

# **SECTION 7- THE FIRE SERVICE**

## **UNIT 4 - FIRE SERVICE HEALTH & SAFETY**

### **UNIT GOAL**

To introduce the student to fire service health and safety issues and what is being done to improve them

### **UNIT OBJECTIVES**

The student by the end of the semester shall:

- Identify the average number of firefighters that are killed each year
- Identify the average number of firefighters that are injured each year
- Identify the greatest cause of firefighter injuries and deaths
- Identify the NFPA standard that deals with firefighter health and safety

### **KEY TERMS**

NFPA 1500 - Occupational Safety & Health Program

Rapid Intervention Teams

OSHA 2 In / 2 Out Rule

CISD

### **INTRODUCTION**

Firefighting has been called the most dangerous peace-time occupation there is. Every year about 100 firefighters die in the line of duty, and over 100,000 are injured. This statistic has remained constant for the past 10 years. Over the past five years there has been a major push by many fire service organizations to dramatically lower these numbers. This is being attempted by improvement in equipment, development of health programs, looking at just what causes these accident, and educational programs that deal directly with safety issues. In this unit we will look at the firefighter safety problem that exists in the United States today and what is being done about it.

### **FIREFIGHTER SAFETY**

On an average about 100 firefighters die every year and 100,000 are injured. Firefighting is considered one of the most dangerous peace-time occupations there is. More firefighters are injured or killed as a result of cardiovascular problems than any other. There is also a higher injury rate among volunteers than career due to 80% of firefighters are volunteer. The information for these statistics come from several sources. These are:

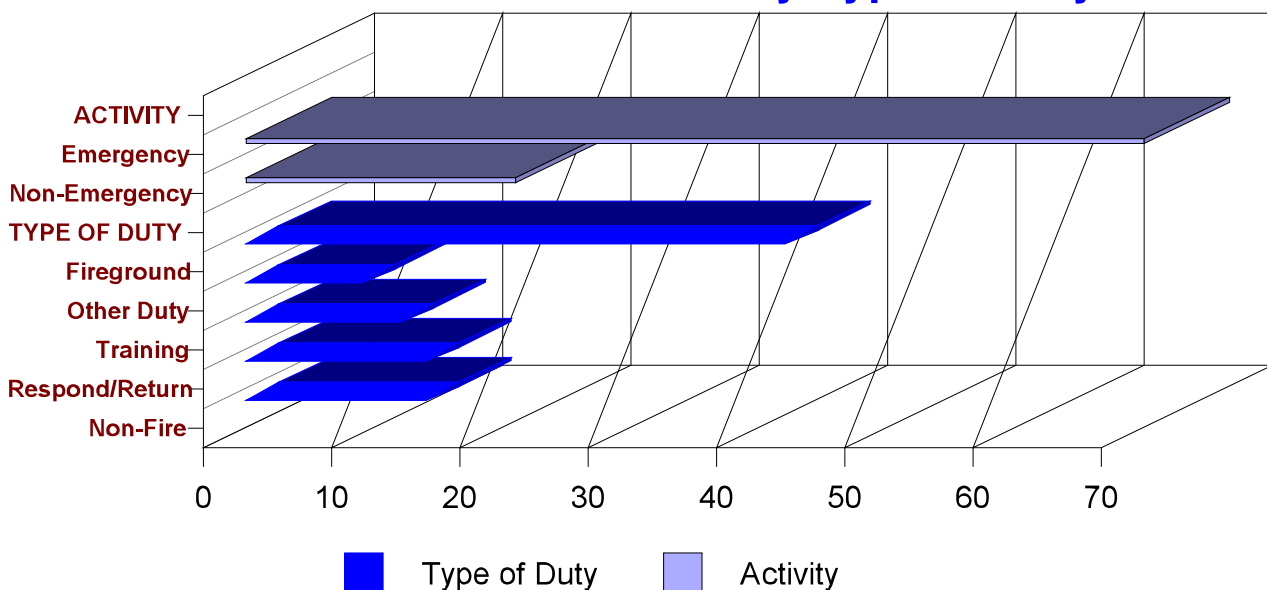
- National Fire Protection Association [NFPA] and its annual death and injury survey.
- Unites States Fire Administration [USFA] and the data from the National Fire Incident Fire Reporting System [NFIRS].
- International Association if Firefighters [IAFF] and its annual death and injury survey.
- Occupational Safety and Health Administration [OSHA] and its reporting requirements for occupation-related deaths and injuries.
- National Institute for Occupational Safety and Health [NIOSH] and its project that investigates firefighter deaths.

## FIRE SERVICE FATALITIES

### 1998 Findings

In every year until 1992, more than 100 firefighters died in the line of duty. The peak was in 1978 when 171 firefighters died. The fewest deaths (75) were recorded in 1992. The 91 deaths that occurred in 1998 represent the third lowest total over the past 10 years. Deaths have been in a narrow range (91 to 104) for the past 5 years, so the actual downward 10-year trend of 17 percent is not as sharp as it was in the early 1990s. Over 10 years, an annual average of 99 firefighters have died. The 91 fatalities represented 37 career firefighters and 54 volunteers. Nine deaths occurred during wildland firefighting operations. One Air Force airman died in a vehicle collision while enroute to a wildland fire near a remote airfield. Seventeen female firefighters were killed on duty from 1994 to 1997, but none died in 1998. As in all years since such data were recorded, the largest number of deaths (42) in 1998 occurred during fireground operations. Of these fireground deaths, 17 resulted from heart attacks on the emergency scene, 14 from asphyxiation, 7 from internal trauma, 2 from burns, 1 from stroke, and 1 from loss of blood due to a partial leg amputation. The second leading category or activity resulting in firefighter deaths is responding to or returning from an emergency. Fourteen firefighters died in 1998, 8 in motor vehicle collisions and 6 from heart attacks. An additional 14 firefighters died in non-fire emergencies: 5 from heart attacks, 3 in a helicopter crash during a medical transport, 4 struck by vehicles while working a vehicle accident scene, 1 drowned while attempting a rescue, and 1 who was attempting to remove a fallen tree. More than twice the number of firefighters died (12) in 1998 during training exercises than in any of the previous 3 years. Eight deaths were from heart attacks, 1 from a stroke/seizure after striking his head on a self-contained breathing apparatus (SCBA) maze, 1 fell from a pickup truck, 1 was struck by a vehicle at the scene of a drill, and 1 during a vehicle collision while on the way to a paramedic training class. Of the 9 deaths that occurred during non-emergency duty activities, 3 died from heart attacks, 2 were electrocuted as they repositioned a metal ladder, 1 died in a vehicle collision, 1 died when a tractor he was using to maintain a fire road rolled over, 1 died of a cardiovascular attack (CVA) while on duty, and 1 died when a blood clot lodged in his lung. [See Table 1]

**Table 1 - F/F Fatalities by Type of Duty**

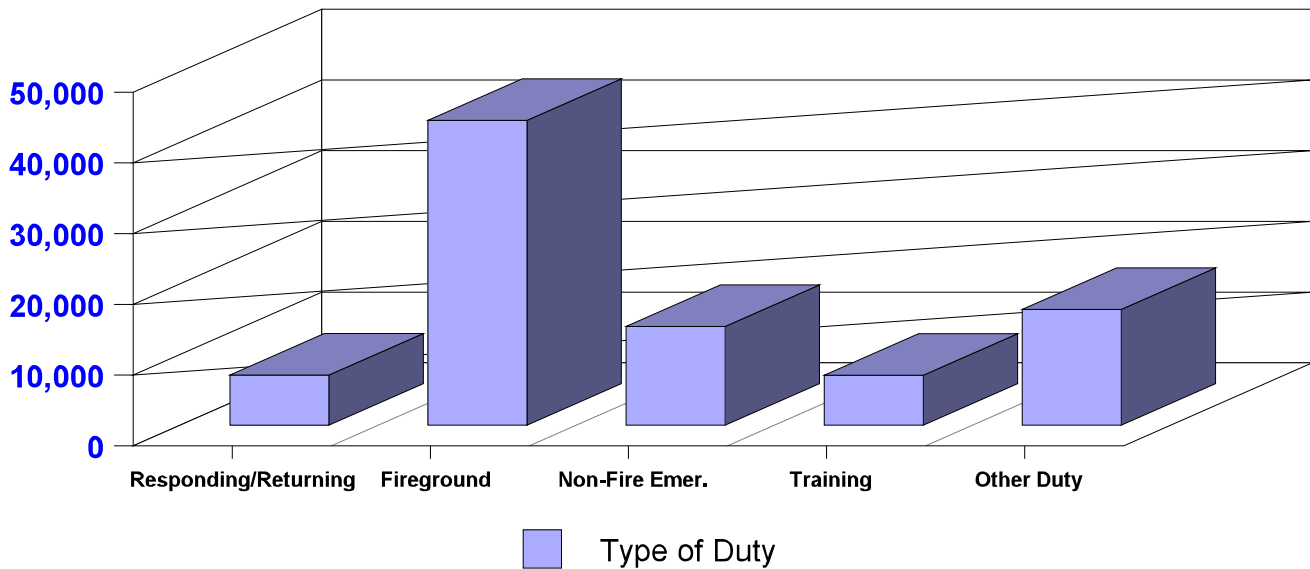


## FIRE SERVICE INJURIES

Twice as many firefighters are injured each year performing fireground duties as there are fire injuries to the civilian population (43,000 versus 23,100 in 1998) from reported fires. In all, 87,500 firefighters were injured while on duty. The 10-year trend, however, in both total firefighter injuries and fireground injuries continued downward trends 17 and 28 percent, respectively. Most of the improvement in reducing firefighter injuries have come in the last 5 years of the 1990s. Of the 87,500 injuries the breakdown is as follows [See Table 2]

- Returning and Responding to incidents - 7,070 injuries
- Fireground - 43,080 injuries
- Non-Fire Emergencies - 13,960 injuries
- Training - 7,055 injuries
- Other On-Duty - 16,355 injuries

**Table 2 - F/F Injuries by Type of Duty for 1998**



## NFPA STANDARDS AFFECTING SAFETY

NFPA Standard 1500 - Occupational Safety & Health Program

NFPA Standard 1521 - Fire Department Safety Officer

NFPA Standard 1561 - Fire Department Incident Management System

NFPA Standard 1021 Fire Officer Professional Qualifications

NFPA Standard 1041 - Fire Service Instructor

NFPA Standard 1981 - Open-Circuit Self-Contained breathing Apparatus [SCBA] for Fire Fighters

NFPA Standard 1982 - Personal Alert Safety Systems [PASS] for Firefighters

NFPA Standard 1404 - Fire Department Self-Contained breathing Apparatus Program

NFPA Standard 1410 - A Training Standard on Initial Fire Attack

## **NFPA Standard 1500 - Occupational Safety & Health Program**

This standard was adopted in an effort to lessen firefighter injuries and deaths. It became effective in 1987. And covers the following areas

- Roles and responsibilities regarding health & safety
- Safety during fire service training
- Requirements for apparatus driver/operators
- Mandates types of protective clothing & equipment used at emergency scenes
- Makes recommendations for minimum manning requirements for fire department response

## **FIRE SERVICE HEALTH ISSUES**

Statistics over the past 10 years and cohort studies done in the United States Northwest and in Philadelphia, Pennsylvania have shown that two major health issues facing firefighters are stress related injuries or fatalities and cancer related deaths and injuries. Cardiac and stress related deaths have accounted for over 40% of fire service related fatalities. The cohort studies mentioned above are showing that firefighters are showing a higher than normal percentage of cancer related illnesses than the normal civilian population. What is interesting is that the cancer related to respiratory functions is about the same as the normal population. The higher amounts seem to be in brain related cancer and lymph system related cancer.

Another areas dealing with firefighter health is Critical Incident Stress Disease or CISD. This is caused by the individual being involved or seeing something that causes high stress levels in the person. Some events that lead to CISD are:

- Sudden or traumatic death or severe injury to an infant or child
- Prolonged rescue efforts with mass casualty or severe suffering of the victim
- A responder knowing the victims
- Traumatic death or severe injury of a co-worker whether or not in the line of duty
- Suicide of a co-worker

These incidents can lead to physical, mental and emotional related symptoms and illness. In some cases they can cause couples to divorce, drug and alcohol abuse, suicide, and in extreme cases the individual taking the lives of other persons. There are various approaches to this, some are:

- **Peer Diffusing** - the concept of using a trained person from the same discipline to talk to emergency responders after a critical incident
- **On-site Diffusing** - the person is removed from the incident and sent to rehab where they are evaluated for signs and symptoms of distress

## **SOME METHODS OF LOWERING THE FIREFIGHTER MORTALITY RATE**

It is important for the fire service to lower the current trend in injuries and fatalities. Over the past 30 years improvements have been made, but we are still maintaining the same numbers from a statistical standpoint. Some areas where work is needed are

**Mandatory requirements for physical fitness training for all firefighters**, especially in the area of cardiovascular fitness to lower the high percentage of cardiac and stress related deaths and injuries.

**Annual medical exams for firefighters** must be mandatory in order to prevent possible cardiac and cancer related illnesses.

**Improved driver-training for fire apparatus operators**, since responding to and returning from incidents accounts for the number four cause of injuries and deaths to firefighters.

**A greater commitment to training that goes beyond the probationary of basic firefighter training.** With over 7,000 injuries per year and seven to twelve deaths annually it is essential that firefighters are taught in a safe environment.

**Improvements in firefighter protective clothing and equipment.** Both the NFPA and OSHA have standards and regulations pertaining to firefighter personal protective clothing. Some of these standards are:

- NFPA 1973 - Gloves For Structural Firefighting
- NFPA 1974 - Protective Footwear For Structural Firefighting
- NFPA 1975 - Station/work Uniforms
- NFPA 1971 - Protective Clothing For Structural Firefighting
- NFPA 1972 - Helmets For Structural Firefighting
- NFPA 1982 - Personal Alert Safety Systems (PASS) For Firefighters
- NFPA 1981 - Open-circuit Self-contained Breathing Apparatus For Firefighters

NFPA 1500 requires that new Personal Protective Equipment [PPE] meet current editions of the above standards. The following is a typical list of components of PPE for firefighting.

- Approved fire helmet with eye protection
- Flame resistant hood
- Turnout coat
- Turnout pants
- Firefighting gloves
- Firefighting boots
- Personal Alert Safety Systems (PASS) devices
- Self-contained Breathing Apparatus



**Figure 1 - Example of Firefighting PPE**

**Improved accountability systems at emergency incidents.** This is a critical part of an incident management system. Since the collapse of the World Trade Center in September of 2001 and the loss of over 400 emergency service workers and the loss of six firefighters at a warehouse fire in Worcester, Massachusetts accountability systems are being closely looked at across the country. It allows the incident commander to keep an accurate tract of all personnel and other resources working at the incident. A good accountability system must meet the following requirements.

- Account for the exact location of all individuals at the fire scene at any given moment
- Provide expansion to meet the needs of the incident
- Be adaptable to the IMS use

- Ensure that all individuals are checked into the system at the onset of the incident
- Provide for visual recognition of participation
- Provide for points of entry into the hazard zone.

Accountability systems require that a Personnel Accountability Report or PAR be used to keep track of personnel. This PAR is a verbal or visual report to the incident commander regarding the status of operating crews; it should occur at specific time intervals or after certain tasks have been completed.

Examples of benchmarks for this PAR include

- A fixed time, as defined by local guidelines
- After a primary search
- After a fire is under control
- After a switch in strategic modes [offensive or defensive]
- A significant event such as a collapse, flashover, backdraft
- After any report of a missing firefighter

### **More active use of Rapid Intervention Teams [RIT]**

Due to the high number of firefighter injuries and deaths that occur each year the fire service has realized that it must take measure to protect its members. One such method is the use of **Rapid Intervention Teams [R.I.T.]** The R.I.T. is designed to provide rescue crews to remove firefighters who have become disabled, trapped or missing at an emergency incident. This is the sole purpose of this team, and its training and equipment is setup to accomplish this goal. Its purpose is not the rescue of civilians from emergency situations, but only the rescue of firefighters from situations that are immediately dangerous to life and health. Another recent ruling from OSHA also impacts the safety of firefighters, this is the **2 in / 2 out OSHA Rule**.

- The 2 in / 2 out requires that when firefighters are making an interior attack on a fire in a structure they must at a *minimum* have two-person teams
- The ruling also states that when a two-person team is in the interior of the structure there *must* be a two-person team on the exterior that is fully equipped with protective equipment that can rescue the interior team(s) if the need arises.

It is hoped that with these two developments that the number of firefighter injuries that occur at the emergency scene will go down.

More active use of fireground rehabilitation. Due to the physical and mental demands put on firefighters at fire scenes, and the impact of extreme weather conditions on them it is important for rehabilitation to occur. Rehabilitation is the group of activities that ensures responders health and safety at the fire scene, and may include rest, medical surveillance, hydration, and nourishment. A basic plan for this includes

- Establishment of a rehabilitation sector or group within the IMS
- Hydration [liquids]
- Nourishment [food]
- Rest and recovery
- Medical evaluation
- Accountability while in the rehabilitation sector