Hazardous Energy Control Standard

Sarnia Refinery

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Summary of Changes

This Summary shows:

- All changes from last approved and published document
- The location within the document where the changes have been made

REVISION LOG			
Date	**Revision**	**Section**	**Comment**
01/16/2019	Original	All	Combined the Turnaround Hazardous Energy Control Manual Revision 4 and Hazardous Energy Control Manual Revision 5 into one new standard. New formatted style. Incorporated Zero Electrical Energy Verification Process. Developed workflow processes for the Complex Group Lockout Method.

Contents

1 About this Standard

1.1 Purpose

1.1.1 Defined

The purpose of this standard is to specify the requirements for hazardous energy control using lockout and other control methods to prevent the inadvertent release or transmission of machine equipment or process system energy.

Lockout is recognized as the primary method of hazardous energy control.

1.2 Scope

1.2.1 Defined

The scope of this standard shall apply to the following hazardous energy types:

- Electrical – low and high voltage
- Chemical - explosion, pressure, heat, fire, corrosive, reactive, oxidizer, toxic, etc.
- Ionizing or non-ionizing Radiation – ultra-violet, infra-red, RF / Microwave, laser, magnetic
- Mechanical - capable of crushing, pinching, cutting, snagging, striking
- Pressure - hydraulic, pneumatic
- Stored Energy - flywheel, springs, differences in elevation, gravity, capacitors, batteries, etc.
- Thermal - high temperature-surface temperature, hot liquids, steam, or gases
- Thermal Cryogenic - super cold surface or cryogenic liquid

When a Canadian Standards Association (CSA) Standard or other recognized Standard exists for a specific type of machinery, equipment or process, it shall be used with this Standard to provide the most effective protection.

The scope of this standard does not apply to:

- The offloading / loading of trucks where the truck drivers involved are in constant attendance and are subject matter experts of the equipment they are working with.

1.3 Exceptions

1.3.1 Defined

The following exceptions are when Lockout is not required:

1. Work on equipment that has been physically separated from all energy sources.

2. Work on equipment which is de-energized by un-plugging or disconnection (examples: electrical or pneumatic energy sources), provided that:
   - The connection point that has been un-plugged or disconnected is under direct control of the person performing the work, **AND**;
   - The disconnected energy source is the only energy source that needs to be isolated, **AND**;
   - The user understands the hazards of the energy sources and applies appropriate safeguards.

3. Work on a piping / process system where the person working is the subject matter expert provided that:
   - The isolations involved are provided by and within line of sight of the individual involved, **AND**;
   - The individual has complete control over the hazardous energy sources, **AND**;
   - A DO NOT OPERATE Tag has been attached to each isolating device.

For example:

- An instrument technician adjusting an instrument where he/she has complete and constant control over the isolation valves.
- A pipe fitter replacing a steam trap or executing steam tracing repairs where the isolation valves are within line of sight and he/she has complete and constant control over the isolation valves.

In these types of cases, the Safe Work Permit will state that isolations will be provided by the Worker. The Worker is responsible for ensuring that the required energy isolating devices have been placed in the required positions and for verifying that the equipment has been de-energized before beginning work. Break-Here Tags are not required under these circumstances.

4. Work performed as per an approved procedure, assessment, MOC or JSA that specifically documents the hazards associated with a task and the control methods used to mitigate those hazards.
5. Work that requires the use of hazardous energy but the worker(s) involved are subject matter experts of the tools / equipment in their control and the worker(s) control their environment to prevent inadvertent release or transmission of the hazardous energy i.e. high pressure water washing, x-raying, NDT, welding, etc.

1.4 Target Audience

1.4.1 Defined

The target audiences of this Standard are all Suncor Personnel, Contractors and Consultants involved in the isolation of hazardous energy to perform maintenance or servicing activities on Suncor's equipment and processes.

1.5 Conformance Expectations

1.5.1 Conformance Expectations

The conformance expectations are as follows:

1. CSA Standard Z460-05 Control of Hazardous Energy – Lockout and Other Methods
2. Unique requirements of machine, equipment, or process service can necessitate worker activity under energized conditions such as tightening pump packing, changing air filters, greasing motors and performing vibe checks. Each such activity must be evaluated to ensure appropriate life protecting safeguarding techniques are employed, as necessary, to protect employees from hazardous machine, equipment or process exposures.
3. If there are discoveries of any conflicts, ambiguities or discrepancies that are unclear it is expected that personnel demonstrate Operational Discipline by Seeking Knowledge and Understanding and Using a Questioning Attitude to Surface Problems. All personnel recognize the severity of non-compliance to ensuring hazardous energy isolation to protection of the worker.

NOTE: There is not a Suncor-Wide Corporate Standard on Hazardous Energy Control.

2 Energy Isolation Methods

2.1 Introduction

2.1.1 Defined

Hazardous Energy is defined as any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, gravity or other energy that could cause injury to personnel.

Hazardous Energy Control is defined as the specific practices and procedures to safeguard workers from the inadvertent or unexpected energization or start-up of machinery, processes or equipment.

2.1.2 Control Methods

Control of hazardous energy is by means of an Energy Isolating Device (EID). An EID is 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.

Push-button selector switches and other control-type devices are not considered energy-isolating devices.

Control of hazardous energy shall be recognized by a Lockout Method to prevent the inadvertent release of hazardous energy. There are two types of lockout methods that are used at the Sarnia Refinery. They are:

- Individual Lockout
- Complex Group Lockout

2.2 Individual Lockout Method

2.2.1 Defined

The Individual Lock Method approach shall be used in situations:

- Where only one trade is involved, **AND**
- Does not require blanking, **AND**
- Does not require an Energy Isolation Plan

The Individual Lockout Method shall be used in situations where all the following requirements are met:

- When the individual cannot maintain line of site of the isolations or where a lock is required to maintain complete control.

- Where each individual involved in the activities requiring lockout is knowledgeable about the hazards associated with the machine, equipment or process to be isolated and about the isolation required to ensure their protection.
- Where the maximum number of isolations allowed using the Individual Lockout Method is limited to 2. Jobs with more than 2 isolations shall follow the Complex Group Lockout Method.

Individuals shall establish isolation if criteria is met by the Personnel Operating Equipment Standard or isolation may be established by Operations

The individual or Operations Personnel shall be responsible to verify, before work begins, that the machine, equipment, or process has been de-energized.

For situations where the Energy Isolation Device is not lockable, a Do Not Operate Tag shall be used.

In the event there is any concern that an isolation may affect the process, Operations shall be contacted to confirm.

2.2.2	Examples of Individual Lockout by Individual	The following examples are scenarios, but not limited to, where the individual would establish isolation: • When a HVAC technician is servicing HVAC equipment. • When an Instrument tech requires isolation from the process. • When Pipefitters provide their own isolations when repairing steam tracing.
2.2.3	Examples of Individual Lockout by Operations	The following examples are scenarios, but not limited to, where Operations would establish isolation for Pipefitters: • When cleaning heater burners. • When changing out a sight glass.
2.2.4	References	The following references are used to support this section: • Personnel Operating Equipment Standard

2.3 Complex Group Lockout Method

2.3.1 Defined	Complex Group Lockout Method shall be used when the work involves more than one trade or more than 2 isolations involved. It involves the creation of an Energy Isolation Plan (EIP) and the use of a Safe Work Permit that references the EIP. A Worker's Initial Form or Contractor Initial Form is used in place of Personal Locks. The Maintenance or Contract Supervision determines which practice to utilize to provide their workers the equivalent of Individual Lockout protection by either using: a) For normal operations: • A Worker's Initial Form (WIF) that the workers sign, **OR** • A Lockbox. b) For Unit Shutdowns, Turnarounds & Modular Outages • A Contractors Initial Form (CIF) that the Contractor Representative signs in place of applying a personal lock.
2.3.2 References	The following references are used to support this section: • Personnel Operating Equipment Standard • Worker's Initial Form (WIF) • Contractor Initial Form (CIF)

3 Locks and Tags for Energy Isolating Devices

3.1 Introduction

3.1.1 Defined

An Energy Isolating Device (EID) is 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 but not limited to:

- Block valves
- Slide Gates
- Blanks/Blinds
- Breakers
- Switches
- Switchgear

Locks and Tags shall be used to lock out Energy Isolation Devices. When a lock or tag is placed on an Energy Isolation Device it indicates that the Energy Isolation Device is not to be operated until the removal of the lock and/or tag.

When relying on a blank as an Energy Isolation Device, the blank shall be considered a lock. Blanks shall be installed in accordance with the Blanking Process Standard.

3.2 Locks

3.2.1 Defined

Lockable devices and locks are used as part of the tracking process to ensure all personnel are protected before the equipment or system is re-energized.

A lock is used to uniquely identify personnel, trades or contractors working under an EIP. Each type of lock identifies the personnel that are actively working on the equipment or system.

A Lockable Device is an auxiliary lock-out device, such as a Lockbox, Lock Ring, Hasp or Lockable Device Board (aka EIP Board), used to secure the keys related to lockout. They are used by the Permit Receiver to provide assured protection to the worker(s).

3.2.2 Lockable Devices for Individual Lockout Method

Individual Lockout Method

The following lockable device is used under the Individual Lockout Method:

- Hasp

Hasp

A Hasp is used when Operations provides the means of isolation.

3.2.3 Lockable Devices for Complex Group Lockout Method

Complex Group Lockout Method

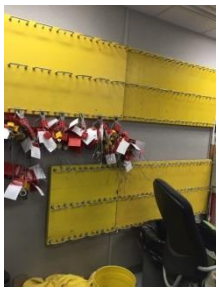
The following lockable devices are used under the Complex Group Lockout Method:

- Lockbox
- Lock Ring or “Satellite” Lock Ring
- Energy Isolation Plan (EIP) Board

Lockbox

Lock Ring

EIP Board



Lockbox

A Lockbox can be used when multiple personnel are required to work under and EIP. A Lockbox contains the key to the Permit Receivers Personal Lock that the Workers secure with their Personal Locks, as a means of providing each Worker the equivalent to “Individual Lockout Method” protection.

If the Maintenance or Contract Supervision has decided to use the Lockbox as equivalence of Individual Lockout protection, the following steps are required:

- A Lockbox is used to keep the keys to all the Personal Locks.
- The Permit Receiver reviews the isolation boundary, and Break-Here locations with each of the Workers assigned to work under the protection afforded to them by the Permit Receiver.
    - The Permit Receiver manages the sign off of the applicable Break-Here tags with the worker(s).
    - Each worker applies a Personal Lock to the Lockbox prior to performing work within the isolation boundary.
- The Permit Receiver applies their Personal Lock to the Lockbox.
- At the completion of each permitted task, the Permit Receiver must:
    - Remove his/her Personal Lock.
    - Request the Craft/Contractor Lock be removed by a representative party of the craft or contractor.
    - Sign off the Safe Work Permit indicating the job is complete.
- If the specified work is to continue over multiple shifts, a Craft/Contractor Lock is to remain on the Lockbox but all Personal Locks must be removed before leaving site.

Lock Ring

A Lock Ring is used for the EIP established by Operations under the Complex Group Method and holds all the keys for the lockable devices.

A “Satellite” Lock Ring may be used when work on the same equipment is to be permitted by different areas that have cross zone isolations. “Satellite” Lock Rings allow each zone issuing Safe Work Permits to have control of the energy isolation by co-signing the permit.

Energy Isolation Plan (EIP) Board

An EIP Board is used to hold all the EIP Lock Rings.

3.2.4 Yellow Lock – EID Locks

A YELLOW lock is an Operations Lock used for an Energy Isolating Device (EID). These locks are individually keyed. They are applied by the Energy Isolation Establisher to the EID.

3.2.5	Red Lock – Continuity Locks	A RED lock is an Operations Lock used to ensure the continuity of energy isolation for operations during a multi-shift maintenance activity. The key to the Operations Lock is controlled by each assigned authorized operator from each shift. These locks are commonly keyed. RED Locks shall not be used as, and shall not take the place of Permit or Personal Locks for worker protection.
3.2.6	Permit/ Personal Locks	Permit/Personal Locks are the same type of lock but used for different purposes: • A Permit Lock is applied to the Lockable Device by the Permit Receiver when they have reviewed the EIP accepting the isolation as being adequate for the work to be done on that shift. The Permit Lock is also the Permit Receiver's Personal Lock. These locks must be individually keyed and identifiable to the person. They may be any color BUT yellow or red. • A Personal Lock is used for personal protection. These locks must be individually keyed and identifiable to the person. They may be any color BUT yellow or red.
3.2.7	Craft/Contractor Locks	The Craft Lock is used by a specific craft (i.e. electricians, pipefitters, millwrights, etc.) and the Contractor Lock is used by a specific company (i.e. FD, Aluma, etc.). They are applied to the Lockable Device holding the keys to the EID to provide: • An indication to Operations that the equipment/system repairs are incomplete, **AND** • Provide lock continuity for the Craft/Contractor over shift changes or periods when work is not occurring. These locks must be commonly keyed and identifiable to the craft/contractor. They may be any color BUT yellow or red. Craft/Contractor Locks shall not be used as, and shall not take the place of Permit or Personal Locks for worker protection.
3.2.8	Lock Removal by Others – Lost Key	In the event of a personal lock being required to be removed due to a lost key, the Supervisor of the person responsible for the key is to be notified immediately. All related work shall stop until the Supervisor verifies the safety of isolation and authorizes the lock to be cut off and replaced with a new lock. This process is followed to mitigate the possibility that the associated key could allow a Lockbox, Lock Ring or an EID to be inadvertently unlocked. The lost key event shall be entered into Suncor's Incident Learning and Prevention System.

Emergency Lock Removal

In any situation in which the equipment is required and a person forgets to remove a Personal Lock, or fails to initial off the CIF or WIF, and the associated Permit Receiver or Worker cannot be located, the following steps shall occur:

1. Confirm that the Permit Receiver or Worker has left the workplace.
2. The Area Operator and a Shift Supervisor shall carefully review the circumstances and determine if the lock is safe to be removed by:
    a. Making every reasonable attempt to contact the individual directly and, if contact is made, the individual shall be made aware of the situation and asked to come back to the workplace to remove his or her lock and/or sign off applicable paperwork as required.
    b. If unable to contact the individual, or if the individual has been contacted but cannot come in, the Maintenance Supervisor or Construction Coordinator shall be contacted. The Shift Supervisor and Maintenance Supervisor/ Construction Coordinator shall review the situation. After taking necessary steps to assure themselves that the lock(s) is indeed safe to remove, the Maintenance Supervisor or Construction Coordinator may authorize the cutting off of the lock or initialing off of the CIF or WIF, if they deem appropriate.
3. The Maintenance Supervisor or Construction Coordinator shall, as soon as possible, advise the lock owner / worker involved of the situation and that the equipment is back in service and no longer safe to work on.
4. The Supervisor shall enter an incident in the Incident Learning and Prevention System of the event.

    Title of the event should be: HEC – EMERGENCY LOCK REMOVAL

3.2.9 References

The following references are used to support this section:

- Blanking Process Standard
- Incident Learning and Prevention System – Enablon

3.3 Tags

3.3.1 Defined

Tags shall be used to identify the stage of the Hazardous Energy Control Isolation Process. There are several types of tags used in in the control of hazardous energy. They are a:

- Danger Do Not Operate Tag
- Zero Electrical Energy Verification Tag
- Break Here Tag
- Blanks in Safe Position Tag
- Test in Progress Tag

Tags shall be legible and understandable by all. A non-erasing / smearing ink shall be used such as a Sharpie marker or equivalent. Electronically produced tags (via Brady printers) are acceptable.

All tags shall be used only once and then destroyed and disposed of per the Termination Process.

3.3.2 Do Not Operate Tag

The purpose of the Do Not Operate Tag is to identify the Energy Isolating Device(s) being controlled as part of this Standard.

A Do Not Operate Tag shall be securely attached to Energy Isolating Device by the use of cable ties or by sliding the tag onto the associated EID lock. These tags are RED in color.

The Do Not Operate Tag shall detail the date the isolation was established, the # of the Energy Isolation Plan (EIP) if one is used, the Device # that is referenced on the EIP, device description, reason for the isolation and the name of the person who applied the tag to the device.

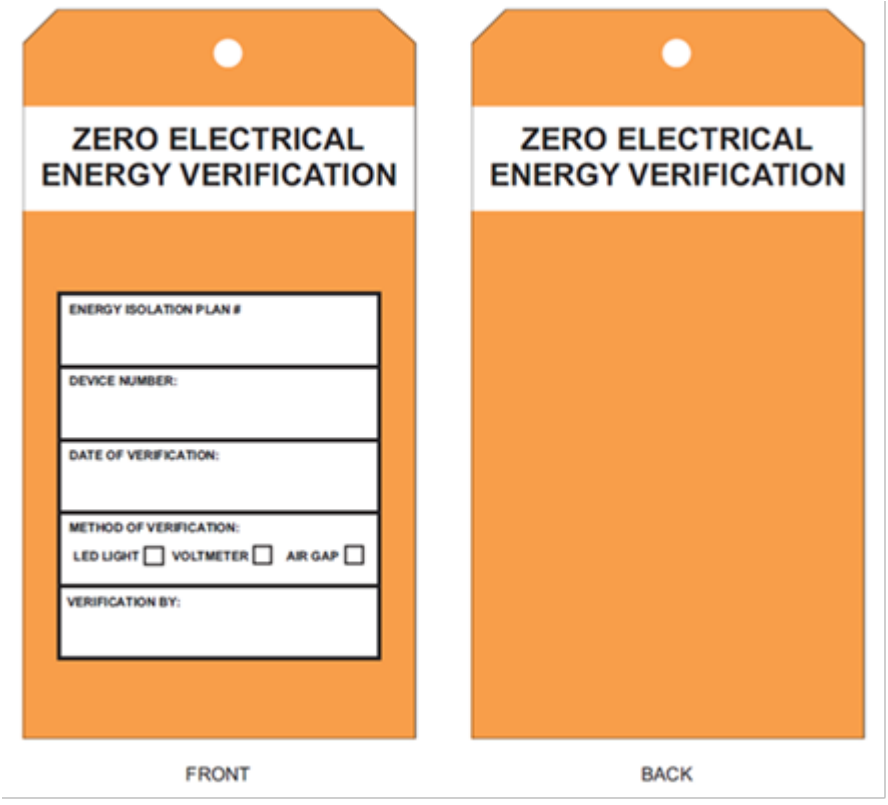
Where a tag cannot be affixed directly to the EID, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

When a tag is attached to an EID, it shall only be removed by an authorized person responsible for it and it shall never be bypassed, ignored, or otherwise defeated unless following a process outlined within this Standard.

3.3.3 Zero Electrical Energy Verification Tags

The purpose of the Zero Electrical Energy Verification Tag is to identify that electrical sources have been confirmed to have zero voltage.

These tags are affixed to the isolation point by the individual completing the verification. These tags are ORANGE in color.



Zero Electrical Energy Verification Tags shall detail the # of the Energy Isolation Plan (EIP), the Device # that is referenced on the EIP, the date zero voltage was verified, the method of zero voltage verification and the name of the person who applied the tag to the device.

Zero Electrical Energy Verification tags shall be used only once and are then destroyed and disposed of as per the Termination Process.

In the event that electrical energy must be restored to complete testing, the tag is to be removed and discarded. Zero electrical energy must be verified again upon testing completion and isolation is reestablished.

3.3.4 Break Here Tags

The purpose of the Break Here Tags are to identify to the worker where it is safe to perform the initial system disconnect within the energy isolation boundaries and to ensure that the worker is on the right side of the isolation point.

Break Here Tags are applied to the initial break points for each system within an executed Energy Isolation Plan. These tags are FLUORESCENT PINK in color.

Anti-Tamper Adhesive

Break Here Tags detail the transfer of acknowledgement of personnel that energy isolation has been established to allow for safe disconnection of the system.

Break Here Tags shall not be attached to any systems before the Energy Isolation Plan has been established.

Break Here tags shall be securely attached to the system break points, flanges, threaded connections, fittings, electrical wiring, coupling guards, etc to positively identify where it is safe for the Worker to initially disconnect the system.

Break Here Tags are installed where:

- Blanks are to be installed.
- Blinds are to be installed.
- Flanges are to be broken.

If Blanks/Blinds are not to be installed, the Break Here Tags must still be installed at the break point location. Examples of where Break Here Tags are required are:

- Water supply and return lines on sample coolers
- Coupling guards on rotating equipment
- Electrical cable from a starter to a motor

Break Here Tags shall be signed off by the Permit Issuer and Permit receiver during the mandatory field visit as part of the Hazardous Energy Control requirements.

Break Here Tags shall be signed off by the Worker after completion of the review with the Permit Receiver as part of the Hazardous Energy Control requirements.

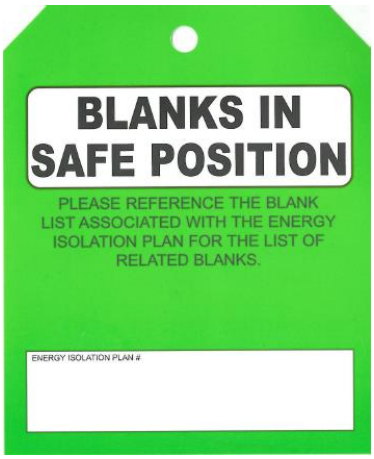
Break Here Tags shall not be moved without review and agreement with the Permit Issuer.

Break Here Tags shall be used once and then disposed of by the Permit Receiver once the break points have been disassembled.

3.3.5 Blanks in Safe Position Tag

The purpose of a Blanks in Safe Position Tag is to indicate that all blanks have been installed in the “safe” position.

Blanks in Safe Position Tags are applied to the Lockable Device once all related blanks are installed. These tags are BRIGHT GREEN in color.



Blanks in Safe Position Tags shall be used on any work scopes deemed to require blanking such as those involving Confined Space Entry, Open Flame and Welding and/or others involving hazardous materials

Blanks cannot be removed while this tag is in place on the Lockable Device.

3.3.6	Test in Progress Tags	The purpose of a Test in Progress Tag is to: • Identify that a piece of equipment or system is undergoing a test per the Testing Process and that portions of the equipment/system are energized, **AND** • That the field conditions are not as stated on the Energy Isolation Plan. These tags are PURPLE/BLACK in color. 
		The Test in Progress Tag shall detail the reason for the test and reference the applicable EIP.

3.4 Energy Isolation Plan Boards

3.4.1	Defined	Energy Isolation Plan (EIP) Boards are used to display and control the Energy Isolation Lock Rings that will be created to control hazardous energy.
3.4.2	Normal Operations	EIP Boards are typically located in control rooms for normal operations.
3.4.3	Unit Shutdowns, Turnarounds & Modular Outages	For Unit Shutdowns, Turnarounds & Modular Outages they are located in close proximity to the permitting trailer.

4 Process Isolation Methods for Developing an Energy Isolation Plan

4.1 Introduction

4.1.1 Defined

There are several different types of process isolations methods that may be used depending upon the type of work activity to create an Energy Isolation Plan. The following process isolation methods are identified for the following scenarios:

- Process Isolations
  - Excluding Open Flame and Weld and Confined Space Entry
  - Open Flame and Weld
  - Confined Space Entry
- Cross Zone Isolations
- Outside Refinery Process Isolations
- Electrical Isolations

Each type of process isolation method shall be evaluated when developing an Energy Isolation Plan.

All equipment or piping shall be completely depressurized, drained and cleaned as far as practical of hydrocarbons and/or chemicals and/or fluids before opening or dismantling.

Removal of a twin seal or a double block and bleed valve shall have its valve cavity drained and the valve removed in the “open” position to ensure that product has not been contained inside the valve.

4.1.2 Special Isolation Requirements

HF Alkylation Unit

If removal of an HF Alkylation Unit plug valve is required as part of the EIP, the valve shall have its valve cavity drained and the valve removed in the “open” position to ensure that product has not been contained inside the valve.

Pressure Relief Systems

Where a Pressure Relief System is present and isolation of the device (i.e. an RV) is required for as part of the EIP, the device shall be isolated after all forms of energy have been isolated.

In some cases the equipment may require time to cool down and/or process material drained/vented to reduce the risk of overpressure. Depending on the location, there still may be the potential for overpressure. Any time an EIP impacts a relief system, the EIP Preparer shall ensure the isolation strategy is

reviewed to decrease the risk to personal safety and equipment damage.

4.1.3 Means of Process Isolation

Process equipment can be isolated in a number of different ways. In order of decreasing levels of safety, the isolation means are as follows:

1. Physical disconnection or removing the section of pipe to be worked on and blinding the remaining associated piping.
2. Blanking or Blinding where the insertion point completely isolates a section of piping from the rest of the process with the piping remaining in place.
3. Double block and bleed valve arrangement
4. Single valve isolation

4.2 Process Isolations

4.2.1 Defined

There are three scenarios for process isolation based upon the work activity. They are:

- Process Isolations Excluding Open Flame and Weld and Confined Space Entry
- Process Isolations for Open Flame and Weld
- Process Isolations for Confined Space Entry

4.2.2 Excluding OFW and CSE

Work activity that does not involve Open Flame and Weld (OFW) or Confined Space Entry (CSE) shall be isolated by means of blanking/blinding, double block and bleed or single valve isolation.

Blanking/Blinding

Blanking or Blinding is where the insertion point completely isolates a section of piping from the rest of the process with the piping remaining in place.

Blanks/blinds shall be installed in the following circumstances:

- In cases of leaking valves that would jeopardize safety of personnel.
- If the equipment repair stops and is not intended to restart until the next working day. (This includes instrument/plant air, steam at pressures greater than 275 kPa, and nitrogen.)
- On process systems containing high concentrations of:
  - LPG's such as propane, butane, iso-butane, olefin feed, Shell BB, etc.
  - Benzene (benzene product, benzene tower reflux, benzene drag, extractor recycle, reformate etc.)
- H2S (sour gas, sour liquid, crude tower overhead, etc.)

- Hydrogen (hydrogen product, reformer off gas, refinery fuel gas etc.)
- All Acids (hydrofluoric acid, sulphuric acid, etc.)
- All Caustics (NaOH, KOH, etc.)

Double Block and Bleed Valve Arrangement

In the event, that positive isolation is not achievable with single valve isolation, then a double block and bleed valve arrangement shall be employed.

However, if positive isolation is not achievable and a significant hazard exists or could develop, then a different method of isolation must be employed. This is common with valves used for isolation that pass product and are not 100% isolatable.

Single Valve Isolation

Single valve isolation is the lowest means of protection for energy isolation.

Single valve isolation may be allowed for situations that are not identified as requiring blanking provided that positive isolation can be verified.

Exemption to Process Isolations Excluding Open Flame and Weld and Confined Space Entry

The Operations Manager (or designate) for an area may authorize an exemption to the requirement for blanking in situations that do not involve Confined Space Entries or Open Flame and Welding, where the duration of blanking equals or exceeds the time required to complete the identified work and hence no more exposure to risk occurs than would be if the blanks were installed.

This exemption is typical in situations where equipment is undergoing cleaning where the cleaning that is going to take less time than the time it takes to install the blanks on the equipment to be cleaned.

4.2.3 Open Flame and Weld (OFW)

Work activity that involves Open Flame and Weld shall be isolated by only means of blanking/blinding of the process piping and equipment.

There are two methods of isolations that must be considered:

- Primary
- Secondary

Primary isolations must be applied by one of the following;

- The section of piping/vessel being worked on is to be blanked off from the related system.
- The section of piping/vessel is to be separated from the system and a blind flange installed on the section not being worked on.
- Any deviation from this requirement requires a Management of

Change (MOC) to be completed.

Secondary isolation considerations shall be given to the potential for a flammable atmosphere to be created due to the liberation of vapours.

- A secondary isolation, such as an Isolation Plug, shall be employed at the work location if potential exists. Factors to be considered to determine if a potential exists include;
  - Service of the line
  - Configuration of the line
  - Length of the line between the primary isolation and work location
  - Methods of safing employed
- Use of any isolation plug shall follow the requirements of the "Use of Pipe Plugs – Isolation, Hydrostatic Test, Nozzle Test Standard".

4.2.4 Confined Space Entry (CSE)

Work activity that involves Confined Space Entry shall be isolated by means of physical disconnection and/or blanking/blinding.

- All connections to vessel (except those only connected to the vessel itself) shall be either blanked or opened to atmosphere.
- In the situation in which the connection is to be opened to the atmosphere, the line shall be physically disconnected with a blank flange, plug or cap installed on the connecting pipe end.
- Vents and drain lines close to sewers shall be blanked. The blank shall be in the flange closest to the vessel.
- Open connections close to sewers shall be avoided.

Blanking at locations other than the vessel flange requires complete removal of explosive, flammable, or harmful substance from the piping on the vessel side of the blank. This should be accomplished by purging through vents, bleeds or spidering. Spidering is a process of opening the flange faces to allow for draining or venting while safing the equipment.

If there is considerable hazard associated with blanking at the vessel flange such as:

- extensive resources for constructing scaffolding **AND/OR**
- requirements for a crane or basket use on a tower

then the blank is allowed to be installed at the next flange (at grade or on a deck that is easier to access) provided there is not any piping attachments between the original location and the newly identified blank location.

If a blank location must be moved further away from the closest flange to a vessel and there are other connections, those other connections shall be

added to the blank list and blanked as well.

For entries related to spaces where blanking is unachievable, all energy isolating deficiencies are to be identified during the CSE assessment and the appropriate life protecting measures applied to protect any worker entering the confined space.

Exemption to Process Isolation for Confined Space Entry

A Management of Change (MOC) may be initiated to allow the following exemption to be authorized in the case of inspection of a heater, including tube grinding for ultrasonic testing or cold work. The MOC shall identify that the heater tubes may not be blanked if all of the following conditions have been met if:

- The tube coil can be isolated without process fluid pressure on either side of the isolating valves, **AND**
- The tube coil can be vented on the coil side of the isolating valves, **AND**
- The fuel gas, fuel oil, snuffing steam, pilot gas, atomizing steam can be been blanked, **AND**
- If the heater is tied into a common stack; a stack blank can be installed, **AND**
- No known tube leaks exist.

4.2.5 References

The following references are used to support this section:

- Use of Pipe Plugs – Isolation, Hydrostatic Test, Nozzle Standard

4.3 Cross Zone Isolations

4.3.1 Defined

Cross Zone Isolations are when isolations involve more than one zone and/or more than one zone is permitting work within a particular isolation boundary.

4.3.2 Requirements

Each Safe Work Permit that is issued must be co-signed by the Area Operator on shift in the other zones that are utilizing the same isolation boundary to ensure that each area is aware of the activities being permitted by the other area.

When work on the same equipment is to be permitted by different areas (ie, multiple job scopes on a pipeline going from Plant 2 to Tank Farm), Satellite Key Rings may be utilized to allow each zone issuing Safe Work Permits to have control of the energy isolation. The originating Key Ring should be kept in the area most convenient to the work taking place.

If only one zone is permitting work, that zone will have control of the Key Ring and will issue Safe Work Permits as needed.

4.3.3 Example

The following information is provided to give guidance on how to set up cross zone isolation for how the repair of a pipeline originating in Plant 2 and ending in the Tank Farm would be handled – in this case the original repair is located in Plant 2 but as the line is out of service, the Tank Farm is executing some opportunity work on the same line:

- Plant 2 will coordinate safing activities and work with the Tank Farm to establish isolation of the line following the Complex Group Lockout method.
- Plant 2 creates the original Key Ring that controls the keys / tags related to the line isolation. This originating Key Ring will reside in the Plant 2 Permit Area.
- The Tank Farm, if they need to execute work on this same line, will utilize a Yellow EID Lock and apply the EID lock to the originating Key Ring Hasp in Plant 2, thereby taking control of the Key Ring. A tag identifying its purpose will be attached to the Yellow EID Lock.
- A satellite Lock Ring will be created in the Tank Farm holding only the key to the Yellow EID Lock applied in Plant 2 with a tag referencing the EIP# and the location of the EIP. This lock ring will be locked with a Red Operations Lock in the Tank Farm Permit Area.
- Any permits issued from the Tank Farm on this line will reference the EIP#. The Permit Receiver executing work for the Tank Farm will apply a Personal Lock to the Lock Ring located in the Tank Farm Permit Area.
- Plant 2 will not be able to make any changes to the EIP without having the Tank Farm remove their EID Lock from the Plant 2 Lock Ring, thereby giving the Tank Farm shared control of the EIP.
- Each time either the Tank Farm or Plant 2 issues a SWP for work on this particular line, the Operator that issues the Safe Work Permit will contact the other area requesting the Safe Work Permit be co-signed by the Operator in charge of that area. This acknowledges that the Area Operator co-signing the SWP is aware of the work taking place on equipment that is shared by his/her Area.

4.3.4 References

The following references are used to support this section:

- Safe Work Permit Standard

4.4 Outside Refinery Process Isolations

4.4.1 Defined	Outside Refinery Process isolations may be required for isolating a device being used for an EIP where work is to be completed on Suncor property. This is typically the situation for isolation at Trans Alta or Praxair. When isolations are required at a location outside of the refinery: • Isolations will be identified on the EIP. • A Suncor Operations Representative will go to the location of that isolation and apply an EIP Lock and Tag. • The key to the lock will be kept on a Key Ring in the area that is permitting the work.
	Isolations involving Hydro One will follow the Electrical Switching Order Procedure.
4.4.2 References	The following references are used to support this section: • Electrical Switching Order Procedure

4.5 Electrical Isolations

4.5.1 Defined	Electrical isolation is a joint responsibility between Operations and Maintenance Electricians as defined in the Electrical System Operations Standard. The following criteria identifies the responsible party for electrical isolation: • Up to 750v – Operations • 2300v and 4160v motor starters located in the Motor Control Centers – Maintenance Electricians • 2300v, 4160v and 13,300v motor starters located in the Distribution Switchgear (i.e., large compressor breakers) – MESOG Electricians • Third Party Isolation Method
4.5.2 Operations	Operators can operate up to and including 750v breakers and switches in motor control centers, panel board and distribution centers. This voltage is based on the CSA2462-18 Standard. The Sarnia Refinery's highest voltage on site is below the 750v CSA Standard at only 600v. For verification of zero electrical energy once the electrical EID has been placed in the isolated position, the Electrical Isolation, Verification and Lockout Procedure shall be followed.

4.5.3	Maintenance Electricians	Maintenance Electricians operate 2300v and 4160v motor starters located in Motor Control Centers. Operations request and permit the EID to be isolated by electricians. Once the EID has been placed in the isolated position by the Electricians, verification of zero electrical energy at the motor shall be accomplished by the Maintenance Electricians in accordance the Electrical Isolation, Verification and Lockout Procedure. Electricians apply the EIP lock for Operations, complete and attach the Zero Electrical Energy Verification Tag to the breaker. The Electrician shall return the key to Operations and sign onto the EIP as the Isolation Establisher for the breaker. For 2300v, 4160V and 13,300V motor starters located in Distribution Switchgear (i.e., large compressor breakers) refer to the "MESOG Electricians" section below. The electricians apply the EID lock, return the key to Operations and sign onto the EIP as the Isolation Establisher for the breaker. In both cases the Operator verifies the equipment is isolated by attempting to start the equipment by means of the start/stop station in the field.
4.5.4	Maintenance Electrical Systems Operating Group (MESOG) Electricians	MESOG Electricians operate 2300v, 4160V and 13,300V motor starters located in Distribution Switchgear (i.e., large compressor breakers). MESOG Electricians operate, for the purpose of this procedure, all Refinery electrical distribution equipment (i.e., Switchgear, Air Break Switches, etc). For all distribution electrical equipment, other than circuit breakers used as motor starters, the MESOG electricians shall operate the equipment under the direction of an approved switching order issued by the Suncor Electrical Group. The switching order indicates which EIDs require an EID lock and/or Tag and the MESOG Electricians develop the EIP for the specific electrical isolation. Once the EIP is completed and reviewed by 2 MESOG Electricians, they present the EIP and the associated Lockable Device to the Permit Issuer. The Permit Issuer affixes the lockable device to the lockout board with an Operations Lock and assume control of this isolation allowing Permits to be issued under the isolation. For 2300v, 4160V and 13,300V motor starters located in Distribution Switchgear (i.e., large compressor breakers) MESOG electricians isolate the breakers at the request of Operations. After the breaker has been isolated the MESOG electrician applies a yellow EID lock, provides the key to this lock to Operations and the MESOG electrician signs on the EIP confirming de-energization by following the Electrical Isolation, Verification and Lockout Procedure. The Operator will then verify the equipment is isolated by attempting to start the equipment by means of the start / stop station in the field.
4.5.5	Third Party Isolation Method	If the “Permit Issuer” has no means to prove the electrical circuit / device is isolated, i.e., electric heat tracing or instrument, the “Permit Issuer” may issue a permit to the craft personnel if it is part of their job or task assignment to

prove isolation provided they indicate on the SWP that the worker needs to provide their own isolations under Individual Lockout Method. If a SWP is being issued for a craft that cannot prove their own electrical isolations, such as insulators working on a line with electric heat tracing, then the Electrical Isolation, Verification and Lockout Procedure must be followed.

4.5.6 References

The following references are used to support this section:

- Electrical Systems Operations Standard
- Electrical Switching Order Procedure
- Electrical Isolation, Verification and Lockout Procedure

5 Hazardous Energy Control Process Workflows

5.1 Introduction

5.1.1 Defined

Hazardous Energy Control Process Workflows identify the series of activities that are necessary to complete the task of energy isolation for Individual and Complex Lockout Methods.

Process workflows are used to coordinate tasks, with the aim of improving organizational clarity and efficiency. A workflow may either be sequential, with each step contingent upon completion of the previous one, or parallel, with multiple steps occurring simultaneously.

Due to the nature of practically executing the process workflows for Hazardous Energy Control, tasks may be completed in a different order to improve execution efficiency except where HARD STOPS have been identified in the process workflow.

5.1.2 Lines of Defense

Lines of Defense are indicated as a HARD STOP in the process workflows. A HARD STOP allows the work prior to or after the HARD STOP task to be executed in any order with the understanding that the order shall not change crossing a HARD STOP. These lines of defense are intended to clarify to all personnel where these tasks are. The HARD STOPS below identify for each lockout method the role and step where they are applied.

Individual Lockout Method

There is 1 Line of Defense task identified in the Individual Lockout Method Process Workflow:

- Worker – Apply Personal Lock to the EID

Complex Group Lockout Method

There are 3 Line of Defense tasks identified in the Normal Operations Process Workflow:

- Permit Issuer/Receiver – Verification of De-energization in the Field
- Permit Receiver/Worker – Walks Field EIP Points with the Worker. Contractor Utilizes the Lockbox or WIF.
- Permit Issuer – Is EIP Ready to Terminate?

There are 7 Line of Defense tasks identified in the in the Unit Shutdowns, Turnarounds & Modular Outages Process Workflow:

- Permit Approver – Signs Master EIP

- Permit Issuer/Receiver – Verification of De-energization in the Field
- Permit Receiver/Worker – Walks Field EIP Points with the Worker. Contractor Utilizes the Lockbox or WIF.
- TA Committee – TA Committee Approval Process
- TA Committee/Contractor – Field Tour & Signing CIF
- Permit Issuer – Is HEC Scope of Work under TA Status?
- TA Committee/Contractor – Contractor Sign off of the CIF and TA Energy Isolation Form signed off

5.2 Individual Lockout Method Process Workflow

5.2.1	Defined	The Individual Lockout Method Process Workflow identifies the series of activities related to lockout by the individual or Operations Personnel.
5.2.2	Individual Established Isolation Process	The following steps are required when the Individual establishes isolation for the Individual Lockout Method Process: 1. Determine the isolation point. 2. Establish the isolation. 3. Attach a Do Not Operate Tag on the EID. 4. Verify de-energization. 5. Apply Personnel Lock to the EID.
		Operations shall notify all affected employees that a piece of equipment, process or system is being locked out. Operations shall document in shift logs to ensure that other shifts are aware of the lockout.
5.2.3	Operations Established Isolation Process	The following steps are required when Operations Personnel establishes isolation for the Individual Lockout Method Process: 1. Determine the isolation point. 2. Establish the isolation. 3. Attach a Do Not Operate Tag, a multi-hasp and Red Operations Lock to the EID.

5.2.4	Individual Lockout Method	The Individual Lockout Method Process Workflow is separated into the following key phases: • Hazardous Energy Isolation Preparation • Hazardous Energy Isolation Establishment • Safe Work Permitting for Hazardous Energy Control • Work Execution • Hazardous Energy Isolation Termination
5.2.5	Hazardous Energy Isolation Preparation	Hazardous Energy Isolation Preparation is the activity of the Operations Personnel and Permit Receiver determining the isolation point in the field and whether isolation can be done by the Permit Receiver or if required by Operations. After the isolation is determined, the next step is the Safe Work Permitting for Hazardous Energy Control in Section 9.3.

5.3 Complex Group Lockout Method Process Workflow

5.3.1	Defined	The Complex Lockout Method Process Workflows identify the series of activities related to energy isolation during: • Normal Operations • Unit Shutdowns, Turnarounds & Modular Outages
		The Complex Lockout Method Process Workflows are separated into the following key phases: • EIP Preparation • EIP Approval • EIP Establishment • Safe Work Permitting for Hazardous Energy Control • **Establishing TA Status – Unit Shutdowns, Turnarounds & Modular Outages ONLY** • **Master EIP Approval – Unit Shutdowns, Turnarounds & Modular Outages ONLY** • Work Execution • EIP Termination

The key difference between the two workflows is that the Unit Shutdown, Turnarounds & Modular Outages Process Workflow adds the following additional phases to the process workflow:

- Establishing TA Status by installing Battery Limit Blanks
- Master EIP Approval, which is a TA Committee Approval Process to "officially" declare a unit or area under "Turnaround Energy Isolation", meaning the review of individual EIPs under the Master EIP are not required every time.

5.3.2 References

The following references are used to support this section:

- Complex Group Lockout Method – Normal Operations Process Workflow
- Complex Group Lockout Method – Unit Shutdown, Turnarounds & Modular Outages Process Workflow

6 Energy Isolation Plan Preparation

6.1 Introduction

6.1.1	Defined	Energy Isolation Plan (EIP) Preparation is the activity of documenting the energy isolation method on the equipment or system to be serviced. The EIP provides a listing of the Energy Isolating Devices along with the means used to control these devices. EIP Preparation only applies to the Complex Group Lockout Method. EIPs are developed for: • Scopes of work related to normal operation of maintenance or capital activities. • Scopes of work related to Unit Shutdowns, Turnarounds or Modular Outages.
6.1.2	Energy Isolation Plan (EIP) Form	All information related to energy isolation shall be completed on the Energy Isolation Plan (EIP) Form. The Energy Isolation Plan Form includes three parts: • PART 1 – Energy Isolating Device Listing • PART 2 – Vents and Bleeds Used for Depressurization and Verification • PART 3 – Zero Electrical Energy Verification
		Each form shall have a Blank List attached identifying the blank locations if required. All EIP's Forms are salmon coloured with unique numbers. Yellow Forms are used for the Blank Lists in Unit Shutdowns, Turnarounds and Modular Outages.
6.1.3	Master	The EIP Form is used for the Master only during Unit Shutdowns, Turnarounds or Modular Outages. The EIP Form combines other individual EIPs based on the equipment or system boundaries. During Unit Shutdowns, Turnarounds or Modular Outages individual EIP Form numbering is transferred to the EIP Form titled as the Master EIP. The Master EIP number is referenced on all Safe Work Permits.
6.1.4	References	The following references are used to support this section: • Energy Isolation Plan Form • Blank List Form

6.2 Roles and Responsibilities

6.2.1 Energy Isolation Preparer	The Energy Isolation Plan Preparer is the person who prepares the EIP and signs on to the EIP in the Energy Isolation Plan Preparer Section. The Energy Isolation Plan Preparer shall be an experienced person that is knowledgeable of the hazards associated with the machine, equipment or process to be isolated and of the required isolation. The Energy Isolation Plan Preparer is a qualified Process Operator but depending on the scope of work may be a member of the Electrical or Suncor Instrument Maintenance groups.

6.3 EIP Preparation for Normal Operations

6.3.1 Defined	An EIP is prepared for normal operations scopes of work related to maintenance or capital activities. The EIP is prepared by determining all sources of energy, including stored energy, and the Energy Isolating Devices that are required for energy isolation. An EIPs shall be prepared by: • Understanding the scope of work to be performed. • Reviewing previous EIPs and Blank Lists. • Determining the hazard(s) both to personnel and equipment by reviewing current standards, procedures, drawings, P&IDs. • Performing a physical inspection of the work site to identify the list of valves, electrical switches and/or breakers to be closed or opened, blanks to be installed and vents/bleeds to be used for verification of depressurization to ensure a safe working area. • Determining what equipment needs to remain “live”. • Documenting the sources of energy on the EIP. • If required, attaching a P&ID, drawing or sketch to the EIP to help detail the isolation points and make it easier to be reviewed in the next step. • If required, attaching the Blank List to the EIP if blanks are required as part of the plan.

6.3.2	Individual EIP	An individual EIP refers to isolation specifically for a piece of equipment, process or system.
6.3.3	References	The following references are used to support this section: • Energy Isolation Plan Form

6.4 EIP Preparation for Unit Shutdowns, Turnarounds or Modular Outages

6.4.1	Defined	EIP Preparation for Unit Shutdowns, Turnarounds or Modular Outages is the same process as preparing an EIP for Normal Operations but incorporates battery limit isolation in conjunction with the supporting documentation to eliminate and control hazardous energy for an entire unit or area. Master EIPs are completed for each unit or area declaring a Unit Shutdown, Turnaround or Modular Outage. This allows Operations to “officially” declare a unit or area under “TA Status”.
		EIP Preparation shall additionally take the following information into consideration to ensure a successful start-up after termination of an EIP: • Prepare the EIP based on the Pre-Startup Safety Review (PSSR) boundaries required for start-up. • Review the constructability of the isolation break points. Isometrics shall be reviewed to ensure the P&IDs correctly identify the break point locations in the field. • Align the EIP based on the planned start-up scheduled. If parts of the unit or area are to be started up prior to full energization, the EIP must reflect the proper isolation boundaries in order to avoid EIPs being recreated during start-up.
6.4.2	Additional Lists	The following additional lists shall be created to identify other energy sources: • Energy Removal List • Live Equipment List • Exception List
		Energy Removal List The Energy Removal List shall include a list of every hazardous energy source that will be removed and controlled from a unit or area for the duration of the shutdown. The Process Battery Limit Blank List and the Utility Battery Blank List shall be reviewed and revised based on the scope of work for the unit or area. Depending on the unit configuration, the Process Battery Limit Blank List and the Utility Battery Blank List can be combined on one list.

Separate EIPs are created for:

- Process Battery Limit Blank locations
- Utility Battery Limit Blank locations
- Additional Energy Sources – Anything that has an energy source within the battery limit boundaries with connections to the process.

When creating EIPs for Process/Utility Battery Limit Blanks, multiple blanks may be installed under the same EIP if needed.

Live Equipment List

The Live Equipment List shall include a list of equipment and/or piping systems that will remain in service during unit shutdown. These equipment and/or systems have no involvement or connection whatsoever to the equipment being worked on for the shutdown. (i.e. Main Flare Header)

Exception List

The Exception List shall include a list of hazardous energy sources within the defined unit or area that must be kept in service during the shutdown. Each hazardous energy source must list a valid agreed to reason for remaining in service and the method in which it will be controlled. (i.e. Instrument Air)

A separate EIP is created for the Exception List.

6.4.3 Master EIP

For Unit Shutdowns, Turnarounds or Modular Outages a Master EIP shall be used for an area or unit. The Master EIP is defined as the compilation of all the individual EIPs used to control the hazardous energy in a unit or area.

The EIP Form is used to compile all the individual EIP numbers. This form has its own unique numbering that is referenced as the Master EIP number and becomes the cover page for the Turnaround Isolation Book.

6.4.4 Turnaround Isolation Book

The Turnaround Isolation Book shall be created as a centralized place where all documentation is kept and monitored by operations during the Preparation, Execution, Approval and Auditing phases of the shutdown. The Turnaround Isolation Book includes:

- Battery Limit Blank List EIPs
- Energy Source EIPs
- Exceptions List EIPs
- Live Equipment List

A Master EIP number is assigned to each Turnaround Isolation Book to be used as a reference when permitting work that is covered under the isolation envelope. Master EIP numbering is based on the unit and year of execution.

6.4.5	References	The following references are used to support this section: • Energy Isolation Plan Form • Energy Removal List Form • Exceptions List Form • Live Equipment List Form

6.5 Changes to the Energy Isolation Plan

6.5.1	Defined	Changes to the EIP may be required due do circumstances that require it necessary to add, remove, or change the isolation points on a system as work changes, progresses or is added. Changes to the EIP may also be required if additional, unrelated, work is to be performed using part or all of an existing isolation system.

6.5.2	Adding or Removing an Isolation Point	Adding or removing an isolation point from an existing EIP shall ensure:
		• All Permit Receivers remove their personal and craft/contractor locks from the Lockable Device and sign off of the Safe Work Permit.
		• The Permit Issuer:
		  ○ Unlocks the Lockable Device.
		  ○ Adds the new EID Lock and EID Tag to the additional EID(s) in the field.
		  ○ Places the EID Lock Keys on to the related Lockable Device.
		  ○ Re-locks the Lockable Device.
		  ○ Adds the new isolation points to the existing EIP.
		  ○ Fills out the bottom of the EIP indicating that the plan has been changed, reason for change, and date of change.
		• The EIP Approver reviews the changes and signs their name on the “Changes Approved By” if they agree that no additional hazards are created.
		• The Permit Receivers:
		  ○ Review the amended EIP.
		  ○ Go to the field with the Permit Issuer to re-verify de-energization with the amended EID and EIP for the same work to continue.
		  ○ Apply the applicable personal locks.
		• New Safe Work Permits are created.

6.5.3	Changing an Isolation Point	Relocating an isolation point on an existing EIP shall ensure:
		• All Permit Receivers remove their personal and craft/contractor locks from the Lockable Device and sign off of the Safe Work Permit.
		• The Permit Issuer:
		  ○ Unlocks the Lockable Device.
		  ○ Removes the applicable EID from the Lockable Device.
		  ○ Proceeds to unlock the applicable EID in the field and removes the EID Tag.
		  ○ Relocates the EID Lock and Tag to the new isolation point.
		  ○ Updates the EIP with the new location details.
		  ○ Fills out the bottom of the EIP indicating that the plan has been changed, reason for change, and date of change.
		• The EIP Approver reviews the changes and signs their name on the "Changes Approved By" if they agree that no additional hazards are created.
		• The Permit Receivers:
		  ○ Review the amended EIP.
		  ○ Go to the field with the Permit Issuer to re-verify de-energization with the amended EID and EIP for the same work to continue.
		  ○ Apply the applicable personal locks.
		• The Safe Work Permit is reissued.

6.5.4	Unrelated Work Using Part of an Existing EIP	Additional, unrelated, work that is to be performed using some or all of the Energy Isolation Devices of an existing EIP shall ensure a new EIP is developed and applied per this Standard. Existing EIP energy isolating devices shall ensure they are tagged and locked properly to ensure any personnel dismantling one EIP is aware that the EID is being used as part of another EIP.
6.5.5	Energy Removal List or Exception List Changes	If a device on the Energy Removal List or Exception List must be altered or moved, the Turnaround Energy Isolation Review Form must be completed. The Turnaround Energy Isolation Review Form: • Identifies the reason for device to be altered. (i.e. piping job needs battery limit blank to be removed) • Determines how isolation will be guaranteed before the device can be altered. The TA Approval Committee reviews and signs off and on the Turnaround Energy Isolation Sign Off Form. The form is placed in the Turnaround Energy Isolation Book for reference.

6.5.6 References

The following references are used to support this section:

- “Change Log” section of the Energy Isolation Plan Form
- Turnaround Energy Isolation Review Form
- Turnaround Energy Isolation Sign Off Form

7 Energy Isolation Plan Approval

7.1 Introduction

7.1.1	Defined	Energy Isolation Plan Approval is the activity of fully verifying the process for how the EIP was developed. EIP Establishment only applies to the Complex Group Lockout Method.

7.2 Roles and Responsibilities

7.2.1	Energy Isolation Approver	The Energy Isolation Plan Approver is the person who is the second level of authorization that shall verify the plan developed by the Energy Isolation Plan Preparer. The Energy Isolation Plan Approver is a person that is knowledgeable of the hazards and isolation requirements associated with the machine, equipment or process to be isolated. The Energy Isolation Plan Approver is typically a Shift Supervisor, Operations Coordinator or a Maintenance Coordinator. This role may also be assigned to the Electrical or Instrument groups for work that is purely Electrical or Instrument based.

7.3 EIP Approval

7.3.1	Defined	All EIPs shall require a second level of authorization before establishing the energy isolation plan. For Unit Shutdowns, Turnarounds and Modular Outages, once all individual EIPs have been approved, they are compiled on a Master EIP that is reviewed and approved under Section 11.

8 Energy Isolation Plan Establishment

8.1 Introduction

8.1.1 Defined

Energy Isolation Plan Establishment is the activity associated with preparing the equipment or system for energy isolation with an EIP. This involves:

- Establishing isolation
- Verifying isolation
- Demonstrating of zero energy in the field

EIP Establishment only applies to the Complex Group Lockout Method and is executed the same for:

- Normal Operations
- Unit Shutdowns, Turnarounds & Modular Outages

8.2 Roles and Responsibilities

8.2.1 Energy Isolation Establisher

The Energy Isolation Establisher is the person responsible for preparing the equipment or system in accordance with the EIP.

The Energy Isolation Establisher shall note their name and date on the EIP as they confirm that each EID is in its isolated position and verifying zero energy in the field where applicable.

The Energy Isolation Establisher is typically done by a Process Operator but it may be done by an Electrician or Suncor Instrument Technician who is performing isolation on behalf of Operations.

8.3 EIP Establishment

8.3.1 Defined

The EIP Establishment involves:

- Operations to safe the equipment, process or system
- Confirming de-energization
- Application of the Zero Electrical Energy Verification Tagging Process if applicable to the scope of work
- Applying Locks and Do Not Operate Tags
- Updating the EIP Board

Operations begins safing equipment by utilizing an approved EIP for energy isolation execution. Operations shall:

- Use procedures available to safely isolation the equipment, process or system
- Notify all affected employees that a piece of equipment, process or system is being locked out and document in shift logs to ensure that other shifts are aware of the lockout

8.3.2 EIP Establishment Process

1. Operations shall establish isolation by:
   a. Placing the EIDs identified in the EIP in their isolation position.
   b. Utilizing electricians or instrument technicians to operate devices that are not normally operated by process operators.
      i. Follow the Zero Electrical Energy Verification Tagging Process in Section 8.4.
   c. Allowing time for cool down and/or process material to be fully drained/vented to reduce the risk of overpressure.
   d. Ensuring drains, vents and bleeds that are left open are identified with a red ribbon as per Identification of Drains, Bleeds & Vents During Unit/Equipment Shutdown & Outages
   e. Ensuring any bull plugs/caps that have been removed are tracked as per the Bull Plug Tracking and Auditing Procedure.
   f. Complying with the requirements in the Unconfirmed Energy Assessment Procedure if energy isolation cannot be confirmed.
2. Operations shall attach a Do Not Operate Tag and install a yellow lock at each isolation point.
3. Operations shall:
   a. Attach all keys to a Lock Ring/Hasp
   b. Apply a Do Not Operate Tag with the EIP information
   c. Secure a RED lock to the Lock Ring/Hasp
   d. Hang Lock Ring on the EIP Board

8.3.3 References

The following references are used to support this section:

- Area Specific Safing Procedure in Livelink
- Identification of Drains, Bleeds & Vents During Unit/Equipment Shutdown & Outages
- Bull Plug Tracking and Auditing Procedure
- Unconfirmed Energy Assessment Procedure

8.4 Zero Electrical Energy Verification Tagging Process

8.4.1	Defined	The following steps are required for Zero Electrical Energy Verification when the Complex Group Lockout Method is used: 1. The individual that verifies that zero electrical energy is required to: a. Fill out the Zero Electrical Energy Verification Tag b. Apply the tag to the electrical isolation device (i.e. breaker or switch). c. Sign off on the Zero Electrical Energy Verification Section on Page 2 of the EIP Form.
8.4.2	Verification of De-energization	Before allowing work to begin on machines, equipment, or processes that have been locked out, the Permit Issuer shall verify that isolation and de-energization have been accomplished by: • Observing open vents. • Using bleeds to verify depressurization by the appropriate measures that shall ensure the bleeds are clear. Cyclones / filters / knockout devices shall not be used for verification because of the potential to plug inside the equipment even though the bleed may be clear. • Inspecting the position of valves. • Zero electrical energy verification with 3 LED lights on breaker, and Electricians performing voltage checks, etc.
		Verification of de-energization shall ensure there are no check valves in the system that could prohibit appropriate depressurization.
		Special consideration must be given if the equipment has been isolated for an extended period of time. Verification of de-energization shall be completed to confirm that isolation valves have held and vents / bleeds have remained open and not plugged up.
8.4.3	References	The following references are used to support this section: • Electrical Isolation, Verification and Lockout Procedure • Zero Electrical Energy Verification Training Package • Sarnia Refinery – Zero Electrical Energy Verification Training Video

9 Safe Work Permitting for Hazardous Energy Control

9.1 Introduction

9.1.1	Defined	The Safe Work Permitting for Hazardous Energy Control follows the Safe Work Permit (SWP) Standard with the following additional criteria by the different roles and responsibilities for the: • Permit Issuer • Permit Receiver • Worker
9.1.2	Normal Operations	Permits required for hazardous energy control reference the EIP number on the permit.
9.1.3	Unit Shutdown, Turnaround & Modular Outages	Permits issued during a Unit Shutdown, Turnaround & Modular Outages reference the Master EIP number on the permit once all the individual EIPs on the Energy Removal List have been completed. The Master EIP is specific to each area covered by the designated Turnaround Energy Isolation Book.
9.1.4	References	The following references are used to support this section: • Safe Work Permit Standard

9.2 Roles and Responsibilities

9.2.1	Permit Issuer	The Permit Issuer is the person assigned to verify the integrity of an EIP and to issue a SWP to a Permit Receiver authorizing job tasks specified on the SWP. The Permit Issuer's responsibilities are to: • Review the scope of work with the Permit Receiver to reach a mutual understanding of the work to be performed and how it will be accomplished, including; I. Any hazardous aspects of the task II. The equipment and area preparation III. The methods of isolation and lock out IV. The work crew size

V. Providing any relevant Assessments and/or Applications

- Visit the field with the Permit Receiver the first time they receive a permit for a particular job. During the field visit.
  I. Isolation points applicable to the job tasks specified on the permit shall be reviewed including verification that hazardous energy sources have been de-energized.
  II. Affix break-here tags to the applicable break-here locations, and review break-here locations. Sign off on each break-here tag as part of field tour with permit receiver.
- Facilitate requirements of the Testing Process.
- Notify the Permit Receiver of any changing conditions or potential impacts to the work area.
- Take appropriate action when informed of an emergency, upset, or changing condition, taking corrective actions up to stopping the job to ensure a hazardous condition does not develop.

9.2.2 Permit Receiver

The Permit Receiver is the person specifically trained in energy isolation and assigned by their Supervision to review and accept the SWP and associated EIP on behalf of themselves or on behalf of themselves and associated Workers. Permit Receivers shall hold valid Permit Receiver Training verification.

The Permit Receiver's responsibilities are to:

- Review the scope of work with the Permit Issuer to reach a mutual understanding of the work to be performed and how it will be accomplished, including
  I. Any hazardous aspects of the task
  II. The equipment and area preparation
  III. The methods of isolation and lock out
  IV. The work crew size
- Visit the field with the Permit Issuer the first time they receive a permit for a particular job. During the field visit.
  I. Isolation points applicable to the job tasks specified on the permit will be reviewed including verification that hazardous energy sources have been de-energized.
  II. Review break-here locations, and sign off on each break-here

tag as part of the field tour with the permit issuer.

- Inform the workers working under the protection of the Permit Receiver of the isolation boundaries, Break Here locations, and of the equipment on which work is authorized to be performed, as well as any special precautions.
- Coordinate the Workers sign on/off of the Workers Initials Form (WIF) OR coordinating the Workers applying Personal Locks to a Lockable Device when following the Complex Group Lockout Method depending which practice is followed.
- Ensure that all work is being performed in accordance with safe work permit conditions, legal requirements, Suncor & Contractor Standards.
- Ensure the Permit Issuer is immediately informed should conditions and/or the scope of work change, when the job is complete, and what the status of the job is when the safe work permit is expired.

9.2.3 Worker

During Normal Operations

The Worker is the person who is assigned to work under the protection afforded them by a “Permit Receiver” and associated EIP.

The Worker’s responsibilities are to:

- Review the isolation boundaries and the equipment where work is authorized, with the Permit Receiver.
- Review Break Here locations and tags and sign off as part of review with the Permit Receiver.
- Sign onto the Worker Initials Form (WIF) or applying a Personal Lock on a Lockable Device.

During Unit Shutdowns, Turnarounds and Modular Outages

The Worker is the person who is assigned to work under the protection afforded them by a “Permit Receiver” and associated Master EIP.

The Worker’s responsibilities are to:

- Review the Turnaround Energy Isolation Approval Form that has been signed off by operations and maintenance supervisor and displayed on the EIP board for that particular unit/area.
- Sign on to the Worker Initials Form (WIF) or applying a Personal Lock on the Lockable Device.

9.3 Safe Work Permitting for HEC

9.3.1 Defined

Safe Work Permitting for HEC involves:

- Review of the isolation point(s) or EIP.
- Verification of de-energization.
- Application of the Unconfirmed Energy Procedure if applicable to the scope of work
- Preparing the Safe Work Permit.
- Conducting a Field Tour.
- Signing the Safe Work Permit.
- Applying personal lock.
- Signing the Break Here Tags.

Permit Locks may be left on the EID if the work is not complete and the lock is readily identifiable with its owner.

9.4 Permitting Under the Complex Group Lockout Method

9.4.1 Normal Operations

Once the EIP has been established, the Permit Receiver inspects the work with the Permit Issuer to:

- Verify all isolations in the field for the first time that they receive a permit for a particular job.
- Confirm de-energization by testing the start/stop switch, verify open vents and bleeds are clear, inspecting the position of valves, performing voltage checks, etc.
    - If energy isolation cannot be confirmed, the requirements prescribed in the Unconfirmed Energy Assessment Procedure shall be followed.
- After confirmation of the field review of the EIP, Operations issues a Safe Work Permit referencing the EIP number.

The Permit Receiver:

- Applies a Personal Lock to the Multi-Hasp on the EIP Board. If a work task is expected to last multiple shifts, the Permit Receiver will also apply a craft/contractor lock.
- Review and sign off Break-Here locations with the Permit Issuer.
- Walks the field EIP points with the Workers and uses the Lockbox or WIF

The Workers:

- Signs the Break-Here Tags

9.4.2 Unit Shutdowns, Turnarounds & Modular Outages

Permitting during a Unit Shutdown, Turnaround & Modular Outage is the same as for Normal Operations except when:

- All isolations have been verified in the field for the first time with the same Permit Issuer and Permit Receiver for a particular job, the Permit Issuer and Permit Receiver do not have to perform another field review provide there have not been any changes related to the EIP.

When permitting Process/Utility Battery Limit Blanks, multiple blanks may be installed on the same permit as long as permit conditions are the same for each blank. Be aware that normal procedures for preparing a blank location must still be followed.

Multiple EIPs can be on one permit.

9.4.3 References

The following references are used to support this section:

- Work Initial Form
- Contractor Initials Form
- Unconfirmed Energy Assessment Procedure

9.5 Permitting for Critical Paths During Unit Shutdowns, Turnarounds & Modular Outages

9.5.1 Defined

The energy isolation process during Unit Shutdowns, Turnarounds and Modular Outages isolation is based on:

- Chemical cleaning requirements
- Critical path requirements
- Start-up planned schedule

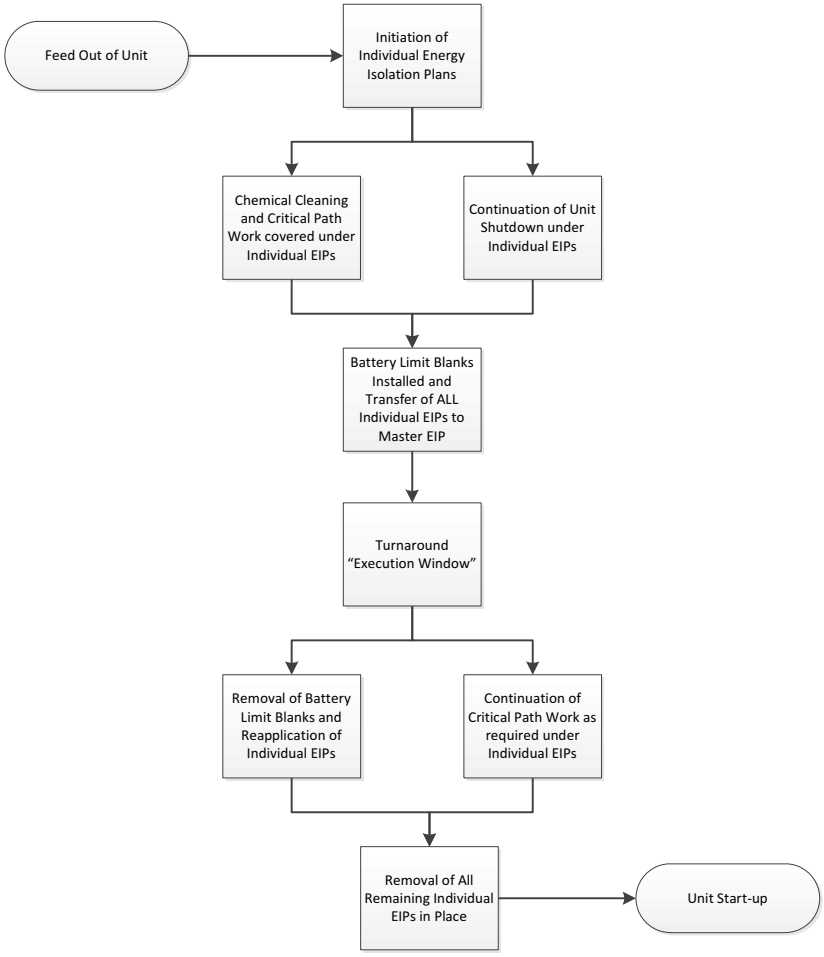
For chemical cleaning and critical path requirements prior to battery limit blanks, the normal process for energy isolation is followed. Once the battery limit blanks have been installed, the individual EIPs are compiled on the Master EIP.

As the turnaround prepares for start-up, specific equipment, processes or systems may require re-energization. Control under the Master EIP is removed and transferred back to an Individual EIP to allow for re-energization of the required equipment, process or system.

9.5.2 EIP Process Workflow from Individual EIP to Master EIP

Below is the workflow in how energy isolation is transferred from an Individual EIP to Master EIP back to Individual EIP.

Individual EIP refers to isolation specifically for a piece of equipment, process or system.



9.6 Break-Here Tagging Process

9.6.1 Defined

The Break-Here Tagging Process is unique to the Hazardous Energy Control Standard. The Break-Here Tagging Process shall be required to:

- Positively identify where de-energized equipment is to be initially opened or physically disconnected from the process.
- Use Break-Here Tags where blanks or blinds are to be installed.

If blanks or blinds are not to be installed, Break-Here Tagging shall still be used at blank locations. For example,

- Water supply and return lines on sample coolers.
- Coupling guards on rotating equipment.
- Electrical cable from a starter to a motor.

All break points must be within the boundary of the EIP to ensure the worker is on the right side of the isolation point.

During Unit Shutdown, Turnarounds & Modular Outages

Break-Here Tags are not required once an individual piece of equipment is completely blanked or physically disconnected from the process. For example:

- Once a compressor is completely blanked the valves can be removed without Break-Here Tags.
- Once a tower is completely blanked the manways can be removed without Break-Here Tags.
- Once the battery limit blanks have be installed, and the hazardous energy is being controlled through Master EIP.

9.6.2 Roles and Responsibilities

Break-Here Tags are affixed by the:

- Energy Isolation Establisher or,
- Permit Issuer during the EIP field tour with the Permit Receiver.

9.6.3 Break-Here Tagging Process

The following steps are required for the Break-Here Tagging Process when the Complex Group Lockout Method is used:

1. Permit issuer shall:
    a. Review Break-Here locations with permit receiver.
2. The Permit Issuer and Permit Receiver shall both sign the Break-Here Tag(s) acknowledging the agreed upon location of the break point.

3. Permit Receiver shall:
    a. Add a personal lock on the lock ring that is on the TA EIP Board for the blanks they will be installing.
    b. Review with Workers the isolation boundaries and Break-Here locations.
4. Workers shall:
    a. Sign on the WIF or place their Personal Locks on the Lockbox.
    b. Sign the associated Break-Here Tag at each specific Break-Here location acknowledging the agreed upon location.
5. Once the equipment or system has been disconnected at the applicable break-here location, the Permit Receiver shall remove and discard the Break-Here Tag.

9.6.4 References

The following references are used to support this section:

- Break Here Tagging Process Video

10 Establishing TA Status – Unit Shutdown, Turnarounds & Modular Outages ONLY

10.1 Introduction

10.1.1 Defined

Establishing TA Status is only done during Unit Shutdowns, Turnarounds and Modular Outages. Establishing TA Status requires blanking to be installed to create a controlled isolation boundary from the process. Once all energy sources have been eliminated, documentation is compiled on the Master EIP and sent for TA Approval.

Blanks shall be installed per the Blanking Process Standard under a Safe Work Permit. Blank List(s) shall be attached to the EIP and referenced on the Safe Work Permit.

10.2 Blanking to Establish TA Status

10.2.1 Defined

The following blanking order is required to install blanks when the Complex Group Lockout Method is used during Unit Shutdowns, Turnarounds or Modular Outages:

- STEP 1 – Battery Limit Blanking for Process
- STEP 2 – Battery Limit Blanking for Utility
- STEP 3 – Additional Energy Source Isolation
- STEP 4 – Exception List Energy Source Isolation

10.2.2 STEP 1 – Battery Limit Blanking Process

Battery Limit Blanking shall be installed to create a controlled isolation boundary from the process. The following steps are required:

1. Operations shall:
    a. Verify the EIP for each Battery Limit Blank locations has been signed off by the EIP Approver.
    b. Isolate, secure a Do Not Operate Tag and install a yellow lock on all valves to each Battery Limit Blank location identified on the EIP.
    c. Place the keys on a lock rink, lock the lock ring with a red lock and tag the lock ring with the blank number and blank description.

d. Place the lock ring on the TA Energy Isolation Board.

e. Sign-off the EIP that isolation has been established.

2. Maintenance shall:

a. Obtain a Safe Work Permit.

b. Install Process Battery Limit Blanks.

c. After blanks have been installed and signed off by maintenance, have the blue permit locks removed from the Turnaround Energy Isolation Board.

3. Operations shall:

a. Verify that the Process Battery Limit Blanks have been installed in the correct location.

b. Add a green “Blanks Installed Tag” to the lock ring.

c. Commence unlocking and opening isolation valves required to perform safing procedures.

d. Sign off Master EIP that 1st Isolation has been removed for each necessary device on the EIP specific to the Process Battery Limit Blank location.

Once Process Battery Limits are installed, the unit or area is now ready for Safing Procedures.

If Safing Procedure are not going to be used for a specific Unit Shutdown, Turnaround or Modular Outage, all battery limit blanks may be installed at the same period and all energy sources may be isolated immediately following blank installation.

10.2.3 STEP 2 – Battery Limit Blanking Process

Utilities that are needed to perform safing procedures will be left in-service. Once procedures are complete Utility Battery Limit Blanks can be installed. Individual EIP’s are not needed for Utility Battery Limit Blanks, once all utility isolation battery limit valves have been isolated and process battery limit blanks have been installed. This provides zero energy in the unit or area reference the Master Process Battery Limit Blank List on the Utility Energy Isolation Plan.

Battery Limit Blanking shall be installed to create a controlled isolation boundary from utilities. The following steps are required:

1. Operations shall:

a. Verify that the Energy Isolation Plan for Utility Battery Limit Blanks has been created, reviewed and signed off by reviewer.

b. Isolate, tag (adding name and date) and lock (with a yellow lock) all valves on the Energy Isolation Plan specific to each

Utility Battery Limit Blank location.

c. Take the keys from the yellow locks and place them on a lock ring. The lock ring will be locked (with a red operations lock) and tagged (with blank number and description of blank) on the Turnaround Energy Isolation Board. Each device will be signed off on the Energy Isolation Plan that isolation has been established.

d. After all isolation devices on the EIP for each specific Utility Battery Limit Blank location have been isolated, tagged and locked, sign off that isolation has been established on the EIP.

2. Maintenance shall:

a. Obtain a safe work permit.

b. Install Utility Battery Limit Blanks.

c. After blanks have been installed and signed off by maintenance, have the blue permit locks removed from the Turnaround Energy Isolation Board.

3. Operations shall:

a. Verify that the Utility Battery Limit Blanks have been installed in the correct locations.

b. Add “DO NOT OPERATE” tags referencing the Master EIP number and sign them off on the Master Utility Battery Limit Blank List.

c. Add a green “Blanks Installed Tag” to the lock ring.

10.2.4 STEP 3 – Additional Energy Source Isolation

There may be multiple Energy Sources that will be identified on the Energy Removal List to establish Turnaround Energy Isolation. This section describes the procedure that will be followed for isolating and documenting these Additional Energy Sources. Each Energy Source is unique but the procedure and documentation to be follow will be the same.

1. Operations shall:

a. Verify that the Energy Isolation Plan for Additional Energy Sources has been created, reviewed and signed off by reviewer.

i. If Additional Energy Source needs to be isolated by a specific trade or personnel they must be contacted at this time. (i.e. Electricians if electrical to be isolated is above 600 volts).

b. Isolate, tag (adding name and date) and lock (with a yellow lock), all devices on the EIP specific to each Additional Energy Source.

i. Electricians will isolate 2400 V and higher.

c. Collect all keys from the yellow locks and place on a lock ring.

d. Lock (with a red operations lock) the lock ring on the Turnaround Energy Isolation Board and tag with the information from the EIP. Sign off plan once isolation has been established.

2. Maintenance shall:

a. Add a supervisory lock (Green Lock) to the lock ring on the Turnaround Energy Isolation Board for each Additional Energy Source.

10.2.5	STEP 4 – Exception List Energy Source Isolation	For the Exceptions List, if the Method of Control requires the use of an Energy Isolation Plan continue with following the EIP, if not list items and their criteria on the Exceptions List.
10.2.6	Master EIP Sign Off	When all documentation in the Turnaround Energy Isolation Book have been isolated and signed off, the Master EIP for that area can now be completed and signed off for submission for approval.
10.2.7	References	The following references are used to support this section: • Blanking Process Standard • Blank List Form • Energy Removal List Form • Exceptions List Form • Live Equipment List Form

11 Master EIP Approval – Unit Shutdowns, Turnarounds & Modular Outages ONLY

11.1 Introduction

11.1.1 Defined

Unit Shutdown, Turnaround or Modular Outage approval is done by a TA Approval Committee and only applies to the Master EIP created for a Unit Shutdown, Turnaround, or Modular Outage.

The Master EIP is a compilation of all the individual EIPs used to control the hazardous energy in a unit or area.

Creating a Master EIP allows operations to eliminate the requirement for the Safe Work Permit Issuer and Receiver to tour each isolation point for a particular Safe Work Permit within the boundaries of the Turnaround Energy Isolation and the equipment being worked on is not deemed live or on the exceptions list.

All isolations under a Master EIP have been freed of all energy and all walk downs, lockouts and signoff have been done at a Supervisory level.

For Unit Shutdowns, Turnarounds, and Modular Outages once the Individual EIPs are verified and have been safed in the field, a TA Approval Committee level of approval is required to “officially” declare the entire area under “Turnaround Energy Isolation”.

11.1 Roles and Responsibilities

11.1.1 TA Committee

The TA Approval Committee is a team of individuals appointed to review and approve that the Energy Isolation documentation shall achieve the necessary isolation and control requirements during a Unit Shutdown, Turnaround or Modular Outage.

The TA Approval Committee is the group of managers representing workers of the various groups conducting maintenance execution work inside the Unit Shutdown, Turnaround or Modular Outage. This committee represents workers from the following groups, who will be performing work within the boundaries of a Unit Shutdown, Turnaround or Modular Outage.

11.2 Master EIP Approval

11.2.1 Defined	The TA Approval Committee shall perform an audit that all of the devices listed on the Master EIP and supporting Individual EIP's are in place as stated. The audit consists of: • 100% of the energy isolation devices that are used to lock out the additional (non-blanked) energy sources are to be field audited by an operations representative along with the primary mechanical contractor(s) representatives to confirm that they have been established. • A field verification of at least 10% of the blanks that have been documented on a blank list with signatures from two independent departments where the blanks that make up the EIP have been identified on P&ID drawings. For example, a blank that has been installed by maintenance or a mechanical contractor and witnessed by an operator. The blank list has been signed off in accordance with the sites, by a representative from the department that installed the blank and by an operator that witnessed the installation of the blank. Audit the blank lists that makeup the TA status EIP to confirm that both sets of signatures are present. One signature is required by the contractor that installed the blank and one signature by the operator who witnessed and verified that the blank is installed and is located in the correct location.
11.2.2 Turnaround Energy Isolation Approval Form	100% signoff by all TA Approval Committee members on the Turnaround Energy Isolation Approval Form. Once all requirements have been met the unit or area can "officially" declare "Turnaround Energy Isolation". A copy of the Turnaround Energy Isolation Approval Form is attached to the Display Boards at the Unit or Complex Battery Limits.
11.2.3 Contractor Initial Form (CIF)	The Contractor Initial Form (CIF) is a document that will allow Contractors to work in a unit/area under Turnaround Energy Isolation without applying an actual lock. The supervisor for each contractor will have to initial the CIF when working in the unit/area under Turnaround Energy Isolation and initial off when they are completely done their work in the unit/area for the duration of the Unit Shut Down, Turnaround or Modular Outage. At no time can Turnaround Energy Isolation be removed while a contractor is signed on the Contractor Initials Form for that specific unit/area during a Unit Shut Down, Turnaround or Modular Outage.
11.2.4 References	The following references are used to support this section: • Turnaround Energy Isolation Approval Form • Contractor Initial Form (CIF)

12 Work Execution

12.1 Introduction

12.1.1	Defined	Work execution is the activity of executing the scope of work described on the Safe Work Permit. This activity may first begin with installing blanks per the EIP or other means of energy isolation described on the EIP.
12.1.2	Normal Operations	Any blanking required during normal operations shall be installed per the Blanking Process Standard.
12.1.3	Unit Shutdown, Turnarounds & Modular Outages	Work execution during a Unit Shutdown, Turnaround or Modular Outage is primarily completed under a Master EIP. However, before the issuing of any safe work permit, the permit issuer shall ensure whether the scope of work is to be completed under TA Status. If the work is not, then the Complex Group Lockout Method for Normal Operations shall be applied.

12.2 Blanking Process Standard

12.2.1	Defined	Blanks shall be installed per the Blanking Process Standard under a Safe Work Permit. Blank List(s) shall be attached to the EIP and referenced on the Safe Work Permit.
12.2.2	References	The following references are used to support this section: • Blanking Process Standard

13 Energy Control Interruption (Test in Progress)

13.1 Introduction

13.1.1 Defined

Energy control interruption may be required during the execution of work to temporarily re-energized the equipment to:

- Test
- Troubleshoot
- Reposition the equipment or process (or a component thereof)

13.1.2 Test in Progress Tags

Test in Progress Tags are used to indicate to all personnel that the field conditions are not as stated on the EIP and that portions of the system are energized.

13.2 Roles and Responsibilities

13.2.1 Permit Receiver/ Permit Issuer

Permit Receivers are required to inform Operations when re-energization is required.

In these situations, the Permit Issuer and Permit Receiver shall ensure that affected equipment, process or system is in a safe and ready state to be re-energized.

All personnel associated with the energy isolation of the equipment or process shall be notified of the intent to fully or partially re-energize the equipment or process.

13.3 Testing Process

13.3.1 Defined

The Testing Process in initiated using the following steps:

1. Permit Receivers notify Operations that a test is to be performed.
2. Permit Receivers shall:
    a. Remove all Personal and Craft/Contractor Locks from the Lockable Device.
    b. Have all personnel sign off of the existing Safe Work Permit or Contractor or Worker Initial Form.
    c. Discard the Zero Electrical Energy Verification Tag. Zero

Electrical Energy Verification completed as part of the initial scope of work will no longer be valid in the event that electrical energy is reenergized.

3. Operations Personnel shall:
    a. Unlock the Lockable Device and obtain the key(s) necessary to unlock and operate, or allow operation of, the EIDs that are part of the test.
    b. Place a Test in Progress Tag onto the Lockable Device and all EIDs in the field indicating a test is in progress.
    c. Leave the original Do Not Operate Tags in their respective locations.
    d. Relock the Lockable Device with an Operations Yellow Lock.
4. The Permit Issuer shall:
    a. Reissue the Safe Work Permit that the equipment, process or system is undergoing a test and noting which energy source(s) are no longer locked out.
5. The Permit Receiver shall:
    a. Accept the Safe Work Permit under the new conditions and apply their lock to the lockable device.
    b. Re-apply Personal and Craft/Contractor Locks to the Lockable Device.
    c. Notify personnel to proceed with test.

13.3.2 Testing Completed

6. Once the testing is completed, Permit Receivers shall:
    a. Remove all Personal and Craft/Contractor Locks from the Lockable Device.
    b. Have all personnel sign off of the existing Safe Work Permit or Contractor or Worker Initial Form.
    c. Notify Operations testing is complete.
7. The Permit Issuer shall:
    a. Return the affected EIDs to their safe position.
    b. Re-apply the EID Locks.
    c. Remove the Test in Progress Tag from the Lockable Device.
    d. Replace the key(s) to the EID locks.
    e. Relocks the Lockable device with an Operations Yellow Lock.
    f. Repeat the Electrical Isolation, Verification and Lockout Procedure.

g. Reissue Safe Work Permits reflecting the new conditions.

13.3.3 References

The following references are used to support this section:

- Electrical Isolation, Verification and Lockout Procedure

14 Energy Isolation Plan Termination

14.1 Introduction

14.1.1 Defined	Energy Isolation Termination is the act performed by Operations personnel once all work is complete and locks are removed from the Lockable Device. An EIP is considered to be “Terminated” when the Energy Isolation Plan Termination Process has been followed. The EIP Termination Process only applies during the use of the Complex Group Lockout Method.

14.2 Roles and Responsibilities

14.2.1 Permit Receiver	The Permit Receiver is the person required to signoff permits when work has been completed. Once the work has been completed, the Permit Receiver communicates to the Permit Issuer and removes locks from the EIP Board.
14.2.2 Permit Issuer	The Permit Issuer ensures all work has been completed per the EIP by following the Termination Process.

14.3 EIP Termination

14.3.1 Defined	The Energy Isolation Plan Termination Process summarizes the main steps to be taken to remove an EIP that is in place.

The following steps are required for the EIP Termination Process:

1. Operations verify:
    a. Work related to the EIP has been fully completed by performing a field visit to verify that:
        i. The machine or equipment is operationally intact.
        ii. All necessary guards have been re-installed.
        iii. All opened bleeds, drains and vents are closed.
        iv. All plugs and caps have been replaced.
        v. All tools and materials used during the repair or maintenance activities have been removed.

vi. Any remaining Break-Here tags have been removed and discarded.

b. All Permit Receivers have signed off the SWP.

c. All locks are removed from the EIP Lock Board.

d. The removal of blanks has followed the Blanking Process Procedure.

2. Operations to inform other individuals in the area that energy is about to be restored and that they should be clear of the equipment.

3. Operations to:

   a. Unlock the Lockable Device to obtain the keys for all the EID locks.

   b. Unlock the EIDs in the field.

   c. Remove all Tags in the field by:

      i. Using the EIP to track that each tag and lock is removed and signed off as they are removed.

      ii. Crossing out the tag to indicate it is no longer valid.

      iii. Disposing of each tag.

   d. Return all locks to the control room.

4. Sign off the EIP once all EIDs have been returned to their original position.

14.3.2 Recordkeeping

The terminated EIP is filed in the EIP Binder.

After 3 months, the EIP's shall be packaged and sent to a Suncor approved offsite storage location.

14.3.3 References

The following references are used to support this section:

- Blanking Process Standard

15 Auditing

15.1 Introduction

15.1.1 Defined	Auditing is required to ensure compliance to the Hazardous Energy Control Standard and the Unconfirmed Energy Assessment during normal operations and Unit Shutdown, Turnaround and Modular Outages. Auditing determines the effectives of the training and compliance to the Standard. All audits are forwarded to the EH&S Department to be included in their Refinery Standards Audit Plan.

15.2 Roles and Responsibilities

15.2.1 Shift Supervisors	The Shift Supervisors are the personnel responsible for auditing compliance to the Hazardous Energy Control Standard.
15.2.2 TA Approval Committee	The Turnaround (TA) Approval Committee personnel are responsible for conducting weekly audits during the execution of a Unit Shutdown, Turnaround or Modular Outage. Audits are completed and submitted using the Turnaround Energy Isolation Audit Form.

15.3 Audit Process

15.3.1 Normal Operations	Audits are conducted on a monthly basis.
15.3.2 Unit Shutdown, Turnaround, Modular Outages	The Auditing Process during Unit Shutdown, Turnaround and Modular Outages is to review 5 isolation devices used to declare TA Status. These devices are identified in the field and confirm that proper isolation is still in place.
	If any of the devices have been found not in compliance with the Turnaround Energy Isolation Book, Turnaround Energy Isolation shall be re-assessed immediately. If all devices are in place, the TA Approval Committee will sign the Turnaround Energy Isolation Audit Form and place the form in the Turnaround Energy Isolation Book for reference.

15.3.3 References

The following references are used to support this section:

- HEC Audit Form
- Focus Observation Operations Leadership Handbook
- Turnaround Energy Isolation Audit Form

16 Training

16.1 Training Requirements

16.1.1 Defined	Hazardous Energy Control Training has been developed to provide an understanding of the purpose and control methods used to control energy isolation at the Sarnia Refinery. Training shall be provided prior to all individuals potentially being exposed to hazardous energy.
16.1.2 Training	Hazardous Energy Training is mandatory for the following positions below but are not limited to: • Operations Manager • Shift Supervisor • Maintenance Coordinator • Operations Coordinator • Operations Turnaround Coordinator • Operator • Construction Coordinator • All personnel in non-process and tank farm areas designated to issue permits, prepare and review Energy Isolation Plans • All personnel designated to receive a safe work permit where energy isolation is involved
	Refresher training shall be conducted whenever there is a change in a person's job assignment, a change in the process or system that presents a new hazard or a change in energy control procedures.
16.1.3 References	The following references are used to support this section: • Maintenance HEC Training Program • Break Here Tagging Process Video

17 References

17.1 Standards

Personnel Operating Equipment Standard

Blanking Process Standard

Use of Pipe Plugs – Isolation, Hydrostatic Test, Nozzle Test Standard

Use of Pipe Plugs – Isolation, Hydrostatic Test, Nozzle Test Standard – Appendix A Only

Safe Work Permit Standard

Electrical Systems Operations Standard

17.2 Forms

Worker Initial Form (Part of the HEC Manual App C pg 62-63)

Contractor Initials Form

Energy Isolation Plan Form (Part of the HEC Manual App A pg 58-59)

Blank List Form

Energy Removal List Form

Exceptions List Form

Live Equipment List Form

Turnaround Energy Isolation Review Form

Turnaround Energy Isolation Sign Off Form

Turnaround Energy Isolation Approval Form

Turnaround Energy Isolation Audit Form

HEC Audit Form

17.3 Workflows

Complex Group Lockout Method – Normal Operations

Complex Group Lockout Method – Unit Shutdowns, Turnarounds & Modular Outages

17.4 Procedures

Bull Plug Tracking and Auditing Procedure

Electrical Switching Order Procedure

Electrical Isolation, Verification and Lockout Procedure

Identification of Drains, Bleeds & Vents During Unit/Equipment Shutdown & Outages

Unconfirmed Energy Assessment Procedure

17.5 Training

Zero Electrical Energy Verification Training Package

Sarnia Refinery – Zero Electrical Energy Verification Training Video

Maintenance HEC Training Program

Break Here Tagging Process Video

Focus Observation Operations Leadership Handbook

The following individuals have approved and signed this document.

UserName: Todd Murray (toddmurray)
Title: Mgr EH&S Sarnia Refinery
Date: Sunday, 20 January 2019, 09:51 PM Mountain Time
Meaning:
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