



# Green Bay Fire Department Edgewood Analysis Team Incident #5747 Final Report



Lieutenant  
Arnie Wolff

July 14, 1951 -  
August 13, 2006





**In Memoriam**  
**Lieutenant Arnie Wolff**  
**July 14, 1951 – August 13, 2006**

**“WE WILL NEVER FORGET”**

*Your Brothers and Sisters of the  
Green Bay Fire Department*

## PREFACE

Tragically, on August 13<sup>th</sup> 2006, Green Bay Fire Department Lieutenant Arnie Wolff lost his life in the line of duty. The Wolff family and the Green Bay Fire Department family suffered a tremendous loss on this day. This report is dedicated to ‘Arnie’, his wife, his children, ...and to his firefighting family. Arnie’s many contributions as a firefighter/paramedic, soccer coach, and friend will never be forgotten. His calm demeanor, caring dedication to his profession and to his co-workers and the citizens he served, has forever enriched those who knew Arnie personally.

Following the collapse on Edgewood Drive, fire department personnel on the scene performed at extraordinary levels. There were numerous displays of heroism demonstrated by members of the department during the rescue of firefighter Jo Brinkley-Chaudoir and repeated attempts to reach Lt. Wolff.

We present this report and the recommendations that come from it to the Fire Chief, the Mayor and Common Council, and the members of the Green Bay Fire Department for their consideration. We have come together with a unity of purpose because August 13<sup>th</sup> 2006 was a day of deep shock and suffering for us. How could this have happened? How can we avoid such a tragedy from ever happening again? The Edgewood Analysis Team was convened to answer these questions.

Our mandate was “to determine direct and indirect causal factors” and “to ensure lessons learned are effectively communicated to prevent future similar occurrences.” To that end we interviewed firefighters and investigators who were at Edgewood Drive, reviewed reports and documentation, held dozens of meetings, and reviewed and transcribed audio recordings.

We have sought to be independent, impartial, and thorough. From the beginning we have been committed to share our findings with others in the hope that it may prevent another such event. Our aim has not been to assign blame, but rather to provide the fullest account of the events surrounding this incident and to identify lessons learned.

## **PREFACE** *(page 2)*

We gained knowledge about the effects of fire and imminent danger of collapse in buildings where modern, lightweight construction methods are used. We've been reminded of the critical nature of effective fireground operations.

We learned of shortcomings in our Standard Operating Guidelines (SOG). We learned of certain deficiencies in terms of training and equipment. We hope that the terrible loss chronicled in this report can create something positive – a fire department organization that is safer, stronger, and smarter. The test before us is to sustain the unity of purpose and meet the challenges that confront each of us.

As we complete our final report, we want to begin by thanking all those who have contributed. The Green Bay Fire Department extends its sincere appreciation to all those who supported and assisted us immediately following this incident, and during the investigation and recovery phase: the Brown County Fire Investigation Task Force; the Green Bay Police Department; the Wisconsin Department of Criminal Investigation – State Fire Marshall's Office; the Federal Bureau of Alcohol, Tobacco and Firearms; the City of Green Bay Risk Management Office; the Cities and Villages Mutual Insurance Company (CVMIC); the American Family Insurance Company; and the National Institute of Occupational Safety and Health (NIOSH); the members of the Green Bay Fire Department; all of whom assisted in providing documentation and subsequently sharing results from their independent investigations.

This incident has led each member of the Green Bay Fire Department through ranges of grief and strong emotions. Individually, and as a family, we've experienced times of sorrow, feelings of anger, frustration, and inadequacy. The Bay Area CISD Team, the Professional Fire Fighters of Wisconsin, the International Association of Fire Fighters, and other public agencies from around the State of Wisconsin and the nation provided much-needed emotional support.

The committees commissioned by the Fire Chief have dedicated hundreds of hours of time since Arnie's death to improve the Green Bay Fire Department. We present this report as a foundation for a better understanding of a landmark event in the history of the Green Bay Fire Department.

We dedicate this report to you, Arnie, our fallen brother.

We will never forget.

# FINAL REPORT #5747

438 Edgewood Drive, Green Bay, Wisconsin

August 13, 2006

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## Edgewood Analysis Team

The Edgewood Analysis Team was convened (per GBFD Standard Operating Guidelines) immediately following the confirmation of a Line-of-Duty Death. This report was developed and completed through a joint commitment from the Green Bay Fire Department Administration, Operations, Fire Prevention, and Training divisions; Green Bay Professional Firefighters Local 141; members from the Fire Department Safety Committee; as well as a representative from the City of Green Bay Risk Management department. All fire department members were afforded the opportunity and encouraged to participate in Team meetings and various sub-committees.

The Edgewood Analysis Team was formed to ensure that all factors leading to the Line-of-Duty Death of Lieutenant Arnie Wolff and injuries to Firefighter Jo Brinkley-Chaudoir would be thoroughly investigated and appropriate actions taken. The data in this report has been compiled through review of reports, investigations, and interviews conducted by the Edgewood Analysis Team in conjunction with outside agencies. The focus of the report is to identify the facts pertaining to the incident and recommend actions that might prevent similar events from occurring in the future.

The following sub-committees were formed to provide a thorough analysis of the events that occurred:

- ❖ Building Construction
- ❖ Fireground Operations
- ❖ Standard Operating Guidelines
- ❖ Training
- ❖ Equipment

Ad-hoc committees were assigned the task of working toward a full understanding of the following in their respective areas of responsibility:

1. the events,
2. the responsibilities and actions of key individuals,
3. the factors that made the department vulnerable to a fatal accident,
4. the actions that should have been taken (Lessons Learned), and
5. the actions that should be taken to prevent a similar occurrence in the future (Recommendations). Committee recommendations are included at the end of each section, and a Summary of Recommendations is included in Chapter Eight of this report.

Many hours of research, team meetings, sub-committee meetings, one-on-one interviews, and extensive review of all available documentation were the sources used to compile this report. It is truly a collective effort on behalf of all members of the Green Bay Fire Department.

## Edgewood Analysis Team



~ Green Bay Fire Department



~ Green Bay Professional Firefighters, IAFF Local 141



~ City of Green Bay

Assistant Fire Chief Don Phillips, GBFD

Captain Jay Selissen, President IAFF Local 141

Firefighter Steve Sellin , GBFD Safety Committee Chair

Engineer/Paramedic Eric Johnson, GBFD Safety & Training

Lieutenant Chris Heil, GBFD Fire Investigator

Ben Rank, City of Green Bay Safety/Risk Management

Firefighter/Paramedic Chad Hadzima, Representative GBFD Local 141

### Ad Hoc Committees and Committee Members

#### ❖ Building Construction

- Chairperson: Lt. Chris Heil
- FF Ryan Gibbons
- FF Jesse Linck

#### ❖ Standard Operating Guidelines

- Chairperson: FF Drew Spielman
- FF Bob Goplin
- Ben Rank
- Lt. Bob Wiegert

#### ❖ Fireground Operations

- Chairperson: Engineer Steve Sellin
- Capt. Jay Selissen
- Lt. Peter Sponholtz
- Engineer Dave Lucier
- Lt. Steve Peggs
- FF Bob Goplin
- FF Drew Spielman

#### ❖ Training

- Chairperson: Capt. Eric Johnson
- FF Bob Goplin
- FF Tony Piontek
- FF Melissa Spielman

#### ❖ Equipment

- Chairperson: Eng. Chad Hadzima
- Engineer Bernie Carwardine
- FF Scott Allen
- FF Jo Brinkley-Chaudoir
- FF Tony Piontek
- FF Jim Irvin
- Engineer Dave Lucier
- FF John Crabbe

# Chapter 1

## OVERVIEW OF THE GREEN BAY FIRE DEPARTMENT



## **Authority**

The Green Bay Fire Department was created by action of the City Council, on September 17, 1891, which resulted in the official dismissal of the volunteer fire departments that had been providing fire protection to the City of Green Bay. The department is organized under Chapter 5 of the Green Bay Municipal Code and State of Wisconsin Statute 62.13, Police and Fire Departments.

## **Mission Statement**

The mission of the Green Bay Fire Department is to protect and educate our community, show compassion to all, and continue the honored tradition and dedication of the fire service.

## **Risk Management Statement**

- ❖ We will begin our response on the assumption that we can protect lives and property.
- ❖ We will risk ourselves a lot, if necessary, to protect a savable life.
- ❖ We will risk ourselves a little, within a structured plan, to protect a savable property.
- ❖ We will not risk ourselves at all to save lives or property that is already lost.

## **Services We Provide**

Green Bay Fire Department personnel are charged with the duties of protecting life and property by the fighting of fires, emergency medical treatment, and other hazardous tasks. Services provided by the fire department include:

**Fire suppression.** The fire department responds to fires and incidents involving explosions. The department responded to 397 fire incidents in 2006.

**Emergency medical services.** The fire department operates four ambulances at the advanced life support (ALS) level. Each ambulance is staffed with a minimum of two Wisconsin licensed paramedics. Additionally, all fire department engine companies are staffed with Emergency Medical Technicians (EMT) and equipped with defibrillators, advanced airways, and necessary supplies to allow EMT's to assess and treat medical and trauma patients until the ambulance arrives. In 2006 the department responded to 6,689 emergency medical incidents; 5,812 patients were transported to local hospitals.

**Fire prevention.** The fire department performs inspections of public buildings and places of employment under the authority of Wisconsin Statute 101.14, Wisconsin

Administrative Code Comm 14, and Chapter 24 of the Green Bay Municipal Code. The department conducted 8,048 inspections at 4,090 occupancies in 2006.

**Life safety education.** The fire department delivers life safety education at Green Bay schools, special events, and as requested by the community. The Learn Not to Burn® program is delivered to third and fourth grade students in a cooperative effort of teachers, fire prevention officers, and fire suppression personnel.

**Hazardous materials incident response.** The fire department responds to all levels of hazardous materials incidents in a coordinated effort with the Brown County Hazardous Materials Response Team and the Northeast Wisconsin Regional Hazardous Materials Response Team.

**Water and ice rescue.** The fire department is trained and equipped to respond to emergencies on the waters and ice of the rivers and ponds in the City of Green Bay and along the immediate shoreline of the Bay of Green Bay. The fire department is not equipped to respond to emergencies beyond the immediate shoreline of the Bay of Green Bay.

**Confined space rescue.** The fire department is trained and equipped to provide emergency rescue response to persons trapped or injured in confined spaces. The department does not provide standby rescue services for confined space entry.

**Vehicle extrication.** The fire department is trained and equipped to free victims trapped in vehicles at the scene of motor vehicle accidents. The extrication equipment has also been used to free victims trapped as the result of industrial and construction accidents. All ladder trucks are equipped with hydraulic rescue tools.

**Trench rescue.** The fire department is in the planning and preparation stage in an effort to perform a safe response and rescue of persons trapped due to collapsed earth in construction trenches.

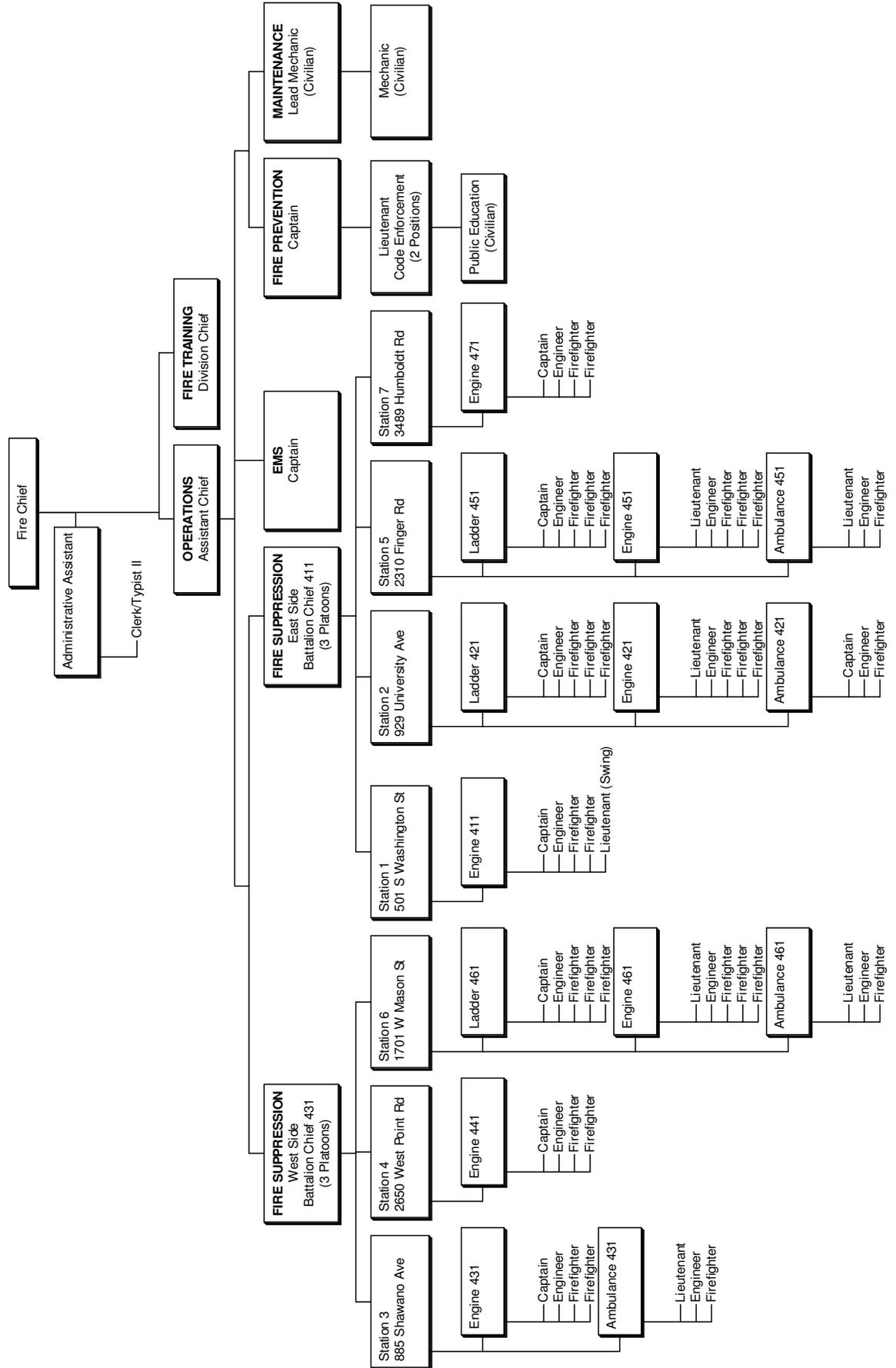
**Structural collapse rescue.** Since 9-11 the fire department has upgraded its collapse rescue equipment through grants and community donations. The department is providing specialized training for personnel in the search and rescue operations that are required at the scene of a collapsed structure.

**Service calls.** The fire department responds to a variety of non-emergency calls for assistance in the community. These incidents include, but are not limited to, animal rescue or removal, lockouts, invalid assists, carbon monoxide alarms, and water (flooding) problems. The department responded to 559 service calls in 2006.

### **Organizational Structure**

The Green Bay Fire Department operates under a traditional fire department organizational structure with the fire chief as the highest-ranking officer. An assistant fire chief serves under the chief and is responsible to discharge the duties of the chief in his/her absence. The department consists of five divisions. Fire Suppression personnel work a 24-hour shift known as a “modified California plan.” Personnel assigned to the Fire Prevention, Training, EMS, and Maintenance Divisions work regular daytime hours, Monday-Friday, and are subject to call-in as support staff during emergencies.

# Green Bay Fire Department Organizational Chart – March 2007



## Chapter 2



## THE INCIDENT

## AT 438 EDGEWOOD DRIVE



## EXECUTIVE SUMMARY

At 12:24 PM on August 13, 2006 the Green Bay Fire Department (GBFD) was dispatched to a building fire at 438 Edgewood Drive, Green Bay, Wisconsin. The first alarm assignment to this single-family residence included a battalion chief, three engines, one ladder truck, and one ambulance. The first units arrived on the scene approximately three minutes after being dispatched. These units (AM451, EN451, LA451) responded from Station 5, which is located approximately 0.8 miles from the incident scene. The Acting Captain on Ladder 451 took command of the incident upon arrival.

After size-up, one three-person crew (EN451) entered the front of the building with a 1-3/4" hose line and another two-person crew (AM451) followed to perform search and rescue. As they entered the building the attack line crew moved to the right in an attempt to locate the fire and the search crew moved to the left. The remaining first alarm units, including Battalion Chief 411, Engine 421, and Engine 411, arrived at the scene during or soon after entry was made. Command was transferred to Battalion Chief 411. Engine 411 was assigned to the role of Rapid Intervention Crew.

Soon after Engine 451 and Ambulance 451 entered the building a truss failure resulted in the collapse of the first floor. The search and rescue crew (AM451) fell approximately 10 feet to the basement, which was fully involved with fire. During the collapse a dividing wall in the basement physically separated Lieutenant Arnie Wolff and Firefighter Jo Brinkley-Chaudoir. Both Lt. Wolff and Firefighter Brinkley-Chaudoir used their portable radios to call "MAYDAY." This alerted personnel on scene and the dispatcher that was monitoring the incident to the severity of the situation. Personnel on scene were reassigned to the rescue effort and a second alarm was dispatched.

Firefighter Brinkley-Chaudoir fell into a room with windows on the north wall and was eventually rescued by firefighters on scene. She suffered a hip fracture, rib fracture, and burns as a result of this incident. Lt. Wolff fell into a room without windows and the only path of egress was blocked by debris. Though he called MAYDAY and his integrated PASS alarm sounded, rescuers were not able to reach him due to the intensity of the fire and the fact that he was partially covered by debris.

Firefighters and investigators recovered Lt. Wolff's body approximately 13 hours after the fire was reported. After careful examination and documentation of the area, he was transported to the St. Vincent Hospital morgue. An autopsy was conducted by the Brown County Medical

Examiner's office, and witnessed by Wisconsin Department of Justice, Division of Criminal Investigations (State Fire Marshal) and Green Bay Police Department investigators.

The Report of Investigation provided by the Office of the Brown County Medical Examiner states "Arnie Wolff died as the result of the consequences of becoming entrapped in a structure fire. This includes inhalation of smoke and soot, thermal injury and possible injuries as the result of the fall."

## **DISCOVERY OF FIRE**

The neighbor at 2503 Edgewood Lane was in his home working and heard a noise. Not seeing anything out of the ordinary, the neighbor continued to work until he smelled smoke. Upon investigating the source of the smell, the neighbor observed smoke coming out of the soffits of the residence next door. The neighbor pounded on the front door and no one answered. Heavy black smoke was also observed coming out of the chimney of the property. The neighbor immediately called 9-1-1.

## **ALARM DETAILS** – GBFD Incident: #5747

- Alarm Date and Time: August 13, 2006 - 12:23:14 PM
- Single-family residential structure fire at 438 Edgewood Drive
- 1st Alarm Units
  - Battalion Chief 411
  - Engine 451
  - Ambulance 451
  - Ladder 451
  - Engine 421
  - Engine 411
- 2nd Alarm Units
  - Battalion Chief 431
  - Ambulance 421
  - Engine 471
  - Ladder 421
  - Engine 431
- Command Staff
  - Chief 401
  - Chief 402
  - Training/Safety Captain 403
  - EMS Captain 404
  - Battalion Chief 411 B-shift
  - Battalion Chief 431 A-shift
  - Inspector 1
  - Inspector 2
  - Inspector 3
- Additional GBFD Units Requested
  - Ambulance 431
  - USAR/Tech Rescue 441
  - Support Unit 411

## Alarm, Dispatch, Enroute, and Arrival Times from GBFD Records Incident #5747

1st Alarm Units	Alarm Time <sup>1</sup>	Dispatch Time <sup>2</sup>	En route Time <sup>3</sup>	Arrival Time <sup>4</sup>
Battalion Chief 411	12:23:14	12:24:10	12:25:39	12:32:29
Engine 451	12:23:14	12:24:10	12:26:39	12:27:28
Ambulance 451	12:23:14	12:24:14	12:26:12	12:27:33
Ladder 451	12:23:14	12:24:12	12:26:26	
Engine 421	12:23:14	12:24:10	12:26:35	12:31:49
Engine 411 <sup>5</sup>	12:23:14	12:24:10	12:29:25	12:36:16
<b>2nd Alarm Units</b>				
Battalion Chief 431		12:42:06	12:44:15	12:55:05
Ambulance 421		12:42:06	12:42:47	
Engine 471		12:42:05	12:45:04	
Ladder 421		12:42:06		
Engine 431		13:16:03	13:18:11	14:01:10
<b>Command Staff</b>				
Chief 401		12:42:06	12:48:54	
Chief 402		12:42:08		
Training/Safety Captain 403		12:42:08		
EMS Captain 404		12:42:10		
Battalion Chief 411 B-shift				
Battalion Chief 431 A-shift				
Inspector 1		12:42:08		
Inspector 2		12:42:14		
Inspector 3				
<b>Additional GBFD Units Requested</b>				
Ambulance 431		12:52:38		
USAR/Tech Rescue 441				
Support Unit 411				

- 1) Alarm Time: Alarm Time originates at the Dispatch Center when the call is created in the Computer-Aided Dispatch (CAD) system.
- 2) Dispatch Time: Dispatch Time originates at the Dispatch Center when the call is sent to the Mobile Data Computers (MDC) and announced (voice communication) by the Dispatcher over the 800 Mhz radio system.
- 3) En route Time: En route Time originates from notification of departure by the Officer using MDC (electronic time stamp) and radio (voice) communication to the Dispatch Center.
- 4) Arrival Time: Arrival Time originates from notification of arrival by the Fire Officer using MDC (electronic time stamp) and radio (voice) communication to the Dispatch Center.
- 5) EN411 EN411 should have been, but was not, paged on the initial voice communication from the Dispatch Center.

\* Time records from the Dispatch Center are fed electronically to the Green Bay Fire Department Records Management System (RMS).

\*missing times in the above Table are not available from GBFD Records

## **FIREFIGHTER INJURIES at 438 Edgewood Drive**

- Ambulance 451

One Fatality: Inhalation of smoke and soot, thermal injury and possible injuries as the result of the fall.

One Injury: Right shoulder burns, hip fracture, rib fractures, multiple bruises, and trauma

- Engine 451

One Injury: Smoke inhalation

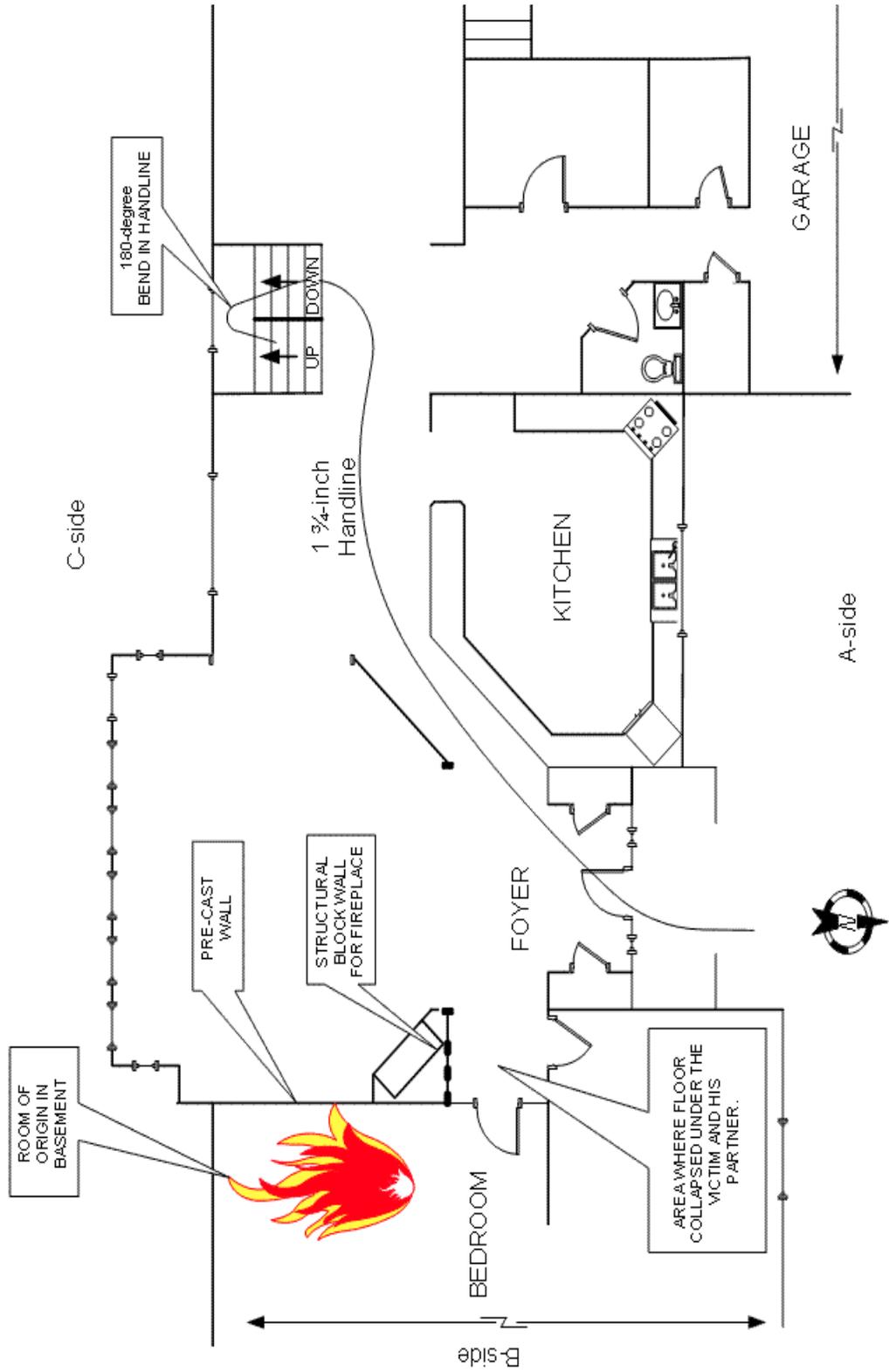
## **SYNOPSIS**

Upon arrival, a three-person attack crew and a two-person search crew (because of a person reported to be missing) entered the front entrance off the driveway. The attack team went to the right and the search crew went to the left. Within minutes, a partial collapse occurred and the entry team to the right was able to back out of the structure. The search crew that had gone to the left, Lt. Arnie Wolff and FF Jo Brinkley-Chaudoir, were unable to back out prior to the floor beneath them collapsing into the basement of the home. FF Jo Brinkley-Chaudoir was rescued through the Charlie side basement windows directly opposite the front entrance. Lt. Wolff was trapped in the Bravo side of the basement where no windows were present.

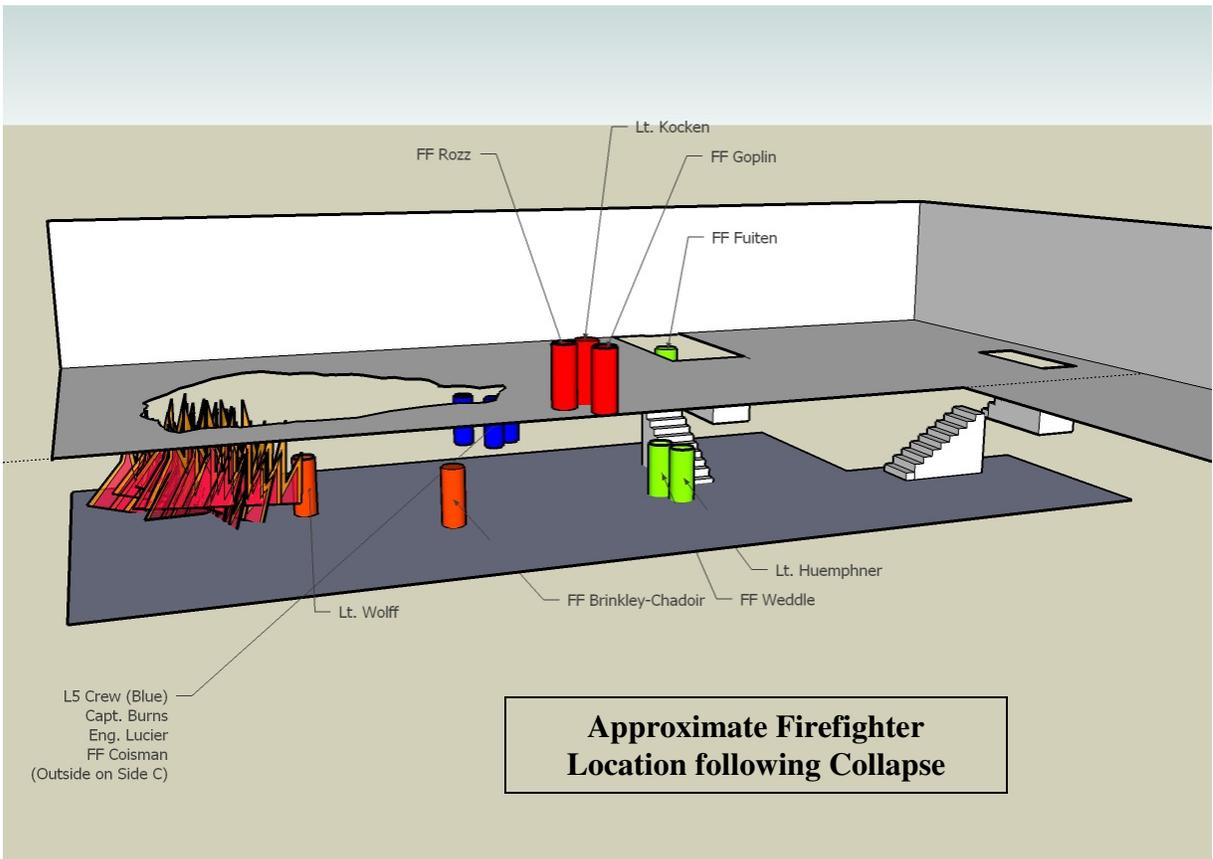
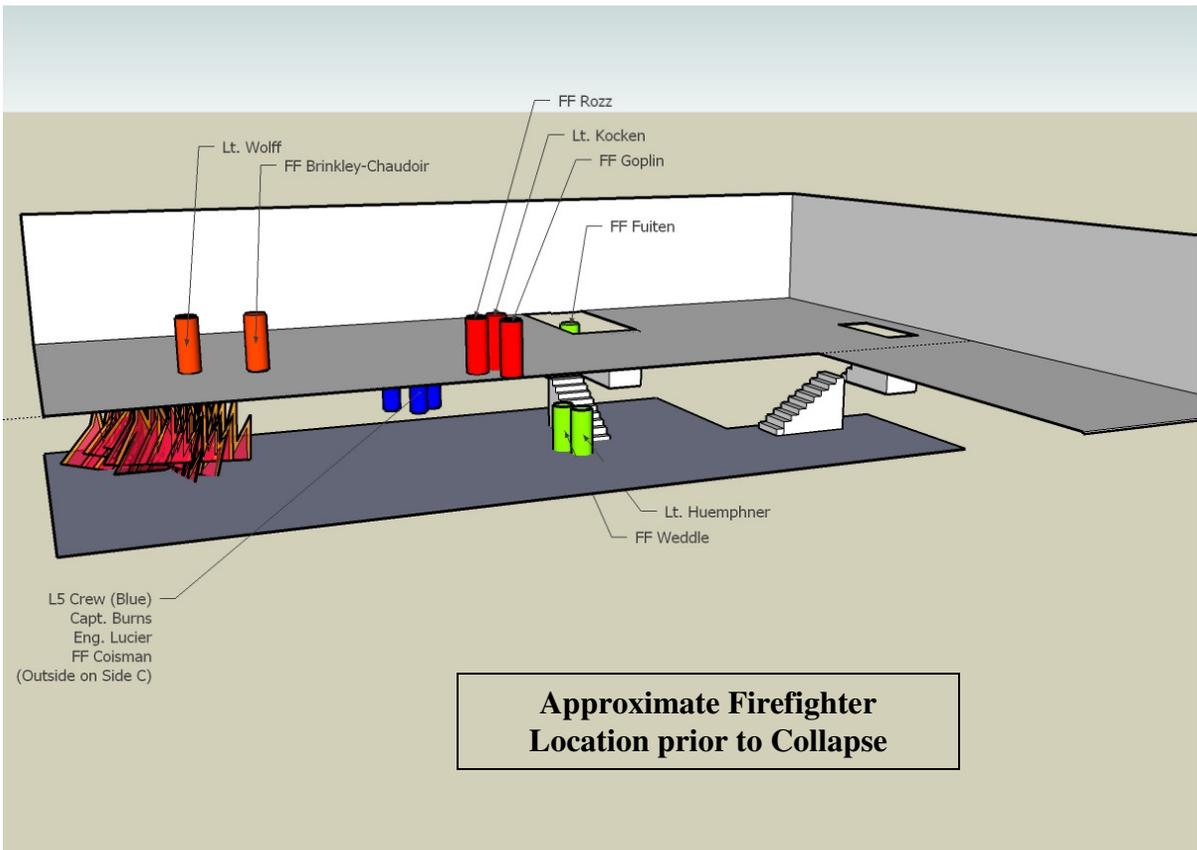
## **BUILDING CONSTRUCTION for 438 Edgewood Drive**

- Exterior: Cultured Stone over wood frame
- Foundation: 9' Prefab concrete sections bolted together
- 1st Floor trusses: Center "Cathedral Area" – 11 7/8" TGI Trusses, 12" O.C.
  - Side wings: 20" Wood Parallel Cord Trusses, 16" O.C.
- 2nd Floor trusses: 20" Wood Parallel Cord Trusses, 16" O.C. (Traditional 2 x 4)
- Flooring: Traditional OSB with carpet and/or ceramic tile
- Floor in area of collapse: OSB, heating coils, poured concrete, ceramic tile. Total = approximately 4 inches
- Interior walls: Dry wall over wood frame
- Support beams: 5 Micro-laminate beams
  - Three beams built into floor system
  - One steel beam in center of home

DIAGRAM  
 PARTIAL FIRST FLOOR LAYOUT  
 F 2006-26  
 AERIAL VIEW  
 RELEVANT SECTIONS ONLY



NC





The photograph above shows the south side of the structure. The window covered by the American Flag is the office window which is on the south side of the hall way to the Master bedroom. The front entry door is where both entry teams entered before going left and right once inside the doorway. The red arrow above shows the fireplace chimney for the living room and basement. The work bench is located on the west side of that chimney in the basement. This is also the chimney that had moved due to settling after the fire.

*Jeff Kubitz Photo*



The photograph at the left shows just inside of the front doorway. The red box is where the foyer floor had been. Behind the foyer floor is the sunken living room. This doorway is the point where one entry team went right and the other entry team went left. Objects in the basement can be observed inside the red box.

*Jeff Kubitz Photo*



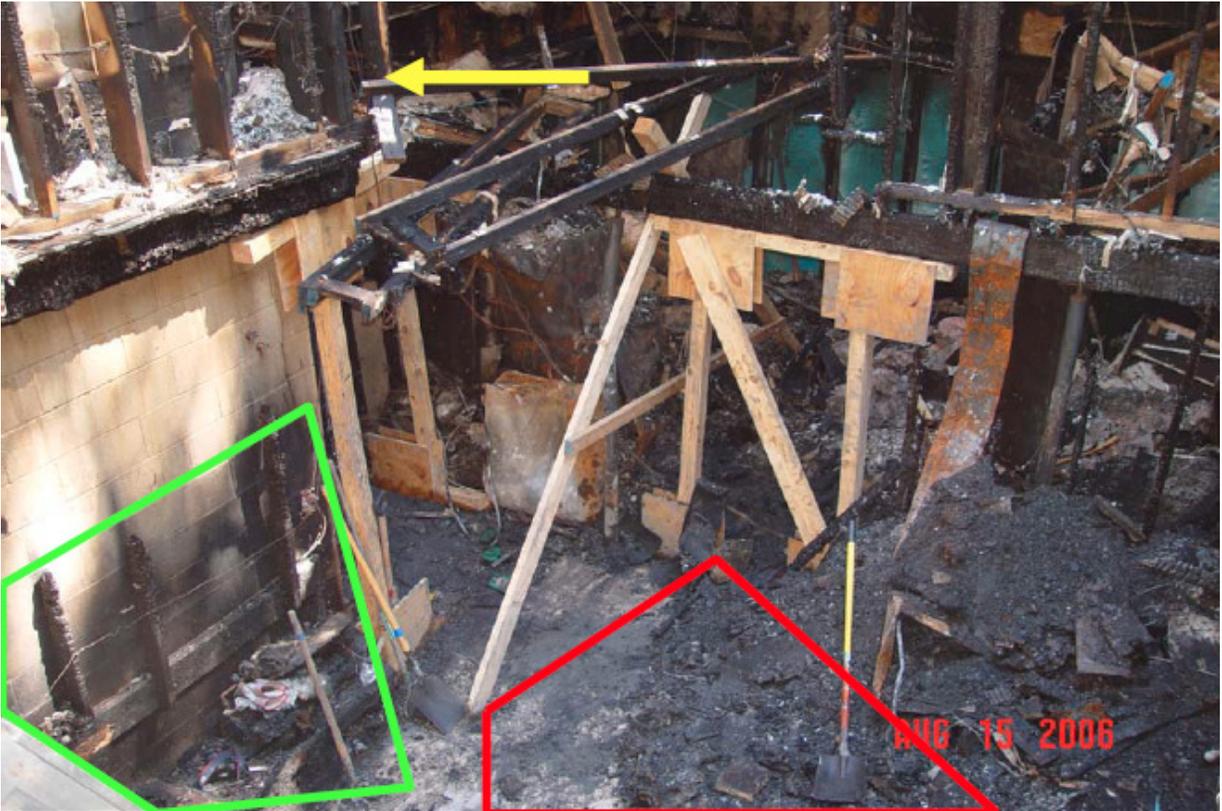
The photograph above is taken from the window with the American Flag. The yellow arrow shows the forced air furnace in the mechanical room below the office. The green box indicates the approximate location of where the floor collapse occurred to firefighters Wolff and Brinkley-Chaudoir. The red arrow below shows the chimney in the basement. The blue arrow shows the location of the work bench in the basement next to the chimney.

*Jeff Kubitz Photo*



The photograph above is also taken from the office window. It shows where the floor of the master bedroom had collapsed.

*Jeff Kubitz Photo*



The photograph above is taken from the patio doorway of the master bedroom located on the north side of the structure (opposite the office window). The green box shows the workbench area along the chimney. Electrical conductors for the structure electrical system can be observed inside the green box. The yellow arrow shows the direction that firefighters Wolff and Brinkley- Chaudoir came from. The red box is the approximate location of where firefighter Wolff was recovered. *Jeff Kubitz Photo*



The photograph above is taken in the basement of the structure under the front entry and is showing the windows to the north of the entry and east of the chimney. This is where firefighter Brinkley-Chaudoir was rescued. *Jeff Kubitz Photo*

## **EXTERNAL EXPOSURES**

Homes/structures adjacent to 438 Edgewood were generally unaffected by the fire. Radiant heat from the fire did impact the trees, bushes, and other vegetation in close proximity both horizontally and vertically to the residence.

## **RADIO COMMUNICATIONS**

There were 369 radio communications transmitted in the first 49 minutes of the incident. Numerous emergency radio transmissions were heard, including several Mayday calls from the crew of Ambulance 451 after the floor in the room they were searching collapsed. Personal Alert Safety System (PASS) alarms were clearly audible in the background of radio communications. Some of the radio communications have been transcribed and are documented on the next several pages.

1224:13 ♦ Fire Call Alert Tones from Brown County Dispatch Center..... [Dispatch] Station 5... Engine 421... Battalion Chief 411... 2503 Edgewood Lane for a house fire... use TAC 3

1224:38 ♦ [BC411] ....411

1226:13 ♦ [EN451] ....451 responding

1226:28 ♦ [EN421] Fire Dispatch ... Engine 421 responding; [Dispatch] Engine 421 use TAC C... ...correction use TAC 3.. 4D... TAC3

1227:20 ♦ [EN451] Engine 451 on scene...; [Dispatch] Engine 451...; [AM451] ...451 on scene...; [Dispatch] Ambulance 451; [EN451] ...two story house... smoke showing from the back of the house coming through the roof... block house... Engine 5 is Command.

1227:50 ♦ [Dispatch] Engine 411 are you enroute?...; [LA451] Dispatch Ladder 451 is on the scene...; [EN451] ...transferring Command to Ladder 5...; [LA451] Ladder 451 copies... Ladder 451 is Command".

1228:47 ♦ [EN451] ...entry in the front door. [Dog Barking?]

1229:15 ♦ [EN411] Fire Dis... ...411 responding...; [Dispatch] Engine 411; [EN451] ...basement from the back...its easier in the front ...we're going to the front; [LA451] Command to the second Engine in on Edgewood, probably Engine 2 .. Engine 421... could you catch the hydrant on the corner of Hillside and Edgewood? [EN421] ...421 catching the hydrant on Hillside at Edgewood.

1230:18 ♦ [EN451] ...charge that line, Engine 451 Engineer, charge the line.

1230:28 ♦ [EN451] ...the line off of Engine 451, pull the second line.

1230:39 ♦ [EN451] ...yeah, hang on... Command from Engine 451...; [LA451] ...this is 451; [EN451] ...want some ahhh ventilation at the rear of the house, some one to go to the rear of the house and ventilate the rear of the house.... ..front of the house. [LA451] Copy... Command copies that Engine 451... ..right now Ladder 451 is connecting your hydrant. [EN451] ...the fire is in the basement. Engine 451 is going to advance an attack line into the house ...looking to go to the basement.

1231:40 ♦ [EN451] ...we need that fan set up in the front of the house, ...someone set that up fan in the front of the house and ventilate the rear windows of this house. [LA451] ...Engine 451 we copy. We are in progress. [EN421] ...Engine 421 is at the hydrant. [BC411] ..Engine 421 there's another hydrant up here. Engine 421 from Battalion 411 there's a hydrant up here by me.

1232:16 ♦ [BC411] ...Battalion ah 411 is on scene... Battalion 411 will be Command... [Dispatch] Battalion 411... [LA451] Ladder 451 copies Battalion.

1232:56 ♦ [BC411] Engine 451 from Battalion 411, have you gained access to the building yet? [EN451] Battalion 411, we're in the building, we're trying to find the access to the basement, ahhh the house is completely filled with smoke and need the rear of the house, the rear of the house ventilated and the fan set up in the front door. [BC411] ...copy that. Copy that Ladder 451? [LA451] ...451 copies.. The fan is operational!

1233:40 ♦ [LA451] ...Command from Ladder 451...suggest ah Engine 2 come up here. [BC411] Engine 421 from Battalion 411, ah, you come up here by me. They've got a hydrant already caught in ah, in front of the Ladder, so come up here by me and I'll give you an assignment when you get up here. [EN421] Engine 421 is coming up.

1234:16 ♦ [BC411] ...Ambulance 451 from Command...; [LA451] ...Command from Ladder 451, we are taking out the basement windows...; [BC411] copy that... Ambulance 451 from Command...; [AM451] ...this is Ambulance 451...; [BC411] I need you to do a search of that house -- primary search of that house.

1235:08 ♦ [LA451] ...(Command) from Ladder 451... we apparently have an involved basement fire, ...at the minimum it is pressuring and blowing quite good.

1235:30 [EN451] ...*(Engine)* 451 to Command; [BC411] ...*(mic keyed)*... [EN451] ...*have the rear windows been ventilated in the house ? .. the rear windows need to be ventilated so we can clear this smoke out.;*  
[BC411] ..*did you hear that Ladder 5? ...get the rear windows ventilated. [LA451] ...we've taken out all of the basement windows Command, this is Ladder 451. Do you want the first floor windows also?*  
[BC411] ...*Just the basement. [EN451] ...those windows out so we can see where we're going. [LA451] ...Command, from Ladder 451 ...the basement windows are out. [BC411] ...copy that. Then assess...*  
...*assess the ventilation of the house, ...and do as necessary. [EN451] Command Engine 451, we need the, ahh rear windows on the above ground ventilated so we can see where we're going. [BC411] ..copy that. Engine 411 from Command, you get up here I want you to be RIC Team. [EN411] .. Command 411 is on-scene, we'll be RIC Team. [EN451] ...451 to Command, we need someone to feed the hose that we have cause we're going into the basement now, we've got access to the basement .. we need someone to feed us the hose.*

1237:04 [BC411] ...*copy that. [Dispatch] ...Command from Dispatch, ...ten-minute time check.*

1237:35 [unknown] ...*mic keyed.*

1237:53 [unknown] ...*mic keyed.*

1238:11 [LA451] ..*Ladder 451 to Command... [BC411] ...go ahead... [LA451] ...flashover... flashover... ..(pause)... ..the house... FLASHOVER!!... [BC411] ...get a line in Engine 421... [AM451] Mayday..Mayday.*

1238:45 [AM451 Brinkley-Chaudoir] ..*Ambulance... ..this is, ahh... ..we came in the front door.. and search the door to the left....*

1238:56 [Dispatch] ...*Battalion 431 from Dispatch.*

1239:05 [EN451] ...*Engine 451 to Command... [BC411] ...go ahead Engine 451 [EN451] ...we lost hose pressure and we did have flashover... we're exiting the building now..... [BC411] Engine 421 ... pull a second line.*

1239:08 [unknown] ...*mic keyed. [Dispatch] ...Battalion 431?*

1239:24 [Dispatch] ...*Battalion 431, can you call in to Dispatch? [unknown] ...3 (?)*

1239:33 [unknown] ...*in the front door. [AM451 Wolff] ...xxx... (unintelligible)...xxx ...in the front door...we had a collapse... we came in the front door... we're just about twenty feet in the front door...it's hot... xxx... (unintelligible)...xxx...xxx...*

1240:04 [BC411] *Engine 411, did you copy that? [EN411] ...did not, did not copy. [AM451 Brinkley-Chaudoir] ...xxx... [LA451] Engine 5 from Ladder 451 ... Engine 451 from Ladder 451... [EN451] This is Engine 451... we're out of the building. ....xxx ... right now. [LA451] ...shine a light on the C side of the building through the windows. .... [AM451 Brinkley-Chaudoir] ...xxx...xxx... 451 is trapped ... there's been a collapse.... xxx. [BC411] ...451 from Command, what is your..., Ambulance 451 what is your location? [AM451 Brinkley-Chaudoir] ...xxx... collapse... (unintelligible) xxx...*

1241:18 [BC411] *Engine 411 did you copy that? [EN411] Command from Engine 411 ... I cannot copy transmission. [AM451 Brinkley-Chaudoir] ... (unintelligible)...xxx... collapse... (unintelligible) ...xxx... collapse ...fire... (PASS Alarm clearly audible) ...xxx ... (unintelligible) ... left.. [BC411] ...are you on the left? ...did you go ...Ambulance 451 did you go to the left when you entered the house? did you go to the left? [AM451 Brinkley-Chaudoir] ... (unintelligible)...xxx... left.. (unintelligible)*

1241:31 [BC431] ...*from Battalion 431. Strike a second alarm at the address. [Dispatch] ...Dispatch copy.*

1242:07 [Dispatch] (Dispatch Fire Alert Tone) *Engine 471, Ladder 421, Battalion Chief 431, Ambulance 421, ... 2503 Edgewood Lane ... Two-Five-Zero-Three Edgewood Lane for a second alarm. [unknown] 2 copies... [AM421] Ambulance 421 copies ... [unknown] ...copies.*

1242:08 [unknown] ...*mic keyed.*

1242:43 [BC411] *Engine 411 from Command .. Have you located Ambulance 451? [AM451 Brinkley-Chaudoir] ...451 is in the basement.. .. trying... [BC411] All units on scene. The Ambulance crew is in the basement. We need to get access to the basement and get the Ambulance crew out of there. [unknown] ... 451... [AM451 Wolff] ...xxx...xxx... (unintelligible) ...xxx... (distress call)*

1243:31 [unknown] ...mic keyed. [LA421] Fire Dispatch, Ladder 421 is responding. I'm on Main now, but I'm switching over to TAC 3. [Dispatch] TAC 3

1243:56 [LA451] Command from Ladder 451 ... [BC411] ..go ahead... [LA451] ... Arnie is not, ...not accounted for... we have one out of the basement... [unknown] ...mic keyed.

[BC411] Repeat, I have one trapped in the basement .. Is that correct? ... [LA451] ...we don't have access back here. We need a RIC Team now! [AM451 Wolff] ...xxx.xxx...(unintelligible). [LA451] ...We need a hose on the C side ... We need a hose on the C side! [BC411] ...the hose is being pulled right now...  
1244:14 ...Engine 411 from Command... [EN471] ...Engine 471 responding... [AM451 Wolff] ...xxx.xxx.. (unintelligible)..xxx... [Dispatch] ...471.. [AM451 Wolff] ...xxx... (distress call)

1245:31 [unknown] ...Engine I(?)...here's your water.

1245:52 [unknown] Engine 411... [unknown] ...xxx... (unintelligible) ... shut down the two and a half with the gated wye. [unknown] ...mic keyed.

1246:13 [LA421] ...Fire Dispatch from Ladder 421 ...did you dispatch another squad? [Dispatch] ...Ladder 421... not another Ambulance ...other than the second alarm .. we've got two ambulances. [LA421] ...Fire Dispatch get another rescue squad there now. [Dispatch] ...Copy.

1246:16 [unknown] ...mic keyed.

1246:26 [LA451] ... 451 to Command. [BC411] ...Engine 411 from Command... [EN411] ...(unintelligible)... [BC411] ... have you reached ..ah... Ambulance 5 .. 451 yet? [EN411] ... we're in the basement ... (unintelligible)...

[LA451] ...Command from Ladder 451 ...the C side of the house needs a line. [BC411] We're getting that .. We've gotta get this firefighter out of the basement. [EN411] ...(unintelligible)... [LA451] ...Ladder 451 to Command ...we have access to the basement. [BC411] ...I copy. ...you're getting water ...you're getting a line right now... [BC411] ...ah, next in Engine from Command, which would be I think Engine 471, ... catch the hydrant down at the corner. [unknown] ...cannot see ...xxx... at the front of the house. [EN471] ..Engine 471 we're a ways in yet ...we're about three to five minutes... three minutes out. [BC411] Rescue 421... take care of the firefighter behind the rescue squad. [unknown] ...431 responding. [AM421] ... Ambulance 421 on scene. [EN451] Engine 451 to Command, ...I also need a hydrant. [BC431] ...atch from Battalion 431... [unknown] ..mic keyed. [BC431] Command from Battalion 431... [BC411] ..Go ahead Battalion 431... [BC431] Command, have everyone else, all your firefighting operations on scene transfer to a different TAC channel than your Mayday channel ...and then also, see if you can get the trapped firefighter to activate his PASS device.

Ambulance call tone from Dispatch [Dispatch] ...Ambulance 461, 2503 Edgewood Lane, 2503 Edgewood Lane on the East side. Respond as the third Ambulance to a structure fire. [AM431] ..Dispatch from Res.. Ambulance 431, we are much closer. 431 can take that call. [Dispatch] .. Absolutely, head out there right now. [AM431] ... for the .. on the computer please.

1247:09 [Dispatch] .. 431, they're on TAC 3, D .. David.

1248:52 [BC411] ..I copy. All suppression units, with the exception of RIC, ... go to TAC 4, ... TAC 4.

[Dispatch] .. Command from Dispatch, this is your twenty-minute time check. Twenty-minute time check. [LA451] ...Ladder 451 to Command ... we're on TAC 4?? [BC411] ... that's correct. [LA451] ...451 to Command. The rear of this building is blowing ... on the first floor ... we're gonna hafta think about when we're pulling these people out of the basement.

[EN451] .. Command from Engine 451... [BC411] .. Go ahead. [EN451] .....a two and a half inch line on the front of the house... it's fully... in ... flames... we're trying the two and half, not making much progress.

1249:44 [BC411] copy that ... ..firefighting go to TAC 4 ... firefighting got to TAC 4... .. Engine 411 from Command. [EN411] ...411.. [BC411] ... have you reached the firefighter? [EN411] ... xxx.xx... we need to go check the ...xxx... yet .....

[BC411] ..Engine 421... can you get RIC Team a line? [EN451] ... Command from 451 .... 421 is actually pulling ...xxx.xxx...by hand down the block. [EN471] Engine 471 on scene .. Engine 471 is securing a hydrant here. We'll be .. ahhh .. we'll be bridging the gap on your supply line. [BC411] Engine 451 ... I need water ... to the RIC Team.

1250:35

1250:41 [EN411] ... command ... charge that inch and three-quarter line... in the basement.. ...charge the line in the basement.

[EN411] .. Command .... charge the inch and three-quarter line. [BC411] .. Repeat ... .. Repeat that...

1251:18 [EN411 Officer] ... this is Engine 411 ... .. we... [EN421] .....xxx.xxx...need more hoseline to the back of the house. We have the trapped people, but we need those hoselines shut down so we can add on. [BC411] Copy that... you want the hoselines shut down? [EN421] .xxx... (unintelligible) ...xxx..

1251:40 [unknown] ...mic keyed.

[EN451 Officer] ...451 to Engineer 451, ...the two and a half to the front entrance ... we ain't got enough pressure... [EN451 Engineer] ...for ya.... I'm at a dead-end hydrant, bud. [LA421] ..Ladder 421 is on scene. [BC411] ... did you copy that? ....did you copy that Engine 451 -- shut down the line. [EN451 Engineer] xxx ... the line you shut down... xxx.(unintelligible) ...xxx.....xxx... over to me.

1252:01

1252:02 [unknown] ..Engine 451 Engineer, recharge that two and a half inch... recharge the two and a half..

1252:12 [unknown] ...mic keyed. ...xxx... (unintelligible) ...xxx.. ...xxx...

1252:14 [AM431] Ambulance 431...ahh, Dispatch from Ambulance 43, from 431 ... can you send us information on our MDT please? [Dispatch] ..go ahead...I'm sorry, repeat... [AM431] Could you please send us information on our ... on our MDT for Ambulance 431? [Dispatch] 10-4.

1252:22 [unknown] ... I don't care who the hell is inside there .. ...xxx... (unintelligible) ...xxx. (low air alarm audible). ...xxx... [EN421] ...Engine 451 ..shut down the line....

1252:41 [Dispatch] ...did you get it to your MDT? ...

1252:49 [Dispatch] ... Ambulance 431 did you get it on your MDT? ...

[BC411] ..Engine ...411 ... ..do you have the firefighter ...and are you out? [EN411 FF] ..there are two firefighters out. We're gonna need to hook up a line to go in and rescue the rest of the people. We need this line shut down to the back of the house. [BC411] I copy that. [unknown] ...mic keyed.

1252:55 ...xxx... (unintelligible) ...xxx.. (low air alarm audible)

1253:10 [unknown] ...mic keyed.

1253:19 [EN451] .. Command from Engine 451.. [LA451] 451 to Command, we need water on the two and a half coming around to the C side of the house. [unknown] ...xxx... (unintelligible). ...xx...

1253:34 [unknown] ...mic keyed.

1253:58 [EN471] ...421 from 471.....

1254:01 [unknown] ...mic keyed.

1254:12 [EN411 FF] ...the line is shut down...

[EN451] .. Command from Engine 451 ... [LA421] ..this is Command... Ladder 421 is now Command on TAC 4. [EN451] ... ladder 421 .. we need Ladder 451 set up... we need Ladder 451 set up... [EN421] ..Command from Engine 421 ...we need more water in the back ... another two and a half .. and we need some lighting for the basement [LA421] ... understand you need more pressure on the two and a half ... Engine 421. [EN421] Negative. We need another line .. another two and a half line brought to the back of the house ... and we need some lighting. [unknown] ...mic keyed ...xxx...

1254:14

[EN471] .. 421 from Engine 471, we've got the hydrant secured.. Are you ready for water?

1254:27 [unknown]...mic keyed. [EN411] ...411 are you ready for water from the wye? [EN411] ...xxx... Melissa...

1254:59 [BC411] .. Engine 411 ... from Command.. I need an update. [EN411] ....building, we're out of air.

[BC431] .. Dispatch .. Battalion 431 is on scene. [Dispatch] .. Battalion 431 [AM431] ... 431 is on scene.

1255:08 [unknown] ..Engine 451 ... come in... [LA451] Ladder 451 to Command... [unknown] ..Spunk, come on up here.. [LA451] ..at this time we have our crews out of the basement ...xxx...

1255:12 [BC411] ...mic keyed.

1256:02 [unknown] ...mic keyed. [unknown] ...mic keyed.

1256:07 [unknown] ...mic keyed.

1256:16 [BC411] .. 431, can you come up here for a face-to-face? [EN471] Engine 471 to Command... we're bringing a line to the back of the house now with, ahhh, Ladder 421. [BC411] ..on ..ah .. TAC 4 .. Engine... you need to get on TAC 4. [unknown] ...mic keyed.

1256:22 [unknown] ...mic keyed.

1256:33 [LA451] Ladder 451 to Command... [unknown] .xxx... [LA451] Command... I would suggest a PAR.. This is a fire -- out of control on the first floor.... and the basement is now untenable. [BC431] ....lion 431 is on scene. Battalion 431 will assume Command of firefighting operations.

1257:05 [unknown] Engineer 451, ahh .... I'm barely hanging on here with these two and a halves unless you open that other hydrant.

1257:36 [BC431] ...421 from firefighting Command.

1257:44 [unknown] ...mic keyed.

1257:53 [EN411] ..from Engine 411 .. We're all out of the building ... we're out of air ... coming to get more air.

1257:57 [BC431] .. Engine 421 from Command... [EN421] ..421.. go ahead... [BC431] .. this is Command...do you need any additional resources or do you have what you need? [EN421] ... we have what we need right now...

1258:10 [BC411] ..Engine 411 from Command ... gimme an update.. [EN411] .. Command... Engine 411 is coming out .. We're out of air... [BC411] ...xxx... the other firefighter in the basement... ..xxx...

1258:35 [Dispatch] .. Command from Dispatch...thirty-minute time check...

1258:41 [EN471] ...one from Engine 471...

1258:49 [BC431] ..Engine 471 from Command.. [EN471] .Command.. [BC431] .. 471 I need you to mask up and I need you to the IRIC .. or the RIC Team is coming out of the basement to re-air and I need you to get suited up and go back down and continue the search for the Mayday. [EN471] ...lemme get my crew together ...I got ... we're just laying out a line to the back of the house. [unknown] 421 ahh .. Engineer, charge this new two and a half inch line for us..

1258:52 [EN421] 421 from Engine 421... let me know when you want the two and a half charged..

1259:35 [unknown] ...mic keyed.

1259:45 [EN471] .. 4 ahh 21 from Engine 471... [BC431] .... this is Command ... go ahead.

1300:06 [BC431] .. Engine 471 ... this is Command...

1300:12 [unknown] ...mic keyed.

1300:21 [unknown] ...mic keyed. [EN471] ... from 471.. [BC431] ...Engine 471 you can switch over to TAC channel 4... you will be on the Mayday channel.. [EN471] ..that'd be TAC channel 3 ... is that correct? [BC431] ...that is TAC channel 4

1300:52 [LA451] .. Fire Command on TAC channel 3.. [BC411] ..go ahead... [LA451] ... we are fearing collapsing in the basement..

1301:04 [unknown] ...mic keyed.

1301:13 [LA421] .. Engine 421 from Ladder 421.. ..that two and a half we pulled of of you ... you can charge it.

1301:35 [unknown] .. Engineer Engine 451 .. Did you copy me?

1301:39 [unknown] ...mic keyed.

1301:48 [BC411] .. Battalion .. ahh .. 431 from Battalion ..ahh ..411...

1302:00 [Dispatch] Command from Dispatch.. [EN471] ..471 is now on TAC 3 .. on the Mayday channel.. [BC411] ..471 .. Can you get access to the basement to hear anything or see anything?

**Fireground Communications**  
**August 13, 2007**

**438 Edgewood Drive**  
**GN06-#5747**

1302:10 ♦ [unknown] ...mic keyed.

1302:24 ♦ [unknown] ..451 Engineer ..xxx... [LA451] Command from Ladder 451...  
[EN471] .. Command from Engine 471... [BC411] ...go ahead... [EN471] ..we're at the rear entry to the  
1302:30 ♦ house.. we've got a firefighter in the basement.. we're being advised by ..ahh.. Rescue 451 that we don't  
think we should make entry.. but we're ahhh ... it's tough to evaluate the situation back here.

1302:58 ♦ [BC411] .. I copy that... I'm gonna see if we can gain access somewhere else. ...Ambulance 451 ...  
Ambulance 451... Ambulance 451 ..... from Command...  
[EN421] ..Engine 421 to Command.. [BC431] ..421 this is Command...go ahead ... [EN421] ..what's  
the status of Lt. Wolff? [BC431] .. 421 would you repeat? [EN421] ..what is the status on Lt. Arnie  
Wolff? [BC431] ..ahh, he is still trapped in the basement at this time. A new RIC Team is evaluating the  
situation on whether or not it is safe to continue the search. [EN421] .. 10-4.. [LA421] .. Command from  
1303:17 ♦ Ladder 421.. [BC431] Ladder 421 .. this is Command ... go ahead... [LA421] we have crew ready to go  
in the back basement window .. do you have a most recent location of firefighter Wolff? BC431 Ladder  
421 if you go in the basement window ..are you going to have a means to get out rapidly if need be? LA421  
we have a ladder in the window down to the basement floor. BC431 switch your TAC channel over to TAC  
channel 3 and talk with the Mayday commander to see if he does have a recent location..

1303:34 ♦ [EN411] Command from Engine 411... 411 has got fresh air .. going back into the basement.. [BC411] I  
copy that... Stay on this TAC ...Stay on this TAC channel. ...the Mayday TAC channel is this channel.  
[unknown] ..from the C side basement stairs... C side...

1304:34 ♦ [AM421] Dispatch... Ambulance 421 is enroute to St. Vincent's Hospital... [Dispatch] 421..

## **RESCUE EFFORTS**

Over the next hour, more than seven entries were made into the structure to attempt the rescue of Lt. Arnie Wolff. All attempts were made under heavy fire, heat, and smoke conditions. At times crews placed themselves in harm's way as the escalating fire conditions further compromised a structure that had already suffered significant partial collapse. Alternative entry points to the basement were identified as the first collapse had destroyed the floor structure immediately inside the initial entry point on the Alpha side front door.

Various crews made entries to fight the fire and search for Lt. Wolff. As the Rapid Intervention Crew (RIC), Engine 411, made multiple entries into the basement from the Alpha and Delta sides and was able to search the finished area of the basement, at times without the protection of a hose line. Ladder 451, after assisting Ambulance 451 Engineer out of the Charlie side basement windows, made an initial entry into the basement from the Charlie side basement windows to perform a search without protection of a hose line. Ladder 451, assisted by Engine 421, also secured a 2 ½" hose line and continued their search while fighting the fire in the basement. After the entry on the initial attack, Engine 451 made two additional entries into the structure to fight the fire and search for Lt. Wolff. Additionally, Engine 471, assisted by Ladder 421, made entry through the Charlie side basement windows for a search of the basement and to fight the fire.

Within the hour crews were able to completely search the finished areas of the basement that covered the Alpha/Charlie/Delta portions of the structure. Debris from the initial collapse blocked entry into the Bravo portion of the basement, making search and firefighting in that area impossible. It was in the Bravo portion of the basement where Lt. Wolff's body was later found.

After all reasonable efforts had been exhausted, crews were ordered to suspend rescue attempts as the fire had weakened floor trusses and the first floor began to sag, indicating imminent collapse. All interior operations were suspended (13:27:00) so as not to risk further loss of life.

## **RECOVERY**

The recovery of the body of Lt. Arnie Wolff was tasked to the Urban Search and Rescue (USAR) Team and carried out with the assistance of many members of the Green Bay Fire Department. Structural engineers were called to assess the condition of the structure and advise to whether shoring operations would even be allowed inside the heavily collapsed structure, as this building had many unique construction features. At the time recovery efforts could begin,

the scene already belonged to the Wisconsin Department of Criminal Investigation (DCI) and the Federal Bureau of Alcohol, Tobacco, and Firearms (ATF), with whom all recovery operation action plans were cleared, so as not to compromise the scene investigation. Recovery operations commenced once USAR Command, Structural Engineers, DCI, and ATF agreed on an action plan.

Knowing the crew of Ambulance 451 made entry through the front door of the Alpha side of the structure and had begun a left hand search pattern when the floor beneath them collapsed, the search concentrated on the Bravo side of the structure. There were several first floor walls that needed to be shored, as the floor beneath them had collapsed or had been burned away. There were also several beams that had lost their support structure. All debris needing to be removed had to first be cleared by DCI so that it could be assessed as to its significance in the investigation. Shoring operations and the removal of debris took several hours and required the assistance of many GBFD members.

The body of Lt. Wolff was found in the center of the room on the Bravo side of the structure. DCI asked that most members leave the area as to maintain scene integrity while under investigation. Photography and inventories were kept on all findings during the investigation. USAR transits set to monitor the large northern chimney started showing significant movement and collapse was feared, which required quickening the DCI investigation. The body of Lt. Wolff was brought up to ground level by stokes basket utilizing a rope system and ground ladder. Lt. Wolff's body was covered with an American Flag per Firefighter honors and was carried by his crew from Station 5 C-Shift to Ambulance 451.

### **INVESTIGATING AGENCIES**

- Brown County Fire Investigation Task Force (BCFITF)
- Wisconsin Department of Criminal Investigation – Fire Marshall's Office (DCI)
- Federal Bureau of Alcohol, Tobacco and Firearms (ATF)
- National Institute of Occupational Safety and Health (NIOSH)
- Cities and Villages Mutual Insurance Company(CVMIC)/City of Green Bay
- American Family Insurance Company
- GBFD Edgewood Analysis Team

### **CAUSE and ORIGIN**

All investigative information obtained to this date suggests that this fire was accidental in nature. The floor that collapsed under Lieutenant Arnie Wolff was directly above where the fire had burned the longest in the basement of the structure. Due to the extreme damage done by the fire, no specific cause for this fire has yet been determined.

# Chapter 3

## BUILDING CONSTRUCTION

Chairperson: Lieutenant Chris Heil  
Firefighter Jesse Linck  
Firefighter Ryan Gibbons



# BUILDING CONSTRUCTION

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## Building Materials - 438 Edgewood Drive

- Foundation: 9' Prefab concrete sections bolted together, with panelized foam insulation (petroleum-based) on some interior basement walls
- 1<sup>st</sup> Floor support beams: 5 Micro-laminate beams
  - Three beams built into floor system
  - One steel beam in center of home
- 1<sup>st</sup> Floor trusses: "Great Room" (center of home) – 11 7/8" Tongue & Groove Inlay (TGI) Trusses, 12" on-center (O.C.)
  - Side wings: 20" Wood Parallel Cord Trusses, 16" O.C.
- Sub-floor: 3/4" Oriented-strand Board (OSB)
- Floor in area of collapse: OSB, heating coils, poured concrete (1 1/2" Gypcrete, 30 lbs. per square foot), ceramic tile. Total = approximately 4 inches
- Flooring throughout: Carpet and/or ceramic tile
- 2<sup>nd</sup> Floor trusses: 20" Wood Parallel Cord Trusses, 16" O.C. (Traditional 2 x 4)
- 2 x 6 framing throughout, 16" O.C.
- Interior walls: Drywall over wood frame
- Exterior: Cultured Stone (70 lbs. per square foot) over wood-frame construction
- Standard Roof Trusses, 24" O. C., OSB Roof Sheeting

The area of catastrophic failure (Bravo side) at 438 Edgewood consisted of unprotected parallel chord trusses in an unfinished area of the basement. The time the fire progressed will never be known. When Ambulance 451 entered the structure to perform their search, the floor support system that failed had already been severely compromised, if not already failed.

The structural collapse can be attributed to two major factors. First, the time the fire progressed through the stages of incipient - to free burning - to failure – estimated to be six to 13 minutes of direct flame impingement, if not quicker due to the fire load and weight of the floor components. Items and materials stored in the room of origin most likely contributed to rapid fire spread. The timeframe cannot be determined to any degree of certainty because of the heavy fire damage to the area of origin. The second factor is the floor support system itself. The Parallel Chord Trusses were unprotected in this unfinished portion of the basement. In this case, which is common construction practice, lightweight trusses spanned large areas and the connecting web members transferred substantial loads to other parts of the truss. The Parallel Cord Truss system supported a sub floor of 3/4 inch tongue and groove OSB, with a 1 1/2 inch Gypcrete (30 lbs per sq ft.) with heating coils for an in-floor heating system, and substantial tile flooring.

# BUILDING CONSTRUCTION

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Although this floor was built within the guidelines of the building code, the substantial load on the truss system in combination with the delayed detection of the fire caused the floor truss system to fail rapidly.

## **Parallel Chord Truss systems (Background)**

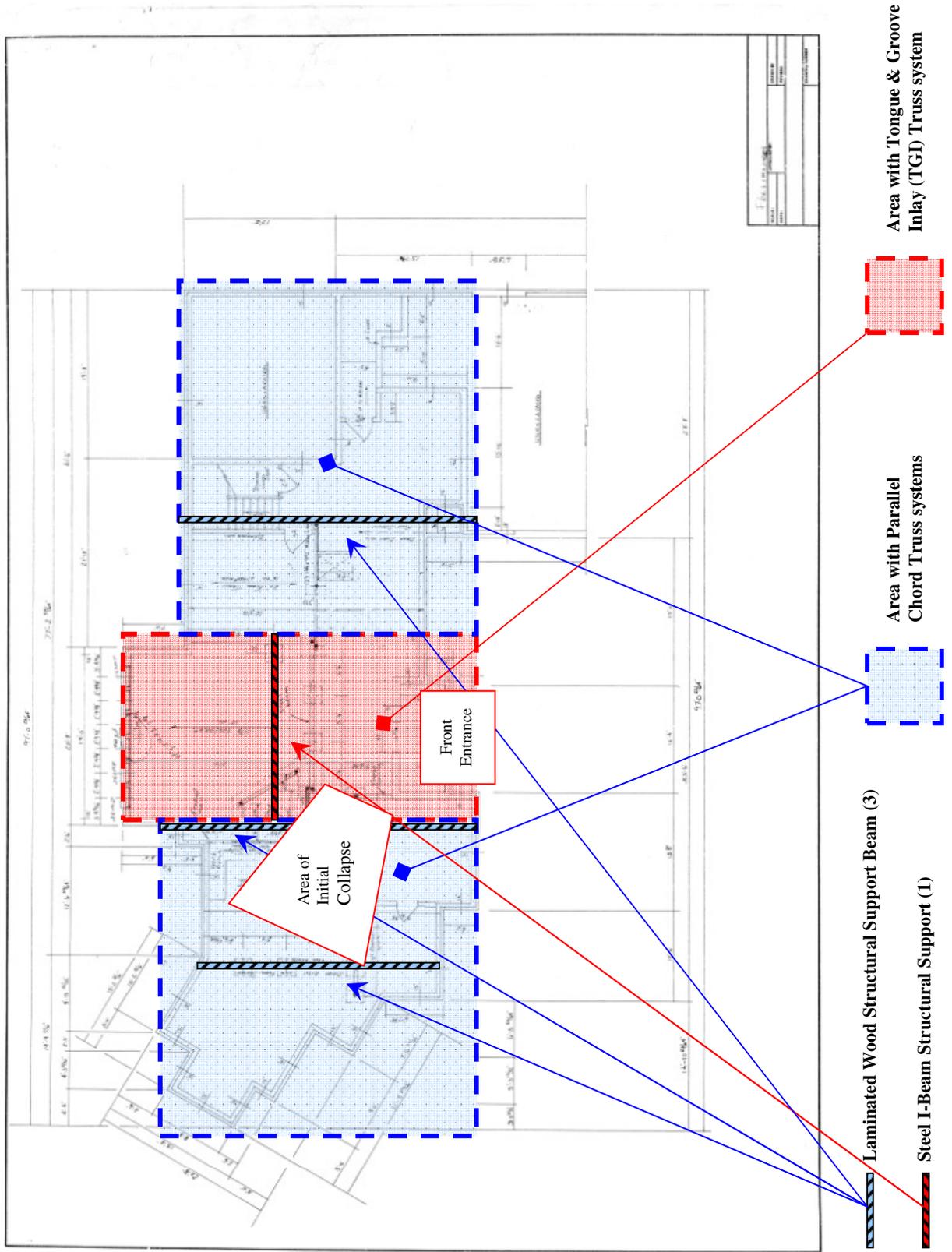
The floor truss system that initially failed was a Parallel Chord Truss system. Parallel chord trusses provide a flat roof or floor. The top and bottom chords are parallel. They are commonly used in single-family dwellings, row houses, apartment buildings, and smaller office buildings. All parts and connections of a parallel chord truss are vital to the stability of the truss. The bottom chord of a truss is under tension. A tension member acts like a rope. If the bottom chord of the truss breaks, the truss system may fail by falling apart. Conversely, the top chord of a truss is under compression. The top chord acts like a column. Failure of a compression member reduces the overall load-bearing capacity of the truss. The failure of any one element can lead to failure of the entire truss causing the load to be transferred to the surrounding trusses, which results in multiple truss failures. Some researchers [Dunn 2001; Brannigan 1999] contend that the connecting metal gusset plates can contribute to the degradation of wooden truss members through pyrolysis (pyrolysis is the chemical decomposition of organic materials by heating). Heat transferred through the metal fastener's teeth may destroy the wooden fibers held in tension by the gripping metal teeth. This process loosens the gusset plate and leads to a weakened truss and possible catastrophic failure. Other researches [Grundahl 2003a; Meeks 2001; Cutter 1990] suggest that the metal gusset plates protect the underlying wood and that the wooden members of the truss are compromised by fire before the areas under the metal gusset plates. The wooden members become weakened by fire causing the wooden members to fail and adversely affecting the metal gusset plates leading to truss failure. In both of the aforementioned scenarios, truss failure happens many times without warning or indication of impending failure.

### **Resources:**

- 1) NIOSH Publication No. 2005-132: Preventing Injuries and Deaths of Fire Fighters Due to Truss System Failure.
- 2) Collapse of Burning Buildings: A guide to Fire Ground Safety by Vincent Dunn; Fire Engineering, A Pennwell Publication.
- 3) Wood and Fire Safety Report; 5th International Scientific Conference, 2004
- 4) Wisconsin Department of Criminal Investigation (DCI) State Fire Marshall's Office Cause and Origin Report

# BUILDING CONSTRUCTION

## Floor Support Detail for 438 Edgewood Drive



## BUILDING CONSTRUCTION

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***Lessons Learned*** - *The need to effectively communicate acquired knowledge and to ensure that beneficial information is factored into planning, training, and fireground activities.*

- Firefighters must understand that fire ratings may not be truly representative of real-time fire conditions and that truss systems' performance may be affected by fire severity causing them to fail more rapidly than expected.
- Fire officers must conduct thorough size-up and risk assessment prior to initiating and during all interior firefighting efforts.
- Firefighting crews should conduct pre-incident planning tours and inspections within their district to identify structures built with truss or lightweight construction.

***General Recommendations*** – *measures for consideration based on challenges revealed in this analysis which will improve the fire department's ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.*

- Firefighters should receive additional training to identify and better understand the hazards of lightweight building construction.
- The Fire Department should develop and implement standard operating guidelines specific to combating fires in buildings of lightweight construction.
- Thermal imaging cameras should be carried on all front line apparatus.
- The Fire Department should aggressively support legislation for sprinkler systems in all new multi-family and large single-family homes.

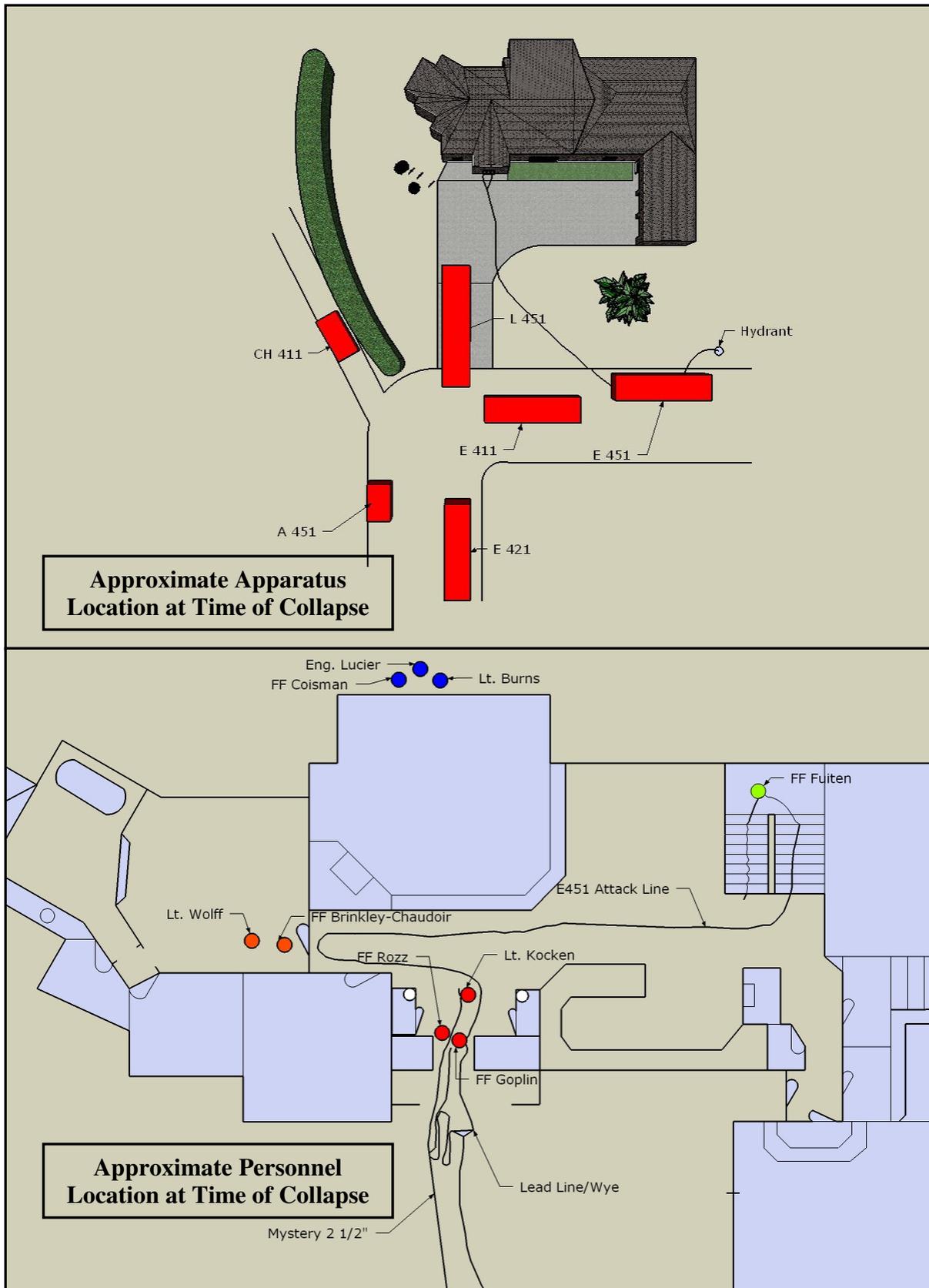
# Chapter 4

## FIREGROUND OPERATIONS

- Chairperson:      Engineer Steve Sellin  
                         Captain Jay Selissen  
                         Lieutenant Peter Sponholtz  
                         Engineer Dave Lucier  
                         Lieutenant Steve Peggs  
                         Firefighter Bob Goplin  
                         Firefighter Drew Spielman



# FIREGROUND OPERATIONS



# FIREGROUND OPERATIONS

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## **Engine Company Operations**

The actions of the first due engine are critical at all incidents. Actions taken at Edgewood were fairly common to most residential structure fires, some communication issues are evident. While it is not uncommon for our engine companies to attack basement fires from the front door of a residence; access at Edgewood would probably have been more secure from the stairs in the garage. **Editor's Note:** *The report of a missing person created urgency to enter the structure.* The stairs from the garage to the basement were made of concrete (unknown to responders) and did not require the attack crew to traverse a section of floor that may have been compromised from exposure to fire.

The first-due engine company at 438 Edgewood Drive secured a water supply, stretched an attack line and made entry for fire attack. The officer of this engine also completed a partial 360° survey of the structure, traversing about one third of the way around the building on a clockwise route starting at Side Alpha and then returning. During the survey, he noted smoke coming from the eaves on the Bravo and Charlie sides and a vent close to ground level near the Bravo/Charlie corner of the building. After Ladder 451 forced the door the crew made entry and began looking for the basement stairs. The crew requested ventilation to assist them with finding the stairs. They encountered smoke conditions from the floor to the ceiling. After ventilation, the crew found the stairs and proceeded to the basement. They were forced out by heavy fire conditions after the collapse of a portion of the first floor and a loss of water to their hoseline.

A fire attack that is coordinated with ventilation is very important in all fires, but especially basement fires. The fire attack at 438 Edgewood Drive was not initially coordinated with ventilation. While the power blower was placed at the front door prior to entry, the attack team did not wait for the exit opening to be created. This did not allow for smoke to clear in order to aid entry.

## **Ladder Company Operations**

Ladder 451 was the first ladder on scene. Upon arrival the Officer took command and the crew of three split. The officer and firefighter assisted the laying of the supply line - 5" Large Diameter Hose (LDH) to the hydrant. The Engineer donned the rest of his Personal Protective Equipment (PPE) and brought the thermal imaging camera to the front door for the suppression crew. He then forced open the front door and assisted the ladder firefighter in putting the Positive Pressure Ventilation (PPV) fan in service. All three then proceeded to the back (side Charlie) to vent a window for the fan. The Engineer then returned to the rig for a ladder. Upon

## **FIREGROUND OPERATIONS**

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returning a large whoosh was heard and Engine 421 at the front door informed him of a floor collapse. The Engineer rejoined the crew at side Charlie where additional rear windows were vented. A Mayday had been called, so the basement windows were removed and the roof ladder was deployed to the basement for emergency egress. Shouts were called into the basement and firefighter Brinkley-Chaudoir heard the shouts and made her way to the ladder. Once she was out, the firefighter and engineer entered the basement, encountered moderate-to-heavy smoke conditions, and performed a left hand search looking for Lt. Wolff. They completed their search but were unable to enter the Bravo-side room due to extensive fire conditions. They reported back to their officer that they needed a hose line to enter the Bravo-side room. After some delay they received a 2 ½" hose line. They directed their line at the Bravo-side room from the center of the basement and after several minutes were making no progress. At this point, the floor above was starting to separate, fire could be seen in the void, and the engineer instructed the crew to get out of the basement. The crew exited the basement, changed out air bottles, and reported to rehab sector. The ladder crew later relieved a crew at side Charlie and continued with the exterior attack.

Engine 451 was ordered to cut ventilation holes in the roof of the structure using the aerial ladder. In the middle of the operation the Engineer was ordered down off the platform to attend Critical Incident Stress Defusing/Debriefing (CISD) and was replaced by a firefighter.

### **Ambulance Company Operations**

The Ambulance company experienced the collapse of the floor and loss of a firefighter at Edgewood Drive. As part of the initial alarm and once on scene, Ambulance 451 was assigned to do a primary search of the structure. Ambulance 451 consisted of two firefighter-paramedics. In their role as firefighters, Ambulance 451 crew is believed to have pulled an uncharged 2.5" line to the Alpha side entrance, however, did not bring this or any other line in the building with them.

Ambulance 451 was directed by Incident Command to conduct a primary search, but the officer of this unit did not inform Command that the crew was entering the building, or of their location of entry. Ambulance 451 began a left hand search pattern of the first floor by the order of the company officer. The crew encountered dark heavy smoke and did not have a hoseline or the use of a Thermal Imaging Camera (TIC). They became trapped in the basement after the first floor collapsed. Upon rescue, there was not a dedicated EMS crew standing by to assist the injured firefighter who had been removed from the structure.

## **FIREGROUND OPERATIONS**

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***Lessons Learned*** - *The need to effectively communicate acquired knowledge and to ensure that beneficial information is factored into planning, training, and fireground activities.*

- The deployment of the “Lead Line” to the structure was most effective due to the length of hose lay to the structure.
- The deployment of the 2 ½” Blitz line was the right choice by Engine 421 based on the amount of fire on arrival.
- The officer on Engine 451 made the right decision (first-due engine) to secure a water supply on arrival.
- The first arriving engine must consider securing its own hydrant for water supply. At a minimum if one is not secured, it must be verbalized to the next in engine to secure the water supply.
- The officer should verbalize to the crew what size line to pull and what type of attack is to be made.
- The hose team should only enter through a point deemed appropriate by the officer. This should only be done in accordance with the two-in/two-out rule at a minimum, but the establishment of a RIC Team is preferred.

***General Recommendations*** – *measures for consideration based on challenges revealed in this analysis which will improve the fire department’s ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.*

- An officer must do a complete 360° size-up of the structure whenever feasible (size of structure) and relay pertinent information to incoming companies.
- Engine companies should take into consideration waiting for support from a ladder company for ventilation and the TIC for the offensive attack.
- Develop a color system such as carabineers or Velcro straps to identify hose lines. (specifically 2 ½” lines & hose lengths)
- Additional training is needed on the different hose loads on engine companies.
- Create seat assignments to allow the officer to do a 360° assessment sooner, creating consistency between crews throughout the department and know that all critical engine tasks have been assigned and are under way.
- If the initial ambulance personnel responding to a fire are to be used as a fireground crew, then a second ambulance shall be dispatched and once on

# FIREGROUND OPERATIONS

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scene, is responsible for EMS duties. Create an SOG to dispatch a second ambulance

- The second ambulance crew can also be responsible for the tasks of fireground accountability and/or rehab. According to GBFD SOG 203.33, an EMS person from the ambulance crew shall be serving as the accountability officer. This will free up needed engine personnel for fireground related tasks.
- To maintain accountability fire crews need to contact and inform command about their location and their actions.
- GBFD needs to increase its training of personnel including more hands on training, practical evolutions, fire size-up, fire ground tactics, proper radio communications and the danger of operating above a fire.
- Ensure that fire fighters from the ventilation crew and the attack crew coordinate their efforts.
- A fourth person on a Ladder Company would greatly increase our ability to accomplish our tasks faster.
- Engineers or Officers must be allowed to finish tasks before being relieved from duty for Critical Incident Stress Debriefing (CISD).
- Radio communications training.
- Self-Contained Breathing Apparatus (SCBA) radio equipment upgrade

## **Resources**

- 1) Green Bay Fire Department SOG 203.33
- 2) Green Bay Fire Department SOG 202.07
- 3) NFPA
- 4) GBFD SOGS: 202.05 (2), (4-a-i), (4-b-iii); 203.33 (8)
- 5) NIOSH report F2002-06 Mar 07, 2002
- 6) Engineer Ladder 451 (Interview)
- 7) Act. Captain Ladder 451 (Interview)
- 8) Firefighter Ladder 451 (Interview)
- 9) After action Report

# FIREGROUND OPERATIONS

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## Communications

The recently implemented new apparatus numbering system caused communication problems during the incident. The three-number system, where only the second number in the series is needed for daily operations, causes excessive verbiage for the speaker and confusion for the listener. The system may have contributed to Fire Dispatch failing to send Engine 411 (RIC Engine) to the call. It is believed that the dispatcher “lost” Engine 411 in all the apparatus numbers.

Although the Brown County Communications Center chose not to participate in the analysis of the Edgewood Drive incident, there are observations and recommendations to help dispatch procedures in addition to reconsideration of the three-number system. On August 13, 2006, Engine 471 encountered several “dead spots” along Huron Road while en route to Edgewood Drive. This caused them to miss radio transmissions from the Edgewood scene that would have alerted them to the Mayday situation. These “dead spots” are caused by an inadequate number of repeater towers in the Brown County Public Safety Communications system.

There is also a lack of Standard procedures for communications with Fire Dispatch. Radio discipline as demonstrated on the Edgewood Drive incident is poor and must be addressed through analysis of our procedures and increased training on this vital topic.

Additionally, no written SOG Mayday communication procedures were in place on August 13, 2006.

***Lessons Learned** - The need to effectively communicate acquired knowledge and to ensure that beneficial information is factored into planning, training, and fireground activities.*

- Constant analysis of Company Officers first in size-up reports. After each incident, size-up must be critiqued for completeness and any deficiencies corrected. Recommend the adoption of the I.D.E.A.L acronym as the official format for first in reporting ; I- Identify arriving unit, D- Describe what you see, E- Explain what you are going to do, A- Assume or pass command, L- Let incoming units know what you want them to do.
- A thorough report should be given when command is passed. This report is best done face to face to ensure completeness and reduce radio traffic.
- When crews enter a structure they must report where they are entering, where they are going and give constant updates to location changes and when they exit. This will ensure that in case of emergency, the IC will know the last known location of that crew to facilitate a quicker rescue.

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- Fireground observations must be reported to the IC. Individual observations taken individually may not seem critical, combined observations from the fireground may identify safety issues for firefighters.
- Be specific when reporting a fireground observation. For example, if ventilation is needed -- be specific to what type of ventilation is needed and exactly where that ventilation must take place.
- Develop standard message formats and language.
- Increase training to include active listening, radio monitoring, overall communication, SCBA communications, and communicating under stress.

***General Recommendations*** – measures for consideration based on challenges revealed in this analysis which will improve the fire department’s ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.

- Return to the standard apparatus numbering system (Engine 1, Engine 2, Ladder 2 etc.).
- Recommend that Brown County make needed upgrades to the communications system, including more repeater towers.
- Develop SOG with Fire Dispatch to facilitate consistent and effective fire ground communications.
  - When there is a report of a working fire, that a dispatcher be assigned to monitor this radio traffic separate from other dispatching duties, to ensure no key fire ground transmissions are missed. Dispatch must have an in-depth understanding of the fireground environment to ensure their ability to triage messages according to their importance and re-broadcast any vital messages to all en route to, or at the scene.
  - Develop a joint Mayday communications procedure between the GBFD and Fire Dispatch.
  - During second alarm transmission for a Mayday, all stations and responding units must be alerted to the Mayday. Example; “A second alarm has been transmitted for a Mayday called at 438 Edgewood Drive. Units to respond are...”
- Promote the use of NIMS to reduce radio traffic. Creation of division and branch leader’s facilitates more face-to-face communication and maintains span of control for the Incident Commander.
- Develop a tiered message priority system. Keywords to prompt immediate action can be tiered based on their priority; for example, “Mayday” signals a life or death situation while “Urgent” may be used to signify a potentially serious

## **FIREGROUND OPERATIONS**

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problem. Such message headers prompt the crews listening priorities and radio discipline to ensure the message is not talked over.

- Develop written Mayday procedures as well as communication needs in a checklist format and added as a side bar to the Incident Command Worksheet.
- When a Mayday is transmitted, the Incident Commander announces to all on the fireground that a Mayday has been transmitted and immediately call for PAR to determine who is in trouble and to listen for further instruction.
- When Incident Command activates the RIC Crew, all pertinent information to the last known location of the missing firefighter(s), as well as any pertinent information to their situation be communicated to the RIC Team Officer. This will facilitate the creation of an Action Plan for the rescue.
- Once a PAR and RIC Team activation is done, Incident Command should notify dispatch to transmit a Second Alarm to the location for a Mayday.
- Recommend a Mayday policy be developed to include the use of the P.L.A.N. acronym. P- Person/persons in trouble, L-Location as best as they can describe, A-Actions they are taking, N-Needs for the rescue. Extensive training is needed so that under great duress the actions will be second nature.
- GBFD should conduct its own studies in Mayday Operations as to whether fireground operations communications should be switched to a separate TAC Channel during a Mayday to determine what makes sense for GBFD.

# FIREGROUND OPERATIONS

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## Accountability

At this incident the Incident Commander (IC) used the second-due Engineer as his Accountability Officer (AO). Incident Commanders on various incidents have used personnel from different positions as the AO. GBFD SOG 202.05 says that, on single alarm incidents, a paramedic from the responding Ambulance Company, who is not an officer, should act as AO.

There was a lack of accountability at times throughout suppression and rescue operations, partially due to a lack of communication between IC and company officers on scene. Multiple companies made multiple entries into and exits from the building at different locations within the structure. In addition, companies who notified the AO rarely reported where in the building they were taking their crews. These actions made the AO ineffective during parts of the operation.

Therefore, the IC did not have accountability of some crews at times during the incident. The Rapid Intervention Crew (RIC) was separated from their officer several times throughout the event, and the RIC officer did not maintain accountability of his crew verbally or visually.

Accountability was hampered by the use of the National Incident Management System (NIMS)-required unit numbering system. Several times during operations at this incident, companies misidentified themselves because of this system.

Lt. Wolff acknowledged the order from the IC to conduct a primary search of the first floor, but did not state when he entered the building or which search pattern he would use. Engine 451 Officer did not communicate that he was entering the structure, what direction he was going, or that his direction changed multiple times while inside.

When Ladder 451 initially reported the flashover and after the Mayday, the IC did not call for a Personnel Accountability Report (PAR). A PAR is required per GBFD SOG 202.05 whenever there is a report of a missing or trapped firefighter, or when there is an unexpected hazardous event at the incident.

In some cases, officers would direct an individual to complete a task independently and maintain communication with the individual. This was the case with the crew of Engine 421 during attempts to stretch hoselines to side Charlie of the structure. However, in other cases an Officer would go to accomplish some task on their own or with one other member while not informing the rest of the crew. In these cases, communication was not maintained. In one instance in particular, this led to two crew members (firefighter rank) entering the structure to

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attempt rescue after other members (Captain and Engineer) of the same crew had been ordered to exit the building due to structural concerns. In another instance, one crew was directed to enter the building to perform a final search, unknown to anyone, another crew entered at the same time, trying to accomplish the same task.

Throughout the early stages of the rescue attempts, there was a significant amount of confusion about who was actually missing. There was also confusion about how many people were missing and whether or not anyone had been rescued. Firefighter Melissa Spielman was said to be “down” in the garage even though she was not. It was not clear to personnel on the scene that the removal of Firefighter Brinkley-Chaudoir had been completed. Despite several requests early on, a Personnel Accountability Report was not conducted until late into the recovery effort. Adding to the confusion was the fact no transmission was heard from the Officer of Ambulance 451 that his crew was entering the structure.

Communication on the fireground is key to accountability, survival and efficient operations. If it is not reported that a rescue of a lost or trapped firefighter has taken place, personnel will continue to make extraordinary efforts to rescue the individual. This places them unnecessarily in harms way. When a firefighter is reported to be missing or “down” and truly is not, the same situation occurs.

Accountability during a high risk, high stress, hazardous event is paramount. While it is acceptable for an officer to allow personnel to function independently from their crew out of the hazard area, effective communications must be maintained. At the Edgewood incident, some crew members reported that their officer was unable to effectively communicate with Incident Command or other crewmembers, leaving the crew members to enter the structure in an attempt to locate their officer and assist with rescue efforts.

***Lessons Learned** - The need to effectively communicate acquired knowledge and to ensure that beneficial information is factored into planning, training, and fireground activities.*

- Command should try to find a location with a good line of sight so in the event of poor radio communications or other changing conditions, command can see what situations he and his crews are dealing with.
- Command should call a PAR as soon as possible to establish the status of on scene personnel as well as their location. As stated in GBFD SOG 202.05- PAR should be initiated at any report of a missing or trapped firefighter, or any sudden hazardous event at the incident (flashover, backdraft, collapse, etc.). Additionally, the Incident Commander should immediately request the next alarm assignment upon receipt of a Mayday<sup>1</sup>. This will assist with

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accountability officer staffing issues to be discussed below as well as general staffing shortages present at every fire scene<sup>2</sup>.

- Overall accountability cannot be accomplished without crew integrity. Company Officers MUST report their actions and location, especially when they differ from their initial assignment<sup>3</sup>. In particular the officer must report that the crew is entering the building, their task and location, significant findings and observations and “exit from the building/area/sector and destination.”<sup>3</sup> If crews are split into separate functional teams or an individual is assigned a task to accomplish separate from his/her crew, it is both the Company Officer’s and the individual’s responsibility to ensure communication and accountability<sup>3</sup>.

During extremely high risk activities, such as the deployment of a Rapid Intervention Team, all crews should remain intact. Strong leadership from company level officers is critical to ensure strict adherence to the orders of the IC and company officers to prevent further injury or loss<sup>2</sup>.

***General Recommendations*** – measures for consideration based on challenges revealed in this analysis which will improve the fire department’s ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.

- The accountability officer should, whenever possible, locate in a position that has a clear view of the primary point of entry.
- Depending on the size of the structure, increase the number of fire department apparatus responding to the initial fire call. Not all single or multi-family structures are alike. Some houses need an increased response due to the larger size.
- When a Mayday or emergency is called, request an additional alarm assignment immediately. With this assignment you will receive more Chief Officers, apparatus and more manpower to help delegate the workload of the emergency scene.
- Green Bay Fire Department should include Officer Development training and proficiency testing pertaining to fireground accountability operations.
- Accountability on the fireground is the responsibility of the Incident Commander<sup>4</sup>. An Accountability System should not only be able to tell the IC which units or personnel are in the building, it should be able to tell him/her where in the building each crew or individual is. Any system that cannot identify the whereabouts of an individual does not fulfill the goal of an accountability system<sup>5</sup>. All crews entering a hazardous environment must report their activities to the Incident Commander. They must include which direction

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they will go or any changes in direction. In turn, if this doesn't occur, Command should request this information for accountability purposes.

- While this task may be delegated, it should only be delegated to an individual experienced in incident management<sup>4</sup>. The person used to fill the accountability position should not be taken from an assignment that is or has the potential to become critical to fireground operations (i.e. personnel from any crew that may engage in tactical operations, including engine and ladder crew members)<sup>4</sup>. This individual should be located near the main point of entry for the attack and back up teams<sup>3</sup>. This type of "portal" control assures that most crews will have to go directly past the accountability officer to enter the structure. This allows the accountability officer to track crew movements and also prevent the "freelancing" in which crews often engage in an effort to help the victim<sup>2</sup>.
- Ideally, any person conducting the task of accountability should be a person of rank, capable of assuming control of a Branch or Division if necessary<sup>4,6</sup>. Specifically, this person should be considered a Chief's Aide or, at a minimum, a Field Incident Technician<sup>2,6</sup>. Due to obvious staffing issues, it may be necessary for both Battalion Chiefs to be dispatched on all fire calls. If the position of Division Chief of Training is available for response, he/she could also respond to fill this position or act as a safety officer. It may also be possible to use staff from the EMS or Fire Prevention Divisions for this purpose. The practice of staffing an accountability position in the aforementioned manner should not be limited to daytime, weekday only fire calls. This practice should be in place 24 hours a day, 7 days a week, regardless of cost.
- The GBFD S.O.G. 0202.05 states that on a "single alarm incident", the rescue company responding on the first alarm shall assign one paramedic, but not the officer, to serve as the accountability officer. This S.O.G. should be changed to indicate the recommendation that this person should be an officer<sup>3</sup>.
- At large scale incidents the accountability board and passport systems should be used as indicated in department SOG's. A tactical worksheet should also be utilized at these and any other incidents to aid the incident commander in tracking personnel<sup>3</sup>.
- Review of SOG 202.05. General issues such as the location and mobility of the IC, location and number of the AO(s), and the personnel assigned as the AO should be addressed. When this SOG review is complete, there should be

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training, both classroom and practical, for all GBFD personnel on this SOG. All officers should receive refresher training and practice on Mayday procedures.

- The number of personnel responding should be increased to allow the IC to assign personnel exclusively to Accountability Officer and Safety Officer positions.

## References:

- 1) GBFD Standard Operating Guideline 0202.01, Command/RIC, par. (D), 7, (d)
- 2) Sendelbach, Timothy E., Chief of Training, Salt Lake City Fire Department, Managing The Fireground "MAYDAY!" An Officers Perspective, [www.tes2training.com](http://www.tes2training.com)
- 3) GBFD Standard Operating Guideline 0202.05, Fireground Accountability
- 4) Wisconsin Dept. of Commerce Chapter Comm 30, Subchapter IX, Comm. 30.14 Emergency Operations, pars. (a), (b), (C), (d), (e), (f), (g)
- 5) Coleman, John (Skip) F., EFO, Battalion Chief, Toledo, OH., Accountability and the Incident Management System, PennWell Corporation, Tulsa, OK
- 6) NFPA 1710 Section A.3.3.37

# FIREGROUND OPERATIONS

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## **The Command Function: Strategy**

At the Edgewood Drive incident, initially the location of the seat of the fire was unknown. Crews entered the home because of the neighbor's report of a missing person. Moments later, size-up and entry crews determined the point of origin to be in the basement.

The following is an excerpt of an article written by the late Lt. Andrew A. Fredericks of FDNY: "When a fire is located below grade in a basement, cellar, or sub-cellar, the objectives of protecting the means of egress and quickly extinguishing the fire remain unchanged, but different tactics are required. The first hand line stretched at a basement or cellar fire must not be used to extinguish the fire. Rather, the first line should be brought to the top of the interior basement or cellar stairs to defend the upper floors against smoke and fire spread.

If the color and temperature of the smoke venting from the basement or cellar indicate a relatively minor fire, the first hand line can be advanced down the stairs and the fire extinguished. If the fire is larger, keeping the interior basement or cellar door closed is imperative and the first line will be used to prevent the fire from burning through this door. The second line will be advanced via an outside entrance to extinguish the main body of fire. If the only entrance to the below-grade area is inside the building (as is often the case with cellars and almost always the case with sub-cellars), the first line will have to be advanced down the interior stairs. The second line will then be used to hold a position at the top of the stairs to protect the personnel assigned to the first line and limit fire extension.

Below-grade fires may also permit an exception to using the front door for stretching and advancing the first hand line. It may be more expedient to utilize a side door if it provides ready access to the basement or cellar stairs. A proper size-up and knowledge of the residential buildings in your area will provide this information. Generally, the front entrance is still preferable."<sup>1</sup>

## **The Command Function: Delegation**

After Lt. Wolff and FF Brinkley-Chaudoir were trapped in the basement on Edgewood Drive by a floor collapse the Incident Commander was forced to try to manage both a fire that was out of control and a rescue effort.

A second alarm was not called until Chief 431 was contacted by Fire Dispatch and advised of the mayday situation. This delayed the separation of the fire suppression and rescue functions. Ladder 421 officer (second alarm assignment) was placed in charge of fire suppression efforts when he arrived. This was then transferred to Battalion Chief 431 on his arrival.

## **FIREGROUND OPERATIONS**

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With two firefighters trapped, both calling for assistance, a ladder company calling for assistance with the rescue, and a RIC calling for information related to the rescue, it was simply too much for one person. Several radio calls were unanswered. Command must be able to give direction and provide assistance immediately in the event of a Mayday. The commander must be able to direct trapped or lost firefighters who may be in a panic mode. He/She must be able to provide these individuals with self-preservation advice, and must also manage the RIC and provide them with the necessary information to make the rescue successful.

There was a lack of coordination between rescue and suppression crews. A Personnel Accountability Report wasn't conducted until approximately 40 minutes after the initial Mayday. A second alarm wasn't requested until the second Battalion Chief was notified of the incident, and management of the fire suppression operation was not handed off to another officer until after Ladder 421 arrived on the second alarm. For a period of time, the suppression operation was allowed to continue on its own, independent of the rescue attempts.

### **The Command Function: Mobility**

The Incident Commander (IC) was stationed in a command vehicle located in a driveway southwest of the structure. From this position, the IC had limited vision of the fire scene and could not see the smoke issuing from the eaves and ground-level vents. This condition was present prior to crews entering the building and was noted by several personnel on scene, however it was not communicated. The smoke conditions may have indicated that the fire had possession of more than one floor of the structure. Only the Alpha and part of the Bravo sides were visible from the IC's position. Additionally, the IC may not have been aware of tasks that fire companies had already accomplished.

Brownish-yellow smoke appeared to be issuing from an elevated point on the structure, possibly the eaves, on arrival of Engine 421. This was noted from the Engine's vantage point on the driveway. This smoke would have been blocked from Command's view by the line of trees between the command vehicle and the fire building. This condition should have also indicated that the fire may be deep-seated, involving structural members and extended farther than originally thought.

This structure was far larger than it appeared from the street and was also situated on an oddly shaped lot. The terrain was heavily sloped, congested with landscaping and very difficult to maneuver in. If a 360° size-up had been conducted and properly communicated, the IC may

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have known that there were several windows available to crews for use during rescue attempts. The IC may have chosen to direct the RIC (Engine 411) to these windows instead of having them search for a way to get in the basement.

A view of the Charlie side of the structure would have shown the nature of the structure and geography, including several windows on all levels of side Charlie that could have been used more effectively for fire suppression operations.

By limiting his visual perspective of the incident, command was forced to ask redundant questions to gather information or issue redundant orders. After Engine 451 states that they have no water and need to back out, the IC can be heard saying “Engine 421, Get a line in that building!” (paraphrased). The line the IC was ordering was already in place and had been for several minutes. The IC also repeatedly asks the RIC (EN411) if they are in the building yet. Unnecessary radio transmissions should be avoided at all costs when a “Mayday” has been initiated. All of this information could have been gathered visually by strategically placing the command post in a different location, specifically in front of the structure.

### **The Command Function: Tactical worksheet**

There was no evidence that a Tactical worksheet was properly utilized at the Edgewood Dr. fire. If used, this may have provided a second line of accountability and aided future IC’s with strategy information. At times, the IC was unaware of the actions of individual crews on scene, and no information from early in the event was recorded for reference later. Some of the tasks listed on the tactical worksheet were not assigned. For example, the actual time of the Mayday was not documented on a tactical worksheet.

***Lessons Learned** - The need to effectively communicate acquired knowledge and to ensure that beneficial information is factored into planning, training, and fireground activities.*

- The best tactic for a lost or trapped firefighter is to create a “defensible” area around them. An area cannot be considered “defensible” if fire has taken control of it or threatens the space. The creation of this “zone of survivability” requires a well-managed, carefully orchestrated fire attack that is coordinated with rescue efforts.
- A second manned attack hoseline should be established to provide back-up for the initial attack line to assist with fire extinguishment and fire fighter rescue. The National Fire Protection Association (NFPA) and the Occupational Safety and Health Administration recommend that four persons (two-in and two-out), each with protective clothing and respiratory protection be provided when interior operations are taking place.

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- A rapid intervention crew should be established to effect fire fighter rescue. NFPA 1500, 6-5.2 states "A rapid intervention crew shall consist of at least two members and shall be available for rescue of a member or a team if the need arises. Rapid intervention crews shall be fully equipped with the appropriate protective clothing, protective equipment, SCBA, and any specialized rescue equipment that might be needed given the specifics of the operation under way."<sup>2,3,4,5</sup>
- Any interior stairwell leading to the basement should be considered suspect at best. The type of basement should also be considered during size up. Exposed or "Walk Out" basements should be attacked from the exposed area if possible, as well as the option of a stairwell leading from the garage into the basement. The first in attack line may need to advance into the first floor of the structure to locate and secure the stairwell while the back up line attempts to access the basement from the exterior<sup>6</sup>. EXTREME CAUTION must be used as this crew may be operating above the fire. This crew must use proper floor sounding techniques and should attempt to operate from a relatively safe area. It may not be possible for this crew to advance down the steps due to the chimney like effect of the stairwell.
- The SOG's of the GBFD should reflect that no attack crew should enter a building without an adequately manned hoseline in place.
- All personnel should be instructed as to the warning signs of imminent danger that may be found during a 360° (including the practice of "reading smoke") and how to communicate to all companies on scene.
- In the event of a Mayday, the time of the Mayday call should be documented in order to monitor the air supply of the lost or trapped individual. The most critical element to the survival of a firefighter in a Mayday situation is the amount of remaining air in their SCBA tank.<sup>7,8</sup> If enough time has elapsed and it is no longer likely that the firefighter has air remaining, rescue personnel should not be forced to endure undue risk.

***General Recommendations*** – measures for consideration based on challenges revealed in this analysis which will improve the fire department's ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.

- Any employee of the GBFD who may function in an Incident Command role or in the role of a Section Chief within the Incident Command System should undergo additional training related to the National Incident Management System (NIMS), specifically span of control theory. Personnel should adhere to the practice of maintaining a manageable span of control at all times as outlined

## FIREGROUND OPERATIONS

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in the NIMS. Personnel should also be trained to understand what a manageable span of control is. It is critical that all Command and General staff positions understand that as incidents intensify and become more dangerous, the span of control must be reduced.

- Due to the time sensitive nature of rescues, whether civilian or firefighter, personnel must be on scene quickly enough to support the operation. Command cannot manage suppression, rescue and accountability without immediate assistance.<sup>7,8,9,10,11</sup> The GBFD must ensure that enough personnel are placed on scene within acceptable time limits to complete all necessary tasks, including Command of the incident. The GBFD should employ personnel to function in the role of Chiefs Aide or Field Incident Technician to provide immediate assistance to Incident Commanders.
- In order to assist with the delegation of workload, tactical worksheets for both the IC and the Chiefs Aide or Field Incident Technician should be developed and utilized. These sheets should divide the tasks assigned to each person during a fire and in the event of a Mayday. If certain tasks are delegated to the Aide or Technician, a full delegation of authority for those tasks must be in place.
- Delegation of these tasks should be implemented immediately to ensure that all necessary tasks are completed. The IC or his designee should immediately request the next higher alarm as soon as a Mayday is received.
- To maintain a proper span of control, additional division/groups need to be created in Mayday situations as well as other complex operations. The basic NIMS training required by the Department of Homeland Security alone, is inadequate. There should be an emphasis on command structure education for all officers.
- Hands On Training for all fireground personnel related to command structure and implementation of task development
- The concept of having a “tactical reserve” available on scene must be introduced to the department and utilized on all emergency scenes, including the adoption of a mutual aid system with neighboring departments. This system should include agreements on staffing, training, equipment and tactics to the extent possible. Specifically, the department should immediately implement the Mutual Aid Box Alarm System as approved by the State Legislature. At a minimum, the department should work with other county departments to create and adhere to a “Best Practices” document outlining countywide fire scene actions and resources agreed upon by all county departments. This document should include language referencing the provision of assistance to other departments or receiving assistance from other departments. The “Best

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Practices” document should be modeled after the “Brown County Public Safety Highway Incident Emergency Management” best practices document that was adopted March 18, 2007 by the Brown County Fire Chiefs Association.

- All Command level officers should be required to attend training on vehicle positioning, radio procedures and effective communications techniques. This training should include a review of GBFD SOGs and industry standards. Commanders should review the importance of being able to visualize the fireground and be given the latitude to be somewhat “mobile” on the fireground.
- As stated in IS 100, IS 200, IS 300, IS 400 and IS 700, Incident Commanders should utilize a tactical worksheet to assist with incident management.<sup>12,13,14,15.</sup> This helps the IC to remember all of the necessary components of incident command.<sup>16</sup> It can also help to assist in the management of personnel (accountability).<sup>16</sup> If so designed, tactical worksheets can include information for incident commanders to utilize in the event of a Mayday. Information such as key actions to take or questions to ask of the lost or trapped individual can be added to these sheets.
- All command level officers should receive training on the use of tactical worksheets and be required to submit one after each incident as part of the incident report.

## References

- 1) Fredericks, Andrew A. Handline Placement, Fire Nuggets, August
- 2) 29 Code of Federal Regulations 1910.120(q)(3), Hazardous Waste Operations and Emergency Response. (Incident Command, Two-In/Two-Out Rule, Communications).
- 3) Essentials of Fire Fighting, 3rd edition, Fire Protection Publications, 1998.
- 4) National Fire Protection Association. NFPA 1500, Standard on Fire Department Occupational Safety and Health Program. NFPA, Quincy, MA. (Back-Up Hose Crew, Rapid Intervention Team) 1997 Edition.
- 5) NIOSH Fire Fighter Fatality Investigation and Prevention Program, Report #F1998-06
- 6) Pressler, Bob Basement Fires, Fire Engineering, June 1998.
- 7) Sendelbach, Timothy E., Chief of Training, “Managing the Fireground “MAYDAY!”, An Officers Perspective.”, [www.tes2training.com](http://www.tes2training.com)
- 8) U.S. Fire Administration/Technical Report Series, Special Report: Rapid Intervention Teams and How to Avoid Needing Them, pg 35, par 1, line 2, USFA-TR-123/March 2003
- 9) National Fire Protection Association. NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, Ch.8, sec 3, par 11, National Fire Protection Association, Quincy, MA. 1997 Edition.
- 10) Unknown Author, Understanding Rapid Intervention, page 5, par 5
- 11) Los Angeles Fire Department, Rapid Intervention Company, Fireground Safety & Incident Accountability
- 12) NIMS, IS 100
- 13) NIMS, IS 200
- 14) NIMS, IS 300
- 15) NIMS, IS 400
- 16) Coleman, John F. “Skip”, Incident Management for the Street-Smart Fire Officer, Ch. 4, pages 54-55, PennWell Publishing, 1997

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## **Initial Rapid Intervention Crew (IRIC)**

On Edgewood Drive, there was no Initial Rapid Intervention Crew (IRIC) in place prior to the attack team entering the structure. The attack line was taken in by the first due Engine Company. It is believed that the officer of Ambulance 451 deployed a 2 ½” attack line to the front door prior to entry; however, this line was not taken in to the structure nor manned at the time of entry.

It is further believed that a neighbor reported to the engineer of Engine 451 that an occupant was still inside the building. It is unclear what lead the neighbor to believe this.

## **Rapid Intervention Crew (RIC)**

The initial dispatch for the fire at 438 Edgewood Drive included Engine 451, Engine 421, Ladder 451, Ambulance 451, and Battalion Chief 411. According to the Green Bay Fire Department SOG, for structural fires, there is a completed response of 3 engine crews, 1 ladder crew, 1 ambulance crew, and 1 Battalion Chief. The Brown County Communications Center failed to dispatch the third engine crew on the initial dispatch of this fire. The third responding engine crew is responsible for critical tasks including the assignment as a RIC. There was an estimated time delay of 4 to 5 minutes that resulted before the third engine (EN411) was dispatched.

Joint training between the Brown County Communications Center and the GBFD should be carried out at least once a year. If the incident goes to a second alarm and an additional engine crew is dispatched for the purpose of a second RIC, that crew must be notified by dispatch of the incident in progress. It is unknown at this time if Engine 411 was lost in the transmission due to all the apparatus numbers that are listed during a dispatch.

The RIC (EN411) had a late arrival on the scene. As a result of this error, several necessary tasks were not in place prior to the initial Mayday transmission. The team was deployed within 60 seconds of their arrival at their staging area, which didn't allow for the necessary 360° size-up of the fire scene prior to making entry into the involved structure, to learn building layout, exit locations, and the entry location of the crew that initiated to mayday. Though all required RIC equipment was placed in the staging area, a designated RIC hand line was not placed prior to the RIC deployment and consequently added to the delay. A hand line was deployed and was necessary for this rescue due to heavy fire conditions.

Ultimately, it was a crew who was not assigned to RIC operations who made contact with Firefighter Brinkley-Chaudoir and assisted her from the building. While it is hard to argue a

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strategy that ultimately ended up being successful, it should be noted that two rescue operations were being conducted independently of one another with no coordinating oversight from Incident Command.

***Lessons Learned*** - *The need to effectively communicate acquired knowledge and to ensure that beneficial information is factored into planning, training, and fireground activities.*

- Reinforce SOGs that state an IRIC “shall be two on scene members designated and dedicated as the initial rapid intervention crew”<sup>1</sup>. This portion of the SOG should be followed at any emergency incident.
- GBFD SOG’s states that “No entry shall be made into an ‘Immediately Dangerous to Life and Health’ (IDLH) atmosphere unless a minimum of five (5) members have assembled on scene.”<sup>2,3</sup> The standard exception to this rule are: a)When there is a life hazard where immediate action could prevent the loss of life, or b)When the fire is in the incipient stage. It also states that the officer is responsible for determining if either of those two conditions existed prior to entry. It further defines the roles of each individual if an entry is made under these circumstances.<sup>2</sup> Reinforce that SOG should be adhered to at all incidents where it is applicable. The department should offer more guidance and conduct further training on what constitutes a life hazard as stated above, and as outlined in OSHA & NFPA Standards.

***General Recommendations*** – *measures for consideration based on challenges revealed in this analysis which will improve the fire department’s ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.*

- The SOG’s state that the “incident commander is responsible for assigning at least two (2) members, four (4) preferred, to serve as a RIC at any emergency incident”. GBFD SOG 0202.01 should be changed to more clearly define the differences between an IRIC and RIC. The SOG should also be changed to state that a minimum of four (4) personnel shall be assigned to a RIC<sup>5</sup>. Training should also be conducted with all fire department personnel with regard to the differences between an IRIC and RIC.

### **References**

- 1) GBFD S.O.G. 0202.01, Command/RIC
- 2) GBFD S.O.G. 0203.35 Two-In/Two-Out Rule
- 3) Wisconsin Dept. of Commerce Chapter Comm 30, Subchapter IX, Comm. 30.14 Emergency Operations, pars. (a), (b), (C), (d), (e), (f), (g)
- 4) 29 Code of Federal Regulations 1910.120 (q)(3), Hazardous Waste Operations and Emergency Response. (Two-In/Two-Out Rule)

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- 5) U.S. Fire Administration/Technical Report Series, Special Report: Rapid Intervention Teams and How to Avoid Needing Them, USFA-TR-123/March 2003

## Urban Search and Rescue (USAR) Operations

On August 13, 2006 Battalion Chief Truckey and Lt. Sponholtz started operations with a 360° size up at 1600hrs. Ten additional members were added to round out the shoring and search teams.

### USAR Command Structure;

- USAR Command-Truckey
- USAR Operations- Quigley
- Cut Team-Gibbons, Wolf, Conard, Ridings.
- Runners-S. Allen, Daul, Weddle
- Entry-Goplin- Lucier Sponholtz- Sellin.

The first USAR entry team set Paratech shores to support a cantilevered wall section and performed search operations. The second team set additional shores and continued to search with the help of GBFD personnel. DCI also assisted in the search operations. A transit was setup to monitor the unstable masonry chimney. One USAR member was stationed at the transit throughout the entire operation.

Lt. Arnie Wolff was located and removed by USAR members at 0220 hrs. on August 14, 2006.

### Resources:

- 1) Accountability Officer Lt Edward Jarosz notes.
- 2) Brown County Dispatch incident recall text.
- 3) GBFD Incident report

***Lessons Learned*** - *The need to effectively communicate acquired knowledge and to ensure that beneficial information is factored into planning, training, and fireground activities.*

- Develop process/SOG to determine possible ways to deliver additional lumber to the scene
- Make state officials aware of the importance of USAR resources.

***General Recommendations*** – *measures for consideration based on challenges revealed in this analysis which will improve the fire department’s ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.*

- A paging system needs to be implemented to notify USAR members of incidents.
- A larger trailer needs to be purchased to carry more supplies.

# STANDARD OPERATING GUIDELINES

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## Chapter 5

# STANDARD OPERATING GUIDELINES

Chairperson: FF Drew Spielman

FF Bob Goplin

Ben Rank

Lt. Bob Wiegert



## STANDARD OPERATING GUIDELINES

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The Edgewood Standard Operating Guideline Committee conducted a thorough and exhaustive review of all GBFD SOGs. This report is intended to serve as a starting point for further analysis and action. The committee reviewed reports submitted by personnel present at the incident, current SOG's and the list of questions or suggestions created from the forum on December 18, 2006. Interviews were also conducted with on-scene personnel in order to more fully understand the events of that day. As a result of this process a list of pertinent SOGs was generated for review.

The following SOG's were reviewed:

- ❖ 0202.01 Command/RIC
- ❖ 0202.05 Fireground Accountability
- ❖ 0202.11 Incident Command System
- ❖ 0202.13 Incident Critique
- ❖ 0203.29 Rapid Intervention Crew
- ❖ 0203.33 Structure Fires
- ❖ 0203.35 Two In/Two Out
- ❖ 0203.45 Water Supply
- ❖ 0205.05 Hoseload/Speedlay
- ❖ 0701.01 Dispatch Procedures (Draft)
- ❖ 0701.03 Notifications
- ❖ 0701.09 Emergency Recall

The committee strongly recommends immediate action to update and improve all of the SOGs listed above. Additionally, the committee recommends that priority be given to the following SOGs:

- ❖ 0202.01 Command/RIC
- ❖ 0202.05 Fireground Accountability
- ❖ 0203.29 Rapid Intervention Crew
- ❖ 0203.33 Structure Fires
- ❖ 0203.35 Two In/Two Out

Furthermore, the absence of SOGs in the areas of Mayday Transmissions, Emergency Radio Traffic and Dispatch Procedures along with Radio system failures contributed to the tragic events of the incident.

The following is a summary of the issues related to SOGs found to have contributed to the events of August 13, 2006:

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- ❖ Several SOGs were not followed in their entirety.
- ❖ Several SOGs do not reflect current GBFD operational practices
- ❖ Several SOGs do not reflect the current structure of the department
- ❖ Several SOGs have not been finalized after being in draft form for over 6 years.
- ❖ SOGs have not been developed for practices routinely engaged in by the GBFD such as Mayday, TIC use and Emergency/Urgent Radio Traffic, etc.
- ❖ SOGs and practices that reflect current and accepted industry standards have not been developed and implemented by the GBFD.

***General Recommendations*** – measures for consideration based on challenges revealed in this analysis which will improve the fire department’s ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.

- Detailed recommendations for GBFD SOGs are outlined on the following pages. It is important that the department address these issues in a timely fashion. Moreover, the SOGs must be truly “Standard”, meaning that they are applied uniformly for all apparatus, personnel and incidents.

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S.O.G 0203.29 Rapid Int. Crew	Special Notes: S.O.G.'s 0202.01, 0203.29 and 0203.35 should be combined into one Rapid Intervention Crew S.O.G.
Line:	Change:
D2	Change Min. personnel to 4
D2,b	Strike, this leads some officers and firefighters to believe that they can't do <b>ANYTHING</b> if they are assigned to RIC
D3	Strike all current language, Replace "The 3rd arriving Engine shall be utilized as the RIC. The IC is responsible for deploying the RIC as needed."
D6, ii)	Strike, no longer reflects the current operations of the Green Bay Fire Department
D7	<b>Strike first line</b>
D8	Add "RIC equip shall not be used for any purpose other than RIC operations or the support thereof."
D9, b	Add "The RIC officer shall maintain knowledge of crew locations. The Accountability officer and RIC officer shall be in close proximity to each other to facilitate rapid communication if necessary.
D9, c	Change to "The RIC should deploy near the attack teams point of entry, unless better access is available elsewhere."
D9, d	Strike "in their assigned area." This should be done to eliminate the possibility that the RIC will feel restricted. Also, the entire fireground may be their assigned area if they are the only RIC.
D11, e	Strike. The RIC officer should be assessing the structure, listening to the radio and positioned near the attack teams point of entry, not positioned near the command vehicle
D12, c	strike, place in IC S.O.G. or in a new combined S.O.G.. Also, the current language makes it sound like the officer will be assuming command of a "Sector", this is not the case.
Equipment Checklist	Review when changes are made, this list is not correct for the current equipment either

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S.O.G. 0202.01 Command/RIC	Special Notes: S.O.G.'s 0202.01, 0203.29 and 0203.35 should be combined in to one Rapid Intervention Crew S.O.G.
Line:	Change:
D2	Change to "The 3rd arriving Engine shall be utilized as the RIC. The RIC shall consist of 4 personnel." The IC will then know that a RIC is assigned regardless of verbalization, provides less to worry about.
D2, a	Change the first line to coincide with the change to D2, remove portion that says the "composition" will be "flexible"
D2, b	Strike, this leads some officers and firefighters to believe that they can't do <b>ANYTHING</b> if they are assigned to RIC
D3	Strike the first sentence and replace with "The determination of assigning additional RIC's shall be the responsibility of the IC. All RIC's shall consist of 4 personnel."
D6	<b>strike last sentence: "The RIC shall be either:"</b>
D6, I	Strike
D6, ii)	Strike
D7	completely review D7, this entire section should be re-written, a "Mayday Checklist" should be added to the departments tactical worksheet
D7, a	<b>Change to state that IC should attempt to contact the lost or trapped ff, designate RI and suppression group supervisors, request second alarm, define roles, reference Phoenix mayday S.O.G.</b>
D7, c	Strike, will be referenced in D7, a. A PAR should occur much sooner than this, this must be moved up in the order of things to do.
Incorrect numbering	Change the second D6 to D8 and the second D7 to D9

## STANDARD OPERATING GUIDELINES

S.O.G. 0202.05 Fireground Acct.	Special Notes: Possibly rename to "Incident Scene Accountability"
Line:	Change:
D1, e	change to "All members <u>shall</u> be equipped with a radio and the radio <u>shall</u> be turned on with the volume up while operating at an emergency scene."
D3, a, ii)	change to simply say that names will be on helmets, this reflects current operations and covers both traditional and contemporary helmets
D3, b	Note to stress importance of using this system in the final report. This system should be changed to coincide with MABAS requirements.
D3, c, I)	change the phrase "collected and the" to "utilized by"
D3, c, ii)	<b>Add "The clipboard shall be utilized for accountability tracking." This is the same as the current numbering system, if we don't use it on the small stuff, we won't know how on the big stuff.</b>
D3, c, iii)	Change to "The accountability board shall be used at all incidents by the IC, sector officer or accountability officer." Same argument as D3, c, ii) above.
D3, d	strike, this is no longer necessary as all personnel now have a radio
D4, a, I)	<b>Change to "Single Alarm Incidents: The second arriving battalion chief responding on the first alarm shall serve as the accountability officer." Both Battalions should be dispatched on all fires.</b>
D4, a, iii)	Strike to reflect the change in D4, a, I) above. This is not currently the practice of the department anyway.
D4, a, iv)	<b>Change to "Light Duty Assignment: If an officer on light duty is to act as the accountability officer, the battalion chief should make this known to the other responding Battalion Chief while enroute."</b>
D4, b, I	<b>Strike, this has never been done and most likely never will be as crews are typically engaged in firefighting, the accountability officer collects the tags and usually that doesn't happen either</b>
D4, b, ii	Strike, see above. These tags should be used as a true "passport" at the time of entry, see below
D4, b, iii	change to "The Accountability Officer will be located in close proximity to and with a clear view of the primary point of entry."
D4, d, ii, f	Change to "Any time command or an on scene company requests."
D4, e, I	Change to "Refer to RIC S.O.G.", refer all of d4, e, I to the RIC S.O.G.
D4, e, ii	move to RIC S.O.G.
D5	Change to "The Passport system shall remain in effect for the duration of the incident."
D6	Strike entire section, this common sense. They have never entered the hazard zone, unless the truck they are on enters the hazard zone.
D7, b	Strike for the same reasons as D4, b, I)
D7, d, ii	strike the engineer portion of this line to be consistent with above recommendations

# STANDARD OPERATING GUIDELINES

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<b>S.O.G. 0202.11 Incident Command</b>	<b>Special Notes: Change any terminology that is not NIMS compliant</b>
Line:	Change:
C3	Change to "All Clear: Indicates completion of the primary search."
C7	Non-compliant terminology, use NIMS terminology of Division or Group
C8	Change to alpha, bravo, charlie, delta. The letter "B", "C", and "D" all sound the same on the radio. The phonetic designations eliminate confusion.
D3, b	Change to "Building description including size, type of construction, occupancy and arrangements."
D3, c	<b>Add and define the terminology to be used: "Nothing showing", "Smoke showing (light, moderate, heavy and location)", "Fire Showing (light, moderate, heavy and location)"</b>
D3, d	Add whether or not a water supply has been secured. Use "We have water" or "We need water" as the terminology. See water supply S.O.G. recommendations
D4	<b>Change to "The radio designation "Command" shall be used. A brief description of the incident location ("Day Street Command or "Port Plaza Command") <u>shall be used at all incidents.</u></b>
D5, b	Change to "Life Safety Mode:..."
D6, b	<b>This portion of the S.O.G. must be enforced with Battalion Chiefs, too many of them "take" command from the "Commander" on arrival, this is not allowed in Incident Command, for good reason.</b>
D7, a	<b>This portion of the S.O.G. must be enforced with Battalion Chiefs, they are not utilizing the tactical worksheets. Again, if they don't on the small stuff, they won't know how on the big stuff</b>
D8, a	Note that more command staff is often needed at our incidents, we are not in compliance with our own S.O.G.
D8	This section in general should be changed so that the terminology is NIMS compliant, ("Division", "Group", "Branch" etc.)

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S.O.G. 0202.13 Incident Critique	Special Notes:
Line:	Change:
A	Change to "To describe the procedures for conducting a post-incident analysis."
D2	Change to include other people sitting in but not allowed to participate other than asking questions for clarification of information.
D4	<b>Change the department policy on photographing scenes so that photos may be available for analysis. It is difficult to utilize or obtain worth while photographs if you are strictly prohibited from taking any.</b>
D5	Allow this portion of the S.O.G. to be utilized, this was denied to personnel during the Edgewood fire even after the investigation was over
D6	<b>Add a line to say that a "Lessons Learned Report" SHALL be completed for all PIA's and distributed to all stations, review of these reports by all crews should be mandatory</b>

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S.O.G. 0203.33 Structure Fires	Special Notes: This S.O.G. should be re-written to incorporate seating assignments including functions and tools, dependant on arrival order and structure type
Line:	Change:
C2	Change Primary All Clear to simply "All Clear"
Add C4	Add a line to reference a "Secondary All Clear"
D1, a	State that "all personnel" shall wear full protective clothing if they are in the "hazard zone". It is then implied that those out of the "hazard zone" do not need gear.
D1, c	Add that all companies will state that they are entering or exiting the building, reference the accountability S.O.G.
D2, a through d	<b>All personnel, including Battalions, must be trained to comply with this section of this S.O.G., this should be in-depth training, including hands on evolutions (Examples of Non compliance include Edgewood and 1691 E. Mason St.</b>
D2, b	Consider shortening the Emergency message, it may be too wordy
D2, c	add language to instruct crews that non-essential equipment should be abandoned in the event of an emergency evacuation
D2, d	State that "Command shall conduct a PAR in the event of an emergency evacuation"
D3	Strike this section, it does not really apply to this S.O.G., it should be in S.O.G. 0202.15
D4	Address having redundant water supplies in the event of a system failure (hose rupture, water main break, pump failure), incorporate 4 way hydrant valves
D4	Insert language so that this section of the S.O.G. coincides with 0203.45 Water Supply. Recommended changes to that S.O.G. are indicated below.
D5, a	The importance of this statement should be re-emphasized to crews in training.
D5, b	The importance of this statement should be re-emphasized to crews in training. A line stating that officers should consider the use of hoseline during search should be added
D5, f	add here or create D5, g to include the use of thermal imagers for S & R and tagline usage
D6, a	add that the fire location and extend must be communicated to all crews
D6, a	The statement "Do not operate fire streams into smoke." must be eliminated, this is standard practice in flashover avoidance, delaying flashover allows escape
D6, a	add a 360 degree survey to this section

## STANDARD OPERATING GUIDELINES

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S.O.G. 0203.33 Structure Fires	Special Notes: This S.O.G. should be re-written to incorporate seating assignments including functions and tools, dependant on arrival order and structure type
Line:	Change:
D6, b, ii)	add building construction to this section
D6, b, iv)	consider using the "A.D.U.L.T.S." acronym for determining when to use 2 1/2" attack lines.
D6, c	strike the size of the attack line, state that "there will be an attack line and a back up line, the back up line will be the same size or larger than the attack line."
D6, c	state that the attack will be directed at the base of the fire with a straight stream
D6, d	Consider "A.D.U.L.T.S." acronym. Add guidance on selecting 2 1/2" lines on newer construction or homes of significant size
D6, e	Add this section: "When an apartment building, hotel, industrial, large residential or long set back is involved the officer should consider the use of the lead line."
D7, a	remove the line: "Engine companies do their work with hose lines; ladder companies do their work with tools." It serves no purpose and is excess verbiage
D7, b, iii)	add: "refer to S.O.G. 0203.33 (5)"
D7, c	Strike this entire section, it is pointless. This should apply to all personnel and should be common sense.
D8, b	refer to recommended update of S.O.G. 0205.05 D4, a, I)
D8, c	<b>add this line: "If personnel from the first arriving Ambulance crew are to be utilized for firefighting operations, a second ambulance shall be dispatched to provide on scene medical care."</b>
D8, d	<b>Add this line: "A second ladder company shall be dispatched non priority to all fire calls and shall be upgraded if smoke, flames or any other hazard is indicated by the first arriving FD unit." (this may be better suited to a different location or S.O.G.)</b>

# STANDARD OPERATING GUIDELINES

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S.O.G. 0203.35 Two-in-Two-out	Special Notes: S.O.G.'s 0202.01, 0203.29 and 0203.35 should be combined in to one Rapid Intervention Crew S.O.G.
Line:	Change:

## STANDARD OPERATING GUIDELINES

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S.O.G. 0203.45 Water Supply	Special Notes:
Line:	Change:
D1	In the first sentence, change the word "may" to "should"
D1	strike text that starts with "It is the responsibility of each engine..." through the end of the paragraph,
D2	<b>Insert new line, "The first in engine shall indicate the water situation by stating "We have Water" or "We need Water". If water is needed the second in engine Shall secure a water supply."</b>
D3	Insert new line, "The third in engine shall secure a secondary water supply if one has not been established."
D2, a	<b>This line will become D4, a. Change the wording to reflect that there is no such thing as a storz to 2 1/2" adapter on our rigs, this should say that it will contain a 2 1/2 to 3 1/2 adapter.</b>

# STANDARD OPERATING GUIDELINES

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<b>S.O.G. 0205.05 Hose Load-Speed Lay</b>	Special Notes: This S.O.G. should include procedures for all hoseloads presently in use
Line:	Change:

# STANDARD OPERATING GUIDELINES

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<b>S.O.G. 0402.03 Breathing Air System</b>	Special Notes: Add Ladder 5 Breathing Air system and procedure to address CO alarms on the compressor
Line:	Change:

# STANDARD OPERATING GUIDELINES

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<b>S.O.G. 0701.01 Dispatch Procedures</b>	Special Notes: This S.O.G. should be written with input from the Dispatch center.
Line:	Change:

# STANDARD OPERATING GUIDELINES

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S.O.G. 0701.03 Notifications	Special Notes:
Line:	Change:
D2	Change to reflect the Division Chief rank of the department safety officer
D2	add to notify the safety officer on Any working fire, any haz mat event, any shooting incident and all incidents listed under the Chief and Asst. Chief notifications

# STANDARD OPERATING GUIDELINES

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S.O.G. 0701.09 Emergency Recall	Special Notes:
Line:	Change:
D4, b	change to state that the chief officer shall assist with the deployment of additional resources instead of callback procedure

# Chapter 6

## TRAINING

Chairperson: Captain Eric Johnson  
Firefighter Bob Goplin  
Firefighter Tony Piontek  
Firefighter Melissa Spielman



# TRAINING

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## **Firefighter Training**

The training sub-committee was tasked to research and provide recommendations with regard to the fire department's training needs identified by the Edgewood Drive incident.

Isolating specific training issues to this incident was difficult. We believe that training issues identified at an emergency incident are present before the incident occurs. It is suggested by the Committee that the "Train as you Fight" motto the United States Army uses could be used by the Green Bay Fire Department in its mission to train its personnel.

To Arnie and Jo – what you endured and sacrificed that day will never be forgotten. Your energy has been absorbed by us, so that present and future members of the Green Bay Fire Department will have the education and training needed to ensure we are able to go home at the end of each shift.

***Editor's Note:** GBFD firefighters meet minimum training requirements mandated by the State of Wisconsin. Refresher courses, annual reviews, and additional training in specific subject areas have been limited by the resources (training personnel) available.*

**Lessons Learned** - *The need to effectively communicate acquired knowledge and to ensure that beneficial information is factored into planning, training, and fireground activities.*

- Ensure that all personnel understand parameters under which a Mayday should be initiated and use a standardized format for communicating a Mayday, including the possibility of radio failure. All personnel must also understand their role when a Mayday is called.
  - Initial and annual required training for Mayday parameters, self-rescue, calling procedures
  - Creating a Mayday SOG for GBFD and the Brown County Public Safety Communications to include scenario-based training
  - Annual required training in SCBA emergency operations
  
- Make RIC Operations more efficient and effective from Command to the actual RIC company. IRIC and RIC training department wide including:
  - Annual hands-on training on RIC activities to include battalion chiefs and dispatchers
  - Training on necessary support functions to facilitate a firefighter rescue

## TRAINING

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**General Recommendations** – measures for consideration based on challenges revealed in this analysis which will improve the fire department’s ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.

- Ensure that all personnel (from Dispatch to officers to firefighters) use a standardized, efficient communications model and understand the use of all communications equipment, including:
  - Assure all personnel have voice amps and portable radios in place at shift change
  - More thorough exchange of information at shift change
  - Add retractable radio microphone clip to required equipment list
  - Annual required training on radio equipment operations and proper etiquette
- Ensure that Officers of all levels receive training (Officer Development) and can demonstrate proficiency in the requirements of their position and have a working knowledge of the functions of the ranks below them. In addition, personnel expected to work at higher ranks should receive training in the responsibilities of those ranks.
  - Provide certified Fire Officer I training for all officers and engineers
  - Provide certified Fire Officer II for captains and ranks above
  - Emphasize training on strategy/tactics so all personnel have a more comprehensive & consistent Action Plan for incidents
  - Review of incidents during morning roll call
  - Develop seat assignments procedure for all positions and for all types of incidents
  - Conduct intensive, scenario based training that places officers in a situation where they must make decisions under extreme pressure
- Ensure that all personnel receive proper training and can demonstrate proficiency in all levels of responsibility and in the responsibilities of the next higher rank.
  - Create minimum standards for out-of-grade Acting Battalion Chief
  - Develop a “roadmap” for personnel to prepare them for career development – manuals for out-of-grade study, division specific expectations, etc.
  - Use of tabletop, scenario-based training for all ranks
  - Increased use of acquired structures for training
- Recommendation to move to Competency-Based Training
  - Job Performance Requirements (JPRs) in NFPA 1001 Standard for Fire Fighter Professional Qualifications, NFPA 1002 Standard for Fire Apparatus Driver/Operator Professional Qualifications, and NFPA 1021 Standard for Fire Officer Professional Qualifications should be used to determine daily drill activity and provided to company officers in the form of a monthly drill schedule. All firefighters should be required to demonstrate competencies based on JPRs.

## TRAINING

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- Captains and lieutenants will maintain responsibility for daily drills for firefighters assigned to their company. Battalion chiefs must oversee multi-company drills to ensure consistency.
- The department should continue to work to meet the minimum standards for single company drills, multi-company drills, and night drills to meet the monthly hourly requirements (20 hours per month for each firefighter) of the Insurance Service Office (ISO) rating schedule.
- The Hands-On-Training (HOT) drill program should be re-implemented to deliver monthly basic firefighting and rescue evolutions as determined by the training office, with personnel required to attend. Those employees that are not available to attend due to absence or incident response should be required to make up the session.

# Chapter 7

## Equipment

Chairperson: Eng. Chad Hadzima

Eng. Bernie Carwardine

FF Scott Allen

FF Jo Brinkley-Chaudoir

FF Tony Piontek

FF Jim Irvin

Eng. Dave Lucier



# EQUIPMENT

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## **Firefighting Equipment**

First alarm assignment: Engine 411, Engine 451, Engine 421, Ladder 451, Ambulance 451, and Chief 411.

- Numerous pieces of equipment were used off these apparatus with no equipment failures reported by personnel using the equipment.

Second alarm assignment: Engine 471, Engine 431, Ladder 421, Ambulance 421, Ambulance 431, SU 3, Chief 431, Chief 401, Chief 402, Training Captain 103, and EMS Captain 104.

- PPE and SCBA were the primary equipment used from these apparatus with no equipment failures reported.

Special call assignment: USAR equipment, and the light tower

In analyzing equipment use related to the Edgewood Drive incident, our committee feels there are two major areas that need attention. These two areas are rapid intervention team equipment and communications equipment.

## **Overview of Rapid Intervention Crew (RIC) Tools and Equipment**

The current RIC equipment used by the Green Bay Fire Department consists of the following: a SKED, a complete SCBA (Self Contained Breathing Apparatus), a 60 foot length of rope, and a flat axe and Halligan bar. This equipment is found on each of the three ladder trucks in various compartments. At the Edgewood fire, the SKED and SCBA, which are married together, were removed and placed in various locations as can be seen by a number of photographs taken that day, and from written accounts of the companies assigned to RIC duties. The equipment was moved to different locations as the RIC company moved to gain optional access points for rescue of the missing firefighters.

While investigating the RIC equipment used on Edgewood Drive, the committee researched other departments' policies and tool caches and found that the equipment carried by the Green Bay Fire Department is lacking certain equipment, and the equipment that is carried is in need of modification. The following addresses current equipment, as well as adding a list of potential equipment that would facilitate future rescue efforts.

### **Current RIC Equipment:**

SKED – Performs well for firefighter drags, especially up and down stairs, or for firefighters with spinal injuries. It would not perform well in high heat conditions such as those found at the Edgewood fire. The strap/buckle combination is not user friendly under conditions found

## EQUIPMENT

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during firefighter rescue, and presents entanglement hazards in the manner the SCBA is currently married to the SKED.

SCBA – As a complete SCBA, it allows for a full range of SCBA emergencies to be remedied. There is no positive attachment of the SCBA to the SKED allowing the SCBA to come loose and/or come apart from the SKED. It currently has a 30 minute air cylinder. The assembly has no RIC or Emergency Breathing Safety System (EBSS) connections or Heads-Up Display (HUD) system.

60’ Rope – Although designed and placed for use as a lifting system for firefighters who have fallen through a floor, it was not utilized at the Edgewood fire due to the nature of the collapse and high heat conditions encountered. The rope system is too short, is of non-heat rated rope, and not set up as a lifting system as it is currently stored.

Axe and Halligan – Placed in the cache for forcible entry/egress by the team, as well as breaching, assisting with search, and as a fulcrum for lifting objects off of a downed firefighter.

***General Recommendations** – measures for consideration based on challenges revealed in this analysis which will improve the fire department’s ability to prepare and respond to fire incidents, providing better safety and security for firefighters and citizens.*

<u>APPARATUS</u>	<u>EQUIPMENT</u>	<u>ISSUE</u>	<u>RECOMMENDATION</u>
Chief 411 & Chief 431	Fire operations radio speaker	Poor placement of speaker makes communications difficult	Look into speaker relocation, have radio transmissions come over AM/FM radio speakers, headsets
Ladder 451	Chainsaw	Saw was dropped from the roof	Have a strap with carabineer attached to the handle on all saws
	Rapid Intervention Team	Lack of equipment to facilitate potential rescues	Purchase more effective and efficient R.I.C. equipment
	Dewatering Pump	Occluded intake	Develop a larger pre-strainer to help prevent occlusion

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# EQUIPMENT

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<u>APPARATUS</u>	<u>EQUIPMENT</u>	<u>ISSUE</u>	<u>RECOMMENDATION</u>
Engine 421	Hydrant bag	disrepair	Find a better designed bag for the intended purpose
	SCBA harness	slippage of straps, specifically parachute style	Change parachute style to alligator style
Engine 421 & Engine 431	Thermal Imaging Cameras	Not available to all crews	T.I.C's should be on all frontline apparatus
Engine 471	Mobile and Portable Radios	Dead spots	Additional repeaters to eliminate dead spots
USAR	Shoring supplies	Insufficient lumber on scene	Obtain larger trailer to carry more equipment
	Lack of pagers	Lack of fast notification for team members	Outfit members with pagers

- Accountability
  - Update worksheets carried by incident commanders
  - GPS/locater system for personnel
- Communication equipment
  - Firecom system in all apparatus
  - In-mask communication system
  - Additional repeaters
- Personal Protective Equipment (PPE)/SCBA
  - Alligator style adjustment straps on the SCBA harness
  - New turnout gear with drag rescue device
  - Additional thermal protection of SCBA
  - Update SCBA to include:
    - Heads up display
    - RIC quick-fill connection
    - Rapid buddy breathing system
    - High temperature indicator in PASS device
    - LED white strobe light attached to gear or SCBA harness
- RIC Equipment
  - Utilize one hour SCBA bottles
  - Update RIC SCBA to be enclosed in a bag assembly to prevent damage to SCBA and increase rapid deployment of RIC SCBA
  - Add and update equipment in RIC cache
- Suppression equipment

## EQUIPMENT

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- piercing nozzles on all frontline engines
  - high temperature rated attack lines
  - 1 ¾ inch smooth bore nozzles
  - class A and/or compressed air foam systems
  - Thermal imaging cameras on all frontline apparatus
  - update hydrant bags
  - glow in dark arrows on hose lines for rapid exit
- 
- Remove the SCBA from the SKED and house it in a bag assembly. The committee looked at a number of options, all of which would contain the SCBA better and allow for rapid deployment, easier dragging, and encapsulate the SCBA to prevent damage, as well as allowing for attachment to the unconscious firefighter. The bags are equipped with pockets for smaller equipment, such as a hand light, rope and webbing, wire cutters, etc. The SKED would remain as a part of the RIC cache.
  - Exchange the 30 minute cylinder with a 60 minute cylinder. This would allow for extended time for extrication and allow the entry team and the downed firefighter additional air. Add RBBS and RIC connections to the RIC SCBA for more efficient and effective air fills under IDLH conditions. **Note:** Not all SCBA on the department have these connections at this time, but adding these options would prevent personnel from having to disconnect their SCBA face piece in IDLH (Immediately Dangerous to Life and Health) atmospheres.
  - Upgrade all SCBA to current standards, including HUD, EBSS, and RIC connections to facilitate efficient and effective air fills under IDLH conditions. Upgrade all PPE to current standards, including higher temperature ratings for outer shells and (Drag Rescue Device) DRD to give additional heat protection and facilitate drag rescues.
  - Design a bag, containing rope and webbing systems for rescuing firefighters who have fallen through floors or roofs. Exchange the 60' rope with a 100' rope. The rope should consist of two 50' ropes which have a handcuff knot and carabineer at the 25' mark. These two in conjunction would allow for four lifting points. The webbing system should consist of four 15' sections tied with a water knot and carabineer to form a loop.
  - Add a high point lifting system for firefighter rescue from elevated windows or off of roofs. The system consists of a length of rope, carabineers, and a pulley, and is used in conjunction with a ladder placed above a window. The current 22' webbing is used to make a hasty harness on the unconscious firefighter to complete the system.
  - Add a folding/collapsible ladder for extrication of a conscious firefighter who has fallen through a floor, or ingress/egress of rescuers into the area. There are a number of these on the market that collapse to the size of a briefcase.
  - Although the axe and Halligan are good forcible entry tools, it must be noted that Department members must be aware that all tools on apparatus become RIC equipment

## EQUIPMENT

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when the need arises. These tools must come to the scene and be made readily available to RIC companies as needed.

- Add a thermal imaging camera to assist the RIC company in rapid entry and locating the downed firefighter.
- In addition to the 60 Minute SCBA in the Bag assembly on each ladder, an SCBA in the RIC bag assembly should be placed on all seven front line Engines. The current RIC equipment only facilitates rescue of one firefighter, such as the situation on Edgewood Drive. Firefighting teams that perform entry into hazardous situations are always in groups of 2-4 individuals. If more than one firefighter becomes trapped, we are currently not equipped to supply air to more than one. This would allow 4 RIC SCBA bags on scene for a single alarm structure fire.
- All personnel should be trained using RIC equipment and this training should culminate with scenario driven evolutions to further evaluate the equipment needs of the RIC Company.

# Chapter 8

## Summary of Recommendations



## SUMMARY of RECOMMENDATIONS

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### **BUILDING CONSTRUCTION**

#### **BC #1: Support building codes favoring residential fire sprinkler systems**

It is recommended that the Green Bay Fire Department support building codes favoring residential fire sprinkler systems, both in multi-family structures as well as single family residential occupancies. It has been reported that wooden trusses are being used in roof and floor systems in more than 60% of all buildings in the United States.

### **FIREGROUND OPERATIONS**

#### **OPS #1: IC should utilize a tactical worksheet to assist with incident management.**

Tactical worksheets include information about accountability and the management of emergency personnel. A completed tactical worksheet should be required as an assessment tool following each incident.

#### **OPS #2: Adoption of the Mutual Aid Box Alarm System (MABAS).**

Major emergencies require the IC to have a tactical reserve – resources beyond what is readily available. Participation in the MABAS system can bring in additional resources if needed, or provide resources to other departments by request.

#### **OPS #3: Increased use of Branches and Divisions for incident management.**

Create and assign Branch and Division group leaders as needed to facilitate face-to-face communication and effective span-of-control.

#### **OPS #4: Dispatch and assign second Battalion Chief as the Accountability Officer**

Dispatch second Battalion Chief to the scene of a working fire to act as Accountability Officer or Safety Officer as needed.

#### **OPS #5: A second ambulance at a working fire.**

If first-arriving ambulance personnel are used for firefighting duties, a second ambulance should be dispatched to provide EMS.

#### **OPS #6: Additional staffing on Ladder companies.**

A fourth person on a ladder company would increase efficiency in accomplishing tasks of ventilation, forcible entry, search and rescue, utilities control, salvage and overhaul, auto extrication, air bags, cribbing, and rope rescue.

## SUMMARY of RECOMMENDATIONS

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### COMMUNICATIONS

**COMM #1: Upgrades to Brown County Public Safety Communications System.**

Recommend that Brown County make needed upgrades to the communications system. The need for an improved public safety communications system in the county has been identified and well-documented; financial reasons are consistently cited for not upgrading the system.

**COMM #2: Modify use of NIMS apparatus numbering system**

Return to the use of the standard apparatus numbering system (Engine 1, Engine 2, Ladder 2 etc.) for internal GBFD radio communications.

**COMM #3: Assign a dedicated Dispatcher to working fire incidents.**

To be dedicated to monitor radio traffic separate from other dispatching duties, to ensure no key fireground transmissions are missed, and to notify all stations of a working incident. This dispatcher must have an understanding of the fireground environment to ensure their ability to triage messages (ex: Mayday) according to importance and re-broadcast any vital messages.

**COMM #4: Develop SOG with Brown County Public Safety Communications**

Development of SOG with Dispatch Center to facilitate consistent and effective fireground communications.

**COMM #5: Develop a tiered message priority system.**

Key words to prompt immediate action can be tiered based on their priority. For example, Mayday signals a life or death situation while Urgent may be used to signify a potentially serious problem.

**COMM #6: Paging system for USAR members.**

Currently there is no efficient way to notify USAR members of deployment.

### STANDARD OPERATING GUIDELINES

**SOG #1: Action to update and improve priority SOGs identified by the Committee**

Development of Dispatch procedures, Mayday guideline, Second Alarm/RIC Team activation, Thermal Imaging Camera use, and Emergency/Urgent Radio Traffic guidelines must be given priority.

## SUMMARY of RECOMMENDATIONS

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### **SOG #2: Develop a guideline for firefighter seat assignments.**

Seat assignments allow the firefighters to know what is expected of them every time, and create consistency between crews so that all critical tasks are assigned and are being completed.

### **SOG#3: Review of GBFD SOGs**

Conduct a review of the GBFD SOG manual. Modify SOGs as needed to reflect current structure of the department and operational practices. Take steps to ensure that SOGs are uniformly applied to all apparatus, personnel, and incidents.

### **SOG #4: Adoption of the I.D.E.A.L. acronym as the official format for first-in reporting.**

I-Identify arriving unit, D-Describe what you see, E-Explain what you are going to do, A-Assume or pass command, L-Let incoming units know what you want them to do.

### **SOG #5: Rewrite SOG 203.29 RIC**

SOG needs to reflect new equipment and procedures

## **TRAINING**

### **TR #1: Additional Training Staff**

Increase Training Office staff from one position to three. Additional staff necessary to facilitate firefighter training, ensure regulatory compliance and support a greater level of safety for all GBFD employees.

**Editor's Note:** *It may not be possible to achieve the remaining Training recommendations without additional training staff as identified in TR #1.*

### **TR#2: Competency-based training to Professional Qualifications**

Recommend that JPRs in NFPA 1001 Standard for Fire Fighter Professional Qualifications, NFPA 1002 Standard for Fire Apparatus Driver/Operator Professional Qualifications, and NFPA 1021 Standard for Fire Officer Professional Qualifications be used to determine daily drill activity and be provided to company officers in the form of a monthly drill schedule. Recommend that all firefighters, drivers, and officers be required to successfully perform competencies based on JPRs.

## SUMMARY of RECOMMENDATIONS

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### **TR #3: Increase hands-on training for firefighting personnel**

It is recommended to increase hands-on training, practical evolutions, and real world scenarios for fire crews. It is further recommended that more emphasis be placed on training fire crews in fire fighting operations in structures utilizing light weight construction.

### **TR #4: Strive to meet Insurance Services Office (ISO) training standards.**

Conduct single company drills, multi-company drills, and night drills to meet the monthly requirement of the ISO rating schedule at 20 hours per month for each firefighter.

### **TR #5: Annual refresher training for all personnel on subjects listed below:**

- Identifying roof and floor truss systems, lightweight building construction
- Working knowledge of water supply systems
- Size-up and fireground tactics
- Radio communications
- Incident command
- Apparatus positioning
- Annual IRIC and RIC
- SCBA emergency procedures

### **TR #6: Reinstigate the HOT training drill program.**

Deliver basic firefighting and rescue evolutions as determined by the training office. All personnel should be required to attend and participate in these monthly sessions.

### **TR #7: Development of scenario-based training**

Conduct intensive, scenario-based training that places officers in a situation where they must make decisions under extreme pressure. Increase use of acquired structures for training.

### **TR #8: GBFD to conduct studies on Mayday operations**

Conduct a study to determine whether fireground operations communications should be switched to a separate TAC Channel during a Mayday.

### **TR #9: Map out career development path for GBFD employees**

Identify/develop manuals for study, division specific expectations, etc.

## SUMMARY of RECOMMENDATIONS

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### **EQUIPMENT**

#### **EQ #1: Purchase Thermal Imaging Cameras for all front line apparatus.**

Thermal Imaging Cameras should be carried on all front line apparatus.

#### **EQ #2: Upgrade communications hardware.**

Upgrade hardware to include outfitting all apparatus with Firecom headsets and outfitting all personnel with SCBA communication devices.

#### **EQ #3: Color coding hose lines to the pump panel.**

Develop a color coding system such as carabineers or Velcro straps to identify hose lines.

#### **EQ #4: Reevaluate/restructure RIC equipment.**

Remove the SCBA from the SKED and house it in a bag assembly, and exchange the 30-minute SCBA with a 60-minute SCBA. Make up a bag containing rope and webbing systems, add a folding/collapsible ladder for extrication, and add a thermal imaging camera to RIC equipment cache.

#### **EQ #5: Replace USAR equipment trailer.**

A larger trailer needs to be purchased to carry more supplies.

## CONCLUSION

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### CONCLUSION

In conclusion it is believed that the only true way to prevent the tragic chain of events that occurred at 438 Edgewood Dr. on 08-13-2006 would have been if;

- (1) the fire had not occurred,
- (2) an automatic fire sprinkler system had been installed in the home, or
- (3) firefighters had not entered the building.

It should be noted that the aforementioned recommendations would have greatly reduced the chances of this tragedy from occurring. There are literally hundreds of similar occupancies (lightweight construction) in the city of Green Bay that currently present the same building construction issues and have the potential of creating a similar chain of events if steps are not taken to safeguard firefighting crews.

**APPENDIX A**

**INITIAL ACTIONS - Listed by Apparatus**

## APPENDIX

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### INITIAL ACTIONS

#### **Battalion Chief 411**

- Responded from Station 2
- Took command upon arrival and noticed light smoke from the rear of the structure but no flames
- Directed Ambulance 451 to conduct a primary search
- Instructed Engine 421 to pull a back-up line to support needs of Engine 451
- Assigned Engine 411 as Rapid Intervention Crew (RIC).

Note: The Green Bay Fire Department has a standard operating guideline to establish a RIC Team with initial assignments at every working fire. As a firefighter rescue team, RIC reports to command and will stage in front of the building, trying to maintain a view of at least two sides of the fire building. The RIC team has rescue tools with them: basic forcible entry tools, full PPE and SCBA, handlights, RIC bag, a thermal imaging camera (if available), and an SCBA rescue pack.

- Battalion 411 heard a radio transmission of “Mayday, Mayday, Mayday”
- Confirmed Mayday transmission with Engine 411 (RIC)
- Directed Engine 411(RIC) to the basement to search for crew of Ambulance 451
- Received call from Battalion Chief 431 to inform that Battalion Chief 431 called a second alarm and was instructed to move all suppression radio traffic to TAC 4 and leave rescue operations on TAC 3
- Kept contact with Ladder 451 and Engine 411 during making rescue attempts
- Ladder 451 assists Ambulance 451 Engineer out of the “Charlie” side basement windows

Note: The Green Bay Fire Department has adopted the method of using letters to designate the sides of a building, thus eliminating the need to know geographic locations on an emergency scene. The Address side of the building is always the A (Alpha) side of the building with B (Bravo), C (Charlie), D (Delta) following in a clockwise manner. This method allows members to respond to orders given on a scene without having to determine which way is north, for instance, in the middle of the night. Therefore the “D”, or Delta side would be the right side of a building as seen from the front or “B/C”, or Bravo/Charlie corner would be the left rear etc.

- Contacted Ambulance 451 Engineer to get more specific area for search and relayed information to rescue teams
- Turned suppression command over to Ladder 421
- Battalion Chief 431 arrives on scene and takes suppression command

## APPENDIX

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- Decided, with Battalion Chief 431 to end interior operations and begin defensive operations due to lack of structural integrity
- Unified Command is established
- Escorted Lt. Wolff's body to St. Vincent Hospital

### **Ambulance 451**

- Assisted in making complete water supply hydrant connection for Engine 451 upon arrival
- Directed by Battalion Chief 411 to conduct a primary search of the structure
- Entered the front door on the Alpha side of the structure and encountered dark brown/grey stagnant smoke in the foyer area that filled the entire space - no heat is felt.
- Ordered to conduct a left hand search pattern by Officer of Ambulance 451.
- Officer and Engineer went to their knees in heavy smoke conditions and began a left search pattern with Officer in the lead and Engineer taking Officers right boot in left hand and fanning out right to search the space
- After a couple forward moves, a large crack was heard and the floor collapsed beneath Officer and Engineer which sent both into the basement
- Officer and Engineer separated by a large pile of collapse debris - Officer fell into a room on the Bravo side of the structure and Engineer fell into a room toward the Delta side; attempts to relocate each other were unsuccessful
- Communicated numerous Maydays and Emergency traffic
- Engineer escaped through basement windows on the Charlie side of the structure
- Officer's body is later found in the center of a room on the Bravo side of the structure.

### **Engine 451**

- Upon arrival found smoke showing from the Bravo - Charlie side
- Neighbor informed first in crews of possible occupant(s) still in residence
- Passed Command to Ladder 451
- FF's pulled attack lines to front door of residence
- Officer completed a size up of residence from Alpha to Bravo to Charlie sides
- Officer found light black smoke emerging from a vent close to ground on Charlie side near Bravo - Charlie corner
- Officer noted no doorways out of basement but large windows from basement on Charlie side
- Officer returned to Alpha side and requested ventilation fan in front door and Charlie side windows
- Officer informed crew to prepare for offensive fire attack
- Crew encountered heavy smoke condition upon entry of front door - ventilation fan helped clear smoke a little

## APPENDIX

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- Initially engaged in left hand search pattern for stairs to basement
- Began a right hand search after first room to left provided no entry to basement
- Entered kitchen area and found stairs to basement
- Proceeded down basement stairs - two crew members encountered a slippery floor which caused both crew members to fall down
- Heard a loud noise followed by orange flame and heat that came towards them knocking one crew member to floor
- Opened their nozzle and their hoseline went limp
- Returned up the stairs due to water supply problem
- Heard Mayday call over radio
- Reaches kitchen area to find the exit to the front door blocked by fire
- Observed a crew spraying water through front doorway
- Ran through fire and out front doorway where Engine 421's crew was spraying water
- Changed air tanks as their low air alarms were sounding
- Re-entered residence through doorway to left of garage doors and right of main doorway on Alpha side - floor by main doorway was noted to have collapsed
- Went down basement stairs to search for missing firefighters
- Searched without success and encounters pieces of ceiling falling along with fire
- Backed out of structure back up the stairwell they entered
- Made a third attempt to enter basement but found floors had completely collapsed
- Sprayed water from hoseline into window on Alpha side
- Cut ventilation hole in roof over living area of residence and moved ladder over garage to cut another ventilation hole
- Private suffers smoke inhalation during ventilation and is transported to a hospital

### Ladder 451

- Engineer forced front door
- Engineer broke out window to right of front door to unlock front door
- Set up Positive Pressure Ventilation (PPV) fan at front door
- Crewmembers proceeded to side Charlie and opened windows
- Broke out remaining glass and shouted into windows following Mayday
- Assisted FF Brinkley-Chaudoir out of window
- Entered building through same window and searched escape path that FF Brinkley-Chaudoir took searching for Lt. Wolff.

### Engine 421

- 2nd Due Engine

## APPENDIX

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- Ordered by Ladder 451 Command to catch the hydrant at Hillside and Edgewood.
- Battalion Chief 411 arrives on scene and advises Engine 421 there is a closer hydrant at Edgewood Court and Edgewood Lane. Having already pulled their 5" line to the hydrant, Engine 421 wraps the hose onto the rig between the cab and pump panel.
- While hooking the hydrant at Edgewood Ct. and Edgewood Lane., Battalion Chief 411 advises Engine 421 that Engine 451 has secured their own water supply. Engine 421 breaks their 5" line at the rig and leaves the hose at the hydrant and proceeds to the scene.
- Ordered by Battalion Chief 411 to pull a backup line.
- Seeing that Engine 451 has pulled their lead line, Engine 421 retrieves a high-rise pack from Engine 451 to hook to the wye on the lead line. While hose was being laid Engine 421 Officer mans a 2 ½" line that had already been pulled to the front door.
- As the final high-rise pack connections were being made, a large crash was heard followed by a tremendous whooshing explosive sound, fire then communicated to a large section of the first floor moving from the Bravo side to the Delta side.
- Engine 421 Officer immediately began flowing water through the front door on the Alpha side with the 2 ½" line and was joined by Engine 421 Privates.
- Engine 421 operated the 2 ½" line in the Bravo and Delta directions to try and push the fire back, while this operation was going on Engine 451 was able to escape through the same Alpha side front door that Engine 421 was operating in.
- Engine 421 backed out of the Alpha side front door to stretch a 2 ½" line to the Charlie side for Ladder 451 to make a rescue attempt through the basement windows on Charlie side. More 2 ½" line was retrieved from Engine 451 and added to the lead line already in place to accomplish this task.
- While pulling the 2 ½" line to the Charlie side, Engine 421 encountered heavy fire and smoke issuing from the windows on the Bravo – Charlie corner.
- On the Charlie side, Engine 421 found heavy black smoke issuing from the first floor windows on the Charlie side; they also found Ladder 451 Officer yelling into the basement windows on the Charlie side and the Engineer and Private from Ladder 451 making entry into the same Charlie side basement windows.
- Engine 421 then fed 2 ½" line into the Charlie side basement windows for Ladder 451 to make a rescue attempt.
- Engine 421 then pulled an additional 2 ½" line from Engine 451, Engine 451 Engineer informed Engine 421 that due to poor hydrant pressure, Engine 451 could not flow another 2 ½" line, additional 2 ½" line was pulled from Engine 451 and stretched to Engine 421.
- Engine 421 Engineer was serving as accountability officer, so the 2 ½" line was delayed in getting charged. Once freed from accountability tasks, the 2 ½" was charged and operated through the windows on the Bravo – Charlie corner of the structure.

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- After rehab, Engine 421 stretched a line to the Charlie – Delta Corner of the structure for defensive operations. Engine 421 operated there until relieved from duty.

### Engine 411

- Not initially dispatched, but part of 1st alarm assignment and responded after discovered on Mobile Data Terminal (MDT) they were part of call
- Assigned Rapid Intervention Crew (RIC) on first alarm and was setting up RIC in driveway when Mayday was called. No Thermal Imaging Camera (TIC) available and they did not have a line yet.
- While staging RIC equipment at driveway, heard “booming noise” and saw heavy fire at front door.
- One FF reports heard #1 & #2 Mayday calls and heard PASS sounding
- EN411 crewmember pulled a 2.5” line to the Alpha side of the building where the rest of the EN411 crew was forcing the service door to the garage.
- EN411 Captain and one firefighter then made their way through the garage to the Delta side stairway - which then led to the basement.
- Made a quick entrance into the basement while the Engineer and one firefighter tried to relocate the 2.5” line to the Delta side garage service entry.
- The Engineer and firefighter met the Captain and firefighter at the Alpha/Delta corner of the house upon exiting of the basement - while the Engineer and firefighter were trying to relocate the 2.5” line to the Delta side entrance.
- The Captain, Engineer and one firefighter made their entry down the stairs with no hose line to begin a search of the basement for the missing firefighter.
- Encountered slippery surface at bottom of stairs. Unknown material caused slick area
- Due to the high heat encountered, one firefighter was sent back upstairs to join with the firefighter at the entrance to secure a hose line for attack. The Captain and Engineer began a search of the basement.
- During their search they located the crew from LA451. With these two firefighters they completed a search of the finished area of the basement.
- At this time a 2.5” line was given to the crew of LA451 through the Charlie side basement window and this line was charged. The Engineer initially assisted with this line as the third man on it until a crewmember’s low air alarm sounded.
- The Captain and Engineer then exited through the Charlie side window. This was the Engineer’s initial and the Captain’s second entry into the basement.
- The Captain and Engineer located the two firefighters on the Delta side at the top of the basement stairs preparing for entry. They had secured a 1 ¾” hose line.
- Upon the second entry into the basement from the Delta side, smoke and flames were coming from the basement stairway.

## APPENDIX

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- At the bottom of the stairs EN411 crew began to operate the line at the ceiling to cool it down and suspended ceiling and debris began to fall around them. They made their way through the basement again conducting a search. They placed the line at the collapse area and operated it from there.
- Exterior crews on the Charlie side (due to the first floor sagging) ordered Engine 411 crew out of the building.
- One FF reports never hearing PASS alarm sounding (while in basement).

### **Battalion Chief 431**

- Monitoring call from the Westside of Green Bay when contacted by dispatch by cell phone and asked if the Mayday was heard, while talking to dispatch heard additional Maydays and informed Dispatch to strike a 2nd alarm.
- Informed Battalion Chief 411 of response and 2nd alarm
- Contacted Battalion Chief 411 to notify absence of PASS alarms and instructed Ambulance 451 to manually activate
- Assumed fire suppression command upon arrival
- Conducted face-to-face with Battalion Chief 411
- Continued offensive fire attack
- Training/Safety 403 assigned Safety Officer upon arrival
- EMS 404 assigned Rehab Officer upon arrival
- Learned of problem with water supply
- Pulled crews from offensive to defensive attack
- Repositioned Ladder 451 to ventilate structure
- Passed fire suppression command back to Battalion Chief 411
- Started addressing logistical needs: Urban Search and Rescue (USAR) Team, Structural Engineers, Critical Incident Stress Debriefing (CISD) Teams, and City Busses
- Assigned task of briefing crews and rest of department of situation - went to Stations 4, 6 and 1

### **Engine 471**

- Dispatched as part of 2nd alarm response
- Served as water supply to Engine 421
- Pulled 2 ½" to side Charlie of the building
- Assisted with fire attack on side Charlie of the building
- Became 2nd RIC on side Charlie of the building
- Put roof ladder in rear basement window for ingress and egress
- Crew entered building via rear window (secured with lifeline), to search Alpha/Bravo area of basement - search was hampered by heavy smoke and fire

## APPENDIX

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- Crew returned to window for attack line
- Search and rescue efforts cease and crew ordered out of building due to falling debris and sagging floor trusses
- Crew changed out air bottles
- Crew made another attempt at search and rescue via stairs in the garage - efforts unsuccessful do to heavy fire conditions in basement

### **Ambulance 421**

- Dispatched as part of 2nd alarm
- Arrived at the incident approximately 3 houses (to the south) from the involved residence
- Assisted injured firefighter from Ambulance 451
- Transported injured firefighter from Ambulance 451 to the hospital for medical treatment

### **Ladder 421**

- Self-dispatched seconds prior to Second Alarm.
- Crew pulled 2 ½" to side Charlie of the building and manned for defensive fire attack
- Ladder 421 Captain takes fire suppression Incident Command until Battalion Chief 431 arrives on scene.
- Crew secured a lifeline to engine crew conducting search and rescue attempts for Lt. Wolff
- Crew proceeded with fire attack after search and rescue crew withdrew from building.

### **Engine 431**

- Special call unit after the 2nd Alarm
- Responded from quarters in emergency mode to the corner of East Mason and Edgewood Drive, when instructed by Battalion Chief 411 to respond non-priority to Station #1 to pick up Support Unit 411 and bring it to the scene
- Once on scene, ordered to relieve the crew of Engine 421 at Charlie/Delta corner of the structure
- Following rehab, manned a 2 ½" line on the Delta side of structure to protect exposures
- From the stoop of the garage on the Alpha side of the structure, knocked down fire extending from the basement to the garage
- Once Ladder 451 began ladder pipe operations, Engine 431 helped direct ladder stream from the Bravo/Charlie corner of the structure
- Assisted in rolling hose and picking up equipment. Returned to quarters

## APPENDIX

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### USAR Team

- USAR vehicle was picked up from Station 4 and brought to Station 1 where USAR Team members were ordered to assemble – team responds from Station 1 to scene
- On scene, USAR Operations Command met with Incident Commander while team members organize at the scene
- USAR Operations Command met with structural engineers and representatives of DCI and ATF to formulate recovery operations strategies, while USAR Team members formulated a resource list
- Water pumps are brought to the scene to remove water from the basement of the structure
- Given instructions by DCI, ATF and structural engineer -- begin recovery operations.
- USAR Team is divided into Entry Teams, Cut Teams and Runner Teams
- USAR Entry Teams entered the structure through the front door entrance on the Alpha side.
- Shoring, debris removal, and search operations started below what was the front door foyer on the Alpha side and moved towards the Bravo side per last known location of Ambulance 451 Officer
- Shoring, debris removal, and search operations continued down a corridor and into a large room on the Bravo side of the structure
- Found the body of Ambulance 451 Officer in the area 9' from the Bravo foundation wall and 9' from the chimney (approximate center of the room).
- Two USAR members assisted DCI agents while other USAR members readied removal equipment
- DCI scene investigation was shortened when transits on the north chimney show significant movement and possible imminent collapse
- Ambulance 451 Officer was placed in a Stokes basket and removed by rope operation up a ladder to the Charlie side of structure

**APPENDIX B**

**WATER SUPPLY**

**and FIRE ATTACK LINES**

## APPENDIX

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### WATER SUPPLY and FIRE ATTACK LINES

#### Engine 451

- 1 - 100' 5" Large Diameter Hose (LDH) hand laid to hydrant by Ladder 451
- Crew pulled Lead Line to front entrance

#### Engine 421

- Attached hi-rise pack to gated-wye on Engine 451 Lead Line
- Pulled a 2 ½" line to side Charlie

#### Engine 411

- Pulled Lead Line to side Delta
- Extended Hi-Rise Pack onto Lead line

#### Engine 471

- Laid 5" LDH from corner of Hillside Drive to Engine 421
- Pulled 2 ½" attack line off of Engine 421 to side Charlie
- Attached Hi-Rise Pack onto end of 2 ½"

#### Ladder 451

- Water Tower - (1) 100' 5" LDH used from Engine 421 for supply

#### Ladder 421

- Pulled 2 ½" to side Charlie

#### Relay Operation

- Engine 471 at hydrant on Hillside Drive
- Initial supply line on hydrant to Engine 421 as discharge line off Engine 471 into Engine 421
- Short length of 5" LDH & (2) 2 ½" lines into auxiliary suction on Engine 471 and relay pump into Engine 421

#### LADDERS

- Roof ladder into Basement (Engine 471).
- 20' roof ladder – Charlie side into basement window
- Attic ladder to the Alpha side – left of the front door
- Roof ladder (Ladder 451) Charlie side basement
- Ladder 451 Water Tower for fire suppression

**APPENDIX C**

**ACRONYMS AND ABBREVIATIONS**

## APPENDIX

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### ACRONYMS and ABBREVIATIONS

ALS.....	Advanced Life Support
AO.....	Accountability Officer
ATF ....	Federal Bureau of Investigation – Alcohol, Tobacco, and Firearms
BCFITF.....	Brown County Fire Investigation Task Force
CISD ....	Critical Incident Stress Defusing/Debriefing
CVMIC.....	Cities and Villages Mutual Insurance Company
DCI ....	Department of Criminal Investigation (Wisconsin State Fire Marshall’s office)
DRD.....	Drag Rescue Device
EBSS.....	Emergency Breathing Safety System
EMT.....	Emergency Medical Technician
EMS.....	Emergency Medical Services
FF.....	Firefighter
GBFD.....	Green Bay Fire Department
HOT.....	Hands-On Training
HUD.....	Heads-Up Display
IAFF.....	International Association of Fire Fighters
IC.....	Incident Commander
IDLH.....	Immediately Dangerous to Life and Health
IRIC.....	Initial Rapid Intervention Crew
ISO.....	Insurance Services Office
LED.....	Light Emitting Diode
LDH.....	Large Diameter Hose (5-inch supply line)
Lt.....	Lieutenant
MABAS.....	Mutual Aid Box Alarm System
MDT.....	Mobile Data Terminal
NFPA.....	National Fire Protection Association
NIOSH.....	National Institute of Occupational Safety and Health

## APPENDIX

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### ACRONYMS and ABBREVIATIONS

NIMS.....National Incident Management System  
O.C.....On-center  
OSB.....Oriented Strand Board  
OSHA.....Occupational Safety and Health Agency  
PAR.....Personnel Accountability Report  
PASS.....Personal Alert Safety System  
PPE.....Personal Protective Equipment  
PPV.....Positive Pressure Ventilation  
RIC.....Rapid Intervention Crew (or RIT - Rapid Intervention Team)  
SCBA.....Self-Contained Breathing Apparatus  
SOG.....Standard Operating Guideline  
TAC.....Tactical Channel  
TIC.....Thermal Imaging Camera  
TGI.....Tongue & Groove Inlay  
USAR.....Urban Search and Rescue

# **APPENDIX D**

## **NIOSH Firefighter Fatality Investigation**

**#F2006-26**



## ***Career Engineer Dies and Fire Fighter Injured After Falling Through Floor While Conducting a Primary Search at a Residential Structure Fire – Wisconsin***

### **SUMMARY**

On August 13, 2006, a 55-year-old male, career, Engineer (the victim) died and another fire fighter was injured after falling through the floor at a residential structure fire. The victim and fire fighter had arrived in their ambulance and assisted the first-due engine attach a 5-inch supply line at approximately 1227 hours. The engine company was conducting a fast attack on a suspected basement fire, while a ladder company conducted horizontal ventilation. The ambulance crew had advanced to the front of the structure when the Incident Commander requested them to conduct a primary search. The victim and injured fire fighter proceeded to conduct a left hand search at approximately 1234 hours. They took a couple of steps to the left just inside the front door to conduct a quick sweep. Visibility was near zero with minimal heat conditions. Because of the smoke conditions, they kneeled, sounded the ceramic tile floor, and took one crawling step while on their knees. They heard a large crack just before the floor gave way sending them into the basement. The basement area exploded into a fireball when the floor collapsed. The victim fell into the room of origin while the injured fire fighter fell on the other side of a basement door into a hallway. The injured fire fighter was able to eventually crawl out of a basement window. The victim was recovered the next day. The NIOSH investigators concluded that, to minimize the risk of similar occurrences, fire departments should:



## Incident Site

- *conduct pre-incident planning and inspections of buildings within their jurisdictions to facilitate development of safe fire ground strategies and tactics*
- *use a thermal imaging camera (TIC) during the initial size-up and search phases of a fire*
- *ensure fire fighters are trained to recognize the danger of operating above a fire and identify buildings constructed with trusses*

Additionally, building code officials and local authorities having jurisdiction should:

- *consider modifying the current building codes to require that lightweight trusses be protected with a fire barrier on both the top and bottom*

## INTRODUCTION

On August 13, 2006, a 55-year-old male, career, Engineer (the victim) died and a fire fighter was injured after falling through the floor at a residential structure fire. On August 14, 2006, the U.S. Fire Administration (USFA) notified the National Institute for Occupational Safety and Health (NIOSH) of the fatality. On August 16, 2006, the International Association of Fire Fighters (IAFF) notified NIOSH of the fatality. On September 11-12, 2006, a Safety and Occupational Health Specialist and a Senior Investigator investigated the incident. Meetings were held with the fire department, IAFF members and city representatives. Interviews were conducted with the officers and fire fighters of the fire department who were directly involved in the incident. The NIOSH investigators reviewed the fire department's report, photos and sketches of the incident site, standard operating guidelines (SOGs), medical examiner's report, dispatch log, and training records. The incident site was visited and photographed.

### Department

The career fire department is staffed by 188 professional fire fighters and operates out of 7 stations responding to approximately 9,000 calls each year. The department provides fire and injury prevention, fire suppression, technical rescue, and emergency medical services to a community of approximately 105,000 residents in a geographic area of about 47 square miles.

### Training

Fire fighter training in the state of Wisconsin is regulated through the Department of Commerce and the training is conducted through the Wisconsin Technical College System. The State requires fire fighters to complete the entry level fire fighter parts I and II. The career department's training program requires their probationary fire fighters to complete the National Fire Protection Association (NFPA) Level I and II training.

The victim had more than 17 years of fire fighting experience. In addition to the NFPA Level I & II equivalency in probationary fire school, the victim had completed other training including building construction, pre-incident planning, HazMat, technical rescue, and ventilation.

The injured fire fighter had more than 10 years of fire fighting experience. In addition to the NFPA Level I & II equivalency in probationary fire school, she had completed other training including building construction, pre-incident planning, fire behavior principles, rapid intervention crew, and ventilation.

### **Structure**

The structure was built in 1999, and was a two-story, single family residence of ordinary construction which encompassed approximately 3,500 square feet of living area above grade and 2,100 square feet below grade.

The floors of the structure involved in this incident consisted of a lightweight wooden parallel-chord truss system and engineered wooden “I” beams. Lightweight wooden parallel-chord trusses typically consist of wooden members measuring 2 inches wide by 4 inches deep and are held together by sheet metal surface fasteners referred to as gusset plates. Engineered wood “I” beams are typically formed with a 2- by 3-inch or 2- by 4-inch top and bottom cord with a sheet of plywood or particle board vertically sandwiched in between as a web.

The origin of the fire was located in a section of unfinished basement that was approximately 750 square feet. The pre-cast basement walls in the room of fire origin were framed and insulated with foam sheets (**Photo #1**). The ceiling in the room consisted of exposed floor trusses that were supported with wooden beams and metal post jacks (**Photos #2 and #3**).

The hallway which separated the unfinished from the finished basement had a concrete block wall for the structural support of the chimney to the south, and a framed wall possibly with drywall to the north. *Note: This is the area where the victim and fire fighter fell into when the floor collapsed.*

The first floor had a radiant floor heating system installed on top of the sub-floor. This system consisted of a flexible hose that circulated hot water and was layered in concrete approximately 3 inches thick (**Photo #4**).

### **Weather**

The conditions were clear and sunny with the temperature averaging 68-degrees Fahrenheit. The wind was averaging around 7 miles per hour from the south.

## **INVESTIGATION**

On August 13, 2006, a 55-year-old male career Engineer (the victim) died and a fire fighter was injured after falling through the floor at a residential structure fire. At approximately 1223 hours, dispatch received a call of a possible structure fire at a local residence. Ambulance 451 (A451), Engine 451 (E451), and Ladder (L451) were dispatched from the same station to the scene. E451 was the first to arrive on the scene at approximately 1227 hours, and the officer reported light smoke showing as they started to attach a 5-inch supply line to a hydrant. The victim and fire fighter from A451 assisted in making the hydrant connection. The E451 crew pulled a 2 ½-inch gated wye with a 100-foot section of 1 ¾-inch handline to the front door. They were met by a neighbor who told them he had tried to enter the structure because he

thought someone might be inside. L451 was now at the front door assisting with stretching the handline and they were preparing to make forcible entry. The crew from E451 noticed light grey smoke pushing from a vent next to the front door that appeared to be coming from the basement. They asked the neighbor if there was an entrance into the basement that was below grade. The neighbor was unsure. The officer proceeded to do a 360-degree size-up and search for another way into the basement. He passed command through face to face communication to the second due officer who was on the scene from L451. The Engineer from L451 forced entry through the front door.

The officer from E451 noticed another vent near the ground on the C-side of the structure that was pushing black smoke with burning particles. Upon his return to the front door, he told his crew of two fire fighters to mask up for entry to search for the fire in the basement. He requested that the positive pressure ventilation (PPV) fan be used at the front door to facilitate horizontal ventilation so his crew could search for an interior stairway into the basement and attack the fire.

Battalion Chief 411 arrived on the scene and took over command from L451 at approximately 1232 hours. Ladder 451 set up and started the PPV fan at the front door and proceeded to the C-side of the structure to conduct horizontal ventilation at approximately 1233 hours. A451 finished making connections to the hydrant and were making their way up the driveway as a crew from E451 prepared to enter the structure. Upon entry, the officer and two fire fighters from E451 encountered yellow/brown smoke that filled the entire first floor of the structure. Visibility was near zero with minimal heat conditions. The crew entered the foyer and conducted a right hand search for an entry into the basement. They were unsuccessful and changed directions. The officer from E451 heard L451 tell command they vented the basement windows. He called command and requested that the first floor windows be vented. Within minutes visibility improved and they could see across the kitchen area to the stairway which led to the basement (**Diagram**).

The crew from E451 walked over to the stairs and started to stretch the hose down the stairway into the basement which had a landing that was mid-way down the stairs. The officer put a fire fighter on the landing which made a 180-degree turn to flake out the hoseline (**Diagram**). The nozzleman made his way down the stairs and opened the door into the basement which was full of thick black smoke. He stepped and immediately fell down because of an extremely slippery floor. He made several attempts to stand up when his Lieutenant stepped and slipped onto the floor knocking him further into the room. He then could feel intense heat coming from the B-side of the basement. Visibility was zero.

The IC requested the victim and the fire fighter from A451 to conduct a primary search of the first floor at approximately 1234 hours. The victim and injured fire fighter finished donning their equipment and made entry through the front door. They took a couple of steps to the left to conduct a quick sweep. The injured fire fighter followed the victim as they both went to their knees because of the thick smoke conditions. The injured fire fighter held onto the victim's boot to start the search. They sounded the ceramic tile floor and took one crawling step forward and heard a loud crack and then they both fell through the floor into the basement. The basement area exploded into a fireball when the floor gave way sending them into the

basement. The victim fell into the room of origin. The injured fire fighter was separated from the victim during the collapse from the resulting debris and fell into an area facing the concrete block wall of the chimney's foundation. She was instantly surrounded by flames as she shielded herself with whatever debris she could find. She took refuge against the block wall as she tried to protect herself while she yelled to try to find the victim. She called for "MAYDAY" four times, but due to the fire conditions and intense situation, she did not hear a response.

At the same time, the crew from E451 made their way back up the stairs from the basement to the front door. The entire foyer area was engulfed in flames at this time. Another crew was spraying water through the front door which allowed the crew from E451 to jump through the flames and out the front door. The injured fire fighter who fell into the basement felt the water and saw the fire darken down. She stood up and once again encountered extreme heat conditions which immediately melted her facepiece. She turned away from the fire and pushed her way through debris created from the collapse and made it into the next room of the basement. She saw a window and could hear crews operating at the rear of the structure. She was able to make her way to the rear of the structure where the crews assisted her out through the windows (**Photo #5**).

After the MAYDAY call, the IC activated the rapid intervention team (RIT) which immediately entered the basement by a set of stairs through the garage in an attempt to locate the victim and the injured fire fighter (**Diagram**). Crews also entered the basement through the windows at the rear of the structure. The room of origin was unattainable due to the collapse debris and extensive fire. The remaining basement area was searched thoroughly until all crews were ordered to evacuate due to impending structural collapse. The operation was declared defensive until the fire was put out and the structure could be protected from collapse. The victim was recovered from the room of fire origin the next day.

## **Cause of Death**

The medical examiner listed the cause of death as smoke inhalation and thermal burns. The injured fire fighter had first-degree burns to approximately 15% of her back and upper arms and she also suffered a fractured hip and ribs.

## **RECOMMENDATIONS/DISCUSSIONS**

***Recommendation #1: Fire departments should conduct pre-incident planning and inspections of buildings within their jurisdictions to facilitate development of safe fire ground strategies and tactics.***

Discussion: National Fire Protection Association (NFPA) Standard 1620 § 4.4.1 states "the pre-incident plan should be the foundation for decision making during an emergency situation and provides important data that will assist the incident commander in developing appropriate strategies and tactics for managing the incident." This standard also states that "the primary purpose of a pre-incident plan is to help responding personnel effectively manage emergencies with available resources. Pre-incident planning involves evaluating the protection systems,

building construction, contents, and operating procedures that can impact emergency operations”.<sup>1</sup> A pre-incident plan identifies deviations from normal operations and can be complex and formal, or simply a notation about a particular problem such as the presence of flammable liquids, explosive hazards, modifications to structural building components, or structural damage from a previous fire.<sup>2-4</sup>

In addition, NFPA 1620 outlines the steps involved in developing, maintaining, and using a pre-incident plan by breaking the incident down into pre-, during- and after-incident phases. In the pre-incident phase, for example, it covers factors such as physical elements and site considerations, occupant considerations, protection systems and water supplies, and special hazard considerations. Building characteristics including type of construction, materials used, occupancy, fuel load, roof and floor design, and unusual or distinguishing characteristics should be recorded, shared with other departments who provide mutual aid, and if possible, entered into the dispatcher’s computer so that the information is readily available if an incident is reported at the noted address.

Typically, pre-incident planning focuses on commercial buildings and the specific hazards they have due to their size, construction, and contents. Modern building components, specifically engineered wood trusses, have allowed residential structures to be designed and built in sizes rivaling commercial buildings. The hazards with this type of construction are the same in both commercial and residential structures. Engineered wood trusses that are exposed to fire weaken or fail very quickly<sup>5</sup>. Inspections and pre-incident planning of large residential construction should be given the same consideration as commercial buildings.

***Recommendation #2 : Fire departments should use a thermal imaging camera (TIC) during the initial size-up and search phases of a fire.***

Discussion: A thermal imaging camera (TIC) can be a useful tool for initial size up and for locating the seat of a fire by assisting fire fighters in quickly getting crucial information about the location of the source (seat) of the fire from the exterior of the structure, so they can plan an effective response with the entire emergency team. Knowing the location of the most dangerous and hottest part of the fire may help fire fighters determine a safe approach and avoid structural damage in a building that might have otherwise been undetectable. Ceilings and floors that have become dangerously weakened by fire damage and are threatening to collapse may be spotted with a thermal imaging camera. A fire fighter about to enter a room filled with flames and smoke can use a TIC to assist in judging whether or not it might be safe from falling beams, walls, or other dangers. The use of a TIC may also provide additional information the Incident Commander can use during the initial size-up. TICs should be used in a timely manner, and fire fighters should be properly trained in their use and be aware of their limitations.<sup>6</sup>

In this incident, members of the initial attack crew had difficulty navigating out of the foyer in order to find the basement stairs. They were attempting to search for the seat of the fire to extinguish it. The use of a TIC during initial size-up and entry into the structure could have

confirmed a general location for the seat of the fire in the basement. This information may have influenced the fire department as to what areas might have been structurally damaged.

***Recommendation #3 : Fire departments should ensure fire fighters are trained to recognize the danger of operating above a fire and identify buildings constructed with trusses.***

Discussion: The danger of being trapped above a fire is greatly influenced by the construction of the burning building. Of the five basic building construction types (fire resistive, noncombustible, ordinary construction, heavy timber, and wood-frame) the greatest danger to a fire fighter who must operate above the fire is posed by wood-frame construction. Vertical fire spread is more rapid in this type of structure. Flames may spread vertically and trap fire fighters operating above the fire in four ways: up the interior stairs, through windows (autoexposure), within concealed spaces, or up the combustible exterior siding. Extreme caution must be used in determining if the structural stability of the flooring system is adequate to facilitate the operations.<sup>2, 8</sup>

The floors of the structure involved in this incident consisted of a lightweight wooden parallel-chord truss system and engineered wooden “I” beams. Lightweight wooden parallel-chord trusses typically consist of wooden members measuring 2 inches wide by 4 inches deep and are held together by sheet metal surface fasteners referred to as gusset plates (see **Photo 3**). The gusset plates have numerous V-shaped points cut through them that may penetrate the wood’s surface approximately ¼ inch to ½ inch. This steel plate could act as a heat collector which can transfer heat to the V-shaped points, destroying the tensioned wood fibers holding the gusset plate in place.<sup>7, 9</sup>

Engineered wood “I” beams are typically formed with a 2- by 3-inch or 2- by 4-inch top and bottom cord with a sheet of plywood or particle board vertically sandwiched in between as a web. No specific time limit has been established for how long fire fighters should operate under or on truss floors or engineered wood “I” beams that are exposed to fire. Even though standard fire engineering calculations show that lightweight trusses may be expected to collapse under 10 minutes in a fully developed fire, it is not recommended that a time limit be set.<sup>9</sup> When it is determined that the building’s trusses have been exposed to fire, any fire fighters operating under or above them should be immediately evacuated.<sup>7</sup> Materials used for radiant floor heating could decrease the time for structural failure by trapping the heat below the floor. Fire fighters who sound the floor with a tool to determine structural integrity will likely get a false reading from the lightweight concrete used in radiant floor heating. Operating above a fire with floor trusses and lightweight concrete used in radiant floor heating should not be attempted.<sup>10</sup>

***Recommendation #4 : Additionally, Municipalities, Building Code Officials and Local Authorities having jurisdiction should consider modifying the current codes to require that lightweight trusses are protected with a fire barrier on both the top and bottom.***

Discussion: Trusses are typically assembled in a system to provide structural support for a roof or floor. The roof or flooring system is certified for the required fire rating by testing the entire assembly such as an attic or floor space with a roof or sub-floor covering on the top and a ceiling component on the bottom. The fire-resistance of the assembly can be viewed as the sum of the resistance of all the components used in the assembly. As mentioned previously, lightweight trusses that are exposed to fire may fail in less than 10 minutes. Lightweight floor trusses constructed as an “I” beam have been reported to fail to support their load in under 6 minutes.<sup>5</sup>

In this incident, the floor trusses for the first floor did not have any protection on the bottom cord, which immediately exposed the trusses to fire in the basement. Unfinished basements are very common throughout the country. It is critical for trusses that are used in a load-bearing assembly be protected with a thermal barrier such as gypsum wallboard. The function of the thermal barrier is the critical factor in the fire performance of the assembly. Municipalities, Building Code Officials, and Local Authorities having jurisdiction should also include experienced fire personnel throughout any developmental review process concerning life safety to the public and fire department members.

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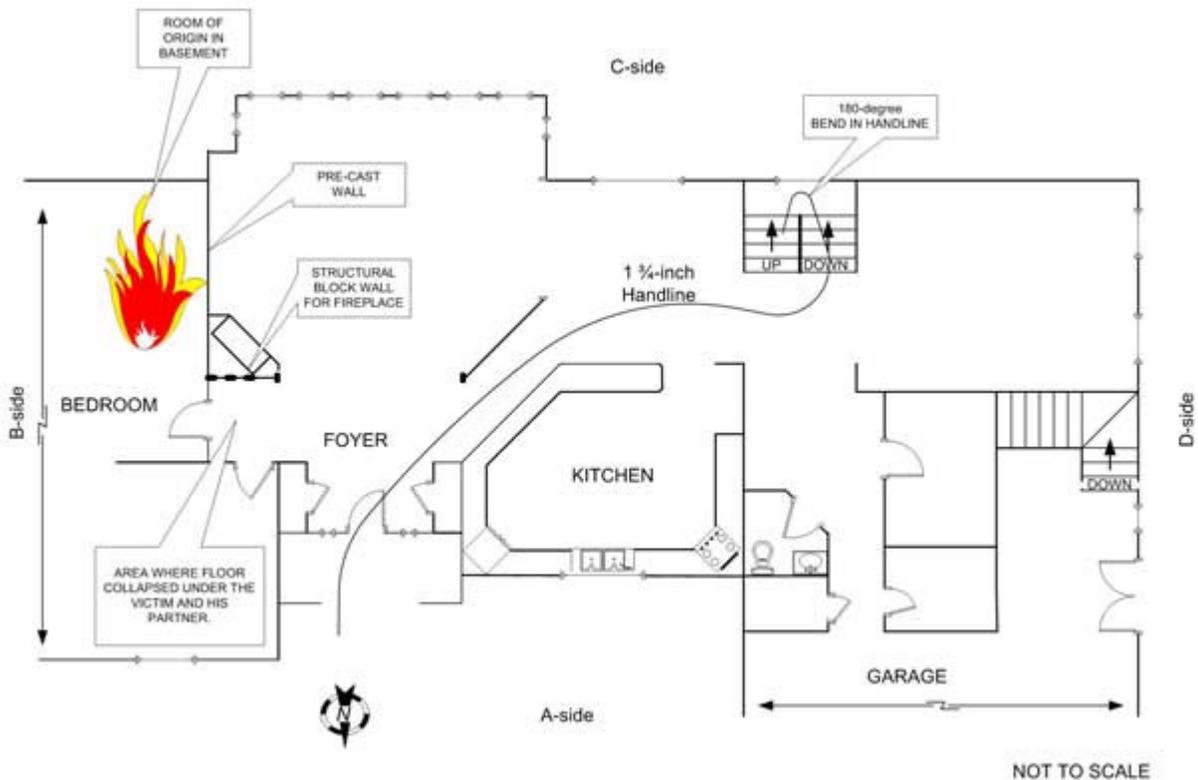
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## INVESTIGATOR INFORMATION

This incident was investigated by Jay Tarley a Safety and Occupational Health Specialist and Rich Braddee, a Senior Investigator, Division of Safety Research, NIOSH. An expert technical review was provided by Battalion Chief Ted Fehr, Tukwila Fire Department.

## diagram and PHOTOS



**Diagram. Partial first floor layout aerial view relevant sections only.**



**Photo 1. Framed pre-cast walls with sheets of foam insulation**



**Photo 2. Wooden beam and metal post jack**



**Photo 3. Wooden beam and metal post jacks with bottom gusset plates from floor joists pinned to beam by first floor framing after entire floor joist consumed by fire.**



**Photo 4. Transition between foyer and hallway where floor collapsed**



**Photo 5. Windows on C-Side of structure where fire fighter exited basement.**

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