

Emergency Incident Rehabilitation

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CERTIFICATION STATEMENT

I do 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 _____
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Abstract

The problem was that the Madison Fire Department had an inadequate rehabilitation protocol in place for fireground operations and it did not have a rehabilitation protocol in place for other emergency incidents. The purpose of this paper was to develop and implement an in depth emergency incident rehabilitation protocol for the Madison Fire Department to use.

Action research was used to answer the following questions: (a) What incidents require the establishment of rehab? (b) Who will staff the rehabilitation unit? (c) What authority does rehab have? (d) What are the functions of rehab? (e) What determines when firefighters go to rehab? (f) What determines when firefighters are able to leave rehab and go back to incident work? (g) What determines when firefighters must leave rehab and seek further medical care? Research was performed by finding and evaluating material from online and printed sources. These sources included journal articles, national standards, studies, technical reviews, and subject matter experts. This information was then reviewed and organized through a literature review process. Original research was performed through the use of a departmental survey, a questionnaire, and an informal study. The findings produced from these research methods and the literature review identified specific criteria that answered the research questions of how and when rehab should be performed and led to specific recommendations for the Madison Fire Department. These recommendations were compiled and integrated into a proposed standard operating procedure.

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Emergency Incident Rehabilitation

During the years between 2006 and 2008, it was estimated that 81,070 firefighters were injured on an annual basis nationwide. Of those injuries, 24.9% were attributed to overexertion and strain (United States Fire Administration, 2011). In 2010, 87 firefighter fatalities occurred in the United States. Of those, 63.2%, or 55, were contributed to stress or overexertion (United States Fire Administration, 2010). Also, it is widely known that, “most firefighter injuries and deaths are the result of preventable situations” (Jones and Bartlett, p. 27).

The Madison Fire Department (MFD) had two major fire incidents last year in which either firefighters passed out during firefighting operations or firefighter activities were significantly delayed as a direct result of insufficient rehabilitation procedures. The problem is that the MFD has an inadequate rehabilitation protocol in place for fire-ground operations and it does not have a rehabilitation protocol in place for other emergency incidents.

The purpose of this paper is to develop and implement an in depth emergency incident rehabilitation protocol for the MFD to use. Action research will be used to answer the following questions: (a) What incidents require the establishment of rehab? (b) Who will staff the rehabilitation unit? (c) What authority does rehab have? (d) What are the functions of rehab? (e) What determines when firefighters go to rehab? (f) What determines when firefighters are able to leave rehab and go back to incident work? (g) What determines when firefighters must leave rehab and seek further medical care?

Background and Significance

The MFD is in the city of Rexburg which is located in Madison County, Idaho. The county is 473 square miles and has a population base of just over 37,500 (U.S. Bureau of the

Census, 2010). Rexburg and Sugar City are the major cities located within this county. Rexburg is considered a gateway community because it is a hub for those traveling to places such as Island Park, Yellowstone National Park, and Jackson Hole. In addition to this, Rexburg is home to the four year university Brigham Young University – Idaho (BYU-I). The university currently has a student population of 14,937 students (Cargal, 2012).

The MFD provides all of Madison County with fire and emergency medical services (EMS) protection. EMS care is provided at the Advanced Life Support (ALS) or Paramedic level. The department also provides mutual aid to numerous surrounding jurisdictions and counties. The MFD is a combination department that employs 12 full-time line staff, 60 paid-call staff, and five administrative staff. Over the last 5 years, many experienced employees have retired. Although the newly hired employees are highly trained, departmental experience levels have seen a dramatic decrease and break down as follows:

- Less than 1 year of experience: 16 employees
- 1 years up to 5 years of experience: 36 employees
- At least 5 years to 10 years of experience: 8 employees
- 11+ years of experience: 17 employees (Firehouse, 2012)

This inexperience has caused the department to evaluate many of its emergency operating procedures in an effort to reduce risk and injury to emergency personnel.

The department responded to 1,838 emergency incidents in 2011 (Firehouse, 2012). Rehabilitation, or simply rehab, was only instituted at a few of these incidents. Rehab is instituted on all structure fire calls. It was not, however, initiated on many wildland fire incidents, hazardous materials (HAZMAT) incidents, technical rescues, vehicle extrications, or mass casualty incidents. Rehab is established by the paid-call staff. They bring a Paramedic

Ambulance to the structure fire incident along with a rehab kit that contains water, electrolyte replacement drinks, and snack food items. Only one provider staffs the rehab unit. The majority of MFD's paid-call staff is only trained to the Basic Emergency Medical Technician (EMT) level. Therefore, the rehab unit is typically staffed by a non-paramedic provider.

On July 24, 2011, the author was personally involved when MFD personnel responded to a mutual aid fire in a neighboring county. The fire was burning through multiple structures and lumber storage piles at a lumber mill. Shortly after the arrival of MFD personnel, the requesting fire department ceased all of their firefighting activities because their personnel were too exhausted to continue working. MFD had initiated their own rehab, but no thresholds were in place for when personnel were to report to and be evaluated by rehab personnel. As a result, MFD also had to cease firefighting operations for a period of time as firefighters became weak and exhausted in the strenuous environment.

On August 19, 2011, a similar occurrence took place on a structure fire within Madison County. The fire was burning through a garage with a heavy fire load from vehicles, fuel containers, and ammunition storage. At this incident, a total of five firefighters suffered from fainting, nausea, and/or exhaustion. All of them required medical attention from rehab personnel. Although rehab had been established, there were still no guidelines present for when firefighters were required to report to and be evaluated by rehab personnel. Also, due to the number of firefighters needing care, the single rehab provider was overwhelmed (C. Child, Memo, August 19, 2011).

Risk reduction is the main aspect of the Executive Analysis of Community Risk Reduction course for which this paper is being written. Reducing risk at the local level through prevention and mitigation and improving local planning and preparedness are also part of the

core initiatives of the United States Fire Administration's (USFA) operational goals ("Strategic Plan," 2010).

With these factors in mind, with the relative inexperience of MFD's staff, and with the recent and significant, or sentinel, rehab events that have taken place within the MFD, the department needs to implement a new emergency incident rehabilitation protocol. In order to do this, the department needs to develop a deeper understanding of the entire scope of rehab, its uses on emergency incidents, and its ability to help prevent emergency responder injury and death. Without proven methods for establishing and performing rehab, MFD's responders will continue to be at a higher risk for injury and death at emergency incidents.

Literature Review

"Firefighters are like professional athletes," says Dr. Lowell Gerber in an interview with the Forecaster (Anderson, 2010), "they go from zero to as fast as possible, they endure a lot of stress and have to perform in adverse conditions" (para. 3). Cybex International (2012), a company that has programs especially to enhance firefighter fitness, also agrees that firefighters are like athletes. Because of the high physical demands on firefighters, they compare the amount of energy used by football players during a game as the same amount of energy that firefighters use during an emergency incident.

Stress or overexertion caused 55 firefighter deaths in 2010 (United States Fire Administration, 2010). Emergency Incident Rehabilitation is a book produced by the USFA that discusses rehab in depth (United States Fire Administration, 2008). This book outlines some of the stressors firefighters are exposed to including: high environmental heat due to outside temperatures, exposure to fire, heavy work conditions, the inability of personal protective equipment to allow firefighters to offload body heat, the strain of performing tasks at high stress

events, and having to perform work at unplanned times of the day. Additionally, this publication also outlines that firefighters are exposed to extreme cold temperatures and this causes added risk of injury.

According to the National Center for Catastrophic Sports Injury (NCCSI) at the University of North Carolina at Chapel Hills (2012), heat related fatalities for sports have increased significantly since 1975. For the years of 1975-1979 the center calculated only eight heat related deaths while tallying eighteen heat related deaths during the years 2005-2009.

The NCCSI are proponents of taking proper care before and after practices to ensure that athletes, who are at risk for heat related injuries, are identified and treated before being allowed to resume sports related activities.

The Kinatex (2012) sports medicine group outlines that football players are at a high risk for heat related injuries due to a combination of strenuous exercise, inadequate fitness levels, high heat environments, inadequate acclimatization, and the fact that the equipment football players wear significantly limits their ability to off-load body heat. This group recommends a six step approach to ensure athletes, who are at high risk for heat related emergencies, stay safe during high impact activities. These steps are:

- **Acclimatization:** Have a progressive program that allows the athlete to work out, in the warm environment, incrementally longer each day. Also, have athletes start working out without equipment and slowly work their way up to practicing in full gear. This will allow their bodies to become more conditioned to the environment they will be playing and practicing in.

- Hydration: Ensure plenty of fluid is available during and after practice. Also make sure athletes replace all fluids lost prior to engaging in practice again the next day.
- Uniforms: Football uniforms contribute to increased core body temperatures. On hot and/or humid days make sure athletes are allowed to remove parts of their uniform in between drills to allow the body to expel heat.
- Overweight and lack of fitness: Both of these factors lead to heat related problems. Pay more attention to those athletes who fall into these categories.
- Cooler athletes perform better: Providing breaks, shaded areas, cold water, misting fans, and reducing the length or intensity of workouts allow athletes to perform better.
- Heat: Have a plan in place to reduce exposure to heat.

Emergency Incident Rehabilitation (United States Fire Administration, 2008) also recommends ways to avoid stress and overexertion from firefighting activities. They are:

- Make sure an adequate number of personnel are used to accomplish jobs.
- Allow firefighters to rest.
- Give medical evaluations on scene.
- Allow emergency workers to eat and hydrate.

Rehabilitation, or rehab, is defined as “to restore or bring to a condition of health or useful and constructive activity” (Merriam-Webster, para. 2). Emergency Incident Rehabilitation (United States Fire Administration, 2008) expands this definition to apply to firefighters. Getting them back to incident work or back to the station ready for future incident work should be the goal of incident rehab.

According to Emergency Incident Rehabilitation (United States Fire Administration, 2008), there are no laws or standards that dictate when rehab should be established. This manual does recommend that incident commanders (IC) should consider multiple factors and then institute rehab if the need for rehab becomes apparent. A department's standard operating procedures (SOPs), the ICs personal experience, common sense, the type of incident, feedback from on scene personnel, and climatic considerations can all be evaluated. This manual further addresses the need to consider rehab during structure fires, high rise building fires, wildland fires, hazardous materials (HAZMAT) incidents, and urban search and rescue incidents. Although lightly touched upon, the manual also points out that training activities should also have rehab established.

The National Fire Protection Association (NFPA) gives some general guidelines for the establishment of rehab through its published standards. NFPA 1584 (2008) states that rehab can be established at both emergency incidents and training activities whenever there are safety or health risks posed to the participants. NFPA 1561 (2008) leaves the establishment of rehab up to the IC. According to this standard, the IC should take into account the circumstances surrounding the incident and then provide rehab based on that information. The supplemental material to NFPA 1584 (2008) suggests that when considering the overall scope of the incident that time, complexity, and intensity are all factors that create additional health and safety risks to firefighters. Time refers to the extended use of turnout gear or extended exposure to weather conditions. Complexity refers to incidents like crime scenes, search and rescue operations, and public gathering type events. Lastly, intensity refers to how much stress, mental or physical, is placed on the responder. These types of incidents would be actual fire attacks, interior search and rescue, and large scale extrications.

In their publication on heat stress, the Center for Disease Control (CDC) offers recommendations to all employers when dealing with heat stress (2012). They recommend the following to avoid problems associated with heat stress:

- Acclimatize workers
- Reduce physical demand on workers
- Trade out workers
- Provide water and other cool liquids to workers
- Ensure workers receive rest periods and water breaks
- Monitor workers

After having one of its own firefighters die, as a result of heat stroke and dehydration, during a low impact training activity, Comox Fire and Rescue changed the way they performed rehab (VFIS News, 2012). For this department, rehab is now a requirement for every training exercise and for every emergency incident.

There is not much information as to what is recommended as the minimum EMS licensure level required for the personnel who staff the rehab unit. NFPA 1584 (2010) is the only guideline that makes a recommendation and it requires Basic Life Support (BLS) as the minimum level of provider available. The supplemental material included with this guideline further explains that even though BLS is the minimum level of care required, departments should consider using Advanced Life Support (ALS) personnel to staff the rehab unit.

In his article “Barriers to an Effective Rehab Sector – Part 4,” Jaslow (2007) says that rehab shouldn’t be doing in depth medical treatments. Instead, rehab should provide a basic and brief medical screening meant to identify new, fireground medical emergencies such as hypertension, de-conditioning, and cardiac ischemia. Jaslow (2007) recommends that there

should be a separate treatment sector for true medical emergencies. He recommends that this sector be located away from the rehab sector.

Bahner and Jaslow (2007) make reference to professional athletes in their article “Barriers to an Effective Rehab Sector – Part 2.” They say athletic trainers are present to be risk managers and protect the overall health of the athlete. They are also there to protect the tremendous investment owners have made in the individual athletes. They call for fire departments to do the same by doing whatever is necessary to have qualified and trained providers on scene for the protection and maintenance of firefighter’s physical and mental well being.

Comox Fire and Rescue (VFIS News, 2012) has a dual approach to rehab. They use local EMS to standby for medical emergencies. Their own firefighters staff the rehab unit. That way if a medical emergency occurs, EMS can transport the patient and rehab remains fully staffed.

McEvoy (2008) suggests that rehab and treatment areas should be kept separate. He says that if a fire department has EMS capabilities, they could perform both functions but that rehab and treatment should remain two separate areas on the fireground. He also recommends that firefighters be involved in the rehab process because they are most aware of the intense physical demands of firefighting. He further recommends that rehab personnel be coworkers of the responders. This allows them to be more familiar with the individual firefighter’s medical history, fitness level, and their usual appearance. Rehab providers will also be more aware of when abnormalities exist.

Emergency Incident Rehabilitation (United States Fire Administration, 2008) recommends that ALS providers be available to provide a more advanced level care that firefighters may require on emergency scenes. The recommendation does not stop there. The

book suggests that certain scenes, including large scale incidents, may require the addition of medical doctors and nurses in order to provide effective rehab for responders.

Emergency Incident Rehabilitation (United States Fire Administration, 2008) also states the need to consider how many responders are available in rehab. While no formulas or guidelines were set forth, consideration should be given to the total number of responders who require rehab, how long the incident is, environmental conditions, and the overall health of the responders when determining staffing levels for the rehab unit. It was also pointed out that not all of the responders need training at the same medical certification level nor do all the rehab workers need to have medical training at all. There are many other functions of rehab, besides medical evaluation, that these workers can perform.

Both NFPA 1584 (2008) and Emergency Incident Rehab (2008) stress that local policies and procedures should be developed to address how rehab is to be performed. They stress the need to evaluate these workers and then recommend actions based on these evaluations. Both of these publications state criteria to look at when withholding a responder's eligibility to return to scene work. NFPA 1584 (2008) specifically states that, based on professional judgment, EMS staff should have the authority to either keep responders in rehab or transport them for more extensive medical assessments and treatments.

McEvoy (2008) stressed that rehab personnel must have authority to detain workers in rehab or even to transport those workers when there are obvious indications that would inhibit them from going back to scene work.

McEvoy (2008) goes on to talk about what functions rehab should perform. He believes they are:

- Relief from climactic conditions: Workers should be able to get away from environmental extremes, such as heat or cold. Workers should also be able to get away from the noise and smoke associated with firefighting activities and any other adverse scene condition. Rehab should be an area where workers can truly rest.
- Rest and recovery: Workers need rest and should be able to do so for at least 10 minutes.
- Cooling or re-warming: If workers are exposed to extreme heat, they should be able to take off their personal protective equipment (PPE) and cool off. Active cooling should also be offered. This can be done by offering arm immersion in cool water, misting fans, and cold towels. Likewise, those exposed to extreme cold should be given blankets and dry clothing, if needed, to enhance warming.
- Rehydration: Workers need to replace any fluids lost through exertion. Water and sports drinks should be available for all workers.
- Calorie and electrolyte replacement: If the event lasts longer than three hours, food should be provided to responders. It is suggested to avoid pizza, in particular, as well as sweets and foods that are fatty.
- Medical monitoring: Responders should be evaluated for, at a minimum, the following:
 - Chest pain, shortness of breath, nausea, headaches, and dizziness.
 - Generalized complaints like cramps or general body aches.
 - Signs and symptoms of either heat related or cold related stress.
 - Changes in behavior, ability to walk, or ability to talk.

- Changes in mental status.
- Changes to vital signs or vital signs that are outside of the department's normal values, as dictated by protocol.
- Refer patients to the treatment area if the medical monitoring shows anything abnormal.
- EMS treatment: Make sure that there is a transporting unit on site to offer both on-site treatment as well as transport to hospitals when required.
- Member accountability: Rehab should be part of the accountability system and the IC should track members through rehab just as they would through other scene operations.
- Release: When a responder is ready to leave rehab, they should be cleared by rehab personnel to resume emergency work.

Rehab should include relief from the environment, rest and recovery opportunities for workers, active or passive cooling measures, fluid replacement, food for longer incidents, medical monitoring, member accountability, release criteria, and documentation according to NFPA 1584 (2008). It also makes reference to workers performing self-rehab. This is different from formal rehab as the responders continue to perform emergency work but they take time for shorter rest breaks and time to rehydrate. Self-rehab does not take the place of formal rehab but allows workers the ability to not become fatigued too quickly during emergency scene operations.

Emergency Incident Rehabilitation (United States Fire Administration, 2008) recommends that rehab follow a process. Step one is to perform self-rehab. After specific criteria are reached, responders should then report to formal rehab. They enter rehab through an

entry point and check in. They are then given an initial medical screening. Responders shed their PPE and other gear at this time. Based on this medical exam, responders are then directed to either the Treatment Unit or the Rest and Refreshment Unit. Lastly a Reassignment Unit is available to give a final evaluation and then recommend either transport to a hospital, reassignment to on scene duties, or demobilization from the scene and return to the station and made available for future emergency work.

A function of the Comox Fire and Rescue (VFIS, 2012) rehab unit is to start rehab prior to the incident. They perform a medical assessment on all participating members immediately before each training event. Because of the impracticality of doing this before every emergency, they do these same medical assessments monthly for every firefighter.

Both McEvoy (2008) and Emergency Incident Rehabilitation (United States Fire Administration, 2008) point to NFPA 1584 (2008) as the standard for determining when firefighters should go to rehab. NFPA 1584 (2008) uses two formats as guidelines: a work to rest ratio and/or self-contained breathing apparatus (SCBA) usage.

The work to rest ratio outlined by NFPA 1584 (2008) says that responders should be required to go through rehab after 40 minutes of intense work. The supplemental material in this guideline states that a more ideal situation would be releasing responders after 20 minutes of work.

The SCBA guideline outlined in NFPA 1584 (2008) says that emergency workers should go to rehab after using a second 30-minute SCBA cylinder or after using a single 40- or 60-minute SCBA cylinder. The supplemental material also states that, ideally, responders would actually be sent to rehab after only using a single 30-minute SCBA cylinder.

NFPA 1584 (2008) also allows the crew's supervisor to adjust these times depending on environmental or operational circumstances.

These guidelines apply to more than just basic structural firefighting, as illustrated in Emergency Incident Rehabilitation (United States Fire Administration, 2008). This publication points out that they can also be applied to high rise building operations, wildland fires, search and rescue, and HAZMAT incidents.

EMS Village (2012) produced a sample firefighter rehab guideline. This guideline places additional criteria for reporting to the rehab unit. These criteria are: exposure to toxic products, burns to the body or airway, generalized weakness, dizziness, muscle cramps, nausea, vomiting, any injury, chest pain, shortness of breath, and headache.

The EMS Village (2012) guideline also sets criteria for moving responders out of the rehab sector. If a responder comes to rehab with a normal presentation, they are allowed to rest for 15 minutes and must rehydrate with 1-2 quarts of fluid. After this time, they are allowed to exit rehab and report to the IC and return to emergency work.

If a responder comes to rehab with an abnormal presentation, but minor symptoms (weakness, dizziness, muscle cramps, nausea, vomiting, or headaches) they are to be given BLS care for 20 minutes. Also, individuals who present with heart rates greater than 110 beats per minute and temperatures greater than 100.6 degrees Fahrenheit (F) receive BLS care for 20 minutes. Responders may return to duty if BLS measures are effective. If BLS measures do not correct the problem, than the EMS Village (2012) guideline recommends that responders receive an ALS evaluation. The ALS provider can then recommend transport based on their findings.

Lastly, this guideline recommends an immediate ALS evaluation of an emergency scene worker, with subsequent transport to a medical facility, if the worker presents with an altered

mental status, chest pain, shortness of breath, or any other significant and life threatening findings.

NFPA 1584 (2008) guides rehab units to provide adequate rest and then evaluate emergency responders prior to releasing them back to work. Responders that have reported to rehab for the first time are eligible for reassignment after a minimum 10 minute rest period. All other responders become eligible after a minimum 20 minute rest period. The guideline gives an option for the worker who is in rehab, but do not feel sufficiently rested, to stay there for a longer duration.

In addition to the minimum rest period, however, responders must not be showing any obvious signs or symptoms that would prevent them from performing their duties in a safe manner. NFPA 1584 (2008) supplemental material explains further what these obvious signs and symptoms are:

- Temperature. A normal body temperature is 98.6 F to 100.6 F. Temperatures outside of this norm should alert rehab providers of possible heat and cold related illnesses.
- Heart rate. A normal, resting heart rate is between 60 and 100 beats per minute. Stress can cause the heart rate to become elevated. The guideline states that a provider's heart rate should return to near normal resting rates after their rest period. If the heart rate is not below 100 beats per minute, the guideline states the responder should not be released back to emergency work but should have further monitoring and possible transport to a medical facility.

- Respiratory rate. A normal respiratory rate is 12 to 20 breaths per minute. If, after the rest period, the respiratory rate is not within these limits, the responder is not allowed to go back to emergency work.
- Blood pressure. Blood pressures that are too high or too low are a cause for concern. The guideline recommends a blood pressure of greater than 160 systolic and/or 100 diastolic as being out of the normal range and responders who have those readings should not be allowed back to emergency work.
- Pulse oximetry. Normal readings are between 95 and 100 percent. Readings less than that indicate hypoxia in varying intensities. Again, responders who have readings less than normal are not allowed back to emergency work.
- Carbon monoxide. Responders with high levels of carbon monoxide might present with changes in mental status. Carbon monoxide should be checked. Normal readings are anywhere from 0 to 5 percent for non-smokers and 5 to 10 percent for smokers. Responders who have reading outside these ranges are not allowed back to emergency work.
- Other significant findings. The guideline suggests that workers who present with chest pain, shortness of breath, weakness, nausea, and etc... should not be allowed back to emergency work.

Emergency responders are also not allowed back on the emergency scene if a member of their immediate crew is injured or killed. NFPA 1584 (2008) says these workers should be removed from the scene as soon as possible and provided with mental health assistance.

The book, *Emergency Incident Rehabilitation* (United States Fire Administration, 2008), suggests following the guidelines as outlined in NFPA 1584, 2008 edition, when determining if

emergency workers are able to leave rehab and return to emergency work or if they require further medical care and treatment.

McEvoy (2008) also recommends following the NFPA 1584, 2008 edition, guidelines when discharging and keeping responders in rehab. He makes the caveat that medical monitoring should be targeted more to the individual department, especially when setting vital sign thresholds. He suggests that if the age of a department's average firefighter is less than 30, they should establish higher upper limits for vital signs. Conversely, if the average firefighter age is greater than 50, the vital sign thresholds should be set lower.

A study was performed by Horn, Gutzmer, Fahs, Petruzello, Goldstein, Fahey, Fernhall, and Smith (2011) to determine timelines for physiological recovery from firefighting activities. This study showed that core body temperature continued to increase for 7 minutes after finishing firefighting activities and the values did not return to baseline until at least 50 minutes after the completion of firefighting activities. The study also showed blood pressures to be reduced during rehab and continued to be significantly lower for at least 120 minutes after firefighters performed emergency work. Cardiac perfusion was also measured and found to be depressed for up to 110 minutes after firefighters completed their work.

Based on that information, this study concluded that the timeline for recovery is longer than the typical 10 to 20 minute rehab period (Horn et al., 2011). The study also found that low blood pressure was a significant risk to responders. Although the study attempted several different rehab procedures, they were unable to find anything that altered the recovery timelines.

This concludes the review of literature for this project. This review followed a logical process. Information was first sought to gain a basic understanding of rehab and what incidents required the establishment of rehab. The initial research findings often compared firefighters to

athletes and the need to provide care in similar manners. Athletes and firefighters have both experienced tragic losses due to system or protocol failures. Both the athletic realm and the firefighter realm of research led to findings dealing with rehab during times of environmental extremes, times of high energy output, and times when personnel were placed under significant stress whether due to work or because of the equipment they were required to wear.

Working off of these findings, the literature review naturally led to break up rehab into its smaller components: who provides rehab and what authority do they have, what takes place in rehab, what determines when rehab is utilized, and what determines the outcome of those who go to rehab?

While searching out relevant information to answer these questions, three sources quickly rose to the top as the standard that others were using to develop their policies. These three sources were the NFPA 1584 (2008) standard on rehab, the USFA's Emergency Incident Rehabilitation publication, and the article, published in Fire Engineering, by Mike McEvoy on fireground rehab. While there was an abundance of information available, other sources all referenced their findings back to these publications. During the examination of these documents, the information they contained was found to be extensive and provided ample material to answer the research questions posed.

Although these sources provided sufficient information on all aspects of rehab during emergency operations, much effort was made to continually search out other references that would add to the information already collected. This led to the data gathered from Comox Fire and Rescue, the sample guideline from EMS Village, and the fireground rehab study by Horn et al. These additional resources provided valuable insight to the research and varying perspectives.

Procedures

The focus of this paper was to find information on rehab and how it applies to various emergency incidents and then use that information to produce a working protocol for MFD to use in the future. During this process it was important to have questions answered on when rehab should be implemented and how it should be carried out once it has been initiated. Action research was used during this project to identify this information and produce this protocol.

Numerous hours were spent collecting information and researching this topic. The Learning Resource Center (LRC) at the National Fire Academy (NFA), local data procured from department statistics and incident reports, the internet, accessing MFD's library of NFPA standards, a department survey, a questionnaire, and an informal study were all used as resources for procuring data for this project.

The LRC was utilized to identify and obtain a list of the current data available on emergency incident rehabilitation. This list was found by using the computers available in the LRC and accessing the LRC's database. This information was pulled and reviewed to find the most applicable resources. These resources were copied or found to be available in electronic format. These materials were then transported home or accessed from home during the final development of this project.

The MFD uses a program called Firehouse to store data related to the emergency incidents the department responds to as well as information for the department overall. Using Firehouse's search function, relevant facts were procured as they related to sentinel, or significant, events and overall statistics for MFD. The department also maintains a printed library of all the current NFPA standards. Using information found at the LRC, a list of applicable standards was reviewed from this library.

The internet was invaluable in looking up the electronic format of articles found at the LRC as well as locating new information. The website www.google.com was used to search for relevant articles using keywords from the author's research questions. Some of the keywords and phrases included firefighter rehab, staffing rehab, rehab requirements, emergency incident rehab, EMS and rehab, rest, re-hydration, and rehab safety. This led to accessing information through numerous websites.

A survey, named the Madison Fire Department Emergency Incident Rehabilitation Survey (Survey), was administered to MFD personnel. The survey was placed online, during the entire month of April, 2012, and could be completed anonymously. The purpose of this survey was to gain an understanding of how the department viewed rehab and identify any obstacles that may need to be overcome when developing a rehab protocol. Using the author's research questions as a basis, the survey questions were developed.

The survey was opened to anyone with at least one year of experience. Members with less than one year of experience were excluded because the author felt that they had not had sufficient exposure to emergency scenes and therefore their opinions may lack sufficient understanding. The author was also excluded from the survey. This left 60 department members who were invited to participate. Each member was personally invited to take the survey. Later, follow up emails and messages were left as reminders. Of the 60 department members, 44 responded to the survey.

Appendix A contains a copy of the Madison Fire Department Emergency Incident Rehabilitation Survey while Appendix B contains the Madison Fire Department Emergency Incident Rehabilitation Survey results.

A questionnaire was also used to gain feedback on the fires described in the Background and Significance portion of this paper. This questionnaire was sent, to the key members of these two incidents, on April 30, 2012, and the results were collected over the following week. The key members selected were the IC's, crew supervisors, and the line staff that utilized rehab during these incidents. Questions were again derived from the author's original research questions but were tailored to fit the circumstances surrounding these fires. The title of this document is the Sentinel Incidents Questionnaire (Questionnaire).

The purpose of this questionnaire was to gain a better perspective from actual incidents within the MFD. In addition, the survey was delivered to the IC's, crew supervisors, and line staff to see if there was a differing of perspectives, as it related to these incidents, between leadership and the line staff. A personal invitation was extended to these key members, the two IC's and 10 line staff, to complete the questionnaire. This document was sent out by email and returned by email. Follow up emails and messages were sent until all of the questionnaires were completed.

Appendix C contains a copy of the Sentinel Incidents Questionnaire and Appendix D contains the Sentinel Incidents Questionnaire Results.

Finally, an informal study was conducted, on May 4, 2012, to observe how vital signs are affected by strenuous activity as well as how they respond to rest after work has been performed. This study, entitled the Work Recovery Study (Study), was not developed to gauge between males and females, to differentiate between body types or weights, nor was it developed to differentiate between members of varying ages. The study was simply designed to casually observe how basic vital signs react to strenuous activity and then how they respond once that activity is completed and a period of rest is implemented.

The study was conducted by observing the author, the author's assigned fire crew, and a second three man crew before and after 30 minutes of strenuous activity. Thirty minutes was chosen to relate to the use of a 30 minute SCBA cylinder during fireground operations. Seven people were chosen to simulate a four person engine company and a three person engine company. This corresponds to the size of MFD's crews that would work and rehab together on an emergency incident.

The strenuous activity performed by this group was a circuit training activity that consisted of fifteen push-ups, eight pull-ups, fifteen yards of lunges, and fifteen incline sit-ups. This circuit was performed, in sequence, for twenty minutes without rest. These activities used each person's own body weight as resistance and therefore could offer some control in the amount of energy each person was expected to expend. After performing the circuit, the test subjects then ran on a treadmill for ten minutes, at a zero percent incline, and a speed of six miles per hour.

Vital signs were taken for each individual before the activity, immediately after the conclusion of the 30 minute routine, 10 minutes into the rest period, and 20 minutes into the rest period. The vital signs taken were heart rate, blood pressure, and oxygen saturations. Also measured was the subject's weight before the activity and after the twenty minute rest period. The crews were allowed to sit and perform oral rehydration during the rest period. Additionally, the test gauged how each subject felt before and after the exercise. The results of this informal study are presented in Appendix E.

A limitation of this paper was that surveys, interviews, or observations were not administered to other departments. These could have yielded additional information on how

others are implementing and using rehab. However, the author felt that these questions were covered adequately through the literature review.

A final limitation is that, because the materials used in this paper were derived from many sources, the author has assumed the data procured from others was accurate and unbiased.

Results

Three separate activities were performed in an effort to find information pertaining to the research questions. Using a survey, a questionnaire, and an informal study, the author was able to find the answers sought. The results are presented at this time. Because of the significant data available from the survey, the questionnaire, and the study, all of the data is not offered in this section. The entirety of the data has been included in the aforementioned appendices and can be referenced for data specifics. However, a summary of the appropriate findings are presented here.

The initial question of this paper sought to recognize which incidents require the establishment of rehab.

Respondents to the Survey (April, 2012) selected structural fires, wildland fires, and HAZMAT incidents as those most needing rehab. Ninety percent or greater chose these options while only 63 % chose crash rescue as needing rehab. Mass casualty EMS incidents, technical rescue, and training incidents were in the median range for responses to this question. Those choosing to make comment stated that any incident that was long and could cause exhaustion should have rehab established.

The second research questions looked to an answer of who should staff the rehab unit.

The Questionnaire (April 30, 2012) resulted in the majority of respondents stating that a higher level of care should be a part of rehab, specifically identifying a Paramedic as the one

most desired. Those who stated that an EMT was appropriate stated this because there were also Paramedic providers that could be called away from scene work if needed. Several responders stated they were uncomfortable with this practice and the higher level of care should be available immediately.

The Survey (April, 2012) had 24 of 44 respondents state that rehab should be staffed by a mixture of certification levels as long as at least one is a paramedic, 11 chose a basic EMT, 9 a paramedic, and three an advanced EMT with IV capabilities. The comments had three responders who would want a paramedic while three responders stated a basic EMT would be fine.

This Survey (April, 2012) also had 28 out of 44 respondents say they think rehab should be staffed by two people. The next highest answer was staffing with one individual and this was selected by 10 people. Seven responders requested a minimum of three to staff the rehab. Ten people gave comments as well and they all stated that the size of rehab should be dictated by the size of the incident.

Only three of the twelve Questionnaire (April 30, 2012) responders thought that there were an adequate number of rehab personnel on the sentinel events. Of these three, one felt the staffing level was appropriate because the scene was able to expand rehab. Those who felt staffing was inadequate recommended two to three rehab personnel should be available.

The next research question asked what authority rehab should have.

The Survey (April, 2012) results showed that MFD responders thought that rehab should have complete authority to require responders to report to rehab as well as keep them there based on medical criteria. Twenty-six out of forty-four responders chose this option. The next highest response, chosen by 13 of 44, was that rehab should have some authority. Specifically that they

should be allowed to hold responders in rehab based on medical criteria but they would not have authority to require them to come to rehab. None of the responders thought that rehab should have no authority.

Another research question looked to find what the functions of rehab are.

MFD members selected the following, through the Survey (April, 2012), as the functions they most believe rehab should perform: provide warming and cooling in an enclosed area, provide advanced incident medical screening (blood pressure, heart rate, oxygen saturation, temperature, blood glucose levels, EKG monitoring, and carbon monoxide monitoring), and provide oral and IV hydration and food.

The Questionnaire (April 30, 2012) revealed that hydration, snacks, shade, and basic medical monitoring were provided on the garage fire while hydration, food, and shade were provided on the lumber mill incident. The participants felt the items provided (food, water, shade) were adequate with the exception of two responders. They stated the rehab unit ran out of food and water.

The fifth question asked was what determines when firefighters go to rehab.

The Survey (April, 2012) shows the belief that responders should present to rehab based on an accumulation of factors (environment, time of day, number of calls previously responded to, length and intensity of work-out during the day, etc...), a combination of time spent working and the amount of time an SCBA was used, and the type of clothing being worn during the incident (HAZMAT suit versus wildland firefighting gear).

The Questionnaire (April 30, 2012) revealed that there were varying opinions as to why firefighters reported to rehab. It was stated that firefighters self-reported, were requested by the IC to report, that other crew members sent them to rehab, that protocol dictated when they

responded, or that they did not respond at all. The Questionnaire also points out that strenuous work was being done both with SCBA protection and without. Those who used the SCBA used two to three bottles before reporting to rehab. Those who worked without the SCBA stated doing so for anywhere between one and four hours of work.

The Study (May 4, 2012) showed that five of seven participants experienced lightheadedness after 30 minutes of strenuous activity. One of the two participants that did not feel lightheadedness did state he felt significant fatigue after the 30 minute.

The last questions sought to resolve what determines when firefighters are able to leave rehab and return to work or leave rehab to seek further medical care.

The Survey (April, 2012) revealed support for allowing responders back to emergency work after meeting criteria based on vital signs, refreshment, and time spent resting. The Survey also supports responders leaving rehab, for further medical care, if they have a sentinel event at any time (syncope, chest pain, shortness of breath, etc...) or if the responder's vitals fall outside of acceptable standards during the time they are in rehab.

The Questionnaire (April 30, 2012) showed confusion among the responders as to what determined when personnel were allowed to return to emergency work or if they required care. Some stated that a logical format was followed (i.e. rest periods along with vital signs) while some simply stated they self-determined if they were ready to return to work. Some responders stated it was the IC who determined when they were ready while others said rehab personnel made that determination. One responder stated he was asked how he felt but also felt peer pressure to return to work.

The Study (May 4, 2012) showed that all of the participant's vital signs failed to return to baseline by the end of the 20 minute rest and rehydration period. Six of seven participants stated

they felt they could perform more work after they had rested for 20 minutes. One participant stated they were still not ready to perform more work after this time limit. Another item of note, all of the participant's heart rates continued to be at or above 100 beats per minute after 20 minutes. Finally, weight loss for all of the participants was between on-half and one pound. This was measured after twenty minutes of rest and rehydration.

As a result of these findings, and the project as a whole, a sample SOG has been included in Appendix F. This SOG incorporates answers to the research questions. Specifically addressed in this SOG are more specific inclusion criteria for establishing rehab, recommendations for staffing numbers and certification levels of providers operating rehab, and how rehab is to perform its functions including accountability, medical evaluations, and the disposition of members undergoing rehabilitation.

Discussion

This research was performed to identify when and how emergency incident rehabilitation should take place. The sentinel events that took place with the MFD last year showed the risks involved with not implementing a comprehensive plan for rehab. The author's research, coupled with the associated literature, has provided ample information for developing this plan. The following discussion will compare and contrast the information gathered and set forth any implications as they relate to the MFD.

The book, *Emergency Incident Rehabilitation*, states that, "When to establish rehab operations at an incident remains more of an art than it is a science" (United States Fire Administration, 2008, p. 73). NFPA 1561 (2008) chapter 4.6.1 states that, "The incident commander shall consider the circumstances of each incident and make provisions for the rest and rehabilitation of responders operating at the scene." NFPA 1584 (2008) chapter 6.1.1 also

gives latitude to the IC. It states that, “Rehabilitation operations shall commence whenever emergency operations or training exercises pose a safety or health risk to members.”

These are vague guidelines. To help guide the IC in determining when to establish rehab, Emergency Incident Rehabilitation (United States Fire Administration, 2008) lists structure fires, high rise building fires, wildland fires, hazardous materials (HAZMAT) incidents, urban search and rescue incidents, and training. The Survey shows MFD members are also in agreement with this list (Survey, April, 2012).

Many of these incidents have the potential to produce significant heat stress on responders. Due to a death, from heat stroke and dehydration, of one of their own firefighters, Comox Fire and Rescue now has rehab part of all training and emergency incidents. “In the past we treated our firefighters as most other fire departments did. We worked them hard and gave them a water break every once in a while.” They go on to say, “This unfortunate death changed all of that for us. We now have a very formal Firefighter Rehab policy and procedure” (VFIS News, 2012, p. 1).

Chief Corey Child was the incident commander on the sentinel fire incident of August 19, 2011. In his Questionnaire response of how his view of rehab had changed, as a result of the incident, he stated, “I immediately had an increased anxiety for more thorough rehab—better medical monitoring for those in rehab, and the desire for better rehab ‘treats’” (Questionnaire, April 30, 2012).

Captain Chris Huskinson also expressed his desires for rehab by saying, “In my lowly opinion rehab should be established at every incident early on but it takes a back seat due to lack of trained personnel, lack of personnel, and personnel wanting to get into the action and having no desire to staff a rehab area” (Questionnaire, April 30, 2012).

Without rehab being properly established on the right incidents, MFD may be exposed to incidents similar to what Comox Fire and Rescue experienced. The sentinel events of last year and the resulting research shows there is frustration, on behalf of MFD personnel, and room for improvement in the current SOG.

While NFPA 1584 (2010) and Jaslow (2007) state that BLS care is all that is required for personnel staffing the rehab unit, ALS providers should be made available, according to Emergency Incident Rehabilitation (United States Fire Administration, 2008). “The availability of ALS personnel is crucial at large-scale incidents, incidents that require firefighters to operate at the limits of their endurance, and those incidents in conditions where serious heat- and stress-related illnesses are likely” (United States Fire Administration, 2008, p. 117).

The Survey (April, 2012) and Questionnaire (April 30, 2012) identified the desire, by most, to have at least one paramedic as part of rehab. Chief Child expressed his anxiety when a paramedic was not immediately available during the August 19th incident. Firefighter David Harrington expressed the need for paramedic care during incidents, “If we are so geared towards providing the citizens we serve with ALS care than in turn why are we not providing that same level of care to our own people” (Questionnaire, April 30, 2012).

Additionally, the Survey (April, 2012) and Questionnaire (April 30, 2012) revealed that the opinion of MFD’s current staffing level, of one provider, is inadequate. The results suggested that a minimum of two responders be present in rehab. Emergency Incident Rehabilitation (United States Fire Administration, 2008) also states there could be multiple responders available to staff rehab. Chief Mikel Walker agrees saying, “I think that there should be at least two personnel staffing rehab” (Questionnaire, April 30, 2012).

Since the MFD provides both fire and EMS services, and since EMS services are provided at a paramedic level, staffing the rehab unit with at least one paramedic is plausible as is staffing the unit with additional personnel.

NFPA 1584 (2008) and McEvoy (2008) both state that rehab should have authority over keeping workers in rehab or transporting workers when necessary. Emergency Incident Rehabilitation (United States Fire Administration, 2008) leaves the authority of rehab up to local policies.

Most of the Survey (April, 2012) responders, however, felt that rehab should also have authority over requesting scene workers to come to rehab. Perhaps this was due to confusion that usually takes place over the authority rehab has. In the Questionnaire (April 30, 2012), respondents demonstrated this confusion by stating that anyone from the IC, to protocol, to the individual firefighter made the decisions of when to come to and when to leave rehab.

NFPA 1584 (2008) chapter 6.2 states that, "Rehabilitation efforts shall include providing the following," and the list includes: relief from climactic conditions, rest and recovery, active and/or passive cooling or warming as needed for the incident type and climate conditions, rehydration (fluid replacement), calorie and electrolyte replacement, medical monitoring, accountability, and release. Emergency Incident Rehabilitation (United States Fire Administration, 2008), McEvoy (2008), and MFD department members have similar lists for the functions of rehab (Survey, April, 2012).

MFD members, through the Survey (April, 2012) additionally requested that the medical monitoring include advanced incident medical screenings (blood pressure, heart rate, oxygen saturation, temperature, blood glucose levels, EKG monitoring, and carbon monoxide monitoring).

Each of these functions is well within MFD's ability to perform. However, a problem identified with a function of MFD's rehab was that, "The rehab ran out of everything," said Lieutenant Joseph Haeberle about the August 19th sentinel event (Questionnaire, April 30, 2012). So, in addition to providing certain services, rehab needs to be well stocked with supplies so they do not run out when workers need them.

"NFPA 1584 provided the first standards-driven direction on recommended work-to-rest ratios and guidelines at structure fires or similar incident," says Emergency Incident Rehabilitation (United States Fire Administration, 2008, p. 114).

McEvoy (2008, para. 9) says, in reference to NFPA 1584, "The standard calls for individual firefighters and their supervisors to undergo rehab following the use of a second 30-minute cylinder, after a single 45-minute or 60-minute cylinder, or after 40 minutes of intense work without SCBA."

With both McEvoy (2008) and Emergency Incident Rehabilitation (United States Fire Administration, 2008) pointing to NFPA 1584 as the standard to follow for determining when emergency workers should rehab, it makes sense that MFD would use this standard as well.

This standard provides a structured framework for when to report to rehab. However, many of the participants, in the author's study on work recovery, experienced lightheadedness after only 30 minutes of strenuous activity. EMS Village's (2012, para. 1) sample guideline dictates that, "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 personnel safety and health." Fortunately, NFPA 1584 (2008) also allows the crew's supervisor to adjust both the work to rest ratio times and the SCBA use times depending on environmental or operational circumstances.

Lieutenant Ellis Johnston stated that the decision to have firefighters present to rehab, during the lumber yard fire, “really came down to just asking to go” (Questionnaire, April 30, 2012). Chief Walker stated that the reason was, “They couldn’t continue to function at the expected rate and were physically unable to continue. So the IC and fellow workers suggested they go to rehab” (Questionnaire, April 30, 2012). These statements, along with others from the Questionnaire, show a lack of structure within the current rehab operating procedures of the MFD.

Besides having structure, as outlined in NFPA 1584, employees at MFD stated they wanted some flexibility. The Survey (April, 2012) revealed they believed responders should present to rehab based on an accumulation of factors such as the environment, time of day, number of calls previously responded to, the length and intensity of their work-out during that day, a combination of time spent working and the amount of time an SCBA was used, and the type of clothing being worn during the incident.

NFPA 1584 (2008) contains a standard for when workers should present themselves for rehab. This standard is recommended by others. It also contains elements that provide both structure and flexibility. Because of these factors, the MFD should be able to adapt this portion of the guideline to its future SOG operations.

The last item for discussion is how scene workers are released from rehab. Of focus is identifying what determinants are used for releasing them back to scene work and what determinants show workers should have further medical care.

Both EMS Village (2012) and NFPA 1584 (2008) give lists, of items that should be monitored as well as thresholds that must be met, when determining the placement of workers

who leave rehab. Vital signs and physical signs and symptoms are these determining factors. Additionally, time spent resting and fluid replacement is also dictated.

Although there were multiple guidelines, for vital signs, available through the research, the NFPA 1584 (2008) chapter A.6.2.6 says that, “Currently, there are no studies that quantify vital sign measurements with the length of rehabilitation or with the need to direct members to a treatment area.”

“The timeline for recovery from firefighting activities is significantly longer than the typical 10-20-minute rehabilitation period that often is provided on the fireground” (Horn et al., 2011, para. 4). This study used vital signs to determine recovery.

The Study, performed by the author, also used vital signs but furthermore included the element of asking the participants about how they were feeling. Although participant’s vital signs did not return to normal, during 20 minutes of rest and rehydration, most of the participants stated they felt well enough to return to work.

Asking an emergency worker how they feel may not be an appropriate practice as at least one worker, from the garage fire, stated the IC asked him if he was able to return to work. Captain Huskinson described the event this way, “He spoke to us and asked if we were ready to go back to work...in all honesty who is going to say no? There was a lot of peer pressure in the area” (Questionnaire, April 30, 2012).

The Survey (April, 2012) members favor a combined approach. They chose using an accumulation of criteria to determine if a firefighter was ready to go back to work. They believed vital signs, receiving refreshment, and the amount of time resting could all be used. Additionally, the survey also revealed that if a worker does not fall within an acceptable range of

vital signs or has a sentinel event (such as syncope, chest pain, or shortness of breath) they should be excluded from scene work and be provided with additional medical care.

McEvoy (2008, para. 13) says more care should be provided in setting guidelines for evaluation of firefighters. “Medical monitoring must be targeted not only to the unique physiological changes associated with the intense work of firefighting but must also be tailored to the medical histories and physical condition of department member.” He goes on to describe the need for departments with lower overall ages to set higher upper vital sign limits while a department with a higher overall age should lower these same limits.

Structure is again an important factor in releasing personnel from rehab. The Questionnaire revealed confusion among everyone involved in how it was determined firefighters were fit enough to resume work. The Questionnaire (April 30, 2012) asked how it was determined which firefighters were able to leave rehab and return to duty. Lieutenant Gary Landon said, “Unknown to me. I was released after I had rest (for a) certain amount of time and felt better.”

The guideline presented by EMS Village (2012), seems to bridge all of these gaps. It provides structure, allows for both basic and advanced medical care, and it also combines signs and symptoms with vital sign evaluation.

MFD can provide structure during this phase of rehab by following a procedure that will identify workers who are at risk if they are returned to the scene before they are ready. From the material available it appears that identifying these risks can include monitoring signs and symptoms, looking at vital signs, and asking responders how they are feeling (without adding pressure to respond in a certain manner) can create a more complete picture for the MFD.

Recommendations

The reason for performing this project was due to the fact that the MFD has an inadequate rehabilitation protocol in place for fireground incidents and it does not have a rehabilitation protocol in place for other emergency incidents. The end goal was to develop and implement an in depth emergency incident rehabilitation protocol for the MFD to use.

Based on the research, a sample SOG was produced. Within this protocol, the following recommendations are made in direct response to the author's research questions:

- Rehab should be established at all incidents or training evolutions where conditions are such that rest and rehab is needed for the personnel operating on the scene. This should include wildland fires, HAZMAT incidents, and technical rescue events.
- Provide a minimum of BLS care initially. Rehab should be upgraded to include at least one ALS provider as soon as possible. This can be accomplished through re-assignment of personnel after resources arrive on scene.
- Provide a minimum of two rehab workers, initially, on all required scenes. This can be accomplished through pre-assignment of duties.
- Ensure the rehab unit has the necessary equipment and supplies to provide proper care. This should include water, electrolyte solutions, ice, quick energy snacks, and food. Additional supplies should be medical supplies usually provided on BLS and Paramedic transporting units. Lastly, supplies to provide relief from the elements. These could include awnings, fans, heaters, dry clothing, blankets, etc.

- Rehab should be given the authority to hold personnel back from re-entering emergency work if vital sign thresholds, signs and symptoms thresholds, or the rest and rehydration minimums have not been met.
- Rehab should be designated to provide accountability, self and formal rehab duties, hydration, nourishment, rest, recovery, medical evaluation, and documentation.
- Personnel should perform self-rehab during SCBA bottle changes and it should include rehydration and a quick snack.
- Personnel should report to formal rehab after the use of two air bottles or after 45 minutes of work time.
- Workers should only leave rehab and be reassigned to emergency work if they have normal findings upon medical exam.
- Workers should be monitored, given an ALS evaluation, or sent for more extensive medical care if they have abnormal findings upon medical exam.

With the establishment of a proposed SOG, the next logical step would be to present this document for approval by the chief officers within the MFD. If approved, training would need to be performed to allow all department members to become familiar with this new standard. Utilization would be monitored through the department's quality assurance and improvement program.

There is significant data available for others who wish to investigate more about this topic. In addition to the national standards and other data discussed during this paper, those interested can look to other department's guidelines and procedures for performing emergency incident rehabilitation. It is not necessary to invent a new program from scratch. Through

examination of this paper and the policies of others, researchers should be able to customize a program that best fits their needs.

References

- Anderson, A. (2010, November 16). Freeport firefighters first in country to test cardiac pilot program. *The Forecaster*. Retrieved from <http://www.theforecaster.net/content/n-fptfirestresstest>
- Bahner, S., Jaslow, D. (2007, September). Barriers to an Effective Rehab Sector – Part 2. *Fire Rescue 1 News*. Retrieved from <http://firerescue1.com/print.asp?act=print&vid=309947>
- Cargall, A. (2012, January 13). Winter semester enrollment largest on record. Retrieved from <http://www.byui.edu/newsroom/01-13-12-winter-enrollment>
- Centers for Disease Control and Prevention. (2012). *Heat Stress*. Retrieved from <http://www.cdc.gov/niosh/topics/heatstress/>
- Firefighters are Athletes. (2012). Retrieved March 12, 2012, from <http://www.cybexintl.com/solutions/firefighter/Brochure.pdf>
- Firefighter Rehab. (2011, Volume 8, Number 4). *VFIS News*. Retrieved from www.vfis.com/pdf/VFISNewsvol08no04web.pdf
- Firefighter Skills* (2009). Sudbury, MA: Jones and Bartlett Publishers, LLC.
- Firehouse Software (Version 5) [Computer Software]. Des Moines, IA: Visionary Systems, LTD.
- Heat Stress and Football. (2012). Retrieved March 1, 2012, from <http://www.kinatex.com/en/Kina-Infos/Heat-Stress-and-Footblaa-2.html>
- Horn, G. P., Gutzmer, S., Fahs, C. A., Petruzello, S. J., Goldstein, E., Fahey, G. C., ...Smith, D. L. (2011). Physiological Recovery From Firefighting Activities in Rehabilitation and Beyond. *Prehospital Emergency Care*, Apr-Jun, 15(2), 214-25. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/21366432>

- Jaslow, D. (2007, November). Barriers to an Effective Rehab Sector – Part 4. *Fire Rescue 1 News*. Retrieved from <http://www.firerescue1.com/print.asp?act=print&vid=319067>
- McEvoy, M. (2008, August). The Elephant on the Fireground: Secrets of NFPA 1584-Compliant Rehab. *Fire Engineering*. Retrieved from <http://www.fireengineering.com/articles/print/volume-161/issue-8/features/the-elephant-on-the-fireground-secrets-of-nfpa-1584-compliant-rehab.html>
- National Fire Protection Association. (2008a). Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises (NFPA 1584). Quincy, MA: National Fire Protection Association.
- National Fire Protection Association. (2008b). Standard for System Implementation (NFPA 1561). Quincy, MA: National Fire Protection Association.
- Recent Data on Heat Illness-related Deaths from the National Center for Catastrophic Sports Injury. (2012). Retrieved March 12, 2012, from <http://ksi.uconn.edu/ksi/assets/File/NCCSRecent%20Data%20on%20Heat%20Illness.pdf>
- Rehabilitate. (2012). Retrieved March 1, 2012, from <http://www.merriam-webster.com/dictionary/rehabilitation>
- Sample Firefighter Rehabilitation Guideline. (2012). Retrieved March 1, 2012, from <http://www.emsvillage.com/articles/article.cfm?id=329>
- U.S. Census Bureau. (2010). *Madison County, Idaho*. Retrieved from <http://quickfacts.census.gov/qfd/states/16/16065.html>
- U.S. Fire Administration. (2008) *Emergency Incident Rehabilitation* (Publication No. FEMA FA-314).

U.S. Fire Administration. (2011) Firefighter Fatalities in the United States in 2010. Retrieved from http://www.usfa.fema.gov/downloads/pdf/publications/ff_fat10.pdf

U.S. Fire Administration. (February 2011). *Fire-Related Firefighter Injuries Reported to NFIRS*, Topical Fire Report Series, Volume 11 – Issue 7.

U.S. Fire Administration. (2010) Strategic Plan Fiscal Years 2010-2014. Retrieved from http://www.usfa.fema.gov/downloads/pdf/strategic_plan.pdf

Appendix A

Madison Fire Department Emergency Incident Rehabilitation Survey

1. What incidents require the establishment of rehab?
 - a. Structure Fires
 - b. Wildland Fires
 - c. HAZMAT
 - d. Mass Casualty EMS
 - e. Technical Rescue
 - f. Crash Rescue
 - g. Training Incidents
 - h. Other (Please Comment)

2. How many people should staff the rehabilitation unit?
 - a. 1
 - b. 2
 - c. 3
 - d. Other (Please Comment)

3. Who should staff the rehabilitation unit?
 - a. Basic
 - b. Advanced
 - c. Paramedic
 - d. A mixture of certifications as long as at least one is an Advanced
 - e. A mixture of certifications as long as at least one is an Paramedic
 - f. It doesn't matter
 - g. Other (Please Comment)

4. What authority should rehab have?
 - a. No authority. Responders should come and go as they please
 - b. No authority. Responders should come and go under the direction of incident command
 - c. Some authority: Can hold responders based on medical criteria but do not have authority to request responders coming to rehab
 - d. Some authority: Can require responders to come to rehab but cannot keep responders in rehab without incident command permission
 - e. Complete authority: Can both require responders to report to rehab as well as keep them there based on medical criteria
 - f. Other (Please Comment)

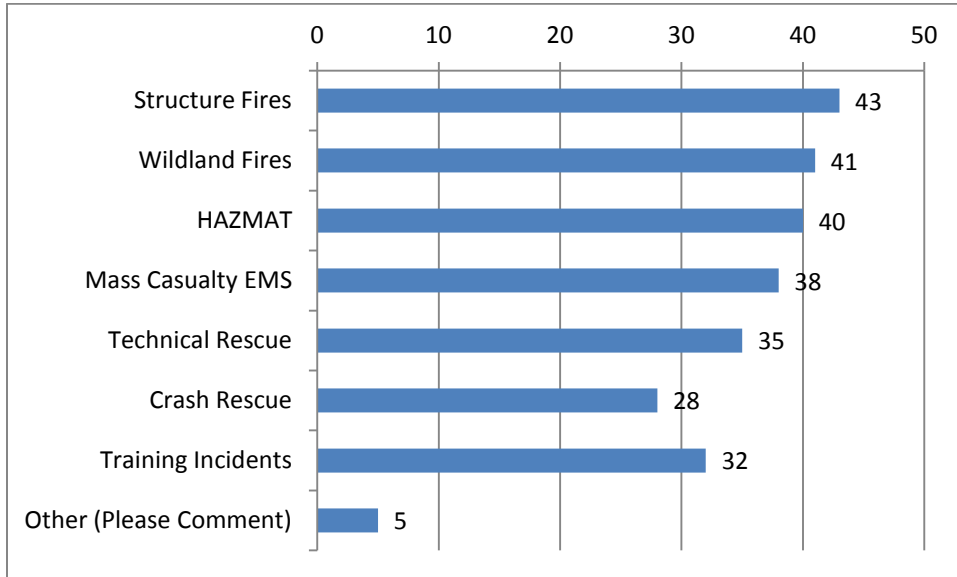
5. What should the functions of rehab be?
 - a. As medical care for responders only
 - b. As medical care for non-responders only
 - c. As medical care for both responders and non-responders
 - d. Provide basic emergency scene functions along with rehab functions

- e. Provide rehab functions only
 - f. Provide only basic incident medical screening (Blood Pressure, Heart Rate, Oxygen Saturations, and Temperatures)
 - g. Provide advanced incident medical screening (Blood Pressure, Heart Rate, Oxygen Saturation, Temperature, Blood Glucose Levels, EKG monitoring, CO monitoring)
 - h. Provide oral hydration and food
 - i. Provide oral and IV hydration and food
 - j. Provide warming and/or cooling in an unenclosed area
 - k. Provide warming and/or cooling in an enclosed area
 - l. Provide pre-incident medical screenings
 - m. Other (Please Comment)
6. What determines when firefighters go to rehab?
- a. Amount of time spent working on scene
 - b. Amount of time spent on SCBA or number of SCBA bottles used
 - c. A combination of time spent working and amount of time/SCBA bottles used
 - d. Time and environment factors (i.e. time on scene on a severely cold day versus time on scene on a mildly cool day)
 - e. Time of day factors (i.e. Morning, Evening, Late night)
 - f. Accumulation of factors (i.e. Environment, time of day, number of calls previously responded to, length and intensity of work-out during the day, etc...)
 - g. Type of protective clothing worn (i.e. HAZMAT level A suite versus wildland gear)
 - h. Other (Please Comment)
7. What determines when firefighters are able to leave rehab and go back to incident work?
- a. Basic vital signs (Blood pressure, heart rate, oxygen saturations, temperature)
 - b. Advanced vital signs (Blood pressure, heart rate, oxygen saturations, temperature, blood glucose, EKG, CO levels)
 - c. Refreshment criteria (i.e. minimum calorie and fluid replacement).
 - d. Time criteria (i.e. minimum rest time)
 - e. Accumulation criteria (i.e. vital signs, refreshment, and time).
 - f. Other (Please Comment)
8. What determines when firefighters must leave rehab and seek further medical care?
- a. Failure of emergency provider to meet re-entry requirements after a minimum amount of time
 - b. Emergency provider falls outside of 'Acceptable' standards at any time during rehab evaluation
 - c. Emergency provider has 'Sentinel Event' at any time during rehab or during emergency incident operations (i.e. Syncope, chest pain, shortness of breath, etc...)
 - d. Other (Please Comment)
9. What other ideas do you think should be addressed in a rehab protocol?
- a. Other (Please Comment)

Appendix B

Madison Fire Department Emergency Incident Rehabilitation Survey Results

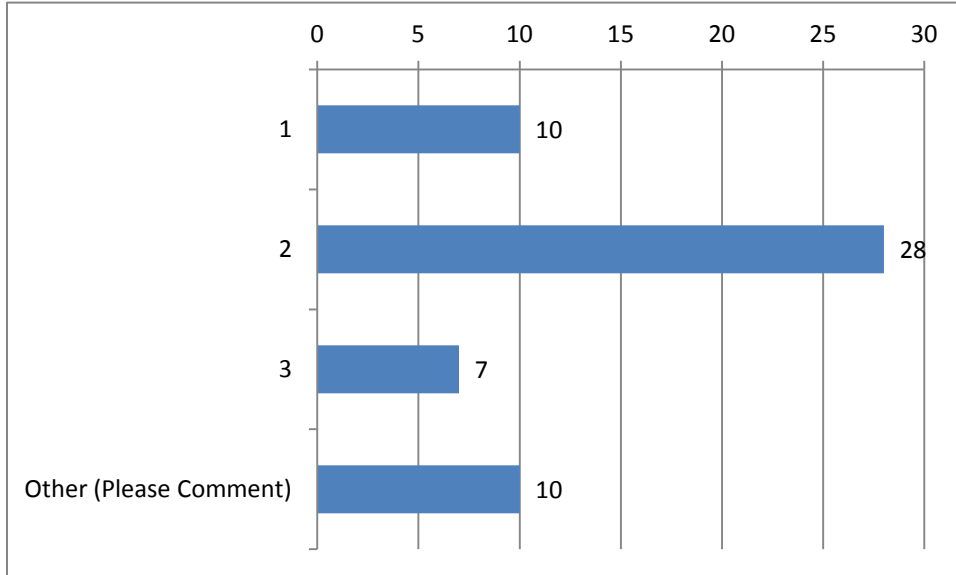
1. What incidents require the establishment of rehab?



Comments:

- a. Any incident of longer duration or hard work.
- b. All.
- c. Any physically exerting activities.
- d. All incidents that have the potential to cause firefighter exhaustion.
- e. All based on complexity and duration.

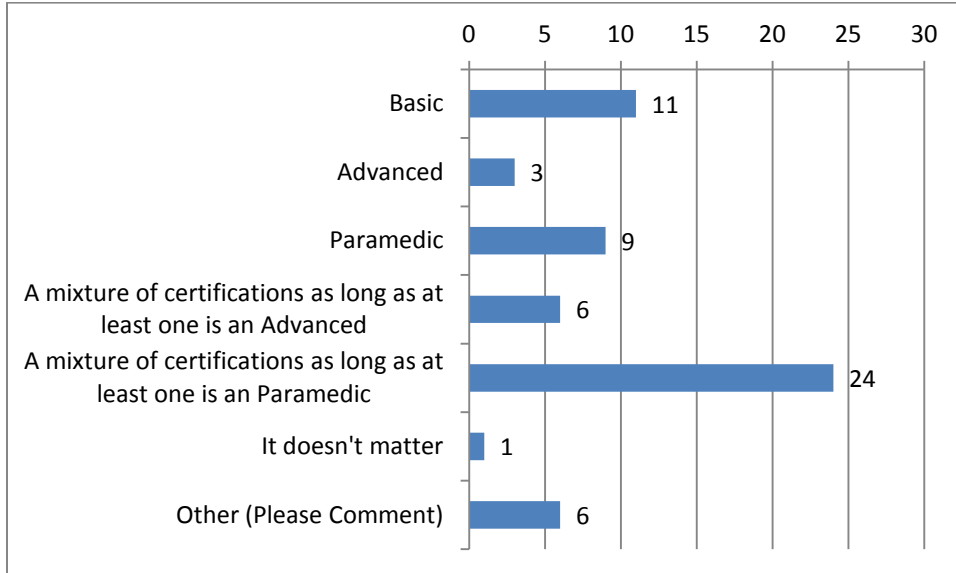
2. How many people should staff the rehabilitation



Comments:

- a. Depends on the size of fire and the amount of people coming to the rehab unit.
- b. As many as needed.
- c. As needed...depending on the potential.
- d. If it is a larger incident, more could be needed.
- e. Depends on size of incident.
- f. I suppose it might depend on the size of the incident and how many personnel are on scene.
- g. Size of the incident should dictate this.
- h. Depends on the size of the incident.
- i. More than one if needed.
- j. Depends on the size of the incident/manpower.

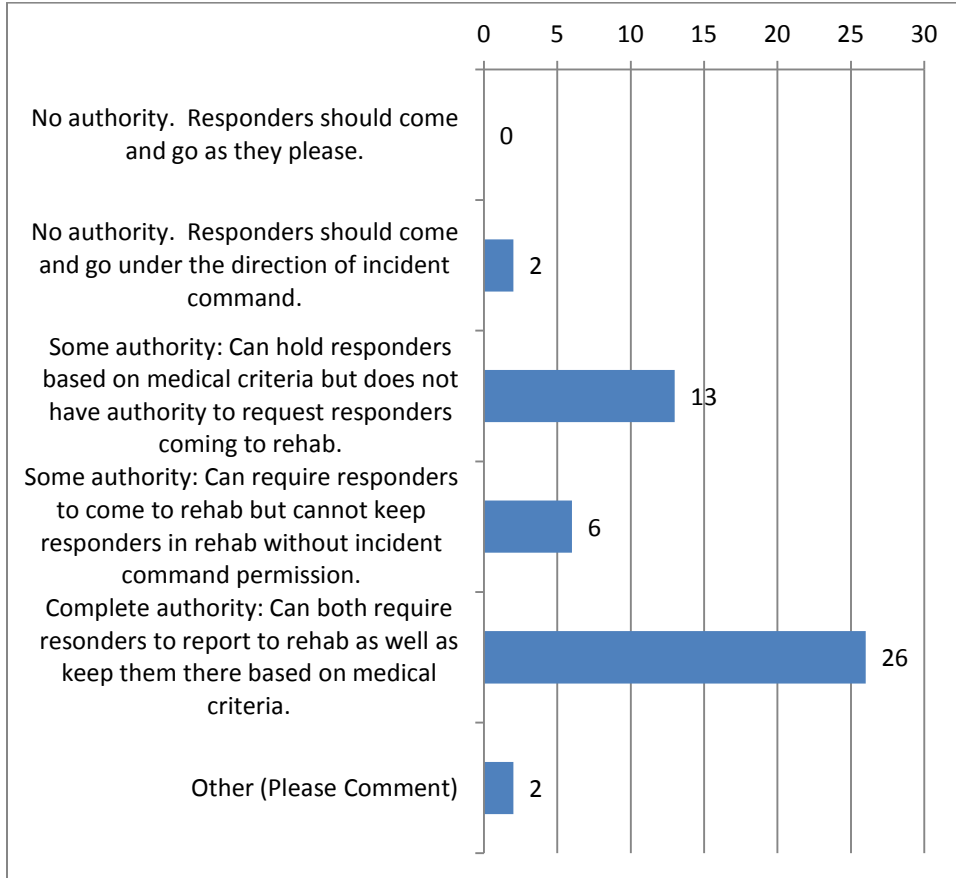
3. Who should staff the rehabilitation unit?



Comments:

- a. Paramedic would be the best, but if your resources are tight a basic will do.
- b. As needed for the situation.
- c. I think that at least one person trained in ACLS should be there, but two or more EMTs at least.
- d. I feel that most common issues seen by rehab could be pointed out and addressed by a basic.
- e. It doesn't matter as long as there is a paramedic available that can break away from other duties.
- f. Basic at a minimum. They can always get a higher level.

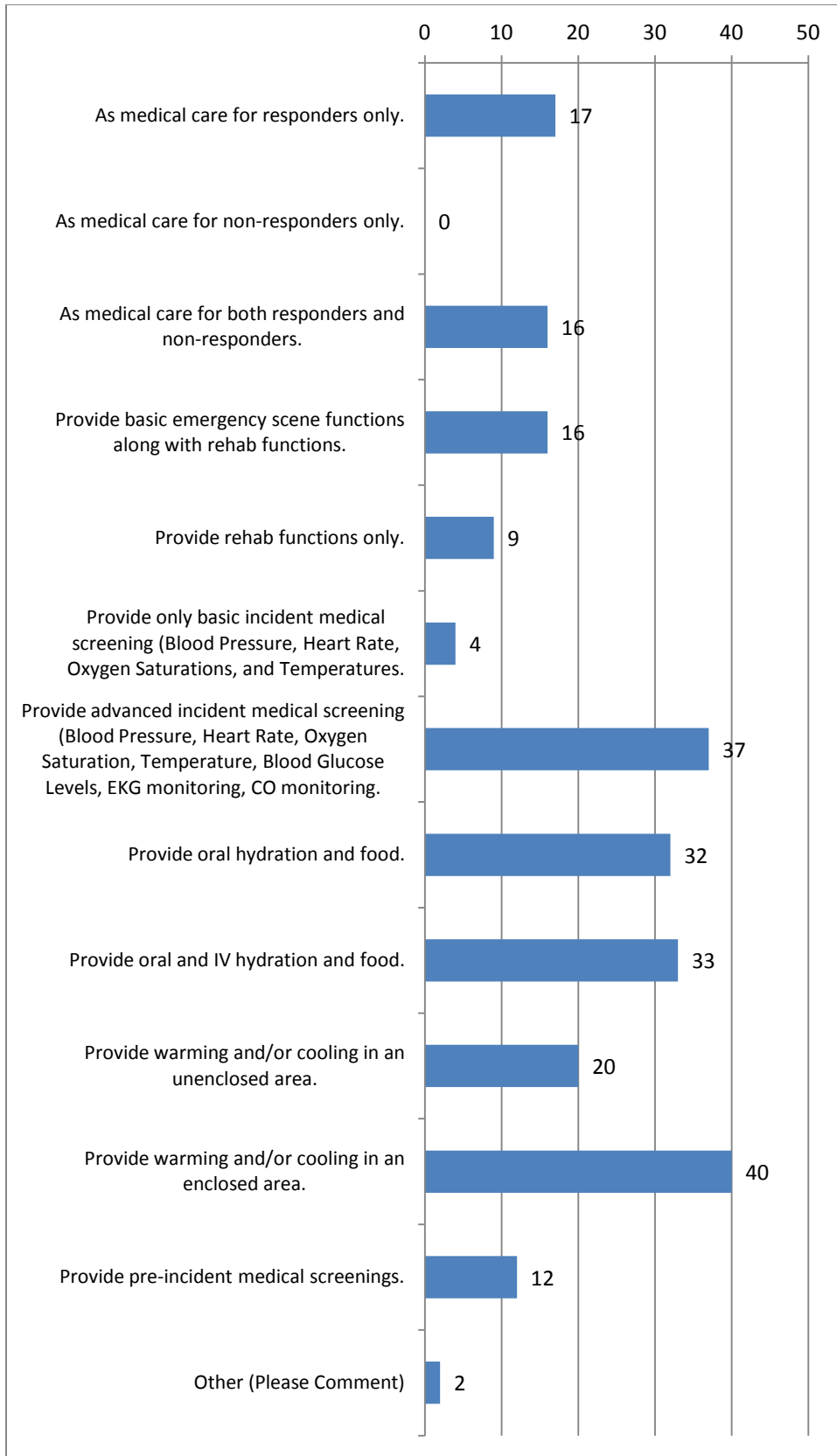
4. What authority should rehab have?



Comments:

- a. I believe that instead of having to give them complete authority, SOP/SOGs should be established requiring rehab. IC has enough to worry about, so I think that the Safety officer should play a bigger role in leading it by either direct control or having a Rehab Leader.
- b. IC should work in conjunction with rehab. IC directs teams to rehab after X amount of bottles or X amount of time. Rehab then should have authority to hold crews based on medical evaluation.

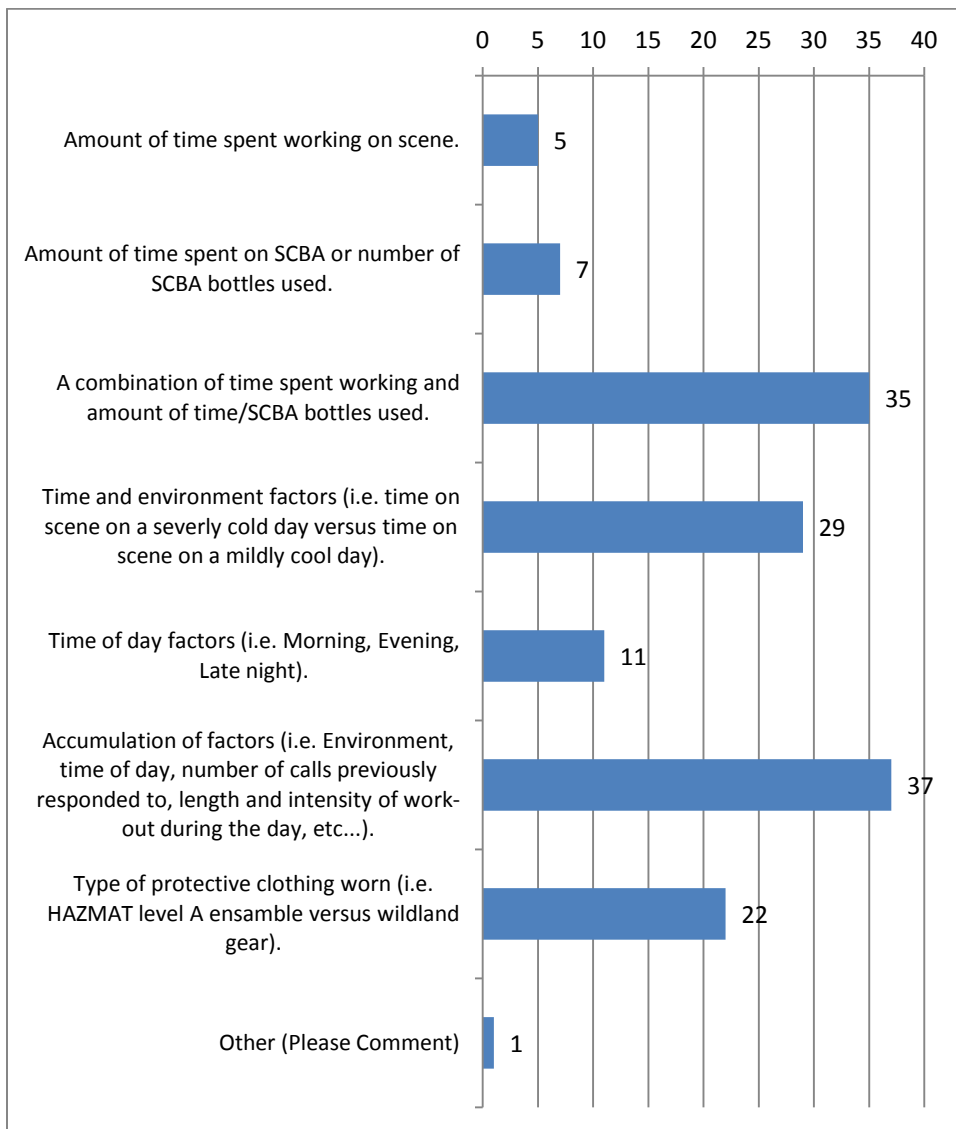
5. What should the functions of rehab be?



Comments:

- a. I believe that the incident should dictate the Rehab complexity, but that a basic complete vitals including cardiac and CO monitoring and capability for IV (meds or hydration) in extremis. Oral nourishment and hydration are key. Rehab should be just for responders. Let the responding Medical (ambulance) care for all Non-responders. Rehab maybe could care for both on much smaller incidents.
- b. Depending again on the size of incident.

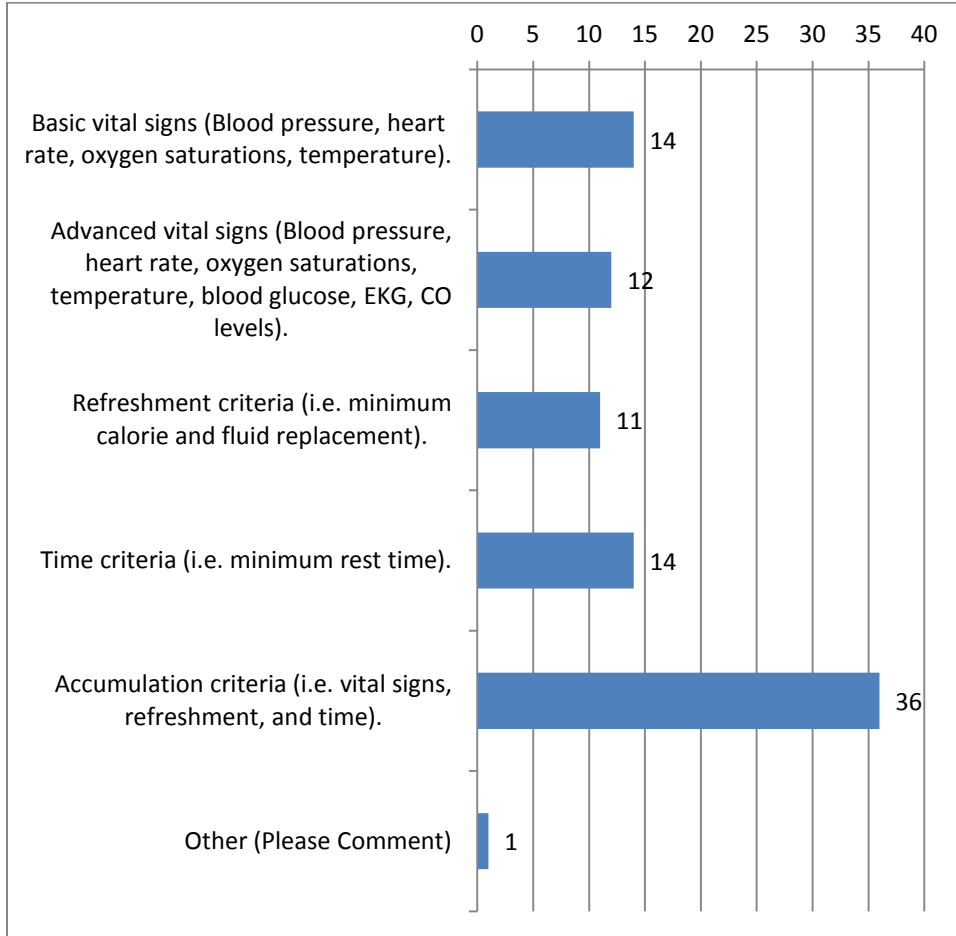
6. What determines when firefighters go to rehab?



Comments:

- a. Everyone is different and they should know to a degree what their abilities are.

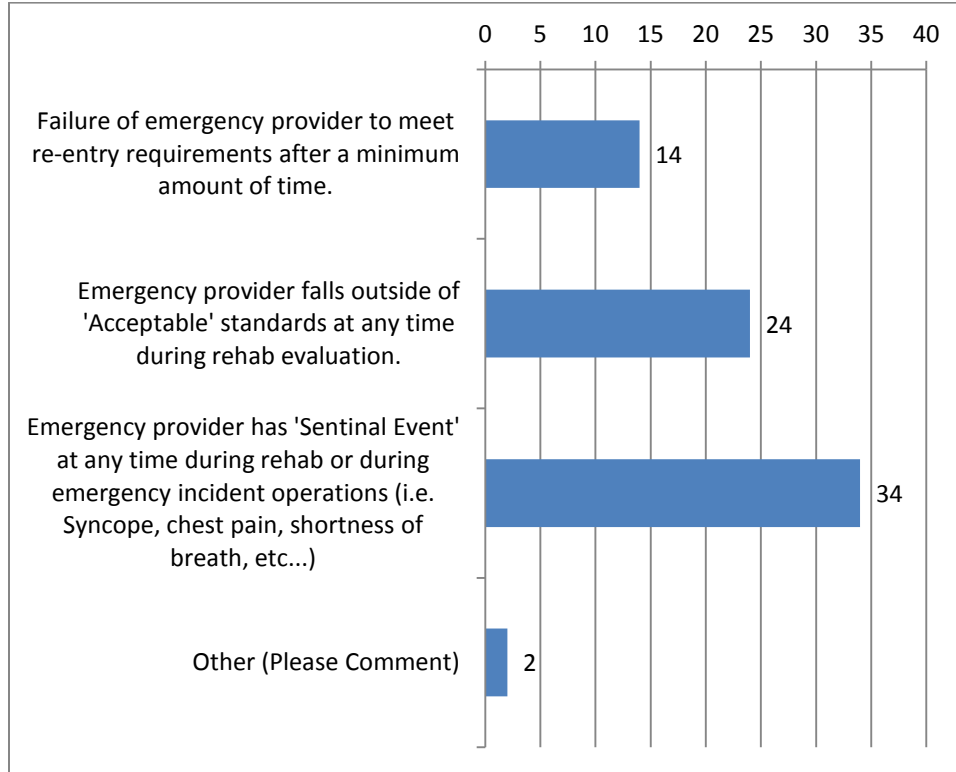
7. What determines when firefighters are able to leave rehab and go back to incident work?



Comments:

- a. When they feel ready.

8. What determines when firefighters must leave rehab and seek further medical care?



Comments:

- a. Rehab personnel feel it is necessary for any reason.
 - b. Failure of emergency provider to meet re-entry requirements after a **MAXIMUM** amount of time.
9. What other ideas do you think should be addressed in a rehab protocol?
- a. After so much time on an incident, firefighters should be sent back to station for more thorough rehab, away from incident with the ability to truly rest and recoup. Rotating personnel will increase productivity be decreasing burnout and fatigue.
 - b. As mentioned in the other areas, I feel that rehab could be a very large operation all in itself. But I feel that, with the exception of minor or smaller incidents, Rehab and Non-responder care must remain separate. That Rehab could or should work with RIC/RIT and EMS to a point or to some extent but should remain separate. I feel a Rehab Protocol should have a very well written SOG and then be supported by Chiefs AND the IC.
 - c. Authority of rehab, training of those running rehab.
 - d. Clear, **OBJECTIVE**, guidelines need to be in place. If they are not objective, then subjectivity takes over and people get hurt.

- e. Consideration of mindset and psychological factors.
- f. Establish acceptable criteria and establish the appropriate culture to utilize the rehab unit as deemed necessary by the individual.
- g. Good judgment on both parties. Our safety should come first and we need to teach that. Nobody needs to try to be a hero. We need to be safe so we can help someone tomorrow.
- h. High stress calls (fatality).
- i. I feel all members should be held to the protocol no matter the rank or department. If there is not enough man power on scene then additional manpower and or departments.
- j. Let's actually do it!
- k. No I can think of. Your list was pretty comprehensive.
- l. Operational length: i.e. meal vs. high energy snack, sleep vs. physical rest, hygiene.
- m. Re-assignment of other team members not requiring extended rehab times. Accountability: i.e. checking in and out of rehab with passports or other documentation.
- n. Staging and response time: i.e. should rehab go with the initial call or when requested by IC.
- o. Training a rehab staffer should have in regards to non-EMS medicine. Rehab is in many instances more like a clinic than an emergency scene call.
- p. Training of rehab staffing duties and clarification (to all) on authority of rehab unit.

Appendix C

Sentinel Incidents Questionnaire

1. Which sentinel incident(s) were you involved in?
2. What was your job on this incident?
 - a. Did you utilize full SCBA precautions at any time on this incident?
 - i. If so, for how long
 - ii. If so, what job(s) were you performing?
 - iii. If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident?
 - o If so, for how long?
3. Did you utilize rehab during this incident?
 - a. If so, why?
4. Was rehab established for this incident?
 - a. If so, was it established immediately or later in the incident?
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?
 - b. If so, how?
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?
 - a. If so, what was their level of certification?
 - b. If not, what level of training and/or certification do you think should be required and why?
7. Were there enough staff members in the rehab unit for this incident?
 - a. If no, why not and how many would you have recommended?
8. Who made the treatment decisions for the firefighters in rehab?
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)
 - a. Was it adequate to meet the needs of the workers on this scene?
 - b. If not, why not?
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?
11. Who determined which firefighters were able to leave rehab and return to duty?
 - a. How did they determine this?
12. Who determined which firefighters were in need of further medical care?
 - a. How did they determine this?

Appendix D

Sentinel Incidents Questionnaire Results

Contact: Chief Corey Child

Question	Response
1. Which incident(s) were you involved in?	<i>August 19th</i>
2. What was your job on this incident?	<i>IC</i>
<ul style="list-style-type: none"> • Did you utilize full SCBA precautions at any time on this incident? 	<i>Not me personally, however, I had firefighters on air.</i>
<ul style="list-style-type: none"> • If so, for how long 	<i>Each person was different; however, if they were on a nozzle or doing mop-up, air was needed due to the amount smoke.</i>
<ul style="list-style-type: none"> • If so, what job(s) were you performing? 	<i>NA</i>
<ul style="list-style-type: none"> • If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>NA</i>
<ul style="list-style-type: none"> • If so, for how long? 	<i>NA</i>
3. Did you utilize rehab during this incident?	<i>As IC, I assigned Firefighter/EMT Michael Clements to Rehab.</i>
<ul style="list-style-type: none"> • If so, why? 	<i>Poor firefighting conditions, a lot of smoke, high temperature, duration of incident all contributed to rehab being set up.</i>
4. Was rehab established for this incident?	<i>Within the first 20 minutes.</i>
<ul style="list-style-type: none"> • If so, was it established immediately or later in the incident? 	<i>YES—I have to admit, this was the first time with Madison Fire Department that I had a person feel faint, light headed and sick to their stomach from fighting an outdoor fire—I not only had one, but I felt it was epidemic as I had three or four within a 30 min period. A couple of the individuals I felt were in OK shape physically, one was in outstanding shape and one was way overweight.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>See below.</i>
<ul style="list-style-type: none"> • If so, how? 	<i>I immediately had an increased anxiety for more thorough rehab—better medical monitoring for those in rehab, and the desire for better rehab “treats.”</i>

<p>6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?</p>	<p><i>Questionable—not that Mike did anything wrong, as a matter of fact, he did an excellent job—it was more a feeling I wish I had higher medical care immediately available for monitoring of those four individuals previously mentioned. We eventually paired Mike with a Paramedic and that calmed my nerves a little bit. Yes, hanging over my head was the thought, “One of these four are going to have a heart attack.”</i></p>
<ul style="list-style-type: none"> • If so, what was their level of certification? 	<p><i>EMT-B</i></p>
<ul style="list-style-type: none"> • If not, what level of training and/or certification do you think should be required and why? 	<p><i>Paramedic—it would have allowed for immediate set up of the highest level of care we offer in the field thus would give our firefighters the best fighting chance in whatever their condition or situation was.</i></p>
<p>7. Were there enough staff members in the rehab unit for this incident?</p>	<p><i>Yes--we were able to expand rehab due to the staffing of the first out ambulance being on scene.</i></p>
<ul style="list-style-type: none"> • If no, why not and how many would you have recommended? 	<p><i>NA</i></p>
<p>8. Who made the treatments decisions for the firefighters in rehab?</p>	<p><i>Michael Clements and Assistant Chief Mikel Walker, who was assigned to rehab when these issues came about.</i></p>
<p>9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)</p>	<p><i>Water, gaiter aide, candy bars, shade, away from smoke, others helping to take of structural gear, medical assessments including heart monitor.</i></p>
<ul style="list-style-type: none"> • Was it adequate to meet the needs of the workers on this scene? 	<p><i>Yes.</i></p>
<ul style="list-style-type: none"> • If not, why not? 	<p><i>NA</i></p>
<p>10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?</p>	<p><i>They each came to rehab on their own accord if I remember correctly.</i></p>
<p>11. Who determined which firefighters were able to leave rehab and return to duty?</p>	<p><i>Chief Walker and the IC</i></p>
<ul style="list-style-type: none"> • How did they determine this? 	<p><i>Initial impression after 15 minutes in rehab—to myself I asked if the interventions had made a difference, how did the firefighter look, what was the monitor telling us etc? Sick, Not Sick? I/We asked how they were feeling.</i></p>

12. Who determined which firefighters were in need of further medical care?	NA
• How did they determine this?	NA

Contact: Captain Chris Huskinson

Question	Response
1. Which incident(s) were you involved in?	<i>I was on the August 19th fire.</i>
2. What was your job on this incident?	<i>Started out as IC and then turned IC over to Chief Child and manned a hoseline in addition to doing mop up work in a nearby field.</i>
• Did you utilize full SCBA precautions at any time on this incident?	<i>Yes.</i>
• If so, for how long	<i>I used two bottles.</i>
• If so, what job(s) were you performing?	<i>Manning a hoseline and pulling items away from a shed to be hosed down.</i>
• If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident?	<i>I also mopped up a field nearby that had fire in it.</i>
• If so, for how long?	<i>Probably for about an hour.</i>
3. Did you utilize rehab during this incident?	<i>Yes, I did rehab....just after my second bottle of air.</i>
• If so, why?	<i>I was overheated and nauseated. The day was hot and the fire burned "hot". Previous in the day our shift had played Ultimate Frisbee which turned out to be a really good workout. I am afraid I did not rehydrate during the day properly adding to my fatigue.</i>
4. Was rehab established for this incident?	<i>Yes</i>
• If so, was it established immediately or later in the incident?	<i>It was established about an hour into the incident.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>Not really.</i>
• If so, how?	<i>In my lowly opinion rehab should be established at every incident early on but it often takes a back seat due to lack of trained personnel, lack of personnel, and personnel wanting to get into the action and having no desire to staff a rehab area.</i>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>It was staffed by a basic EMT....It should have been staffed by someone who could give fluids intravenously.</i>

<ul style="list-style-type: none"> If so, what was their level of certification? 	<i>EMT</i>
<ul style="list-style-type: none"> If not, what level of training and/or certification do you think should be required and why? 	<i>Paramedic or advanced EMT.</i>
7. Were there enough staff members in the rehab unit for this incident?	<i>Only one person was dedicated to the rehab but there was a lot of backseat driving.</i>
<ul style="list-style-type: none"> If no, why not and how many would you have recommended? 	<i>At least two qualified personnel.</i>
8. Who made the treatments decisions for the firefighters in rehab?	<i>Mainly the IC.</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>Gatorade or water, candy bars, and granola bars.</i>
<ul style="list-style-type: none"> Was it adequate to meet the needs of the workers on this scene? 	<i>In the short term it was sufficient but it was haphazard.</i>
<ul style="list-style-type: none"> If not, why not? 	<i>See above.</i>
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>IC</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>IC</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>He spoke to us and asked if we were ready to go back to work...in all honesty who is going to say no? There was a lot of peer pressure in the area.</i>
12. Who determined which firefighters were in need of further medical care?	<i>IC</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>By asking if we were ready to go back to work</i>

Additional Comments:

I have to say our efforts at rehab are not very proactive. I do have to say the best rehab I have gotten in recent memory was from Dave Harrington at a house fire in Sugar City a couple of years ago. He had just attended the state fire academy and did everything very well. Years ago when I worked in Oregon everyone was required to take Rehab training and we actively trained on how to provide rehab on fire scenes. We seem to put rehab on the back burner...we forget the cooler, don't set up an area, have lower ranking personnel as staff (First out ambulance may be a basic EMT with zero fire experience), and don't make it a priority. I hope your efforts will help the department realize its shortcomings and jump on board with some good care. Thanks!!

Contact: Lieutenant Joseph Haerberle

Question	Response
1. Which incident(s) were you involved in?	<i>The August 19th event.</i>
2. What was your job on this incident?	<i>Initially attack team one, later pump operator of the initial arriving engine.</i>
<ul style="list-style-type: none"> • Did you utilize full SCBA precautions at any time on this incident? 	<i>Yes.</i>
<ul style="list-style-type: none"> • If so, for how long 	<i>I used SCBA during all of the attack phase.</i>
<ul style="list-style-type: none"> • If so, what job(s) were you performing? 	<i>Fire Attack.</i>
<ul style="list-style-type: none"> • If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>NA</i>
<ul style="list-style-type: none"> • If so, for how long? 	<i>NA</i>
3. Did you utilize rehab during this incident?	<i>Yes.</i>
<ul style="list-style-type: none"> • If so, why? 	<i>Chief Child required me to.</i>
4. Was rehab established for this incident?	<i>Yes</i>
<ul style="list-style-type: none"> • If so, was it established immediately or later in the incident? 	<i>Yes it was established, I think it was later, but I do not know.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>No</i>
<ul style="list-style-type: none"> • If so, how? 	<i>NA</i>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>I feel the staffing of the rehab was inadequate, as I remember the event EMTs and Advanced EMTs were simply taking vitals (basic ones – BP, HR, RR, SPO2). Paramedics should have been assessing the basic vitals and 4 and 12 Lead EKGs.</i>
<ul style="list-style-type: none"> • If so, what was their level of certification? 	<i>Not adequate.</i>
<ul style="list-style-type: none"> • If not, what level of training and/or certification do you think should be required and why? 	<i>Paramedic minimum, paramedics have greater assessment finding knowledge.</i>
7. Were there enough staff members in the rehab unit for this incident?	<i>No</i>
<ul style="list-style-type: none"> • If no, why not and how many would you have recommended? 	<i>No because the rapidity of firefighter arrivals was for a time overwhelming to the 1 or 2 individuals. A second ambulance/rehab crew was indicated, but not called for.</i>

8. Who made the treatments decisions for the firefighters in rehab?	<i>EMTs and Advanced EMTs</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>Water, Sports drinks, candy bars, and granola bars.</i>
<ul style="list-style-type: none"> • Was it adequate to meet the needs of the workers on this scene? 	<i>No</i>
<ul style="list-style-type: none"> • If not, why not? 	<i>The rehab area ran out of everything.</i>
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>The majority self-presented. Some, like myself, were ordered and then reassigned.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>The fatigued firefighters themselves.</i>
<ul style="list-style-type: none"> • How did they determine this? 	<i>I don't know.</i>
12. Who determined which firefighters were in need of further medical care?	<i>I am unaware of any further care being required.</i>
<ul style="list-style-type: none"> • How did they determine this? 	<i>NA</i>

Contact: Lieutenant Gary Landon

Question	Response
1. Which incident(s) were you involved in?	<i>I was involved with the Aug 19, 2011 fire in Madison County.</i>
2. What was your job on this incident?	<i>My job was Lt. of an Engine company performing offensive and defensive attacks on the south side of a shed.</i>
<ul style="list-style-type: none"> • Did you utilize full SCBA precautions at any time on this incident? 	<i>YES</i>
<ul style="list-style-type: none"> • If so, for how long 	<i>Approximately 10-15 minutes.</i>
<ul style="list-style-type: none"> • If so, what job(s) were you performing? 	<i>Offensive attack of shed.</i>
<ul style="list-style-type: none"> • If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>YES</i>
<ul style="list-style-type: none"> • If so, for how long? 	<i>>1 hr</i>
3. Did you utilize rehab during this incident?	<i>YES</i>
<ul style="list-style-type: none"> • If so, why? 	<i>I became nauseated due to dehydration.</i>
4. Was rehab established for this incident?	<i>YES</i>
<ul style="list-style-type: none"> • If so, was it established immediately or later in the incident? 	<i>To my knowledge soon after incident began.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>NO</i>
<ul style="list-style-type: none"> • If so, how? 	<i>NA</i>

6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>YES/NO</i>
<ul style="list-style-type: none"> If so, what was their level of certification? 	<i>EMT-BASIC</i>
<ul style="list-style-type: none"> If not, what level of training and/or certification do you think should be required and why? 	<i>I believe that it was adequate for my situation, but if a severe problem had arrived, IV access could have been required. In our system it is unknown if an ALS unit would be available to respond to the fire. In a normal system, BLS care would be adequate, but ideally I feel ALS care should be available when possible.</i>
7. Were there enough staff members in the rehab unit for this incident?	<i>NO; There was only one to my knowledge.</i>
<ul style="list-style-type: none"> If no, why not and how many would you have recommended? 	<i>Minimum of 2 or 3.</i>
8. Who made the treatments decisions for the firefighters in rehab?	<i>The decisions were made by the rehab personnel.</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>All the above mentioned.</i>
<ul style="list-style-type: none"> Was it adequate to meet the needs of the workers on this scene? 	<i>YES</i>
<ul style="list-style-type: none"> If not, why not? 	<i>NA</i>
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>The decision for the firefighters to GO to rehab was made by the firefighters themselves, their crew leaders, and the IC.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>The IC and Rehab personnel.</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>Unknown to me. I was released after I had rest and certain amount of time and felt better.</i>
12. Who determined which firefighters were in need of further medical care?	<i>I believe it was IC and rehab personnel.</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>Unknown to me. I believe it was made based on the experience of the Rehab and IC experience.</i>

Contact: Firefighter David Harrington

Question	Response
1. Which incident(s) were you involved in?	<i>Both (July 24th and August 19th).</i>
2. What was your job on this incident?	<i>Fire suppression and initial attack.</i>
<ul style="list-style-type: none"> • Did you utilize full SCBA precautions at any time on this incident? 	<i>Because of the fire conditions on the mutual aid fire no SCBA was needed. On the second fire however conditions warranted the use of SCBA.</i>
<ul style="list-style-type: none"> • If so, for how long 	<i>On the garage fire I took three bottles without relief before coming in for rehab.</i>
<ul style="list-style-type: none"> • If so, what job(s) were you performing? 	<i>My job was to perform Initial attack and fire suppression and I came in on the first due Engine.</i>
<ul style="list-style-type: none"> • If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>On the mutual aid fire the labor was overly strenuous because of manpower issues and a lack of urgency to stabilize the scene on the part of the AHJ. Because of this we utilized most of our responding manpower to establish a scene presence, as well as a viable water source and then prepare for relay pumping operations.</i>
<ul style="list-style-type: none"> • If so, for how long? 	<i>≤ 4 hours</i>
3. Did you utilize rehab during this incident?	<p><i>During the Mutual aid fire in saint Anthony, yes I did. The AHJ brought in sandwiches and Gatorade and water. Because of the heat of the day and the strenuous workload I had lost a lot of water and was working to rehydrate. I also had not yet eaten that day and although I was not showing signs of weakness I considered it preventative maintenance.</i></p> <p><i>During the Garage fire I also utilized rehab to replace lost fluids during work.</i></p>
<ul style="list-style-type: none"> • If so, why? 	<i>See above.</i>
4. Was rehab established for this incident?	<i>For the garage incident yes, and for the mutual aid incident I believe that we set up our own rehab station for our personnel.</i>
<ul style="list-style-type: none"> • If so, was it established immediately or later in the incident? 	<i>In both cases rehab was established as an after-thought to a growing problem.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>See below.</i>

<ul style="list-style-type: none"> • If so, how? 	<p><i>I have always been of the opinion that Rehab plays a major role in the safety, Health and well being of all personnel engaged combat. Pride has no place on a fire scene and I believe that most people feel that rehab is a way of showing weakness instead of exploiting the strength of a fully function team that understands rotation through rehab is a necessary part of any major incident.</i></p>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	NA
<ul style="list-style-type: none"> • If so, what was their level of certification? 	<p><i>In both cases in which I was involved in the level of certification was at a Basic level. I pose the question “if we are so geared towards providing the citizens we serve with ALS care than in turn why are we not providing that same level of care to our own people?”</i></p>
<ul style="list-style-type: none"> • If not, what level of training and/or certification do you think should be required and why? 	<p><i>See above.</i></p>
7. Were there enough staff members in the rehab unit for this incident?	<p><i>See below.</i></p>
<ul style="list-style-type: none"> • If no, why not and how many would you have recommended? 	<p><i>No only one person in both cases. I feel that Rehab should be setup with the mindset and the preparation to treat our personnel as patients if needed. I believe that a true Rehab unit would be comprised of a Full ALS crew according to dept protocol.</i></p>
8. Who made the treatments decisions for the firefighters in rehab?	<p><i>In both cases in which I was involved in we all kind of seemed to make our own decisions as to when it was time to rehab and why.</i></p>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<p><i>In both cases I utilized fluid replacement, food and shade.</i></p>
<ul style="list-style-type: none"> • Was it adequate to meet the needs of the workers on this scene? 	<p><i>The interventions listed above were adequate to elicit a return to homeostasis for all involved.</i></p>
<ul style="list-style-type: none"> • If not, why not? 	NA

10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>I did, along with others that were with me all made the decision that we were reaching out exhausted stage and required rehab.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>One of the basic personnel I believe it was Firefighter Clements was taking vitals and required us to stay if our pulse was above average. For the most part though we decided when we were ready to return to work.</i>
<ul style="list-style-type: none"> • How did they determine this? 	<i>See above.</i>
12. Who determined which firefighters were in need of further medical care?	<i>In both cases no one made such an assessment.</i>
<ul style="list-style-type: none"> • How did they determine this? 	<i>See above.</i>

Contact: Chief Mikel Walker

Question	Response
1. Which incident(s) were you involved in?	<i>July 24, 2011. (Lumber Yard Fire).</i>
2. What was your job on this incident?	<i>Safety Officer</i>
<ul style="list-style-type: none"> • Did you utilize full SCBA precautions at any time on this incident? 	<i>No</i>
<ul style="list-style-type: none"> • If so, for how long 	<i>NA</i>
<ul style="list-style-type: none"> • If so, what job(s) were you performing? 	<i>NA</i>
<ul style="list-style-type: none"> • If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>No</i>
<ul style="list-style-type: none"> • If so, for how long? 	<i>NA</i>
3. Did you utilize rehab during this incident?	<i>Yes</i>
<ul style="list-style-type: none"> • If so, why? 	<i>The intense heat from the weather with the PPE caused fatigue.</i>
4. Was rehab established for this incident?	<i>Yes</i>
<ul style="list-style-type: none"> • If so, was it established immediately or later in the incident? 	<i>Immediately.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>Yes</i>
<ul style="list-style-type: none"> • If so, how? 	<i>I always knew that rehab was important, but this incident proved that it was necessary.</i>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>Yes, because we had higher certification on scene with the incident.</i>

<ul style="list-style-type: none"> If so, what was their level of certification? 	<i>EMT</i>
<ul style="list-style-type: none"> If not, what level of training and/or certification do you think should be required and why? 	<i>NA</i>
7. Were there enough staff members in the rehab unit for this incident?	<i>No</i>
<ul style="list-style-type: none"> If no, why not and how many would you have recommended? 	<i>I think that there should be at least two personnel staffing rehab.</i>
8. Who made the treatments decisions for the firefighters in rehab?	<i>It was kind of left up to the individual to go to and return from rehab when they felt ready.</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>Fluid replacement, candy bars, shade and limited medical assessments</i>
<ul style="list-style-type: none"> Was it adequate to meet the needs of the workers on this scene? 	<i>With fluid replacement and shade it was adequate, food was not adequate.</i>
<ul style="list-style-type: none"> If not, why not? 	<i>With the heat and work load food would have been nice, earlier than later. The mutual agency supplied food, but not adequate amount for everyone to get what they needed.</i>
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>They couldn't continue to function at the expected rate and were physically unable to continue. So the IC and fellow workers suggested they go to rehab.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>It was mainly left up to the individual firefighter.</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>When they felt like they could continue.</i>
12. Who determined which firefighters were in need of further medical care?	<i>No one at this incident required further medical care. Everything was handled on scene.</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>NA</i>

Contact: Lieutenant Ellis Johnston

Question	Response
1. Which incident(s) were you involved in?	<i>July 24, 2011 Lumber yard.</i>
2. What was your job on this incident?	<i>We did a defensive fire attack, to prevent fire from spreading onto nearby stock piles of lumber.</i>
<ul style="list-style-type: none"> Did you utilize full SCBA precautions at any time on this incident? 	<i>Maybe for one to two hour I had one on my back with using it maybe for 30 minutes.</i>

<ul style="list-style-type: none"> If so, for how long 	<i>30 minutes of use time and two hours of packing it around</i>
<ul style="list-style-type: none"> If so, what job(s) were you performing? 	<i>We were in a heavy smoke and heat area that needed to be protected. I also laid a lot of hose lays down for master stream devices.</i>
<ul style="list-style-type: none"> If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>Also later we did a lot of overhaul, mop up without the use of SCBA</i>
<ul style="list-style-type: none"> If so, for how long? 	<i>I would say a few hours.</i>
3. Did you utilize rehab during this incident?	<i>Yes</i>
<ul style="list-style-type: none"> If so, why? 	<i>During the time my team was on air we ran out so command told us to go to rehab. It had worked out that the timing of us needing rehab and another truck showed up.</i>
4. Was rehab established for this incident?	<i>Yes</i>
<ul style="list-style-type: none"> If so, was it established immediately or later in the incident? 	<i>Rehab was great on this incident. A giant loafing shed used to store lumber was right next to the scene. It provided great shade with a nice cool wind blowing through. A tarp was laid on a buck of lumber with an array snacks to eat and drink.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>See below.</i>
<ul style="list-style-type: none"> If so, how? 	<i>It is very hard for someone that lives for everyday to fight a fire and then go to a fire to just sit and watch it while he takes a break. On the other hand, on this fire I really felt the need for rehab. The heat was high and the work load was in great need. Sitting in rehab was greatly appreciated.</i>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>The EMT-B that set up this rehab had a little coaching but really ran with his duties. I don't think you will find this to be with everyone.</i>
<ul style="list-style-type: none"> If so, what was their level of certification? 	<i>EMT-B</i>

<ul style="list-style-type: none"> If not, what level of training and/or certification do you think should be required and why? 	<i>An in-house training for how we want to run our rehabilitation program. Knowing when and how to set up a rehab, Know when to intervening with on scene activities.</i>
7. Were there enough staff members in the rehab unit for this incident?	<i>Plenty this time but two would maybe be more appropriate.</i>
<ul style="list-style-type: none"> If no, why not and how many would you have recommended? 	<i>See above.</i>
8. Who made the treatments decisions for the firefighters in rehab?	<i>The EMT-B called all of the shots. Nothing but heat stress was present.</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>This fire location was ideal for rehab. It had built in shelter shade.</i>
<ul style="list-style-type: none"> Was it adequate to meet the needs of the workers on this scene? 	<i>This time it was. I could see him getting overwhelmed very easily.</i>
<ul style="list-style-type: none"> If not, why not? 	<i>See above.</i>
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>It really came down to just asking to go or having extra guys there to swap in your spot.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>An EMT-B</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>There was nothing high tech, cool off for a few minutes and then you were good to go.</i>
12. Who determined which firefighters were in need of further medical care?	<i>Nothing was used.</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>See above.</i>

Contact: Lieutenant Matt Byrne

Question	Response
1. Which incident(s) were you involved in?	<i>I was at the lumber yard fire.</i>
2. What was your job on this incident?	<i>I was the pump operator.</i>
<ul style="list-style-type: none"> Did you utilize full SCBA precautions at any time on this incident? 	<i>Negative</i>
<ul style="list-style-type: none"> If so, for how long 	<i>NA</i>
<ul style="list-style-type: none"> If so, what job(s) were you performing? 	<i>NA</i>
<ul style="list-style-type: none"> If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>Affirmative</i>
<ul style="list-style-type: none"> If so, for how long? 	<i>On and off for the entire incident</i>
3. Did you utilize rehab during this incident?	<i>Affirmative</i>

<ul style="list-style-type: none"> • If so, why? 	<i>To prevent becoming dehydrated</i>
4. Was rehab established for this incident?	<i>Affirmative</i>
<ul style="list-style-type: none"> • If so, was it established immediately or later in the incident? 	<i>I believe it was established relatively early on in MFD's operational period but not immediately.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>Negative</i>
<ul style="list-style-type: none"> • If so, how? 	<i>NA</i>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>I admit I do not recall but I believe it was either a brand new basic or a paramedic student.</i>
<ul style="list-style-type: none"> • If so, what was their level of certification? 	<i>See above.</i>
<ul style="list-style-type: none"> • If not, what level of training and/or certification do you think should be required and why? 	<i>At least the advanced level. I believe the rehab unit should be able to offer IV fluid replacement therapy. I also believe that there should be an experienced provider in charge of the unit so that they would recognize and treat environmental emergencies.</i>
7. Were there enough staff members in the rehab unit for this incident?	<i>Negative</i>
<ul style="list-style-type: none"> • If no, why not and how many would you have recommended? 	<i>I believe there was only one person with the "responsibility" of rehab. At least two personnel should be on rehab. One to "man" the unit and treat responders reporting to the rehab unit and one to run refreshment to responders at their assigned duty locations.</i>
8. Who made the treatments decisions for the firefighters in rehab?	<i>I do not know. I was unaware of the need for personnel to be treated on this incident.</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>To my knowledge, there was a rehab cooler with water and sports drinks, high energy snacks (candy bars/granola bars). The rehab cooler was placed in the shade under one of the lumber yard's shelters. There was an ambulance on scene with cold packs and the capability of doing a medical assessment. I believe that the ambulance was not near the shaded area and the rehab cooler.</i>
<ul style="list-style-type: none"> • Was it adequate to meet the needs of the workers on this scene? 	<i>At the time, I believed it was. But thinking back, I believe it was not.</i>

<ul style="list-style-type: none"> If not, why not? 	<i>I do not believe the person “in charge” of the rehab unit understood his role. I also do not believe he had the experience or skills necessary to recognize and treat the possible environmental emergencies that could have occurred that day.</i>
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>I was unaware that we had firefighters in that condition. I do not know who made that decision.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>I was unaware of the situation. I do not know who made that determination.</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>NA</i>
12. Who determined which firefighters were in need of further medical care?	<i>NA</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>NA</i>

Contact: Captain Robert Kohler

Question	Response
1. Which incident(s) were you involved in?	<i>St Anthony Saw Mill Fire.</i>
2. What was your job on this incident?	<i>Assisted with Mop up.</i>
<ul style="list-style-type: none"> Did you utilize full SCBA precautions at any time on this incident? 	<i>No</i>
<ul style="list-style-type: none"> If so, for how long 	<i>NA</i>
<ul style="list-style-type: none"> If so, what job(s) were you performing? 	<i>NA</i>
<ul style="list-style-type: none"> If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>NA</i>
<ul style="list-style-type: none"> If so, for how long? 	<i>NA</i>
3. Did you utilize rehab during this incident?	<i>No</i>
<ul style="list-style-type: none"> If so, why? 	
4. Was rehab established for this incident?	<i>Yes, As according to our guidelines.</i>
<ul style="list-style-type: none"> If so, was it established immediately or later in the incident? 	
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>Yes.</i>
<ul style="list-style-type: none"> If so, how? 	<i>Weather was near 100 degrees and Fatigue was present.</i>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>I was aware of the rehab cooler being present and possibly a EMT-B.</i>
<ul style="list-style-type: none"> If so, what was their level of certification? 	<i>NA</i>

<ul style="list-style-type: none"> If not, what level of training and/or certification do you think should be required and why? 	NA
7. Were there enough staff members in the rehab unit for this incident?	<i>In my opinion, no, not for the number of personnel that were present. Part of the issue, was the department that we were aiding had no rehab set up for their personnel.</i>
<ul style="list-style-type: none"> If no, why not and how many would you have recommended? 	NA
8. Who made the treatments decisions for the firefighters in rehab?	<i>I am unaware of any treatment, other than oral fluids.</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>I was aware of the rehab cooler, stocked with oral fluids and various snacks. A shed was used for shade. With how hot the temperatures were, and how many Firefighters were present.</i>
<ul style="list-style-type: none"> Was it adequate to meet the needs of the workers on this scene? 	NA
<ul style="list-style-type: none"> If not, why not? 	NA
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>The employee, the co-worker, and Command was watching employees closely.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>I am unaware if or how these decisions were made, I was not present in the rehab area.</i>
<ul style="list-style-type: none"> How did they determine this? 	NA
12. Who determined which firefighters were in need of further medical care?	<i>I am unaware if or how these decisions were made, I was not present in the rehab area.</i>
<ul style="list-style-type: none"> How did they determine this? 	NA

Contact: Lieutenant Stan Crittenden

Question	Response
1. Which incident(s) were you involved in?	<i>July 24, 2011 Mutual aid Lumber yard fire.</i>
2. What was your job on this incident?	<i>Drafting site engine operator.</i>
<ul style="list-style-type: none"> Did you utilize full SCBA precautions at any time on this incident? 	<i>No</i>
<ul style="list-style-type: none"> If so, for how long 	NA
<ul style="list-style-type: none"> If so, what job(s) were you performing? 	NA
<ul style="list-style-type: none"> If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>Yes</i>

<ul style="list-style-type: none"> • If so, for how long? 	<i>Approx. 10 Min.</i>
3. Did you utilize rehab during this incident?	<i>I used the rehab for water.</i>
<ul style="list-style-type: none"> • If so, why? 	<i>To keep myself hydrated.</i>
4. Was rehab established for this incident?	<i>Yes it was established partially into the incident.</i>
<ul style="list-style-type: none"> • If so, was it established immediately or later in the incident? 	<i>See above.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>My opinion did not change just strengthened in support of rehab.</i>
<ul style="list-style-type: none"> • If so, how? 	<i>See above.</i>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>Yes</i>
<ul style="list-style-type: none"> • If so, what was their level of certification? 	<i>Basic EMT</i>
<ul style="list-style-type: none"> • If not, what level of training and/or certification do you think should be required and why? 	<i>NA</i>
7. Were there enough staff members in the rehab unit for this incident?	<i>Yes</i>
<ul style="list-style-type: none"> • If no, why not and how many would you have recommended? 	<i>NA</i>
8. Who made the treatments decisions for the firefighters in rehab?	<i>Protocols and the EMT himself.</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>Fluid and food.</i>
<ul style="list-style-type: none"> • Was it adequate to meet the needs of the workers on this scene? 	<i>Yes</i>
<ul style="list-style-type: none"> • If not, why not? 	<i>NA</i>
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>Protocol and I.C.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>Protocol and Rehab Personnel</i>
<ul style="list-style-type: none"> • How did they determine this? 	<i>Protocol and training</i>
12. Who determined which firefighters were in need of further medical care?	<i>Not necessary.</i>
<ul style="list-style-type: none"> • How did they determine this? 	<i>NA</i>

Contact: Firefighter Bill Denos

Question	Response
1. Which incident(s) were you involved in?	<i>I was involved in both incidents.</i>
2. What was your job on this incident?	<i>On the Lumber yard fire I was on the nozzle and back up. On the other structure fire I was nozzle and back up as well.</i>
<ul style="list-style-type: none"> • Did you utilize full SCBA precautions at any time on this incident? 	<i>Yes, both.</i>
<ul style="list-style-type: none"> • If so, for how long 	<i>For the Lumber yard fire we were on and off depending on whether we were being offensive or defensive. This lasted about 2 to 3 hours. For the other structure fire I was on air at all times while fighting fire. I went through about 3 bottles of air. This lasted around 2 hours or so.</i>
<ul style="list-style-type: none"> • If so, what job(s) were you performing? 	<i>Nozzle work along with moving debris around on both fires.</i>
<ul style="list-style-type: none"> • If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>NA</i>
<ul style="list-style-type: none"> • If so, for how long? 	<i>NA</i>
3. Did you utilize rehab during this incident?	<i>Yes to both.</i>
<ul style="list-style-type: none"> • If so, why? 	<i>The reasons were for heat exhaustion on the lumber yard fire and to gain rest and energy through food and water to continue to fight fire for the other structure fire.</i>
4. Was rehab established for this incident?	<i>It was established a little later on for the lumber yard fire and sooner for the other structure fire.</i>
<ul style="list-style-type: none"> • If so, was it established immediately or later in the incident? 	<i>See above.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>Not really, I have always known it was there for those who needed rest or were otherwise taken out of the line of work for fainting or other reasons.</i>
<ul style="list-style-type: none"> • If so, how? 	<i>NA</i>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>I felt it was adequate.</i>
<ul style="list-style-type: none"> • If so, what was their level of certification? 	<i>They were EMT-B or EMT-P</i>

<ul style="list-style-type: none"> If not, what level of training and/or certification do you think should be required and why? 	NA
7. Were there enough staff members in the rehab unit for this incident?	<i>I felt there were enough staff members for the other structure fire. You did your own rehab for the Lumber yard sale after it was established.</i>
<ul style="list-style-type: none"> If no, why not and how many would you have recommended? 	NA
8. Who made the treatments decisions for the firefighters in rehab?	<i>Those in charge of monitoring would inform the incident command and they would make the final decision. This was for the other structure fire. The Lumber yard fire the individual fire fighters made their own determination.</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>There was food, fluids, shade, medical monitoring. This was for the other structure fire. For the Lumber yard fire there was food, shade, and fluids.</i>
<ul style="list-style-type: none"> Was it adequate to meet the needs of the workers on this scene? 	<i>I felt that for the other structure fire it was adequate. The Lumber yard fire I felt could have used a little more.</i>
<ul style="list-style-type: none"> If not, why not? 	<i>I felt that the lumber yard sale could have used a person to oversee the supplies being used and making sure people were receiving the rest and that the supplies were sufficient for the group fighting.</i>
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>The firefighters felt the symptoms and often times went and removed themselves by reporting to the IC.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>The IC determined who could leave rehab after receiving the information from those in charge of the rehab station for the other structure fire and for the Lumber yard it was the person firefighter that made that decision.</i>
<ul style="list-style-type: none"> How did they determine this? 	<i>Based on vitals and the information they got back from the firefighter and how they were feeling.</i>
12. Who determined which firefighters were in need of further medical care?	<i>I did not know of anyone who needed further medical care.</i>
<ul style="list-style-type: none"> How did they determine this? 	NA

Contact: Firefighter Mat Hardy

Question	Response
1. Which incident(s) were you involved in?	<i>Fremont lumber yard fire only.</i>
2. What was your job on this incident?	<i>Relief team for those who had suffered from exhaustion.</i>
<ul style="list-style-type: none"> • Did you utilize full SCBA precautions at any time on this incident? 	<i>Not to my recollection.</i>
<ul style="list-style-type: none"> • If so, for how long 	
<ul style="list-style-type: none"> • If so, what job(s) were you performing? 	
<ul style="list-style-type: none"> • If no, did you perform strenuous labor, without the use of full SCBA precautions, at any time on this incident? 	<i>Yes. I hauled house, operated a nozzle to extinguish hot spots, cleared debris to access hotspots, and assisted cutting down a tree that had been burned. All of these were completed outdoors in what I felt was not an IDLH environment.</i>
<ul style="list-style-type: none"> • If so, for how long? 	<i>45 min to an hour.</i>
3. Did you utilize rehab during this incident?	<i>Yes after I completed my tasks. Though not even close to the exhaustion of some of my fellow department members I was tired. I remember it being a hot day.</i>
<ul style="list-style-type: none"> • If so, why? 	<i>See above.</i>
4. Was rehab established for this incident?	<i>Rehab was established by the time I arrived.</i>
<ul style="list-style-type: none"> • If so, was it established immediately or later in the incident? 	<i>In a way yes. In this particular incident rehab became more of a necessity instead of a convenience. I believe that having relief personnel readily available is just as important so that those who feel they are becoming exhausted have the opportunity to attend rehab without a detriment to the fire scene.</i>
5. Because of the resulting problems with firefighter stamina, did your opinion of rehab change?	<i>NA</i>
<ul style="list-style-type: none"> • If so, how? 	<i>NA</i>
6. Was the level of training and/or certification adequate for the responder staffing the rehab unit on this incident?	<i>NA</i>
<ul style="list-style-type: none"> • If so, what was their level of certification? 	<i>While I was on scene none of our department members needed medical attention</i>
<ul style="list-style-type: none"> • If not, what level of training and/or certification do you think should be required and why? 	<i>I believe that EMT basic is an adequate level of training. However the EMT should be able to call for ALS assistance whenever he feels it necessary.</i>

7. Were there enough staff members in the rehab unit for this incident?	<i>I believe so.</i>
<ul style="list-style-type: none"> • If no, why not and how many would you have recommended? 	<i>NA</i>
8. Who made the treatments decisions for the firefighters in rehab?	<i>I did not see anyone get treated.</i>
9. What was provided as part of the rehab unit on this incident? (i.e. fluid replacement, food, shade, active or passive cooling, medical assessments, etc...)	<i>We were provided with candy bars, Gatorade, water, and shade.</i>
<ul style="list-style-type: none"> • Was it adequate to meet the needs of the workers on this scene? 	<i>Yes</i>
<ul style="list-style-type: none"> • If not, why not? 	<i>NA</i>
10. Who or what made the decision for the exhausted/sick/injured firefighters to go to rehab?	<i>The individuals.</i>
11. Who determined which firefighters were able to leave rehab and return to duty?	<i>NA</i>
<ul style="list-style-type: none"> • How did they determine this? 	<i>NA</i>
12. Who determined which firefighters were in need of further medical care?	<i>NA</i>
<ul style="list-style-type: none"> • How did they determine this? 	<i>NA</i>

Appendix E

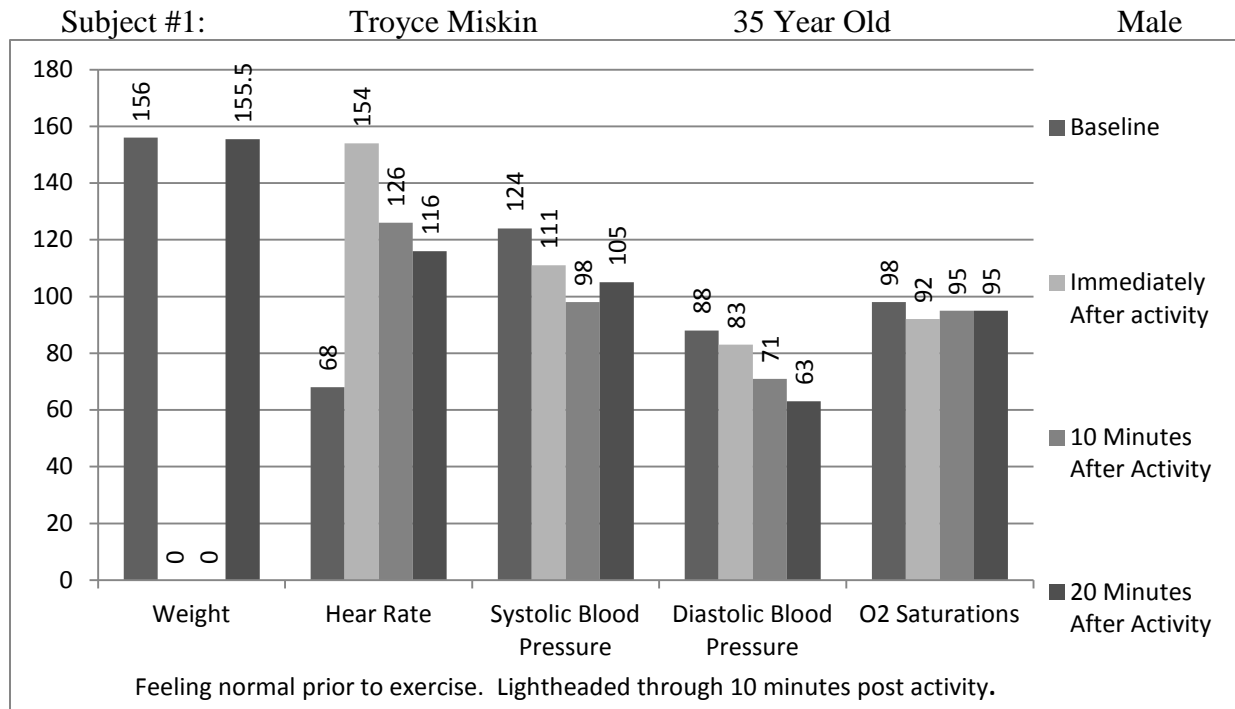
Work Recovery Study Results

Weight = Measured in pounds

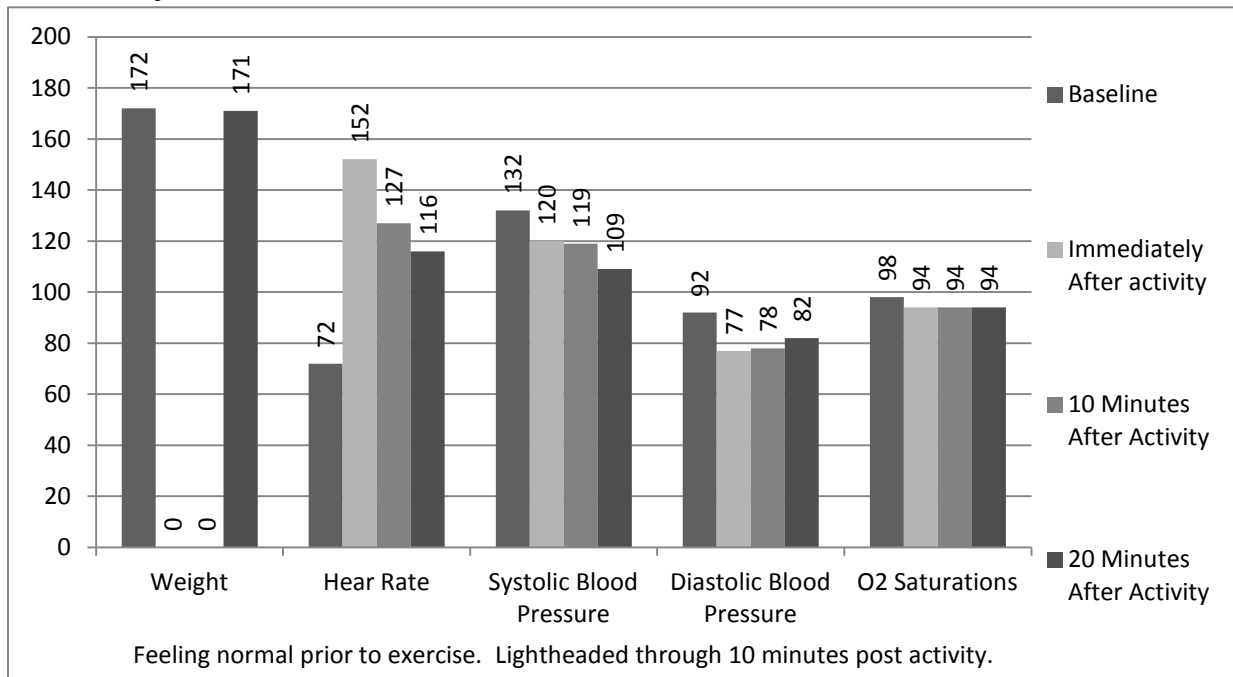
Heart Rate = Measured in beats per minute

Systolic and Diastolic Blood Pressures = Measured in mmHg or millimeters of mercury

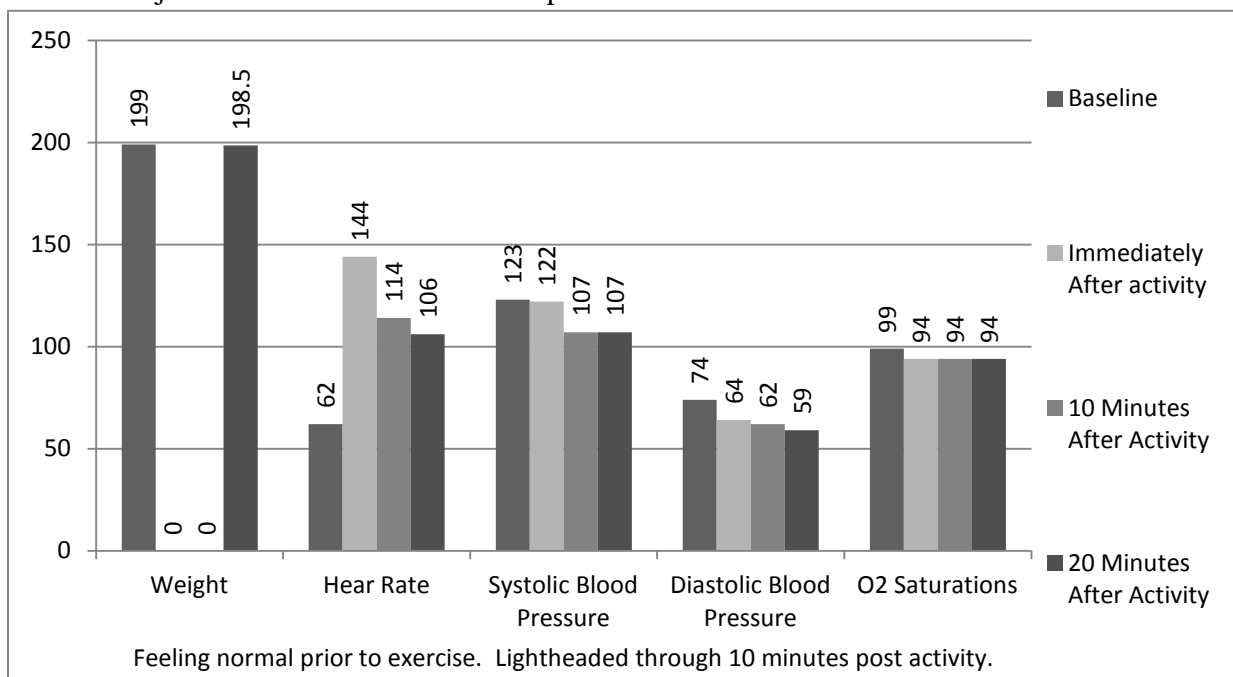
O2 Saturations = Measured in percentage



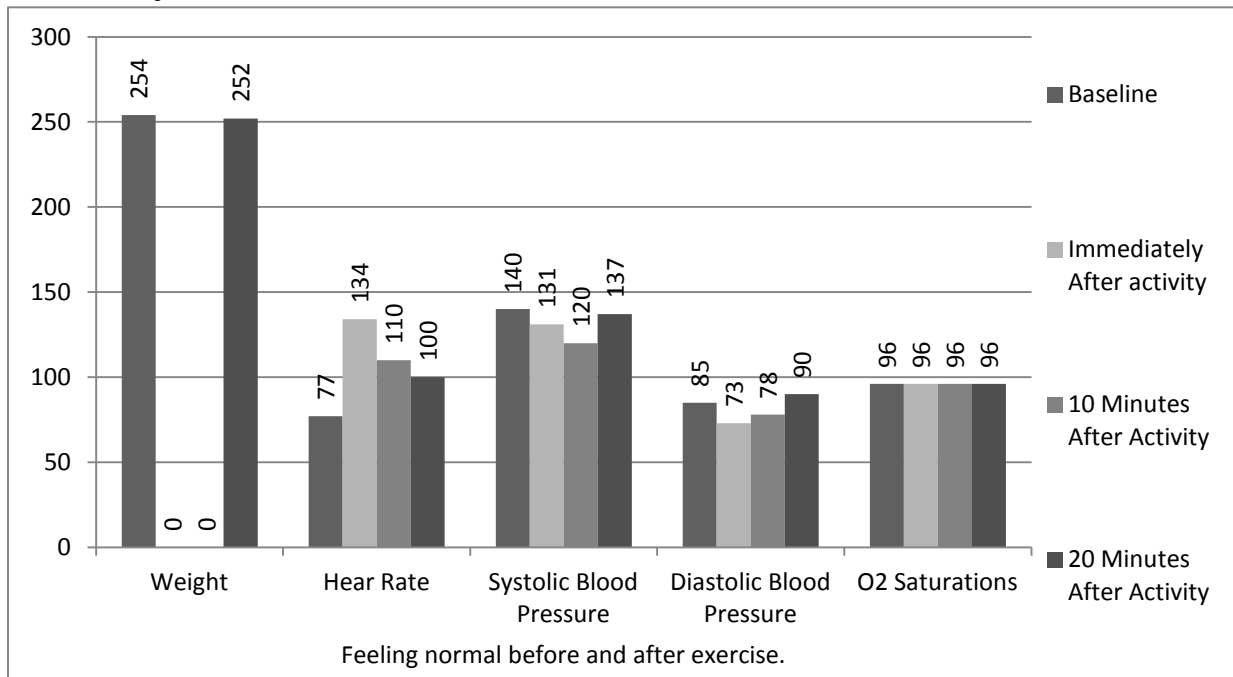
Subject #2: Ellis Johnston 35 Year Old Male



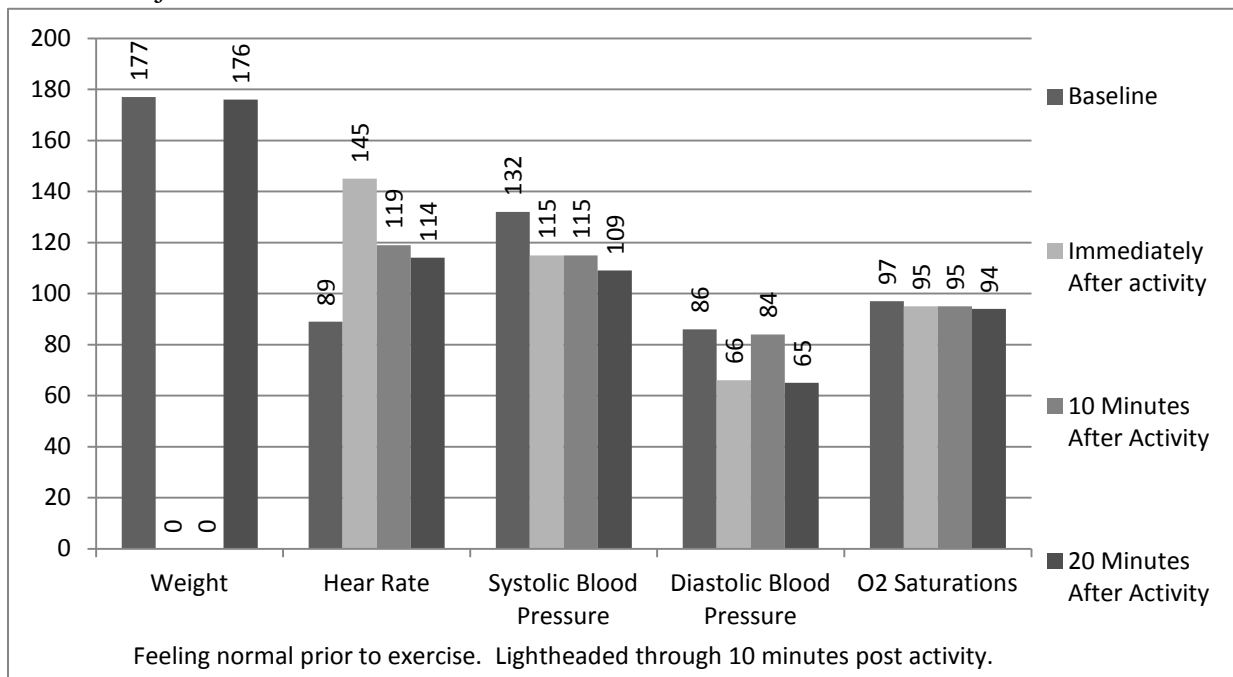
Subject #3: Brandon Pope 28 Year Old Male



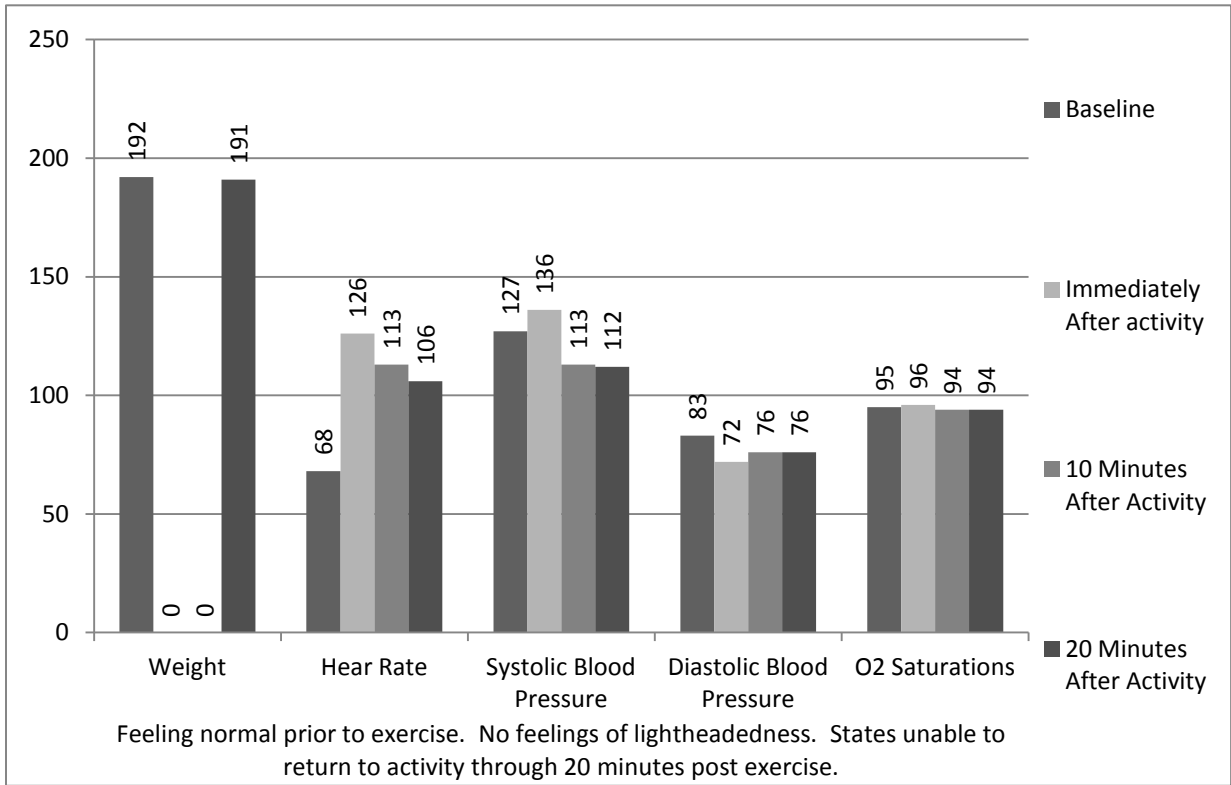
Subject #4: Eric VanGenderen 28 Year Old Male



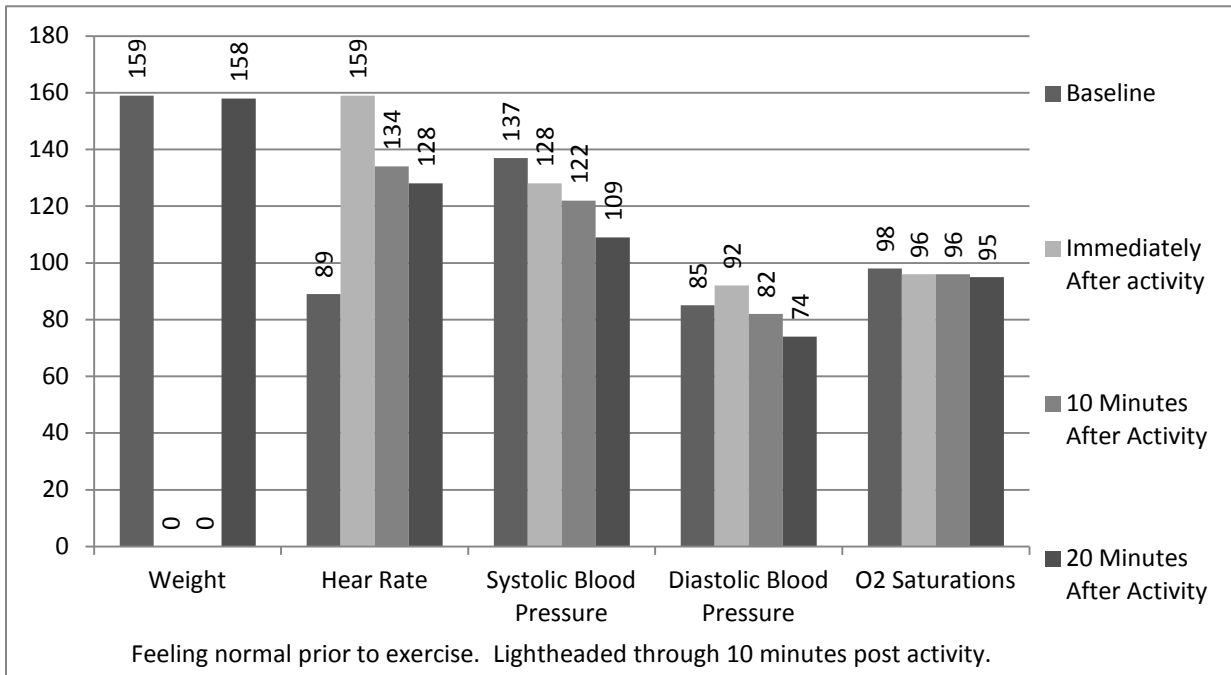
Subject #5: Josh Davis 23 Year Old Male



Subject #6: Chris Allison 48 Year Old Male



Subject #7: Bill Denos 34 Year Old Male





Appendix F

Rehabilitation
SOG # C-5 *(Proposed)*

Chapter: Incident Management
Subject: Emergency Incident Rehabilitation
Revised: February 2012

PURPOSE

To ensure that the physical and/or mental condition of members operating at the scene of an emergency or a training exercise does not deteriorate to a point that affects the safety of each member, or that jeopardizes the safety and integrity of the operation.

RESPONSIBILITY

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 evolutions, treatment and monitoring, food and fluid replenishment, mental rest, and relief from extreme climatic conditions and the other environmental parameters of the incident. The rehabilitation shall include the provision of Emergency Medical Services (EMS) at the Basic Life Support (BLS) level or higher.
2. All officers 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 safety and health. The Command structure shall be utilized to request relief and the reassignment of fatigued crews.
3. During periods of hot weather, members shall be encouraged to drink water and activity beverages throughout the work day. During any emergency incident or training evolution, all members shall advise their supervisor when they believe that 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.

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

ESTABLISHMENT OF REHABILITATION SECTOR

The Incident Commander will establish a Rehabilitation Sector or Group when conditions indicate that rest and rehabilitation is needed for personnel operating at an incident scene or training evolution. These conditions are present during the following events and rehab should be established automatically:

- Structural fires
- Wildland brush fires
- HAZMAT incidents where HAZMAT PPE is worn

- Technical rescue events

A member will be placed in charge of the sector/group and shall be known as the Rehab Officer. The Rehab Officer will typically report to the Safety or Logistics Officer in the framework of the incident management system.

The rehab sector may be initiated by BLS providers. The IC should take into account personnel qualifications on scene and upgrade the rehab unit to include at least one Paramedic level provider as soon as possible.

Rehab will be staffed by a minimum of two personnel. Initial staffing will be accomplished by utilizing the first and second out EMS providers.

Location

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

Site Characteristics

The Rehabilitation Area should:

- Be in a location that will provide physical rest by allowing the body to recuperate from the demands and hazards of the emergency operation or training evolution.
- Be far enough away from the scene that members may safely remove their turnout gear and SCBA and be afforded mental rest from the stress and pressure of the emergency operation or training evolution.
- Provide suitable protection from the prevailing environmental conditions. During hot weather, it should be in a cool, shaded area. During cold weather, it should be in a warm, dry area.
- Enable members to be free of exhaust fumes from apparatus, vehicles, or equipment. (including those involved in the Rehabilitation Sector/Group operations)
- Be large enough to accommodate multiple crews, based on the size of the incident.
- Be easily accessible by EMS units.
- Allow prompt reentry back into the emergency operation upon complete recuperation.

Site Designations

The Rehabilitation Area could be appropriately located in:

- A near-by garage, building lobby, or other structure.
- An area several floors below a fire in a high rise building.
- A school bus, municipal bus, or bookmobile.
- A fire apparatus, ambulance, or other emergency vehicle at the scene or called to the scene.
- A retired fire apparatus or surplus government vehicle that has been renovated as a Rehabilitation Unit (This unit could respond by request or be dispatched during certain weather conditions).
- An open area in which a Rehab Area can be created using tarps, fans, and so forth.

Resources

- The Rehab 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, activity beverage, oral electrolyte solutions and ice.
 - Food: soup, broth, or stew in hot/cold cups or food ordered from a vendor.
- Initial rehab supplies (fluids and Food) are to be obtained from the “Rehab Kit” which is placed in the first arriving ambulance. This kit is stored at station one.
- Medical supplies: blood pressure cuffs, stethoscopes, oxygen administration devices, cardiac monitors, intravenous solutions, and thermometers.
- Other: awnings, fans, tarps, smoke ejectors, heaters, dry clothing, extra equipment, floodlights, blankets and towels, traffic cones and fire line tape (to identify the entrance and exit of the Rehabilitation Area).

GUIDELINES

Rehabilitation should be considered by staff officers during the initial planning stages of an emergency response. However, the climatic or environmental conditions of the emergency scene should not be the sole justification for establishing a Rehabilitation Area. Any activity or 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.

Accountability

Members will retrieve their passports from the accountability board and present them to the rehab officer. The rehab officer will return passports upon successful completion of rehab and clearance to return to duty. These passports will be taken by members and placed back on the accountability board. Members will then be available for reassignment.

Rehab

There are several different ways to perform rehab. They are:

Self Rehab

- Emergency scene workers will perform ‘self rehab’ after the use of one 30-minute air bottle or after 20 minutes of strenuous work. Self-rehab is performed by taking a short break, 5 minutes, while hydrating and getting a quick snack.
- This can be performed while SCBA bottles are being changed.

Formal Rehab

- Emergency scene workers will enter formal rehab after the use of two air bottles or after 45 minutes of work time.

Members will receive hydration, nourishment, rest, and the opportunity recovery while undergoing rehab. Members will also receive a medical evaluation prior to being reassigned from rehab.

Hydration

Hydration is a critical factor in the prevention of heat injuries. The maintenance of water and electrolytes are paramount. Re-hydration 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. Alcohol and caffeine beverages should be avoided before and during heat stress because both interfere with the body's water conservation mechanisms. Carbonated beverages should also be avoided. Members must drink a minimum of 8 ounces of fluid while in rehab.

Nourishment

The department shall provide food at the scene of an extended incident when units are engaged for three or more hours. A cup of soup, broth, or stew is highly recommended because it is digested much faster than sandwiches and fast food products. In addition, food such as apples, oranges, and bananas provide supplemental forms of energy replacement. Fatty and/or salty food should be avoided.

Rest

Rest shall not be for less than ten minutes and may exceed an hour, as determined by the Rehab Officer. Fresh crews, or crews released from the Rehabilitation Sector/Group, shall be available in the Staging Area to ensure that fatigued members are not required to return to duty before they are rested, evaluated, and released by the Rehab Officer.

Recovery

Members in the Rehabilitation Area should maintain a high level of hydration. Members should not be moved from a hot environment directly into an air conditioned area because the body's cooling system can shut down in response to the external cooling. An air conditioned environment is acceptable after a cool-down period at ambient temperature with sufficient air movement.

Members should remove PPE or clothing that contributes to either heat or cold retention.

Certain drugs impair the body's ability to sweat and extreme caution must be exercised if the member has taken antihistamines, such as Actifed or Benadryl, or has taken diuretics or stimulants.

Medical Evaluation**Emergency Medical Services (EMS)**

EMS shall evaluate vital signs, examine members, and make proper disposition (return to duty, continued rehabilitation, or medical treatment and transport to medical facility). Continued rehabilitation should consist of additional monitoring of vital signs, providing rest, and providing fluids for re-hydration. Medical treatment for members, whose signs and/or symptoms indicate potential problems, should be provided in accordance with local medical control procedures. EMS personnel shall be assertive in an effort to find potential medical problems early.

Evaluate members by performing an initial assessment, as indicated by medical protocols. The initial assessments will include the following vital signs:

- Mental status evaluation

- Respiratory rate
- Heart rate
- Blood pressure
- Temperature
- Skin color, temperature, and condition evaluation
- CO monitoring
- Overall evaluation of how the patient is feeling
- Blood glucose monitoring (optional based in general impression)
- EKG monitoring (optional based in general impression)

Workers who present with findings within normal limits will be considered to have presented 'normally.' Workers who present outside of these norms will be considered to have presented 'abnormally.'

Normal Presentation

- Allow to rest for 15 minutes.
- Once this is completed, they are allowed to report back to the IC for reassignment.

Abnormal Presentation

- Abnormal presentation but only minor symptoms (weakness, dizziness, muscle cramps, nausea, vomiting, headache, heart rates greater than 110 beats per minute, or temperatures greater than 100.6 F), provide BLS care for 20 minutes.
- If the BLS measures are effective at terminating the symptoms, the worker returns to emergency scene work.
- If BLS care is ineffective, the worker then receives an ALS evaluation. If deemed necessary, the ALS provider can initiate further medical care and treatment.
- Immediate ALS evaluation, treatment, and transportation is required if a worker presents, at any time, with an altered mental status, chest pain, shortness of breath, or any other significant and life threatening findings.

Documentation

All medical evaluations shall be recorded on suggested forms along with the member's name and complaints and must be signed and dated, and the time recorded by the Rehab Officer or his/her designee.