


Hazardous Energy Isolation Code		Document Number: 950C-C-028
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HAZARDOUS ENERGY ISOLATION CODE

8	APP	Mar 17, 2025	Approved	Tammy Siver	Lisa Norris	Dave Kallay 
7	APP	SEP 14, 2023	Approved	Mark Haupt	Tammy Siver	Dave Kallay
6	APP	JAN 17, 2023	Approved	Tammy Siver	Lisa Norris	Dave Kallay
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1.0 PURPOSE

The Company has developed a Hazardous Energy Isolation Code to identify the proper level of protection against a potential injury / incident due to unplanned activation of an energy source to employees, contractors, and the public while operating within the Company's areas of responsibility.

2.0 SCOPE AND APPLICATION

The application of an effective hazardous energy control program is identified in preparing a written, standardized procedure, as well as providing necessary training and responsible supervision. The application of this code shall ensure that a sequence for access, de-energizing, lockout, clearance, release, and start-up of equipment is in place. In conjunction with referenced legislation, clear and concise direction drives the standards, which are to be viewed as the minimum requirements identified by the Company.

3.0 DEFINITIONS

3.1 Blind

A blind is a metal disk placed in a pipe capable of withstanding the maximum pressure of the system to ensure that no air, steam, or other substance will pass through that point if the system is accidentally activated. Before installing blinds, bleed down steam, air, or hydraulic lines to get rid of any pressure. Environmental controls are to be in place as required in case of product release. Lines are to be isolated where appropriate using a double block and bleed process prior to blinding.

3.2 Blocking

Blocking, special brackets, or special stands such as those commonly used under raised vehicles or equipment. Blocking must be placed under raised dies, lifts, or any equipment that might inadvertently move by sliding, falling, or rolling.

3.3 Double Block and Bleed

A pipe isolation system that incorporates two in-line valves and a "bleed" value in-between the in-line valves. The system is lockable and/or requires excessive force to operate without specialized equipment.

3.4 Bump Test

Once equipment has been locked out and tagged, the "authorized worker" shall ensure all personnel and tools are clear, then test (bump) start the locked-out equipment as a final check to ensure that the lockout is successful.

3.5 Company

North American Construction Group (NACG) divisions, departments, or subsidiaries.

3.6 De-Energize

Dealing with energy that already exists by draining or relieving residual energy sources: bleed down air and hydraulic lines; release coiled springs and spring-loaded devices, dissipating stored electrical or thermal energy and negate the effects of gravity so that their stored energy will not result in inadvertent movement.

3.7 Energy Source

Any electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, or other source of energy. This can exist in the form of parts movement, such as equipment rolling; or stored energy, such as coiled springs, spring-loaded devices, or suspended loads.

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3.8 Group Lock Out

A set of locks used to isolate energy sources (active or potential) in a system. When more than one lock is required to isolate a system a lock-box procedure will be used. A supervisor will accompany a tradesperson to place group locks on appropriate energy isolation points. The energy isolation key(s) for the group locks will be placed in the lock box. The supervisor will place a supervisor lock on the lockbox and attach a list of which power isolation points are covered. In turn, every person who works on the machine or system will apply their personal locks to the lockbox.

3.9 Isolation Tag

A single use tag that accompanies the equipment crossover lock to identify the reason why the machine is locked out. The isolation tag identifies critical steps that could cause serious injury or equipment damage should the machine be started. It is attached to the lockout location and remains there until the critical step has been completed or the machine is ready to return to service.

Information on the tag must include the following (see Appendix D for examples):

- Danger: Do not operate/use,
- Reason why the machine is locked out,
- Name of person and date and time the tag was applied.

3.10 Live Work

Work that requires the equipment running in order to perform work. An SOP must be in place to provide a written procedure for such work.

3.11 Live Testing

Work that requires the equipment running in order to test or set up the system. The Live Testing Checklist (Appendix B) must be completed to perform live testing.

3.12 Lockout

To prevent the re-energization or an undesirable activation of a system. The use of lock(s) to physically secure the isolation of all energy sources to render machinery or equipment inoperable. This must be in accordance with a written procedure.

3.13 Lockout Devices / Adaptor (Lock Scissors)

A device that enables multiple locks to be placed on the same lockout point. After the work is completed, each worker removes their personal lock and only upon removal of all locks, can the equipment be returned to serviceable condition.

Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

3.14 Locks

The method for securing isolation. Locks will be substantial and durable. Combination locks will not be used. Unless requested otherwise by client, the locks will adhere to the described color scheme.

A master key to all personal locks will be held by the site or project's senior company Management Representative or designate who can remove the lock, if required, after completing the Lockout Removal Form, Appendix A. Completed Lockout Removal Forms will be kept on file.

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All locks will be accompanied by a tag to describe the reason for the lock.

Personal locks will be individually numbered. Each site is responsible to maintain a database to identify the lock numbers, who they have been assigned to, current contact information of assigned person and lock status. Appendix C – Personal Lock Tracking Log can be used to track this information.

3.15 Personal Lock

Personal locks will be green. One, individually keyed lock will be assigned to the employee. The lock will be numbered, linking the lock to an individual employee. A personal tag must accompany all personal locks applied.

3.16 One-Time Personal Lock

One-time issue personal locks will be orange. When a worker requires more than one personal lock to complete a lock out, the supervisor will have the worker sign for a one-time lock with instructions to return it once the task is complete. For Group Lockout, One-Time Personal Locks are used by the supervisor to lock out the equipment or machinery.

3.17 Equipment (Cross-Over) Lock

Equipment (cross-over) locks will be black. A black lock is used to maintain equipment isolation when there are no workers working on the machine. The last person to remove their personal lock will be responsible for ensuring there is an equipment lock in place once all personal locks are removed.

Locks will be keyed alike, and keys given to authorized employees. An isolation tag must accompany all equipment locks applied. If an additional isolation tag is attached due to a critical step being incomplete, it must remain with the equipment lock until it is verified that the critical step has been completed.

3.18 Supervisor Lock

A blue lock is placed by a supervisor to set up a group lock out on the lockout box or when a system is not to be re-energized until a supervisor has verified the work.

The locks are keyed alike and only supervisors, or their designated representatives will have a key to these locks.

3.19 Electrical Lock

Electrical locks are yellow and are placed on systems 600V and above. They are similar to an equipment lock and are keyed alike. They may be applied and removed only by an electrician.

3.20 Personal Tag

Attached to the lockout location and able to identify the following:

- Danger Do Not Operate
- No Unauthorized Removal
- The Company name (i.e. North American Construction Group)
- Name of the employee who is working on the equipment and how that person may be reached.

3.21 Standard Operating Procedure (SOP)

- Concerning the control of hazardous energy, as required:
- Procedures developed that identify the steps needed to isolate a specific piece of equipment.
- Procedural steps for the control of hazardous energy during live work when equipment must be running to perform work.

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Table 3-1 Lock Descriptions

Lock Type:	Color:	Key Type:	Who:	Key Location:	Lock Location
Personal	Green	Keyed Individually	All	With Person	With Person
Equipment	Black	Keyed Alike	Maintenance Personnel	With Person or with Supervisor	1. NACG Equipment 2. Lockout Station 3. Field Maintenance Person 4. With Supervisor
Electrical	Yellow	Keyed Alike	Electricians Only	With Electrician	With Electrician or Electrical Supervisor
Supervisor	Blue	Keyed Alike	Supervision	With Supervisor	Supervisor's Office
Personal – one time issue and return	Orange	Keyed Individually	1. Person requiring another lock 2. Visitor 3. Sub-Trade 4. Technical Expert 5. Group Lockout	With Person	Supervisor's Office

4.0 EXPECTATIONS

The Hazardous Energy Isolation Code shall provide required and adequate procedures to ensure knowledge of potential hazards of an energy source are available to all employees, contractors, visitors, and general public within the Company's areas of responsibility.

This code shall supplement but not supersede any regulatory Provincial / Federal legislation within the operational areas of responsibility of the Company.

Health, Safety and Environment documents will be made available to all personnel.

5.0 ROLES AND RESPONSIBILITIES

5.1 Employees

- All employees shall be instructed in the safety significance of the lockout procedure by a competent and designated individual of the Company and made aware of site-specific procedures.
- Each new or transferred affected employee shall be instructed by a competent and designated individual of the Company in the purpose and use of the lockout procedure.
- Employees authorized to perform lockout must understand the significance and difference between equipment and personal locks and what they protect.
- Employees authorized to perform lockout shall be certain as to which switch, valve, or other energy isolating devices apply to the equipment being locked out.
- All employees, contractors and visitors shall not attempt to operate any switch, valve, or other energy isolating device bearing a lock.
- Immediately inform the Supervisor of any violations or infractions of this code, which did or could result in an incident or injury to the worker, employees, contractors, or general public within the area.

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- Through adequate training, be responsive to minimize the risk of exposure to potentially harmful work environments through the requirement of lockout procedure.

5.2 Supervisors

- Immediately correct any violations or infractions of this code which did or could result in an incident or injury to the worker, employees, contractors, or general public within the area.
- Provide in accordance with the Company programs, any corrective action or discipline required.
- Ensuring compliance with this code and document said action appropriately.
- Ensure the equipment is being returned to service in a safe manner.
- Ensure that when a situation exists where a group lockout is required that a group personal lock is signed out, and a group personal tag is used to indicate a group lockout.
- Conduct periodic inspections of the energy control to ensure that the procedure and the requirements of this code are being followed.

5.3 Management

- Ensure that each worker involved in the application of a personal locking out device is the only worker equipped with the key to that device and only the company management representative will hold the master key.
- Ensure that in a situation where a lock device is installed by a worker that the installing worker is aware of who holds the master key and when and how that key would be applied.
- Ensure compliance with this code, by all levels of the company including contractors, visitors, and the general public within the Company's areas of operation or active worksites.
- Establish adequate training and monitoring for compliance.
- Oversee the proper completion and filing of Lockout Removal Forms (Appendix A).

5.4 Corporate Health, Safety and Environment Team

- Develop and review this code as outlined in Health, Safety and Environment program. This is to ensure it remains current and complies with all regulatory legislation and company practices.
- Amend and maintain this code within the defined review period.
- Periodically audit to ensure the accurate tracking and the distribution of personal locks with the corresponding personal information.
- Ensure information is available to supervisors or their delegates when required for lockout removal.

6.0 METHOD

6.1 Written Requirements of Hazardous Energy Isolation (Lockout)

All equipment shall be locked out to protect against accidental or inadvertent operation when such operation could cause injury to personnel or damage to property. This includes maintenance, servicing, inspecting, testing, cleaning, repairs and defective machinery or equipment.

If it is not practical to shut down machinery or equipment for maintenance, only the parts which are vital to the process may remain energized. The work must be performed by workers who are qualified to do the work, have been authorized by the employer to do the work, and have been provided with and follow written standard operating procedures.

If the machinery or equipment is disconnected from its power supply, and its connection point is kept under the exclusive and immediate control of the worker at all times during the course of work, a lockout is not required. Typical examples include electrical cords and quick release air or hydraulic lines.

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The Company shall ensure an effective lockout program through a written standardized code which shall be supplemented by site and equipment specific Standard Operating Procedures, as well as Live Work SOPs (where applicable).

This format shall include and verify a sequence for access, de-energizing, lockout, clearance, release, and start-up. Stored energy shall also be considered when de-energizing equipment and special consideration must be paid to new hazardous conditions, which now exist due to the removal of guards for maintenance and servicing.

The Company shall ensure the following is applied and included in the standardized forms for isolation procedures:

- Job objectives and equipment involved.
- Reference material detailing the energy sources for each machine and their respective isolation locations and procedures.
- Lock and key identification and distribution.
- Steps for shutting down, blocking, de-energizing, and securing machinery.
- Procedural steps for applying equipment and personal lockout and tag-out.
- Procedural steps for verifying isolation effectiveness.
- Procedural steps for restarting.
- Employees authorized to perform lockout.
- Annual compliance audit, performed by Corporate Health Safety and Environment team.
- Written Requirements of Hazardous Energy Isolation (Lockout).

6.2 Personal Lockout

- Use a personal lock and personal tag anytime you are working, servicing, or inspecting a machine.
- If work is expected to be complete either before the end of the shift or before the worker is assigned elsewhere, a personal lock will be used.
- If work is expected to continue through shift change, an equipment (cross-over) lock and isolation tag will be placed in addition to all personal locks required.
- If a worker is assigned to another piece of equipment, that worker must remove their personal lock. In doing so, if all locks are removed from the equipment, that worker must ensure the equipment lock and isolation tag(s) are applied to protect the equipment from being started.
- If there are any critical steps not complete, they must be identified on the isolation tag, documented in the crossover notes and reported to the supervisor.
- Workers must review the isolation tag and any crossover notes related to the work before attaching personal lock(s) and prior to working on the equipment.

6.3 Sequence of Lockout Procedure by Individual Worker or Group Lockout

1. Notify all affected employees that a lockout is required and the reasons.
2. If the equipment is operating, shut it down by the normal stopping procedure prescribed by the manufacturer.
3. Operate the switch, valve, or other energy isolating devices so that the energy sources (electrical, mechanical, hydraulic, and other) are disconnected or isolated from the equipment.
4. Stored energy, such as that in capacitors, springs, elevated machine members, rotating fly wheels, hydraulic systems; and air, gas, steam, or water pressure, must also be de-energized or restrained by methods such as grounding, repositioning, blocking, and bleeding down.
5. Lockout energy isolating devices with required lock.
6. Attach an isolation tag to the equipment lock and a personal tag to the personal lock.

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7. After ensuring that no personnel are exposed and as a check on having disconnected the energy sources, a qualified individual must verify that the equipment will not operate and be satisfied that it will not operate. It is the responsibility of the first employee applying a personal lock to verify isolation.
8. The equipment is now locked out.

6.4 Supervisor for Group Lockout

Follow steps outlined in 5.8

- A Personal – One Time Issue and Return lock and a group lockout tag will be placed by the supervisor at the lockout location.
- The key for that lock is place inside a lockbox and the supervisor attaches a supervisor lock to the lockbox.

6.5 Worker for Group Lockout

- After the key for a Personal – One Time Issue and Return lock is placed inside the lockbox and a supervisor lock has been placed on the lockbox, workers follow with their Personal locks.
- The equipment is now locked out.

6.6 Sequence of Lockout Procedure for Light Vehicles

1. Notify all affected employees that a lockout is required and the reason.
2. If the equipment is operating, shut it down by the normal stopping procedure of turning off the key and gaining possession of the command start, if applicable.
3. If the vehicle has a remote start, deactivate it in the vehicle settings menu and raise the hood.
4. Remove the key and command start and place it either under direct control (pocket) or in a lockbox. If there is more than one worker per vehicle place keys in a lockbox and place personal locks on the lockbox.
5. Attach an isolation tag to the steering wheel and a personal tag to the personal lock.
6. The equipment is now locked out.

6.7 Multiple Personal Locks Required

In the event that a worker requires two or more personal locks to adequately isolate multiple forms of hazardous energy, personal locks can be signed out from the supervisor. Note that all procedures requiring more than one personal lock must follow a written SOP or a JSA.

6.8 Working on Equipment Which Must Be Running During Servicing

In cases where equipment must be operational for servicing and or where it is not possible to lock out equipment for service work, the Company shall identify such equipment and implement the following:

- (a) FLRA - A detailed Field Level Risk Assessment shall be conducted on the equipment prior to working with or around such equipment.
- (b) Live Work Standard Operating Procedure or Job Safety Analysis - Follow a detailed SOP or JSA for tasks being performed around and/or including the use of that equipment.
- (c) Live Testing Checklist - The Live Testing Checklist (Appendix B) must be used.

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6.9 Verification of Hazardous Energy Isolation, De-energization & Control

Prior to working on any system, the worker must verify hazardous energy has been isolated, de-energized and controlled. Workers must review manufacturer procedures to confirm how to control hazardous energy and verify its isolation or de-energization.

Depending on the task, verification can include, but is not limited to:

- Test starting the machine to confirm it cannot start.
- Placing the machine into gear to confirm it cannot move.
- Moving the hydraulic gears to confirm attachments cannot move and the machine cannot swing or travel.
- Opening hydraulic or air lines to bleed off the residual pressure.

When verifying stored energy systems have been de-energized, workers must use the following additional controls:

- Do not stand in the line of fire.
- Protect the body from residual pressure release. This can include additional PPE (face shield) or covering the area with suitable shield or barricade to deflect the release of residual pressure.

If unable to confirm if a system's hazardous energy has been isolated, de-energized and controlled, the worker must stop work and notify their supervisor.

6.10 Removal of Locks

Whenever an employee is not working on a piece of equipment the employee must remove his/her personal lock.

The equipment locks stay on to mark the equipment as down during shift change. Update isolation tag as required during shift change. If there are any critical steps not complete, you must identify them on the isolation tag, document in the crossover notes and notify your supervisor.

When the job is complete and equipment is ready for testing or normal service, all guards, barriers, or other safety devices shall be replaced prior to removal of any lock or tag.

When equipment is clear of personnel and obstructions, each person may remove his/her personal lock. A qualified individual will then remove the equipment lock and ensure the isolation tag(s) are completed and documented accordingly. The energy isolating devices may be operated to restore energy to equipment.

The management member responsible for the entire activity shall ensure that all locks are removed in accordance with the company procedure.

6.10.1 Removal of a Personal Lock by a Supervisor

In the event a worker is unavailable to remove a lock that he/she has installed (i.e., they are not on site) the Company's Senior Management Representative onsite can remove the lock using the master key only after verifying the location and safety of the worker in question, completing the Lockout Removal Form (Appendix A), and documenting it accordingly. The verification must be witnessed by another company employee.

1. Check the area to ensure the worker is not around.
2. Attempt to contact the worker by phone to confirm the worker is off site and to determine if there is any reason that the equipment is not safe.
3. Ask permission of the worker to remove the lock.

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4. The supervisor and another tradesperson familiar with the equipment will do a walk-around and perform other checks to ensure the equipment is ready for start-up.
5. The supervisor will remove the lock by means of a master key or bolt cutters.
6. A Lockout Removal Form will be completed. The supervisor and other workers involved in the lock removal will sign to indicate that all the steps were followed.
7. When the owner of the lock returns, the supervisor will discuss with them the steps taken to remove the lock and review the lock out code as it applies to personal lock removal when not at a machine or equipment. The lock will be returned or a new one issued if it was cut off.

6.11 Pigging and Testing of Pipelines

A person who is not directly involved in a pigging and testing operation must not be in the immediate area of piping exposed during the operation.

Team leaders shall ensure:

- A pig-receiver on a pipeline is isolated from the pipeline and depressurized before the pig is removed, and
- There are no workers at the end of the pipe or in the immediate vicinity of the pig-receiver if the pipe or pig-receiver is under pressure during the operation.

If piping contains harmful substances under pressure, the Company must ensure that blanking, blinding or block and bleed systems are in place and can be used to isolate pipes containing harmful substances under pressure. If flow in the pipe can come from more than one direction, a double block-and-bleed setup is required on each upstream side. The valves of a double block-and-bleed system must be secured to ensure an acceptable level of safety. Securing must be by a "positive" mechanical means that is either:

- Lockable (operated by a key or similar device) and attached to or integral with the securing device, or
- Not lockable but is strong enough to withstand inadvertent/unauthorized opening without the use of excessive force, unusual measures, or destructive techniques e.g., metal-cutting tools.

All piping that has been blanked or blinded must be clearly marked to indicate the presence of the blank or blind. Piping systems that contain harmful substances must be blanked, blinded or double block-and-bleed before and during the repair, modification, or replacement of the piping. When blanking or blinding are not reasonably practicable, alternate isolation systems may be used. The alternate isolation systems shall:

- Adequately protect workers, and
- Be certified as appropriate and safe by a professional engineer.

7.0 TRAINING REQUIREMENTS AND MATERIALS

- Company and site-specific orientation.
- Hazardous Energy Isolation Training

8.0 RESOURCES

- Alberta Occupational Health and Safety Act, Regulation and Code – Part 15 Managing the Control of Hazardous Energy
- British Columbia Ministry of Mines – Health, Safety and Reclamation Code for Mines in British Columbia (2008)

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- WorkSafe BC – Occupational Health and Safety Regulation Part 10 De-energization and Lockout
- Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.147
The control of hazardous energy (lockout/tagout)
- 950C-C-028 Hazardous Energy Isolation Code
- 960C-SOP-111 Live Work: Working on Equipment While it is Running

9.0 SUPPORTING DOCUMENTS

- None

10.0 APPENDICES

- Appendix A – 999C-F-019 Lock Removal Form
- Appendix B – Live Testing Checklist
- Appendix C – Personal Lock Tracking Log
- Appendix D – Example of an Isolation Tag



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Appendix A Lock Removal Form

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Date	Time of Removal		Unit Number	Unit Description
Lock Type	Lock #	Employee Name	Supervisor	Client
<input type="checkbox"/> Personal				
<input type="checkbox"/> Other				
Attempts to Contact Lock Owner				
Time	Result		Comments	
1 st Attempt				
2 nd Attempt				

Employee Present	Reason for Removal
<input type="checkbox"/> Yes	<input type="checkbox"/> Lost Key
<input type="checkbox"/> No	<input type="checkbox"/> Employee no longer works at Company
Name and Signature:	<input type="checkbox"/> Employee Off Site
	<input type="checkbox"/> Other:
Lock Destroyed?	
	<input type="checkbox"/> Yes <input type="checkbox"/> No

Senior Company Representative Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No
HSE or designate verified equipment is safe to operate and no personnel are in the hazard area.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Supervisor or designate verified equipment is safe to operate and no personnel are in the hazard area.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Senior Company Representative Name & Signature:	HSE Representative Name & Signature:
Supervisor Name & Signature:	

Additional Notes:

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Appendix B Live Testing Checklist

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CHECKLIST	YES	NO	COMMENTS (Required for NO answers)
Procedure (OEM or SOP) has been reviewed for the task OR a JSA has been created.			
Tasks are communicated & assigned to all individuals directly involved; all workers signed the Live Work Checklist. All workers understand the test/live work task being performed.			
Live Work task has been communicated to other personnel in the area.			
Signage and/or flagging indicating Live Work have been placed in the area.			
Equipment guards are in place.			
Suspended loads are secured.			
Spotters have been identified; personnel have clear visibility of each other. Primary spotter has been designated. Everyone understands spotter signals.			
All potential stored energy sources have been de-energized or controlled by blocking, bleeding, guarding, mechanically securing or identified as a controlled hazard during the live work/test task. (i.e. wheel chocks, box pins/cables, propel lockouts, park brakes, grounded implements).			
Person operating equipment being tested understands the machine controls.			
Equipment is returned to service in a safe manner and is fully isolated after the live work task is complete.			

SIGNATURES: *All workers involved in the task, must review and sign off on this checklist*				
Workers Involved:				
Supervisor Review: (Signature, date and time)				

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Appendix C Personal Lock Tracking Log

[illegible]

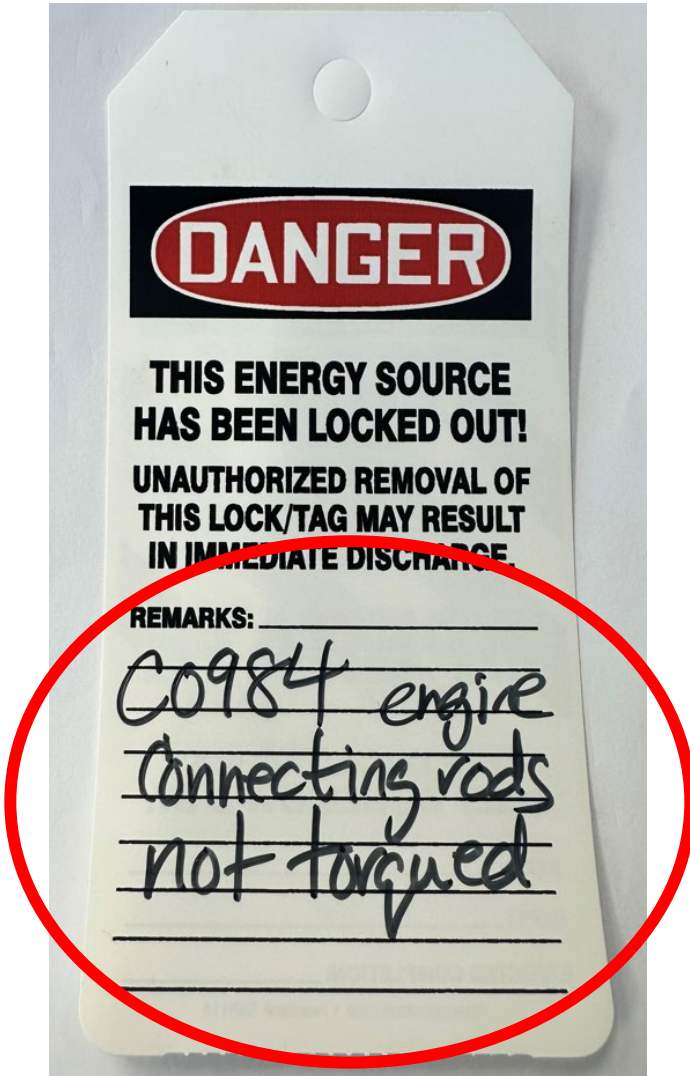
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Appendix D Example of an Isolation Tag

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Isolation tag(s) are used to identify why the machine is locked out.

If you leave the job, you **MUST** remove your personal lock and personal tag and place an equipment (cross-over) lock and isolation tag prior to leaving.

If there are any critical steps not complete, you **MUST** identify them on the isolation tag, document in the crossover notes and notify your supervisor.

Workers **MUST** review the isolation tag and any crossover notes related to the work before attaching personal lock(s) and prior to working on the equipment.

This is an example of an Isolation tag used to identify a critical step not complete.