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CHAPTER 14 - HOT WORK MANAGEMENT AND PERMIT SYSTEM

A. INTRODUCTION

1. The provisions of this Chapter are intended to minimize risk of injury, loss of life, and property damage from fire or explosion as a result of hot work.
2. This Chapter does **not** apply to the following: candles, pyrotechnics or special effects, cooking operations (including sterno cans), scientific heating/drying ovens or other heat producing appliances, and electric soldering irons. Also, additional requirements for hot work operations in confined spaces, lockout / tagout procedures during hot work operations, and tar kettle or bituminous melter use are not covered in this chapter.
3. This Chapter establishes the fire protection requirements for conducting hot work operations both in a fixed (designated) hot work area and outside designated hot work locations.
4. Hot work operations include, but are not limited to, welding and allied processes (arc welding, oxy-fuel gas welding, open-flame soldering, brazing, thermal spraying, oxygen cutting, and arc cutting), grinding, heat treating, thawing pipe, torch-applied roofing, and similar applications producing or using a spark, flame, or heat. Hot work also includes laboratory operations that are open flame in nature, such as propane torches, Bunsen burners, or similar operations.
5. This Chapter applies to all SI owned and leased facilities including museums, research facilities or installations, storage facilities, outdoor areas, and equipment; piers, boats, vehicles, tanks or containers, and all other SI facilities or equipment not specifically identified by type.
6. The requirements of this Chapter apply to construction activities as well as normal building activities requiring the use of hot work operations.
7. The requirements of this Chapter shall be followed by all SI staff and contractors. Contractor controlled sites, where SI personnel and property are not at risk, may employ an independent hot work permit program that is equivalent to Smithsonian Institution's standards. Before starting any hot work, contractors and the Smithsonian shall discuss the planned project completely, including the type of hot work to be conducted and the hazards in the area. The contractor's Hot Work Permit Program shall be submitted to OSHM for review and approval prior to commencing hot work operations.

B. CHAPTER SPECIFIC ROLES AND RESPONSIBILITIES

1. Permit Authorizing Individual (PAI)
 - a. A Permit Authorizing Individual (PAI) is someone designated by the facility Director to authorize hot work. (e.g. Building Manager, Safety Coordinator, etc.)
 - b. The PAI shall conduct a pre-job inspection to ensure that appropriate fire safety requirements are in place, as outlined within this Chapter. Additionally, the PAI must ensure that all portions of the hot work permit are completed and signed for permit issuance.
 - c. The PAI ensures that all alternatives to hot work were fully considered before proceeding with the hot work permit program process.
 - d. The PAI shall ensure that all aspects of this Chapter are followed throughout the permit issuance period.
 - e. The PAI shall ensure that all hot work personnel and appropriate supervisors are suitably trained (e.g. welding certification, factory trained, etc.) in the safe operation of the hot work equipment and the hot work permit process.
 - f. The PAI shall advise all COTR's and contractors, as well as SI personnel not familiar with the facility, about hazardous conditions.
 - g. If necessary to impair a fire protection system to conduct a hot work operation, the PAI ensures that the proper fire system impairment permit ([Chapter 36, "Fire Protection,"](#) of this *Manual*) is obtained, in addition to the hot work permit. A copy of the fire system impairment permit shall be attached to the approved hot work permit before posting at the job site. Additionally, hot work is not permitted when the automatic sprinklers are impaired.
 - h. The PAI provides a copy of the hot work permit to the museum or facility Security Manager and Control Room Operator prior to the hot work being initiated.
 - i. The PAI may request the Office of Safety, Health and Environmental Management (OSHEM) to review special hazard situations and recommend mitigating practices or compensatory measures to prevent fires or explosions, specific lockout/tagout requirements, or special ventilation and respiratory protection measures necessary to safely complete hot work activities.
2. Safety Coordinator
 - a. Ensures that the requirements identified in this Chapter are applied throughout the respective museum, facility and/or operation and that all the areas meet all the safety requirements outlined within this chapter.

- b. Shall work with staff to identify, inspect, and ensure permits are obtained for designated (fixed) hot work locations every six months (twice per year) within their museum, facility or operations under their purview and that all areas meet the safety requirements of this Chapter.
 - c. Serves as a Permit Authorizing Individual if so designated by the Director.
 - d. Provides quality control of hot work program to ensure permits are being issued for all hot work operations within the building, facility or operation under their purview, and that proper precautions are being followed for all operations.
 - e. Maintains a current list of authorized PAI's for the building, facility or operation under their purview.
 - f. Incorporates designated (fixed) hot work locations in their self-inspections.
3. Building or Facility Manager
- a. Serves as a Permit Authorizing Individual if so designated by the museum director.
 - b. Ensures that hot work permits are being issued for all hot work activities being conducted within their building or facility.
 - c. Ensures that designated (fixed) hot work permits are issued and are updated semiannually for all designated hot work areas within their building or facility, in accordance with the requirements of this Chapter.
 - d. Maintains all permit records in accordance with Section E, Records and Reports of this Chapter.
4. Supervisors
- a. Shall be responsible for determining if an alternative method or process can be used in lieu of hot work for completing a job or task, as described in Section C, Hazard Control Part 1.
 - b. Requests a hot work permit from a building or facility designated PAI prior to the initiation of hot work operations, prior to the expiration of an existing permit, and when conditions change.
 - c. Ensures that hot work equipment is handled safely.
 - d. Ensures that combustible materials and hazardous areas/situations are properly identified within the hot work area, and appropriate precautions taken to mitigate all hazards prior to commencement of hot work.
 - e. Ensures that conditions are in accordance with the issued hot work permit requirements, before the hot work operator begins the operation.

- f. Ensures that all fire suppression systems are active in the work area and that portable extinguishing equipment is properly located at the hot work location.
 - g. Ensures that the fire watch is in place prior to initiation of the hot work operation.
 - h. Ensures that all fire safety requirements of an issued hot work permit are followed for activities under his/her purview.
 - i. Ensures personnel performing hot work are trained/certified for the hot work operation(s) being conducted.
5. Hot Work Operator. The hot work operator shall handle equipment safely and use it as follows so not to endanger lives and property:
- a. Shall have supervisor and PAI approval before starting the hot work operation.
 - b. Shall ensure equipment is in safe and reliable operating condition. If equipment is found to be faulty or unsafe, it must be properly repaired, or removed from service. Hot work shall not be conducted utilizing faulty or unsafe equipment.
 - c. Shall continue a hot work operation only when conditions remain unchanged from the approved permit. If conditions change, the operator shall immediately cease work and notify their supervisor and the PAI for re-evaluation of the operation.
 - d. Shall only perform hot work for which they are certified or properly trained.
6. Fire Watch (FW). The fire watch is the individual(s) designated by the supervisor to monitor the hot work operation for fire development or hazardous conditions.
- a. Shall not have other collateral duties. The Fire Watch's sole duty is to support and monitor the hot work operation and shall not be assigned any other tasks while on duty. The Fire Watch cannot act as the Hot Work Operator.
 - b. Shall be trained to understand the inherent fire hazards of the work site and of the hot work operation.
 - c. Shall have the authority to STOP the hot work operation if hazardous conditions develop. These hazardous conditions are described in Section C, Hazard Control Part 2.
 - d. Shall have fire-extinguishing equipment readily available and shall be trained in its use.
 - e. Shall be familiar with the facility and procedures for sounding an alarm in the event of a fire. The fire watch shall know the location of the nearest emergency pull station and telephone to report an emergency.

- f. Shall observe for fire in all exposed areas and attempt firefighting activities only when conditions are safe and obviously within the capability of the equipment available. If the fire is beyond the capability of available equipment, the fire watch shall immediately sound the alarm.
- .
- 7. Project - Contracting Officer's Technical Representative (COTR)
 - a. Shall ensure that a SI permit is obtained for all project and/or construction related activities which require hot work operations under their purview, prior to the initiation of hot work activities.
 - b. Shall ensure that all requirements and restrictions indicated as part of permit issuance are followed by all SI personnel and contractors, during the course of the hot work operation.
 - c. Shall ensure that appropriately trained fire watch personnel are provided in accordance with the requirements of this Chapter and will review emergency protocol and reconfirm the duration of the fire watch.
 - d. Shall ensure hot work operations do not occur within a construction area if the fire suppression system is impaired within the intended work zone.
 - e. Shall stop hot work if the activity has breached permit requirements or conditions have changed. Shall require re-evaluation of the hot work operation and issuance of a new permit.
 - f. Shall immediately report any fires or incidents caused by hot work to the Building or Facility Manager, Facility Safety Coordinator and OSHEM.
 - g. Shall perform a post hot work inspection of jobsite.
 - h. Shall **not** serve as a PAI, unless specifically designated by the facility Director.
 - 8. Office of Protection Services (OPS)
 - a. Upon notification of hot work permit issuance, must ensure that the respective security control room operator is made aware of the permit and follows the general status of the on-going hot work operation.
 - b. Shall immediately summon the appropriate fire department or emergency response if notified of a fire or explosion related to the hot work operation.
 - c. Shall follow the status of fire system impairments, if a fire system impairment permit is issued as part of the hot work permitting process.

- d. Shall report any fires or incidents caused by hot work to the Building or Facility Manager, facility Safety Coordinator and OSHEM.

C. HAZARD CONTROL

1. ***AVOID HOT WORK WHEREVER POSSIBLE!*** Consider all alternatives to hot work, prior to utilizing a hot work method. These alternatives may include, but are not limited to, the following:
 - a. Mechanical bolting vs. welding
 - b. Screwed or flanged pipe vs. sweat soldering
 - c. Mechanical pipe cutter vs. torch cutting
 - d. Manual hydraulic shears vs. torch cutting
 - e. A roof covering system that is not torch applied
 - f. Mechanical removal and relocation of frozen piping to a heated area vs. thawing pipe in place with hot work.
2. General Hot Work Precautions. Hot work activities shall not be permitted on or in the following:
 - a. Areas not authorized by a PAI.
 - b. Sprinklered buildings when sprinklers are impaired. *Note: Welding or torch cutting on automatic sprinkler systems after installation is prohibited.*
 - c. Combustible walls or ceilings or those containing combustible insulation.
 - d. Pipes or other metal in contact with combustible materials, if ignition of materials is possible due to conduction.
 - e. Metal partitions, walls, ceilings, or roofs having a combustible covering.
 - f. Walls or partitions of combustible sandwich-type panel construction.
 - g. Tanks or pipes that have held flammable or combustible liquids (unless they have been thoroughly purged and tested for residual vapor). Hot tapping or other cutting and welding on a flammable gas or flammable /combustible liquid transmission or distribution utility pipeline shall be performed by a crew that is certified to make hot taps.
 - h. In the presence of explosive atmospheres.
 - i. In the presence of uncleaned or improperly prepared drums, tanks, or other containers and equipment that have previously contained materials that could develop explosive atmospheres.

- j. In areas with an accumulation of combustible dusts.

3. Personal Protection Requirements

The following personal protection precautions are required:

- a. Exposed personnel shall be suitably protected from heat, sparks, slag, and ultraviolet radiation hazards. This may be accomplished through the use of fire resistive screens or shields, or other protective measures.
- b. If hot work is being performed on metals such as stainless steel, lead, nickel, chromium, or metals with special coatings, the OSHM staff must be contacted prior to work initiation, to review the process for special ventilation or respiratory protection requirements. Refer to [Chapter 27, "Ventilation for Health Hazard Control"](#) and [Chapter 18, "Respiratory Protection"](#) of this *Manual*.

4. Hot Work Permit Issuance and Requirements

- a. A daily hot work permit ([Attachment 1- SI Daily Hot Work Permit Form](#)) must be obtained prior to the start of a hot work operation in a non-designated hot work location. A hot work permit is valid for a maximum of one day (24 hours). For additional clarification as to whether a hot work permit is required see ([Attachment 2– Hot Work Permit Decision Tree](#)).
- b. Combustible materials and flammable liquids within the required safe distance of the hot work area must be removed, and oily deposits within this distance must be cleaned and/or removed. See table below for safe distances required for various types of hot work.

Type of Hot Work	Safe Distance
Soldering	10ft
Brazing	15ft
Cutting	35ft
Grinding	35ft
Welding	35ft
Other	35ft

- c. Combustible materials within the required safe distance which cannot be removed must be covered or shielded with flameproof covers, fire resistant guards, or fire resistant curtains. The edges of covers at the floor shall be tight to prevent the entrance of sparks. The materials should also be wetted-down, if appropriate for protection of the hazard.

- d. Cracks in walls, floors, ducts, or other concealed spaces within the required safe distance must be covered to prevent the passage of sparks or slag to adjacent areas.
- e. Combustible materials must be removed from the opposite side of walls, partitions, ceilings, or roofs prior to performing hot work on or near such assemblies.
- f. Special precautions must be taken to prevent unwanted activation of automatic fire detection or suppression systems due to hot work operations. This may include impairment of smoke detectors in the work area, consistent with the SI Fire Protection System Impairment Procedure (and/or physical protection of system components that may be activated), [Chapter 36, "Fire Protection,"](#) Attachment B, of this *Manual*. Examples include:
 - (1) Shielding of a sprinkler head or applying a wet rag over the sprinkler head during the hot work operation and immediately removing it following completion of the work.
 - (2) Applying covers on smoke detectors during the hot work operations and immediately removing it following completion of the work.
 - (3) Temporarily deprogramming smoke detectors that may be impacted, and immediately re-engaging the detectors upon completion of the work.
- g. All fire protection systems shall be brought back on-line immediately following completion of hot work.
- h. A flammable vapor test must be conducted by OSHM Environmental Management Division, or other appropriately trained personnel, for any hot work operation when flammable/combustible liquids, vapors, or gases may be present. If test results exceed 25% of the lower explosive limit (LEL) for liquids and 10% LEL for gases, additional precautions may be required.
- i. Where the hot work area is accessible to persons other than the hot work operator, conspicuous signs shall be posted to warn others before they enter the hot work area. The signs shall display the following warning: (Attachment 5 – Hot Work in Progress Signage)

CAUTION

HOT WORK IN PROGRESS

STAY CLEAR

- j. A fire watch must be provided for all hot work operations performed outside of a designated (fixed) hot work location. ([Attachment 3 - Fire Watch Decision Matrix](#)) will aid in determining fire watch requirements.
- k. A fire watch must have portable fire extinguishing equipment immediately available for use at the hot work operation (not to

exceed 10 feet from the actual hot work site or affected area). Portable equipment must include an ABC dry chemical fire extinguisher which has a minimum rating of 2A:20-BC. Other extinguishers and first aid appliances such as an air pressurized water (APW) extinguisher, water pump can, bucket of water, or a hose line may be warranted and required depending on the hot work operation and location. The extinguisher(s) shall be in addition to the portable extinguishers permanently located throughout the facility.

- l. More than one fire watch shall be required if combustible materials that could be ignited by the hot work operation cannot be directly observed by the initial fire watch.
 - m. A fire watch shall be maintained for a period of **not less than 30 minutes** following completion of hot work. A more hazardous condition or situation may warrant the fire watch being extended beyond the initial 30 minutes, and is at the discretion of the PAI.
 - n. The PAI retains Part A of the daily hot work permit. Part B of the Daily Hot Work Permit shall be posted within the vicinity of hot work. Both Part A and Part B of the daily hot work permit shall be returned to the PAI immediately following completion of the hot work operation, and notification made to OPS that hot work has ceased.
 - o. The PAI must return both Parts A and B of the original daily hot work permit to the Building / Facility Manager for final record keeping.
5. Hot Work Permits for Designated (Fixed) Hot Work Areas
- a. A designated (fixed) hot work permit ([Attachment 4 – SI Designated \(Fixed\) Hot Work Permit](#)) must be completed and posted within the shop or work area. The single permit is intended to cover all hot work operations within the fixed shop area. Fixed shop permits may be issued for a **maximum of 6 months**. Designated (fixed) hot work permits are only for areas with controls in place to prevent conditions from changing; otherwise, a daily permit is needed.
 - b. Shops that perform hot work activities should be located in noncombustible or fire resistant structures, unless permitted by OSHM Fire Protection Division.
 - c. The designated area or shop must be located in a sprinklered portion of the facility, unless permitted by OSHM.
 - d. Hot work operations shall not be permitted while sprinkler protection is out of service.
 - e. The designated (fixed) shop area shall be free of all hazards, as outlined within this chapter.

- f. The area or shop boundary must be constructed to prevent sparks and/or slag migration outside the approved area, or the immediate space surrounding the defined hot work area must be kept clear of all combustibles for the required safe distance. See section C.4.b for these distances.
- g. Unconnected gas cylinders stored in the area or shop must be limited to a 1-day supply.
- h. The shop supervisor or individual responsible for the hot work area must request a new inspection and permit whenever the configuration and/or occupancy of the fixed hot work area are changed, or the permit is about to expire.
- i. At least one ABC dry chemical fire extinguisher, which is rated **minimum 2A:20-BC**, shall be located within the fixed hot work area.

D. TRAINING. Personnel involved with hot work operations shall complete OSHEM provided training as follows:

- 1. Permit Authorizing Individual (PAI) – Shall be trained annually regarding the requirements of hot work permit issuance.
- 2. COTR – Shall be trained on the safety requirements relating to hot work management and permitting.
- 3. Safety Coordinator – Shall be trained regarding the requirements of hot work permit issuance. [Note: A Safety Coordinator does not have to serve as a PAI, but must be trained as a PAI, to ensure competency when periodically reviewing hot work permitting operations under their purview.]

E. REQUIRED INSPECTIONS AND SELF ASSESSMENTS

- 1. The PAI shall inspect all hot work operations prior to issuance of a permit, and at least once per day while daily permits are in effect.
- 2. The hot work operator shall inspect all equipment prior to use.
- 3. The COTR responsible for the hot work activity area, shall inspect the location for general compliance, prior to requesting issuance of a hot work permit, and periodically re-inspect the hot work operation to ensure that all safety precautions and permit restrictions are being followed during the operation.

F. RECORDS AND REPORTS

- 1. Hot work permits shall be posted in a conspicuous location at all hot work job sites, including designated (fixed) hot work area locations.

2. Copies of fire protection system impairment permits must be posted with the hot work permit, if required as part of the hot work permitting process.
3. Copies of hot work permits issued within a museum or facility shall be retained by the building manager for a period of **not less than two years** from date of issue.

G. REFERENCES

1. National Fire Protection Association (NFPA) 51B, "Standard for Fire Prevention During Welding, Cutting, and Other Hot Work," 2014
2. Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) Subpart Q, "Welding, Cutting, and Brazing."
3. American Welding Society, "Safety in Welding, Cutting, and Allied Processes," ANSI Z49.1: 2012
4. FM Global Property Loss Data Sheet 10-3, "Hot Work Management," September 2015
5. International Code Council (ICC), "International Fire Code (IFC)," 2015