Hot Work Procedure

1. Purpose

This program sets safety requirements to prevent fires, explosions, injuries, and property damage caused by hot work operations on university property. It outlines clear responsibilities to ensure all welding, cutting, brazing, and open-flame activities happen safely.

2. Scope & Applicability

This policy applies to all University employees, students, contractors, and temporary workers performing hot work on Notre Dame-owned, leased, or managed properties.

2.1. Standard Scope

Hot work includes any temporary operation involving open flames or producing heat, sparks, or slag. Common examples include:

- Welding, torch cutting, brazing, and soldering
- Grinding, thermal spraying, and hot riveting
- Thawing frozen pipes with open flames
- Applying torch-applied roofing materials

2.2. Laboratory Environment

Academic, research, and technical laboratories must follow the fire prevention principles of this program in alignment with NFPA 45 (Standard on Fire Protection for Laboratories Using Chemicals) and NFPA 51B. Section 3.6 outlines specific rules and exemptions for standard laboratory heating tools.

2.3. Hazardous Locations

Additional requirements apply when Hot Work occurs in a hazardous (classified) location. Examples include, but are not limited to, areas such as paint booths and locations where flammable gases, flammable liquid vapors, combustible dust, ignitable fibers, or other hazardous conditions may be present. Definitions

3. Definitions

3.1. Affected Employee - an employee whose job requires them to work in an area in which hot work is being performed.

3.2. Authorized Person – An individual deemed capable, through training, of implementing a hot work activity and the associated safe work practices necessary to create a safe hot work area.

3.3. Designated Hot Work Area – An area that meets the requirements outlined in this procedure and has been approved by Environmental Health and Safety and does not require a daily Hot Work Permit. However, workers must inspect these areas daily and maintain standard fire controls.

3.4. Detected Space – A location with a smoke, heat, or other type of fire detection system.

4. Hot Work Activities
   - Open flame activities, such as welding, cutting, the use of torches, or soldering.
   - Spark-producing operations such as grinding, chipping, chiseling, and drilling. This excludes fixed machinery, such as pedestal grinders, where housekeeping is maintained.
   - Use of flash or electronic cameras, electric or battery-powered tools, gasoline or diesel-powered pumps or motors that do not meet the electrical classification of the area in which they are being used.
   - Electrical, instrumentation, or electrical power work in a Class I area that necessitates working on “live" exposed wiring (24 volts, 4-20 milliamp systems are excluded from the need for a Hot Work Permit).
   - Any other activity that may cause flammable gases or vapors, or combustible materials to ignite.
   - This does not apply to standard laboratory activities, including but not limited to the use of soldering irons, Bunsen Burners, alcohol burners, oil baths, hot plates, or other laboratory heat-producing equipment. However, laboratory activities involving welding, torch use, brazing, or similar activities are considered hot work.
   - This does not apply to activities involving the use of electric soldering irons except if soldering irons are used in electrically classified areas.

4.1. Hot Work Area – An area where hot work activities occur.

4.2. Hot Work Dashboard – An online tool used to track open and closed hot work permits.

4.3. Non-Detected Space – A location that does not have a smoke, heat, or other type of fire detection system. This could be a room/space within a larger detected space or building.

4.4. Soldering – The process of joining metals through the application of materials with the aid of a fluxing agent and a heat source. ‘Heat source' refers to heat that is either flame or electrically generated. The purpose of soft solder is to bridge a gap. Solder has fusible temperatures below 700°F (370°C), generally an alloy of lead and tin. Hard solder connects two pieces of metal by expanding into the pores opened by high temperatures. Hard solders are made of a high-temperature metal (such as silver) with a small amount of tin to lower the melting temperature.

5. Exemptions & Exclusions

5.1. Designated Hot Work Areas
Hot work performed in designated, EHS-approved hot work areas (such as maintenance shops or specialized fabrication studios) does not require a daily

Hot Work Permit. However, workers must inspect these areas daily and maintain standard fire controls.

5.2. Laboratory Activity Controls & Exemptions

Standard Laboratory Equipment (Exempt from Permits): Routine use of electrical heating equipment (hot plates, heating mantles, oil baths, drying ovens) and micro-burners/Bunsen burners for experimental work does not require a daily Hot Work Permit, provided you meet all of the following conditions:

- Maintain a 3-foot clearance zone free of flammable liquids, compressed gases, and combustible materials (or operate the equipment inside a certified chemical fume hood).
- Inspect equipment for electrical or fuel line damage before turning it on and use only UL/ETL-listed devices.
- Keep open flames out of biosafety cabinets (BSCs) and away from flammable vapor sources exceeding 10% of the Lower Explosive Limit (LEL).
- Never leave open flames unattended.

5.3. Permit-Required Laboratory Work: You must obtain a standard Hot Work Permit for open-flame glassblowing torches (other than handheld benzomatic torches), heavy soldering, torch cutting, grinding, or welding inside any laboratory space.

6. Responsibilities

Affected employees are responsible for adhering to this procedure.

6.1. University Supervisors:

- Ensure employees under their responsibility who perform hot work are trained and adhere to this procedure and applicable regulations.
- Ensure contractors under their responsibility are informed of this procedure and direct them to adhere to this procedure and applicable regulations.

6.2. Contractors:

- Ensure employees who perform hot work are informed and adhere to this procedure and applicable regulations.
- Enroll in the Notre Dame hot work permit application at the Notre Dame Fire Department.

6.3. Notre Dame Fire Department (NDFD):

- Review permits and assesses any special conditions or requirements for the hot work to be performed.
- Register contractors in the Notre Dame online hot work application and provide hot work permit training.
- Monitor open hot work permits and ensure they are closed after the hot work activity or at the end of the worker's shift.
- Manage temporary modifications to fire detection systems.

6.4. Environmental Health and Safety (EHS):
- Develop training to implement this procedure.
- Conduct an annual review of this program.
- Conduct periodic field audits (Section 11.1) to verify compliance with this procedure.
- Retain a record of hot work permits, training records, and field audits.
- Inspect specific designated hot work areas no less than annually to ensure compliance with hot work requirements (Appendix C).

7. Hot Work Permit Procedure

7.1. An Authorized Person is required to obtain a Hot Work Permit using the online Hot Work application located on the EHS webpage. Before completing the application, the Authorized Person must call NDFD at 631-6200 to verify if:
- There is smoke or heat detection,
- The fire suppression system is functional, and if necessary, the fire detection systems are disabled to prevent a false activation.
- And inquire if a thermal camera inspection is required at the end of the hot work.

7.2. Upon submitting the permit request, an email will be sent to the originator containing the permit information. A second email will be sent with a link to close the permit.

7.3. Hot work must not commence until a hot work permit is completed by the Authorized Person. A properly completed hot work permit must be available at the job site until the hot work has been completed.

7.4. A hot work permit must be completed on the day of its intended use.

7.5. If multiple hot work tasks are being performed in a hot work area, each hot work task must have a separate permit.

7.6. The hot work permit expires at whichever condition occurs first:
- The completion of the hot work activity.
- The end of the workers' shift.
- If an unsafe condition occurs in the immediate or surrounding area of the hot work (such as a spill of flammable liquids). In this case, the hot work must stop immediately and cannot resume until a new hot work permit is issued.
- If the work crew requests the re-issuance of the permit.
- Any potential change to the working conditions must be evaluated to determine if a new permit will be issued.
- If the Authorized Person changes for the work authorized under the permit.

7.7. After the completion of the hot work activity, an Authorized Person must contact NDFD at 631-6200 to communicate that the fire detection system may be put back in service, if necessary. If the space does not have active detection, the caller must request from NDFD a thermal camera inspection.

For the Hesburgh Library, Main Building, and the Basilica of the Sacred Heart, a thermal camera inspection is always required.

7.8. The hot work permit must be closed out by an Authorized Person indicating that the hot work and any fire watch activities have ceased. Periodic monitoring, if required, will continue as prescribed.

8. Hot Work Preparations

8.1. Remove Fire Hazards

8.2. Combustible materials close enough to be ignited by hot metal and flying sparks must be removed to a safe area. A safe area is defined as an area that is a minimum of 35 feet from the work being performed.

8.3. If the combustible material cannot be moved, it must be protected by other measures such as flame-resistant blankets or tarps, etc.

8.4. Sweep floors of combustibles; if the floor is combustible, protect it with damp sand, metal, or other spark/heat shields.

8.5. Remove flammable liquids, dust, lint, and oily deposits.

8.6. Eliminate any explosive atmospheres.

8.7. House gas may not be used as a fuel source for hot work activities.

8.8. Ensure that gas cylinders used as part of the hot work are:

- Properly handled to and from the work site, concerning the regulator, which should not be stressed or strained during handling or moving of the cylinder.
- Located a minimum of 6 feet from any source of ignition.
- Have had the hose, regulator, tank, and all associated connections tested for leaks before each shift or after any movement of the cylinder.
- Are positioned away from areas that could cause damage to the regulator or tank.
- Properly secured to ensure they cannot tip over.
- Equipped with the proper safety devices including,flame and backflow arrestors or check valves.
- If the cylinder is equipped with a removable handle, ensure that it is properly placed on the valve stem for ready shutoff of the tank in case of an emergency.

8.9. Protect Immovable Fire Hazards

- Identify building construction (walls, roofs, floors) that are combustible and shield them with metal or suitable guards or curtains.
- Avoid hot work of any kind in areas handling, processing, or storing flammable liquids, gases, or combustible dust.
- Combustible material that cannot be moved must be protected by wetting down or covering it with fire-resistant blankets or tarps.

- Oxygen and acetylene cylinders and hoses must be placed in a location where they will not be exposed to hot metal, slag, or flying sparks.

8.10. Protect Fire Hazards by Preventing Sparks from Reaching Remote Flammables and Combustibles.

- Where hot work is conducted above open grating, fire-resistant blankets or tarps must be used to prevent hot slag and sparks from falling on equipment and personnel below.
- The hot work area and the area below must be barricaded, or some other means implemented to prevent unauthorized access.
- Wall and floor openings must be covered with non-combustible materials, including access to concealed spaces in walls or floors.
- Combustible materials that are adjacent to the opposite side of partitions, walls, ceilings, or roofs that may be ignited by heat transfer via conduction or radiation.
- Ducts or conveyors that may carry sparks to distant combustibles must be suitably protected or shut down.

8.11. Prevent Remote Flammables from Reaching Hot Work Area

- To prevent flammables from reaching sparks or heat in the permitted hot work area, the Authorized Person(s) must:
- Identify and eliminate potential sources of flammable vapors.
- Have the valves closed that could feed flammable vapors through open systems.
- Consider sewers and trenches as potential sources of flammable liquids and vapors.
- Evaluate other activities that may take place in the area that could potentially affect the atmosphere and create a hazard while hot work is in process. Take actions to abate the hazard, such as rescheduling activities.

8.12. Provide Suitable Fire Extinguishing Equipment

- Fire extinguishing equipment is required at the hot work area. Refer to Appendix A for fire extinguisher types.
- Assigned department/building fire extinguishers must not be used as the fire watch's fire extinguishers. Authorized Persons must supply their own fire extinguishers.

8.13. Assign a Fire Watch

8.13.1. A dedicated fire watch must be assigned during hot work activities that are not performed in a Designated Hot Work Area. A dedicated fire watch must:

- Be an individual assigned the sole responsibility of providing constant watch during hot work activities to extinguish fires in the early stages, activate the emergency response, and perform other fire prevention duties specified by the permit issuer.
- Have suitable fire extinguishing equipment readily available.
- Have been trained in the use of fire extinguishing equipment.
- Continuously observe hot work tasks and attempt to extinguish a fire if it is within the capacity of the fire extinguishing equipment and the fire watch believes it can be done safely.
- Know when and how to call for assistance in the event of a fire.
- Stop the hot work activity if permitted conditions change that could create a hazardous condition (e.g., spill of flammable liquids) and notify the permit

issuer.
- Know how to read multiple gas monitors if the hot work requires continuous atmospheric monitoring.

8.13.2. A dedicated fire watch is not required during soft soldering work. When soft soldering is performed, the authorized person may self-perform the duties of a fire watch unless the conditions are such that a fire watch, as deemed by the authorized person, is warranted. This does not apply to the Basilica or the Main Building. Any soldering in these two locations must have a dedicated fire watch.

8.13.3. A fire watch must:
- Maintain assignment during and for at least sixty (60) minutes after completion of hot work in “non-detected” spaces.
- Maintain assignment during and for at least thirty (30) minutes after completion of hot work in “detected” spaces.
- All “non-detected” hot work areas must be periodically monitored or evaluated for three (3) hours after completion of the fire watch duties. This may be the fire watch or another individual trained in summoning assistance and using a fire extinguisher.

8.13.4. The Authorized Person must ensure the fire watch understands their responsibilities.

8.13.5. Multiple fire watches may be necessary if the fire watch cannot observe fires in all exposed areas, such as multiple floors.

9. Personal Protective Equipment (PPE)

All persons performing hot work activities must wear appropriate PPE for the specific task being performed in accordance with OSHA regulations (29 CFR 1910.252 and 29 CFR 1910 Subpart I). Required PPE includes:

- Welding helmet or face shield with a properly rated filter lens for welding, cutting, or brazing.
- Safety glasses or goggles are worn under welding helmets to protect from flying particles and sparks.
- Flame-resistant clothing that fully covers the arms and legs. Synthetic materials are prohibited.
- Leather or heat-resistant gloves suitable for welding and grinding tasks.
- Hearing protection is required when noise levels exceed permissible exposure limits.
- Respiratory protection is required when ventilation does not adequately control fumes, vapor, or gases.
- All PPE must be inspected before use and replaced if damaged.

9.1. Ventilation and Atmospheric Controls

9.1.1. Adequate local exhaust or general mechanical ventilation must be provided to control exposure to fumes, vapors, gases, or smoke generated during hot work, in accordance with 29 CFR 1910.252(c) and (f).

9.1.2. Ventilation must be sufficient to maintain airborne contaminants below OSHA Permissible Exposure Limits (PELs). Where ventilation cannot be provided, appropriate respiratory protection must be worn.

9.1.3. When working in confined or enclosed spaces:

- Continuous atmospheric monitoring must be performed for oxygen, flammable gases, and toxic contaminants.
- Ventilation must be maintained to ensure oxygen concentrations remain between 19.5% and 22.0%.
- Hot work must cease immediately if atmospheric conditions become unsafe.

10. Automatic Fire Suppression Systems

Automatic sprinklers or other fire suppression systems protect many buildings and process areas. Hot work must not be permitted in these buildings or areas while these systems are out of service.

11. Confined Space Hot Work Activities

11.1. Any confined space activity must have a confined space permit. Please refer to the University's Confined Space Procedure for details.

11.2. Hot work activities conducted in confined spaces require continuous monitoring for oxygen and flammable vapors. The hot work must cease immediately, and the space must be evacuated if the air monitoring device indicates a potentially dangerous atmosphere.

11.3. All cylinders are to be located outside of the confined space.

11.4. If arc welding or torch activities are being conducted, the electrodes and/or torches must be removed from the space during suspension of activities (e.g., breaks, end of shift).

12. Designated Hot Work Areas

12.1. A hot work permit is not required in a Designated Hot Work area.

12.2. The Designated Hot Work Area must:

- Be posted with a sign that reads: "A Hot Work Permit is NOT required within this

area" or similar wording.
- Be isolated from combustible materials by a distance of 35 feet or protected by welding curtains, non-combustible insulating constructions, or barriers.
- Have a designated fire extinguisher in the hot work area.

12.3. Outdoor areas that are at least 35 feet away from a building, vault, or other enclosure are considered Designated Hot Work Areas if they meet all the requirements under Section 9.2 and are delineated or otherwise identified to warn personnel of the hot work activities.

12.4. If work is to be done on any item or equipment brought into a Designated Hot Work Area, the equipment must be thoroughly cleaned/purged of flammable or combustible materials.

12.5. Designated Hot Work areas do not need a fire watch.

12.6. Appendix C lists the approved Designated Hot Work Areas. Contact Environmental Health & Safety to have an area evaluated/approved as a Designated Area. If an area is not listed in Appendix C, the Hot Work Permit process must be followed.

13. Employee Training

13.1. All persons involved in hot work activities (performing work, fire watches, etc.) must be trained in the hot work procedure and other requirements in applicable referenced standards and regulations before performing this work.

13.2. Refresher training must be conducted:
- When changes to this procedure are made.
- If field evaluations reveal a misunderstanding of hot work requirements.
- At least every three (3) years.

14. Procedure Evaluation

14.1. Hot Work Evaluations (field audits) must be documented using the Qualtrics Field Audit form. Audits must be performed to verify this procedure is being followed. If gaps are identified, they must be addressed immediately and documented on the field audit form for future program review.

14.2. The EHS Department must conduct an annual program review that includes a review of the Hot Work Field Evaluation forms.

15. Recordkeeping

All hot work permits and hot work audit records must be kept for five years.

16. References

16.1. National Fire Protection Association (NFPA) – NFPA 1 Chapter 18 Hot Work Operations

16.2. National Fire Protection Association (NFPA) – NFPA 51B Standard for Fire Prevention During Welding, Cutting, and other Hot Work

16.3. Occupational Safety and Health Administration (OSHA) – 1910 Subpart Q Welding, Cutting, and Brazing, 29 CFR 1910.252 General Requirement.

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Revision History Table

History	Effective Date
Hot work procedure developed.	January 2017
Hot work procedure revised – • Directions on when a thermal camera is needed added. Section 5.7. • Removed hot work permit options except FM Global Hot Work App. Appendix D	July 2017
Hot work procedure revised – • Updated Appendix C • Corrected typos	October 2017
Hot work procedure revised – • Updated fire watch requirements for soldering. Section 6.6.2. • Updated Appendix C	October 2017
Hot work procedure revised – • Question added to Appendix B “Procedure discrepancies reviewed with Notre Dame project contact?”	January 2018
Hot Work Procedure revised – • Removed “small torches” from the 6th bullet point in section 3.5	February 2019
Hot Work Procedure revised – • Removed reference to FM Global application. • Removed Appendix D. • Added reference to Notre Dame permit application.	January 2020
Hot Work Procedure revised – • Updated definitions. • Updated NDFD requirements under section 4.4.	May 2020
Hot Work Procedure revised – • Corrected typos.	January 2021
Hot Work Procedure revised - • Updated NDFD and EHS responsibilities. • Removed paper version of Field Audit form - now on Qualtrics only • Updated Fire Extinguisher table to include visual representation of symbols. • Removed Athletics Grounds Garage from Designated Hot Work Locations	October 2023
Hot Work Procedure revised - • Addition of sections 6.7 Personal Protective Equipment (PPE) and 6.8 Ventilation and Atmospheric Controls. • Updated Stepan Chemistry Designated Locations	September 2025
Hot Work Procedure revised - • Sections 2.2, 5.2 and 5.3 added for clarification of hot work expectations in laboratory environments	October 2026

Appendix A

Fire Extinguisher Types

Fire class	Geometric symbol	Pictogram	Intended use	Mnemonic
A			Ordinary solid combustibles	A for "Ash"
B			Flammable liquids and gases	B for "Barrel"
C			Energized electrical equipment	C for "Current"
D			Combustible metals	D for "Dynamite"
K			Oils and fats	K for "Kitchen"

Appendix B
Hot Work Evaluation Form Questions

Location of Hot Work
Permit Number
Equipment or Material Involved for Hot Work
Reason for Hot Work
Flammable materials removed, covered, or wetted?
Fire watch trained, assigned, and available, if required?
Is proper fire extinguishing equipment available?
Proper personal protective equipment used?
Appropriate ventilation in use?
Affected area barricaded where needed with caution tape?
Is the Hot work permit properly completed and available at the job site?
All personnel involved in the hot work job are trained (authorized)
Person, hot work operator, and fire watch? This is verifiable upon record examination.
Procedure discrepancies reviewed with affected employees?
Procedure discrepancies reviewed with Notre Dame project contact?

Please use the Qualtrics Field Evaluation Form to Complete Audit Process.

Appendix C
Approved Designated Hot Work Areas & Link to Evaluation Form

Name	Location	Date of Approval
Welding Booth 1	Riley Hall	10/3/2017
Welding Booth 2	Riley Hall	10/3/2017
Welding Booth	Maintenance Center Tin Shop	10/3/2017
Welding Booth	Nieuwland Hall of Science Shop	3/2/2017
Chemistry Lab	Stepan Chemistry - Room 257	9/15/2025
Chemistry Lab	Stepan Chemistry - Room 372	9/15/2024
Glassblowing Shop	Radiation Building - Rad Lab	9/15/2025
Outdoor areas at least 35 feet from a building, vault, or other enclosure that meet the requirements in section 9.2 are considered designated hot work areas and do not require separate approval.		
Hot Work Designated Area Evaluation Form		