ORANGE COUNTY SANITATION DISTRICT	SOP-118 (Ver. 4) Hot Work Program
Standard Operating Procedure (SOP)	Effective: 1/25/2022 Supersedes: 11/02/2020
Approved By: James D. Herberg General Manager	

I. Purpose

The Hot Work program describes the precautions that the Orange County Sanitation District (OC San) workforce and contractor employees shall take when performing hot work in OC San worksites.

The purpose of the program is to minimize or eliminate fire or explosion hazards associated with hot work. The requirements of the permitting process are intended to confirm that the proposed hot work activities are properly planned, and safety executed.

Hot work is any work that could produce a source of ignition or temperatures high enough to cause ignition of flammable gases and combustible materials. Hot work includes but is not limited to welding and allied processes, heat treating, grinding, powder-driven fastening, hot riveting, torch-applied activities, or similar applications producing or using a spark, flame, or heat.

II. Background

Performing hot work in classified and non-classified locations may be considered a hazardous work activity, and a hot work permit may be required. Guidelines for determining whether a hot work permit is required is provided in Appendix A – Hot Work Permit Applicability.

The hot work permit has four main purposes:

- To serve as written permission to perform such work.
- To provide a safety checklist to address common hazards.
- To demonstrate steps necessary for making the work site safe.
- To provide a record of safety steps taken for contract work.

If a permit is required, the hot work permit shall be completed in accordance with this document.

III. Definitions

Classified (Hazardous) Location: Any area in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. Guidance to identify classified locations can be provided by area classification diagrams (as presented in Maps and Apps on the San Box (intranet site) and by standards such as American Petroleum Institute (API) 500, National Fire Protection Association (NFPA) 70E, and NFPA 820.

Combustible Material: Any material that may ignite when introduced to an ignition source (e.g., wood, paper, cardboard, and plastic).

Competent Person: Capable, through acquired knowledge, demonstrated skills and experience of identifying existing and predictable hazards in surroundings, working conditions or behaviors; and having the authorization to take prompt corrective measures to eliminate those hazards.

Designated Area: A permanent area approved for hot work by Risk Management that is noncombustible or fire-resistive construction, is free of combustible and flammable contents and is suitable segregated from adjacent hazards. Designated areas are kept clear of combustible materials for at least 35 feet. Hot work performed in a designated area does not require a Hot Work Permit. Classified locations are never designated areas.

Flammable Gas: All combustible and flammable gas and vapors that burn in the air when the gas or vapor concentration is within the range of concentration of possible combustion.

Hot Work: Any work that could produce a source of ignition or temperatures high enough to cause the ignition of flammable gases and combustible materials.

Lower Explosive Limit (LEL): The minimum concentration of a flammable gas that will propagate a flame in the presence of an ignition source. The more explosive the gas, the lower the LEL. LEL is usually expressed as a percentage (from zero to 100 percent explosive) and is often used interchangeable with lower flammability limit (LFL).

Lower Flammability Limit (LFL): A term with the same definition of Lower Explosive Limit (LEL) and that is used interchangeably with LEL.

Primary Source Ignition (PSI) Hot Work in Classified Locations: Primary source ignition (PSI) hot work that is performed either inside a classified location or outside a classified area that the hot work may affect.

Primary Source Ignition (PSI) Hot Work: Any work with equipment and tools that is likely to ignite a flammable or combustible atmosphere, solid materials and liquids when used in a normal manner. This can include welding and burning, grinding, and cutting with discs, torch cutting and soldering, explosives, and surface temperatures greater than 390 degrees Fahrenheit.

Primary Source Ignition (PSI) Non-Class I Hot Work: Primary source ignition (PSI) hot work that is performed outside of and will not impact a Class I area.

Secondary Source Ignition (SSI) Class I Hot Work: Secondary source ignition (SSI) hot work that is performed inside a Class I area.

Secondary Source Ignition Hot Work: Any work with equipment and tools that may create low-energy sparks and ignite a flammable or combustible atmosphere when used in a normal manner or due to errors or malfunction. This may include sandblasting, using electrical or electronic equipment that is not intrinsically safe or explosion-proof, using internal combustion engines, using rotating steel brush, electrical isolation testing, producing friction spark, or soldering.

Secondary Source Ignition (SSI) Non-Class I Hot Work: Secondary source ignition (SSI) hot work that is performed outside a Class 1 area. SSI non-Class 1 hot work does not require a hot work permit.

IV. Responsibilities

A. Risk Management

1. Review and update this program annually to align with regulatory requirements and available consensus standards.

2. Provide appropriate information, education, and training for those conducting hot work activities.

3. Issue hot work permits to hot work operators.

4. Verify completed and canceled hot work permits are retained.

5. Review canceled permits to ensure conformance to this program.

6. Provide technical assistance regarding hot work protocol, atmospheric testing equipment, PPE, hazard assessment and research information on unusual hazards.

7. Hot work conducted in areas with vertical or horizontal fire exposures that are not observable by a single fire watch shall have an additional fire watch assigned to ensure that exposed areas are monitored.

B. Supervisors

1. Enforce requirements of the Hot Work program.

2. Ensure hot work operators and fire watch follow the hot work procedure and complete hot work permits prior to the start of hot work.

3. Verify employees have been trained prior to assigning work that requires hot work activities.

4. Verify that proper hot work-related equipment, including personal protective equipment (PPE), atmospheric testing equipment, fire protection equipment and other appropriate safety equipment, is used during hot work operations.

5. Hot work conducted in areas with vertical or horizontal fire exposures that are not observable by a single fire watch shall have an additional fire watch assigned to ensure that exposed areas are monitored.

C. Hot Work Operators (Employees and Contractors)

1. Shall obtain proper authorization from Risk Management to perform hot work operations via the hot work permit. The hot work operator shall participate in completion of the hot work permit.

2. Review and sign the hot work permit to acknowledge understanding of the condition documented on the permit.

3. Shall comply with conditions of the issued hot work permit.

4. Shall safely handle hot work equipment and processes.

5. Shall cease hot work operations if unsafe conditions develop and notify supervision immediately for evaluation and appropriate action.

6. Shall notify workers in adjacent areas of the hot work to be conducted who could be affected by the hot work.

7. Shall complete hot work training as required by this program, and for following all hazard control processes designated by Risk Management or supervision.

8. Shall operate air monitoring equipment to monitor the presence of flammable gas in the area where hot work is planned. This includes calibration of the air monitoring device according to the manufacturer's instructions.

9. Verify that copies of completed and canceled hot work permits are properly disseminated to Risk Management.

10. Make fire extinguishing equipment readily available and be trained in its use.

11. Hot work conducted in areas with vertical or horizontal fire exposures that are not observable by a single fire watch shall have an additional fire watch assigned to ensure that exposed areas are monitored.

D. Fire Watch (Employees and Contractors)

1. Must understand the location, nature, and hazards of the hot work to be performed.

2. Survey the area to verify that the necessary fire protection equipment is in place and ready for use.

3. Confirm that safe conditions are maintained during hot work operations. The fire watch shall have the authority to stop the hot work operations if unsafe conditions develop.

4. Make fire extinguishing equipment readily available and be trained in its use.

5. Remain within communication range of the person(s) performing the hot work and maintain a line of sight with the hot work.

6. Do not leave for any reason without a replacement. Watch for fires in all areas exposed to hot work and communicate to hot work operators to cease all hot work if a fire occurs.

7. Try to extinguish a fire only when the fire is 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 shall sound the alarm immediately.

8. Implement evacuation procedures immediately if the fire is not within capacity of the available extinguishing equipment.

9. Remain in the hot work area at least 30 minutes after the hot work has ceased to detect and extinguish possible smoldering fires.

10. Shall not have any other duties besides those specific in this practice during the hot work activities. Fire watch may perform atmospheric monitoring.

11. The fire watch shall be familiar with the procedures for sounding an alarm in the event of a fire.

12. Hot work conducted in areas with vertical or horizontal fire exposures that are not observable by a single fire watch shall have an additional fire watch assigned to ensure that exposed areas are monitored.

V. Procedure

A. General Requirements

1. Authorization

   a. Risk Management shall authorize a Hot Work Permit before any PSI hot work (other than in a designated area), or any SSI Class 1 hot work is performed. The template hot work permit is maintained under Safety Forms on the Risk Management SharePoint site.

   b. Any volatile contaminants on OC San sites shall be evaluated to determine if the definition of Class 1 is met.

   c. A Hot Work Permit is not required for SSI non-Class 1 hot work.

2. Validity

   a. The Risk Management permit issuer shall determine the period for which the hot work permit is valid.

   b. If the hot work is suspended during a shift, the permit shall be revalidating before further hot work can continue. Revalidation involves inspecting the hot work area for any change in previous conditions and conducting air monitoring if the hot work is performed in a Class 1 area.

3. Posting and Signage

   a. The Hot Work Permit shall be posted at the work site until the hot work is completed or the permit expires. Completed permits shall be returned to the Risk Management permit issuer.

      Where the hot work area is open to persons other than the operator of the hot work equipment, conspicuous signs shall be posted to warn others before they enter the hot work area. Such signs shall display the following warning: CAUTION HOT WORK IN PROGRESS STAY CLEAR.

4. Stop Work / Permit Cancellation

   Conditions that may trigger a Stop Work notice include:

   a. All personnel involved in a hot work operation have the authority and responsibility to stop any work they consider to be unsafe.

   b. If work is stopped, the Hot Work Permit shall be returned to Risk Management for re-evaluation.

c. Condition can may trigger a stop work can include:

1) Changes in job site condition that present a hazard after permit issuance.

2) LEL >10% is detected.

3) Atmospheric monitoring equipment fails (e.g., battery depleted, calibration error, readings fluctuating).

4) Scope of work changes.

5) Unsafe condition or behavior identified by personnel involved in work.

6) Facility emergency alarms activated.

7) Occurrence of a minor incident or near miss/loss during a job task.

d. Permit cancellation can include:

1) Change out of entire work crew.

2) Change of Permit Requestor/Holder

3) Work lasts longer than one shift.

5. Applicable Permits

a. If hot work is to be performed inside a confined space, a Confined Space Job Hazard Analysis must be issued.

B. Permit Preparation and Approvals

1. Work permit forms are usually prepared by the hot work operator. The hot work operators shall seek input from individuals who have technical and procedural competencies to provide input to the permit as necessary to address the hazards and permit conditions related to hot work.

2. Once the Hot Work Permit has been prepared, Risk Management will review and sign the permit. By signing the permit, Risk Management authorizes the work to proceed.

3. The hot work operator will sign the permit after Risk Management authorizes the work. By signing the permit, the hot work operator accepts responsibility of observing the permitted work to confirm that the work is performed within the permit conditions.

4. Self-authorization may be allowed with approval from Risk Management. This may be done only for lower-risk applications such as low energy SSI Class 1 hot work.

5. Risk management will verify that the fire safety precautions required by the permit have been taken.

C. Non-Permissible Areas

1. All hot work is prohibited in areas not authorized by Risk Management and the following areas:

a. Sprinkler-equipped buildings where sprinklers are impaired unless the requirements of NFPA 25 are met.

b. In the presence of explosive atmospheres (greater than or equal to 10 percent of the LEL).

c. In the presence of unclean or improperly prepared tanks or vessels, and equipment that have previously contained flammable or combustible materials when their contents may be exposed to an ignition source.

d. Presence of combustible dusts.

D. Site Preparation

1. Preparation for All Primary Source Ignition Hot Work

a. PSI hot work is any hot work with equipment and tools that, when used in a normal manner, is likely to ignite flammable or combustible atmospheres, solid materials, and liquids.

b. PSI hot work such as grinding, has been known to generate sparks with enough energy to transport them up to 35’ from the point of hot work. It is, therefore, possible to perform PSI hot work up to 35’ away from a Class 1 location and yet still introduce an ignition source into a Class 1 area.

c. Prior to performing PSI hot work, the requirements of this section shall be met and verified by the hot work operator:

1) The hot work equipment shall be in satisfactory operating condition and good repair.

2) All combustible and flammable materials shall be relocated at least 35’ in all directions from the work site.

d. Solids (e.g., cake, combustible dust) shall be cleaned away before any work can proceed.

e. If relocating these materials is impractical, the following precautions shall be taken:

1) Shield materials with fire-retardant covers or with metal or fire-retardant guards or curtains.

2) Edges of covers at floor shall be tight to prevent entrance of sparks, including at the point where several covers overlap when a large pile is being protected.

3) A fire watch may be required.

4) A fully charged and operable fire extinguisher appropriate for the type of potential fire shall be available for use in the work area (20 lbs. minimum).

5) A nonflammable, impervious material shall seal sewer openings, ducts, and drains. Where sealing is insecure or impractical, water spray should be directed across the openings.

6) The location of the hot work relative to combustible and flammable materials and classified areas shall determine the need for a fire watch.

7) Personnel in the vicinity of the hot work shall be suitable protected against dangers such as heat, sparks, flash, and slag.

2. Preparation for Primary Source Ignition Class 1 Hot Work

a. Prior to performing any work in PSI Class 1 hot work, the requirements of Section IV.D.1 Preparation for all Primary Source Ignition Hot Work and Section IV.E Air Monitoring shall be verified by Risk Management.

1) A fire watch shall be assigned for duration of hot work and for 30 minutes after the hot work is completed to detect and extinguish any smoldering fires.

2) The venting, draining, or bleeding of flammable or combustible liquids and gases shall be stopped within 35’ of the hot work.

3) Affected excavations, conduits, drains and manholes within 35’ of the hot work shall either be monitored for the presence of flammable gas or sealed to confirm that an ignition source is not present. If the work extends over several days, the shields shall be removed at the end of each workday and replaced, accordingly.

4) Initial and continuous monitoring shall be performed and documented.

5) Non-intrinsically safe tools (including cell phones) are prohibited from use in Class 1 areas, except as defined in Section IV.E.4X, Initial and Continuous Hot Work Air Monitoring.

3. Preparation for Primary Source Ignition Hot Work within 35’ of Buildings or Structures

a. The conditions of Section IV.D.1 Preparation for all Primary Source Ignition Hot Work and this section shall be met and verified before any PSI hot work is performed inside or within 35’ of buildings or structures with materials or contents that may be combustible or flammable.

1) Openings or cracks in walls, floors or ducts within 35’ of the hot work shall be tightly covered with fire-retardant or noncombustible materials to prevent the passage of sparks to adjacent areas.

2) If hot work is performed near walls, partitions, ceilings or roofs of combustible materials, fire-retardant shields or guards shall be provided to prevent ignition.

3) If hot work is done on one side of a wall, partition, ceiling or roof, combustibles on the other side shall be relocated, if possible. If it is impractical, a fire watch shall be provided on the side of the combustibles.

4) Hot work shall not be attempted on a partition, wall, ceiling, or roof with a combustible covering or insulation, or on walls or partitions of combustible sandwich panels or similar construction.

5) If the hot work is close enough to cause ignition by conduction, it shall not be performed on pipes or other metal that is in contact with combustible walls, partitions, ceilings roofs or other combustibles.

6) The following procedures shall apply to hot work performed near a sprinkler head:

a) A wet rag shall be laid over the sprinkler head and then removed at the conclusion of the welding or cutting operation.

b) Special precautions (e.g., ventilation, shielding) shall be taken during the hot work to avoid accidental operation of automatic fire suppression systems.

4. Preparation for Secondary Source Ignition Class 1 Hot Work

a. Secondary Source Ignition (SSI) Hot Work designates any work with equipment and tools that may create low-energy sparks and ignite a flammable or combustible atmosphere when used in a normal manner or due to errors or malfunction. SSI hot work is also referred to as ‘spark potential’ hot work.

b. Before any SSI Class 1 hot work is performed, initial air monitoring shall be performed and documented.

c. Periodic up to continuous air monitoring, as determined by Risk Management, shall be performed and documented.

d. Air monitoring equipment is to produce an audible alarm when LEL exceeds 10 percent. The air monitoring equipment shall remain in hearing range of the audible alarm and locate the air monitoring equipment between the hot work and potential vapor source. More than one air monitor may be needed to monitor the air properly.

E. Air Monitoring (Class 1 Areas)

1. General

a. Flammable and combustible liquids and gases may be present in Class 1 areas. To perform hot work safely in these areas, initial and continuous air monitoring is required to confirm that any flammable gas in the work area is detected and properly controlled.

b. If the hot work will be performed in a tank or basin, the air monitoring requirements for confined spaces will also apply.

c. When the possibility exists for an oxygen-deficient atmosphere, the oxygen level could be below the level required by the air monitor to give the correct flammability (LEL) reading. This could occur where a tank, vessel or pipe contains an inert gas such as nitrogen or carbon dioxide. For this reason, it is important to monitor oxygen levels prior to monitoring for LEL.

d. Hot work is prohibited if air monitoring readings are greater than or equal to 10 percent of the LEL.

e. All air monitoring associated with hot work shall be conducted by an authorized and trained person who is competent in the use of the instrument and hazards of the monitored area.

f. The instrument(s) used for gas monitoring shall be calibrated prior to use. Documentation of such calibrations shall be maintained.

g. Hot work air monitoring requirements are summarized in Appendix C.

2. Initial Hot Work Air Monitoring (PSI Class 1)

a. Initial hot work air monitoring shall be conducted prior to the authorization and issuance of the Hot Work Permit for PSI Class 1 hot work.

b. Initial air monitoring shall be performed by an authorized and trained person surveying no more than 5 feet from the point of hot work with a properly functioning, calibrated air monitor equipped with LEL and O2 sensors.

c. If initial air monitoring indicates the presence of any flammable gas, the hot work may not proceed until an LEL mitigation plan is developed and implemented.

3. Continuous Hot Work Air Monitoring (PSI Class 1)

a. All PSI Class 1 hot work requires attended continuous air monitoring while the hot work is being performed. An authorized and trained person shall monitor and survey the perimeter of the permitted area at least once per hour. The survey shall cover at least 35’ from the hot work area.

b. If initial air monitoring readings are 0 percent LEL, but continuous air monitoring indicates the presence of flammable gas (greater than 0 percent LEL), the hot work shall stop and an LEL mitigation plan shall be developed, documented, and implemented.

c. If the implementation of the LEL mitigation plan controls the flammability level to less than 10 percent of the LEL, the authorized gas tester will continue monitoring the area while hot work operations continue. If at any time the LEL reading reaches 10 percent LEL, the hot work shall stop until the source of the flammable gas is controlled to less than 10 percent of the LEL.

4. Initial and Continuous Hot Work Air Monitoring (SSI Class 1)

a. Vehicles, mobile equipment, and other non-intrinsically safe equipment present potential ignition sources. Consequently, SSI hot work in Class 1 areas requires the completion of a Hot Work Permit and the performance of air monitoring.

b. Air monitoring shall be performed for SSI hot work in Class 1 areas:

1) Before a vehicle or equipment that is not intrinsically safe can enter the Class 1 area, an authorized gas tester shall survey the area along its planned path to its destination.

2) The vehicle or equipment can proceed into the classified area only when flammability readings are 0 percent LEL, or less than 10 percent LEL with an implemented LEL mitigation plan.

c. Continuous air monitoring shall be performed if the vehicles engine or non-intrinsically safe equipment is running, and initial monitoring is greater than 0 percent LEL.

d. If the vehicle or non-intrinsically safe equipment is shut off, it shall not be restarted until the area around the vehicle or non-intrinsically safe equipment is surveyed for flammable gas.

e. The planned egress of the vehicle or equipment from the Class 1 area shall be surveyed for flammable gas prior to its departure from the area.

f. Periodic up to continuous air monitoring, as determined by Risk Management, shall be performed and documented.

F. Lower Explosive Limit Mitigation Plan

1. An LEL mitigation plan shall be developed and implemented if the presence of flammable gas is detected (LEL greater than 0 percent) at any time during the hot work.

2. The following information shall be documented on the mitigation plan:

   a. The percent of the LEL that was measured.

   b. The identified source(s) of the flammable gas within the hot work area.

   c. The controls, if any, that will be implemented to effectively reduce the flammability level to less than 10 percent of the LEL with the hot work area.

   d. The percent LEL measured after controls, if any, have been implemented.

3. If at any time the LEL reading is greater than or equal to 10 percent of the LEL, the hot work shall stop immediately and will not resume until controls are implemented to reduce the LEL level to less than 10 percent of the LEL.

G. Fire Watch

1. A fire watch is required whenever the hot work meets the following criteria, which are summarized in Appendix B:

   a. The hot work consists of PSI Class 1 hot work.

   b. The PSI hot work will be performed:

      1) Within 35’ of shielded combustible materials.

      2) Within 35’ radius of wall or floor openings that expose combustible materials.

      3) Adjacent to metal partitions, walls, ceilings, or roofs that are in contact with combustible materials on the other side and are likely to be ignited by conduction or radiation.

      4) Where fire alarms or suppression systems must be disabled.

2. Fire watch shall abide by the roles and responsibilities listed in Section III.D.

3. The fire watch shall always be in the ready position while hot work is performed and remain in the hot work area for at least 30 minutes after the hot work has ceased to detect and extinguish possible smoldering fires. Ready position consists of being attentive to the work being performed, properly positioning of fire extinguisher before work starts, always maintaining eyesight with hot work.

4. Fire watch shall stop the work if they deem that unsafe conditions have developed, or the work is exceeding the scope of the Hot Work Permit.

5. A second fire watch is required if one fire watch cannot directly observe combustible materials that could be ignited by the hot work operation.

VI. Ventilation

A. Mechanical ventilation, if it is deemed necessary, will consist of either general dilution systems or local exhaust systems.

B. General mechanical ventilation will be of sufficient capacity and so arranged as to produce the number of air changes necessary to maintain welding fume and smoke within safe limits. Twenty (20) air changes per hour shall be achieved when welding.

C. Local exhaust ventilation shall be used when toxic metals are generated and used in addition to any general mechanical ventilation provided.

D. Local exhaust ventilation will consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work. This system will be of sufficient capacity and so arranged as to remove fumes and smoke at the source and keep the concentration of them in the breathing zone within safe limits.

E. Contaminated air exhausted from a working space will be discharged into the open air or otherwise clear of the source of intake air. All makeup air will be clean and suitable for breathing. The contaminated air from the operation must be ventilated to a safe area where employees will not be exposed to the contaminants.

F. Oxygen will not be used for ventilation purposes, comfort cooling, blowing dust from clothing, or for cleaning the work area.

G. Ventilation plans shall be prepared for primary source ignition hot work in non-designated areas or if a LEL Mitigation Plan is required. The ventilation plan shall be prepared by the hot work operator with approval by Risk Management. Ventilation is required to reduce atmospheric hazards to within acceptable levels.

H. Mechanical ventilation for indoor operations shall provide a local exhaust system that is effective at removing the welding fumes to a safe location.

I. Welding or cutting operations involving metals coated with lead-containing paint, stainless steel, and other impurities, must have adequate ventilation and hot work operators must wear adequate respirator protection. Respiratory protection is not required if sufficient quantitative industrial hygiene data suggests employees are not subjected to exposure when conducted using effective engineering and administrative controls. Respirators must be selected and used according to OC San's written respiratory protection program.

J. Ventilation equipment that is damaged shall immediately be removed from service.

VII. Designated Areas

A. A specific location designed and approved for hot work operations and the location must be maintained fire safe.

B. Area should be made of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitable segregated from adjacent hazards.

C. Risk Management must approve the area as a designated hot work area.

D. Designated hot work areas do not require a hot work permit. The approved list of designated hot work areas is provided in Appendix D.

VIII. Hazardous Area Classification

A. All areas designated as hazardous (classified) locations shall be documented and available to those authorized to design, install, inspect, maintain, or operate electric equipment at the location. Area Classification maps have been established for all facilities and are located on OC San intranet site.

B. OC San will refer to NFPA 820 for Fire Protection in Wastewater Treatment and Collection Facilities when classifying work areas.

C. Equipment and associated wiring approved as intrinsically safe shall be permitted in any classified location for which it is approved. Intrinsically safe equipment and wiring shall not be capable of releasing sufficient electrical or thermal energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture in its most easily ignited concentration. Abnormal conditions shall include accidental damage to any field-installed wiring, failure of electrical components, application of over-voltage, adjustment and maintenance operations, and other similar conditions.

IX. Oxy-Fuel Welding and Cutting

A. Fuel-gas hoses and oxygen hoses shall be distinguishable from each other. Oxygen and fuel-gas hoses shall not be interchangeable.

B. Gas hoses shall be inspected at the beginning of each work shift. Defective hoses shall be removed from service.

C. Equipment tips (torch/welders) shall be cleaned with approved cleaning wires, drills, or other devices designed for this purpose.

D. Torches shall be inspected at the beginning of each work shift for leaking shutoff valves, damaged hose couplings, and clogged tip connection. Defective torches will not be used.

E. Torches shall be ignited by friction lighters or other approved devices only. Matches, flame lighters, or hot work will not be used to ignite a torch.

F. Oxygen and fuel-gas pressure regulators, including related gauges, shall be in proper working order and equipped with flashback arrestors attached to the gauges. NOTE: Flashback arresters are in addition to backflow devices.

G. Cylinders, cylinder caps and valves, couplings, regulators, hose, and apparatus shall be kept free from oil or greasy substances and will not be handled with oily hands or gloves. Oxygen shall not be directed at oily surfaces or greasy clothes or used within a fuel oil or other storage tank or vessel.

H. Torches and hoses shall be completely depressurized (bled) of pressurized gas, prior to storage, or at the end of each shift.

I. Torches and hoses shall not be stored in enclosed areas (e.g., gang boxes, lockers) while connected to cylinders and gauges will be removed at the end of shift.

X. Arc Welding and Cutting Safety

A. Electrode holders which are designed for arc welding/cutting and are capable of safely handling the maximum rate current required shall be used.

B. Cables shall be insulated and flexible, capable of handling the maximum current requirements of the work.

C. Only cables free from repair or splices for a minimum distance of 10 feet from the electrode holder shall be used. Cables with standard insulated connectors or splices with insulating quality that is equal to that of the cable are permitted.

D. To avoid the possibility of electric shock, electrode holders shall not be dipped in water.

E. When the arc welder or cutter leaves work, stops work for any length of time, or when the arc welding cutting machine is to be moved, the power supply to the equipment will be turned off.

F. Any faulty or defective equipment will be reported to the supervisor and tagged out of service until repaired.

G. All arc welding/cutting operations will be shielded by noncombustible or flameproof screens to protect employees and other persons working in the vicinity from the direct ray of the arc.

XI. Compressed Gas Cylinders Storage and Handling

A. Cylinders shall be legibly marked with either the chemical or trade name of the gas. Such markings will be stenciled, stamped, or labeled and will not be easily removable. The marking will be located on the shoulder of the cylinder.

B. Cylinders will be equipped with approved connections.

C. Acetylene cylinders will be stored and used valve end up.

D. Cylinders will be stored in an upright and secure position with caps installed and separated from fuel-gas cylinders or combustible materials (especially oil or grease), by a minimum distance of 20 feet, or by a noncombustible barrier at least 5 feet high and having a fire resistance rating of at least one-half hour.

E. All empty gas cylinders shall be returned to the proper storage area with caps intact, secured and placed in the storage compartment marked empty.

F. Cylinders shall not be dropped, struck by objects, or permitted to strike each other violently.

G. Cylinder valves shall be closed, and gauges removed before moving cylinders and at the end of the shift or when work is finished. Valves of empty cylinders will be closed.

H. Cylinders will be kept far enough away from the actual welding/cutting operation so that sparks, hot slag, or flames will not reach them.

I. Cylinder valves shall be opened slowly. Acetylene cylinder valves shall not be opened more than one and one-half turns of the valve stem and preferably no more than three-fourths of a turn.

J. Where a special wrench is required to operate a cylinder valve, it will be left in position on the stem of the valve while the cylinder is in use. In the case of manifolded or coupled cylinders, at least one such wrench will be available for immediate use.

K. Regulators will be removed, valve caps in place, and valves closed when cylinders are transported by vehicles. All vehicles used to transport cylinders will have a proper support rack installed.

L. A suitable cylinder truck, chain, or other steadying device will be used to prevent cylinders from being knocked over while in use or storage.

M. Cylinders will not be placed where they may become part of an electric circuit. Tapping of an electrode against a cylinder to strike an arc is prohibited.

N. Oxygen and acetylene cylinders shall have approved regulators and shall be equipped with flash back arrestors.

XII. Welding and Cutting on Containers

A. No hot work shall be performed on empty drums, barrels, tanks, or other containers until they have been thoroughly cleaned. This is to ensure that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which, when subjected to heat, might produce a hazard. Any connection to the drum or vessel will be disconnected or blanked off.

B. All hollow spaces, vacancies, or containers will be ventilated to remove gases before preheating, cutting, or welding. Purging with inert gas is recommended. Purging plans must be submitted and approved by Risk Management or Engineer.

C. When Hot Work is to be performed on tanks, lines, or other equipment associated pipes, lines, or other connections, isolations shall consist of a double block and bleed valve system or blanked/blinded to assure complete isolation of the Hot Work area from combustible gases.

D. When possible, objects to be welded, cut, or heated will be moved to a designated hot work area. If this is not possible, all movable fire hazards in the workspace will be taken away to a safe place.

E. If the object to be welded, cut, or heated cannot be moved and all fire hazards cannot be removed (e.g., equipment, walls, floors, etc.), positive means will be taken to confine the heat, sparks, and slag to protect the immovable fire hazards as well as opposite sides.

F. No welding, cutting, or heating will be done where the application of flammable paint, the presence of other flammable compounds, or heavy dust concentrations create a possible hazard.

G. Welding or cutting work shall not be held or supported on compressed gas cylinders or containers.

XIII. Flammable Liquids

A. Flammable liquids shall be stored in specially approved and designated cabinets, storage rooms, or outbuildings.

B. Use of only manufacturer's original containers or U. L. approved flammable liquid containers.

C. Proper handling and dispensing procedures to include grounding, quantity limits, and pressure relief, and personal protective equipment.

D. Flammable and combustible cabinets shall be made of at least 18-gauge sheet iron and double walled with one and one-half inch airspace. Doors must have three-point latch and be self-closing.

E. Quantity of liquid stored in a cabinet shall not exceed:

1. 25 gallons of Category 1 liquids in containers

2. 120 gallons of Category 2, 3, or 4 liquids in containers

3. 660 gallons of Category 2, 3, or 4 liquids in a single portable tank

F. Only use flammable liquids in well-ventilated areas and away from ignition sources.

G. Containers shall be labeled in accordance with Hazardous Communication Program.

H. Storage cabinets - Not more than 120 gallons of Category 1, 2, 3 and 4 flammable liquids may be stored in a storage cabinet. Of this total, not more than 60 gallons may be of Category 1, 2 and 3 flammable liquids. Not more than three such cabinets may be in a single fire area, except that in an industrial occupancy additional cabinet may be in the same fire area if the additional cabinet, or group of not more than three cabinets, is separated from any other cabinets or group of cabinets by at least 100 feet

XIV. Flammable Gases

A. All storage and handling procedures for specific flammable gases and operations will be strictly observed.

B. Flammable gases will be stored separately from oxygen or other oxidizers. Only exception will be one oxygen cylinder in use on an acetylene welding cart.

C. Unless the cylinder valve is protected by a recess in the head, keep the metal cap in place to protect the valve when the cylinder is not connected for use.

D. Do not use a cylinder of compressed gas without a pressure reducing regulator attached to the cylinder valve, except where cylinders are attached to a manifold, in which case the regulator will be attached to the manifold header.

E. Use regulators and pressure gauges only with gases for which they are designated and intended.

F. Never bring cylinders into tanks, unventilated rooms, or other closed quarters.

G. Cylinder valves shall be kept in a closed position when work is completed.

XV. Personal Protective Equipment

A. Selection and use of personal protective equipment will comply with Personal Protective Equipment Program.

B. Eye and Face Protection

1. Welding helmets and hand shields will be used during all arc welding/ cutting operations, excluding submerged arc welding. Cutting/welding goggles will also be worn during arc welding/cutting operations. The goggles or glasses may be either clear or colored glass, depending on the type of exposure in welding operations. Helpers or attendants will wear proper eye protection.

2. Safety goggles or other approved eye/face protection are for use during gas welding operations on light work, torch brazing, or inspection.

3. All operators and attendants on resistance welding or brazing equipment will use face shields or goggles, depending on the job.

C. Protective Clothing

1. Except when engaged in light work, all welders will wear flameproof gauntlet gloves.

2. Flameproof aprons made of leather, or other suitable material, may also be desirable for protection against radiated heat and sparks.

3. Woolen clothing will be worn in preference to cotton because it is not so readily ignited. Nylon clothing is not permitted for welding/cutting operations. All outer clothing, such as jumpers or overalls, will be reasonably free from oil or grease.

4. Clothing shall be selected to protect the welder from ignition, burning, trapping hot sparks, or electric shock.

D. Respiratory Protective Equipment

1. Respiratory protective devices will be required when one or more of the following conditions exist:

   a. Feasible engineering controls are insufficient to mitigate the hazards.

   b. Room size (with special regard to ceiling height) is limited, or welding/cutting work is extensive, and ventilation is limited.

c. Several welders are working in the area at the same time.

d. Potentially unsafe atmospheric conditions exist.

e. Too much heat is generated.

f. Hazardous fumes, gases, or dusts of toxic metals, particularly lead, cadmium, chrome, beryllium, and zinc are present in the base metal or in coatings.

2. Respiratory protective equipment will be selected, used, and maintained in accordance with Respiratory Protection Program.

XVI. Smoking

A. The State of California prohibits smoking within 20 feet of the entrance to a building.

B. Smoking shall be restricted to designated smoking areas only. Smoking areas are provided with appropriate non-combustible ashtrays and will be emptied at appropriate frequencies by janitorial staff.

C. Designated smoking area maps are provided in the OCS Map Library.

XVII. Fire Extinguishers

A. Employees assigned to conduct portable fire extinguisher monthly visual inspections are responsible for seeing that the following inspection procedures are followed:

1. No obstruction to access or visibility.

2. Pressure gauge reading indicates the needle point is in the green.

3. Operating instructions on nameplates are legible and face outward.

4. Safety seals and tamper indicators are not broken or missing.

5. Examination for obvious physical damage, corrosion, leakage, or clogged nozzle.

6. Fire extinguishers shall be replaced if deficiencies are found.

B. Extinguishers used for hot work shall be appropriately sized for the type of work being performed.

C. The extinguisher shall be available and ready to use.

XVIII. Training

Classified Location Awareness - This short course is for all personnel except office staff that does not enter process areas. The course should review the contents of this policy.

Working in Hazardous Locations (Hot Work) - This course should cover use of non-sparking tools, hot work permits, any specialized personal protective equipment, and use of atmospheric monitors.

Atmospheric Monitors - This course is already taught in the OC San Training curriculum. Implementation of this policy may require additional personnel to be trained in the use of Atmospheric Monitors.

XIX. Recordkeeping

All records created or generated during this procedure shall be legible and stored in a way that they are readily retrievable in facilities or electronic document/content management systems that provide a suitable environment to prevent damage, deterioration, or loss. Records may be in the form of any type of media, such as hard copy or electronic media. The OC San Records Retention Schedule is the official procedure governing the retention, retirement, and destruction of District records. Document owners should use these schedules to determine the item and series that best fit their records. Document owners are responsible for ensuring that documents are properly marked, indexed, and filed for their projects or area of responsibility.

XX. References

Cal OSHA, Title 8, California Code of Regulations (CCR), Subchapter 5, Group 1, Article 59, Hazardous (Classified) Locations

Cal OSHA, Title 8, CCR, Subchapter 5, Group 2, Article 34, Hazardous (Classified) Locations

Cal OSHA Title 8, CCR, Subchapter 7, Group 10, Gas Systems for Welding and Cutting

Cal OSHA Title 8, CCR, Subchapter 7, Group 11, Electric Welding

Cal OSHA Title 8, CCR, Subchapter 7, Group 20, Flammable Liquids, Gases and Vapors

Cal OSHA Title 8, CCR, Subchapter 7, Group 27, Fire Protection

NFPA 51B, Standard for Fire Prevention During Welding, Cutting and Other Hot Work

NFPA 70E, Electrical Safety in the Workplace

NFPA 497, Recommended Practice for the Classification of Flammable Liquids, Gases or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas

NFPA 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities.

XXI. Revision History

Version	Date	By	Reason
1.0	07/09/2009	Huynh, Cindy	New
2.0	06/07/2012	Shephard, Adam	Periodic Update
3.0	08/28/2020	Frattali, John	Periodic Update – Refer to Program Change Log
4.0	12/07/2021	Spencer, Case	Periodic Update – Refer to Program Change Log

XXII. Appendices

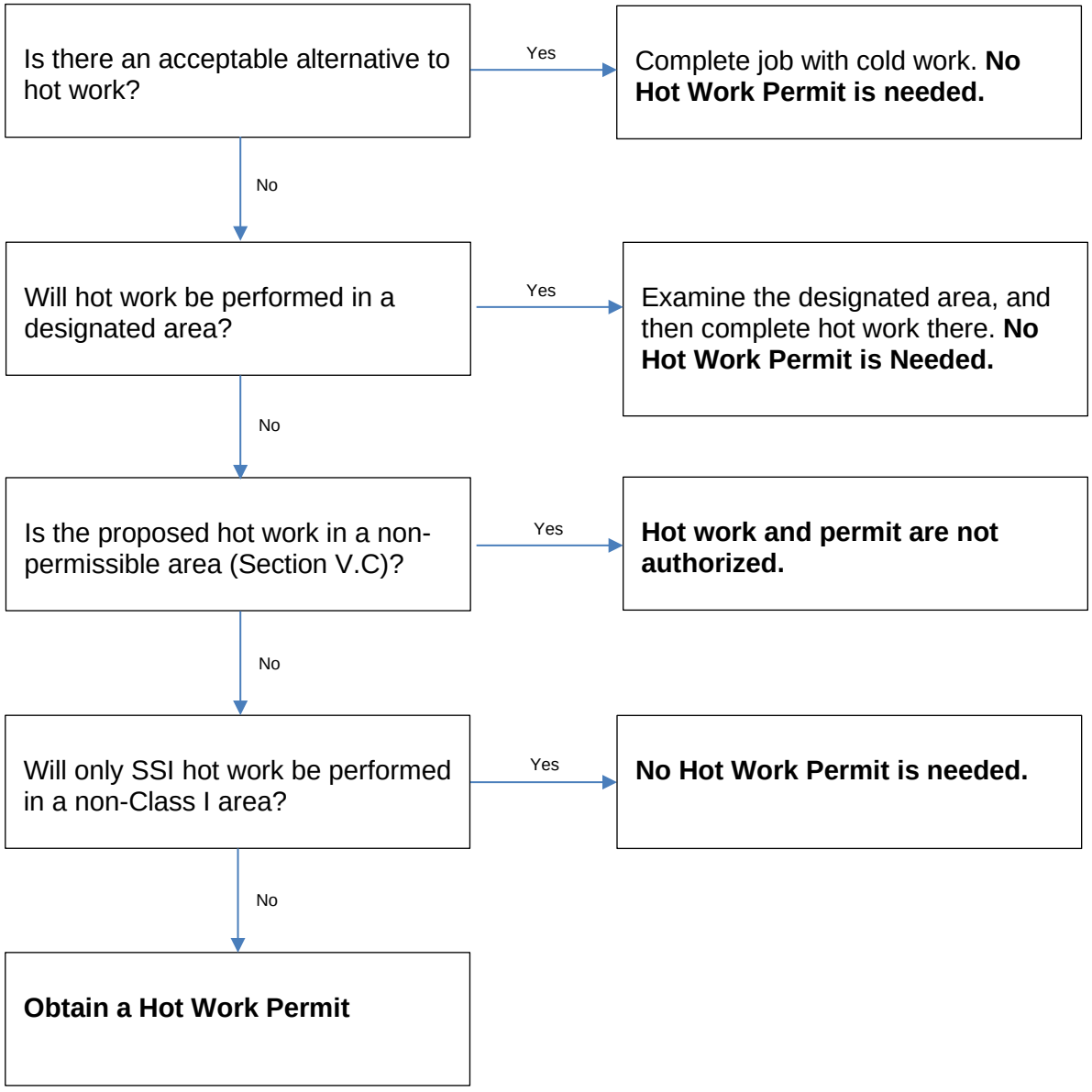
A. Hot Work Permit Applicability

B. Situations Requiring a Fire Watch

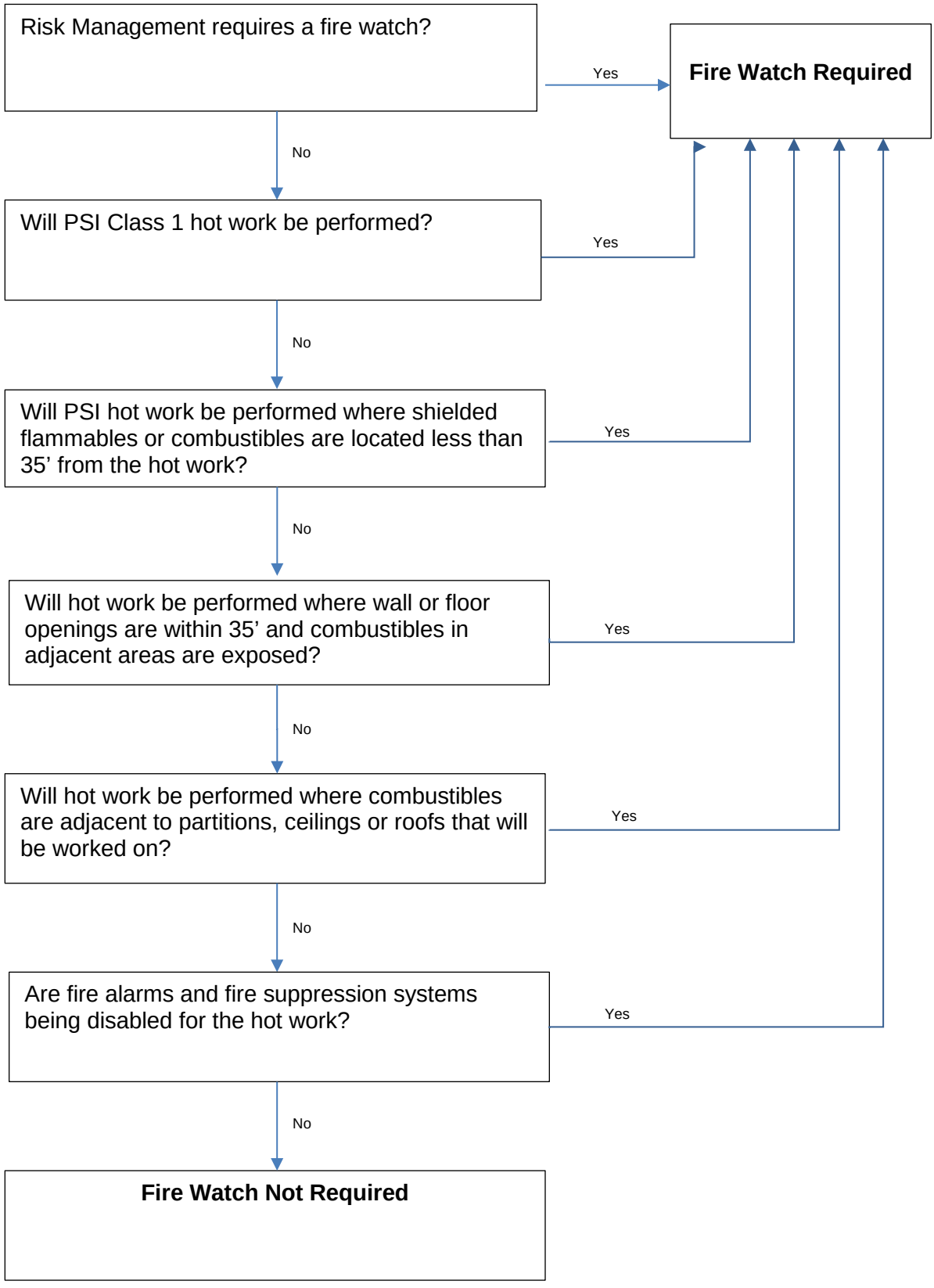
C. Hot Work Air Monitoring Requirements

D. Designated Hot Work Areas

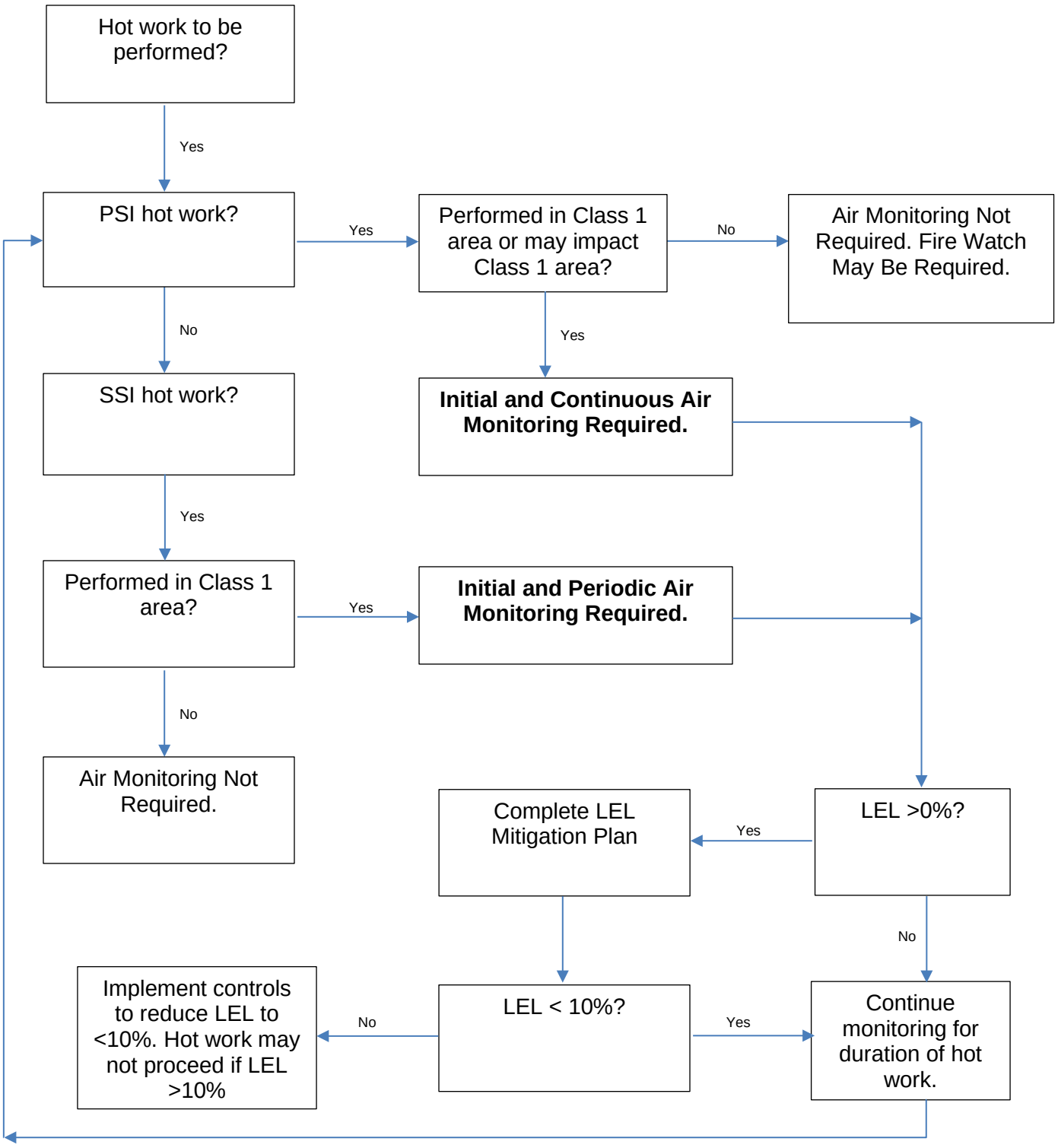
Appendix A – Hot Work Permit Applicability



Appendix B – Situations Requiring Fire Watch



Appendix C – Hot Work Air Monitoring Requirements



Appendix D – Designated Hot Work Areas

Plant 1
Building B (Rebuild Shop)
Central Power Generation Building – Maintenance Bay

Plant 2
Central Power Generation Building – Maintenance Bay