

Hot Work During Construction of Large Buildings

 **CONSTRUCTION FIRE SAFETY COALITION**

FIRE SAFETY MANUAL

2



AMERICAN WOOD COUNCIL

The American Wood Council is an independent organization that provides independent, non-proprietary information about timber and wood products to professionals and companies involved in building design and construction.

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NOTICE:

THOSE INDIVIDUALS UTILIZING THIS MATERIAL TO PROVIDE ORIENTATION AND/OR TRAINING AND EDUCATION OF PERSONNEL SHOULD ALSO VISIT THE FOLLOWING WEBSITES:

Woodaware.com

Modernfirefighting.com

Constructionfiresafetypractices.com

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1. Scope of this Document

1.1 Introduction

The scope of this document is to describe the best management practices for performing Hot Work on buildings during construction. It is assumed that all Hot Work will always be guided by site supervisors in accordance with company policy and the specifics of the fire safety plan.

The purpose of producing this information and making it available is to reduce the frequency and severity of fires that are caused by Hot Work. Raising the awareness of this particular topic, by conducting in-service training is likely to reduce fire loss more than any other specific topic dealing with buildings under construction. The combined efforts of the developer, the primary contractor, fire and building inspectors, and the fire suppression force should have a measurable impact on fire loss over time.



**Hot Work Produces Heat – excessive heat can lead to fire initiation
(Replace Illustration)**

1.2 Task Analysis

A task analysis for a person performing Hot Work has been developed using statutes, codes and standards that reflect the body of knowledge. Any person performing Hot Work activities shall be qualified and tested for competency. A checklist is provided in Appendix A of this manual. The inventory of knowledge, skills and abilities necessary for a person to perform Hot Work involves compliance with company policy, federal and state statutes and adopted codes, as well as interpretations and guidance provided by the authority having jurisdiction (AHJ). This publication along with continued training at the local level is an important component to reducing the frequency and severity of construction fires.

2. Relevant Legislation and Regulation

2.1 OSHA

Compliance with federal, state and local guidelines is critical to assuring that Hot Work is performed correctly. There are several industry standards published by Occupational Safety and Health Administration (OSHA) Section 29 CFR 1926.352 Subpart J sets the standard for welding, cutting and braising as part of Hot Work. For additional information on specific requirements, please visit the website at www.osha.gov.

2.2 State Regulation

All of the model codes spell out the requirements for welding and other Hot Work. Each of these codes provides guidance on general requirements as well as specific fire safety requirements. In those states that allow local amendments there may be additional requirements that have been adopted by the fire or building department. Many contractors use NFPA 51B as a reference. These requirements need to be researched as part of the development of the Fire Safety Plan for any specific site.

2.3 General Precautions

The pre-hot-work check shall determine all the following:

1. Hot work equipment shall be in satisfactory operating condition and in good repair.
2. Hot work site is clear of combustibles or combustibles are properly protected.
3. Exposed construction is of noncombustible materials or, if combustible, they are adequately protected.
4. Openings are protected.
5. Floors are clean.
6. No exposed combustibles are located on the opposite side of partitions, walls, ceilings or floors.
7. Fire watches, when required, are assigned.
8. Approved actions have been taken to prevent accidental activation of suppression and detection equipment in accordance with Sections 3504.1.8 and 3504.1.9.
9. Fire extinguishers and fire hoses (where provided) shall be operable and located in accordance with NFPA 10.

2.4 Specific Precautions

Hot Work Program Permit - Hot Work permits issued by an *approved* responsible *person* under a Hot Work Program, shall be available for review by the fire code official at the time the work is conducted and for 48 hours after work is complete.

Qualification of Operators – a permit for Hot Work operations shall not be issued unless individuals in charge of performing such operations are capable of performing such operations safely. Demonstration of a working knowledge of the provisions of this chapter shall constitute acceptable evidence of compliance with this requirement.

The individual responsible for the Hot Work area shall maintain ‘pre-work check’ reports in accordance with Section 2604.3.1. Such reports shall be maintained on the premises for 48 hours after the work is complete.

Signage – Visible hazard identification signs shall be provided where required by Chapter 50. Where the Hot Work is accessible to *persons* other than the operator of the Hot Work equipment, conspicuous signs shall be posted to warn others before they enter the Hot Work area. Such signs should display the following warning:

- ❖ Caution
- ❖ Hot work in progress
- ❖ Stay clear

The individual conducting Hot Work is expected to comply with all of the pertinent provisions of the Model Code.

In addition, Hot Work shall comply with the provisions of OSHA Standard 1910 Subpart I, Subpart Q, and Subpart Z.

Hot work areas shall not contain combustibles or shall be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles. A good management practice is to have a blanket or tarp that is fire resistant available to surround the area where hot work is being performed

Whenever there are openings or cracks in the walls, floors, ducts or shafts within the hot work area they shall be tightly covered to prevent the passage of sparks to adjacent combustible areas, or shielded by metal fire-resistant guards or curtains shall be provided to prevent passage of sparks or slag to areas below the hot work is being performed.

Housekeeping - Floor should be kept clean within the hot work area.

Sprinkler protection - Automatic sprinkler protection shall not be cut off while hot work is performed. Where hot work is performed close to automatic sprinklers, noncombustible barriers or damp cloth guards shall be used to shield individual sprinklers and shall be removed when the work is completed. If the work extends over several days, the shields shall be removed at the end of each workday.

The *fire code official* shall approve any hot work if sprinkler protection is impaired and requires a fire watch.

A fire watch shall be provided during hot work activities and shall continue for a minimum of 30 minutes after the conclusion of the work. The *fire code official* or the responsible manager under a hot work program is authorized to extend the fire watch based on the hazards or work being performed.

Location - The fire watch shall include the entire Hot Work area. Hot Work conducted in areas with vertical or horizontal fire exposures that are not observable by a single individual shall have additional personnel assigned to fire watch to ensure that exposed areas are monitored.

Duties - Individuals designated to fire watch duty shall have fire-extinguishing equipment readily available and shall be trained in the use of such equipment. Individuals assigned to fire watch duty shall be responsible for extinguishing spot fires and communicating an alarm.

Fire training - The individuals responsible for performing the Hot Work and the individuals responsible for providing the fire watch shall be trained in the use of portable fire extinguishers.

Where hose lines are required, they shall be connected, charged and ready for operation.

A minimum of one portable fire extinguisher complying with Section 906 and with a minimum 2A: 20-B: C rating shall be readily available within 30 feet of the location where Hot Work is being performed.

Before Hot Work is permitted and at least once per day while the permit is in effect, the area shall be inspected by the individual responsible for authorizing Hot Work operations to ensure that it is a fire safe area. Information shown on the permit shall be verified prior to signing the permit accordance with Section 105.6 of the IFC.

A pre-Hot-Work check shall be conducted prior to work to ensure that all equipment is safe and hazards are recognized and protected. A report of the check shall be kept at the work site during the work and available upon request.

Post Work Inspection

The permit authorizing individual (PAI) should conduct an inspection prior to the release of the fire watch.

2.5 Actions to be Taken

Accountability and supervisory oversight are required to be in place in order to assure that these regulations work. The employee has a responsibility for compliance and the supervisors have a responsibility to ensure that all procedures are followed. All of the elements described in this material need to be enforced with equal emphasis. No one feature is any more important than any other when applied properly. Collectively they result in a positive outcome.



Compliance with codes and standards ensures the protection of buildings.

3. Definitions

AHJ - Authority Having Jurisdiction.

Hot Work – operations which have an element of heat involved in the process, including cutting, welding, thermit welding, brazing, soldering, grinding, thermal spraying, thawing pipe, installation of torch-applied roof system or any other similar activity.

Hot Work Area – the area exposed to sparks, hot slag, radiant heat, or convective heat as a result of the Hot Work.

Hot Work Equipment – electric or gas welding, soldering or cutting equipment used for Hot Work.

Hot Work Permits – permits issued by the responsible person at the facility under the Hot Work Permit program permitting welding or other Hot Work to be done in locations referred to in model codes and pre-permitted by the fire code official.

Hot Work Program – a permitted program, carried out by approved facilities-personnel allowing them to oversee and issue permits for Hot Work conducted by their personnel or at their facility. The intent is to have trained, on-site, responsible personnel ensure that required Hot Work safety measures are taken to prevent fires and fire spread.

PAI - Permit Authorizing Individual

PPE - Personal Protective Equipment

Responsible Party – a person trained in the safety and fire safety considerations concerned with Hot Work. This person is responsible for reviewing the site prior to issuing permits as part of the Hot Work permit program and following up as the job progresses.

Torch-Applied Roof System – bituminous roofing systems using membranes that are adhered by heating with a torch and melting an asphalt back coating instead of moping hot asphalt for adhesion.

4. Basic Fire Concerns

4.1 Chemistry of Fire

The Fire Triangle – the fire triangle represents the three elements needed for a fire to occur – fuel, heat and oxygen. It is necessary to have all three sides of the fire triangle present in the proper proportions in order to have a fire. Once a fire is burning, the removal of one side of the triangle will cause the fire to go out.



The Fire Tetrahedron – The fire tetrahedron is a four-sided figure that incorporates the fire triangle; (fuel, heat and oxygen), with the added feature of the chemical chain reaction that constitutes a fire.

Classification of Fires – Fires are classified according to the nature of the material being burned (the fuel) and whether live electrical equipment is involved. The primary purpose for which fires have been classified by type is for identifying the type of extinguishing agent being required to control a fire. The following classification system groups fires by the type of materials that fuel a fire.

- Class A Fires -ordinary combustibles such as paper, wood, cloth, etc.
- Class B Fires -flammable & combustible liquids & gases
- Class C Fires -electrical fires
- Class D Fires -combustible metals
- Class K Fires -flammable cooking oils

The method of fighting a fire depends on the fuel and the electrical hazards in general. There are three approaches to putting out a fire:

- ❖ Starvation - Cutting off the fuel supply;
- ❖ Smothering - Separating the fuel from the oxidant; and
- ❖ Cooling – Lowering the temperature, below the ignition temperature of the material.

4.2 Heat Transfer

Heat from a fire can be transferred by three methods, radiation, conduction, and convection.

In a typical building fire, solid and liquid matter is converted to a gaseous state by heat, and additional heat (thermal energy) is released as the volatile gases are consumed through the process called burning.

Thermal energy that is in the form of electromagnetic waves is called **radiation**. A hot body (solid, liquid or gaseous) emits radiation and the radiation is absorbed by other bodies, thereby increasing the heat energy of the receiving bodies. Radiation is probably the most important method of heat transfer from building to building. Transfer of heat by radiation can result in ignition of materials at some distance from the originating fire. Raising the temperature of the exposed face on an adjacent building to their ignition temperature often results in what we call an **exposure fire**.

Radiation can also be the main driver of ‘flashover’ within a room or compartment. The term flashover is typically used to describe the transition from localized burning (for example, of a single object or small

group of objects) to the burning of all fuel surfaces in a room or compartment.¹ This most often occurs because the heat in the smoke and gases that form a layer at the ceiling of a room or compartment where there is a fire radiates to all other surfaces in the room; when the amount of radiation reaches a critical point, all exposed fuel surfaces ignite.

In **conduction**, heat is transferred by passing kinetic energy across from a temperature gradient through direct contact of solid materials. This is not normally an important process by which fires spread between buildings; however, they can sometimes contribute to the spread of fire within a building.

The most important method of heat transfer when it comes to fire spread within a building is **convection**. Convection is the transfer of heat from one place to another by the movement of fluids. In the case of a building fire, it is the movement of air, including the fire-generated smoke and other gases around a fire that transfers heat. A fire can spread by all three methods.

4.3 Fire Extinguishers

The nature of the fuel and the reaction to extinguishing agents dictate the type of extinguisher to be used. It is important to understand in certain scenarios, some agents have undesirable side effects. For example, pouring water on a flammable liquid fire can cause an adverse reaction. Putting water on an electrical fire can result in injury. It is important that those engaged in Hot Work know the class of fire extinguisher and its components before using it on a fire.

Extinguishers are classed using the same letter as the type of fire. The following table provides a matrix of these types.

Extinguisher Class/Type	Extinguishing Agent	Extinguishing Method	Remarks
A	Water Foam ABC dry powder	Cooling Smothering Smothering	Lower Temperature Blanket cuts off air from fuel
B	ABC dry powder Foam, CO ₂ , BCF*	Smothering Smothering	Blanket cuts off air Possible re-ignition
C	ABC dry powder CO ₂ , BCF* Water fog	Smothering Smothering Cooling	Blanket cuts off air Possible re-ignition Special equipment
D	Special dry powders or sand	Smothering	Water would produce H ₂ and an explosion
E	Dry powder CO ₂ , BCF*	Smothering Smothering	Blanket cuts off air Possible re-ignition
K	ABC Wet Chemical	Smothering	Special fire risks based on cooking oils

*BCF - Bromochlorodifluoromethane

Employees should be familiar with signage and location of all fire extinguishers on site.

How do you use a Fire Extinguisher?
1. Call for help before attempting to extinguish a fire. The fire may grow much faster than you're capable of dealing with it, and if help is on the way, it removes one less concern for you. <ul style="list-style-type: none"> • Call, or have someone else call, 911
2. Check for your own safety before starting to try to extinguish a fire. There are some key things to check for before you start fighting a fire using a fire extinguisher: Check to see if it is charged

¹ Drysdale, D.; *An Introduction to Fire Dynamics*, Second Edition, John Wiley and Sons Toronto, 2000

<ul style="list-style-type: none"> • Assess the fire size. • Check the type of extinguisher. For example, never use a water extinguisher on an electrical fire. • Check to see if the fire extinguisher is charged.
3. Ready the fire extinguisher. Almost all fire extinguishers have a safety pin in the handle. This pin usually looks like a plastic or metal ring, sometimes colored red which is held in place by a plastic seal. The seal needs to be broken and the pin pulled.
4. Aim for the base of the fire. Shooting into the flame is a waste of the extinguishing agent, addressing/affecting the source of the flames.
5. The PASS method is the most accepted and correct way to use a portable fire extinguisher: <ul style="list-style-type: none"> • PULL out the safety pin • AIM at the base of the fire • SQUEEZE the trigger • SWEEP the base of the fire
6. Do not let the casing of the extinguisher come into contact with energized electrical equipment.
7. When fighting fires which contain loose particles or involve light materials, or when fighting liquid fires, be careful not to spread the fire with the blast of the agent from the nozzle.
8. Be aware that the typical fire extinguisher will contain around 10 seconds of extinguishing agent.
9. If you have successfully put out the fire, tend to the area. This means not leaving it alone, as it might re-ignite without warning.
10. Replace the used fire extinguisher immediately. The used one is now depleted and will serve no further purpose. Leaving it in place will create a false sense of security. Remember: If you have used an extinguisher it MUST be recharged or replaced.

Where Extinguishers are Required

For additional information of fire extinguishers see NFPA Standard 10: Standard for Portable Fire Extinguishers and appropriate Sections of model codes such as the International Fire Code. They should be properly located and appropriate signage should be provided.

The individual who is conducting the fire watch should have a fire extinguisher available that is rated at not less than 2-A: 20-B: C.



5. Protective Clothing and Equipment

Individuals who are engaged in Hot Work must have adequate personal protective equipment (PPE) in order to perform their jobs safely. The following is a list of practices that should be incorporated when performing Hot Work.

5.1 Best Management Practices

- ❖ Protective clothing and equipment shall be suitable for the type of work to be performed, kept in good repair, and kept free of oil and grease.
- ❖ Sleeves shall be kept buttoned at the wrist.
- ❖ Collars shall be kept buttoned.
- ❖ Fire-resistant gauntlet gloves, aprons of leather or asbestos, and other appropriate PPE shall be used as protection against radiated heat or sparks.
- ❖ Front pockets on overalls and aprons, and cuffs on pants shall be eliminated.
- ❖ Capes or shoulder covers made of leather or other flame and heat-resistant material shall be worn during overhead welding or cutting operations. Leather skull caps worn under helmet provide protection against head burns. When working in a confined space or an overhead location, ear plugs shall be worn or the ears covered with wire screen protectors.
- ❖ Hard hats or other types of head protectors shall be used where there is exposure to falling objects.
- ❖ Low cut shoes shall not be worn unless the ankles are covered with protective leggings.
- ❖ Employees required to wear respirators shall keep them clean and sterilized after each use. When not in use, such equipment shall be stored in closed containers.
- ❖ The air line to supplied-air respirators shall be provided with a filter that will remove pipe scale, water, oil, mist, and noxious vapors. It shall also be equipped with a pressure reducing valve to prevent the supplied-air pressure from exceeding 25 psi.
- ❖ Insulating mats of sufficient size shall be used when sitting on the same metal that is being welded. Rubber gloves shall be worn under welding gloves when welding in wet or damp locations.
- ❖ After a welding job is completed, the material shall be chalk marked "HOT," or a warning sign shall be posted to caution other employees.

5.2 Eye Protection

Due to the production of sparks and particulate matter, it is very important that eye protection be provided. The following is a list that should be used as guidance in protecting individuals doing hot work.

- ❖ Goggles, helmets, hand shields, or other suitable eye protection having the proper lens shade for the work being done shall be worn during all welding or cutting operations.
- ❖ Goggles, helmets, and hand shields shall be checked frequently. Equipment with light leaks shall not be worn, as radiation burns will result. Cracked, broken, or loose filter plates must be replaced immediately.
- ❖ Protective colored flash goggles with side shields shall be worn under a hood for protection against harmful rays, flying chips, and sparks when an arc is struck prematurely before the helmet is lowered. The lenses shall be No. 1 or No. 3 shade. Inert gas metal-arc welding by nearby welders requires goggles under the helmet with lens shade.
- ❖ When arc welding operations are performed in an area that is not enclosed or isolated, workers or other persons near the welding area (generally within 75' of the arc) shall wear appropriate goggles.
- ❖ Flash shields shall be carried on portable welding carts as standard equipment and shall be used when necessary.

5.3 Action to be Taken

If a person is injured or a fire results from Hot Work, it usually reflects the failure to comply with best management practices. Personal accountability is the best prevention strategy.

6. Permits

6.1 Obtaining Permits

The Occupational Safety and Health Administration (OSHA) Subpart J 1926.352 prohibits cutting and welding operations unless appropriate steps are taken to minimize fire hazards, such as the removal or protection of combustible materials. Where Hot Work is performed, site managers are responsible to ensuring that adequate control and procedures are in place before work begins.

The idea of having a Permit process is based upon the reality that paying attention to the detailed requirements of a permit process can limit the risk of fire as result of having a checklist of things to consider, Hot Work permits shall be obtained from the appropriate authority before the commencement of any operation involving cutting, welding, brazing, metal burning and/or any other procedure that produces sparks or heat. There are some cities that require a separate Hot Work permit for the job site as a whole.

This shouldn't be confused with the requirement to have a site specific Hot Work permit when that activity is going to occur. When in doubt as to whether a permit is issued or not, the individual should contact the AHJ.

6.2 Relating Fire Chemistry to Hot Work

The relationship between fire behavior and hot work is simple. In previous Sections it has been noted that it takes three things to cause a fire; heat, fuel and oxygen. Construction processes provide fuel - Hot Work provides heat. Therefore, the need to prevent the combination of two of the components is fundamental to reducing fires.

It should be noted that very few fires start off as a threatening blaze. To the contrary, they often start very small. A good example might be the shavings on a floor or cardboard boxes that serve as fuel when a hot spark or piece of slag comes in contact. Finely divided fuels are much more susceptible to ignition than large dimensional lumber pieces.

Effective control programs begin with understanding that fuels and heat must be kept away from one another. Removing or at least protecting fuel is the most effective strategy. The Hot Work area should be as free from finely divided fuels as possible.

The second component that requires consideration is the "smoldering" fire. This is caused when a fuel is exposed to heat, but does not break out into an open flame. Instead the fuel burns very slowly. This can happen for several reasons, not the least of which is the fact that sometimes fuels are moist and do not readily ignite. However, this characteristic is the real reason why the Hot Work area needs to be kept under surveillance for an extended period after the Hot Work has been completed. If work is conducted later in the work day this may require coordination to assure that the firewatch is maintained. Literature review reveals that many fires occur in the late evening or early morning hours and can be attributed to smoldering fires that went un-observed.

6.3 Required Training and Certification

All persons performing Hot Work shall be trained in proper equipment operation, handling and storage of welding materials, compressed gas safety, chemical hazards, and working procedures including the requirements of the written Hot Work permit. Additional training may also be required in the proper selection and use of Personal Protective Equipment (PPE).

Training in confined space entry is also necessary before any Hot Work is performed in a confined space area.



Some organizations have an internal process for conducting the required training. Others use a third party entity to conduct the training. The manner and method used to recognize that a person has completed the course of instruction varies. The illustration above is one example of how this can be done through use of a decal or attachment to the person's PPE.

Workplace Fire Safety Training

There are several generic training programs to support the certification process. The following websites are identified as producing materials that are generic and meet the needs of specific competencies. They are follows:

National Safety Compliance, Incorporated - This organization produces training kits that address issues generic to this problem area they have materials in both English and Spanish. They can be found at the following website- an additional site that was reviewed his call safety compliance company. Their website is <http://www.safetycompliance.com/>

Safety Compliance Management, Incorporated. They are at: <Http://www.scm-safety.com/meet-our-experts/>

Department of Labor's website for OSHA. They can be found at the following website <https://www.osha.gov/law-regs.html> <http://www.osha-safety-training.net/>

6.4 Action to be Taken

The permit process cannot be underestimated. It identifies responsible parties and focuses upon personal accountability. As a result demanding compliance with the permit process reduces the possibility of an inappropriate action that could result in a fire.

7. Notification of an Event

7.1 Notification Processes

In the event that an actual emergency occurs, it is essential that public safety resources be properly notified and dispatched to the scene quickly. Time is of the essence. A workplace emergency is any unforeseen situation that: threatens employees, customers, or the public; disrupts or shuts down your operations; or, causes physical or environmental damage. Emergencies can be either natural or man-made. **This cannot be emphasized enough.**

Procedures for notifying emergency service personnel should be well documented and readily available to all employees and site visitors. Training about the notification process should include the following:

- ❖ What to do when you discover an emergency;
- ❖ How to raise the alarm and what should happen next;
- ❖ What should be done upon hearing a fire alarm sound;
- ❖ The procedures for alerting job site personnel and visitors, directing them to evacuate if needed;
- ❖ The specific arrangements and methods for notifying fire and rescue service;
- ❖ The reporting of incidents, especially any near-misses;
- ❖ Policies and procedures to interface with responding units.

Documentation of a supervisor's investigation or report of incident should be filed on all events.

7.2 Interface with Emergency Services Personnel

In the event you call for emergency services, you will likely observe that fire departments operate using a very specific system of command. It is called the Incident Command System (ICS). The ICS is "a systematic tool used for the command, control, and coordination of emergency response" according to the United States Fire Administration. A more detailed definition of an ICS according to the United States Center for Excellence in Disaster Management & Humanitarian Assistance is "a set of personnel, policies, procedures, facilities, and equipment, integrated into a common organizational structure designed to improve emergency response operations of all types and complexities. See Appendix B.

An ICS is a subcomponent of the National Incident Management System (NIMS), as released by the U.S. Department of Homeland Security in 2004. An ICS is based upon a changeable, scalable response organization providing a common hierarchy within which people can work together effectively. These people may be drawn from multiple agencies that do not routinely work together, and an ICS is designed to provide standard response and operation procedures to reduce the problems and potential for miscommunication on such incidents. The ICS has been summarized as a "first-on-scene" structure, where the first responder of a scene has charge of the scene until the incident has been declared resolved, a more qualified responder arrives on scene and receives command, or the Incident Commander appoints another individual Incident Commander.

As the person who reports an emergency, you may have information that will be valuable to the Incident Commander. During the development of the fire safety plan, a procedure needs to be identified on how to interface with the Incident Commander to pass that information along.

7.3 Action to be Taken

Compliance with general OSHA requirements for emergencies can be found in the following sections of the agency's General Industry Occupational Safety and Health Standards (29 CFR 1910). The publication [How to Plan for Workplace Emergencies and Evacuations](#) is an excellent document for reference and review in preparing for the handling of emergencies on site.

8. Fire Watch

8.1 Primary Action

The role of fire watch should never be underestimated during Hot Work activity. Depending upon the size and physical layout of a specific site, security measures to prevent a fire may vary but, the role of the firewatch should be very consistent. They are there to prevent a smoldering fire from becoming a raging inferno.

There are many actions that can be taken by the fire watch. All of them have to be taken seriously because the failure of any one of them could result in a problem occurring. A person to perform fire watch duties over Hot Work is not only required, but is **essential**. A person other than the individual conducting the Hot Work should remain for at least 30 minutes after Hot Work operations have ended. The PAI is the only one who should release the fire watch.

The reasoning behind this is related to fire behavior. Sometimes a small spark will remain in a combustible fuel without causing ignition immediately. It can smolder and result in open flame later. This 30 minute rule is reasonable when viewed against the consequences of fires being started under these conditions.

8.2 Action to be Taken

In conducting review of numerous fires, the phenomenon of a fire occurring within a short timeframe after the Hot Work operator has left is more frequent than many of the other sources of ignition. Fire watch duties should also include maintaining surveillance for conditions in which heat sources and combustible fuels can result in an ignition.



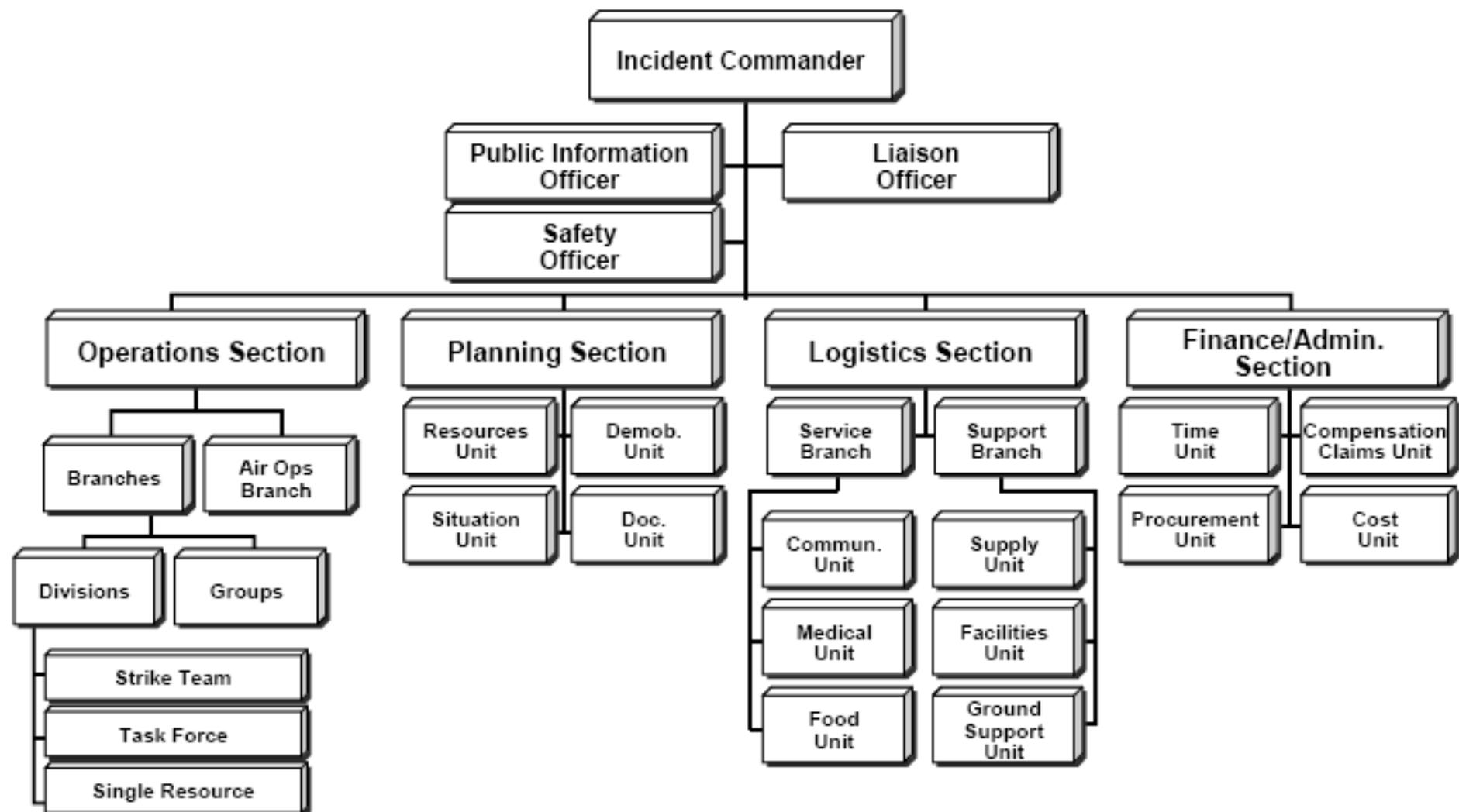
**Watching for fire is Not Just security's Responsibility,
It's Everyone's Responsibility**

Appendix A - Knowledge Skills and Abilities of Hot Work Personnel

Knowledge, Skills and Abilities
Demonstrate knowledge and skills necessary to comply with appropriate sections of model fire and building codes.
Demonstrate knowledge and skills necessary to comply with NFPA Standard 241.
Demonstrate the knowledge and skills regarding taking precautions against fire ignition, including an understanding of basic fire behavior, fire cause ignition sources and fire spread characteristics in buildings under construction.
Demonstrate knowledge and skills necessary to utilize temporary heating equipment including compliance with the Mechanical Code, use of oil –fired-heaters, LP-gas heaters including both the refueling and installation.
Demonstrate knowledge of roles and responsibilities of an individual conducting fire watch.
Demonstrate the knowledge and skills to safely use, inspect and operate fire extinguishers.
Demonstrate knowledge and skills to assure that water supply for fire protection meet minimum requirements on-site when on site hot-work performed.
Identify the function of automatic sprinkler systems and the issues associated with temporary shut downs and operation of valves.

Demonstrate knowledge and skills of internal combustion powered equipment in relationship to potential fire causes.
Demonstrate knowledge and skills necessary to conduct safe roofing operation.
Demonstrate knowledge and skills regarding the storage and utilization of flammable and combustible liquids and gases.
Demonstrate knowledge and skills regarding the storage and handling of explosive materials.
Demonstrate knowledge and skills of proper means of notifying the Authority Having Jurisdiction (fire department) of an emergency in progress.
Demonstrate knowledge and skills necessary to interface the first responders on the scene.

Appendix B – Fire Department Incident Command Chart



Appendix C - Checklist for Hot Work

	Y	N	N/A	COMMENTS
A. General Welding and Cutting Controls				
1. Welding and cutting operations restricted to authorized and trained employees				
2. Permit obtained				
3. Hot work performed in a shop area, if possible				
4. Combustible materials moved at least 35 feet from the worksite				
5. Floor and wall openings covered at least 35 feet from worksite				
6. Procedures developed to prevent welding and cutting in the presence of explosive or toxic air contaminants				
7. Fire resistant curtains and/or tinted shields provided				
8. Local or general exhaust ventilation adequately used				
9. Appropriate personal protective equipment provided and used				
10. Appropriate fire extinguishers provided in vicinity of hot work				
11. Building sprinkler systems operational, when applicable				
12. Procedures developed to establish and maintain a fire watch in hot work areas				
13. Procedures developed to assure prompt notification to emergency services crews if an incident occurs.				
14. Hot work permit closed out				
15. Paperwork filed				