PROCEDURE 4.0—HOT WORK PROGRAM (HWP)

4.1 INTRODUCTION

Purpose
Regulations promulgated by the Occupational Safety and Health Administration (OSHA—29 CFR 1910.252—Welding, Cutting and Brazing) and the NYS Fire Code (Code Chapter 26—Hot Work) require facilities to develop procedures to protect both human health and welfare, and the facility itself, from the hazards posed by hot work in the workplace. This program is intended to provide the Hamilton College community with the guidance necessary to comply with these regulations.

Scope
Hamilton College is committed to providing a safe and healthful work environment for its students, employees and the greater college community. The following Hot Work Program (HWP) has been developed to eliminate or minimize risks to personnel, students, and campus facilities. While the greatest hot work risks arise from spark/slag producing activity (welding, cutting, brazing), other forms of hot work (pipe soldering, pipe thawing, etc.) may also present risks in the form of radiant heat and/or open flame. As such, certain elements of this program will pertain to all types of hot work activity, and others will only address the more dangerous activities that produce sparks.

This HWP includes:
- Identification of Responsibilities
- Prohibited Hot Work Areas/Activities
- Welding/Cutting/Brazing Authorization Process
- Hot Work Permits
- Special Considerations for Soldering/Other Hot Work Activities
- Fire Watch
- Contractors

Applicability
The Director of Environmental Protection, Safety & Sustainability (EPS&S) will maintain and update the College's written Hot Work Program, and will work primarily with other relevant parties (the Physical Plant and certain academic departments) for training and compliance purposes.

Excluded Hot Work/Open Flame Activities
There are at least four other types of activities that occur on College premises that utilize heat and/or open flames, including:
- Bunsen burner use in laboratory settings
- Soldering iron use in laboratory or electronics workshop settings
- Candle use for religious or other ceremonial purposes
- Food cooking or warming using gas/charcoal grills or solid fuel canisters (Sterno)

This HWP is not intended to apply to any of these hot work/open flame activities and are therefore excluded. However, as other regulations and/or best management practices for safeguarding against the inherent fire safety hazards of these activities do apply, SOP's established in Appendix 3, 4 and 5 below are included to address three of the four activities. Procedures for the safe use of food cooking/warming operations with open flames will be the responsibility of the College's food service provider.

4.2 RESPONSIBILITIES

Management (Officers, Department Directors, Academic Chairs)
Hamilton College management shall recognize its overall responsibility for the safe conduct of cutting/welding/brazing activities on campus, and shall:

- Establish areas where cutting/welding/brazing may be performed safely and other areas where additional procedures for cutting/welding/brazing are required.
- Designate those responsible for authorizing cutting/welding/brazing activities in areas where safety procedures are required.
- Require adequate training for employees/personnel involved in performing and/or supervising cutting/welding/brazing activities.
- Advise all contractors about flammable materials and/or hazardous conditions of which they may not be aware.
- Extend certain provisions of this procedure to activities other than cutting/welding/brazing, such as soldering, pipe-thawing, etc.

Department Supervisors
Physical Plant supervisory personnel and certain academic department personnel who supervise other employees or students involved in hot work have primary responsibility in implementing this HWP in areas under their supervision. These employees are generally considered to be "Permit Authorizing Individuals" (PAI's). They are specifically responsible for ensuring:

- Personnel (including students) performing hot work use safe and approved equipment, and that they are adequately trained on such equipment.
- Appropriate safety/fire protection/extinguishing equipment is available for all hot work personnel.
- Combustible/flammable materials are adequately protected from ignition sources associated with hot work.
- Authorizing "Hot Work Permits" via HWP Form-2 below.
- Ensuring fire watch personnel and procedures are properly established.

Hot Work Operators
Regular College employees engaged in hot work are referred to as "Hot Work Operators" (HWO's). In some cases, HWO's and PAI's may be on in the same, if the individual has supervisory authority over others. HWO's are responsible for:

- Assessing potential risks/hazards associated with hot work activities before they occur via the "Pre-Hot Work Check", HWP Form-1 below.
- Getting approval from their supervisor via an authorized Hot Work Permit before beginning any such hot work that requires one.
- Performing hot work activities only when and where conditions are safe to do so, and continuing hot work so long as conditions are unchanged from those under which approval was granted.

Restricted Hot Work Operators
Students engaged in hot work are referred to as "Restricted Hot Work Operators" (RHWO's). RHWO's are only allowed to engage in qualifying hot work under the presence and direct supervision of a PAI, since the PAI will also often also act as fire watch.

4.3 PROHIBITED HOT WORK AREAS/ACTIVITIES

Hot work may not be performed under the following circumstances:

- In areas not authorized by management (i.e. officers, department directors, academic chairs).
- In buildings with fire safety systems when such protection is impaired.
- In the presence of explosive atmospheres (mixtures of flammable gases/vapors/liquids/dusts in air).

- Inside or upon tanks or vessels of any size, or inside confined spaces that have the potential to hold an explosive atmosphere.
- In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk combustibles.

4.4 CUTTING/WELDING/BRAZING AUTHORIZATION PROCESS

The process of authorizing hot work associated with cutting, welding or brazing is dependent upon the criteria established below:

Approved/Designated Hot Work Areas
Three areas on campus are generally recognized as being specifically designated and/or approved for cutting/welding/brazing, along with other types of hot work. These areas include:

- Physical Plant automotive maintenance garage.
- KTSA Hot Shop Studio (room #116B).
- KTSA Scenic Workshop (room #212).

**Note that outdoor areas where there is no flammable or combustible material within 35 feet of the immediate work area are also generally approved for hot work.

Requirements for Approved/Designated Areas
All of the requirements or conditions listed below must be verified as having been met by way of the HWO executing section's 1 and 2 of the "Pre-Hot Work Check", included as HWP Form-1 in the appendix below. Criteria against which a hot work activity is assessed for HWP hazards include the following:

- Appreciable combustible material must not be located within 35 feet of the primary hot work area;
    - While combustible material within the 35 foot clearance area should be relocated during hot work to the greatest extent possible, limited materials may be isolated by means of appropriate shielding or guarding.
- Work floors or surfaces must be of non-combustible construction (concrete), or a suitable non-combustible outdoor environment (soil/stone).
- Floor surfaces (and the entire hot work area in general) should be well maintained from a housekeeping perspective.
- Flammable materials, or empty containers formerly holding flammable materials, must not be stored in the immediate work area.
- Heavy concentrations of dust, or actual/potential explosive atmospheres (from gases, dusts, vapors, liquids) must not be present in the immediate work area.
- Walls and partitions of the approved/designated area must be of non-combustible construction, any holes or openings through those partitions must be tightly covered, shielded or guarded so as to prevent the passage of sparks or slag, and (where metal walls/partitions exist in the hot work area) combustible materials must be adequately relocated on the other side of the wall.
- Mechanical local exhaust ventilation will be provided for all cutting/welding/brazing operations conducted inside buildings, where the room space is less than 10,000 cubic feet and/or the room has ceilings less than 16 feet in height.
- Visible signage reading "Caution—Hot Work In Progress—Stay Clear" shall be conspicuously posted at entrances to the work area to warn others, and flash shielding will be utilized to protect others as needed against UV radiation.
- Safety equipment, including an emergency eye wash, a fire blanket, and properly sized/rated fire extinguishers, will be appropriately staged and maintained in a functional state of readiness.

If all of the conditions above are met, then the hot work is exempt from requiring a Hot Work Permit and fire watch. However if all conditions have not been met, a Hot Work Permit is required, as described below.

Requirements for Non-Approved/Non-Designated Areas
All other indoor areas on campus, other than the three identified above, where cutting/welding/brazing is to be performed are not considered approved/designated areas. Therefore, both HWP Form-1 (pre-hot work check) and HWP Form-2 (hot work permit) below must be completed and strictly adhered to.

4.5 HOT WORK PERMIT REQUIRMENTS

General Considerations
The purpose of the Pre-Hot Work Check is to assess occupational and fire safety considerations in advance of planned hot work in a given area, whether it is an approved/designated area or not. But the essential purpose of a Hot Work Permit is to establish suitable additional engineering and administrative control measures for planned hot work when and where existing hazards cannot be fully controlled, as per the following:

- Whenever a HWO completes section's 1 and 2 of the Pre-Hot Work Check and determines that a Hot Work Permit is required, he/she must obtain approval from a PAI to authorize/sign the Hot Work Permit.
- Again, while it is acceptable for the HWO and PAI to be the same person, a single HWO/PAI cannot also perform their own fire watch duties. And since all Hot Work Permits require fire watch, it is necessary for a PAI to authorize all Hot Work Permit activities to ensure safety protocols are being strictly adhered to (including a designated fire watch).
- HWO's authorized by PAI's to perform Hot Work Permitted activities must conform to the criteria and control measures established in the permit, and post the permit at the site where the hot work is being performed.
- Upon termination/completion of the Hot Work Permitted activity, the respective departments are responsible for maintaining a copy of the completed Hot Work Permit (and the Pre-Hot Work Check) for recordkeeping purposes. For example:
    - Physical Plant hot work documentation should generally be maintained by stapling the completed forms (HWP Form-1 and HWP Form-2) to the work order.
    - Academic departments should generally maintain files of completed forms (HWP Form-1 and HWP Form-2) with the appropriate supervisor's work area.

4.6 SPECIAL CONSIDERATIONS FOR SOLDERING/OTHER HOT WORK ACTIVITIES

Soldering/Other Hot Work Activities
Other hot work activities exist that are beyond the scope of the OSHA cutting/welding/brazing standard, but are regulated under the NYS Fire Code hot work standard. These activities include:

- The use of hand-held propane torches for pipe soldering/sweating.
- The use of radiant heat/open flames for pipe thawing or torch-applied roofing systems.
- The use of fixed/bench grinders or hand-held grinders with metallic objects, thereby generating flying sparks.

Requirements for Soldering/Other Hot Work Activities
Similar to cutting/welding/brazing hot work activities, personnel engaged in other types of hot work are required to assess the occupational and structural hazards posed by the hot work. However, because the risks posed by heat, open flame and grinding are different than those posed by flying sparks and slag from welding, less rigorous Pre-Hot Work Check criteria apply in the determination of whether or not a Hot Work Permit is required. This is done by executing section's 1 and 3 of the Pre-Hot Work Check only, and evaluating the work against the following criteria:

- Combustible materials (boxes, papers, clothing, garbage, etc.) are not stored within the immediate work area (within 3 feet, next to underneath the activity), or any such material within the area has been adequately protected by guarding/shielding.
- Where soldering/other hot work is performed near combustible structural members, those members are adequately free of combustible debris and/or are protected by guarding/shielding.

- Where soldering/other hot work is performed near flammable/combustible liquids, a 15 foot clearance is observed. Do not perform any hot work in odor associated with fuel storage or natural gas is detectable.

In event the Pre-Hot Work Check for soldering/other hot work does in fact indicate that a Hot Work Permit will still be required, then all other Hot Work Permit criteria shall apply.

4.7 FIRE WATCH

Where and when required by the Hot Work Permit, a fire watch will be posted with the following responsibilities:

- Fire watch personnel shall have fire extinguishing equipment readily available and be trained in its use.
- Fire watch personnel shall be familiar with the facilities and procedures for sounding an alarm and notifying Campus Safety in the event of a fire.
- Fire watch personnel shall watch for fires in all exposed areas, and try to extinguish them only when obviously within the capacity of the equipment available, or otherwise they must sound the alarm immediately and initiate an emergency evacuation.
- Fire watch personnel may have no other assigned duties during the fire watch period, outside of watching and supporting the hot work permitted activity.
- A fire watch shall be maintained for a half-hour or as otherwise necessary after completion of hot work permitted activities to detect and extinguish smoldering fires.
- Generally speaking, Restricted Hot Work Operators/RHWO's (students) may not be solely assigned fire watch duties, as regular/fire extinguisher trained College employees should fulfill this role. However, if a hot work permitted activity is occurring in an academic studio/workshop under the direct supervision of a PAI, multiple fire watchers may be assigned. In this scenario, a student RHWO may be assigned as primary fire watch, and the PAI may be the secondary fire watch.

4.8 CONTRACTORS

When on-site contractors are required to engage in qualifying hot work, they will either use this HWP or their own HWP so long as it is at least as stringent as the procedures contained herein.

APPENDIX 1

HWP FORM-1 (PRE-HOT WORK CHECK)

Section 1—Prerequisite Requirements

1. Is welding, cutting, brazing, or other hot work to be performed?	☐ No—hot work permit not required—stop here.	☐ Yes—continue onto question 2.
2. Is equipment to be used in good working order, and properly inspected or tested as required?	☐ No—do not start work—get equipment fixed.	☐ Yes—continue onto question 3.
3. Have all personnel been provided with applicable PPE (gloves, eye protection, shielding, dust mask, etc.)?	☐ No—do not start work—get proper equipment.	☐ Yes—continue onto question 4.
4. Is a fully charged, operable and appropriately rated fire extinguisher available at the site?	☐ No—do not start work—get proper equipment.	☐ Yes—continue onto permit determination.

Section 2—Hot Work Permit Determination For Cutting/Welding/Brazing Activities

Condition	N/A	Condition Met	Condition Not Met—Permit Required
Combustible materials are not stored within 35 feet of the immediate work area, or they are adequately protected by guarding/shielding.			
Floors have been swept clean of combustible debris, and if floors themselves are combustible, they are adequately protected with shielding or wet methods.			
Flammable materials/liquids (or containers that once held flammables) are removed from the work area (35 feet of clearance).			
Adequate natural or mechanical ventilation is provided.			
All wall openings, cracks, floor edges, etc., within 35 feet are tightly covered or otherwise shielded/guarded to prevent the passage of sparks/slag.			
Where hot work is done near walls/partitions/ceilings that are either combustible, or non-combustible yet have combustibles on the other side, adequate precautions have been taken including shielding/guarding/relocation.			
Where hot work is done near a sprinkler head, a wet rag has been laid over the head for the duration of work, and removed when work has been concluded.			
Special precautions have been taken to avoid accidental operation of automatic fire detection systems (isolation, lockout, physical barriers, etc.).			
Nearby containers, vessels, materials or equipment staged within the hot work area are not susceptible to damage by the hot work, and do not present hazards to workers.			

If a permit is required, proceed to bottom of page. If all conditions are either met or not applicable, proceed with welding/cutting/brazing activities without a hot work permit, and sign here:

Name:_____ **Signature:**_____ **Date:**_____

Section 3—Hot Work Permit Determination For Soldering/Other Activities

Condition	N/A	Condition Met	Condition Not Met—Permit Required
No combustible materials (boxes, papers, clothing, etc.) are stored within the immediate work area (within 3 feet next to/underneath soldering, or within reach of any grinding sparks), or any such material within the immediate work area has been adequately protected by guarding/shielding.			
Where soldering/other hot work is performed near combustible structural members, those members are adequately free of combustible debris and are adequately protected by guarding/shielding.			
Where soldering/other hot work is performed near flammable/combustible liquids, a 15 foot clearance is observed. Do not perform any hot work if odor associated with fuel storage or natural gas is detectable.			

If a permit is required, proceed to bottom of page. If all conditions are either met or not applicable, proceed with soldering or other hot work activities without a hot work permit, and sign here:

Name:_____ **Signature:**_____ **Date:**_____

A Hot Work Permit Is Required: Yes ☐ No ☐ Date:_____

Name:_____ **Signature:**_____

APPENDIX 2

HWP FORM-2 (HOT WORK PERMIT)		
Hot Work Permit Basic Information		
Permit Issued To:	Supervisor Authorizing Work:	Date:
Building/Room:	Area Equipment To Be Used:	
Special Work To Be Done:	Permit Duration	Date: Time: Date: Time:

Check Appropriate Response	YES	NO	N/A
1. Have affected personnel been briefed on job safety & requirements?			
2. Has equipment been properly prepared for this work?			
3. Does the hot work affect other nearby/adjacent work or processes?			
4. Have fire detection and/or suppression systems been isolated? List below. If necessary, be sure to notify Campus Safety if you have to isolate multiple smoke/heat detectors as a part of this process.			
5. Is the work area clean and ready for work to begin?			
6. Is there a phone nearby in the event of a fire emergency to immediately notify Campus Safety?			
7. Has fire watch been assigned with appropriate equipment? Name(s) below:			

Fire Watch 1 Name:_____ Signature:_____

Fire Watch 2 Name:_____ Signature:_____

Special Work Requirements (list any special/additional precautions taken, especially related to fire detection/suppression system):

_____

_____

_____

_____

Hot Work Permit Termination Information		
Job Completed Without Incident? Yes ☐ No ☐	Date/Time Permit Surrendered: Date: Time:	Date/Time Permit Canceled Early: Date: Time:

Any Additional Comments:

_____

_____

_____

_____

_____

Post Hot Work Permit At Worksite For Duration Of Hot Work

APPENDIX 3

Soldering Iron Safety

The use of soldering irons while performing bench-mounted electronics (or other) soldering in lab/workshop environments is often both a chemical and physical hazard in need of control. Note that the conduct of soldering with hand-held propane torches is not addressed by this SOP, and rather should be managed in full accordance with the College's written "Hot Work Program".

General Soldering Iron Safety Considerations

- Never touch the element or tip of the soldering iron. They are very hot (about 400°C) and will burn.
- Hold wires to be heated with tweezers or clamps.
- Keep the cleaning sponge wet during use.
- Always return the soldering iron to its stand when not in use. Never put it down on your workbench.
- Turn unit off or unplug it when not in use.

Work Safely with Solder, Flux and Cleaners

- Always wear eye protection (safety glasses) and 100% cotton garments to cover your arms and legs as solder can "spit".
- Always wash your hands with soap and water after soldering.
- Read and understand MSDS's for any materials you are working with before beginning work.

Avoid Toxic Fumes

- Always work in a well-ventilated area. The smoke formed is mostly from the flux which can be irritating, a sensitizer and aggravates asthma. Avoid breathing it by keeping your head to the side of, not above, your work.
- If your benchtop area is equipped with a fume extractor, use it at all times.
- Use lead-free solder.

Dangers of Lead Exposure

- If it is essential to use a lead-based solder, recognize that lead fumes can be inhaled or ingested (through contaminated fingers) during soldering activities, and ventilation engineering controls are necessary.
- Lead can have serious chronic health effects, such as reproductive problems, digestive problems, nerve disorders, memory/concentration problems, and muscle/ joint pain.
- Since lead is a Type 2 PHS, signage like the image to the right is required to be posted in areas where lead soldering takes place (get from Sci Stockroom).
- If you generate any lead solder waste, it must be collected as hazardous waste in a labeled container.

Fire Safety

- Soldering iron work surfaces must be fire proof or otherwise relatively inflammable.
- Keep work surfaces neat and orderly, and keep all loose combustibles away from your work area. The general rule of thumb is to keep 3 feet of clearance adjacent/above/below your work area free of loose combustibles.
- It is recommended that an ABC fire extinguisher be located in areas where soldering iron work is performed, and that personnel are trained on how to use them. Note that for qualifying "hot work", fire extinguisher staging and training is required.

First Aid

- For minor topical (1st degree) skin burns, cool the affected part under cold water for 15 minutes. Do not use creams or ointments for minor topical skin burns—simply cover with a band-aid from laboratory 1st aid kits.
- If the burn covers an area greater than 3 inches across, seek medical attention.
- Be sure to report all injuries to your supervisor, no matter how minor.

APPENDIX 4

Bunsen Burner Safety

While Bunsen burners are essential tools in laboratory environments for heat generation or sterilization purposes, they also present fire safety hazards. Bunsen burners produce an open flame and burn at high temperatures, and as a result, there is potential for an accident to occur. For the safety of all working in a lab setting, it is important that the following guidelines be observed.

General Bunsen Burner Safety Considerations

- **Place** the Bunsen burner away from any overhead shelving, equipment or light fixtures by at least 12 inches.
- **Remove** all papers, notebooks, combustible materials and excess chemicals from the immediate work area.
- **Tie-back/restrain** any long hair, dangling jewelry or loose clothing.
- **Inspect** the connecting hose for cracks, holes, pinch points or any other defect before securing it between the gas valve and the burner. **Replace** any hose found to be defective and throw it away.
- **Ensure** all others in your immediate vicinity are aware that a Bunsen burner will be utilized.
- **Utilize** a sparker/igniter with an extended nozzle to light the burner. **Never** use a match.
- **Have** the sparker/igniter available before turning on the gas.
- **Adjust** the flame by turning the collar to regulate air flow and produce an appropriate flame for the experiment (typically a medium blue flame).
- **Never** leave open flames unattended and **never** leave the lab while the burner is on.
- **Shut off** the gas upon completion of the experiment.
- **Ensure** the Bunsen burner and any devices exposed to its heat have been allowed time to cool before handling.
- **Verify** that the gas valve has been closed securely before leaving the lab.

PPE & Other Emergency Considerations

- **Always** wear PPE that's appropriate to your Bunsen burner work. Typically that means a lab coat, indire

PPE Considerations

Always wear PPE that's appropriate to your Bunsen burner work. Typically that means a lab coat, indirectly vented safety goggles and chemical protective nitrile gloves. If you must handle hot items, use thermally protective gloves.

Other Emergency Considerations

- In the event of a Bunsen burner fire, immediately notify all lab personnel and your supervisor, shut off the gas (if you can), notify Campus Safety by the phone or by activating the nearest fire alarm pull station, and initiate an emergency evacuation.
- If you smell an appreciable gas odor, initiate an emergency evacuation and turn off the main gas valve at the lab's yellow safety station as you evacuate.
- In you experience a minor topical (1st degree) skin burn, cool the affected part under cold water for 15 minutes. Do not use creams or ointments for minor topical skin burns—simply cover with a band-aid from a lab 1st aid kit.
- If the burn covers an area greater than 3 inches across, seek medical attention.
- Be sure to report all injuries to your supervisor, no matter how minor.

APPENDIX 5

Open Flame/Candle Safety Rules

While NYS fire safety regulations do permit the use of open flame/candles in certain limited situations, it is always preferable to use electronic devices to simulate an open flame/candle, or select an external/outside venue for the event. If neither alternative is acceptable, the following open flame/candle rules and procedures shall apply.

General Open Flame/Candle Safety Rules

- In accordance with College policy and NYS fire safety regulations, open flames/candles (or comparable devices like incense, lanterns or sparklers) are prohibited inside all College facilities unless they qualify for an exception.
- To qualify for an exception, the event must be religious or ceremonial in nature (as defined below). No exception may be granted for open flames/candles in any residence hall, regardless of the nature of the event.
- Qualifying and excepted events must have at least one fire extinguisher trained College employee to stand as fire watch for the duration of the event. If the event is large (>50 attendees), or involves hand-held vigil candles in any quantity, there must be at least two fire extinguisher trained College employees present for the entire event.
- At no time may an approved open flame/candle event be held in a building with a fire safety system impairment. All fire safety detection or suppression systems must be fully operable for the duration of the event.
- Any approved open flame/candle event will require Campus Safety notification in advance of event occurrence, and must conform to the qualifying candle criteria noted below.

Religious or Ceremonial Events Qualifying for the Exception

In order for the event to qualify for this exception, it must be:

- A recognized and departmentally sanctioned religious event, or
- A recognized and departmentally sanctioned ceremony of substantial cultural or social significance.

Division officers shall be responsible for determining and authorizing which religious or ceremonial events will qualify for this exception.

Qualifying Candle Criteria

The use of candles shall conform with the below. Other candle types not described must be first approved, or are assumed to be prohibited.

Free-standing candelabra or chimney candles must be staged on non-combustible material or surfaces, be securely fastened to prevent overturning, and be located at least 10' from event occupants or other combustible material like drapes or curtains.

Tea-light or floating candles in non-combustible holders must be of the type that will return to an upright position after being tilted to an angle of 45 degrees from vertical, and must be recessed at least 1 inch below the upper lip of the holder.

OK

Not OK

Hand-held vigil candles are especially dangerous because they are often handled by event participants (including children) who are not fire safety trained. While these types of candles are strongly discouraged, if they are necessary and approved for an event, at least two fire extinguisher trained College employees are required as fire watch. Hand-held vigil candles may never be passed from one person to the other while lit, and should never be disposed of in the regular trash. Collect and reuse for future events, or collect in a non-combustible/metal container for disposal at a later time.

Emergency Considerations

- In the event of an open flame/candle fire, the event organizer(s) shall immediately initiate both an emergency evacuation and the notification of Campus Safety **BEFORE** considering whether fire extinguisher use is appropriate.
- When fire extinguisher trained College employees are assigned fire watch duties, the fire extinguisher(s) shall be immediately available to them and "at the ready" for use as needed.