

Marathon Petroleum Company LP			
Hot Work	Document No.: RSW-SAF-062-DT	Approval Date: 04/30/2018	Page 1 of 18
	Revision No.: 25	Next Revision Date: 05/25/2022	
	Document Custodian: Environmental, Safety and Security		

PURPOSE

The purpose of this procedure is to provide minimum requirements to ensure that attended hot work and non-attended hot work is performed safely to prevent injury, loss of life, and loss of property from fire or explosion.

1.0 SCOPE

This procedure applies to all Marathon Petroleum Company (MPC) LP employees, consultant agencies, contractors, subcontractors performing hot work at MRD performing hot work at the Michigan Refining Division (MRD).

All in-service welds and hot taps must follow [RSW-SAF-007-DT In-Service Welding and Hot Tapping](#).

2.0 PROCEDURE

3.1 RESPONSIBILITIES

3.1.1 Owning Department

- 3.1.1.1 Grant permission for personnel to work on equipment in their area.
- 3.1.1.2 Ensure the correct issue and cancellation of Safe Work Permits in the area and/or equipment under their control. Communicate the permit conditions to the servicing group representatives. Ensure the permit recipients fully understand the requirements of the Safe Work Permit.
- 3.1.1.3 Ensure that hot work operations remain consistent with the terms of the Safe Work Permit.
- 3.1.1.4 Prepare equipment for release to the servicing group following all applicable operating and HES procedures, so it is safe for the intended work.
- 3.1.1.5 Identify any hazards associated with the work and the actions or required means to safely mitigate the hazard.
- 3.1.1.6 Conduct joint job site visits with the servicing group representative(s) to verify that all precautions are in place, all necessary PPE is available, the area is inspected for fire and explosion hazards and that site conditions are acceptable to proceed with the work scope.
- 3.1.1.7 Notify servicing group employees of any operating emergency or changes in conditions that could affect the safety of the job.
- 3.1.1.8 When applicable and practical, require that attended hot work be done in an area outside of process units or dike areas.
- 3.1.1.9 Be competent (by virtue of training or experience) in the field on calibration and use of the instrumentation utilized to monitor atmospheric conditions, perform required atmospheric monitoring for permitted work and advise all applicable personnel of monitoring results.
- 3.1.1.10 Communicate to relief, any ongoing hot work in their area.

3.1.2 Hot Work Servicing Groups (i.e. Maintenance/Contractors)

- 3.1.2.1 Be knowledgeable of the and adhere to the provisions of this procedure.
- 3.1.2.2 Contact a permit writer prior to the commencement of any hot work so a Safe Work Permit can be issued. Comply with all permit requirements (e.g., appropriate PPE, precautions, and special requirements).

- 3.1.2.3 Understand the scope and impact of the identified work and ensure the owning department has a complete understanding of the job's execution requirements and job scope to verify proper equipment preparation.
- 3.1.2.4 Conduct joint job site visits with the owning department for the work to be performed and convey any potential hazards that will be introduced to the job site while performing work.
- 3.1.2.5 Verify atmospheric monitoring has been completed.
- 3.1.2.6 Ensure that all equipment (e.g., cords, leads, hoses, cylinders, regulators, weld machines, electric tools, etc.) is in good working condition and acceptable for the job to be undertaken.
- 3.1.2.7 Provide a dedicated, properly trained fire watch when required and discontinue the job if conditions are unsafe or if notified by the fire watch of an unsafe condition or problem.
- 3.1.2.8 **STOP** Hot Work activities if conditions of the Safe Work Permit can no longer be met.
- 3.1.2.9 Ensure gasoline or diesel powered equipment is shutdown in the event of an emergency/evacuation
- 3.1.2.10 Notify the owning department of any work scope changes.
- 3.1.2.11 Clean up the job site upon the completion of work.
- 3.1.2.12 Inform the owning department when the job is complete. Participate in a post joint job site visit, if required.
- 3.1.2.13 Welders must be able to provide personal welder qualifications to MPC upon request.
- 3.1.3 MPC Supervision/Contractor Coordinators/Contractor Management
 - 3.1.3.1 Ensure that all work carried out by personnel under his/her control is covered by a valid Safe Work Permit and that personnel comply with all precautions specified on the permit and all MRD HES rules and procedures. This must be done while understanding all limitations and restrictions of the permit.
 - 3.1.3.2 Ensure that all precautionary measures specified on the Safe Work Permit, employee PPE, acceptable equipment, etc., is in place prior to work commencing.
 - 3.1.3.3 Those planning hot work shall ensure that the provisions of this procedure and all other applicable HES rules and procedures are included in the scope.
 - 3.1.3.4 Ensure that employees performing work are properly informed of MRD's Safe Work Permit procedure and of the provisions set forth in this procedure.
 - 3.1.3.5 Ensure that the fire watch personnel are available at the site when required and has the proper fire suppression equipment, is knowledgeable in its use, understands their duties and was properly trained.
 - 3.1.3.6 Verify with the Inspection Department the qualifications of welders to ensure that they are properly qualified.
- 3.1.4 Fire Watch
 - 3.1.4.1 The fire watch must be trained to understand the inherent hazards of the work site and hot work, and the hot work permit.
 - 3.1.4.2 Ensure the conditions of the Safe Work Permit are met before hot work and maintained during hot work.

- 3.1.4.3 The fire watch shall print their legal name on the space provided on the reverse side of the Safe Work Permit.
- 3.1.4.4 Have the authority to stop work and do so if unsafe conditions develop.
- 3.1.4.5 Have fire extinguishing equipment readily available and be trained in use of that equipment including extinguishing small fires.
- 3.1.4.6 Preplan escape routes of welders and other affected personnel and ensure that fire extinguishing equipment will cover their escape.
- 3.1.4.7 Ensure sewers within 35 feet of the Attended Hot Work area are covered and spark containment is adequate.
- 3.1.4.8 Be knowledgeable in all assigned responsibilities of the Fire Watch and all conditions noted on the Safe Work Permit.
- 3.1.4.9 Know how to sound an alarm (air horn) and/or contact emergency personnel in the event of a fire or changing conditions.
- 3.1.4.10 Positioned such that they can have clear line of sight and readily respond to any potential fire hazard resulting from the hot work. Fire watch must not be assigned any work that shall interfere with fire watch responsibilities. In some cases a Fire watch may be assigned a dual role as Confined Space attendant
- 3.1.4.11 For hot work jobs at elevated heights where the fire watch is positioned at ground level, the work crew must also have an additional 20lb fire extinguisher with them at the elevated job site. This is in addition to the 20 lb extinguisher that the fire watch is required to have near their person.
- 3.1.4.12 Fire watch personnel must be trained and knowledgeable in the use of fire extinguishers, extinguishing small fires, the provisions set forth in this procedure and of the hazards involved in the work scope.
- 3.1.4.13 Remain in the most suspect areas for a fire to occur while the hot work is being performed, and remain in the hot work area at all times while it is in progress.
- 3.1.4.14 Stop all activities when the emergency siren is activated, when a deviation from the provisions set forth on the Safe Work Permit is observed or when changing conditions are observed that would adversely affect employees and/or equipment.
- 3.1.4.15 Wear an orange or red vest for identification purposes.
- 3.1.4.16 A fire watch shall be maintained for at least a half-hour after completion of welding or cutting operations if combustible materials are present and have the possibility to flare up, this includes meals and breaks.
- 3.1.4.17 Fire watches must initial next to the check box on the back of the Safe Work Permit to acknowledge understanding that they shall remain on-site or be replaced by another fire watch for 30 minutes after the last spark was thrown, at any breaks, lunch, and at job's end.

3.1.4.18 Fire Watch Requirements for Electrical Resistance Heat Treatment

3.1.4.18.1 Heat Treatment activities include preheat for welding, bake-out, post weld heat treatment, and line thaws

3.1.4.18.2 A fire watch will be required during the following activities:

- Attaching thermocouples

- Electrical current ramp up to increase temperature
- During “Soak Period”
- During cool down until cycle completion or electrical current is discontinued

3.1.4.18.3 May utilize a “roving” fire watch if the person can maintain line of sight while traveling the job. Must have means of communication to the control center if power needs to be shut off.

3.1.4.18.4 Must strategically place fire extinguishers based on the scale of the job, not to exceed a distance of 50 feet, and at all levels.

3.1.4.18.5 Must still sign on back of permit and wear red/orange vest

3.1.4.18.6 Must stay 30 minutes after last spark and/or electrical current is shut off

3.1.5 Permit Writer

- 3.1.5.1 Know the hazards that could be encountered during the permitted work, including information on each potential hazard, including exposure mode (skin contact, inhalation, etc.), exposure signs and symptoms, and the consequences of an exposure.
- 3.1.5.2 Inspect the work site before the work begins and ensure the hot work operations remain consistent with the terms of the Safe Work Permit.
- 3.1.5.3 Ensure a Joint Job Site Visit (JJSV) is conducted in accordance with [RSW-SAF-006-DT Safe Work Permit](#).
- 3.1.5.4 Determines the site-specific flammable materials, hazardous processes, and other potential fire hazards that are present or likely to be present at the hot work location. Ensure these hazards are mitigated prior to issuing a Safe Work Permit.
- 3.1.5.5 Determine when testing and/or monitoring is required to demonstrate the safety of the job site. Be competent (by virtue of training and/or experience) in the field on calibration and use of the instrumentation utilized in testing and monitoring.
- 3.1.5.6 Be able to perform required atmospheric monitoring for permitted work, delegate this responsibility to the operator in charge of the area where work will take place or delegate another competent member of the owning department.
- 3.1.5.7 Ensure that the testing/monitoring results are accurately documented on the Safe Work Permit. Determine time intervals in which atmospheric monitoring should occur if circumstances would necessitate that more frequent testing is needed.
- 3.1.5.8 Verify that all needed entries have been made on the permit, that all tests specified have been conducted and within acceptable limits, and that all procedures and equipment specified are in place before signing the permit and allowing hot work to begin.
- 3.1.5.9 Determines and documents any fire extinguishing equipment requirements on the Safe Work Permit.
- 3.1.5.10 Review compliance requirements and approve/terminate hot work. Terminate and cancel the hot work operations if an emergency arises or when conditions change from those under which approval was granted.

- 3.1.5.11 Determine if a fire watch is required and if so, instruct and discuss the individual's responsibilities.
- 3.1.5.12 Contact the Safety Department for special testing and protective equipment requirements if needed.
- 3.1.5.13 Permit writers must complete initial permit writer training and scheduled refresher training.

3.2 GENERAL

- 3.2.1 A properly authorized safe work permit including the hot work section and authorizing signatures is required for all attended and non- attended hot work. See the definition of hot work for more information. See [RSW-SAF-006-DT Safe Work Permit](#) for more information.
- 3.2.2 Personal devices (e.g., hearing aids, watches, and other medical devices) with button batteries are exempt from the Hot Work permit requirements. Other medical devices with larger batteries (e.g., certain insulin pumps) would require a Hot Work permit or the person to be equipped with a personal LEL detector.
- 3.2.3 Attended Hot Work requires a dedicated fire watch.
 - 3.2.3.1 Additional fire watches may be required based on the hazards of the work being performed.
 - 3.2.3.2 A fire watch shall be maintained for at least a half-hour after completion of welding or cutting operations if combustible materials are present and have the possibility to flare up. This is to detect and extinguish possible smoldering fires.
 - 3.2.3.3 Fire watch personnel will wear a red/orange vest for identification.
- 3.2.4 Non Attended hot work does not require a fire watch.
- 3.2.5 Stray sparks from Hot Work activities create a major fire risk in a refinery. Every effort must be made to contain sparks as best as practicable to prevent fires from Hot Work.
- 3.2.6 The following minimum requirements must be implemented for attended hot work:
 - 3.2.6.1 Remove or cover any combustible material within 35 feet of the Hot Work.
 - 3.2.6.2 Seal all sewers and manholes within 35 feet of the Hot Work site to prevent emission of flammable vapors from the sewer and conduct appropriate atmospheric monitoring to verify.
 - c. Sewers must be protected with a catch basin or Flat style drain cover. In areas where this type of arrangement will not work or where it is not practical, wet fire blanketing may be used to cover these areas.
 - 3.2.6.3 Construct spark containments of fire blankets and/or fire resistant tarps to prevent sparks and slag from impacting live process equipment or other areas where flammable vapors or liquids could accumulate.
 - 3.2.6.4 Prevent or mitigate emissions of flammable vapors from tank vents, pit vents, oily water sumps, and seal/packing vents on pumps/compressors within 35 feet of Hot Work and conduct the appropriate atmospheric monitoring to verify.
- 3.2.7 Attended hot work shall not be performed if fire hazards cannot be moved and guards cannot be used to protect immovable fire hazards.
- 3.2.8 When performing attended hot work, such as cutting with a torch, welding or grinding, evaluate the impacted area of hot slag/sparks and protect Pressure Vacuum Valve

(PVV), sewer openings, doorways, man ways, cracks in flooring, areas of employee foot traffic, etc (within 35').

- 3.2.9 Adequate firefighting equipment (water hose and/or, fire extinguisher and/or, fire resistant shield/blanket, etc.) must be maintained while the hot work is in progress. In all cases, at least a minimum 20lbs. fire extinguisher will be required. When making this designation, the class of fire extinguisher should be made as well. See Section 3.15 for more information on fire extinguishers.
- 3.2.10 In some cases a water hose must be charged and ready to wet areas that may be negatively impacted, where PVV, sewer covers/fire blanketing need to be kept wet or where there is any possibility of combustible materials igniting by the hot work, falling sparks, slag, etc. However, every effort must be made to remove combustible material in the area of sparks/slag before this type of work is performed.
- 3.2.11 Consideration must be given to the positioning of other spark producing equipment (e.g. light plants/towers, generators, compressors) outside of process and dike areas. The positioning of such equipment must be treated as unattended hot work, included in applicable work scopes and permitted as such.
- 3.2.12 Unattended hot work outside of process / outlying areas shall have a fire extinguisher readily available.
- 3.2.13 The immediate area will be in satisfactory condition prior to the start of any hot work. Walkways, stairways, ladders, tank man ways, and other approaches to the work area must be accessible and free from obstacles which may obstruct the access/egress of personnel in the event of an emergency.
- 3.2.14 Consideration must be given for barricading the area directly below the spark producing work and area where there is a potency of sparks/slag falling. Barricading must comply with [RSW-SAF-043-DT Barricade Procedure](#).
- 3.2.15 Ensure that heat conduction and/or heat radiation cannot occur through walls, roofs, pipes, etc. and ignite nearby flammable or combustible materials. Consideration shall be taken to break/disconnect adjacent lines and/or materials (e.g. steel members, pipes, etc.) where heat from the hot work could be transmitted.
- 3.2.16 Ensure that all flammable materials are in appropriate storage area (e.g. cabinet, cage).
- 3.2.17 Ensure that fixed fire suppression systems have not been impaired. If one or more of these systems must be taken out of service to accomplish the hot work, additional portable or fixed fire protection equipment shall be available at the site.

3.3 Special Precautions While Hot Work is in Progress

- 3.3.1 When performing Hot Work activities the Servicing Group and Permit Writer shall take the following into consideration:
 - 3.3.1.1 Wind direction,
 - 3.3.1.2 Potential upstream hazards when performing Hot Work adjacent to drainage basins, separators, and open ditches,
 - 3.3.1.3 Other work activities in the adjacent area, and
 - 3.3.1.4 Sewers, oily water sumps, equipment, combustibles, personnel, etc. Below, when performing hot work from an elevated location.
- 3.3.2 No additional work permits, sample catching, truck unloading of combustible or flammable liquids, breaking into pipelines or equipment that contain combustible material, etc., shall be permitted within a 35 foot radius of hot work in progress in an operating unit. Consideration must be given to wind direction, etc.

3.4 Atmospheric Monitoring for Hot Work

- 3.4.1 Atmospheric testing must be performed in the immediate area following the guidelines set forth in [RSW-SAF-006-DT Safe Work Permit](#), and recorded in the appropriated section of the Safe Work Permit. At times, depending on the hazard and conditions, continuous monitoring may be required. This is to be determined by the Owning Department in conjunction with the appropriate Maintenance Foreman/Coordinator.
- 3.4.2 Prior to the use of any atmospheric testing equipment, users must assure themselves that the instrument is properly calibrated and in good working condition. For more information see MRD's [RSW-SAF-034-DT, Portable Gas Detector Care](#)
- 3.4.3 Gas tests will be made after all blinding, disconnecting, purging, steaming and other preparatory work has been completed and in as short a time as practical prior to the start of work. In every instance a test must be taken within two hours prior to the start of work. When work is not started within two hours of the time the gas tests were taken, another test must be made with results shown and initialed by the person making the second test.
- 3.4.4 Though PVV, sewers, drains and like areas are to be identified and covered with adequate fire resistant drain covers /shielding, these points are to be included as part of the thorough atmospheric test of the hot work area.
- 3.4.5 Acceptable conditions are as follows:
 - Oxygen concentration between 19.5% and 23.5%
 - LEL concentration of 0 – 10% (Confined Space is 0%). When the LEL is greater than 0% for non-confined space work, work may only continue when a plan is developed with Operations/Product Control Supervision, Maintenance Supervision, and the Safety Dept. The plan must address the justification to complete the hot work at increased LEL, additional control procedures required to complete the hot work safely, and conditions when the hot work must be stopped.
 - See [RSW-SAF-025-DT Contaminant Thresholds and Conditions](#) for more information on acceptable air conditions.
 - Four hour gas checks and additional atmospheric monitoring must be conducted in accordance with SWP Procedure, after a change in conditions or upon request of the servicing group.

3.5 General Process Equipment Preparation: Refer to [RRD-1323-000](#) for other equipment preparation recommendations.

- 3.5.1 If possible, equipment and piping that will be involved in any hot work must be:
 - Isolated and/or disconnected
 - Cleaned, gas free, and tested, and
 - Vented to prevent overpressure.
- 3.5.2 Combustible dust shall be cleaned from the immediate vicinity of the hot work operations. This includes equipment, machines, overhead structures and floors.
- 3.5.3 All out-of-service equipment (e.g. pipe, towers, etc.) shall be isolated for hot work by blinding, disconnecting or other acceptable means, and must be made gas-free by steaming, washing or other accepted procedure before approval for hot work is given.
- 3.5.4 If the equipment and piping cannot be cleaned and gas freed, cold cutting methods must be used for initial cuts so adequate atmospheric monitoring can be conducted to ensure the equipment/piping is gas free.
- 3.5.5 Welding on steam lines while under pressure shall require all precautionary measures taken for similar work on oil and gas lines (e.g. in-service welds)

- 3.5.6 Demister pads in vessels shall be removed prior to hot work if they pose a hazard due to the work activity being performed.
- 3.5.7 Structured packing shall be removed prior to Hot Work if it poses a hazard from Hot Work activity (or precautions must be put in place to mitigate sparks or slag from contacting the packing).

3.6 Hot Work on Used Containers and Out of Service Equipment

- 3.6.1 Hot Work shall not be performed on used drums, barrels, tanks, or other containers until they have been thoroughly cleaned to make sure there is no flammable materials present or any substances such as greases, tars, acids, or other materials that when subjected to heat might produce flammable or toxic vapors. Any pipelines or connections to the drum or vessel shall be disconnected or blinded.

3.7 Hot Work in Confined Spaces – Refer to [RSW-SAF-010-DT Confined Space Entry](#)

3.8 Welding and Cutting Equipment Requirements

- 3.8.1 A hot work permit issued for welding is understood to cover approval of the location of the weld machines.
- 3.8.2 All welding and burning equipment (e.g., leads, grounds, hoses, cables, gauges, regulators, etc.) shall be visually inspected daily, prior to hot work occurring to ensure that it is in good working condition.
- 3.8.3 Every effort must be made to locate weld machines outside of process and dike areas. In addition, pollution prevention equipment (e.g. drip pans) shall be used to prevent spills and/or release fluids to the environment. Weld machines must also be positioned such that exhaust will not negatively impact the atmosphere of employee working areas (e.g., CO build up).
- 3.8.4 Welding grounds shall be grounded as close to the work as possible. When welding on pumps, turbines or compressors to eliminate welding machine grounding through bearings or seals the ground lead shall be adjacent to the work
- 3.8.5 Effort must be made to route leads and hoses overhead and/or out of walkways to prevent creating tripping hazards.
- 3.8.6 Adequate natural or mechanical ventilation shall also be considered to reduce or eliminate the hazards of exposure to weld fumes. Any accumulation of gases must be vented to a safe location, away from the hot work.
- 3.8.7 Welding and cutting operations will require additional Personal Protective Equipment (PPE). The Safe Work Permit must identify the additional PPE requirements. Examples of these additional PPE requirements include:
 - Respiratory protection for toxic metal fumes,
 - Correct shade of eye protection for welding and cutting operations (e.g., welding hoods, cutting goggles, etc.) (**Note:** Welding hoods cannot be used for grinding unless they are approved for grinding operations.)
 - Welding gloves
 - Face shield
 - Welding leathers
 - Fall protection equipment.
- 3.8.8 When welding is suspended for a substantial period of time (e.g., lunch, breaks, shift change, etc.) all electrodes are to be removed from their holders and the machine is to be turned off and/or disconnected from its power source. For gas welding/burning in

confined spaces, torches and hoses must be removed from the vessel and/or disconnected at the vessels.

3.9 Designated Hot Work Shops & Fabrication Areas

- 3.9.1 Work in designated maintenance work shops does not require a safe work permit. See [RSW-SAF-006-DT Safe Work Permit](#) for more specific information on these locations. New locations must be approved through the safety department.
- 3.9.2 Designated hot work and fabrication shops is an existing building must:
- Be mechanically and/or naturally ventilated to prevent an accumulation of toxics.
 - Have exits appropriately marked with emergency exit signs.
 - Combustible materials may not be present within 35 feet of the welding & cutting area.
 - Flammable liquids must be stored in an approved flammable liquid storage cabinet.
- 3.9.3 At times during maintenance and construction it is necessary to erect and/or establish temporary fabrication areas. The following guidelines shall be adhered to when considering the establishment of such an area. Temporary fabrication areas must:
- 3.9.3.1 Be permitted according to the work occurring in the fabrication area, i.e. attended hot work.
- 3.9.3.2 Not allow the presence of combustible materials.
- 3.9.3.3 Not allow the storage of flammable liquids
- 3.9.3.4 Have two means of egress available from the fabrication area.
- 3.9.3.5 Must be surrounded by physical barriers
- 3.9.3.6 Each area will be equipped with a sealed, functional, well-maintained fire extinguisher, complete with inspection tags and appropriate labeling. The area may be large enough and the amount of work being done may be enough for the safety department to require more than one fire extinguisher.
- 3.9.3.7 Be mechanically and/or naturally ventilated to prevent an accumulation of toxics.
- a. The most preferred method for this is local exhaust ventilation where:
- work can be located as close to the ventilation hood as possible,
 - hoods perform best when located to the side of the work,
 - suggested flow rates (from the ACGIH Industrial Ventilation Manual) are:
- 335 cfm when the hood is <6" from work**
- 560 cfm when the hood is 6-9" from work**
- 1000 cfm when the hood is 9-12" from work**
- b. Where local exhaust ventilation cannot be used, due to it affecting the shield gas, or for other safety considerations, the next recommended option is general exhaust ventilation. Suggested flow rates are:
- For open areas, where welding fume can rise away from the breathing zone, ventilation flow rate should be:

$$\text{cfm} = 800 \times \text{lb./hour rod used}$$

- For enclosed areas, where welding fume does not readily rise away from the breathing zone, ventilation flow rate should be:

$$\text{cfm} = 1600 \times \text{lb./hour rod used}$$

- c. If neither local exhaust ventilation nor general exhaust ventilation is feasible, the following is required at a minimum:
 - There shall be no buildup of fumes from the hot work being conducted,
 - Housekeeping must be adequate to mitigate any dust build up,
 - While using fire blankets, allow for some natural ventilation to occur as long as this doesn't impede spark containment.
- d. For toxic materials higher airflows may be necessary and operator should use respiratory protection equipment. Refer to specific procedures ([RSW-SAF-036-DT Hexavalent Chromium Standard](#)) and ([RSW-SAF-014-DT Lead Abatement](#)).

3.9.3.8 Continuous air monitoring may be required if the fabrication area has the potential to build up toxics, flammable gases and/or fumes.

3.9.4 Any fabrication area within 35 feet of process equipment requires a fire watch for attended hot work.

3.9.5 MPC supervisory personnel of the owning department of a particular area, along with maintenance supervisors and/or contractor coordinators and safety will authorize the locations of temporary fabrication areas. The contractor foreman or maintenance foremen using the site will be responsible for setting up in accordance with Detroit Refinery guidelines. A final inspection of the arrangement by the persons authorizing the site will take place before beginning the work.

3.9.5.1 These areas shall be enclosed with fire retardant material.

3.9.5.2 Protection from being flashed must be included in the set-up.

3.9.5.3 The area must be far enough away from walk ways, process units, roadways and other commonly used areas to ensure that sparks and/or any byproduct of the temporary work area cannot adversely affect them or the people that may be using them. Sewers within 35 feet of the hot work must be protected with appropriate blankets and shielding.

3.9.6 As always, the cleanliness of the area must be maintained. Housekeeping must be addressed on every shift.

3.10 HOT BOLTING/FLANGE TIGHTENING

3.10.1 Attended Hot Work (e.g., torch cutting, grinder with a cut-off wheel, reciprocating saw) is sometimes required to remove bolts/studs on bolted connections of process equipment. In order to prevent the ignition of flammable or combustible vapors and liquids inside process equipment, the seal on the gasket of the process equipment must be maintained.

3.10.2 To ensure that the seal on the gasket is maintained during hot work removal of studs/nuts, at least four bolts must always be able to be removed via mechanical means (e.g., impact wrench, hand tools) for the final break on process equipment connections.

3.10.3 Four bolt flanges require a new bolt be replaced as each bolt is cut.

3.10.4 See [RMP-M167-MI-DT Hot Bolting & Bolt Replacement for Bolted Joints](#) for more information.

- 3.10.5 On larger pieces of equipment with multiple bolts/studs more than four bolts may be required to maintain the gasket seal. The new bolts must be spaced adequately to maintain the gasket seal during Hot Work removal of the remaining bolts. Contact Engineering when unsure about the required gasket stress. Refer to MPC Process Safety Advisory, [PSA 13-08](#), on an industry event that resulted in fatalities while hot cutting bolts of a heat exchanger.
- 3.10.6 Tightening Smoking Flanges or Connections
 - 3.10.6.1 If flange is smoking but not leaking hydrocarbon in amounts enough to give a combustible reading (LEL), a hot work permit will be issued, to ensure a gas check is conducted. The method of hot bolting or the use brass or non-sparking tools is required.
 - 3.10.6.2 If a flange or connection is leaking enough hydrocarbon liquid or vapor and combustible readings are detected, again, a hot work permit is necessary but with stipulations on method used such as:
 - 3.10.6.2.1 Lower the LEL in the immediate work area to acceptable limits.
 - 3.10.6.2.2 Use steam, inert gas, ventilation, etc., whatever acceptable means is necessary while following the guidelines set forth in MRD's Safety Rules and Procedures.
 - 3.10.6.2.3 Fire watch with continuous monitoring, steam hose, fire extinguisher, etc., on hand.
 - 3.10.6.2.4 Area barricaded and secured against non-essential traffic.
 - 3.10.6.2.5 Sewers covered in case of possible ignition.
 - 3.10.6.3 If a flange or connection is leaking but not enough to create an explosive or ignitable atmosphere, but is in a unit or process area where gas has escaped from some other source, then a hot work permit is necessary and again, all conditions listed under 3.11.5.2 must be followed.
 - 3.10.6.4 If a hazardous but non-combustible leak develops, such as steam, acid, caustic, amine, chemical injection, etc., other special precautions are required, such as but not limited to acid suits, gloves, face shields, goggles, rubber boots and possibly breathing air.
 - 3.10.6.5 Some leaks may be too excessive and may not be able to be handled under these hot bolting guidelines. Some cases may require unit shut down or isolation of leaking equipment or flange.
- 3.10.7 Loosening
 - 3.10.7.1 If a unit is shut down, it may be necessary to hot bolt flanges for blinding and man ways on towers for opening. In cases where units are totally hydrocarbon free and, depressurized a cold work permit may be issued for the above-described work. In this case, hammers and wrenches may be used. If impact wrenches are necessary, a hot work permit must be issued. Owning department supervision will notify Maintenance personnel as to when hot bolting may be performed. Maintenance and Owning department supervision shall determine how many bolts may be removed safely.
 - 3.10.7.2 If the unit is shut down, but not totally hydrocarbon free, a hot work permit will be necessary for any hot bolting or loosening of flanges. The hot work permit must stipulate what tools (Brass or non-sparking etc...) are allowed to use and any other special safety precautions that must be followed.
 - 3.10.7.3 If no hydrocarbon is detected at the work site but the vessel or flange contains hydrocarbon, a hot work permit will be necessary due to area

conditions. Impact wrenches and/or hammer wrenches can be utilized for four bolting. When removing the last four bolts, or the number of bolts specified by Maintenance and Owning department supervision, other methods of unbolting that do not create sparks will be necessary.

- 3.10.7.4 If it is unknown whether the vessel or piping is gas free, the conditions specified in 3.11.6.3 must be followed, and perhaps others upon discussion with appropriate owning department supervision and maintenance representatives.

3.11 TIE-INS - Refer to [RDP-E011-08-DT Piping Tie-In Coordination Procedure](#)

3.12 Special Hot Work Requirements for Aboveground Storage Tanks (ASTs)

- 3.12.1 Because of the unique hazards of conducting Hot Work on ASTs the following additional requirements must be taken into consideration on top of the normal Hot Work items identified on the Safe Work Permit. See [RSP-1715-000](#) Section 3.12 for specific requirements of a safety plan for AST.

- 3.12.2 When work on empty tanks with floating roofs is required, special precautions shall be made to ensure that all pontoon compartments as well as the tank seals are completely gas free before a hot work permit is issued. Personnel should be instructed to stay clear of roof vent hatches.

3.13 If a BBQ Grill is desired to be used within the Detroit Refinery it must meet the following criteria.

- 3.13.1 All manufacture guidelines must be followed and available with the grill.
- 3.13.2 At minimum, a 20lb. ABC extinguisher must be located within 10' of grill.
- 3.13.3 A dedicated grill attendant is required at all times when the grill is lit. When not in use, all fuel sources must be turned off completely.
- 3.13.4 All flammable material must be located at least 35 feet from ignition source except for the grills fuel source.
- 3.13.5 Sewers within 35 feet must be protected with a catch basin or Flat style drain cover, appropriate blankets or shielding.
- 3.13.6 If the Grill is located adjacent from a control room, a gas test must be conducted prior to ignition.
- 3.13.7 Grilling is not permitted in the units or any process and dike areas.
- 3.13.8 Consumption of food or beverages is not permitted in any area where there is exposure to dusts or toxic materials. The location must be clean and sanitary before grilling begins.
- 3.13.9 Charcoal Grills are not permitted within the Marathon Refinery
- 3.13.10 A Safe Work Permit is not required with the use of a BBQ Grill.

3.14 FIRE EXTINGUISHERS

- 3.14.1 Fire extinguishers are available for emergency use throughout the refinery. An assortment of sizes and types are provided, based on the expected hazard and location.
- 3.14.2 New fire extinguishers are to be ordered through the Warehouse, utilizing the owning department's budget. Before the new fire extinguisher is put into service, the Owning department will contact the Safety Department, and the Safety Mechanics will issue a yellow "Detroit Refinery" numbered sticker to uniquely identify the extinguisher for future inspection and tracking. The Safety Department Administrative Assistant will submit updates to Drafting Department to reflect new locations of extinguishers on Safety Equipment Plot Plan.

- 3.14.3 If the Owning Department utilizes RADAR for inspections, it shall be their responsibility to update the RADAR system with the new extinguisher location and identification number (if applicable). If the Owning Department utilizes hard copy inspection forms, it shall be their responsibility to notify the Safety Department Administrative Assistant to update inspection forms with the new extinguisher location and identification numbers (if applicable).
- 3.14.4 The owning department of the fire extinguisher(s) is required to complete monthly inspections. The Safety Department will coordinate the required annual inspections and 5 year hydro testing of extinguishers.
- 3.14.5 Maintenance and refilling of fire extinguishers shall be coordinated by the Fire Chief and Safety Mechanics.
- 3.14.6 The extinguisher shall have a clearly labeled class designation on it. Many extinguishers cover multiple classes. For example, some cover classes A and B, some cover class B and C, some cover A, B and C.
 - Class A fires include fires that involve wood, paper, cloth, etc....
 - Class B fires include fires that involve combustible liquids such as gasoline.
 - Class C fires involve energized electrical equipment. If electrical energy has been removed from equipment, it can be treated as class A.
 - Class D fires are fires that involve combustible metals (ex. Titanium).
 - Class K extinguishers are intended for deep fryers. They are also safe to use on class C fires. Use of a class K extinguisher is unlikely.

3.15 COMPRESSED GAS CYLINDERS

- 3.15.1 Oxygen cylinders in storage must be separated from flammable gas cylinders and/or ordinary combustible materials (especially oil and grease) by a minimum of twenty (20) feet or by a non-combustible barrier at least five (5) feet high having a fire resistance rating of 1/2 hour.
- 3.15.2 All cylinders shall be stored in an upright position and be secured to prevent falling.
- 3.15.3 All cylinders in storage shall have a properly fitting valve cap securely installed. Do not store any cylinder next to a heat source.
- 3.15.4 All cylinders shall be stored in well ventilated areas, preferably outdoors.
- 3.15.5 Acetylene cylinders stored inside buildings, rooms, compartments, etc., shall cause that area to be treated as a Class 1, Division II area.
- 3.15.6 While in transit the regulators shall be removed from the cylinders and the safety caps fully screwed onto the bottles. **Exception:** Oxygen and Acetylene cylinders may be transported with regulators and without safety caps in place when they are rigidly secured into place on a welding rig, trailer or cart designed for the purpose.
- 3.15.7 Acetylene cylinders should never be stored or transported horizontally whether full or empty due to the liquid acetone contained in the porous internal packing.
- 3.15.8 Cylinders should never be dropped or allowed to come in contact with sharp objects.
- 3.15.9 All cylinders must be labeled as to their contents. Always check the label on the cylinder to make certain you have the proper gas. If label is unreadable, do not use the cylinder.
- 3.15.10 All cylinders must be in compliance with hydrostatic test dates (tested within 5 years, except acetylene cylinders, which are visually inspected).
- 3.15.11 When in use, all cylinders shall have the proper pressure regulating devices installed.

- 3.15.12 Cylinders shall not be store under where welding / cutting is being performed.
- 3.15.13 When cylinders are left unattended with hose and torch still connected, cylinder valves must be closed and excess gas bled down from supply line and regulator to prevent accidental release of gases. Never store a connected torch in a confined space.
- 3.15.14 When in use, oxygen and acetylene cylinders shall be securely fastened in a cart or rack to prevent them from falling. They do not have to meet requirements in 3.6.1 or 3.6.3 when in use. Cylinders shall not be secured with rope. Acceptable means of securing cylinders are nine wire and chains.
- 3.15.15 Do not open the valve on compressed gas cylinders all the way. Open the valve a minimum of ¼ turn to a maximum of 1 ½ turns. Cylinder valves should also never be opened until the regulator pressure adjusting screw is fully released and drained of gas. Do not stand in front of the regulator when adjusting the screw. Stand to the side.
- 3.15.16 All cylinders shall be transported in an approved cart, or with approved lifting device. Racks shall be inspected prior to each use to ensure that all devices (e.g., chains, straps, bars, latches, etc.) securing the cylinders in the rack are in good condition. Slings, chains, or other similar choker devices that wrap around the body of cylinder are prohibited from use when moving/transporting cylinders.
- 3.15.17 All regulators on acetylene and oxygen cylinders shall be equipped with a back flash (check) valve on the supply hose outlet connection. Always use a regulator. Inspect the regulator before use. Faulty seats can result in a leaking connection.
- 3.15.18 Fittings for oxygen/acetylene service shall be of the grease/oil free type and shall be properly selected for the cylinder on which they are to be placed.

3.16 USE OF TEMPORARY PORTABLE PUMPS

- 3.16.1 The use of portable pumps to pump hydrocarbons must be managed to control potential ignition sources, releases, and fire
- 3.16.2 The [Proceduralized Management of Change \(PMOC\)](#) located on the PSM webpage must be completed prior to the start-up of any non-intrinsically safe portable pump used to pump hydrocarbons inside tank dikes or unit battery limits
- 3.16.3 The PMOC must contain the following information, at a minimum:
 - a) PMOC duration
 - b) Product and pump specifications
 - c) Hazard Review
 - d) Approvals
 - e) Implementation actions
 - f) Pre-startup safety review (PSSR)
- 3.16.4 Temporary non-intrinsically safe pumps used to pump hydrocarbons that are located inside tank dikes or unit battery limits must be manned at all times while in operation and equipped with a remote shutdown device (e.g., lanyard, electronic shutoff, disconnect switch, fuel shutoff valve, etc.).

3.17 TRAINING

- 3.17.1 Training must be provided initially and periodically for all employees, whose assignment may involve hot work. The training must instruct employees in the procedures to be followed to minimize potential hazards.

- 3.17.2 Supervisors are responsible for ensuring that all employees have had the proper training prior to any assignment as a permit issuer, supervisor, fire watch or any other specific training relevant to that specific aspect of hot work.

3.0 DEFINITIONS

Blinding - The absolute closure of a pipe, line or duct by installing a slip blind (spade), plug or cap which completely covers the opening; which extends at least to the outer edge of a flange's mating surfaces; and which is capable of withstanding the maximum upstream system pressure. A blank, slip blind, blind flange, cap, and/or physical disconnect are all considered to be blinds.

Hot Bolting - Hot bolting is the tightening or loosening of bolts on a flanged connection while the piping or equipment is in service or under pressure.

Hot Work - is repair, maintenance or construction activity, which requires the use of spark-producing equipment or open flame. All work requires a gas test and the presence of a fire extinguisher. However, some forms of hot work require a dedicated fire watch (attended) while other forms do not (not attended). Examples of those that require a fire watch (attended) include:

- Acetylene burning, welding and brazing
- Electric arc welding
- Annealing / Stress relieving ~ electric or gas
- Use of open flames
- Use of non process propane or gas fired heaters or boilers
- Chipping, ripping, breaking, or sawing concrete or refractory
- Cutting and grinding using a Metabo or similar tool
- CAD Welding
- Electric soldering

Hot work examples that do not require a fire watch (non attended) includes:

- Vehicle entry (See Safe Work Permit Procedure for permitting of vehicle entry)
- Use of non-explosion-proof electric equipment/ Non-Intrinsically Safe Electric and Battery powered tools, including cameras, lights, or extension cords.
- Use of air-powered impact wrenches
- Use of Powder Actuated tools
- Use of gasoline- or diesel-powered engines (compressors, pumps, generators, power washers, etc.)
- Opening of in-service explosion-proof enclosures
- Abrasive blasting using sand and other media
- Grass cutting inside dike areas

NOTE: Hot tapping and welding on lines or equipment under pressure or not gas-free requires special permit following the requirements of the [In-Service Welding and Hot Tapping Procedure](#).

Soak Period – The desired hold time and temperature during a heat treatment cycle for the heat to “soak” through the component

5.0 REFERENCES

[RSW-SAF-006-DT Safe Work Permit.](#)
[RSW-SAF-010-DT Confined Space](#)
[RSW-SAF-002-DT, Energy Isolation](#)
[RSW-SAF-034-DT, Portable Gas Detector Care](#)
[RSW-SAF-007-DT In-Service Welding and Hot Tapping](#)
[RSW-SAF-025-DT Contaminant Thresholds and Conditions](#)
[RSW-SAF-043-DT Barricade Procedure](#)
[RSP-1715-000 Hot Work](#)
[MIOSHA General Industry Standards Part 12 "Welding and Cutting"](#)
[MIOSHA, Construction Safety Standards, Part 7, "Welding and Cutting."](#)

6.0 REVISION HISTORY

Revision number	Description of change	Written by	Checked by	Effective date
21	Added Section 3.17 on the use of temporary portable pumps	J. Taggart	J. Rabideau	5/30/17
22	Hot Work exception to use open flame on bulk head caps and sample taps – asphalt service only	S. Kumpar	Steering Committee MOC 20178461-001	12/28/17
23	Added to section 3.4.5 on elevated LEL, added 3.5.1 to match RSP, removed section "hot work on equipment not verified as gas free", Minor reformatting, correction of number system	J. Rabideau	Honor Sheard	04/30/18
24	Added Section 3.1.4.18 Fire Watch Requirements for Electrical Resistance Heat Treatment. Added "Soak Period" to Definitions section.	J. Taggart	Safety Steering Committee on 3/19/20. Recommendation# 171983	3/26/20
25	Corrected formatting with the new post weld heat treat fire watch sections	J. Taggart	A. Morales	05/04/20

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Appendix A – Hot Work Audit

[Hot Work Audit Form](#)

This form may be used to audit hot work jobs.