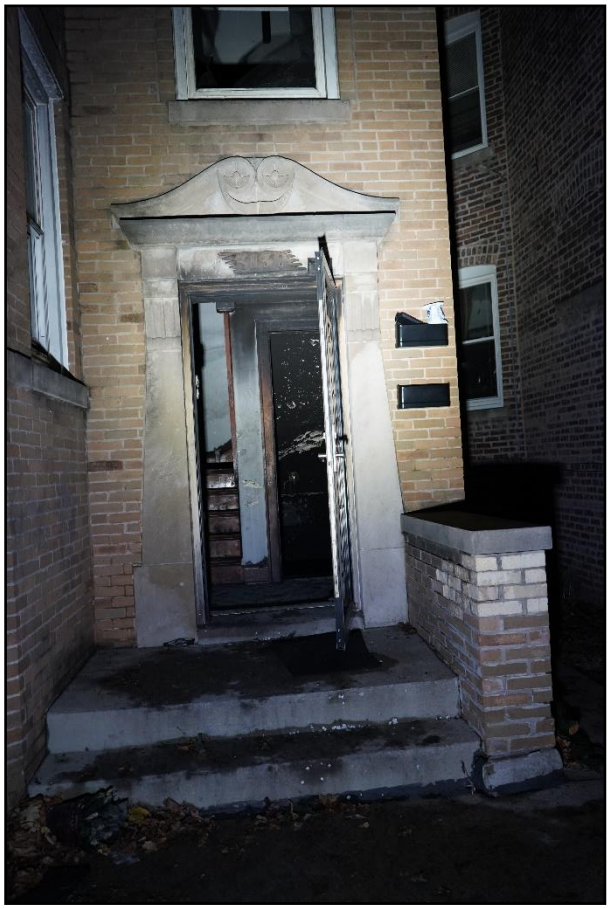
1000 FREDERICK LANE, MORGANTOWN, WV 26508 • 304.285.5916

Career Candidate Firefighter Found Unresponsive at a Residential Structure Fire and Dies 5 Days Later–Illinois

Executive Summary

On December 16, 2021, a 30-year-old male career candidate firefighter/emergency medical technician (EMT) was found unresponsive in a 1st floor apartment of a 2½-story apartment building at a structure fire. A "Still" Alarm was transmitted for Box 111329 at 02:06:25 hours for a basement fire in an apartment building. Companies dispatched were Battalion 8, Engine 94, Engine 7, Truck 58, and Truck 53. Engine 94 arrived on scene at 02:10:38 hours. The officer of Engine 94 initially reported nothing showing from a 2-story residential structure. Truck 58 arrived at 02:11:00 hours and reported smoke showing. There was no verbal communications between the officer of Engine 94 and the officer of Truck 58 upon arrival. Upon further investigation, smoke was showing from the basement door at the top of the steps in the vestibule on Side Alpha. The Engine 94 Lieutenant went into the basement and found a couch on fire. The lieutenant then went back up the stairs and outside. He ordered the pipeman firefighter (nozzle firefighter) and the heelman fire fighter (backup firefighter) from Engine 94 to stretch an attack line from the engineer's side and lead out. The department identifies the nozzle firefighter as the pipeman and the backup firefighter as the heelman. For the purpose of this report, the terms Engine 94 Nozzle and Engine 94 Backup will be used. Engine 94 Nozzle pulled one horseshoe load of 2½-inch to 1¾-inch hose towards Side Alpha and the front door. A horseshoe hose load is loaded in the hose bed and the whole load is folded in half, resembling a horseshoe (**see Photo 4**). At 02:12:16 hours, a "Working Fire" Dispatch was transmitted for Box 111329. The units dispatched were Battalion 7, Truck 57, Squad 2, Ambulance 52, Ambulance 7, 2-7-2 (Command Van), 4-5-3 (EMS Field Supervisor). At 02:13 hours, Battalion 8 arrived



The front entrance to the apartment building. The basement entrance is to the right and the entrance to the 1st floor apartment is the set of stairs to the left. (*Photograph courtesy of the fire department*)

on-scene. At 02:15:52 hours, Battalion 8 had assumed Command and advised Main that the building was 2-story ordinary construction with fire in the basement. Command did not define a strategy or provide an incident action plan (IAP). On the front steps, the lieutenant ordered Engine 94 Nozzle to bleed the hoseline, go down to the basement, and advised the fire would be on the left. The lieutenant went into the basement to wait for Engine 94 Nozzle. Both Engine 94 Nozzle and Engine 94 Backup had gone on air at this time. Engine 94 Backup left the building to straighten out the hose with the engineer from Engine 94. While the lieutenant of Engine 94 was in the basement, Truck 58 opened the Side Bravo near the corner of Side Charlie door and then forced open the basement apartment door. This created a flow path due to the opening of the door on Side Bravo and the open door on Side Alpha. The fire now had a low intake and a high exhaust. The fire ignited the contents of the basement living room on Side Alpha, which extended up the stairwell to Side Alpha. Engine 94 Backup had entered the front door when conditions changed. Due to the amount of smoke, he had to crawl to the vestibule to locate the hoseline. Engine 94 Backup took the nozzle and moved outside to hit the fire through the basement windows on Side Delta and Side Bravo that had be removed. The lieutenant left the basement due to the heat, went up the front stairs, and to the outside through the front door, which was open on Side Alpha. He did not see the Engine 94 Nozzle or the hoseline when he exited the building. Battalion 7 arrived on scene at 02:18 hours. When he arrived on scene, he heard "Mayday, Mayday, Mayday" on the fireground channel. He called Command about the Mayday, but Command was on Main (Dispatch Channel). Battalion 7 reported to Command and advised him that a fire fighter had transmitted a Mayday. The dispatcher called Command and asked if there was a Mayday. Command (BC8) ordered everyone out of the building due to deteriorating conditions at 02:19:21 hours. At 02:21 hours, Command advised the dispatcher that there was no Mayday at this time and a personnel accountability report (PAR) was being conducted. When the PAR was conducted, the lieutenant from Engine 94 realized that the Engine 94 Nozzle was missing and advised Command. At 02:23 hours, Command called Main and requested a Still and Box Alarm plus an Emergency Medical Services (EMS) Plan 1 for a Mayday at Box 111329. Additionally, 3 civilians were located in the basement and removed by various companies at 02:15 hours, 02:21 hours, and 02:25 hours respectively. One of the civilians died and 2 were severely injured. Command initiated a RIT response. He sent Truck 53 to the 1st floor apartment and Truck 57 and Battalion 7 into the basement apartment to search for Engine 94 Nozzle. The captain and a firefighter from Truck 53 entered the building through the front door and went up to the 1st floor apartment. While searching the 1st floor, they heard a PASS alarm sounding. They found Engine 94 Nozzle in a prone position in the dining room near the dining room table of the 1st floor apartment. His facepiece was on but was ajar on his face and the Mask-Mounted Regulator (MMR) was attached to the facepiece. There was no air flowing from the facepiece and he was unresponsive. The officer and firefighter from Truck 53 with the lieutenant and a firefighter from Truck 57 removed Engine 94 Nozzle from the structure at 02:27 hours. Once outside, cardiopulmonary resuscitation (CPR) was started on Engine 94 Nozzle and he was transported to a local hospital. While in the emergency room of the hospital, he regained a pulse and was eventually moved to a trauma center in the city. Engine 94 Nozzle was pronounced deceased five days later on December 21, 2021.

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Contributing Factors

- *Incident management and command safety*
- *Fireground operations*
- *Fire department operations.*

Key Recommendations

Fire departments should ensure:

- *Incident commanders conduct a scene size-up and risk assessment, develop a strategy and incident action plan (IAP), use a functional personnel accountability system, maintain a tactical worksheet, incorporate the principles of command safety, establish divisions/groups early in an incident, are provided with an incident command technician or emergency incident technician, and appoints a safety officer*
- *All companies operating on the fireground, maintain crew integrity, are operating based upon the assignment given by the Incident Commander, critical incident benchmarks are communicated to the Incident Commander, and inspect and check their assigned SCBA at the beginning of each shift and after each use*
- *Fire department operations include a SOP/SOG for adequate staffing, wind-impacted fires, coordinate ventilation with suppression, review and revise SOP/SOG for below-grade fires, all firefighters and fire officers are trained in fireground survival procedures, all members and dispatchers are trained on the safety features of portable radios.*

For further information, visit the program website at www.cdc.gov/niosh/firefighters/fffipp/ or call toll free 1-800-CDC-INFO (1-800-232-4636).

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Career Candidate Firefighter Found Unresponsive at a Residential Structure Fire and Dies 5 Days Later–Illinois

Introduction

On December 16, 2021, a 30-year-old male career candidate firefighter/ EMT was found unresponsive in a 1st floor apartment of a 2½-story apartment building at a structure fire. The candidate firefighter was transported to a local trauma center. He died on December 21, 2021. On December 23, 2021, the U.S. Fire Administration (USFA) notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. During February 21-27, two NIOSH Fire Fighter Fatality Investigation and Prevention Program (FFFIPP) investigators traveled to Illinois to investigate this incident onsite. One investigator returned to Illinois during May 15–19, 2022 to complete the field investigation.

The NIOSH investigators met with the fire commissioner, deputy fire commissioners of fire operations and EMS operations, the chief of safety (district chief), fire department attorney, battalion chief of the Office of Fire Investigations (OFI), deputy district chief of Bureau of Logistics, the district chief of training (Chief of Training), Vice President and now current President of International Association of Fire Fighters (IAFF) local, the medical examiner from the county's medical examiner's office, and a lieutenant with the department's communications division.

NIOSH investigators interviewed command officers, company officers, and firefighters assigned to Box 111329 on Still Alarm, Rapid Intervention Team (RIT) Dispatch, and the Still and Box Alarm. Due to the pandemic, member interviews were initially conducted virtually. Member interviews were also conducted during both field investigations.

The investigators reviewed training records, training requirements, and SOPs, and general orders used by the fire department. A complete record of the fire alarm office radio transmissions was reviewed. During the second field investigation, department staff assisted with the development of a timeline for this incident.

Fire Department

The fire department involved in this incident is a career department. At the time of this incident, the department had 5,143 full-time members. The fire department is led by a fire commissioner and is assisted by a 1st deputy fire commissioner. The 1st deputy commissioner oversees the four Bureaus—Operations, Fire Prevention, Administrative Services, and Logistics. Each bureau is commanded by a deputy fire commissioner.

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Administrative services oversees the Personnel Division, the Employee Assistance Program Unit, and the Training Division. The Personnel Division manages the Medical Section that monitors the health and fitness of all uniformed members of the department.

The Bureau of Operations is the department's largest staffed bureau, with a personnel strength of more than 4,500 uniformed firefighters and paramedics, many of whom are "cross-trained." The Bureau of Operations consists of four divisions: Fire Suppression and Rescue, Emergency Medical Services (EMS), Special Operations, and the OFI.

The Fire Suppression and Rescue Division is responsible for the day-to-day operation of all fire suppression companies in the 98 firehouses dispersed throughout the city. When those companies are not fighting fires or responding to EMS incidents, they are responsible for conducting daily training, school inspections, and fire hydrant inspections within their first due district. The division staffs 96 engine companies, 61 truck companies, four squads (heavy rescues which are 2-piece companies), 25 battalions (battalion chiefs), 14 deputy district chiefs, and eight district chiefs, which are divided into five districts. The department covers a land area of 228 square miles, 37 miles of rivers and waterways, and serves a population of 2,697,000. Department members assigned to the Operations Division work a 24-on/48-off schedule with three platoons or shifts.

Each firehouse is assigned a captain. The captain is responsible for the fireground operations and management, firehouse budget, conducts candidate training and evaluation, supervises firefighters, leave management, develops training schedules for each shift, apparatus maintenance, facility management and maintenance, public fire education, fire inspections, and serves as acting battalion chief as needed.

Each position on an engine, truck, and squad company has a unique identifier that are used for communication purposes (s**ee Table 1**). If an engine or truck company operates short (staffing of 4), they operate under a manning variance (staffing of 4 instead of 5). There are four squad companies, which are two-piece companies. Each squad company consists of a heavy rescue and a 55-foot snorkel.

Table 1: Staffing Positions for each Company

Company	Staffing	Positions				
Engine	5	Officer	Engineer	Firefighter Pipeman (Nozzle)	Firefighter Heelman (Back-up)	Firefighter Hydrant
Truck	5	Officer	Driver	Firefighter Roof	Firefighter Entry	Firefighter Search
Squad	4 & 2	Squad Officer	Squad Driver	Squad – (2 FFs) Rear and Roof	Snorkel – Entry	Snorkel Driver

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The 3rd Fire District encompasses the two airports in the city that the department provides aircraft rescue firefighting (ARFF), structural firefighting, and EMS. The department operates 10 ARFF apparatus, five engine companies, two tower ladders, and three ALS ambulances and numerous support vehicles at these two airports.

The EMS Division operates 80 advanced life support (ALS) ambulances, which are staffed with two paramedics. EMS field supervisors are assigned to each battalion to assist with staffing, logistical needs, and patient care.

The Special Operation Division is the "special rescue" branch that is involved in homeland security activities. It currently includes the Hazardous Materials Unit, the Air Sea Rescue Unit and the Technical Rescue Unit. Currently the hazardous incident units 5-1-1 and 5-1-2 are the department's primary units for all hazardous incidents. This unit responds to a wide array of incidents, ranging from industrial accidents, crimes against nature, and terrorist incidents and works closely with local, state, and federal agencies in mitigating hazardous material incidents. The Technical Rescue Unit operates 2 urban search and rescue units and is part of the Illinois Technical Rescue Teams and IL-Task Force 1.

The OFI is mandated by state law and municipal ordinance to determine the cause and origin all fires, within the city. The OFI has five 24-hour response units, as well as a Major Incident Response Unit (MIRU) that is outfitted with tools and supplies to compliment the 24-hour vehicles sent to investigate major incidents.

The Fire Prevention Bureau (FPB) has four area offices: North, South, West and Central. These offices conduct general inspections of businesses, schools, hotels, public places of assembly, and high-rise occupancies within their geographic boundaries. Inspections are done on an annual basis to ensure that each entity complies with all required fire and life safety codes.

The fire department has written policies and procedures, which are available to all department members within their stations.

Training, Education, and Professional Development

Illinois Office of the State Fire Marshal

The Illinois Office of the State Fire Marshal (OSFM) does not mandate minimum training requirements for firefighters. However, the OSFM does maintain and oversee the Division of Personnel Standards and Education (DPSE) which promotes, encourages, and assists local governments to improve the levels of education and training standards for local firefighters. While this program is strictly voluntary, the OSFM and the DPSE highly encourage local governments to adopt and complete firefighter certification programs. This encouragement includes a reimbursement program for firefighter training costs. Additional information about the DPSE's programs can be found at the Division's website, and the General Assembly's Illinois Administrative Code which includes training facilities, examinations and certifications, and a current list of certifications.

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Illinois Department of Labor, Division of Occupational Safety and Health (IL-OSHA)

Illinois fire departments must comply with various occupational safety and health standards under the Code of Federal Regulations (CFR) 1910.

For example, IL-OSHA states that the authority having jurisdiction (AHJ) should ensure personnel meet the requirements of *29 CFR 1910.134, Respiratory Protection*. The job of an AHJ is also to ensure that the education and training of personnel and operations comply with NFPA standards such as:

- NFPA 1001, *Standard for Fire Fighter Professional Qualifications*
- NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*
- NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*
- NFPA 1700, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*

IL-OSHA also states that the AHJ should establish an accountability system to ensure that personnel only operate in an area and at the level commensurate to their training. A link to IL-OSHA investigation report of this incident is: https://labor.illinois.gov/laws-rules/safety/fire.html

Fire Department Training

This career fire department enacted requirements that exceed the state's requirements. The fire department hires candidates through the city's civil service process. The fire department gives recruitment tests for both single-role paramedics and firefighter positions. Recruits that pass the exam are placed on an eligibility list and that list is sorted in lottery order. The lottery order is then referred to the department as vacancies become available. Recruits must pass a background check, a physical ability test, and a medical examination that complies with NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*.

The fire department operates its own recruit training academy that exceeds the state fire training requirement. The curriculum includes:

- *Basic Operations Firefighter*
- *Fire Service Vehicle Operator* (FSVO) course
- National Incident Management System (NIMS): *Introduction to the Incident Command System* (IS100)
- National Incident Management System (NIMS): *An Introduction to the National Incident Management System* (IS-700.b)
- National Fallen Fire Fighters Foundation, *Courage to Be Safe Course*
- *Hazardous Materials Awareness and Hazardous Materials Operations*
- *Farm Machinery Extrication*

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The recruit academy is more than six months in length and consists of more than 490 classroom and practical training contact hours; written and practical testing per state protocol; successfully complete a physical training test (a minimum of 3 times during the course of instruction); and completion of flashover simulator training.

Also, each recruit must complete instruction in emergency medical services and receive a *National Registry of Emergency Medical Technicians* Emergency Medical Technician (EMT)-Basic certification. This certification is a minimum of 120 hours of classroom and practical training and education.

Firefighter candidates must complete a probationary period upon successful completion of recruit school. The probationary period is nine months of continuous employment from the date of initial hire. After completing the recruit training, candidates are further reviewed during the candidate field evaluation period, which is a period of 12 months of post-fire academy assignment on a company (engine or truck). The candidate is assigned to the station captain's shift.

Each shift, firefighters are required to participate in a minimum of two hours of training per shift, which is documented by the company officer. All firefighters must complete a 30-minute SCBA drill at the beginning of each work shift, which includes monitoring air management. During the SCBA drill, firefighters add their identification tag to the apparatus collection ring located on the apparatus they are assigned to for the shift.

All pump operators on the fire department hold the career service rank of engineer, which requires them to pass competitive written and practical examinations. Engineers also complete a five-week class at the fire academy. Ladder/truck apparatus do not have pumps. Ladder/truck operators are referred to as a driver. The fire department's engineer and driver training requirements exceed the requirements of NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications* [NFPA 1002 2017].

The battalion chief position is the highest tested rank in the department, appointed by the Fire Commissioner. The ranks of assistant deputy chief paramedic, deputy district chief, district chief, assistant deputy fire commissioner, deputy fire commissioner, and 1st deputy fire commissioner are also appointed by the Fire Commissioner. The Fire Commissioner is appointed by the Mayor.

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Table 2. The promotion process and respective requirements for the positions of lieutenant, captain, and battalion chief

Position/Rank	Required Length of Service	Promotional Process	Training Post Promotion
Lieutenant	Requires 5 years of service as Firefighter	Written examination and oral interview	5-week training program at the fire academy
Captain	Requires 30 months of service as a Lieutenant	Written examination and oral interview	2-week training program that covers the National Fire Academy's *Incident Safety Officer* course, investigating motor vehicle accidents, the care, maintenance, and use of PPE, and ICS training
Battalion Chief	Requires 30 months of service as a Captain	Written exam	2-week officer candidate school program for battalion chiefs includes department communications procedures including the operational issues for portable radios, high-rise firefighting operations and practical drill, the use and management of rapid intervention crews, and Mayday procedures.

Engine 94 Nozzle had completed a total of 960 hours of training which consisted of recruit school curriculum and company drills between 2020 and 2021. The company level training hours are not shown (**see Table 3**).

Table 3. Engine 94 Nozzle's completed training requirements from recruit school

Training Requirement	Hours	Date of Completion
Basic Operations Firefighter	350	March 2021
Fire Service Vehicle Operator	16	April 2021
Hazardous Materials First Responder – Awareness and Operations	40	April 2021
Vehicle and Machinery Operations	40	April 2021
IS-00100.c. – *Introduction to Incident Management System, ICS-100*	16	December 2020
IS-00200.c – *Basic Incident Command System for Initial Response*	16	December 2020

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IS-00700.b – *An Introduction to the National Incident Management System*	16	December 2020
IS-00800.d – *National Response Framework, An Introduction*	16	December 2021
AWR-140-W – *Introduction to Radiological/Nuclear WMD Operations*	4	April 2021
National Registry of Emergency Medical Technicians – *Emergency Medical Technician*	150	February 2021

Engine 94 Lieutenant, who was a relief lieutenant or floater. A relief officer or floater works from a staffing pool on an assigned shift, is not assigned to a permanent firehouse, and reports to a different firehouse for a finite period of time. The lieutenant had completed 950 hours of training from 2001 to 2018 (**see Table 4**). The training hours shown are from training administered by the department's Division of Training and does not include company level training hours.

Table 4. Engine 94 Lieutenant's completed training requirements

Training Requirement	Hours	Date of Completion
University of Illinois Fire Service Institute - *Advanced Technician Firefighter*	100	June 2018
NFPA 1001, Standard for Fire Fighter Professional Qualifications, *Firefighter II*	350	May 2001
NFPA 1001, Standard for Fire Fighter Professional Qualifications, *Firefighter III*	450	December 2010
Hazardous Materials – *Awareness Level*	8	April 2001
Hazardous Materials – *Operations Level*	40	June 2001
Hazardous Materials – *Technician B*	40	October 2018
Vehicle and Machinery Operations	40	May 2018
Fire Service Vehicle Operator	8	April 2014
NFPA 1041, *Standard for Fire and Emergency Services Instructor Professional Qualifications – Instructor I*	40	April 2018
NFPA 1041, *Standard for Fire and Emergency Services Instructor Professional Qualifications – Instructor II*	40	April 2018
NFPA 1003, *Standard for Airport Firefighter Professional Qualifications*	80	August 2003
NFPA 1003, Standard for Airport Firefighter Professional Qualifications	40	June 2004
IS-00100.c. – *Introduction to Incident Management System, ICS-100*	16	December 2008
IS-00200.c – *Basic Incident Command System for Initial Response*	16	December 2008
IS-00700.b – *An Introduction to the National Incident Management System*	16	May 2006
IS-00800.d – *National Response Framework, An Introduction*	16	April 2018

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Battalion 8 (Command) had completed a total of 962 hours of training from 2001 to 2021 (s**ee Table 5**). The training hours shown are from training administered by the department's Division of Training and does not include company level training hours.

Table 5. Battalion 8's completed training requirements

Training Requirement	Hours	Date of Completion
University of Illinois Fire Service Institute - *Advanced Technician Fire Fighter*	100	June 2019
NFPA 1001, Standard for Firefighter Professional Qualifications, *Firefighter II*	350	January 2001
Hazardous Materials – *Awareness Level*	8	January 2001
Hazardous Materials – *Operations Level*	40	April 2001
Hazardous Materials – *Technician A*	40	August 2008
Hazardous Materials – *Technician B*	40	December 2016
Fire Service Vehicle Operator	8	April 2019
NFPA 1041, *Standard for Fire and Emergency Services Instructor Professional Qualifications – Instructor I*	40	September 2014
NFPA 1041, *Standard for Fire and Emergency Services Instructor Professional Qualifications – Instructor II*	40	January 2021
NFPA 1021, *Standard for Fire Office Professional Qualifications* – Fire Officer I	40	June 2019
Vehicle and Machinery Operations	40	June 2019
National Fire Academy, Fire Department Incident Safety Officer	16	June 2019

Building Construction

The structure involved in this incident was a 2½-story apartment building built in 1922. The dimensions were 25 feet wide and 50 feet long. The total square footage for the apartment building was 3,636 square feet:

- The basement apartment was 1,050 square feet
- The 1st floor apartment was 1,280 square feet
- The 2nd floor apartment was 1,306 square feet

The structure was constructed of ordinary construction (Type III) and had a parapet roof. The building is known as a "Brick-2-Flat" or "Two flats" which consists of:

- ordinary construction
- 1 flat (apartment) on the 1st floor
- 1 flat (apartment) on the 2nd floor
- A basement that is either an apartment, storage, or a laundry room (**see Photo 1**).

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Photo 1. "Brick-2-Flat" apartment building. The front entrance is on Side Alpha/Side Delta corner. The small casement windows near the ground indicate a basement.
(*Photograph courtesy of the fire department*)

Brick-2-Flats have a unique profile and history in the city's architecture. The construction of the Brick-2-Flat dates back more than 100 years. They are similar to horizontal townhouses. Brick-2-Flats architecture is the city's comparison to Brooklyn brownstones or the row houses of Philadelphia. These structures are often found in impressive ensembles in various parts of the city. Facades in brick or stone typically feature an entry porch to one side, and a projecting bay of windows on the other side. All these features are surmounted by an ornate cornice in brick or stone. Postage-stamp front yards connect to narrow gangways between the closely spaced buildings. When these structures were built, plans and building materials could even be purchased as kits [Block Club Chicago 2019].

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The basement was occupied by two males and one female at the time of the fire. The 1st floor was occupied by a family that called 9-1-1 and tried to notify the occupants in the basement of the fire. The 2nd floor was being renovated at the time of the fire. The owner's son was living in the apartment but was not in the apartment at the time of the fire.

Floor Plans

The floor plans for the Brick-2-Flat involved in this incident, includes the front vestibule (**see Diagram 1**), the 1st floor (basement apartment) (**see Diagram 2**), 2nd floor (1st floor apartment) (**see Diagram 3**) and the 3rd floor (2nd floor apartment) (**see Diagram 4**).

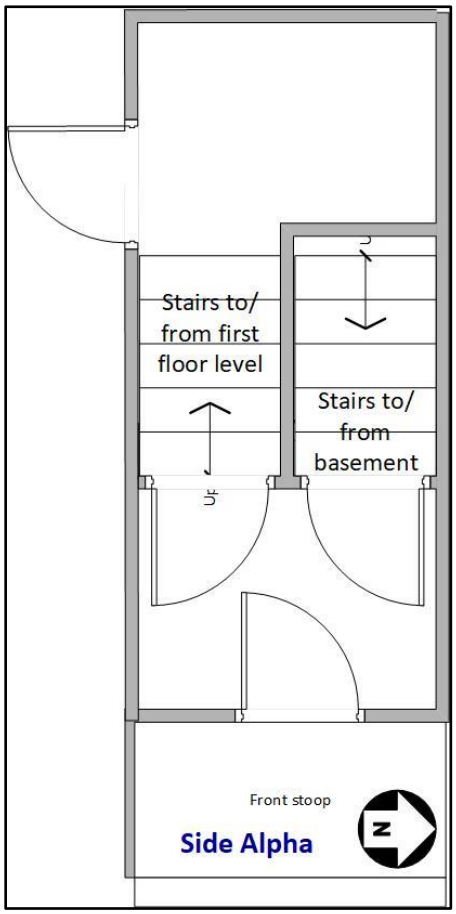

Diagram 1. The vestibule (also identified as the ***Foyer***) located on the Side Alpha/Side Delta corner of the building. The stairs to the left go to the 1st floor apartment and to the 2nd floor apartment.
(*Diagram courtesy of Rayburn Fire Scene Investigations, Inc.*)

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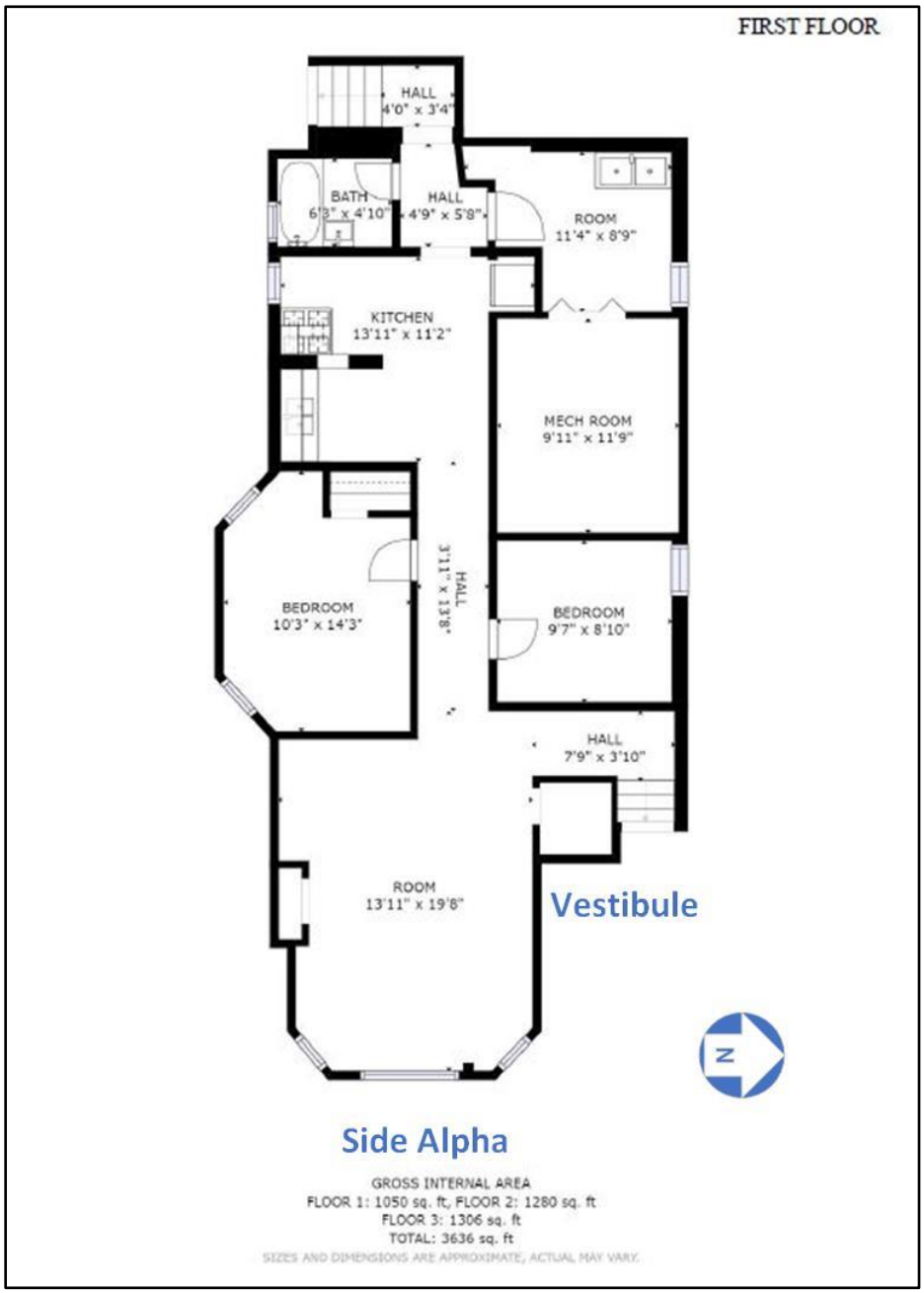

Diagram 2. The floor plan of the basement apartment identified as Floor 1. The rear door entrance is on Side Bravo near the Side Bravo/Side Charlie corner accesses the basement by the steps in the hallway.
(*Diagram courtesy of Rayburn Fire Scene Investigations, Inc.*)

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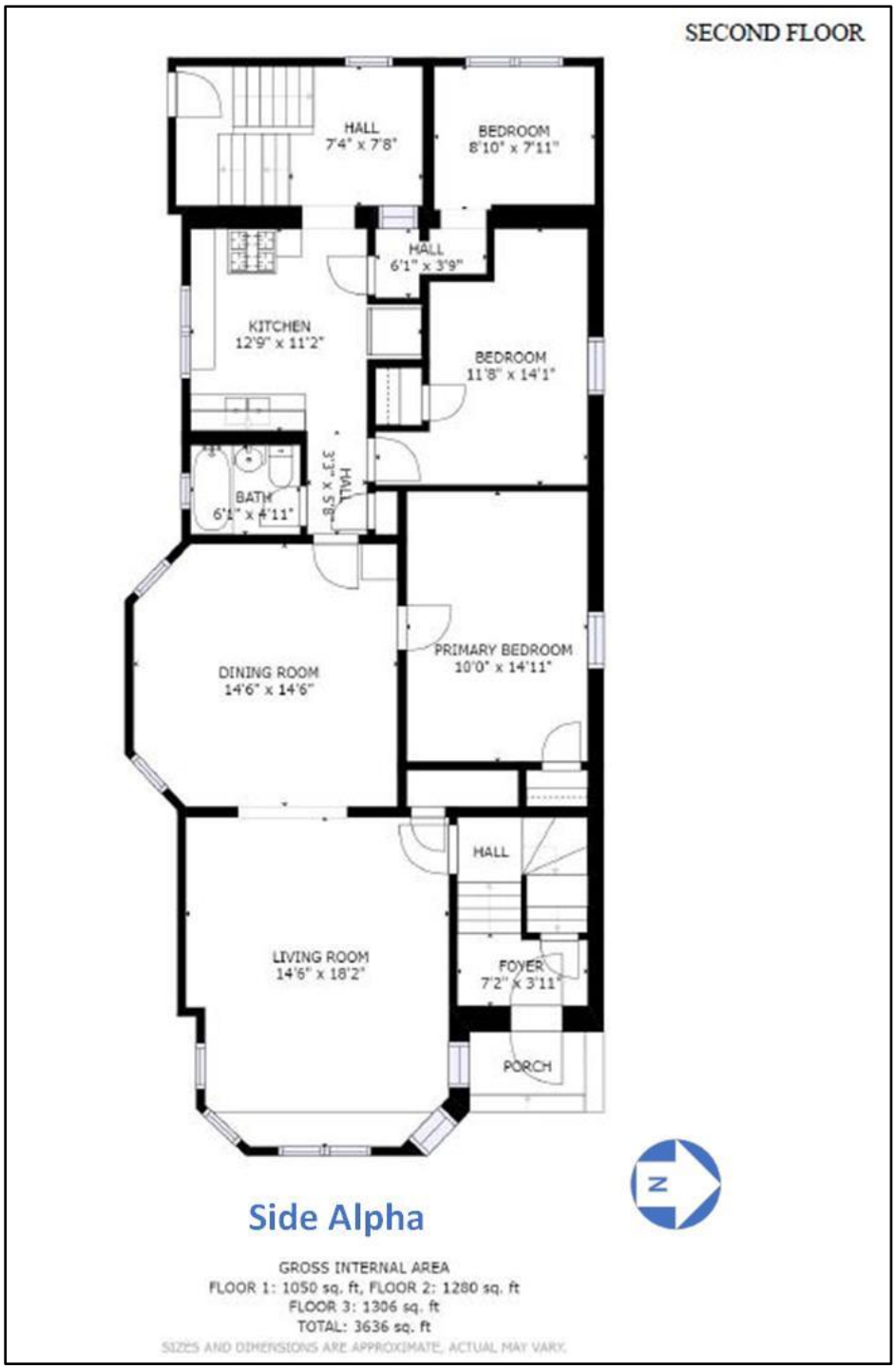

Diagram 3. The floor plan of the 1st floor apartment identified as the Second Floor. The **vestibule** is identified as the ***Foyer*** in this diagram. The rear door is on the Side Bravo side at the corner of Side Charlie, which swings inward.
(*Diagram courtesy of Rayburn Fire Scene Investigations, Inc.*)

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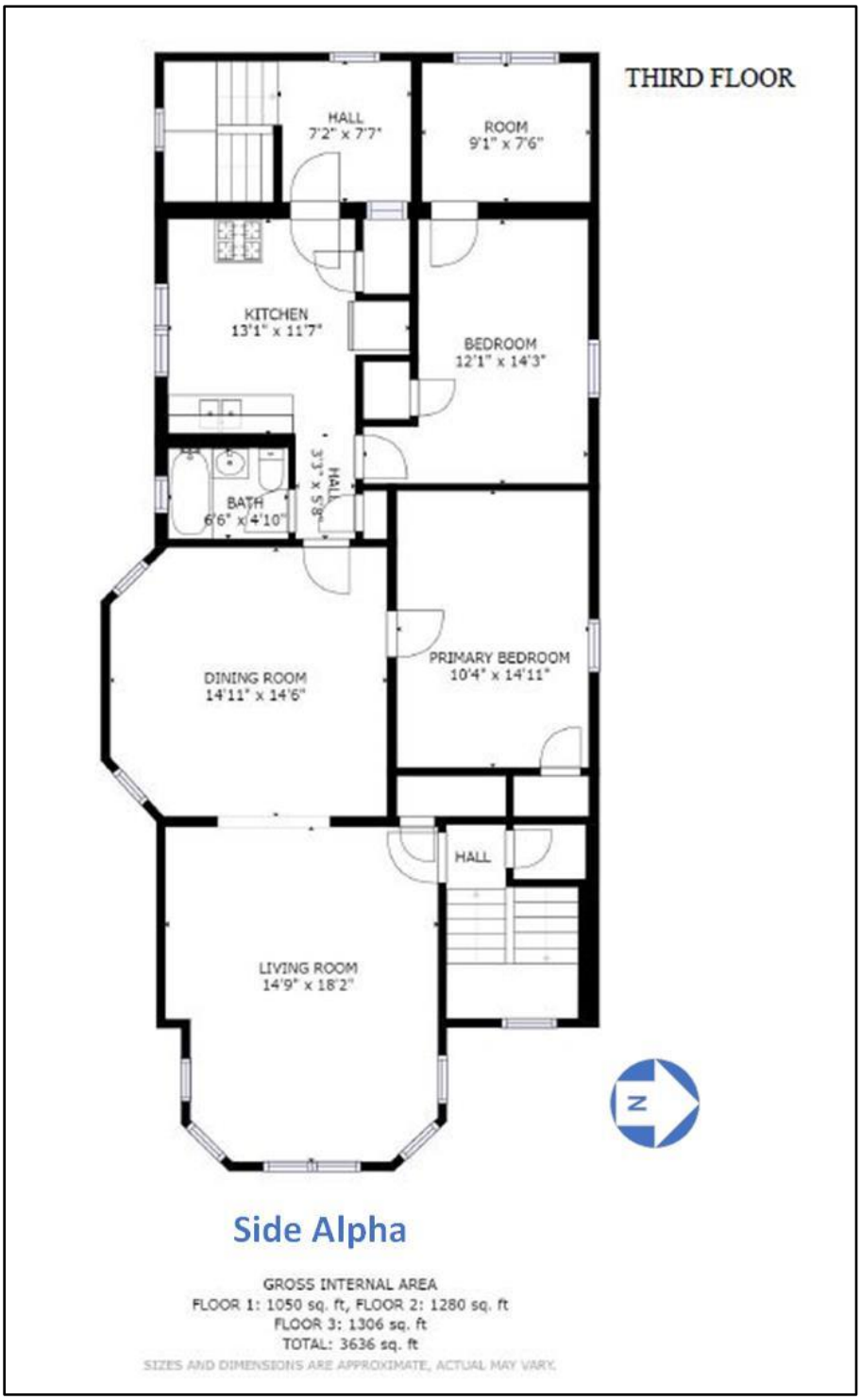

Diagram 4. The floor plan of the 2nd floor apartment identified as the Third Floor. This apartment was being renovated at the time of the fire.
(*Diagram courtesy of Rayburn Fire Scene Investigations, Inc.*)

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Apparatus, Staffing, and Communication

A "Still" Alarm was transmitted for Box 111329 at 02:06:25 hours for a basement fire in an apartment building. Companies dispatched were Battalion 8, Engine 94, Engine 7, Truck 58, and Truck 53. At 02:13:09 hours, a Rapid Intervention Team (RIT) Dispatch was transmitted for Box 111329. The units dispatched were Battalion 7, Truck 57, Squad 2, and Ambulance 7.

Table 5. Companies dispatched on the Still Alarm and RIT Dispatch

Apparatus	Staffing	Comments
Engine 94	5 – Lieutenant and 4 firefighters	
Engine 7	5 – Lieutenant and 4 firefighters	
Truck 58	5 – Captain and 4 firefighters	
Truck 53	4 – Captain and 3 firefighters	Running a staffing variance
Battalion 8	1 – Battalion Chief	Incident Commander
Truck 57	5 – Lieutenant and 4 firefighters	Assigned as RIT
Squad 2	5 - Lieutenant and 4 firefighters	2-piece company
Ambulance 7	2 – EMT and Paramedic	
Battalion 7	1 – Battalion Chief	Assigned as RIT Chief

The city's Office of Emergency Management and Communications (OEMC) operates the 9-1-1 center and dispatch for both fire and police. OEMC operates two dispatch centers for the fire department in the city, one north and one south. The fire department has two basic responses for the report of a structure fire. The alarms are a "Still" alarm or a "Still and Box" alarm. The Fire Alarm Office dispatches a "Still" alarm assignment to initial reports of structure fire. The "Still" alarm dispatch then sends two engine companies, two truck companies, and a battalion chief. If the Fire Alarm Office receives additional reports of a fire or a company arrives on scene and reports a "working fire," then a squad company, a command van, and a RIT complement are also dispatched. If the report of a fire is located in a squad company's first due area (approximately 40 blocks), then the squad company is sent automatically. A "Still and Box" alarm is usually requested by a fire officer, though there are situations where the Fire Alarm Office can transmit a "Still and Box" alarm. These situations can include a person trapped in the fire building, multiple structures on fire, a large commercial building on fire, a building collapse, train derailment, an airport alert (aircraft in distress), or smoke in a building with a high life hazard (e.g., hospital, nursing home, or theater).

Extra or additional alarms are designated as 2-11, 3-11, 4-11, and 5-11 with defined response protocols for each alarm. Any equipment needed above a 5th alarm (5-11) is requested by the Incident Commander. For emergency medical services (EMS) incidents with a defined number of patients, the fire department dispatches an EMS Plan I, II, or III, each having a defined response protocol. For example, the *EMS Plan I* includes:

- 5 ALS ambulances
- 1 engine company
- 1 truck company

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- 1 battalion chief
- 1 EMS field officer
- 1 assistant deputy chief paramedic

For fireground operations, an incident is dispatched on a repeated channel. For incidents that require a tactical channel (e.g., Fireground Channel 4), members switch to the assigned tactical channel. The fireground tactical channel is a non-repeater channel with limited distance, is not recorded, and cannot be monitored by the Fire Alarm Office. Every firefighter and fire officer is assigned a portable radio. A firefighter is identified by their assigned position (e.g., Engine 94 Nozzle) and the officer is identified by the apparatus they are assigned to (e.g., Engine 94 or Engine 94 officer. At the time of this incident, the battalion chief s had only 1 portable radio. A battalion chief was expected to change radio channels from the Fireground channel to the Dispatch channel; thereby preventing a battalion chief from hearing what was said on one channel when speaking on another channel. After this incident the department provided all battalion chiefs with a second portable radio as reflected in **Appendix 5**. One portable radio is to monitor the Dispatch channel (Fire Alarm Office) and other portable radio is to communicate with companies operating on the Fireground channel. Each portable radio has an emergency alert button (**orange**), and it is programmed to identify the channel the portable radio is on when pushed.

The fire department operated 1700 portable radios and 400 mobile radios.

Timeline

The timeline is a summary of events that occurred as the incident evolved. Not all incident events are included in this timeline. This timeline lists the dispatch communications, fire department response, fireground communications and fireground operations. Times that are approximate are rounded to the closest minute. The times to the second, were taken from the fire alarm office radio transmissions, the fire alarm office communications records, the data log information from Engine 94 Nozzle's SCBA data log, and EMS patient reports.

Time	Fireground Operations, Response, and Details
December 16, 2021	
02:05:51 Hours	• Original 9-1-1 call received for Box 111329.
02:06:25 Hours	• Main dispatched a *Still Alarm* for Box 111329: Battalion 8, Engine 94, Engine 7, Truck 58, and Truck 53.
02:06:37 Hours	• 9-1-1 caller states that "smoke and flames" are showing.

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Time	Fireground Operations, Response, and Details
02:08:29 Hours	• Engine 94 enroute.
02:10:38 Hours	• Engine 94 on-scene. Engine 94 officer advised Main, Engine 94 was southbound and the structure was 2-story ordinary construction. There was nothing showing, indicating a ventilation limited fire,
02:11:00 Hours	• Truck 58 on-scene. Truck 58 reported smoke showing.
02:11:01 Hours	• Engine 7 on-scene.
02:11:30 Hours	• The lieutenant of Engine 94 went down to the basement apartment. ○ Engine 94 officer found a small fire on the couch in the basement apartment on Side Alpha.
02:12:16 Hours	• Main transmitted a *Working Fire* Dispatch for Box 111329. ○ Main dispatched Battalion 7, Truck 57, Squad 2, Ambulance 48, 4-5-3, and 2-7-2.
02:12:36 Hours	• Truck 53 on-scene.

02:13:00 Hours	• Battalion 8 arrived on-scene and assumed Command.
	  ○ This time is based upon Battalion 8 witnessing Engine 94 Nozzle go "on air".
	  ○ The CAD time indicated Battalion 8 arriving on-scene at 02:15:40 hours.
	• Engine 94 Nozzle "on air".
	• Truck 58 to the basement for search.
	  ○ Truck 58 entered door on Side Bravo/Side Charlie and then forced the door to the basement apartment.
	• The lieutenant from Engine 94 goes down to the basement a 2nd time via the steps on Side Alpha.

02:13:09 Hours	• Battalion 7 and Truck 57 designated as RIT.
02:13:30 Hours	• Truck 58 aerial to the roof. ○ A firefighter from Truck 58 assigned to vent the roof.

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Time	Fireground Operations, Response, and Details
02:14 Hours	• Battalion 7 and Squad 2 enroute.
02:15 Hours	• Truck 58 found the first civilian victim, who was a female, in the kitchen of the basement apartment and began to move the civilian out of the building. • Truck 53 entered the basement apartment.
02:15:52 Hours	• Command to Main, "2-story ordinary construction with fire in the basement".
02:16 Hours	• Fire was showing from Side Alpha basement windows, indicating a ventilation induced flashover. • Engine 94 Nozzle's SCBA was free flowing as indicated by the data log. • Truck 53 is out of the basement due to heavy fire. ○ Truck 58 officer went to Side Charlie to ensure Truck 53 was out of the basement.
02:17 Hours	• Engine 94 Nozzle called a Mayday.
02:17:32 Hours	• Command advised Main that Engine 94 had one line in service. • Truck 58 (PAR 2) was operating on the roof. • Command advised Main to have an ambulance go to the alley. ○ Truck 58 was removing a victim from the basement.
02:18 Hours	• Engine 94 Nozzle's SCBA cylinder is empty. • Truck 58 has a female victim out of the building on Side Charlie.
02:18:14 Hours	• Battalion 7 and Squad 2 on-scene. ○ Battalion 7 asked the Squad 2 officer if he heard a Mayday on the radio.
02:19 Hours	• Engine 94 Nozzle's PASS alarm was manually activated.
02:19:21 Hours	• Battalion 7 advised Command of the Mayday being called. • Command ordered the evacuation of the building and conduced a personnel accountability report (PAR).
02:19:30 Hours	• The Main (North Dispatch Center) acknowledged the Mayday.

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Time	Fireground Operations, Response, and Details
02:20 Hours	• Truck 58 moved the female victim to Side Alpha. • Truck 58 and Engine 7 start patient care on the female victim.
02:21 Hours	• Squad 2 sent to the basement to search for Engine 94 Nozzle. • Squad 2 finds a second victim (male) in the basement.
02:23 Hours	• Command initiated the RIT. • Truck 53 (officer and a firefighter) were sent to the 1st floor apartment to search for Engine 94 Nozzle. • Battalion 7 and Truck 57 were sent to the basement to search for Engine 94 Nozzle.
02:24 Hours	• Squad 2 has the second civilian victim out of the building. ○ Squad 2 moved the male victim towards Side Alpha.
02:24:02 Hours	• Command advised Main that there was a Mayday at Box 111329. ○ "Just conducted a PAR. We're short one member. Emergency, emergency, emergency, give me a box. I've put RIT to work and get me another RIT company."
02:24:04	• Main dispatched a *Still and Box Alarm* for Box 111329: Engine 125, Engine 68, Tower Ladder, 23, 4-5-4 (Paramedic Field Chief), Battalion 11, Battalion 10, 2-2-2 (Deputy District Chief – 2nd Fire District), and the Office of Fire Investigations (OFI).
02:24:30 Hours	• The captain and a firefighter from Truck 53 entered the building on Side Alpha to search the 1st floor apartment for Engine 94 Nozzle. • Squad 2 (PAR 2) and Engine 94 hydrant enter the basement to search for Engine 94 Nozzle on Side Alpha.
02:25 Hours	• Squad 2 (PAR 2) and Engine 94 hydrant find a third civilian victim near the front bedroom and the bottom of the front stairs.
02:25:45 Hours	• Truck 53 officer was in the 1st floor apartment and heard a PASS alarm. ○ Truck 53 officer found Engine 94 Nozzle in the dining room near the dining room table.
02:25:55 Hours	• Truck 53, Truck 57, and Battalion 7 started moving Engine 94 Nozzle out of the 1st floor apartment.

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Time	Fireground Operations, Response, and Details
02:27:30 Hours	• RIT had Engine 94 Nozzle out of the building and moved to the front yard (Side Alpha).
02:28 Hours	• Squad 2 and Engine 94 Hydrant had the third civilian victim out of the building on Side Alpha.
02:28:20 Hours	• Command advised Main that the fire was knocked down at Box 111329.
02:28:45 Hours	• Engine 94 Nozzle was moved to a stretcher in the front yard. ○ Engine 94 Nozzle's SCBA, turnout coat, and turnout pants were removed.
02:30:53 Hours	• Engine 94 Nozzle placed on a cardiac monitor on Side Alpha by Ambulance 52.
02:31:39 Hours	• Engine 94 Nozzle's PASS alarm manually turned off.
02:32:10 Hours	• Engine 94 Nozzle moved to Ambulance 52 for transport to a local trauma hospital.
02:49:45 Hours	• Command advised Main that the fire was out.

Personal Protective Equipment

NIOSH investigators inspected and photographed the structural firefighting gear and SCBA worn by Engine 94 Nozzle at the department's Breathing Apparatus and Air Mask Service facility. At the time of the fire, the firefighter was wearing full turnout gear and SCBA with facepiece. All the personal protective equipment (PPE) were compliant with NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting* and were in good condition. The turnout pants were cut by EMS personnel during patient care.

The SCBA worn by Engine 94 Nozzle was a Mine Safety Appliance (MSA) G1. It was approved by NIOSH and certified as meeting the 2013 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, by a third-party certification body [NFPA 2018]. A visual inspection revealed that the SCBA worn by Engine 94 Nozzle had a hole in the low-pressure hose during this incident (s**ee Photo 2 and Photo 3**). This issue with the SCBA was investigated by the department's Breathing Apparatus and Air Mask Service on December 16, 2021, with the fire department safety office, and MSA. MSA issued a user notice on February 3, 2022, in

response to the issues at this incident. The user notice was *MSA G1 Regulator Hose Inspection* (s**ee Appendix One**).

The SCBA data log (downloaded after the incident) provided the following information timeline for the SCBA:

- 02:12 hours: Engine 94 Nozzle turns on his SCBA (4190 psi)
- 02:13 hours: Engine 94 Nozzle "on air" (4210 psi)
- 02:17 hours: SCBA low air warning activates (<2250 psi)
- 02:17 + 15 seconds: The low air alarm (EOSTI) activates, indicating less than 33%+/- air was remaining in the cylinder (<1500 psi)
- 02:18 hours: Cylinder is empty
- 02:19 hours: Engine 94 Nozzle manually activated his PASS alarm
- 02:31 hours: PASS alarm silenced and SCBA turned off (See Appendix Two)

The cylinder capacity was a 4500 psi (45-minute) cylinder. Engine 94 Nozzle's cylinder pressure, 4210 psi, was considered full by the department.

The normal breathing rate is 40 liters per minute per NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*.

Photo 2. Unpressurized hose with a hole and bulge near the regulator boot on the SCBA worn by Engine 94 Nozzle.
(*Photo courtesy of the fire department.*)

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Photo 3. The cracked low-pressure hose with a hole on the SCBA worn by Engine 94 Nozzle. **(*Photo courtesy of the fire department.*)**

MSA reported this incident to the NIOSH National Personal Protective Technology Laboratory (NPPTL). NPPTL opened a Nonconforming Respirator Investigation (NRI), formerly known as a certified product investigation process (CPIP). Upon notification, NIOSH works with the SCBA manufacturer to address any identified non-conformances to 42 CFR 84 or the Chemical Biological Radiological and Nuclear Statement of Standards and may initiate an NRI. NRIs document the findings of the SCBA manufacturer's investigation into the root cause of the issue and confirm the issues are resolved, including issues identified on respirators that are in the field. NRIs may result in user notices, voluntary stop sales, recalls, retrofits, changes to the SCBA manufacturer's quality control process or design of the approved product, or revocation of the NIOSH approval. NIOSH takes these actions to ensure respirators offer the level of protection that manufacturers claim.

Weather Conditions

On December 16, 2021, at 0151 hours, the weather was cloudy and windy. The temperature was 64°F, the dew point was 58°F, the humidity was 80%, the winds were from the SSW, the wind speed was 28 mph with wind gusts were 45 mph (**see Photo 4**), and the barometric pressure was 28.83 inches. A 10 mph wind can create a wind-impacted fire. There had been no precipitation in the past 24 hours [Weather Underground 2021].

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Photo 4. The wind direction at Box 111329 on December 16, 2021. the winds were from the SSW, the wind speed was 28 mph with wind gusts were 45 mph
(*Photo courtesy of the fire department*)

Investigation

On December 16, 2021, the Office of Emergency Management and Communications (OEMC) received a 9-1-1 call at 02:05:51 hours from an occupant of an apartment building stating there was smoke in the building and a fire in the basement apartment. The occupant from the 2nd floor apartment and an occupant from the 1st floor apartment tried to enter the basement apartment, but the smoke was too heavy. OEMC transmitted a "Still" alarm for Box 111329 at 02:06:25 hours for a basement fire in an apartment building. Main dispatched Battalion 8, Engine 94, Engine 7, Truck 58, and Truck 53 for a report of structure fire. On December 15 and 16, Truck 53 was running with a manning variance. Thirty-five companies city-wide are allowed to operate on a variance each shift. At 02:06:37 hours, an occupant called 9-1-1 stating there was smoke and fire showing from the basement. Engine 94 arrived on-scene at 02:10:38 hours. The Engine 94 Lieutenant provided his scene size-up upon arrival, which he stated, "Engine 94 is southbound, 2-story structure, nothing showing." Truck 58 arrived at 02:11:00 hours and reported smoke showing. The front door on Side Alpha was open as was the door to the basement apartment on Side Alpha. The door on Side Bravo at the Side Charlie was closed.

The Engine 94 Lieutenant entered the building on Side Alpha and went down the stairs to the basement. He found a small fire on a couch that was near the Side Alpha basement wall at 02:11:30 hours. He went back up the stairs and exited the building. He ordered the Engine 94 Nozzle and the

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Engine 94 Backup to stretch an attack line from the engineer's side and lead out. Engine 94 Lieutenant told Engine 94 Nozzle to take the hoseline down the stairs (approximately 5-6 steps) and advised the fire was on the left in the basement. Engine 94 Lieutenant went back down to the basement to wait on Engine 94 Nozzle. At 02:12:16 hours, OEMC transmitted a "Working Fire" dispatch for Box 111329, which was were Truck 57, Squad 2, 2-7-2 (Command Van), Ambulance 7, Ambulance 52, and 4-5-3 (EMS Field Supervisor).

Engine 94 Nozzle helped Engine 94 Engineer pulled one horseshoe load with 1¾-inch hose connected to 2½-inch hose (**see Photo 4.**). The Engine 94 Engineer handed Engine 94 Nozzle the nozzle as he stretched the line across the front yard to the front door. Also, Engine 94 Backup pulled 3 more lengths of 2½-inch and helped pull the 1¾-inch hoseline to the front door. Engine 94 Nozzle got the nozzle to the front door and bled the attack line of air. Engine 94 Backup was flaking out the hoseline out in the front yard. At approximately 02:13 hours, Battalion 8 arrived on-scene and assumed Command.

Truck 58 (captain and 2 firefighters) entered the structure through the rear door which located on the Side Bravo/Side Charlie corner. They opened the door to enter the basement. When they opened the doors, This created a flow path due to the wind conditions entering through the open door on Side Bravo and exiting through the door on Side Alpha. The fire now had a low intake and a high exhaust. At this point, the couch was in the smoldering phase. When the flow path was created due to the opening of the Side Bravo rear door, this caused the couch to reignite. The fire consumed the couch and contents on Side Alpha in the basement. Engine 94 Lieutenant was in the basement at this time. Engine 94 Backup went on air and got to the vestibule. Engine 94 Nozzle was moving towards the basement. Engine 94 Backup had to go outside to get the gated wye and straighten out the hoseline. Engine 94 Backup went back to the vestibule. Engine 94 Backup had re-entered the front door when conditions changed. Due to the amount of smoke, he had to crawl to the vestibule to locate the hoseline. He saw fire in the basement and opened the nozzle and flowed water for 1-2 minutes into the basement from the vestibule He took the nozzle and moved outside to hit the fire from the exterior through the basement windows on Side Delta.

Prior to Engine 94 Backup coming back to the hoseline, Engine 94 Lieutenant left the basement due to heavy fire and smoke. He came out of the basement and met Command in the front yard. At 02:13:09 hours, Battalion 7 and Truck 57 were designed as RIT. At 02:13:40 hours, the driver of Truck 58 had the aerial to the roof and a firefighter from Truck 58 assigned to ventilate the roof. The captain and a firefighter from Truck 53 went to the basement for search and rescue at approximately 02:14 hours. At approximately 02:15 hours, Truck 58 found a female victim in the kitchen area of the basement apartment. Truck 58 started to move the female victim to the backyard (Side Charlie), requesting an ambulance respond through the alley to access the patient. At 02:15:52 hours, Command advised Main, that the structure was, "a 2-story ordinary with fire in the basement". At approximately 02:16 hours, there is fire showing from the basement windows on Side Alpha, Side Bravo, and Side Delta. Truck 53 left the basement through the rear door due to heavy fire in the basement. The captain from Truck 58 went to the rear entrance to ensure that Truck 53 was out of the basement.

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Photo 4. Hose bed on Engine 94. The horseshoe hose load that Engine 94 Nozzle pulled from the engineer's side of Engine 94. The green arrows indicate the hoselines that were pulled.
(*NIOSH Photograph*)

Based on the data log from the SCBA worn by Engine 94 Nozzle, the air was free flowing at 02:16 hours. At this point, no one on the fireground knew the location of Engine 94 Nozzle. There were two firefighters from Truck 58 and the driver of Truck 53 were venting the roof. The members of Truck 58 cut a hole in the roof on Side Bravo and the driver of Truck 53 cut a ventilation hole over the stairwell. It is unknown the size of the ventilation holes that were cut (**see Diagram 5)**.

The status of all companies at approximately **02:16 hours**:

- Battalion 8 was in Command on Side Alpha
- Engine 94 was in the front door/vestibule
- Engine 7 was stretching backup hoselines on Side Alpha
- Truck 58 was in the basement (PAR 3)
- Truck 58 was ventilating the roof (PAR 2)
- Truck 53 was going to the basement (PAR 2) (Operating on staffing variance)

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- Truck 53 was ventilating the roof (PAR 1)
- Truck 53 was laddering the building on Side Alpha (PAR 1)
- Resources responding:
  - Battalion 7 (PAR 1)
  - Truck 57 (PAR 5)
  - Ambulance 7 (PAR 2)
  - Ambulance 52 (PAR 2)
  - 2-7-2 (PAR 1)
  - 4-5-3 (PAR 1)

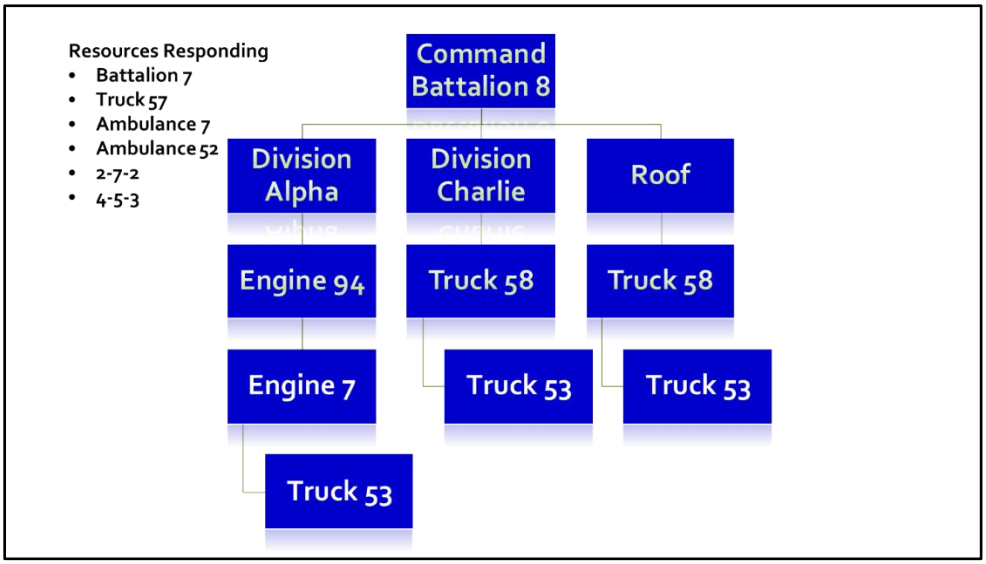

Diagram 5. The assignment of all companies operating at Box 111329 at 02:16 hours. All companies were reporting to Command.
(*Diagram prepared by NIOSH.*)

At approximately 02:17 hours, Engine 94 Nozzle called a Mayday on the fireground tactical channel (Fireground Tac Channel 4). At 02:17:32 hours, Command called Main to provide an update for Box 111329. Command advised Main that Engine 94 had one line in service, Members of Truck 58 and 53 were venting the roof. The officer and firefighters requested an ambulance meet Truck 58 in the alley, as Truck 58 was removing a victim from the basement. At approximately 02:18 hours, Engine 94 Nozzle's SCBA cylinder was empty.

As Battalion 7 and Squad 2 arrived on-scene at 02:18:14 hours, Battalion 7 heard "Mayday, Mayday, Mayday" while he was still in his vehicle on the fireground channel. He asked the officer on Squad 2 if he had heard the Mayday. Battalion 7 then called Command but he was on the dispatch channel. Battalion 7 switched to the fireground tactical channel (Fireground 4) and advised Command. There was a Mayday transmitted but no LUNAR (location, unit assigned, name, assistance needed, and resources needed) in the message. At approximately 02:19 hours, Engine 94 Nozzle's PASS alarm was manually activated. At 02:19:21 hours, Battalion 7 met with Command in the front yard. Battalion 7

suggested that Command conduct a PAR, escalate the incident to a 2nd Alarm, and request another RIT company (truck company). Command ordered an evacuation of the building on the fireground tac channel due to heavy fire in the basement. The wind was blowing into the basement on Side Charlie created a flow path through the apartment. The exhaust portion was the front door on Side Alpha. Also, the windows in the basement started to fail and increased ventilation for the fire. At 02:19:21 hours, the captain of Truck 58 went to the door on the corner of Side Bravo/Side Charlie to make sure that Truck 53 was out of the basement. Engine 7 and Engine 94 attacked the fire in the basement with the two 1¾-inch hoselines from the outside, using the basement windows on Side Alpha and Side Bravo.

At 02:19:30 hours, Main acknowledged the Mayday on the dispatch channel. At 02:20 hours, Truck 58 moved the first victim (female) to Side Alpha. Truck 58 and Engine 7 started patient care on the female victim. Ambulance 7 was assigned to patient care and was the transport unit for the civilian female victim. At 02:20:10 hours, Truck 57 arrived on-scene. At this time, two firefighters from Truck 58, two firefighters from Squad 2, and one fire fighter from Truck 53 were venting the roof. Also, three firefighters from Squad 2 had entered the basement. They found another civilian victim (second victim was a male) and began to remove the victim to the outside using the doorway on Side Bravo/Side Charlie. At 02:21:49, Command advised Main there was no Mayday at Box 111329. Command was in the process of conducting a PAR. At approximately 02:22 hours, Command asked the captain of Truck 58 if he heard a Mayday. The captain stated he had heard radio traffic about a Mayday. Engine 94 Backup advised Command that Engine 94 Nozzle was missing.

At approximately 02:23 hours, Command initiated the RIT, which was Truck 57. Command also assigned Battalion 7, Squad 2 and Snorkel 2 to Side Charlie with Truck 57 to search the basement for Engine 94 Nozzle. The captain and a firefighter (Search) from Truck 53 went to the 1st floor apartment to initiate a search for Engine 94 Nozzle. At 02:24:02 hours, Command advised Main there was a Mayday at Box 111329. At 02:24:04 hours, Main dispatched a 2nd Alarm for Box 11329. The following resources were dispatched: DDC2, Engine 125, Engine 68, Tower Ladder 123, 4-5-4, Battalion 11, Battalion 10, and the OFI. The members of Squad 2 got the second victim, who was a male. out of the building and to Side Alpha as Truck 53 entered the building to search the 1st floor apartment for Engine 94 Nozzle. The time was approximately 02:24 hours (**see Diagram 6**).

The captain of Truck 53 was searching the 1st floor apartment with the firefighter from Truck 53 who was conducting a right-handed search in the apartment. They brought a RIT pack into the 1st floor apartment. At this point, there was heavy smoke and moderate heat in the 1st floor apartment. Nothing was showing on the captain's thermal imager. The captain approached the middle of the apartment and heard a PASS alarm sounding. The captain found Engine 94 Nozzle face down near the dining room table. The SCBA EOSTI was not sounding, only the PASS alarm. His facepiece was partially off of his face, his eyes closed, and he was not breathing. The captain called Command, indicating he had located Engine 94 Nozzle in the 1st floor apartment at approximately 02:25 hours.

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Diagram 6. The location of Engine 94 Nozzle in the 1st floor apartment dining room when he was located by the captain of Truck 53 at approximately 02:25 hours. The red line indicates his path of travel from the vestibule to the dining room in the 1st floor apartment.
(*Diagram courtesy of Rayburn Fire Scene Investigations, Inc.*)

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While two members of Squad 2 and Engine 94 Hydrant were in the basement searching for Engine 94 Nozzle, they found a third civilian victim (male) near the bedroom by the stairs going to the front door. These firefighters were preparing to get the victim out of the basement apartment using webbing. The captain called for the firefighter from Truck 57 to help him get Engine 94 Nozzle out of the apartment. Members of Truck 57 and Battalion 7 entered the apartment from the stairs on Side Charlie. A member of Squad 2 entered the 1st floor apartment and asked Battalion 7 where the downed firefighter was located. The firefighter from Squad 2 got the RIT pack and placed it by Engine 94 Nozzle's legs. With the help of Truck 57, Battalion 7, and a member of Squad 2, Engine 94 Nozzle was removed from the 1st floor apartment to the stairs on Side Alpha. He was moved down the stairs and outside headfirst. Engine 94 Nozzle was out of the building and in the front yard at 02:27:30 hours**.**

As Engine 94 Nozzle was being removed from the building, Squad 2 and Engine 94 hydrant found a third victim in the basement near the front bedroom located by the Side Alpha stairs. The third victim was removed by the Side Alpha stairs. Engine 94 Nozzle was already in the front yard as the third victim (male) was removed from the building coming up the stairs and out the front door. The time was approximately 02:28 hours.

At 02:28:45 hours, Engine 94 Nozzle was on a stretcher and his SCBA and turnout gear were removed. Advanced life support ALS patient care was started by firefighters and paramedics from Ambulance 52. Engine 94 Nozzle was transported to a local hospital at 02:32:09 hours. Engine 94 Nozzle was transferred to a university medical center within the next 24 hours. He died on December 21, 2021.

Command advised Main at 02:28:20 hours that the fire was knocked down at Box 111329. At 02:49:45 hours, DDC2 declared the fire out for Box 111329.

Fire Behavior

It is the considered opinion of the investigating fire marshal that this fire incident was caused by an open flame ignition of fabric on the couch. The fire spread to adjacent combustibles in the basement living room. The careless use/misuse/discarding of smoking materials was deemed a factor. The investigating fire marshal classified this event as incendiary due to human action causing the fire.

Cause of Death

According to the *Report of Postmortem Examination* by the Office of the Medical Examiner, Engine 94 Nozzle died due to complications of carbon monoxide toxicity and thermal injuries due to the inhalation of smoke and soot during the apartment fire.

Contributing Factors

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately results in injury or fatality. NIOSH investigators identified the following contributing factors (areas needing improvement) in this incident that ultimately led to the fatalities:

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- Incident management and command safety
- Fireground operations
- Fire department operations.

Recommendations

Fire departments should:

Recommendation #1: Ensure all Incident Commanders conduct a scene size-up and risk assessment, develop a strategy and incident action plan (IAP), establish divisions/groups early in an incident, use a functional personnel accountability system, maintain a tactical worksheet, incorporate the principles of command safety, are provided with an incident command technician or emergency incident technician, and appoints a safety officer.

Discussion: The lieutenant from Engine 94 went into the basement twice and never communicated conditions or a risk assessment to Command. Also, companies going to the basement via Side Charlie did not provide a scene size-up and risk assessment. Command never communicated a strategy or incident action plan and did not have an accountability officer or incident command technician to support the command function. Command encountered crews finding 3 civilians in basement and Engine 94 Nozzle being lost and unaccounted for, and a safety officer was not dispatched until the 2nd Alarm was transmitted.

Scene Size-up and Risk Assessment

The strategy and IAP (tactics) of an incident are dictated by the size-up, initial risk assessment, and situational report made by the first arriving officer. The priority is to get fire department resources to Side Charlie as quickly as possible. However, unless an obvious life safety issue exists (e.g., visible victims requiring immediate assistance), interior firefighting operations should not commence until a report from Side Charlie is received. If physical barriers make the 360-degree size-up impractical for the 1st arriving officer, the delegation of the size-up of Side Bravo, Side Charlie, and Side Delta may go to another engine company or other resource on the 1st Alarm assignment. Even if a 360-degree size-up is conducted, the assignment of resources should go to Side Charlie. Resources could include any unit - engine, truck, medic unit, or chief - preferably an engine company with a hoseline [NVERS 2013]. Until the 360-degree assessment is completed, Incident Commanders should be cautious in committing fire crews, constantly monitor changing conditions, be prepared to immediately adjust crew commitments or withdraw crews all together.

Another fireground tactics tool is RECEO-VS (s**ee Diagram 7**). Based on a risk-benefit analysis, the first-arriving engine company officer initiates development of the appropriate organizational structure to manage the incident. If there is a need to initiate interior offensive operations, they should be initiated as quickly as possible.

Tasks that need to occur at any fire, regardless of the occupancy, are an initial on-scene report upon arrival, initial risk assessment, situational report, water supply, deployment of handlines and back-up handlines, search and rescue, ventilation, establishment of a RIT, ground and aerial ladder placement, fire attack and extinguishment, and salvage and overhaul.

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Ensuring the safety of firefighters is a continuous process throughout the incident. A risk management plan ensures that the risks are evaluated and matched with appropriate actions and conditions. Risk management practice provided by NFPA 1550 [2024] include:

- Limit activities that present a significant risk to the safety of members to situations where there is a potential to save endangered lives
- Recognize activities that are routinely employed to protect property as inherent risks to the safety of members and take actions to reduce or avoid these risks
- Do not risk the safety of members when it is not possible to save lives or property
- Limit activities to defensive operations in situations where the risk to fire department members is excessive.

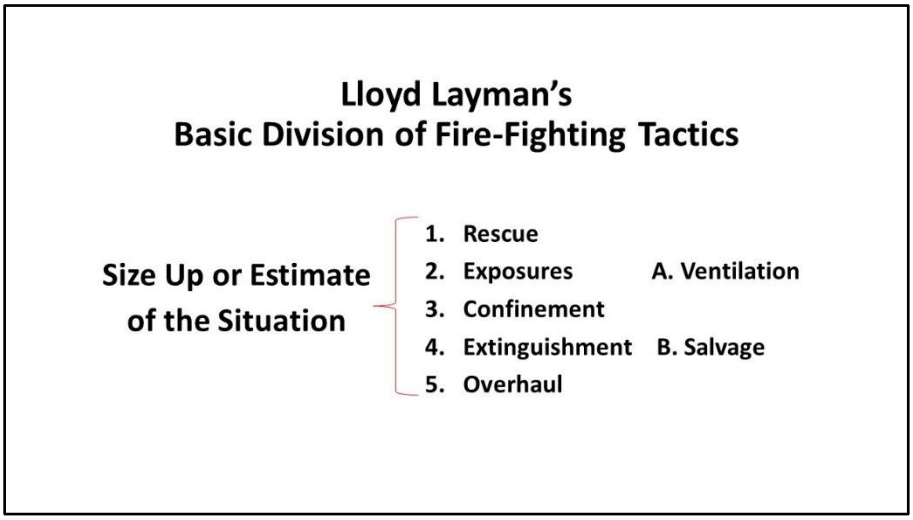

Diagram 7. Lloyd Layman's "Basic Division of Firefighting Tactics" (*Diagram courtesy of Lloyd Layman.*)

Tasks that need to occur at any fire, regardless of the occupancy, are an initial on-scene report upon arrival, initial risk assessment, situational report, water supply, deployment of handlines and back-up handlines, search and rescue, ventilation, establishment of a RIT, ground and aerial ladder placement, fire attack and extinguishment, and salvage and overhaul. The incident commander is responsible for adjusting/changing attack strategy/based on current/on- going size-up and risk assessment.

Strategy and IAP

Fireground operations are dynamic and fast-paced. An Incident Commander must determine a strategy and then develop an IAP. Incident commanders follow a decision-making model that includes identifying incident critical factors (through a situational evaluation or size-up), considering the standard risk management plan, declaring the strategy (offensive or defensive), and then setting tactical objectives [NFPA 1550 2024]. This model leads to the development of an IAP, which serves as the tactical road map to effectively manage the incident. An IAP defines where and when resources are assigned throughout the incident, along with tasks and objectives.

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To ensure a standard outcome for each incident, Incident Commanders should match the standard conditions to standard actions. This is the core of the incident command system and the basis for all operations. The Incident Commander should identify the incident's current critical factors before taking any action (s**ee Diagram 8**).

Diagram 8. This model displays the decision-making process into a standard sequence. **(*Courtesy of South King County Fire Training Consortium*)**

The initial and continuous size-ups of the incident's conditions should produce the information that becomes the basis for the incident strategy and the IAP. The collection of current, accurate, and relevant information will provide the foundation for effective initial and ongoing actions. Ultimately, this systematic evaluation process will produce standard, safe, and well-managed incident outcomes [Brunacini 2002].

When developing an IAP, the strategic goals are developed first, followed by development of the tactical objectives that are assigned to responding companies. At each incident, the Incident Commander should start with a standard placement-oriented operational plan that develops a strong, dependable beginning for command and control of the incident [Brunacini 2002; FRDNV 2013]. The Incident Commander can use the following acronyms to help develop, implement, and revise the IAP :

- R – recognize
- P – prioritize

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- M – mobilize
- R – reinforce
- R – redirect
- R – retreat.

The Incident Commander is responsible for adjusting/changing the attack IAP/based on the current/on-going size-up and risk assessment.

Often the initial Incident Commander is a company officer who arrives on-scene prior to a chief officer. The company officer should provide a detailed size-up, which is communicated to all responding resources, including the dispatch center or fire alarm office. The company officer assumes command and makes decisions regarding the strategy and the IAP. Events can occur quickly before a detailed tactical worksheet or written IAP is developed. When the company officer does not have the ability or time to record the IAP on paper, a verbal IAP is appropriate when transferring Command [Brunacini 2002; Fire Fighter Nation 2010].

Once command is established, the overall strategy is communicated. Command should make specific assignments to arriving companies along with tactical objectives, such as search, rescue, fire attack, ventilation, utility control, and exposure protection. Announce the initial entry for fire attack, both the engine and truck must initiate fire attack from the same entry point.

The responding chief officer should monitor radio communications and document tactical objectives on a tactical worksheet. When the chief officer arrives on scene, an update from the initial Incident Commander should occur (face to face or by radio). The chief officer will then assume command at a stationary location. By following this process, the initial and subsequent Incident Commanders will be in a more effective position to command and control an incident [NFPA 1550 2024].

Divisions and Groups

The ICS organization must develop at a pace that stays ahead of the tactical deployment of resources. For the Incident Commander to manage the incident, they must be able to direct, control, and track the position and function of all resources. Building an ICS organization is the best support mechanism Incident Commanders can utilize to achieve the balance between managing personnel and incident needs.

The Incident Commander should begin to assign divisions/groups based on the following factors when [SKCFTC 2023]:

- Situations involve several companies or functions, beyond the capability of the Incident Commander to directly control
- The Incident Commander can no longer effectively manage the number of companies involved in the operation
- Companies are involved in complex operations (large interior or geographic area, hazardous materials, technical rescues, etc.)
- Companies are operating from tactical positions that the Incident Commander has little or no direct control over (e.g., out of sight)

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- The situation presents special hazards and close control is required over operating companies (i.e., unstable structural conditions, hazardous materials, heavy fire load, marginal offensive situations, etc.).

The Incident Commander should initially assign division/group responsibilities to a second company officer since the first due officer has an assignment and is operating on the task level. This allows the first company officer to work with his company and focus on the assigned task and more importantly prevents task saturation. The second company officer assigned as the division/group supervisor can operate on the tactical level, which ensures a broader view of the operations. Another benefit, if companies are operating with limited staffing, the company officer assigned to the position of division/group supervisor can assign his/her crew to the initial crew to improve company operations.

When assigning resources to a division/group that is already established with a company officer, the Incident Commander includes:

- The location of the assignment
- The tasks required
- The tactical objectives to be addressed
- The division/group supervisor that they will be reporting to/working under.

Command must then contact the division/group supervisor and inform them what additional resources have been assigned to them. Company officer division/group supervisors have the same set of challenges as the fast-attacking company officer Incident Commander. The challenges are [SKCFTC 2023]:

- communications difficulties wearing full PPE
- working in a hazard zone (heat, visibility)
- supervising and accounting for their own crew members
- engaging and focusing in on task level activities.

If the division/group supervisor is operating in or has to go into the immediately dangerous to life and health atmosphere (hazard zone), the division/group supervisor should operate with another firefighter. The primary function of company officers working within a division/group is to direct the operations of their individual crews in performing assigned tasks. Company officers will advise their division/group supervisor of work progress, maintaining radio discipline, good CAN reports and exchange of information via the tactical channel. All requests for additional resources or assistance within a division/group must be directed to the division/group supervisor. Division/group supervisors will communicate with the Incident Commander. When additional chief officers arrive, they should be assigned to a division or group to provide the best assessment for the Incident Commander and provide ongoing conditions, actions, and needs (CAN) reports. It is important to have visual observation of all four sides and the interior of an incident to influence the IAP. Without the observations and CAN reports, the Incident Commander will be limited in vital information [SKCFTC 2023].

This early establishment of division/group provides an effective incident management organization framework on which the operation can be built and expanded. One of the most important benefits of

establishing divisions/groups early in the incident is that accountability is shifted to each division/group supervisor, which improves the ability to track resources on the fireground. Subdividing the incident provides tactical supervision, direction and support to units assigned when operating in the hazard zone. This delegated management also helps the Incident Commander to achieve the incidents tactical objectives much more safely and effectively. Utilizing the appropriate divisions/groups [SKCFTC 2023]:

- Maintains the Incident Commander's span of control
- Streamlines and creates more effective incident scene communication
- Allows the Incident Commander to focus on the strategic elements of the incident from a stationary command post
- Gives the Incident Commander an array of functions to choose from and match the particular needs to the incident
- Improves personnel accountability
- Places strong tactical direction and leadership where the work is actually taking place
- Improves firefighter safety by having dedicated officers directly manage and control the position and function of the operating companies assigned to them.

When establishing a division/group, the Incident Commander will assign each division/group [FIRESCOPE 2015]:

- A supervisor
- Tactical objectives
- Communications
- A radio designation (Roof Division, Division A, Rescue Group)
- The identity of resources assigned to the Division/Group.

The safety of firefighting personnel is the major reason for establishing divisions/groups. Each division/group supervisor must maintain communication with assigned companies to control both their position and function. The division/group supervisor must constantly monitor all hazardous situations and risks to members plus make sure all companies are operating in a safe and effective manner.

Personnel Accountability

A personnel accountability system is a system that readily identifies both the location and function of all members operating at an incident scene [NFPA 1550 2024]. The philosophy of the personnel accountability system starts with the same principles of an incident management system—company unity and unity of Command. It is possible to fulfill unity initially and maintain it throughout the incident by documenting the situation status and resource status on a tactical worksheet or a resource status/accountability board. All members operating at an incident are responsible for understanding and participating in this system. Incident Commanders may delegate to other appropriate staff members, the facilitation of the accountability for those resources to meet those goals, objectives, and tasks as needed. An integral part of the accountability system is to make sure that the firefighters who are assigned and operating in the hazard zone are accounted for, starting with the initial operations through the entire incident.

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One of the most important functions of command safety is for the Incident Commander to initiate a personnel accountability system that includes the functional and geographical assignments at the beginning of operations until the termination of the incident. NFPA 1550, *Standard on Emergency Responder Health and Safety*, states in Paragraph 18.3.15, "The Incident Commander and members who are assigned a supervisory responsibility that involves multiple companies or crews under their command shall have an additional person (staff aide) assigned to facilitate the tracking and accountability of the assigned companies or crews." [NFPA 1550 2024].

An important aspect of a personnel accountability system is the PAR. PAR is an on-scene roll call in which supervisors reports the status of their crew when requested by the Incident Commander [NFPA 1550 2024]. It is necessary to conduct the PAR every 15–20 minutes or when benchmarks are met.

A functional personnel accountability system requires the following:

- Development and implementation of a departmental SOP/SOG
- Necessary components and hardware, such as an accountability board, individual name tags, and company name tags
- Training for all members on the operation of the system
- Strict enforcement during emergency incidents.

A functional personnel accountability system should have the ability to identify:

- All members operating in the hazard zone (who)
- Where all members are in the hazard zone (where)
- The conditions in the hazard zone (conditions)
- What actions are in use in the hazard zone (actions)
- Paths of access and egress in and out of the hazard zone (exits)
- RICs and their assignments.

Many different methods and tools are available for resource accountability, including [NFPA 1550 2024]:

- Tactical worksheets
- Command boards
- Apparatus riding lists
- Company responding boards
- Electronic bar-coding systems
- Accountability tags or keys.

Personnel who are responsible for maintaining the location and status of all assigned resources at an incident should handle resource accountability. As the incident escalates, resource status should be placed under the Planning Section. This function is separate from the role of the Incident Commander. The Incident Commander is responsible for the overall command and control of the incident. Because of the importance of responder safety, the size and complexity of the incident should help determine resource status assignments. A properly initiated and enforced personnel accountability system enhances firefighter safety and survival.

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For the personnel accountability system to properly function, the process should include an SOP/SOG that defines each function's responsibility and the necessary hardware required to ensure this process is successful on the fireground. Another key to the success of the personnel accountability system is to include a training component (both classroom and practical) to ensure this process functions properly during emergency incidents.

Tactical Worksheet
When a command officer (e.g., battalion chief, district chief, deputy chief) arrives on scene, the command officer should automatically assume a standard stationary, exterior, and remote command position and immediately assume Command. Command officers should function inside their vehicle or at the rear of the vehicle, which has a command board with a tactical worksheet.

The use of a tactical worksheet can assist the Incident Commander with tracking various task assignments on the fireground. The tactical worksheet provides a method of documentation that is necessary to command and control an incident. The tactical worksheet is the proper way of maintaining information plus ensuring that frequent conditions, actions, and needs (CAN) reports are delivered from the key tactical areas of the operation. This allows the IC to maintain an updated incident action plan.

It is important that the Incident Commander start using the tactical worksheet as early in the incident as possible [NFPA 1550 2024], along with pre-plan information and other relevant data, to integrate information management, fire evaluation, and decision-making. Advantages of using a tactical worksheet are that the tactical worksheet [NFPA 1550 2024]:

- Includes a location to quickly note individual assignments
- Provides prompts for the Incident Commander, such as time, air management, and PARs
- Provides tactical benchmarks, such as "water on the fire," "primary search complete," "fire under control," and "loss stopped"
- Documents the command structure—strategic, tactical, and task
- Facilitates consistent, organized information
- Documents assignments and responsibilities
- Expedites passing of Command or support for the Incident Commander
- Provides resource status.

When a Mayday is transmitted, the Incident Commander has a very narrow window of opportunity to locate the lost, trapped, or injured member(s). The Incident Commander must restructure the strategy and IAP (tactics) to include a priority rescue [NFPA 1550 2024].

Some departments have adopted the term LUNAR to gain additional information in identifying a firefighter who is declaring a Mayday. The Incident Commander, division/group supervisors, company officers, and firefighters need to understand the seriousness of the situation. It is important to have the available resources on scene and to have a plan established prior to the Mayday [Brunacini and Brunacini 2004; NFPA 1550 2024]. Two checklists are provided in **Appendix Three**, *Sample Incident Commander's Tactical Worksheet for a Mayday*.

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The checklist can assist the Incident Commander in ensuring the necessary steps are taken to clear the Mayday as quickly and safely possible. This structured checklist serves as a guide, and it is possible to tailor the checklist to any fire department's Mayday procedures. This process is too important to operate from memory and risk missing a vital step that could jeopardize the outcome of the rescue of a firefighter who is missing, lost, trapped, or injured.

Command Safety
Command safety ensures that the Incident Commander formulates an incident action plan that is communicated to all responding resources, develops and implements a risk management plan, and ensures for the highest level of safety for all members operating at this incident.

The purpose of command safety is to provide the Incident Commander with the necessary resources on how to use, follow, and incorporate safety into the incident management system at all incidents. Command safety is used as part of the eight functions of command developed by Fire Chief Alan V. Brunacini. Command safety is designed to describe how the Incident Commander must use the regular, everyday command functions to complete the strategic level safety responsibilities during incident operations. Using the command functions creates an effective way and a close connection between incident safety and incident management.

The functions of command in the "Command Safety" book differ than the eight functions of command [Brunacini and Brunacini 2004]. According to Brunacini and Brunacini, 2004, functions of command safety include:

- Assumption, confirmation, and positioning of command
- Situation Evaluation
- Communications
- Deployment
- Strategy and Incident Action Planning
- Organization
- Review, Evaluate, and Revise
- Continue, Transfer, and Terminate Command.

The Incident Commander must follow each of these functions in order without skipping or missing any function. Automatically connecting and integrating safety with command becomes a simple and essential way that the incident management system protects assigned resources at an incident. These functions serve as a practical performance foundation for how the Incident Commander completes their responsibility as the strategic-level incident manager and the overall incident safety manager [Brunacini and Brunacini 2004].

Command safety focuses on the balance between the level of the hazards that are present in relation to the size of the standard safety system. The book refers to this term as "safety math" and is a simple way to make operational position/action decisions about the survivability of firefighters to guide where they can go and what they can do. This becomes a survivability index the IC can use to make offensive/defensive strategy decision for the incident [Brunacini and Brunacini 2004].

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The Incident Commander cannot assign firefighters to positions where the safety system will not offer effective protection. If the safety system is bigger than the hazard, the Incident Commander defines the strategy as an offensive strategy. If the hazard is bigger than the safety system, the Incident Commander defines the strategy to be operated in a defensive strategy.

Once the overall incident strategy has been determined and the IAP developed, the Incident Commander should manage the completion of the tactical priorities for the chosen strategy. Each strategy has a different set of tactical priorities to complete. Tactical priorities provide the Incident Commander with a simple, short list of major categories that are designed to act as a practical guideline during the difficult initial stages of fireground planning. The IAP must be short and simple. A complicated IAP tends to break down during this critical time.

Generally, the Incident Commander tries to achieve the same basic objectives from one incident to the next. Tactical priorities offer a regular set of tools that the Incident Commander can utilize for tactical activities in order to develop a standard approach to solving incident problems. With this standard approach, the Incident Commander can manage the basic work sequence at every incident, in the same manner.

Basic, structural firefighting incident hazards that often injure or kill firefighters includes:

- Structural collapse
- Toxic insult from the products of combustion
- Thermal threat posed by the fire
- Becoming trapped or lost.

The safety system components used to protect firefighters includes [Brunacini and Brunacini 2004]:

- Adequate number of fit and trained firefighters
- Proper use of turnout gear and SCBA
- Functional and operational equipment and apparatus
- Water
- Safety SOPs
- Incident Management System.

The beginning of the safety system starts with the firefighters. Every firefighter that operates with a company must take responsibility for their own compliance with the department's safety plan. This requires every member to [Brunacini and Brunacini 2004]:

- Understand the details, dynamics, and effects of basic firefighting hazards
- Understand the department's safety plan and its limitations
- Be physically, mentally, emotionally, and organizationally capable of doing their job
- Monitor their own safety and wellbeing
- Continually evaluate and self-adjust their own safety procedures in relation to the incident
- Directly stop any unsafe acts they can impact
- Assist those nearby
- Report safety conditions throughout the incident organization
- Comply with safety orders and instructions.

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The reason for including this information is to emphasize the important roll a firefighter has regarding their own personal safety. Everyone in the organization has a role and responsibility. No operational level of the organization (task, tactical, or strategic) can perform the duties or responsibilities of another level. Firefighters are not absolved from their own personal responsibility to the safety system because the Incident Commander is in place. Firefighters play an integral role in the safety system and if they aren't following the recommendations above, injuries or losses can occur [Brunacini and Brunacini 2004].

Incident Command Technician/Emergency Incident Technician
The duties and responsibilities of an incident command technician are divided into two functions: Administration and Operations. Though the administration component is important, the command and control of an emergency incident is important to firefighter safety and health and the focus of this recommendation.

An incident command technician (ICT) can also be known as a field incident technician, emergency incident technician, staff aide, or staff assistant. A staff aide / incident command technician (ICT) is defined by NFPA 1550, *Standard on Emergency Responder Health and Safety*, as a firefighter or fire officer assigned to an operational chief officer to assist with the logistical, tactical, and accountability functions at an emergency incident [NFPA 1550 2024].

Incident Commanders know that an incident can rapidly escalate and bring with it a host of complexities. Regardless, if the incident is limited to a 1st Alarm assignment or it expands, the principles of reliable command post (CP) support remains constant:

- Support the Incident Commander
- Communicate clearly
- Listen carefully
- Write clearly
- Account for everyone
- Act appropriately
- If you don't know – ask
- Work together as a team [LAFD 2011].

The key functions of an ICT include but not limited to:

- maintain radio and other communications (e.g., MDT, fax, cell phone)
- maintain the tactical worksheet
  - personnel accountability
  - diagram of incident operations
- May be assigned with the battalion chief to the hazard zone as part of a tactical assignment (e.g., division or group supervisor).

In addition to NFPA 1550, NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* contain specific requirements regarding personnel accountability of members at emergency incidents including, but not limited to the following:

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- The Incident Commander shall be responsible for overall personnel accountability for the incident
- The Incident Commander shall initiate an accountability worksheet at the beginning of the incident and maintain the system throughout the operation
- The Incident Commander shall maintain an awareness of the location and function of all companies assigned to an incident [NFPA 1550 2024; NFPA 1710 2020].

When an incident is dispatched, the accountability begins while resources are enroute and monitoring tactical activities of the first-arriving companies. An initial essential role of the ICT is function as the driver or chauffeur for the battalion chief. This allows the battalion chief to initiate documentation of the incident on a tactical worksheet. This allows the IC to start developing the incident action plan for the incident. Without an ICT, this process doesn't start until arrival on-scene. Once on scene, the battalion chief will assume the role of IC. While the IC provides direction to companies on-scene and arriving units, the ICT will need to initiate the following duties:

- As building size and the situation allows, the ICT should conduct a 360-degree scene size-up and risk assessment, which is reported to the IC
- Prepare all appropriate radios for use:
  - Dispatch Channel
    - Provide the Incident Commander with important messages from the fire alarm office or dispatcher
    - Relay critical messages from the Incident Commander to the fire alarm office or dispatcher
  - (Incident) Command Channel
  - Incident Tactical Channel(s)
  - Staging Channel (if Staging is established)
- Initiate the tactical worksheet and begin to record:
  - Resource Status (RE STAT)
  - Situation Status (SIT STAT)
  - Resources enroute
  - Companies/Resources in Staging
  - Companies in Rehab
- Remain in close proximity to the IC so that important tactical information can be appropriately recorded and drawn in a picture format
- Perform any other related duties that will assist in efficient operation of the CP as directed by the Incident Commander
  - Maps
  - Perimeter Security
  - Preparing for 2nd battalion or district chief [LAFD 2011].

The ICT as a member of the command team has the following functions:

- Situation Status
  The ICT records the situation status creates and maintains a display of the current situation status and maintains a record of command personnel.

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- Resource Status
  The ICT records the resource status creates and maintains a current roster of the companies assigned to the incident of their status. As the Incident Commander is responsible for overall personnel accountability for an incident, the ICT initiates an accountability and inventory worksheet (tactical worksheet) at the very beginning of company deployment and shall maintain that system through completion of the incident.
- Tactical Worksheet
  The Incident Commander shall be responsible for overall personnel accountability for the incident. The ICT shall initiate an accountability worksheet at the beginning of the incident and maintain the process throughout the operation. The resource columns on the tactical worksheet play a significant role in keeping accurate track of companies working at an emergency incident. It is important to make proper entries to maintain situational awareness at all times.
- Building Drawing
  Multi-level buildings should show the floor numbers in small boxes. List resources assigned to a floor and indicate a company's assignment. As conditions are updated, notations with times can be recorded around the drawing. For single-level structure fires or brush fires, use square outlines for exterior building walls, block perimeters or brush fire lines, depending on size or type of fire. Orient drawing by showing geographical designations or street names with arrows indicating north.
  Also, when wind is a factor, indicate direction by an arrow with speed and time.
- Emergency Traffic/Mayday
  When a firefighter encounters a life-threatening situation at a fire, the ability to remain calm at the command post is paramount. The guideline below is provided to serve as template to help the command team broadcast important messages under difficult circumstances:
  - Emergency Traffic… Emergency Traffic
  - We have a firefighter lost/missing/trapped
  - LUNAR
  - Communications with lost/missing/trapped firefighter
    - STAY CALM… HELP IS ON THE WAY… STAY ON THE TAC CHANNEL
    - TURN ON YOUR PASS DEVICE AND FLASHLIGHT…
    - HOW MUCH AIR DO YOU HAVE LEFT? WHERE DID YOU GO IN?
    - WHO DID YOU GO IN WITH? ARE YOU ON A HOSELINE? WHO'S HOSELINE? ARE YOU AT THE NOZZLE? WHAT CAN YOU SEE?
    - WHAT CAN YOU HEAR? WHAT IS THE FIRE DOING NOW?
    - STAY CALM… WE'RE GOING TO GET YOU OUT…
    - TELL ME WHEN YOU CAN HEAR THE RAPID INTERVENTION TEAM.

At the conclusion of the "EMERGENCY TRAFFIC" situation, the IC shall transmit an "ALL CLEAR – RESUME RADIO TRAFFIC" on all assigned Command and Tactical Channel(s) in addition to the notification to the fire alarm office or dispatcher to conclude the emergency situation [LAFD 2011].

The functions of the incident command technician are invaluable to the Incident Commander and the command and control of an emergency incident.

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Safety Officer

The function of incident scene safety officer has to be carried out at all incidents. It is the responsibility of the Incident Commander who cannot perform this function due to the size or complexity of the incident to assign or request response of a safety officer to staff this function. There are, however, incidents that require immediate response or appointment of a safety officer, such as a hazardous materials incident or special operations incident. These types of incidents should be defined in the fire department's response policy or procedure to ensure that the safety officer responds. Likewise, some situations require a safety officer to respond after members are on the scene, such as a working fire or at the request of the Incident Commander.

The position of safety officer can be expanded to include the following additional roles and responsibilities under safety in responding to such incidents:

- The ability to cover all critical areas of the incident with safety staff
- Provide a structured organization and communication system to manage the safety function
- Provide an enhanced focus on safety-related progress reports to the command post
- Enhance firefighter safety at the incident scene
- Improve safety information to the Incident Commander for better command decisions [NFPA 1550 2024].

Upon arrival at an incident, the designated safety officer should meet with the Incident Commander or designee to confirm the safety officer assignment. Also, the safety officer is integrated into the personnel accountability system. Upon confirmation, the safety officer should obtain the following information:

- The overall situation status and resource status
- The incident action plan and personnel accountability status
- Known hazards and concerns and establishment of control and collapse zones
- Status of rapid intervention teams and the rehab area
- Confirmation of established radio communication channels.

Once this information is obtained, the safety officer should don personal protective equipment (PPE) appropriate for the potential hazards that he or she will be exposed to, as well as a safety officer identifying vest or helmet. From here, the safety officer should perform a reconnaissance of the incident and begin safety officer functions. If the safety officer enters a warm zone or hot zone as identified in NFPA 1550, the safety officer should be accompanied by another responder [NFPA 1550 2024].

A predesignated safety officer responds automatically to incidents defined by the fire department. Upon arrival at the incident, the safety officer should meet with the Incident Commander to confirm the safety officer assignment and become integrated into the personnel accountability system.

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Types of incidents that might require expansion of the safety officer role include the following:

- Incidents covering a large geographical area (e.g., high-rise structure) that include numerous branches, divisions, or groups
- Incidents where significant acute or chronic responder health concerns require coordination and input to the planning section (responsible for accounting for the organizational structure availability of resources, deployment of resources, and the situation status reports)
- Incidents requiring interface with local, state, federal, or other health and safety representatives
- Multi-agency incidents where Unified Command is established
- Incidents where Area Command is established [NFPA 1550 2024].

Assistant safety officers assigned to branches, divisions, or groups are addressed according to their area of responsibility. For example, an assistant safety officer assigned to Division Alpha is addressed as Division Alpha assistant safety officer. The assistant safety officers assigned to branches, divisions, or groups report to and follow direction from the safety officer of the Command staff. The assistant safety officer works with the supervisory person in the assigned branch, division, or group to assure that safety conditions are met [FIRESCOPE 2019; NFPA 1550 2024; NIOSH 2012].
Larger fire departments should consider having one or more full-time dedicated safety officers who are on duty and can routinely respond to working fires (e.g., full-time shift safety officers). In smaller departments, every officer should have the ability to function as the safety officer when assigned by the Incident Commander. The presence of a safety officer does not diminish the responsibility of individual firefighters and fire officers for their own safety and the safety of others.

The safety officer serves as a key figure on fireground operations (not tactics) by gathering a broad overall perspective of the fireground and acting as the eyes and ears for the Incident Commander. When the Incident Commander is tasked with strategic objectives and may not have time to give full attention to every safety detail, the safety officer can assist the Incident Commander. A safety officer should have training beyond that of a company level officer, with increased focus on safety issues such as [NFPA 1550 2024]:

- Fire department safety officer training
- Fire department health and safety officer training (acute and chronic threats to firefighter health)
- Fireground risk assessment
- Risk management
- Accountability
- Fireground hazards and hazard recognition, evaluation, mitigation, and elimination
- Building construction and collapse
- Fire behavior
- Fireground tactics and strategy
- PPE use, capabilities, and limitations
- Firefighter rehabilitation.

Fire departments should establish a training and education program for safety officers. This ensures that officers who are appointed on scene as the safety officer have the necessary knowledge, skills, and

abilities to effectively function in this position. For large scale incidents, such as this incident, departments should consider appointing assistant safety officer(s).

Recommendation #2: Ensure all companies operating on the fireground, maintain crew integrity, are operating based upon the assignment given by the Incident Commander, critical incident benchmarks are communicated to the Incident Commander, and inspect and check their assigned SCBA at the beginning of each shift and after each use.

Discussion: At this incident, as part of crew integrity, the members of Engine 94 should have been with Engine 94 Nozzle to get him out of the building when he started experiencing issues with his SCBA. When the Mayday occurred and civilian victims were being found, there was no assignments given by Command, Also, company officers did not communicate with Command when benchmarks were met or not met. All members need to thoroughly inspect their SCBA at the being of each shift and after each use.

Crew Integrity
NFPA 1550, *Standard on Emergency Responder Health and Safety* states, "Company officers shall maintain an ongoing awareness of the location and condition of all company members. "Where assigned as a company, members shall be responsible to remain under the supervision of their assigned company officer." [NFPA 1550 2024, Paragraphs 10.5.6 to 10.5.7].

Crew integrity is essential to fireground and personnel accountability. Fire departments should have a personnel accountability procedure in place to track both crews and individuals and identify who is operating in the hazard zone, their assignment, and their location. The collection of personal accountability tags or passports placed on an apparatus will not assist in maintaining awareness to the fireground location.

Accountability levels provide a clear idea of what each term means and how they are to be used while at an event or incident. The five levels of accountability discussed by FIRESCOPE [2019] are: Personal; Single resource; Supervisor; Scene; and Functional. It is the responsibility of every fire fighter and company officer to stay in communication or contact with crew members by visual observation, voice, or touch while operating in the hazard zone. Technology, such as thermal imagers, aid in accountability when there is zero visibility. Additionally, firefighters should maintain the unity of command by operating under the direction of their company officer.

Per NFPA 1021, *Standard on Fire Officer Professional Qualifications* requires Fire Officer I to demonstrate the following job performance requirement regarding crew integrity and personnel accountability: 4.6.2* states, "Implement an action plan at an emergency operation, given assigned resources, type of incident, and a preliminary plan, so that resources are deployed to mitigate the situation." A.4.6.2 states "This requirement takes into consideration the officer's ability to give orders, direct personnel, evaluate information, and allocate resources to respond to the wide variety of emergency situations the fire service encounters."

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> (A) *Requisite Knowledge* – Standard operating procedures, resources available for the mitigation of fire and other emergency incidents, an incident management system, scene safety, and a personnel accountability system.
> (B) *Requisite Skills* – The ability to implement an incident management system, to communicate orally, to manage scene safety, and to supervise and account for assigned personnel under emergency conditions [NFPA 1021, 2020].

If crew integrity is lost, firefighters are placed at increased risk. A Mayday should be called if any member cannot be accounted for during a personnel accountability report. One purpose of the system is to provide rapid determination of whether any responders are missing if an area is required to be evacuated or a structural collapse or other unplanned event occurs. The incident management system should account for the degree of danger that is involved in specific activities and should provide more direct supervision over responders exposed to greater risks [NFPA 1550 2024].

Task Assignments Given by the Incident Commander
Assigning the tactics in the order of accomplishment will aid in the coordination of the fireground activities. Companies should communicate their progress reports on the tactical objectives given to them by Command to complete the tactical priorities. This keeps the operation focused on making sure everyone is out and okay, eliminating the incident problem, and reducing the damage to the customer's property. Incident operations are conducted around the completion of the tactical priorities. Incident communications should mirror this simple concept to keep communications brief and effective. This also maximizes the available free airtime. The Incident Commander must structure unit assignments around [SKCFTC 2023]:

- Addressing the incident's critical factors
- Completing the tactical priorities
- Having tactical reserve (On Deck).

The Incident Commander has a choice of available methods to implement the IAP. One option is assigning tactics. It is necessary to assign tactics in order of accomplishment, which will aid in the coordination of the fireground activities [USFA 2009]. Assigning tactics also limits the amount of radio traffic needed to implement the IAP, allows companies to react immediately to unforeseen or changing conditions, and reduces the demands placed on the Incident Commander.

An important component to this process should be to provide how engine companies and truck companies should fulfill their tasks when operating on a manning variance. When the first engine company/truck company or second engine company/truck company are on a manning variance, it is imperative the company officer defines who is expected to carry out the duties of the vacant firefighter position or what duties are being omitted by that company. This critical when the Incident Commander assigns a company a task operating on a manning variance (operating with one less firefighter) and what tasks is not going to be completed. A fire department should have defined procedures when this occurs.

An assigned tactic provides a direction to a company, which serves as the basis for feedback to the Incident Commander as to whether the tactic is complete. If a company is unable to complete the

assignment, the Incident Commander needs to know as soon as possible to adjust the IAP. When units arrive on the scene, they should announce that they are staged. Dispatch should not acknowledge any staged units over the tactical channel. Command should contact the staged units and assign them based on the IAP.

Orders to 1st Alarm-staged units should follow a Task-Location-Objective format:

- Tasks
- Location of the tasks
- Objectives of the tasks.

Location of those tasks should include:

- What floor to operate on
- What occupancy/exposure to operate in
- What side to make entry on
- What side to operate on (defensive).

When assigning a company to deploy a hoseline, the Incident Commander should designate the following:

- What the company needs to do with their apparatus
  - Lay a supply line
  - Pump a supply line
  - Park the apparatus out of the way (manpower only)
- Where the company will get the handline from:
  - Their own company
  - Another forward pumper designated by Command
- Having a charged hoseline that is not committed in front of the building for immediate deployment.

The task objectives should focus on the completion of the tactical priorities (objective = completion benchmark) [Brunacini 2002]:

- Search/rescue = primary and secondary "all clear"
- Fire control = "under control"
- Loss control = "loss stopped".

When assigning companies to areas that already have units assigned, the Incident Commander should inform the newly assigned company to whom it will report to/work under. The Incident Commander also should inform the division/group supervisor of the newly assigned companies(s).

Critical Incident Benchmarks

This is an essential element of the IAP because this process allows Command to consider and account for changing fireground operations. Moreover, Command must be able to forecast the direction of the incident to stay ahead of the fire. Without this information, the IAP becomes out of sequence with the phase of the fire.

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Fire departments should consider incident management system training and a certification program for company officers and chief officers that can prepare members for dynamic events that they will encounter. This program may benefit officers who serve in the role of Incident Commander, as well as those who supervise and manage emergency and hazard zone operations for National Incident Management System Type V and Type IV incidents [NFPA 1550 2024].

Fireground benchmarks are an essential element for accomplishing successful and safe outcomes. To ensure that the proper benchmarks are communicated at fireground incidents, fire departments should develop and maintain a consistent process for communicating critical benchmarks in the form of an SOP/SOG. The SOP/SOG should include effective hands-on classroom and practical training programs with annual live fire training, a defined department deployment model, an effective incident management system, adequate radio equipment (mobile and portable radios), and adequate radio channels (dispatch, tactical, and command channels) [NIOSH 2014a, NIOSH 2014b, NIOSH 2015, NIOSH 2018a].

Because the Incident Commander is located at the Command Post (outside the hazard zone), interior crews should communicate the interior conditions to the Incident Commander as soon as possible. Interior conditions can change the Incident Commander's strategy and IAP. Interior crews can aid the Incident Commander in this process by providing reports of the interior conditions as soon as they enter the fire building and by providing regular updates, especially when benchmarks are met (e.g., "primary search complete, all clear" and "the fire has been knocked down"). A company officer can track personnel in smoky conditions by calling out to crew members. This becomes necessary when conducting a PAR. Because it is possible to have crew members with the same first name, it is best to use the member's last name.

Communication of critical incident factors and their possible consequences offer the basis for a standard incident management approach. A standard information approach is the launching pad for effective incident decision making and successful operational performance. Incident Commanders should use the critical factors in their order of importance, as the basis for making the specific assignments that make up the IAP. Incident Commanders should not assume the action-oriented responders engaged in operational activities will stop what they are doing so they can feed the Incident Commander with a continuous supply of top-grade, objective information. It is the Incident Commander's responsibility to do whatever is required to stay effectively informed [Brunacini 2002].

For all members operating at an incident scene, radio discipline is essential. All members on the fireground should receive training on and use the thought process of "is my transmission necessary" as a part of fireground behavior. It is necessary to reserve all radio transmissions for relevant messages, such as benchmarks, CAN reports, PARs, safety issues or concerns, needed resources, changing conditions, emergency traffic, and a Mayday. Members should refrain from transmissions that add little information to the IAP.

The following are considerations of critical incident benchmarks that should be completed during initial fireground operations [SKCFTC 2023]:

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- First-due company officer should assume Command
- A complete size-up and risk assessment should be completed by the first-due company officer
- Status of personnel accountability (announce the initial accountability location)
- Disposition of resources
- Rapid intervention crew in place and location
- Any notable results of the initial fire attack
- The first due companies should advise Command if they did not lay a supply line
- Once operations are initiated on Side Charlie, the company officer should provide a description of company locations, entry locations, and conditions encountered
- When companies change locations, the division supervisor should provide a complete description of the tactical operations including a description of a basement and its dimensions
- When Command assigns a division supervisor, this should be communicated to the companies assigned to this division to ensure personnel accountability within the division
- Once the 1st Alarm companies are on-scene, a company or companies should be assigned as the RIC
- Once officers communicate critical information about smoke or fire in a structure, Command should revise the IAP and communicate any tactical changes
- Company officers should conduct radio checks to ensure all company members are on the correct radio channel. Radios should not be on the "scan" function
- The fire department should evaluate and simplify the selection of radio frequencies to reduce the possibility of mistakes upon dispatch
- Command should be advised when a company assigned water supply and is having trouble establishing the water supply
- When tactical benchmarks are not being meet, the I C must consider the current incident strategy. The IC should consider reinforcing operations, redirecting operations of a tactical retreat.

As the incident progresses, the following information needs to occur between Command and companies operating on the fireground [SKCFTC 2023]:

- Follow-up radio report—a CAN report
- Safety concerns
- Status of water on the fire
- Additional detailed report of fire/smoke conditions and location(s).

Critical incident factors and their possible consequences offer the basis for a standard incident management approach. A standard information approach is the launching pad for effective incident decision making and successful operational performance. Incident Commanders should use the critical factors, in their order of importance, to make tactical assignments for the IAP. The Incident Commander should develop a standard information system and use effective techniques to keep informed at the incident. It is the Incident Commander's responsibility to do whatever is required to stay effectively informed and to ensure that critical incident benchmarks are communicated [NIOSH 2009, NIOSH 2010].

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SCBA Care and Use

Personal protective equipment, including the SCBA, allow firefighters to enter the hazard zone to perform essential interior operations. These operations include offensive fire attack, victim search, rescue and removal, ventilation, and overhaul. They are also used at non-fire incidents involving hazardous materials and confined spaces where there is a threat of toxic fumes or an oxygen-deficient atmosphere.

As part of a fire department's respiratory protection program, members are tasked with the responsibility to ensure for the proper care and maintenance of SCBA. This process should comply with NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)*. Routine SCBA maintenance tasks such as daily inspection, cleaning, and disinfection are usually handled are an integral part of overall preventive maintenance. The daily inspection process should include a visual inspection at the beginning of each duty day or shift and after each use. As a result of SCBA inspections and regular maintenance, failures or other problems will be reduced or eliminated before the firefighter is caught in an IDLH atmosphere. The daily inspection of the SCBA should include the following components [NFPA 1852 2019]:

- Backpack harness and frame
- Air cylinders
- First stage regulator Pressure hoses
- Second stage regulator
- Gauge/low air warning light
- Facepiece
- Integrated PASS device.

For more information on developing a SCBA inspection program, contact the department's SCBA manufacturer.

When entering the hazard zone, proper personal protective clothing (turnout gear) and SCBA are the vital lifeline to being protected. All members that respond and function in the hazard zone or contaminated environments shall be equipped with self-contained breathing apparatus (SCBA) and trained in its proper use, care, and maintenance A daily checklist is provided in the appendix **(see Appendix Four).**

Recommendation #3: Ensure fireground operations include a SOP/SOG for adequate staffing, wind-impacted fires, coordinate ventilation with suppression, review and revise SOP/SOG for below-grade fires, all firefighters and fire officers are trained in fireground survival procedures, all members and dispatchers are trained on the safety features of portable radios.

Discussion: At this incident, Truck 53 was operating on a manning variance, with only a staffing of 4 members, the wind was blowing against the fire building on Side Charlie. The open doors on Side Bravo/Side Charlie and the open door on Side Alpha created an unrestricted flow path from the basement to the 1st floor, allowing the fire to spread in the basement. the fire in the basement was knocked down in the basement from the exterior. The ventilation occurred when the rear door was opened creating a flow path in the basement. Each firefighter and fire officer was assigned a portable

radio. Training procedures should have dictated how to best exit the hazard zone. Engine 94 Nozzle transmitted a Mayday and then activated his PASS alarm, but did not leave the building. The fireground tactical channel is a non-repeater channel with limited distance, is not recorded, and the fire alarm office cannot monitor the fireground tactical channels. If a transmission is missed, there is no ability to identify the portable radio and the tactical channel is not taped for recall by the Fire Alarm Office.

Staffing

The evaluation of the fire department's provided level of service needs to be performed against the authority having jurisdiction's (AHJ) established service delivery performance objectives. These objectives should be based on a jurisdictional risk assessment. The objectives established within this standard are based on a 2,000-square foot two-story, single-family home without a basement and having no exposures. The AHJ's response objectives should be established based on numerous factors such as the circumstances affecting response personnel, adopted building codes, required fire/life safety-related engineering controls, accepted turnout/travel times, complexity of facilities, and occupancy hazards within the jurisdiction [NFPA 2020].

NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* also requires staffing of engine companies and truck companies with a minimum of four on-duty personnel. To better match resources to service demands and address risk, the standard also states that companies shall have a minimum of five on-duty members in jurisdictions with high numbers of incidents or geographical restrictions or six on-duty members in jurisdictions with tactical hazards, high-hazard occupancies, or dense urban areas as identified by the authority having jurisdiction (AHJ) [NFPA 1710 2020]. The requirements are defined below.

NFPA 1710 requires the following for engine companies and truck companies:

- *5.2.3.1.2: For engine companies that operate in first-due response zones with a high number of incidents, geographical restrictions, geographical isolation, or urban areas, as identified by the AHJ, these companies shall be staffed with a minimum of five on-duty members.*
- *5.3.3.2.2: For truck companies that operate in first-due response zones with a high number of incidents, geographical restrictions, geographical isolation, or urban areas, as identified by the AHJ, these fire companies shall be staffed with a minimum of five on-duty members.*
- *5.2.3.1.2.1: For engine companies that operate in first-due response zones with tactical hazards, high-hazard occupancies, or dense urban areas, as identified by the AHJ, these fire companies shall be staffed with a minimum of six on-duty members.*
- *5.2.3.2.2.1: For truck companies that operate in first-due response zones with tactical hazards, high-hazard occupancies, or dense urban areas, as identified by the AHJ, these fire companies shall be staffed with a minimum of six on-duty members.*

Wind-Impacted Fires

A wind-impacted fire may be one of the most dangerous operations firefighters will encounter. The term "wind-impacted" fire is used to describe a fire in which the wind has the potential to, or is already causing, a dramatic and sudden increase in fire, heat, and smoke conditions.

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Adjusting firefighting tactics to account for wind conditions in structural firefighting is critical to enhance the safety and effectiveness of firefighters. Experienced fire officers and firefighters who have survived wind-impacted fires have described the following [FDNY 2013]:

- Upon arrival, conditions appeared to be routine.
- Within seconds, fire, heat, and smoke conditions changed without warning "from routine to life threatening."
- An operating 2½-inch hose line flowing from the downwind position or into the exhaust portion of the flow has little or no effect on the incredible heat being produced; however, flowing water into the intake or inlet side of the flow path has shown to be very effective.
- A wind impacted fire should be attacked from the windward side or alternate strategies. Members must identify and communicated conditions/ventilation profile that indicate wind impacted fire conditions and implement the appropriate attack strategy.
- Firefighters should not assume that the wind-impacted fire conditions can be impacted head-on from a downwind position, regardless of the size and number of handlines flowing.

When responding to a reported structure fire, an overriding consideration concerning size-up should include wind conditions and their potential effect on the fire. The key to successfully operating at wind-impacted fires in a structure depends on recognizing that a seemingly routine fire may change into a "blowtorching" fire when the fire is impacted by wind conditions. The impact of the wind will be affected by the size of the window opening, the fuel load, and the stage of the fire when a window fails. When wind-impacted fire conditions exist in a structure, the Incident Commander should notify the dispatcher so this information can be relayed to all responding units. Also, the Incident Commander should make an announcement on the tactical channel. Once the critical factors of an incident are identified, steps can be taken to minimize the hazards to firefighters [FDNY 2013].

Fire departments are encouraged to develop and implement a SOP/SOG addressing such issues as obtaining the wind speed and direction, considering the possible fuel load associated with a particular occupancy, determining proper strategy and tactics for fireground operations, considering ventilation, and establishing possible scenarios associated with the wind speed based upon risk assessment. Under wind-impacted conditions, an exterior attack from the upwind side of the fire may be necessary to reduce fire intensity to the extent that firefighters can gain access to the involved compartments [NIOSH 2017].

NFPA 1700, *Guide for Structural Fire Fighting* discusses aspects of wind influenced fires (Chapter 6, Paragraph 6.6). Specifically, NFPA discusses the role of speed and changes in direction and flow path as having a significant impact on the flow behavior of the fire gases, increasing the risk of fire extension and threat to human life.

When wind speeds exceed 9 mph (14.5 km/hr.) the Incident Commander, division/group supervisors, company officers, and firefighters should use caution and take wind direction and speed into account when selecting a strategy and developing tactical objectives. The National Institute of Standards and Technology (NIST) has determined that wind speeds as low as 9 mph (14.5 km/hr.) are sufficient to create wind-impacted fire conditions if the flow path is uncontrolled [Madrzykowski and Kerber 2009]. A NIST study showed that wind speeds as low as 10 mph can turn a routine "room and contents

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fire" into a floor to ceiling fire storm or "blowtorch effect," generating untenable conditions for fire fighters, even outside of the room of origin. In the study, temperatures more than 600 ºC (1100 ºF) and total heat fluxes in excess of 70 kW/m² were measured at 4 feet above the floor along the flow path between the fire room and the downwind exit vent. These conditions were attained within 30 seconds of the flow path being formed by an open vent on the upwind side of the structure and an open vent on the downwind side of the structure [Madrzykowski and Kerber 2009].

In simulations and in previous full-scale experiments, it has been demonstrated that wind can increase the thermal hazards of a structure fire [Madrzykowski and Kerber 2009]. Therefore, wind must be considered as part of the initial size-up of the fire conditions and be monitored and reported throughout the fire incident. It is critical that firefighters are not in the exhaust portion of the fire flow path. The directional nature of the fire gas flow path results in higher temperatures than the area adjacent to the flow path or upwind of the fire. The flow path can be controlled by limiting ventilation. Previous studies demonstrated that applying water from the exterior into the upwind side of the structure can have a significant impact on controlling the fire prior to beginning interior operations [Madrzykowski and Kerber 2009].

Whenever possible, approach and attack the fire from the windward side to keep it from spreading throughout the structure. It should be made clear that in a wind-impacted fire, it is most important to use the wind to your advantage and attack the fire from the upwind side of the structure. The unexpected ventilation from a broken window can suddenly change the interior thermal conditions. Interior operations need to be aware of potentially rapidly changing conditions [Madrzykowski and Kerber 2009].

Training and education components [FDNY 2014, NIOSH 2017] on wind-impacted fires suggests that fire departments ensure:

- An adequate initial size-up and risk assessment of the incident scene is conducted before beginning interior firefighting operations
- Firefighters do not place themselves in the exhaust portion of the flow path
- Firefighters, company officers, division/group supervisors, and the Incident Commander has a sound understanding of fire behavior and the ability to recognize indicators of fire development and the potential for extreme fire behavior (such as smoke [color, velocity, and density], visible fire, and heat)
- Firefighters and company officers are trained to recognize the potential impact of windy conditions on fire behavior and implement appropriate tactics to mitigate the potential hazards of wind-impacted fire
- Failure to utilize the rear door to their tactical advantage to attack the fire on its own level and not requiring a hoseline being advanced down the interior stairs (e.g., Cherry Road fire, Watts Street fire)
- The Incident Commander's strategy considers high-wind conditions if present
- Firefighters understand the influence of ventilation on fire behavior and effectively apply ventilation and fire control tactics in a coordinated manner
- Firefighters and officers understand the capabilities and limitations of thermal imagers.
- A thermal imager is used as part of the size-up process

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- Firefighters check for fire in overhead voids upon entry and as charged hose lines are advanced
- A Mayday standard operating procedure is developed, implemented, and enforced
- Firefighters are trained to understand the Mayday process and know how to initiate a Mayday
- Firefighters are trained in fireground survival procedures
- Firefighters on the fireground are equipped with radios capable of communicating with the Incident Commander and the dispatch center.

Coordinate Ventilation with Suppression

Opening the apartment door to gain access should be thought of as ventilation, in terms of its capability to exhaust from the fire compartment but also for its potential to cause fire growth as well as smoke movement into the stairwell (which could limit the egress for potential occupants in exposure units). Consideration should be given to employ suppression and ventilation tactics that may lessen the flow of combustion gases into shared common spaces whenever feasible [UL FSRI 2020].

A flow path is the interior volume between a higher-pressure source and a lower-pressure space that's within the structure and/or atmospheric pressure exterior vent. Fresh air in-flow and smoke exhaust out-flow can be co-located at bidirectional vents or at independent locations via unidirectional vents. Gases that flow within the flow path are driven by pressure, which typically is generated from the production of expanding, high-temperature fire gases (i.e., smoke). The most dangerous place for firefighters to be located is in the exhaust portion of the flow path. Exhaust portions of the flow path have had gas speeds recorded up to 20 mph (32.2 kph). These high velocities increase the rate of energy transfer exponentially to all objects in the flow path, including firefighters. Modern firefighter PPE can only protect firefighters a few seconds in high-temperature and high-velocity flows [UL FSRI 2020; NFPA 1700 2024].

The first engine company and first truck company should initiate fire attack from the same entry point, which is very important for flow path control. At this incident, the first engine company and truck company should have utilized the rear door (Side Bravo) to their tactical advantage to attack the fire on its own level and not requiring line advance down the interior stairs. Without coordinating ventilation with suppression, this created the ventilation induced flashover and placed members in the exhaust portion of the flow path at this incident. Ventilation should be limited, potentially to the fire compartment only, and closely timed with the beginning of suppression. Ventilation post-suppression should be focused on the areas of greatest hazard for potentially trapped occupants' continued exposure to fire gases [FDNY 2013; UL FSRI 2020].

Some recommendations regarding ventilation coordinated with suppression are:

- Fire dynamics and ventilation profile
- Identify and confirm the access for the initial fire attack
- Initiate fire attack from the same level of the fire whenever available
- Announce the initial entry for fire attack for both the engine company and truck company; they must initiate fire attack from the same entry point, which is very important for flow path control
- Firefighters and fire officers should understand that if ventilation is not tightly coordinated with suppression there will be a change to rapid fire growth and development [FDNY 2013].

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Basement Fires

Recognizing a below-grade fire is essential to developing proper strategy and tactical objectives. These types of fires are low frequency/high risk events for several reasons. Below-grade fires may be difficult to initially detect; may be difficult to access; require additional staffing for hoseline placement, operation, and ventilation; and firefighters may be working over the fire [NIOSH 2018b]. There is increased risk to firefighters due to:

- Limited entry and egress into a basement including an interior access only
- Some basements have a cellar which is only accessible through the basement
- Unusual and/or unanticipated void spaces
- Working above the fire
- Weakened floor joists and flooring materials
- Being caught in the exhaust portion of the fire flow path
- Unknown and frequently excessive fire loading
- Restricted ventilation options
- Utility panels and meters plus connections
- Otherwise, separate areas connected by non-fire stopped utility penetrations
- Hanging wires and ductwork
- Furniture and appliances - often disorganized distribution of the contents.

During below-grade fire operations, every firefighter should remember access and ventilation. Access includes how easily a firefighter can get water in and how they can make an attack via a window or door. Ventilation may not exist in below-grade areas; however, wind can pressurize the structure and contribute to erratic fire behavior. For structures with no exterior access to basement or below-grade area, the main way for air and smoke to move through the home will be from the basement, up the stairs toward an open door or windows above grade.

If the fire has not penetrated the structure, a bi-directional flow will occur at the doorway to the basement stairs. The air supply to the fire is inefficient and limited, therefore the potential of flashover is reduced when there is no exterior ventilation access to the basement. Potential ventilation via windows or doors connected to the below-grade compartments enables rapid changes in fire growth. Uni-directional exhaust flows in the stairwell(s) may result in an increased burning rate of contents and any wood floor assembly, increasing the potential for floor collapse and reducing safe operating time on the floor above. Ventilation of below-grade space was a key factor in firefighter line of duty deaths including the Pang Fire (Seattle, WA); the Cherry Road Fire (Washington, DC); the Squirrelsnest Lane Fire, Colerain, OH; the Berkley Way Fire, San Francisco, CA; and the Pater Road Fire, Hamilton, OH. [Madrzykowski and Weinschenk 2018; Kerber et al. 2012; Madrzykowski and Kent 2011]. Key factors in recognizing a below-grade fire include:

- fire or smoke venting from a cellar window, smoke pushing from the chimney (especially during warmer weather)
- evenly distributed smoke with no visible fire on the 1st floor
- floorboards may not be hot. Look for smoke around the edges of the baseboard or HVAC duct penetrations
- smoke from eaves, attic windows or louvered attic vents especially in older homes with balloon frame construction.

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Below-grade fires in dwellings with balloon construction often extend to the attic via hidden voids. Units operating above the basement need to stretch enough hoseline to reach the upper floors. Intermediate floors need to be checked for fire before a hoseline is committed to the top floor. Floor and wall voids in balloon frame construction are all interconnected and can spread fire throughout the building in unexpected ways. Flooring systems and floor coverings are good insulators and may not transfer a significant amount of heat from a basement fire. Laboratory experiments, field-testing, and modeling have shown that in post-flashover basement fires with platform construction and engineered lumber sub-floors, even after the floor supports start to lose the structural integrity [Kerber et al. 2012; Madrzykowski and Kent 2011; Madrzykowski and Stakes 2025]:

- high heat conditions may not be generated on the floor above
- thermal imagers may not provide clear information on the level of hazard
- the subfloor will hold up to a strike from a tool during sounding, but the floor supports may not be able to carry the weight of a firefighter or firefighters.

SOPs/SOGs need to consider numerous factors that affect firefighting operations. This will ensure essential strategic-, tactical-, and task-level functions are performed by the IC, division/group supervisors, company officers, and firefighters. Specifically, an SOP/SOG for below-grade fires needs to include the following topics:

- community risk assessment
- pre-incident planning
- scene size-up
- building construction
- strategy and tactics
- use of a thermal imager
- ventilation considerations
- proper size and adequate hoselines.

If the size-up indicates there is a fire in the basement (e.g., floor to ceiling smoke and not lifting significantly once the basement walk-out door was opened) then the basement needs to be investigated and cleared before crews can safely operate above. Opening a door is ventilation and will increase the size of a ventilation-limited fire. Basement fires also need to be considered ventilation limited until proven otherwise so if the fire location is not known then ventilation should be limited until sufficient water can be applied to what is burning.

As with all fires, a risk assessment and an occupant survivability profile should be conducted to evaluate the risks for lives and property. Fire departments should conduct a post-incident analysis for significant incidents, especially below-grade fires. Fire departments should periodically update their community risk assessment program and SOPs/SOGs based on recommendations from post-incident analysis reports.

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Fire Department Actions Taken Since the Incident

During the course of the investigation, the fire department advised NIOSH investigators that they had implemented a number of changes in department in fireground operations (**see Appendix Five**). The fire department is addressing issues that include fireground communications, stationary command post, personnel accountability, use of a tactical worksheet that compliments personnel accountability and crew integrity, and a continuous scene size-up and risk assessment.

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Investigator Information

This incident was investigated by Murrey E. Loflin, Safety and Occupational Health Specialists with the Fire Fighter Fatality Investigation and Prevention Program, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH located in Morgantown, WV and Robert Saunders, Technical Information Specialist with the Fire Fighter Fatality Investigation and Prevention Program, Hazard Evaluations and Technical Assistance Branch, Division of Field Studies and Engineering, NIOSH located in Cincinnati, OH. An expert technical review was provided by George Healy, Deputy Chief with the FDNY and Mario Rueda, Los Angeles Fire Department (Retired) and Fire Chief of the San Marino, CA FD. A technical review was also provided by Dan Madrzykowski and Keith Stakes with UL Fire Safety Research Institute and the National Fire Protection Association, Public Fire Protection Division.

Additional Information

UL's Firefighter Safety Research Institute (FSRI) continues to work with fire departments and fire service organizations to conduct research on fire dynamics, fire safety issues, and fire ground operations. Access to reports from completed studies and information from on-going studies can be found at https://fsri.org. Access to free online training on evidence-based firefighting (more than 30 course modules in all) can be found at https://training.fsri.org. Additional information regarding this incident can be found at FSRI/ISFSI *Understanding and Fighting Basement Fires Summary Video* (https://vimeo.com/317106248) or the online course available at https://training.fsri.org/course/83/understanding-and-fighting-basement-fires have important and useful information on below grade fires.

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International Association of Fire fighters Fire Ground Survival Program
The IAFF Fire Ground Survival Training addresses Mayday prevention and Mayday operations for fire fighters, company officers, and chief officers. Firefighters must be trained to perform potentially life-saving actions if they become lost, disoriented, injured, low on air, or trapped. Funded by the IAFF and assisted by a grant from the U.S. Department of Homeland Security through the Assistance to Fire fighters (FIRE Act) grant program, this comprehensive fireground survival training program applies the lessons learned from firefighter fatality investigations conducted by the National Institute for Occupational Safety and Health (NIOSH). It was developed by a committee of subject matter experts from the IAFF, the IAFC, and NIOSH.

NFPA 1550, Standard on Emergency Responder Health and Safety (2024 edition)
NFPA 1550 marks the integration of NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*; NFPA 1521, *Standard for Fire Department Safety Officer Professional Qualifications*; and NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety*, into a single standard that addresses emergency responder health and safety.

NFPA 1550 maintains the chapter on "Command Safety." This chapter provides a foundation for incorporating the incident management system at all emergency incidents, especially *Type V* and *Type IV* incidents. The chapter on Command Safety clearly defines the requirements for the IC, including establishing a fixed command post, personnel accountability, the use of staff aides and rapid intervention crews, and the appointment of a safety officer and assistant safety officer(s) (as needed). The standard addresses the expectations and authority of the safety officer. Annexes cover Functional Assignments for High-Rise Building Incidents, Development of Subordinate Officers or Implementing a More Efficient Management System, Incident Management for the Fire Service on Type V or Type IV Incidents, and Structural Fire-Fighting—Risk Assessment and Operational Expectation.

NFPA 1700, Guide for Structural Fire Fighting (2021 edition)
NFPA 1700, *Guide for Structural Fire Fighting*, 2021 edition, is the first NFPA document connecting fire dynamics research and its application to strategy, tactics, and best practices for firefighters in controlling fires within a structure.

Initiated through a project request in April 2015, the Standards Council requested input by June 21, 2015, on the proposed guide. Creation of the Technical Committee on Fundamentals of Fire Control Within a Structure Utilizing Fire Dynamics, the committee responsible for NFPA 1700, was approved at the August 2015 Standards Council meeting. This technical committee was charged with developing a document outlining techniques and methods used in firefighting based on accepted scientific principles and research in fire dynamics. The technical committee includes a balance of representatives from the fire service, insurance industry, subject matter textbook publishers, special experts, and stakeholders actively engaged in fire dynamics research.

NFPA 1700 addresses fire control within a structure by establishing a basic understanding of fire science and fire dynamics. NFPA 921, *Guide for Fire and Explosion Investigations*, served as a model for how to translate fire dynamics understanding in practicable, applicable ways. Current information from recognized research efforts complements fundamental occupancy, building construction, and

building service considerations. While acknowledging occupant life threats, the document further addresses the protection of firefighters from the immediately dangerous to life and health environment by reinforcing the need for personal protective equipment and methodologies for contamination control.

The focus of the document is to provide guidance to individuals and organizations on interacting within a structure on fire with proven approaches based on documented fire investigations, research, and fire dynamics testing to achieve the most successful outcome. Chapters are dedicated to establishing strategies with tactical considerations to provide effective search, rescue, and fire suppression operations, as well as civilian and responder safety.

Disclaimer

The information in this report is based upon dispatch records, audio recordings, witness statements, and other information that was made available to the National Institute for Occupational Safety and Health (NIOSH). Information gathered from witnesses may be affected by recall bias. The facts, contributing factors, and recommendations contained in this report are based on the totality of the information gathered during the investigation process. This report was prepared after the event occurred, includes information from appropriate subject matter experts, and is not intended to place blame on those involved in the incident. Mention of any company or product does not constitute endorsement by NIOSH, Centers for Disease Control and Prevention (CDC). In addition, citations to websites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date. *NIOSH Approved is a certification mark of the U.S. Department of Health and Human Services (HHS) registered in the United States and several international jurisdictions.*

Career Candidate Firefighter Found Unresponsive at a Residential Structure Fire and Dies 5 Days Later–Illinois

Appendix One
MSA G1 Regulator Hose Inspection

User Safety Notice
MSA G1 Regulator Hose Inspection

February 3, 2022

MSA
The Safety Company

MSA Corporate Center
1000 Cranberry Woods Drive
Cranberry Township, PA 16066
800.MSA.2222
www.MSAsafety.com

Dear MSA G1 Customer,

MSA is issuing this User Safety Notice to inform you of a new and additional required step to the inspection of your Fire Service G1 Self Contained Breathing Apparatus (SCBA). This is in response to a limited number of reports of bulging hoses for the G1 second stage regulator (also referred to as the demand valve). In one report, the bulge also exhibited a leak.

The G1 SCBA operating manual contains instructions for visual inspections to be performed upon receipt, daily and after each use. Users are instructed to inspect all components for "deterioration, dirt, cracks, debris, tears, holes, stickiness, signs of heat- or chemical-related damage, or other visible signs of damage." Based on the reports MSA has received, we are advising customers to perform inspections of the second stage regulator hose, while the SCBA is pressurized, daily and after each use. Wear safety glasses while performing the inspection.

An example of a bulging hose can be seen in Figure 1. Any SCBA that exhibits a bulging condition must be removed from service. Also remove from service any G1 SCBAs with second stage regulator hoses exhibiting deterioration, dirty O-rings or seals, cracks, debris, tears, holes, stickiness, signs of heat- or chemical-related damage, or other visible signs of damage.

MSA is advising all customers to inspect MSA Fire Service G1 second stage regulator hoses while the SCBA is pressurized during the daily and after each use visual inspections.

Remove from service any G1 SCBAs with second stage regulator hoses exhibiting bulging, deterioration, dirty O-rings or seals, cracks, debris, tears, holes, stickiness, signs of heat- or chemical-related damage, or other visible signs of damage.

Wear safety glasses while performing the inspection.

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Career Candidate Firefighter Found Unresponsive at a Residential Structure Fire and Dies 5 Days Later–Illinois

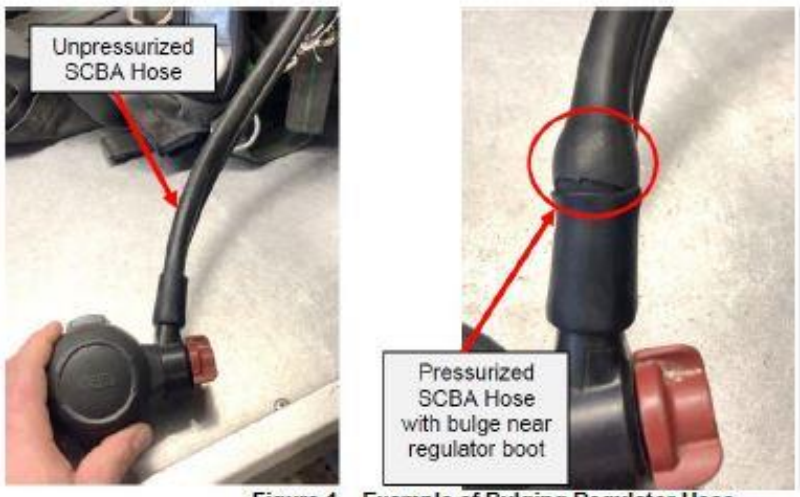

Figure 1 – Example of Bulging Regulator Hose

MSA
The Safety Company

MSA Corporate Center
1000 Cranberry Woods Drive
Cranberry Township, PA 16066
800.MSA.2222
www.MSAsafety.com

Addressing G1 SCBA That are Removed From Service

To request replacement G1 regulator hose assemblies, please use the attached MSA G1 SCBA Regulator Hose Assembly Replacement Order Form. You will be requested to return the assembly that did not pass inspection.

For questions about this notice, please contact MSA at:

- U.S., Canada, or U.S. Territories – +1-866-672-0005, IRG@MSAsafety.com
- Middle East, Africa - cs.mideast@msasafety.com
- Hong Kong, Asia - +603-9767 8800, msa.malaysia@msasafety.com
- Australia, New Zealand - 61 (02) 9688 0333 / 1300 728 672, aus.customerservice@msasafety.com
- Europe – Contact local MSA Customer Service

We apologize for any inconvenience this may cause; however, your safety and continued satisfaction with our products is important to us.

Issued by: Nathan Andrulonis
Director, Product Safety

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Career Candidate Firefighter Found Unresponsive at a Residential Structure Fire and Dies 5 Days Later–Illinois

MSA G1 SCBA Regulator Hose Assembly Replacement Order Form

MSA The Safety Company

Please complete this form and email it to the address below. Included in the email, please provide photos of the affected second stage regulator hoses that require replacement.

U.S., Canada, or U.S. Territories – IRG@MSAsafety.com	Australia, New Zealand - aus.customerservice@msasafety.com
Middle East, Africa - cs.mideast@msasafety.com	Europe – E-mail local MSA Customer Service
Hong Kong, Asia - msa.malaysia@msasafety.com	

A separate form must be submitted for each fire department reporting regulator hoses that did not pass inspection.

Department Name

Contact Name

Phone

Email

Department Shipping Address

Address 2

City **State** **Zip**

Is your Department CARE Certified? _____Yes _____No

Channel Partner/Distributor
(If Department not CARE certified)

Channel Partner Shipping Address

Address 2

City **State** **Zip**

Part Number(s) of G1 SCBA Hose Assemblies Requested and Quantities Needed of Each

G1 SCBA Serial Number(s)

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PS22007-01

Career Candidate Firefighter Found Unresponsive at a Residential Structure Fire and Dies 5 Days Later–Illinois

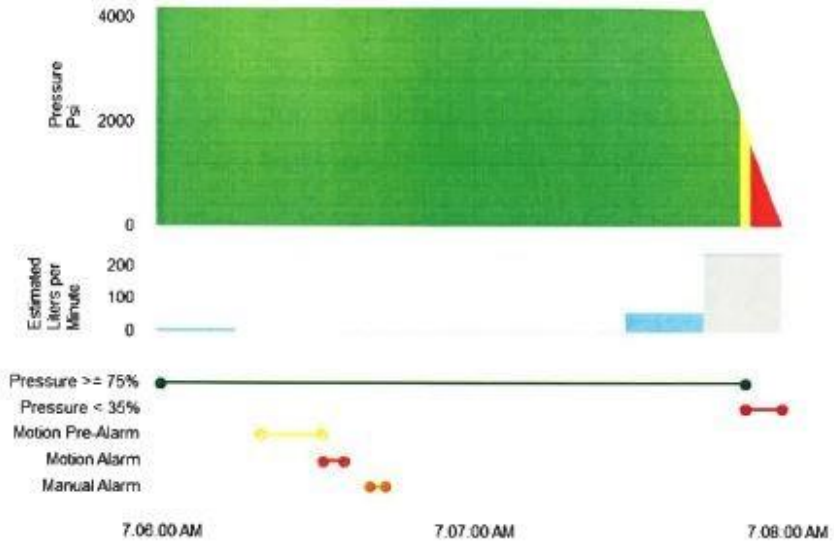
Appendix Two
Engine 94 Nozzle - G1 Inspection Log

MSA The Safety Company

G1 Incident Log

Serial number: 01042EE2

Incident Start: 12/15/2021 07:05
Incident End: 12/15/2021 07:07



Current user:

Page 1 of 1

Monday, December 20, 2021

www.msasafety.com

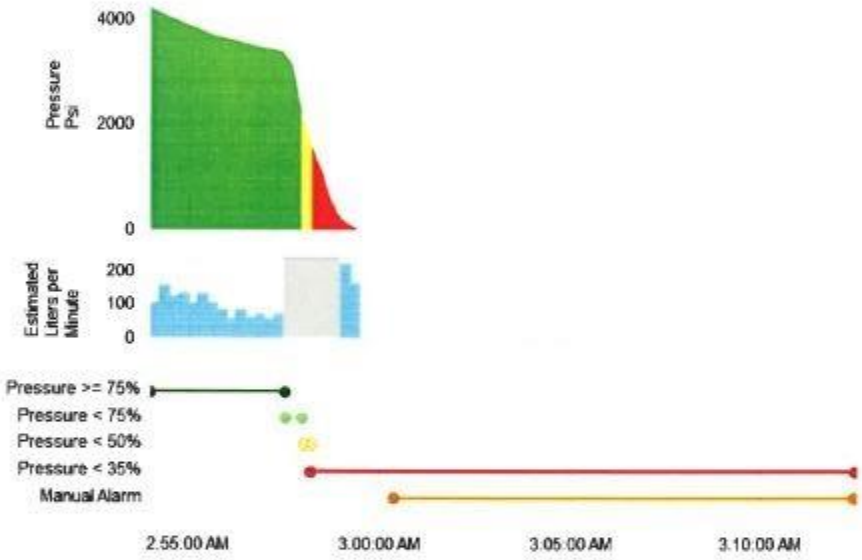
Career Candidate Firefighter Found Unresponsive at a Residential Structure Fire and Dies 5 Days Later–Illinois

MSA
The Safety Company

G1 Incident Log

Serial number: 01042EE2

Incident Start: 12/16/2021 02:53
Incident End: 12/16/2021 03:11



Current user:

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Monday, December 20, 2021

www.msasafety.com

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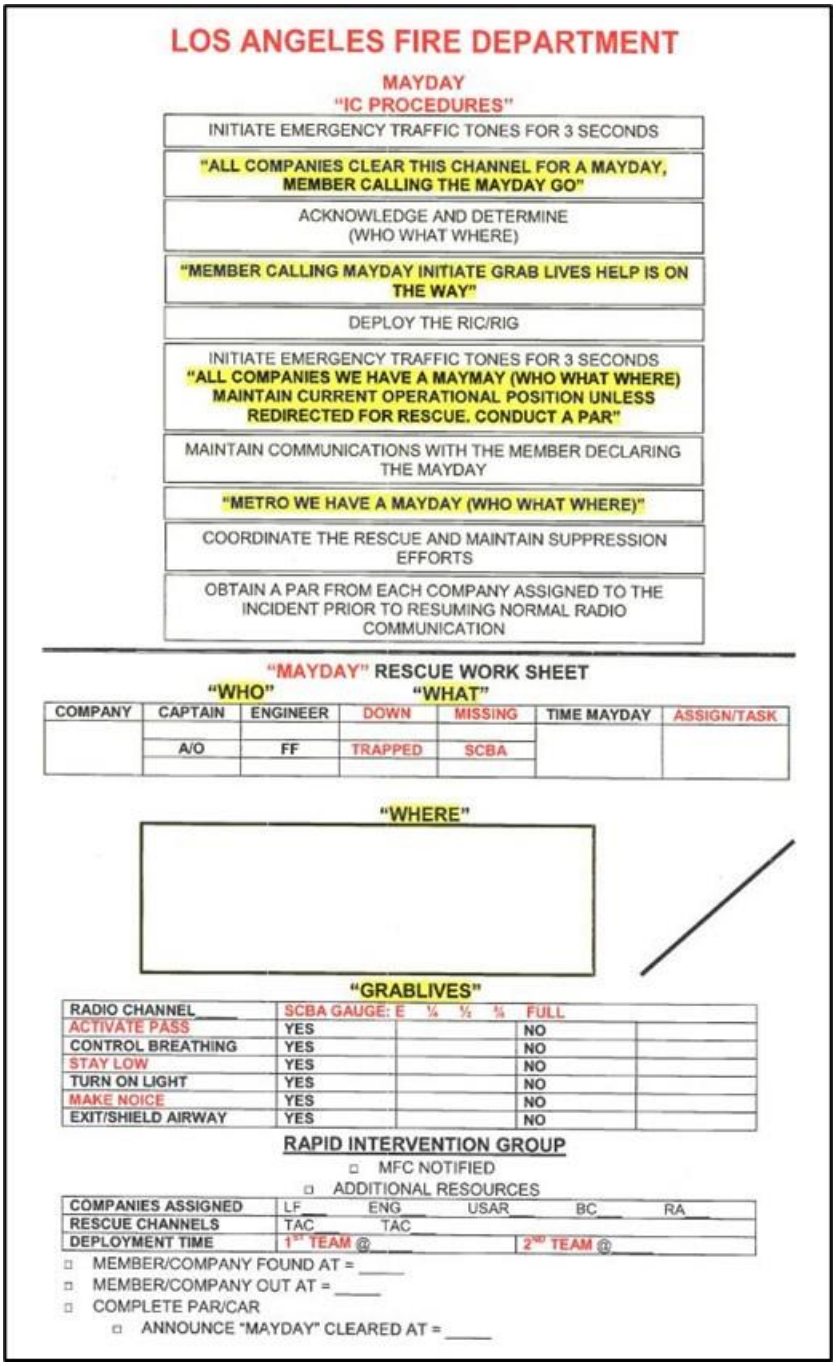
Appendix Three
Sample Incident Commander's Tactical Worksheet for a Mayday



LOS ANGELES FIRE DEPARTMENT

MAYDAY
"IC PROCEDURES"

INITIATE EMERGENCY TRAFFIC TONES FOR 3 SECONDS
"ALL COMPANIES CLEAR THIS CHANNEL FOR A MAYDAY, MEMBER CALLING THE MAYDAY GO"
ACKNOWLEDGE AND DETERMINE (WHO WHAT WHERE)
"MEMBER CALLING MAYDAY INITIATE GRAB LIVES HELP IS ON THE WAY"
DEPLOY THE RIC/RIG
INITIATE EMERGENCY TRAFFIC TONES FOR 3 SECONDS **"ALL COMPANIES WE HAVE A MAYMAY (WHO WHAT WHERE) MAINTAIN CURRENT OPERATIONAL POSITION UNLESS REDIRECTED FOR RESCUE. CONDUCT A PAR"**
MAINTAIN COMMUNICATIONS WITH THE MEMBER DECLARING THE MAYDAY
"METRO WE HAVE A MAYDAY (WHO WHAT WHERE)"
COORDINATE THE RESCUE AND MAINTAIN SUPPRESSION EFFORTS
OBTAIN A PAR FROM EACH COMPANY ASSIGNED TO THE INCIDENT PRIOR TO RESUMING NORMAL RADIO COMMUNICATION

"MAYDAY" RESCUE WORK SHEET

"WHO" **"WHAT"**

COMPANY	CAPTAIN	ENGINEER	DOWN	MISSING	TIME MAYDAY	ASSIGN/TASK
	A/O	FF	TRAPPED	SCBA		

"WHERE"

"GRABLIVES"

RADIO CHANNEL	SCBA GAUGE: E ¼ ½ ¾ FULL			
ACTIVATE PASS	YES		NO	
CONTROL BREATHING	YES		NO	
STAY LOW	YES		NO	
TURN ON LIGHT	YES		NO	
MAKE NOICE	YES		NO	
EXIT/SHIELD AIRWAY	YES		NO	

RAPID INTERVENTION GROUP

- ☐ MFC NOTIFIED
- ☐ ADDITIONAL RESOURCES

COMPANIES ASSIGNED	LF	ENG	USAR	BC	RA
RESCUE CHANNELS	TAC	TAC			
DEPLOYMENT TIME	1ST TEAM @		2ND TEAM @		

- ☐ MEMBER/COMPANY FOUND AT = ____
- ☐ MEMBER/COMPANY OUT AT = ____
- ☐ COMPLETE PAR/CAR
  - ☐ ANNOUNCE "MAYDAY" CLEARED AT = ____

(*Courtesy of Los Angeles Fire Department*)

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MAYDAY	Talk Group		Time MAYDAY CALLED		Time MAYDAY CLEARED	
WHO		**WHAT**		**WHERE**		

○	1	Confirm MAYDAY	"Command to all units on the scene, a MAYDAY has been declared. STOP all routine radio traffic & continue operations. The following units are assigned to the MAYDAY Branch (read units). Stand by for an accountability check."						
○	2	SCENE ANNOUNCEMENT							
○	3	LOCATION OF MAYDAY	Location	QUAD	UNIT	NAME	AIR SUPPLY	RESOURCES NOTES	CLEARED
○	4	Unit with mayday							
○	5	Name of member(s)							
○	6	Air status of member(s)							
○	7	Resources needed							
○	8	Deploy RIT - Action Plan	"Command to RIT, deploy to _____ for (units) _____"						
○	9	Notify Dispatch	"Command to dispatch, a MAYDAY has been declared at (address)." Give "LUNAR". "Send me (additional units) _____"						
○	10	Request resources							
○	11	Continue fire attack (action)	"Command to fire attack (or Division/Group), continue operations while RIT works."						
○	12	Conduct Accountability	"Command to Division 1, PAR", wait for response, "Command to Roof, PAR", etc. Division & Group supervisors report units/# of personnel operating, what action is being done, and announces "PAR", or announces missing assigned members						
○	13	Assign MAYDAY Branch Director							
○	14	Assign RIT Safety Officer							
○	15	Establish Point of Entry Accountability	MAYDAY Branch Director				RIT Supervisor		
○	16	ALS Resources	Units Assigned to MAYDAY & RIT	# Personnel Assigned			MAYDAY Group	Location	EMS Group Supervisor
○	17	Create defendable space		2	3	4	5	6	
○	18	Develop alternative strategies							UNITS / Hospital
○	19	Control unassigned resources							
○	20	Risk Assessment							
○	21	Control information release							
○	22	NOTIFY ALL when MAYDAY is CLEARED							

Career Candidate Firefighter Found Unresponsive at a Residential Structure Fire and Dies 5 Days Later–Illinois

INCIDENT COMMANDER FIREGROUND MAYDAY CHECKLIST

Upon receipt of a mayday transmission on the fire ground, the Incident Commander should:

- ☐ **Acknowledge the Mayday.**
- ☐ Identify the unit calling the Mayday and determine:
- ☐ Location Condition Actions Air Needs **(LCAAN).**
- ☐ **Advise Mayday Fire Fighter of GRAB LIVES:**
  Gauge (Check air gauge) **Radio** (MAYDAY) **Activate** (Activate PASS Alarm) **Breathing** (Conserve Air) **Low** (Stay Low) **Illuminate** (All flashlights on in the IDLH) **Volume** (Make Loud Noises) **Exit** (Find an Exit) **Shield Airway** (Protect Airway)
- ☐ **Control radio communication by restricting the air to emergency traffic only.**
- ☐ **Advise all companies on the fire ground of the Mayday and the last known location.**
- ☐ **Utilize the Inside/Out approach to locate unit calling Mayday.**
- ☐ **Deploy RIC or Standby Team.**
  1. Backfill the RIC or Standby if launched.
- ☐ **Advise dispatch of Mayday transmission.**
  1. Provide company name and/or name of missing or injured individual.
  2. Dispatch will proceed with their Mayday procedures. Additional alarm will be automatically dispatched.
- ☐ **Request additional ALS resources as needed.**
- ☐ **Request additional radio frequencies as needed.**
- ☐ **Continue fire ground activities to protect companies involved in RIC/RIG activities.**
- ☐ **Assign a "Rapid Intervention Group" (RIG) and Rapid Intervention Group Supervisor.**
  1. The IC should push the Mayday to Divisions. The IC will support Divisions, Fire Control, Medical.
  2. The RIG Supervisor will manage the rescue.
- ☐ **Re-Evaluate the IAP**
- ☐ **After rescue confirmed – Terminate the Mayday and conduct a PAR or Roll Call as appropriate.**
- ☐ **Return incident communications to Routine Traffic.**
  1. Develop new IAP
  2. Restate Strategy

Career Candidate Firefighter Found Unresponsive at a Residential Structure Fire and Dies 5 Days Later–Illinois

Appendix Four
Sample Daily SCBA inspection and Check-off Form

Apparatus: Engine 2

Month/Year: 2024

VBFD SCBA Daily Usage and Inspection Form

VBFD Inventory No.: 42221 (Spare)

Location: Spare

Date	Shift	Mask Number	Control Module	Battery %	Regulators & Hose	HUD/ Buddy Lights	Bluetooth	RFID Tag In	EOSTI (Low air alarm)	Straps/Harness/ Back plate	Transfill Pouch/Hose	Cylinder Pressure	Initials
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
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*Control Module: includes PASS Device, battery module, and power module *Regulators: 1st and 2nd stage regulators and all associated functions *RFID: log-in functions and associated RFID keys * Indicate Cylinder Pressure in Numeric value ex: 4500psi

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Appendix Five
Fire Department Recovery Process

The department undertook a number of actions to prevent the occurrence of a similar situation. The fire commissioner initiated a review of this incident. Several new Operations Orders related to fireground operations were issued by the Bureau of Operations based upon the review of this incident.

- **SUBJECT:** MOTOROLA XTS-5000 UHF RADIO AS SECOND PORTABLE RADIO FOR CHIEF OFFICER INCIDENT COMMANDERS
  - It is the policy of the fire department to distribute the Motorola XTS 5000 Single Band UHF Portable Radio as a second portable radio for Chief Officers to use on the scene of emergency incidents to monitor tactical channels. The second radio is to be deployed when the Chief Officer is the Incident Commander.
  - **RESPONSIBILITIES**
    - Chief Officers shall be held accountable for the daily inventory, inspection, and care of the Motorola XTS 5000 Single Band UHF Portable Radio and associated equipment.
    - Chief Officers shall be responsible for ensuring compliance with the provisions of this Order.
    - It is the responsibility of all members to have a thorough knowledge of this Order.

- **SUBJECT:** FIRE INCIDENT SAFETY CHIEF
  - It is the policy of the fire department to ensure the safety of members operating at all emergency incidents. A Fire Incident Safety Chief shall be dispatched to assist the Incident Commander in overseeing the safety of operations at working fires and other emergency incidents. The Fire Incident Safety Chief shall be dispatched after the RIT Chief has been dispatched.
  - **RESPONSIBILITIES**
    - Chief Officers shall be responsible for ensuring compliance with the provisions of this Order.
    - Chief Officers and Company Officers shall conduct Company School to ensure that all members are aware of the provisions of this Order.
    - It is the responsibility of all members to have a thorough knowledge of this Order.