Note: When contractors are involved in the job, a Westlake Coordinator shall be involved in the Pre-Job discussion and note on permit as such.

1. Purpose

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

2. Scope

2.1 The scope of this procedure applies to anyone performing activities 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, 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 3.8.

2.2 Reference Appendix 2 for minimum PPE requirements for "unverified" process openings. If a process opening will involve a hazardous material not found in Appendix 2, then the Safety Data Sheet shall be reviewed by the Safety Department and a determination will be made.

2.3 There are numerous activities that are performed each day as part of normal operations that present potential hazards that will not fall under the scope of this procedure, but will require that an associated risk assessment be completed and documented as part of a standard operating/maintenance procedure or written Job Safety Analysis. Some of those normal daily operational activities include but may not be limited to:

2.3.1 Flushing / Draining Process Equipment

2.3.2 Opening Vents, Bleeders and Maintaining Gauges

2.3.3 Routine Maintenance on Instrumentation & Process Analyzers

2.3.4 Routine Sampling Activities

2.3.5 Routine Maintenance on steam traps open to atmosphere by complex maintenance steam trap crew.

Additional activities may be added upon a Safety Department review.

NOTE: Personnel performing these activities shall, at a minimum, wear the personal protective equipment required by the risk assessment associated with the Standard Operating Procedure (SOP) or Standard Maintenance Procedure (SMP) or written Job Safety Analysis (JSA). See section 4.2.3.1 for guidance.

2.4 If Operation personnel will be completing a process opening as defined in the scope 2.1 and definition 3.15, then all requirements detailed in sections 4.1, 4.2, 4.3 and 4.4 shall be followed. A permit will not be required when operation personnel perform a process opening, but all operations personnel will be required to adhere to the appropriate PPE determined in this procedure.

2.5 When working under a sniff deviation at N/S Liquefaction, follow the sniff deviation procedure (#1001-00-9301) for working on this process.

3. Definitions

3.1 Affected Process Opening Personnel – The fewest number of personnel required to perform the process openings. All non-essential personnel (those who are not physically performing the process opening) shall be outside the line opening affected area at all times.

3.2 Bleeder – Valve controlled 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) – Determination conducted once necessary openings have been completed. Quantitative verifications should be the primary method followed by Qualitative methods to confirm that piping, equipment, and/or vessel(s) have been adequately drained, de-pressured, cleared, and/or purged.

3.5 Maintenance/Construction Supervisor or Foreman – 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).

3.6 Equipment Operator – An A Operator, B Operator, C Operator, or D Operator assigned to an area or unit who operate the process related piping, vessels and equipment.

3.7 Equipment Owner – The Lead Operator or Operations Supervisor assigned to an area or unit who operate the process related piping, vessels and equipment.

3.8 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).

3.9 Isolated – The placement of an energy isolating device that physically prevents the transmission of release of energy as outlined in Lock Out Procedure 4301-06-306.

3.10 Opening – The act of physically opening, physically cutting into or breeching the integrity of closed Process Piping, Equipment or Vessel(s) that normally or last contained a hazardous material.

3.11 Permit authorizing Individual – The person designated to authorize the opening of process lines, equipment, and/or vessel(s).

3.12 Personal Protective Equipment – Clothing and/or equipment that is worn or used in order to provide protection against contacting hazardous materials.

3.13 Line Opening Affected Area – The area barricaded around the process piping, equipment or vessel to be opened. The affected area determination is dependent upon the level of verification achieved in section 4.3.

3.14 Line Opening Field Review – The review will take place at the job site and be led by the Equipment Owner/Operator and Maintenance or Construction Supervisor. A review of the LOTO will be conducted as well as identifying each line opening location. All line opening locations must be identified as per 4.3.2.3 (verified clear – no obstruction) and 4.3.3.5 (unverified). **Note:** When contractors are involved in the job, a Westlake Coordinator shall be involved in the pre-job discussion and note on permit as such.

3.15 Pre-Job Safety Briefing – Detail review of the job (covered on the Safe Work Permit.)

3.16 Process Equipment – Any process related piping, pipelines, bleeders, tanks, vessel, towers, columns, reactors, valves, pumps, blinds or any other equipment in process service.

3.17 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.

3.18 Process Piping, Equipment or Vessel Safe Closing – The closing or reassembly of process piping, equipment or vessel that contained or contains a hazardous material.

3.19 Process Piping, Equipment or Vessel Safe Opening – The act of physically opening, physically cutting into or breeching 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.

3.20 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.

3.21 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)

3.22 Qualitative Verification – The use of a device or process to measure process hazard materials to provide a positive indication of process conditions. Examples include, but not limited to, visual verification, chemical indicators (colorimetric tubes or tape/paper), surface temperature of the external piping and measuring internal conditions (Thermal Imaging).

3.23 Visual Verification – A visual confirmation that process piping, equipment or vessel is clear of a hazardous material obtained by running air, water or nitrogen through the vessel, equipment or process piping. See FAQ #2 4301-06-315A

3.24 Westlake Coordinator – An employee that will facilitate a healthy pre-job conversation

between operations and contractor as an additional layer of protection for jobs performed by contractors.

4. Safe Process Piping, Equipment & Vessel Opening Procedure

4.1 Pre-Line Opening Job Preparations

4.1.1 Prior to any line opening involving process piping, equipment or vessel, all process systems involved in the opening shall be shut down and all potential energy isolated and de-energized per **Lockout Procedure – 4301-06-306.**

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

4.1.2.1.1 There may be several options for clearing, purging and depressurizing a system containing a hazardous material and will be dependent on the system layout and design. Standard Operating Procedures should always be followed. Some options may include but are not limited to the following:

4.1.2.1.2 High Point vents and Low Point drains

4.1.2.1.3 Purging/Flushing with Steam, Water, Air or Nitrogen

4.1.2.1.4 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.

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 depressurized, 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.

4.2 Clearance Verification

4.2.1 Clearance verification shall be conducted by the Equipment Owner/Operator and the Maintenance/Construction Supervisor or Forman to review the method and results of the clearing process.

4.2.1.1 A determination made based on visual and quantitative results whether or not the process is "verified clear - no obstruction" or "unverified".

4.2.1.2 In some instances, there may be situations where the PPE in Appendix 2 for unverified can be adjusted based on the evaluation of the job. The determination is decided and adjusted PPE for the task listed on the permit. See example in FAQ for Line Breaks #4301-06-315A.

4.2.2 Clearance verification will be agreed upon by the Equipment Owner/Operator and the Maintenance/Construction Supervisor and a plan to safely complete the task will be formulated and documented on the Safe Work Permit.

4.2.3 Personal Protective Equipment shall be determined and documented on the Safe Work Permit.

4.2.3.1 Minimum PPE for "Verified Clear" (No Obstruction) openings is normal PPE plus Goggles and Face Shield and the appropriate gloves. When vapors may be present, respiratory protection shall be addressed based on quantitative verification. Otherwise, a full-face respirator with appropriate cartridges worn.

4.2.3.2 Minimum PPE for "Unverified" openings listed in Appendix 2.

4.3 Line Opening Job Planning

4.3.1 Job Permitting

Equipment Owner/Operator and Maintenance/Construction Supervisor

Note: When contractors are involved in the job, a Westlake Coordinator shall be involved in the pre-job discussion and note on permit as such.

4.3.1.1 Only employees who are AUTHORIZED shall write and issue permits.

4.3.1.2 Follow established work permitting process (Safe Work Permit and Job Ready Tag) to ensure a permit is issued for all openings on process piping, equipment and vessels that contained a hazardous material.

4.3.1.3 The Safe Work permit and the Job Ready Tag shall be completed and reviewed to ensure all applicable requirements and potential hazards have been documented. Items to consider:

4.3.1.3.1 Detailed description of the task of job and location

4.3.1.3.2 Prior contents contained in the process piping, equipment or vessel

4.3.1.3.3 Required PPE as determined during the Clearance Verification in 4.2

4.3.1.3.4 If required **(unverified)**, RED BARRICADE

tape noting perimeter distance and location(s) or shielding requirements.

4.3.1.3.5 Document that each line opening location has been physically identified in the field by placing a Line Cut or Process Opening Tag.

4.3.1.3.6 Any containment or spill cleanup requirements.

4.3.1.3.7 The duration of the permit for all Line Openings.

4.3.1.4 The Process Opening Field Review as defined in 4.4 must be revalidated if the process opening activities have not commenced within **2 hours from the time when the permit to work was initially issued**.

4.3.2 Job Site Preparation (**Verified Clear**-(No Obstruction)

Equipment Owner/Operator and Maintenance/Construction Supervisor

4.3.2.1 The process opening affected area may be barricaded with red barricade tape and tags per 4301-06-343 Plant Barricades, at the determination of the Clearance Verification.

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

4.3.2.3 Each individual opening location shall be identified during the Process Opening Field Review and marked with Line Cut or Process Opening Tag.

4.3.2.4 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 approved safety shower/eye wash station must be set up near the line opening area but outside the barricade.

4.3.3 Job Site Preparation (**Unverified**)

Equipment Owner/Operator and Maintenance/Construction Supervisor

4.3.3.1 The process opening affected area **shall** be barricaded with red barricade tape and tags per #4301-06-343 Plant Barricades, at a minimum of 10’ horizontal radius from the point of the opening for process openings at grade.

4.3.3.2 For elevated process openings the process 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’ horizontal 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.

4.3.3.3 Shielding may be used when the use of barricade tape is

impractical to protect nearby personnel, piping and equipment.

4.3.3.4 Each opening should be individually evaluated to ensure the minimum distances stated are sufficient to protect nearby personnel. The use of posted warning, danger or keep out signs may also be warranted based on the job planning process.

4.3.3.5 Each individual opening location **shal**l be identified during the Process Opening Field Review and marked with a Line Cut Tag or Process Opening Tag. 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 will be accomplished by the following:

Process Opening Point:

- Process opening points shall be identified by Operations/Owner utilizing the Process Opening Tag(s).
- The Process Opening Tag(s) shall be affixed at each Process Opening Point by Operations/Owner.
- Operations will fill in the date, work order number and print name on the Process Opening Tag as he/she affixes the tags at each process opening point.
- The maintenance/construction supervisor will print name on the Process Opening Tag(s) at each opening during the field review with operations/owner.
- Craftsmen will remove the Process Opening Tag(s) after each process point opening.

Cut Locations:

- Operations/Owner shall identify the process line to be cut in the presence of maintenance.
- At this time, the Process Cut Point Tag shall be affixed to the process equipment by maintenance/construction at the process cut point in the presence of operations/owner.
- Owner/Operations, maintenance/construction supervisor and craftsman performing cut will print name and date on the tag(s) at the time the cut or cuts will be performed.
- Maintenance will remove the tags as they finish each cut.
- No cuts will be allowed until Operations/Owner, Maintenance/Construction Supervisor and Craftsman have printed names on the tag(s).

Note: If cuts are not completed on the shift they were signed, the information for that shift must be updated or new Process Cut Tags must be issued and name printed for the shift and date the actual cuts will be made.

4.3.3.6 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 process opening area, a portable ANSI approved safety shower/eye wash station must be set up near the line opening, but outside the barricade.

4.4 Process Opening Field Review

Equipment Owner/Operator and Maintenance/Construction Supervisor

4.4.1 A Process Opening Field Review will be conducted for all process openings involving process systems that last contained a hazardous material.

4.4.2 The review will take place at the job site and be led by the Equipment Owner/Operator. The individual responsible for supervising the work crew (Maintenance/Construction Supervisor) shall also be present for the field meeting. **Note:** When contractors are involved in the job, a Westlake Coordinator shall be involved in the pre-job discussion and note on permit as such.

4.4.3 The Process Opening Field Review shall verify and validate all energy isolation completed by the equipment owner. They will complete a de-energization verification process to include going through each isolation point to verify that each energy source is completely de-energized, 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.

4.4.4 All parties involved in the Process Opening Field Review must agree and document that the job preparation is complete and permit is ready to be issued and or completed.

4.4.5 These steps are covered as part of the Safe Work Permitting process and Lockout Tag out process.

Equipment Owner/Operator

4.4.6 The equipment owner shall complete the Process Opening Field Review and associated requirements of section 4.3 with the Work Crew if the Work Crew will be working under the direct supervision of the Equipment Owner/Operator.

4.5 Process Opening Pre-Job Safety Briefing (Safe Work Permit)

Maintenance/Construction Supervisor or Foreman & Work Crew

4.5.1 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.

4.5.2 The Maintenance/Construction Supervisor will complete the Job Safety Briefing with the work crew at the job site.

4.5.3 All work crew members must be present for the Job Safety Briefing.

4.5.4 The Job Safety Briefing shall address but is not limited to the following:

4.5.4.1 Approach all process piping, equipment and vessel openings last containing a hazardous material as having the potential of being full and under pressure.

4.5.4.2 Detailed scope of work and visual confirmation of each identified opening. 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 is accomplished by:

Process Opening Point:

- Process opening points shall be identified by Operations/Owner utilizing the Process Opening Tag(s).
- The Process Opening Tag(s) shall be affixed at each Process Opening Point by Operations/Owner.
- Operations will fill in the date, work order number and print name on the Process Opening Tag as he/she affixes the tags at each process opening point.
- The maintenance/construction supervisor will print name on the Process Opening Tag(s) at each opening during the field review with operations/owner.
- Craftsmen will remove the Process Opening Tag(s) after each process point opening.

Cut Locations:

- Operations/Owner shall identify the process line to be cut in the presence of maintenance.
- At this time, the Process Cut Point Tag shall be affixed to the process equipment by maintenance/construction at the process cut point in the presence of operations/owner.
- Owner/Operations, maintenance/construction supervisor and craftsman performing cut will print name and date on the tag(s) at the time the cut or cuts will be performed.
- Maintenance will remove the tags as they finish each cut.
- No cuts will be allowed until Operations/Owner, Maintenance/Construction Supervisor and Craftsman have printed names on the tag(s).

Note: If cuts are not completed on the shift they were signed, the information for that shift must be updated or new Process Cut Tags must be issued and name printed for the shift and date the actual cuts will be made.

4.5.4.3 Last Contained Hazardous Material.

4.5.4.4 Equipment and Methods to safely complete each line opening.

4.5.4.5 Location of emergency shower / eyewash stations.

4.5.4.6 Primary paths of egress for evacuation and discuss wind socks and wind direction.

4.5.4.7 Red Barricade Tape requirements establishing line opening work area.

4.5.4.8 PPE requirements as per Appendix 2 for all work crew members working inside the red barricade tape.

4.5.4.9 Decontamination procedures specific for the potential hazards in the event of an exposure.

4.5.4.10 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.

4.5.4.11 Provide clear instruction on body position and line of fire.

4.5.4.12 Discuss the proper way to open / break flanges – “down and away”.

4.5.4.13 If a leak or pressure is detected – be prepared to immediately retighten bolts to secure the opening and immediately contact the Maintenance/Construction Supervisor.

4.5.4.14 If any plugging is discovered or is suspected stop work and notify Maintenance/Construction Supervisor.

4.5.5 If any abnormal conditions are identified, stop work and notify Maintenance/Construction Supervisor.

4.5.6 The individual supervising the work crew shall visually verify that each crew member has all the approved and required PPE donned correctly, equipment and materials to complete the job safely.

4.5.7 The individual supervising the work crew 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 safeguards by signing the Safe Work Permit.

Operation Personnel

4.5.8 The operation supervisor must complete the Job Safety Briefing and the requirements of section 4.5 with the Work Crew if the Work Crew will be working under the direct supervision of the Operations Supervisor. **Note:** When contractors are involved in the job, a Westlake Coordinator shall be involved in the pre-job discussion and note on permit as such.

4.6 Safe Process Piping, Equipment & Vessel Opening

Equipment Owner/Operator or Maintenance/Construction Supervisor

4.6.1 Equipment Owner/Operator and Maintenance/Construction Supervisor shall verify that each opening be properly marked with a Line Cut or Process Opening location tag.

4.6.2 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.

4.6.3 If barricading or shielding is present, will ensure only authorized personnel are allowed inside the barricaded work area and are wearing the required PPE to enter the work area.

4.6.4 Ensure the areas above, below and around the location of the process piping, equipment or vessel opening(s) is appropriately barricaded, applicable signage is in place and any non-essential personnel in the surrounding area are at safe distance for unverified openings.

4.6.5 Shall ensure that all members of the work crew working in the area stay suited in the approved and required PPE until the line opening(s) are completed and a Cleared Process Confirmation (CPC)-No Obstruction can be determined by the equipment owner.

4.6.6 Once all process openings have been completed the Equipment Owner/Operator will verify the applicable tests to deem a Cleared Process Confirmation (No obstruction). **NOTE** – the person conducting these verifications must be donned in the approved and required PPE if working in the area.

4.6.7 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:

4.6.7.1 Gases – utilize the appropriate calibrated gas instrumentation/meter and perform gas sampling at or in the opening(s) themselves and surrounding areas.

4.6.7.2 Visual (No Obstruction) – A visual confirmation that process piping, equipment or vessel is free of a hazardous material

4.6.7.3 Temperature – utilize the appropriate calibrated instrument to monitor surface or internal temperatures

4.6.7.4 Chemical indicators – utilize color metric tubes / pumps or "color changing" tape/paper to measure characteristics of the specific hazardous material

4.6.8 Based on the results of the Visual and applicable quantitative verifications, validate a Cleared Process Confirmation allowing the work crew to adjust to the appropriate PPE as determined by the Supervisor of the crew, but not below the minimum PPE referenced in Sect. 4.2.3.1.

4.6.9 The Cleared Process Confirmation (No Obstruction) shall be documented on the Safe Work Permit by signature and adjusted, if needed, PPE noted.

Work Crew

4.6.10 Shall ensure prior to process opening work beginning that personal LOTO requirements have been completed and verified.

4.6.11 Understand all items discussed during the Job Safety Briefing.

4.6.12 Ensure approved and required PPE is donned and worn in its entirety while working within the work area until the Cleared Process Confirmation (CPC) (No Obstruction) is determined and the Safe Work Permit signed.

4.6.13 Follow safe process piping, equipment and vessel opening methods as detailed in Appendix 1 – Safe Line Opening Method Guidelines. Verify Line Cut or Process Opening location tags and sign off on Line Cut Tag if a line cut will take place.

4.6.14 Immediately contact the Maintenance/Construction Supervisor if any abnormal condition arises.

5. Unverified Process Piping, Equipment or Vessel Opening Conditions

5.1 In some instances, there may be situations where the PPE in Appendix 2 for unverified can be adjusted based on the evaluation of the job reviewed during the field review. The determination can be decided and adjusted PPE for the task listed on the form prior to the signatures. See example in FAQ for Line Breaks #4301-06-315A.

5.2 This section addresses uncommon tasks associated with process openings that may have to be completed on an irregular basis.

5.3 If there is discovery or suspicion of plugging the Maintenance/Construction Supervisor should stop all process opening activities and consult operations personnel.

5.4 If there is a section of process piping, equipment or vessel that cannot be depressurized the Maintenance/Construction Supervisor should consult operations personnel.

5.5 A team of experienced site personnel will need to evaluate each potential plug and or section of process piping, equipment or vessel that can’t be depressurized individually and shall provide approval prior to any plug removal or pressure relieving activities.

5.6 A new permit may be required for each plug removal or relieving of pressure from sections of piping, equipment or vessels that cannot be depressurized.

5.7 The pressure shall be removed releasing the potentially stored pressure in the safest and most controlled fashion.

5.8 The suspected plugged line or section of process piping, equipment or vessel should 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 the LOTO procedure.

5.9 This procedure shall be followed for all "unverified" process openings.

5.10 The following methods should be considered as part of the team's analysis to remove the plug or relieve pressure.

5.10.1 Using bleeders to relieve pressure on both sides of the suspected plug.

5.10.2 Opening / Breaking flanges to relieve pressure on both sides of the suspected plug.

5.10.3 If no bleeders or flanges are present, drilling holes in pipe on both sides of the plug to relieve pressure. Once pressure has been relieved, cut the pipe using "cold cut methods" at the location of the drilled pilot holes.

5.10.4 In all cases the methodology chosen as well as a detailed work plan shall be approved by the site team prior to any plug removal or pressure relieving efforts.

6. References

6.1 OSHA 29 CFR 119(f)(4) – Process Safety Management of Highly Hazardous Chemicals.

6.2 OSHA 29 CFR 1910.147 – Control of Hazardous Energy

7. Training

7.1 Initial training for all employees on revisions.

7.2 Retrain on an as needed basis.

APPENDIX 1

Safe Process Opening/Break Method Guidelines

All work crew members working inside the barricaded work area shall be suited with the approved and required PPE specific to the hazardous material agreed upon and documented on the Safe Work Permit. Shielding will be utilized when required.

A. Safe Line Opening / Break

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 "1" 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.
4. If no pressure is detected or leakage is observed, continue to loosen a second bolt "away" from your body position, 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.

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.

APPENDIX 2

See Procedure Link for specific Personal Protective requirements:

APPENDIX 3

Half-Bolting Guidelines

1) Purpose:

a) The purpose of these guidelines is to give parameters and expectations to half-bolting a flange. ***Note:*** *This is not to be confused with hot bolting (changing bolts while a system is under pressure without a lockout).*

2) Definitions:

a) **Half-Bolting**-The removal of every other bolt (so the flange is left with half the number of bolts) during plant depressurization, when the system is close to atmospheric pressure. (It is sometimes called Skip-Bolting or Odd-Bolting)

b) **Bolt**-An all-inclusive term for any type of threaded fastener that can be used in a pressure boundary bolted flange joint assembly such as bolt, stud, stud bolt, cap screw, etc.

3) Precautions:

a) Although half bolting removing guidelines can reduce plant downtime, they are potentially hazardous and therefore caution shall be exercised in their planning and execution.

b) When conducting half bolting removal, the risk of fluid leakage is increased due to reduced gasket compression and the possibility that the system may inadvertently repressure. For this reason, the system pressure at which half bolting is conducted, should be well below design pressure and at or near atmospheric pressure, with controls in place to prevent repressurization.

4) Guidelines:

a) A JSA must be conducted to identify all potential hazards, the potential consequences, with necessary mitigations and/or precautions identified.

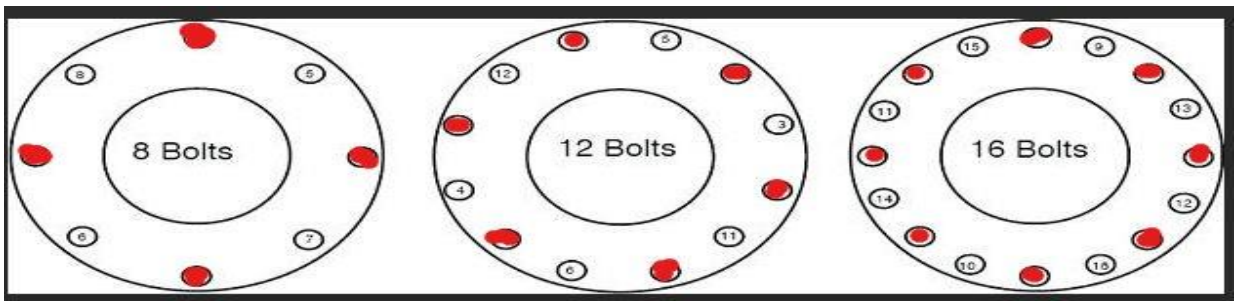
b) Flanges for half bolting must have a minimum of **eight (8) bolts.**

c) Confirmation that the pressure has been reduced **and** that the repressurization is not feasible**, is obtained from operations before the half bolting removal operation is started.**

d) To anticipate flange bolt relaxation, every bolt must be checked for tightness prior to removing the first bolt. Tightness must be checked by applying torque with either a hand wrench or a hydraulic torque wrench. Do not use hammer or pneumatic wrenches.

e) All flanges must be adequately supported and not subject to excessive vibration, pulsation or shock/impact loading.

f) The flange gasket area must not show signs of leakage and the piping, flanges and the bolts and nuts must not be significantly corroded (i.e., to the point of affecting the integrity of the metal).



APPENDIX 4
Unverified Process Opening Checklist and Approval

Date: _____

Line Service: _____ **Permit #** _____

Material Last Contained: _____

Is the material corrosive? Yes/No Toxic? Yes/No Flammable? Yes/No Hazardous? Yes/No

CLEANING/PURGING

1. How was the system cleaned/purged? _____
2. Is the line completely depressurized, and how is that determined? Yes/No
3. Has each opening location been identified? Yes/No Number of opening locations _____
4. Was a notification written for additional bleeds? Yes/No Notification # _____

WHAT'S LEFT INSIDE?

1. Any process coating the lines or layering? _____ Yes/No
2. Liquid level? _____ Yes/No
3. Any trapped Liquids? _____ Yes/No
4. Will you be disturbing a material after opening that could contain volatiles and suddenly increase the LEL? Yes/No
5. Are there any vapors present? Yes/No Determined how? _____ Concentration: _____

UNVERIFIED LINE OPENING

1. Why is the line not able to be cleared? _____
2. What is the plan to execute work**?** _____
3. PPE Requirements _____

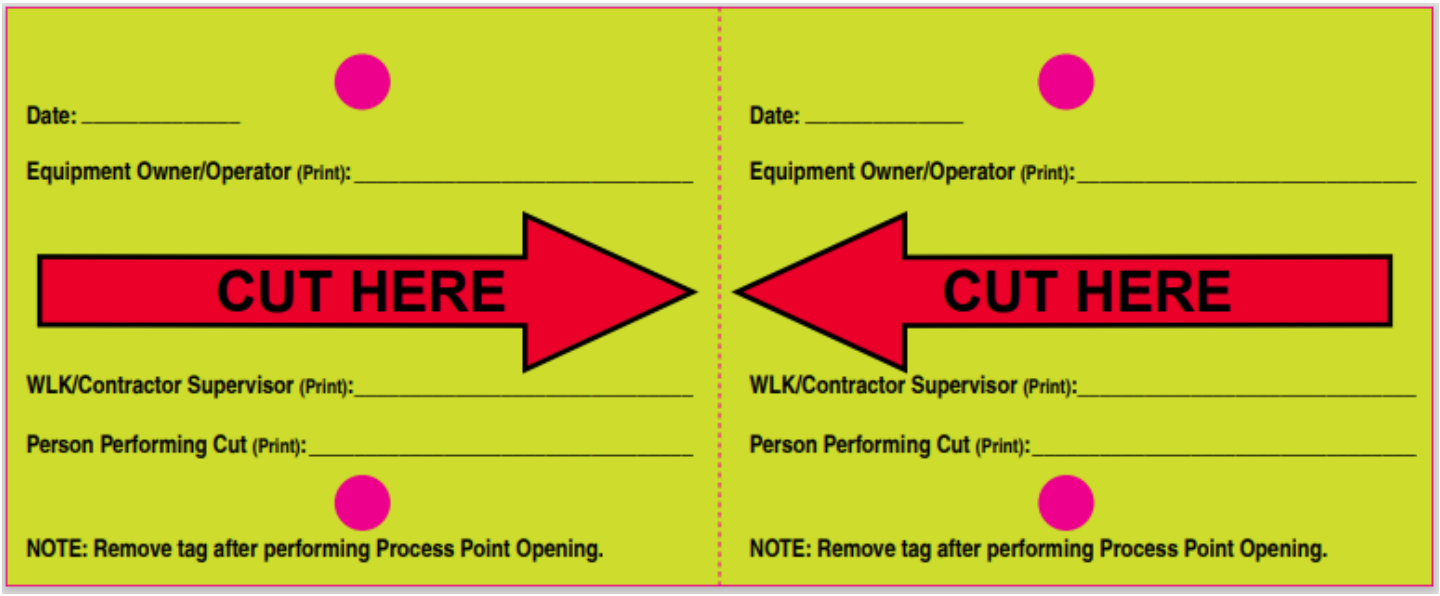
Checklist completed by Operator _____ Date: _____

Approved by Operations Superintendent or Designee _____ Date: _____

Approved by Maintenance Superintendent or Designee _____ Date: _____

Approved by Contractor Superintendent _____ Date: _____

Approved by Safety Representative _____ Date: _____


Date: _____
Equipment Owner/Operator (Print): _____
CUT HERE
WLK/Contractor Supervisor (Print): _____
Person Performing Cut (Print): _____
NOTE: Remove tag after performing Process Point Opening.
Date: _____
Equipment Owner/Operator (Print): _____
CUT HERE
WLK/Contractor Supervisor (Print): _____
Person Performing Cut (Print): _____
NOTE: Remove tag after performing Process Point Opening.


PROCESS
OPENING POINT
DATE: _____
EQUIPMENT OWNER/OPERATOR:
_____
Printed Name
WLK/CONTRACTOR SUPERVISOR:
_____
Printed Name
NOTE: Remove tag after performing Process Point Opening.
LCP ??????