

Sanford Underground Research Facility



ENVIRONMENT, HEALTH, AND SAFETY

HOT WORK POLICY

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VERSION CONTROL

Responsible Person	Document Control Number	Document Version	Publication Date	Description of Change
Fred Raubach	EHSDoc-107	1	07/28/10	Initial release.
Fred Raubach	EHSDoc-107	2	11/10/10	Oxy-Acetylene torch added as a Hot Work application.
Tom Regan	EHSDoc-107	3	03/18/11	Appendix B added.
James Hanhardt	Document-73416 (EHSDoc-107)	4	08/05/11	Added info on High Risk and third party reviewer. Change terminology for permit.
James Hanhardt	Document-73416	5	09/22/11	Added requirement that expired permits be returned to EHS and that PAI is subject to approval.
James Hanhardt	Document-73416	6	10/27/2011	Updated 'posting' requirements for Yates and Ross Hot Work Permits; added notification to hoist operator if hot work is in Ross or Yates shaft.
James Hanhardt	Document-73416	7	1/3/2012	Change third party reviewer visit from twice to once in Section 6.1.
James Hanhardt	Document-73416	8	02/26/2013	Streamlined overall process for Hot Work Permit, added hot work log; updated roles and responsibilities, redefined high risk hot work, clarified requirements for third party reviewers.
James Hanhardt	Document-73416	9	04/02/2013	Added requirement for documented work planning for high risk hot work and changed title of PAI reference document.
James Hanhardt	Document-73416	10	06/28/2013	Multiple shift Hot Work Permits apply for 31 days.
James Hanhardt	Document-73416	11	10/7/2014	Revised PAI requirements.

James Hanhardt	Document-73416	12	2/17/2015	Fire Watch clarification in Sections 3.5 and 3.6.
James Hanhardt	Document-73416	13	9/22/2015	Add MPPP gas torch.
Pete Girtz	Document - 73416	14	12/20/16	Added chain sharpening, changed EHS to ESH for standardization, updated reference links, added new PAIs to list, consolidated the Hot Work Permit to only one permit. Changed the procedure for Hot Work Logs. Added a 30 minute requirement for Department Directors to determine source of alarm.

1.0 POLICY

Hot work of any kind represents ignition hazard and presents a fire hazard to people, property, and the environment. To address these issues, it is the Sanford Underground Research Facility (hereafter referred to as Sanford Laboratory or SURF) policy that all work activities meeting the definition of hot work, listed below, will be authorized through the Laboratory's "Hot Work Permit" process. (The term "hot work" within this document does not pertain to energized electrical work or other energized sources.)

- Grinding
- Chain Saw Sharpening
- Heat treating
- Hot riveting
- Powder-driven fasteners
- Oxy-Acetylene torch
- MAPP gas torch
- Thawing pipe
- Torch-applied roofing
- Weed burner usage
- Welding and allied processes
- Similar applications producing or using a spark, flame or heat

2.0 SCOPE

The Hot Work Permit procedure establishes and presents provisions to prevent loss of life and property from fire or explosion as a result of hot work and provides guidance for persons, including outside contractors, who manage, supervise and perform hot work. This policy is applicable to all Sanford Laboratory employees, scientists, and contractors involved in hot work activities.

3.0 RESPONSIBILITIES

3.1 Management

Management is responsible for the safe operation of hot work activities. The responsibilities listed below apply to the line managers and/or project managers involved in the safe operation of hot work activities.

Management must:

- Confirm that no work requiring a Hot Work Permit is conducted without a permit.
- Designate locations for Long Term Hot Work Permits.
- Confirm that all individuals involved in hot work operations, including contractors, are familiar with the provisions of this section. Individuals, depending on their role, must undergo appropriate training.
- Ensure that individuals involved in hot work operations are trained in the safe operation of their equipment and in the safe use of the process.

- Ensure that individuals involved in hot work operations have an awareness of the inherent risks involved and understand the emergency procedures in the event of a fire.
- Ensure that contractors are advised about site-specific flammable materials, hazardous processes or conditions, or other potential fire hazards.
- Ensure that, as part of the quality assurance process, that the source of a potential hazard, such as a high CO reading or the smell of smoke underground, can be determined within 30 minutes of notification from a hoist operator or the Emergency Response Coordinator.

3.2 Permit Authorizing Individual (PAI)

- Permit authorizing individual is responsible, in conjunction with management, for the safe operation of hot work activities for each Hot Work Permit issued. Only persons designated by Sanford Lab can serve as a PAI: [Designated Hot Work Permit Authorizing Individuals \(PAIs\)](#).

The **PAI** must:

- Fill out the Hot Work Permit, annotate if it is a Long-Term, Multi-Shift or Single-shift permit. Thoroughly document the work scope on the Hot Work Permit such that the bounds and conditions of the permit are clearly scoped and defined.
- Determine if the proposed hot work is high risk. If determined to be high risk, the PAI must provide for a third party reviewer and inform the permit owner that work planning documentation must be provided.
- Consider the safety of the operator, fire watch, and adjacent personnel and areas with respect to personal protective equipment (PPE) for other special hazards beyond Hot Work operations.
- Confirm with permit owner/work lead what site-specific flammable materials, combustible materials, hazardous processes, or other potential fire hazards are present or likely to be present in the work location.
- Confirm with permit owner/work lead that fire protection and extinguishing equipment is operable, appropriate for the type of possible fire, and immediately available at the work area.
- Confirm with permit owner/work lead that all tools and other hot work equipment to be used are in satisfactory operating condition and in good repair. Document the tools that were verified and are to be used on the Hot Work Permit.
- When a Hot Work Permit has been issued for a multi-shift duration, ensure performance of inspections of the work area prior to hot work performance at least once per shift when the permit is in use, to confirm that the work site is a fire-safe area and remains in accordance with the Hot Work Permit requirements.
- Review the Hot Work Permit with the permit owner.
- Sign the Hot Work Permit as the PAI.
- When contacted by the permit owner for a work scope change, review the requirements with the permit owner. Issue a new permit as necessary.

- Confirm with permit owner/work lead that permit requirements/conditions are being followed.
- Maintain a record of all issued Hot Work Permits in the SURF permit database, including permits issued to contractors. Record permit issued to/department, start and closed dates on the log.
- Provides follow-up on permits that are not reported as closed when expected closure time is exceeded.

3.3 Permit Owner (Sanford Laboratory Surface and Underground Operations Foreman, General Supervisors, Project Managers, Contract Supervisor)

Permit Owner is responsible for ensuring that work has been approved by the PAI prior to work start, and that the work is performed in accordance with the requirements set forth in the Hot Work Permit as issued by the PAI.

Accordingly, the **permit owners** will:

- Identify hot work tasks in the projects under their control.
- Allow only individuals to perform hot work who are qualified with respect to the hot work task being performed and who have been trained with respect to the requirements of the Hot Work Policy and permit procedure.
- When a Hot Work Permit is required, the PAI should be contacted at least 24 hours in advance. **EXCEPTION:** Occasionally a hot work need is identified during the course of other work activities or after normal administrative hours. When this occurs, notification to PAI authorization is not required prior to starting hot work operations, and posting the permit. The permit owner must provide written justification of this exception and must assure all inspections, precautions, and reporting pertaining to hot work are performed and documented. This exception is limited to one shift.
- Provide hot work planning documentation if the hot work is determined to be high risk.
- Sign the Hot Work Permit as the permit owner.
- Designate a qualified individual as the hot work lead operator for each hot work task.
- Ensure fire protection and extinguishing equipment is immediately available at the work area.
- Assign Fire Watch when required by the Hot Work Permit.
- Be sufficiently familiar with the content of this procedure so they can determine when a Hot Work Permit is needed for activities under their supervision.
- Be adequately trained to the Sanford Laboratory requirements to fulfill these responsibilities.
- Ensure that all contractors (and subcontractors) under their supervision adhere to the requirements of this policy.
- As a best practice, each department that requires a Hot Work Permit can use a paper based or electronic log to record times, or annotate the hot

work on daily work planning forms or annotate on the daily trip action plan where and approximate start time of hot work.

- Ensure the Permit is properly closed and completed forms returned to ESH department.

3.4 Hot Work Lead Operator (i.e. Work Lead)

Operators are responsible for executing the work in accordance with the written Hot Work Permit. Operators are those personnel assigned to hot work operations, including operators of gas welding/cutting equipment and electric arc welding or cutting machines.

Operators must:

- Review and sign a valid Hot Work Permit that is signed by the PAI and permit owner prior to the start of the hot work process.
- Acquire proper equipment for the hot work operation and examine it to verify that all operating equipment is in safe condition. Equipment will be verified and listed on the permit. If personnel find equipment incapable of reliable safe operation, arrange to have the equipment repaired by qualified personnel prior to its use, or withdraw and tag it out of service. Notify the permit owner in the event that other equipment must be used for work if different than that specified and inspected under a Hot Work Permit.
- Ensure that all requirements of the Hot Work Permit are met.
- Ensure a copy of the permit is at or near the worksite.
- Be familiar with the procedure for reporting an emergency.
- Remove combustibles from the work area, as required by the Hot Work Permit.
- Protect combustibles that cannot be removed by covering them with an approved noncombustible material, as per the Hot Work Permit.
- Handle all hot work equipment in a safe manner as described in this section.
- Stop work if conditions change or scope of work as described in the approved Hot Work Permit changes. If work is stopped, contact the permit owner. The permit owner will request that the PAI review the changes and issue a new permit as necessary.
- During hot work operations, take special precautions to avoid accidental operation of automatic fire detection or suppression systems (e.g. special extinguishing systems or sprinklers).

3.5 Fire Watch

The Fire Watch monitors for fire hazards and/or other unsafe conditions during and after hot work. A Fire Watch is assigned for all hot work other than hot work performed in areas for which a [Long Term Hot Work Permit for Designated Location](#) has been issued.

Fire watch must:

- Be trained to understand the inherent hazards of the work site and of the hot work operations.

- Confirm that safe conditions are maintained during hot work operations, keeping the work area free and clear of combustibles.
- Verify that hot slag or sparks from hot work operations do not come into contact with combustibles.
- Stop the hot work operations if unsafe conditions develop.
- Inspect fire protection and extinguishing equipment to verify it is fully charged, is operable, and appropriate for the type of possible fire.
- Have fire-extinguishing equipment readily available and must be trained in its use (if they are Sanford Laboratory employees, complete Fire Extinguisher Training Course).
- Be familiar with the procedure for reporting an emergency in the event of a fire. Verify the location of the nearest means of emergency communication.
- Watch for fires in all exposed areas and attempt to extinguish them only when the fires are obviously within the capacity of the equipment available. If the fire watch determines that the fire is not within the capacity of the equipment, the fire watch must immediately report the emergency.
- Remain at the work area during all breaks and for at least 30 minutes after the hot work operation has been completed in order to make a final check.
- Be permitted to perform additional job tasks, but those tasks must not distract him or her from his or her fire watch responsibilities. If the Fire Watch is also serving as a Safety Watch, additional job task performance is not allowed.

3.6 Safety Watch

Safety watch is assigned when hazards are such that an operator cannot adequately monitor developing conditions that directly affect his/her own well-being. The Safety Watch can serve concurrently as a Fire Watch, but without the allowance to perform additional tasks.

Accordingly, the **safety watch** must:

- Prevent persons performing work from putting themselves in harm's way.
- Be familiar with the procedure for reporting an emergency. Verify the location of the nearest emergency communication system.
- Have as their only duty at the time, watching over the work being performed and the well-being of the worker. They cannot have any other concurrent job duties while being a safety watch. However, they may perform other safety-related duties associated with the work, such as reading the procedure and checking off steps as they are performed, or serving as a Fire Watch.
- Have fire-extinguishing equipment readily available and be trained in its use.

3.7 ESH Department

- Develop, implement, and maintain the Sanford Laboratory's Hot Work Program.
- Perform an annual audit of the Sanford Laboratory's Hot Work Program, including a review of this policy.

- Assist with the development and implementation of a Hot Work Training program.
- Serve as resource for any questions regarding hot work.

3.8 Third Party Reviewer

- Provides oversight to activities or areas only identified as high risk.
- Has no direct involvement in work performance and can provide impartial objective oversight to the hot work.

4.0 DEFINITIONS

Designated Area: A permanent location designed or approved for hot work operations that may be provided with a Long Term Hot Work Permit, such as a maintenance shop or a detached outside location that is of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent areas.

Fire watch: Process of watching for fire hazards and/or other unsafe conditions during and after hot work. This term is also applied to the person performing this process.

Hot Work: Work that has the potential to create an ignition hazard and presents a fire hazard. Hot work is considered **high risk** when it poses a greater than normal threat to operations because of the heightened probability of fire initiation and/or is applied to an area where the consequence of a fire would be catastrophic.

Hot Work Permit: A document issued by Sanford Laboratory for the purpose of authorizing performance of hot work based on long-term, multi-shift or single shift durations. This permit contains a set of precautions and reminders to be followed and will be posted for inspection in a visible and accessible location near the work site.

Hot Work Lead Operator: Sanford Laboratory representative responsible for executing the work in accordance with the written Hot Work Permit. Operators are those personnel assigned to hot work operations, including operators of gas welding/cutting equipment and electric arc welding or cutting machines.

Hot Work Log: A documented, chronological record maintained by the PAIs of the Hot Work Permits issued. It includes the date, location, start and stop times, and contact information.

Permit Authorizing Individual (PAI): Sanford Laboratory management representative designated to authorize hot work.

Permit Owner: Sanford Laboratory management representative responsible for obtaining approval and insuring that work is performed in accordance with the requirements set forth by the PAI.

Safety Watch: Process of watching for hazards that an operator cannot adequately monitor developing conditions that directly affect his/her own well-being. This term is also applied to the person performing this process.

Welding and Allied Processes: Processes such as oxy-fuel gas cutting and welding, arc-cutting and welding, open flame soldering, brazing, thermal spraying, etc.

5.0 HOT WORK PROCEDURES

All hot work conducted at the Sanford Laboratory must be authorized through a Hot Work Permit. The Hot Work Permit authorizes work for a specific task or several tasks conducted in a specific area. Area related hot work shall be identified on the permit and discussed in the daily toolbox or coordination meeting. If the scope of the original hot work changes, the Hot Work Permit must be amended and re-approved by the PAI.

5.1 Hot Work

Hot work is work that has the potential to create an ignition hazard and presents a fire hazard.

5.1.2 Exceptions:

A Hot Work Permit is not required for the following:

- Permanently installed boilers, furnaces, and cooking stoves
- Electric soldering irons
- Bunsen burners or similar laboratory operations integrated into laboratory safety management system. (if the operation generates smoke, impairment of the smoke detector may be necessary)
- Charcoal grills, or gas grills when located outside, at least 25 feet from flammable gas/liquid storage areas and the nearest building.
- Resistance welders.

5.2 Hot Work Procedure

The process for obtaining, filling out, conducting, and closing hot work is as follows:

5.2.1 Permit Owner planning to conduct Hot Work must obtain authorization from the PAI.

- If the hot work is determined to be high risk, the permit owner must provide work planning documentation.

5.2.2 PAI will initiate the Hot Work Permit process as follows:

- Ensure the Hot Work Permit is coordinated with any JHA/SOP that may be in effect.
- Determine the fire hazards and requisite safety controls to be included in the Hot Work Permit. If determined to be high risk and the requirements for a third party review are identified, these will be noted on the permit and the PAI will seek the third party approval.
- Confirm with permit owner or hot work lead operator that an assessment of the work site for combustibles, flammable materials, hazardous processes, and other potential fire hazards present or likely to be present, and identify them on the permit.
- Identify on the permit required safety control measures.
- Ensure that the hot work lead operator is qualified to do the work, and take into consideration the safety of the operators and those on fire watch.
- Authorize the permit and discuss the requirements with the permit owner.
- Record the Hot Work Permit.

5.2.3 The Hot Work Lead Operator shall:

- Have a Hot Work Permit that has been approved by the PAI in hand prior to starting hot work operations.
- Post the Hot Work Permit near the work site. For hot work performed in wet locations, the permit can be placed in a water resistant container (e.g. baggie) and carried by the hot work lead operator.
- Put into effect any controls specified on the permit. Take appropriate measures to remove any hazards identified on the permit, or protect them from possible ignition.
- Notify the applicable hoist operator if hot work is to be performed in or near a shaft.
- Ensure that fire protection and extinguishing equipment are adequate, functional, and properly located.
- Ensure fire watch is in place.
- Examine the site and all equipment to ensure all are in safe operating condition.
- Cease operations if unsafe conditions are discovered or develop while performing the task.
- If the scope of the hot work changes, seek approval from the permit owner who will ensure Hot Work Permit is amended to account for the change in scope by the PAI.

5.2.4 The Third Party Reviewer (if determined high risk, see High Risk Hot Work Areas and Tasks Appendix) shall:

- Review the work preparations.

- If needed, provide suggestions or initiate changes to provide greater safety.
- Verify that Hot Work Permit controls are in place.

5.2.5 Fire Watch shall:

- Ensure safe conditions are maintained during hot work operations;
- Have the authority to stop hot work if unsafe conditions develop;
- Have functional fire extinguishing equipment available and be trained in its use;
- Be familiar with the facility and procedures for sounding an alarm;
- Watch for fires in all exposed areas and extinguish fires within the capacity of the extinguishing method. If the fire is beyond the capacity of the available extinguishing equipment the fire watch shall initiate the Emergency Response Plan immediately.
- Fire Watch will continue for a minimum ½ hour after hot work is completed; additional time for Fire Watch may be required by the nature of the job and hazards present, and indicated on the permit.
- **NOTE:** Unless the Fire Watch also serves as a Safety Watch, during fire watch it is acceptable to perform other local tasks if those tasks do not distract the person from the fire watch responsibility.

5.2.6 Completion of Hot Work

- The hot work lead operator will inform the permit owner, who will in turn notify the PAI that the work is complete, and the permit is closed.
- The expired Hot Work Permit (when the job is finished) will be sent to ESH where it will be reviewed and archived for one year.

6.0 MULTIPLE SHIFT AND LONG TERM HOT WORK PERMITS

6.1 Multiple Shift Hot Work Permits

No permanent Hot Work Permits will be issued. Permits can be issued for one shift or for multiple shifts. Where conditions are constant, permits can be issued, at the PAI's discretion, for a period of **up to 31 days**. If a Hot Work Permit is issued for more than one shift, a re-inspection of the area is required prior to hot work performance each shift when the permit is in use. A documented re-inspection each shift can be done by the PAI, permit owner, Work Lead or a designee. The designee shall be an individual having the qualifications of a "permit owner" in accordance with this procedure.

6.2 Long Term Hot Work Permits for Designated Locations

A permit may be issued for a designated area, such as a maintenance shop or a detached outside location that is of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent areas.

Permits for designated areas may be issued for **up to one year** and may require annual inspection. Long term permits do not have the requirements for notification or providing start and stop times. These permits will be coordinated with Standard Operating Procedures (SOPs), if applicable. The department responsible for these areas will **inspect them on a monthly basis** for compliance with this policy and report any violations to the ESH Department. Permits can be revoked in non-complying areas. Refer to the [Long Term Hot Work Permitting Process](#) and included list of designated locations.

7.0 HOT WORK AND FIRE DETECTION SYSTEMS

When it is likely that a fire detection system will be activated by a hot work operation, the system may be temporarily disabled or shielded by the Operations Department. However, the following **MUST** be done:

- All planned and emergency requests for disablement shall be communicated by permit owner or Lead to ESH, Science, Operations, and the department affected.
- ESH must approve such request except in emergency situations, before the work can commence.
- The system must be reactivated or shield(s) must be removed whenever the hot work operation is completed or at the end of the workday, whichever comes first.
- The permit owner or their designee shall verify reactivation or removal of the shield(s) and shall notify ESH, Operations, and any other interested parties.
- If deactivation or shielding is not an option, the permit owner must inform ESH, Operations, and the department affected that a false alarm is possible. ESH should approve the planned work before it can commence.
- ESH should be contacted upon completion of the work. If applicable, the alarm must be tested to ensure it was not damaged during the process.

8.0 CONTRACTORS AND HOT WORK

Contractors will follow SURF Hot Work Procedures.

Contractors shall have UL or FM listed check valves and flash back arrestors attached to the regulator side of their oxy-acetylene cutting units.

Contractors shall furnish their own fire extinguishers. Units shall be of type and size suitable for the job to be completed and listed as such in the hazard analysis.

- Inspections tags and seals shall be current for all extinguishers used on all jobs.

9.0 REFERENCE AND RELATED DOCUMENTS

9.1 Standards

- ANSI Z49.1, Safety in Welding, Cutting and Allied Processes
- NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
- OSHA 1910, Subpart Q, Welding, Cutting and Brazing
- ANSI Z89.1, Safety Requirements for Industrial Head Protection, American National Standards Institute,
- Cutting and Welding, Factory Mutual Loss Prevention Data Sheet 10-15.
- NFPA 51, Oxygen-Fuel Gas Systems for Welding and Cutting, National Fire Protection Association,
- NFPA 55, Compressed Gases and Cryogenic Fluids Code, National Fire Protection Association,
- NFPA 70, National Electrical Code, National Fire Protection Association

9.2 Related Documents

- [Fire Prevention and Protection](#)
- [Emergency Reporting System Flowchart](#)
- [Hot Work Quick Reference](#)
- [Designated Hot Work Permit Authorizing Individuals \(PAIs\)](#)

9.3 References

- [Hot Work Permit](#)
- [Multi-Shift Hot Work Log](#)
- [Long Term Hot Work Permitting Process, Designated Locations, and Permit](#)
- [High Risk Hot Work Areas & Tasks](#)