



# **Control of Hazardous Energy in Vehicle Maintenance Operations**



## **A Program Development Guide**

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## Guidance and Advice

Developing and implementing an effective energy control program requires the following:

1. A written program that includes or references energy control procedures.
2. Employee training that is based on the nature of their exposure. Authorized employees who actually implement energy controls require a higher level of training, than do affected employees who work in the area where energy control may be used.
3. Periodic inspections or "audits". These must be completed annually, as a minimum.

This guide outlines a step by step process that will help you fulfill the above requirements and meet or exceed the VOSHA requirements outlined in 1910.147 for vehicle maintenance operations. In addition, it contains a number of helpful forms, a model written program and an example of a completed energy control procedure.

The forms and model program provided in this document should each be copied and pasted into a new WORD document, and then individually edited to suit your organizational needs and equipment exposures. If you would like separate electronic copies of the individual forms, please email us at [losscontrol@vlct.org](mailto:losscontrol@vlct.org).

To develop a comprehensive energy control program for vehicle repair tasks, complete the following steps:

1. Use the Energy Source Evaluation Form (blank) to help you identify potential sources of uncontrolled energy for a given vehicle maintenance task and a method of controlling that energy. Repeat this evaluation for each maintenance task performed by your employees.
2. Once all the tasks have been evaluated, the information on the evaluation forms will help you create procedures for each task. Use the Energy Control Procedure Form (blank) to finalize your procedures.

Depending on the nature of the task and the sources and types of energy exposures, multiple maintenance tasks may be able to use the same energy control procedures. The Example of Energy Control Procedure form illustrates this. It is important to note that the "example" form provided may not cover every energy control procedure that is required for your operations. Make sure to thoroughly evaluate your exposures and make procedure additions, deletions or revisions as needed.

3. Use the Control of Hazardous Energy During Vehicle Maintenance - Model Written Program to develop your overarching written program. This model program will need to be edited to fit your specific operational structure and energy control exposures.
4. Compile your procedures into an energy control procedure manual. The procedure manual should become part of your written energy control program (to meet VOSHA requirements) and be attached as Appendix A. In addition, make the procedures available in the workplace and/or post them. Use the approach that will be most effective in your workplace.

5. Once the written program is completed, periodic audits must be completed at least annually. The audit is not part of the program, but is required by the program. The form included in this guide may be used for this purpose. It is recommended that completed forms be retained for at least 2 years.
6. Employees must have sufficient training regarding your energy control program and procedures.
  - a. Employees who actually *implement* the energy control procedures (called **authorized employees**) must thoroughly understand your program as well as the actual energy control procedures themselves. They must be able to execute them flawlessly. It makes sense to involve them in the hazard evaluation process and when drafting the written procedures.
  - b. Other employees who may come across equipment where energy controls may have been applied or who *work in that area* (called **affected employees**) must understand the purpose and use of the program and prohibition on removing locks or tags or re-energizing or otherwise tampering with equipment under energy control.
  - c. Training should be fairly straightforward and is something you should be able to complete yourself. If you wish to provide supplemental training, the PACIF Online University has a good course on this subject.

As always, please contact your PACIF loss control consultant if you have questions or need individual assistance.

# **Step 1:**

## **ENERGY SOURCE EVALUATIONS**

This form can be used to evaluate potential sources of uncontrolled energy that may be present during various vehicle maintenance and associated tasks. Performing an evaluation of the exposures and methods of isolation or control is helpful because this information is critical to developing simple, energy control procedures. When available, manufacturer's recommendations should be consulted as part of the evaluation process to ensure that all possible source of energy are identified.

Lastly, make sure to involve qualified individuals who actually perform vehicle repairs. They can be very helpful with identifying sources of uncontrolled energy and with the development of written procedures that they will ultimately have to follow.

# Energy Source Evaluation Form

Task Evaluated	Vehicle(s) or Equipment Evaluated

Energy Type & Magnitude	Is this present for this task?	If yes, list isolation/control method and how and where to apply.
<b>Electrical</b>		
<b>Engine (Start)</b>		
<b>Spring</b>		
<b>Counterweight</b>		
<b>Flywheel</b>		
<b>Hydraulic</b>		
<b>Pneumatic</b>		
<b>Chemical</b>		
<b>Thermal</b>		
<b>Gravity/Kinetic</b>		
<b>Other</b>		

# Step 2:

## ENERGY CONTROL PROCEDURES

This section includes a blank procedure form and an example of a completed procedure. The blank form can be used to list task-specific energy control procedures that control the hazards identified in step 1 of this guide. Note that your list of procedures may include more or fewer steps than are listed on the blank form. When available, manufacturer's recommendations should be consulted when developing these procedures.

Note that in some cases, it may be possible to group multiple tasks that have the same energy exposures and controls. In all cases, the resulting procedures must be able to effectively prevent uncontrolled releases of energy that exist. You will also need to add or delete procedural steps as needed for specific tasks and/or pieces of equipment. If more than one person is involved in a task, specific responsibilities will need to be assigned to ensure proper application and coordination of procedures.

Listed below are some *general procedures* that may be applicable, depending on the actual task being performed. Note that these are listed in no particular order and not all procedures will apply in every case. Additional procedures may be required depending on the equipment and/or vehicle and are dependent on the individual evaluation of employee exposure to uncontrolled releases of energy. Ultimately, the finished product should consist of a series of steps that can be easily followed when applying and removing energy controls.

- Park on a firm, level surface.
- Place the controls in the park or neutral position.
- If a wing or plow is attached, dead block, secure or place these on the ground so that a zero energy state exists.
- Set the parking brake.
- Lower forks, buckets, booms, or other attachments to the ground.
- Shut off the engine.
- Allow hot parts to adequately cool prior to initiating a task that brings an employee into close proximity to a hot area of the vehicle. Test hot locations to ensure they are safe to work on or near.
- Cycle hydraulic controls to eliminate residual pressure.
- Lock the ignition and remove the key.
- Lock all vehicle doors and place “DO NOT OPERATE lockout/tagout tags on outside door handles if working under vehicle.

- Attach a “DO NOT OPERATE” tag to the steering wheel or lever.
- Block the wheels.
- If working on air brakes or other pneumatic systems, bleed off residual air pressure if appropriate.
- Disconnect the battery (via switch or physical disconnect of the terminals) if working on or around the electrical system.
- Install lift arm restraints or block the cylinders if work must be done with arms in the raised position.

## **NOTES**

- ◆ When in doubt or conflicts in a procedure exist, reference the manufacturer's maintenance and repair guidance.
- ◆ A "zero energy state" means that the energy source or exposure in question has been controlled so that the employee is no longer exposed to an uncontrolled release of that energy.
- ◆ Educate your employees about the specific procedures. The authorized employees (those who will be performing the vehicle maintenance tasks and implementing the energy controls) must be well-versed in the procedures and follow them.



## **Energy Control Procedure For: [Municipal Name Here]**

This energy control procedure must be followed each time the stated task(s) is/are performed. This procedure only applies to the tasks listed on this form. Only authorized persons may apply and remove energy control devices, as outlined in this procedure.

Task(s):	
Vehicle(s) Covered:	

### Energy Control Procedures

- 1.
- 2.
- 3.
- 4.
- 5.

### Restoration to Normal Operating State (Removal of Energy Controls)

- 1.
- 2.
- 3.
- 4.

## **Example of Completed Energy Control Procedure**

This energy control procedure must be followed each time the stated tasks are performed. This procedure only applies to the tasks listed on this form. Only authorized persons may apply and remove energy control devices, as outlined in this procedure.

Task(s):	Greasing fitting and general lubrication, oil changes, tire changes, starter repair/replacement and other mechanical repairs <u>not</u> involving pneumatic or hydraulic exposures.
Vehicle(s) Covered:	

### **Energy Control Procedures**

1. Advise affected employees in the area that the vehicle is going out of service and that energy controls are being applied.
2. Remove ignition key, place key in pocket and place lockout/tagout tag on steering wheel to indicate vehicle is out of service and should not be operated.
3. Toggle the battery disconnect switch to the off and/or locked position and remove key and place in pocket, if key controls switch operation. Otherwise, disconnect leads from battery terminals.
4. Chock at least one wheel in both forward and backwards directions.
5. If plows or wings are installed, place them on the ground or floor (zero energy state). Alternatively, wings may be chained using the safety chains if appropriate.
6. Prior to initiating maintenance or repairs, verify that the vehicle has cooled down so that contact with mufflers, exhaust components and hot engine parts do not result in burns.
7. NOTE: This procedure only applies when performing work under a raised dump body. Install dump locks, dump body control pin or other substantial control to prevent inadvertent movement of dump body.
8. Verify zero energy state and proceed with maintenance task.

### **Restoration to Normal Operating State (Removal of Energy Controls)**

1. Advise employees in area that you are removing energy control from vehicle.
2. Remove dump locks/locking pins if in use.
3. Re-activate battery disconnect to the "on" position or reconnect battery cables.
4. Remove chocks from wheels and lockout tag from steering wheel.

# **Step 3:**

## **Develop the Written Program**

This model written program is designed to be used by municipal public works facilities that perform vehicle repairs and perform maintenance tasks that expose employees to uncontrolled releases of stored energy. As a model document, it cannot conceive of every possible task or exposure and therefore will require modification and editing by the final user.

Developing the written program is just one piece of how you protect employees from uncontrolled releases of energy. The written program provides the outline of what the program covers and what you as an employer will do. The most important part of the written program is the completion and attachment of the written procedures (from step 2). To properly complete the procedures, an evaluation must first be done. As a result, this guide asks that you:

- Complete the evaluation
- Use that information to complete the written procedures
- Attach the written procedures to the program
- Make edits as needed to the written program document itself
- Adequately train both authorized and affected employees
- Complete audits (as a minimum this must be done annually)

CONTROL OF HAZARDOUS  
ENERGY DURING VEHICLE  
MAINTENANCE -

WRITTEN PROGRAM AND  
PROCEDURES

For

*[Enter Municipal Name]*

Updated: *[Enter date]*

## I. PURPOSE

This document establishes policy, practices and procedures to assure that employee exposure to uncontrolled releases of energy is eliminated. This written program seeks to comply with all requirements outlined in Vermont Occupational Safety & Health Administration (VOSHA) standard 1910.147 and includes or references applicable written energy control procedures which are part of this program.

## II. SCOPE & APPLICATION

The following written program and procedures are established by the [*municipality name here*]. These apply to the servicing and maintenance of vehicles, heavy machinery and related equipment in which the unexpected energization or start up of the machines or equipment or release of stored energy could cause injury to employees.

This program applies to affected employees who may work in an area where energy control procedures may be in use, as well as to authorized employees who will be applying and removing specific energy controls.

## III. POLICY & DEFINITIONS

- A. The [*municipality name here*] is committed to providing a safety and healthy workplace and fulfilling compliance requirements established by the VOSHA.
- B. Supervisory personnel are responsible for developing the proper attitude toward safety and health. As such, they are expected to set an example with regard to compliance with safety and health standards and are also responsible for educating employees about specific policies and procedures. They are also responsible for enforcing employee adherence to required safety practices.
- C. Employees are responsible for adherence to all safety & health rules and regulations including this program and procedures and may be subject to disciplinary action for safety infractions.
- D. Authorized employees are those individuals who will be actively performing maintenance tasks and applying and/or removing energy controls in accordance with the written energy control procedures.
- E. Affected employees are those individuals who work in the area where energy controls may be used.
- F. The terms energy control and lockout/tagout may be used synonymously.

## IV. RESPONSIBILITY

The [*insert the name and title of person responsible for ensuring safe operations in the highway department*] is responsible for:

- A. Completing an annual audit of the application of energy control procedures and the effectiveness of this program, as well as maintaining a record of same.
- B. Training all new employees coming into the highway department about the requirements of this program, as that pertains to their job responsibilities. Provide guidance and assistance when needed.
- C. Understanding the energy control program and the proper means of applying lockout/tagout equipment.
- D. Ensuring that the written procedures for energy control are being followed at all times. Individuals performing vehicle maintenance, repairs or service on municipal equipment must comply with all elements of this written program.

Employees must adhere to established procedures and follow all training provided by the municipality. With regard to the application of energy controls, authorized employees must:

- Follow the established energy control procedures that are listed in this program.
- Be knowledgeable concerning the intent and use of this program and request additional training if energy control procedures are unclear or if any questions, issues or problems arise regarding controls or procedures for a specific task or piece of equipment.
- Be aware of the type of, magnitude of, the hazards of, and the correct means to control and isolate the chemical, electrical, hydraulic, gravity, spring, pneumatic, thermal or battery energy associated with the equipment to be worked on.
- Attach their tag and/or lock as applicable and never remove a lock that is not theirs unless specifically directed to do so by management.
- Personally verify that all energy sources have been properly controlled and that the equipment is at zero energy state, prior to starting the task.
- Maintain the key on their person, to all personal locks that are in active use as part of the energy control procedures.
- At the completion of work, remove all personal locks and tags and notify affected employees that the equipment is safe to operate.

Affected employees must not tamper, move, attempt to operate or interact with equipment that is under active energy control. They must be aware of when energy controls are being applied, removed and when equipment is being tested or re-energized.

## V. GENERAL CONCEPTS & PROCEDURES

### Mobile Equipment

Mobile equipment maintenance presents a variety of dangers from stored and potentially hazardous energy. It is important to bring equipment to a **zero energy state** in which there is no potential for accidental release of stored or potential energy and accidental start-up or movement is prevented.

When working on wheeled equipment, wheel chocks shall be placed (in both directions) to prevent the equipment from rolling. If maintenance or service work requires that any attachments or other components be elevated, suitable hardwood blocks, equipment jacks, safety stops, engineered restraints or pivot pins shall be installed to prevent the elevated items from falling.

In general, the written energy control procedures describe the steps for implementing energy controls and the steps for restoring the equipment to its normal operating condition.

### Shutdown/Isolation of Mobile Equipment

All authorized employees engaging in a vehicle repair or maintenance task that requires the use of energy control shall refer to the written procedure for that task and piece of equipment. All written procedures for implementing energy controls are attached and included as part of this written program as appendix A.

### Testing or Positioning

In the event that equipment testing or positioning is needed in the middle of the repair or service, the following actions shall be followed:

- Clear the area and vehicle of all tools and equipment.
- Visually and verbally ensure that all employees are free and clear of the equipment.
- Remove the Lockout and Tagout devices only to the extent needed to conduct the test.
- Energize and proceed with testing or positioning.
- De-energize and follow the steps outlined for locking out the equipment and the completion of the test.
- Re-verify isolation and zero energy state.
- Re-install Lockout/Tagout devices.

### Shift or Personnel Change (note that this section is not needed if there is only one person performing these types of repairs)

In the event of maintenance continuing through the end of a shift, the off-going authorized employee will review the job, the hazards involved, and the locations of isolations with the on-

coming authorized employee. The off-going authorized employee will remove their personal lock and tag and the on-coming authorized employee shall install their personal lock and tag prior to the off-going employee removing their lock and tag.

## VI. PROGRAM MONITORING

As noted in the responsibility section, an audit of the Control of Hazardous Energy During Vehicle Maintenance Program shall be conducted to ensure that authorized employees are following the procedures and requirements.

If the audit finds any deficiencies at the employee level, the individual(s) involved will be retrained or disciplined depending on the severity of the deficiency. The individual conducting the audit shall use the Control of Hazardous Energy Program document to review and discuss requirements with the employee.

Any deficiency found with the program itself (faulty procedures, inadequate training, lack of equipment, etc.) will be addressed immediately. Employees are encouraged to bring any safety concern to the attention of [*list the names of road foreman, operations supervisor, municipal manager, governing body, etc.*] at any time and not wait for the program evaluation.

## VII. EMPLOYEE TRAINING AND RETRAINING

Training and retraining will be provided to ensure employees understand the purpose and function of the Control of Hazardous Energy Program and that they have the knowledge and skills required for safe application, usage and removal of isolation device(s). Training will be given and employees must demonstrate an understanding of requirements that are applicable to them. Records of employee training will be maintained in their personnel files or as part of the department's training records.

Additional employee training will be provided any time an employee has a change in job duties, tasks or exposures that would result in the individual being exposed to a new or unfamiliar hazard. Energy control procedures will be created or revised as necessary to ensure that new exposures are properly controlled.

Each authorized employee who will use the Lockout/Tagout procedure will receive training in the recognition of the type and magnitude of the hazard, and the correct means to control and isolate the energy source.

Each affected employee whose job requires them to operate or use equipment on which maintenance or servicing will be done or who will work in the area where energy controls will be used will be trained in the purpose and use of the Control of Hazardous Energy Program and the need to never remove any energy control appliance or attempt to operate the vehicle or piece of equipment.



## Appendix A: Energy Control Procedures

[COMPLETED PROCEDURE FORMS MUST BE INSERTED HERE. AS WITH ANY PROCEDURE, IT SHOULD NOT BE KEPT ON A SHELF-BUT INSTEAD SHOULD BE ACTIVELY USED IN THE REAL WORLD.]

## **Step 4:**

# **Complete an Annual Audit of the Program**

Your program must be audited on at least an annual basis to verify that employees are following the procedures outlined in the program. The **Energy Control Procedure Audit** form may be used for this purpose. Any problems that are identified during this audit must be documented and corrected.

Proof of correction should be captured on the audit form (if addressed at the time of audit) or attached to the completed form after-the fact. Make sure you retain your audit results for at least 2 years, as proof of your annual audit.

Energy Control Procedure Audit

**Date of Audit/Evaluation:** \_\_\_\_\_ **Location of Evaluation:** \_\_\_\_\_

**Equipment/Vehicle Involved:**

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**Task(s) Performed:**

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**Evaluator Name:**

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**Employee Name:**

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**Did the employee follow the specified energy control procedures?**      Yes     No   
**Was the work area free from energy control or other hazards?**      Yes     No   
**Were affected employees aware that energy controls were in place?**      Yes     No

**Any no answer requires an explanation and a description of corrective elements:**

**Additional Comments or Observations:**

**Signature of Person Completing Audit:** \_\_\_\_\_

**Retraining will be required if procedures were not performed correctly.**

Retain this evaluation form as documentation that the energy control program is reviewed on at least an annual basis.