



HAZARDOUS ENERGY ISOLATION

SWS #19000-022

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Document Owner: Director, Ethanol Operations

Document Contact: Environment Health and Safety Team Lead

PURPOSE AND SCOPE:

The purpose of this Standard is to identify and communicate Suncor St. Clair Ethanol minimum requirements and associated procedures, processes and work practices which are implemented *to protect workers from potential hazards associated with exposure to hazardous energy sources* that may endanger the worker's health and/or safety due to unexpected release of hazardous energy

This standard applies to all Suncor St. Clair Energy Plant (SCEP) employees, contractors, subcontractors, consultants and agents of SCEP and any deviation to this standard required approval through the SCEP Management of Change Process

This standard does not prescribe electrical isolations in compliance with the Canadian Standards Association (CSA), which must be defined by a Qualified Electrician and executed only by competent personnel.

RELATED DOCUMENTS:

This standard replaces "General Equipment Lock Out Tag Out".

1.0 Roles and Responsibilities

The following are positions with assigned responsibilities for work involving the identification, assessment and implementation of controls for hazardous energy sources via hazardous energy isolating devices

Environment, Health & Safety Manager is responsible for:

- Supporting the development and maintenance of the Standard in compliance with regulatory requirements
- Supporting implementation of the Standard
- Assisting with the identification of hazardous energy isolation equipment and devices required to support safe execution of work
- Overseeing coordination of training of employees
- Assisting in the maintenance of records and documents pertaining to this Standard
- Ensuring that non-conformances with the Standard and/or the law are subject to appropriate corrective action
- Monitoring the effective implementation of this Standard through the OBS program and procedural audits

Department Managers (Operations, Maintenance, Technical) are responsible for:

- Ensuring that hazardous energy sources have been identified (in their area of responsibility as part of the work planning process), adequately assessed and all reasonable precautions taken to test, verify conditions and remove hazardous energy sources through procedures and plans – to include physical isolation.
- Ensuring that hazardous energy identification and associated controls have been evaluated through the planning process, implemented through the safe work permit, the Hazardous Energy Isolation Plan and all other applicable standards
- Assisting the planner with identifying and scoping the work

- Developing adequate control measures and procedures to eliminate any potential for hazardous energy exposure (verify the equipment is at safe energy state)
- Identification and procurement of hazardous energy isolation equipment and devices required to support safe execution of work
- Accurate completion of the Isolation and/or Blank and Blind Installation and Removal List Template Installation List to ensure safe isolation of all hazardous energy
- Ensuring that employees, contractors and subcontractors adhere to requirements
- Ensuring that all employees under his/her supervision are adequately trained and competent to perform the work
- Ensuring that non-conformances with this Standard are subject to appropriate corrective action
- Monitoring the effective implementation of this Standard through the OBS program and procedural Audits

Shift Supervisor & Area Operators (Permit Issuer) are responsible for:

- Providing operations technical oversight and work authorization when implementing the Standard and other associated Standard(s) (i.e. safe work permit, confined space) to support the isolation of hazardous energy through mechanical lock out
- Assisting the Planner, where appropriate, in completion of the Hazardous Energy Isolation Plan and/or Blank and Blind Installation and Removal List Template List to ensure the safe isolation of all hazardous energy
- Safely remove all hazardous energy sources from equipment (drain, de-pressure, de-energize, etc.) in compliance with safe work procedures
- Verify the safe energy state of all equipment prior to applying the first operations lock(s) and/or tag(s)
- Review the contents of all hazardous energy isolation documentation (P&ID, Work Scope Plan, Isolation Devices, Hazardous Energy Isolation Plan, Atmospheric Monitoring, PPE requirements) for accuracy versus field conditions
- Review and/or execute additional controls associated with “first break” procedures associated with the implementation of the hazardous energy control plans via execution of the Hazardous Energy Isolation Plan and/or Blind/Blank List
- Ensure Safe Work Permits generated hazardous energy isolation have a clear reference to, and are retained with, all relevant supporting documentation
- Conduct field review of the Hazardous Energy Isolation Plan and/or Blind/Blank List associated with the work and confirm accuracy in advance of permit issuance
- Review the hazardous energy isolation with all workers and addressing any issues and/or concerns before personal locks are applied
- Identify the status of the equipment with all workers during the safe work permit process (i.e. depressurized, drained, flushed, not clean)
- Ensuring that employees, contractors, and subcontractors adhere to, and are held accountable for adherence to the Safe Work Permit documentation, this Standard (and all other applicable standards associated with the work)
- Ensuring that all workers that will be impacted by a hazardous energy isolation apply their personal lock/tag, without exception, and that locks remain in place until their work activities are complete.
- Notify the permit receiver and/or direct report of any changing conditions and/or potential impacts to the work area. Evaluate permit validity when conditions change.
- Ensuring that employees under his/her supervision are adequately trained
- Ensuring that non-conformances with the Standard and/or the law are subject to appropriate corrective action
- Monitoring the effective implementation of this Standard through the OBS program and procedural audits
- Ensuring hazardous energy isolation equipment is in working condition

Planner(s) are selected by the Operations Manager (or delegated to the shift supervisor off-hours) and are responsible for:

- Must be qualified via operations testing for the area(s) for which the Hazardous Energy Isolation Plan is being developed
- Stewarding the development of work scopes which include additional controls for “first break” activities, as well as monitoring and assessment to ensure the potential hazards of the work are controlled at all times in consultation with operations, maintenance, and contractors.
- Review “first break” procedures associated with the implementation of the hazardous energy control plans via execution of the Hazardous Energy Isolation Plan and/or Blind/Blank List with all potentially impacted workers
- Accurate review of the Hazardous Energy Isolation Plan to ensure the safe isolation of the space (safe energy) when responsibility is delegated by the Department Manager
- Providing technical assistance to support the consistent implementation of this Standard
- Consulting with other SCEP staff, contractors, and subcontractors in meeting the requirements of this Standard and the law
- Apply double-block and bleed isolations (or greater) to all confined space entries
- Ensuring that non-conformances with the Standard and/or the law are subject to appropriate corrective action and support investigation activities
- Monitoring the effective implementation of this Standard through the OBS program and procedural audits
- **Only a qualified electrician may develop the portion of Hazardous Energy Isolation Plans related to Electrical energy for systems greater than 600V. For HEIP’s less than 600V – and electrician must review, in consultation with the planner, electrical considerations associated with the isolation (i.e., breaker lockout associated with motor disconnect etc.) and sign-off. Please note that only a qualified electrician may execute overload adjustment, fuse replacement, etc.**

Permit Receivers (please note that ALL workers must sign the Safe Work Permit at the SCEP site and considered Permit Receiver) are responsible for:

- Assuming the duties and responsibilities of a supervisor as defined under the Ontario Occupational Health and Safety Act.
- Ensuring competency, understanding and communication with all hazard mitigation controls and equipment associated with the work
- Review the scope of work with the permit issuer and ensure both parties fully understand the scope of and agree to the work to be performed (including area preparation etc.), as well as the potential hazards and associated control measures required to mitigate.
- Verify that all sources of energy are isolated prior to applying locking devices
- Maintain all equipment and locking devices
- In consultation with the Permit Issuer ensure the full documentation and communication of potential hazards. Implement appropriate associated controls (i.e. Safe Work Permit, Hazardous Energy Isolation Plan and/or Blank and Blind Installation and Removal List Template, task analysis safe card (TASC))
- Ensure the application of personal locks and/or tags, and that locks remain in place until the completion of work
- Ensure workers maintain control of all keys for their personal locks
- Have knowledge of, understand and comply with all requirements of the Safe Work Permit and associated documentation. Apply signature to the permit and associated documentation to formally acknowledge this understanding
- Post the Safe Work Permit and all associated documentation in a practical location at the work site. Please note that the Hazardous Energy Isolation Plan must remain with the permit issuer following review



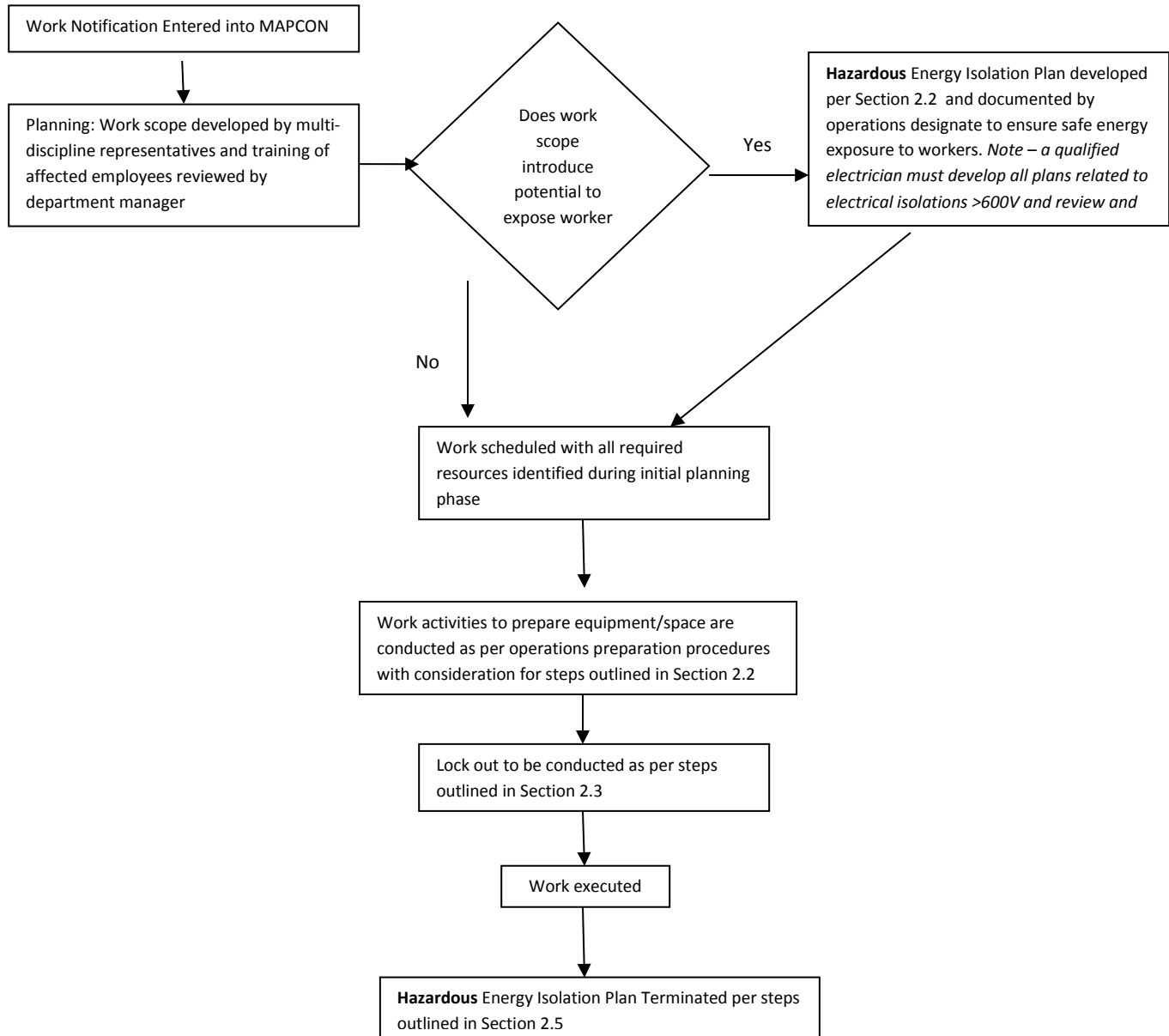
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- Provide adequate supervision to ensure hazards at the job site are properly identified, communicated and controlled in compliance with requirements and the law
- Ensure Shift Supervisors/Area Operators are immediately notified of a change in conditions and/or scope of work to allow for evaluation of permit validity
- Upon completion of work return all documentation to the Shift Supervisor/Area Operator (permit issuer)
- Properly use/maintain equipment and devices required to support safe execution of the work
- Adhering to, and effectively carrying out the requirements of this Standard and the law
- Promptly reporting issues, hazards, and non-conformance relating to this Standard to the Supervisor
- Ensuring that non-conformances with the Standard and/or the law are reported immediately

2.0 Hazardous Energy Identification and Assessment

Figure 1: Workflow



2.1 Identification of Hazardous Energy

Hazardous Energy – Any energy source that has the potential to cause injury. Energy sources include, but are not limited to the following;

- Electrical – low and high voltage (onsite qualified electrician must be engaged as prescribed in Section 1.0 Roles and Responsibilities)
- Chemical – corrosive, reactive, oxidizer, toxic, pressurized, heat, flammability, explosive
- Pressure – hydraulic, pneumatic, compressed gas
- Mechanical – motion, (crushing, pinching, cutting, snagging, striking hazards etc.), breaker lockout for mechanical, springs etc.
- Thermal – liquids, steams, gases, heated surfaces
- Radiation – ionizing and non-ionizing (ultra-violet, infer-red, magnetic etc.)
- Stored Energy – gravity, spring, elevation, capacitors

The control of hazardous energy applies to machinery, equipment, and powered mobile equipment, as well as piping, pipelines, process materials/by-products and process systems. **The Planner must consider all potential sources of hazardous energy associated with a defined scope of work (following operations completion of vessel preparation) when developing a Hazardous Energy Isolation Plan and ensure controls are defined to eliminate and/or control the hazards.**

Please note that vessel preparation procedures and associated sequence of steps developed to ensure the vessel is safe to isolate prior to the execution of a Hazardous Energy Isolation are outside of the scope of the standard and are the responsibility of the Operations Manager.

2.2 Hazard Assessment/Development of Hazardous Energy Isolation Plans

Prior to conducting any work that will require isolation of equipment and/or opening of process equipment, *Planner or Permit issuer* must conduct a hazard analysis to identify the potential hazards associated with the isolation and to determine the controls necessary to ensure that isolation and/or opening of process equipment can be performed safely.

Process equipment can be isolated in a number of different ways with varying levels of protection.

Below is a list of approved isolation methodologies at the St. Clair Ethanol facility, in order of decreasing efficacy.

The Planner must always begin Hazardous Energy Isolation Plans (HEIP) with the most stringent isolation methodology applied at the location where the system is exposed to the potential introduction of hazardous energy and utilize less stringent methodologies based on physical limitation (please note that physical limitations identified must be documented and provided to the Suncor St. Clair Ethanol leadership to support further evaluation/potential modifications) and associated potential risk of exposure to Hazardous Energy. **Any deviations from the guidance below must be approved by the Operations Manager (or delegate) prior to implementation.** *Please note these isolation methodologies are described by the planner at locations in the process where Hazardous Energy may be present – not at each isolation point in the process.*

a. **Physical disconnection**



b. **Blanking / Blinding** – must be installed in situations where physical disconnect is not possible and the potential exists for -

- leaking valves to jeopardize the safety of personnel,
- equipment repair is not continuous in nature (starts and stops),
- work includes open flame and weld,
- confined space entry,
- and/or includes process systems containing caustic/acid/anhydrous ammonia/carbon dioxide/carbon monoxide/gasoline/ethanol/toxics



c. **Double Block and Bleed** – minimum isolation methodology permitted for isolations to support confined space entries and may be used in place of blinding/blanking per Operations Manager approval only. Applicable when positive isolation cannot be provided by single valve isolation and/or the potential for hazardous energy exposure exists or could develop. If the removal of a double block and bleed valve is necessary to support maintenance, the valve cavity must be drained and ensure product has not been contained inside the valve.



d. **Single Valve Isolation w/ verification** – note that valves must be chain locked closed. Single valve isolation is permitted for Hazardous Energy Isolation Plan work not requiring blanking (provided that positive isolation is achieved). Verification may include gas monitoring and visual observation following the execution of first break procedure

e. **Single Valve Isolation** – note that valves must be locked at the primary isolation point. Applicable only for conditions where introduction of energy results in a “nuisance” only i.e. slight odour

Steps to establish a Hazardous Energy Isolation Plan (HEIP);

- Ensure clear understand of scope of work to be performed via consultation with affected workers (cross-functional team for group lock-outs)
- Determine the hazard to both personnel and equipment by reviewing current drawings, P&ID's, procedures, physical inspection of the work site and consultation with qualified area operators
- Document the sources of energy on the Hazardous Energy Isolation Plan
- Append a drawing to the HEIP with isolation points identified wherever practicable
- Attach associated blank list to the HEIP where applicable
- Describe mechanism for verifying stored energy has been released (gas monitoring, equipment testing etc.)
- Review the HEIP with the Shift Supervisor (and the Maintenance Supervisor) where applicable.
- Document any physical limitation associated with HEIP development and submit to the Suncor St. Clair Ethanol leadership team

Please note that all high voltage electrical isolation components of Hazardous Energy Isolation Plans are to be developed and implemented by the onsite electrician following CSA standard requirement. If low voltage electrical isolation is required as part of the HEIP – the onsite electrician will be responsible for review and acceptance of all electrical isolation and safe disconnection procedures to be implemented by non-electrical personnel (i.e. Heat Trace, systems <600V).

2.3 Execution of Hazardous Energy Isolation Plans

Please note that personal locks and tags are issued to St. Clair Ethanol employees via authorization from their direct supervisor. Their direct supervisor is responsible to ensure that the employee is competent before authorizing participation in any of the steps to support a Hazardous Energy Isolation Plan (HEIP).

Lock inventories are maintained on the controlled drive and are updated as required.

An inventory of Lockboxes is maintained in the Shift Supervisors office and Permit trailer. Any other energy isolating devices required to support a Hazardous Energy Isolation Plan are to be identified by the planner and may be procured with the assistance of the EHS Department where support is required.

Contractors are responsible to maintain and implement a Hazardous Energy Isolation Standard which is equivalent or more stringent than St. Clair Ethanol and are required to supply all locks and devices.

- a. **Inform all impacted employees of equipment shutdown**
- b. **Establish isolation** by operating the Hazardous Energy Isolation Devices (HEID) in the Hazardous Energy Isolation Plan and place them in their isolated positions.
- c. **Every effort must be made conduct equipment or piping depressurization, draining and flushing prior to opening or dismantling.** If the equipment cannot be completely depressurized, drained or flushed, this must be indicated clearly on the HEIP. If opening of the vessel is required to conduct final venting and/or cleaning, appropriate first break procedures and associated controls (monitoring, PPE, the permit issuer. *In the event that a key is misplaced while work is underway, the workers direct supervisor is to be notified immediately and a replacement lock and key are to be provided and applied to the Hazardous Energy Isolating Device to ensure the protection of the worker is maintained.*

Group Lockout (Lock Box)

A group lockout (lock box) may be utilized **when one or more of the following requirements** apply to the work

- More than one trade/discipline is conducting work on or is affected by an isolated system
 - Blanking is required as part of the HEIP
 - 3 or more isolation points are required
- a. An Hazardous Energy Isolation Plan (HEIP) must be prepared by the which identifies all potential exposures to energy sources and list the location of the energy, the HEID required to isolate the source.
 - b. The HEIP must be reviewed and approved by the Permit Issuer and trade/discipline supervisor prior to field execution.
 - c. The Permit Issuers will oversee the field execution of the isolation per requirements outlined in Section 2.3. Please note that SCEP operations personnel qualified in an identified area may execute the isolation with the approval and under the direction of the Shift Supervisor utilizing the Hazardous Energy Isolation Plan and all associated forms. SCEP operations personnel are required to work under a Safe Work Permit only when directed by the Shift Supervisor/Operations Manager.
 - d. Each individual involved in the work (permit receiver) to be conducted on an isolated system conducts a field review of the energy isolation to ensure isolations have been conducted per the approved Hazardous Energy Isolation Plan and, if verified correct, will apply their lock to the lockbox and maintain control of their key at all times. The permit issuer maintains care and custody of the lockbox key at all times. *In the event that a workers key for an individual lock is misplaced at any time – the workers supervisor must be notified immediately and a replacement lock and key provided to be applied to the lockbox to ensure worker protection is maintained.*

2.5 Termination of Hazardous Energy Isolation Plan

- a. Upon completion of each individual's prescribed work scope, each permit receiver is to communicate the completion of work with operations, sign off the associated Safe Work Permit and then remove their lock. In the event that the individuals work is complete, however the disciplines work is not complete (see section 2.1) – a discipline lock will remain in place (i.e. a black electrical lock will remain in place to signify that electrical work is still required before the system is returned for safe operation). See section 2.6 for lost key or unavailable workers
- b. Operations Permit Issuer is to verify that all work related to the HEIP has been fully completed and that the related Safe Work Permits (SWP), have been signed off as complete.

Operations Permit Issuer (or designate) will conduct a field verification that:

- the machine/equipment is operationally intact
 - all necessary guards have been reinstalled
 - manway covers have been reinstalled
 - removal of blanks following the blank removal procedure
 - all open bleeds/drains and vents are closed
 - all plugs and caps have been replaced
 - all tools and materials used during repair/maintenance activities have been removed
- c. Operations will notify all workers in the area that energy is being restored and ensure the area is clear
 - d. The lockbox will be unlocked and the keys for the HEID locks will be removed and taken to the field
 - e. All Hazardous Energy Isolating Device Locks and Tags will be removed from the equipment/system and returned to the Permit Issuer in original position
 - f. The Permit Issuer will ensure all locks and tags have been removed and accounted for
 - g. The Permit Issuer will authorize the execution of start-up procedures as equipment is made available for safe start-up

2.6 Lost Key/Unavailable Worker

Prior to initiating requests to support worker lock removal activities of any kind, operations is responsible to ensure that work scopes have been completed and there are no open permits related to, or that may interact with, the affected lock.

In the event that a worker had applied their lock is no longer available to attend the site, operations will confirm that all work scopes have been completed and there are no open permits related to the affected lock out. Operation will then notify the direct supervisor of the worker and indicate that they are to execute initiate the Hazardous Energy Control Standard protocols related to unavailable worker. The direct supervisor will make every attempt to contact the worker. If the worker cannot be reached, the direct supervisor will confirm completion of the work scope, confirm the location of all direct reports, sign off the Safe Work Permit and, if safe to do so, authorize removal of the workers lock. The direct supervisor will ensure the lock owner/worker involved that the equipment is back in service and no longer safe to work on.

In the event that the contractor direct supervisor cannot be reached, the Operations and Maintenance Manager must provide authorization related to lock removal per the steps outlined above. Additional follow-up with the unavailable contract supervisor will be required.

All communications/approvals will be recorded on the St. Clair Hazardous Energy Isolation Lock Removal Form

3.0 Records

Records of the most recent Hazardous Energy Isolation Plan for any isolation work, is to be stored on the controlled drive location for reference purposes only. A Hazardous Energy Isolation Plan must be reviewed and updated before each use by the Planner. All HEIP completed documentation is to be kept with the Safe Work Permit.

The hard copy of the Hazardous Energy Isolation Plan and associated documentation are to be maintained with the Safe Work Permit and stored as specified in the Safe Work Permit Standard.

4.0 Training

All St. Clair Ethanol employees who are required to participate in a Hazardous Energy Isolation Plan must be deemed competent by their direct supervisor prior to work being conducted.

All employees are required to review this standard and forward any questions or concerns to their supervisor or EH&S.

The Operations Qualification program to support competency as it provides detailed knowledge of the various systems at the St. Clair Ethanol facility including energy sources present, system flows and controls. Only operations personnel qualified in an area may fulfill the "Planner" role for that area and must be deemed competent by the Operations Manager (or delegate). **Only a qualified Electrician may develop Electrical Hazardous Energy Isolation Plans for any equipment greater than 600V. A qualified electrician must review and sign-off the electrical portions of a Hazardous Energy Isolation Plan under 600V developed by the designated planner.**

Contractors are responsible to maintain a Hazardous Energy Isolation Standard which is equivalent or more stringent than St. Clair Ethanol and are required to train all personnel and ensure competency prior to performing work at the St. Clair Ethanol site.

Definitions

Blank- installing or removing an engineered and approved device at an open end of a line and/or between two flanges.

Cap and Plug - plugging/capping off the open end of a screwed fitting.

Blind- refers to the installation of a non-engineered device at an open end of a line, between two flanges, or a cover installed over the open pump casing.

Double Block and Bleed- the engineered design and installation of 2 block valves with a bleed valve installed between the 2 block valve gates. When used in place of a blank, the 2 block valves will be secured in a closed position, while the bleed valve will be secured in the open position. The distance between the two block valves should not exceed 3 ft. (to ensure no possibility of sufficient buildup of debris that could plug the bleed valve).

Hazardous Energy Isolation Plan –document(s) associated with describing the scope of work to be performed, the equipment to be isolated, hazardous energy evaluation, a list of the Hazardous Energy Isolating Devices and/or vents and bleeds that are required to support verification and/or depressurizations. Document types include, but are not limited to; Hazardous Energy Isolation Plan Form, Blind/Blank List Form, P&ID's, documented work scope etc.

Hazardous Energy Isolating Devices (EID)-A mechanical device that blocks, restrains or otherwise physically prevents or controls the transmission or release of hazardous energy that may affect the work area. This includes block valves, slide gates, blanks / blinds, breakers, switches, switchgear, etc.

Group Lockout- Group lockout method can be used when there are multiple workers relying on the same, multiple isolation devices for their protection.



Individual Lock Out A method of lock out in which each individual involved in the activity requiring energy isolation is knowledgeable about the hazards associated with the equipment to be isolated and the isolation required to ensure their protection. Individual lock out requires that each person has applied a Personal Lock to each lockable energy isolating device for their own protection.

Lock Box – A lockable metal box that is used when more than one person works on complex equipment. A single key or keys locking out the equipment is placed in the lock box, and then each person attaches their own lock to the box.

Spider – One or two flat bars placed between two flange faces to provide a drain point in a piping system where no drain currently exists. The spider provides a double block and bleed configuration where system blanking is not an option due to piping design.

END OF PROCEDURE

REVISIONS			
No.	Date (mm/dd/yyyy)	Author	Description
0	03/16/2016	L. Nauta	Created
1	11/07/2016	L. Nauta	Changed to a SWS