F2001
28
NIOSH
Fire Fighter Fatality Investigation and Prevention Program

Death in the line of duty...

A Summary of a NIOSH fire fighter fatality investigation *June 3, 2003*

Fire Fighter Receives Severe Electrical Shock Causing Cardiac Complications, Forcing His Retirement, and Eventually Causing His Death - Massachusetts

SUMMARY

On December 23, 1995, a 59- year-old male career Captain was dispatched to a residential fire. As he proceeded down the stairway into the basement to search for fire extension, his right hand/thumb touched a fire/burglar alarm panel causing a severe electrical shock. Although he did not lose consciousness, he suffered multiple fractures in his right thumb and incurred significant heart damage. Due to the heart damage (both to the heart muscle and its electrical system), the Captain was not cleared to return to full duty and he retired approximately 7 months later. On May 30, 2001, after trimming tree limbs at his home, he suffered an unwitnessed collapse. Despite cardiopulmonary resuscitation (CPR) and advanced life support (ALS) administered on the scene and at the hospital for approximately 30 minutes, the victim died. The death certificate and the autopsy, both performed by a pathologist for the State Medical Examiner's office, listed "arteriosclerotic coronary heart disease" as the immediate cause of death, with "hypertensive heart disease" as a contributing, but not an underlying, cause of death.

It is unlikely that any of these recommendations could have prevented the electrocution, subsequent cardiac complications, and eventual sudden cardiac death of this retired fire fighter. Therefore, the following recommendations address health and safety generally. They include some preventive measures that have been recommended by other agencies to reduce the risk of sudden incapacitation among fire fighters. These recommendations have not been evaluated by NIOSH, but they represent published research or consensus votes of technical committees of the NFPA or fire service labor/management groups.

- ***Conduct annual medical evaluations to determine fire fighters' medical ability to perform duties without presenting a significant risk to the safety and health of themselves or others. The Department and Union should negotiate the content and frequency to be consistent with NFPA 1582.***
- ***Phase in a mandatory wellness/fitness program for fire fighters to reduce risk factors for cardiovascular disease and improve cardiovascular capacity.***

INTRODUCTION AND METHODS

On May 30, 2001, a 64-year-old male Captain lost consciousness after trimming tree limbs at his home. He had retired from the Fire Department in 1996 due to cardiac complication from an electrocution at a structure fire on December 23, 1995. Despite CPR and ALS administered by the ambulance crew and physicians in the emergency department, the victim died. NIOSH was notified of this fatality on June 20, 2001, by the United States Fire

Fire Fighter Receives Severe Electrical Shock Causing Cardiac Complications, Forcing His Retirement, and Eventually Causing His Death - Massachusetts

Administration. On July 23, 2001, NIOSH contacted the affected Fire Department to initiate the investigation. On October 15, 2001, a physician and a Safety and Occupational Health Specialist from the NIOSH Fire Fighter Fatality Investigation Team traveled to Massachusetts to conduct an on-site investigation of the incident.

During the investigation NIOSH personnel interviewed the

- Fire Chief
- Deputy Fire Chief
- Training Officer
- Victim's wife

During the site visit NIOSH personnel reviewed

- Fire Department policies and operating guidelines
- Fire Department training records
- Fire Department annual report for 2000
- Fire Department incident report
- Emergency medical service (ambulance) incident report
- Hospital emergency department report
- Fire Department physical examination protocols
- Death certificate
- Autopsy record
- Past medical records of the deceased

INVESTIGATIVE RESULTS

Incident. On December 23, 1995, at 1334 hours, Stations 2 and 3 of the involved Fire Department were dispatched to a fully involved structure fire. For the response timeline, see Table 1. Between 1335 hours and 1342 hours, four engines, one engine/tanker, one shift commander, two fire chiefs, and 17 personnel responded.

Unit 321 arrived on the scene at 1342 hours, assumed command (IC), and advised Dispatch that the involved structure was a 1½-story, wood-frame, Cape Cod-style single-family dwelling (35' x 24') with a heavy fire condition involving the exterior of Side 4 (right side), heavy gray smoke from the windows and eaves, and heavy black smoke from the rear of Side 3/4 (rear and right side). See Photograph 1 and Photograph 2. A car was parked in the driveway. The temperature was 28E Fahrenheit (F) with a 7- mph wind from the east. Unit 321 conducted a full four-sided size-up of the structure and at 1344 hours advised Dispatch that the building was heavily charged with fire. Fire was showing on the right side of the first floor (Side 1) and was blowing out the kitchen sliding glass door onto the deck and exterior (Side 3). Other mutual aid units were dispatched to provide coverage for the district.

Engine 304 crew members advanced 150 feet of 2½-inch preconnected hoseline to the front door on Side 1. Wearing full bunker gear and SCBA (on air), fire fighters made forcible entry and encountered heavy fire conditions. Visibility into the dwelling was good prior to water application, but as fire suppression commenced, flames rolled out over the fire fighters' heads. The Senior Private from Engine 304 became the Interior Officer. Engine 296 crew members took 225 feet of 1¾-inch preconnected hoseline off Engine 304 and advanced it to knock down the exterior fire on Side 3/4.

At 1347 hours, Engine 315 arrived at the fire scene and connected the 4-inch hydrant supply line to Engine 296, which then supplied Engine 304 via a 4-inch supply line. Engine 315 crew members pulled a second preconnected 1¾-inch hoseline (150 feet) from Engine 304 and advanced it to the front door to be used as a backup line. The Engine 304 crew pushed the fire back toward the burned area and out Side 3. They advanced into the living room and knocked down the fire in the living room, kitchen, and hallway. They cut off the fire from advancing up the stairway to the second floor.

Fire Fighter Receives Severe Electrical Shock Causing Cardiac Complications, Forcing His Retirement, and Eventually Causing His Death - Massachusetts

Engine 296 crew members left their 1¾-inch hoseline at Side 3/4, moved to the front door and, wearing full bunker gear and SCBA (on air), entered the structure with the backup 1¾-inch hoseline as a backup to Engine 304's crew. Engine 315 crew members continued to extinguish the exterior fire on Side 3/4. A crew member from Engine 304 requested ventilation and the IC advised that a crew (Engine 305) would go to Side 3 to open up windows (perform horizontal ventilation). Additionally, a positive pressure ventilation (PPV) fan was set up on Side 1 at the front door to assist with ventilation.

The Interior Officer advised Engine 296 to search the second floor and perform overhaul. At 1349 hours, the IC requested the electric utility company be dispatched to disconnect the electrical power to the structure. At 1350 hours, the IC advised Dispatch that the fire was knocked down, all occupants were accounted for, and crews were doing an extensive overhaul. At 1352 hours, the IC advised the interior crew (Engine 304) that all occupants had been accounted for outside.

At 1352 hours, Ladder 314 (staffed by a Driver/Operator, the Captain (victim), and one fire fighter) arrived on the scene. The car parked in the driveway and trees in front of the structure prevented the use of Ladder 314, so the IC requested the Ladder 314 crew report to the scene with tools to check the basement and open the locked bulkhead. The Ladder 314 crew, including the victim, took the 150 foot preconnected 1¾-inch hoseline used by the Engine 315 crew, added 75 feet of additional 1¾-inch hoseline, advanced to Side 3, and wearing full bunker gear and SCBA (on air), entered the structure from the deck via the open kitchen sliding glass door. Unit 301 proceeded to Side 3 and turned off the gas meter. At 1401 hours, the IC advised Dispatch that the fire was knocked down and crews were still performing overhaul. The Ladder 314 crew proceeded to the interior cellar stairway.

As the victim began to descend the cellar stairway, he placed his right hand on the wall as a guide. Shortly thereafter, he touched the fire/burglar alarm panel, which, unbeknownst to him, had become energized. A loud boom and a bright flash of light occurred and the victim received a severe electrical shock, knocking him down the stairway. A crew member came to his aid, activated his PASS (personal alert safety system) device, which alerted the remainder of the interior crew members who led the victim out of the structure. At 1405 hours, the IC ordered the standby ambulance (Rescue 325) on the scene into service. At 1407 hours, the IC advised Dispatch of the injured fire fighter and to commit another ambulance to on-scene standby.

The victim walked to the awaiting Rescue 325. Although the victim could respond to commands, he was disoriented, pale, had soft tissue damage to the right thumb, and an elevated blood pressure. A heart monitor revealed sinus rhythm with possible bundle branch block with ST segment elevation. Rescue 325 departed the scene at 1417 hours en route to the hospital, arriving at the emergency department at 1428 hours.

Medical Findings.

Evaluation in the emergency room revealed a swollen exquisitely tender right thumb with part of the thumb nail lifted from its bed. A thumb X-ray showed multiple fractures. The thumb was cleaned, the nail was sutured back into position, a dressing applied, and antibiotics prescribed. An electrocardiogram (EKG) taken in the emergency department showed a heart conduction system abnormality (left bundle branch block [LBBB]) and a blood test for heart damage was positive. Specifically, his creatinine kinase (CK) was elevated at 236 international units/liter (IU/L) (normal 24-195 IU/L) and the cardiac portion (MB bands) was also elevated at 6.0 nanograms/milliliter (ng/ml) (normal 0-5 ng/ml).

Fire Fighter Receives Severe Electrical Shock Causing Cardiac Complications, Forcing His Retirement, and Eventually Causing His Death - Massachusetts

In January 1996 the victim had an extensive evaluation of his heart including an EKG, an echocardiogram, and a thallium exercise stress test (EST). The EKG continued to show his LBBB. The echocardiogram showed mild concentric left ventricular hypertrophy. The treadmill EST was conducted under the Bruce protocol for 6 minutes 35 seconds reaching a peak workload of 7.9 METS and a peak heart rate of 140 beats per minute (87% of the age-predicted maximal heart rate). The test was stopped due to fatigue and knee pain. There were no symptoms suggestive of angina (ischemic heart pain) or exercise-induced arrhythmias. There was a borderline hypertensive blood pressure response (208/90) at peak exercise. The EKG was non-diagnostic for ischemia due to the victim's underlying LBBB. The thallium portion of the EST showed a dilated left ventricle with small, fixed defects in the distal inferior wall and inferior portion of the septum. There was no definitive evidence of ischemia. Due to these findings the victim's personal physician recommended that he apply for disability retirement which was granted by the State's Retirement Board in 1996.

On the afternoon of May 30, 2001, the victim was at home alone trimming trees in his yard using a chain saw. His wife returned home at approximately 1630 hours. She could not immediately locate her husband, and, after an hour in the house, she began looking for him. At approximately 1730 hours she found him unresponsive, facedown in the garage. She called 911 and an ambulance arrived at the residence shortly thereafter. Despite CPR and ALS on the scene, during transport, and at the hospital, the victim died and resuscitation efforts were discontinued at 1800 hours.

The death certificate and the autopsy were both conducted by a pathologist with the State Medical Examiner's Office. "Atherosclerotic coronary heart disease" was listed as the immediate cause of death with "hypertensive heart disease" as a contributing, but not an underlying, cause of death. Pertinent findings from the autopsy included

- an enlarged heart (cardiomegaly) of 500 grams (normal less than 400 grams)
- all four chambers of the heart were dilated
- thickened left ventricle wall of 1.8 centimeters (normal <1.2 centimeters)
- severe arteriosclerosis with diffuse calcification
  - 90% blockage of the left anterior descending artery
  - 80% blockage of the right coronary artery
- Contusion and laceration on the left side of the head without internal injury

The Captain had five known risk factors for coronary artery disease (CAD) (male gender, age over 45, hypertension, high cholesterol, and cigarette smoking). He was receiving medical treatment for these conditions, including prescription medications. His wife and coworkers stated that he did not express symptoms suggestive of angina prior to his death.

DESCRIPTION OF THE FIRE DEPARTMENT

At the time of the NIOSH investigation, the Fire Department consisted of 49 uniformed personnel and served a population of 25,000 year-round residents and a summertime population of 40,000 in a geographic area of 26 square miles. There are three fire stations. Fire fighters work the following schedule: 24 hours on duty, 24 hours off duty, 24 hours on duty, 5 days off duty, from 0800 hours to 0800 hours.

In 2000, the Department responded to 3,275 calls: 2,160 rescue/medical calls, 385 false alarm calls, 269 service calls, 196 good intent calls, 108 hazardous condition calls, 40 other fire calls, 39 other/not classified calls, 26 wildland fires, 25 structure fires, 18 vehicle fires, 7 outside of structure fires, 2 overpressure rupture calls.

Fire Fighter Receives Severe Electrical Shock Causing Cardiac Complications, Forcing His Retirement, and Eventually Causing His Death - Massachusetts

Training. The Fire Department requires all new fire fighter applicants to be State-certified emergency medical technicians (EMTs) and have some fire-fighting experience, pass a written exam, a preemployment physical examination, a physical ability test, and a swim test prior to being hired. Most fire fighters hired are already Fire Fighter I & II certified. Once hired, they are put on days for 2 weeks of orientation and then placed on one of four shifts. All fire fighters are required to attend the 11-week State Fire Academy fire fighter training course unless certified by an equivalent academy at the Fire Fighter I & II level.

Fire fighters receive 10 hours of recurrent training in their station monthly. Other fire fighter training is available at the County Fire Academy and the State Fire Academy. There is no State requirement for fire fighter recertification. Biannual recertification is required for EMT/Paramedics. The victim was trained as a Fire Fighter II, Driver/Operator, EMT, Fire Officer, Fire Inspector, Fire Investigator, Fire Service Instructor, Hazardous Materials operations level, and he had 29 years of fire-fighting experience.

Preemployment/Preplacement Evaluations. The Fire Department requires a preemployment/ preplacement medical evaluation for all new hires, regardless of age. The components of this evaluation, mandated by the Human Resources Division of the Commonwealth of Massachusetts since 1996, are listed below:

- A complete medical history
- Height, weight, and vital signs
- Physical examination
- Vision test
- Audiogram
- Blood tests: complete blood count with differential (CBC), chemistry, lipid, and liver profile
- Urine tests: urinalysis, drug screen
- Resting electrocardiogram (ECG)
- Chest X-ray
- Skin test for tuberculosis (PPD)

Although not required by the State, the City also recommends that the candidate have a viral hepatitis screen (A, B, C), and a human immunodeficiency virus (HIV) test performed.

These evaluations are performed by a local medical clinic under contract with the Fire Department. Once this evaluation is complete, a decision regarding medical clearance for fire-fighting duties is made by the examining physician and forwarded to the FD.

Since November 1, 1998, the State requires all medically cleared candidates to complete a timed performance evaluation of typical fire-fighting duties (physical ability test) at one of three testing centers around the State.

Periodic Evaluations. Periodic medical evaluations are not required by this FD. However, as a benefit, members between the ages of 40 to 50 can opt for a complete medical evaluation every 5 years. Members between the ages of 50-65 can opt for a complete medical evaluation every 3 years. Components are the same as the preemployment medical evaluation with two exceptions: the PPD test is not conducted and the viral hepatitis panel is included. These evaluations are performed by the same medical clinic performing the preemployment medical evaluations. Only one or two fire fighters per year opt to take advantage of this program.

Medical clearance for SCBA use is not conducted by this FD. If an employee is injured at work, he/ she must be cleared for return to work by the contract physician. In addition, if a fire fighter has a non-occupational injury or medical condition resulting in three or more missed shifts, the Chief of the FD can require the individual be cleared for return to work by the contract physician.

Fire Fighter Receives Severe Electrical Shock Causing Cardiac Complications, Forcing His Retirement, and Eventually Causing His Death - Massachusetts

A voluntary fitness/wellness program is available to fire fighters. The program includes an individualized exercise program that can be completed during work hours (all stations have exercise [strength and aerobic] equipment). Wellness programs are conducted by the local public health nurses at the fire stations with sessions on diet, nutrition, smoking cessation, diabetes, and hypertension.

DISCUSSION

The Fire Department's tactics and strategy for this fire incident have been reviewed as well as possible mechanisms of injury to the victim. An electrician and local and state electrical inspectors inspected the circuit breaker panel, fire/burglar alarm panel, transformer, and wiring. They concluded that heat from the fire melted together the wiring from the home's electrical system and the home's fire/burglar alarm panel. This charged the fire/burglar alarm panel box with up to 220 volts instead of sending the charge to the circuit breaker panel, which would normally cause a circuit breaker to trip, thus interrupting the flow of electricity. When the victim touched the electrically positive panel box, the flow of electricity arced from the box to him through his wet, though properly gloved, thumb and hand.

Although the electric company had been called and were responding to the fire scene, the structure still had electric power. Since there were no wires visible as the victim proceeded down the cellar steps, there was no indication that an electrical shock was possible. Therefore, it was reasonable to continue the overhaul phase of the operation. It is our finding that no improper tactics were performed to have caused or contributed to the victim's injuries.

Approximately one third of patients with an electrical injury serious enough to seek medical care suffer cardiac complications a finding probably related to the vascular system's relatively low resistance to current flow.[1] The type and severity of cardiac involvement is determined by the type of current, voltage, duration of contact, and the path of current flow through the victim.[2] Known cardiac manifestations include immediate cardiac arrest, acute myocardial necrosis, pseudo-infarction, myocardial ischemia, arrythmias, conduction abnormalities, acute hypertension with peripheral vasospasm, and asymptomatic non-specific EKG abnormalities.[2] Based on witness accounts of the incident, the victim did not lose consciousness, and, therefore, did not have a cardiac arrest. However, elevation of heart muscle enzymes in his blood (cardiac isoenzymes) 90 minutes after the injury strongly suggested heart damage (acute myocardial necrosis) a complication confirmed a month later by his thallium EST. The location of this damage within the victim's heart (the distal inferior wall and inferior portion of the septum) is typical of damage due to electrical injury.[3]

The victim's initial visit to the emergency department in 1995 included an EKG. This test showed a conduction abnormality, LBBB, which is a less common complication due to electrical injury.[4] The lack of a baseline EKG prior to this episode precludes concluding that the electrical injury caused this conduction abnormality. However, given the injury was of sufficient severity to cause myocardial necrosis, it is possible that the victim's LBBB was due to his electrical injury. Finally, in January of 1996, the victim also had an echocardiogram. This test identified a mild concentric left ventricular hypertrophy, a finding strongly suggestive of heart damage due to longstanding hypertension. It is unlikely this condition was due to his electrical injury.

These cardiac complications from the electrical injury put the victim at risk of not being able to perform the essential job duties of structural fire fighting. In addition, according to NFPA 1582 (Medical Requirements for Fire Fighters and Information for Fire Department Physicians), these complications put

the victim at risk of becoming suddenly incapacitated, thereby endangering himself or others.[5] NFPA 1582 categorizes fire fighters' medical conditions as Category A (precludes a person from performing as a fire fighter) and Category B (*could* preclude). This fire fighter had three separate Category B heart conditions: (1) left bundle branch block, (2) hypertrophy, and (3) CAD. Guidance whether a Category B condition should preclude fire fighting is included in Appendix A of NFPA 1582. Specifically for CAD, "persons at mildly increased risk for sudden incapacitation are acceptable for firefighting. Mildly increased risk is defined by the presence of each of the following:

- normal left ventricular ejection fraction
- normal exercise tolerance, >10 metabolic equivalents (METS)
- absence of exercise-induced ischemia by exercise testing
- absence of exercise-induced complex ventricular arrhythmias
- absence of hemodynamically significant stenosis on all major coronary arteries (>=50% lumen diameter narrowing)."[5]

Given that the victim did not meet the criteria of 1, 2, or 5, the decision to retire from active duty fire suppression was prudent.

RECOMMENDATIONS

It is unlikely that any of these recommendations could have prevented the electrocution, subsequent cardiac complications, and eventual sudden cardiac death of this retired fire fighter. Therefore, the following recommendations address health and safety generally. It includes some preventive measures that have been recommended by other agencies to reduce the risk of sudden incapacitation among fire fighters. These recommendations have not been evaluated by NIOSH, but they represent published research or consensus votes of technical committees of the NFPA or fire service labor/management groups.

Recommendation #1: Conduct annual medical evaluations to determine fire fighters' medical ability to perform duties without presenting a significant risk to the safety and health of themselves or others. The Department and Union should negotiate the content and frequency to be consistent with NFPA 1582.

Guidance regarding the content and frequency of periodic medical evaluations for fire fighters can be found in NFPA 1582, Medical Requirements for Fire Fighters,[5] and in the report of the International Association of Fire Fighters/International Association of Fire Chiefs (IAFF/IAFC) wellness/fitness initiative.[6]

Applying the above NFPA standard involves legal and economic repercussions and must be carried out in a nondiscriminatory manner. Appendix D of NFPA 1582 provides guidance for fire department administrators regarding legal considerations in applying the standard.

Economic repercussions go beyond the costs of administering the medical program. Department administrators, unions, and fire fighters must also deal with the personal and economic costs of the medical testing results. NFPA 1500 addresses these issues in Chapter 8-7.1 and 8-7.2.[7] The success of medical programs may hinge on protecting the affected fire fighter. The department should provide alternate duty positions for fire fighters in rehabilitation programs, if possible. If the fire fighter is not medically qualified to return to duty after repeat testing, supportive and/or compensated alternatives for the fire fighter should be pursued by the department. Other than for the statement regarding duty status, these medical records should be kept confidential.

Fire Fighter Receives Severe Electrical Shock Causing Cardiac Complications, Forcing His Retirement, and Eventually Causing His Death - Massachusetts

Recommendation #2: Phase in a mandatory wellness/fitness program for fire fighters to reduce risk factors for cardiovascular disease and improve cardiovascular capacity.

Physical inactivity, or lack of exercise, is the most prevalent modifiable risk factor for CAD in the United States. Additionally, physical inactivity is associated with other risk factors, namely obesity and diabetes. NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, and NPFA 1583, Standard on Health-Related Fitness Programs for Fire Fighters, require wellness programs that provide health promotion activities for preventing health problems and enhancing overall well-being.[7,8] In 1997, the International Association of Fire Fighters (IAFF) and the International Association of Fire Chiefs (IAFC) joined in a comprehensive Fire Service Joint Labor Management Wellness/Fitness Initiative to improve fire fighter quality of life and maintain physical and mental capabilities of fire fighters.[6] Ten fire departments across the United States joined this effort to pool information about their physical fitness programs and to create a practical fire service program. They produced a manual and a video detailing elements of such a program. The Fire Department and the Union should review these materials to identify applicable elements for their Department.[6-8] Other large city negotiated programs can also be reviewed as potential models. Wellness programs have been shown to be cost effective, typically by reducing the number of work-related injuries and lost work days.[9-11]

REFERENCES

1. Stewart CE. Environmental Emergencies. Baltimore, Williams & Wilkins, 1990, 290-306.

2. Carleton SC. Cardiac Problems associated with electrical injury. The cardiovascular effects of environmental traumas. Cardiology Clinics 1995; 13(2):263-6.

3. Kinney TJ. Myocardial infarction following electrical injury. Ann Emerg Med 1982;11:622-25.

4. Solem L, Fischer RP, Strate RG. The natural history of electrical injury. J Trauma 1977;17:487-92.

5. National Fire Protection Association. NFPA 1582, Standard on Medical Requirements for Fire Fighters and Information for Fire Department Physicians. NFPA, Quincy MA, 2000.

6. International Association of Fire Fighters, International Association of Fire Chiefs. The fire service joint labor management wellness/fitness initiative. Washington: IAFF, IAFC; 2000.

7. National Fire Protection Association. NFPA 1500, Standard on Fire Department Occupational Safety and Health Program. Quincy: NFPA; 1997.

8. National Fire Protection Association. NFPA 1583, Standard on Health-Related Fitness Programs for Fire Fighters. Quincy: NFPA; 2000.

9 Maniscalco P, Lane R, Welke M, Mitchell J, Husting L. Decreased rate of back injuries through a wellness program for offshore petroleum employees. J Occup Environ Med 1999;41:813-20.

10. Stein AD, Shakour SK, Zuidema RA. Financial incentives, participation in employer sponsored health promotion, and changes in employee health and productivity: Health Plus health quotient program. J Occup Environ Med 2000;42:1148-55.

11. Aldana, SG. Financial Impact of health promotion programs: A comprehensive review of the literature. Am J Health Promot 2001;15:296-320.

Fire Fighter Receives Severe Electrical Shock Causing Cardiac Complications, Forcing His Retirement, and Eventually Causing His Death - Massachusetts

INVESTIGATOR INFORMATION

This investigation was conducted by and the report written by Thomas Hales, MD, MPH, Occupational and Internal Medicine Physician, and Tommy N. Baldwin, MS, Safety and Occupational Health Specialist. Dr. Hales and Mr. Baldwin are with the NIOSH Fire Fighter Fatality Investigation and Prevention Program, Cardiovascular Disease Component, located in Cincinnati, Ohio.

Fire Fighter Receives Severe Electrical Shock Causing Cardiac Complications, Forcing His Retirement, and Eventually Causing His Death - Massachusetts

Table 1. INCIDENT TIMELINE

1334 hours:	Stations 2 and 3 are dispatched to a fully involved structure fire.
1335 hours:	Following Units respond: Unit 321 (Shift Commander) Engine 304 (Driver/Operator [D/O], Senior Private, and two Fire Fighters (FF)), Engine 315 (D/O and one FF) and Unit 301 (Fire Chief)
1336 hours:	A line box alarm (including mutual aid) is requested Unit 321 advised Dispatch to alert Station 1
1338 hours:	Station 1 (Engine 305 and Engine 302) is dispatched Mutual aid Engine/Tanker 296 (D/O, Lieutenant, and two FF) Unit 291 (Fire Chief) respond
1339 hours:	Engine 305 (D/O and three FF) respond
1342 hours:	Engine 302 (D/O and two FF) respond Unit 321, Engine 304, and Unit 291 arrive on the scene Unit 291 is appointed Water Supply Officer Ladder 314 (D/O, Captain [the victim], and one FF) respond
1343 hours:	Engine 296 arrives on the scene Rescue 325 (Paramedic and two Emergency Medical Technicians) respond
1345 hours:	Engine 302 (D/O, Senior Private, one FF) respond Engine 315 arrives at a nearby hydrant, wraps it with 4-inch supply line, and lays approximately 600 feet to the fire scene
1347 hours:	Engine 315 arrives Engine 305 arrives and its crew is used for manpower
1348 hours:	Unit 301 arrives at the fire hydrant and dresses the hydrant
1349 hours:	IC requests the electric utility company be dispatched
1350 hours:	IC advises Dispatch that the fire is knocked down, all occupants are accounted for, and crews are doing an extensive overhaul
1352 hours:	IC advises the interior crew that all occupants have been accounted for outside Ladder 314 arrives on the scene
1353 hours:	Rescue 325 arrives on the scene
1354 hours:	Engine 302 arrives on the scene and the Senior Private takes charge of the water supply hydrant
1401 hours:	IC advises Dispatch that the fire is knocked down and crews are performing overhaul
1404 hours:	IC requests a Rehabilitation package be dispatched to the scene
1405 hours:	IC requests an ambulance to the scene ASAP and Rescue 325 proceeds to the scene
1407 hours:	IC advises Dispatch that a fire fighter is injured, that Rescue 325 will be committed, and another ambulance is needed at the scene for standby
1408 hours:	Electric utility arrives on the scene
1410 hours:	Electric power is turned off
1417 hours:	Rescue 325 departs the scene at 1417 hours en route to the hospital
1428 hours:	Rescue 325 arrives at the emergency department