Hot Work Procedure

1. Purpose

1.1. All Hot Work creates conditions which increase the possibility for fire-related injury or property damage. The purpose of this Hot Work Program is to reduce the potential for injury, fire and/or explosion resulting from conducting hot work.

2. Scope

2.1. The Hot Work Procedure applies to properties owned by the University of Notre Dame and where activities/tasks that fall under the definition of hot work (Section 3) are being conducted. This does not apply to properties that are leased or are located internationally nor does it apply to the Power Plant and utilities operated facilities. The Power Plant and utilities-operated facilities shall adhere to their specific hot work program.

2.2. Hot Work Permits are required for all activities defined as hot work excluding work being conducted in a “designated” hot work area.

2.3. In hazardous (classified) locations including but not limited to the paint booths in Riley Hall, Maintenance Center, Washington Hall, West Lake Hall, and White Field Research Building a Hot Work Permit is required for all activities involving the use of electrical tools or other equipment that do not meet the electrical classification for the area.

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 where hot work is permitted without a hot work permit.

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

3.5. Hazardous (Classified) Location – A location where a potential hazard (e.g., a fire, an explosion, etc.) may exist under normal or abnormal conditions because of the presence of flammable gases, flammable liquid-

produced vapors, combustible liquid-produced vapors, combustible dust, or ignitable fibers or flyings.

The NFPA Publication 70, NEC, and CEC define three categories of hazardous materials designated as Class I, Class II, or Class III. The Classes define the type of explosive or ignitable substances that are present in the atmosphere. Class I locations are those in which flammable gases, flammable liquid-produced vapors, or combustible liquid-produced vapors may be present. Class II locations are those in which combustible dust may be found. Class III locations are those that are hazardous because of the presence of easily ignitable fibers or filings. Each of the three Classes is further subdivided into two Divisions, Division 1 or Division 2.

3.6. Hot Work Activities

- Open flame activities, such as welding, cutting, use of torches, or soldering.
- Spark-producing operations such as grinding, chipping, chiseling, and drilling. This excludes fixed machinery such as pedestal grinders where the 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 that involve welding, torch use, brazing, or similar are included as 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.

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

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

3.9. 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.

3.10. 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.

4. Responsibilities

4.1. Affected employees are responsible for adhering to this procedure.

4.2. University supervisors shall:

- 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.

4.3. Contractors shall:

- Ensure employees under their responsibility 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.

4.4. Notre Dame Fire Department (NDFD) shall:

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

4.5. Risk Management and Safety Department (RMS) shall:

- 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).

5. Hot Work Permit Procedure

5.1. An Authorized Person is required to obtain a Hot Work Permit using the online Hot Work application located on the RMS webpage. Before completing the application, the Authorized Person shall call NDFD at 631-6200 to verify if:

- There is smoke or heat detection,
- The fire suppression system is functional, and if necessary, that 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.

5.2. 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.

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

5.4. A hot work permit shall be completed on the day of its intended use.

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

5.6. The hot work permit expires at whichever condition occurs first:

- At the completion of the hot work activity.
- At 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 shall 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 shall be evaluated to determine if a new permit shall be issued.
- If the Authorized Person changes for the work authorized under the permit.

5.7. After the completion of the hot work activity an Authorized Person shall 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 shall 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.

5.8. The hot work permit shall be closed out by an Authorized Person indicating that the hot work and any fire watch activities have ceased.

Periodic monitoring, if required, shall continue as prescribed.

6. Hot Work Preparations

6.1. Remove Fire Hazards

6.1.1. Combustible materials close enough to be ignited by hot metal and flying sparks shall 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.

6.1.2. If the combustible material cannot be moved, it shall be protected by other measures such as flame-resistant blanket or tarps, etc.

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

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

6.1.5. Eliminate any explosive atmospheres.

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

6.1.6.1. Properly handled to and from the work site, in particular concerning the regulator which should not be stressed or strained during handling or moving of the cylinder.
6.1.6.2. Located a minimum of 6 feet from any source of ignition.
6.1.6.3. Have had the hose, regulator, tank, and all associated connections tested for leaks before each shift or after any movement of the cylinder.
6.1.6.4. Are positioned away from areas that could cause damage to the regulator or tank.
6.1.6.5. Properly secured to ensure they cannot tip over.
6.1.6.6. Equipped with the proper safety devices when applicable such as flame arrestors or check valves.
6.1.6.7. 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.

6.2 Protect Immovable Fire Hazards

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

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

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

6.3.1. Where hot work is conducted above open grating, fire resistant blankets or tarps shall be used to prevent hot slag and sparks from falling on equipment and personnel below.
6.3.2. The hot work area and the area below shall be barricaded, or some other means implemented to prevent unauthorized access.
6.3.3. Wall and floor openings shall be covered with non-combustible materials including accesses to concealed spaces in walls or floors.
6.3.4. 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.
6.3.5. Ducts or conveyors that may carry sparks to distant combustibles shall be suitably protected or shut down.

6.4 Prevent Remote Flammables from Reaching Hot Work Area

6.4.1. To prevent flammables from reaching sparks or heat in the permitted hot work area, the Authorized Person(s) shall:
- 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.

6.5 Provide Suitable Fire Extinguishing Equipment

6.5.1. Fire extinguishing equipment is required at the hot work area. Refer to Appendix A for fire extinguisher types.

6.5.2. Assigned department/building fire extinguishers shall not be used as the fire watch's fire extinguishers. Authorized Persons shall supply their own fire extinguishers.

6.6 Assign a Fire Watch

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

- 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 the multiple gas monitor if the hot work requires continuous atmospheric monitoring.

6.6.2. 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 shall have a dedicated fire watch.

6.6.3. A fire watch shall:

- 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 shall 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.

6.6.4. The Authorized Person shall assure the fire watch understands their responsibilities.

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

7. Automatic Fire Suppression Systems

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

8. Confined Space Hot Work Activities

8.1. Any confined space activity shall have a confined space permit. Please reference the University's Confined Space Procedure for details.

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

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

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

9. Designated Hot Work Areas

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

9.2. The Designated Hot Work Area shall:

- 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.

9.3. 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.

9.4. If work is to be done on any item or equipment brought into a Designated Hot Work area the equipment shall be thoroughly cleaned/purged of flammable or combustible materials.

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

9.6. Appendix C lists the approved Designated Hot Work Areas. Contact Risk Management and 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 shall be followed.

10. Employee Training

10.1. All persons involved in hot work activities (performing work, fire watches, etc.) shall be trained in the hot work procedure and other requirements in applicable referenced standards and regulations prior to them performing this work.

10.2. Refresher training shall 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.

11. Procedure Evaluation

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

11.2. The RMS Department shall conduct an annual program review that shall include a review of the Hot Work Field Evaluation forms.

12. Recordkeeping

12.1. All hot work permits, and hot work audits records shall be kept for five years.

13. References

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

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

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

UNIVERSITY OF NOTRE DAME

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 RMS 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

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

1. Location of Hot Work
2. Permit Number
3. Equipment or Material Involved for Hot Work
4. Reason for Hot Work
5. Flammable materials removed, covered or wetted?
6. Fire watch trained, assigned and available, if required?
7. Proper fire extinguishing equipment available?
8. Proper personal protective equipment used?
9. Affected area barricaded where needed with caution tape?
10. Hot work permit properly completed and available at job site?
11. All personnel involved in the hot work job trained (authorized
12. Person, hot work operator, and fire watch)? This is verifiable upon record examination.
13. Procedure discrepancies reviewed with affected employees?
14. Procedure discrepancies reviewed with Notre Dame project contact?

Please use Qualtric 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	Landscape Services Garage	8/31/2017
Welding Booth	Warren Golf Course Shop	5/24/2017
Welding Booth	Nieuwland Hall of Science Shop	3/2/2017
Glassblowing Shop	Rad Lab	10/17/2017
Chemistry Lab	Stepan Chemistry - Room 374	8/16/2023
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		