

## Controlling Hot Work

### 1.0 Purpose

This procedure outlines required controls for conducting safe hot work in compliance with Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) standards. The provisions of this procedure apply to work activities associated with open flames, welding, cutting, or grinding and other tasks performed by Battelle- Pacific Northwest Division (PNWD) subcontractors.

### 2.0 Definitions

- Hot Work            In this context, refers to work involving open-flame, welding, cutting, and grinding (any work that generates sparks).
- Fire Watch            Process of watching for fire for a specified period during and after hot work. The fire watch person is solely dedicated to this task. Requires special training, including hands-on fire extinguisher training.

### 3.0 Requirements

This procedure has the following program elements:

- Working with Open Flame, Welding, Cutting, or Grinding
- Fire Safety Precautions
- Personnel Protective Equipment (PPE) for performance of hot work
- Contractor personnel shall know how to respond to fires in the work area, including initiating alarms, fire department contact and communication with PNWD contact.

#### 3.1 Working with Open Flame, Welding, Cutting, or Grinding

The following requirements apply to contractors conducting hot work at PNWD:

- Contractor personnel will identify when “Hot Work” is required.
- The contractor shall perform “Hot Work” in accordance with a *Working with Open Flame, Welding, Cutting, or Grinding* permit approved by PNWD.
- The permit requirements will be communicated to all applicable contractor personnel via a pre-job briefing.
- Contractor personnel who perform fire watch duties must receive PNWD fire watch training (PNNL Course #000679). Individual performing fire watch duties must complete hands-on fire extinguisher training (PNNL Course #000654).
- Alternatives to performing hot work (e.g., saw cutting instead of grinding wheel or torch cutting; crimp-type pipe fittings instead of soldered fittings) should be used where practical. Hot work should

be performed in contractor shops or designated areas (e.g., pre-approved weld booths or shop areas) where practical.

- Return completed hot work permit to the Building Manager when work is complete.

### **3.2 Fire Safety Precautions**

PNWD's best management practices on fire safety precautions while conducting hot work are provided below. However, the descriptions below do not provide comprehensive requirements; contract and/or project-specific requirements should be evaluated on a case-by-case basis.

#### Equipment for Open Flames or Welding

- Inspect hoses, tubing, cable or wire insulation, or other easily damaged parts to be sure they are in good condition. Clamped hose or tubing connections must be used to prevent the hose/tubing from becoming disconnected while under pressure. Repair or replace damaged hoses or cables before starting work.
- Protect fuel and oxidizer hoses or tubing from the heat of the flame or sparks during operations.
- When fuel gas and oxygen are used together, properly designed and FM-approved and/or UL-listed hose, fittings, and reverse flow check valves must be installed.
- Use welding and cutting equipment that is FM-approved or UL-listed.
- Keep the equipment in good condition and remove unsafe equipment from the work area.
- Compressed gas cylinders, including propane cylinders, must be secured to prevent them from tipping or falling over. Gas cylinders must be protected from damage such as overhead movement of materials and moving vehicles.

#### Facility Features

- Do not conduct open-flame, welding, cutting, or grinding work during facility fire-sprinkler system outages.
- Know where fire extinguishers are mounted. When applicable, a fire watch shall have dedicated fire extinguisher(s) available. Building fire extinguishers are not to be used by fire watch.
- Know where fire alarm pull boxes are located.
- Know how to call the fire department from the work location where you are located.
- Have emergency communications such as cellular phones or radios available when working in remote or outside areas.

#### Fire Prevention

- Remove or protect combustible materials within 35 feet of welding, cutting, or grinding work areas. For open-flame operations that do not produce sparks, a 2-foot clearance around the open flame device may be sufficient.

- Fully inspect areas below/underneath equipment and the work location for combustible materials. For overhead work, a fire watch may be necessary on multiple levels.
- Protect openings in walls, floors, roofs, and ceilings where sparks can travel beyond the work area to inaccessible or unprotected areas. Beware of heat conduction through penetrations.
- Keep flammable liquids in closed containers and remove the containers from the work area.
- Before performing work, clean containers that have been used to store flammable materials or materials that produce flammable or toxic products. Make sure no cleaning solvent remains on the portion of the container that will be exposed to flame. Be aware that heating nonflammable solvents can produce toxic vapors or gases.
- Wear fire retardant personal protective clothing when exposed to open flames or to welding, cutting, or grinding operations in confined spaces, radiation areas, hazard waste sites, and controlled access areas.

#### Operational Practices

- Remain at the work area whenever an open flame is present.
- Confirm that the personnel who will be operating the equipment have been trained in its use and know how to use it safely.
- Maintain a fire watch for unplanned fires during hotwork operations and for at least 30 minutes the completion of the hotwork operation. The fire watch observes staff conducting the welding, cutting, or grinding operations and monitors adjacent areas. Stop work if sparks travel beyond the area that fire watch can observe. The fire watch is not assigned any other duties during hot work operations and for the 30-minutes after completion of the hot work.
- Maintain good housekeeping in the work area.
- Provide adequate ventilation in the “hot work” area in accordance with the *Working with Open Flame, Welding, Cutting, or Grinding* permit.
- Post a guard, barrier, or other type of warning to keep passersby away from the work area in accordance with the *Working with Open Flame, Welding, Cutting, or Grinding* permit.
- When using arc-producing equipment, use protective screens positioned to protect staff from exposure to light from the arc.
- Shut down electric welding machines and shut off gas supplies at the point of supply when work is halted even for a short time such as when stopping for a break.
- When stopping work for the lunch period or overnight, shut off gas supplies at the cylinder valves and the power to the electric welding machines. Remove electrodes and place them far enough away from the machine so accidental contact cannot occur. Welding machines that have been used outside a designated area must be disconnected at the power source.
- When working in a confined space and stopping work for the lunch period or overnight, disconnect electric welding machines from the power source. Remove electrodes and the electric welding leads from the confined space and place them where accidental contact with the machine is not possible. Shut off gas supplies at the cylinder valves and remove hoses from the confined space.

### **3.3 Personal Protective Equipment**

#### General

- Select clothing to minimize the risk of ignition based on the location and nature of the work being performed.
- Select heavier materials such as woolen clothing, heavy cotton, or leather when possible.
- Keep sleeves and collars buttoned with no pockets on the front of clothing. Do not cuff or roll pant legs (e.g., to discourage lodged sparks).
- Avoid wearing frayed clothing.
- Select clothing that provides sufficient coverage to minimize the potential for burns.
- Select clothing that is clean with no contaminants (e.g., oils or grease that could reduce effectiveness of the protective properties).

#### Aprons, Leggings, Capes, Sleeves

- Wear flame-resistant leggings or guarding where necessary to give added protection.
- Wear flame-resistant cape-sleeves or shoulder covers with bibs for overhead welding, cutting, or other operations, as necessary.
- Wear durable, flame resistant aprons to protect the front of the body when additional protection against sparks and radiant energy is needed.
- Use insulated linings to protect areas exposed to high-radiant energy.

### **4.0 References**

- National Fire Protection Association (NFPA) 51B: Standard for Fire Prevention During Welding, Cutting, and Other Hot Work.
- ANSI Z49.1, Safety in Welding, Cutting, and Allied Processes

### **5.0 Records**

None

### **6.0 Forms**

[Permit for Working with Open Flame, Welding, Cutting, or Grinding](#) (Word)