

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

1.0 PURPOSE

To minimize the consequences that may result from the potential unexpected release of hazardous chemicals while opening process piping, equipment and vessels at the Westlake Plaquemine site.

2.0 SCOPE

- 2.1 The scope of this procedure applies to anyone performing activities at the Westlake Plaquemine site that involve opening of pipe flanges, un-coupling of threaded pipe fittings or instrumentation (that is mounted with no isolation valves), physically cutting into process piping or equipment (including demolition and new construction), the opening of process related equipment and removing process related equipment from service for repairs that have contained or had the potential to contain hazardous materials as defined in 3.7.
- 2.2 PPE utilized for safe process openings shall meet at a minimum the requirements of the PPE matrix in Appendix 2 - Minimum PPE Requirements for Process Line & Equipment Opening involving Hazardous Materials. If a line opening will involve a hazardous material not found in Appendix 2, the Safety Data Sheet shall be reviewed. If more information is needed, the EHSS Department shall be contacted in order to provide information on the proper PPE.
- 2.3 There are numerous activities that are performed each day as part of normal operations by Operations and Westlake Maintenance that present potential chemical hazards that will not fall under the scope of this procedure. Examples include:
- Flushing / Draining process equipment
 - Opening vents and bleeders
 - Routine maintenance on instrumentation & process analyzers where exclusion control of isolation points exists
 - Routine sampling activities
 - Loading and unloading railcars
- 2.3.1 When conducting any of the above activities or any other Operations activities that present potential chemical exposure hazards, personnel performing these activities shall, at a minimum, follow the PPE Matrix requirements or perform a documented risk assessment. This risk assessment may be documented in an SOP or Job Hazard Analysis. A template has been attached as an appendix for your convenience

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

(Appendix 4).

- 2.4 When Operation personnel will be completing a line opening as defined in the scope 2.1 and definition 3.15 the following requirements apply:
- Isolate and prepare equipment for services as outlined in section 4.1
 - Follow PPE Matrix (Appendix 2)
 - Follow Barricade Requirements as outlined in sections 4.2.1.1, 4.2.1.2, 4.2.1.3, 4.2.1.4
 - Follow CPC requirements as outlined in sections 4.5.6, 4.5.7, 4.5.8, 4.5.10 (with the exception of documenting the CPC on the Safe Work Permit.)

3.0 DEFINITIONS

- 3.1 Affected Line Opening Personnel – The fewest number of personnel required to perform the line openings. All non-essential personnel (those who are not physically performing the line opening) shall be outside the line opening affected area at all times.
- 3.2 Bleeder – Valve controlled small diameter openings in piping provided for draining, washing, injection, product transfer, or facilitating clearing or purging.
- 3.3 Blind / Slip Blind / Stopper Plate – A metal plate designed for isolating process piping, equipment and vessels to control hazardous energy sources. Plates must be designed and constructed to meet the applicable pipe standard. Both maximum operating pressure and material of construction should be verified prior to placing into service.
- 3.4 Cleared Process Confirmation (CPC) – This determination shall be confirmed once a sufficient number of line openings have been completed to verify the absence of hazardous materials in the process opening. Operations confirms applicable visual or quantitative verifications. Once all verifications have been confirmed a CPC shall be documented in the “line Opening” section of the Safe Work Permit.
- 3.5 Crew Leader – The person who is responsible for supervising the work crew that is performing the process piping, vessel, equipment openings or physical process line cut(s).

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

- 3.6 Cut Location Point – The point where process piping or equipment will be cut which will result in opening of the process.
- 3.7 Hazardous Material - For the purpose of this procedure the term hazardous material shall mean any substance that is corrosive, toxic, flammable, reactive, represents a biological hazard, organic combustible dust or is under pressure greater than 10 psi, is above 120° or below 32° Fahrenheit (Note: This definition also includes plant utilities such as air, nitrogen, and process water when they meet the criteria listed).
- 3.8 Hot Bolting - The practice of removing selected bolts from a flanged connection, such as pipe, vessel, and head cover, etc., without conducting line-opening or breaking the seal. This is done to replace corroded/damaged bolting or to facilitate anticipated line breaking.
- 3.9 Initial Line Opening – The initial line opening to include a physical cut on a process piping, vessel or other process related piece of equipment for a single permit for a single system.
- 3.10 Line Opening Affected Area – The area barricaded around the process piping, equipment or vessel to be opened. The affected area shall be barricaded with red barricade tape at a minimum of 10' radius from the point of the opening for line openings at grade. For elevated line openings the line opening affected area shall be barricaded with red barricade tape at each level to include the grade level which should be at a minimum of 15' radius. Factors such as material, operating pressure and temperature, weather conditions, vehicle and/or pedestrian traffic may warrant the increase of the barricaded area.
- 3.11 Line Opening Field Review – The review will take place at the job site and be led by Operations. The individual responsible for supervising the work crew (Crew Leader) shall also be present for the field meeting. A review of the LOTO will be conducted as well as identifying each line opening location. Operations shall physically mark all line opening locations as per 4.2.1.5.
- 3.12 Pre-Job Safety Briefing – Detail review of the permit and line opening activities and requirements by the Crew Leader with all the work crew. This review shall be conducted in the field at the job site and be documented.
- 3.13 Process Equipment – Any process related piping, pipelines, bleeders, tanks, vessel, towers, columns, reactors, valves, pumps, blinds or any other equipment in process service.

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

- 3.14 Process Opening Point – The point where the process will be opened by unfastening or unbolting process equipment at designed locations such as flanges or manways.
- 3.15 Process Piping, Equipment & Vessel Purging/Flushing – The use of water, air, steam, nitrogen, vacuum, chemical washing, a combination of these or other approved material connected to a low point bleeder or high point vent to flush or purge a section of process piping, piece of equipment or vessel prior to completing a line opening.
- 3.16 Process Piping, Equipment or Vessel Safe Closing – The closing or reassembly of process piping, equipment or vessel that contained or contains a hazardous material.
- 3.17 Process Piping, Equipment or Vessel Safe Opening – The act of physically opening, physically cutting into or breaching the integrity of closed process piping, equipment or vessels that normally or last contained a hazardous material. This includes loosening bolts, nuts, and fasteners, opening manways, removing equipment from service, installing or removing blinds.
- 3.18 PPE Matrix – Appendix 2 - Minimum PPE Requirements for Process Line & Equipment Opening.
- 3.19 Quantitative Verification – The use of a device or process to measure process hazard materials to provide a numeric or positive indication of process conditions. Examples include the use of instrumentation specific to the chemical hazard (Gas meters), chemical indicators (Colorimetric tubes or tape/paper), surface temperature of the external piping and measuring internal conditions (Thermal Imaging).
- 3.20 Visual Verification – A visual confirmation that process piping, equipment or vessel is free of a hazardous material.

4.0 Safe Process Piping, Equipment & Vessel Opening Procedure

4.1 Pre Line Opening Job Preparations

Operations

- 4.1.1 Prior to any line opening involving process piping, equipment or vessels, all process systems involved in the opening shall be shut down and all potential energy isolated and de-energized per HSP 317 *“Control of Hazardous Energy.”*

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

4.1.2 All process piping, equipment or vessels shall be drained, depressured and/or purged utilizing Westlake Plaquemine's standard operating procedures to ensure all systems are as clear as possible of any potential hazardous materials.

4.1.2.1 There are several options for clearing, purging and depressurizing a system containing a hazardous material and will be dependent on the system layout and design. Westlake Plaquemine's standard operating procedures shall be followed. Some options may include but are not limited to the following:

- High Point vents and Low Point drains
- Purging/Flushing with Steam, Water, Air or Nitrogen
- Vacuuming

4.1.3 Ensure process piping, equipment or vessel temperatures have cooled to a temperature to allow for safe work.

4.1.4 Ensure heat tracing has been turned off or is protected for safe work.

4.1.5 Survey the process piping, equipment or vessel system to ensure that the area where the openings are to occur will be adequately supported to withstand forces / weight or unwanted movement when openings are completed.

WARNING:

- Due to the design of some process piping, equipment and vessels, hazardous material may be trapped and present due to low points and high points (gases lighter than air). These should be noted and communicated during both the permit and job briefing processes.
- If a section of process piping, equipment or vessel containing a hazardous material cannot be depressured, cleared or purged then Section 5 of this procedure shall be followed.
- Care should be taken when closed valves are used as isolation devices as they have the potential to leak allowing hazardous materials to continue to flow and potentially build pressure.

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

4.2 Line Opening Job Planning

4.2.1 Job Site Preparation

Operations

4.2.1.1 The line opening affected area shall be barricaded with red barricade tape at a minimum of 10' radius from the point of the opening for line openings at grade.

4.2.1.2 For elevated line openings the line opening affected area shall be barricaded with red barricade tape at each level to include the grade level which should be at a minimum of 15' radius. Factors such as material, operating pressure and temperature, weather conditions, wind direction, vehicle and/or pedestrian traffic may warrant the increase of the barricaded area.

4.2.1.3 Shielding may be used when the use of barricade tape is impractical to protect nearby personnel, piping and equipment.

4.2.1.4 Each opening should be individually evaluated to ensure the minimum distances stated are sufficient to protect nearby personnel. Barricade tags will be required per HSP 302 *"Signs, Signals and Barricades."*

4.2.1.5 Each individual opening or cut location shall be identified by using a method to clearly mark where the opening or cut will take place. This shall be accomplished by:

4.2.1.5.1 Cut Location Points

4.2.1.5.1.1 Operations shall identify the process line to be cut in the presence of Maintenance.

4.2.1.5.1.2 At this time, the Process Cut Point Tag(s) shall be affixed to the process equipment by Maintenance at the process cut points in the presence of Operations. Only the work order number is written on the tag at this time.

4.2.1.5.1.3 Operations, Crew Leader and Craftsman performing the cut will sign and date the tag(s) at the time the cut or cuts will be made.

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

NOTE: If cuts are not completed the shift they were signed, the information for that shift must be updated or new Process Cut Point Tags must be issued and signed for the shift and or date the actual cuts will occur.

NOTE: If the Crew Leader is supervising the work and performing the cut, he/she would sign both “Crew Leader” and “Craftsman” portion of the Cut Location Point Tag.

4.2.1.5.1.4 Maintenance will remove the tags as they finish each cut.

4.2.1.5.1.5 No cuts will be allowed until Operations, Crew Leader and Craftsman have signed the tag(s).

4.2.1.5.2 Process Opening Point

4.2.1.5.2.1 Process Opening Points shall be identified by Operations utilizing the Process Opening Point Tag (Appendix 3).

4.2.1.5.2.2 The Process Opening Point Tag(s) shall be affixed at each Process Opening Point by Operations.

4.2.1.5.2.3 Operations will fill in the date, Work Order Number and sign the Process Opening Point Tag as he/she affixes the tags at each process opening point.

4.2.1.5.2.4 The Crew Leader will sign each Process Opening Point during the Line Opening Field Review with Operations.

4.2.1.5.2.5 Craftsman will remove the Process Opening Point Tags after opening each process point.

4.2.1.6 Emergency safety shower and eyewash locations must be identified and operability verified. If a fixed emergency safety shower or eyewash is not located near the line opening area, a portable ANSI or CSA approved safety shower/eye wash station must be set up near the line opening area.

4.2.2 Job Permitting

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

Operations

4.2.2.1 Only employees who are authorized shall write and issue permits.

4.2.2.2 Westlake Plaquemine will follow HSP 200 “*Safe Work Permitting*” to ensure a permit is issued for all openings on process piping, equipment and vessels that contained a hazardous material.

4.2.2.3 The permit shall be completed and reviewed to ensure all applicable requirements and potential hazards have been documented. Permit items unique to Line Opening include:

- In the “Nature of Work” section, check “Line Breaking”
 - Required PPE as outlined in Appendix 2 – “Minimum PPE Requirements for Line & Equipment Opening for Hazardous Materials”
 - In the “Line Opening” Section of the permit document:
 - “Cleared Process Confirmation” (Operation Signature/Time)
 - Required RED BARRICADE tape noting perimeter distance and location(s) or shielding requirements
 - That each line opening location has been physically identified in the field
- Line Opening Field Review (Operations/Crew Leader)
- Consider the following potential control and recovery measures if applicable:
 - Decontamination procedures specific for the potential hazards in the event of an exposure
 - Any containment or spill cleanup requirements

4.3 Line Opening Field Review

Operations & Crew Leader

4.3.1 A “Line Opening Field Review” will be conducted for all line openings involving process systems that last contained a hazardous material.

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

- 4.3.2 The review will take place at the job site and be led by the Operator issuing the permit. The individual responsible for supervising the work crew (Crew Leader) shall also be present for the field meeting.
- 4.3.3 The “Line Opening Field Review” shall verify and validate all energy isolation completed by Operations. They will complete a deenergization verification process to include going through each isolation point to verify that each energy source is completely deenergized, deactivated and isolated from the energy source, locks are in place, valves or blinds are in the correct position and review of all purging, flushing and draining activities.
- 4.3.4 During this meeting, the Crew Leader will sign all the Process Opening Point Tags.
- 4.3.5 All parties involved in the “Line Opening Field Review” must agree and document that the job preparation is complete and permit is ready to be issued and/or completed per HSP 200 “*Safe Work Permitting.*”
- 4.3.6 The “Line Opening Field Review” must be revalidated on the permit if the line opening activities have not commenced within 2 hours from the time when the permit to work was initially issued. Initials next to signatures with time by Operations and Crew Leader will document this revalidation.

4.4 Line Opening Pre-Job Safety Briefing

Crew Leader & Work Crew

- 4.4.1 A “Line Opening Pre-Job Safety Briefing” shall be completed for all openings on process piping, equipment or vessels that last contained a hazardous material.
- 4.4.2 The Crew Leader will complete the Job Safety Briefing with the work crew at the job site.
- 4.4.3 All work crew members must be present for the Job Safety Briefing.
- 4.4.4 The Job Safety Briefing shall address but is not limited to the following:

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

- 4.4.4.1 Approach all process piping, equipment and vessel openings last containing a hazardous material as having the potential of being full and under pressure.
 - 4.4.4.2 Detailed scope of work and visual confirmation of each identified opening
 - 4.4.4.3 Last Contained Hazardous Material
 - 4.4.4.4 Equipment and Methods to safely complete each line opening
 - 4.4.4.5 Location of emergency shower / eyewash stations
 - 4.4.4.6 Primary paths of egress for evacuation and discuss wind socks and wind direction
 - 4.4.4.7 Red Barricade Tape requirements establishing line opening work area
 - 4.4.4.8 PPE requirements as per Appendix 2 – Minimum PPE Requirements for Line & Equipment Opening for all work crew members working inside the red barricade tape
 - 4.4.4.9 Decontamination procedures specific for the potential hazards in the event of an exposure
 - 4.4.4.10 Ensure that all line opening crew members are aware of the potential hazards of the last known hazardous material contained in system and provide a SDS as needed for clarification.
 - 4.4.4.11 Provide clear instruction on body position and line of fire
 - 4.4.4.12 Discuss the proper way to open / break flanges – “down and away”
 - 4.4.4.13 If a leak or pressure is detected – be prepared to immediately retighten bolts to secure the opening and immediately contact Operations.
 - 4.4.4.14 If any plugging is discovered or is suspected stop work and notify Operations.
 - 4.4.4.15 If any abnormal conditions are identified, stop work and notify Operations.
- 4.4.5 The Crew Leader shall visually verify that each crew member has all the approved and required PPE donned correctly, equipment and materials to complete the job safely.
- 4.4.6 The Crew Leader must document that the Job Safety Briefing has been completed. Each work crew member must document that they participated in the Job Safety Briefing and understand all requirements and safe guards. This documentation is accomplished

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

by signing the “Permit Acceptance” Section of the Safe Work Permit.

WARNING:

Approach all process piping, equipment and vessel openings last containing a hazardous material as having the potential of being full and under pressure until a sufficient number of line openings have been completed to validate and document a “Cleared Process Confirmation “ by Operations.

4.5 Safe Process Piping, Equipment & Vessel Opening

Joint Accountability – Operations and Crew Leader

- 4.5.1 Operations, qualified in that area and Crew Leader shall be present during the initial opening or physical cut for each permitted job involving process piping, equipment or vessel openings that has or did last contain a hazardous material.
- 4.5.2 Operations and Crew Leader shall verify that all approved and required PPE is properly donned by each of the work crew who will be working inside the barricaded work zone.
- 4.5.3 Operations and Crew Leader will ensure only authorized personnel are allowed inside the barricaded work area and are wearing the required PPE to enter the work area.
- 4.5.4 Operations and Crew Leader shall ensure the areas above, below and around the location of the process piping, equipment or vessel opening(s) is appropriately barricaded, applicable barricade tags are in place and any non-essential personnel in the surrounding area are at safe distance.
- 4.5.5 Operations and Crew Leader shall ensure that all members of the work crew working inside the barricaded area stay suited in the approved and required PPE until a sufficient number of line opening(s) are completed to determine a Cleared Process Confirmation (CPC) documented on the permit by Operations and PPE has been updated on all copies of the Safe Work Permit.

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

The Cleared Process Confirmation

WARNING:

- The following **DO NOT CONSTITUTE** a Cleared Process Confirmation for process piping, equipment or vessels that last contained a hazardous chemical:
 1. Flushing and Purging process piping, equipment and vessels
 2. Opening and rodding low point drains
 3. Opening high point vents
 4. Vacuuming process piping, equipment or vessels
- If there is discovery or suspicion of plugging, line opening activities should be stopped and operations personnel consulted. Section 5 of this procedure shall be followed.

- 4.5.6 Once a sufficient number of line openings have been completed to begin the process of determining if the process is clear, Operations will verify the applicable tests to deem a Cleared Process Confirmation. **NOTE** – the person conducting these verifications must be donned in the approved and required PPE while working inside the barricaded work area.

NOTE: A “sufficient number” of line openings may be different depending on the design and configuration of the process. For jobs that require multiple opening points, the “initial line opening” shall never be considered “sufficient” to determine and validate a Cleared Process Confirmation. For jobs that require a single opening point, a CPC may be issued if a clear process can be validated.

NOTE: If Operations cannot verify a “Cleared Process” for any reason (i.e. leaking valve), a “Cleared Process Confirmation” shall not be granted. The work crew will remain in the original line opening PPE for the remainder of the permitted work.

- 4.5.7 Some examples of methods that can be used to perform to determine if a process piping, equipment or vessel is in a state of “Cleared Process” are the following:

- 4.5.7.1 Gases – utilize the appropriate calibrated gas instrumentation/meter and perform gas sampling at or

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

- in the opening(s) themselves and surrounding areas.
- 4.5.7.2 Visual – A visual confirmation that process piping, equipment or vessel is free of a hazardous material
- 4.5.7.3 Temperature – utilize the appropriate calibrated instrument to monitor surface or internal temperatures
- 4.5.7.4 Chemical indicators – utilize colorimetric tubes/pumps or “color changing” tape/paper to measure characteristics of the specific hazardous material
- 4.5.8 Based on the results of the visual and/or applicable quantitative verifications, Operations shall validate a Cleared Process Confirmation.
- 4.5.9 The Cleared Process Confirmation shall be documented in the “Line Opening” section on the Safe Work Permit with time, and signature.
- 4.5.10 Operations shall then assess what level of PPE is required to complete the remaining job activities. The adjusted PPE shall be documented in the PPE section of the permit and provide instruction to the work crew. Both the original and job copy must be adjusted with the new PPE requirements.

Work Crew

- 4.5.11 Craftsmen shall ensure prior to line opening work beginning that personal LOTO requirements have been completed and verified.
- 4.5.12 Craftsmen shall understand all items discussed during the Pre-Job Safety Briefing.
- 4.5.13 Craftsmen shall ensure approved and required PPE is donned and worn in its entirety while working within the barricaded work area until Operations has verified a Cleared Process Confirmation and approved a change in appropriate PPE and documented this change on the work permit.
- 4.5.14 Craftsmen shall follow safe process piping, equipment and vessel opening methods as detailed in Appendix 1 – Safe Line Opening Method Guidelines.
- 4.5.15 Craftsmen shall immediately contact Operations
- If any abnormal condition arises
 - Environmental conditions change

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

- Job scope needs to be adjusted
- Incident or injury occurs

4.5.16 Craftsmen will always work within the parameters stated on the permit.

5.0 Abnormal Process Piping, Equipment or Vessel Opening Conditions

- 5.1 This section addresses uncommon tasks associated with line openings that may have to be completed on an irregular basis.
- 5.2 If there is discovery or suspicion of plugging the Crew Leader shall stop all line opening activities and consult operations personnel.
- 5.3 If there is a section of process piping, equipment or vessel that cannot be depressured the Crew Leader shall consult operations personnel.
- 5.4 Operations will evaluate each potential plug and or section of process piping, equipment or vessel that cannot be depressured individually and the Production Unit Manager or his/her designee shall provide approval prior to any plug removal or pressure relieving activities.
NOTE: A new permit shall be required for each plug removal or relieving of pressure from sections of piping, equipment or vessels that cannot be depressured.
- 5.5 The pressure shall be removed releasing the potentially stored pressure in the safest and most controlled fashion.
- 5.6 The suspected plugged line or section of process piping, equipment or vessel shall be isolated from “in-service” piping by valves or in-line blinds as close as possible to the suspected plug or isolating the smallest section of pressurized piping following HSP 317 “*Control of Hazardous Energy*.”
- 5.7 This procedure shall be followed for all line openings.
- 5.8 When developing method to address plugging, reference HSP 317 “*Control of Hazardous Energy*”, Section 5.18.1 Plugged Line Safety Procedure.
- 5.8.1 In all cases the methodology chosen as well as a detailed work plan shall be approved by Production Unit Manager or his/her designee prior to any plug removal or pressure relieving efforts.

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

6.0 References

- OSHA 29 CFR 1910.119 (f)(4) – Process Safety Management of Highly Hazardous Chemicals.
- OSHA 29 CFR 1910.147 – Control of Hazardous Energy
- Tier 2 “Safe Process, Piping, Equipment and Vessel Opening”

7.0 Training

7.1 Employees shall be trained in the safe process piping, equipment and vessel opening procedure.

7.1.1 Employees will undergo initial training upon initial hire to the level of detail specific for position and or assignments.

7.1.2 Retraining shall be conducted when employees deviate from this procedure or show inadequacy of knowledge of this procedure. This retraining shall occur in the field at the time the deficiency is observed.

8.0 Program Effectiveness

Westlake Plaquemine shall institute a process that ensures this procedure is being adhered to in the field and is effective. This process shall be documented including field effectiveness observations and line opening permit audits. Deficiencies shall be addressed with participants in the field and communicated to Line Management. Corrective actions shall be documented in Enablon and tracked to completion.

Revision History

Rev	Changes	Approved	Date
10	Rebranded with new Westlake logo.	H. Garner	4/30/22

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

APPENDIX 1

Safe Line Opening/Break Method Guidelines

Process piping, equipment and vessels last containing a hazardous material must be assumed to be full and under pressure until the line openings are completed and a Cleared Process Confirmation has been completed by the Crew Leader or supervisor.

All work crew members working inside the red barricaded work area shall be suited with the approved and required PPE specific to the hazardous material. Shielding will be utilized when required.

WARNING:

- Bolts that have become corroded or seized which need to be replaced shall be completed one at a time prior to Line Opening activity.
- Line Opening Activities may begin once all the damaged bolts have been replaced and are secure
- Additional Permitting may be required such as a hot work permit if bolts need to be burned or cut off.
- Hot Bolting – Plaquemine will follow site specific procedures and best engineering practices for all Hot Bolting activities.

A. Safe Line Opening / Break – 4 Bolt Flanges

1. Position your body on the opposite side out of the “line of fire” of where you plan to loosen the first bolt as shown below in figure 1.
2. While in this position, loosen the first bolt (bolt position “3” in Figure 1) slowly “down and away” making sure not to fully remove the nuts and or bolt.
3. Try to determine if the process piping, equipment or vessel is still under pressure by LISTENING for the sound of escaping gas and WATCHING for liquid. Caution should also be given for systems that might be under vacuum.

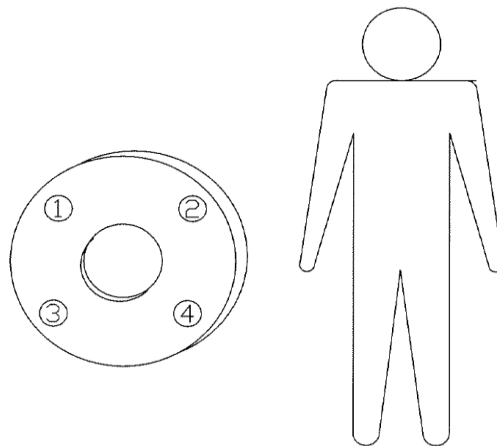
HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

4. If no pressure is detected or leakage is observed, continue to loosen the second bolt (bolt position “1” Figure 1) again making sure not to fully remove the nuts and or bolt. Again, Listen and Watch for pressure and or leaking material.
5. The use of a spreader bar or other device may be utilized to spread the flanges to break the seal if required. Bolts shall not be removed until the flange gasket seal is broken.
6. If no leakage occurs, loosen remaining 2 bolts keeping nuts on all bolts until inside condition can be verified not to be under pressure, vacuum or is leaking.
7. Once a safe condition is observed all nuts can be removed.
8. NOTE – Always be prepared to retighten the nuts and secure the process system in an emergency or in the case of an abnormal condition.
9. The same method should be followed on flanges which have additional bolt holes – always loosen first “down and away.”

B. Safe Line Opening / Break – Threaded Connections

1. Position your body away from the “line of fire” and slightly loosen the fitting no more than a few threads.
2. Try to determine if the process piping, equipment or vessel is still under pressure by LISTENING for the sound of escaping gas and WATCHING for liquid around threaded fitting. Caution should also be given for systems that might be under vacuum.
3. If no pressure is detected or leakage is observed, continue to loosen the threaded fitting a few more threads making sure not to fully remove the fitting. Again, Listen and Watch for pressure and or leaking material.
4. If no pressure is detected or leakage is observed, continue to loosen the threaded fitting a few more threads making sure not to fully remove the fitting. Again, Listen and Watch for pressure and or leaking material.
5. At this point gently jiggle the threaded connection. If no pressure or leakage is detected move the threaded fitting.

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure





Document Number: HSP 307
Prepared By: A. Downing
Manager Approval: Hillary Garner

Current Rev: 5/24/22
Revision No: 10
Page 19 of 19

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure

HSP 307 APPENDIX 2: MINIMUM PROTECTIVE CLOTHING REQUIRED FOR POSSIBLE CHEMICAL CONTACT ¹															
June 25, 2019															
Plaquemine Master List PPE MATRIX															
CHEMICAL NAME	Chemical Protective Clothing				Respiratory Protection ²			Face/Eye Protection ³	Chemical Gloves						Chemical Boots
	CPF3 or Z300 w/ hood ⁴	Tychem SL w/ hood	Tyvek Coveralls "paper suits"	Chemical Slicker w/ hood	Supplied Air (SAR/SCBA)	Air Purifying ⁵ (full-face)	Disposable N-95 Filtering Facepiece	Monogoggles ⁶ and Faceshield	Nitrile (Best #730)	Neoprene (Best #6780)	Butyl (Best #878)	Viton-Butyl ⁷ (Best #890)	PVC (Best #634R)	Durable Work Gloves	PVC or Neoprene Boots
Acetone	X					X		X		X	X	X			X
Nalco 7468 Anti Foam								X	X						X
AF-12 Antifoam				X				X	X						X
Alpha-Methyl Styrene	X					X		X		X		X			X
AM 26				X				X			X				X
Anhydrous Ammonia		X			X			NA	X	X	X	X			X
Anox				X				X	X						X
Benzene	X				X			NA				X			X
Boiler Treatment (Nalco 1742)								X	X						X
Caustic Soda (Sodium Hydroxide)		X				X		X	X	X	X	X	X		X
Chlorine - liquid	X				X			NA				X			X
Chlorine - gas		X			X			NA	X	X	X	X			X
Nalco 3DT177				X				X	X						X
Nalco 3DT190								X	X						X
Cumene	X					X		X	X			X			X
Cumene Hydroperoxide	X				X			X			X	X			X
Ethylene (gas)					X			NA				X			
Ethylene Dichloride (EDC)	X				X			X		X	X	X			X
Evicas 90		X						X	X						X
Freon		X						X	X						X
Glycomul				X				X	X						X
Hydrated Lime			X				X	X		X					X
Hydrochloric Acid		X				X		X	X	X	X	X	X		X
Hydrogen/Natural Gas					X			NA						X	
Methocel Dispersants		X						X	X						X
Nitrogen					X			NA						X	
OS-1								X	X						X
OS-2002								X	X						X
P-14				X				X		X					X
Phenol	X					X		X		X	X	X			X
Phenol Heavy Bottoms		X						X		X					X
Phosphate (Ammonium Polyphosphate)								X	X						X
Plant Air								X						X	
PVC Initiators (Organic Peroxides)	X					X	X						X		
PVA Dispersants (Alcotex)		X						X	X						X
PVC Slurry (Stripped)				X				X	X						X
PVC Slurry (Unstripped)				X	X			X	X			X			X
PVC Resin			X					X						X	
Tris (2-chloroethyl) amine	See "VCM Liquid Phase Direct Chlorination Area Safe Work Program" for information on Chemical PPE														
RO-5				X				X	X						X
Sanitary Waste Water (Biohazard)		X						X	X						X
Soda Ash			X				X	X		X					X
Sodium Hypochlorite (Hypo)		X						X	X	X					X
Sodium Nitrite (solution)		X						X	X						X
Sodium Sulfite (15%)		X						X	X						X
Sodium Thiosulfate (30%)		X						X	X						X
Steam Condensate				X				X	X	X	X	X	X	X	X
Sulfuric Acid		X				X		X	X	X	X	X	X		X
Trichloroethylene (TCE)	X				X			X				X			X
Vinyl Chloride- Liquid		X			X			NA	X		X	X			X
Vinyl Chloride- Vapor					X			NA	X		X	X			
Water ⁷				X				X	X	X	X	X	X	X	X

¹ When chemical hazards cannot be controlled by employing effective engineering and/or administrative controls, appropriate personal protective equipment (PPE) may be used. The personal protective equipment requirements provided in this table are based on the assumption that process piping, equipment and vessels last containing a hazardous material may not be empty and have not been decontaminated. PPE shall not be downgraded until the line openings are completed and a Cleared Process Confirmation has been completed by operations. Some routine operations/maintenance tasks may warrant a lesser level of PPE than what is specified in this table and may be downgraded if a PPE hazard assessment supports the decision. Physical hazards (i.e. electrical, thermal, cut, abrasion, vibration, etc.) should also be considered when selecting appropriate PPE.

² All line opening tasks will be evaluated on an individual basis to determine the necessary level of respiratory protection. Based on an assessment, a full-face piece air purifying respirator may be acceptable for routine operations/maintenance tasks. If a hazard assessment determines that the recommended respiratory protection is not necessary, both a faceshield and monogoggles are required to be worn for liquid splash.

³ Dupont Tychem CPF3 and Kappler Zytrol 300 (Z300) suits provide equivalent chemical protection and can be interchanged.

⁴ The correct air-purifying cartridge must be selected for the potential hazard(s). The user must consider the physical state and concentration of all chemical agents involved as well as environmental conditions. (Contact a Westlake industrial hygienist for assistance or upgrade the respiratory protection to supplied air if there is any uncertainty.) Discard cartridges immediately after use or according to a written change-out.

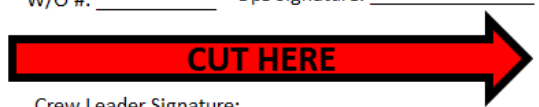
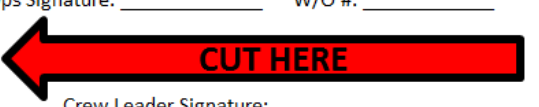
⁵ Monogoggles should be non-vented or have indirect vents (vent covers and/or baffles that preventing straight-line passage of liquids into the goggles). Monogoggles shall be adjusted so that they seal tightly against the face. N/A means that eye and face protection are provided by a full-face piece respirator. If determined by a Risk Assessment that respiratory protection is not needed, then monogoggles and face shield are

⁶ Users should be cautioned in using gloves made of a Viton/butyl rubber laminate as some chemicals (i.e. acetone) may cause severe swelling of Viton but has little effect on the butyl rubber. This may cause permanent damage to the gloves.

⁷ The composition of any water involved in a line opening must be taken into consideration. For potable water, a rain suit is acceptable.

HEALTH AND SAFETY PROGRAM 307 – Safe Process Piping, Equipment & Vessel Opening Procedure



Date: _____ ● Shift: Day ☐ Night ☐ W/O #: _____ Ops Signature: _____  Crew Leader Signature: _____ Craftsman Signature: _____ ●	Date: _____ ● Shift: Day ☐ Night ☐ Ops Signature: _____ W/O #: _____  Crew Leader Signature: _____ Craftsman Signature: _____ ●
--	---



**PROCESS
OPENING POINT**

DATE: _____

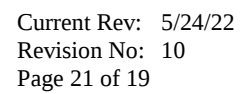
W/O #: _____

OPERATIONS :

Signature

CREW LEADER:

Signature

[illegible]