

# Work Safety Code

7th Edition - July 2022

Generating Stations



Note: To reflect circumstances in the field, some statements have been reproduced in their entirety, although they do not fully comply with the implementing regulation of the Charter of the French Language.

Original document written in French.

In the event of a discrepancy between the English version and the French version of this document, the French version prevails.

# Preface

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Worker safety is Hydro-Québec's key concern. We need to put the required tools and framework in place to provide all Hydro-Québec and supplier employees with a safe work environment.

The Work Safety Code establishes the safety principles for the hazards associated with energy sources found in the workplace. The Code is a corporate directive and related guidelines may clarify its application. Hydro-Québec and supplier personnel performing work on or near Hydro-Québec's facilities must comply with the principles and provisions of the Code.

Everyone's safety depends on adequate knowledge of work processes, planning, job hazard analysis and proper work supervision. Workers must have the knowledge and skills required to perform work safely. As a team, we need to work together to implement effective hazard prevention and control measures in the day-to-day performance of our work.

Let's make a commitment to pool our efforts to create such a safe workplace for all of us.



Sophie Brochu  
President and Chief Executive Officer

# **Committee Mandate Work Safety Code**

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The most recent version of the mandate is available on the intranet site of the Work Safety Code.

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# General

## 1 Introduction

### 1.1 Purpose

The Work Safety Code sets out the measures to be applied so that workers can perform work safely. Safety measures pertain to the hazards related to energy sources in Hydro-Québec's generating, transmission, distribution, and telecommunications facilities.

### 1.2 Scope

The Work Safety Code applies to work performed by Hydro-Québec and contractor personnel on or near Hydro-Québec's energized or de-energized facilities.

In an emergency, if someone's safety is in jeopardy, full application of the Work Safety Code is not required. Once the emergency is under control, the Code applies again in full.

The Work Safety Code applies to work in areas designated as "construction sites" for facilities or parts of facilities that have already been commissioned.

The Work Safety Code does not apply to:

- Facilities or parts of facilities designated as "construction sites" that have never been commissioned.
- A generating station that is designated as a "construction site," is not connected to the grid and is no longer under the responsibility of an operator.

In such cases, the *Québec Safety Code for the Construction Industry* applies up to the commissioning stage.

### **1.3 Sector standards**

The Work Safety Code applies when work is being done on certain specific facilities with special characteristics.

The principles of the Work Safety Code apply and are described in the applicable guidelines (A73-03, A73-04 and D.24-26).

## **2 Training and qualification**

The rules pertaining to the training and qualification of Hydro-Québec and contractor personnel are defined in the guideline entitled *Work Safety Code Training and Qualification (HQ-SST-N-1003)*.

## **3 Inquiries**

Any inquiries relating to the understanding of this Work Safety Code must be submitted using the procedure set out in the guideline entitled *Mécanisme de compréhension du Code de sécurité des travaux (SST-N-100)* [Inquiries relating to the Work Safety Code].

## 4 Monitoring enforcement of the Work Safety Code

Hydro-Québec must implement a compliance auditing system regarding enforcement of the Work Safety Code and the related guidelines to confirm that the parties involved are aware of and apply the prescribed guidelines.

The audit program must include the following:

- Roles and responsibilities in coordinating, planning, conducting audits and implementing corrective action
- Criteria relating to auditor qualifications and selection
- Audit scope
- Annual audit frequency
- Methods to be used and analysis of findings
- Production of reports

The audit plan must be submitted to the Work Safety Code Committee.

Audit findings and conclusions along with all action plans must be documented and communicated to the workers involved, the parties responsible for the corrective actions, and submitted annually to the Work Safety Code Committee.



# Generating Stations

## 1 Application to generating stations

This chapter specifies how the Work Safety Code applies during work performed in generating stations and other structures.

However, it does not cover work carried out on power transformers even when located inside a generating station.

For thermal and hydraulic generating stations with bulb-type generating units, the development of sector standards must comply with this Code and specify the latter's application.

## 2 Definitions

### **Device**

Any component of a facility (e.g., circuit breaker, transformer, disconnect switch, reactor or gate).

### **Apparatus**

Group of devices in a facility (e.g., switching, transforming or generating apparatus).

### **Thermal generating station**

Electric generating station that uses fossil fuel (e.g., oil or gas) as the energy source.

### **Telecommunications network component**

Any component of the telecommunications network.

## **Energy-isolating device**

Device that physically prevents electrical or mechanical energy from being transmitted or released.

*Note: Pushbutton switches and similar controls are not energy-isolating devices.*

## **Autonomous power**

Power from an autonomous source that does not contribute to the operation of a device, apparatus or facility.

## **Auxiliary power**

Mechanical, hydraulic, pneumatic, electrical energy (750 V and less), whether radiant or optical, that contributes to the operation of a telecommunications network device, equipment or component.

## **Induced power**

Electrical power generated inductively or capacitively.

## **Main power**

Electrical power at a voltage of more than 750 V present or flowing through a facility or in a device.

The following are also considered main power:

- Any other energy source powering an electric generator
- Water flowing through hydraulic control structures

## **Equipment**

Materials and machinery used for the maintenance of a facility such as a passenger elevator, traveling crane, freight elevator, sprinkler system, telephone or PA system.

## **Switchperson**

An authorized worker who carries out or supervises switching operations under the orders of an operator.

## **Operator**

An authorized worker from Hydro-Québec designated by an administrative unit as being in charge of operating specific facilities.

## **Security guard**

An authorized worker from Hydro-Québec who is in charge of applying the safety measures set out in this Code. This worker may suspend work if there is a hazard that may put workers' safety at risk, and then notifies their supervisor.

*Note: For the sake of readability, this term will not be repeated in the document. A security guard has the same duties as a worker in charge (WIC), with the exception of work coordination.*

## **Facility**

A defined set of devices and apparatuses or telecommunications network components, such as generating stations, hydraulic structures or telecommunications rooms, taken as a whole or in part.

## **Gated spillway**

Water-retaining structure that regulates and controls river flow by releasing water through gates into the river.

## **Uncontrolled spillway**

Water-retaining structure that regulates and controls river flow without gates by releasing excess water over its crest into the river.

## **Authorized worker**

A worker who meets the qualification criteria specified in the Work Safety Code (*HQ-SST-N-1003*).

## **Initiated worker**

A worker who has taken the introductory course on the Work Safety Code ("Initiation au Code de sécurité des travaux").

## **Electrical isolation point**

An energy-isolating device that allows a protected zone to be separated in an electrical circuit and that can be visually or positively verified according to the applicable guideline (*P-SEC-N-027*).

## **Mechanical isolation point**

An energy-isolating device that prevents the transmission of mechanical energy in a protected zone and that can be visually or positively verified according to the applicable guideline (*P-SEC-N-027*).

## **Team leader (responsible)**

Authorized worker who oversees the work and is responsible for applying the safety measures applicable to his team in the work zone.

*Note: Depending on the type of job, qualification under the Work Safety Code is not required for Hydro-Québec or contractor personnel required to act as team leaders. The types of jobs concerned by the qualification can be found in the training and qualification guideline (HQ-SST-N-1003).*

## **Worker in charge (WIC)**

Hydro-Québec or contractor authorized worker who is in charge of applying the safety measures of the Code. When there is more than one team, the WIC is responsible for coordinating the work in the work zone.

## **Lockout**

A device or system whereby the state of a control or mechanism allows or prevents the operation of another device (e.g., access control). When physical protective measures (e.g., pins, locks, blocks or chains) are required, they must be capable of withstanding any force to which they will be subjected (after a full lockout) with an adequate safety factor in accordance with the relevant standards.

## **Work zone**

Area established by the WIC and the team members at the site where the work is to be carried out.

## **Protected zone**

Area established by the operator by means of isolation points corresponding to a WIC's needs and within which measures taken by the operator enable the WIC to establish a work zone.

## 3 Equipment

### **Lockout box**

Lockable box used by the WIC and team members designed to allow workers to check whether there are any lockout padlock keys.

### **Lockout padlock**

A series of padlocks opened using the same key, bearing the same alphanumeric serial number and used for lockout purposes.

### **Individual padlock**

A lock or series of locks with a single key marked with the person's name for the duration of the work, and for which only that worker has the key.

### **Transfer envelope**

An envelope used by the WIC to carry out an indirect change in WIC when no lockout box is used. The envelope contains at least the Safety Measures Sheet. It is designed so that the seal number, safety regime number, identification and location of the work can be seen.

### **Lockout Sheet**

Form containing all the information related to the lockout and verification of the isolation of the energy-isolating devices (*HQ-SST-M-1002*).

*Note: The fact that there is no Lockout Sheet does not prevent the lockout from being performed; however, it must be carried out according to the action plan in the applicable guideline.*

### **Safety Measures Sheet (SMS)**

Form used to enter all the information concerning the safety measures put into place for the safety regime being used.

### **Work Authorization Form**

Form used to enter all the information related to the protected zone. The operator delivers a protected zone to the WIC under conditions agreed upon with the latter.

### **Accord tag**

Blue and white tag marked "ACCORD" that is used when work is to be done under the Accord regime.

### **Self-protection tag**

Yellow and white tag that reads "NE PAS MANŒUVRER – AUTOPROTECTION" [No switching – Self-protection] displayed when work is to be done under the Self-protection regime.

### **Lockout tag**

Red and white tag that reads "APPAREIL CONDAMNÉ – DÉFENSE DE MANŒUVRER" [Device locked out – No switching] used when work is to be done under a Work Authorization regime.

*Note: On the operators' monitors, the Accord and Work Authorization tags are represented by icons.*

### **Lockout hasp**

Device that allows several locks to be installed.

### **Transfer seal**

Single-use device with unique numbering installed on a lockout box or transfer envelope to ensure lockout continuity. Used only when there is an indirect change in WIC.

## **4 Safety regimes**

The types of safety regimes are as follows:

- Work Authorization
- Accord
- Self-protection

When work is performed by Hydro-Québec personnel under a Work Safety Code regime, the latter are held by Hydro-Québec authorized personnel. However, support or expertise provided by Hydro-Québec personnel is permitted in a work zone for which the Work Safety Code regime is held by contractor personnel, provided the work is performed by the contractor.

## **4.1 Work Authorization regime**

### **4.1.1 Application**

The Work Authorization regime applies to work performed in generating stations, upstream or downstream of the generating station and upstream or downstream of gated hydraulic control structures, with no main power, to ensure the safety of Hydro-Québec and contractor personnel on facilities under the Hydro-Québec operator's responsibility (*GEN-N-881*).

It also applies to work upstream or downstream of an uncontrolled spillway when the latter is adjacent to a generating station and this safety regime must be used for one or more generating units if the work requires that they be shut down.

### **4.1.2 Selection of isolation points for the protected zone (Table 1)**

#### **I Mechanical isolation points for work performed between a gate upstream of the wicket gates and the tailgate**

The mechanical isolation points are selected using the specific Lockout Sheet according to one of the following cases:

## Case A

When the work has to be done outside the scroll case and involves no contact with rotating or moving parts, the mechanical isolation that enables a protected zone to be created is achieved by:

- Case A1. Wicket gates closed at 0% with oil pressure<sup>2</sup> eliminated at the servomotor; locking out of servomotors.<sup>1</sup>

or

- Case A2. Closing a gate upstream of the wicket gates.

## Case B

When the work to be done is outside the scroll case and requires the presence of workers or their tools in the path of a moving or rotating generating unit part, the mechanical isolation that creates the protected is achieved by:

- Closing a gate upstream of the wicket gates
- Opening the wicket gates
- Locking out the servomotors
- Eliminating the oil pressure<sup>2</sup> at the servomotors

For submerged generating units, when, when inadvertent movement cannot be rule out, the following methods are used:

- Installation of downstream stoplogs (or gates)

or

- Use of piston brakes in jacking mode

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<sup>1</sup> Bolt capacity must have been certified through a generating station assessment; in such a case, Case A1 cannot be applied.

<sup>2</sup> Includes electrical energy in the case of an electrically-powered servomotor.

- Installation, where applicable, of a mechanical lock (e.g., blocks)
- Closed and locked-out isolation valve(s)

#### Case C

When the work to be performed requires the presence of personnel inside the scroll case, the mechanical isolation used to create the protected zone is achieved by:

- closing a gate upstream of the scroll case and the associated bypass valve, if any
- setting up the tailgate if the scroll case is lower than the downstream level and in locations where there are major variations in the downstream level over very short periods of time
- opening the wicket gates
- locking out the servomotors
- eliminating oil pressure<sup>2</sup> at the servomotors
- depressurizing the hydraulic circuit of the blades in the case of variable-blade turbines

When carrying out the work, the WIC ensures that access to the scroll case remains open.

For Case B or C, when work is done on one of the components serving as a mechanical isolation point consisting of servomotors, the oil intake valve(s)<sup>2</sup> and the drain valve(s) to establish the protected zone, this component is replaced by:

- The air-oil pressure tank open to the atmosphere with dissipated mechanical energy

or

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<sup>2</sup> Includes electrical energy in the case of an electrically-powered servomotor.

- Removal of a physical component with dissipated mechanical energy

## II Mechanical isolation points for upstream/downstream work

When a Work Authorization is required, upstream/downstream guides must be drawn up for each category of work for each facility involved (*P-SEC-G-003*).

*Note: When the upstream/downstream guide requires the flow of one or more generating unit(s) to be controlled in addition to the generating unit required under the Work Authorization, the WIC must apply the Accord regime as per Section 4.2.1, IV on the adjacent generating unit(s) concerned.*

The mechanical isolation points are selected using the specific Lockout Sheet according to one of the following cases:

- a) When the work to be performed requires the presence of personnel **upstream** of the generating station, the mechanical isolation used to create the protected zone is achieved by:
- Closing the gate(s) upstream of the generating unit(s) concerned
- or
- Closing the ring, spherical, butterfly or clamshell head gate
- or
- Closing the wicket gates at 0% with the oil pressure<sup>2</sup> eliminated at the servomotors
  - Locking out the servomotors<sup>1</sup>

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<sup>1</sup> Bolt capacity must have been certified through a generating station assessment; in such a case, Case A1 cannot be applied.

<sup>2</sup> Includes electrical energy in the case of an electrically-powered servomotor.

b) When the work to be performed requires the presence of personnel **downstream** of the generating station, the mechanical isolation used to create the protected zone is achieved by:

- Closing the gate(s) downstream of the generating unit(s) concerned

*Note: The tailgate may be used if its design allows for it.*

or

- Closing the ring, spherical, butterfly or clamshell head gate

or

- Closing the wicket gates with oil pressure<sup>2</sup> eliminated at the servomotors
- Locking out the servomotors<sup>1</sup>

When work is performed downstream of the generating station and the generating unit(s) concerned by the work **already** involve a Work Authorization, with mechanical isolation points established according to Case A, B or C in accordance with Section 4.1.2 I, the mechanical isolation point(s) related to the protected zone for the downstream work may involve:

- Closing the wicket gates with oil pressure<sup>2</sup> eliminated at the servomotors
- Locking out the servomotors<sup>1</sup>
- Opening the wicket gates
- Locking out the servomotors
- Closing a gate upstream of the wicket gates

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<sup>1</sup> Bolt capacity must have been certified through a generating station assessment; in such a case, Case A1 cannot be applied.

<sup>2</sup> Includes electrical energy in the case of an electrically-powered servomotor.

*Note: Under no circumstances may the mechanical isolation point be modified in accordance with Section 9.1 on the generating units concerned for the duration of the downstream work.*

### III Electrical isolation points

The electrical isolation points for the protected zone are achieved by:

- Opening the disconnect switches
- Removing the plug-in circuit breakers
- Removing a physical component
- Opening the molded-case circuit breaker of less than 750 V

*Note: For **upstream** work, if the mechanical isolation point is a gate upstream of the wicket gates, no electrical isolation points for the protected zone are required. For **downstream** work, if the tailgate is one of the mechanical isolation points, no electrical isolation points for the protected zone are required.*

### IV Isolation points for work at hydraulic control structures (upstream/downstream)

For work upstream or downstream of structures, mechanical isolation point or points are created by closing the required gates, stoplogs or cofferdams.

#### 4.1.3 Outage requests

When scheduled work has to be done under a Work Authorization, an outage request must be submitted to the operator in accordance with the operating rules. The outage alone is not sufficient to authorize the work (*GEN-D-007*).

Relevant information regarding the protected zone as well as all other information needed to plan and carry out the work must be provided to the WIC before work begins.

#### 4.1.4 Establishing the protected zone

The operator must establish or have someone establish the isolation point(s) to create the protected zone. The operator must disable, or have someone disable, the energy-isolating devices of the equipment serving as electrical or mechanical isolation points. The operator makes sure, or has someone make sure, that the isolation has been verified (*D.25-20*).

*Note: See the Lockout Sheet(s) for detailed information on how the protected zone is established according to the specific request.*

When creating the protected zone, isolation points of less than 750 V after the secondary of an auxiliary service transformer must be considered as an isolation point for the protected zone when there is a possibility of electrical backfeed.

For plug-in circuit breakers, the air space constitutes the electrical isolation point for the protected zone. The electrical isolation point for the protected zone is then identified by the circuit breaker cell involved (e.g., cell 12-4).

The operator checks or has someone check for zero voltage using an approved voltage detector or according to the applicable guidelines for SF<sub>6</sub>-insulated devices. For other energy sources, a zero-energy check is performed in accordance with the applicable guideline (*TET-APE-N-7001, GEN-D-941, GEN-D-946*).

Protected zones must never overlap. However, establishing a new protected zone is not considered an overlap as long as the Work Authorization has not been issued. Separate protected zones may have common isolation points.

However, for protected zones created for work downstream of a generating station, if one or more generating units already under a Work Authorization are involved, the isolation points for the protected zone may be different.

When a WIC requests a Work Authorization from the operator for a device, the operator checks whether a safety regime has already been issued on control and/or protection circuits related to the device covered by the request.

When a safety regime has been issued on control and/or protection circuits covered by the request, the operator and the requesting WIC must apply the communication procedure described in Appendix III.

The WIC and the operator must agree on the size of the protected zone.

#### **4.1.5 Lockout of protected zone**

Each worker must install a padlock as a protective measure to prevent the device the worker is working on from being accidentally started up or re-energized.

The isolation provided by energy-isolating devices must be visually or positively verifiable in accordance with the applicable guideline (*P-SEC-N-027*).

*Note: The lockout must be performed in accordance with the instructions on the Lockout Sheet. The fact that there is no Lockout Sheet does not prevent the lockout from being performed; however, it must be done in accordance with the guideline (HQ-SST-M-1002).*

#### **Priority lockout mode**

Using the Lockout Sheets, the WIC and at least one team member must lock out the energy-isolating devices serving as isolation points for the protected zone (*HQ-SST-M-1002*).

The entire team should participate with the WIC in the lockout process in order to become familiar with the energy-isolating devices (*HQ-SST-M-1002*, *P-SEC-M-003*).

For these lockouts, after verifying the isolation, the WIC uses one or more lockout padlocks. Each padlock must be installed using a lockout hasp. When the energy-isolating device serving as an isolation point for the protected zone has already been locked out, the isolation is considered to have been done.

The WIC places the key(s) for the lockout padlocks being used in the lockout box, and each team member, including the WIC, locks the box with an individual lock. This is done after locking out the energy-isolating devices for any energy source present in the work zone that may constitute a hazard for the entire team.

#### **4.1.6 Issuing the Work Authorization**

The operator provides the Work Authorization to the WIC by issuing a Work Authorization number (Guide formulaire AdT-RDT, GEN-R-981).

The operator and the WIC agree not to modify the protected zone unless there is a change in the state of a mechanical isolation point as indicated in Section 9.1.

No work is permitted on an energy-isolating device serving as an electrical isolation point for the protected zone. For disconnect switches, no work is allowed on the jaw or pivot sides when one side is energized, even if the approach distances are observed. It is also forbidden to remove or connect jumpers to disconnect switches.

However, for an energy-isolating device serving as a mechanical isolation point for a protected zone, some work can be performed under the following conditions:

- The work must not affect the mechanical capacity of the energy-isolating device performing the isolation. The safety measures for such work must be established and implemented after agreement with the relevant health and safety committees.

- No work may be done that could change the “open” or “closed” state of an energy-isolating device serving as a mechanical isolation point for the protected zone.

## **4.2 Accord regime**

### **4.2.1 Application**

Under the Accord regime, Hydro-Québec and contractor personnel can perform the following:

- Energized or de-energized work on automatic controls and telecommunications systems
- De-energized work on apparatuses operating at less than 750 Volts or powered by another form of auxiliary power
- De-energized work on apparatuses operating at over 750 Volts
- Work requiring the operation of a generating unit or gated hydraulic control structure
- Work not requiring a generating unit
- Operating checks and tests that may require auxiliary power, with or without the presence of main power
- Energized work on batteries

on facilities under the responsibility of an operator (*GEN-N-881*).

### **I Energized or de-energized work on automatic control and telecommunications systems**

The Accord regime applies to de-energized work that must be done on automatic control and telecommunications systems.

The Accord regime applies to energized work that must be done on automatic control and telecommunications systems in accordance with applicable guidelines (*P-SEC-M-008, P-SEC-M-011, TEL-SEC-P-34-00-006*).

The Accord regime also applies to work on the telecommunications network that affects the Hold Order regime (*TEL-GES-P-31-05-001-O*).

If the de-energizing of automatic control and telecommunications systems prevents normal operation of the device, an outage request must be made; otherwise, the device may remain in operation.

## **II De-energized work on apparatuses operating at less than 750 V or powered by another type of auxiliary power**

The Accord regime applies to de-energized work on apparatuses operating at less than 750 V or powered by another type of energy, including work on or inside the gates of gated hydraulic control structures.

If de-energizing such apparatuses prevents the normal operation of the device it is supplying with auxiliary power, an outage request must be submitted, otherwise, the device may remain in operation.

## **III De-energized work on apparatuses operating at more than 750 V**

The Accord regime allows de-energized work to be performed on an apparatus that may be isolated from the power system.

Use of the Accord regime must be justified according to the work to be done and when the type of work allows approach distances to be observed (*AP-GS-N002*).

In each case, the work must be done in accordance with a guideline developed for the specific facility using a standard template (*P-SEC-G-009*).

## **IV Work requiring the operation of a generating unit or gated hydraulic control structure**

The Accord regime applies:

- When honing slip rings with the disconnect switch open on the low-voltage side while the generating unit is powered by hydraulic energy and isolated from the power system.
- When controlling the flow through one or more gates of a gated hydraulic control structure during work performed upstream or downstream of that structure.
- When controlling increased flow through one or more generating units while work is performed upstream or downstream of the generating station.
- When tightening the cable gland, provided that the turbine shaft is secured so that there is no possible contact with the rotating or moving parts.

Use of the Accord regime must be justified according to the work to be done as well as the operating rules and current restrictions on the generating unit.

In each case, the work must be done in accordance with a guideline developed for the specific facility using a standard template (*P-SEC-G-009*).

## **V Work not requiring the operation of the generating unit**

The Accord regime applies to the work listed below to be performed while the generating unit is shut down:

- Adjusting servomotor cams
- Adjusting wicket gate position sensors

*Note: In both of the above cases, a gate upstream of the wicket gates must be closed and locked out.*

- Adjusting intake gate positioning mechanisms

- Inspecting and greasing intake gate cables when work is performed above water level

*Note: In both of the above cases, a gate upstream of the wicket gates or the wicket gates themselves must be closed and locked out.*

In each case, the work must be done in accordance with a guideline developed for the specific facility using a standard template (*P-SEC-G-009*).

## **VI Operating checks and tests that require auxiliary power, with or without the presence of main power**

The Accord regime applies in the following cases:

- a) During operating checks and tests on automatic controls and telecommunications systems, auxiliary power may or may not be present, while main power may or may not be required
- b) During operating checks and tests for starting up a generating unit, auxiliary and hydraulic power are both present, while the generating unit may be isolated or connected to the power system

## **VII Energized work on batteries**

The Accord regime applies to work performed on batteries (*P-SEC-M-008*).

The Accord regime applies to energized work using a DC power supply in distribution panels when that power supply cannot be eliminated (*TEL-SEC-P-34-00-006*).

The work to be performed must be done in accordance with the applicable guidelines (*P-AUT-M-002*, *P-AUT-M-003*, *TEL-EQR-P-24-05-002*, *TEL-EQR-P-24-05-006*, *TEL-EQR-P-24-05-007*).

### **4.2.2 Advance request**

The WIC must request the required operating conditions ahead of time.

When a WIC requests an Accord regime from the operator for one or more control and/or protection circuits, the operator must check whether a safety regime has been issued for one or more devices related to the circuit(s).

When a safety regime is issued for the device covered by the request, the operator and the requesting WIC must apply the communication procedure described in Appendix III.

If the work requires an outage request, the request must comply with the operating rules (*GEN-D-007*).

If the objective of the outage is also to ensure worker safety, the WIC must apply the Work Authorization regime. This includes work on the secondary side of a current transformer.

### **4.2.3 Issuing the Accord regime**

The Accord regime may be issued for the:

- Electronic part (control, protection and regulation) of a generating unit excitation system
- Measurement, control and protection circuits

when they are located outside the device, even if a regime has been issued for that device.

The Accord regime may be issued for telecommunications network components.

The operator issues the Accord regime to the WIC by providing the Accord regime number.

## **4.3 Self-protection regime**

### **4.3.1 Application**

The Self-protection regime applies to de-energized and energized work on batteries performed by Hydro-Québec and contractor personnel on facilities, parts of facilities or equipment outside the responsibility of an operator (*GEN-N-881*):

- Construction of a facility or part of a facility, or the installation of apparatuses not yet connected to the power system
- Dismantling of a facility or part of a facility or apparatus that has been withdrawn from the system and will not be connected back to it
- Maintenance by Hydro-Québec personnel of mechanical or electrical equipment of 750 V or less

*Note: The Self-protection regime does not apply to contractors performing maintenance on mechanical or electrical equipment operating at 750 V or less.*

### **4.3.2 Terms of application**

For this regime, no control number is issued to personnel performing the work.

## **5 Establishing safety measures for the work zone**

For the Work Authorization and Accord regimes, the planning of the safety measures required to establish the work zone begins once the WIC has the safety regime number that was issued by the operator.

If the work involves several trades, a team leader must be appointed for each one to oversee the performance of the work and apply the safety measures specific to their team.

However, at the WIC's request, a team leader from the same trade as the WIC may be appointed, depending on the type of work and the work environment.

### *I Work Authorization*

During work on a generating unit, only one work zone and one WIC are allowed, except when safety measures for construction sites are being applied (EQ-CO-SC-PR04/P-SEC-M-021).

There may be several work zones within a protected zone, but no work zones may overlap.

If the work zone spans several floors, work may be done simultaneously on each floor.

*Note: See Appendix IV for components of a generating unit work zone.*

## **5.1 Planning the safety measures**

The WIC and the team members plan the required measures for establishing the work zone.

For instance, they must:

- A) define the work zone based on the work to be performed
- B) identify the safety measures to apply
  - 1) Controlling re-energization caused by induced energy, lightning or accidental re-energization.

At no time should the protection provided by the grounding devices be affected by the opening of an electrical circuit when work is being performed.

Identify, according to applicable guidelines, the location(s) chosen for installing the grounding devices that provide protection against the risk of re-energization by induced energy, lightning or accidental re-energization depending on the type of work being done and the short-circuit current (*P-SEC-N-017, P-SEC-M-010, AP-GS-M-021, TEC-GES-N-1023*).

When personnel is required to work on a device operating at over 750 V that has been de-energized and the type of work allows approach distances to be observed, grounds do not need to be installed on the de-energized device, except for work on the secondary side of current transformers (*AP-GS-N002*).

## 2) Identifying auxiliary and other energy sources

The WIC and the team members must make sure that potentially hazardous energy sources of all types have been eliminated. Some types of work require an energy control method; in such a case, refer to the applicable guidelines.

If such energy sources constitute a hazard for the entire team, they must be eliminated at the start of the work.

If such energy sources constitute a hazard for only part of the team, they must be eliminated during the work.

## C) enter the safety measures identified in B) on the Safety Measures Sheet

## 5.2 Applying the safety measures

The WIC applies, or has someone apply, the safety measures determined by the team.

The team leader applies, or has someone apply, the safety measures specific to their team.

A) Controlling re-energization caused by induced energy, lightning or accidental re-energization.

- In the case of work involving the main power, designate a worker in charge of verifying zero voltage using an approved voltage detector or according to the applicable guideline for SF6-insulated devices and DC devices (*TET-APE-N-7001*).
- Assign a worker to install, at the chosen location and in accordance with applicable guidelines, grounding devices, identified by a lockout tag bearing the sequential number of the Work Authorization Form, that provide protection against the risk of re-energization by induced energy, lightning or accidental re-energization (*P-SEC-N-004, P-SEC-N-017, P-SEC-M-010, TEC-GES-N-1023*).

*Note: Grounds must be installed immediately after the zero-energy check.*

- Assign a worker responsible for using devices for bypassing energy other than electrical energy in accordance with applicable guidelines.

B) Eliminating auxiliary and other energy sources (see Table 2, "Documenting protection switches").

When the energy sources present in the work zone may present a hazard for the entire team, the worker in charge and at least one team member, using the Lockout Sheets and after checking the isolation, lock out the energy-isolating devices with a lockout padlock and hasp.

### *I Under the Accord or Self-protection regimes*

The WIC and the team members can also use their individual padlocks and a hasp to lock out the energy-isolating devices that present a hazard for the entire team.

### *II Under the Self-protection regime*

The WIC places a Self-protection tag identified with their name on each energy-isolating device to be locked out.

The isolation of the energy-isolating devices serving as safety measures must be verifiable visually or positively according to the applicable guideline (*P-SEC-G-027*).

When a lockout box is used, the WIC places the key for the lockout padlock in the lockout box and each member of the team locks the box with their individual padlock.

All team members should take part in the lockout process in order to become familiar with the energy-isolating devices (*HQ-SST-M-1002, P-SEC-M-003*).

For energy sources that present a hazard for only part of the team, each worker locks out, using the Lockout Sheets, the energy-isolating devices with an individual padlock and hasp. The WIC or the team leader must also attach their individual padlocks. If more than one energy-isolating device has to be locked out, a lockout box can be used. These lockout mechanisms are put in place before work begins and may be removed when no longer required.

The lockout device, when there is one, must be installed before starting the work.

### 5.3 Delimiting the work zone

The WIC and team members must delimit the work zone.

Markings must be placed while observing approach distances based on the work to be performed and its duration. Markings must be placed so that they can be seen by workers to keep them from crossing the work zone boundaries (*HQ-SST-N-9001, AP-GS-N002*).

Markings may be modified once the work in the section to be removed from the work zone has been completed.

In general, depending on the type of work involved, this zone does not include the control and protection panels, even if there are work zone safety measures there.

The work zone must be delimited with one or more clearly visible entrances.

The materials used for delimiting the work zone must be standard material suited for that purpose.

However, depending on the type of work under the Accord and Self-protection regimes, the area is delimited by physical means.

## 6 Instructions to personnel

The WIC informs team members of the area of the protected zone and of the lockout, if applicable, of the work zone, along with the safety measures that have been installed. The WIC provides the instructions to personnel according to the terms of applications of the Safety Measures Sheet.

The team members sign the Safety Measures Sheet to certify that they understand and agree with the information and the instructions that were given. The WIC signs the Safety Measures Sheet only once all the team members have signed it and he or she has authorized the start of the work.

If any team leaders are present, each one fills out a Safety Measures Sheet and enters the safety regime number if applicable (Guide FMS PO/CE).

Before entering a work zone, each worker must have been given the instructions to personnel, signed the Safety Measures Sheet and attached their individual padlock. Any worker unfamiliar with the Code must be accompanied by an authorized worker.

## **7 Presence of worker in charge and team leader**

The WIC must be in the work zone when work is being done provide adequate supervision.

The team leader must be in the work zone when work is being performed by their team to provide adequate supervision.

The WIC must not allow work to be performed in more than one work zone at a time.

### *1 Work Authorization*

However, under a Work Authorization, the WIC may briefly leave the work zone after notifying workers if doing so is related to the purpose of the Work Authorization and does not affect worker safety.

*Note: The provisions of the last paragraph do not apply to diving work.*

### 8.1 Change of WIC

#### A) Direct change of WIC

When a direct change of WIC is planned, the following procedure applies:

- If a safety regime has been issued, the operator is notified of the change. The operator confirms the safety regime number. Under a Work Authorization, the operator confirms the isolation points for the protected zone to the new WIC.
- The new WIC obtains from their predecessor the Work Authorization Form, where applicable, the Safety Measures Form, the associated Lockout Sheet(s), and fills out a new Safety Measures Sheet with the team members. In signing, the new WIC confirms having been informed by their predecessor of the safety measures that have been taken, and, after verification, if required, agreeing with them.
- The new WIC must also, where applicable, check the lockout before accepting it (except for the isolation verification steps, which are considered to have been done) and communicate with the WICs concerned when the communication procedure is in use (see Appendix III).
- The new WIC installs their individual padlock and their predecessor removes their padlock.

#### B) Indirect change in WIC

When an indirect change in WIC is planned, meaning that the WICs do not cross paths physically, the following procedure applies:

The WIC leaving the work zone must:

- Enter the transfer seal number in the appropriate box on the Safety Measures Sheet
- If a lockout box is being used:
  - Place the transfer seal on the lockout box
  - Have the individual padlocks removed from the lockout box and remove their individual padlock
- When no lockout box is used, a transfer envelope must be used:
  - Place the Safety Measures Sheets and, where applicable, the associated Lockout Sheets and Work Authorization form inside the transfer envelope (the Safety Measures Sheet must be positioned so that the seal number, safety regime number, identification and work location can be seen)
  - Place the transfer seal on the envelope
- Place the lockout box or transfer envelope at a predetermined location, as well as the Safety Measures Sheet, the related Lockout Sheets and the Work Authorization Form, if required
- Inform the operator of the measures that have been taken if the operator has issued a safety regime

*Note: No work may be performed when there is a transfer seal in a lockout box or transfer envelope.*

The new WIC must:

- Retrieve the lockout box or transfer envelope at the predetermined location, as well as the Safety Measures Sheet, the related Lockout Sheets and the Work Authorization Form, if required
- Make sure the transfer seal number matches the number on the Safety Measures Sheet

*Note: If the seal number does not match the one on the Safety Measures Sheet or if the transfer seal has been tampered with, lockout continuity cannot be ensured.*

- Place their individual padlock on the lockout box, if required
- Remove the transfer seal from the lockout box or transfer envelope
- Notify the operator of the change and confirm the safety regime number if the operator has issued a safety regime (under a Work Authorization, the operator confirms the isolation points for the protected zone to the new WIC)
- Complete and sign the Work Authorization Form, if applicable
- Check the lockout before accepting it (except for the isolation verification steps, which are considered to have been completed)
- Fill out a new Safety Measures Sheet. In signing, the WIC certifies that they have verified the safety measures taken by the previous WIC and are in agreement with them
- Contact the WICs concerned when the communication procedure is in use (see Appendix III)

### C) Unforeseen absence

In case of an unforeseen absence on the part of the WIC, the immediate superior designates a new WIC and notifies the operator. The absent WIC's padlock remains in place and the immediate superior takes the necessary action with the employee as per Appendix 1, if required.

The immediate superior and a team member inform the new WIC of the safety measures taken by the latter's predecessor, and the remainder of the procedure regarding a direct change in WIC applies.

## 8.2 WIC rotation under a Work Authorization

For scheduled WIC rotations, the name of each WIC must appear on the Work Authorization Form.

The WIC and at least one team member who are taking the first rotation perform the lockout using the Lockout Sheets, in accordance with the Code. Upon arriving, the WICs and the team members place their individual padlocks on the lockout box. For the first rotation, each WIC checks the lockout using the Lockout Sheets with at least one team member (except for the isolation verification steps, which are considered to have been done).

All the team members should take part in the lockout process in order to become familiar with the energy-isolating devices (*HQ-SST-M-1002, P-SEC-M-003*).

At the end of each rotation, the WIC and a team member leave their individual padlocks on the lockout box, except for their last rotation for the work in question.

At each rotation, the WIC fills out a Safety Measures Sheet according to the procedures in the applicable guideline, and makes sure that the safety measures are being applied, reminds workers of the instructions, and then authorizes access to the work zone.

## 9 Work interruptions

When work is stopped by the WIC, the latter must make sure that all team members have left the work zone. The WIC prohibits anyone from returning to the work zone and schedules the time and place for everyone to meet before work is resumed.

Upon returning, the WIC makes sure that safety measures are being applied, reminds workers of the instructions, enters information on the Safety Measures Sheet, and then authorizes access to the work zone.

When a lockout box is used, it must be unlocked at the end of the workday by all the team members, except for the WIC and one team member. When they return, the Safety Measures Sheet must be completed as per the applicable procedures.

## **9.1 Modification of the state of the wicket gate isolation points, variable-blade turbines and tailgate**

Under a Work Authorization, the state of the isolation points may need to be modified for work on mechanical apparatus parts that requires the removal of the lockout of an energy-isolating device serving as a mechanical isolation point for the protected zone. Since the change may reduce the level of protection provided by the protected zone, the following rules must be observed:

- a) Under no circumstances may the mechanical isolation point be modified on the generating units involved for the duration of the downstream work when two protected zones have different isolation points.
- b) Only one change at a time may be made to the protected zone.
- c) The WIC gathers together all team members to modify the lockout of the energy-isolating device serving as the mechanical isolation point. The WIC then places the key back in the lockout box, and each team member locks the box again.
- d) Such modifications consist in removing the lockout on the following energy-isolating devices acting as isolation points:

- 1) Wicket gates (servomotor, oil intake valve(s),<sup>2</sup> drain valve(s))

When the modification to the wicket gate isolation point is no longer required, the latter must be returned to its initial state by notifying the operator of a new modification to the isolation point.

- 2) Tailgate

The position of the tailgate can be modified, which allows the Work Authorization to be returned without bringing the tailgate back to its original position.

- 3) Hydraulic circuit or oil intake valve(s) and drain valve(s) of the speed governor and variable-blade turbine blades

When the modification of the isolation point of the variable-blade turbine hydraulic circuit is no longer required, the latter must be returned to its initial state by notifying the operator of a new modification to the isolation point.

- e) A modification may be made to an energy-isolating device serving as a mechanical isolation point during the work:

### **For the modification involving the wicket gates:**

For work requiring that the wicket gate isolation point be unlocked, special safety measures<sup>3</sup> must be drawn up for the facility involved to cover the risks identified based on the work to be performed and the means to control them.

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<sup>2</sup> *Includes electrical energy in the case of an electrically-powered servomotor.*

<sup>3</sup> *The special safety measures must be applied after agreement with the local health and safety committee (CLSS). Such an agreement must be confirmed by the regional health and safety committee (CRSS).*

These measures must cover the risks associated with:

- re-opening the wicket gates, when these must be kept closed, to prevent any inadvertent movement that may be caused by the discharge of any accumulated water
- taking measurements of wicket gate contact points when oil pressure is present
- tasks requiring work in the turbine shaft

*Note: Tasks that require that Case B mechanical isolation points be used will need to be identified.*

- For work requiring such a modification, access to the scroll case must be closed off to workers and access to the turbine shaft blocked off to workers who are not required during the time the isolation point is unlocked

*Note: When the wicket gate contact points are being measured, access to the scroll case is allowed and the oil intake valve(s) and drains do not need to be locked out again.*

- The other work in the turbine shaft and scroll case may resume when the “wicket gate” isolation point is locked out again at 0% or 100% (all other intermediate positions require the use of the atmospheric hydro-pneumatic tank or intermediate lockout device)
- Work on rotating parts may only be done if the WIC makes sure that access to the scroll case remains open

*Note: When the work is carried out as Case B or C, no work on rotating parts may be performed while the modification is being done.*

## **For changes involving operation of the blades of a variable-blade turbine:**

- access to the scroll case must be closed off to workers for the entire time the lockout on the isolation point is being removed
  - access to the draft tube must be restricted to personnel involved in the work
  - workers must not place themselves in the path of the blades when the hydraulic circuit is under pressure
  - markings must be placed so that they can be seen by workers to keep them from crossing work zone boundaries (*HQ-SST-N-9001*)
- f) If the modification was not anticipated when instructions to personnel were given, the WIC must fill out a new Safety Measures Sheet.
- g) All removal of lockouts must be approved by the operator and entered on the Work Authorization Form.

## **10 Operating checks and/or tests**

### **10.1 Operating checks involving auxiliary power**

When work is performed under a Work Authorization, Accord or Self-protection regime and operating checks and tests are required involving auxiliary power on control, protection or teleprotection circuits, for example checking alarm signal reception or control signal transmission, and several work zones under several safety regimes are involved,

The WICs must:

- establish the safety measures to be applied based on the Lockout Sheet(s) (when required)

- enter these safety measures in the “Comments” section on the Safety Measures Sheet or on the Lockout Sheets
- brief the members of their team
- apply the safety measures that have been established

If auxiliary power is required for such checks, the WIC must inform the team members and then proceeds as follows:

- If auxiliary power is required at the start of the work, the energy-isolating devices are not locked out.
- If auxiliary power is required after the work has been done, the lockout is removed using the Lockout Sheets (when required) as per one of the following procedures:
  - a) When the lockout was done by the WIC, they gather the entire team to remove the lockout on the energy-isolating devices. The WIC then places the key back in the lockout box, and each team member locks the box again.
  - b) When the lockout is performed by a team leader and/or part of the team, they must notify the WIC.

Once the checks have been completed, the lockout is done as specified in Section 5.

## **10.2 Tests involving autonomous power sources**

When work is performed under a Work Authorization, Accord or Self-protection regime and tests must be done that involve autonomous power sources and several work zones, the work must be performed under a single regime and in a single work zone.

When tests need to be done using autonomous power sources while work is under way, the WIC:

- makes sure the power source is not hazardous for the workers; otherwise, the personnel not required for the tests must be evacuated

For autonomous sources of electrical energy:

- the WIC makes sure no energy can be released from their work zone by electrically isolating it from all other work zones within the protected zone
- in cases where autonomous power may be released from the work zone, the WIC must confirm with the operator that no other Work Authorization or Accord regime is in effect in areas that may receive energy from the autonomous power source

### **10.3 Operating checks involving main power**

The WIC must hand in the Work Authorization before performing operating checks involving main power.

When checks need to be done by connecting the device to the power system or that require a generating unit to be started up, the WIC must apply the Accord regime.

The safety measures to be taken are set out in the following documents:

- Essais en réseau ou mise en exploitation des installations [Operational testing or commissioning of facilities] (*TET-AUT-P-0.0.1.3*)
- Application des mesures de sécurité et des règles d'exploitation dans un contexte de mise en route [Application of safety measures and operating rules at startup] (*PT-3002-02*)

## **11 Removal of safety measures in a work zone**

Once the work has been completed, the WIC makes sure that all safety measures they and their team have put in place in the zone are removed as follows:

- Have non-essential workers leave and prohibit them from returning
- Remove, or have someone remove, the work zone markings
- Remove, or have someone remove, the grounds and restore bypass devices to their initial state
- Remove the individual locks together with the team members
- Remove the lockouts performed for the team in the work zone according to the Lockout Sheet(s)
- Notify the team members that the work zone has been closed and prohibit anyone from returning to or accessing the area

## **12 End of work**

### **12.1 Removal of lockout devices in the protected zone**

The WIC must make sure that all the lockout materials installed by themselves or their team has been removed, in accordance with the Lockout Sheet(s).

## 12.2 End-of-work notice

When a safety regime is issued by the operator, the WIC provides them with the end-of-work notice by returning the regime number and indicating the state in which the facility is being returned.

### *1 Work Authorization*

When a modification of the protected zone involves an energy-isolating device serving as an electrical isolation point, the WIC leaves the work uncompleted in the work zone, without removing the grounds, bypass devices and lockout devices required to obtain a new Work Authorization.

When a modification to the protected zone involves energy-isolating devices serving as mechanical isolation points located upstream of the wicket gates, the rules are as follows:

- Modifications to the protected zone to reduce its size are permitted. If a ring gate becomes the new energy-isolating device serving as a mechanical isolation point for the protected zone, the operator must fill the penstock and scroll case with water before issuing a new Work Authorization.
- Modifications to the protected zone intended to expand its size are allowed subject to an agreement with the local health and safety committee (CLSS) concerned regarding the safety measures to implement to create the new protected zone (risks related to the presence or accumulation of water). Such an agreement must be confirmed by the regional health and safety committee (CRSS).

When a modification to the protected zone involves an energy-isolating device that is part of a mechanical isolation point for the protected zone that includes either:

- servomotors or
- oil intake valve(s)<sup>2</sup> and drain valve(s)

the energy-isolating device(s) are replaced by the following device(s) for establishing the protected zone:

- air-oil pressure tank open to the air with dissipated mechanical energy

or

- physical component removed with dissipated mechanical energy

In all cases, the WIC must leave the work uncompleted in the work zone, without removing the grounds, bypass devices or lockout devices needed to obtain a new Work Authorization.

In all cases, the same WIC must obtain a new Work Authorization as soon as the new protected zone has been established to complete the work.

## 13 Specific types of work

Application of the Work Safety Code is described in the approved guidelines for the specific types of work listed below:

- Application du Code de sécurité des travaux dans les installations blindées isolées au gaz SF<sub>6</sub> (*TET-APE-N-7001, GEN-D-946*) [Application of the Work Safety Code in SF<sub>6</sub>-insulated shielded facilities]

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<sup>2</sup> Includes electrical energy in the case of an electrically-powered servomotor.

- Application des mesures de sécurité et des règles d'exploitation dans un contexte de mise en route (*PT-3002-02*) [Application of safety measures and operating rules at startup]
- Application des mesures de sécurité de la procédure chantier (*EQ-CO-SC-PR04/P-SEC-M-021*) [Application of construction site safety measures]
- Élaboration des guides pour les travaux en amont ou en aval d'une centrale ou d'un ouvrage de contrôle hydraulique muni de vannes (*P-SEC-G-003*) [Development of guides for work upstream or downstream of a generating station or gated spillway]

# Appendix I

## Padlock Control

### A) Principles

There is only one key for lockout padlocks and individual padlocks.

No copies may be made of such keys.

The name of the worker who places their individual padlock must be clearly indicated on the padlock if no record is kept.

If the key or the padlock is defective or if the key was lost, only the employee involved who is present at the work site can cut their own padlock.

At all times, before authorizing that a padlock be cut, the immediate superior must make sure that doing so does not jeopardize anyone's health, safety or physical well-being.

### B) Procedure to authorize the cutting of an individual padlock

If an individual lock has remained attached because it was forgotten or due to an unforeseen absence, the WIC must contact their immediate superior to notify them of the situation.

Before cutting an employee's padlock, the immediate superior should always consider waiting for the employee to return the same day or on the following days. If the operator has no other choice, they may cut the padlock only after strictly following the steps outlined below:

- 1) Make sure that the employee who owns the padlock to be removed is no longer at the work site.
- 2) Use all reasonable means to reach the employee directly.
- 3) If the employee is no longer at the work site but can be reached, the immediate superior must inform them of the situation and ask them to come back to the work site to remove their padlock, if they are reasonably able to do so.
- 4) If the employee is no longer at the work site and cannot be reached, or is not reasonably able to return to the work site, the immediate superior must complete the designated form documenting all of the following actions that have been taken:
  - a) The immediate superior contacts their superior or substitute to obtain the latter's consent to authorize the forgotten padlock to be cut.
  - b) The immediate superior confirms with the WIC that the employee has left the work zone and determines whether it is safe to cut the lock.
  - c) The immediate superior, accompanied by the WIC, cuts the individual padlock that was left in place. If the immediate superior is not reasonably able to come to the site, upon receiving their immediate superior's approval, they authorize the WIC to cut the padlock while accompanied by a team member.
  - d) The immediate superior must meet with the owner of the padlock when the latter returns to work to notify them that their padlock was cut and finalizes the form by recording this notice; a copy is sent to the employee and to the health and safety committee involved.

### **C) Procedure to authorize the cutting of a lockout padlock**

If a lockout padlock has been forgotten, after confirming that the safety regime was handed in, the immediate superior removes the padlock, or has someone remove it, using the key.

When a lockout padlock must be cut following a defect or if the key was lost, the WIC notifies the members of their team and contacts their immediate superior to inform them of the situation. The immediate superior may authorize that a lockout padlock be cut, but they must complete the required form by documenting all of the following actions that were taken:

- 1) When required, make sure that the safety regime has been given to the operator.
- 2) Contact the immediate superior or replacement to obtain the latter's consent to authorize that the padlock may be cut.
- 3) The immediate superior, accompanied by the WIC, cuts the padlock that was left in place, but if the immediate superior is not reasonably able to come to the site, they may authorize the WIC to cut the padlock.
- 4) Fill out the form and send a copy to the relevant health and safety committee.

### **D) Padlock cutting tracking form**

Each time a padlock is cut, it must be entered on the appropriate form by the immediate superior and kept for one (1) year.

# Appendix II

## Installation of Lockable Energy-isolating Devices

Following discussions between Hydro-Québec and the trade, technical and clerical employee unions while establishing the lockout method, Hydro-Québec agreed to set up measures aimed at eliminating the number of non-lockable energy-isolating devices by applying the following measures:

### **A) New facilities, including additions to existing facilities**

All new energy-isolating devices must be lockable.

### **B) Major changes to existing facilities**

When projects involve major modifications to part of an existing facility, the new energy-isolating devices must be lockable

### **C) Non-lockable energy-isolating devices**

In all cases, the following measures must be applied when a non-lockable energy-isolating device is found:

- Establish an action plan to make it lockable, which will involve a worker responsible for the action along with a timeline. The action plan is submitted to the relevant health and safety committee
- The materials and drawings or as-built diagrams must be available
- The energy-isolating device must be made lockable according to the action plan

# Appendix III

## Communication Procedure

If a safety regime has been issued for the device covered by an outage or advance request, the operator and the requesting WIC apply the communication procedure.

- 1) Before issuing a safety regime, the operator informs the requesting WIC that a safety regime has been issued for the device or on the control and/or protection circuits covered by their request.
- 2) The requesting WIC contacts the WIC holding the safety regime, reaches an agreement with the latter on the safety measures to be applied (e.g., switch, disconnect switch cabinet, fuse) and obtains the number of the safety regime from the WIC involved.
- 3) The requesting WIC contacts the operator and confirms the safety regime number of the WIC concerned by their safety regime request.
- 4) After checking the safety regime number sent by the requesting WIC, the operator issues the safety regime.
- 5) At the end of the work, the WICs concerned by the agreed-on safety measures must contact each other to confirm the return of their safety regime.

*Note: If modifications need to be made to the agreed-on safety measures or if there is a change in WIC, the WICs must contact one another.*

If several devices or control and/or protection circuits are concerned by the safety regime request, the communication procedure must be applied with each WIC concerned.

**This procedure does not apply to the following devices:**

- Transformer without a tap changer or with a manual tap changer
- Current transformer
- Reactor
- Circuit breaker (equipped with a disconnecting cabinet or switches)

# Appendix IV

## Work Zone Components
















The following components are part of a generating unit work zone:

- Intake gate and penstock, if there is no head gate
- Headgate (spherical valve, clamshell gate, butterfly valve or ring gate)
- Draft tube
- Tailrace canal
- Tailgate (depending on tailwater level)
- Scroll case
- Speed governor
- Pumping unit (air-oil pressure tank, collector, including pump and small turbine)
- Turbine
- Generator
- Generating unit cooling system
- Neutral ground cabinet
- Generating unit voltage and current transformer
- High-power portion of static and/or dynamic excitation
- Fire fighting system specific to the generating unit, including fire alarm panel and flood valve cabinet

The following components are generally not included in a generating unit work zone:

- Control and metering circuits
- Protection circuits
- Electronic portion of the excitation system (e.g., control, protection and regulation)

**Table 1 – Selection of mechanical isolation points**

	Case A No contact with rotating or moving parts		Case B Contact with rotating or moving parts	Case C Access to scroll case
	1st poss. P.Z.	2nd poss. P.Z.		
	Wicket gates closed			
	Wicket gates open			
	Servomotors locked			
	Oil pressure eliminated at servomotors			
	Gate upstream of wicket gates closed			



**Table 2 – Documenting protection switches**

	<b>System Safety</b>	<b>Work Zone Safety</b>
<b>Responsibility</b>	The operator must establish, or have someone establish, the measures related to power system safety.	The WIC establishes, or has someone establish, the safety measures for the work zone.
<b>Identification of open switches</b>	The switchperson attaches the tag specified in the operating guideline ( <i>GEN-D-520</i> ).	The WIC performs the lockout (see Section 5).
<b>Documenting the switches</b>	The switches used for power system protection are documented according to the applicable guideline.	The switches that serve as safety measures for the work zone are entered by the WIC on the Safety Measures Sheet or the Lockout Sheet.
<b>Regime</b>	No safety regime	The regime held by the WIC



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