Hot Work

Purpose

The purpose of this Safety Standing Instruction (HSS) is to provide minimum requirements to ensure that Attended Hot Work and Non-Attended Hot Work is performed safely within the refinery to prevent injury, loss of life, and loss of property from fire or explosion.

Scope

This HSS for Hot Work Authorization represents a composite of petroleum industry safe practices and the OSHA requirements for this type of task.

Because Hot Work can encompass so many different situations and applications this HSS does not attempt to address every possible situation. If a special need or problem is encountered during Hot Work activities, consultation between Maintenance and the Safety Department should be conducted before proceeding. Any alternative procedures must be at least as effective as the requirements in this HSS.

Out of Scope

Hot-taps and in-service welding require specialized procedures and additional review and authorization. Please refer to:

- HSS-640 Welding on Equipment in Service
- MTN-PIPE-024
- T-101B-Hot Tap Drilling Machine prior to performing these activities.

Records Retention

Printed copies of this document should not be retained more than 12 months. Any revision to this document will be retained a maximum of 10 years following the revision.

Table of Contents

1.0 References

1.1 Refining References

The table below lists the Refining references used with this document.

Number	Description
HSS-201	Safe Work Permit
HSS-215	Confined Space
HSS-306	Respiratory Protection Program
HSS-412	Compressed Gas Cylinder Safety
HSS-640	Welding on Equipment in Service
PSA 13-08	E/M Refinery Exchanger Fire
PSA 16-02	Galveston Bay Refinery Fire at Temporary Pump Installation
RRD-1323-000	Safe Equipment Preparation Guidelines
RSP-1715-000	Hot Work
RSP-1715-000-FORM01	Elevated LEL Hot Work Approval Form
RSP-1715-000-FORM02	PMOC Form for Temporary Portable Pumps

1.2 Industry References

The table below lists the industry references used with this document.

Number	Description
API RP 2009	Safe Welding, Cutting, and Hot Work Practices in the Petroleum and Petrochemical Industries
API RP 2201	Safe Hot Tapping Practices in the Petroleum & Petrochemical Industries
API RP 2207	Preparing Tank Bottoms for Hot Work
ANSI Z49.1.	Safety in Welding, Cutting, and Allied Processes, 2012.
ANSI/FM 4950	Evaluating Welding Pads, Welding Blankets and Welding Curtains for Hot Work Operations 2007.
NFPA 51B	Standards for Fire Prevention during Welding, Cutting, and Other Hot Work; 2014 Edition

1.3 Regulatory References

The table below lists the regulatory references used with this document.

Number	Description
29 CFR 1919.119	Process Safety Management of highly hazardous chemicals
29 CFR 1910.252	General Requirements for Welding, Cutting, and Brazing
29 CFR 1926 Subpart J	Welding and Cutting
Title 8 CCR §1537	Welding, Cutting, and Heating of Coated Metals

Title 8 CCR §4851	Arc Welding and Cutting
Title 8, CCR, §6777	Hot Work Procedures and Permits

1.4 Terms

The following terms are used in this document:

- Attended Hot Work
- Battery Powered Equipment
- Class A Combustible Material
- Cold Work
- Designated Hot Work Area
- Hazardous Atmosphere
- Hot Tapping (Pressure Tapping)
- Hot Work
- Hot Work Permit
- Internal Combustion Engine
- In-Service Welding
- Joint Job Site Visit
- Non-Attended Hot Work
- Other Ignition Sources
- Owning Department
- Oxygen Deficient Atmosphere
- Personal Protective Equipment
- Process (Covered)
- Process Safety Management
- Safe Work Permit
- Servicing Representative

Reference: For details, see Appendix A: Terms and Definitions.

2.0 Roles and Responsibilities

2.1 Roles and Responsibilities

The table below describes the roles and responsibilities related to this document.

Roles	Responsibilities
Fire Watch	The following are minimum requirements for the fire watch, when required: **(a)** The fire watch must be trained to understand the inherent hazards of the work site and hot work, and the hot work permit. **(b)** Ensure the conditions of the Safe Work Permit are met before hot work and maintained during hot work. **(c)** The fire watch shall print their legal name (i.e. the name listed on your badge) on the space provided on the reverse side of the Safe Work Permit. **(d)** Have the authority to stop work and do so if unsafe conditions develop. Stop all activities when an emergency siren is activated, when a deviation from provisions set forth in the Safe Work Permit is observed, or when changing conditions are observed that would adversely affect employees and/or equipment. **(e)** Have fire extinguishing equipment readily available and be trained in use of that equipment including extinguishing small fires. **(f)** Discuss assembly/evacuation areas and escape routes for work crew (e.g. welders, pipefitter, etc.) and other affected personnel and ensure that fire extinguishing equipment (e.g. fire extinguisher and charged fire hose) will cover their escape. **(g)** Know how to sound an alarm (air horn) and/or contact emergency personnel in the event of a fire or changing conditions. **(h)** Ensure sewers within 35 feet of the Attended Hot Work area are covered and spark containment is adequate. **(i)** Remain at the site of Hot Work for at least 30 minutes after Hot Work is complete when there is a potential for smoldering fires (e.g., Class A combustible materials within 35 feet of the Hot Work area.) All Fire Watches shall wear an FR-rated high-visibility orange or red vest while performing Fire Watch duties.

Permit Writer	The Owning Department employee who prepares and issues the Hot Work Permit shall: **(a)** Be responsible as a representative of the owning department for safe operation of hot work activities. **(b)** Inspect the work site and prepare the hot work permit and present it to the servicing department. **(c)** Conduct a Joint Job Site Visit (JJSV) with the employee(s) or contractors who will perform the work. If contractors are involved, the permit writer shall discuss the hazards with the contractor representative or elect to discuss with contract employees directly. **(d)** Determine if a fire watch is required. **(e)** Determine 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. **(f)** Conduct atmospheric monitoring per Section 4.0 of this HSS Determines and documents any fire extinguishing equipment requirements on the Safe Work Permit.
Servicing Group	**(a)** Comply with all conditions specified on the Safe Work Permit. **(b)** **STOP** Hot Work activities if conditions of the Safe Work Permit can no longer be met. **(c)** Ensure tools and equipment to be used are in good-working condition and are safe to use. **(d)** Verify atmospheric monitoring has been completed. **(e)** Ensure gasoline or diesel powered equipment is shut down in the event of an emergency/evacuation.

3.0 Hot Work Requirements

3.1 General Process Equipment Preparation

3.1.1 Equipment and piping that is involved in any Hot Work must be:

- Isolated and/or disconnected,
- Cleaned, gas free, and tested, and
- Vented to prevent over-pressurization

3.1.2 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.

3.1.3 Welding on utility lines (e.g., steam, condensate, etc.) under pressure shall require all precautionary measures taken for similar work on oil and gas lines (e.g., in-service welds).

3.1.4 Demister pads in vessels shall be removed prior to hot work if they pose a hazard due to the work activity being performed.

3.1.5 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).

3.1.6 Refer to RRD-1323-000 for piping and equipment preparation recommendations

3.2 Welding/ Cutting Equipment Requirements

3.2.1 All welding and burning equipment (e.g., leads, grounds, hoses, cables, gauges, regulators, etc.) shall be visually inspected daily, and prior to hot work occurring, to ensure the equipment is in good working condition. Damaged equipment must be replaced with new.

3.2.2 Every effort shall be made to locate weld machines outside of process and dike areas. Weld machines must also be positioned such that exhaust will not negatively impact the atmosphere of employee working areas and confined space entries.

3.2.3 Regulators must have functional gauges on both the high and low pressure sides. Covers will be used on all gauges for protection.

3.2.4 Boxes used for storing gas hoses shall be ventilated.

3.2.5 Torches shall be lit with approved friction type lighters.

3.2.6 Effort must be made to route leads and hoses overhead and/or out of walkways to prevent creating tripping hazards.

3.2.7 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.

3.2.8 Flash-back arresters and back flow preventers must be in place on both the fuel and oxygen systems at the torch. (New torches must have built in flash-back arresters and back flow preventers.)

3.2.9 Exercise good housekeeping as you work.

3.2.10 Provide bucket for electrode stubs.

3.2.11 Use sand trap or metal catch pan under cutting to protect concrete and asphalt (as required).

3.2.12 Before burning or welding on structure, check blind side and floor below for combustibles.

3.2.13 Weld or cut only clean metal, wire brush or grind if necessary.

3.2.14 Check all enclosed areas for toxicity hazards before welding or cutting.

3.2.15 Ensure machines are turned off when not in use.

3.2.16 Welding leads must be free from defects or damage and have fully insulated connections.

3.2.17 When electrode holders are to be left unattended, the electrodes shall be removed. In the event of a gas or vapor release or evacuation, shutdown all spark producing equipment.

3.2.18 Welding connections shall not be taped together

3.3 Arc Welding (Shielding Metal, Gas Tungsten and Gas Metal Arc Welding)

3.3.1 A proper ground must be used for electric welding. The use of rods, flat steel and homemade grounds are not permitted on this site. Make sure that the proper clamp is used and that the clamp goes from the work to the proper ground. Work with your foreman or Marathon representative to ensure that the welding machine is grounded properly.

- Do not install weld grounding cable across pump or turbine to prevent damage to equipment.
- Do not install weld grounding cable to Coker Crane rails or rail structure unless welding on the rail structure and the Coker Crane rail is de-energized.
- Grounding cable should be as close to the weld as possible.
- When making weld repairs to vehicles or crane, ensure battery is disconnected prior to welding.
- Ensure Weld grounding cable is installed as close as practical to work

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3.4 Oxy-Fuel Gas Safety

3.4.1 Oxy/Acetylene and other gas-type equipment must be maintained and in good condition. All personnel required to use a cutting torch on this site must be qualified to operate a cutting torch.

3.4.2 Perform the following safety steps when using Oxy-Fuel Equipment:

- Fully release the adjusting screws and drain the regulator before attaching to cylinder, or before opening cylinder and after use, to prevent fire or explosion.
- Test regulators and gauges periodically (each quarter).
- Keep all oil and grease away from cylinder valves, regulators, etc.
- Open cylinder valve slightly and close it before attaching regulator. This will aid in clearing foreign particles from cylinder connection.
- Open cylinder valves slowly, so pressure in regulators increases gradually. Always open fuel gas first.
- Make sure valves are tight on torch head.
- Use proper top or head on torch and keep clean.
- Do not use valve handle as lever or hammer.
- If an Acetylene cylinder is found on its side for any reason, place it in the upright position and secure it. Then, check with the cylinder manufacturer to determine the minimum time needed for the gas to settle out prior to using again.
- For other information on the care of the gas cylinders, refer to HSS-412 Compressed Gas and Cylinder Safety.

3.5 Hot Work on Used Containers and Out of Service Equipment

3.5.1 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.

3.6 Special Precautions While Hot Work is in Progress

3.6.1 When performing Hot Work activities, the Servicing Group and Owning Department Representative shall take the following into consideration:

- Wind direction,
- Potential upstream hazards when performing Hot Work adjacent to drainage basins, separators, and open ditches,
- Other work activities in the adjacent area, and
- Sewers, drains, manholes, oily water sumps, equipment, combustibles, personnel, etc. below, when performing Hot Work from an elevated location.

4.0 Atmospheric Monitoring for Hot Work

4.1 Atmospheric Monitoring Requirements for Hot Work

4.1.1 Atmospheric monitoring must be conducted in the immediate work area per the Safe Work Permit Safety Standing Instruction and the results of the monitoring shall be recorded in the appropriate section of the Safe Work Permit.

4.1.2 As a minimum, the atmospheric monitors must use a calibrated/bump tested combustible gas indicator to determine oxygen and flammable vapor concentrations before hot work is started.

Note: Ensure there is adequate atmospheric oxygen inside the monitoring area, per the manufacturer's recommendation, for correct operation of the combustible gas indicator.

4.2 Initial Atmospheric Monitoring

4.2.1 Atmospheric monitoring must not be completed until after all blinding, disconnecting, purging, steaming and other preparatory work has been completed, and in as short a time as possible before hot work is started. In every instance atmospheric monitoring must be conducted within two hours prior to the start of work.

4.2.2 When work is not started within two hours of the time the atmospheric monitoring was conducted, new, additional atmospheric monitoring must be conducted and documented on the Safe Work Permit.

Hot Work Atmospheric Monitoring Limits	
Oxygen	19.5% - 23.5%
LEL	0%

Note: This Procedure may allow Hot Work in atmospheres up to 10% LEL where the source of the flammable vapors is known. Approval for work in these atmospheres must be approved using the Elevated LEL Hot Work Approval Form (Appendix B) and must include a plan that addresses the following items:

- Justification to complete Hot Work at increased LEL,
- Additional control procedures required to complete the Hot Work Safely,
- Conditions when the Hot Work must be stopped.

4.3 Mid-Shift Atmospheric Monitoring

4.3.1 Mid-Shift Atmospheric Monitoring must be conducted as specified in HSS-201 8.4 Step 10.
4.3.2 Additional atmospheric monitoring must be conducted after a change in conditions or upon request of the servicing group.

4.4 Continuous Atmospheric Monitoring

4.4.1 The Owning Department Representative will require continuous atmospheric monitoring for any attended Hot Work activity.

Note: Mid-shift atmospheric monitoring is still required when continuous atmospheric monitoring is conducted

5.0 Atmospheric Monitoring for Confined Space

5.1 Confined Space Hot Work Requirements/ Considerations

Note: The Confined Space policy HSS-215 shall be followed when performing work in a Confined Space, and the following additional requirements/considerations shall apply for hot work:

5.1.1 Provisions shall be made to ensure adequate ventilation for each person conducting Hot Work in the confined space. Cutting or welding operations must be performed such that an additional hazard to personnel is not created.

5.1.2 Fumes can be created by cutting or welding on surfaces which are galvanized, contain chromium, or lead contaminated and may require additional respiratory protection or other control measure to limit personnel exposure. Refer to HSS 306 Respiratory Protection Program an increase in oxygen and/or flammable gases could occur from leaking cutting torch or hoses.

5.1.3 When welding is suspended and the space is vacated for more than 15 minutes (e.g., lunch, breaks, shift change, etc.) all electrodes are to be removed from their holders and the machine turned off and/or disconnected from its power source.

5.1.4 For gas welding /burning in confined spaces torches and hoses must be removed from the confined space and/or disconnected at the fuel gas and oxygen cylinders, when work is stopped, and the space is vacated for more than 15 minutes.

5.1.5 Compressed gas cylinders shall never be staged, stored, or located inside a confined space.

5.1.6 Mechanical ventilation shall be required when welding occurs inside of confined spaces. Certain large and/or open-air confined spaces (e.g., heaters, open tanks, excavations, etc.) may be exempt from this requirement provided there is adequate natural ventilation.

5.1.7 Plant air shall not be used as a source of ventilation if plant air is backed up by Nitrogen

6.0 Designated Hot Work Shops and Fabrication Areas

Note: LAR can designate permanent locations designed or approved for Hot Work operations.

6.1 Requirements for Designated Hot Work Locations/ Buildings

6.1.1 Areas must be naturally and/or mechanically ventilated to prevent an accumulation of toxics.

6.1.2 Areas must not allow the presence of combustible materials within 35 feet of the welding/cutting area.

6.1.3 Store any flammable liquids present in an approved flammable liquids storage cabinet.

6.1.4 Areas must be equipped with appropriate fire extinguishing equipment.

6.1.5 Areas must have appropriately marked exits.

Note:

- Additional atmospheric monitoring may be required (up to continuous monitoring) if the fabrication area has the potential to build-up toxic or flammable gases and/or fumes.
- The site Industrial Hygienist shall be notified of the construction of new Hot Work locations/buildings to determine if ventilation is appropriate for the intended use.

Important: Any fabrication area within 35 feet of process equipment shall require a Fire Watch when performing work covered by the definition of Attended Hot Work per this Safety Standing Instruction.

6.2 Requirements for Temporary Fabrication Areas

6.2.1 Areas must be naturally and/ or mechanically ventilated to prevent an accumulation of toxics.

6.2.2 Not allow the presence of combustible materials.

6.2.3 Not allow the storage of flammable liquids.

6.2.4 Have two means of egress available from the fabrication area.

Important: Fabrication areas established outside of the battery limits and away from other process hazards including live process piping (e.g., laydown yard, remote fabrications area, etc.) may not require a Safe Work Permit based on a hazard assessment conducted by The Safety Department.

7.0 Fire Suppression Equipment

7.1 Requirements

7.1.1 Fire suppression equipment is required at all Attended Hot Work sites ready to be used in the event of an incipient fire.

7.1.2 The following is the minimum acceptable fire suppression equipment to be maintained at the site of the Hot Work activity:

- 20lb. dry chemical fire extinguisher
- Charged water hose

7.1.3 The Owning Department Representative can require additional fire protection based on the surrounding conditions and other fire risks. This additional fire protection may include:

- 150lb. dry chemical fire extinguisher,
- Multiple charged fire hoses,
- Multiple fire extinguishers, and
- On-site ERT

8.0 Internal Combustion Engines (ICE's) as an Ignition Source

8.1 Types of Motor Vehicles Considered as ICE's

8.1.1 A motor vehicle or other equipment (e.g., light plants, compressors, welding machines, etc.) are considered potential ignition sources.

Important Note: Refer to HSS-201 Safe Work Permit for details on how ICE's and these ignition sources will be controlled in the Safe Work Permit process under Atmospheric Monitoring.

9.0 Temporary Portable Pump

9.1 Use of Portable Pumps

9.1.1 The use of portable pumps to pump hydrocarbons must be managed to control potential ignition sources, releases, and fires.

9.1.2 The Proceduralized Management of Change (PMOC) (see Appendix C) must be completed in Intelex prior to the start-up of any non-intrinsically safe portable pump used to pump hydrocarbons inside tank dikes or unit battery limits.

9.2 Minimum Requirements for Use of a Site PMOC/MOC

9.2.1 PMOC/MOC duration.

9.2.2 Product and pump specifications.

9.2.3 Hazard review.

9.2.4 Approvals.

9.2.5 Implementation actions.

9.2.6 Pre-startup safety review (PSSR).

Note: 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.).

Reference: Refer to MPC Process Safety Advisory, PSA 16-02, which covers an event that resulted in a fire while utilizing a portable pump to transfer hydrocarbons from a tank.

10.0 Ventilation

10.1 Natural Ventilation

10.1.1 Adequate natural or mechanical ventilation shall be considered to reduce or eliminate the hazards of weld fumes. Any accumulation of gases must be vented to a safe location, away from the Hot Work.

10.2 Local Exhaust Ventilation

10.2.1 Local exhaust ventilation is required for any welding or torch work conducted inside enclosed structures. Contact the site Industrial Hygienist to determine adequacy of the ventilation configuration.

10.2.2 If it is determined that mechanical ventilation is required, then:

- If general dilution ventilation (or general exhaust) is used, a minimum rate of 2,000 cu ft per minute (cfm) per welder, cutter or gouger is required.
- When welding on metals with a hexavalent chromium hazard refer to HSS-403 Hexavalent Chromium for exhaust requirements and/or contact Industrial Hygiene.
- If local exhaust ventilation is used, a minimum velocity of 100 ft/min of local exhaust is required. It should be within 4-12" of the arc to maintain effectiveness.

11.0 Bolted Process Equipment and Hot Work

11.1 Requirements for Hot Work on Bolted Process Equipment

11.1.1 Spark producing 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.

11.1.2 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.

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

Note: 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

12.0 Welding PPE

12.1 Welding and Cutting Operations Will Require Additional Personal Protective Equipment (PPE)

12.1.1 These additional PPE requirements must be identified on the Safe Work Permit. 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.). Correct shading for tasks listed below:

Welding Operation	**Minimum Shading #**
Shielded Metal Arc Welding	
Electrode 5/32 or smaller	10
Electrode 3/16 to ¼	12
Electrode 5/16 or larger	14
All carbon steel welding (carbon arc welding)	14
Gas Metal/Tungsten Arc Welding	
Electrode 5/32 or smaller	12
Soldering	2
Oxy/Acetylene (Cutting Stock)	
Less than 1"	3 or 4
1" to 6"	4 or 5
Over 6"	5 or 6
Torch Brazing	3 or 4
Gas Welding (Welding Stock)	
Less than 1/8"	4 or 5
1/8" to 1/2"	5 or 6
Over 1/2"	6 or 8

- The lenses in welder's hoods should be NIOSH approved and of a hardened clear plastic, as provided by site tool-room. One (1) clear lens should be in front of shaded protective lens in both welding hoods and oxy-fuel goggles

Note: Welding hoods cannot be used for grinding unless they are approved for grinding operations.

- Welding gloves,
- Face shield,
- Welding leathers, and Fall protection equipment

13.0 Shields, Guards and Curtains for Containing Heat and Sparks

13.1 Sparking Hot Work Activities

13.1.1 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.

The following minimum requirements must be implemented:

- Remove or cover any combustible material within 35 feet of the Hot Work.
- Seal all sewers, drains and manholes within 35 feet of the Hot Work site with the welding pads or blankets to prevent emission of flammable vapors from the sewers, drains and manholes and conduct appropriate atmospheric monitoring to verify.
- 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.
- 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.

Note: Welding and cutting shall not be performed if fire hazards cannot be moved or Spark and Heat Containment cannot be used to protect immovable fire hazards.

14.0 Welding on Chlorinated Solvents

14.1 Hot Work on Chlorinated Solvents

14.1.1 Welding on or near chlorinated solvents can produce phosgene, a toxic gas. The effects of phosgene may not be immediate but can have long term severe health effects.

- Do not use any chlorinated solvents as cleaning agents for welding jobs.
- Remove all traces of any chlorinated solvents before welding.

15.0 Special Hot Work Requirements for Above Ground Storage Tanks (AST's)

Note: 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. This section applies to out-of-service ASTs undergoing maintenance and turnaround activities. The safety plan for AST work must, at a minimum, address the following, where applicable.

15.1 AST Floor Hazard Assessment

15.1.1 Hydrocarbons of other previously stored flammable materials may be present under AST floors which need repair. This is more probable if there has been a breach in the floor. Prior to cutting the floor with an open flame, the Servicing Group shall take appropriate precautions to ensure that flammables are not present under the AST floor. Refer to API RP 2207.

15.1.2 The AST must be checked for the presence of a double bottom or sketch plates welded to the perimeter of the AST. Where this condition exists, refer to the precautions outlined in API RP 2207.

15.1.3The floor area must be inspected to ensure that patch plates were not used to cover old water draw or process sumps. Where these areas are suspected, holes should be drilled in the floor to verify there is no product under the patch plate.

15.2 AST Shell Hazard Assessment

15.2 1 AST shell surface must be inspected for the presence of product residue, wax, ignitable rust or scale in the areas where hot work may be performed.

15.2.2 Historically, equipment in contact with amines, hydrogen fluoride or "sour" (hydrogen sulfide containing) materials has been susceptible to hydrogen blistering. This occurs more often in areas which have been welded. If the AST contained one of these products or if hydrogen blistering is suspected for any other reason, an evaluation by a qualified person (e.g., metallurgist) must be included in the determination of whether it is safe to perform hot work

15.3 AST Roof Structure Hazard Assessment

15.3.1 Verify that product residue is not present on the upper surfaces of the roof rafter.

15.3.2 Some ASTs were constructed using piping as structural support columns. Where this is the case, verify that mouse holes were cut at the base of the columns so they can be free draining

15.4 AST Floating Roof Hazard Assessment

15.4.1 Deck

- The underside of the floating roof must be inspected for the presence of product residue, wax, ignitable rust or scale in the areas where hot work could be performed.
- The floating roof must be inspected to verify there are no pockets of hydrocarbon that could be trapped between the deck plates due to the underside of the floating roof being seal welded.

15.4.2 Seals:

- If the AST is equipped with either a primary or secondary resilient urethane foam log, it must be removed or protected from hot sparks prior to hot work being performed in the area. These seals can leak and trap hydrocarbon.
- Mechanical shoe-type seals need to be inspected for liquids and must be cleaned prior to hot work being performed in the area. The area between the top side of the primary fabric and the bottom side of the secondary seal fabric or underside of wiper must be clean. Outer rim plates, shoe seals, springs and other seal hardware must be clean and vapor free prior to any hot work activity

15.4.3 Pontoon & Double Decks:

- All deck and pontoon covers must be opened and each compartment free of hydrocarbon, ignitable rust, scale or wax, prior to any Attended Hot Work on or near the float roof.

15.4.4 Floating Roof Deck Penetrations

- All leg sleeves, vacuum breaker sleeves, gauge wells, column and ladder wells must be inspected for cleanliness and verified that they are hydrocarbon free.
- Floating roof and vacuum breaker legs can hold product. Prior to hot work, each leg must be cleaned and free draining.
- Gauge poles must be inspected to verify that they are free draining and clear of wax, product residue and scale.

15.4.5 AST Nozzle and Piping Hazard Assessment:

- Verify that jet and internal distributors are clean and both vapor and liquid free.
- Foam lines must be checked for hydrocarbons. The frangible diaphragms often break allowing for product vapor to leak from the ASTs.
- Skimmer and drain piping must be drained, cleaned and gas free prior to performing hot work.

15.4.6 Hazard Assessment for Areas Adjacent to ASTs

- Tank dike must be free of combustible materials that could be affected by the Hot Work.
- Process valve bonnets and flanges located in the tank dike must be checked for leakage.
- All drain and vent valves located in the tank dike must be inspected to ensure there is a plug installed.
- The ground around the AST must be inspected to check for the possibility of an underground line leak.

16.0 Requirements for Hot Work on Vertical Tubes Inside Heaters and other Process Equipment

16.1 Requirements for Cutting Vertical Tubes

16.1.1 Spark producing Hot Work (e.g., torch cutting, grinder with a cut-off wheel, reciprocating saw) is sometimes required to cut or demo vertical tubes. In order to prevent the ignition of flammable or combustible vapors and liquids inside these tubes, the following requirements must be met:

- Ensure gas testing of the tubes is conducted in accordance with HSS-201 section 8.4.
- The tubes must be checked to ensure no liquid remains in low points of the tubes prior to hot work.

16.1.2 How to facilitate a proper gas test of vertical tubes and ensure low points are liquid free:

- If the hot work will be conducted inside a confined space, atmospheric monitoring must be done prior to entry in accordance with HSS-215 and HSS-201.
- Ensure there is high point vent on the tubes.
- Use a pneumatic drill to open holes in the low points of the tubes and allow all liquid inside the tubes to drain before conducting gas test for hot work. Ensure holes are large enough to verify that nothing is plugging up the hole and all liquid has drained from tubes.
- In order to get a representative sample of the inside of the tubes where the hot work will take place, perform a cold cut or drill a pilot hole in the tube at the location for hot work using pneumatic tools only. This must be done at each hot work location.

Appendix A: Terms and Definitions

A.1 Attended Hot Work]	Attended Hot Work is hot work that requires a fire watch. Some examples of attended hot work are burning, welding, brazing, electric arc welding, annealing (electric or gas), electric soldering, stress relieving, use of open flames, use of non-process propane or gas fired heaters, cutting and grinding, CAD welding, and if combustible materials are within 35 feet of worksite. This type of hot work requires the placement of covers on sewers, drains and manholes covers within 35 feet. These listings are not all-inclusive.
A.2 Battery Powered Equipment	Use of unclassified, Battery-Powered Equipment (e.g., cordless drills, computers, cell phones) requires a hot work permit. Personal devices (e.g., hearing aids, watches, and other medical devices) with button batteries are exempt from the Hot Work permit requirements.
A.3 Class A Combustible Materials	Class A Combustible Materials are ordinary combustibles such as wood, cloth, or paper.
A.4 Cold Work	Cold Work is maintenance, repair, cleaning, or construction activity, not requiring the use of fire, hot surfaces, spark producing equipment, or electrical equipment that is not classified for use in the area.
A.5 Designated Hot Work Area	An area where a documented hazard assessment shows the area is safe for daily hot work without expecting the presence of flammable or combustible materials.
A.6 Hazardous Atmosphere	A Hazardous Atmosphere is an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (i.e., escape unaided from a permit space), injury, or acute illness.
A.7 Hot Tapping (Pressure Tapping)	Hot Tapping (Pressure Tapping) is the practice of installing a valve connection and then drilling or cutting into the pipe or equipment, through the valve connection, while the pipe or equipment is in service or has not been purged (hydrocarbon gas free).

A.8 Hot Work	Hot Work is repair, maintenance, or construction activity, which requires the use of spark- producing equipment or may create an ignition source. **Note:** LAR has designated that all areas with the exception of the MPC Maintenance Shops Building will require hot work permits and a designated fire watch for attended hot work.
A.9 Hot Work Permit	A written record that authorizes specific work within an operating area for a specified time period. An agreement between the Owning Department and the Servicing Group that clearly documents the conditions, preparations, precautions, and limitations that must be understood before work begins.
A.10 Internal Combustion Engine (ICE)	An engine that generates power by burning gasoline, oil, or other fuel with air. Examples include vehicles, trains, portable compressors, portable generators, welding machines, light stands, etc.
A.11 In-Service Welding	In-Service Welding is the practice of welding on pipe or equipment (for example, tank, vessels, exchangers, etc.) which is in-service. This includes grinding, burning, and welding for any purpose, such as adding brackets, shoes, boxing in leaks, adding weld-o-lets and back welding fittings. **Reference:** For detailed permit requirements for in-service welds, see the site specific In- Service Welding and Hot Tapping Procedure listed in the reference section of this document.
A.12 Joint Job Site Visit	Joint Job Site Visit is a meeting between an Owning Department representative and at least one servicing representative of all parties working off of the permit at the specific location where the job will be conducted. The meeting discussion will address the work scope and all safety aspects of the permit. The servicing representative that attends the Joint Job Site Visit must convey the information covered in the discussion to all members of their work party.
A.13 Non-Attended Hot Work	Non-Attended Hot Work is hot work that does not require a fire watch. Some examples of non-attended hot work are: concrete breaking; use of unclassified hand tools, lights, and extension cords, non-explosion proof cordless tools, non-intrinsically safe flash cameras, gasoline or diesel-powered equipment (e.g., compressors, generators, pressure washers, etc.), opening of energized explosion proof enclosures, abrasive blasting, and grass cutting in dike area.

A.14 Other Ignition Sources	Other Ignition Sources include, but are not limited to: • Abrasive blasting • Electric, or battery-powered drills • Electric, gasoline, or battery-powered saws • Jack hammers • Non-intrinsically safe devices, such as cell phones, radios, cameras, or battery-operated devices • Open electric or battery heating elements • Other Internal Combustion Engines
A.15 Owning Department	Owning Department refers to the department that owns and operates process, process-related, and/or utility equipment, machinery, building, and/or systems
A.16 Oxygen Deficient Atmosphere	Oxygen Deficient Atmosphere is any atmosphere containing less than 19.5% oxygen by volume
A.17 Personal Protective Equipment	Equipment (such as protective clothing, respiratory devices, protective shields or barriers) worn or used by individuals to protect eyes, face, head and extremities from hazards of equipment, processes or environment capable of causing injury or functional impairment.
A.18 Process	A PSM/RMP covered process. Any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or combination of these activities. For purposes of this definition, any group of vessels which are interconnected and separate vessels which are located such that a highly hazardous chemical could be involved in a potential release shall be considered a single process.
A.19 Process Safety Management	Process Safety Management is an OSHA regulation for management of hazardous chemicals.

A.20 Safe Work Permit

The Safe Work Permit is a work-authorizing process and record that is managed, prepared, and issued by the Refining department that "owns" the equipment or is responsible for the area before certain work is conducted.

Notes:
(1) It authorizes a specific scope of work for a specific time frame and is a prerequisite for performing work.
(2) It is used to assess hazards and to document requirements and conditions such as atmospheric monitoring results, personal protective equipment, confined space details, work requirements (e.g., hot tap, excavation, critical lift), emergency communications, and other potential hazard mitigation means and methods.
(3) The authorization coordinates and controls the work and is a form of agreement between the Safe Work Permit issuer and all personnel involved with the work.

A.21 Servicing Representative

Servicing Representative(s) are the people who are working on the equipment/process. This may include operations, blending shipping, maintenance, contractors, and salaried employees.

Appendix B: Elevated Hot Work Form

Elevated LEL Hot Work Approval Form

(RSP-1715-000-FORM1)

Company Performing Work: _____

Date: _____ Time: _____ Area/Unit: _____ Permit No.: _____

Hot Work to be Completed: _____

Describe the Source of the Flammable Vapors: _____

Justification to Complete the Hot Work at Increased LEL: _____

Additional Control Procedures Required to Complete the Hot Work Safely: _____

Conditions When the Hot Work Must be Stopped: _____

Maintenance Manager

Safety Supervisor

Appendix C: PMOC Form for Temporary Portable Pumps

PMOC Form for Temporary Portable Pumps
(RSP-1715-000-FORM2)

Initiation and Initial Review

Initiator_____ Date_____

Responsible Person_____ Target Completion Date _____

Area / Unit _____

Title _____

Description of Change _____

_____

Technical Basis for Change _____

_____

Pump Dead Head _____ Pipe MAWP _____ @_____°F Flow rate _____

Hose MAWP _____ @_____°F Process stream _____

Specific Hazards _____

Expiration date for this temporary change (max expiration 6 months): _____

Approver *(Change Approver/Area Team Lead - sign)* _____

Categories of Change (check all that apply).

Type: ☐ Trailer/vehicle mounted ☐ Skid mounted ☐ Stand alone

Driver: ☐ Diesel ☐ Gasoline ☐ Electric ☐ Air ☐ Steam ☐ Hydraulic driven

Hazard Review

Hazard Review Checklist	Yes	No	N/A
1. Have you confirmed that this change meets the acceptable use of the PMOC? If no, comments (required): _____			
2. If the Portable Pump is a diesel/gasoline engine driven, have you confirmed that an (intrinsically safe) electric, air, steam, or hydraulically driven pump use is infeasible? If no, comments (required): _____			
3. Has the portable pump and hose design been approved by Engineering to meet MPC design requirements for the service it is being used for? If no, comments (required): _____			
4. Is the portable pump intrinsically safe? *(If you answer "no" when in operation it must be 100% manned.)* If no, comments (required): _____			
5. Can connections be made primarily with hard piping? *(If no, have steps been taken to minimize run of hose?)* If no, comments (required): _____			

	Hazard Review Checklist	Yes	No	N/A
Hazard Review, *continued*	6. Have you considered/addressed the consequence of hose failure? *(Process Safety, Environmental, Industrial hygiene).* If no, comments (required): _____			
	7. Have you considered/addressed personnel hazards caused by the installation of the pump or piping? If no, comments (required): _____			
	8. Have you considered/addressed the effects of reverse flow? *(Is a check valve needed)?* If no, comments (required): _____			
	9. Is the Portable Pump/Hoses compatible with the process fluid? (Consider corrosion, erosion, and/or contaminants in the process?) If no, comments (required): _____			
	10. Is the Portable Pump/Hoses rated for the entire range of the process pressure (Consider normal maximum and minimum, blocked in case and thermal expansion)? If no, comments (required): _____			
	11. Is the Portable Pump/Hoses rated for the entire range of the process temperature (maximum and minimum)? (Start-Up, Shutdowns, Steam Out, N2 purge, etc) If no, comments (required): _____			
	12. Is the downstream piping and equipment rated for the portable pump max dead head? *(Pressure and Temperature)* If no, comments (required): _____			
	13. Have you reviewed the impacts on upstream and downstream units or the piping header? *(Pressuring up the header and backing out upstream/downstream units/equipment).* If no, comments (required): _____			
	14. Have any inspection requirements identified for the temporary pump hose/piping installation been included in the Safety Plan? If no, comments (required): _____			

Hazard Review Team	The Portable Pump Hazard Review has been completed and the change is acceptable (Print/sign) _____ Date_____ Shift Foreman or Process Specialist or Day Foreman *(one is required)* (Print/sign) _____ Date_____ Operations Hourly Representative *(required)* (Print/sign) _____ Date_____ Area Team Reliability Engineer *(required)* (Print/sign) _____ Date_____ Safety Professional or Safety Supervisor *(one is required)* (Print/sign) _____ Date_____ Environmental Area Team Rep *(required)* (Print/sign) _____ Date_____ Other *(if necessary)*
Approval to Implement Change	The Change Approver/Area Team Lead has reviewed and authorized the proposed change. Name (print/sign) _____ Date_____

Implementation Actions		Completed By / Date
	1. Ensure that the Portable pump installation has been permitted with a Safe Work Permit. *(Foreman)*	
	2. Ensure that a plot plan overview showing the exact pump location with distances marked to nearby hydrocarbon service equipment and any other hazards in the area has been documented. (This plan should be stored in the supervisor's office and a copy attached to the PMOC. *(Foreman)*	
	3. Ensure that a detailed and documented Safety Plan has been completed. Safety Plan shall include the purpose of the pump, the justification for use of the pump, the frequency of monitoring of the pump, provisions for monitoring per hazard Review, how any risks arising from the use of the pump will be managed, and documentation from the manufacturer (the horsepower for the engine and the engine manufacturer's specification sheet detailing NOx and CO emissions factors (in lb/hp-hr)) to support use for the service they are being placed in. (This should be stored in the supervisor's office and a copy attached to the PMOC.*(Foreman)*	
	4. Ensure that Stationary and Portable Engine Authorization, Monitoring and Record Keeping Requirements have been followed *(Foreman)*	
	5. Provide Operations with a "Red-Lined" copy of the affected PSI (P&IDs, etc) to reflect the change. *(Area Team Reliability Engineer)*	
	6. Construction and equipment has been field verified to be in accordance with the design specifications (i.e., metallurgy flange ratings, spec breaks, bolting, torquing, expansion loops, vents and drains, support, fill materials, etc.) *(Area Team Reliability Engineer)*	
	7. Confirm that the valves have been orientated such that their position, open or closed, is readily apparent. *(Foreman)*	

Implementation Actions, *continued*		Completed By / Date
	8. Confirm that the check/non-return valves have been mounted in the horizontal position? *Note: A vertical location can adversely affect the response of some types of check/non-return valves and should be avoided. For vertical upward flows, there are certain types of check/non-return valves more suited to the duty, such as vertical/globe/angle lift check valve and tilting-disk check valve? (Foreman)*	
	9. Confirm that manual valves, that could potentially be needed to respond to an emergency situation, are readily accessible? *(Foreman)*	
	10. Confirm that a form of secondary containment system has been installed with the pump and/or fuel tank. *(Foreman)*	
	11. Ensure that a safety work order has been created to repair the permanent pump. *(Foreman)*	
	12. Ensure that the Environmental Evaluator has been informed of the date when the Portable pump arrived onsite and when the engine is expected to start operation. *(Foreman)*	
	13. Ensure that Environmental has authorized the emissions from the engine prior to startup and LDAR has been informed of operation. *Note: LDAR must monitor the portable pump and associated fugitive components during operation but no later than 30 days after the portable pump is placed into operation. (Environmental Area Team Rep)*	
	14. Ensure the rented equipment is entered into the rental equipment tracking system.	
Pre-Startup Safety Review		Completed By/ Date
	1. Confirm that the change was made in accordance with intended design and design specifications, including all local requirements. *(Area Team Reliability Engineer)*	
	2. Confirm that any affected procedures have been updated and if so, that they are in place and adequate *(Process Specialist)*	
	3. Confirm any pre-startup actions identified from Evaluation are completed. *(Responsible Person)*	
	4. Confirm affected operating personnel have been informed of the Change. *This item is considered confirmed when the communication and the date of entry are put in OpsCore (Foreman)*	
	5. Confirm affected Maintenance personnel have been informed of the Change. *(Maintenance Foreman)*	
	6. Confirm that Process safety Information (PSI) affected by the change and required for startup is current and accurate, and readily available. *(Area Team Reliability Engineer)*	
Approval to Startup	(Signature) _____ Date _____ Owning Department Manager (or designee) (Signature) _____ Date _____ Change Approver/Area Team Lead	

Post Startup Action Items	Send completed PMOC to Process Safety to be entered into KMS as Post-Startup Action Items	Assigned to / Due Date / N/A
	1. Ensure that Pride has been updated for this change. *(The portable pump and hoses should be inspected as a Pride activity.*	
	2. Notify Environmental of the removal of diesel pump to document that the diesel pump was not used for more than 6 months *(Responsible Person)*	Due 6 months from pump delivery
	3. Maintain MSS emissions (not required for electric or pneumatic drivers). *(Environmental Area Team Rep)*	

REVISION HISTORY

Revision No	Revision Details	Revised By	Approved By	Revision Date	Effective Date
0					

Revision History

Document Revision History

Complete the following table for each document revision.

Revision Number	Description of Change	Author	Approved By	Rev. Date	Effective Date
1	Integrated HSS for MPC LAR Hot Work Safety	Rinaldo Edmonson	Mike Kulakowski	09/16/2020	09/16/2020
2	Merged HSS-635 Welding and Cutting Safety into Hot Work policy. Added section on Hot Work on vertical tubes	Brian Kirby	Connie Lema	05/26/2023	5/30/2023