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Hot Work Procedure

South Shore Regional School Board

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Introduction

Hot work comes in a variety of applications each with its own heat source severity. All hot work in and of itself is a fire hazard that left unmanaged will create high probability conditions for injury and/or property loss. Under the right conditions, hot work heat sources with the lowest temperature ratings can easily ignite products that seem most difficult to burn.

A hot work management system is required to reduce the risk of hot work causing injury, fire or other property damage. The following information is intended to establish the programs and processes designed to manage this risk.

Definition:

Hot work is **any temporary or permanent operation involving open flames or producing heat and/or sparks**. This includes but is not limited to: brazing, cutting, grinding, soldering, torch applied roofing and welding. The definition of hot work can be applied to activities within a facility such as normal manufacturing processes, periodic/planned maintenance activities, new construction work and emergency repairs.

Management Commitment

The South Shore Regional School Board (SSRSB) values the health and safety of employees and is committed to ensuring a safe and healthy workplace for employees, students, parents or guardians, and the general public. The SSRSB will take every precaution and effort to provide a healthy and safe work and learning environment, with the objective of eliminating the possibility of injury, occupational illness or property damage.

SSRSB will not tolerate fires and/or explosions caused by hot work or allow conditions that may lead to these hazardous events. Hot work may only be conducted on SSRSB premises outside of designated hot work areas if authorized by designated Operations personnel and the following conditions are verified:

1. No other suitable non-hot work means can be found to produce the desired result;

2. No other safe location can be found to do the hot work; and

3. The designated/trained person(s) involved with authorizing and conducting the hot work have complied with all hot work permitting process requirements, including all precautions and required follow-up actions

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All employees and other persons doing hot work on SSRSB premises will receive the necessary education to be able to accept responsibility for safe, loss-free hot work operations. Failure to comply with these procedures may be cause for disciplinary action whether the failure lies with the worker doing the work or the person supervising the work being done.

Hot Work Management Process

Hot Work Management contains four components:

1. Avoid Hot Work where possible;
2. Conduct Hot Work in designated Hot Work Areas;
3. Prohibit Hot Work where it can not be conducted safely;
4. Conduct Hot Work in areas containing hazards by:
    - relocating the hot work, if possible.
    - manage hot work by using the hot work permit system described below.

1) Avoid hot work when possible. Consider all alternative methods to hot work. Some alternative methods include:

- Mechanical removal and relocation of frozen piping to a heated area vs. thawing of piping in place with any form of hot work.
- Manual hydraulic shears vs. saw/torch cutting.
- Mechanical bolting vs. welding.
- Screwed or flanged pipe vs. sweat soldering.
- Reciprocating saw vs. radial saw.
- Standard mechanically attached/fully adhered roof system vs. a torch applied roof system.
- Mechanical pipe cutter vs. torch or radial saw cutting.
- Self-drilling or compressed air-actuated steel roof deck fasteners vs. puddle welding.
- A roof covering system that is not torch-applied instead of one which is torch-applied.

2) Designated Hot Work Areas. The Bridgewater and North Queens bus garages are the only "Designated Hot Work" locations within SSRSB schools and other worksites. Hot work in these locations does not require hot work permits.

3) Prohibit hot work in areas where hot work cannot be conducted safely under any conditions or where extensive preparation and planning are required to make the area and/or equipment involved fire safe. When these conditions exist, the area and/or equipment involved will be designated as a "No Hot Work Area". Examples of a "No Hot Work Area" include:

- Areas/equipment that contain/handle flammable liquids, flammable gases, combustible dusts or combustible metals.

- Partitions, walls, ceilings or roofs with combustible plastic covering or cores (i.e., expanded plastic insulation, sandwich panels)
- Rubber lined equipment.
- Oxygen enriched atmosphere.
- Storage and handling of oxidizer materials.
- Storage and handling of explosives.

Within SSRSB schools and worksites, “No Hot Work Areas” are:

- Chemical storage rooms (unless and until all chemicals have been removed from the room);
- Cleaning products storage rooms (unless and until all chemicals have been removed from the room);
- Rooms used for the purpose of wood working in which wood dust accumulation occurs;
- Partitions, walls, ceilings or roofs with combustible plastic covering or cores; and
- Other areas containing the hazards noted above.

4) When hot work must be conducted in areas or equipment containing hazardous processes as described above follow the specific precautions outlined below.

a) When possible, **relocate hot work** to a suitably arranged and isolated fixed hot work station. Locate fixed hot work in noncombustible buildings or combustible building areas with secured and sealed 1 hour fire rated noncombustible barriers over combustible floors, walls and ceilings. Maintain the fixed hot work station free of combustible materials and isolate it from surrounding combustible occupancies with physical noncombustible enclosures or open space of at least 35 ft (11 m). Provide manual fire extinguishers throughout the fixed hot work station.

If the materials or equipment cannot be relocated to a fixed hot work station, and hot work is unavoidable, use the least hazardous form of hot work that will get the job done (i.e., electric iron or heat gun vs. propane torch).

Note: These hot work options still require hot work management.

b) **Hot work conducted outside of a designated, fixed hot work station will be managed using a formal hot work permit system.**

As noted above, “hot work” is **any temporary or permanent operation involving open flames or producing heat and/or sparks.** Within SSRSB, hot work is defined as either “minor hot work” or “major hot work” each of which requires a different level of permit and hazard control methods.

Minor Hot Work is defined as hot work which has a low risk or causing injury, fire or property damage because of the method of hot work, tools and equipment used and the materials in or near the hot work area. Designated workers can issue their own permit for conduct of minor hot work. The hazard assessment on the hot work permit will be used to determine if the work is minor hot work. In most cases, the worker is their own “fire watch”. The fire watch is maintained until the material being worked on is cool to the touch at which time an inspection of the work area and adjacent areas is conducted by the worker. While not normally required, the worker may re-inspect the work area or have another employee re-inspect the work area after a period of time if they feel a re-inspection is warranted.

Major Hot Work is defined as hot work where there is a moderate to high risk of injury, fire or property damage because of the method of hot work, tools and equipment used and the materials in or near the hot work area. **Workers must be issued a hot work permit by a Operations Manager in order to complete major hot work.** The hazard assessment on the hot work permit will be used to determine if the work is major hot work. During major hot work, a fire watch will be posted to give continuous surveillance of the work area. Also, a continuous fire watch will be conducted for the length of time noted on the permit after the work is complete. A re-inspection will occur by the worker or another designated employee at the time indicated on the permit.

Hot Work Permit Process

1. **Hazard Assessment**: The worker assigned the task of conducting hot work must complete the hazard assessment which forms the first part of the hot work permit.

2. **Issue Permit**: The worker determines if the work is “minor hot work” or “major hot work”. If it is minor hot work, they issue a permit to complete the work. If it is “major hot work”, they will request the foreman issue the permit.

3. **Inform**: The hot work permit is posted in a visible place within the work area. School board employees and supervisors in the area are informed about the hot work activity and the need to support the implemented precautions for this hazardous operation.

4. **Work Proceeds**.

5. **Fire Watch**: While the hot work proceeds, the fire watch maintains a constant vigil (even during employees breaks and meal times) to maintain the hot work area in a fire-safe condition, keeps watch for any stray sparks, smoldering fires, or other fire hazards, and is ready to provide the initial fire response.

6. **Complete Work, Close Permit**: Once the work is completed, the fire watch remains in the area as noted below. When work is completed the permit is removed and must be retained as a record of the work.

Fire Watch for “Minor Hot Work”

The worker completing the work is normally their own Fire Watch. They are to stay in the area until the material being worked on is cool to the touch and work area inspected.

Fire Watch for “Major Hot Work”

The fire watch will be assigned and initiated when the hot work permit is issued by an Operations Manager. This function must be maintained throughout the hot work operation including break/lunch and for the period noted on the permit, continuously following the completion of hot work.

A fire watch should be posted and maintained in the immediate area of the hot work and in any adjacent areas that may be exposed by this operation. For any hot work operations on a building roof or adjacent to building walls where a combustible occupancy exists within the structure or the building has any combustible construction, a second fire watch should be posted in the exposed adjacent areas. For roof level hot work, a second fire watch should be posted on the floor immediately below for roof hot work. Where suspended ceilings are present between the building occupancy and the underside of the structural roof, this space should be inspected periodically during the hot work operation.

Hot work conducted on any building floors/walls or adjacent to building walls with unprotected openings where a combustible occupancy or construction exists on the opposite side, should include assignment of a second fire watch on the opposite side of the wall. This same approach should apply when hot work is conducted on pipe/building shafts, HVAC ductwork, etc.

The fire watch has responsibility to make sure the hot work area is maintained in a fire-safe condition throughout this work and has the authority to stop the hot work if unsafe conditions are observed. This person must understand the basic hazards of any combustible construction involved with the hot work area, the fire exposure hazard hot work creates to occupancies adjacent to/below the hot work operation, the hazards associated with the occupancy, and the need to maintain proper isolation of all hot work operations from combustible or flammable materials. The fire watch also must be properly trained in use of manual, portable fire extinguishers and emergency notification procedures within the school/worksite.

Fire Prevention Measures

Based on the Hot Work Permit System, implement hot work fire prevention precautions as follows for **minor hot work**:

- Maintain automatic sprinkler protection and other fixed fire protection systems in service and fully operational.
- Provide manual firefighting equipment appropriate for the construction/occupancy hazards in the hot work area.
- Maintain hot work equipment in good repair.
- Within the work area:
    a) Sweep floors clean, removing any spilled grease, oil and/or dust
    b) Remove any moveable flammable materials (wood, cardboard, etc) or liquids (paints, oils and lacquers) from the hot work area. This does NOT include ceiling tiles.
    c) Combustibles that cannot be moved **may** be protected with fire resistive tarpaulins, materials or metal shields **if required**.
- Hot work is prohibited on partitions, walls, ceilings or roofs with combustible plastic coverings or cores (i.e., expanded plastic insulation, sandwich panels).
- Schedule hot work during shutdown periods if possible.

Based on the Hot Work Permit System, implement hot work fire prevention precautions as follows for **major hot work (Not involving spark producing tools such as a grinder.)**:

- Maintain automatic sprinkler protection and other fixed fire protection systems in service and fully operational.
- Provide manual firefighting equipment appropriate for the construction/occupancy hazards in the hot work area.
- Maintain hot work equipment in good repair.
- Separate hot work operations from combustibles using fire resistive blankets or screens to properly isolate the hot work from the adjacent combustible materials.
- Within the work area:
    a) Sweep floors clean, removing any spilled grease, oil and/or dust
    b) Remove any moveable flammable materials (wood, cardboard, etc) or liquids (paints, oils and lacquers) from the hot work area.
    c) Combustibles that cannot be moved **may** be protected with fire resistive tarpaulins, materials or metal shields **if required**.
- Hot work is prohibited on partitions, walls, ceilings or roofs with combustible plastic coverings or cores (i.e., expanded plastic insulation, sandwich panels).
- Schedule hot work during shutdown periods if possible.

Based on the Hot Work Permit System, implement hot work fire prevention precautions as follows for **major hot work (That <u>does</u> involve spark producing tools such as a grinder.)**:

- Maintain automatic sprinkler protection and other fixed fire protection systems in service and fully operational.
- Provide manual firefighting equipment appropriate for the construction/occupancy hazards in the hot work area.
- Maintain hot work equipment in good repair.
- Separate hot work operations from combustibles by a minimum of 35 ft (11 m) of open space from grade level hot work areas. An alternative is to use proper fire resistive welding blankets and screens to properly isolate the hot work from the adjacent combustible occupancies.
- The following fire safety precautions listed on the Hot Work Permit apply to the surface area within 35 ft (11 m) of the hot work. The major purpose is to isolate fuels from sparks. Within this area:
    a) Sweep floors clean, removing any spilled grease, oil and/or dust. Cover floors made of combustible material (i.e., boards on joist, plank on steel, wood block) with fire-resistant tarpaulins or other noncombustible material.
    b) Remove any flammable liquids (paints, oils and lacquers) from the hot work area.
    c) Protect combustibles that cannot be moved with fire resistive tarpaulins or metal shields. This includes all storage or machinery with grease or lint deposits. Hot work blankets used to cover combustible materials or construction that cannot be relocated from the hot work area should always be “tented”.
    d) Cover all wall and floor openings. Plug floor openings with an approved fire stop material. Seal ductwork and duct openings with metal covers or cover them with fire-resistive tarpaulins. Close all doors and fire doors to prevent sparks from escaping.

- Prohibit hot work on partitions, walls, ceilings or roofs with combustible plastic coverings or cores (i.e., expanded plastic insulation, sandwich panels).
- Schedule hot work during shutdown periods if possible.

High Risk Hot Work (Explosive Atmospheres, Flammable Liquids/Gases)

- **High Risk Hot Work requires the prior approval of an Operations Manager.**
- Either eliminate explosive atmospheres (dust or vapor) or prohibit the hot work. Shut down any process that produces explosive atmospheres, and continuously monitor the area for accumulation of combustible gases before, during and after hot work. Prohibit hot work where accumulations of volatiles or combustibles are severe and cannot be eliminated.
- Secure, isolate and vent pressurized vessels, piping and equipment as needed prior to initiating hot work. Clean combustible and/or flammable liquids, gases and solids whenever present within the equipment, prior to initiating hot work.

- For hot work on vessels or boilers, use only contractors who are qualified by a nationally or internationally recognized boiler and pressure vessel code.
- Assign a designated fire watch to the hot work operation before this work is started. Maintain a continuous fire watch during the hot work activity, throughout all break and lunch periods, and for at least one hour following the completion of the hot work. Beyond this, monitor the area for up to an additional 3 hours, depending on local conditions.
- Avoid hot work of any kind in areas handling, **processing or storing flammable liquids or gases**. Hot work provides an ignition source in an area where fuel is available in significant quantities and in a readily ignitable form. Ideally, relocated any hot work operation within a flammable liquid or gas occupancy to a non-hazardous location. When relocation is not possible, the following additional precautions should be implemented:
  a) Drain all equipment or piping in the area of flammable and combustible liquids.
  b) Steam clean equipment or pipe to be worked on or provide with a inert atmosphere, to prevent creation of a flammable atmosphere.
  c) Shut off pipe supplying the area with flammable and combustible liquids off at the source (valve should be locked shut to prevent unexpected opening). If the piping is to be worked on, blank if off.
  d) Check equipment or piping with a portable oxygen analyzer before and during the hot work. This is to ensure that sufficient oxygen to support combustion is not present inside the equipment or piping.
  e) Protect all permanent storage tanks or piping (that cannot be moved or drained) against physical contact and heat from hot work equipment. Preferably all equipment that is within reach of the hot work equipment (grinder, welding rod holder, cutting torch, etc.) will be drained, purged and inerted. If this is not possible due to the quantities of flammable liquids involved, provide physical protection for closed flammable liquid equipment by placing welding curtains and temporary barriers between the equipment and the hot work. Carefully review the area to ensure that no vents or other opening are near the hot work that could allow fumes to come into contact with any sparks or hot surfaces.
  f) Keep mechanical exhaust ventilation in the room/building in operation.
  g) Use a portable combustible gas analyzer before and during the work. If any detectable readings are obtained, then work cannot begin or continue until the source is found and suitably mitigated such that the concentration is maintained below 10% of the LFL.

Alternative to the 35 ft (11 m) Rule

An alternative to the 35 ft (11 m) rule is to physically isolate the hot work operation from adjacent combustible occupancies or construction using properly fire rated hot work shields and/or blankets. “Boxing” the hot work operation can be accomplished through vertically suspending hot work shields or blankets around the hot work extended at least

15 ft (4.6 m) above the highest elevation of the hot work or to the bottom of a solid/smooth ceiling/roof and extending to floor. When “boxing” is used in buildings with structural members that create an open space between the top of the member and the floor or roof above, this space should be sealed to prevent liberation of sparks/spatter/slag through the open space. The lower elevation of the “boxing” materials should overlap onto the floor at least 6 in. (152 mm) and this layer should be constructed of a noncombustible, fire resistive hot work blanket material. The process of “boxing” the hot work hazard requires a proper understanding of the limitations of the hot work shields or blankets being used.

Hot work shields or screens should be used only as vertical barriers for hot work operations. Where these shields or screens are required to extend onto the floor in the hot work area, the bottom 2 ft (0.6 m) of the screen should be constructed of noncombustible hot work blanket material. ***Hot work shields or screens are typically constructed of translucent plastic materials that are combustible and will fail under extended exposure to severe hot work in positions other than a vertical position.***

Where severe hot work (torch cutting, arc stick welding) will be conducted and the area beneath this activity needs to be protected against the hot work, hot work pads should be provided.

Elevated Hot Work

For elevated hot work, combustible materials should be either relocated a minimum of 50 ft (15.2 m) from the hot work area; or properly protected with fire retardant welding blankets; or the hot work operation isolated with welding screens. Suspend fire-resistive welding blankets under hot work conducted near the ceiling. Place noncombustible screens around hot work at the floor to trap sparks. Every elevated hot work operation needs to be evaluated on a case-by-case basis to determine a reasonable safe distance from hot work to combustible occupancies or construction. The physical conditions involved may dictate relocation of combustibles beyond 50 ft (15.2 m).

Outside Contractors

Many hot work operations are performed by outside contractors; these include cutting, welding, joint soldering, paint removal, roofing, etc. Hot work by itself is a hazardous process. When outside contractors are involved, the risk of fire may increase simply because contractors don’t understand the hazards at the school/worksite.

Contractors working for SSRSB, and conducting hot work, must have their own Hot Work Permit/Management System that provides equal or greater risk mitigation than those methods and procedures mention herein.

Contractors must inform SSRSB when hot work will be conducted at any schools or worksites.

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Hot Work Permit

(To be completed by the worker assigned the task.)

Date of Work: _____ Location of Work:_____

Description of Work: _____

Name of worker(s): _____

Hazard Assessment:

Methods:	
Welding	
Other:	**Oxy-Acetylene** **Stick welding** **Tig-welding** **Mig-welding**
Cutting	
Reciprocating saw **Other:**	**Torch** **Grinder** **Gas powered/electrical chop saw** **Other:**
Brazing	
	Oxy-Acetylene
Soldering	
Soldering Gun **Soldering Iron** **Torch (Pipes of 2 inch or less diameter)**	**Torch (Pipes of greater than 2 inch diameter)**
Grinding	
	Mini-grinder
Flooring	
Torch Other	Other
Surrounding Materials (within 11m/35 ft.)	
Cement block **Vinyl floor tile** **Metal (partitions, etc.)** **Insulation (fiberglass, rock-wool)** **Other:**	**Paper, cardboard** **Wood/plywood** **Insulation (seaweed)** **Other:**
Materials used: (Includes those brought to the site such as wood, metal, insulation, etc.)	

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Minor Hot Work (To be issued by worker.)	Major Hot Work (Must be issued by Foreman.)
I have reviewed the Hazard Assessment and precautions checklist below and determined the task to be minor hot work. **I understand that I am to be my own fire watch, wait until material has cooled and inspect the work area prior to departure.** **This permit is valid from (date and time):** **_____ to** **_____.** **(Not longer than 24 hrs.)** **_____** **(Print name, sign, date.)**	**I have reviewed the Hazard Assessment and precautions checklist above and confirm that it is major hot work.** **Continuous Fire Watch Required for:** **30 mins 1-hour 2-hours** **Number of people assigned: _____** **Re-inspection to occur after work completion at:** **1 hour 2 hours 3 hours** **Person assigned: _____** **This permit is valid from (date and time):** **_____ to** **_____.** **(Not longer than 24 hrs.)** **_____** **(Print name, sign, date.)**

Precautions Checklist:	
Precautions: **Fire extinguisher available in the work area** **Hot work equipment in good repair** **Hazardous energy locked-out/tagged-out** **Requirements within 11m (35 ft):** **Flammable liquids and combustible materials removed from the area** **Floors swept and structure clear of dust, lint, debris** **Fire-resistive covers/blankets in place** **All floors and wall openings covered/protected**	**Work in confined spaces:** **Hazard assessment completed** **Atmosphere tested and passed** **Purging/ventilation in place** **Confined space permit issued**