ConocoPhillips Canada	HOT WORK ALL-HSE-PRC-175	**Retention Code:** *CG01 - CA* **Revised:** *March 2015*
Owner: *HSE Performance Assurance*	**Approved By:** *Manager, HSE Performance Assurance*	**Review Frequency:** *Five years or less*

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1.0 Purpose

This procedure ensures hot work is managed in the safest, most practical manner. It applies to work:

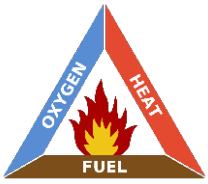
- In which arcs, sparks, heat or other sources of ignition may be produced (e.g. lighting burners, welding, grinding).
- Using electric power tools (including battery-operated tools), portable electric and gas driven equipment, and electric lighting.
- Using electronic equipment that is not intrinsically safe.
- That introduces a combustion engine to a work process (e.g. vehicles or generators).
- Exposing current conducting equipment in a classified area.
- Lighting of flares, burners or furnaces.

This procedure applies to all work at sites operated by ConocoPhillips Canada (CPC).

2.0 Hazards to Mitigate

Hazards include, but are not limited to, the following:

- Explosions.
- Fires.
- Natural gas, hydrocarbons (and associated entrained or produced liquids or gases).
- Pyrophoric materials.
- Sparking.
- Arc flash.
- Toxic gas.



Note: Consider completion of the fire triangle when assessing hazards.

3.0 Procedure-Specific Roles and Responsibilities

3.1. Permit/PJHA Issuer

- Ensure applicable hazard assessment process (PJHA/ Permit to Work) is issued and followed.
- Ensure workers are adequately qualified and have been deemed competent to perform the permitted work.
- Assess the impact that the work will have on adjacent or simultaneous operations.
- Ensure controlled products involved in work will be managed effectively. See MSDS.
- Determine if a fire watch is required.
- Determine atmospheric testing requirements.
- Verify any required sign-offs are obtained on the work permit or applicable hazard assessment.

3.2. Work Supervisor

- Assign a competent person to test or, if necessary, continuously monitor atmospheric conditions.
- Ensure emergency equipment is available and ready for immediate use if required.
- Monitor for changing work site conditions.
- Suspend work permit if changing conditions affect personnel safety.
- After hot work is complete, return the work area to service.
- Notify those in adjacent work areas and/or the control room (if applicable) that the work area or equipment has started or returned to service.
- Manage simultaneous operations in adjacent work areas.

3.3. Fire Watch

- Ensure emergency response and rescue procedures are followed when required.
- Monitor for fires.
- Verify fire extinguishers have been inspected and are adequate for the task.
- Maintain awareness of all workers in the hot work area.
- Ensure sparks and slag are contained.
- Ensure work area is kept wet (as defined on the applicable hazard assessment).
- Ensure entry and exit routes are unobstructed.
- Maintain contact and line of sight with those performing hot work.
- Sound alarm and/or otherwise notify others (e.g. the emergency response team (ERT)) as necessary.
- Extinguish fires if safe to do so.
- Ensure personal protective equipment (PPE) for rescue purposes is readily available.
- Shutdown work activities if conditions become hazardous.
- Evacuate workers as necessary.

- Remain on duty for one hour after hot work has stopped, work is complete, or another competent person takes over fire watch.
- Perform a final inspection of the work area after work is complete.

3.4. Workers

- Understand the potential fire and explosion hazards (including their mitigation).
- Maintain communication with the fire watch.
- Review material safety data sheets (MSDS) for controlled products in the hot work area.
- Only use equipment and tools in good operating condition.
- Understand emergency procedures, roles, and responsibilities.
- Stop hot work if conditions change from those identified on the hazard assessment.
- Identify potential hazards associated with the work and equipment (e.g. leaks, spills, changes in operation, etc.).
- Follow the current quality control manual approved by the provincial authority (e.g. ABSA) if applicable to work conducted.
- Ensure a process is in place to confirm welding machines are shut down at the end of the day.
- Inspect work area and adjacent work areas after work has been completed to ensure it is in safe condition.

4.0 Procedures

4.1. General

- When possible plan hot work activities occurring in hazardous locations during maintenance or when process equipment is not operational.
- Gas testing, permitting and other requirements identified in this procedure are not required for hot work if being conducted in a safe area. Specifically:
  - The area is not in a potentially hazardous location or source of hydrocarbons.
- Safe areas must be designated as safe by the appropriate CPC representative. Also see Section 4.7.

Note: In BC**,** recently conducted hot work must be marked HOT or guarded off if workers not directly involved in the process may make contact with the hot material.

Note: In BC**,** screens, partitions or curtains must also have a non-reflective surface finish when arc welding.

4.2. Permit/PJHA

A work permit/PJHA or applicable hazard assessment must be completed before performing hot work in hazardous environments. It must identify the:

- Potential or actual presence of hydrocarbons, oxygen/air and energy-ignition sources in or near the work area or equipment.
- Potential for the release of flammable or noxious gas as a result of hot work.

- Atmospheric testing requirements.
- Fire watch requirement (based on the hazard assessment Impact of the hot work and controls on adjacent work areas.
- Procedural requirements for the work being performed.
- Work permit requirements for job scope changes.
- Personal protective equipment requirements.

See PJHA procedure to determine the appropriate duration of the PJHA/ work permit being issued.

For the following hot work activities the PJHA/work permit or applicable hazard assessment may be issued for up to 30 days (provided hazard review cards are completed):

- For use of electronic equipment not classified for use in a hazardous location.
- For use of an internal combustion engines in hazardous areas.
- When Introducing a vehicle within 3 m (10 ft.) of a hydrocarbon source, a flammable substance or within a hazardous location when fuel is lighter than air (e.g. methane) or
- Within 7.5 m (25 ft.) when the fuel source is heavier than air (e.g. propane).

Note: A PJHA/work permit or other hazard assessment (as applicable) may be issued for up to one year for competent employees and FTE contractors for whom the above listed activities are routine (weekly).

Note: PJHAs/work permits may not be issued for hot work if metal that has been cleaned with a flammable or combustible liquid has not thoroughly dried. This is legislated in Saskatchewan.

4.3. Fire Watch

A fire watch is required when hot work is being conducted in hazardous locations. A fire watch is not required when the work being conducted is limited to activities as outlined in section 4.2.

Note: Should another hot work activity be performed in combination with the above, a fire watch is required.

A fire watch may shutdown hot work:

- If the PJHA/work permit or applicable hazard assessment has expired.
- If conditions change within the work area or in adjacent work areas which may have an impact on the hot work activity.
- With occurrence of an unsafe act.
- If behavioral changes or disorientation (e.g. appearing confused or stumbling) are identified in workers.
- If communication procedures not being followed.
- If workers are not following the safety precautions recorded on the PJHA/work permit.
- If ventilation or atmospheric monitoring equipment malfunctions.
- With activation of an alarm.
- If workers are unable to effectively and safely perform the required duties.

One fire watch may only control/monitor more than one activity at the same time if the total work area has a radius of ≤ 8m (25 ft.) and/or:

- A clear line of site can be maintained.
- Reaction to an event will not be compromised (e.g. by congestion).
- A minimum of one fire extinguisher is available per person conducting the hot work.

4.4. Atmospheric Testing and Monitoring

- A competent person must conduct an initial gas test for:

O_2	**19.5% – 23.0%**
H_2S	**10 ppm – 8hours**
LEL	**< 10%**
CO	**25 ppm – 8 hours**

- Ensure occupational exposure limits (OELs) are followed.
- Every reasonable precaution should be taken to keep levels within the above acceptable ranges (i.e. O_2) or as low as possible (e.g. H_2S). Do not proceed if out of acceptable range.
- Continuous atmospheric monitoring is required for all hot work in confined spaces.
- Results must be recorded on or attached to the permit to work or applicable hazard assessment.
- Testing and monitoring must continue for the duration of the work at the frequency defined on the permit to work. Also see Gas Detection Procedure.

4.5. Ventilation

- If a mechanical ventilation system is required, ensure it:
  - Uses either a positive-pressure (blowing) or push-pull mechanism, to prevent dead air spaces in pockets and corners.
  - Has a failure warning system (if not possible, a procedure for the same must be established) to initiate emergency evacuation.
  - Has an explosion-proof motor on a fan, with non-sparking fan blades (if explosive atmospheres are present).
- Situate the fan outside the confined space or hazardous location.
- An appropriate respirator (based on exposure) must be worn if adequate ventilation is not reasonably achievable during:
  - Short duration hot work activities.
  - Emergency work.
- Also see Industrial Hygiene program.

4.6. Personal Protective Equipment (PPE)

Suitable eye protection must be worn when within 12 m (40 ft.) of an electric welding arc.

Note: In BC, regardless of the atmosphere, in addition to basic PPE, when welding or burning workers must wear:

- Gauntlet gloves (leather or other suitable material) and arm protection when cutting or welding.
- An apron (leather or other suitable material) for heavy work.
- Eye and face protection must be worn to protect workers from exposure to harmful radiation, particles or molten metal, and while chipping and grinding welds.

Also see Personal Protective Equipment specification.

4.7. Work Area Preparation

Prior to starting hot work:

- Take all reasonable precautions to prevent fire.
- When applicable, fully contain or eliminate hazards associated with slag, sparks or debris using hoardings, fire blankets etc.
- When applicable, welding screens and hoardings must be used to ensure workers and safety shutdown devices are protected from arc flash.
- Gas test structural piles and under building floors and skids if work the potential accumulation of hazardous gas exists and may be impacted by the hot work.
- Suitably isolate or move flammables or combustibles at least 7m (23 ft.) from the work area. For example:
  - Move equipment on which hot slag or burning materials may fall.
  - Place tight covers on all open containers that cannot be relocated.
  - Place tight covers on all open vessels, tanks, and piping in the vicinity.
  - Plug bleeder valves on pumps, lines, and vessels that contain combustibles.
  - Cover manholes and other sewer connections.
  - Ensure receptacles for electrode stubs are available.
  - Plug sump vents to prevent the escape of gases.
  - Ensure that all open sumps are pumped out and securely covered to prevent entry of sparks or slag.
- Shut down portable equipment.
- If portable equipment cannot be shut down, ensure it is vented to a safe location.
- If pyrophoric materials (e.g. iron sulfide) may be encountered during hot work activities and cannot be removed, keep the materials wet or until properly disposed of.
- Keep hot work areas damp if the heat will be intensive.
- Should venting occur near the work area, ensure workers are notified and controls are in place as applicable.
- Ensure walkways, ladders and other approaches are unobstructed.

- Ensure emergency response equipment is:
  - In good condition.
  - Operating correctly.
  - Readily available to the fire watch.
- At least one fire extinguisher must be within 9 ft. of hot work activities of:
  - A welding or cutting activity.
  - An open flame portable heating device.

4.8. Equipment Preparation

As applicable, when preparing equipment for hot work:

- Follow equipment specific preparation as per manufacturer's specifications.
- Ensure when applicable, equipment is properly isolated, cleaned, and purged. Also see Lockout/ Tag out, Positive Isolation and Purging procedures.
- Only use intrinsically safe equipment in hazardous locations. See Section 4.2 for exemptions.
- Do not drive vehicles into a hazardous area unless deemed safe in the PJHA/work permit.
- Gas test insulated vessels and linings or pipes with sleeves if hydrocarbons could potentially be trapped in the insulation.
- Disconnect mechanical and electrical sources and interlocking systems if required.
- Ensure all equipment is free of defects, leaks, oil or grease.
- Ensure when applicable equipment is adequately grounded and bonded to prevent ignition by static electricity.
- Ensure appropriate welding and ground leads are used to fasten the electric supply cable securely.
- For welding, ensure flashback arrestors are installed between the torch and the regulator on oxyfuel systems.

4.9. Safety Shutdown Devices

When required, ensure that hot work activities are out of view of fire eyes. When doing so:

- Consider any surfaces that may reflect spark or arc flash and initiate an alarm or shutdown.
- Cover all windows to ensure fire eye alarms are not activated.

If shutting down of fire eyes is unavoidable allow sufficient time for consultation with operations and bypass approvals.

Also see business unit (BU) specific Bypassing Safety Shutdown Devices procedure.

4.10. Portable Combustion Engines

For an internal combustion engine (excluding vehicles) located in hazardous locations, the engine must be:

- Approved by the applicable CPC representative.
- Equipped with a flame arrestor.

- Shielded or blanketed to prevent contact with hot material or slag.
- See Work Site Entry procedure for additional requirements.

Also see Section 4.2 for requirements specific to vehicles in classified areas.

4.11. Return to Service

Once hot work is complete:

- Tools, materials or equipment must be removed from the area.
- Waste must be properly disposed of.
- All workers must be accounted for (e.g. for confined space entry).
- All barricades, partitions, curtains etc. must be removed.
- All welding equipment must be shut down and properly stored.
- Inspect the work area and ensure it is safe to return to service.

5.0 References

- Canadian Electrical Code, Section 20.
- CSA Standard W117.2-06 (R2011), Safety in Welding, Cutting and Allied Processes.
- Alberta, OHS Code, Part 10, Fire and Explosion Hazards.
- British Columbia, OHS Regulation, Part 9, Confined Spaces.
- British Columbia, OHS Regulation, Part 12, Tools, Machinery and Equipment.
- Alberta Fire Code.
- Alberta Building Code.

- Confined Space Entry procedure ALL-HSE-PRC-165.
- Equipment Spacing procedure ALL-HSE-PRC-173.
- Electrical Work procedure ALL-HSE-PRC-167.
- Gas Detection procedure ALL-HSE-PRC-170.
- Ground Disturbance procedure ALL-HSE-PRC-171.
- Hot Tapping procedure WCBU-HSE-PRC-216.
- Industrial Hygiene ALL-HSE-PGM-155.
- Lockout/Tagout procedure ALL-HSE-PRC-179.
- Permit to Work procedure ALL-HSE-PRC-387.
- Positive Isolation procedure ALL-HSE-PRC-181.
- Purging procedure ALL-HSE-PRC-182.
- Ventilation procedure ALL-HSE-PRC-152.

6.0 Document Retention

Retain records in accordance with the ConocoPhillips Document Retention Schedule.

Record	Owner	Classification	Retention
Work Permits or applicable hazard assessment	BUs and Functional Departments as applicable	HE11	2 years

Appendix A – Acronyms

ABSA	Alberta Boilers Safety Association
AER	Alberta Energy Regulator
ERP	Emergency Response Plan
LEL	Lower Explosive Limit
MSDS	Material Safety Data Sheets
OEL	Occupational Exposure Limit
PJHA	Pre-job Hazard Assessment
PPE	Personal Protective Equipment
SCBA	Self-contained Breathing Apparatus

Appendix B – Definitions

Competent Person	A person who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to workers, and who has authorization to take prompt corrective measures to eliminate them.
Contractor	A person or company that signs an agreement to provide services to CPC but is not in an employee relationship.
Electrical Equipment	Equipment that involves the generation, distribution, switching, storage and conversion of electrical energy to other energy forms using wires, motors, generators, batteries, switches, and other passive components.
Electronic Equipment	Any non-intrinsically safe device.
Fire Watch	A person with the dedicated responsibility to introduce precautions to prevent fires during hot work, watch for fires when hot work is being done and mitigate the effects of an outbreak of fire.
Hazardous Location	Place where fire or explosion hazards may exist due to flammable gases or vapors, flammable or combustible liquids, combustible dust or ignitable Fibers or filings, as described in the Canadian Electrical Code or as deemed by the PJHA/ permit issuer.
Hot Tap	A process of penetrating through the pressure-containing barrier of a pipeline, line, piping system, tank, vessel, pump casing, compressor casing or similar facility that has not been totally isolated, depressurized, purged and cleaned.
Hot Work	Work in which a flame is used or arcs, sparks, heat or other sources of ignition may be produced, including cutting, welding, burning, brazing, air gouging, riveting, drilling, grinding, riveting and chipping. Hot work also includes using electronic equipment not classified for use in a hazardous location and introducing a combustion engine to a work process.
Lower Explosive Limit	Lowest concentration (percentage) of a gas or a vapour in air capable of producing a flash of fire in presence of an ignition source (arc, flame or heat).
Material Safety Data Sheet (MSDS)	A document that contains information on the potential health effects of exposure to chemicals, or other potentially dangerous substances, and on safe working procedures when handling chemical products.
Occupational Exposure Limit (OEL)	Upper limit of the acceptable concentration of a hazardous substance in workplace air for a particular material or class of materials.
Self-Contained Breathing Apparatus (SCBA)	Respirator that provides the respirator user with breathing air from a self-contained supply.
Welding or Allied Process	Any specific type of electric or oxy-fuel gas welding or cutting process, including those processes referred to in Appendix A, CSA Standard W117.2-01 – Safety in Welding, Cutting and Allied Processes.

Appendix C – Revision Record

Page#	March 17, 2015	Previous Information	Change Assessment
3	Added additional responsibilities to permit issuer, work supervisor, fire watch to align with other documents and current work procedures.	None.	Med - failure to list them may lead to breakdown in the hazard assessment and control process.
10	Added additional references.	None.	Med - failure to list them may result in non-compliances with legislation.
4/5/8	Added additional information pertaining to specific hot work activities (e.g. welding, lighting burners and flares)	None.	Med - failure to list them may result in non-compliances with legislation.
6	Added details pertaining to PPE to align with legislation.	None.	Med - failure to list them may result in non-compliances with legislation.
4/5	Provided clarity for when hot work requires permits, gas detection, fire watch etc.	None.	Low - work permits issued for hot work in a green field while not necessary does not create additional risk.
8/9	Added requirements for availability of fire extinguishers during hot work.	None.	Med - failure may result in legislative non-compliance or unnecessary spread of fire.