

FIREFIGHTER FATALITY REPORT

**12 Bartow Lane
Chatham Borough, New Jersey**

April 1, 1993

DIVISION OF FIRE SAFETY

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TABLE OF CONTENTS

TABLE OF CONTENTS	Page i
INTRODUCTION	Page 1
SUMMARY	Page 2
OVERVIEW	Page 3
Municipality	Page 3
Fire Department	Page 3
Incident Management System	Page 4
Victims	Page 4
THE INCIDENT	Page 5
Incident Location	Page 5
Weather Conditions	Page 5
Initial Incident Response	Page 5
Initial Actions of Firefighter Casualty	Page 7
Fire Ground Actions	Page 7
COMMENTS	Page 10
Building Collapse	Page 10
Weather Conditions	Page 10
Nighttime Operations	Page 10
Incident Management System	Page 10
Safety Officer	Page 11
Standard Operating Procedures	Page 11
Personal Protective Equipment	Page 11
Critical Incident Stress Debriefing Team Use	Page 11
RECOMMENDATIONS	Page 12
Building Collapse	Page 12
Weather Conditions	Page 13
Nighttime Operations	Page 14
Incident Management System	Page 14
Safety Officer	Page 14
Personal Protective Equipment	Page 14
Personal Alert Safety System Device	Page 15

Emergency Evacuation Signal	Page 15
Firefighter Accountability	Page 15
Standard Operating Procedures	Page 16
Collapse Zone	Page 16
Critical Incident Stress Debriefing Team Use	Page 16
CONCLUSION	Page 17
REFERENCES	Page 18

INTRODUCTION

This report was prepared in accordance with N.J.S.A. 52:27D-192, *et seq.*, Duties of the Division. The purpose of these firefighter casualty investigations is to report the causes of serious firefighter injuries or deaths. In some cases new information may be developed, or old lessons reinforced, in an effort to prevent similar events in the future. Fire cause and origin investigation is not a part of this report.

This investigation was conducted by Division of Fire Safety staff. The Division acknowledges the assistance and cooperation of the Morris County Prosecutor's Office, particularly Investigator Paul J. Sagal. The Division also recognizes Chief Gregory Henrich of the Chatham Borough Fire Department for his cooperation and assistance.

SUMMARY

At 0325 hours on Thursday April 1, 1993 the Chatham Borough Fire Department was dispatched to a delayed alarm for a dwelling fire at 12 Bartow Lane, Chatham Borough. Initial reports received by the fire department indicated that there was at least one, and possibly two, victims trapped. The building was a two story, wood frame, single family dwelling. Upon arrival the first alarm units found heavy fire conditions throughout the dwelling.

The fire department's activities at the incident were hampered by a delay in notification. A very heavy rain and low hanging smoke, which reduced visibility, added to the difficulties at this incident. In addition, there was a problem with the rear yard retaining rain water resulting in deep muddy conditions. A crew of four firefighters was operating a 1 ½" hose line in this mud at the rear of the dwelling. During a shift in wind the smoke cleared and several firefighters noted that the chimney was falling toward them. Three of the firefighters were able to maneuver clear of the collapse zone but one firefighter took the full impact of the chimney. He suffered severe multiple blunt trauma and was killed. An elderly female resident in the dwelling also died in the fire.

OVERVIEW

The Municipality

Chatham Borough is located in Morris County and is classified as a suburban community by the New Jersey Department of Community Affairs due to being predominantly single family residential and within a short distance of an urban area. With a resident population of 8,007¹, the borough covers 2.35² square miles and has a population density of 3,407 persons per square mile.

The Fire Department

The Chatham Borough Fire Department (CBFD) is a volunteer department consisting of 65 members, of whom approximately 25 are reported to be active firefighters. The fire department has one fire station which is located at 1 Firehouse Plaza, Chatham Borough. The CBFD operates three engines, one 85' straight aerial ladder and one rescue truck. Chatham Borough's Office of Code Enforcement is the Local Enforcing Agency for New Jersey's Uniform Fire Code. The department does not report to the Division via the National Fire Incident Reporting System (NFIRS). The CBFD reportedly responded to about 160 alarms in 1992.

Recruit training is conducted at the Morris County Police and Fire Academy in Morris Plains. There is also an average of one or two monthly drills given by the fire department. These drills primarily are to review basic firefighter skills. Specialized drills with outside agencies (e.g., a local chemical company) are also performed on a periodic basis.

The CBFD did not utilize a safety officer on this incident. No dedicated safety officer had been appointed within the department prior to this incident.

Communications

The CBFD is dispatched by the Borough Police Department, and utilizes that agency for all communications. The department has the capability to operate on both the police and fire frequencies.

¹Population data taken from *Total Residential Population, New Jersey, Counties and Municipalities, 1980 and 1990*, State Data Center, New Jersey Department of Labor, Trenton, New Jersey, 1991.

²Square mile data taken from *1990 Statement of Financial Condition of Counties and Municipalities*, Division of Local Government Services, New Jersey Department of Community Affairs, Trenton, New Jersey, 1990.

Incident Management System

The officers of the Cbfd have had training on the National Fire Academy's Incident Command System (ICS). However, ICS was not utilized on any consistent basis by the department.

The Victims

Firefighter (FF) Lewis Sheats, age 51, was a 24 year veteran of the Chatham Borough Fire Department. He was also a career lieutenant with the South Orange Fire Department in Essex County. He had been in the South Orange Fire Department since 1974.

Mrs. Pauline Troyer was an 81 year old widow who reportedly suffered severe hearing and visual handicaps. She lived alone.

THE INCIDENT

Incident Location

The incident occurred at 12 Bartow Lane, Chatham Borough. This was an occupied two-story, single family dwelling (BOCA Use Group R-3) of wood frame, balloon type construction (BOCA Construction Type 5). The south facing dwelling was reported to be 80 to 100 years old, and its dimensions were approximately 36' across the front and 28' deep. There was also an 8' wide enclosed porch attached to the rear wall, extending across the rear of the dwelling from the north west corner for a distance of approximately 28'.

The dwelling was the last house on a dead end street, located about 100 yards from the Madison Borough line.

There was no exposure on Division A or B³. There was a garage as Exposure C and a single family dwelling as Exposure D.

Mrs Troyer's daughter reported that the dwelling contained at least one smoke detector, however the investigation conducted after the incident by the CBF and the Morris County Prosecutor's Office could neither confirm nor deny that fact.

Weather Conditions

At the time of this incident was raining heavily, with the temperature in the 40s. The area had recently been receiving heavy rains. This caused problems due to the topography of the property. Much of the rain water had been retained in the rear of the property making for a muddy condition. The rain also reduced visibility. In addition, the smoke from the fire was held low to the ground, causing additional visibility problems.

Initial Incident Response

The initial indications of fire were discovered by the Madison Borough Police Department at approximately 0300 hours. A sergeant on patrol noted a smoke condition in the vicinity of the Madison Borough, Chatham Borough and Florham Park border. She was unable to find any source for the smoke, and after searching for about 20 minutes returned to Madison Borough Police Headquarters. She relieved the police officer on the desk at about 0320 hours and directly thereafter received a 9-1-1 call from a nearby gasoline station attendant reporting a structure fire on Brooklake Road, Madison Borough. She dispatched the Madison Fire and Police Departments to the scene. Two

³Terminology for divisions, exposures etc. are taken from the National Fire Academy Model Incident Command System.

Madison patrol cars arrived on Brooklake Road. They discovered that the incident was actually located in Chatham Borough. The Madison dispatcher was notified to contact that police department. The police officers then ran across a large recreation area, containing several ball fields, to the dwelling. Madison Borough Patrolman (Ptl.) Darren Dachinson arrived first and reported heavy fire showing at all windows. He also reported that the roof and rear enclosed porch were also heavily involved in fire. The officers found fire conditions too intense to allow entry into the dwelling. They then evacuated the occupants of 10 Bartow Lane (Exposure D) as a precautionary measure.

The occupants of 10 Bartow Lane reported that they had been awakened by their newborn infant. The mother reported that she was up between 0200 and 0230. She noted lights on at 12 Bartow Lane but did not see any evidence of fire at that time. These residents were again awakened sometime between 0300 and 0330 by the crackling of the fire and observed that 12 Bartow Lane was heavily involved with fire in the rear and that there were two police officers already there. The resident at 8 Bartow Lane was also aroused by the crackling, noted the fire but did not report it due to police personnel already being on the scene. Several other neighbors stated that they were roused by the fire's crackling and noted the heavy fire conditions at 12 Bartow Lane to the CBPD. One neighbor reported this to be at about 0323 hours by her clock. At about the same time that the Madison Borough Police Dispatcher called the Chatham Borough Police Dispatcher, Chatham Boro Police also began receiving neighbors' calls and dispatched the Chatham Borough Police and Fire Departments to the scene. Chatham Borough Ptl. Edward Uranyi was the first arriving officer. Uranyi reported that he found heavy fire conditions at all windows and the roof. He reported that he tried to open the front door to ascertain if the victim may have been on the floor near the front door of the dwelling but found it locked. He noted that the door knob was extremely hot to the touch.

Chatham Borough Fire Chief Gregory Henrich responded to the scene in his department vehicle. While driving to the scene he was informed by the dispatcher that there was the likelihood of an elderly woman being in the home. Henrich immediately requested the dispatcher to have the Chatham Emergency Squad (CES) and a mobile intensive care unit (MICU) respond.

Chief Henrich arrived at the scene at 0328 and was met by Ptl. Uranyi who briefed him that he had heavy fire in the dwelling, and that there was a trapped woman who was elderly and severely handicapped. There was also the report of a possible live-in home health aide (this was unfounded). The chief called for mutual aid from the Madison Fire Department (MFD) to the scene, and ordered the Chatham Township Fire District 2 (CTFD2) to relocate to the Chatham Borough Fire Department station for coverage. Shortly thereafter, Chief Henrich redirected the CTFD2 apparatus to the incident scene

for further assistance. Henrich also contacted the CBPD dispatcher to confirm, if possible, from a relative that the resident was alone in the dwelling and to determine if there was a home health aide. The CBPD contacted the woman's daughter, who confirmed that her mother lived alone in the dwelling.

Shortly after the chief arrived, CBF Engine 3 arrived, followed by the Borough's Truck 3, Engine 2 and Rescue 1 a few minutes later. Mutual aid response brought an additional engine and a tower ladder from Madison Borough and two engines from Chatham Township Fire District 2. Additional personnel also arrived from both mutual aid departments to supplement the personnel who arrived on the apparatus.

Initial Actions of Firefighter Casualty

FF Sheats responded to the incident in his privately owned vehicle. It was reported that Sheats carried his personal protective equipment (PPE) in his vehicle. According to the prosecutor's office, he appears to have arrived at about the same time as Chief Henrich, but the exact timing of his arrival has not been determined.

Fire Ground Actions

Chatham Borough Engine 3 arrived with a five member crew that laid a 3" supply line to the dwelling. Upon setting up the engine beyond the fire building, the crew pulled two 1 ½" hose lines to the front of the residence. Chatham Borough Truck 1 took a position in front of the dwelling and utilized the main ladder to open the second floor windows to enhance the ventilation made by the fire. Chatham Borough Engine 2 was connected to a hydrant on Garden Avenue and supplied itself. Chatham Borough Rescue 1 was located on Meadow Road, to be utilized as a lighting unit and a command center. Chatham Township Engine 2 laid a 5" supply line from Main Street to supply Chatham Borough Engine 3 and Madison's Tower Ladder.

FF John Conlon lived around the corner from the incident scene and responded to the incident on foot. Conlon reported arriving prior to Chatham Borough Engine 3. When the engine arrived he and FF William Weichert III, who also responded prior to the apparatus, took a 1 ½" hose line from Chatham Borough Engine 3 and began to attack the fire in the living room (corner of Divisions A and B). Chief Henrich ordered two crews to attempt to enter the front door with 1 ½" hose lines. Conlon and Weichert were told of this and they shut down their nozzle. Henrich also ordered a crew to take a 1 ½" hose line up the aerial ladder to attempt an entry through the second floor windows.

FF Conlon then noticed FF Lewis Sheats pulling a third 1 ½" hose line to the rear of the dwelling by himself. Conlon reported that since he was no longer applying water into the living room he went to assist Sheats. Once the line was placed in the rear of the dwelling, Conlon went back to the engine and told the pump operator to charge the line. He then returned to the rear of the dwelling to assist Sheats. FF John Baldwin arrived in the rear of the dwelling and also began to aid with the hose line operation. FF John Clark also was present and assisted. Clark, in addition to being a firefighter, is assigned as the department's fire ground photographer. He had taken some pictures of the fire scene and had put his camera away. It was then that he assisted the crew on the hose line in the rear.

The firefighters on this line began by applying water through the kitchen windows (Division C at the Division D corner). After the fire darkened down they began moving to the next window to the right and to work their way across the rear of the dwelling. Then they began to attack the fire on the second floor and on the porch. At this time Sheats was on the nozzle and Baldwin, Conlon and Clark were backing him up.

Members on the scene reported that visibility was very poor due to the heavy rain and the smoke hanging low to the ground. Conlon stated that, due to the smoke, it was difficult to see the house from time to time. The nozzle was now positioned at the rear of the structure and directly in line with the chimney. At this time (about 0345), both Clark and Conlon reported that they then saw two extremely bright flashes in the sky. This was reportedly due to a large transformer explosion in Livingston about five miles away, that cut all electric power to the area. The timing of the explosion of the transformer was coincidental and not related to this incident. During John Conlon's interview with the prosecutors office he reported that FF Sheats asked, "What was that?" The flash also caused the firefighters to look up toward the sky. Chief Henrich reported that there was a wind shift at this time clearing the smoke momentarily. Then Conlon and Clark both reported that at that instant they saw the chimney falling toward them. Conlon yelled a warning, as did Clark. Baldwin reported seeing a dark shadow falling toward them. Conlon reported that he dove to the right, Clark dove further back into the yard. Baldwin reported that he also dove to the right and thought that Sheats had escaped behind him.

When the firefighters began to get up after the chimney hit the ground they realized that Sheats was down in the rubble when an unidentified firefighter stated "We got a man down." Clark approached Sheats and asked him if he was all right. Clark reported that as he was speaking to him, Sheats opened his eyes and raised his head, but made no other response. Both Conlon and Baldwin ran to the front of the building to inform Chief Henrich that a firefighter was down and injured. Conlon then returned to the rear of the structure, Baldwin did not.

EMT David Weinert, Chatham Borough Emergency Squad, responded to the fire and was on the scene with a handlight when he heard about a firefighter being down and went into the back yard. Weinert assessed Sheats condition. He found Sheats to be unresponsive. He then began cervical spine stabilization and airway management. Firefighters on the scene removed the chimney cap and other broken masonry debris from Sheats to allow the Emergency Medical Services (EMS) personnel to place him on a backboard. He was then placed on a stretcher and moved into the ambulance. Paramedics from Overlook Hospital cut away Sheats turnout gear and clothing and then began treatment with intravenous drugs and intubation. The need for cardiopulmonary resuscitation was also indicated at this time and was initiated as the ambulance departed the scene at approximately 0415 hours. Treatment continued while responding to Morristown Memorial Hospital and while in the emergency department after the ambulance arrived. Sheats was pronounced dead at 0458 hours by the emergency department physician.

COMMENTS

Building Collapse

The reports and interviews regarding this fire indicate that a roof collapse may have caused the chimney collapse. The building had been burning for an unknown amount of time prior to discovery and the arrival of the fire suppression forces, allowing significant damage to occur to the building's structure.

Wood frame buildings have a significant history of collapse. After destruction of the structural support system, the entire building, or portions thereof, will collapse. These collapses can be slow and predictable or sudden and more difficult to predict. The potential is there with all structures of this type. Balloon frame construction serves to spread the fire even faster than most other types of wood frame construction. The longer the burn time, the higher the potential for collapse.

It was difficult to detect the collapse hazard at this incident due to the low visibility caused by the darkness of night, the heavy rain and the low hanging smoke. In addition, Investigator Paul Sagal of the Morris County Prosecutor's Office noted that there did not appear to be any of the "tabs" currently used to tie a chimney into the structure to which it is attached. This is consistent with 80 to 100 year old construction.

Weather Conditions

The complexity and danger of the situation was compounded by the heavy rain and the low hanging smoke condition. Had the wind not shifted, and had there not been a coincidental bright arcing in the sky caused by a nearby transformer explosion, the falling chimney may not have been seen at all. This could have compromised the entire hose line crew and not just one of its members.

Nighttime Operations

Fire department operations at night are generally more hazardous due to lack of visibility. Those involved in initial operations are particularly at risk since lighting is usually not a priority for first arriving companies. This incident appears to have been no exception.

Incident Management System

An Incident Management System (IMS) was not utilized on this incident. The Chatham Borough Fire Department's officers have taken the National Fire Academy's ICS course. However, ICS had not been implemented.

Safety Officer

No safety officer was utilized on this fire prior to the collapse event. At the time of this incident the Chatham Borough Fire Department had not appointed a dedicated safety officer.

Standard Operating Procedures

The Chatham Borough Fire Department has developed basic standard operating procedures (SOPs). At the time of this incident additional SOPs were being developed by the department.

Personal Protective Equipment

All personal protective equipment worn by FF Sheats was compliant with N.J.S.A. 12:100-10, *et. seq.*, *Safety and Health Standards for Public Employees, General Safety Standards for Firefighters*. Sheats did not have on a Self Contained Breathing Apparatus (SCBA) nor a Personal Alert Safety System (PASS) device. However, they are not required for exterior work under the regulations.

Critical Incident Stress Debriefing Team Use

Chief Henrich activated the Critical Incident Stress Debriefing (CISD) network of New Jersey due to the nature of this incident. A CISD team assisted members from the responding agencies, FF Sheats' career fire department and some family members.

RECOMMENDATIONS

Building Collapse

Wood frame building construction always has the potential for building collapse. After a sufficient portion of the building's frame has been destroyed, there is a continually increasing potential for collapse. This potential must be considered by the Incident Commander (IC). In addition to a full or partial structural collapse, the potential for a chimney collapse is also present. This is particularly true where the chimney is on an exterior wall and is subject to weathering, building stresses and the effects of fire on the building to which it is attached.

According to Francis Brannigan, member of the Society of Fire Protection Engineers:

"Fire burning in balloon frame walls destroys the structural integrity of the building. Collapse is a serious threat. Fires in balloon frame buildings should be observed from the exterior, by an officer specifically assigned to that function...[t]his officer should watch for...heavy volumes of smoke pushing out from voids in the building, intense heat buildup and structural failure..."⁴

William Clark, former director, Florida State Fire Service Training, states:

"Probably the greatest hazard in firefighting is the collapse of buildings. It is likely that most of the on-site deaths of firefighters are from this cause. Buildings can collapse quickly and with little warning...[t]herefore, collapse probability and effect should be studied."⁵

On any fire where there is significant damage to the building, particular attention must be made to areas of the building that may allow for partial or complete collapse. Collapse should become a primary firefighter safety consideration in fire department operations once significant progress is made by the fire, or if a lack of progress is made by the suppression forces. A member of the fire department should be assigned to observe conditions and report to the IC. Decisions must be made on changes in strategic goals and specific tactics. Either the declaration, marking and enforcement of a collapse zone must be instituted, or evacuation of the building and a change from an offensive to defensive operation must become primary options for that operation.

⁴Francis L. Brannigan, Chapter 3, *Building Construction for the Fire Service*, Third Edition, Quincy, MA, National Fire Protection Association, 1992, pp. 99-100.

⁵William E. Clark, *Firefighting Principles and Practices*, New York, Dun-Donnelley Publishing Corporation, 1974, pp. 181-182.

Indicators for collapse are presented in the National Fire Academy's course *Firefighter Safety and Survival: The Company Officer's Responsibility*:

"One of the most feared conditions is being caught in a partial or total structural collapse. It is too often reported that the collapse took place without warning. This is not always true. There are many indicators of potential collapse. They are sometimes overlooked, misunderstood or not reported . . ."

The indicators that the officer should look for and report are:

1. Little or no progress on a fire after 10-12 minutes of operating well placed handlines...
2. Walls or floors bowing or sagging.
3. Distortion of doors or windows.
4. Beam ends pulling away from supports.
5. Floor joist bowing.
6. Little or no run-off while using heavy streams.
7. New cracks developing and moving.
8. Plaster or brickwork falling.
9. Walls disassemble under stream impact.
10. Shifting of stock off shelving.

Conditions must be monitored constantly since the indicators may not be present on initial survey."⁶

Weather Conditions

Unusual or problematic weather conditions should be taken into account during size-up and during fire ground operations. In this incident heavy rain and low hanging smoke served to seriously diminish the firefighters' visibility. Changes in plans or concessions in incident strategies or tactics may need to be made in response to these special conditions.

⁶National Fire Academy, Module 5, *Firefighter Safety and Survival: The Company Officer's Responsibility*, Emmitsburg, MD, 1986, pp. SM 5-7-SM 5-8.

Nighttime Operations

Nighttime operations have additional, or increased, dangers because of the restriction of visibility due to darkness. Lighting should be an immediate consideration in conjunction with the initial hose line placements or rescue operations.

Incident Management System

The Chatham Boro Fire Department does not utilize a recognized Incident Management System (IMS). The use of a recognized system would allow local and mutual aid incidents to be controlled in a more standard, efficient and effective manner.

The Division of Fire Safety recommends that all fire departments adopt a nationally recognized incident management system. Additionally, the National Fire Protection Association (NFPA) Standard 1500, *Fire Department Occupational Safety and Health Program* recommends the use of an incident management system on all incidents. NFPA 1561, *Standard for Fire Department Incident Management Systems*, provides the recommended contents of such a system. A statewide survey by the Division indicate that the National Fire Academy's Incident Command System is the system predominantly used in New Jersey. It was also identified as the system of choice for standardization of IMS in New Jersey⁷, and has been endorsed by the New Jersey Fire Safety Commission.

Safety Officer

On this incident the fire chief retained what would be the safety officer functions for the fire ground. The assignment of a dedicated safety officer would lessen the load on the fire chief and would allow for continuous monitoring of safety conditions on the fire ground. NFPA 1500, *Fire Department Occupational Safety and Health Program* and NFPA 1521, *Standard for Fire Department Safety Officer* both recommend the use of a safety officer. The Division of Fire Safety strongly recommends the use of a dedicated safety officer on all significant incidents.

Personal Protective Equipment

In this event the firefighter's personal protective equipment (PPE) was compliant. However, with the possible exception of the fire helmet, PPE is not designed to protect the firefighter from a building collapse and did not make a difference in the outcome in this incident. The Division of Fire Safety strongly recommends that all firefighters have

⁷Incident Management System Survey Results, New Jersey Department of Community Affairs, Bureau of Fire Safety, June 25, 1992

compliant PPE. The New Jersey Department of Labor requires, through N.J.S.A. 12:100-10, *et. seq.*, *Safety and Health Standards for Public Employees, General Safety Standards and Standards for Firefighters*, that all firefighters engaged in interior structural firefighting be issued compliant personal protective equipment.

Personal Alert Safety System Device

The Division of Fire Safety strongly recommends the use of a Personal Alert Safety System (PASS) device by all firefighters at a structural fire or other incident requiring its use. The New Jersey Department of Labor requires, through N.J.S.A. 12:100-10, *et. seq.*, *Safety and Health Standards for Public Employees, General Safety Standards and Standards for Firefighters*, that all firefighters be issued a compliant PASS device. It further requires that the PASS device be worn by all firefighters: engaged in interior structural firefighting; while working in confined spaces; during all phases of overhaul and those limited situations where a self contained breathing apparatus (SCBA) is not being worn by the firefighter but a PASS DEVICE may be necessary for firefighter safety.

Emergency Evacuation Signal

An emergency evacuation signal would not have been a factor in this particular incident, as the collapse was not anticipated by on-scene personnel. The Division of Fire Safety, however, recommends that all fire departments adopt an emergency evacuation signal for use on all incidents when needed. Such signal as a radio announcement followed by a 30-second air horn blast could be used to alert personnel to evacuate a building in the event of rapidly deteriorating conditions.

Firefighter Accountability

While the existence of such a system would have had no bearing on the outcome of this incident, fire departments should ensure that there is a viable firefighter accountability system in place. This system will allow for rapid accounting of all firefighters in the event firefighters are evacuated from a building if there is a building collapse, or if some other critical situation arises. An accountability system will allow the incident commander to be aware of the number and location of all forces operating on the incident. The Division of Fire Safety strongly recommends the use of a firefighter accountability system.

Standard Operating Procedures

Standard operating procedures (SOPs) that are carefully developed, used in training and enforced add to the firefighter's safety on the fireground. If all members know the procedures for a certain situation, then predictions of actions and effects can be made. If there are no SOPs and a given situation is handled differently each time, there is a diminished ability to predict needs and potential outcomes for that situation.

Specifically referring to this incident, fire departments should develop SOPs to identify and manage potential collapse situations. A second related SOP should also be developed to manage the incident scene once a collapse has occurred.

Collapse Zone

A collapse zone must be established for incidents where the potential for structural collapse is present.

Critical Incident Stress Debriefing Team Use

Chief Henrich stated that the use of the Critical Incident Stress Debriefing (CISD) team in this instance was very helpful to the emergency responders involved in the incident. It was also of benefit to members of the deceased firefighter's career fire department, and some effected family members. The Division of Fire Safety recommends the notification and use of CISD teams when the CISD trigger events are found to be present. Such significant events may include:

- line of duty death of a co-worker
- mass casualty incident
- death of a child
- death occurring after prolonged rescue efforts
- when a victim reminds an emergency worker of a loved one
- during highly dangerous or highly visible events
- when the emergency worker influences death or injury
- co-worker suicide
- any other unspecified highly traumatic event⁸

The statewide emergency contact number for activation of a CISD team is (609) 395-3600.

⁸Trigger events information from Critical Incident Stress Debriefing Network of New Jersey.

CONCLUSION

The Chatham Borough Fire Department started this incident with a distinct disadvantage due to the delayed alarm, heavy rain, low hanging smoke and water retention in the dwelling's back yard. Tragically, two persons lost their lives in this fire.

Fire departments must always consider the potential for structural collapse at any heavily involved building. A collapse zone must be set up and enforced. Masonry walls and chimneys have the potential to fall and then roll or tumble a greater distance than anticipated, and this must be considered in calculating the collapse zone.

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