

**Running head: Developing an Emergency Incident Rehabilitation Program**

**Developing an Emergency Incident Rehabilitation Program  
For the Lynn, MA Fire Department**

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### **Certification Statement**

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: \_\_\_\_\_

## **ABSTRACT**

The problem statement that prompted this research project is there has been an increase in heat related injuries. The research purpose is to investigate programs and/or best practices of providing services to reduce heat related injuries. Descriptive research was the method used to answer the following questions: What is required in standards to offer protection to firefighters regarding heat related injuries? How would a rehabilitation program benefit members and how can it be integrated? Will the cost to implement such a program be cost effective? Procedures used included a literature review of fire service journals, internet sources, and telephone interviews. The results showed the need to establish a rehabilitation program. Recommendations included incorporating a rehabilitation program into department procedures.

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# INTRODUCTION

The problem that prompted this research project is that the Lynn Fire Department has been experiencing an increase in heat related injuries to firefighters on the fireground. The purpose of this research project is to investigate current local and nationally recognized programs and/or best practices of providing services to reduce heat related injuries to firefighters.

In conducting this research, descriptive research was supported historical research.

The following five research questions were posed:

1. What is required in the various standards and publications, to offer providing services to reduce heat related injuries to firefighters?
2. How would an emergency incident rehabilitation program be beneficial to the members of the Lynn Fire Department?
3. How can an emergency incident rehabilitation program be integrated into the Lynn Fire Department?
4. Will the anticipated additional dollar cost to implement an emergency incident rehabilitation program be cost effective for the Lynn Fire Department as it pertains to the United States Fire Administration 's operational objective "C": Reduce the loss of life from fire of firefighters?

## Background and Significance

Although Massachusetts is not known as a hot climate, in summertime, temperatures can reach the 90's or even higher. Operating at emergency incidents on extremely hot days can be a very dangerous. In fact, operating at emergency incidents in extremely cold weather can be dangerous as well. Extreme weather, hot or cold, has the potential of making what is already a threatening situation worse.

In the summer of 2005 I was battling a multiple alarm fire on a very hot summer day. The temperature was approaching 100 degrees and the relative humidity that day was "oppressive" and the heat index was soaring over 100 degrees. All of a sudden I became weak and woozy. I couldn't understand what was happening to me. I told my partner who was operating with me in the elevated platform of an aerial ladder truck that I was in trouble and I needed to get down to the ground quick. I had been working hard removing siding and fascia boards from the side of a burning building that was fully involved. I was expending a great deal of energy for a considerable amount of time when all of a sudden it hit me. My partner who was operating the controls of the platform whisked me down to ground level from a height of about 25 feet in no time. At that point, I staggered out of the gate of the platform and fell to the ground.

Needless to say, this had never happened to me before and I had no idea what was going on. Several firefighters on the ground rushed in to help me. They whipped off my turnout gear and SCBA and proceeded to throw water on me in attempt to cool me down. The next thing I knew I was being sent off to a nearby ambulance for evaluation by paramedics. Soon we were on the way to the hospital with me on the stretcher riding as the patient in the back of the ambulance. This was a switch because after many years on the job as an EMT, I was now the

patient. I ended up at the hospital about 20 minutes later feeling much better, but very embarrassed. I submitted to various types of medical testing. I was admitted for observation and brought upstairs to an inpatient room. I lay in bed thinking that this could be the end of my fire career.

I was devastated to say the least. Here I was, in the prime of life, possibly looking at the end of doing what I thoroughly enjoyed doing all these years – being a firefighter. I was only in my 40's and was in good physical condition. I was a dedicated physical fitness buff. I was into competitive road racing. In fact, I had just completed running the Boston Marathon the year previous in a very respectable time (4 hours and 35 minutes) for someone in my age group - 48 years old at that time.

I thought how could this be happening to me? I was lying in bed awaiting the results of what I was told was routine testing in order to rule out a heart problem. I was in there all night and at about 4:00 a.m. it hit me hard – could this be it? Was I all done? How will I be able to support my wife and two children? I was not nearly ready to be retired. I was praying for a miracle or something to make everything better. I was crying and I felt so alone. I felt like the whole world was counting on me and I didn't want to let anyone down. To make a long story short, all my tests came back negative and with cardiac problems ruled out I was released in the morning back to full duty. The obvious diagnosis: heat exhaustion.

My story is not unique. It has happened to several firefighters within the past few years and it seems to be getting more common. Is it coincidental? Is it the heavier turnout gear? Is it

global warming? Hopefully this research paper will answer some or all of these questions. After all, firefighter safety is of extreme importance in the Lynn Fire Department.

The Lynn Fire Department is a fully paid department consisting of approximately 200 uniformed members that operate out of seven stations throughout its 10.5 square mile area. Lynn, with a population of around 88,000 people, is situated on the seacoast of the Atlantic Ocean. Lynn is located just eight miles north of downtown Boston and just like any metropolitan area it is densely populated. Its population density ranks Lynn one of the most densely populated cities in the country.

Firefighters work a four-platoon system working an average of forty-two hours per workweek on “10’s and 14’s.” That is, we work two ten-hour days followed by two fourteen-hour nights, then four days off. This format, known as the “four on, four off” schedule is divided into four working platoons or as we refer to them as divisions or groups. In the calendar year 2006, the department answered over 15,000 emergency calls. In 2007, the Lynn Fire Department operated with six engines; three ladder trucks; one advanced life support unit (ALS), a division fire chief with an aide; and one full-time, dedicated safety officer. Each fire company runs with at least three firefighters – an officer and two firefighters and ladder trucks have a minimum of four firefighters – an officer and three firefighters, except the Medic Unit, which runs with two paramedics.

Lynn FD also has several staff positions as well – including the chief of the fire department, a deputy fire chief; a district chief in charge of training with a captain; an Emergency Medical Service (EMS) division with a captain and a firefighter/paramedic; several staff positions in the maintenance division; a fire prevention bureau with eight uniformed fire

prevention inspectors; a fire investigation unit with one lieutenant and a firefighter; and a communications division with a fire lieutenant in charge of twelve civilian fire alarm operators.

In the City of Lynn, the fire department has an annual budget exceeding \$18 million. As previously stated, the City of Lynn has over 88,000 residents who represent a widely diverse population. Immigrants have migrated to Lynn from all over the world and people from some eighty to ninety countries are represented in Lynn. With its tremendously diverse population, Lynn is a very poor city in terms of socio-economics. At the same time, Lynn, claiming to be the third oldest settlement in Colonial America - having been settled in 1629 – has a base population of residents whose families have been in Lynn for over one hundred of years in some cases. In a way of speaking, Lynn is a “tale of two cities.” It has a segment of the population who has been here for a long period of time and it has groups of people who have literally just arrived in this country. Lynn is the proverbial “melting pot” and has been so since roughly the time of the Industrial Revolution of the nineteenth century. Waves of immigrants began arriving at Lynn’s shores and continue to do so even today. Like many older U.S cities, Lynn has seen its share of urban decay.

For that reason, Lynn has had a high number of fire and emergency incidents over the years, which continues up to the present time. As one might expect, Lynn with its large call volume and high number of fires has resulted in dangerous working conditions for its firefighters. Many firefighters, unfortunately, get injured each year due to the large call volume and rough conditions found in the city. Fireground safety is of the utmost importance.

This project is significant to the Lynn Fire Department because it could improve fireground and emergency incident scene operations as well as provide a higher level of firefighter health and safety that is not currently available.

## LITERATURE REVIEW

A literature review was conducted to determine the need for dealing with the problem of heat related injuries to firefighters and the possibility that because no formal emergency incident rehabilitation currently exists, perhaps establishing one might go a long ways to reducing heat related injuries. The paper also looked into the feasibility of developing an emergency incident rehabilitation program along with the equipment supplies and resources necessary for the establishment of such a program. The literature was divided into four areas: the need for establishing an emergency incident rehabilitation program, operating a rehabilitation area, resources needed to establish a rehabilitation area, and rehabilitation programs currently in use.

### The Need For An Emergency Rehabilitation Program

The most valuable resource the fire service has is its members. It is not always recognized that human resources are more important than the other resources. After all, firefighters put out the fires, not the equipment and apparatus. It seems we spend much more time and energy thinking about purchasing apparatus and equipment than we do about our own people (Treadwell, 1999).

The best personal protective equipment (PPE) is essential. The physical demands associated with firefighting, along with the environmental hazards (extreme heat and extreme cold), can create conditions that can have an adverse impact on firefighter health and safety. Firefighters need proper hydration and rest during emergency scene operations as much as they need the most advanced and protective PPE. Without proper rehabilitation, firefighters and other emergency responders are placed in jeopardy of compromising their own safety as well as the safety of others (Wieder, June 2000).

When emergency responders become fatigued, their ability to operate safely becomes impaired. Reaction times can be reduced and ability to make critical decisions diminishes. Emergency incident rehabilitation time is absolutely essential on any emergency scene in order to investigate the incident as well as provide protection to those operating in that environment (Wieder, June 2000).

Many National Fire Protection Associations (NFPA) standards have addressed the need for emergency incident rehabilitation, including: *NFPA 1500 Standard on Fire Department Occupational Safety and Health (2007 Ed.)*, *NFPA 1584 Recommended Practice on the Rehabilitation of Members at Incident Scene Operations and Training Exercises (2003 ed.)*, *NFPA 1561 Standard on Emergency Services Incident Management Systems (2005 ed.)*, *NFPA 1521 Fire Department Safety Officer (2007 ed.)*, and *NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2004 ed.)*.

*NFPA 1500 Standard on Fire Department Occupational Safety and Health (2007 Ed.)*

states that:

- 8.9 Rehabilitation During Emergency Operations
- 8.9.1\* The fire department shall develop standard operating procedures that outline a systematic approach for the rehabilitation of members operating at incidents.
- 8.9.2\* The incident commander shall consider the circumstances of each incident and initiate rehabilitation in accordance with the standard operating procedures and with NFPA 1561.
- 8.9.3\* Such on-scene rehabilitation shall include at least rest, hydration, active cooling where required, basic life support care, food where required, and protection from extreme elements.
- 8.9.4 Each member operating at an incident shall be responsible to communicate rehabilitation needs to their supervisor.
- 8.9.5\* Each member who engages in wildland fire-fighting operations shall be provided with 2 qt (2 L) of water.
- 8.9.5.1 A process shall be established for the rapid replenishment of water supplies.

NFPA 1584 Recommended Practice on the Rehabilitation of Members at Incident Scene Operations and Training Exercises has addressed the need for Emergency Incident Rehabilitation programs by stating that:

- 6-1 Criteria for Implementation
  - Rehabilitation operations should commence whenever emergency operations or training exercises pose a risk of members exceeding a safe level of physical or mental endurance.
- 6.2 Rehabilitation operations should be provided in accordance with fire department standard operating procedures (SOP's), *NFPA 1500, Standard of Fire Department Occupational Safety and Health Program*, and *NFPA 1561, Standard on Emergency medical Services Incident management System*.
  - 6.2.1 Members should be assigned to rehabilitation as prescribed by departmental SOP's.
  - 6.2.2 Unusual circumstances, such as large-scale incidents, long-duration incidents, labor-intensive incidents, or those associated with significant climate extremes, should require an alteration in procedures.
  - 6.2.3 Role of Emergency Medical Services (EMS).
  - 6.3.1 Basic Life Support (BLS) should be the minimum level of available care.
  - 6.3.2 Advanced Life Support (ALS) personnel should be considered preferable where they are available.
  - 6.3.3 EMS personnel should briefly question members arriving a rehabilitation to determine if they have symptoms of dehydration, heat stress, cold stress, physical exhaustion, cardiopulmonary abnormalities, emotional/mental exhaustion and should utilize the rating of Perceived Exertion (RPE).
  - 6.3.4 EMS personnel should assess and treat any member having signs and symptoms of heat stress or cold stress.
  - 6.3.5 In the event of an injury to a member during emergency operations, EMS personnel assess and treat the injury, based on local EMS protocol and fire department SOP's.

In addition, NFPA 1561 *Standard on Emergency Services Incident Management Systems (2005 ed.)* states that:

- 5.4 Emergency Incident Rehabilitation
  - 5.4.1 The incident commander shall consider the circumstances of each incident and make suitable provisions for rest and rehabilitation of personnel operating at the scene. These provisions shall include medical evaluation and treatment, food and fluid replenishment, and relief from extreme climatic conditions, according to the circumstances of the incident.

- 5.4.2 After rehabilitation, responders shall receive a new incident assignment, return to staging area to receive a new incident assignment, or be released from the incident.

NFPA 1521 *Fire Department Safety Officer (2007 ed.)* states:

- 6.1.12 The incident safety officer shall ensure that the incident commander establishes an incident scene rehabilitation tactical level management unit during emergency operations.

NFPA 1521 also addresses the safety officer's responsibility to consider rehabilitation for members operating at emergency medical service (EMS) operation by stating.

- 6.3.3 The incident safety officer shall ensure that incident scene rehabilitation and incident stress management are established as needed at emergency service operations, especially mass casualty incidents (MCI's).

NFPA 1710 (2004 Edition) *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* states:

- 6.1 Safety and Health System  
A fire-fighter occupational safety and health program shall be provided in accordance with NFPA 1500, *Standard on Fire Department Safety and Health Program*
- 6.2\* Incident Management System
- 6.2.1 An incident management system shall be provided in accordance with NFPA 1561, *Standard on Emergency Services Incident Management Systems (2005 ed.)*, to form the basic structure of all emergency operations of the fire department, regardless of the scale of the department or the emergencies shall be designed to manage incidents of different types, including structure fires, wildland fires, hazardous materials incidents, emergency medical operations, and other types of emergencies that could be handled by the department.

Obviously, many references from the various NFPA standards require the establishment of a rehabilitation sector at all emergency incidents. FEMA publication, *Emergency Incident*

*Rehabilitation FA-114*, from United States Fire Administration (USFA) demands the same.

IFSTA's textbook *Emergency Incident Rehabilitation* makes an extremely strong case concerning the same.

“The evidence is insurmountable concerning the importance of firefighter rehabilitation. We, in the fire service, can no longer ‘look the other way’ in terms of ignoring that fact that emergency incident rehabilitation is of paramount importance. Incident Commanders, all supervisors, and firefighters have to realize the importance rehabilitation” (Wieder, 2000).

#### Operating A Rehabilitation Area

“Fire departments have made a growing commitment to providing appropriate on-scene rehabilitation procedures since the first edition of NFPA 1500, Standard of Fire Department Occupational Safety and Health was released in 1987”, (Wieder, February 2000, p. 59). He further states,

“In the fire service the terms rehabilitation and rehab are used to describe the process of providing rest, rehydration, nourishment, and medical evaluation to responders who are involved in extended and/or extreme incident scene operations with the goal of getting them back in action or back to the station safely. Proper rehabilitation operations ensure that the physical and mental condition of responders operating at the scene on an emergency does not deteriorate to a point that affects safety and integrity of the operation.” (Wieder, February 2000, p. 60).

The actual method of operating a rehabilitation area will vary depending on many factors, including: available manpower, number of firefighters in need of rehabilitation, and local SOP's. In any case, the Rehabilitation Area/Sector should be staffed with as many people as is needed to provide for all aspects of rehabilitation. Rehabilitation consists of rehydration and rest as well as medical evaluation. The best-qualified EMS people available should provide medical evaluation on scene. At a minimum, EMT-Basic's should be assigned to the Rehabilitation Sector (Wieder, June 2000).

According to Wieder (May, 1999, p. 53), the Rehabilitation Sector must provide the following important functions:

- A safe area of refuge where firefighters can be evaluated and provided rest and rehydration
- Be aware of those who are at risk of heat and stress related illness/injuries

- Medically evaluate firefighters who enter the rehab area and determine if they are ready to return, require additional rehab, or transport to the hospital
- Make sure all firefighters who enter or exit are accounted for
- Give regular reports/updates to the Incident Commander and/or Safety Officer

In addition to these requirements, it is important to establish what is known as *rehabilitation levels* -Level I, Level II, and Level III (Mass Fire Academy, Rehab Procedures, 2001). Generally speaking, initiate Level I care when emergency incident operations will extend beyond one hour. Less than one hour is considered “firefighter friendly”. Level I should also be initiated when operating at the scene of a high-rise incident, hazardous materials incident, severe cold weather, or when the heat stress index and humidity is oppressive (MFA, 2001).

The heat stress index is defined as a relative index that evaluates how people respond to variable meteorological conditions including temperature and humidity in the air. The heat stress index, also called apparent temperature, is a measure of what hot weather feels like to the average person over various temperatures and relative humidities. The higher the humidity, the hotter it feels (Jefferson Labs, Inc., internet).

Suggested guidelines for firefighters to remain in Level I rehabilitation are that the heart rate is greater than 110 after a 10 – 20 minute rest period. If the pulse is less than 60 and greater than 110, a longer rest period is required. Personnel not recovering from rest and fluid replenishment should be considered for Level II rehabilitation (MFA, 2001).

Level II rehabilitation is indicated when firefighters are not responding to Level I care. Firefighters should be separated from the immediate incident area by at least 200 feet. Continued monitoring of vital signs should commence, including blood pressure, pulse, and respirations. Guidelines for blood pressure should be: Systolic = 100 to 180, Diastolic = 70 to

110. Any vital signs greater than this requires further rest and rehabilitation. If firefighters do not recover in 30 minutes in Level II care, then personnel will be transferred to Level III care (MFA, 2001).

Level III Rehabilitation requires transport to a medical facility for further evaluation. Indicators for transporting to the hospital immediately are: chest pain, smoke inhalation, fractures, burns, respiratory distress, crush injuries, vomiting. Rest period guidelines are as follows: Level I – 5 to 10 minutes, Level II – 30 minutes, Level III – to hospital (MFA, 2001).

Another way to look at it is by considering triage (Level I), treatment (Level II), and transport (Level III). Depending on the circumstances, the proper dispensation could include any of the following: Return the responder to duty (Level I), Continue to rehabilitation (Level II), Initiate advanced life medical treatment and transport to hospital (Level III) (Wieder, 1999).

The prevention of heat and /or stress related illness or injury is greatly aided by maintaining a sufficient level of water and electrolytes within the responder's body. Under extreme sweating conditions, it may be necessary for the responder to consume as much as one quart of water per hour in order to maintain safe levels in their system (Wieder, 1999). The recommended hydration drink is a 50/50 mixture of water and a sports activity beverage. This should be served at a temperature of 40 degrees F. Caffeinated, alcoholic, and carbonated beverages should not be used for rehabilitation purposes because they can interfere with the body's ability to conserve water (Wieder, 1999).

#### Resources Needed to Establish a Rehabilitation Area

Resources needed to establish an emergency incident rehabilitation include, but are not limited to the following: First and foremost the rehabilitation sector needs human resources. The number of personnel needed will be based upon the size and complexity of the incident. In

smaller incidents, it may not be necessary to have a large number of people to provide rehabilitation sector service. The number required is the number of people to get the job done (Treadwell, 2000).

According to FEMA/USFA *Emergency Incident Rehabilitation*,

‘the Rehab Officer shall secure the necessary resources required to adequately staff and supply the rehabilitation area’ (1992, n.p.). The supplies should include the items listed below:

- (1) Fluids-water, sports activity beverages (Gatorade), oral electrolyte solutions, glycogen replacement fluids (Take-up), and ice.
- (2) Food-soup, broths, or stew in hot/cold cups, and snack crackers.
- (3) Medical-blood pressure cuffs, stethoscopes, intravenous solutions, thermometers, cardiac monitors and re-chargers, and extra oxygen bottles and non-rebreathers.
- (4) Other-awnings, tents, fans, cool misting machines, tarps, smoke ejectors, dry clothing, extra equipment, floodlights, blankets and towels, traffic cones, fireline tape, and folding tables. (FA-114, n.p.).

In addition to these supplies, the vehicle could have and on board generator, kitchen facilities, such as a microwave oven, stove, coffee maker (although coffee is not recommended for responders, it may be useful to those providing rehabilitation), refrigerator, hot/cold water dispenser, storage areas (counter space and cabinets), air conditioning, bench seats for medical evaluations, and adequate lighting (FEMA/USFA *Emergency Incident Rehabilitation*, 1992).

#### Rehabilitation Programs Currently In Use

Currently, there is only one full-time fire department rehabilitation truck in service in the Metropolitan Boston area according to Boston Fire Department Firefighter Richard Ryan, BFD’s Emergency Medical Services (EMS) coordinator (phone interview on September 18, 2007). He is assigned to the Training/EMS Division at Boston Fire Department Headquarters. During a phone conversation, he explained the Rehabilitation Unit belongs to the Boston Fire Department.

Placed into service approximately five years ago, Unit W-25 – as it is known – runs out of the Tremont Street station with Engine Company 22.

W-25 is staffed 24/7 with a fire lieutenant permanently assigned on each of the four groups. The unit is a Gladiator ambulance that the city recently purchased. W-25 also doubles as a Decontamination (Decon) Unit. It also is used to provide medical supplies to all of Boston Fire Departments fire companies. So, the unit has multiple capabilities, but is primarily used as a Rehabilitation unit and it is dispatched to every “smoke showing” call in the city. W-25 supplies all standard rehabilitation services to Boston firefighters including: rehydration (water and Gatorade), chairs, portable misting machines, tents, air conditioning, medical monitoring equipment, etc.

Another unit that provides Rehabilitation services in the Metropolitan Boston area is a Fallon Ambulance Company unit operating in Quincy, MA. Fallon, the private ambulance company that has the emergency EMS contract in the City of Quincy, provides the Rehabilitation service there for the Quincy Fire Department, according to Quincy Fire Department Senior Staff Officer Deputy Chief Joseph Barron, who I contacted by telephone on September 18, 2007. Deputy Barron said Fallon provides this service for Quincy as well as many surrounding towns.

I contacted Fallon Ambulance Company’s Chief Operating Officer Patrick Tyler and interviewed him on September 18, 2007. Mr. Tyler explained that he and several of his employees have gone through intense training through the Massachusetts Emergency Management Agency (MEMA). Many of his 600 employees are trained to provide rehabilitation service and much more. They provide standard rehabilitation service including lighting, generators, tents, trailers, etc.

Another company, Community Service Emergency Rehab District 5, based in Peabody, MA, known simply as “Rehab 5”, is a private, non-profit company that provides all manner of emergency incident rehabilitation services for the fire service. Community Service Emergency Rehab, Ltd. – or Rehab 5 - protects twenty-two cities and towns on the North Shore of Massachusetts. It covers those towns in southern Essex County in northeastern Massachusetts in Massachusetts Fire District 5. District 5 is comprised of the cities and towns along the coastline of Massachusetts, including Lynn, which is the largest city in the area. (Rehab 5 web site).

Rehab 5 operates out of one station and its members are volunteers, most of whom are firefighters and fire dispatchers. Rehab 5 exists solely for the purpose of providing firefighter rehabilitation services. It serves a population of over 400,000 thousand people and is headed by Mr. Roger Baker, who I interviewed on the phone on September 25, 2007. Mr. Baker is a private citizen. Baker and his volunteers “man” Rehab 5 and will bring the vehicle(s) to the scene of any emergency in the district.

Started in 1987, Rehab 5 has responded to virtually every incident - as well as major training exercises, such as “live burns” – since that time. The volunteers are made up of civilians, firefighters, EMT’s, and fire alarm operators from the communities of Peabody, Lynn, Lynnfield, Marblehead, Salem, and other cities and towns. As time has gone by, Rehab 5 continuously expands its capabilities in terms of providing all aspects of firefighter rehabilitation services including rehydration, rest, cool zones, tents, and medical treatment. As these and other services have increased, a resultant increase in volunteer efforts has increased, too. In 1987, there were two people providing this service – now there over twenty and still growing (Rehab 5 web site).

Rehab 5 operates with three vehicles in its fleet. Each vehicle is equipped to provide firefighter rehabilitation services including the standard services mentioned above. The Salvation Army donates one of the trucks to Rehab 5. It is a 1996 Ford Utilmaster body that is a converted mobile kitchen converted into a rehabilitation unit. The typical rehabilitation equipment has been added to complete the conversion. Rehab 5 also owns two 1997 GMC K2500's. These are 4-wheel drive,  $\frac{3}{4}$  ton vehicles used for rehabilitation operations as well. The Massachusetts Registry of Motor Vehicles law allows these three vehicles to operate with special "red plates" which are reserved only for "special service vehicles". These plates only go to non-profit companies who provide charity services (Rehab 5 web site, n.d.).

Rehab 1 out of central Massachusetts is another rehabilitation vehicle operating here that will respond to incidents in their area. Rehab 1 runs out of Leominster, MA and is staffed – like Rehab 5 – with volunteers from various fire departments in the area. Rehab 1's operation is very much like Rehab 5's operation, in that regard. I interviewed Fire Lieutenant Charles LeBlanc of Leominster, MA Fire Department on September 25, 2007 for this information. Lieutenant LeBlanc informed me that Rehab 1 is stationed in the Civil Defense Building in Leominster and will respond to any city or town in the Central Massachusetts Mutual Aid network.

The Massachusetts Bay Transportation Authority (MBTA) or simply, the "T" has air-conditioned busses that they will send to any major incident in the metropolitan Boston area for the purposes of rehabilitation. The "T" makes these buses available 24/7 if any member community needs it. The "T" will send the bus with a driver and the host community has to staff it with rehabilitation personnel to provide rehabilitation for responders on the scene. Michael Foley, Safety Officer for Massachusetts Bay Transportation Authority, was contacted

by telephone on September 30, 2007 for this information. Cities and towns must be part of MBTA's service area in order to receive this service.

## PROCEDURES

Descriptive research procedures were used in preparing this paper. That is, the research consisted of a literature review of historical data and then preparing action oriented SOP's, including a Rehabilitation Supply and Equipment list, Rehabilitation Reports, and other appendices. This research was started originally in July 2007 at the National Fire Academy (NFA) in Emmitsburg, MD. A more intense and fuller undertaking of this project began in August 2007. The research was done after attending the Executive Development course, which is the first course of four in the Executive Fire Officer Program at NFA.

A search of articles pertaining to Emergency Incident Rehabilitation, NFPA standards, USFA literature, Massachusetts Firefighting Academy Instructor Guides, and many articles from fire service and medical trade journals were searched for over the internet as well as the National Fire Academy's (NFA) Learning Resource Center's (LRC) computerized card catalog system. All subjects searched were post 1997, with exception of *Emergency Incident Rehabilitation*, a FEMA/USFA publication, published in 1992. Many articles that pertained to these subjects were located during the search.

The majority of these articles were found using an internet search. Some articles were sent to me from the LRC including those in *Firehouse Magazine*, the *Journal of Emergency Medical Services (JEMS)*, *Fire Chief Magazine*, *Fire Engineering*, *Health & Safety Magazine*, Executive Fire Officer (EFO) papers, and others. The textbook, *Emergency Incident Rehabilitation*, an International Fire Service Training Association (IFSTA) manual was also

used in the writing of this paper. The gathering of this information proved to be very valuable in the research.

The research began with a thorough review of the literature collected. This was done to help make the author more knowledgeable about the subject. Articles were outlined to highlight the information that was directly related to the purpose of this research paper. The purpose of this research is to develop a policy to assign personnel during emergency incidents for the sole purpose of providing all manner of emergency incident rehabilitation and to develop a list of supplies and equipment needed for such a task. After a thorough review of the literature was completed a Standard Operating Procedure (SOP) for the use of rehabilitation on the fireground and a supplies and equipment list was developed (see Appendix A) as well as Rehabilitation Reports (see Appendix B).

## **Limitations**

The research and analyses were limited to the articles and text reviewed by the author and the six-month limit for the completion and submission of the paper by the National Fire Academy's Executive Fire Officer program. In addition, because of the fact that in Massachusetts not many fire departments have a formalized policy of providing fireground and other emergency incident rehabilitation to firefighters, statistical data and the lack of local SOP's for review also proved to be a limiting factor.

## **Assumptions**

The procedures used to complete this research paper were based on the assumption that the literature reviewed was factual, objective, and unbiased. Telephone interviews were

conducted in a limited geographical area concerning how they conducted emergency incident rehabilitation operations.

## **Definition of Terms**

Diastolic Blood Pressure – A measurement of the pressure exerted against the walls of the arteries, while the left ventricle of the heart is at rest.

Federal Emergency Management Agency (FEMA) – The government agency that oversees all aspects of emergency management as it pertains to disasters. The National Fire Academy (NFA) is under the auspices of this agency.

Incident Commander (IC) – The person responsible for all decisions relating to management of the emergency incident.

Incident Command System (ICS) – An organized system of roles, responsibilities, and standard operating procedures used to manage and direct emergency operations.

International Association of Fire Chiefs (IAFC) – An organization of chief fire officers with the purpose to further the professional advancement of the fire service.

International Association of Fire Fighters (IAFF) – An labor organization representing full-time paid firefighters.

Massachusetts Emergency Management Agency (MEMA) – The Commonwealth of Massachusetts' version of FEMA under the auspices of the Executive Office of Public Safety.

Mutual Aid – A formal agreement of assistance from fire service agencies from surrounding communities.

National Fire Protection Association (NFPA) – An association borne out of the

insurance industry over 100 years ago whose mission is to promote fire safety. They write all standards relating to the fire service including the National Fire Codes.

Personal Protective Equipment (PPE) – Approved protective gear suitable for hostile firefighting conditions sometimes referred to “turnout gear.”

Rating of Perceived Exertion (RPE) – Sometimes referred to as Borg’s Rating of Perceived Exertion, is how hard you feel you are working. Widely used by physicians and trainers.

Rehabilitation – An organized procedure for providing for the safety and welfare of all members by providing them with rest, rehydration, and nourishment.

Standard Operating Procedures/Guides (SOP/G’s) – A set of instructions used by fire officers as guidelines to execute orders.

Sun Stroke – a type of heat stroke caused by a failure in the body’s cooling system. Dehydration contributes to sunstroke.

Systolic Blood Pressure – A measurement of the pressure exerted against the walls of the arteries during contraction of the heart muscle.

United States Fire Administration – Government agency responsible for the reduction of life and economic losses due to fire and related emergencies

## RESULTS

1. What is required in the various National Fire Protection Association (NFPA)

Standards to offer protection to firefighters regarding heat related injuries?

All NFPA standards mentioned state that the fire department shall provide for firefighter rehabilitation working at emergency incidents. Specifically, *NFPA 1584 Recommended Practice on the Rehabilitation of Members at Incident Scenes and Training Exercises (2003)*

*ed.*), under the section on *Rehabilitation During Emergency Operations* states that the fire department has to develop Standard Operating Procedures that provide for rehabilitation for firefighters operating at emergency incidents and training exercises (2003, 6.2).

In addition, NFPA 1584 states that the incident commander must consider and initiate rest and rehabilitation, including medical evaluation and treatment if necessary, fluid and food replenishment of its members operating at emergency scenes (2003, 6.3). NFPA 1584 states, too, that such on scene rehabilitation shall include basic life-support care personnel and preferably advanced life support personnel be available on scene (1584, 6.3.1).

Also, *NFPA 1500, the Standard on Fire Department Occupational Health and Safety (2007 Edition)* states The fire department shall develop SOP's that outline a systematic approach for the rehabilitation of members operating at incidents (2007, 8.9.1). It further states that the incident commander shall consider the circumstances of each incident and initiate rehabilitation in accordance with the SOP's and with *NFPA 1561* (2007, 8.9.2).

Additionally, *NFPA 1561 Standard on Emergency Services Incident Management Systems (2005)* stating that Emergency Incident Rehabilitation makes similar provisions concerning the incident commander's responsibility to make suitable provisions for rest and rehabilitation of personnel operating at the scene. The standard continues to state that the incident commander shall consider the circumstances of the incident and make provisions for the rest and rehabilitation for each responder (1561, 5.4.1). It further states that all responders receive a new incident assignment, return to staging to receive a new incident assignment, or be released from the incident. (1561, 5.4.2).

*NFPA 1521 Fire Department Safety Officer (2007)* in Section 6.2 requires in the functions of the safety officer concerning overall scene safety, that he/she shall ensure the incident commander establishes an incident scene rehabilitation tactical level management unit during emergency operations (1521, 6.2.2). The standard calls for rehabilitation at all types of incidents, including emergency medical service incidents, HazMat incident, and other specific types of incidents, as well (1521, 6.2.3).

*NFPA 1710 the Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2004 Edition)* states that relative to overall safety and health systems that a fire-fighter occupational safety and health program shall be provided in accordance with NFPA 1500 (2004, 6.1) and that the incident management system shall be provided in accordance with *NFPA 1561* to form the basic structure of all emergency operations of the fire department, regardless of the scale of the department or the emergency (2004, 6.2.1).

Clearly, many NFPA standards have addressed the need for incident commanders, safety officers, and other supervisors to establish emergency incident rehabilitation for personnel operating within their span of control (NFPA 1500, NFPA 1584, NFPA 1561, NFPA 1521, and NFPA 1710).

2. How would an emergency incident rehabilitation program be beneficial to the members of the Lynn Fire Department?

According to all applicable NFPA standards and SOP's from fire departments in many major U.S cities, there is an overwhelming need for establishing such a rehabilitation program.

Firefighters will benefit by the added measure of safety and its resultant positive effect of firefighter health and well being. Firefighting is still an extremely dangerous job and the very nature of the inherent danger requires that we try to minimize our exposure to injury and death. We will continue to find ourselves at risk of death and injury at emergency scenes because of the unpredictability of the fire and the fire building (Wieder, 1999).

3) How can an emergency incident rehabilitation program be integrated into the Lynn Fire Department?

One way to integrate an emergency incident rehabilitation program is to develop Standard Operating Procedures (SOP's) to provide for this service. SOP's from many fire departments call for the establishment of rehabilitation sectors. Boston, New York City, Phoenix, Las Vegas, - to name a few - are fire departments who have written SOP's and policies relating to emergency incident rehabilitation for its personnel (City of Phoenix Fire Department web site) (American Heat video, September 2002). The United States Fire Administration states that an emergency incident rehabilitation program can be established in any fire department with minimal impact on human, fiscal, and equipment related resources and a successful rehabilitation program will improve the moral of the department and will increase the level of productivity as well (USFA Publications, FA-114).

While NFPA 1500 sets up the general guidelines for the establishment of the rehabilitation program, it is up to the individual fire departments to determine the proper implementation of the guidelines. For some small departments, private buses or similar vehicles may offer the shelter necessary for firefighter safety (Cline, 1997).

Resources to set up a rehabilitation sector can be provided by the Lynn Fire Department for the initial rehabilitation operation in a number of ways. On extended incidents, outside help

will be needed, such as private ambulance services or other agencies such as the Red Cross. (Wieder, May 1999).

Lynn Fire Department ambulances and outside contract ambulances could provide this function, especially medical monitoring. District chief aides could be utilized as well. An additional fire company – an engine company or a ladder company - could be dispatched to provide for rehabilitation. We could then get additional assistance through the mutual aid agreements. In any case, the incident commander and/or safety officer could be charged with the responsibility of implementation and management (NFPA 1584).

4. Will the anticipated additional dollar cost to implement an emergency incident program be cost effective for the LFD as it pertains to the United States Fire Administration's operational objective "C": Reduce the loss of life from fire of firefighters?

Safety costs money. To the extent that a firefighter's life is extremely valuable, there is never a reason not to expend whatever resources necessary to protect firefighters. The cost for training would only be a minimal cost – nothing that would be considered cost prohibitive (MFA, 2001). However, the cost of a vehicle(s), the cost of equipment and supplies, and the cost of additional people to provide the rehabilitation function would be expensive, especially if we had to hire new people in addition to the personnel we currently have. This would probably not be the case, because we could use the people we already have. We would need to shift people around to provide the rehabilitation service (Wieder, May 1999).

The only change that needs to be made in the current response system is to dispatch an additional unit to serve as the rehabilitation sector. Depending on how to do it will determine which piece to send. One way to accomplish the task of establishing a rehabilitation sector is to

send the next due fire apparatus – either an engine company or a ladder company. It may be more plausible to dispatch an engine company as opposed to a ladder company simply because of the fact that more engine companies are available under ordinary circumstances. This engine company will move up and an additional engine company may need to come from the mutual aid network (Wieder, May 1999) (NFPA 1584) (USFA, FA-114, 1992).

Another way to establish a dedicated rehabilitation unit is to allow the current system of getting Rehab 5 to respond, which is a sensible decision. Since Rehab 5 has been responding to all incidents for many years now and because they provide an excellent and reliable service, this may be the best option. However, a time may come when Rehab 5 – for whatever reasons - may or may not be able continue its current commitment of providing rehabilitation services to all of District 5. The cost for this service is minimal as it is a non-profit operation that relies solely on donations from area departments and firefighter unions.

The training requirement is something else to consider as far as cost is concerned. The Massachusetts Firefighting Academy offers a course in Rehabilitation at no cost to fire departments, unless it is considered a “municipal hire.” A municipal hire costs the department money because it is not offered to all firefighters in Massachusetts. Rather, it is for the host department only. We could send our members to get that training or get fire department instructors to get it and then train our own people. In either case, it wouldn’t be difficult to get the proper training to accomplish our goal (MFA, 2001).

## **DISCUSSION**

The study conducted in this research paper has shown the author that there is more to establishing an emergency incident rehabilitation sector than just giving firefighters a drink of

water. It involves a considerable amount more than that. Training department members in rehabilitation responsibilities, basic survival skills on the fireground, the rehabilitation concept, and the standard operating policies are all interrelated when attempting to provide a successful rehabilitation program (Wieder, 1999).

Wieder believes fire departments have made considerable progress with regard to rehabilitation since NFPA standard 1500 came out in 1987, but there is still a lot more that can be done to improve in this area (Wieder, 1999). Most fire departments have established plans for the rehabilitation their personnel in recent years. However, he said, we should review those plans and critique their actual performance to make sure that our rehabilitation operations are still properly serving their target audience: our firefighters and other emergency responders (Wieder, 1999).

Further, when justifying the importance of implementing a rehabilitation area, FEMA/USFA *Emergency Incident Rehabilitation* guidelines (1992) states:

Recent studies have concluded that properly implemented fireground rehabilitation will result in fewer accidents and injuries to firefighters. Moreover, responders who are given prompt and adequate time to rest and rehydrate may safely re-enter the operational scene, which may reduce the requirement for additional staffing at the incident (n.p.).

This thought is confirmed in more recent literature by Hal Burnett (1998) in that:

The purpose of a rehab programme is to ensure that the physical and mental conditions of emergency workers do not deteriorate to a level that will affect the safety of that worker or the safety and integrity of the operation (p.28). Washburn, Leblanc, and Fahey (1998) say that the leading cause of fatal injury to firefighters in 1997 was stress resulting in heart attack and that, health and safety issues should be our first priorities in the battle to reduce on-duty firefighter deaths (p.58).

As a result of this study, this author has come to the conclusion that the Lynn Fire Department's past efforts to rehabilitate firefighters was deficient in all areas recommended by

the literature, such as crew rotation, medical evaluation and treatment, food and fluid replacement, and relief from extreme climactic conditions. The LFD has sent firefighters to rehabilitation, but not soon enough and we are relying on the generosity of volunteer organizations (e.g. Rehab 5) to provide the rehabilitation service we should be providing (Treadwell, 1999).

Currently, no medical monitoring is conducted by the LFD unless specifically requested. Research has indicated that medical monitoring provides the best indicator of stress levels and recovery. Recommendations by the literature include checking of the pulse, blood pressure, and respiration rates with the pulse being the best indicator of recovery (Wieder, 2000). The result of this study has led to a greater awareness by the author of the importance of establishing an emergency incident rehabilitation area at emergency scenes. The research also shows the necessity of having a written SOP in place that deals with emergency incident rehabilitation. As a result of this research, the author has concluded that what the LFD provides for rehabilitation falls way short of what is actually required.

The development of a formalized and recognized emergency incident rehabilitation program would reap several benefits for the members of the LFD. These include personnel knowing the conditions when rehabilitation needs to be implemented and their specific responsibilities if they are assigned to the rehabilitation sector. It would allow the department to spot potential medical problems early and start treatment before the development of more serious medical problems becomes evident.

Additionally, it allows for a continuous rotation of fresh personnel to assign at the emergency scene. The most important aspect of providing an emergency incident rehabilitation program would be to take care of our most important asset, our members. It has been many

years in the making, but we are now finally starting to see a significant change in attitude regarding taking better care of ourselves. Upper management in LFD are now committed to providing firefighters with any necessary resources regarding safety. The cost of such a program would be paid for by the current leadership of LFD willingly. Again, firefighter safety is of paramount importance to the department.

## **RECOMMENDATIONS**

After the completion of the research, I feel the Lynn Fire Department should adopt a formalized policy of providing an emergency incident rehabilitation program as set forth by NFPA 1584 and other pertinent NFPA standards (i.e. NFPA 1521, 1561, 1500 and 1710).

I have reached this conclusion because of the benefit it will provide the department and its membership. The use of an emergency incident rehabilitation program will greatly increase the safety and health of the firefighters operating at the scene, which in turn, will provide for a much-improved overall wellness program (Wieder, 2000).

The use of an emergency incident rehabilitation program is not a new concept. It has been with us for many years in varying degrees. Like overall scene safety, a heightened awareness of the importance of rehabilitation, in particular, has been realized. Edward T. Dickinson, M.D. and Michael A. Wieder say, “For many years, the fire service treated the element of job-related danger as a badge of courage, has been seen in recent years. Attitudes are changing concerning safety in general and worn with pride. In the last twenty years, the attitude of the fire service toward safety has changed dramatically” (Emergency Incident Rehabilitation, IFSTA, 2000, p. 3).

The literature review has provided this author with the needed information to implement an effective emergency incident rehabilitation program to meet the desired purpose of this

research project. An effective rehabilitation program will have a significant and positive impact on the health and safety of our members (Wieder, 2000).

An SOP has been developed (Appendix A) for future use for establishing a rehabilitation program. It clearly outlines and identifies the roles and responsibilities of the rehabilitation sector and how it will work at an emergency incident. It also outlines what supplies and equipment are needed in the Rehabilitation Sector. Emergency Incident Rehabilitation Reports (Appendix B and C) clearly state what information needs to be gathered and recorded when members enter the Rehabilitation Sector regarding medical evaluation.

Based on additional information gained in the literature review, the author has come to see the benefit associated with an emergency incident rehabilitation program. It is recommended that an emergency incident rehabilitation program be implemented as soon as reasonably possible. Undoubtedly, the most economically efficient way to provide for this service is to continue the present system currently in place. That is, to have Rehab 5 – a private, non-profit company - provide the rehabilitation service and have each municipality in District 5 pay Rehab 5 for this service. This is the most cost-effective way to provide rehabilitation services.

However, I believe that the municipal fire departments have an obligation to provide this service to an even greater extent. I also believe that they are somewhat remiss in their duty. The fact that Rehab 5 has been providing the service successfully since 1987 proves that they are more than capable, qualified, and reliable enough to provide rehabilitation services in the future.

## REFERENCES

- Burnett, H. (1998, May). *Protecting One's Own*. Fire International, 28.
- Cline, J. (1997, February). Rehab Units at Work. *Fire Engineering*, 150, 71-72.
- Commonwealth of Massachusetts, Department of Fire Services, Massachusetts Firefighting Academy, (2001, January). *Rehab, Instructor Guide*, 4-4 – 4-7, and 6-2 – 6-5.
- Community Service Emergency Rehab, Ltd. *Community Service Emergency Rehab District 5*. Retrieved September 27, 2007, from <http://www.rehabfive.org/>.
- Dickinson, E. and Wieder, M., *Emergency Incident Rehabilitation*. Brady, IFSTA: 2000.
- Federal Emergency Management Agency, United States Fire Administration. 1992. *Emergency Incident Rehabilitation (FA-114/ July 1992)*. Retrieved September 5, 2007 from <http://www.usfa.dhs.gov/downloads/pdf/publications/fa-114.pdf>.
- Jefferson Labs, Inc. 2007. *Appendix 6670-TS: Heat Stress Index and Regional Climatic Data* [Electronic version]. Retrieved September 27, 2007, from <http://www.jlab.org/chs/manual/EHSbook-549.html>.
- National Fire Protection Association. 2007. *NFPA 1500: Standard on Fire Department Occupational Safety and Health*, 2007 Edition. Quincy, MA: National Fire Protection Association.
- National Fire Protection Association. 2007. *NFPA 1521: Fire Department Safety Officer, 2007 Edition*. Quincy, MA: National Fire Protection Association.
- National Fire Protection Association. 2005. *NFPA 1561: Standard on the Emergency Services Incident Management Systems, 2005 Edition*. Quincy, MA: National Fire Protection Association.

- National Fire Protection Association. 2003. *NFPA 1584: Recommended Practice on Rehabilitation of Members Operating at Incident Scene Operations and Training Exercises, 2003 Edition*. Quincy, MA: National Fire Protection Association.
- National Fire Protection Association. 2007. *NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2004 Edition*. Quincy, MA: National Fire Protection Association.
- Treadwell, L. 1999. *Emergency Incident Rehabilitation Program for the Lubbock, TX Fire Department*. Executive Fire Officer Program, Emmitsburg, MD: National Fire Academy.
- Wieder, M. (1999, May). Operating a Rehab Area-Part 1, *Firehouse*, 24, 52-54.
- Wieder, M. (2000, February). Operating a Rehab Area-Part 2, *Firehouse*, 25, 58-65.
- Wieder, M. (2000, June). Operating a Rehab Area-Part 3: Selecting A Site For Rehab Operations, *Firehouse*, 25, 40-43.

## APPENDIX A

# STANDARD OPERATING PROCEDURE

## EMERGENCY INCIDENT REHABILITATION

### **I Purpose**

To ensure that the physical and mental conditions of members operating at the scene of an emergency or training exercise do not deteriorate to a point that they affect the safety of each member, or jeopardize the safety and integrity of the operation.

### **II Scope**

This procedure shall apply to all emergency operations and training exercises where strenuous physical activity or exposure to heat or cold exists.

### **III Responsibilities**

#### A. Incident Commander

1. The incident commander shall consider the circumstances of each incident and make adequate provisions early in the incident for the rest and rehabilitation of all members operating at the scene. These provisions shall include medical evaluation, treatment and monitoring, food and fluid replenishment, mental rest, and relief from extreme climactic conditions.

#### B. Supervisors

1. All supervisors shall maintain an awareness of the condition of each member operating within their span of control and ensure that adequate steps are taken to provide for each member's health and safety. The command structure shall be utilized to request relief and reassignment of fatigued crews.

#### C. Personnel

1. During periods of hot weather, members shall be encouraged to drink water and activity beverages throughout the workday. During any emergency incident or training evolution, all members shall advise their supervisor when they believe their level of fatigue or exposure to heat or cold is approaching a level that could affect themselves, their crew, or the

operation in which they are involved. Members shall also remain aware of the health and safety of other members of their crew.

## **IV Establishment of a Rehabilitation Sector**

### **A. Responsibility**

1. The incident commander will establish a Rehabilitation sector when conditions indicate that rest and rehabilitation is needed for personnel operating at an incident scene or training evolution. A member with a radio will be placed in charge of the sector and shall be known as the Rehabilitation Officer. The Rehabilitation Officer shall report to the Logistics Officer within the framework of the Incident Command System.

### **B. Location**

1. The Incident Commander will normally designate the location of the Rehabilitation Area. If a specific location has not been designated, the Rehabilitation Officer shall select an appropriate location based on the site characteristics and designations below.

### **C. Resources**

1. The Rehabilitation Officer shall secure all necessary resources required to adequately staff and supply the rehabilitation area. The supplies should include the items listed below:
  - Fluids – water, oral electrolyte solutions, and ice
  - Food – soup, broth or stew in cold/hot plates
  - Medical – blood pressure cuffs, stethoscopes, oxygen administration devices, cardiac monitors, intravenous solutions and semi-automatic defibrillator
  - Other – awnings, tents, chairs, tarps, smoke ejectors, heaters, dry clothing, extra equipment, floodlights, blankets and towels, traffic cones, cool misting machines, fireline tape

## **V Guidelines**

### **A Rehabilitation Sector Establishment**

1. Rehabilitation should be considered by staff officers during the initial planning stages of an emergency response. However, the climactic or environmental conditions of the emergency scene should not be the sole justification for establishing a Rehabilitation area. Any activity/incident that is large in size, long in duration, and/or labor intensive will rapidly

deplete the energy and strength of personnel and, therefore, merits consideration for rehabilitation.

2. Climactic or environmental conditions that indicate the need to establish a Rehabilitation Area is a heat stress index over 100degrees F or a windchill index below 10 degrees F.

#### B. Hydration

1. A critical factor in prevention of heat injury is the maintenance of fluid levels in the body. Water must be replaced during exercise periods and at emergency incidents. During heat stress, the members should consume at least one quart of water per hour. This fluid should be served at a temperature between 40 degrees F and 50 degrees F.
  - a) Rehydration is important even during cold weather operations where, despite the outside temperature, heat stress may occur during firefighting or other strenuous activity when protective equipment is worn.
2. Beverages that contain caffeine should be avoided as they interfere with the body's water conservation mechanisms.
  - a) Carbonated beverages should be avoided.

#### C. Nourishment

1. At extended incidents, food shall be provided at the scene. A cup of soup or broth is highly recommended because it is digested much faster than sandwiches and fast-food products. In addition, foods such as apples, oranges, bananas provide supplemental forms of energy replacement. Fatty and/or high sodium foods should be avoided.

#### D. Rest

1. Personnel sent to the Rehabilitation Area shall be allowed to rest at least fifteen minutes.
2. In all cases the objective evaluation of a member's medical condition shall be the criteria for rehabilitation time.
3. Personnel shall not be released from rehabilitation unless their heart rate is below 110 beats per minute.

#### E. Recovery

1. Members in the Rehabilitation Area should maintain a high level of

hydration.

2. Members should not be moved from a hot environment directly into an air-conditioned area as the body's cooling system could shut down in response to the external cooling.

#### F. Medical Evaluation

1. As personnel enter the rehabilitation area the heart rate and blood pressure should be taken. The heart rate should be measured for 30 seconds as early as possible in the rest period.
2. If personnel exhibit signs or symptoms that could indicate potential medical problems, EMS will be dispatched to the incident for further evaluation. If firefighters exhibit any of the following symptoms, EMS will be requested.
  - a) Diastolic blood pressure is greater than 110mmHg.
  - b) Systolic blood pressure is greater than 180mmHg.
  - c) If after 15 minutes in rehabilitation, the pulse rate is above 140 beats per minute.
  - d) If the firefighter is symptomatic.
3. Pulse rates will be taken from firefighters before they are released from rehabilitation.
  - a) Only those firefighters with pulse rates below 110 beats per minute will be released.

#### G. Documentation

1. All medical evaluations shall be recorded on standard forms along with the members name and complaints and must be signed and dated and timed by the Rehabilitation Officer or their designee.

#### H. Accountability

1. Members assigned to the rehabilitation sector shall enter and exit the sector as a crew. The Rehabilitation Officer shall document the names, crew designations, and the times of entry to and exit from the rehabilitation area.
2. Crews shall not leave the Rehabilitation Sector until authorized to do so by the Rehabilitation Officer.





**APPENDIX D**

**HEAT STRESS INDEX**

		<b>RELATIVE HUMIDITY</b>								
		10%	20%	30%	40%	50%	60%	70%	80%	90%
<b>TEMPERATURE</b>	104	96	104	110	120	132				
	102	97	101	108	117	125				
	100	95	99	105	110	120	132			
	98	93	97	101	106	110	125			
	96	91	95	98	104	108	120	128		
	94	89	93	95	100	105	111	122		
	92	87	90	92	96	100	106	115	122	
	90	85	88	90	92	96	100	106	114	122
	88	82	86	87	89	93	95	100	106	115
	86	80	84	85	87	90	92	96	100	109
	84	78	81	83	85	86	89	91	95	99
	82	77	79	80	81	84	86	89	91	95
	80	75	77	78	79	81	83	85	86	89
	78	72	75	77	78	79	80	81	83	85
	76	70	72	75	76	77	77	77	78	79
	74	68	70	73	74	75	75	75	76	77

NOTE: Add 10°F when protective clothing is worn and add 10°F when in direct sunlight.

<b>APPARENT TEMP.</b>	<b>DANGER CATEGORY</b>	<b>INJURY THREAT</b>
80° - 90°	CATEGORY 1: CAUTION	SUNSTROKE AND FATIGUE POSSIBLE IF EXPOSURE IS PROLONGED AND THERE IS PHYSICAL ACTIVITY
90° - 105°	CATEGORY 2: EXTREME CAUTION	SUNSTROKE, HEAT CRAMPS AND HEAT EXHAUSTION POSSIBLE IF EXPOSURE IS PROLONGED AND THERE IS PHYSICAL ACTIVITY
105° - 130°	CATEGORY 3: DANGER	SUNSTROKE, HEAT CRAMPS OR EXHAUSTION LIKELY, HEAT STROKE POSSIBLE IF EXPOSURE IS PROLONGED AND THERE IS PHYSICAL ACTIVITY.
ABOVE 130°	CATEGORY 4: EXTREME DANGER	HEAT STROKE OR SUNSTROKE IMMINENT!