



Fire Fighter Dies After Returning from Mutual-Aid Fire Call – Connecticut

SUMMARY

On February 18, 2001, a 53-year-old male fire fighter responded to and staged at a shopping mall fire which was quickly controlled. After returning to quarters, he parked the engine-tanker he had driven and then a rescue truck in their respective apparatus bays. He was found approximately 1 ½ hours later, in the driver's seat of the rescue truck, in cardiorespiratory arrest. Due to his clinical appearance, resuscitation was not attempted. The death certificate listed "cardiac arrest" as the immediate cause of death, with hyperlipidemia and diabetes mellitus as contributing factors. No laboratory studies or autopsy were done.

The following recommendations address general health and safety issues. Included are preventative measures that are recommended to reduce the risk of cardiovascular deaths among fire fighters. These selected recommendations have not been evaluated by the National Institute for Occupational Safety and Health (NIOSH) but represent published research, consensus standards issued by the National Fire Protection Association (NFPA) or fire service labor/management fitness and wellness initiatives. Recommendations are also made regarding the fatality investigative process.

- *Staff fire stations to ensure adequate emergency response capability for the community and safety of personnel. Staffing levels were probably unrelated to the victim's collapse. However, the extended time between his collapse and discovery precluded resuscitation and left the community unaware that it was missing a critical component of its fire-rescue system.*

- *Phase in a mandatory wellness/fitness program for fire fighters to reduce risk factors for cardiovascular disease and improve cardiovascular capacity.*
- *Supply Fire Department (FD) physicians with specific job descriptions for personnel at the time of fitness-for-duty medical evaluations.*
- *Consider exercise stress testing (EST) for those fire fighters with risk factors for cardiac disease.*
- *Follow any fire fighter line-of-duty death with a complete post-mortem medical examination.*

INTRODUCTION AND METHODS

On February 18, 2001, a 53-year-old male fire fighter backed a rescue truck into the apparatus bay and was found dead approximately 1 ½ hours later, still in the truck. Because of obvious lividity, no resuscitation efforts were made. NIOSH was notified of this fatality on March 2, 2001, by the United States

The **Fire Fighter Fatality Investigation and Prevention Program** is conducted by the National Institute for Occupational Safety and Health (NIOSH). The purpose of the program is to determine factors that cause or contribute to fire fighter deaths suffered in the line of duty. Identification of causal and contributing factors enable researchers and safety specialists to develop strategies for preventing future similar incidents. The program does not seek to determine fault or place blame on fire departments or individual fire fighters. To request additional copies of this report (specify the case number shown in the shield above), other fatality investigation reports, or further information, visit the Program Website at www.cdc.gov/niosh/firehome.html or call toll free 1-800-35-NIOSH



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Fire Administration. On May 9, 2001, NIOSH contractors contacted the affected FD to initiate the investigation. On May 21, 2001, two contractors with the NIOSH Fire Fighter Fatality Investigation Team traveled to the Connecticut towns involved to conduct an on-site investigation of the incident.

During the investigation NIOSH contractors interviewed the

- Victim's next of kin (aunt and uncle)
- Incident Commander at the fire
- Fire fighters, including those at the scene of the fire, those who last saw the victim alive, and those who responded to the 911 cardiac arrest call
- Resident Trooper Program constable who first found the victim
- Dispatcher who took the 911 cardiac arrest call from the resident trooper
- Responding ambulance service personnel
- Fire Chief
- President of the Fire Company
- FD physician

During the site visit NIOSH contractors reviewed the following:

- FD training records
- FD Standard Operating Guidelines
- Past medical records of the deceased
- Ambulance and paramedic run reports
- National Fire Incident Reporting System (NFIRS) reports
- Police report
- Death certificate

INVESTIGATIVE RESULTS

Background. The incident occurred in a town (AB) covered by two fire departments, FD-A and FD-B. The victim was on duty in FD-A at the time of the incident; the fire call was in FD-B's jurisdiction. In addition, fire departments from two other towns responded (FD-C and FD-D). Engine-Tankers 1 and 2, and Rescue 1 from FD-A, Engine-Tankers 1

and 2, and Ambulance 1 from FD-B, Engine 1 and Ladder Truck 1 from FD-C, and Engine 1 from FD-D responded.

Incident. On February 18, 2001, at 1713 hours, a 911 call was received regarding smoke coming from a store ceiling in a mall located in town AB. A full fire response was dispatched involving personnel and equipment from fire departments A, B, C, and D. Two part-time fire fighters/EMTs from FD-B returning from a medical call in Ambulance 1 were close by and responded directly to the call, establishing Incident Command.

The first fire apparatus (from FD-C) was on the scene at 1716 hours, with Engine 1 (one Captain and three fire fighters) and Truck 1 (two fire fighters). A total of 22 fire fighters (both paid and volunteer) from FD-A responded with Engine-Tanker 1 (two fire fighters), Rescue 1 (one fire fighter), and their own vehicles. A total of eight fire fighters (both paid and volunteer) from FD-B responded with Ambulance 1, Engine-Tankers 1 and 2, and their own vehicles. The six fire fighters from FD-C were paid. The 14 volunteer fire fighters who responded from FD-D staged with Engine 1.

It was found that cardboard on a bathroom vent had ignited, creating a smoke condition and precipitating the 911 call. The fire was extinguished by the sprinkler system prior to crew members' arrival. FD-A had responded and staged as part of the automatic mutual-aid assignment. The victim was working alone as a part-time fire fighter, and he drove Engine-Tanker 1 to the call with a volunteer. Rescue 1 from the same firehouse also responded, driven by a volunteer. The fire fighters from FD-A remained with their apparatus for the duration of the incident, in full bunker gear. They never donned self-contained breathing apparatus (SCBA). No hoselines were stretched from these two trucks. The incident was declared under control at 1735 hours, 22 minutes after the



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initial alarm. FD-A left the scene directly from staging at 1834 hours, after overhaul and salvage were completed by other crews. The victim returned to the firehouse at 1900 hours. He parked Engine-Tanker 1 in the apparatus bay and then parked Rescue 1 after it had been refueled by a volunteer. He was last seen alive backing Rescue 1 into the apparatus bay, waving to three volunteer fire fighters as they left the firehouse.

At 2025 hours that evening, one of the town's Resident Trooper Program constables passed the firehouse en route to an unrelated call, and he noted an open garage bay door. It was still open when he cleared that call at 2034 hours. Considering this unusual for February, he stopped at the firehouse. He could not find anyone inside the dayroom, office, or sleeping quarters, so he proceeded to the garage with the open bay door. He called out but got no response, then saw the victim slumped over in the driver's seat of Rescue 1. He noted that the victim was unresponsive and not breathing. Rescue 1's battery power was on but the ignition had been turned off. The keys were in the ignition. The victim was wearing bunker pants without his turnout coat, and he had both hands in his lap. A two-way radio was within easy reach. The trooper was unable to palpate a pulse, and he noted that the victim's forehead was cold to the touch. He notified the barracks, requesting an ambulance and an additional trooper to respond.

The second resident trooper notified the barracks at 2040 hours that he would be responding to the firehouse to investigate. The barracks notified the dispatch center, and at 2041 hours Ambulance 1 and hospital-based Medic 1 (one paramedic) were dispatched to the scene for a possible cardiac arrest/respiratory arrest. The second trooper heard this call over the scanner as he responded, arriving at the firehouse at 2045 hours. The first fire fighter to respond (an emergency medical technician [EMT]

and FD-A Lieutenant) arrived at 2043 hours. He called for an expedited response by the ambulance and canceled all FD-A personnel other than the Chief, Assistant Chief, and President. The Lieutenant noted the victim was cyanotic, sweaty, and becoming stiff. The victim was sitting up with head down, and profuse salivary secretions were noted.

At 2046 hours Ambulance 1 arrived, and the Lieutenant and one EMT from Ambulance 1 placed monitor leads from Rescue 1's automated external defibrillator (AED) on the victim. Asystole was confirmed and no resuscitation efforts were initiated. At 2048 hours the second trooper notified the barracks of the untimely death. Medic 1 arrived and, after making her assessment, considered the victim to be dead at 2052 hours. The victim appeared atraumatic, with dependent lividity. A physician on call for the victim's personal doctor arrived at the fire station about 1 ½ hours later with the victim's medical records from their office. The victim was officially pronounced dead at 2240 hours by the on-call physician at the firehouse.

The police sergeant (a CT State Trooper) arrived at 2100 hours and took over the scene. He notified the Chief Medical Examiner's (M.E.) Office of the incident. The assistant M.E. on duty informed the police supervisor that an autopsy was not required in this situation and declined the case. The only known next of kin were notified by the FD Chief, the President of the Fire Company, and two resident troopers at approximately 2330 hours. The victim's aunt and uncle also indicated a preference that an autopsy not be performed unless it was legally required.

Medical Findings. The death certificate was completed by the physician on call for the victim's general practitioner. "Cardiac arrest" is listed as the immediate cause of death, and "hyperlipidemia" and "diabetes mellitus" are listed as contributing factors.



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No blood glucose or carbon monoxide exposure determinations were made at the scene or subsequently.

The fire fighter had the following three risk factors for coronary artery disease (CAD): advancing age (greater than 45 years), male gender, and diabetes mellitus. His diabetes had been diagnosed in 1993 and had been well controlled with oral hypoglycemic medications. However, he had been observed by coworkers to sweat profusely with minimal exertion and to use oral glucose at times. According to his medical records, the victim did not have hypercholesterolemia (high blood cholesterol), but did have mildly elevated low-density lipoprotein (LDL) levels for a diabetic patient.

Electrocardiograms (EKGs) obtained in 1999 and 2000 were normal. Although advised to exercise regularly by his physician, the victim exercised sporadically. According to physician records, he was generally compliant with medical regimens and follow-up. He lived alone, had no immediate family, and did not have a close relationship with his next of kin. Besides his work as a part-time paid fire fighter-EMT, he was also a volunteer fire fighter and was very active in fire prevention and related town activities. On the day of the incident, he did not report any symptoms consistent with coronary ischemia or hypoglycemia to other members of the department. He was never noted to be in distress throughout the fire call or while returning to the station.

DESCRIPTION OF THE FIRE DEPARTMENT

At the time of the NIOSH investigation, FD-A and FD-B each covered half of a town with a geographic area of 44 square miles and a population of 20,720 town residents. When a major university is in session, the total population in town increases significantly to almost 30,000 residents. At the time of the incident, FD-A consisted of 14 career and

part-time paid personnel and approximately 50 volunteers.

The victim's department, FD-A, includes two fire stations covering approximately 21 square miles with a population of approximately 6,500 residents. Each station is staffed with one paid fire fighter/EMT at all times, working 8-hour shifts. Days are covered by full-time paid fire fighters who work 2 weeks of day shifts and 2 weeks of evenings. Nights and weekends are covered by part-time, paid personnel. FD-A provides first-response emergency medical services (EMS) at the EMT-Basic level but does not transport patients.

In 2000, FD-A responded to 876 calls: 605 rescue (EMS) calls, 35 fire calls (10 structure fires, 9 vehicle fires, 7 dumpster fires, 3 grass/brush fires, 6 other fires), 78 mutual-aid fire calls, 51 false alarms, 3 hazardous materials calls, 25 other hazardous responses, 3 calls not categorized, and 76 service runs. On the day prior to the incident, the victim responded to one call as a volunteer, and then worked two 8-hour shifts (0700-2300, responding to one additional call). On the day of the incident, the victim was scheduled to work from 1500-2300 as a paid fire fighter; he did not respond to any calls prior to the automatic mutual-aid fire call at 1713 hours.

Training. The Fire Department requires that all active internal structural fire fighters be state-certified to the Fire Fighter I level. Paid personnel are required to be state-certified EMT-Basic and to have completed the state pumper Driver/Operator course as well. There is no state requirement for fire recertification. In addition to being the FD's Health and Safety Officer, the victim was a state-certified Fire Officer and Instructor, and he had 25 years of fire-fighting experience, 23 of which were as a paid fire fighter/EMT. He had multiple training certificates in many aspects of fire fighting.



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Preemployment/Preplacement Evaluations. Volunteers and paid personnel are required to have a preemployment/preplacement comprehensive medical exam prior to active duty, regardless of age. The fire department physician bases this evaluation on a previous contractor's criteria, loosely following the 1992 edition of NFPA 1582.¹ The exam typically includes

- A complete medical history and review of systems
- Height, weight, and vital signs
- Physical examination
- Visual acuity testing
- Assessment of cardiac risk factors
- EKG
- Blood tests: complete blood count (CBC), chemistries, and lipid profile (total cholesterol, high density lipoprotein (HDL)/LDL cholesterol ratio, triglycerides)
- Urinalysis
- Pulmonary function testing
- Audiogram

These evaluations are performed by a physician contracted by the FD. Once this evaluation is complete, a decision regarding medical clearance for fire-fighting duties is made by that physician.

Periodic Evaluations. The FD requires that all active interior structural fire fighters have an annual comprehensive medical evaluation and annual medical clearance for SCBA use. If employees are injured or have a medical illness, the Fire Chief determines whether a medical clearance for return to work by the FD physician is necessary. No specific FD fitness/wellness programs were in place, but the FD does have some exercise equipment at one station.

The victim's last medical evaluation by his private physician was October 23, 2000. His last medical clearance by the FD physician was in November 2000. He was cleared for interior structural fire

fighting and the wearing of SCBA but was to follow up regarding borderline-high LDL levels. On November 16, 2000, the FD physician raised the issues of mildly elevated serum LDL level and diabetes to the victim's private physician, who attempted to contact the victim for follow-up.

DISCUSSION

In the United States, coronary artery disease (atherosclerosis) is the most common risk factor for cardiac arrest and sudden cardiac death.² Risk factors for its development include age over 45, male gender, family history of coronary artery disease, smoking, high blood pressure, high blood cholesterol, obesity, physical inactivity, and diabetes.^{3,4} The victim had three risk factors for coronary artery disease (age over 45, male gender, and diabetes).

The narrowing of the coronary arteries by atherosclerotic plaques occurs over many years, typically decades.⁵ However, the growth of these plaques probably occurs in a nonlinear, often abrupt fashion.⁶ Heart attacks typically occur with the sudden development of complete blockage (occlusion) in one or more coronary arteries that have not developed a collateral blood supply.⁷ This sudden blockage is primarily due to blood clots (thrombosis) forming on the top of atherosclerotic plaques. It is unknown whether the victim had a blood clot in any of his coronary arteries because an autopsy was not performed.

Blood clots, or thrombus formation, in coronary arteries are initiated by disruption of atherosclerotic plaques. Certain characteristics of the plaques (size, composition of the cap and core, presence of a local inflammatory process) predispose the plaque to disruption.⁷ Disruption then occurs from biomechanical and hemodynamic forces, such as increased blood pressure, increased heart rate, increased catecholamines, and shear forces, which occur during heavy exercise.^{8,9}



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Fire fighting is widely acknowledged to be one of the most physically demanding and hazardous of all civilian occupations.¹⁰ Fire-fighting activities are strenuous and often require fire fighters to work at near maximal heart rates for long periods. The increase in heart rate has been shown to begin with responding to the initial alarm and persist through the course of fire suppression activities.¹¹⁻¹³ Even when energy costs are moderate (as measured by oxygen consumption) and work is performed in a thermo-neutral environment, heart rates may be high (over 170 beats per minute) owing to the insulative properties of the personal protective clothing.¹⁴ Furthermore, fire fighting can result in severe fluid loss, which decreases blood volume and decreases the amount of blood pumped from the heart (stroke volume).¹⁵ Epidemiologic studies have found that heavy physical exertion sometimes immediately precedes and triggers the onset of acute heart attacks.¹⁶⁻¹⁹ The victim responded to the alarm and was in full bunker gear during staging operations.

The stress of responding to this fire and his likely underlying atherosclerotic CAD contributed to this fire fighter's "probable" heart attack, subsequent cardiac arrest, and sudden death. The term "probable" is used because autopsy findings (thrombus formation), blood tests (cardiac isoenzymes), or ECG findings are required to "confirm" a heart attack (myocardial infarction). Since an autopsy was not performed, and no blood tests were conducted for cardiac isoenzymes, and he had no heart beat to show the characteristic findings of a heart attack on the cardiac monitor, it cannot be definitively stated that he suffered a heart attack or that his heart was responsible for his sudden death.

The NFPA has developed and revised guidelines for FD physicians entitled "Standard on Medical Requirements for Fire Fighters and Information for Fire Department Physicians," also known as NFPA

1582.¹ Included are appendices with further information, which, among other things, are aimed at reducing the risk of cardiovascular disease and deaths within the fire service. NFPA 1582 recommends a baseline EKG and screening for CAD risk factors. NFPA 1582 also recommends an EST at age 40, and at age 35 for those with one or more CAD risk factors, with repeat testing every 2 years. These recommendations are similar to those of the American College of Cardiology/American Heart Association.²⁰ Myocardial ischemia, demonstrated by perfusion imaging and then confirmed by cardiac catheterization, exists in over 20% of asymptomatic type-2 diabetic male patients.²¹ This FD required comprehensive annual medical exams; however, they do not require, nor did this victim have, an EST. Had an EST been performed on this individual, his underlying CAD might have been identified, thereby leading to further evaluation and treatment, and possibly the prevention of his sudden death.

NFPA 1582 categorizes fire fighters' medical conditions as Category A (precludes a person from performing as a fire fighter) and Category B (*could* preclude). CAD, including history of myocardial infarction, coronary artery bypass surgery, or coronary angioplasty, is a Category-B condition, but Appendix A contains additional guidelines. "Persons at mildly increased risk for sudden incapacitation are acceptable for fire fighting. 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 ($\geq 50\%$ lumen diameter narrowing)."²¹



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Since this fire fighter never had an EST, it is unknown whether he met the second, third and fourth criteria.

There was concern about the victim's apparent hypoglycemic episodes by coworkers, but these were not reported by the victim to his physician. Diabetic patients' awareness and assessment of severity of hypoglycemic episodes do not correlate with witnesses' reports.^{1,22} This is thought to be due to impaired cerebral function associated with hypoglycemia. Having diabetes (regardless of insulin requirement) does not preclude one's ability to work as a fire fighter; however, according to the NFPA, any episode of incapacitating hypoglycemia does.¹ Without an autopsy or a blood glucose level at the scene, it is impossible to know if hypoglycemia played a role in his death.

The increased risk of CAD in diabetic patients is partly due to lipid abnormalities. Medical records indicated the victim had a history of mild hyperlipidemia. Desirable levels range from <100 milligram per deciliter (mg/dL) (American Diabetes Association [ADA]) to <130 mg/dL (National Cholesterol Education Program [NCEP]).²³⁻²⁵ The ADA recommends lipid-lowering pharmacological agents if there is an inadequate response to a trial of exercise, diet and glucose control, to the goal of <100mg/dL LDL. According to NCEP guidelines, dietary treatment is indicated at 130 mg/dL, and drug therapy at levels of 160 mg/dL or greater, in a patient with two risk factors such as this patient (age ≥45 years and diabetes).²⁴ Appropriately, the fire department physician raised this issue to the victim's private physician, who attempted to contact the victim for follow-up and for possible initiation of a lipid-lowering agent.

RECOMMENDATIONS

The following recommendations generally address fire fighter health, safety and fitness for duty. This list includes some preventative measures that have been

recommended by other agencies to reduce the risk of line-of-duty heart attacks and sudden cardiac death among fire fighters. These recommendations have not been evaluated by NIOSH but represent research presented in the literature or consensus votes of Technical Committees of NFPA or labor/management groups within the fire service. Although NIOSH cannot definitively conclude that this Fire Fighter suffered a heart attack or a hypoglycemic episode, his surviving colleagues could benefit from the following recommendations.

Recommendation #1: Staff fire stations to ensure adequate emergency response capability for the community and safety of personnel. Staffing levels were probably unrelated to the victim's collapse. However, the extended time between his collapse and discovery precluded resuscitation and left the community unaware that it was missing a critical component of its fire-rescue system.

NFPA standards^{26,27} and OSHA²⁸ regulations emphasize the need for adequate staffing to safely engage in fire suppression and emergency medical response under hazardous conditions. One common staffing model for small combination departments is assignment of a single paid fire fighter to drive/operate apparatus that is met at incident scenes by volunteers responding in private vehicles. This approach may improve apparatus response times over those seen in all volunteer departments, but it has some drawbacks.²⁹

The present case illustrates an additional hazard to single-staffed engines: the possibility of a medical emergency resulting in sudden incapacitation of the lone fire fighter. If such an emergency occurs while the fire fighter is operating the apparatus, public safety is directly threatened by loss of control of the apparatus. There may also be significant delays in recognizing the incident and getting assistance to the



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stricken fire fighter. This latter concern is amplified when a fire fighter staffs a station alone. Although the cause of death is unknown in this case, the chance of resuscitation from possibly reversible causes such as cardiac arrhythmia or hypoglycemia was lost by the time elapsed between his collapse and discovery.

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

The International Association of Fire Fighters (IAFF) and the International Association of Fire Chiefs (IAFC) created the Fire Service Joint Labor Management Wellness/Fitness Initiative to strengthen fire fighters' mental, physical, and emotional capabilities.³⁰ Similarly, NFPA 1583 mandates the establishment of such programs in fire departments.³¹ Wellness programs have been shown to be cost effective, typically by reducing the number of work-related injuries and lost work days.^{32,33} Substantial cost savings have been reported by the wellness program at the Phoenix Fire Department, where a 12-year commitment resulted in a significant reduction in their disability pension costs.³⁴

Recommendation #3: Supply the Fire Department Physician with specific job descriptions for personnel at the time of fitness-for-duty medical evaluations.

NFPA 1582 emphasizes the importance of physician awareness of fire fighter essential job tasks.¹ Without such understanding, physicians may clear individuals for duty who are at substantial risk of suffering acute, incapacitating illness under stressful operational conditions. In the present case, the FD forms required the physician to acknowledge clearance for wearing SCBA, based on pulmonary function testing. At interview, however, the FD physician was under the impression that the victim served as a volunteer

member of the fire police squad rather than as a paid, interior structural fire fighter. Since the victim had not been engaged in interior structural fire fighting prior to his sudden death, this did not play a role in the victim's death.

Recommendation #4: Consider exercise stress testing for those fire fighters with risk factors for cardiac disease, such as diabetes.

As mentioned in the discussion section, NFPA 1582 recommends EST for those fire fighters above the age of 40 and above the age of 35 with risk factors for CAD. If an EST had been performed in this individual, it is possible that underlying CAD could have been identified, thereby leading to further evaluation and treatment and possibly the prevention of his sudden death.

Recommendation #5: Include a complete pathological examination in the investigation of any fire fighter line-of-duty death.

In the present case, it is not possible to identify the definitive cause of this line-of-duty death. Statistically, it is most likely due to sudden cardiac ischemia with arrhythmia. Alternative explanations such as cerebrovascular catastrophe, carbon monoxide poisoning or hypoglycemia cannot be ruled out as either causes or contributors to the cause of death. Considering that the victim was staged in a running engine for almost 2 hours prior to his death, and that the incident occurred across the dinner hour, these are reasonable alternatives. No blood chemistries were obtained, no toxicologic studies were performed, and there was no examination for gross or microscopic pathology.

Most of the departmental officers and personnel interviewed were under the impression that this fire fighter's death did not qualify as "line-of-duty" since (1) he had not engaged in structural fire fighting



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activities at the call from which he was returning, (2) there were no signs of trauma or other injury, or (3) the victim was in the apparatus bay and not engaged in duty-related physical exertion at the time of his death. It was presumed by the on-the-scene EMS staff and pronouncing physician to have been cardiovascular in origin, given the victim's age, 8-year history of diabetes mellitus, and his apparent sudden, complete incapacitation. The FD officers did not impress upon the family the need for an autopsy when they notified them of his death. The chief officers present were aware of the autopsy requirement for federal death benefits, but the victim was known to have no beneficiaries, so the issue was not pursued further. The State Medical Examiner declined the case in accordance with the family's wishes when the "untimely" death was not judged to be "suspicious" by either law enforcement or medical staff at the scene. The National Fallen Firefighters Foundation defines "line-of-duty deaths" as those "meeting the Department of Justice's Public Safety Officers Benefits (PSOB) program guidelines, and those cases that appear to meet these guidelines whether or not PSOB has adjudicated the specific case prior to the annual National Fallen Firefighters Memorial Service; and [resulting] from injuries, heart attacks or illnesses directly attributable to a specific emergency incident or training activity."³⁵

Federal PSOB regulations (28 CFR 32) define "line-of-duty" as Federal PSOB regulations (28 CFR 32) define 'line-of-duty' as "any action that the public safety officer whose primary function is crime control or reduction, enforcement of the criminal law, or suppression of fires is authorized or obligated by law, rule, regulation, or condition of employment or service to perform."³⁶

Parking the rescue vehicle in the apparatus bay after returning from a structure fire call was clearly an activity that this paid fire fighter was required to perform. However, a number of medical conditions

and circumstances would have disqualified this incident from the PSOB definition of "line-of-duty" had they been present. These include chronic or progressive medical conditions as well as intoxication, negligence or misconduct. On the other hand, an acute cardiovascular or neurologic catastrophe occurring in the setting of heat stroke, carbon monoxide poisoning or other chemical exposure would likely qualify under current definitions.³⁶ Such conditions could only be detected and legally documented by appropriate medical investigation following a fire fighter's death. Without this information, subsequent claims and determinations would be impossible, and cause of death can never be established. Regardless of survivor eligibility for PSOB benefits, designation of a fire fighter line-of-duty death is important to departments and families who are also assisted by the National Fallen Firefighter Foundation and Memorial activities. Equally important, the information learned from the medical investigation can be accumulated into databases to establish trends and recommend procedural changes that will decrease the risk of future incidents.

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- This investigation was conducted under contract # 1R43OH04173-01 with the NIOSH Fire Fighter Fatality Investigation and Prevention Program, Cardiovascular Disease Component.