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PUBLIC HEALTH SERVICE/CDC/NIOSH/DSR
FACE 97-16

TO: Director, National Institute for Occupational Safety and Health

FROM: Division of Safety Research, NIOSH

SUBJECT: One Fire Fighter Dies of Smoke Inhalation, One Overcome by Smoke While Fighting an Attic Fire--New York

SUMMARY

On July 4, 1997, one fire fighter died and another was injured while fighting a residential fire. As the two fire fighters advanced into the attic of the residence, the heat and smoke became so intense that fire fighter 1 (victim), on the attack nozzle, stated "I've got to go." Fire fighter 2 (injured), the back-up fire fighter, asked, "Are you OK?" Fire fighter 1 responded, "Yeah." Fire fighter 2 moved forward to control the attack nozzle that had been turned off. However, the heat and smoke were so intense that he could not advance. As he retreated, he had trouble with his air supply. After trying emergency procedures, he unsuccessfully attempted to remove his facepiece, and let out an undistinguishable sound. This is the last thing he remembered until he regained consciousness on the second floor. He was hospitalized and the fire fighter who remained in the attic died of smoke inhalation. NIOSH investigators concluded that, to prevent similar occurrences, employers should:

- *ensure that fire command always maintains close accountability for all personnel at the fire scene*
- *ensure all fire fighters wear and use personal alert safety system (PASS) devices when involved in fire fighting, rescue, or other hazardous duties*
- *develop and implement written maintenance procedures for self-contained breathing apparatus.*

INTRODUCTION

On July 4, 1997, a 30-year-old male fire fighter died of smoke inhalation and a 39-year-old male fire fighter was overcome by smoke while fighting a residential attic fire. On July 9, 1997,

the International Association of Fire Fighters (IAFF) notified the Division of Safety Research (DSR) of the fatality and injury, and

requested technical assistance in investigating the circumstances surrounding the fatality and the serious injury. On July 16, 1997, the Chief of Trauma Investigations Section traveled to New York to investigate this incident. Meetings were held with the chief assigned to conduct the internal investigation; fire fighters involved in the incident, including the injured fire fighter; and the local president of the IAFF. A site visit was conducted and photographs of the incident site were taken. Also, a copy of the dispatch log was obtained from the fire department. The self-contained breathing apparatus (SCBA) worn by fire fighter 1 and fire fighter 2 was sent to the NIOSH Laboratory in Morgantown, West Virginia for evaluation and testing.

The fire department involved in the incident serves a population of 320,000 in a geographic area of 35 square miles. The fire department is comprised of approximately 980 workers, of whom 800 are fire fighters. The fire department provides all new fire fighters with the basic 10-week training at the fire academy, and requires an additional 124 hours of on-the-job training per year. The monthly training schedule is developed by the training officer and is sent to all stations. The required training is designed to cover fire department operation, such as ladder training, aerial operations, hose training, and breathing apparatus. The written standard operating procedures manual was reviewed and appeared to be complete.

The site of the incident was an older, 2 ½ story wood frame house measuring 47 feet deep by 22 feet 6 inches wide. The house contained one apartment on each floor.

Although several fire companies were involved in this incident, only those directly involved up to the time of the fatal incident are discussed in this report.

INVESTIGATION

On July 4, 1997, at 2240 hours, a fire call came into the 911 dispatcher reporting a residence fire. The call was immediately directed to fire dispatch. A first alarm was sounded and Engine 33, Engine 18, Engine 31, Ladder 6, Ladder 14, Rescue 1, and a Battalion Chief were ordered to respond. Engine 33 was the first on the scene at 2243 hours. Upon arrival at the residence, smoke and fire were visible along the front leading edge roof (yankee) gutter. Engine 33 was manned by four fire fighters: fire fighter 1 (victim), fire fighter 2 (injured), an acting lieutenant, and the driver.

Fire fighters 1 and 2 pulled a 1 3/4-inch charged line to the front of the residence where they were met by one of the residents, who directed them through the front door and up the stairs to the

attic. The acting lieutenant was the third fire fighter up the stairs. Fire fighters 1 and 2 donned their SCBA and went up the steps from the second floor to the attic where they encountered heavy black smoke and intense heat, but did not see any flames. The acting lieutenant went back downstairs to feed the charged line that had become hung up.

At 2251, the Division Chief arrived on the scene and assumed command, and the Battalion Chief assumed command of interior operations.

At 2255 hours, the lieutenant from Ladder 14 donned his SCBA and went up to the attic to assist Fire Fighters 1 and 2, while two other fire fighters on the outside were raising an aerial ladder to vent the roof. The fire fighters trying to vent the roof reported the roof was "spongy" so the attempt was aborted. Fire fighter 1 was using the attack nozzle and fire fighter 2 was directly behind him (advancing approximately 10 feet into the attic), both in a crawling position. The lieutenant from Ladder 14 was a few feet back, but was unable to see either fire fighter because of the thick, black smoke. Within a few minutes, fire fighter 1 turned and yelled to fire fighter 2, "I've got to go." Fire fighter 2 asked, "Are you OK?" Fire fighter 1 responded, "Yeah." Fire fighter 1 then moved to the right to exit, while fire fighter 2 moved up to take control of the attack nozzle which had been turned off. Fire fighter 2 stated that the heat was so intense that he could not advance very far before he had to get out. As he turned to retreat from the attic, he had trouble with his air supply. After trying emergency procedures, he unsuccessfully attempted to remove his facepiece, and let out an undistinguishable sound. This is the last thing he remembered until he regained consciousness on the second floor. The lieutenant from Rescue 1 radioed to command "May day, may day, we have a man down," and went to the attic to assist the lieutenant from Ladder 14 in rescuing the downed fire fighter (fire fighter 2) from the attic (this radio transmission was not heard by the alarm office and was not received by command due to radio traffic. However, the transmission was heard in firehouses, not on the fire ground). They dragged him down the stairs to the outside, and he was taken to the hospital. Because of the thick, black smoke in the attic, the rescuers did not see fire fighter 1, who was only a few feet from fire fighter 2. There are conflicting reports on whether either fire fighter (1 or 2) had activated his PASS (personal alert safety system) device.

At 2258 hours, the Division Chief ordered everyone out of the attic.

At 2303 hours, the Division Chief also ordered the deck gun, in use to fight the exterior fire, shut down and a search of the attic by Rescue 1. The lieutenant from Rescue 1 and two fire fighters went back into the attic, and at approximately 2306 hours, they found fire fighter 1 down, unresponsive, and with his mask off. He was immediately removed to the outside and taken to the hospital, where he did not respond to life-support measures.

CAUSE OF DEATH

According to the medical examiner, the cause of death was carbon monoxide poisoning due to smoke inhalation.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Fire departments should ensure that fire command always maintains close accountability for all personnel at the fire scene. [1-3]

Discussion: Accountability for all fire fighters at a fire scene is paramount, and one of the fire command's most important duties. However, at the current time the fire department does not have any formal written accountability procedures for the fire scene. The fire department is currently reviewing different types of accountability procedures to determine which would work best in their department.

Recommendation #2: Fire departments should strictly enforce the wearing and use of PASS devices when fire fighters are involved in fire fighting, rescue, or other hazardous duties.[2]

Discussion: The PASS device is a small electrical device worn by the fire fighter and will emit a distinctive audible alarm if the fire fighter is motionless for more than 30 seconds. Both fire fighter victims were wearing the device; however, there are conflicting reports as to whether the PASS devices were activated.

Recommendation #3: Fire departments should develop and implement written maintenance procedures for the self-contained breathing apparatus (SCBA). [4,5]

Discussion: From the information gathered as a result of this investigation, it appears that the fire department does not have a preventive maintenance program for self-contained breathing apparatus. The fire department should develop a comprehensive record-keeping system that includes the following:

(1) It was apparent from the NIOSH investigation of a few of the air hoses that they were not being replaced as needed. A written procedure that establishes a policy for returning each SCBA to the Air-Mask Maintenance Shop on a regular basis for preventive maintenance should be implemented. This procedure should provide for a tracking system that ensures the SCBA will be returned at the proper intervals. 29 CFR 1910.134 states that respirators shall be maintained as to retain its original effectiveness... shall be approved for use in hazardous

atmospheres where they are maintained in an approved condition and are the same in all respects as those devices for which a certificate of approval has been issued. Fire Departments should also refer to the manufacturers specific inspection and maintenance procedure.

(2) Establish a record-keeping system that will record the results of:

(a) Regular calibration of the respirator test equipment as recommended by the manufacturer.

(b) Any repairs made during both routine preventative maintenance and necessary maintenance on SCBA taken out of service.

(c) Performance tests conducted on a regular basis as well as before and after repairs are performed.

These records should identify the SCBA and regulator identification numbers, test equipment identification numbers, date, a description of the service action including parts (and part numbers) involved, and identification of the repair person.

(3) Establish a record-keeping system for tracking the SCBA cylinders to ensure that the cylinders are hydrostatically retested and recertified every 3 years as required by DOT in 49 CFR 179.34(e)(13) and NIOSH in 42 CFR 84.81(a).

REFERENCES

1. Morris, Gary P., Brunacini, Nich., Whaley, Wynn; Fireground Accountability: The Phoenix System Fire Engineering, Vol. 147, No. 4, April, 1994.

2. National Fire Protection Association. NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, National Fire Protection Association, Quincy, MA.

3. National Fire Protection Association. NFPA 1561, Standard on Fire Department Incident Management System, National Fire Protection Association, Quincy, MA.

4. 29 Code of Federal Regulations 1910.134 Respiratory Protection.

5. National Fire Protection Association. NFPA 1404, Standard on Fire Department SCBA Program, National Fire Protection Association, Quincy, MA.

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Fatality Assessment and Control Evaluation (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (FACE) investigations when a participating State reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

States participating in this study: North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia.

Additional information regarding this report is available from:

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