
PSSP Cat 1b

Safety isolation procedures required for level I-IV interconnected customers



Student guide

December 2024

 **BC Hydro**
Power smart

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Course Introduction

Welcome to the Power System Safety Protection, or PSSP, Category 1B training module, Safety isolation procedures required for level I to IV interconnected customers.

This student guide is designed to accompany the PSSP Category 1B online course and be used as reference material.

After completing this module, you'll be able to define what level I-IV interconnections are, identify customer boundaries and recognize the personnel authorized to implement safety isolation procedures. You should also be able to indicate the planning and scheduling requirements for isolation, describe the safety isolation procedures and indicate requirements for live line work on boundary equipment.

Audience

BC Hydro workers authorized to PSSP Category 5 who are required to establish customer isolation.

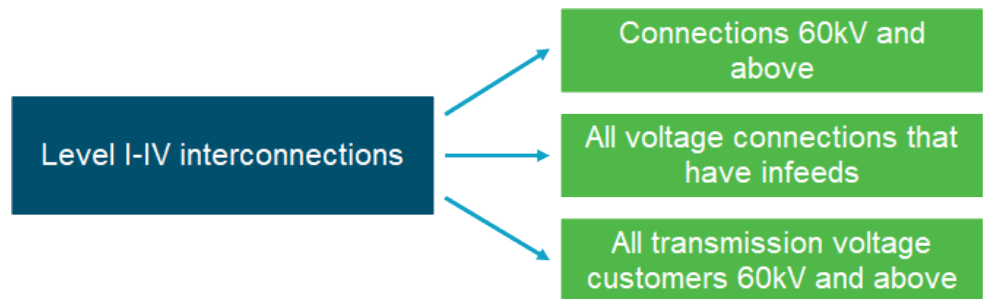
Course Objectives

At the end of this course, you will be able to:

- Define what level I-IV interconnections are.
- Identify customer boundaries.
- Recognize the personnel authorized to implement safety isolation procedures.
- Indicate the planning and scheduling requirements for isolation.
- Describe the safety isolation procedures.
- Indicate requirements for live line work on boundary equipment.

Level I-IV interconnections

Level I-IV interconnections	These are connections to BC Hydro's electrical system that are 60 kilovolts and above, or from customers who are connected at less than 60 kilovolts but have customer infeeds.



These connections will always be displayed on the operating one-line drawing, and the isolation procedures must be described in a Joint Operating Order.

What are some examples of level I-IV customer interconnections?

- Interconnected utilities.
- Transmission voltage customers.
- Independent power producers.
- Customers with multiple feeder sources, such as hospitals, airports and BC Hydro's control centres.

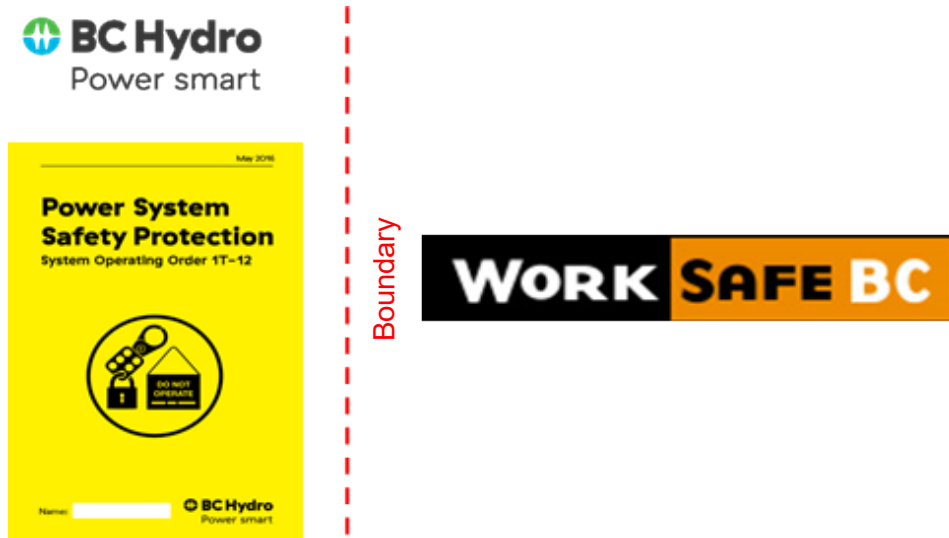
What is a customer infeed?

Any customer-owned power supply that is not equipped with a Canadian Standard Association (CSA) approved transfer switch or with CSA approved key interlock switch designed to ensure that the supply cannot feed into the power system. Customers who have multiple sourced looped feeds or interconnected generation without the CSA approved transfer switch are considered customer infeeds. (SPR Glossary)

Boundary identification

What is a boundary?

Item	Description
Boundary	A boundary is a designated point where one Operating Authority ends and another begins. In the case of level I-IV customer interconnections, the boundary is where PSSP ends and the customer's safety procedures begin. Customers primarily use WorkSafeBC-compliant lockout.



What is a Joint Operating Order?

Item	Description
Joint Operating Order	A Joint Operating Order is a document that describes the procedures necessary to facilitate interconnected operation, as well as the safety isolation procedures. We will refer to the Joint Operating Order throughout this training.

Boundary

The description of the boundary and which party has Operating Authority of the designated equipment is listed in section 4 of the Joint Operating Order, called Operating Authority and Boundary Description.

4.0 OPERATING AUTHORITY AND BOUNDARY DESCRIPTION

Operating Authority is defined as the right to control a portion of the power system to establish conditions required for and to issue Safety Protection Guarantees.

The BC Hydro control centre is the Operating Authority and the Person-in-Charge of Safety Protection Guarantee administration for 1L219 up to, but not including, T1 DS 89.1 and T2 DS 89.2. The BC Hydro control centre will issue Safety Protection Guarantees to PSSP authorized workers for work on 1L219.

Domtar is the Operating Authority for all WEY equipment located within the WEY substation, including T1 DS 89.1 and T2 DS 89.2. All work on WEY equipment will be performed under Domtar safety rules and procedures.

The designation and layout of electrical equipment, including the Domtar / BC Hydro Operating Authority boundary, are shown on the operating one-line diagrams:

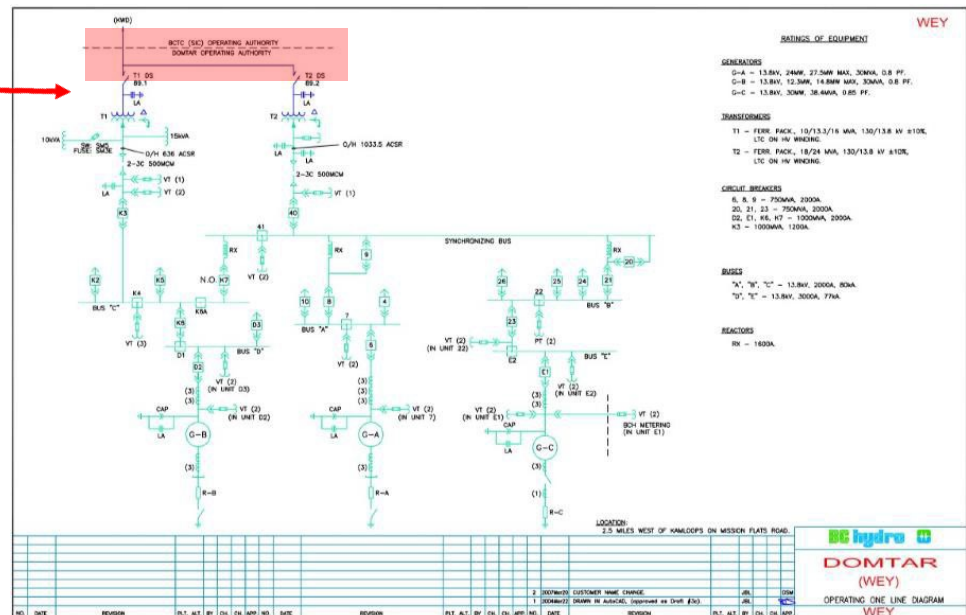
Domtar

WEY

BC Hydro has metering equipment installed on each generator and on the 1L219 intertie, as shown on the operating one line diagram.

Boundary

It is displayed on the one line drawing as a dotted line.



Boundaries between the power system and a customer are defined in a Joint Operating Order and displayed on the one line drawing. Both BC Hydro and the customer must reference this order when establishing work protection.

Authorized personnel

Section 3 of the Joint Operating Order identifies the personnel authorized to implement safety isolation procedures. This information can differ from one customer site to the next, so it is necessary to look it up in section 3 of each Order.

Note

It's important to know that the customer representatives don't hold PSSP authorization – nor they are required to – but have been selected for their experience with and knowledge of the customer's safety isolation procedures.

3.0 AUTHORIZED PERSONNEL AND TELEPHONE NUMBERS

This section identifies the personnel authorized to implement safety isolation procedures. This section also identifies the personnel to be contacted for real time operating issues related to reliability and supply.

Only persons named in this section, or identified on planned outage requests as having temporary authorization, or verbally confirmed as Domtar's authorized delegate during emergencies, will be issued a Guarantee of Isolation from the BC Hydro control centre.

It is Domtar's responsibility to provide authorized personnel changes to the BC Hydro System Control Manager for inclusion in this operating order. Temporary authorization delegation (contractors) for planned work will be verbally confirmed by the BC Hydro Outage Scheduler, as part of the outage scheduling process, and noted on the BC Hydro outage request form (CROW).

In an emergency, the BC Hydro control centre will accept verbal assurance from Domtar's delegate that they have been authorized by Domtar's management to implement safety isolation on behalf of Domtar.

Planning and scheduling

It's essential to plan and schedule any outage, so the required timeline for isolation can be established and the required Category 5 authorized BC Hydro worker can be onsite to carry out the isolation.

When planning work, it is critical that all those involved share information related to worker protection. Workers are responsible for, and have final authority for, identifying the equipment that will be out of service and the safe work zone for this equipment.

The Person in Charge, or PIC, is responsible for isolating the major equipment. This involves determining the sequence of switching and applying locks and tags. At the same time, the PIC must also ensure the operational security and reliability of the system.

Outage #0-00311789 Rev.2

Requested Date/Time:

Planned Outage Request

Generated: 2018/02/05 13:01 for Buccini, Keith V. page 1 of 4

1L219 Out From KWD, WEY, WEY T1DS89.1, T2DS89.2 OOS

Outage Request Summary					
Operator Notes:					
Outage Number:	Rev 2	Requested By:	Buccini, Keith V.		
Outage Status:	Approved 2018/02/05 12:37 by Buccini, Keith V.		Outage Type:	Planned	
Locked By:					
Equip. Requested / Major Equipment Impacted					
Circuit/ Equipment	Description	Portion Out	Equip Level	Voltage Class	Operated By
1L219		Out From KWD	4	138 kV	Area, System
DOMTAR (WEY)		OOS	n/a	n/a	Area
WEY T1DS89.1		OOS	4	n/a	Area
WEY T2DS89.2		OOS	4	n/a	Area
Single Outage Zone					
Isolating Points:	Isolating Point	Outage State	Normal State		
	KWD 1D1	Open	Closed		
	KWD 1PT1 Secondaries	Open	Closed		
Additional Isolating Points:					
Reason/Priority:	Customer Requested Outage to work on WEY T1 DS 89.1 and T2 DS 89.2 for Brent Zahnd @ Domtar Office: 250-434-8807 Cell: 250-851-6383				
Charge #:	N/A				
Outage Start:	2018/02/16 08:00	Outage Complete:	2018/02/18 16:00		
Outage Duration:	Exactly 2.33 Day(s)	Continuous/Daily:	Continuous		
Recall:	Minimum Recall Time:	2 Hour(s)	Cost:	\$0	
Cancellation:	Minimum Cancellation Time:	0 Min(s)	Cost:	\$0	
Outage Cause:	PL	Subcause:	MC		

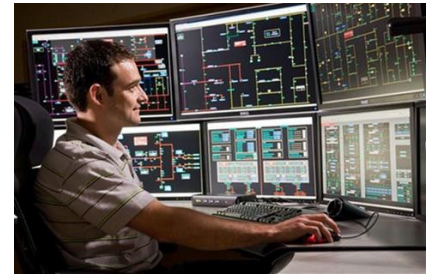
Approvals			
Required Approval	Status	Update By/ When	Conditional
Scheduler's Comments			
Area	Pending		No
Please contact Brent Zahnd: Electrical Mgr. Superintendent (Office:1-250-434-8807 or Cell:1-250-851-6383) @ WEY prior to switching 1L219 @ KWD			
As per ST-WEY-01			
6.2 Isolation Required By Domtar For Work On WEY T1 DS 89.1 and T2 DS 89.2			
At the scheduled time, Domtar will off load 1L219 by opening their circuit breakers in WEY. Domtar will notify the BC Hydro control when this is completed.			
The BC Hydro control will direct a PSSP authorized worker to open KWD 1CB5.			
The BC Hydro control will then direct the PSSP authorized worker to open KWD 1D1 and KWD 1PT1 secondaries, lock each with a BC Hydro System Lock and apply to each a Guarantee of Isolation Tag.			
The BC Hydro control will advise Domtar that 1L219 is isolated, and issue to the Domtar authorized person a Guarantee of Isolation from KWD 1D1 and KWD 1PT1 secondaries.			
The BC Hydro control will log this information and use a Safety Protection Record Form for recording purposes.			
Domtar, following prior arrangement with the BC Hydro control, may dispatch a worker to apply their personal locks and tags on KWD 1D1 and KWD 1PT1 secondaries. This may require the use of a "isolator ckt" device on each locking point to facilitate the use of a BC Hydro System Lock and a Domtar lock simultaneously.			
Domtar will use their normal safety protection procedures for further isolation of their equipment and understand the requirement to use safe work practices including the application of safety grounds.			
Domtar may request BC Hydro workers to install portable working grounds on the conductors between the KWD 1D1 and WEY T1 DS 89.1 and T2 DS 89.2. The BC Hydro crews will work under the direction of the Domtar authorized person and use the Domtar safety system procedures when applying the portable working grounds. The BC Hydro worker must confirm with Domtar that the Guarantee of Isolation from BC Hydro is in effect, check open			

Guarantee of Isolation

Item	Description
Guarantee of Isolation	Is a means of effecting guaranteed isolation between different Operating Authorities. (Source: SPR Glossary)

In order to secure isolation between different Operating Authorities, BC Hydro follows a safety procedure called **Guarantee of Isolation**, or GOI.

A GOI is not a Safety Protection Guarantee, or SPG, but a means by which isolation is secured across boundaries. This allows the BC Hydro PIC to use isolation established in another Operating Authority's area when developing the required isolation for an SPG.



It's also used by the BC Hydro PIC to provide the customer with the required isolation from BC Hydro's system. This happens when establishing the required isolation within the BC Hydro Operating Authority.

Guidelines for establishing GOI

- For work that occurs on the BC Hydro side of a boundary but requires isolation on an interconnected customer's side, BC Hydro reserves the right to secure the isolation by an authorized BC Hydro worker using BC Hydro locks and tags.
- For work that occurs on the interconnected customer's side of the boundary but requires isolation on the BC Hydro side, all work carried out by the customer on their equipment will be done following their safety rules and procedures – normally, WorkSafeBC compliant lockout.
- BC Hydro will direct and implement any isolation required on the BC Hydro side of the boundary.
- BC Hydro will allow the customer to come onto BC Hydro property to apply their personal locks to the isolation device(s) once established.

Isolation required by BC Hydro

When a work location crosses an operating boundary with a level I-IV customer, there are specific procedures required to ensure the isolation of equipment – both BC Hydro's and the customer's. These are documented in section 6 of the jointly-signed operating order.

Here are the procedures for ensuring isolation of BC Hydro's equipment when a work location crosses an operating boundary with a level I-IV customer.

Step 1

At a scheduled time, the BC Hydro PIC asks the customer's representative to open the isolating devices specifically identified in the signed Joint Operating Order and then confirm with the PIC that the isolation has been established and will remain so.



Step 2

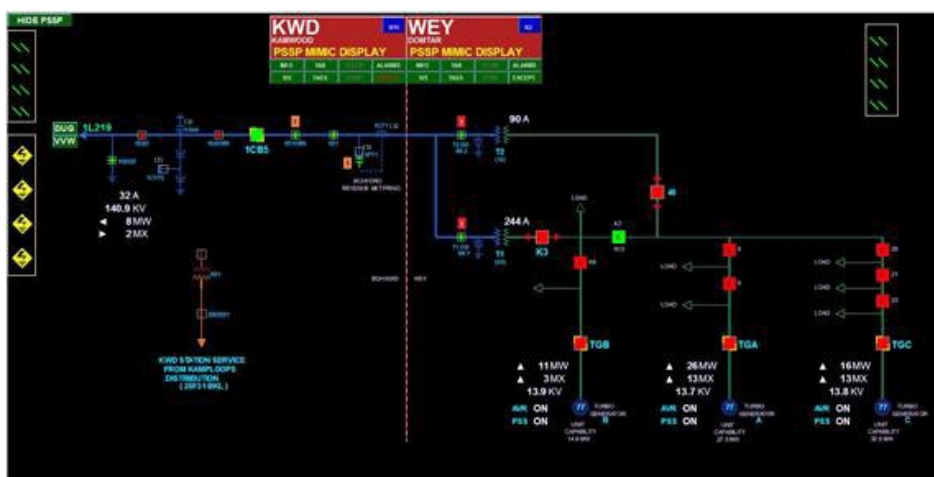
The PIC arranges for a PSSP-authorized BC Hydro worker to:

- Confirm that the customer's isolating devices are open.
- Apply BC Hydro system locks and GOI tags.



Step 3

The PIC logs the switching and updates the PSSP mimic display.



Step 4

The PIC then directs the rest of the required switching on the BC Hydro system, to secure the isolation required to issue the SPG.

SPGForms - GR1-311790

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Station or Circuit: 1L219 & KWD 1D1	Issued to: John Doe	No: GR1-311790	Pending
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Safety Protection Record Form

☒ Clearance

☐ Test and Work

☐ Guarantee of Isolation

☐ Transfer of Operating Authority

Prepared By: KVB
 Checked By: HDQ

For Work on: KWD 1D1
 Purpose: Disconnect maintenance

Isolation Points:
 KWD 1D1CB5 WEY T2 DS 89.2 – Open & Tagged GOI
 KWD 1PT1 Secondaries
 WEY T1 DS 89.1 – Open & Tagged GOI

Previous SPG Notes

Issued by: Keith Buccini
 Returned by:
 Returned to:

Date/Time: 2018/03/01 08:43
 Date/Time:

Operator Notes:

Worker Protection Grounding Clear?
☐ Yes ☐ No

Ready For Service?
☐ Yes ☐ No

SPG Notes:

	Protection extended to	Time	Date	Returned By	Time	Date	Worker Protection- Grounding / Bonding and/or Blocking Clear?
1							☐
2							☐
3							☐
4							☐
5							☐
6							☐

Generated by Buccini, Keith V.

2018-02-05

Isolation required by the customer

Here are the isolation procedures required to ensure isolation of the customer's equipment.

Step 1

At the scheduled time, the BC Hydro PIC makes arrangements to open the isolating devices specifically identified in the Joint Operating Order.



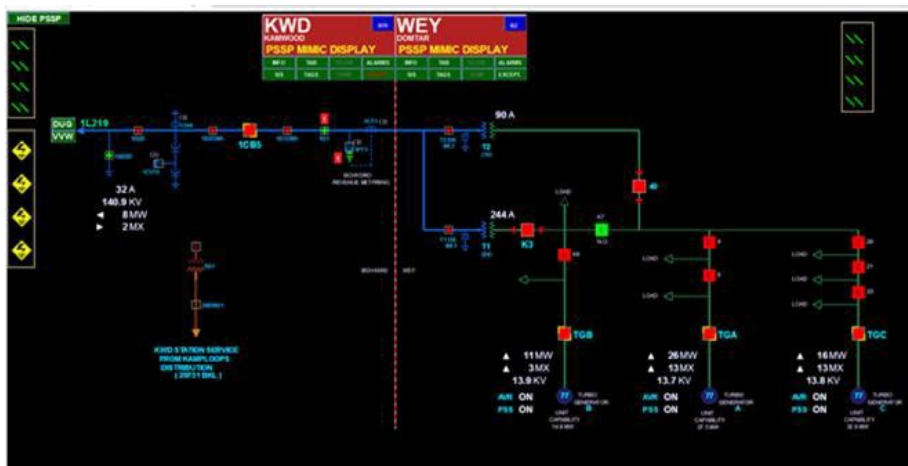
Step 2

The BC Hydro PIC directs a PSSP-authorized worker to lock open the required devices with a BC Hydro system lock, and then applies a GOI tag to it.



Step 3

The BC Hydro PIC logs the switching steps, updates the PSSP mimic display and completes a Safety Protection Record Form.



Step 4

The BC Hydro PIC advises the customer's authorized person that the required devices have been isolated, and issues a GOI.

SPGForms - GR1-311789

Page 1 of 1

Station or Circuit: 60L392 Part	Issued to: Brent Zahnd	No: GR1-311789	Pending
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Safety Protection Record Form

☐ Clearance

☐ Test and Work

☒ Guarantee of Isolation

☐ Transfer of Operating Authority

Prepared By: KVB
 Checked By: HDQ

For Work on: WEY T1DS89.1 & WEY T2DS89.2
 Purpose: GOI Issued to Brent Zahnd @ Domtar to perform entrance disconnect maintenance. Office 1-250-434-8807 or Cell: 1-250-851-6383

Isolation Points:
 KWD 1D1
 KWD 1PT1 Secondaries

Previous SPG Notes

Issued by: Keith Buccini
 Returned by:
 Returned to:

Date/Time: 2018/02/06 09:13
 Date/Time:

Operator Notes:

Worker Protection Grounding Clear?
☐ Yes ☐ No

Ready For Service?
☐ Yes ☐ No

SPG Notes:

	Protection extended to	Time	Date	Returned By	Time	Date	Worker Protection- Grounding / Bonding and/or Blocking Clear?
1							☐
2							☐
3							☐
4							☐
5							☐
6							☐

Generated by Buccini, Keith V.

2018-02-05

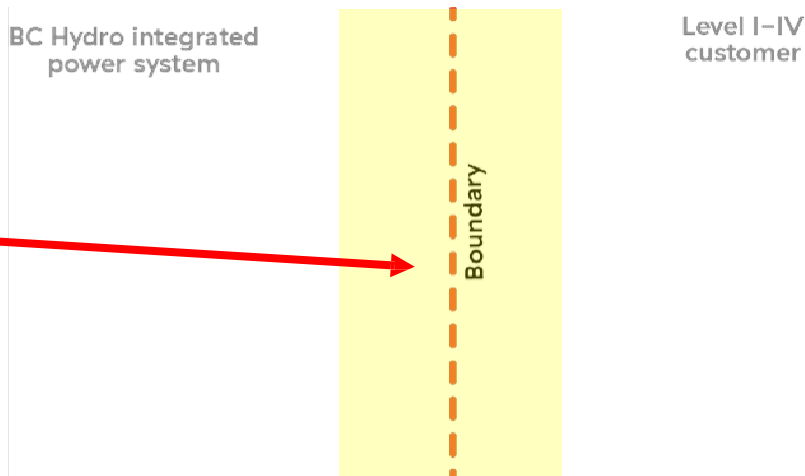
Step 5

The customer, following prior agreement with the BC Hydro PIC, may dispatch a worker to apply their personal lock and tag to the required devices. When on site, this worker is directed and supervised by a BC Hydro Category 5 authorized worker.



Concurrent work

Concurrent work is any work activity on the integrated system that is being carried out independently on both sides of a boundary.

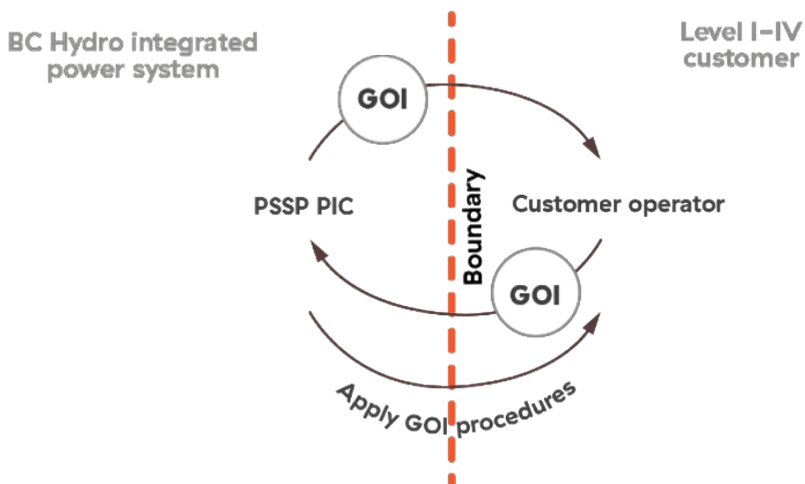


Common isolation zone

In these cases, a shared common isolation zone is required.

Concurrent work is relatively common during customer outages due to the impact of the outage on the customer and the subsequent scheduling issues.

The same procedures discussed earlier apply on both sides of the boundary, with the BC Hydro PIC issuing appropriate SPGs to PSSP-authorized workers. The customer will use their normal safety protection procedures.



Remember

Performing hazardous electrical testing is not allowed on either side of the boundary during concurrent work, unless it is coordinated directly between the customer and BC Hydro's authorized field workers, and both parties agree on measures to prevent exposure to their workers. This needs to be scheduled and discussed during a pre-job meeting.

Procedures for returning equipment to service

Upon completion of the work on boundary equipment, the BC Hydro PIC and the customer's authorized person confirm that the equipment can be returned to normal operation:

- All crews are clear.
- Grounds are removed.
- Equipment is ready for service.
- Safety Protection Guarantees have been returned.

The PIC cancels the GOI with the customer and directs the switching as required to energize the customer's equipment.



Work on customer equipment not involving PIC

For situations where a Person in Charge is not involved, the BC Hydro worker arranges directly with the authorized customer representative to open the required isolation device.

An example of this would be isolation of a metering kit from primary sources under the control of the customer.

As this is not part of the defined BC Hydro power system, the BC Hydro worker applies personal locks to the customer's isolation devices, in accordance with WorkSafeBC OHS Regulation Part 10 lockout procedures.



Live line work on boundary equipment

For live line work on boundary equipment, a Guarantee of No Reclose – or GNR – may be required.



Item	Description
Guarantee of No Reclose (GNR)	A stated and duly-logged guarantee between the PICs of different Operating Authorities, specifying that a particular conductor or piece of equipment shall not be reclosed manually or automatically until the PIC (in this case the customer authorized worker) who received the guarantee authorizes it. (SPR Glossary)



There are situations when a GNR is required and situations when it's not:

A GNR is required by customers for live work that:

- Is done on, or adjacent to, their transmission.
- Using procedures approved by WorkSafeBC.
- Requires an assurance from the BC Hydro control centre restricting reclosing.

Note:

When required, the BC Hydro control centre arranges for automatic reclosing to be blocked and then issues a GNR to the customer.

A GNR is not required from customers with infeeds or from independent power producers (IPP) under the following condition:

- A Joint Operating Order describes the operating restrictions and/or control design, ensuring the customer/IPPs will not attempt to energize the power system.

Additional resources

Category 6 PIC Core Training

Power System Safety Protection (PSSP) 1T-12

Safety Practice Regulations (SPR) 506, 600-610

OSH Standard

WorkSafeBC OHS Regulation Part 10