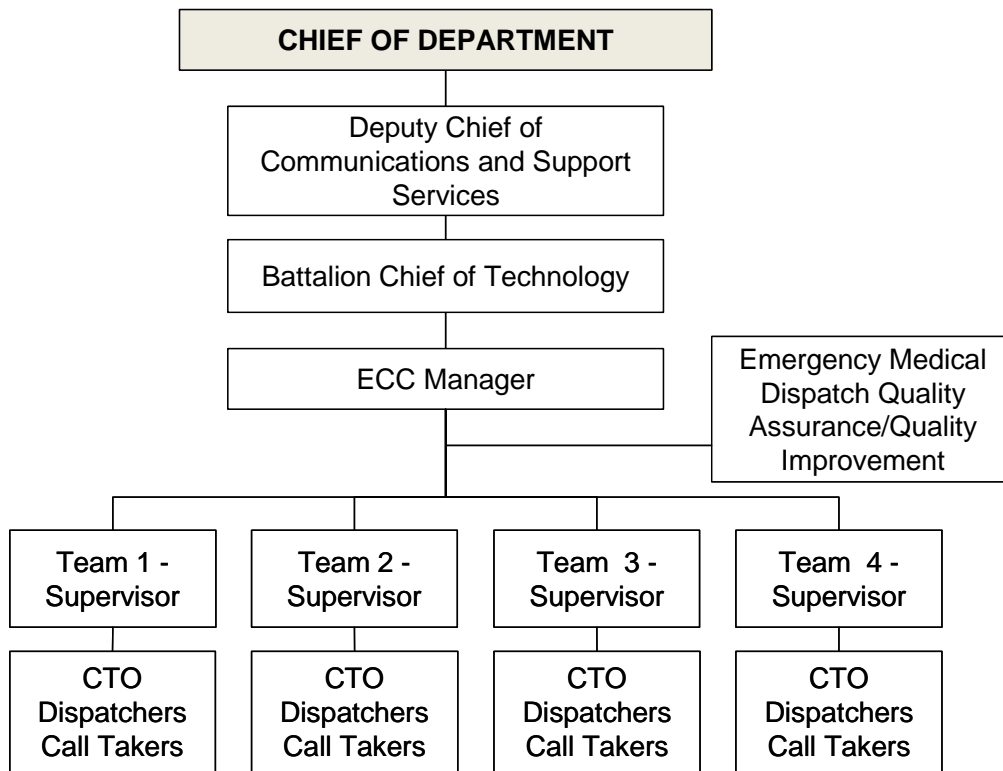
There are 28 LCFR personnel assigned to the ECC. These employees work a 42-hour workweek, utilizing a rotating schedule of 12-hour shifts; employees work two 12-hour days (0700-1900) and two 12-hour nights (1900-0700), followed by four days off. Each shift is comprised of a supervisor, Communications Training Officer (CTO), four dispatchers, and one call taker. The minimum staffing complement is four personnel; one supervisor or CTO and three released dispatchers.

The supervisors are responsible for direct, day-to-day oversight of ECC personnel, with the CTOs responsible for initial and ongoing training. The ECC Manager oversees the supervisors and is responsible for program management. The ECC Manager reports to the Battalion Chief of Technology, who, in turn reports to the Deputy Chief of Communications and Support Services (see Figure 23).

Personnel are responsible for monitoring 16 dedicated E911 trunk lines, 10 dedicated E911 cell lines, three backup emergency lines, two dedicated fire alarm lines, and seven administrative lines for non-emergency calls.

The ECC's minimum staffing level is four, but can drop to three between the hours of 0300 and 0700. Typically, one employee is dedicated to answering E911 calls, one employee is assigned to the primary dispatch channel (6-Alpha), one employee is assigned to the primary response channel (6-Bravo), and any remaining employees assist with answering E911 and non-emergency calls as well as monitoring additional tactical channels. The supervisor provides personnel oversight and rotates through radio channel operations, as required during the shift.

Over the course of a 12-hour shift, personnel rotate between positions every four hours. Depending on staffing levels, the supervisor may or may not be included in the rotation. Assignments may change to address fluctuations in the number of E911 calls or the volume of emergency incidents.

Figure 23: LCFR ECC Organizational Chart

Prior to beginning work in the ECC, LCFR call takers and dispatchers must successfully complete an eight (8) week training course designed by the CTOs, which includes classroom instruction, practical evolutions, and “ride alongs” with fire and rescue units in the field. Upon completing their training, ECC personnel receive the following certifications:

- Association of Public Safety Communications Officials (APCO) Public Safety Telecommunicator and Fire Service Communications
- National Academies of Emergency Dispatch (NAEMD) Emergency Medical Dispatcher; Institute for Disabilities Research and Training, Inc.
- Telephone Device for the Deaf (TDD)
- American Heart Association (AHA) Cardiopulmonary Resuscitation for Healthcare Providers

CALL PROCESSING AND DISPATCH

As Loudoun’s designated Public Safety Answering Point (PSAP), the LCFR ECC is responsible for answering all incoming E911 telephone calls in the County and its seven incorporated towns.

In addition, the ECC coordinates all fire and rescue-related radio communications in the County. System personnel use an 800 MHz radio system to relay information from and to the ECC. The radio system’s primary zone comprises two dispatch channels, one

primary response channel, 11 incident channels, and two hospital channels. There are also two other zones, each with 16 radio channels, used for training, emergency management functions, etc.

Upon receiving an E911 call, the LCFR Call Taker/Dispatcher determines the nature of the incident and either processes the call or transfers the call to the appropriate agency. This process is described in detail below.

Once personnel determine that a caller requires fire department assistance, they must:

- Verify the nature of the call, incident address, caller's telephone number, and any additional information that units may need prior to arrival.
- Load the call into the Computer Aided Dispatch (CAD) system to "ship" it to the Dispatcher assigned to the primary Dispatch channel (6-Alpha).

The dispatcher assigned to 6-Alpha is responsible for:

- Verifying the dispatch recommendation from the CAD system.
- Setting off the "tones" to activate various alerting devices.
- Giving two verbal General Announcements, which includes the location of the incident, nature of the emergency, and assigning a tactical radio channel.

The dispatcher assigned to monitor the tactical radio channel is responsible for:

- Manually inputting responding units and their staffing.
- Monitoring radio traffic.
- Manually inputting pertinent information.
- Giving the third General Announcement, after the completion of the response assignment.

For incidents requiring mutual aid, personnel must make contact with the appropriate jurisdiction to ensure that the dispatched units are actually available to respond on the call. If those resources are unavailable, personnel must manually replace the units in CAD.

ECC personnel are also required to make notifications to outside agencies, such as utility companies, hospitals, etc., as requested by the Incident Commander or on-scene units. Various ECC personnel perform this task, depending on their availability.

ECC RESPONSE ON MAY 25, 2008

On May 25, 2008 the ECC was staffed with six personnel: a Supervisor, a CTO, two Dispatchers, a Call Taker, and one Call Taker trainee. One Dispatcher called in sick prior to the beginning of the shift.

12:59:52 – The ECC received a 911 call reporting a fire at the Ross Department Store, located at 1023 Edwards Ferry Road. The 911 caller stated there was smoke in the electrical room, but no visible fire.

13:01:00 – The ECC received a 911 call reporting a structure fire at 43238 Meadowood Court. The caller indicated that the “house...is on fire.”

13:01:59 – The Dispatcher on 6-Alpha transmitted a commercial structure fire assignment for the Ross Department Store; responding units assigned were assigned the tactical radio channel 6-Charlie.

After processing the Meadowood Court call and forwarding it to the 6-Alpha dispatcher, one of the dispatchers continued to question what the caller was seeing and to determine whether anyone was home. The Dispatcher entered the caller’s answers into the CAD notes, which are visible to both personnel in the ECC and personnel in the field accessing CAD remotely.

13:03:56 – The Dispatcher on 6-Alpha transmitted a house fire assignment, with responding units assigned the tactical radio channel 6-Delta.

At some point, an off-duty Dispatcher contacted the ECC to inquire whether additional personnel were needed. The Supervisor authorized the off-duty Dispatcher to come in to assist; the Dispatcher reported to the ECC at 1330 hours.

From this point forward, ECC operations returned to a more “normal” state and personnel began to account for the fill-in companies across the County. Numerous units self-dispatched and “moved up” to cover response areas that had been depleted by the Meadowood incident. Also, the Supervisor requested assistance from the Critical Incident Stress Management (CISM) Team.

REVIEW OF ECC POLICIES AND PROCEDURES

During post-incident interviews, ECC personnel indicated that there are procedural gaps in the ECC’s policies and processes. As a result, each employee must immediately develop and implement solutions to react to particular requests or situations.

As an example, the ECC has no policies or procedures to guide how personnel respond to a MAYDAY or Emergency Evacuation order. These are low-frequency, high-risk events that require a standardized response algorithm to ensure that critical tasks are completed consistently.

Recommendation: Perform a comprehensive gap analysis of policies and procedures in the ECC and establish policies, procedures, and processes as necessary. The review should include procedures for call taking, call processing, dispatching, response to MAYDAY calls, and emergency evacuation orders, etc. Procedures should be supplemented by quick-action guides, which provide ready reference for response to low-frequency, high-risk incidents.

Supplemental Information

The initial 911 caller indicated that “the house is empty” and that “there’s nobody home.” The caller also stated that the “smoke is pouring out” and that the fire was in the Sunroom on the first floor as well as through the roof. The Dispatcher who answered the call entered the following information into the CAD notes:

“Smoke coming from 1st FL sunroom and roof.”
“Caller claims no one in house and no one home.”

Prior to July 8, 2008, the ECC’s practice was to provide supplemental information on the third General Announcement, which is transmitted over the tactical radio channel after the completion of the response assignment.

The Dispatcher on 6-Delta did not transmit a third General Announcement or advise responding units of the supplemental information. In post-incident interviews, it was noted that the Dispatcher did not page through the CAD notes to view or subsequently transmit the information.

As a result of a preliminary recommendation from the Investigative Team, the FRC revised FRG Ops 8.0.1, *Incident General Announcements*, to require dispatchers to provide supplemental information on the second General Announcement. To support this revision, LCFR SOP 04.00.06 went into effect on July 8, 2008.

Assignment of Radio Channels

One of the features of the 800 MHz system is the ability to group radio channels together for incident operations.

There are no formal policies or procedures that define how ECC personnel assign radio channels to working incidents. Generally, incidents are assigned to a tactical channel in the order they are received, which is why the Ross Department Store incident was assigned to 6-Charlie and the Meadowood Court incident was assigned to 6-Delta.

Recommendation: Modify the radio channel template to group, or “band,” radio channels together by incident. For an example, see Table 8 below. The County has a standing agreement with Dulles International Airport to use Loudoun County radio channels in the event of a serious plane crash on or near the airport. The proposed “banding” would not affect this agreement, as a specific incident band could remain pre-designated for airport operations.

Table 8: Proposed Radio Template

Talkgroup	Proposed Use	Notes
6-Alpha	Dispatch	Primary dispatch channel
6-Bravo	Daily Operations	Typical operations, EMS, Investigations, etc.
6-Charlie	Incident 1	First tactical channel assigned to working incidents
6-Delta	Incident 1	Available for Incident 1 (Groups, Divisions, Branches)
6-Echo	Incident 1	Available for Incident 1 (Groups, Divisions, Branches)
6-Foxtrot	Incident 1	Command Channel assigned to Incident 1
6-Golf	Incident 2	Tactical channel assigned to second working incident
6-Hotel	Incident 2	Available Incident 2 (Groups, Divisions, Branches)
6-Indigo	Incident 2	Available Incident 2 (Groups, Divisions, Branches)
6-Juliet	Incident 2	Command Channel assigned to Incident 2

Requests for Law Enforcement

Within the CAD system, there are certain nature codes (call types) that automatically generate an LCSO response. The structure fire code (SF) is not one of these codes. ECC personnel must manually ship the call to the LCSO, via a one-button transfer, or verbally request assistance from LCSO dispatchers on the other side of the ECC. For incidents under the jurisdiction of the Leesburg Police Department or the Virginia State Police, ECC personnel must call the appropriate agency directly to request assistance.

The Team was not able to determine when ECC personnel requested assistance from the Sheriff's Office for scene and traffic control during the incident on Meadowood Court.

Records indicate that FM601 arrived on the scene at 13:29:26 and transmitted the following on FINVS:

"Loudoun this is FM1 on fire investigations. Hold me on the scene, we need PD in here as well. We have tremendous traffic issues on McConnell and Parkers Ridge."

In post-incident interviews, personnel noted that traffic and crowd control posed significant issues.

Recommendation: Modify the CAD nature codes so that structure fires automatically generate a law enforcement response for scene and traffic control.

ECC STAFFING

During the Meadowood Court incident, the Dispatcher from 6-Bravo switched radio channels to monitor 6-Delta; the Dispatcher who answered the initial 911 calls switched from answering 911 calls to monitoring 6-Bravo; the CTO was assigned to 6-Alpha, and the Supervisor was committed to monitoring 6-Charlie. The Call Taker was the only qualified employee available to answer 911 calls, as the Call Taker trainee had not yet been cleared to do so.

As units diverted from one call to the other, the amount of radio traffic increased exponentially and units began to switch to alternate channels to contact the ECC. At various points between 1318 and 1330 hours, units on the scene, units responding, and Command were calling the ECC on radio channels 6-Alpha, 6-Bravo, 6-Charlie, 6-Delta, 6-Echo, and 6-Foxtrot.

The amount of phone calls into the ECC also increased exponentially. Due to the volume of radio traffic, personnel called the ECC on the telephone to mark on the scene. The ECC also fielded routine phone calls from personnel requesting phone patches to the hospital and from the media requesting incident information.

Had the ECC received another multi-unit call requiring a monitored channel, an employee would have been forced to pay attention to two channels simultaneously. Similarly, had the Meadowood Court call been received during a period when the ECC was staffed with only three or four personnel, each dispatcher would have been required to monitor multiple channels simultaneously.

Recommendation: Evaluate and adjust ECC staffing levels to support the System's emergency communications needs. ECC personnel should not be routinely required to monitor multiple radio channels simultaneously. Additionally, supervisors should not routinely be required to operate as call takers or dispatchers.

DELAY IN DISPATCH

There are a variety of organizations that recommend goals for processing emergency calls and dispatching responding units. NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, states:

“Ninety-five percent of emergency call processing and dispatching shall be completed within 60 seconds, and 99 percent of call processing and dispatching shall be completed within 90 seconds.”¹⁵

For FY08, the ECC’s average call processing time was 2:02.

The initial 911 call reporting the fire on Meadowood Court was received at 13:01:00, but units were not actually dispatched on 6-Alpha until 13:03:56, a call processing time of nearly three minutes. The following events contributed to the delay in dispatch:

1. The Dispatcher who answered the initial 911 call waited to “load” the call into CAD until after verifying the address of the incident, rather than immediately dispatching units to a location “in the area of” the caller’s address.
2. Loudoun County uses radio tones to activate station alerting devices and pagers carried by System members. The Dispatcher on 6-Alpha had to wait for over 30 seconds of tones to process prior to dispatching the call.

Recommendation: Review current ECC policies, procedures, and processes to reduce dispatch delays. Potential solutions include pre-alerting personnel prior to transmitting the tones or modifying the dispatch procedure to include a unique signal for structure fires.

COMMAND CHANNEL

A Command Channel is used for radio communications from the Command Post to the ECC and vice versa. A Command Channel provides the Incident Commander the ability to communicate directly with the ECC, to request additional resources, provide incident updates, etc., without interfering with critical transmissions on the tactical radio channel(s).

According to the NOVA *Command Officer Operations Manual*, a Command Channel should be requested after an adequate command staff has been organized at the Command Post or in cases where a second alarm has been transmitted.¹⁶

During the incident on Meadowood Court, routine communications on the tactical channel (6-Delta) interfered with the transmission of critical information to and from

¹⁵ 7.4.2

¹⁶ 3.17.1

Command. Implementing a Command Channel reduces these transmissions by moving 2nd alarm units to an alternate channel as soon as such units are dispatched.

The System has no formal policies or procedures regarding when to establish a Command Channel. During the Meadowood Court incident, there were conflicting requests for a Command Channel, from multiple units.

13:27:01 – Wagon 5 Driver/Operator on 6-Echo:

"OK, Loudoun - go ahead and give me a Command Channel - I'm going to stay on 6-Edward and monitor 6-David, try to keep this (unintelligible). Have 2nd alarm units to, to 6-Edward."

13:28:09 – Command on 6-Echo:

"Command to Loudoun on Echo."

13:28:14 – ECC on 6-Echo:

"Command."

13:28:18 – EMS601 on 6-Alpha:

"Also, what are we using for a command channel? I'll talk to you on that."

13:28:26 – ECC on 6-Alpha:

"I believe they're using, 6-Charles, 6-Charlie, I'm sorry."

Since the Command Channel was not established until late in the incident, units from the 1st and 2nd alarm were forced to communicate on a single radio channel, which made it difficult for personnel on the scene to transmit critical information to the Incident Commander.

Recommendation: Develop and implement formal policies and procedures that define when to establish a Command Channel. Such policies should include guidelines that describe situations where a Command Channel is necessary, including additional alarms, MAYDAY situations, etc. Ensure that such policies address the responsibilities of both ECC personnel and Incident Commanders.

ADD-ON UNITS/UNIT DIVERSION

Due to their proximity to the incident, numerous units added-on to the call on Meadowood Court or diverted from the call at the Ross Department Store. This practice is consistent with System guidelines, specifically FRG 8.0.6, which states:

“When a unit is available for response to an emergency incident and the officer-in-charge (OIC) of the unit believes that (1) the unit is appropriately staffed and equipped and (2) can reach the scene of the incident before the dispatched unit(s), the unit may respond to the incident even if they were not included in the original dispatch assignment.”

As a result, personnel in the ECC had a difficult time determining the units required for the 2nd alarm. Further, the Incident Commander was not aware of all the units responding to the scene, complicating the IC’s ability to maintain personnel accountability.

Recommendation: Reevaluate existing policy and current practice, which allow units to add-on or divert to calls at any point in the incident. One solution may include giving ECC personnel the authority to place units in service. Implementing this recommendation will positively impact incident operations, ECC unit tracking, and personnel accountability.

EMS TASK FORCE

During the Meadowood Court incident, the Incident Commander specifically requested an “EMS Task Force with at least two ALS units.” A “Task Force” consists of a combination of resources (e.g., 2 ALS units and 2 BLS units).

Loudoun has no System-wide policy that defines the dispatch complement for an EMS Task Force.¹⁷ As a result, ECC personnel had to determine which resources the IC was requesting and manually load the dispatch complement into CAD.

Recommendation: Develop and implement formal policies and procedures that define NIMS-compliant Task Forces, Strike Teams, and other specialized dispatch complements.

RESOURCE TYPING

Units are numbered depending on the station to which they are assigned, with the exception of units in Leesburg, where units are numbered according to the volunteer corporation’s primary station (resulting in Engine 1 instead of Engine 20). Additional units assigned to a station are identified by a number (e.g., Ambulance 25-1).

¹⁷ The NOVA *Multiple Casualty Incident Manual*, which addresses EMS Task Forces, was still under review as of August 2008.

In Loudoun County, the terms “Engine,” “Reserve Engine,” “Rescue Engine,” and “Wagon” are used interchangeably to refer to fire apparatus equipped with a pump and fire hose. Depending on the amount of water the apparatus carries, it may also be referred to as a “Tanker” or a “Reserve Tanker.” It also makes it difficult to determine which type of apparatus is responding on a particular call and whether additional apparatus are required.

The National Incident Management System (NIMS) includes an initiative to establish a comprehensive, integrated national mutual aid and resource management system that provides the basis to type, order, and track all (Federal, State, and local) response assets.

Regionally, departments in Northern Virginia have consolidated resource types, to better clarify and define each unit’s capabilities, particularly during mutual aid incidents. This effort also includes using a letter, rather than a number, to identify additional units assigned to a particular station (e.g., Engine 606, Engine 606-Bravo, Engine 606-Charlie).

Recommendation: Number units according to the station to which they are assigned. During the Meadowood Incident, there were numerous instances where units were referred to by the wrong term or the wrong number, creating confusion on the fireground and in the ECC.

Recommendation: Adopt a NIMS-compliant mechanism to type apparatus and assign designations, consistent with the system adopted by the Metropolitan Washington Council of Governments (MWCOCG).

RADIO DISCIPLINE

The term “radio discipline” broadly refers to the process by which personnel transmit information over the radio. Elements of radio discipline include keeping transmissions concise, ensuring that information is transmitted on the correct channel, and using good judgment to ensure that the information relayed is timely and appropriate.

Units on Meadowood Court were assigned the tactical radio channel 6-Delta. However, analysis of radio traffic and data from the 800 MHz system indicate that personnel on the scene were actually operating on multiple radio channels.

Of personnel on the interior of the structure, the portable radios assigned to the Reserve Engine Officer and Tower Firefighter were on 6-Delta. The portable radios assigned to the Tower Officer and Reserve Engine Firefighter were on 6-Charlie.

Recommendation: Reiterate that personnel must be cognizant of the assigned radio channel and ensure that their portable radio is on the correct channel. This step could be included in a crew's "buddy check" prior to entering an IDLH. Also, there are technological solutions available to assist personnel in this effort, including voice prompts that indicate the selected radio channel.

Analysis of radio traffic and other data reveal multiple instances where units transmitted non-pertinent information at inappropriate times.

1. A unit marked on the scene immediately after Battalion Chief 601 called for an evacuation of the structure.
2. A unit marked responding while Command and Division Charlie were attempting to determine whether personnel were still missing inside the structure.

Recommendation: Develop and implement System-wide training programs that reinforce the importance of radio discipline. Personnel must be aware of radio traffic prior to transmitting and use good judgment to determine whether a radio transmission is actually required. For example, personnel should maintain radio silence, except for emergent traffic, any time there is an active MAYDAY. The installation of Mobile Data Computers (MDCs) in fire and rescue apparatus may reduce routine radio transmissions, such as units marking responding or on the scene.

TECHNICAL ANALYSIS OF THE RADIO SYSTEM

Loudoun County uses an 800 MHz digital trunked radio system, which is controlled by a computer that assigns frequencies to users. The radio consoles in the ECC are equipped with pre-emption switches, which are designed to give the ECC priority over all other radios in the system. Other features of the system are supposed to prevent multiple field units from transmitting simultaneously.

Post-incident analysis of the ECC consoles revealed that the pre-emption switch on the console used by the Dispatcher on 6-Delta was not activated. As a result, field units and the ECC were able to transmit simultaneously, as illustrated by the following examples:

1. The Dispatcher had an open mic when the Tower Firefighter transmitted the MAYDAY.
2. A field unit was able to transmit while the evacuation tones were sounding.

Recommendation: Check all of the consoles in the ECC to ensure that the pre-emption switches are activated and functioning properly.

Loudoun also uses a program to record radio traffic. Each radio transmission creates a corresponding data file, indicating when the user depressed and released the transmit button.

The Investigative Team determined that the Tower Firefighter's MAYDAY transmission did not generate a corresponding digital data file. Despite this, the Firefighter's transmissions were clearly heard by units on the scene.

Recommendation: Have a subject matter expert perform a detailed technical analysis of the radio system and all of its components to identify and correct deficiencies.

MESSAGES REPEATED BY ECC

It is imperative that ECC personnel accurately repeat messages to assure that critical information is transmitted to all personnel. Two examples illustrate this point.

1. The Reserve Engine Officer transmitted the following on scene report:

"Reserve Engine 6 to Loudoun. We're on the scene. Got a 2 story single family dwelling. Got a fire that looks like it's in the attic or running Side Charlie. I'll get a situation report to you in a minute."

The dispatcher acknowledged the report, but omitted the fact that the Officer had confirmed a working fire, saying:

"Reserve Engine 6 on the scene. Smoke showing, possible fire in the attic."

2. FM607 was unable to contact Command on 6-Delta and switched to the Fire Marshal Investigation Channel to advise that personnel had bailed out of the structure:

"Sir, I know you're extremely busy - let Command know that 3 firefighters have bailed out, are on Side Baker. I need a medic over here ASAP."

The following is the message that was ultimately relayed to Command on 6-Delta, which omitted both the number of injured firefighters and the request for a medic:

"Loudoun to Chief 11, Chief 11 be advised I got firefighters diving out to the rear of the structure."

Recommendation: Develop System-wide training programs that reinforce the importance of accurately repeating messages over the radio.

FIRE BEHAVIOR

Fire behavior refers to the means by which a fire develops and spreads through a structure.

During the course of their investigation, the Loudoun County Fire Marshal's Office conducted a series of interviews with the homeowner and several neighbors who were home on the morning of May 25, 2008. Much of the information in the pre-fire and fire discovery sections is derived from the information gained during those interviews.

PRE-FIRE

The homeowner lived alone and reported smoking a cigarette at around 0930 hours on the back deck, in the vicinity of the Sunroom. At approximately 1020 hours, the homeowner smoked another cigarette in the garage and left the house. All exterior doors were closed and locked (including both garage doors) and all windows were closed, except for one in the Sunroom and one in the Master Bedroom.

FIRE DISCOVERY

Neighbors reported smelling smoke around 1240 hours, which they attributed to someone in the area using a backyard grill. Just prior to 1300 hours, two children were skateboarding in the area of the driveway leading to 43234 Meadowood Court (Bravo Exposure). One of their skateboards rolled off the driveway into the grass at the B/C corner of 43238 Meadowood Court. When the child went to retrieve the skateboard, the child reported seeing a flame through the Sunroom window.

The children ran to 43226 Meadowood Court to call 911. While the homeowner at that address went inside to get the telephone, the children returned to the B/C corner of 43238 Meadowood Court. They reported noticing that the steps leading to the deck were on fire. Shortly thereafter, the 911 caller joined the children and observed that there was smoke coming from the Sunroom on the first floor and flames along the ceiling on the far side of the Sunroom.

The neighbor's statements are consistent with the evidence collected by the FMO. According to the FMO investigative report, the fire originated on the attached deck at the point where the stairs join the main body of the deck (just outside the door leading to the Sunroom). The report notes that there was a void space at this juncture, between the Family Room and Sunroom exterior walls. There was extensive burn damage in this area.

FIRE SPREAD

The fire spread along the vinyl siding and combustible sheathing and traveled up through the vented soffits into the continuous attic space.

Interviews with the Delta Exposure homeowner indicate that the fire traveled up the exterior of the Sunroom, around the base of the fireplace enclosure and progressed rapidly along the second floor exterior toward the roof.

Fire initially entered the first floor via the glass door in the Sunroom. Fire penetrated through the Family Room exterior wall into the Family Room, which was furnished with several large pieces of over-stuffed furniture. This substantial fuel load in the Family Room contributed to the rapid spread of the fire through the first floor, until it reached the point of flashover.

Fire then entered the second floor from three directions: from above in the attic space, through the exterior wall on Side Charlie, and from below on the first floor, through the two-story foyer and up the stairs.

BEHAVIORAL HEALTH

This Chapter addresses the behavioral and mental health services and counseling options available to career and volunteer personnel.

AVAILABLE RESOURCES

The following resources are available to members of the Loudoun County Fire and Rescue System. They include the County's Critical Incident Stress Management (CISM) Team, Employee Assistance Program (EAP), and the chaplain program.

Critical Incident Stress Management (CISM) Team

The CISM Team is a joint effort between the Fire and Rescue System, LCSO, and the Loudoun County Department of Mental Health and consists of emergency responders (career and volunteer) and mental health experts. All members are required to obtain training and certification through the International Critical Incident Stress Foundation in group crisis intervention. The Team is activated via pager; responders can call the pager directly or request CISM through the ECC.

The CISM Team provides pre-incident stress management education and post-incident peer counselor or clinician led group defusings and/or debriefings. The Team is not designed to replace ongoing professional counseling or employee assistance programs. Rather, the Team provides immediate, stress specific, supportive interventions to emergency response personnel who have been exposed to, or are showing signs of traumatic stress experienced in the line of duty.

There are no System-wide policies that address types of situations where CISM should be requested nor are there specific policies or procedures addressing how the Team is activated. The Team does have internal policies and procedures, but these are not disseminated to System personnel.

Recommendation: Develop and implement formal policies and procedures that define situations where CISM should be requested, how the Team should be notified, and the Team's roles and responsibilities.

Employee Assistance Program (EAP)

Loudoun County employees have access to an Employee Assistance Program (EAP) where they can seek short term counseling services for any issue affecting their personal lives and/or job performance. EAP provides assistance for issues associated with marriage, family, parenting, relationships, mental and emotional health, alcohol and substance abuse, grief and loss, stress, legal, and financial issues.

There are no Department or County policies or procedures that identify situations where supervisors should refer personnel to EAP.

Newly hired County personnel are informed about the existence of EAP during their initial employee orientation. EAP is also mentioned in various supervisory courses offered by the Department and County Human Resources.

Recommendation: Develop standardized training for Department employees and supervisors identifying services available through EAP and methods to access those services.

Chaplain Program

Historically, many of Loudoun County's volunteer companies have chaplains associated with them. The chaplains offer assistance to victims on emergency scenes and are available to any fire and rescue personnel for counseling services. In July 2008, the Fire and Rescue Commission adopted a formal chaplain program which outlines the services available and standardizes the training required to become a recognized chaplain.

LONG-TERM SERVICES

Currently, the services available to personnel are focused on short-term counseling or crisis intervention services. Since each program is independent from the others, there is no oversight mechanism to ensure that personnel receive a cohesive complement of services nor is there a mechanism for long-term care. There are voids in the Department's and System's ability to support the immediate and long term mental health needs of fire and rescue personnel and their families.

The fire on Meadowood Court exposed personnel to a high stress event that involved substantial firefighter risk and resulted in critical injuries to multiple firefighters. Responding personnel may be in need of acute and long term behavioral health intervention, as individuals and with their families. Currently, the County does not have a mechanism to provide long-term mental health services from clinical specialists who have experience working with fire and rescue personnel and are trained in trauma-induced stress.

Recommendation: Develop a System-wide behavioral health program which includes immediate, short, and long-term counseling services for fire and rescue personnel and their families.

TRAINING

This Chapter addresses entry-level and ongoing training requirements and opportunities available to career and volunteer members of the Fire and Rescue System.

ENTRY-LEVEL TRAINING

Career

The career recruit training program has changed dramatically over the past 10 years in response to the Department's rapid growth. The Department's first employees were not required to complete a recruit training program; rather, personnel were required to obtain the necessary certifications prior to being hired by the County. The first career Recruit Class entered the Training Center in August 1999 for five weeks of basic fire suppression and EMS training. Today's recruit training program consists of approximately 26 weeks of basic firefighting, EMS, hazardous materials incident abatement, child safety seat installation, and basic pump operations. The recruits graduate with Virginia certifications in Firefighter I, Firefighter II, Hazardous Materials Operations and EMT-Basic, among others. All entry-level operational personnel must successfully complete recruit training prior to being assigned to the field.

All four of the injured LCFR personnel successfully completed a career recruit training program, ranging from Recruit Class 4 to Recruit Class 18.

Volunteer

Each year, the LCFR Training Division offers a spring and a fall firefighter training program for volunteer members of the System, which consists of approximately 24 weeks of night and weekend classes. After completing the program, members receive Virginia certifications Firefighter I, Firefighter II, and Hazardous Materials Operations, among others.

ONGOING/ADVANCED TRAINING

The LCFR Training Division offers a wide variety of ongoing and advanced fire, rescue, and EMS training courses, as the following examples illustrate:

- Driver/Operator – Aerial and Pumper
- National Fire Academy – Incident Safety Officer, Health and Safety Officer
- Fire Officer I, II, III, and IV
- Fire Instructor I and II

- Emergency Medical Technician – Intermediate
- Emergency Medical Technician – Paramedic Upgrade
- Advanced Cardiac Life Support

FIREFIGHTER SELF-SURVIVAL TRAINING

Firefighter self-survival training addresses a wide variety of topics, including flashover, RIT, and MAYDAY/Firefighter Down!

Flashover Training

The Montgomery County (MD) Department of Fire and Rescue Services flashover simulator training program consists of classroom and practical evolutions.

Specifically, the training curriculum is designed to:

- Provide firefighters with a safe and secure system for flashover training.
- Give firefighters an introduction on how to read smoke conditions.
- Teach firefighters to recognize the signs of flashover.
- Provide firefighters with techniques that can delay flashover long enough for them to escape.
- Save firefighters from injury and death from flashover.

During the classroom session, the instructors explain how the exposure to flashover potential has increased over recent years, the dangers of flashover, dangers of smoke as fuel, techniques to read smoke conditions, the definition of flashover, the warning signs of flashover, survival techniques, nozzle techniques that might delay flashover, and nozzle tactics if flashover occurs.

While inside the simulator, students are taught to “test” the atmosphere for flashover potential and nozzle tactics if flashover is imminent. To test the atmosphere, the students are instructed to direct a fog stream straight up, in one short burst. If water drops fall down and hit the firefighter’s facepiece, the temperature is below 212° Fahrenheit. If no water drops fall down and hit the firefighter’s facepiece, the water has been converted to steam and flashover is possible.

If flashover is imminent, firefighters are taught to practice aggressive cooling – “penciling” the atmosphere with a 30° fog pattern to the right, to the center, and to the left.

If this tactic fails, firefighters are directed to get as close to the floor as possible, open the nozzle fully, on a wide fog pattern, and rotate the nozzle above their head in a circular pattern.

The earliest written documentation of Loudoun's participation in the Montgomery County flashover training program is from a volunteer Firefighter I class on April 7, 2002.¹⁸ However, photographic evidence and personnel statements suggest that LCFR Recruit Class 4 participated in the flashover training program as early as 2001.

The Investigative Team was able to validate that the Reserve Engine Firefighter and the Tower Firefighter participated in the flashover simulator training on September 29, 2006 and April 28, 2004 respectively.¹⁹ Through photographs, the Investigative Team determined that the Tower Officer had participated in flashover simulator training, but the Team was unable to locate records to validate this finding. Through post-incident interviews, the Investigative Team determined that the Reserve Engine Officer had participated in flashover simulator training, but the Team was unable to locate records to validate this finding.

MAYDAY/Firefighter Down!

Since 2001, LCFR recruits have been required to successfully complete the Virginia Department of Fire Programs (VDFP) MAYDAY/Firefighter Down! program. The program has been offered to volunteers since approximately the same time and is now included in the Firefighter I and II certification program.

The VDFP curriculum provides for a two-day training program, which includes both classroom and practical evolutions.

Day One

- Case Studies (classroom)
- Fireground Hazards (classroom)
 - Building Hazards
 - Fire Behavior Hazards
- Drags & Carries (practical)
- Self-Rescue Techniques (practical)

Day Two

- Self-Rescue Techniques (practical)

Training records indicate that all of the personnel that were inside the structure had received MAYDAY/Firefighter Down! training while in recruit school or during a stand-alone class session for incumbent personnel.²⁰

¹⁸ MCFRS Flashover Training Roster.

¹⁹ MCFRS Flashover Training Roster, Career Recruit School 18 Logbook, Career Recruit School 18 Calendar.

²⁰ Reserve Engine Officer – January 31, 2001; Tower Officer – September 26, 2001; Reserve Engine Firefighter – October 18, 2006; Tower Firefighter – April 30, 2004.

Rapid Intervention Training

In April 2006, the Department acquired two structures in Arcola to use for training. In one structure, personnel built a variety of training props to teach and reinforce firefighter self-survival techniques, including emergency ladder bails, emergency SCBA procedures, hose slides, firefighter drags and carries, and window bails using rope and other tools. In the other structure, personnel constructed a maze, which was used for a RIT scenario.

Instructors developed an eight-hour curriculum whereby students practiced individual skills and culminated with a RIT scenario in the afternoon.

Between May 1, 2006 and July 1, 2006 the Department cycled every on-duty crew through the training; volunteer crews cycled through on the weekends, as scheduled by the System's Volunteer Chiefs and Presidents.

The Investigative Team was not able to determine if any of the four personnel involved in the MAYDAY had participated in the 2006 training program. Personnel statements suggest that both Officers and the Tower Firefighter had been through the Arcola training, but no such documentation could be located. The Reserve Engine Firefighter was not hired until after the delivery of the 2006 training program.

Recommendation: Develop and implement System-wide, entry-level and ongoing firefighter self-survival training that at a minimum addresses RIT, flashover, MAYDAY procedures, crew integrity, ladder bails, emergency SCBA procedures, firefighter drags and carries, and practical scenario-based evolutions.

BUILDING CONSTRUCTION

The VDFP requires building construction as part of the base curriculum for Firefighter I and II certification. Some of the training's objectives are as follows:²¹

- Describe the characteristics of the following building materials: masonry, concrete, steel, glass, gypsum board, and wood.
- Describe the function of each of the following building components: foundations, floors, ceilings, roofs, trusses, walls, doors, windows, interior finishes, and floor coverings.
- Match types of construction to characteristics and descriptions of the primary fire hazards associated with each.
- List fire fighting hazards related to construction.
- Answer questions about the hazards associated with lightweight and truss construction.

²¹ Building Construction PowerPoint, LCFR Training Center.

- List signs of potential building collapse.
- List actions to take when imminent building collapse is suspected.

All four of the interior personnel had received some type of formal instruction in building construction. However, due to differences across Recruit Classes, it was not possible for the Investigative Team to determine the specific information conveyed during these training sessions.

The Training Division also offers the National Fire Academy's courses in the Principles of Building Construction-Combustible and Principles of Building Construction-Non-Combustible.

The Principles of Building Construction-Combustible "addresses the need for fire service Incident Commanders (IC's) to understand fully building construction, methods of construction, materials used in building construction, and fire-resistance requirements in order to conduct fire scene operations safely and make sound strategic decisions."²²

The course helps students to:

- Identify the important structural features of a building and use this information in the formation of the Incident Action Plan (IAP), including the strategic goals, tactical objectives, and incident priorities.
- Identify critical size-up issues such as smoke, heat, and fire travel inside a structure, and predict the path or method of travel based upon the building construction features.
- Identify critical safety issues that affect firefighter safety for each classification of construction and identify appropriate measures to enhance the safety of emergency responders.

Training records indicate that only the Reserve Engine Officer had completed by NFA course on combustible building construction (6/12/2004).

Recommendation: Review and enhance the System's entry-level and ongoing training on building construction to emphasize the unique characteristics of lightweight construction and associated special hazards. (e.g., open floor plans, Herculite ®, etc.).

OFFICER DEVELOPMENT

The incident on Meadowood tested the knowledge, skills and abilities of responding company and command officers. As has been discussed previously, the building's construction and features combined with rapid fire spread posed a particular strategic and tactical challenge.

²² NFA-Principles of Building Construction, Combustible

In particular, traditional fire training curricula have not focused on ongoing officer development nor have they kept pace with changes in building construction, materials, and design and the associated impact on operational strategy and tactics. These curricula should be revised and augmented with updated information that is specific to Loudoun County.

Recommendation: Develop and implement an ongoing, System-wide officer development training and continuing education program. At a minimum, these programs should address:

- Risk benefit analysis
- Strategy and tactics
- Building construction
- Fire spread and extension (e.g., exterior fires with interior extension)
- Crew integrity
- Crew resource and situational awareness management
- Incident crisis management
- ICS (particularly expansion of the command structure)
- Command level decision making and practices (e.g., escalating incidents, high-risk/low frequency events)

TRAINING RECORDS AND ADMINISTRATION

While reviewing training records, the Investigative Team determined that such records are maintained by multiple divisions across the Department and the System, which made it difficult to determine which personnel had or had not received training.

For career personnel, their Official Personnel Record is maintained by the County's Department of Management and Financial Services, Human Resources Division. This Record contains documents related to the employee's hire, promotions and certain disciplinary actions. The Department also maintains a personnel file in its Office of Human Resources (Program Services Division), which contains training certifications, disciplinary actions, Pay-for-Performance (PFP) evaluations, and various correspondence.

Station Captains also typically maintain files for each employee that contains certain disciplinary actions, copies of training certifications, copies of quarterly PPE (Personal Protective Equipment) inspection forms (F023), copies of Standard Operating Procedure Sign Off Forms (F000), emergency contact information, and various correspondence.

For volunteers, the Department's Volunteer Coordinator maintains an official file for each volunteer member of the system; each Corporation also develops its own internal recordkeeping mechanisms.

The LCFR Training Division maintains files for all members of the System, which include completed training certifications. If members complete training outside of

Loudoun County, the member is responsible for providing the Training Center with a copy of the certification.

Finally, VDFP maintains a state-wide database of personnel training records; hard copies are kept in the VDFP's seven regional offices.

Recommendation: Develop and implement a centralized, standardized System-wide record-keeping system for all training-related records.

APPARATUS AND EQUIPMENT

This Chapter addresses the apparatus and associated equipment complement of the first arriving units to Meadowood Court, Reserve Engine and Tower 6.

APPARATUS IN LOUDOUN COUNTY

The volunteer corporations own the majority of fire suppression apparatus and equipment in Loudoun County. The only System-wide apparatus policy is FRG 5.0.1.1, *Heavy Squad Standard*, which addresses the equipment required for a unit to be considered a "Rescue." Otherwise, there are no System-wide apparatus standards or specifications that require companies to purchase a particular make or model of fire apparatus nor are there any specific requirements for specific equipment or the location of equipment on apparatus.

RESERVE ENGINE 6

Reserve Engine 6 is a 2004 Ferrara with a Spartan Gladiator Classic Chassis. It has a 1500 gallon per minute (GPM) Waterous Pump, carries 500 gallons of water and 20 gallons of foam.

The Reserve Engine has six pre-connected attack lines:

1. Bumper line – 100 feet 1 ¾ inch Ponn Conquest hose, 75 PSI Automatic Fog Nozzle/1 inch smoothbore nozzle.
2. Crosslay 1: 200 feet 1 ¾ inch Ponn Conquest hose, 75 PSI Automatic Fog Nozzle break away to 1 inch smoothbore nozzle.
3. Crosslay 2: 200 feet 1 ¾ inch Ponn Conquest hose, 75 PSI Automatic Fog Nozzle break away to 1 inch smoothbore nozzle.
4. 250 feet 2 ½ inch hose, Blitzfire Nozzle with 1 inch, 1 ¼ inch, and 1 ½ inch nozzles.
5. 400 feet 2 inch hose, 75 PSI Automatic Fog Nozzle break away to 1 inch smoothbore nozzle.
6. 250 feet 2 ½ inch hose, 75 PSI Automatic Fog Nozzle break away to 1 ¼ inch smoothbore nozzle.

Primary Attack Line

The primary attack line on Meadowood Court was a 200', 1 ¾ inch crosslay. Ponn Conquest hose, used for the crosslay, is specially designed to reduce friction loss which allows it to be pumped at lower pressures than other types of fire hose. The manufacturer also coats the hose to protect it against high heat and abrasion. The Investigative Team was able to verify, through hose testing records, that the affected section of hose passed its annual hose test in 2007.

The line was equipped with an Elkhart Select-O-Matic, 75 psi 60-200 GPM Automatic Fog Nozzle, which could be broken down to a 1 inch smoothbore nozzle.

The initial attack hoseline was significantly damaged and burned through the inner and outer layers approximately 10 feet from the nozzle. In several other places, the outer sheath was burned through, but the inner core was intact. From post-incident interviews and physical evidence in the structure, the Investigative Team determined that the hose burned through while deployed in the staircase.

Members of the Investigative Team flowed water through the section of hose using a nozzle identical to that used by personnel on Meadowood Court. Team members observed that there was a significant amount of water flowing through the hole with the nozzle in the open or closed position. With the nozzle open, Team members noted that there was limited water pressure available at the nozzle.

TOWER 6

Tower 6 is a 2004 Ferrara with a Spartan Gladiator Classic Chassis, equipped with a 100 foot heavy duty ladder, a 1000 lb tip load and a pre-piped waterway. The Tower is also equipped with a Waterous 1500 GPM pump and a 68 gallon tank.

The Tower carries a full complement of ground ladders:

- 2 – 10' Folding Ladder
- 2 – 28' Extension Ladders
- 1 – 16' Straight Ladder
- 2 – 14' Straight Ladder
- 1 – 24' Extension Ladder
- 1 – 35' Extension Ladder
- 1 – Little Giant

THERMAL IMAGING CAMERAS

Thermal Imaging Cameras (TICs) translate infrared energy into images visible to the human eye. Firefighters use TICs to locate victims, other firefighters, hidden fire within structures, and other heat sources.

The Reserve Engine and Tower 6 inventories both include TICs manufactured by Bullard. The Tower is assigned the Bullard T3 (Figure 24) and the Reserve Engine is assigned a Bullard Commander (not shown).

Figure 24: Bullard T3



TIC use on Meadowood Court

Only the Tower's TIC was utilized on Meadowood Court. The Tower Officer entered the front door, turned the TIC on and visualized the Reserve Engine crew and Tower Firefighter proceeding up the stairs. The Officer also used the TIC during the search of the second floor.

During the investigative process, the Team recovered the TIC in the Master Bedroom under a window on Side Delta (see Figure 25).

Figure 25: Tower 6 TIC



APPARATUS INSPECTIONS

There are no System-wide requirements for apparatus inspections. Each volunteer corporation and LCFR has developed or is in the process of developing policies and procedures that address the regular inspection and maintenance of fire/rescue apparatus.

Personnel at Station 6 are expected to complete daily, weekly, and monthly checks on all of the apparatus assigned to the station. Station records indicate that both Reserve Engine 6 and Tower 6 were inspected on the morning of May 25, 2008.

HAND TOOLS BROUGHT INTO THE STRUCTURE

Figure 26 illustrates the tools carried into the structure by the crews of Reserve Engine and Tower 6. In addition, all four personnel carried a flashlight. The flashlights were heavily damaged; the Tower Officer's flashlight lens had completely disintegrated.

The Reserve Engine Officer carried a four foot "Z" hook, with a fiberglass handle. The Tower Officer carried a four foot Boston rake and the Tower firefighter carried a set of

“commercial irons,” which consisted of an 8 lb sledgehammer and a Halligan bar (Figure 26).

Figure 26: Gear Photo 027

Left to Right: Equipment Carried by Tower Officer, Reserve Engine Officer, and Tower Firefighter



There are no System-wide policies or procedures that address the tools and equipment required for each riding position.

In post-incident interviews the Tower Firefighter indicated that, in retrospect, the sledgehammer was not the most appropriate tool for a residential structure fire.

Recommendation: Develop System-wide policies and procedures that address the responsibilities associated with each riding position on fire/rescue apparatus and the tools and equipment to be carried, based on call type. Such policies should specifically outline the duties assigned to each position and the tools and equipment necessary to complete those tasks.

UNIFORMS AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

This Chapter addresses uniforms and Personal Protective Equipment (PPE). The Loudoun County Department of Fire, Rescue, and Emergency Management issues all of its personnel uniform items for daily wear and PPE for emergency incident response.

UNIFORMS

The Department of Fire, Rescue, and Emergency Management issues all uniformed personnel station wear. SOP 03.01.01, *Uniforms*, addresses the components of the daily uniform as well as the types of uniforms appropriate to particular circumstances. The Class D uniform is the designated uniform for daily use by Operations personnel assigned to fire/rescue stations and during compensated training activities.

The Class D uniform consists of a Department-issued collared “polo” shirt, black belt (either leather with appropriate buckle or black webbing), Department-issued dark blue pants (either poly-cotton or fire retardant), dark blue or black socks, and Department-approved black uniform footwear. Personnel are permitted, but not required, to wear a Department-issued 100 percent cotton blue t-shirt under the polo shirt. The uniform pants are made of a 65/35 cotton/polyester blend; the polo shirts are made of 100 percent cotton.

Each individual volunteer corporation develops its own policies and procedures with regard to uniform requirements and issuance.

On May 25, 2008, all four personnel who were inside the structure were compliant with SOP 03.01.01 and were wearing a Department-issued 100 percent cotton t-shirt under their collared shirts.

Recommendation: Develop a System-wide policy that requires personnel to wear two layers of 100 percent cotton garments. Combined with properly worn PPE, the second layer of cotton provides additional protection from thermal injury.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

There is no System-wide standard for PPE. LCFR and each of the County’s 17 volunteer corporations purchase PPE according to their own specifications and replacement cycles. There are no policies or procedures prohibiting System members from purchasing and wearing different types of protective equipment, such as firefighting gloves and hoods. As a result, it is possible that personnel could be wearing PPE that does not comply with industry standards.

The Department of Fire, Rescue, and Emergency Management issues PPE to all operational employees. In 2006, the Department received PPE from a regional Urban Area Security Initiative (UASI) grant, which provided a second set of gear for all Department employees and Company-identified members of the volunteer System.

Depending on the set of gear, firefighting pants and coats are manufactured by Globe and are either the GX-7 or G-XTREME models. The fire helmet is a Cairns 1000, Kevlar Composite traditional style helmet. The firefighting gloves are manufactured by FireDex; protective hoods are manufactured by Lifeliners.

There is a policy that addresses the requirement of personnel to wear PPE, but it is not System-wide. LCFR General Order 2006-010, *Helmets*, mandates that Department employees wear the issued Cairns 1000 fire helmet. Otherwise, neither the Department nor the System has adopted any policies or procedures requiring personnel to don PPE prior to entering an IDLH environment.

Recommendation: Develop and implement System-wide policies and procedures that require personnel to properly don PPE before entering an IDLH atmosphere. Such policies and procedures should include a provision that crews complete a “buddy check” prior to entry.

On May 25, 2008, the four personnel from Reserve Engine and Tower 6 were wearing Department-issued turnout coats, bunker pants, boots, and helmets. Three of the members were wearing the G-XTREME gear while one was wearing Globe GX7.

Three personnel were wearing Department-issued firefighting gloves; one employee was wearing gloves that were not issued by the Department.

Two personnel were wearing Department-issued protective hoods; the other two were wearing different styles of hoods, which were not issued by the Department.

Only two of the firefighters had their collars up and properly fastened prior to entering the structure for interior firefighting operations.

All four personnel had engaged the chinstrap on their helmet. Only one of the firefighters had the earflaps down prior to entering the structure for firefighting operations.

All four firefighters had their suspenders attached to their bunker pants. Post-incident interviews indicated that all four used their suspenders during the Meadowood incident.

Recommendation: Adopt System-wide policies and procedures that prohibit personnel from wearing PPE that is not issued. The System could consider developing an approval process whereby personnel would be permitted to purchase and wear non-issued PPE.

PPE Inspection and Cleaning

There is no System-wide policy or procedure requiring regular PPE inspections or cleaning. LCFR Standard Operating Procedure 02.03.01, *Personal Protective Equipment Inspection*, outlines the procedure for quarterly gear inspections. When the policy was issued in February 2007, all stations were provided copies of Globe's inspection guidelines for protective clothing and NFPA 1851, *Standard on Selection, Care, and Maintenance of Structural Fire-Fighting and Proximity Fire-Fighting Protective Ensemble*. Though not addressed in the policy, it is the Department's practice to send PPE to a third party for cleaning and repair on an annual basis.

PPE Inspection Forms, Form 023, are maintained at the station level. Three of the four personnel had records from the first quarterly PPE inspection (January 2008) but none had forms for the required second quarterly inspection (April 2008).

Recommendation: Develop and implement a System-wide procedure that requires the regular inspection, repair, and cleaning of issued PPE. Also, reiterate the requirement that LCFR personnel inspect their PPE on a quarterly basis.

PPE Analysis

The four injured employees' PPE was sent to International Personnel Protection, Inc. in Austin, Texas for analysis. A comprehensive report was provided to the Investigative Team, detailing their findings and conclusions, which correlate the firefighter's injuries with physical evidence found on the PPE. A summary of the report can be found in Appendix 7.

The following highlights are taken from the report:

- The clothing showing the greatest levels of damage belonged to the Tower Officer, whose protective coat and pants showed severe deterioration of the majority of reflective trim present and also melting of several items onto the clothing. Moreover, this damage extended into the interior layers of the clothing, particularly the moisture barrier layer and also to the thermal barrier. The PPE worn by the Tower Officer was considerably older and had a completely different trim package than the PPE worn by the other firefighters.
- The helmets of each firefighter showed heavy soiling and damage to the more vulnerable parts, such as the eye shields (if present), edge beading, and reflective markings. Three of the firefighters did not deploy their ear covers, as the covers were rolled up into the helmet; the only exception was the Tower Officer.

- The Reserve Engine Officer was wearing the lightest weight gloves of all firefighters that were injured. These gloves include a textile back that improved hand dexterity but at the expense of thermal insulation. As the hands represent an area of the body that has a high surface area to volume ratio, providing adequate protection is a challenge and not always commensurate with body protection. If wet, hands may be even more susceptible to burn injury. The burns to the Reserve Engine Officer's neck are likely partly the result of not having worn the collar in an upward deployed position or using the helmet ear covers properly.

Figure 27: Tower Firefighter's Flashlight

- All four personnel carried flashlights, which provide some indication of the relative heat exposure sustained by each firefighter. The Tower Officer's flashlight lenses were completely disintegrated. There was also severe damage to the flashlights belonging to the Reserve Engine Officer and Tower Firefighter. These lenses melt at approximately 300° Fahrenheit (see Figure 27).
- The Tower Officer sustained burns primarily to the back of the body including the back, legs, and buttocks. Though damage appears both equally to the front and back of the PPE, some of the more penetrating damage is found on the back and upper arms under trim bands that had disintegrated as the result of the flashover exposure. It is further likely that the Officer's burns were primarily the result of the Officer's orientation with respect to the flashover, which overpowered the degree of protection provided by both the coat and pants. The report of continued burning of the Officer's clothing also suggests that the Officer contacted some flammable agent on the fireground that either adhered to the clothing or absorbed into it, resulting in continued burning after exiting the fire structure and lengthening the Officer's exposure.
- The specific damage noted to the trim with its complete deterioration, particularly on Tower Officer's protective coat and pants suggests exposure temperatures that were well in excess of 600° Fahrenheit for several seconds. The reflective marking damage combined with edge bead melting of helmet materials, bubbling and extension of eye shields on the protective helmets worn by the Reserve Engine Officer, Reserve Engine Firefighter and Tower Firefighter also confirm exposures at these levels. The damage to the helmets, hoods, and portions of the protective clothing, and other components worn by the firefighters do support the characterization of the firefighters being exposed to a flashover.
- No specific defects were found in any of the items of protective clothing and equipment that would have contributed to the injuries sustained by each firefighter.



Recommendation: Reinforce the importance of proper PPE usage during emergency operations to ensure that personnel receive the highest protective benefit possible. Three of the four burned firefighters sustained some level of burn injury to their ears. The investigation revealed these three firefighters did not deploy their ear flaps.

Recommendation: Modify gear specifications to relocate the reflective striping away from compression areas and require additional layers of thermal protection on the bunker coat sleeves. For further discussion, see page 114, Additional Considerations.

Gear Photos

The following photos are included to illustrate the variations in heat exposure sustained by each of the injured firefighters.

Figure 28: Tower Officer



Figure 29: Tower Firefighter



Figure 30: Reserve Engine Firefighter



Figure 31: Reserve Engine Officer



Figure 32: Tower Officer



Figure 33: Tower Officer



Figure 34: Tower Officer Liner



Figure 35: Tower Officer Liner



Figure 36: Reserve Engine Firefighter



Figure 37: Reserve Engine Officer



RADIOS

The Department purchases and maintains all of the portable and mobile radios in Loudoun County.

The Reserve Engine Officer carried a Motorola XTS3000 800 MHz radio. The Tower Officer, Tower Firefighter, and Reserve Engine Firefighter carried Motorola XTS5000 800 MHz portable radios.

During post-incident examinations, the Investigative Team determined the following:

- The Reserve Engine Officer carried the radio in a radio strap. The portable was on 6 Delta, not on scan, and was missing the Push-to-Talk (PTT) on the lapel microphone. The connection between the lapel microphone and the portable radio had separated and the Officer's radio strap was connected to the SCBA harness.

Figure 38: Tower Officer Portable

- The Tower Officer's radio was on 6-Charlie and was not on scan mode. The Officer carried the radio in a radio strap; both the portable radio and the radio strap sustained thermal damage (see Figure 38).
- The Reserve Engine Firefighter carried the portable in the radio pocket of the turnout coat. The portable was on 6-Charlie and was not on scan.
- The Tower Firefighter carried the radio in a radio strap. The portable was on 6-Delta and was not on scan. The Tower Firefighter's radio sustained thermal damage.



SELF-CONTAINED BREATHING APPARATUS (SCBA)

All Department-purchased SCBA are SCOTT Airpak 50s equipped with a buddy breather connection. In 2007, the Department of Fire, Rescue, and Emergency Management implemented a Respiratory Protection Program whereby the Department assumed responsibility for SCBA previously owned by the volunteer corporations. The Ashburn Volunteer Fire and Rescue Department joined the Respiratory Protection Program in April 2008 and LCFR delivered a complement of new SCBA and cylinders on May 21 and May 22, 2008.

Fit testing is a component of the System-wide Respiratory Protection Program. All career personnel are fit-tested annually during their required Medical Evaluation; fit-testing for volunteers was implemented in November 2007.²³

The System's Respiratory Protection Program Manual has yet to be approved. A final draft was distributed to stakeholders on May 27, 2008.

Recommendation: Finalize, adopt, and implement a Respiratory Protection Program Manual.

There are no System-wide policies or procedures that require personnel to don SCBA prior to entering an IDLH atmosphere.

Recommendation: Develop and implement a System-wide policy that requires personnel to don SCBA prior to entering an IDLH atmosphere or when they may be exposed to an IDLH atmosphere.

SCBA Use on Meadowood Court

Three of the four injured firefighters had been fit-tested for the AV3000 facepiece within the last year. One firefighter had not been fit-tested since November 2006. That firefighter had separated from LCFR to work for another career fire department in April 2007 but returned to LCFR employment in September 2007. Upon returning to LCFR, the firefighter was not required to undergo a Medical Evaluation and was not scheduled for an annual Medical Evaluation until June 2008. The Department has since changed its policy to require any employee that leaves LCFR and returns to undergo a Medical Evaluation prior to resuming operational duties.

All four firefighters donned SCBA prior to entering the structure and were wearing SCOTT AV3000 facepieces.

The SCBA were worn properly with the waist straps secured. The SCBA functioned properly throughout the incident with no operational failures on the scene, evidenced by the fact that none of the four injured firefighters experienced any airway burns or respiratory compromise.

²³ FRG OPS 2.1.3

Figure 39: Tower Officer



Figure 40: Tower Officer



Air Shop Analysis

All four SCBA were sent to the Fairfax County Fire and Rescue Department Air Shop for analysis. The Air Shop provided a detailed report on the condition of each SCBA and flow-tested each SCBA at least twice. Excerpts and pictures from their report are included in Appendix 6.

The following is a brief summary of their findings.

Tower Officer SCBA

- The Officer's SCBA regulator and facepiece were in such a condition that they were unable to be tested (Figure 39).
- There was significant damage to the facepiece; the lens was grossly disfigured from high heat or flame exposure.
- The regulator was still attached to the lens and the low pressure air line of the reducer.
- The entire cover was distorted from exposure to high heat.
- The latch was not operational.

The Air Shop used a spare regulator to test the SCBA, reporting the following:

- There was heat damage to various hoses and couplings as well as the backframe assembly and air cylinder. In particular, the Air Shop noted that the Officer's Emergency Breathing Support System (EBSS) hose had a tear in the outer cover, heat damage, and a cut just below its retaining strap.

The report concluded that due to the compromised EBSS line and extreme thermal damage to the regulator, the SCBA was only seconds from failure.

Tower Firefighter SCBA

- Operational, with signs of heat damage.

Reserve Engine Officer

- Operational, with signs of heat exposure.

Reserve Engine Firefighter

- Operational, with minimal heat damage.

ADDITIONAL CONSIDERATIONS

The Meadowood Court incident and subsequent investigation activities identified processes that contribute to a lack of system efficiency and effectiveness.

This chapter addresses a variety of topics, which the Investigative Team determined to be outside of the scope of the Team's initial mission. They are included here because they impact and influence the System's ability to implement many of the Team's recommendations.

POLICY AND GOVERNANCE

System-wide, there are a multitude of administrative and operational policies, procedures, and guidelines. The System lacks a single unifying policy and procedure manual that clearly establishes and defines administrative and operational responsibilities for the System and its personnel.

There are significant voids in the existing policies with regard to standardized training and certification requirements, record keeping, ECC operations, minors participating on the fireground, personnel entry into IDLH atmospheres, and apparatus and equipment inventory and check out procedures.

Recommendation: Develop and implement System-wide administrative and operational procedural manuals. As an example, one step in this process would be to formally adopt all of the NOVA *Operations Manuals*.

The County lacks an effective System-wide mechanism to communicate and implement newly adopted policies and procedures. Inconsistency in the process leads to misunderstandings, miscommunication, and non-compliance.

Recommendation: Develop and implement a communication process to distribute newly adopted policies and procedures. Standardizing the distribution process will help to ensure that all System personnel are educated and trained on new policies and procedures.

HEALTH AND SAFETY

There are no System-wide policies or procedures that address response to a significant firefighter injury or fatality. Specifically, there are no protocols that address the treatment of injured personnel.

Recommendation: Develop and implement System-wide protocols that address the unique challenges of treating injured firefighters. Since not all EMS providers are qualified firefighters, these personnel may not be familiar with PPE and may need additional training regarding how to remove gear without causing further injury.

There are no System-wide policies or procedures that address reaction to an incident with significant firefighter injury(ies) or fatalities. In addition to the immediate reaction and required notifications, it is important to thoroughly investigate the incident and produce an analysis that provides recommendations to prevent another similar occurrence.

Recommendation: Develop and implement System-wide policies and procedures that address response to a serious firefighter injury or fatality, including required notifications and the investigation of the incident. Ideally, this should take the form of a national effort toward a methodology for addressing line of duty injuries and fatalities.

Post-incident interviews revealed that there is variation between the volunteer corporations' requirements for personnel to perform various fireground activities, including entering IDLH atmospheres. Depending on the volunteer corporation, personnel may or may not be required to complete an internal program to allow them to enter an IDLH atmosphere.

In particular, during the Meadowood Court incident, there were personnel wearing SCBA and red helmets. Per FRG 2.1.4.1, a red helmet indicates that the wearer is a recruit or has no certifications.

At least one of the personnel wearing a red helmet was later determined to be less than 18 years of age. The Code of Virginia²⁴ requires minors between the ages of 16 and 18 obtain Firefighter 1 certification prior to entering an IDLH. While it is not clear whether a minor entered an IDLH on Meadowood Court, it is an area of concern.

Given the lack of a System-wide policy, unit officers and others on the scene could not readily identify the capability of personnel wearing red helmets. This leads to ambiguity, lack of appropriate supervision, and potential for personnel to become engaged in activities for which they are not trained or certified.

Recommendation: Establish a System-wide policy, which clearly defines the certifications required for entry into an IDLH atmosphere and provides mechanisms to readily differentiate personnel on the fireground. The policy should also address the Code of Virginia's requirements pertaining to minors.

²⁴ Code of Virginia § 40.1-79.1.

COMPETENCY-BASED TRAINING

Fire/rescue personnel at all levels require a wide variety of knowledge, skills, and abilities. In particular, personnel must be able to rapidly assess a situation, select the appropriate actions, and begin operations. The ability to do this successfully is acquired through personal experience and career-long training.

Training focused on decision-making, basic strategy and tactics, and command competencies is crucial to ensuring that personnel are competent, confident, and make sound decisions. The ongoing demonstration and evaluation of the competencies associated with each rank is critically important to ensuring that personnel can perform their essential job tasks and functions.

Recommendation: Develop and implement ongoing, System-wide competency-based training for all rank levels. Personnel in positions of authority, responsibility, and decision-making should have the opportunity to learn, train, and demonstrate their knowledge, skills and abilities.

APPARATUS AND EQUIPMENT STANDARDIZATION

Standardized fire apparatus and equipment inventories improve the efficiency of fireground operations and promote personnel safety.

Standardized fire apparatus allow driver/operators to become proficient in apparatus operation, regardless of whether they are assigned to that unit. Standardized equipment inventories ensure that personnel are able to locate and retrieve equipment quickly, without having to search through each compartment, only to find that the apparatus is not equipped with a particular item.

Without apparatus and equipment standardization, incident commanders, unit officers, and firefighters cannot adequately address strategy and tactics, as they may not be aware of the specific capabilities of the apparatus and equipment in use on the incident scene. Given the wide variety of apparatus in Loudoun, it is not practical for personnel to know the capabilities, specifications and limitations of each one.

Recommendation: Develop and implement a standardized, System-wide apparatus specification and design standard and equipment inventory for fire, rescue and EMS units.

There are also no System-wide policies addressing the inspection, maintenance, and repair of fire/rescue apparatus. Since much of the apparatus is owned by the County's volunteer companies, each company has developed its own mechanism for performing and tracking daily check-outs, etc.

Recommendation: Develop and implement a standardized, System-wide apparatus and equipment check-out policy for all apparatus in the County.

The policy should include a mechanism for documenting regular apparatus inspections, repair, and maintenance.

SCBA

SCBA and all components must withstand low, moderate and extreme temperatures and continue to function so long as there is the potential for firefighter rescue. Analysis of the SCBA used on Meadowood Court and during several recent regional MAYDAY/close call events has revealed several important trends.

Given the increased use of plastics and synthetic materials, today's structure fires produce an enormous amount of heat and thermal energy. SCBA components that are made of plastic and rubber are vulnerable to rapid deterioration as a result of exposure to heat and thermal energy. As a result, the existing industry standards that address the durability of SCBA, including PASS devices, are no longer adequate.

Recommendation: The fire service should work with SCBA manufacturers to reduce the vulnerability of SCBA components, particularly those made of plastic and rubber, to heat and adverse conditions.

PORTABLE RADIOS

It is extremely difficult for a firefighter to locate and activate the EA button while wearing firefighting gloves and other protective equipment.

Recommendation: The fire service should work with the portable radio industry to make EA buttons more user-friendly while avoiding unintentional activations.

REFLECTIVE STRIPING

During the evolution of structural firefighting PPE, there has been a general trend to place reflective striping on turnout coats and pants to improve personnel visibility. Initially, this addition of reflective striping may have been an effort to specifically improve the visibility of responders operating in the roadway at motor vehicle accidents. While this may have been successful in the past, recent changes in national reflective safety apparel standards make reflective striping on structural firefighting PPE redundant for roadway safety purposes.

The recent revision of the national standard, ANSI 207, addresses reflective safety apparel and requires the wearing of Public Safety Vests (PSV) on roadway incidents that have a specific amount of fluorescent background material among other

requirements. There are no manufacturers producing structural firefighting PPE that meets the current ANSI 207 standard.

During the Meadowood Court incident, a review of the PPE worn indicates that the firefighters suffered burns in areas, specifically the forearms, where reflective striping was located. The PPE examination indicated that the reflective striping had ignited and in some cases burned completely, possibly causing or exacerbating the firefighters' burn injuries.

Recommendation: Encourage a national effort to minimize reflective striping on structural firefighting PPE from areas of possible compression (e.g. forearms). The availability of PSVs for roadway operations makes reflective striping on structural firefighting PPE unnecessary for visibility. Reflective striping should remain on the perimeter of structural firefighting PPE (e.g. coat hem, coat and pant cuffs) to aid in visibility and recognition on the fireground and low-light environments.

COMMUNITY OUTREACH

Members of the System provide a variety of fire prevention programs targeted to high-risk groups in the County, including children and the elderly. Occasionally, after significant fires, personnel go door-to-door in the community, handing out educational materials, checking, and installing smoke alarms. These programs are not coordinated or standardized across the County.

After the Meadowood Court incident, personnel conducted a canvas of the surrounding neighborhood to provide basic incident information, ensure residents had working smoke alarms and answer any fire safety-related questions.

Recommendation: Develop and implement a standardized community outreach fire and injury safety prevention program that addresses when and how to conduct community canvasses after significant fire events.

Bystanders posed a significant challenge to responders on Meadowood Court. Personnel noted that there were vehicles parked along the response route, which made it difficult to access the Court and effectively position apparatus. Personnel mentioned residents were walking in the neighborhood streets, which was dangerous to both the citizens and the responders.

In addition, none of the neighbors approached the first-arriving crews to advise them that all of the occupants were out of the house.

Recommendation: Develop and implement educational opportunities for citizens that provide direction on what to do in the event of an emergency in their home or community. Such programs should focus on what information to relay to the 911 call taker, what to tell the first-arriving crews, etc.

RESIDENTIAL SPRINKLERS

The structure at 43238 Meadowood Court was equipped with smoke alarms, as required by County ordinance. However, the structure was not equipped with automatic fire sprinklers.

Residential fire sprinklers typically reduce chances of dying in a fire and the average property loss by one-half to two-thirds compared to where sprinklers are not present.²⁵ Sprinklers provide a critical measure of safety for citizens and firefighters.

Recommendation: Encourage the development of a sprinkler ordinance through the legislative process. Virginia is considered a Dillon Rule state, which means that local governments derive their authority from the state and are not able to exercise authority that has not been expressly granted to them by the state. Currently, local governments in Virginia do not have the authority to enact an ordinance that requires residential sprinklers.

²⁵ <http://www.homefiresprinkler.org/FS/FSFacts3.html>, accessed August 22, 2008.

GLOSSARY

Ambulance: An EMS transport unit that provides Basic Life Support (BLS) care to patients.

Battalion: A geographical response area.

Command: Position within the Incident Command System that is responsible for the overall management of the incident. Synonymous with the term Incident Commander.

Computer Aided Dispatch (CAD): A combination of hardware and software that provides data entry, makes resource recommendations, notifies and tracks those resources before, during, and after alarms, preserving records of those alarms and status changes for later analysis.

Chaplain: A member of the clergy, who is a County volunteer that serves to assist fire and rescue personnel and citizens experiencing public safety related emergencies.

Command Post (CP): Location at which primary command functions are executed.

Crosslay: Refers to a hoseline that is racked across the apparatus and is designed to be deployed by one firefighter.

Division: A level of organization within the Incident Command System. Divisions are used to divide an incident into geographical areas of operation.

Division/Group Supervisor: An incident command system position responsible for supervising personnel and resources assigned to a division or group.

Emergency Communications Center (ECC): Work location for LCFR Communications personnel.

Emergency Evacuation: The immediate withdrawal of personnel from a structure or area.

Engine: Refers to fire apparatus that are equipped with a pump and carry water and fire hoses. The terms “Wagon”, “Engine”, and “Reserve Engine” are interchangeable with regard to their capabilities on the fireground.

Exposure: Refers to a structure in the vicinity of the fire building. Exposures are commonly identified with a letter and a number to describe the location of the structure relative to the fire building (e.g., Bravo-3 Exposure, Charlie-1 Exposure).

General Order: An LCFR General Order (GO) is a directive that orders one or more persons, either by name or by class/group, to take a specific action or series of actions and is of interest to all LCFR personnel.

Gallon Per Minute (GPM): A unit of measurement that describes the rate of fluid flow. Typically used to refer to the amount of water flowed through a hoseline or the capacity of a pump.

Group: A level of organization within the Incident Command System. Groups are used to divide an incident into functional assignments (e.g., rescue, ventilation, salvage, water supply, etc.).

Hoseline: Firefighters use hose to move water from one place to another. Hoselines are described by their size (diameter).

Host Company: The volunteer fire or rescue company that owns and operates a particular piece of apparatus.

1 ¾ inch hoseline: Primary hoseline used for fire attack in Loudoun County.

Immediately Dangerous to Life or Health (IDLH): An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Incident Action Plan (IAP): The IAP is developed by the Incident Commander and addresses the objectives that reflect the overall incident strategy, tactics, risk management, and member safety. These plans are updated throughout the incident.

Incident Commander (IC): Position within the Incident Command System that is responsible for the overall management of the incident. Synonymous with the term Command.

Incident Command System (ICS): An Incident Command System (ICS) defines the roles and responsibilities to be assumed by responders and the standard operating procedures to be used in the management and direction of emergency incidents and other functions.

MAYDAY: A term used to report firefighters who are lost, trapped, disoriented, or in a life threatening situation.

Medic Unit: A patient transport unit that provides advanced life support (ALS) care to patients.

MWCOG: Acronym for the Metropolitan Washington Council of Governments. MWCOG is a regional organization, comprised of 21 local governments surrounding the nation's

capital, members of the Virginia and Maryland legislatures, the U.S. Senate, and the U.S. House of Representatives.

National Incident Management System (NIMS) – In February 2003, President Bush issued Homeland Security Presidential Directive (HSPD)-5, which required all federal departments and agencies to adopt a system that provides a consistent approach incident response and includes a core set of concepts, principles, and terminology. That system is now known as NIMS.

Mode of Operation: A strategic plan for the initiation of operations based on size up of incident conditions.

NOVA: Acronym for Northern Virginia. In this document, the term refers to the Fire & Rescue Departments of Northern Virginia.

PAR Check: Acronym for Personnel Accountability Report. PAR checks are radio reports, initiated by the Incident Commander, at predetermined points in the incident. During PAR checks, unit officers report the total number and accountability of members assigned to their unit, the area they are operating in, and indicate the number of people operating outside of the hazard zone.

PASS Device: Acronym for a Personal Alert Safety System. A device that senses movement and is designed to automatically activate an alarm signal indicating the wearer is in need of assistance. The device can also be manually activated to trigger the alarm signal. PASS devices may be integrated into the SCBA or a standalone device.

Personal Protective Equipment (PPE): Equipment and clothing required to reduce the risk of injury from, or exposure to, hazardous conditions encountered during the performance of duty.

Personnel Accountability System: A system that readily identifies both the location and function of members operating on an incident scene.

Public Safety Answering Point (PSAP): Facility where 911 calls are answered and processed.

Rapid Intervention Team (RIT): A team consisting of at least three firefighters, including one officer, which is immediately available to respond to requests for help from lost, trapped or incapacitated firefighters.

Reserve Engine: Refers to fire apparatus that are equipped with a pump and carry water and fire hoses. Typically, but not always, “Reserve” engines are spare apparatus, which are maintained in the event that the primary apparatus goes out of service. The terms “Wagon”, “Engine”, and “Reserve Engine” are interchangeable with regard to their capabilities on the fireground.

Rescue: Name given to fire apparatus in Loudoun County that is used to carry specialty equipment such as vehicle extrication equipment, rope rescue equipment, and confined space equipment.

Safety Officer: Responsible for monitoring and assessing safety hazards, unsafe conditions, and developing measures for ensuring personnel safety during an incident.

Scan: Refers to a mode by which personnel can monitor multiple radio channels simultaneously.

Self-Contained Breathing Apparatus (SCBA): An atmosphere-supplying respirator that supplies breathing air to the user from a source that is independent of the ambient environment and designed to be carried by the user.

Sides Alpha, Bravo, Charlie, and Delta: Geographical designation that refers to the sides of a building, clockwise from the front. See diagram on page 8.

Situational Awareness: The knowledge of being aware of a situation as it actually exists.

Size Up: The objective of the size-up is to identify the nature and severity of the immediate problem and gather sufficient information to formulate a valid action plan.

Thermal Imaging Camera (TIC): A camera that uses infrared technology to locate victims during search and rescue operations and locate hidden fire.

Truck: Refers to fire apparatus that are equipped with an aerial ladder, but do not have a platform for personnel to work off of or out of.

Tower: Refers to fire apparatus that are equipped with an aerial ladder and a platform for personnel to work off of or out of.

Type V Construction: As defined by the National Fire Protection Association, a form of construction where structural members consist entirely of wood.

Wagon: Refers to fire apparatus that are equipped with a pump and carry water and fire hoses. The terms “Wagon”, “Engine”, and “Reserve Engine” are interchangeable with regard to their capabilities on the fireground.

Walk Around: The act of walking around an emergency incident to conduct a scene size up.

APPENDIX 1 – RECOMMENDATIONS

Operations	
1.	Increase the System-wide minimum staffing level to at least four qualified firefighters on all fire suppression units, including engine, truck, and rescue companies.
2.	Develop and implement System-wide procedures that address modifications to the arrival sequence and/or original dispatch complement.
3.	Develop and implement System-wide policies and procedures that address the actions required of EMS units upon arrival at a structure fire.
4.	Develop and implement System-wide training that addresses the roles and responsibilities of EMS officers during fire incidents
5.	Review the County's EMS protocols, specifically those related to helicopter transports and burns.
6.	Increase staffing at the Command Post by developing incident management teams.
Firefighter Safety	
7.	Develop and implement formal, System-wide, policies and procedures related to Two-In/Two-Out compliance
8.	Reiterate the importance of visualizing the entire structure prior to making entry.
9.	Develop a System-wide training program that focuses on situational awareness, particularly how to "read" interior and exterior smoke conditions to identify the location and predicted spread of a fire.
10.	Implement ongoing, mandatory, System-wide training on NOVA MAYDAY procedures and self-survival techniques
11.	Develop System-wide quick-reference guides for all command vehicles that address low-frequency, high-risk incidents, including MAYDAY situations, building collapse, etc.
12.	Reprogram the portable radios so that the microphone is automatically open for a period of time after the EA is depressed.
13.	Develop ongoing, System-wide training programs to reiterate the importance of transmitting an EA as soon as firefighters realize they are in trouble.
14.	Develop and implement formal, System-wide policies and procedures addressing the withdrawal and emergency evacuation of firefighters from structures during emergency incident operations.
15.	Reiterate that Incident Commanders must take care not to issue conflicting orders on the fireground (e.g., evacuating the structure while sending in a Rapid Intervention Team).

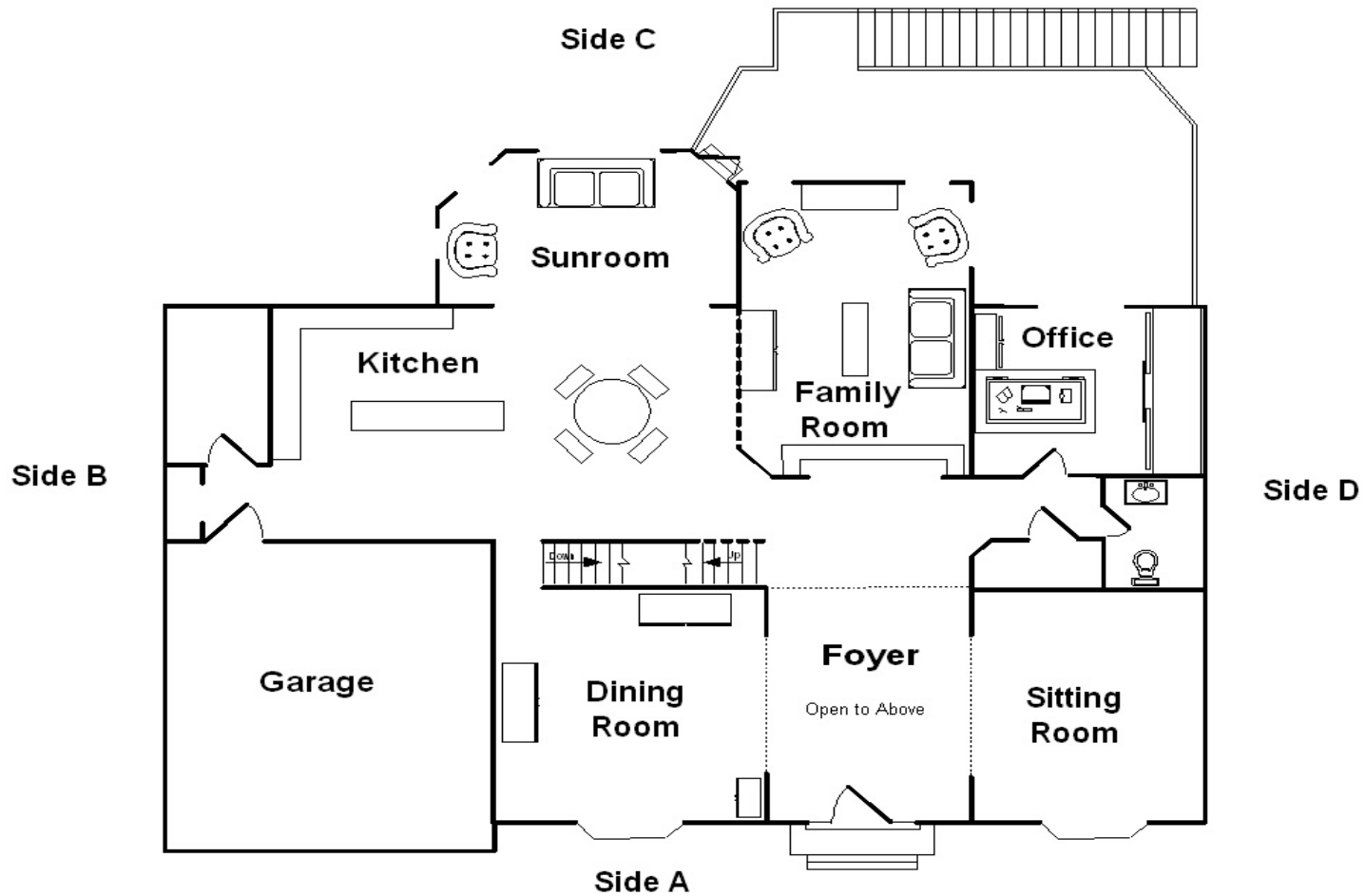
16.	Develop ongoing, System-wide training programs that reinforce the actions expected of units assigned RIT, which are consistent with the NOVA <i>RIT Manual</i> .
17.	Adopt policies and procedures that require the formation of a RIT Group as soon as the RIT is activated.
18.	Develop ongoing, System-wide training programs that reinforce the importance of acknowledging assignments on the fireground by echoing the transmission over the radio or face-to-face.
19.	Develop and implement System-wide policies and procedures related to personnel accountability.
Communications	
20.	Perform a comprehensive gap analysis of policies and procedures in the ECC and establish policies, procedures, and processes as necessary.
21.	Modify the radio channel template to group, or “band,” radio channels together by incident.
22.	Modify the CAD nature codes so that structure fires automatically generate a law enforcement response for scene and traffic control.
23.	Evaluate and adjust ECC staffing levels to support the System’s emergency communications needs.
24.	Review current ECC policies, procedures, and processes to reduce dispatch delays.
25.	Develop and implement formal policies and procedures that define when to establish a Command Channel.
26.	Reevaluate existing policy and current practice, which allow units to add-on or divert to calls at any point in the incident
27.	Develop and implement formal policies and procedures that define NIMS-compliant Task Forces, Strike Teams, and other specialized dispatch complements.
28.	Number units according to the station to which they are assigned.
29.	Adopt a NIMS-compliant mechanism to type apparatus and assign designations, consistent with the system adopted by the Metropolitan Washington Council of Governments (MWCOG).
30.	Reiterate that personnel must be cognizant of the assigned radio channel and ensure that their portable radio is on the correct channel.
31.	Develop and implement System-wide training programs that reinforce the importance of radio discipline.
32.	Check all of the consoles in the ECC to ensure that the pre-emption switches are activated and functioning properly.
33.	Have a subject matter expert perform a detailed technical analysis of the radio system and all of its components to identify and correct deficiencies.
34.	Develop System-wide training programs that reinforce the importance of accurately repeating messages over the radio.

Behavioral Health	
35.	Develop and implement formal policies and procedures that define situations where CISM should be requested, how the Team should be notified, and the Team's roles and responsibilities.
36.	Develop standardized training for Department employees and supervisors identifying services available through EAP and methods to access those services.
37.	Develop a System-wide behavioral health program which includes immediate, short, and long-term counseling services for fire and rescue personnel and their families.
Training	
38.	Develop and implement System-wide, entry-level and ongoing firefighter self-survival training that at a minimum addresses RIT, flashover, MAYDAY procedures, crew integrity, ladder bails, emergency SCBA procedures, firefighter drags and carries, and practical scenario-based evolutions.
39.	Review and enhance the System's entry-level and ongoing training on building construction to emphasize the unique characteristics of lightweight construction and associated special hazards. (e.g., open floor plans, Herculite ®, etc.).
40.	Develop and implement an ongoing, System-wide officer development training and continuing education program.
41.	Develop and implement a centralized, standardized System-wide record-keeping system for all training-related records.
Apparatus and Equipment	
42.	Develop System-wide policies and procedures that address the responsibilities associated with each riding position on fire/rescue apparatus and the tools and equipment to be carried, based on call type.
Uniforms and PPE	
43.	Develop a System-wide policy that requires personnel to wear two layers of 100 percent cotton garments.
44.	Develop and implement System-wide policies and procedures that require personnel to properly don PPE before entering an IDLH atmosphere.
45.	Adopt System-wide policies and procedures that prohibit personnel from wearing PPE that is not issued.
46.	Develop and implement a System-wide procedure that requires the regular inspection, repair, and cleaning of issued PPE.
47.	Reinforce the importance of proper PPE usage during emergency operations to ensure that personnel receive the highest protective benefit possible.

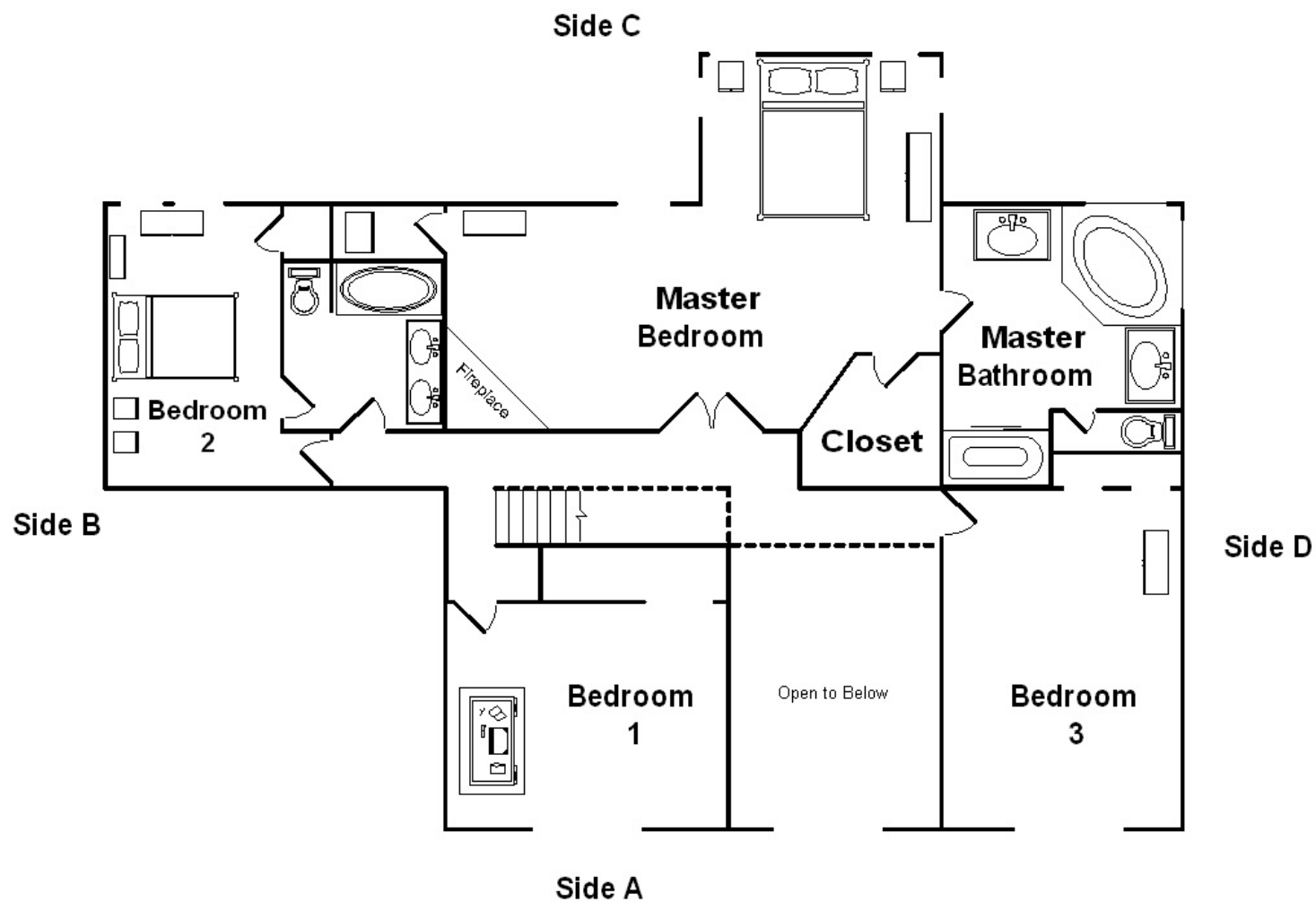
48.	Modify gear specifications to relocate the reflective striping away from compression areas and require additional layers of thermal protection on the bunker coat sleeves.
49.	Finalize, adopt, and implement a Respiratory Protection Program Manual.
50.	Develop and implement a System-wide policy that requires personnel to don SCBA prior to entering an IDLH atmosphere or when they may be exposed to an IDLH atmosphere.
Additional Considerations	
51.	Develop and implement System-wide administrative and operational procedural manuals.
52.	Recommendation: Develop and implement a communication process to distribute newly adopted policies and procedures.
53.	Develop and implement System-wide protocols that address the unique challenges of treating injured firefighters.
54.	Develop and implement System-wide policies and procedures that address response to a serious firefighter injury or fatality, including required notifications and the investigation of the incident.
55.	Establish a System-wide policy, which clearly defines the certifications required for entry into an IDLH atmosphere and provides mechanisms to readily differentiate personnel on the fireground.
56.	Develop and implement ongoing, System-wide competency-based training for all rank levels.
57.	Develop and implement a standardized System-wide apparatus specification and design standard and equipment inventory for fire, rescue and EMS units.
58.	Develop and implement a standardized, System-wide apparatus and equipment check-out policy for all apparatus in the County.
59.	The fire service should work with SCBA manufacturers to reduce the vulnerability of SCBA components, particularly those made of plastic and rubber, to heat and adverse conditions.
60.	The fire service should work with the portable radio industry to make EA buttons more user-friendly while avoiding unintentional activations.
61.	Encourage a national effort to minimize reflective striping on structural firefighting PPE from areas of possible compression (e.g. forearms).
62.	Develop and implement a standardized community outreach fire and injury safety prevention program that addresses when and how to conduct community canvasses after significant fire events.
63.	Develop and implement educational opportunities for citizens that provide direction on what to do in the event of an emergency in their home or community.
64.	Encourage the development of a sprinkler ordinance through the legislative process.

APPENDIX 2 – FLOOR PLANS

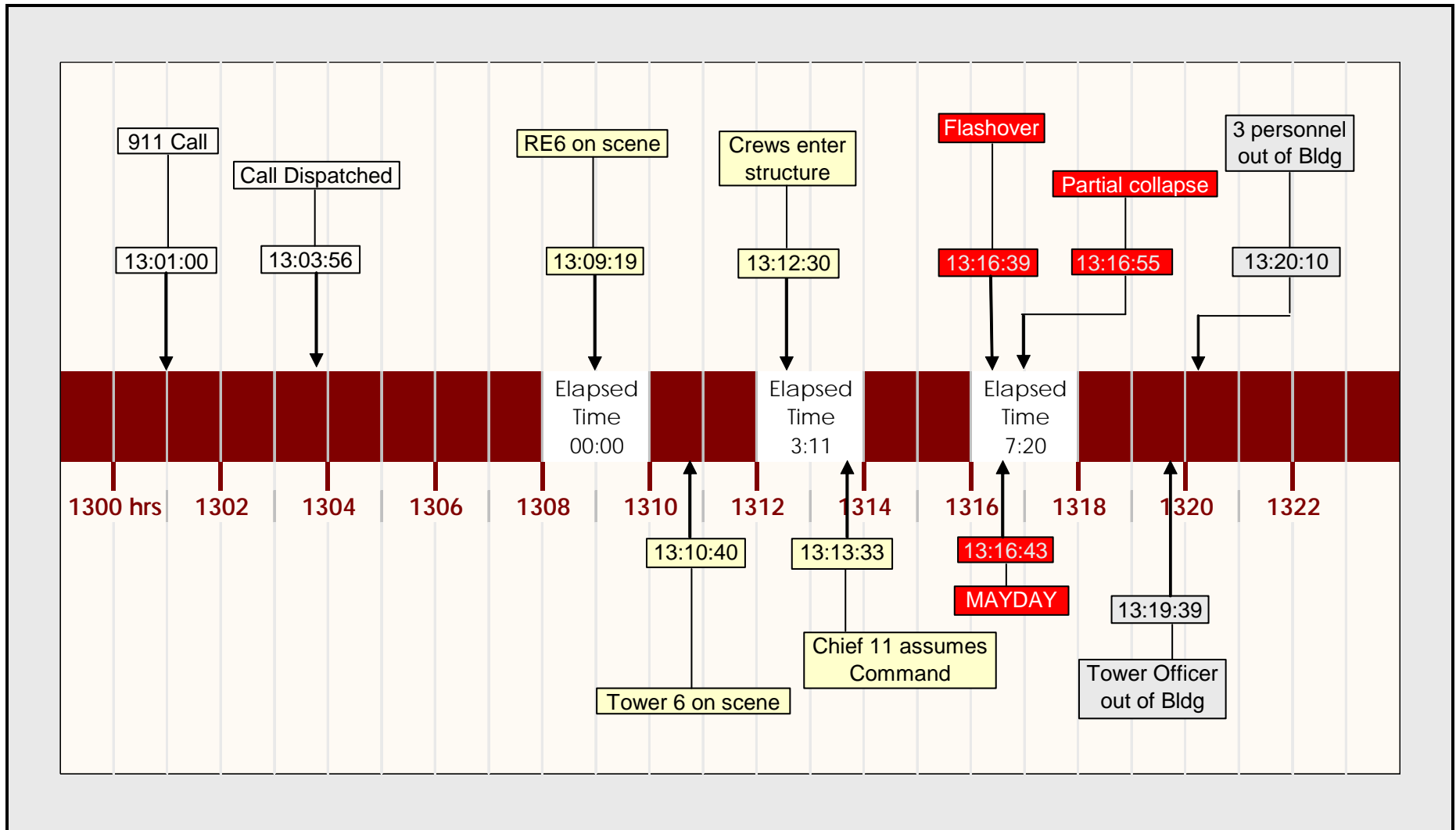
First Floor



Second Floor



APPENDIX 3 – TIMELINE OF CRITICAL EVENTS



APPENDIX 4 – TRANSCRIBED RADIO TRAFFIC

TG	Alias	Begin	End	Dur.	Notes
6A	Disp Con 1	13:01:54	13:01:57	0:00:03	Mic click
6A	Disp Con 1	13:01:56	13:01:58	0:00:02	Mic click
6A	Disp Con 1	13:01:57	13:02:00	0:00:03	Mic click
6A	Disp Con 1	13:01:59	13:02:19	0:00:20	"Engine companies 1, 10, 6, 5, Truck 1, Tower 6, Rescue 13, Ambulance 13, Battalion Chief 601, Safety Officer 601, EMS 601, 6-Charlie, Box 20-01, Structure Fire - Ross Department Store Leesburg."
6B	Disp Con 5	13:02:03	13:02:08	0:00:05	"Loudoun to Engine 18 on 6-Bravo"
6B	Disp Con 5	13:02:10	13:02:16	0:00:06	"Loudoun to Engine 18 on 6-Bravo"
6C	SO601	13:02:16	13:02:20	0:00:04	"Safety 601"
6A	Disp Con 1	13:02:18	13:02:19	0:00:01	Mic click
6A	Disp Con 1	13:02:18	13:02:45	0:00:27	"Engine companies 1, 10, 6, 5, Truck 1, Tower 6, Rescue 13, Ambulance 13, Battalion Chief 601, Safety Officer 601, EMS 601, 6-Charles, Box 20-01, Structure Fire - Ross Department Store Leesburg - 1023 Edwards Ferry Road Northeast, crossstreet the Leesburg Bypass - 1302."
6C	Disp Con 4	13:02:19	13:02:25	0:00:06	"Safety 601 - 1302." Covers: SO601 repeating traffic?
6C	T-1	13:02:24	13:02:27	0:00:03	Open mic with siren
6C	T-1	13:02:26	13:02:31	0:00:05	"Truck 1 with 4"
6C	Disp Con 4	13:02:30	13:02:35	0:00:05	"Truck 1 - 1302." Covers: unintelligible
6B	Disp Con 5	13:02:33	13:02:38	0:00:05	"Loudoun to Engine 18 on 6-Bravo"
6C	EMS601	13:02:35	13:02:39	0:00:04	"EMS 601"
6C	Disp Con 4	13:02:38	13:02:44	0:00:06	"EMS 601 - 1302."
6C	A13-5	13:02:45	13:02:51	0:00:06	"Loudoun, Medic 13-5 responding with 2."
6C	BC602	13:02:50	13:02:55	0:00:05	"Battalion 602 (unintelligible)"
6C	W-1	13:02:54	13:02:59	0:00:05	"Wagon 1 with 3"
6C	RS-13	13:02:58	13:03:05	0:00:07	"Rescue 13 with 5, correction - 4."
6C	E-10	13:03:04	13:03:11	0:00:07	"Engine 10 with 3"

TG	Alias	Begin	End	Dur.	Notes
6C	Disp Con 4	13:03:12	13:03:21	0:00:09	"OK Wagon 1, Engine 10, Rescue 13 - 1303. Break - Loudoun to Battalion Chief 601."
6C	BC601	13:03:20	13:03:25	0:00:05	"Battalion 601 to Loudoun - go ahead."
6C	Disp Con 4	13:03:24	13:03:35	0:00:11	"Battalion 601 - we're putting out another house fire on Meadowood Court - in 22 box area."
6C	BC601	13:03:34	13:03:39	0:00:05	"OK - I'll be diverting to that."
6C	RS-13-P2	13:03:38	13:03:39	0:00:01	Mic click
6C	Disp Con 4	13:03:38	13:03:43	0:00:05	"OK - Battalion 602, you direct?"
6C	BC602	13:03:42	13:03:47	0:00:05	"I'm direct."
6A	Disp Con 1	13:03:51	13:03:54	0:00:03	Mic click
6C	W-1	13:03:52	13:03:53	0:00:01	Mic click
6C	W-1	13:03:52	13:04:09	0:00:17	"Wagon 1's on the scene, single story commercial strip center, nothing evident on the outside, building is NOT evacuated - we'll be investigating - I'll have command until the arrival of the Battalion Chief - we'll have our own water in front of the store."
6A	Disp Con 1	13:03:53	13:03:54	0:00:01	Mic click
6A	Disp Con 1	13:03:53	13:03:56	0:00:03	Mic click
6A	Disp Con 1	13:03:55	13:03:57	0:00:02	Mic click
6A	Disp Con 1	13:03:56	13:04:20	0:00:24	"Engine companies 18, 23, and 11, Fairfax Engine 439, Truck 11, Fairfax Squad 439, Ambulance 13 your second call, Battalion Chief 602 respond 6-Delta, Box 22-03, House Fire 4-3-2-3-8 Meadowood Court."
6C	Disp Con 4	13:04:10	13:04:15	0:00:05	"OK Wagon 1 - 1304."
6C	T1	13:04:14	13:04:20	0:00:06	"Truck 1's on scene, Side Alpha."
6A	Disp Con 1	13:04:19	13:04:42	0:00:23	"Engine companies 18, 23, 11, Fairfax Engine 439, Truck 11, Fairfax Squad 439, Ambulance 13 your second call, Battalion Chief 601 respond 6-Delta, Box 22-03, House Fire 4-3-2-3-8 Meadowood Court, crossstreet McConnell Way - 1304."
6C	RS13-Off	13:04:19	13:04:23	0:00:04	Mic click
6C	Disp Con 4	13:04:23	13:04:32	0:00:09	"Truck 1, 1304." Covers: "Reserve Engine 6 to Battalion Chief 602."
6C	W5	13:04:32	13:04:37	0:00:05	"Wagon 5 with 4."
6D	TL6	13:04:34	13:04:40	0:00:06	"Tower 6 to Battalion 601."

TG	Alias	Begin	End	Dur.	Notes
6C	Disp Con 4	13:04:36	13:04:45	0:00:09	"OK Wagon 5, 1304. Covers RE6: "Chief, request permission to divert to the other box. It's in our first due."
6D	Disp Con 5	13:04:39	13:04:42	0:00:03	"Tower 6, you had extremely low volume. Try it again."
6D	Disp Con 5	13:04:41	13:04:48	0:00:07	ECC Covers TL6: "Do you want us to divert to the other house fire?"
6C	SO601	13:04:44	13:04:50	0:00:06	"Safety 601 on the scene."
6D	E11	13:04:47	13:04:51	0:00:04	"Engine 11, with 4."
6D	Disp Con 5	13:04:50	13:04:57	0:00:07	"OK, Engine 11, 1304. Tower 6 stand by."
6C	Disp Con 4	13:04:51	13:04:58	0:00:07	"Safety 601, 1304. Loudoun to Battalion Chief 602."
6D	CMD18	13:04:56	13:05:01	0:00:05	"Chief 11's en route to the 22 box."
6C	BC602	13:04:57	13:05:02	0:00:05	"Go ahead - I didn't copy - I covered him."
6D	Disp Con 5	13:05:00	13:05:03	0:00:03	"OK, Chief 11." Covers: "Engine 18 with 3."
6D	E18	13:05:00	13:05:01	0:00:01	"Engine 18 with 3."
6C	Disp Con 4	13:05:01	13:05:13	0:00:12	"OK, the, initially, the call was for smoke in the electrical room. Did not see any fire, but did see smoke. Wagon 1, Truck 1, you direct?"
6D	Disp Con 5	13:05:02	13:05:06	0:00:04	"OK, Engine 18."
6D	RE23	13:05:05	13:05:11	0:00:06	"Reserve Engine 23 with 3."
6D	Disp Con 5	13:05:10	13:05:14	0:00:04	"OK, Reserve Engine 23."
6C	W1-Off	13:05:12	13:05:20	0:00:08	"Yeah, we're direct. Who, ah, do we have a business store who would have called this in?"
6D	Disp Con 5	13:05:14	13:05:23	0:00:09	"Loudoun to Engine 18, Engine 18, be advised you're probably gonna be first due. Believe this is gonna be a working job."
6C	Disp Con 4	13:05:19	13:05:26	0:00:07	"Ross's Department Store. 1023 Edwards Ferry."
6D	E18	13:05:22	13:05:26	0:00:04	"Engine 18's direct."
6C	W1-Off	13:05:25	13:05:33	0:00:08	"OK, we're direct."
6D	RE6	13:05:25	13:05:30	0:00:05	"Reserve Engine 6 to Loudoun."
6D	Disp Con 5	13:05:29	13:05:36	0:00:07	"Reserve Engine 6."
6D	CMD18	13:05:29	13:05:30	0:00:01	"Chief 11 to Loudoun (unintelligible). I need the address repeated for me again please."
6D	Disp Con 5	13:05:35	13:05:46	0:00:11	"Chief 11, it's going to be 4-3-2-3-8, 4-3-2-3-8 Meadowood Court, runs off of McConnell Way." Covers: "Truck 11 with 4."
6D	RE6	13:05:46	13:05:50	0:00:04	"Reserve Engine 6 to Loudoun."

TG	Alias	Begin	End	Dur.	Notes
6D	Disp Con 5	13:05:49	13:05:53	0:00:04	"Reserve Engine 6, go ahead."
6D	RE6	13:05:52	13:06:04	0:00:12	"OK, we are diverting off of the fire in Leesburg to the secondary structure fire in the 22 box. We do have smoke on the horizon."
6D	Disp Con 5	13:06:03	13:06:06	0:00:03	"OK, Reserve Engine 6, I copy that."
6C	RS13	13:06:05	13:06:13	0:00:08	"Rescue 13 on the scene...Side Charlie (unintelligible)."
6D	Disp Con 5	13:06:05	13:06:09	0:00:04	Mic click
6D	FM-612	13:06:08	13:06:12	0:00:04	"Loudoun, FM12, hold me en route to Meadowood Court."
6D	Disp Con 5	13:06:11	13:06:17	0:00:06	"OK FM12, copy that."
6C	A13-5	13:06:12	13:06:19	0:00:07	"Medic 13-5, same traffic."
6C	Disp Con 4	13:06:18	13:06:27	0:00:09	"OK, Medic 13-5. I did not copy the last unit, due to background noise. Could you repeat?"
6D	Q11	13:06:21	13:06:27	0:00:06	"Truck 11 to Loudoun - did you copy us with 4?"
6C	RS13	13:06:26	13:06:27	0:00:01	Mic click
6C	RS13	13:06:26	13:06:34	0:00:08	"Rescue 13's on the scene. We'll be going to Side Charlie."
6D	Disp Con 5	13:06:27	13:06:31	0:00:04	"OK, Truck 11."
6C	Disp Con 4	13:06:33	13:06:37	0:00:04	"OK, Rescue 13."
6D	BC601	13:06:33	13:06:40	0:00:07	"Battalion 601 to Engine 6."
6D	RS439	13:06:49	13:06:55	0:00:06	"Rescue 439, Engine 439 responding."
6C	EMS601	13:06:50	13:07:01	0:00:11	"EMS601's arrived. I'm direct on Wagon 1's traffic so far. I'll be assuming Ross Command."
6D	Disp Con 5	13:06:54	13:07:00	0:00:06	"OK, units from 439, 1306."
6C	Disp Con 4	13:07:00	13:07:06	0:00:06	"OK, EMS601. 1307."
6D	BC601	13:07:01	13:07:06	0:00:05	"Battalion 601 to Loudoun, do you have any cross streets? I'm not showing this in our map."
6D	Disp Con 5	13:07:05	13:07:08	0:00:03	Mic click
6D	Disp Con 5	13:07:07	13:07:19	0:00:12	"That's correct. Runs off of McConnell Way, McConnell Way. Also Battalion Chief 601, Tower 6 was requesting to divert to this call. "
6C	RS13	13:07:14	13:07:23	0:00:09	"Rescue 13's on Side Charlie, nothing evident."
6D	BC601	13:07:20	13:07:27	0:00:07	"Clear that through Battalion 602, Loudoun. I'm not sure what's going on there with that."
6C	W1-Off	13:07:23	13:07:25	0:00:02	Mic click

TG	Alias	Begin	End	Dur.	Notes
6C	Disp Con 4	13:07:24	13:07:28	0:00:04	"OK, Rescue 13."
6D	Disp Con 5	13:07:26	13:07:30	0:00:04	"OK"
6C	Disp Con 4	13:07:27	13:07:33	0:00:06	"Loudoun to Battalion 602."
6C	BC602	13:07:32	13:07:36	0:00:04	"602 - go ahead."
6D	BC601	13:07:34	13:07:40	0:00:06	"Battalion 601 to Engine 6."
6C	Disp Con 4	13:07:35	13:07:49	0:00:14	"OK, the Reserve Engine 6 has diverted to the house fire - the Tower at 6 is requesting permission to do the same. Your discretion."
6D	RE6	13:07:39	13:07:44	0:00:05	"Go ahead, Chief."
6D	BC601	13:07:43	13:07:50	0:00:07	"I'm taking Ashburn Village to 7. Give me some running routes from there."
6D	RE6	13:07:49	13:07:52	0:00:03	"Head for River Creek Parkway, I'll get you in from there."
6C	BC602	13:07:50	13:07:55	0:00:05	"Yeah, let's go ahead with that."
6D	A13-1	13:07:51	13:07:56	0:00:05	Mic click
6C	Disp Con 4	13:07:54	13:08:00	0:00:06	"OK. Break - Loudoun to Edwards Ferry Command."
6D	Disp Con 5	13:07:55	13:08:08	0:00:13	"Loudoun to Battalion 601, come up River Creek, make a right on Parkers Ridge, make the left on McConnell and then Meadowood should be right in front of you. Make the left."
6C	EMS601-P1	13:07:59	13:08:04	0:00:05	"Command - go ahead."
6C	W1-Off	13:08:05	13:08:14	0:00:09	"Wagon 1 to EMS601."
6D	BC601	13:08:08	13:08:14	0:00:06	"OK"
6C	EMS601	13:08:14	13:08:19	0:00:05	"Command - go ahead, Wagon 1."
6C	W1-Off	13:08:19	13:08:35	0:00:16	"Ok, we've investigated and believe we're gonna have something, isolated, ah, receptacle that's burned up in the electrical room. Ah, with all, with all the diversion of the units, you can hold one on this I believe and release the channel and put us back on Bravo."
6D	Disp Con 5	13:08:19	13:08:23	0:00:04	"Loudoun to Tower 6."
6D	TL6	13:08:23	13:08:26	0:00:03	"Go ahead, Loudoun."
6D	Disp Con 5	13:08:25	13:08:31	0:00:06	"Just wanted to make sure that you were OK, and that you can respond on this."
6D	TL6	13:08:30	13:08:36	0:00:06	"OK, we got three."

TG	Alias	Begin	End	Dur.	Notes
6C	EMS601	13:08:34	13:08:41	0:00:07	"OK - hold with one and one. Isolated electrical. Are you gonna need Rescue 13 with you?"
6D	Disp Con 5	13:08:35	13:08:39	0:00:04	"OK"
6C	W1-Off	13:08:40	13:08:46	0:00:06	"That's a negative. They can go back."
6D	Disp Con 5	13:08:42	13:08:54	0:00:12	"Attention all units, attention all units responding to Meadowood Court. Gettin' numerous calls on it. Believe this is gonna be a working job."
6C	EMS601	13:08:46	13:08:56	0:00:10	"OK. Ross Command to Loudoun. Isolated to an electrical - we're gonna hold Truck 1, Wagon 1, clear everybody else."
6C	Disp Con 4	13:08:55	13:09:10	0:00:15	"OK Ross Command. Attention units at 1023 Edwards Ferry Road, Ross Department Store - electrical problem to an outlet. Holding Wagon and Truck 1 - all other units can go in service. Engine 5?"
6D	W18	13:08:56	13:09:01	0:00:05	"Loudoun, Wagon 18's en route with 4."
6D	Disp Con 5	13:09:00	13:09:05	0:00:05	"OK, Wagon 18."
6C	W5	13:09:10	13:09:14	0:00:04	"Engine 5's direct."
6C	Disp Con 4	13:09:14	13:09:17	0:00:03	"Gotcha Wagon 5. Engine 10."
6C	E10	13:09:17	13:09:25	0:00:08	"Engine 10's OK. We're in Leesburg - do you need us to cover up or, ah, add onto anything?"
6D	RE6	13:09:19	13:09:34	0:00:15	"Reserve Engine 6 to Loudoun. We're on the scene. Got a 2 story single family dwelling. Got a fire that looks like it's in the attic or running Side Charlie. I'll get a situation report to you in a minute."
6C	Disp Con 4	13:09:25	13:09:34	0:00:09	"Engine 10 - if you would stand by in Leesburg for just a minute and we're gonna make a decision on what to do there, OK?"
6C	E10	13:09:33	13:09:39	0:00:06	"Alright - we'll be back on A in Leesburg."
6D	Disp Con 5	13:09:33	13:09:37	0:00:04	"OK, Reserve Engine 6 on the scene. Smoke showing, possible fire in the attic. 1309 hours."
6D	Disp Con 5	13:09:36	13:09:44	0:00:08	Mic click
6C	Disp Con 4	13:09:39	13:09:43	0:00:04	"OK, 1309."
6C	Disp Con 4	13:09:42	13:09:47	0:00:05	"Loudoun to Battalion 602."
6C	BC602	13:09:46	13:09:54	0:00:08	"I'm direct Loudoun. What's the status on the other box and do they need a second BC?"
6C	Disp Con 4	13:09:53	13:10:00	0:00:07	"I'd go ahead and start that way. I believe we have a working fire."

TG	Alias	Begin	End	Dur.	Notes
6D	RE6-OF	13:09:56	13:09:57	0:00:01	"Reserve Engine 6 to Tower 6. Nobody out here to meet us. Gonna need to do a search."
6D	RE6-OF	13:09:56	13:10:05	0:00:09	Mic click
6C	BC602	13:09:59	13:10:07	0:00:08	"OK, add me to the call in CAD so I can get it on my MDT."
6D	TL6	13:10:04	13:10:09	0:00:05	"Tower's OK."
6C	EMS601	13:10:08	13:10:14	0:00:06	"Yeah - they got smoke showing from the roof."
6D	RE6-OF	13:10:08	13:10:14	0:00:06	"Reserve Engine 6 to Loudoun, situation."
6D	Disp Con 5	13:10:13	13:10:16	0:00:03	"Go ahead."
6D	RE6-OF	13:10:15	13:10:17	0:00:02	Mic click
6C	BC602	13:10:16	13:10:21	0:00:05	"OK. Loudoun is that 6-David?"
6D	RE6-OF	13:10:16	13:10:31	0:00:15	"Two story single family dwelling, confirming a working structure fire, number 2 floor. I'll go ahead and establish Command. Need to transfer it ASAP."
6C	Disp Con 4	13:10:20	13:10:28	0:00:08	"That's correct, 6-David. Loudoun to Safety 601."
6C	SO601-P1	13:10:28	13:10:32	0:00:04	"Go ahead."
6D	Disp Con 5	13:10:30	13:10:37	0:00:07	"OK, Battalion Chief 601, Chief 11 you direct on that?"
6C	Disp Con 4	13:10:35	13:10:43	0:00:08	"You direct on the call on Meadowood?"
6D	BC601	13:10:36	13:10:40	0:00:04	"601's direct."
6D	CMD18	13:10:39	13:10:42	0:00:03	"Chief 11's direct, just passing Belmont Ridge."
6D	TL6	13:10:41	13:10:46	0:00:05	Mic click
6D	BC602	13:10:47	13:10:55	0:00:08	"Battalion 602 to 601, I'm coming as the second BC, what else you need?"
6C	Disp Con 4	13:10:50	13:10:57	0:00:07	"Loudoun to Safety 601."
6D	BC601	13:10:54	13:10:59	0:00:05	"OK "
6C	SO601	13:10:56	13:11:00	0:00:04	"Go ahead."
6C	Disp Con 4	13:10:59	13:11:05	0:00:06	"Are you direct on the fire at Meadowood?"
6D	TL6-P1	13:11:01	13:11:08	0:00:07	Mic click
6C	SO601	13:11:04	13:11:12	0:00:08	"That's correct. I'm clear the, ah, one in Leesburg. Show me en route to that one. What's the ops channel?"
6D	TL6-P1	13:11:08	13:11:13	0:00:05	Mic click (SCBA noise)
6C	Disp Con 4	13:11:11	13:11:17	0:00:06	"Right now it's gonna be on 6-Delta."

TG	Alias	Begin	End	Dur.	Notes
6D	TL6-P1	13:11:14	13:11:19	0:00:05	Mic click
6C	SO601	13:11:17	13:11:22	0:00:05	"OK, can you, ah, send me a page on that so I can get the address?"
6C	Disp Con 4	13:11:21	13:11:28	0:00:07	"You should be getting it now. Should be 4-3-2-3-8."
6C	SO601	13:11:28	13:11:33	0:00:05	"Thank you."
6C	Disp Con 4	13:11:33	13:11:39	0:00:06	"Loudoun to Medic 13-5."
6D	SO601	13:11:33	13:11:38	0:00:05	"Safety 601's en route."
6D	Disp Con 5	13:11:37	13:11:43	0:00:06	"OK, Safety 601, 1311."
6D	RE6-OF	13:11:53	13:11:57	0:00:04	Mic click
6D	SO601	13:12:09	13:12:20	0:00:11	"Safety 601 to Loudoun, what's that call on, ah, Meadowood Court?"
6D	TL6-P1	13:12:30	13:12:35	0:00:05	Mic click
6D	Disp Con 5	13:12:36	13:12:45	0:00:09	"Loudoun - Safety 601, the call on Meadowood Court is going to be for a working structure fire."
6D	SO601	13:12:44	13:12:49	0:00:05	"OK"
6D	RS13	13:12:48	13:12:55	0:00:07	"Rescue 13's en route with 4."
6D	Disp Con 5	13:12:57	13:13:03	0:00:06	"OK, Rescue 13, 1312."
6D	TL6-P1	13:13:07	13:13:12	0:00:05	Mic click
6D	TL6-P1	13:13:15	13:13:20	0:00:05	Mic click
6D	CMD18	13:13:25	13:13:31	0:00:06	"Chief 11's arriving on scene, be reporting to Command."
6D	Disp Con 5	13:13:30	13:13:34	0:00:04	"OK, Chief 11, 1313."
6D	CMD18	13:13:33	13:13:44	0:00:11	"Chief 11's on scene, looks like I'm the first command officer on scene, Side Alpha. Engine 6 I'm direct on all your traffic - I'm ready to take command when you're ready to transfer."
6D	RE6-OF	13:13:43	13:13:56	0:00:13	"Go ahead, take it. Reserve Engine 6 to the driver, start feeding some hose. Chief it is in the attic."
6D	A13-1	13:13:55	13:14:02	0:00:07	"Medic 13-1's on the scene, staging."
6D	Disp Con 5	13:14:03	13:14:07	0:00:04	"OK, Medic 13-1."
6D	CMD18	13:14:06	13:14:17	0:00:11	"Chief 11 to Loudoun: I'll go ahead and assume Command on Side Alpha of the structure. Confirm we have heavy fire in the attic at this time."
6D	Disp Con 5	13:14:16	13:14:21	0:00:05	"OK, Chief 11, I copied that, 1314."

TG	Alias	Begin	End	Dur.	Notes
6D	RE23	13:14:20	13:14:30	0:00:10	"23 to the Chief, ah, give me a hydrant situation. I didn't hear anything about water."
6D	CMD18	13:14:29	13:14:44	0:00:15	"6 has their own water at the end of the court. I have another hydrant in front of 3-2, 4-3-2-4-2 if you want to hit that, be in front of the David-1 exposure."
6C	RE6-P1	13:14:50	13:14:57	0:00:07	Mic click
6D	E434-D	13:14:53	13:14:59	0:00:06	Mic click
6D	A13-1 D/O	13:14:58	13:15:06	0:00:08	Mic click
6D	BC601	13:15:12	13:15:16	0:00:04	"Battalion 601's on the scene - reporting to Command."
6D	Disp Con 5	13:15:15	13:15:20	0:00:05	"OK, Battalion Chief 601, 1315."
6D	RE6-OF	13:15:19	13:15:26	0:00:07	"Reserve Engine 6 to Command."
6D	CMD18	13:15:25	13:15:28	0:00:03	"Go ahead, Engine 6."
6D	RE6-OF	13:15:27	13:15:34	0:00:07	"Any progress from the outside? We have visibility of zero."
6D	CMD18	13:15:33	13:15:43	0:00:10	"Alright, sir, you were starting to get a hit on it. Looks like you still got heavy fire through the attic ridge vents, visible from both sides."
6D	TL6-P1	13:15:42	13:15:47	0:00:05	Mic click
6D	RE6-OF	13:15:46	13:15:50	0:00:04	Mic click
6D	CMD18	13:15:49	13:15:58	0:00:09	"Command to Reserve Engine 6 - I have 23 pulling a second line to you."
6D	TL6-P1	13:16:25	13:16:29	0:00:04	Mic click
6D	RS13	13:16:29	13:16:34	0:00:05	"Rescue 13's on the scene."
6D	Disp Con 5	13:16:33	13:16:37	0:00:04	"OK, Rescue 13, 1316."
6D	SO601	13:16:36	13:16:40	0:00:04	"Safety 601 also."
6D	Disp Con 5	13:16:39	13:16:48	0:00:09	"OK, Safety 601, 1316." Covers: TL6 P1 - "MAYDAY, MAYDAY, MAYDAY, Engine 6, Tower 6 second floor (unintelligible)."
6D	CMD18	13:16:47	13:16:48	0:00:01	"Command acknowledged Mayday, Engine 6 second floor. Rescue, need you in there for RIT Activation ASAP. "
6D	Disp Con 5	13:16:47	13:16:56	0:00:09	Mic click
6D	BC601-P1	13:16:55	13:16:58	0:00:03	"Battalion 601 to Command - evacuate, structure collapse rear, evacuate."
6D	BC601-P1	13:16:57	13:17:05	0:00:08	Mic click

TG	Alias	Begin	End	Dur.	Notes
6D	E18	13:17:04	13:17:08	0:00:04	"Engine 18's on the scene (unintelligible)"
6D	TL6-P1	13:17:07	13:17:14	0:00:07	Mic click
6D	Disp Con 5	13:17:14	13:17:19	0:00:05	"Loudoun to Chief 11, did you copy everything?"
6D	CMD18	13:17:18	13:17:31	0:00:13	"Sir - I'm trying to get radio traffic. Command to all Loudoun - all units operating on the fireground, evacuate the structure ASAP, we do have a RIT activation from Engine 6. Need an accountability on Reserve Engine 6."
6C	TL6-Off	13:17:25	13:17:27	0:00:02	Mic click
6C	TL6-Off	13:17:26	13:17:28	0:00:02	Mic click
6C	TL6-Off	13:17:27	13:17:29	0:00:02	Mic click
6C	TL6-Off	13:17:28	13:17:30	0:00:02	Mic click
6C	TL6-Off	13:17:29	13:17:31	0:00:02	Mic click
6C	TL6-Off	13:17:30	13:17:32	0:00:02	Mic click
6D	TL6-P1	13:17:30	13:17:40	0:00:10	"Second floor's cut off, get a line up here!"
6C	TL6-Off	13:17:31	13:17:33	0:00:02	Mic click
6C	TL6-Off	13:17:32	13:17:33	0:00:01	Mic click
6C	TL6-Off	13:17:33	13:17:35	0:00:02	Mic click
6C	TL6-Off	13:17:34	13:17:36	0:00:02	Mic click
6C	TL6-Off	13:17:35	13:17:37	0:00:02	Mic click
6C	TL6-Off	13:17:36	13:17:38	0:00:02	Mic click
6C	TL6-Off	13:17:37	13:17:40	0:00:03	Mic click
6C	TL6-Off	13:17:39	13:17:41	0:00:02	Mic click
6D	CMD18	13:17:39	13:17:48	0:00:09	"10-4 we got ladders. Gonna be on Side A, David Quadrant, Side A, David Quadrant."
6C	TL6-Off	13:17:40	13:17:42	0:00:02	Mic click
6C	TL6-Off	13:17:41	13:17:48	0:00:07	Mic click
6D	TL6-P1	13:17:47	13:17:54	0:00:07	"Negative, need 'em Side Baker, Charlie."
6D	TL6-P1	13:17:53	13:17:54	0:00:01	Mic click
6D	TL6-P1	13:17:53	13:17:59	0:00:06	Mic click
6D	E10	13:17:59	13:18:08	0:00:09	"Loudoun, show Engine 10 with three on the scene. We'll be taking RIT."

TG	Alias	Begin	End	Dur.	Notes
6D	CMD18	13:18:11	13:18:20	0:00:09	"Command to all units, need a ladder to Side Charlie ASAP, I got a RIT activation in progress."
6B	Q-11	13:18:24	13:18:33	0:00:09	"Truck 11 to Loudoun on Baker - I did not hear another truck go on scene - we're approaching. Due to radio traffic, I'm calling you on this channel. We're arrival - arriving."
6D	CMD18	13:18:25	13:18:31	0:00:06	"Command to Reserve Engine 6, your status?"
FINVS	FM612-P1	13:18:30	13:18:38	0:00:08	Mic click
6B	Disp Con 2	13:18:32	13:18:36	0:00:04	"Truck 11, 1318."
6D	RE6-OF	13:18:33	13:18:38	0:00:05	(Unintelligible)
6B	Q-11	13:18:35	13:18:41	0:00:06	"Is there another truck on scene?"
6D	TL6-P1	13:18:37	13:18:42	0:00:05	Mic click
6B	Disp Con 2	13:18:40	13:18:46	0:00:06	"Tower 6, we believe, is on scene."
6D	RS13-OF	13:18:43	13:18:46	0:00:03	Mic click
6B	Q-11	13:18:45	13:18:50	0:00:05	"OK - I'm gonna switch back to Delta."
6D	TL6-P1	13:18:45	13:18:51	0:00:06	Mic click
6B	Disp Con 2	13:18:49	13:18:53	0:00:04	"1318"
6D	CMD18	13:18:50	13:18:55	0:00:05	"Command to Reserve Engine 6, your status? I got units en route to you."
6A	EMS601-P1	13:18:54	13:19:03	0:00:09	"EMS601 Loudoun, go ahead and assign me another channel for medical. Get all the medical units (unintelligible) over to that channel."
6D	TL6-P1	13:18:54	13:18:59	0:00:05	"(Unintelligible), Side Charlie out the 2nd floor ground ladder."
6D	RS13-OF	13:18:58	13:19:03	0:00:05	Mic click
6A	Disp Con 1	13:19:02	13:19:06	0:00:04	"OK"
6C	RE6-P1	13:19:02	13:19:25	0:00:23	"Hold on, hold on - You have to get my hand, it's stuck (open mic)."
6D	CMD18	13:19:02	13:19:06	0:00:04	"Copy, are you all out of the structure?"
6D	TL6-P1	13:19:05	13:19:11	0:00:06	Mic click
6D	E18-OF	13:19:11	13:19:18	0:00:07	Mic click
6A	EMS601-P1	13:19:15	13:19:20	0:00:05	"Also, start me a second medic unit."
6A	Disp Con 1	13:19:19	13:19:23	0:00:04	"OK"
6D	TL6-P1	13:19:19	13:19:20	0:00:01	Mic click
6D	TL6-P1	13:19:19	13:19:23	0:00:04	Mic click

TG	Alias	Begin	End	Dur.	Notes
6D	TL6-P1	13:19:22	13:19:28	0:00:06	Mic click
6D	CMD18	13:19:27	13:19:33	0:00:06	"Command to Charlie Division - need to account for those crews who came out from the rear."
6D	TL6-P1	13:19:32	13:19:37	0:00:05	Mic click
6A	EMS601-P1	13:19:35	13:19:43	0:00:08	Mic click
6D	TL6-P1	13:19:36	13:19:40	0:00:04	Mic click
6C	RE23-Off	13:19:39	13:19:50	0:00:11	"We got firemen down - charlie side - bailing out the window. Need EMS now."
6D	BC601-P1	13:19:39	13:19:47	0:00:08	"Division Charlie to Command, need a medic unit back here, firefighter down."
6D	CMD18	13:19:46	13:19:55	0:00:09	"Command to Loudoun - go ahead and strike a second alarm, give me an EMS task force with at least 2 ALS units. At this time, pre-alert a helicopter."
6D	Disp Con 5	13:19:54	13:20:02	0:00:08	"You got it sir, and I got Medic 13-1 is on the scene." Covers:
6A	E-19	13:19:55	13:20:00	0:00:05	"(unintelligible) emergency traffic."
6A	Disp Con 1	13:19:59	13:20:04	0:00:05	"Engine 19 to Loudoun on Alpha."
6D	SO601-P1	13:20:01	13:20:03	0:00:02	"Safety 601."
6D	E1	13:20:02	13:20:07	0:00:05	Mic click
6D	RS13-OF	13:20:06	13:20:11	0:00:05	Mic click
6D	FM607-P1	13:20:10	13:20:15	0:00:05	"FM7 to Command - Emergency Traffic"
6D	RS13-OF	13:20:13	13:20:13	0:00:00	EA Activation
6D	E11	13:20:14	13:20:16	0:00:02	Mic click
6D	RS13-OF	13:20:14	13:20:16	0:00:02	Mic click
6D	RS13-OF	13:20:15	13:20:22	0:00:07	Mic click
6D	Disp Con 5	13:20:21	13:20:29	0:00:08	"Loudoun to Command - Command, I got a EA activation from Rescue 13's officer."
6A	Disp Con 1	13:20:28	13:20:31	0:00:03	Mic click
6D	RS13-OF	13:20:28	13:20:31	0:00:03	Mic click
6A	Disp Con 1	13:20:30	13:20:32	0:00:02	Mic click
6D	CMD18	13:20:30	13:20:32	0:00:02	"Command to Rescue 13 Officer, confirm or deny?"

TG	Alias	Begin	End	Dur.	Notes
6A	Disp Con 1	13:20:31	13:20:36	0:00:05	"Medic 6 respond, 6-(pause)"
6D	RS13-OF	13:20:31	13:20:41	0:00:10	Mic click
6A	Disp Con 1	13:20:35	13:20:45	0:00:10	"6-David, Box 22-03 to assist on the house fire, 4-3-2-3-8 Meadowood Court."
6D	RS13-OF	13:20:40	13:20:44	0:00:04	Mic click
6D	RS13-OF	13:20:43	13:20:49	0:00:06	Mic click
6A	Disp Con 1	13:20:44	13:20:57	0:00:13	"Medic 6 respond, 6-David, Box 22-03, assist on the house fire, 4-3-2-3-8 Meadowood Court, crossstreet McConnell Way, 1320."
FINVS	FM607-P1	13:20:45	13:20:50	0:00:05	"FM7 to Loudoun."
6D	T-1	13:20:48	13:20:54	0:00:06	"Truck and Wagon 1 are on scene."
FINVS	Disp Con 4	13:20:49	13:20:52	0:00:03	"FM7 "
FINVS	FM607-P1	13:20:51	13:21:02	0:00:11	"Sir, I know you're extremely busy - let Command know that 3 firefighters have bailed out, are on Side Baker. I need a medic over here ASAP."
6B	A13-5	13:20:53	13:21:01	0:00:08	"Loudoun, Medic 13-5. We're responding to the EMS Task Force. We're going to switch over to Delta - there's too much traffic."
6D	Disp Con 5	13:20:53	13:20:57	0:00:04	"OK, Truck and Wagon 1."
6D	W18	13:20:56	13:21:02	0:00:06	"Wagon 18's on scene, we got a secondary water supply."
6B	Disp Con 2	13:21:00	13:21:05	0:00:05	"Medic 13-5, 1321."
6D	Disp Con 5	13:21:01	13:21:06	0:00:05	"OK, Wagon 18."
FINVS	Disp Con 4	13:21:01	13:21:07	0:00:06	"3 firefighters bailed out on Side Baker - need a medic unit ASAP?"
6D	SO601-P1	13:21:05	13:21:09	0:00:04	"Safety to Command."
FINVS	FM607-P1	13:21:06	13:21:12	0:00:06	"That's correct."
6D	CMD18	13:21:08	13:21:15	0:00:07	"Command to all units operating on the fireground, we are evacuating the structure, we are going defensive at this time."
6D	Disp Con 5	13:21:14	13:21:23	0:00:09	"Loudoun to Chief 11, Chief 11 be advised I got firefighters diving out to the rear of the structure."
6C	Q11-D/O	13:21:22	13:21:30	0:00:08	Mic click
6D	CMD18	13:21:22	13:21:26	0:00:04	"Copy that sir."
6D	Disp Con 5	13:21:25	13:21:33	0:00:08	"Also sir, whenever you're ready, I'm ready to drop the evac tones."
6D	CMD18	13:21:32	13:21:36	0:00:04	"Drop 'em."
6D	Disp Con 5	13:21:35	13:21:41	0:00:06	(Evacuation tones sound) - Covers: "Rescue 439's on the scene."

TG	Alias	Begin	End	Dur.	Notes
6C	Q11-D/O	13:21:39	13:21:46	0:00:07	Mic click
6D	Disp Con 5	13:21:40	13:21:42	0:00:02	Mic click
6D	Disp Con 5	13:21:41	13:21:54	0:00:13	"Attention all units, attention all units operating at Meadowood Court, evacuate the building immediately. All units evacuate the building immediately. 1321 hours."
FINVS	FM607-P1	13:21:41	13:21:47	0:00:06	"Thank you Loudoun."
6A	Disp Con 1	13:21:51	13:22:10	0:00:19	"Engine companies 5, 11, Medic 13, Air Unit 23, respond 6-David, Box 22-03, assist on the house fire, 4-3-2-3-8 Meadowood Court."
6D	CMD18	13:21:53	13:22:02	0:00:09	"Command to the Charlie Division, what's the status of the firefighters down to the rear. Do I have accountability on all personnel?"
6D	BC601-P1	13:22:02	13:22:10	0:00:08	"Division Charlie to Command. I have the Tower 6 officer back here. That's all I have right now."
6D	CMD18	13:22:09	13:22:16	0:00:07	"Alright sir, how many personnel are still reported missing?"
6A	Disp Con 1	13:22:12	13:22:31	0:00:19	"Engine companies 5 and 11. Medic 13, Air Unit 23, respond 6-David, Box 22-03, to assist on the house fire, 4-3-2-3-8 Meadowood Court, crossstreet McConnell Way, 1323."
6D	W5	13:22:16	13:22:22	0:00:06	"Wagon 5's responding with 4."
6D	CMD18	13:22:23	13:22:31	0:00:08	"Command to Charlie Division, we have an accountability on one. How many firefighters are still missing?"
6A	A17-1	13:22:30	13:22:36	0:00:06	"Loudoun, Medic 17-1 transferring to Station 20."
6D	BC601-P1	13:22:30	13:22:38	0:00:08	"Can you account? All I have is [name redacted, Tower Officer]."
6A	Disp Con 1	13:22:35	13:22:43	0:00:08	"Medic 17-1, 1322."
6D	SO601-P1	13:22:37	13:22:41	0:00:04	"Safety to Command."
6D	CMD18	13:22:40	13:22:44	0:00:04	"Go ahead, Safety."
6A	TL-19	13:22:42	13:22:51	0:00:09	"Tower 19 to Loudoun - I'm right down the street from the fire, do you want me to go on the 2nd alarm?"
6D	SO601-P1	13:22:43	13:23:01	0:00:18	"I have two from Reserve Engine 6, the firefighter from Tower 6 at the Alpha/Bravo corner of the house on the exterior. I need to get EMS for them and a crew on this side to assist with this exposure."
6A	Disp Con 1	13:22:50	13:22:55	0:00:05	"Tower 19, you can start that way."
6A	TL-19	13:22:54	13:22:59	0:00:05	"OK - I'll be there in a minute."

TG	Alias	Begin	End	Dur.	Notes
6D	CMD18	13:23:00	13:23:16	0:00:16	"Alright sir. I have a secondary RIT team. Do we still have a report of anybody left inside the structure? I can account for two personnel from Rescue Engine, Reserve Engine 6 who were interior - one from the Tower who was interior. What do we have otherwise?"
6E	EMS601-P1	13:23:05	13:23:11	0:00:06	"EMS601 on Echo."
6D	SO601-P1	13:23:15	13:23:24	0:00:09	"That's who I can account for personally, that's on the exterior at this time."
6A	Disp Con 1	13:23:20	13:23:23	0:00:03	Mic click
6A	Disp Con 1	13:23:22	13:23:25	0:00:03	Mic click
6D	CMD18	13:23:23	13:23:30	0:00:07	"Alright then, and I have the officer of Tower 6."
6A	Disp Con 1	13:23:29	13:23:44	0:00:15	"Medics 13-4, Medic 13-3, respond 6-David, Box 22-03, to assist on the house fire 4-3-2-3-8 Meadowood Court."
6D	BC601-P1	13:23:29	13:23:34	0:00:05	"Division Charlie to Command."
6D	BC601-P1	13:23:29	13:23:34	0:00:05	Mic click
6D	CMD18	13:23:33	13:23:36	0:00:03	"Go ahead Division Charlie."
6D	BC601-P1	13:23:35	13:23:44	0:00:09	"OK, the Tower 6 officer is right behind you. That's all I have on Division Charlie at this time."
6A	Disp Con 1	13:23:43	13:23:58	0:00:15	"Medics 13-4 and 13-3, respond 6-David, Box 22-03, to assist on the house fire 4-3-2-3-8 Meadowood Court, crossstreet McConnell Way, 1323."
6D	CMD18	13:23:43	13:23:58	0:00:15	"Alright, looks like we may still have one unaccounted for. We got the roof coming in. I'm gonna have the Tower deck gun it shortly and we're gonna go ahead and send the RIT team in so we can do a search."
6D	A6-3 D/O	13:23:59	13:24:05	0:00:06	Mic click
6D	BC601-P1	13:24:04	13:24:13	0:00:09	"Command, do you have Firefighter [name redacted, Tower Firefighter] accounted for? Division Charlie to Command - do you have Firefighter [name redacted, Tower Firefighter] accounted for?"
6D	CMD18	13:24:12	13:24:18	0:00:06	"Command to Safety, do you have Firefighter [name redacted, Tower Firefighter]?"
6D	Q11-OF	13:24:17	13:24:23	0:00:06	"Engine 23, charge the deuce and a half."
6C	E18-D/O	13:24:24	13:24:31	0:00:07	Mic click
6C	RE23-P3	13:24:36	13:24:44	0:00:08	"Water on the deuce and half to the rear."

TG	Alias	Begin	End	Dur.	Notes
6D	BC601-P1	13:24:38	13:24:50	0:00:12	"Division Charlie to Command, we're flowing inch and three quarter, two and a half, additional inch and three quarter. Two inch and three quarters, one two and a half to the rear."
6D	Disp Con 5	13:24:55	13:25:00	0:00:05	"Loudoun to Command - 12 minutes, 12 minutes into command."
6D	CMD18	13:24:59	13:25:09	0:00:10	"Copy 12 minutes. Status right now: I have several firefighters that were removed from the structure. Attempting an accountability at this time."
6A	E-19	13:25:08	13:25:13	0:00:05	"Engine 19 to Loudoun."
6D	Disp Con 5	13:25:09	13:25:14	0:00:05	"OK"
6A	Disp Con 1	13:25:12	13:25:15	0:00:03	"Go ahead."
6A	E-19	13:25:14	13:25:23	0:00:09	"Yes, ma'am - I know you're busy. We're in the Brambleton area training. Do you need us to go on the second or fill in somewhere?"
6D	W5	13:25:14	13:25:19	0:00:05	"Wagon 5's on scene."
6D	Disp Con 5	13:25:18	13:25:23	0:00:05	"OK, Wagon 5, 1325."
6D	E1-OF	13:25:22	13:25:29	0:00:07	"Loudoun hold Engine 1 on the scene for second alarm. We're pulling the Blitzfire."
6F	W5-D/O	13:25:23	13:25:30	0:00:07	"Wagon 5 to Loudoun on 6-Frank."
6D	BC601-P1	13:25:28	13:25:33	0:00:05	"Division Charlie to Command."
6D	CMD18	13:25:32	13:25:36	0:00:04	"Go ahead, Division Charlie."
6D	BC601-P1	13:25:35	13:25:41	0:00:06	"Do you have anyone further unaccounted for?"
6A	Disp Con 1	13:25:39	13:25:45	0:00:06	"OK, Engine 19, could you start toward Station 6?"
6D	CMD18	13:25:40	13:26:01	0:00:21	"Sir, at this time I have [name redacted, Reserve Engine Firefighter], [name redacted, Reserve Engine Driver/Operator] was exterior, and [name redacted, Reserve Engine Officer] from the Reserve Engine 6. Also have [name redacted, Tower Firefighter] from Reserve Engine 6. You have [name redacted, Tower Officer]. That should be accountable for all personnel at this time. Copy?"
6A	E-19	13:25:44	13:25:49	0:00:05	"Yes, ma'am - on the way. We'll stay on Alpha."
6A	Disp Con 1	13:25:48	13:25:53	0:00:05	"OK"
6A	EMS601-P1	13:25:53	13:26:00	0:00:07	"EMS601 to Loudoun, I need Mike and I need you to listen to it, OK?"
6A	Disp Con 1	13:25:59	13:26:04	0:00:05	"OK"

TG	Alias	Begin	End	Dur.	Notes
6D	BC601-P1	13:26:00	13:26:12	0:00:12	"That's correct. [name redacted, Tower Firefighter] would have been for the Tower. [name redacted, Reserve Engine Firefighter], [name redacted, Reserve Engine Officer] and [name redacted, Reserve Engine Driver/Operator] would have been for the Engine. We're only running three on the Tower today."
6D	CMD18	13:26:11	13:26:21	0:00:10	"Command to Loudoun, we have full accountability of all firefighters on the Mayday."
6E	W5-D/O	13:26:12	13:26:17	0:00:05	"Wagon 5 to Loudoun on 6-Edward."
6M	EMS601-P1	13:26:15	13:26:22	0:00:07	"EMS601 to Lansdowne."
6E	Disp Con 4	13:26:16	13:26:20	0:00:04	"Wagon 5"
6E	W5-D/O	13:26:19	13:26:30	0:00:11	"Sir, I'm gonna be first in staging - first in engine on 2nd alarm - could you give me a rundown of units that I have coming on the 2nd alarm please?"
6D	Disp Con 5	13:26:21	13:26:24	0:00:03	Mic click
6D	Disp Con 5	13:26:23	13:26:31	0:00:08	"Loudoun to Command - just verifying - all firefighters are accounted for?"
6D	CMD18	13:26:30	13:26:37	0:00:07	"Command to Loudoun - we have all firefighters accounted for and we are going defensive on the structure at this time."
6E	Disp Con 4	13:26:34	13:26:50	0:00:16	"OK, Wagon 5, I'm showing you and E10 on the scene, Wagon 1, Truck 1, Tower 19 and we have a couple of different medic units coming."
6D	Disp Con 5	13:26:36	13:26:43	0:00:07	"OK, I copy that, when you get a chance..." Covers: "Division Charlie to Command."
6M	EMS601-P1	13:26:41	13:26:48	0:00:07	"EMS601 to Lansdowne Hospital on Mike."
6D	E10-D/O	13:26:45	13:26:54	0:00:09	"Engine 10 driver to command, be advised I have a water supply established down in the cul-de-sac."
6M	LHC-LANS	13:26:48	13:26:54	0:00:06	"Go ahead."
6E	Disp Con 4	13:26:49	13:26:54	0:00:05	"Also, we have Engine 6."
6D	CMD18	13:26:53	13:26:58	0:00:05	"Command's direct."

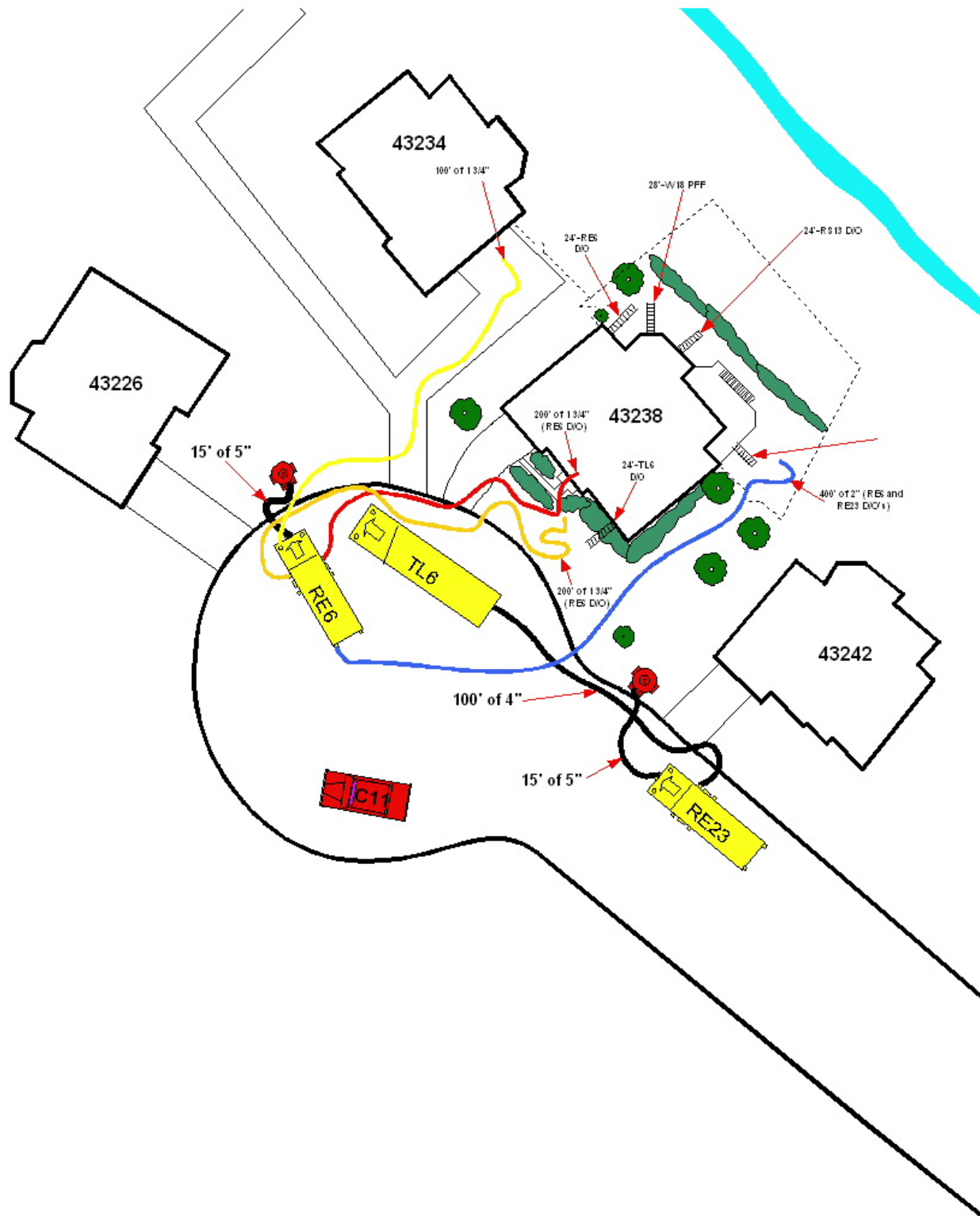
TG	Alias	Begin	End	Dur.	Notes
6M	EMS601-P1	13:26:53	13:27:10	0:00:17	"Hey [name redacted, INOVA Employee], it's [name redacted, EMS601] - we're working a 2 alarm structure fire. We got one definitely burned, several others we're evaluating right now. I'm going to call for helicopters to fly the burned ones out so I'll be giving you a more detailed report a little bit later. We may have up to 5 patients."
6E	W5-D/O	13:27:01	13:27:15	0:00:14	"OK, Loudoun - go ahead and give me a Command Channel - I'm going to stay on 6-Edward and monitor 6-David, try to keep this (unintelligible). Have 2nd alarm units to to 6-Edward."
6D	A6-3 D/O	13:27:08	13:27:12	0:00:04	"Loudoun, Medic 6-3 on the scene."
6M	LHC-LANS	13:27:09	13:27:16	0:00:07	"We copy [name redacted, EMS601]. Just let us know - keep us informed."
6D	Disp Con 5	13:27:11	13:27:14	0:00:03	"OK, Medic 6-3."
6D	Disp Con 5	13:27:13	13:27:21	0:00:08	"Loudoun to Command." Covers: "Go ahead 6-3, bring your crew to the Command Post, I have two firefighters down."
6E	Disp Con 4	13:27:15	13:27:21	0:00:06	"That's correct - 1327."
6D	A13-3	13:27:22	13:27:27	0:00:05	"Medic 13-3's on the scene as well."
6D	Disp Con 5	13:27:26	13:27:30	0:00:04	"OK Medic 13-3."
6D	A13-4	13:27:29	13:27:35	0:00:06	"13-4, same traffic."
6D	Disp Con 5	13:27:34	13:27:40	0:00:06	"OK, 13-4. 1327." Covers: "Engine 1 charge that."
6D	A13-3	13:27:39	13:27:45	0:00:06	"Medic 13-3 to Command, where would you like us?"
6A	EMS601-P1	13:27:45	13:27:46	0:00:01	Mic click
6A	EMS601-P1	13:27:45	13:27:50	0:00:05	"EMS601 to Loudoun on Adam, on Alpha."
6D	BC601-P1	13:27:46	13:27:52	0:00:06	"Division to Charlie to Command, Priority Traffic."
6A	Disp Con 1	13:27:49	13:27:59	0:00:10	"EMS601, we copied your traffic on 6-Mike, we are contacting MedSTAR. They did have a helicopter on standby."
6D	CMD18	13:27:51	13:27:55	0:00:04	"Go ahead, Charlie."
6D	BC601-P1	13:27:54	13:28:03	0:00:09	"I have, I have a collapse area, Bravo/Charlie."
6A	EMS601-P1	13:27:58	13:28:04	0:00:06	"OK - put 'em in the air and find me a second helicopter to start this way."
6A	Disp Con 1	13:28:03	13:28:08	0:00:05	"OK"
6D	CMD18	13:28:03	13:28:08	0:00:05	"Could you repeat that, please?"

TG	Alias	Begin	End	Dur.	Notes
6A	EMS601-P1	13:28:07	13:28:16	0:00:09	"And we don't have anybody here we can break away for an LZ so if you can look at a map and find one, just tell them to orbit until the medic unit gets there."
6E	BC603-P3	13:28:09	13:28:15	0:00:06	"Command to Loudoun on Echo."
6D	CMD18	13:28:14	13:28:19	0:00:05	"Command to Charlie Division - repeat your traffic."
6E	Disp Con 4	13:28:14	13:28:17	0:00:03	"Command."
6A	Disp Con 1	13:28:15	13:28:19	0:00:04	"OK"
6E	BC603-P3	13:28:16	13:28:24	0:00:08	"OK - we need to know a rundown of units (unintelligible)."
6A	EMS601-P1	13:28:18	13:28:25	0:00:07	"Also, what are we using for a command channel? I'll talk to you on that."
6D	BC601-P1	13:28:18	13:28:24	0:00:06	"Collapse zone - Bravo/Charlie, Bravo/Charlie."
6D	CMD18	13:28:23	13:28:28	0:00:05	"Copy - attention all units operating on the fireground, (unintelligible) structure, collapse zone 1 and a half times the height of the structure all the way around."
6E	AU-623	13:28:23	13:28:29	0:00:06	"MAU23 with 2."
6A	Disp Con 1	13:28:26	13:28:35	0:00:09	"I believe they're using, 6-Charles, 6-Charlie, I'm sorry."
6D	SPARE-316-P	13:28:27	13:28:37	0:00:10	Mic click
6E	ER-6	13:28:28	13:28:34	0:00:06	"Rescue Engine 6 with 3."
6D	A13-3-P1	13:28:36	13:28:43	0:00:07	"Medic 13-3 to Command."
6E	Disp Con 4	13:28:36	13:28:39	0:00:03	Mic click
6E	Disp Con 4	13:28:38	13:29:09	0:00:31	"Command - I'm showing Engine 18, Reserve Engine 23, Engine 11, Engine 439, Rescue 439, Medic 131, 133, 135, Engine 10, Wagon 5, Engine 6, Rescue Engine 6, Tower 19. Tower 19, Medic 133, 134, the Air Unit's en route. That's what we're having. We've missed several units that are on the scene, so I'm not exactly sure who's on the scene - OK?"
6D	CMD18	13:28:42	13:28:46	0:00:04	"Go ahead for Command."
6A	TW-1	13:28:43	13:28:49	0:00:06	"Tanker 1 to Loudoun on Adam. If you need an LZ, we're staffed."
6D	A13-3-P1	13:28:45	13:28:53	0:00:08	"What resources do you need from us and where would you like us?"
6A	Disp Con 1	13:28:48	13:28:57	0:00:09	"OK, Tanker 1. Could you start that way while we try to establish a landing zone?"

TG	Alias	Begin	End	Dur.	Notes
6D	CMD18	13:28:52	13:28:56	0:00:04	"Unit calling?"
6D	A13-3-P1	13:28:55	13:29:00	0:00:05	"Medic 13-3."
6A	TW-1	13:28:57	13:29:04	0:00:07	"That's affirmative. You can look at the schools off Potomac Station Drive."
6D	CMD18	13:28:59	13:29:07	0:00:08	"Bring your equipment to the Command Post; I still have injured firefighters to treat."
6A	Disp Con 1	13:29:03	13:29:07	0:00:04	"OK"
6D	Disp Con 5	13:29:09	13:29:15	0:00:06	"Loudoun to Command on 6-David."
6D	A6-3 D/O	13:29:17	13:29:33	0:00:16	"Medic 6-3 to Command: <i>[name redacted, Medic 6-3 Officer]</i> 's gonna take EMS Command, I'm moving all patients - or, all patients moved to the driveway at 43227 Meadowood Court. I'm gonna move all patients there."
FINVS	FM601	13:29:26	13:29:38	0:00:12	"Loudoun this is FM1 on fire investigations. Hold me on the scene, we need PD in here as well. We have tremendous traffic issues on McConnell and Parkers Ridge."
6E	BC603-P3	13:29:31	13:29:40	0:00:09	"OK - return Tower 19. Strategically locate them."
6D	CMD18	13:29:32	13:29:42	0:00:10	"OK - I copy. EMS601 is doing a quick lap - he's going to come back and you can have EMS Group at this time."
6E	Disp Con 4	13:29:39	13:29:45	0:00:06	"OK - Loudoun to Tower 19, 6-Edward."
6D	BC601-P1	13:29:41	13:29:46	0:00:05	"Division Charlie to Command."
6D	CMD18	13:29:45	13:29:49	0:00:04	"Go ahead, Charlie."
6D	BC601-P1	13:29:48	13:29:59	0:00:11	"OK - I have removed personnel from the Charlie Division. If you need to go ahead and flow the Tower down on it, go right on ahead."
6E	Disp Con 4	13:29:56	13:30:02	0:00:06	"Loudoun to Tower 19, 6-Edward."
6D	CMD18	13:29:58	13:30:03	0:00:05	"We're OK - we're flowing the ladder pipe at this time."
6D	BC601-P1	13:30:02	13:30:07	0:00:05	"Division Charlie's direct."
6D	E6	13:30:06	13:30:11	0:00:05	"Engine 6 on scene, 2nd alarm."
6D	E439-DRIVER-P	13:30:10	13:30:15	0:00:05	Mic click
6D	BC601-P1	13:30:14	13:30:25	0:00:11	"Command, also, I have Engine 23's crew, Truck 11's crew, 2 personnel from Rescue 13."

TG	Alias	Begin	End	Dur.	Notes
6D	CMD18	13:30:29	13:30:35	0:00:06	"Guys - we're starting to get a handle on (unintelligible)."
6D	Disp Con 5	13:30:34	13:30:42	0:00:08	"Loudoun to Tower 19, Tower 19 if you're on this channel, I need you on 6-Adam."
6E	Disp Con 4	13:32:08	13:32:32	0:00:07	"Loudoun - Meadowood Court Command."
6E	Disp Con 4	13:32:25	13:32:40	0:00:08	"Meadowood Court Command on the command channel, 6-Echo."
6E	BC603-P3	13:32:32	13:32:41	0:00:05	"Command, are you calling Loudoun?"
6E	Disp Con 4	13:32:36	13:33:09	0:00:17	"That's correct - what channel would you like to give for the helicopter LZ? We do not want to do it on Delta, would you like to use this channel or you want us to use Charlie?"
6E	BC603-P3	13:32:52	13:33:09	0:00:09	"We'll clear a unit up here, give them another channel and let them handle. I'll, ah, give it to you here shortly."
6E	Disp Con 4	13:33:00	13:33:19	0:00:10	"OK - we have Tanker 1 en route to the LZ and we're going to have them use Charlie, OK?"
6E	BC603-P3	13:33:09	13:33:25	0:00:16	"That's fine - have them handle and make that a separate incident. Go ahead and start me a second helicopter - second helicopter - we are going to have two flyouts. Loudoun covers: That's correct - they've already requested that."

APPENDIX 5 – HOSE AND LADDER DIAGRAM



APPENDIX 6 – EXCERPTS FROM SCBA REPORT

Note: all names and pronouns have been redacted.

Fairfax County Fire and Rescue Department
SCBA Technical Services
6800-A Industrial Rd.
Springfield, VA. 22151
703-658-3660

ATTACHMENT EXPLAINING THE CONDITION OF [NAME REDACTED'S] EQUIPMENT AS IT WAS RECEIVED BY THE EVALUATORS.

Cylinder:

Cylinder received showing approximately 1900 psi on the gauge.

Cylinder is smoke stained, knob is missing some paint, gauge on front side is bubbled, still visible.

Gauge on backside is smoke stained, still slightly visible.

Red stripe at top of cylinder does not show signs of heat exposure. All labels are legible

Reducer / Hoses:

Smoke stained, Loudoun County Flow Test decal attached over the primary and secondary seat access is legible, has Apr 2008 holes punched out.

HUD driver has what appears to have a rusty color on the metal tube going to the gauge block.

High pressure hose appears intact, UAC boot attached. Low pressure breathing line looks good, no apparent damage except for the HUD line coming off of it going to the HUD driver has what appears to be minor blistering. Quick connect is discolored, rusty look. EBSS hose looks ok, no apparent damage, boot still attached to the quick connect.

Regulator:

Cover appears normal with minimal smoke stain. Bubbles on decal, one over the screw that attaches the air saver mechanism to cover and one below it in a U shape.

HUD socket worn on one edge.

No visible damage to hose, purge knob is smoke stained with no visible damage, turns as it should. Latch moves freely, no visible damage. HUD wire and HUD visor intact, no visible damage.

Gasket intact, no apparent damage. Regulator sn visible on body of regulator, the number 60613 is etched on the inside of the locking plate.

Backframe / Straps:

No apparent damage, some surface discoloration on the frame. Shoulder harness assembly has some minor discoloration.

Waist to shoulder strap, no apparent damage. Waist pad assembly, Right side some discoloration, left side looks normal.

Female waist strap has regulator holder attached, no apparent damage. Male waist strap no apparent damage, buckles operate normally and lock securely. Cylinder retention strap / buckle locked, no damage. Back part of latch plate slightly blistered. Adjustable clip for retention strap blistered.

Mask:

Mask lens crazed, no smoke stain, label at bottom of lens [name redacted]. Harness clean, neck and temple straps clean and operational. All size dots in place, buckle pads are present. Faceseal, nose cup, voicemitter ducts, inhalation valves all intact with no visible damage.

P.A.S.S. / Console:

Pak-alert no visible damage. Console cover has some debris, rubber seal looks intact. Console gauge is visible, no smoke stain. Gauge lens does appear slightly disfigured, both emergency activation button and reset button have smoke stains.

Both the pak-alert wire harness and gauge line are slightly discolored where they go under the shoulder harness sleeve. Gauge retaining strap present and undamaged.

1	Date of Evaluation	6/5/2008			
2	Submitted by	Instrument Technician [name redacted]			
3	Primary Evaluators	1	Instrument Technician [name redacted]		
		2	HazMat Technician [name redacted]		
4	Date of Incident / Event	5-26-2008 @ 1330 hr			
5	Incident Number / Address	200810172		43238 Meadowood Ct Leesburg, VA	
6	Brief Description of Incident or Event	[name redacted] / 60613, was injured during this incident involving a structure fire. FF was operating on the scene with this SCBA.			
7	Was the User "On Air" at the time of the incident?	No report on incident received			
8	Equipment being Evaluated / Service & Testing History				
Cylinder	Cylinder	Manufacturer:	Luxfer	Year:	2002
		Model / Type	4500 PSI Carbon Fiber		
		Serial Number:	1xxxxxx5		
		Other ID:	Loudoun County 1xxxxxx5		
		Latest Hydrostatic test date:	Month	Feb	Year 2005
		Condition / appearance on scene or upon arrival at air shop:			
		Amount of air remaining in cylinder (PSI)	1900 psi		
		See attached report			
Reducer / Hoses / HUD driver	Reducer / Hoses / HUD driver	Manufacturer:	SCOTT Health and Safety	Year:	2006
		Model / Type	Air Pak 50 w/ HUD		
		Serial Number:	1xxxxxxxxxxxxx		
		Other ID:	Loudoun County 1xxxxxx9		
		Last inspection / test / service	Month	Apr	Year 2008
		Condition / appearance on scene or upon arrival at air shop:			
		See attached report			
Regulator	Regulator	Manufacturer:	SCOTT Health and Safety	Year:	2006
		Model / Type	EZ Flow QD CBRN w/ HUD		
		Serial Number:	1xxxxxxxxxxxx4		
		Other ID:	Loudoun County 1xxxxxx8 also 60613 etched on cap of body		
		Last inspection / test / service	Month	Unk	Year Unk
		Condition / appearance on scene or upon arrival at air shop:			
Backframe/straps	Backframe/straps	See attached report			
		Manufacturer:	SCOTT Health and Safety	Year:	
		Model / Type	Air-Pack 50		
		Serial Number:	None		
		Other ID:	2 labels: #60613 and Loudoun County Fire and Rescue		
		Last inspection / service	Month	Apr	Year 2008
		Condition / appearance on scene or upon arrival at air shop:			
		See attached report			

	Mask	Manufacturer:	SCOTT Health and Safety		Year:	
		Model / Type	AV3000 size Large			
		Serial Number:				
		Other ID:	[name redacted] label on outside of lens at bottom near faceseal.			
		Last inspection / service	Month	Unk	Year	Unk
		Condition / appearance on scene or upon arrival at air shop:				
		See attached report				
	P.A.S.S / Console	Manufacturer:	SCOTT Health and Safety			
		Model / Type	Pak-Alert SE+ Distress Alarm			
		PASS s/n	0xxxxx5		Year	2006
		Console s/n	1xxxx7		Year	2006
		Last inspection / service	Month	Apr	Year	2008
		Condition / appearance on scene or upon arrival at air shop:				
		See attached report				
	Pre Test Evaluation					
12	Perform Daily Check on all equipment being evaluated / enter comments					
	Cylinder	PSI Reading		1900 psi		
		Any damage requiring repair prior to bench test				
	Evaluators initials	KC/AG/PC	Cylinder opened fully, charged reducer and regulator. Condition of cylinder mentioned earlier in this report.			
	Reducer / Hoses / HUD driver	Any damage requiring repair prior to bench test				
		Appears operational, no air leaks detected. HUD driver operating properly				
	Evaluators initials	KC/AG/PC	Condition of reducer, HUD driver and hoses mentioned earlier in this report.			
	Regulator	Any damage requiring repair prior to bench test				
		Operational, vibralert activated, HUD lights ok, no air leaks detected. Condition of regulator mentioned earlier in this report.				
	Evaluators initials	KC/AG/PC				
	Backframe / Straps	Any damage requiring repair prior to bench test				
		Condition of backframe and straps noted earlier in this report				
	Evaluators initials	KC/AG/PC				
	Mask	Any damage requiring repair prior to bench test				
		Condition of mask noted earlier in this report				
	Evaluators initials	KC/AG/PC				
	P.A.S.S / Console	Any damage requiring repair prior to bench test				
		Manual activation of pak-alert and reset worked as it should. All lights working properly, pak-alert sounded as it should when cylinder initially turned on. Motion sensor operating as it should. Gauge on console working as well as lights. No indication of low batteries.				
	Evaluators initials	KC/AG/PC				

	Communications Equipment		Report any damage requiring repair
			n/a
	Evaluators initials		
	Other / Misc Equipment		Report any damage requiring repair
			n/a
	Evaluators initials		
	Pre Test SCBA: Test SCBA in condition it was received		
13	If any repairs were required for Pre-testing equipment on PosiChek, comment on the repairs and list parts used.		
	No repairs needed to perform pre test		
14	Test SCBA on posi-chek /did all components pass / comment on results / attach test sheets		
	Pre test had 1 failure, purge flow failed. After disassembly, inspection and cleaning of all components, reducer, regulator and mask passed all tests.		
	Post Test Evaluation		
15	Disassemble reducer and regulator AS NEEDED to complete evaluation. At minimum, do a normal annual inspection, checking filters and replacing batteries. Note findings as equipment is disassembled, conditions of filters, gaskets, pistons, etc. Note any repairs to backframe or straps. Inspect and repair mask. If replacement parts are used, list parts replaced and KEEP USED PARTS!		
	Equipment	Comments	
	Reducer / Console / Pak-alert	Removed and inspected primary and secondary seats. Removed cover and inspected piston heads, low cylinder transfer valve and auto transfer valve. Filters clean, batteries were changed in pak-alert and HUD, used new hardware to secure reducer to backframe. Did not replace the low pressure hose with the minor heat damage to HUD wire.	
	Regulator	No remarkable damage. Disassembled, inspected and cleaned all parts, visual inspection.	
	Mask	Cleaned and inspected, lens slightly crazed, did not replace.	
	Backframe / Straps /Other Miscellaneous	Cleaned and inspected, no problems noted.	
16	Cleaning Process: Note what cleaning was done if any.		Reducer wiped down, used Scot wash on regulator, mask, backframe and cylinder.

	Post Testing : Test SCBA after inspection and repairs completed.	
17	Test SCBA on posi-chek /did all components pass / comment on results / attach test sheets	
	Reducer and regulator tested and passed using [name redacted's] mask on the posi-chek. Purge flow required adjustment, was too low. Used Fairfax County test regulator to check function of HUD driver. After posi-chek, reconnected [name redacted's] regulator to HUD driver to check operation of HUD lights	
18	Is any of the equipment being evaluated unable to be returned to service?	No
	List the equipment unable to return to service and reason	
19	Cost to replace equipment not repairable	No parts were replaced during the evaluation or testing process.
20	Cost of any repairs that were made to equipment	No repairs were performed during the evaluation or testing process.
21	Evaluators Comments or notes	
	This SCBA appeared to show some signs it was exposed to heat conditions. Regulator appeared to show signs of heat exposure on cover, mask lens crazing minor, hardly visible on inspection. HUD wire from low pressure hose to HUD driver appeared to have some heat exposure. Once cleaned up, SCBA, regulator and mask appeared in good condition and passed all tests.	

ATTACHMENT EXPLAINING THE CONDITION OF [NAME REDACTED'S] EQUIPMENT AS IT WAS RECEIVED BY THE EVALUATORS.

Cylinder:

Cylinder appears to be in good condition (7610). Soot covered, bumper has a gouge on outside near the gauge lens (7620), paint on knob not blistered (7622), labels legible with some smoke stain (7610). Abrasion on hydro label appears to be chip of missing epoxy, not cylinder damage (7626). Outside gauge lens bubbled, gauge visible and shows approximately 2900 psi still remaining in the cylinder (7614). Inside gauge lens no damage, just some soot, still visible (7639). Black band around the top portion of the cylinder has no blistering or sign of significant heat exposure(7621).

Reducer /Hoses:

Reducer appears to be in good condition (7628). Smoke stained, all connections appear intact. Both the high pressure hose and EBSS hose appear undamaged with all connections good. Low pressure breathing line has what appears to be some heat damage to the HUD wire that plugs into the HUD driver. HUD driver appears to be intact, no damage. UAC boot is attached to high pressure hose and hanging loose, not connected.

Regulator:

Regulator appears to be in good condition. Cover has a couple of bubbles on the label, one where air saver screw is and another in the center portion (7634). HUD visor, air saver boot, purge knob, latch, gasket and hose all appear in good shape with no damage. Regulator hose has older style HUD socket, appears undamaged.

Backframe and straps:

Backframe appears to be in good shape with not damage, just moderately soot covered. Waist pad assembly in good condition, lower left button was unsnapped from frame. The right side at the backframe shows some substance that appears imbedded in the material (7624). No damage noticed on the waist to shoulder straps. Shoulder harness has a small tear on left sleeve (7636). Female waist strap has a regulator holder, undamaged. No damage noticed on male waist strap. Buckle is operational and does lock.

Mask:

Harness appears fairly clean and in good condition. Both temple and neck straps in place. Lens has minor crazing. Nose cup in place, face seal and bezels appear undamaged. Inhalation valves in place and appear to be undamaged. Voicemitters and voicemitter ducts in proper position and no apparent damage. Lower left size dot missing.

P.A.S.S / Console:

Pak-Alert looks intact, no apparent damage. Smoke stained. No apparent damage to wire connection to console. Console does not appear to have any signs of heat damage. Gauge is visible, lens appears intact. Emergency and test buttons appear ok. High pressure gauge line shows slight sign of possible rust.

1	Date of Evaluation		6/9/2008				
2	Submitted by		Instrument Technician [name redacted]				
3	Primary Evaluators	1	Instrument Technician [name redacted]				
		2	Instrument Technician [name redacted]				
List any additional evaluators at the end of the report							
4	Date of Incident / Event		5-26-2008 @ 1330 hr				
5	Incident Number / Address		43238 Meadowood Ct				
			Leesburg, VA				
6	Brief Description of Incident or Event		[name redacted] / 60619, was injured wearing this SCBA while fighting a structure fire.				
7	Was the User "On Air" at the time of the incident?		No report on incident received				
8	Equipment being Evaluated / Service & Testing History						
	Cylinder	Manufacturer:		Luxfer	Year:	Dec-08	
		Model / Type		4500 PSI Carbon Fiber			
		Serial Number:		Ixxxxxxx5			
		Other ID:		Loudoun County 1xxxxxxx7			
		Latest Hydrostatic test date:		Month	Jan	Year	2008
		Condition / appearance on scene or upon arrival at air shop:					
		Amount of air remaining in cylinder (PSI)		2900			
		See attached report					
	Reducer / Hoses / HUD driver	Manufacturer:		SCOTT Health and Safety	Year:	Jun-08	
		Model / Type		2002 (HUD) Air pak 50			
		Serial Number:		1xxxxxxxxxxxxx9			
		Other ID:		Loudoun County 1xxxxxxx3			
		Last inspection / test / service		Month	Apr	Year	2008
		Condition / appearance on scene or upon arrival at air shop:					
		See attached report					
	Regulator	Manufacturer:		SCOTT Health and Safety	Year:		
		Model / Type		EZ Flow QD CBRN			
		Serial Number:		1xxxxxxxxxxxxx2			
		Other ID:		Loudoun County 10000432			
		Last inspection / test / service		Month	Unk	Year	Unk
		Condition / appearance on scene or upon arrival at air shop:					
	Backframe/straps	Manufacturer:		SCOTT Health and Safety	Year:	Jun-05	
		Model / Type		Air-Pack 50			
		Serial Number:					
		Other ID:		60619 Label			
		Last inspection / service		Month	Apr	Year	2008
		Condition / appearance on scene or upon arrival at air shop:					
		See attached report					

	Mask	Manufacturer:		SCOTT Health and Safety		Year:		
		Model / Type		AV 3000 size Small w/STD harness				
		Serial Number:						
		Other ID:	Last name [name redacted] label on lens of mask					
		Last inspection / service		Month	Unk	Year	Unk	
		Condition / appearance on scene or upon arrival at air shop:						
		See attached report						
	P.A.S.S / Console	Manufacturer:		SCOTT Health and Safety				
		Model / Type		Pak-Alert SE+ Distress Alarm				
		PASS s/n		3xxxx5	Year	May-06		
		Console s/n		9xxx5	Year	May-06		
		Last inspection / service		Month	Apr	Year	2008	
		Condition / appearance on scene or upon arrival at air shop:						
		See attached report						
Pre Test Evaluation								
12	Perform Daily Check on all equipment being evaluated / enter comments							
	Cylinder	PSI Reading		2900				
		Any damage requiring repair prior to bench test						
	Evaluators initials	WR/PC	None					
	Reducer / Hoses / HUD driver	Any damage requiring repair prior to bench test						
		None						
	Evaluators initials	WR/PC						
	Regulator	Any damage requiring repair prior to bench test						
		None						
	Evaluators initials	WR/PC						
	Backframe / Straps	Any damage requiring repair prior to bench test						
		None						
	Evaluators initials	WR/PC						
	Mask	Any damage requiring repair prior to bench test						
		None						
	Evaluators initials	WR/PC						
	P.A.S.S / Console	Any damage requiring repair prior to bench test						
		None						
	Evaluators initials	WR/PC						
	Communications Equipment	Report any damage requiring repair						
		n/a						
	Evaluators initials							

		Report any damage requiring repair
	Other / Misc Equipment	n/a
	Evaluators initials	
	Pre Test SCBA: Test SCBA in condition it was received	
13	If any repairs were required for Pre-testing equipment on PosiChek, comment on the repairs and list parts used.	
	No repairs needed to perform pre test	
14	Test SCBA on posi-chek /did all components pass / comment on results / attach test sheets	
	Pre test had only one minor failure, Breathing Resistance Standard Work Rate. May require regulator adjustment or flow problem in mask. This test passed in the post test after equipment was disassembled, inspected, cleaned up and reassembled.	
	Post Test Evaluation	
15	Disassemble reducer and regulator AS NEEDED to complete evaluation. At minimum, do a normal annual inspection, checking filters and replacing batteries. Note findings as equipment is disassembled, conditions of filters, gaskets, pistons, etc. Note any repairs to backframe or straps. Inspect and repair mask. If replacement parts are used, list parts replaced and KEEP USED PARTS!	
	Equipment	Comments
	Reducer / Console / Pak-alert	Replaced Low Pressure hose. Removed and inspected primary and secondary seats. Removed cover and inspected piston heads, low cylinder transfer valve and auto transfer valve. Filters clean, batteries were changed, used new hardware to secure reducer to backframe.
	Regulator	No remarkable damage. Disassembled, inspected and cleaned all parts, visual inspection, no problems noted.
	Mask	Replaced crazed lens, replaced missing size dot. Cleaned and inspected, no problems noted.
	Backframe / Straps /Other Miscellaneous	Cleaned and inspected, no problems noted.
16	Cleaning Process: Note what cleaning was done if any.	Reducer wiped down, used Scot wash on regulator, mask, backframe and cylinder.
	Post Testing : Test SCBA after inspection and repairs completed.	
17	Test SCBA on posi-chek /did all components pass / comment on results / attach test sheets	
	Reducer and regulator tested and passed using [name redacted's] mask on the posi-chek. Used Fairfax County test regulator to check function of HUD driver. After posi-chek, reconnected [name redacted's] regulator to HUD driver to check operation of HUD lights	
18	Is any of the equipment being evaluated unable to be returned to service?	No
	List the equipment unable to return to service and reason	

19	Cost to replace equipment not repairable	All defective equipment was repairable
20	Cost of any repairs that were made to equipment	Replaced following parts: HUD hose and socket assembly-200017-01, AV3000 lens-805345-01, green size dot-10012121
21	Evaluators Comments or notes	
	This SCBA was in very good shape, showing no significant heat damage.	

ATTACHMENT EXPLAINING THE CONDITION OF [NAME REDACTED'S] EQUIPMENT AS IT WAS RECEIVED BY THE EVALUATORS.

Cylinder:

Cylinder has significant smoke staining uniformly distributed. Handwheel is missing paint, appears blistered. Bumper blistered. Gauge lens on the outside not visible, blistered with a bubble and smoke stained. Gauge lens on the inside blistered with a bubble, smoke stained, barely visible, shows approximately 2200 psi. Melted debris on top of cylinder. High pressure connection appears intact. No visible gouges or dents. Green stripe at top of cylinder appears to have some blistering. Hydrostatic label intact. Other labels are smoke stained, no visible blistering.

Reducer / Hoses:

Fairly clean, some smoke stain. Top of seats and cover screws are discolored with a rust looking color. Low pressure hose and quick connect coupling appear in good condition, still connected to regulator hose. EBSS hose and quick connect coupling appear in good condition, boot strap is around the hose but appears it was cut or torn as the boot is missing. Supplied air hose has a Schrader connection that is hanging loose, not connected to the block on the frame. The high pressure hose looks good. All hose connections look good.

Regulator:

Cover has blistering to the decal. Air saver switch looks good. Latch sticky, stays open if moved. Purge knob turns properly. Hose is dirty, looks intact. Gasket in good shape, number 60653 etched on lock plate of body.

Backframe / Straps:

Metal frame is showing discoloration. The waistpad assembly has some minor fraying on the right side. Male and female waist strap both appear in good shape. Waist to shoulder straps appear in good shape, right side discolored more than left. Shoulder pad assembly, right side shows some discoloration and Scott label on sleeve torn. Left side has a slight tear in the Scott label on the sleeve. Cylinder retention assembly has significant blistering. Cylinder latch missing rubber cover.

Mask:

Lens crazed, no label ID found. Voicemitter ducts appear in good condition with inhalation valves in place. Nose cup is attached to lens with ring. Nose cup is not attached to the left voicemitter grooves as it should be. Right side is attached correctly. Bezels have no visible defects or markings. Faceseal appears to be in good condition with no damage. Two size dots are missing, left temple and right neck. Buckles appear in good condition and have buckle pads in place. Harness appears fairly clean with no apparent damage. Neck straps in good condition. Temple straps are not adjustable. On both left and right side, the running end of the strap has been taped to the standing end of the strap on the backside of the buckles with what appears to be black electrical tape.

P.A.S.S. / Console:

Pak-Alert appears smoke stained, wire harness and screws discolored, appear rusty. Console appears in good condition with no defects. Gauge lens has minor distortion. No smoke stain, gauge is visible. Label on back cover legible. Area around reset button has some blistering. Seal appears to be intact. Retaining strap in place.

1	Date of Evaluation	6/5/2008
2	Submitted by	Instrument Technician [name redacted]
3	Primary Evaluators	1 Instrument Technician [name redacted]
		2 Instrument Technician [name redacted]
	List any additional evaluators at the end of the report	
4	Date of Incident / Event	5-26-2008 @ 1330 hr

	Incident Number / Address	200810172	43238 Meadowood Ct. Leesburg, VA			
6	Brief Description of Incident or Event	[name redacted] / 60653, was injured during this incident involving a structure fire. FF was operating on the scene with this SCBA.				
7	Was the User "On Air" at the time of the incident?		No report on incident received			
8	Equipment being Evaluated / Service & Testing History					
	Cylinder	Manufacturer:	Luxfer	Year:	2002	
		Model / Type	4500 PSI Carbon Fiber			
		Serial Number:	Ixxxxxx4			
		Other ID:	Loudoun County 1xxxxxxx3			
		Latest Hydrostatic test date:	Month	Jan	Year	2007
		Condition / appearance on scene or upon arrival at air shop:				
		Amount of air remaining in cylinder (PSI)	2100			
		See attached report				
	Reducer / Hoses / HUD driver	Manufacturer:	SCOTT Health and Safety	Year:	2003	
		Model / Type	Air Pak 50 (non HUD)			
		Serial Number:	Nxxxxxxxxxxxxx2			
		Other ID:	Loudoun County 1xxxxxx2			
		Last inspection / test / service	Month	Feb	Year	2008
		Condition / appearance on scene or upon arrival at air shop:				
		See attached report				
		Regulator	Manufacturer:	SCOTT Health and Safety	Year:	Jun-05
	Model / Type		EZ Flow QD CBRN			
	Serial Number:		RxxxxxxxxxxxxxB			
	Other ID:		Loudoun County 1xxxxxx6 also 60653 etched on cap of body			
	Last inspection / test / service		Month	Unk	Year	Unk
	Condition / appearance on scene or upon arrival at air shop:					
	See attached report					
	Backframe/straps		Manufacturer:	SCOTT Health and Safety	Year:	
		Model / Type	Air-Pack 50			
		Serial Number:	none			
		Other ID:	Ashburn Vol FD label, Calibration sticker 835, #60653			
		Last inspection / service	Month	Apr	Year	2008
		Condition / appearance on scene or upon arrival at air shop:				
		See attached report				
		Mask	Manufacturer:	SCOTT Health and Safety	Year	
	Model / Type		AV 3000 size Medium w/STD harness			
	Serial Number:					
	Other ID:		No ID seen on any components of the mask			
	Last inspection / service		Month	Unk	Year	Unk
	Condition / appearance on scene or upon arrival at air shop:					
	See attached report					
	P.A.S.S / Console		Manufacturer:	SCOTT Health and Safety		
		Model / Type	Pak-Alert SE+ Distress Alarm			
		PASS s/n	P31627	Year	2003	
		Console s/n	Label illegible-worn off		Year	
		Last inspection / service	Month	Apr	Year	2008
		Condition / appearance on scene or upon arrival at air shop:				
		See attached report				
		Pre Test Evaluation				
12	Perform Daily Check on all equipment being evaluated / enter comments					

		PSI Reading	2900 psi
	Cylinder		Any damage requiring repair prior to bench test
	Evaluators initials	WR/PC	Cylinder opened fully, charged reducer and regulator. Condition of cylinder mentioned earlier in this report.
	Reducer / Hoses / HUD driver		Any damage requiring repair prior to bench test
			Appears operational, no air leaks detected. Condition of reducer, and hoses mentioned earlier in this report. Pak alert lights and alarm work both manually and on air. This SCBA does not have a HUD.
	Evaluators initials	WR/PC	
	Regulator		Any damage requiring repair prior to bench test
			Operational, vibralert activated, no air leaks detected. Condition of regulator mentioned earlier in this report.
	Evaluators initials	WR/PC	
	Backframe / Straps		Any damage requiring repair prior to bench test
			Condition of backframe and straps noted earlier in this report
	Evaluators initials	WR/PC	
	Mask		Any damage requiring repair prior to bench test
			Condition of mask noted earlier in this report
	Evaluators initials	WR/PC	
	P.A.S.S / Console		Any damage requiring repair prior to bench test
			Manual activation of pak-alert and reset worked as it should. All lights working properly, pak-alert sounded as it should when cylinder initially turned on. Motion sensor operating as it should. Gauge on console working as well as lights. No indication of low batteries.
	Evaluators initials	WR/PC	
	Communications Equipment		Report any damage requiring repair
			n/a
	Evaluators initials		
	Other / Misc Equipment		Report any damage requiring repair
			n/a
	Evaluators initials		
	Pre Test SCBA: Test SCBA in condition it was received		
13	If any repairs were required for Pre-testing equipment on PosiChek, comment on the repairs and list parts used		
	No repairs needed to perform pre test		
14	Test SCBA on posi-chek /did all components pass / comment on results / attach test sheets		
	Pre test had 2 failures. Exhalation pressure and Breathing Resistance Standard Work Rate. After disassembly, inspection and cleaning of all components, reducer, regulator and mask passed all tests.		
	Post Test Evaluation		
15	Disassemble reducer and regulator AS NEEDED to complete evaluation. At minimum, do a normal annual inspection, checking filters and replacing batteries. Note findings as equipment is disassembled, conditions of filters, gaskets, pistons, etc. Note any repairs to backframe or straps. Inspect and repair mask. If replacement		

	parts are used, list parts replaced and KEEP USED PARTS!	
	Equipment	Comments
	Reducer / Console / Pak-alert	Removed and inspected primary and secondary seats. Removed cover and inspected piston heads, low cylinder transfer valve and auto transfer valve. Filters clean, still replaced with new ones. Used new hardware to secure reducer to backframe. Batteries taken out of pak alert were 2 9volt RayOVac alkaline 6LF22 / 6LR61. Replaced with new Duracell ProCells
	Regulator	No remarkable damage. Disassembled, inspected and cleaned all parts, visual inspection, no problems noted.
	Mask	Replaced crazed lens, replaced 2 missing size dots. Cleaned and inspected, no other problems noted.
	Backframe / Straps /Other Miscellaneous	Replaced cylinder latch assembly. Cleaned and inspected all other components, no problems noted.
16	Cleaning Process: Note what cleaning was done if any.	Reducer wiped down, used Scot wash on regulator, mask, backframe and cylinder.
	Post Testing : Test SCBA after inspection and repairs completed.	
17	Test SCBA on posi-chek /did all components pass / comment on results / attach test sheets	
	Reducer and regulator tested and passed using [name redacted's] mask on the posi-chek.	
21	Evaluators Comments or notes	
	This SCBA appeared to show some signs it was exposed to high heat conditions. Some minor heat damage to exposed areas of cylinder and backframe components. Regulator showed signs of heat exposure on cover, mask lens crazing was definitely visible on inspection. Once cleaned up, SCBA, regulator and mask appeared in good condition and passed all tests.	

ATTACHMENT EXPLAINING THE CONDITION OF [NAME REDACTED'S] EQUIPMENT AS IT WAS RECEIVED BY THE EVALUATORS.

Cylinder:

Cylinder has signs of exposure to high heat or flame.

Bumper distorted and pushed down into gauge assembly. Front side of gauge lens not visible, covered by damaged bumper.

There appears to be a hole in the gauge lens.

The back side of the lens has no apparent damage; gauge is visible and showing 2000 psi.

Gauge needle is not accurate, needle of gauge stuck due to front side damage. Actual air in cylinder is zero.

Handwheel is missing paint. Hydrostatic test label significantly damaged, date is slightly visible.

Green stripe around the top portion of cylinder blistered .

Backside of cylinder appears good, no blistering of labels or green stripe.

Reducer / Hoses:

Reducer intact, smoke stained. Scott label on cover intact, no blistering.

High pressure connection still connected to cylinder. The coupling nut assembly appears to have a shiny brass look, possibly a sign of high heat exposure.

Hose is intact, feels stiff and possibly brittle.

The low pressure breathing line is intact, no visible defects.

EBSS hose has a tear in the outer cover at the reducer, some damage to inner weave.

The top portion of the EBSS hose where it would curve at the top portion of the cylinder appears to have heat damage.

There is a tear on the outer cover adjacent to where it is in position next to the cylinder retaining strap. Appears the hose was cut just below the EBSS retaining strap. Quick connect coupling looks ok, boot is missing.

This SCBA also has a supplied air hose connected to the bottom side of air manifold.

Hose was loose, not secured into catch that holds the coupling. The loose end is a Schrader connection that has a brassy look as did the high pressure coupling nut.

Regulator:

The regulator appears to have been exposed to high heat. It was still attached to lens and the low pressure air line of the reducer.

The entire cover is distorted from exposure to high heat.

The top portion of the air saver boot is missing, exposing the inside of the regulator cover and air saver switch mechanism.

The purge knob is significantly distorted, still turns as designed.

The outer cover of hose cracked, no separations. The latch is not operational, is stuck to the lens.

Regulator body is in good shape, gasket intact, and no damage. Number 10002040 etched onto upper body on purge knob side.

Backframe / Straps:

The cylinder retention assembly is blistered and distorted but was still operational.

Shoulder harness assembly is intact and has some discoloration indicating heat exposure to both sleeves.

Gauge retaining strap is cut. Right side of waist to shoulder assembly is cut, some discoloration from heat.

Left side intact; no significant discoloration.

Waist pad assembly has discoloration; right side has some debris melted on it.

Male waist strap twisted in buckle, no discoloration.

Female waist strap exposed to high heat, regulator holder was melted into the strap. The female buckle showed some signs of rust.

The frame itself is in good condition, some discoloration but no deformities noted.

Mask:

Mask was not intact. The lens was separated from the upper and lower bezel. The upper and lower bezels were attached to each other but separated from the face seal. Face seal and harness still intact together.

The mask is an AV3000 size medium face seal. The lens was grossly disfigured from high heat or flame exposure. Appears grass was embedded into the front of the lens. The nose cup, both voicemitter ducts with inhalation valves surrounded by the melted deformed lens. Outer portion of voicemitters show some signs of heat exposure. Upper and lower bezels showed signs of heat damage on the front surfaces, mostly to the top right and bottom left. The harness and both neck and temple straps look good, no apparent damage. All 4 size dots present both buckle pads in place.

P.A.S.S. / Console:

Pak-alert was intact. Two energizer batteries were out of unit loose with the gear. One of the batteries showed significant corrosion damage on the positive terminal. The battery cover was missing 1 screw. Original batteries placed in pak-alert and did supply power to it allowing it to go into alarm when emergency button was activated. Left side of housing showed signs of heat exposure. Wire enclosure going to console in good shape, some debris melted on top portion of it where it curves down near the top of the cylinder. The console showed signs of high heat exposure. Gauge lens was distorted, gauge not visible. Cover for indicator lights distorted. The red and yellow on the emergency and reset buttons visible, some smoke stain. Gauge retaining strap was cut. Gasket appears intact, back cover labels illegible from possible heat damage. Bell assembly intact, retaining strap still connected to low pressure breathing hose. Cricket line is intact, no visible damage.





1	Date of Evaluation	6/5/2008	
2	Submitted by	Instrument Technician [name redacted]	
3	Primary Evaluators	1	Instrument Technician [name redacted]
		2	Instrument Technician [name redacted]
List any additional evaluators at the end of the report			
4	Date of Incident / Event	5-26-2008 @ 1330 hr	
5	Incident Number / Address	200810172	43238 Meadowood Ct Leesburg VA
6	Brief Description of Incident or Event	[name redacted] / 60652, was injured during this incident involving a structure fire. FF was operating on the scene with this SCBA.	
7	Was the User "On Air" at the time of the incident?	No report on incident received	
8	Equipment being Evaluated / Service & Testing History		
Cylinder	Manufacturer:	Luxfer	Year: 2002
	Model / Type	4500 PSI Carbon Fiber	
	Serial Number:	IL110376	
	Other ID:	Loudoun County 1xxxxxxx9	
	Latest Hydrostatic test date:	Month	Jan Year 2007
	Condition / appearance on scene or upon arrival at air shop:		
	Amount of air remaining in cylinder (PSI) No air...stuck @2000		
	See attached report		
Reducer / Hoses / HUD driver	Manufacturer:	SCOTT Health and Safety	Year: 2003
	Model / Type	Air Pak 50 (non HUD)	
	Serial Number:	Nxxxxxxx**B1	
	Other ID:	Loudoun County 10002691	
	Last inspection / test / service	Month	Unk Year Unk
	Condition / appearance on scene or upon arrival at air shop:		
	See attached report		
	Regulator	Manufacturer:	SCOTT Health and Safety
Model / Type		EZ Flow QD CBRN	
Serial Number:		not legible	
Other ID:		Loudoun County 1xxxxxx0 also 60652 etched on cap of body	
Last inspection / test / service		Month	Unk Year Unk
Condition / appearance on scene or upon arrival at air shop:			
See attached report			
Backframe/straps		Manufacturer:	SCOTT Health and Safety
	Model / Type	Air-Pack 50	
	Serial Number:	none	
	Other ID:	Ashburn Vol FD label, Calibration sticker 834, #60652	
	Last inspection / service	Month	Unk Year Unk
	Condition / appearance on scene or upon arrival at air shop:		
	See attached report		
	Mask	Manufacturer:	SCOTT Health and Safety
Model / Type		AV 3000 size Medium w/STD harness	
Serial Number:			
Other ID:		[name redacted] name label on lower part of lens	
Last inspection / service		Month	Unk Year Unk
Condition / appearance on scene or upon arrival at air shop:			
See attached report			







	P.A.S.S / Console	Manufacturer:		SCOTT Health and Safety			
		Model / Type		Pak-Alert SE+ Distress Alarm			
		PASS s/n		Pxxxx6	Year	2006	
		Console s/n		not legible	Year	unk	
		Last inspection / service		Month	Unk	Year	Unk
		Condition / appearance on scene or upon arrival at air shop: See attached report					
	Pre Test Evaluation						
12	Perform Daily Check on all equipment being evaluated / enter comments						
	Cylinder		PSI Reading		0 psi..no air		
			Any damage requiring repair prior to bench test				
	Evaluators initials	WR/PC	Cylinder empty. Condition of cylinder mentioned earlier in this report.				
	Reducer / Hoses / HUD driver		Any damage requiring repair prior to bench test				
			Not in a condition to perform a daily check..see previous comments earlier in this report.				
	Evaluators initials	WR/PC					
	Regulator		Any damage requiring repair prior to bench test				
			Not in a condition to perform a daily check..see previous comments earlier in this report.				
	Evaluators initials	WR/PC					
	Backframe / Straps		Any damage requiring repair prior to bench test				
			Condition of backframe and straps noted earlier in this report				
	Evaluators initials	WR/PC					
	Mask		Any damage requiring repair prior to bench test				
			Mask not intact. Condition of mask noted earlier in this report				
	Evaluators initials	WR/PC					
	P.A.S.S / Console		Any damage requiring repair prior to bench test				
			Not in a condition to perform a daily check..see previous comments earlier in this report.				
	Evaluators initials	WR/PC					
	Communications Equipment		Report any damage requiring repair				
			n/a				
	Evaluators initials						
	Other / Misc Equipment		Report any damage requiring repair				
			n/a				
	Evaluators initials						
	Pre Test SCBA: Test SCBA in condition it was received						






13	If any repairs were required for Pre-testing equipment on PosiChek, comment on the repairs and list parts used.	
	Replaced cut EBSS hose to perform reducer test. After test, reconnected bad hose.	
14	Test SCBA on posi-chek /did all components pass / comment on results / attach test sheets	
	Used FXCO test regulator and mask for first pretest of reducer. Failed one test (Secondary pressure at high cylinder.) See test for comments. Pretested regulator using a FXCO test mask and reducer. Although regulator functioned, the only test it passed within limits was exhalation valve pressure. See test for comments. Second pre test of reducer using the damaged regulator on a FXCO test mask. See test for comments.	
	Post Test Evaluation	
15	Disassemble reducer and regulator AS NEEDED to complete evaluation. At minimum, do a normal annual inspection, checking filters and replacing batteries. Note findings as equipment is disassembled, conditions of filters, gaskets, pistons, etc. Note any repairs to backframe or straps. Inspect and repair mask. If replacement parts are used, list parts replaced and KEEP USED PARTS!	
	Equipment	Comments
	Reducer / Console / Pak-alert	See attached comments
	Regulator	Regulator had so much damage it was decided not to replace all the parts that would require a test to place it back in service.
	Mask	Mask not in condition to test
	Backframe / Straps /Other Miscellaneous	Backframe cleaned up, no parts replaced. No other defects noted.
16	Cleaning Process: Note what cleaning was done if any.	Damp towel and Scott wash used to clean equipment
	Post Testing : Test SCBA after inspection and repairs completed.	
17	Test SCBA on posi-chek /did all components pass / comment on results / attach test sheets	
	Regulator was not post tested, not reassembled after disassembly and inspection. Several parts require replacement. Reducer passed post test after disassembly and inspection.	
18	Is any of the equipment being evaluated unable to be returned to service?	Yes
	List the equipment unable to return to service and reason	
	Mask-heat damage to lens, voicemitters, bezels. Reducer-heat damage to hoses. Regulator-heat damage to cover/air saver switch components, purge knob, hose. Backframe-heat damage to cylinder retention assembly. Cylinder-heat damage to bumper, gauge assembly and will require hydrostatic test due to high heat exposure.	
19	Cost to replace equipment not repairable	Replaced check valve in reducer...part no. 802295-01. Due to numerous parts that need to be replaced, SCBA is being returned as is with the exception of the check valve that was replaced for testing purposes.




20	Cost of any repairs that were made to equipment	No repairs made, only replaced defective check valve.
21	Evaluators Comments or notes	
	It appears that this SCBA and all of its components were exposed to significant heat. After the disassembly and inspection, the reducer was reassembled, replacing the EBSS hose used to test the reducer with the original damaged hose. The regulator was not reassembled or post tested due to the amount of damage. The reducer was not reattached to the backframe. All mask components were bagged. Cylinder should have a hydrostatic test prior to being returned to service. Any loose parts were bagged and returned.	

ATTACHMENT EXPLAINING THE CONDITION OF [NAME REDACTED'S] EQUIPMENT AS IT WAS RECEIVED BY THE EVALUATORS.



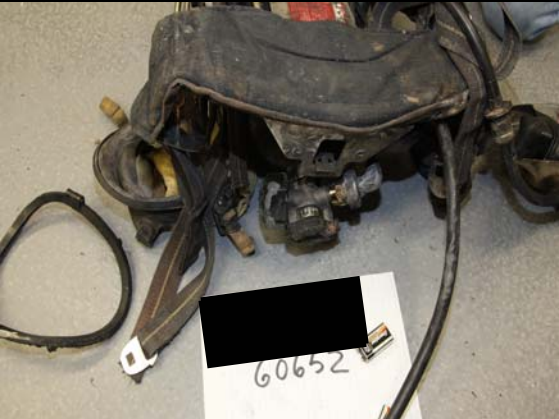

Cylinder:	
Cylinder received showing approximately 1900 psi on the gauge.	Cylinder is smoke stained, knob is missing some paint, gauge on front side is bubbled, still visible.
	
Gauge on backside is smoke stained, still slightly visible.	Red stripe at top of cylinder does not show signs of heat exposure. All labels are legible.
	






Reducer / Hoses: Smoke stained, Loudoun County Flow Test decal attached over the primary and secondary seat access is legible, has Apr 2008 holes punched out.	HUD driver has what appears to have a rusty color on the metal tube going to the gauge block
	
High pressure hose appears intact, UAC boot attached. Low pressure breathing line looks good, no apparent damage except for the HUD line coming off of it going to the HUD driver has what appears to be minor blistering.	Quick connect is discolored, rusty look. EBSS hose looks ok, no apparent damage, boot still attached to the quick connect.
	
Regulator: Cover appears normal with minimal smoke stain. Bubbles on decal, one over the screw that attaches the air saver mechanism to cover and one below it in a U shape.	HUD socket worn on one edge.
	







<p>No visible damage to hose, purge knob is smoke stained with no visible damage, turns as it should. Latch moves freely, no visible damage. HUD wire and HUD visor intact, no visible damage. Gasket intact, no apparent damage. Regulator sn visible on body of regulator, the number 60613 is etched on the inside of the locking plate.</p>	
	
<p>Backframe / Straps: No apparent damage, some surface discoloration on the frame. Shoulder harness assembly has some minor discoloration. Waist to shoulder strap, no apparent damage.</p>	
	
<p>Female waist strap has regulator holder attached, no apparent damage. Male waist strap no apparent damage, buckles operate normally and lock securely. Cylinder retention strap / buckle locked, no damage. Back part of latch plate slightly blistered.</p>	<p>Adjustable clip for retention strap blistered.</p>
	

Mask:	
Mask lens crazed, no smoke stain, label at bottom of lens [name redacted] Harness clean, neck and temple straps clean and operational. All size dots in place, buckle pads are present. Faceseal, nosecup, voicemitter ducts, inhalation valves all intact with no visible damage.	
	
P.A.S.S. / Console:	
Pak-alert no visible damage. Console cover has some debris, rubber seal looks intact. Console gauge is visible, no smoke stain. Gauge lens does appear slightly disfigured, both emergency activation button and reset button have smoke stains.	Both the pak-alert wire harness and gauge line are slightly discolored where they go under the shoulder harness sleeve. Gauge retaining strap present and undamaged.
	

ATTACHMENT EXPLAINING THE CONDITION OF [NAME REDACTED'S] EQUIPMENT AS IT WAS RECEIVED BY THE EVALUATORS.






<p>Cylinder:</p> <p>Cylinder has signs of exposure to high heat or flame.</p>	<p>Bumper distorted and pushed down into gauge assembly. Front side of gauge lens not visible, covered by damaged bumper. There appears to be a hole in the gauge lens.</p>
	
<p>The back side of the lens has no apparent damage; gauge is visible and showing 2000 psi. Gauge needle is not accurate, needle of gauge stuck due to front side damage. Actual air in cylinder is zero. Hand wheel is missing paint. Hydrostatic test label significantly damaged, date is slightly visible.</p>	<p>Green stripe around the top portion of cylinder blistered.</p>
	







Cylinder (continued):	
Backside of cylinder appears good, no blistering of labels or green stripe.	
	
Reducer / Hoses:	
Reducer intact, smoke stained. Scott label on cover intact, no blistering.	High pressure connection still connected to cylinder. The coupling nut assembly appears to have a shiny brass look, possibly a sign of high heat exposure.
	
Hose is intact, feels stiff and possibly brittle.	The low pressure breathing line is intact, no visible defects.
	



<p>EBSS hose has a tear in the outer cover at the reducer, some damage to inner weave.</p>	<p>The top portion of the EBSS hose where it would curve at the top portion of the cylinder appears to have heat damage.</p>
	
<p>There is a tear on the outer cover adjacent to where it is in position next to the cylinder retaining strap.</p>	<p>Appears the hose was cut just below the EBSS retaining strap. Quick connect coupling looks ok, boot is missing.</p>
	
<p>This SCBA also has a supplied air hose connected to the bottom side of air manifold.</p>	<p>Hose was loose, not secured into catch that holds the coupling. The loose end is a Schrader connection that has a brassy look as did the high pressure coupling nut.</p>
	

Regulator:	
<p>The regulator appears to have been exposed to high heat. It was still attached to lens and the low pressure air line of the reducer.</p>	<p>The entire cover is distorted from exposure to high heat.</p>
	
<p>The top portion of the air saver boot is missing, exposing the inside of the regulator cover and air saver switch mechanism.</p>	<p>The purge knob is significantly distorted, still turns as designed.</p>
	
<p>The outer cover of hose cracked, no separations.</p>	<p>The latch is not operational, is stuck to the lens.</p>
	

<p>Regulator body is in good shape, gasket intact, and no damage. Number 10002040 etched onto upper body on purge knob side.</p>	
	
<p>Backframe / Straps:</p>	
<p>The cylinder retention assembly is blistered and distorted but was still operational.</p>	<p>Shoulder harness assembly is intact and has some discoloration indicating heat exposure to both sleeves.</p>
	
<p>Gauge retaining strap is cut. Right side of waist to shoulder assembly is cut, some discoloration from heat.</p>	<p>Left side intact; no significant discoloration.</p>
	

<p>Waist pad assembly has discoloration; right side has some debris melted on it.</p>	<p>Male waist strap twisted in buckle, no discoloration.</p>
	
<p>Female waist strap exposed to high heat, regulator holder was melted into the strap. The female buckle showed some signs of rust. The frame itself is in good condition, some discoloration but no deformities noted.</p>	
	
<p>Mask:</p> <p>Mask was not intact. The lens was separated from the upper and lower bezel. The upper and lower bezels were attached to each other but separated from the face seal. Face seal and harness still intact together.</p>	<p>The mask is an AV3000 size medium face seal. The lens was grossly disfigured from high heat or flame exposure. Appears grass was embedded into the front of the lens. The nose cup, both voicemitter ducts with inhalation valves surrounded by the melted deformed lens.</p>
	

<p>Outer portion of voicemitters show some signs of heat exposure. Upper and lower bezels showed signs of heat damage on the front surfaces, mostly to the top right and bottom left.</p>	<p>The harness and both neck and temple straps look good, no apparent damage. All 4 size dots present both buckle pads in place.</p>
	
<p>P.A.S.S. / Console:</p> <p>Pak-alert was intact. Two energizer batteries were out of unit loose with the gear. One of the batteries showed significant corrosion damage on the positive terminal. The battery cover was missing 1 screw. Original batteries placed in pak-alert and did supply power to it allowing it to go into alarm when emergency button was activated.</p>	<p>Left side of housing showed signs of heat exposure.</p>
	
<p>Wire enclosure going to console in good shape, some debris melted on top portion of it where it curves down near the top of the cylinder.</p>	<p>The console showed signs of high heat exposure. Gauge lens was distorted, gauge not visible. Cover for indicator lights distorted.</p>
	

<p>The red and yellow on the emergency and reset buttons visible, some smoke stain. Gauge retaining strap was cut. Gasket appears intact, back cover labels illegible from possible heat damage.</p>	<p>Bell assembly intact, retaining strap still connected to low pressure breathing hose. Cricket line is intact, no visible damage.</p>
	

APPENDIX 7 – PPE REPORT SUMMARY

Note: All names and pronouns have been redacted.

**EXAMINATION OF
FIREFIGHTER PROTECTIVE CLOTHING AND EQUIPMENT
WORN BY [NAME REDACTED], [NAME REDACTED],
[NAME REDACTED], AND [NAME REDACTED]
DURING MAY 25, 2008 FIRE IN LEESBURG, VIRGINIA**

**Final Report
June 30, 2008**

Summary

This report describes my examination of the protective clothing and equipment worn by [name redacted], [name redacted], [name redacted], and [name redacted] during a fire at a single family home in Leesburg, Virginia on May 25, 2008. I received the protective coat, pants, helmet, hood, gloves, footwear, in addition to some other articles of clothing and equipment worn by each fire fighter during this incident for examination. Many of the items showed evidence of moderate to heavy fireground soils and varying levels of thermal damage. The types of damage noted primarily occurred to the firefighters' protective helmet, hoods, coats, and pants, and to a lesser extent their gloves. No damage and minimal soiling was noted for each set of firefighter protective footwear.

Some of the burn injuries sustained by different firefighters appear to the result of incorrect wearing of their protective coat and protective helmet. In particular, three of the firefighter coats had collars that showed evidence of not being extended upward. Likewise, the ear covers provided on the protective helmets for these same three firefighters were rolled inside the helmet and not deployed. Each of these firefighters sustained burn injuries either on their ears or neck.

Inconsistencies in the provided protective clothing and equipment also appear to have contributed to some burn injuries. The majority of trim provided on the older protective coat worn by [name redacted] was completely deteriorated and burned off of FF's coat. Burning trim may have the observed flaming on [name redacted] during FF's exit from the fire structure. This burning may not explain all of FF's injuries, which primarily were observed on FF's back side (back, buttocks, and legs). The extent of burn injury to this position of FF's body suggests an orientation on the fireground where he had an extended exposure to the reported flashover. Differences in protective gloves worn by each firefighter can also explain observed hand burns for two firefighters but not the other firefighters.

The predominate basis for the observed burn injuries other than the reasons provided above was the fireground conditions exceeding the protection limits provided by the protective clothing. Structural fire fighting protective clothing and equipment is designed to allow firefighters the opportunity to escape a flashover without injury, but some flashover conditions can overwhelm the insulation properties of the clothing. There were no apparent deficiencies or defects found in any of the clothing or equipment items that were examined.

Objective

I was contacted by Division Chief Richard Bowers of the Montgomery County Fire and Rescue Services and requested to examine the protective clothing worn by [name redacted], [name redacted], [name redacted], and [name redacted] during a recent structural fire. The purpose of this examination was to determine if any conditions of the clothing might have contributed to the firefighters' injuries.

Description of the Incident

The following description of the incident was provided from the incident file:

On Sunday May 25th, 2008 at approximately 1300 hours Loudoun County Fire and Rescue units responded to a structure fire in a single family home in Leesburg, Virginia located at 43238 Meadowood Court. The structure was a two story colonial home and approximately 5-6 thousand square foot. The foyer and living areas were of open design and a combination of lightweight construction and dimensional wood floor joists (2x10). The attic was of truss assembly and the basement is partially sub-grade and not finished. The front of the house is brick veneer and the sides consisted of 3/8 black sheeting and vinyl siding. The rear of the structure was covered with a 1/8th inch energy bracing and vinyl siding. There were two bump outs on the rear of the house that protrude beyond the normal facing of the structure. There was a sunroom with an open vaulted ceiling and a family room and master bedroom bump-out on floor one and two. The master bedroom was on floor two over the family room.

Neighbors reported a fire in the sun room and deck area of the rear of the house. The Loudoun County Fire Investigators reported that the fire started on the rear deck as a result of discarded smoking materials. The smoking material ignited the wood deck and transmitted thermal radiation and convective heat to the combustible siding and energy bracing on the rear of the house. The fire then traveled vertically and horizontally to the first floor family and sunrooms and then to the second floor and attic areas.

Fire and Rescue units arrived on the scene and reported heavy smoke showing from the attic and rear of the structure on floor number 2. The engine and truck companies arrived and initiated a fire attack from the front of the structure to the second floor. The crews reported moderate smoke conditions on floor one and low heat. The crews advanced a 200 foot 1 ¾ fire attack line to the master bedroom via the interior foyer stairwell. The truck initiated a primary search while the engine crew positioned the line for fire confinement and extinguishment in the master bedroom. The engine crew reported heavy smoke conditions in the master bedroom and fire evident in the rear of the master bedroom. As the engine and truck crew were engaged in their tasks in the area of the open foyer, they reported that the smoke conditions drastically changed to zero visibility and extreme heat conditions. They reported that the heat forced them to the ground. They reported a ball of fire or orange glow came up over the banister of the open foyer. The crews retreated and opened the hose line. The attack line went limp because the hose had melted. The engine crew and the truck firefighter exited the structure via a ground ladder from the bedroom window located on the Bravo-Charlie side. The Tower Officer exited the second floor via a window and fell to the ground

below. The rapid intense fire conditions burned each of the fire personnel that were on the second floor of the structure.

It is believed that the fire flashed on floor one and in the attic. The first floor family room and sunroom had a significant fuel load package of combustible overstuffed furniture in each room. It is believed that the furniture on the first floor was off-gassing and contributed to the fire conditions when the fire penetrated the sunroom and family room. This allowed the introduction of air from horizontal ventilation on side A along with the off-gassing of the energy bracing and vinyl siding on side C to produce a flashover on floor one and eventually in the attic area of the house.

The fire personnel narrowly escaped the intense fire conditions. One observation was provided that [name redacted's] protective coat appeared to continue flaming after exiting the fire structure.

Description of Fire Fighter Injuries

The following specific burn injuries were reported:

- [name redacted] – Second degree burns to left side of neck and left thumb; first degree burns to both sides of both hands.
- [name redacted] – Second degree burns to back, buttocks, and both sides of both legs.
- [name redacted] – Second degree burns to tips of both ears and left forearm.
- [name redacted] – Second degree burns to tip of left ear, both sides of both arms, both sides of both hands, and both lower legs.

Items Examined and Observations

The following items were provided for examination and observation for each of the four firefighters:

- Protective coat
- Protective pants
- Protective helmet
- Protective hood
- Protective gloves
- Protective footwear

For one firefighter, only one glove was provided. Other items were provided for some firefighters that included the station/work pants, belt, station/work shirt, underclothing, and radio belt/harness. For both the coat and the pants of all four firefighters, the liner was separated from the shell and the coat liner had been opened allowing inspection of the interior surfaces of the moisture barrier and thermal barrier. Some equipment and other items were also found on or in the clothing. For example, the flashlight for each firefighter was retained in the flashlight pocket.

Specific descriptions and observations for each firefighter's gear are provided in the sections below.

[Name redacted]. Table 1 provides the descriptions and observations for each item worn by [name redacted] that was provided for examination.

Table 1 - Descriptions and Observations for [name redacted] Protective Clothing

Item	Description	Observations
Protective coat	<p>Manufacturer: Globe Firefighter Suits Style: GXTreme Cut No. 5X066C Serial No. 2xxxxx7 Size: 44/32 Mfg. Date: 08/2005 Outer shell: 7.2 oz PBI Matrix Gold Moisture barrier: Crosstech PJ Thermal barrier: Caldura SL Quilt Features: Radio pocket, flashlight holder, two lower cargo pockets; 3M lime Scotchlite Triple Trim, leather reinforced elbows and cuffs; zipper front closure Label indicates compliance with NFPA 1971-2000</p>	<p>Heavy to moderate soiling on exterior of shell. Flashlight intact without damage. Mild charring lower and upper torso bands right side. Collar was not deployed by evidence of charring on interior of collar. Liner showed light soiling and mild charring on shoulders and upper right back on moisture barrier side of liner.</p>
Protective pants	<p>Manufacturer: Globe Firefighter Suits Style: GTXreme Cut No. 5X116P Serial No: 2xxxxx5 Size: 36/28 Mfg. Date: 09/2005 Outer shell: 7.2 oz PBI Matrix Gold Moisture barrier: Crosstech PJ Thermal barrier: Caldura SL Quilt Features: Cargo pockets; leather reinforced knees with additional shell and insulation layers; leather reinforced cuffs; attached suspenders Label indicates compliance with NFPA 1971-2000</p>	<p>Moderate to heavy soiling on shell exterior. Mild charring on lower left leg trim.</p>
Protective helmet	<p>Manufacturer: Cairns Model: C-TRD Mfg. Date: 6/14/2005 Features: White, Borque Eye Shields; two layer ear flaps – PBI/Kevlar woven shell and knit liner Serial No.: 1xxxxxxx7 Label indicates compliance with NFPA 1971-2000</p>	<p>Ear covers rolled into helmet (not deployed). Moderate soiling on exterior helmet. Light charring on face shield. Mild damage to front edge bead. Melting of eye shields. Melting of goggles.</p>

Item	Description	Observations
Protective hood	Manufacturer: Majestic Style: PAC2 Size: Universal Material: P84/Lenzing FR/Kevlar (40/55/5 blend) Lot No.: Unreadable Mfg. Date: Unreadable	Mild wear throughout hood. Some melted resin on inside of face opening. Mild charring on right side.
Protective gloves	No Label, Cut Out Leather back and palm, apparent Direct Grip Crosstech lining	Mild soiling on glove exterior. No apparent thermal damage other than melted exterior Crosstech label.
Protective footwear	Manufacturer: Warrington Pro Style: 3009 Size: 9.5D Materials: Leather with Cambrelle Crosstech lining; Vibram sole Lot: 3R08007Cove Mfg. Date: Not provided Serial: Wxxxxxxxxx7 Features: Full leather boot with Vibram sole Label indicates compliance with NFPA 1971-2000	Mild soiling and wear. No apparent thermal damage.
Station/Work Shirt	Manufacturer: Devon and Jones Size: Large Material: 100% Cotton	No soiling or damage.
T shirt	Champion Large 100% Cotton	No soiling or damage.

The protective coat worn by [name redacted] showed moderate to heavy soiling on the exterior of the shell primarily on both arms and the front as shown in Figures 1 and 2. This soiling was less apparent on the interior of the outer shell (Figures 3 and 4). Unlike the flashlight attached to the coat for the other firefighters, [name redacted's] flashlight showed only minimal heat damage. However, some thermal damage was apparent on portions of the horizontal trim bands located on the lower and upper right side of the coat. Based on the soiling and charring patterns on the collar, the collar was not properly deployed. The label shows that the coat was relatively new with a manufacture date in late 2005 (Figure 5). The moisture barrier side of the lining as pictured in Figure 6 and 7 does show some light soiling and mild charring principally on the shoulders and upper right back. There was no damage to the thermal barrier as shown in Figure 8 and 9. The liner label appears in Figure 10.

[Name redacted's] protective pants also show moderate to heavy soiling, with the relatively little fireground soiling in the top areas of the pants that are overlapped by the coat (Figures 11 and 12).

The thermal damage to the protective pants was limited to some mild charring on the lower left leg of the trim. Very little soiling was evident on the interior side of the shell (Figures 13 and 14) or the moisture barrier side of the liner (Figures 16 and 17). The thermal barrier appeared to be in good condition (Figures 18 and 19). Labels for both the shell and liner are shown in Figures 15 and 20, respectively.

As expected, fireground soot and soils covered [name redacted's] protective helmet as shown in the front, side, and back view presented in Figures 21 through 24. There was physical damage to which heat likely contributed on the front edge beading and very light damage to the reflective markings and helmet shield. On the helmet interior, the ear covers were rolled into the helmet and do not appear to have been deployed (Figure 25). There was also significant melting of the Borque eye shields on the underside of the front brim. The shield materials extended significantly during the heat exposure (Figure 26). Likewise, the goggles placed on the back of the helmet showed damage by way of crazing (Figure 27).

[Name redacted's] protective hood showed mild wear throughout and some melted resin on inside of the face opening that appears to be some of the helmet edge beading based on the material color and physical characteristics (Figures 28 and 29). There was also some charring on the right side of the hood that somewhat discernable.

It was impossible to identify the protective gloves worn by [name redacted] as the label was cut out in both gloves. The back and palm sides of the gloves are shown in Figures 30 and 31. These gauntlet style leather gloves showed mild soiling on the exterior and no thermal damage other than the "Crosstech" label that is attached to the side of the glove that exhibited some melting. There is also the possibility that the gloves exhibited some level of shrinkage though this determination cannot be made without comparing a new pair of the same gloves worn by [name redacted].

The protective footwear worn by [name redacted] was in relative good condition showing only mild soiling and wear (Figures 32 and 33). There was no observed thermal damage to the footwear.

Two non-protective clothing items were provided for examination and included the station/work shirt and t-shirt worn by [name redacted]. Both of these items were 100 percent cotton and did not show any soiling or damage (Figures 34 to 37).

[Name redacted]. Table 2 provides the descriptions and observations for each item worn by [name redacted] that was provided for examination.

Table 2 – Descriptions and Observations for [name redacted] Protective Clothing

Item	Description	Observations
Protective coat	<p>Manufacturer: Globe Firefighting Suits Style: GX7 Cut No.: 1782 Serial No.: 2xxxxx3 Size: 42+2/35 Mfg. Date: 11/2001 Outer shell: 7.5 oz PBI/Kevlar Moisture barrier: CrossTech Thermal barrier: Caldura Aralite Features: Radio pocket, flashlight holder, two lower cargo pockets; solid lime yellow fluorescent trim, leather reinforced elbows and cuffs; zipper front closure Label indicates compliance with NFPA 1971-2000</p>	<p>Heavily soiling particularly on both arms and shoulders and lower front. Reflective striping deteriorated, in all locations except front top band (which is still heavily charred) and portion of top rear band (which is also charred). Coat cut off along sleeves. Tar residue lower right side. Charring through shell both sleeves underneath back top trim band. Significant charring of wrist well right sleeve and left sleeve Closure tape on top of front closure melted. Collar closure flap not deployed, though collar worn in deployed position. Melted debris on left side of collar (appears to be tar). Plastic lens totally melted. Radio microphone melted to right side of coat. Clamps and other equipment inside pockets melted to pocket interior. Charring on moisture barrier over sleeves and portions of back and shoulders; charring appears along middle back of thermal barrier face cloth side and bottom of front closure and small portions of both right and left arms. Extra hood found in liner pocket, Severe damage to thermal barrier side left lower front closure.</p>

Item	Description	Observations
Protective pants	<p>Manufacturer: Globe Firefighter Suits Style: GX-7 Cut No.: 1782 Serial No.: 2xxxxx9 Size: 34/34 Mfg. Date: 11/2001 Outer shell: 7.5 oz PBI Kevlar Moisture barrier: Crosstech Thermal barrier: Caldura Aralite Features: Knee reinforcement with coated material and Q9 and extra shell, solid lime yellow fluorescent trim, leather reinforced pocket bottoms and cuffs Label indicates compliance with NFPA 1971-2000</p>	<p>Cut off of individual along both legs. Solutions care tag inside clothing. Heavy soiling over majority of clothing Melted closure tape (left pocket). Thermal damage to moisture barrier (left knee, lower leg) – separation of film in moisture barrier in same area. Nitrile exam gloves found in left cargo pocket but unmelted. Melted tar on portions of left leg. Extensively charred reflective tape (lower cuff of both legs). Penetrating tar residue at bottom of both legs Tear on right cargo pocket</p>
Protective helmet	<p>Manufacturer: Cairns Model: C-TRD Mfg. Date: 6/2/2006 Features: Black, Borque Eye Shields; two layer ear covers – PBI/Kevlar woven shell and knit liner Unreadable under lot number and other label information</p>	<p>Severely charred outer shell and reflective markings Front outer edge bead melted Eye shields melted underneath brim Chin strap buckle melted Ear covers heavily soiled Helmet shield separated from helmet and heavily charred</p>
Protective hood	<p>Manufacturer: Life Liners Style: Indiscernible Size: Regular Material: P84/Lenzing FR Lot: Indiscernible Mfg. Date: Indiscernible Label indicates compliance with NFPA 1971-1997</p>	<p>Hood heavily soiled Charring on left and top sides of exposed area Melted debris (appears to be carpet fiber) on front bib</p>

Item	Description	Observations
Protective gloves	Manufacturer: American Firewear Style: 6500 Size: Indiscernible Material: Lot: Indiscernible Mfg. Date: Indiscernible Features: Cowhide shell with Crosstech moisture barrier and modacrylic thermal barrier; Nomex wristlet Label indicates compliance with NFPA 1971-2000	Heavily soiled Thermal damage to shell with shrinkage to both gloves (greater for right glove) Tear in right glove wristlet
Protective footwear	Manufacturer: Warrington Pro Style: 3009 Size: 12D Materials: Leather with Cambrelle Crosstech lining; Vibram sole Lot: 0J03024 COVE Mfg. Date: 3/2000 Label indicates compliance with NFPA 1971-2000	Soiled, no damage
Station Workshirt	Color: Navy Size: Large Material: 100% Cotton	No damage Cut off of individual
Station Workpants	Manfg.: Lion Apparel Lot: 130 Style: 20 Size: 32R Mfg. Date: 3/23/2005 65/35/Poly Cotton Nylon belt attached	Does not meet any standard Cut off of individual Components on belt show signs of melting under observations
Socks, underwear, and T-shirt	Materials: 100% Cotton	No damage

[Name redacted's] protective coat displays a significant amount of damage. This damage includes heavy soiling and thermal damage in the form of charring to portions of the outer shell as shown in Figures 38 and 39, particularly those portions of the coat where trim has been applied. The interior of FF's coat is also shown in Figure 40 while the product label for the coat shell is provided in Figure 41. Several photographs show specific areas of damage on FF's coat including the water well in FF's right sleeve (Figure 42), the flash light attached to the left upper front on FF's coat (Figure 43), a radio microphone cord that is melted to FF's right front lower cargo pocket (Figure 44), and one example of a deteriorated section of trim on the lower right sleeve of FF's coat (Figure 45). Figures 46 and 47 show deteriorated trim along the upper back circumferential band on FF's coat (right side) and the corresponding interior side of the shell

where charring is evident. Nearly all portions of the coat trim are deteriorated with the exception of those parts which were covered by the breathing apparatus. The coat liner also shows extensive damage with severe charring along both arms and on portions of the moisture barrier side of the liner, particularly along the back (Figures 48 and 49). In several locations along the arms, the moisture barrier fabric side has charred and delaminated from the film. This damage does not extend to the face cloth side of the thermal barrier (Figures 50-51) except at the lower right side of the thermal barrier by the front closure (Figure 52). The liner label is shown in Figure 53.

[Name redacted's] protective pants show similar levels of soiling and damage compared to the protective coat. Several areas of charring, particularly for the lower leg trim bands, are shown on the pants exterior (Figures 54 and 55) and interior (Figure 56). The pants were of a similar age as the coat as shown in the product label (Figure 57). Despite the high levels of heat, the purple nitrile gloves in one of the pants cargo pockets remained unaffected. [Name redacted's] pants were cut from FF's body along both legs allowing a closer examination of the liner for both the moisture barrier side (Figure 58) and thermal barrier side (Figure 59) with the label shown in Figure 60. The pants exhibited heavy soiling over the entire surface and damage in different locations including melted closure tape, delaminated moisture barrier, charred trim, and tar deposits. There was no particular means for discerning the source of the tar deposit, whether roof shingles or other materials present in the burning structure.

The helmet worn by [name redacted] showed severe heat exposure to the exterior with heavy soiling (Figures 61 through 64). All of the reflective markings were charred and the majority of the outer edge bead was melted or otherwise damaged. Other damage to the interior side of the helmet (Figure 65) included heavy soiling and adherence of debris on the brim, melting of the chin strap buckle, melting of the eye shields underneath the front brim (undeployed), and heavy soiling and some charring of the ear covers. The specific debris appears to be grass that melted into the helmet as it was cooling. The appearance of damage on the ear covers suggests that they were properly deployed. There was also heavy charring of the helmet shield, which was detached from the helmet and possibly recovered at a later time (Figure 66).

The protective hood was heavily soiled and exposed areas showed signs of charring (see Figures 67 and 68). There was also melted debris on the front of the bib that appears to be carpet fiber, but this identification cannot be confirmed without further analysis. Like the coat and pants, the hood was relatively old compared to the other examined gear with a label indicating compliance to the 1997 edition of NFPA 1971. Specific manufacturing dates and other product identification information was not discernible.

[Name redacted's] gloves were heavily soiled and showed the thermal shrinkage characteristic of a high heat exposure (Figures 69 and 70). This shrinkage appeared to be worst for the right glove. There was also a tear in the wristlet of the right glove.

The protective footwear was soiled but showed no damage. Much of the soiling was dried on mud (see Figures 71 and 72).

A number of other articles of clothing were provided for review. These included the station/work uniform pictured in Figure 73 and the station/work pants shown in Figures 74 and 75. Both pants and shirt showed no damage and only mild soiling. The pants were cut off of the firefighter. There is evidence of melting of a pouch mounted on the belt as shown in Figure 76. The pants and shirt did not mean any particular standard as shown in label provided in Figure 77. There were also a regular T-shirt, underwear, and socks that did not show any damage.

[Name redacted]. Table 3 provides the descriptions and observations for each item worn by [name redacted] that was provided for examination.

Table 3 – Descriptions and Observations for [name redacted] Protective Clothing

Item	Description	Observations
Protective coat	Manufacturer: Globe Firefighter Suits	Moderately soiled.
	Style: GXTreme Cut No.: 64316C Serial No.: 3xxxxxxx4 Size: 36/29 Mfg. Date: 12/2006 Outer shell: 7.5 PBI Matrix Gold Moisture barrier: Crosstech Thermal barrier: Caldura SL Quilt Features: Cargo pockets; leather reinforced knees with additional shell and insulation layers; leather reinforced cuffs; attached suspenders, drag rescue device (DRD) Label indicates compliance with NFPA 1971-2000	Some tar on left sleeve. Mild charring upper trim band. No damage to flash light. Collar was not deployed. Liner: Mild soiling both shoulders of moisture barrier side of liner.
Protective pants	Manufacturer: Glove Firefighter Suits	Moderately soiled both legs. No
	Style: GXTreme Cut No.: 64316P Serial No.: 3xxxxxxx3 Size: 32/28 Mfg. Date: 12/2006 Outer shell: 7.5 PBI Matrix Gold Moisture barrier: Crosstech Thermal barrier: Caldura SL Quilt Features: Intergrated waist belt, leather reinforced knees and cuffs, 3M Triple Trim. Label indicates compliance with NFPA 1971-2000	apparent damage. Trim in good condition. Liner shows only mild soiling in knee and lower cuff areas.

Item	Description	Observations
Protective helmet	Manufacturer: Cairns Model: C-TRD Mfg. Date: 8/23/2006 Features: No eye shields Label indicates compliance with NFPA 1971-2000	Charred shield. Melted damage edge beading. Some separation of reflective markings. Ear covers rolled inside helmet. Some charring of chin strap.
Protective hood	Manufacturer: LifeLiners Style: 9723ES Size: Regular Material: P84Linning FR Lot: 209 Mfg. Date: 6/2005 Label indicates compliance with NFPA 1971-2000	Moderate soiling middle hood. Light charring in exposed area.
Protective gloves	Manufacturer: FireDex Style: MGLG03 Size: Small Material: Cow skin shell, Crosstech moisture barrier, modacrylic lining Lot: 76662 Mfg. Date: 10/2006 Features: Gauntlet style Label indicates compliance with NFPA 1971-2000	Only one glove provided (left). Moderately soiled. No apparent heat damage.
Protective footwear	Manufacturer: Warrington Pro Style: 3009 Size: 10D Materials: Leather with Cambrelle Crosstech lining; Vibram sole Lot: 4J12044C Mfg. Date: Serial: Wxxxxxxxxxx6 Label indicates compliance with NFPA 1971-2000	Mild soiling. No damage.
Station/Work Pants	Lion Apparel Lot: 130 Style: 20 Size: 34R Mfr Date: 6/26/2006 Material: 65/35 Poly Cotton	No damage.
Station/Work Shirt	Devon and Jones Size: Large 100% Cotton	No damage.
Underwear	Size: Regular	No damage.

[Name redacted's] protective coat show only moderate levels of soiling and small areas of damage as shown in Figures 78 and 79. The principal damage appears on the upper trim band of the left arm where there is mild charring and there are also small tar deposits on the left sleeve. All other parts of the trim appear in relative good condition. The soiling pattern indicates that the collar was not worn in a deployed position. Unlike the other firefighter, there was relatively little damage to the attached flash light. Figures 80 and 81 show only a small part of the interior shell side with charring (underneath the damaged trim portion of the clothing). Some of this damage is also evident on the left side and sleeve of the moisture barrier side of the lining as depicted in Figures 82 and 83, though no damage was observed for the thermal barrier side of the lining as pictured in Figures 84 and 85. The coat label appears in Figure 86.

The protective pants are less damaged than the pants and show only moderate soiling to both legs (Figures 87 and 88) and no damage to the interior side of the shell (Figures 89 and 90). The label indicated that the pants were relatively new (Figure 91). There is only mild soiling in the knee and lower cuff areas of the moisture barrier side of the lining (Figures 92 and 93) and no soiling apparent on the thermal barrier side (Figures 94 and 95). The product label on the lining is shown in Figure 96.

[Name redacted's] protective helmet showed most of the damage to the edge beading (Figures 97 through 100). The reflective markings were slightly damaged by heat exposure and two of these markings showed some separation from the helmet. The leather shield was also damaged with charring. The ear covers were not deployed and were rolled inside the helmet (Figure 101).

The protective hood displayed moderate soiling along exposed areas, but there was also some light charring along the middle of both sides of the hood (see Figures 102 and 103).

Only one glove (left) was provided for examination. This glove showed only moderate soiling particularly on the palm side but with no apparent heat damage (Figures 104 and 105).

The protective footwear showed no damage and only mild soiling (Figures 106 and 107). The boots looked relatively new.

Both station/work shirt (Figures 108 to 109) and station/work pants (Figures 110 and 111) showed no soiling or damage. A sport bra was also provided but did not show any damage.

[Name redacted]. Table 4 provides the descriptions and observations for each item worn by [name redacted] that was provided for examination.

Table 4 – Descriptions and Observations for [name redacted] Protective Clothing

Item	Description	Observations
Protective coat	<p>Manufacturer: Globe Firefighter Suits Style :GXTreme Cut No. 5X116C Serial No.: 2xxxxxx2 Size: 42/32 Mfg. Date: 09/2005 Outer shell: 7.2 PBI Matrix Gold Moisture barrier: Crosstech Thermal barrier: Caldura SL Quilt Features: Cargo pockets; leather reinforced knees with additional shell and insulation layers; leather reinforced cuffs; attached suspenders Label indicates compliance with NFPA 1971-2000</p>	<p>Heavy to moderate soiling. Light charring of trim and some locations on back. Collar was not deployed. Melted tar on right sleeve from elbow to wrist. Attached flash light with melted lens. Liner: Light charring on moisture barrier side of lining and along right side of back. Wristlets were cut on both sleeves.</p>
Protective pants	<p>Manufacturer: Globe Firefighter Suits Style: GXTreme Cut No.: 54826P Serial No.: 3xxxxxx4 Size: 34/32 Mfg. Date: 02/2006 Outer shell: 7.2 PBI Matrix Gold Moisture barrier: Crosstech Thermal barrier: 2 layer E89 Quilt Features: Intergrated waist belt, leather reinforced knees and cuffs, 3M Triple Trim. Label indicates compliance with NFPA 1971-2000</p>	<p>Moderate to heavy soiling. Some tar residue on back of pants. Soiling lower legs in knee regions moisture barrier side of liner. Tear in moisture barrier on lower left leg (front).</p>
Protective helmet	<p>Manufacturer: Cairns Model: C-TRD Mfg. Date: 11/08/2005 Serial No.: 1xxxxxxxx4 Features: Borque Eye Shield, PBI/Kevlar ear flaps, two layers, interior layer is knit Label indicates compliance with NFPA 1971-2000</p>	<p>Charred front shield. Melting and damage to front edge beading on all sides. Ear covers are rolled up into helmet. Severe melting and extension (thermal elongation) of eye shields.</p>

Item	Description	Observations
Protective hood	Manufacturer: Lifeline's Manufacturer Style: 9723ES Size: Universal Material: P84/Lenzing FR Lot: 8013 Mfg. Date: 7/2003 2000 Edition Label indicates compliance with NFPA 1971-2000	Heavy soiling middle hood. Charring at along collar interface area.
Protective gloves	Manufacturer: Shelby Style: 5285 Size: Medium Lot: 080831 Mfg. Date: March 2008 Features: Kevlar knit back, cow hide palm, Crosstech Direct Grip moisture barrie combined with Kevlar/Nomex lining, Nomex wristlet Label indicates compliance with NFPA 1971-2007 Edition	Mild soiling on back of gloves. Some tar residue on left glove, palm side.
Protective footwear	Manufacturer: Warrington Pro Style: 3009 Size: 60 Serial #: Wxxxxxxxxx8 Materials: Leather with Cambrelle Crosstech lining; Vibram sole Lot: 3H31064 COVE Label indicates compliance with NFPA 1971-2000	No apparent soiling or damage
Radio Harness	Radio Harness Boston. Primarily Leather	Melted nylon pouch.
Station/Work Pants	Lion Apparel Lot: 130 Style: 20 Size: 34R Mfr Date: 6/26/2006 Material: 65/35 Poly Cotton	No damage. Cut off of individual.
Station/Work Shirt	Devon and Jones Size: Large 100% Cotton	No damage. Cut off of individual.

The protective coat worn by [name redacted] had moderate to heavy soiling on the exterior (Figures 112 and 113). The attached flashlight received heavy heat damage with the lenses completely melted (Figure 114). In addition, the trim on the upper left arm was deteriorated (Figure 115) and the collar appeared not to have been deployed (Figure 116). Some of the charred exterior areas showed lighter damage on the coat interior (Figures 117 and 118). This damage was also observable on the moisture barrier side of the lining as shown in Figures 119 and 120, though no damage was apparent for the thermal barrier side of the lining (Figures 121 and 122).

[Name redacted's] protective pants also displayed moderate to heavy soiling with some tar residue on the back of the pants and much of the soiling towards the lower legs on both exterior and interior sides of the shell (Figures 123 through 126). This soiling was also apparent most on the lower legs on the moisture barrier side of the lining (Figures 127 and 128). A physical tear was found in moisture barrier on the front of the lower left leg. There was no thermal damage to the thermal barrier (Figures 129 and 130). The product label for the pants is shown in Figure 131.

Front, side, and rear views of the protective helmet are shown in Figures 132 through 135. The helmet condition showed a charred front shield and melting damage to all sides of the front edge beading. The ear covers were rolled into the helmet (Figure 136) and the eye shield shows extreme melting and distortion (Figure 137).

[Name redacted's] protective hood showed soiling and some charring on the exposed areas as shown in Figures 138 and 139. This condition was worse on the right side of the hood.

The protective gloves showed some shrinkage and mild soiling on the back of the gloves (Figure 140). Tar residue was found on the palm side (Figure 141).

There was no apparent soiling or damage to the protective footwear (Figures 142 and 143).

Both station/work shirt and pants showed no damage but had been cut off of the individual (Figures 144 to 147). Likewise, there was no damage to the T-shirt (Figure 148) or belt (Figure 149, though these items were also cut off the firefighter. Lastly, the radio harness showed melting of a nylon pouch that was attached (Figure 150).

The Fireground Environment

One approach to review possible injuries to the firefighters involved in this incident is to examine industry information that shows the range of fireground conditions that can be experienced and relate these conditions to the types of damage that can occur to clothing and equipment.

The relationship between increasing thermal radiation (expressed in $\text{cal/cm}^2\text{s}$) and the resulting rise in air temperature (expressed in degrees Celsius and degrees Fahrenheit) is presented in Figure 151. Possible structural fire fighting situations are illustrated in this figure:^{1,2}

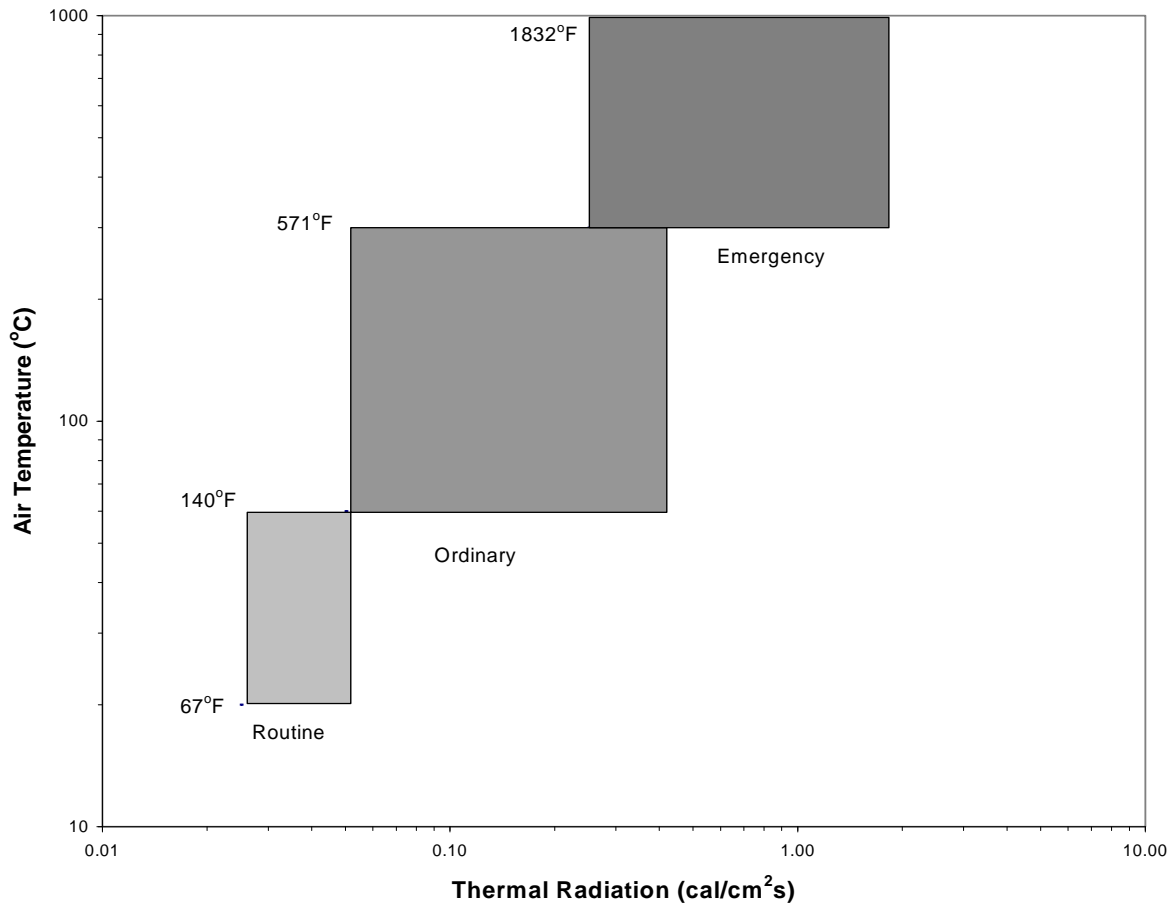
- The **Routine** region describes conditions where one or two objects, such as a bed or waste basket, are burning in a room. The thermal radiation and the air temperatures are virtually the same as those encountered on a hot summer day. As shown in Figure 17, **Routine** conditions are accompanied by a thermal radiation range of 0.025 to 0.05 $\text{cal/cm}^2\text{s}$ and by air temperatures ranging from 68 to 140°F. Protective clothing for fire fighters typically provides protection under these conditions, but excessively long exposure times may create a burn injury situation.
- The **Ordinary** region describes temperatures encountered in fighting a more serious fire or being next to a "flash-over" room. **Ordinary** conditions are defined by a thermal range of 0.05 to 0.6 $\text{cal/cm}^2\text{s}$, representing an air temperature range of 140 to 571°F. Under these conditions, protective clothing may allow sufficient time to extinguish the fire or to fight the fire until the nominal air supply is exhausted (usually less than 30 minutes).
- The **Emergency** region describes conditions in a severe and unusual exposure, such as those caused inside a "flash-over" room or next to a flame front. In **Emergency** conditions, the thermal load exceeds 0.6 $\text{cal/cm}^2\text{s}$ and temperatures exceed 571°F. In such conditions, the function of firefighters' clothing and equipment is simply to provide protection during the short time needed for an escape without serious injury.

The fireground event as described would have involved conditions that could be classified in ordinary range of exposure. Depending on the length of exposure, these conditions may produce no damage to the clothing and equipment. Given the fact that no damage was noted, particularly to the heat sensitive components of trim and hook/loop closure tape (with the exception of name redacted's pants), it is unlikely that the clothing was subjected to any long term exposure of very high heat as would be experienced under emergency conditions. Clothing and equipment exposure was likely at the lower range of ordinary region.

¹N. J. Abbott and S. Schulman, "Protection from Fire: Nonflammable Fabrics and Coatings, *Journal of Coated Fabrics*, Vol. 6, July 1976, pp. 48-64.

²H. P. Utech, "High Temperatures vs. Fire Equipment," *International Fire Chief*, Vol. 39, 1973, pp. 26-27.

Figure 151. Range of Thermal Conditions Faced by Firefighters



Heat transfer through protective clothing can also occur through conduction and the effects of stored energy. As clothing layers are compressed against the body, heat is more easily able to transfer into the body causing the earlier onset of burn injury. Similarly, heat absorbed by the clothing can be stored and then when the clothing contacts the body through compression, burn injuries can occur. These effects may be more pronounced for denser areas of the clothing, such as in reinforced areas, even though there may be more layers present. The transfer of heat can further be increased if the clothing was wet. Clothing wetness from exterior hose spray or from interior sweating can increase heat transfer under certain heat exposure conditions.

Analysis and Findings

Clothing damage varied among each firefighter and the element of the ensemble:

- The clothing showing the greatest levels of damage belonged to [name redacted], whose protective coat and pants showed severe deterioration of the majority of reflective trim present and also melting of several items onto the clothing. Moreover, this damage extended into the interior layers of the clothing, particularly the moisture barrier layer and in some limited also to the thermal barrier. Lesser damage was noted for clothing worn by the other firefighters, though it should be pointed out that the clothing worn by [name redacted] was considerably older (2001 versus 2005 and 2006) and had a completely different trim package. Generally, more damage was observed on the coat compared to the pants.
- In three of the four cases, firefighters did not appear to have properly deployed their collars in the up position. [Name redacted] appeared to be the only firefighter with FF's collar worn upright; however, soiling patterns indicate that FF's collar flap was not secured properly.
- The flashlight worn by each firefighter in a holder on the right upper side of their protective coat provides some indication of the relative exposure of each firefighter to the high heat conditions sustained on the fireground. [Name redacted's] flashlight lenses were completely disintegrated. Severe damage was also observed for flashlights on protective coats of [name redacted] and [name redacted]. These lenses melt at approximately 300°F.
- The helmets of each firefighter showed heavy soiling and damage to the more vulnerable parts, such as the eye shields (if present), edge beading, and reflective markings. Three of the firefighters did not deploy their ear covers as the covers were rolled up into the helmet. The only exception was [name redacted]. For two of the firefighters that had eye shields mounted under the brims, extensive melting was noted. In one case [name redacted], this melting resulted in severe extension of the faceshield down from the brim. The goggles worn by [name redacted] also showed significant damage though on the top back of the helmet. In some cases, charring of the chin strap or melting of the chin strap components was observed, indicating that the much of the heat damage was high on each firefighter's body.
- Protective hoods also showed significant fireground soiling and charring in many cases. Hood charring was most severe for [name redacted], [name redacted], and [name redacted]. The patterns of soiling showed for the most part that hoods were worn and worn correctly as the soiling was contained to those areas that would be exposed on the fireground – sides and back and around face opening. The one exception was [name redacted's] whose front bib showed some charring and soiling. It possible that the additional damage occurred while efforts were made to remove the clothing from [name redacted] based on the description of continued burning of FF's ensemble after exiting the fire. In fact, melted debris that appeared to be carpet or other coarse textile fiber was found on the front of [name redacted's] hood.

- A maker and model of gloves were found to be used by each firefighter. For three of the firefighters, the gloves had complete leather shells on both back and palm sides. [Name redacted] had gloves with a knit textile back that was considerably lighter than the other gloves examined. Moreover, the leather quality was different in each case, which can contribute to different responses to the same levels of heat as well as the overall insulation provided by the glove with different types of liners in place. Both [name redacted] and [name redacted] sustained hand burns but their gloves showed least apparent shrinkage.
- In every case, the same protective footwear was used and showed no damage and limited soiling. No foot burns were reported.
- Other examined items of apparel, including station/work uniform shirts and pants, together with underwear and T-shirts did not yield any information due to the lack of soiling and damage. Some nylon materials provided as part of radio harnesses or belts did exhibit melting suggesting that these materials reached temperatures nearing 500°F.

Each firefighter sustained burns to different parts of their bodies. The rationales for the differences in burn injury are likely due to several reasons that include their relative position to the main source of heat. The report of an apparent flashover that forced the firefighters to the ground further explains why the majority of reported burn injuries and greatest protective clothing damage was relatively high on the body. Specific reasons for firefighter burns are provided below based on the examination of each firefighter's protective clothing:

- [Name redacted] was wearing the lightest weight gloves of all firefighters that were injured. These gloves include a textile back that improved hand dexterity but at the expense of thermal insulation. As the hands represent an area of the body that has a high surface area to volume ratio, providing adequate protection is a challenge and not always commensurate with body protection. If wet, hands may be even more susceptible to burn injury. The burns to [name redacted's] neck are likely partly the result of not having worn FF's collar in an upward deployed position or using the helmet ear covers properly.
- [Name redacted] was burned primarily to the back of FF's body including FF's back, legs, and buttocks. Though damage appears both equally to the front and back of FF's clothing, some of the more penetrating damage is found on the back and upper arms under trim bands that had disintegrated as the result of the flashover exposure. It is further likely that FF's burns were primarily the result of FF's orientation with respect to the flashover and simply overpowered the degree of protection provided by both the coat and pants. The report of continued burning of FF's clothing also suggests that he contacted some flammable agent on the fireground that either adhered to FF's clothing or absorbed into it, resulting in continued burning of FF's clothing after exiting the fire structure and lengthening FF's exposure.
- [Name redacted] had burns to the ears and left forearm. In this case, the damage to the clothing easily shows where excessive exposures occurred. Charring of the hood in the exposed areas in combination with an undeployed coat collar and helmet ear covers provide some basis for the burn injuries to the ears. In addition, the most extensive damage to the

coat appears on the left arm, particularly at the upper trim band though the overall heat exposure to that side of the coat was likely relatively high compared to other areas of the body.

- [Name redacted] sustained burns to both hands and arms. The damage to the coat was most extensive in the arm regions and the gloves were somewhat lighter than the gloves worn by the other firefighters. Burns to the lower legs were primarily the result of orientation with respect to the flashover. The improper deployment of the protective coat collar and helmet ear covers probably contributed to burns on the left ear, though the heat levels of a flashover can often overwhelm the protective qualities of the hood.

The existence of damage to a clothing item is not necessarily an indication that burn injury is sustained. For example, the burn injuries to [name redacted] were primarily to the back of FF's body, though several parts of the front of FF's clothing ensemble showed similar levels of damage as the back side of the same ensemble.

The specific damage noted to the trim with its complete deterioration, particularly on [name redacted's] protective coat and pants suggests exposure temperatures that are well in excess of 600°F for several seconds. The reflective marking damage combined with edge bead melting of helmet materials, bubbling and extension of eye shields on the protective helmets worn by [name redacted], [name redacted] and [name redacted] also confirm exposures at these levels. The damage to the helmets, hoods, and portions of the protective clothing, and other components worn by the firefighters do support the characterization of the firefighters being exposed to a flashover.

No specific defects were found in any of the items of protective clothing and equipment that would have contributed to the injuries sustained by each firefighter.

Conclusions

It is my conclusion that there are no defects or problems with the clothing or equipment for each firefighter that I examined. The observed thermal damage on the different clothing items was the result of specific exposure circumstances that are characteristic of emergency fireground conditions and in this case exceeded the normal performance limits of this clothing and equipment for the firefighter based on their relative position and orientation on the fireground. While structural fire fighting protective clothing and equipment is intended to allow firefighters to be protected and be allowed to escape in many flashover conditions without burn injuries, several circumstances can increase the chances for burn injury.³ These circumstances include being exposed to higher than normal levels of heat or for longer durations, high levels of moisture in the lining materials of the clothing, the specific proximity of the firefighter and their orientation to the principal sources of heat, the adequacy of clothing fit (not assessed in this examination) and the failure to correctly wear any protective clothing item.

I find that some of the burn injuries can be attributed to incorrectly wearing the protective coat and protective helmet. It appears from the burn damage observed for [name redacted's] protective clothing that he sustain the highest level of exposure; however, he did not sustain any burns to FF's

³ Protective clothing subjected to emergency fireground conditions is often damaged to the extent that major repairs are needed or the clothing must be retired.

neck or ears because it appears that he had properly deployed his protective coat collar and helmet ear covers. Yet, [name redacted], [name redacted], and [name redacted] each sustained burns to either their neck or ears. These burns were likely the result of improper wearing of both the protective coat and protective helmet.

There were also some inconsistencies in the type of protective clothing available to each firefighter that can provide explanations for the differences in burn patterns observed on each firefighter. While [name redacted], [name redacted] and [name redacted] all wore relatively similar protective coats and pants, [name redacted] had a much older set of bunker gear with a different trim package. The relative susceptibility of older trim to heat damage and consequent heat transfer to inner layers of clothing may explain some of [name redacted's] greater heat exposures. It also appears that since the trim is totally destroyed that it may be the source of continued flaming observed during [name redacted's] exit from the fire structure.

Differences in the types of protective gloves worn by each firefighter also provide some basis for the occurrence of hand burn injuries. A different manufacturer and styling was observed for each firefighter's gloves. [Name redacted] wore gloves with the least apparent insulation where a textile back was used in the construction and sustained burns to both hands. [Name redacted] was also burned on both hands and used a two-layer glove system (combined thermal barrier and moisture barrier). While all of these gloves meet the respective requirements of NFPA 1971, differences in the amount of thermal insulation may result in some firefighters being more susceptible to hand burns than others since not all firefighters are in the same type of gloves. These differences arise as manufacturers attempt to balance thermal insulation with improvement with hand function as the hands are a difficult area of the body to insulate thermally without affecting tactility and dexterity. It is important that a uniform ensemble be used by each firefighter as much as practical since this provides a consistent sense of perception for thermal exposure on all parts of the firefighters' bodies as part of a response unit.

Respectfully submitted,

A handwritten signature in black ink that reads "Jeffrey O. Stull". The signature is written in a cursive, flowing style.

Jeffrey O. Stull, President
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Austin, Texas