
PSSP STC

PSSP Substation Training Component



May 2021

Participant guide

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Your notes

[illegible]

Course introduction

Welcome to the **PSSP Substation Training Component** course.

Approximate time required to complete this training is two hours.

Audience

The intended audience for this training is workers who enter the substation portion of the power system.

Course goal

In this course, you'll learn how to access the substation portion of the power system, and you'll get an overview of relevant operating orders, PSSP training and authorization requirements, the use of the Local Information Manual and worker responsibilities related to the Substation Training Component. You'll also learn how to safely and securely enter and exit a BC Hydro substation.

If you are going to be working in an indoor substation, please contact your manager for specific indoor substation training.

The information you'll learn in this course will have an impact on *your* safety and that of the people you work with. There are some questions and activities throughout to get you thinking and to ensure you're confident in your knowledge of how to find and use operating orders in your work. When you're finished the course, you'll need to complete an exam.

Course topics

This course has been split into three sections:

- PSSP operating orders and training requirements.
- Substation entry and exit procedures and local information training.
- Multi-employer workplaces (MEWs) and NERC Critical Infrastructure Protection (CIP).

Course objectives

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

- Identify BC Hydro operating orders that are relevant to STC.
- Explain the training and authorization requirements for accessing or working on the substations portion of the BC Hydro power system.
- Identify worker STC responsibilities.

- Recognize the requirement to complete a review of the operating orders listed in Appendix 3 of 1T-12N and the STC final exam for STC authorization.
- Identify entry and exit procedures for a substation.
- Identify relevant information in the Local Information Manual.
- Identify a multi-employer workplace (MEW).
- State who to contact if you have questions about NERC CIP training

Completion requirements

At the end of the course you will complete an exam to demonstrate your understanding of the information taught in this course.

Safety first

BC Hydro has a number of programs in place to ensure your safety and the safety of others on the job. Being aware of and following the three programs mentioned here will allow you to stay safe while working in substations.

Safety Stop

The **Safety Stop** helps to create a consistent process for addressing and resolving safety concerns, questions and rule violations – one that encourages employees to speak up any time they feel unsafe.



SafeStart®

The **SafeStart®** program highlights four major safety problems:

- Rushing
- Frustration
- Fatigue
- Complacency



When we find ourselves in just one of those states, we can make critical errors, such as not keeping our eyes and mind on our task; putting ourselves in the line of fire; or not having adequate balance, traction or grip.

Life Saving Rules

The **Life Saving Rules** are a series of nine rules intended to provide guidance on a variety of situations you may encounter in your work. The Life Saving Rules include:

1. Maintain your limits of approach.
2. Ensure there's a Safety Protection Guarantee or Lockout in place and that it's appropriate for your work.
3. Test for hazardous energy.
4. Ensure that Worker Protection Grounding/Bonding is in place.
5. Protect yourself from falling when working at height.
6. Maintain a safe atmosphere in a confined space and ensure you can be rescued.

7. Prevent harmful exposure to known carcinogens, toxins and biohazards.
8. Don't work while under the influence of alcohol or drugs.
9. Adjust your driving to the weather and road conditions.

Life Saving Rules



These safety programs and others are meant to ensure worker safety. It's important to always keep all aspects of safety in mind as you perform your work.

Lesson 1: PSSP operating orders and training requirements

Purpose:

This lesson focuses on PSSP operating orders and training requirements.

Objectives:

When you're finished the lesson, you'll be able to:

- Identify BC Hydro operating orders that are relevant to STC.
- Explain the training and authorization requirements for accessing or working on the substations portion of the BC Hydro power system.
- Identify worker STC responsibilities.
- Recognize the requirement to complete a review of the operating orders listed in Appendix 3 of 1T-12N and the STC final exam for STC authorization.

Let's start this training by focusing on operating orders and the PSSP training requirements that they define.

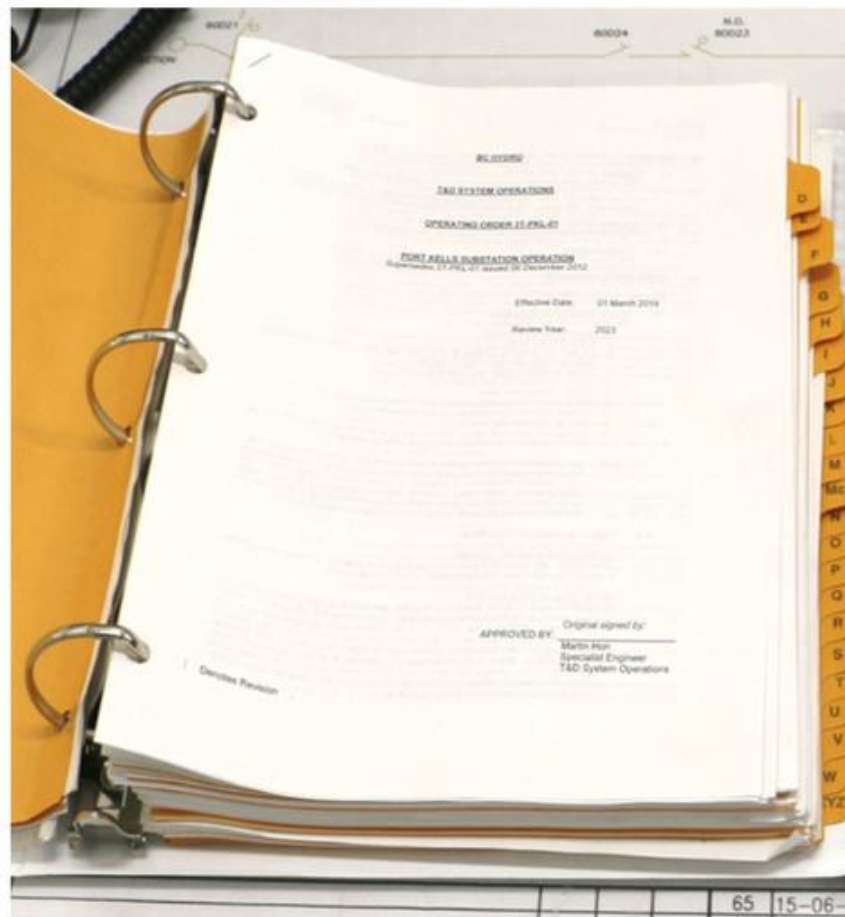
Operating orders

What exactly are operating orders?

They are instructions to BC Hydro employees and contractors that provide information and define policies and procedures for the BC Hydro power system.

Operating orders provide workers with accurate information necessary for the safe and consistent operation of the power system and for compliance with regulations.

Operating orders are used as a reference if there is a disagreement with Fraser Valley Operations (FVO).



Operating orders can be found on:

- SafeHub
- Site Information System (SIS)
- Contractor extranet

Remember, not all contractors have access to SIS. You may need to check with your manager if you have any issues accessing operating orders.

For STC training, you'll use operating orders to understand, confirm and complete training and authorization requirements.

Operating order 1T-12

Operating order **1T-12** is actually a series of operating orders that specify requirements for the consistent application of safety protection on BC Hydro's transmission and distribution power systems. We refer to 1T-12 as the **PSSP book**.

Within 1T-12, **part L** defines PSSP training requirements and **part M** defines PSSP authorization requirements. These two parts specify the rules you'll follow for STC training.



Table of Contents

Power System Safety Protection
System Operating Order 1T-12

Table of Contents

Operating Order 1T-12 is divided into the following parts:

| | |
|--------|---------------------------------|
| 1T-12A | Summary |
| 1T-12B | Power System Definition |
| 1T-12C | Equipment Identification |
| 1T-12D | Power System Locking |
| 1T-12E | Central Control |
| 1T-12F | PSSP Mimic Display |
| 1T-12G | Communications Systems |
| 1T-12H | Operating Authority |
| 1T-12I | Isolation for Safety Protection |
| 1T-12J | Operating Procedures |
| 1T-12K | Audits |
| 1T-12L | Training |
| 1T-12M | Authorization |

1T12-L

1T12-L covers PSSP rules that outline the training requirements for all employees and contractors who access or work on the power system.

Training**Power System Safety Protection
System Operating Order****1T-12L—Training****1.O General**

Personnel required to have access, switch, or to work on the power system, must be trained and authorized in PSSP and relevant sections of the SPR as specified in this operating order. Updates will be provided when changes are made to PSSP operating orders. PSSP training is in addition to other required skills, work procedures, or safety training. Exceptions to authorization are detailed in 1T-12M 4.3.

2.O Training

PSSP authorization consists of a System Component, a Functional Component and local information training. The training level will be dependent on the category of PSSP authorization required for each worker.

2.1 SYSTEM COMPONENT

The System Component training requirements are detailed in Modules 1A, 1B, 2, 3, 4, 5, and 6 of this operating order. The PSSP Web-Based Training package includes a review

1T12-M

1T12-M covers PSSP rules that outline the principles, processes and procedures used by authorizing managers to authorize employees and contractors to access or work on the power system.

Authorization

Power System Safety Protection
System Operating Order

1T-12M—Authorization

1.0 General

All employees and contractors working on, or in the vicinity of, the BC Hydro power system are required to have Power System Safety Protection System Component training and, as appropriate, Distribution Component (DBC), Stations Component (STC), Non-Integrated Area (NIA) and/or Transmission Component (TxC), plus Local Information training. In addition, they must be authorized in the PSSP Manager database by a BC Hydro Authorizing Manager.

This order details the principles, processes and procedures for Authorizing Managers.

The list of Authorizing Managers can be found on the PSSP Website.

Lists of Authorizing Managers and authorized workers can also be accessed via:

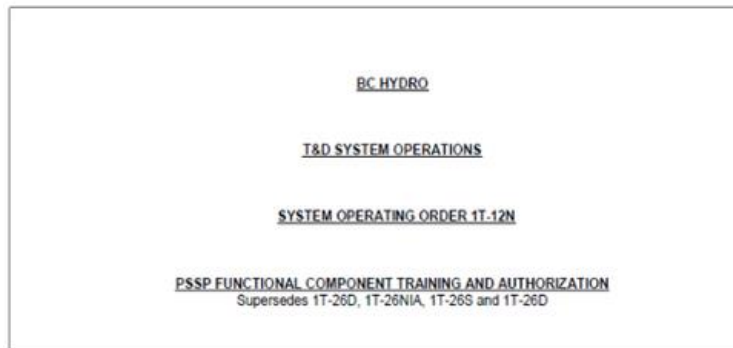
- PSSP web page (<http://w3/pssp/index.shtml>)
- PSSP Manager (http://fvobctwebsvc1/PSSP_Mgr/)

SOO 1T-12M135

1T-12M

1T-12N

1T-12N is an operating order that covers important information about PSSP functional component requirements and authorization.



Remember, functional component training is only **one** part of your PSSP training.

1T-12N provides an overview of all the types of training required for PSSP authorization, including:

- **System component training** – including PSSP CAT 2, 3 and 5 – walks you through the PSSP book and introduces you to the power system.
- **Functional component training** is this PSSP STC course. It outlines additional requirements related to BC Hydro distribution (DBC), substations (STC), transmission (TXC) and non-integrated areas (DGC). It also introduces you to the correct way to access the substation portion of the power system.

Functional training **does not** include training for outdoor substations, which requires a specific functional component, local information and authorization by the local site manager.

There are other courses for the functional component training for other functions of the power system, including distribution, transmission and non-integrated areas.

- **Local information training** shows you how and where to find the information you need to access or work in specific stations. It covers site-specific safety issues, requirements and procedures, such as:
 - Specific hazards at the site
 - Security systems
 - Communication systems
 - Key contacts
 - Fire, first aid, rescue and evacuation procedures

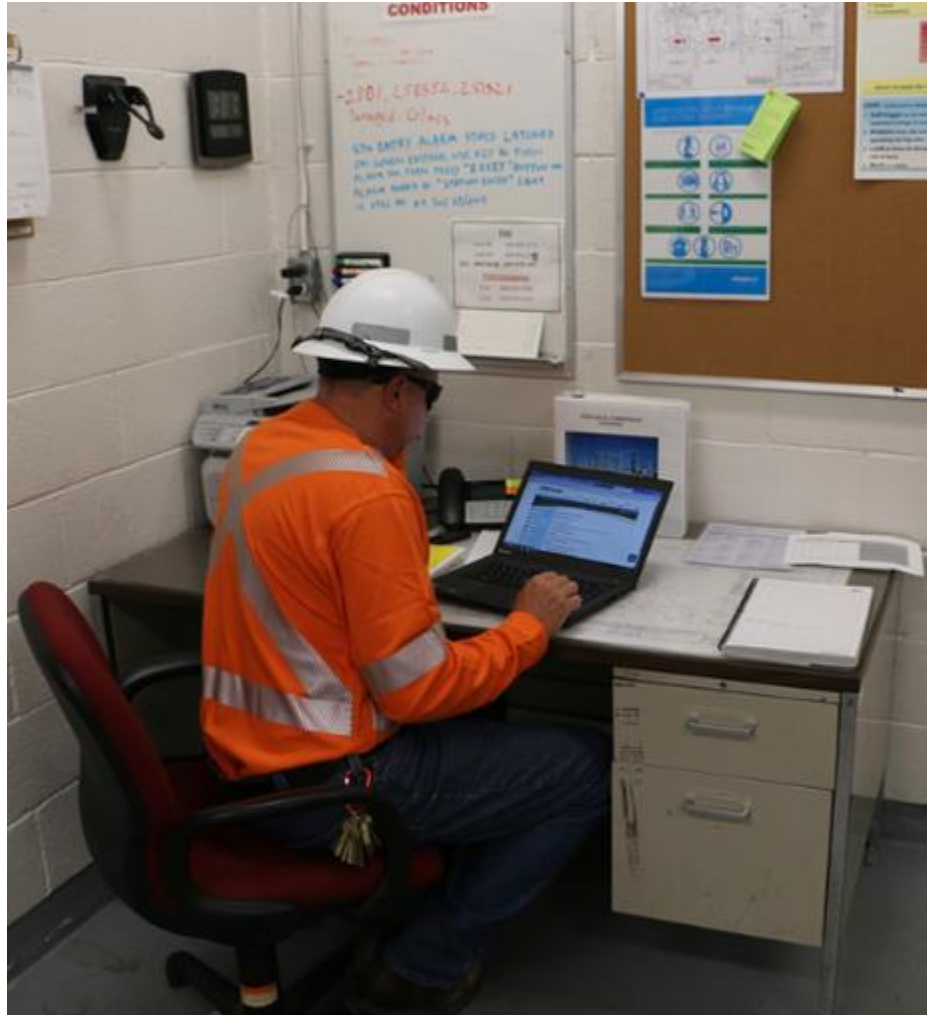
You must complete all three training requirements to get PSSP authorization to access or work on the power system.

You are required to review 1T-12N to determine and complete your STC training requirements.

How to search for an operating order

Now that you know a little more about what operating orders are, let's take a look at a scenario demonstrating how easy it is to search for operating order 1T-12N.

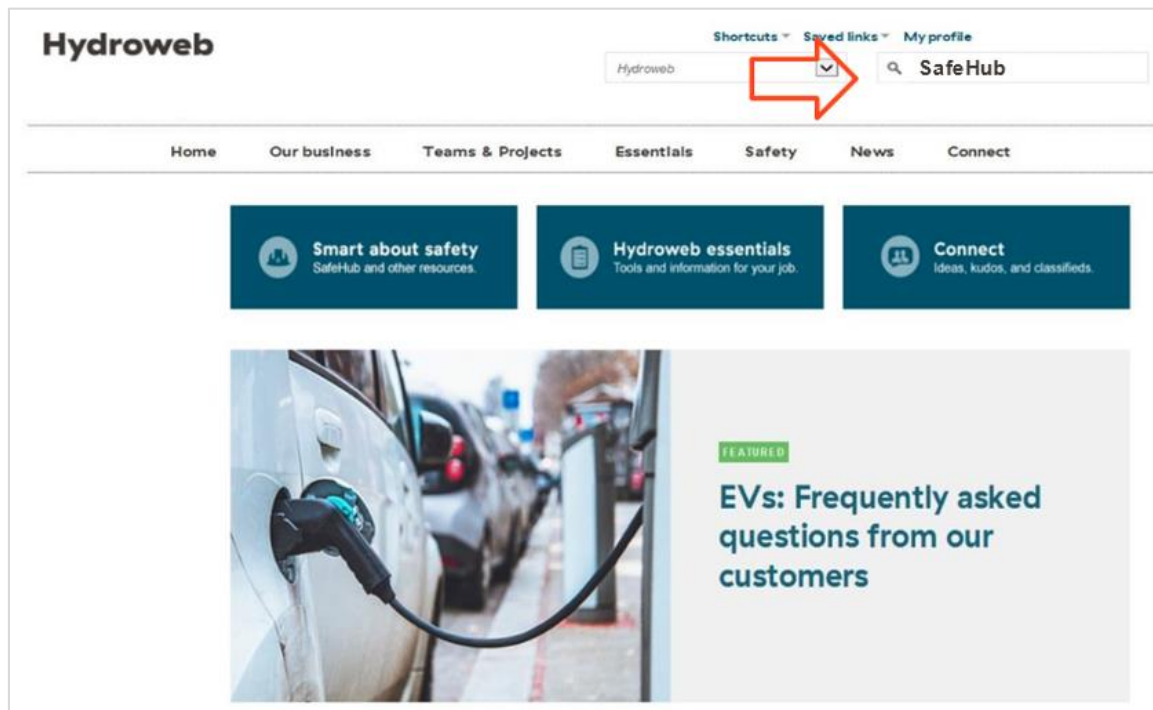
Dave is completing his PSSP STC training to meet the requirements for PSSP authorization to work in a substation. From his training, he knows he needs to review 1T-12N, but he needs to locate it first.



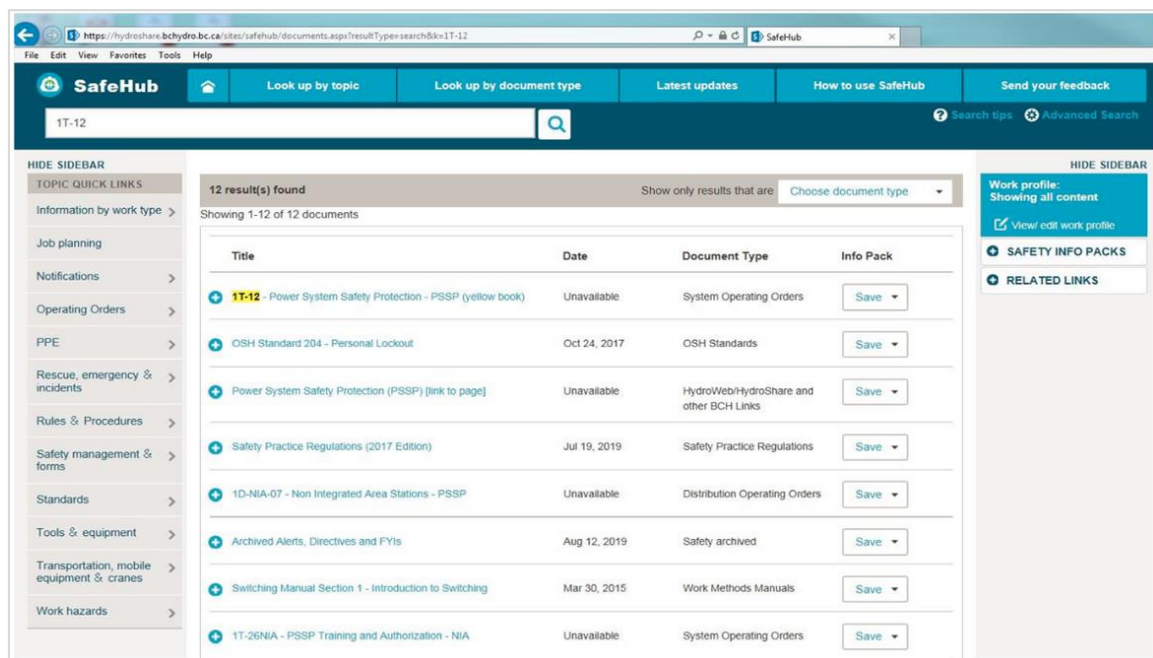
Although there are multiple sites Dave can use for his operating order search, he decides to use **SafeHub** to find 1T-12N.

Dave's first step is to go online and use BC Hydro's **home page** to do a search for **SafeHub**.

Next, Dave selects **Search** and types in "SafeHub."



From the results page, he goes to the **SafeHub** page and enters "1T-12N" in the search bar.



He selects **1T-12N PSSP Functional Component Training and Authorization** from SafeHub results.

Here's a tip – you should contact your BC Hydro contract representative if you don't have access to SafeHub, SIS or the contractor extranet.

Keep in mind that if you are a contractor, you may not have access to SIS to find an operating order, so try using SafeHub first.

In this scenario, Dave was successful in accessing **1T-12N** – but if you are having issues accessing **1T-12N** or any other operating order, contact your manager.

1T-12N PSSP responsibilities

1T-12N defines responsibilities for workers.

- First, you must follow all safety rules and safe work practices.
- You will also need to understand, follow and work only within the limits of your STC authorization.
- And of course, you have to understand and review your functional component, including this course.
- Finally, you must understand and review the local information, which you'll learn more about in lesson 2.



Manager responsibilities

Managers are responsible for ensuring their employees or contractors complete and understand the system component, the STC as the functional component and the local information training. They must also ensure that authorized workers understand the limits of their authorization.

Managers are responsible for regularly reviewing the list of authorized workers under their direction and ensuring their authorizations are current and accurate for the type of work being undertaken.

Authorizing manager responsibilities

Authorizing managers are responsible for the authorization of workers.

You can access the list of BC Hydro authorizing managers on the **BC Hydro intranet** via the **PSSP website**.

BC Hydro contract manager responsibilities

BC Hydro contract managers are responsible for training all workers under their direction and finding authorizing managers available to complete authorizations of large projects.

1T-12N and your responsibilities

Your STC responsibilities include understanding and completing the requirements in **Appendices 1 and 3 of 1T-12N**.

Appendix 1 – Training Component Form

Appendix 1 is called the **Training Component Form** and acts as a checklist for your STC training.

SOG 1T-12N
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APPENDIX 1 – TRAINING COMPONENT FORM

Name: _____ Employer: _____
 Date (yy/mm/dd): _____ Phone #: _____
 CDF: _____ Address: _____
 Occupation: _____
 System Component PSSP Training: 1A _____ 1B _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ Expiry Date: _____
 Limits of Approach Authorization Columns: 1 _____ 2 _____ 3 _____ 4 _____ Expiry Date: _____
 Authorized to Switch: Yes _____ No _____

| Review the following items with the worker: | |
|---|--|
| 1 | How to use the Local Information <ul style="list-style-type: none"> Location of binder, if applicable General purpose of binder, if applicable Requirement to consistently review, if applicable |
| 2 | Local Component summary (review sample) <ul style="list-style-type: none"> Location, address, GPS coordinates Communication options Emergency & non-emergency numbers Special instructions (lock gates, sign station log) Hazards and Precautions (section may also be repeated in Special Precautions section) |
| 3 | One-line Diagrams (review sample, detail dependent on type of worker) |
| 4 | Operating Orders (review sample, detail dependent on type of worker) |
| 5 | Communications (reference Operating Orders) |
| 6 | Special Precautions <ul style="list-style-type: none"> Highlight importance of Special Precautions page for all stations for all workers |
| 7 | Emergency Response <ul style="list-style-type: none"> Spill contingency plan (review sample) Emergency equipment (review how equipment is shown on spill contingency plan drawing) Substation fires (reference procedure, review dependent on type of worker) |
| 8 | Protection Information (review dependent on type of worker) |
| 9 | Local Information Binder Signature Sheet, if applicable (highlight requirement to sign) |
| 10 | Personal lockout – Some station areas use lockout procedures, i.e. cranes, workshops, etc. |
| 11 | Multi-Employer Workplace |
| 12 | Review OOI's listed in Appendix 2 associated with the Functional Component authorization |

The items above were explained to me (Trainee Signature): _____
 Functional Component PSSP Trainer: _____
 Worker Authorized to Category: 2 _____ 3 _____ 4 _____ 5 _____ 6 _____
 Functional Component Authorization: Stations _____ Transmission _____ Distribution _____ Diesel Gen _____
 Indoor or DC Station Specific Authorization: CSQ _____ DGR _____ GDK _____ MPT _____ MUR _____
 Local Restrictions: _____

Don't forget – because you are taking this training in person, you'll need to fill out the form and submit it to your manager.

If you are taking this training online, Appendix 1 will be automatically completed, and you will be entered into the PSSP database once you have passed the STC quiz.

Appendix 3 – List of system operating orders required by component

Completing Appendix 3 is part of your STC training.

It lists the operating orders that you are responsible for reviewing and understanding, based on your system component training.

In 1T-12N, you'll be able to find your relevant operating orders by selecting the links in Appendix 3.

If you have any issues with locating operating orders from Appendix 3, contact your manager.

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APPENDIX 3 – LIST OF SYSTEM OPERATING ORDERS REQUIRED BY COMPONENT

| SOD | Title | Component ¹ | BCH | Contractor | Cat2 | Cat3 | Cat5 |
|------------------------|--|------------------------|-----|-------------------|------|------|------|
| 1T-02 | T&D Job Life Cycle Safety System – Overview | S, T, D | X | X | | | X |
| 1T-02A | T&D Job Life Cycle Safety System – Outage Request Submittal Stage | S, T, D | X | X | | | X |
| 1T-02B | T&D Job Life Cycle Safety System – Control Room Job Implementation Stage | S, T, D | X | X | | | X |
| 1T-02C | T&D Job Life Cycle Safety System – Return of Equipment to Service Stage | S, T, D | X | X | | | X |
| 1T-03 | Backfeed From Voltage Transformers (CVT and PT) | S | | | | | X |
| 1T-04 | Work on a De-Energized Transmission Line That is Parallel to Energized Line | S, T | | | | | X |
| 1T-06 | Switching Procedures, Designated Isolation Point and Equipment Not Ready for Service (COM-001-1) | S, D | X | X (if applicable) | | | X |
| 1T-09 | Isolation Points and Line Cuts | S, T, D, N/A | X | X | | | X |
| 1T-10 | Safety Requirements in BC Hydro Transmission and Station Projects | S, T | | | | | X |
| 1T-11A | Operating Responsibility and Operating Authority Assignment to Deisks | S, T, D | X | X | X | X | X |
| 1T-13 | Roles and Responsibilities of PICs and Field Workers | S, T, D | X | X | | | X |
| 1T-16 | Personnel Working Alone | S | | | | X | X |
| 1T-17 | Entry and Exit Reporting Requirements for Attended and Non Attended Power System Substations and Generating Stations | S, D | X | | X | X | X |
| 1T-18 | Live Line Permits, Assurance of No Reclose Permits and Caution Tags | S, T, D, N/A | X | X | | | X |
| 1T-19 | Station Service Isolation | S | | | | X | X |
| 1T-22 | Outage Scheduling | S, T | | | | X | X |
| 1T-26B | Distribution Substation Main Feeder Bus Reclosing Policy (35 kV and Below) | S, D, N/A | X | | | X | X |
| 1T-35 | Commissioning Procedure for Station, Transmission and Generating Projects | S, T | | | | X | X |
| 1T-36 | Commissioning Procedure for Station, Transmission and Generation Communications, Protection and Control Equipment | S | | | | X | X |
| 1T-50 | Public Safety and Incident Response | S, T | | | | | X |
| 2T-04 | Substation Reclosers with Electronic Controls | D, N/A | X | | | | |
| 2T-05 | Transmission Line and Substation Disconnect Switching Criteria | S | | | | | X |
| 2T-07 | Distribution Feeder Switching Using Disconnect Switches | S, D, N/A | X | | | | X |
| 2T-09 | Emergency Response Procedures | S, D, N/A | X | | | X | X |
| 2T-10 | Substation Fires – Reporting and Response Procedures | S | | | | X | X |

If you are taking this training with a PSSP trainer, you are responsible for filling in this form and submitting it to your manager.

If you are taking this training online, Appendix 3 will be automatically completed, and you will be entered into the PSSP database once you have passed the STC quiz.

Now that you've seen Dave find 1T-12N and learned about 1T-12N Appendix training requirements, the next step is to determine Dave's STC requirements.



Within **1T-12N**, Dave locates **Appendix 3**.



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APPENDIX C – LIST OF SYSTEM OPERATING ORDERS REQUIRED BY COMPONENT

| S/O# | Title | System | TC | Contractor | Call | C&S | Call |
|---------|---|---------|----|------------|-----------------|-----|------|
| 11.002 | T&D Job Life Cycle Safety System – Overview | S, T, D | X | | | | |
| 11.003 | T&D Job Life Cycle Safety System – Outage Request System – Stages | S, T, D | X | | | | |
| 11.004 | T&D Job Life Cycle Safety System – Control Room Life Cycle System – Stages | S, T, D | X | | | | |
| 11.006 | T&D Job Life Cycle Safety System – Return of Equipment to Service Stage | S, T, D | X | | | | |
| 11.007 | Backfeed from Voltage Transformers (T, CT and PT) | S | X | | | | |
| 11.014 | Work on a De-Energized Transmission Line That is Parallel to Energized Line | S, D | X | | | | |
| 11.016 | Switching Procedures, Neglected Isolation Point and Equipment Not Ready for Service (SCM-01.1.3) | S, D | X | | X if applicable | | |
| 11.017 | Isolation Points and Line Cuts Safety Requirements in T&D | S, T, D | NA | X | | | |
| 11.019 | Transmission and Station Projects | S, T, D | X | | | | |
| 11.031A | Operating Responsibility and Operating Authority Assignment to O&S | S, T, D | X | | | | |
| 11.113 | Roles and Responsibilities of PICs and Field Workers | S, T, D | X | | | | |
| 11.114 | Personal Injuries | S | X | | | | |
| 11.117 | Entry and Call Information | S, D | X | | | | |
| 11.120 | Procedures for Alarmed and Non Alarmed Down System Substations and Generating Stations | S, T, D | NA | X | | | |
| 11.118 | Line Loss Protocol, Awareness of No Reserve Permit and Caution Tags | S, T, D | NA | X | | | |
| 11.119 | Station Service Isolation | S | X | | | | |
| 11.126 | Outage Scheduling | S, T, D | NA | X | | | |
| 11.128 | Distribution Substation Main Feeder Bus Reenergizing Policy (25 kV and Below) | S, T, D | NA | X | | | |
| 11.131 | Commissioning Procedure for Station, Transmission and Generating Projects | S, T | X | | X | | |
| 11.136 | Commissioning Procedure for Communication, Protection, Generation Communications, Control and Control Equipment | S, T | X | | | | |
| 11.150 | Personal Safety and Incident Response | S | X | | | | |
| 21.264 | Substation Reducers with Electric Control | D | NA | X | | | |
| 21.265 | Transmission Line and Substation Transformers | S | X | | | | |
| 21.267 | Distribution Feeder Switching Using Transformers | S, D | NA | X | | | |
| 41.420 | Emergency Response Procedures | S, D | NA | X | | | |
| 51.442 | Substation Monitoring and Response Procedures | S | X | | | | |

As Dave is a **Cat 3 worker**, **Appendix 3** will show him which operating orders are relevant to his system component training.

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APPENDIX 3 – LIST OF SYSTEM OPERATING ORDERS REQUIRED BY COMPONENT

| SOO | Title | Component ¹ | BCH | Contractor | Cat2 | Cat3 | Cat5 |
|------------------------|--|------------------------|-----|-------------------|------|------|------|
| 1T-02 | T&D Job Life Cycle Safety System - Overview | S, T, D | X | X | | | X |
| 1T-02A | T&D Job Life Cycle Safety System – Outage Request Submittal Stage | S, T, D | X | X | | | X |
| 1T-02D | T&D Job Life Cycle Safety System – Control Room Job Implementation Stage | S, T, D | X | X | | | X |
| 1T-02E | T&D Job Life Cycle Safety System – Return of Equipment to Service Stage | S, T, D | X | X | | | X |
| 1T-03 | Backfeed From Voltage Transformers (CVT and PT) | S | | | | | X |
| 1T-04 | Work on a De-Energized Transmission Line That is Parallel to Energized Line | S, T | | | | | X |
| 1T-06 | Switching Procedures, Designated Isolation Point and Equipment Not Ready for Service (COM-001-1) | S, D | X | X (if applicable) | | | X |
| 1T-09 | Isolation Points and Line Cuts | S, T, D, N/A | X | X | | | X |
| 1T-10 | Safety Requirements in BC Hydro Transmission and Station Projects | S, T | | | | | X |
| 1T-11A | Operating Responsibility and Operating Authority Assignment to Desks | S, T, D | X | X | X | X | X |
| 1T-13 | Roles and Responsibilities of PICs and Field Workers | S, T, D | X | X | | | X |
| 1T-16 | Personnel Working Alone | S | | | | X | X |
| 1T-17 | Entry and Exit Reporting Requirements for Attended and Non Attended Power System Substations and Generating Stations | S, D | X | | X | X | X |
| 1T-18 | Live Line Permits, Assurance of No Reclose Permits and Caution Tags | S, T, D, N/A | X | X | | | X |

Dave is a Cat 3 worker.

Dave finds **Cat 3** on the **Appendix** and follows the column down.

He knows that he must open, review and understand all operating orders that are marked with an **X** for **Cat 3**.

He decides to start with **1T-17** so he can review and understand entry and exit procedures for substations.

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APPENDIX 3 – LIST OF SYSTEM OPERATING ORDERS REQUIRED BY COMPONENT

| SOO | Title | Component ¹ | BCH | Contractor | Cat2 | Cat3 | Cat5 |
|------------------------|--|------------------------|-----|-------------------|------|------|------|
| 1T-02 | T&D Job Life Cycle Safety System - Overview | S, T, D | X | X | | | X |
| 1T-02A | T&D Job Life Cycle Safety System – Outage Request Submittal Stage | S, T, D | X | X | | | X |
| 1T-02D | T&D Job Life Cycle Safety System – Control Room Job Implementation Stage | S, T, D | X | X | | | X |
| 1T-02E | T&D Job Life Cycle Safety System – Return of Equipment to Service Stage | S, T, D | X | X | | | X |
| 1T-03 | Backfeed From Voltage Transformers (CVT and PT) | S | | | | | X |
| 1T-04 | Work on a De-Energized Transmission Line That is Parallel to Energized Line | S, T | | | | | X |
| 1T-06 | Switching Procedures, Designated Isolation Point and Equipment Not Ready for Service (COM-001-1) | S, D | X | X (if applicable) | | | X |
| 1T-09 | Isolation Points and Line Cuts | S, T, D, N/A | X | X | | | X |
| 1T-10 | Safety Requirements in BC Hydro Transmission and Station Projects | S, T | | | | | X |
| 1T-11A | Operating Responsibility and Operating Authority Assignment to Desks | S, T, D | X | X | X | X | X |
| 1T-13 | Roles and Responsibilities of PICs and Field Workers | S, T, D | X | X | | | X |
| 1T-16 | Personnel Working Alone | S | | | | X | X |
| 1T-17 | Entry and Exit Reporting Requirements for Attended and Non Attended Power System Substations and Generating Stations | S, D | X | | X | X | X |
| 1T-18 | Live Line Permits, Assurance of No Reclose Permits and Caution Tags | S, T, D, N/A | X | X | | | X |

Dave selects the **1T-17** link and the PDF pops up on the screen for him to begin his review.

Dave can now read 1T-17 and ensure his understanding.

| | |
|---|---|
| <u>BC HYDRO</u> | Now that Dave has located 1T-17, he can review and ensure his understanding of the operating order. |
| <u>REAL TIME OPERATIONS</u> | |
| <u>OPERATING ORDER 1T – 17</u> | |
| <u>ENTRY AND EXIT REPORTING REQUIREMENTS FOR ATTENDED AND NON ATTENDED POWER SYSTEM SUBSTATIONS AND GENERATING STATIONS</u> Supersedes OO 1T-17 issued 13 September 2016 | |
| Effective Date: | 24 October 2017 |
| Review Year: | 2021 |

He has successfully found one of the operating orders that he is responsible for reviewing for STC authorization as a Cat 3 worker.

This scenario shows **only one** of multiple operating orders on the first page of the appendix, but you must **ensure you check the entire appendix** for the operating orders that are relevant to your system component training.

For **contractors**, if you don't have access to operating orders, please ask your manager.

Knowledge check

Now that you've finished the first section, take a few minutes to answer some questions and confirm what you know. Once you have answered the questions, compare your responses with those in the answer key located at the end of this guide.

Functional component training covers the appropriate safety and operating procedures for the specific function of the power system.

- ☐ True
- ☐ False

Where can you locate operating orders? (Select all that apply.)

- ☐ Site Information System (SIS)
- ☐ Contractor extranet
- ☐ SafeHub

Lesson 2: Substation entry and exit procedures and local information training

Purpose:

In this lesson you'll learn about substation entry and exit procedures, the Local Information Manual and your responsibilities for local information training.

Objectives:

When you're finished the lesson, you'll be able to:

- Identify entry and exit procedures for a substation.
- Identify relevant information in the Local Information Manual.

Considerations before going to the substation

You've got your work assignment and you're ready to go to the substation and start the job.

But what do you have to think about *before* you go?



Before you start

- First, you need to decide what **personal protective equipment (PPE)** you'll need. You will have to wear flame-resistant clothing, a hardhat, steel-toe boots and eye protection. And there may be additional PPE required for other, more specific tasks.
- You need to understand your **limits of approach (LOA)**, hazards and **precautions**.
- You should also consider whether the work you've been assigned requires you to have **additional training**, such as confined space training.
- Check with the facility manager or the BC Hydro representative to see if you will need to obtain **additional security authorization** to enter a restricted area.
- Check for **parking restrictions or limitations** at the substation.



How to enter a substation

You've reviewed your list of requirements and now you are ready to go the substation and get started on your work.

There are a lot of things to consider that will make your entry into the substation an easy and safe experience.

Let's follow a scenario demonstrating the proper substation entry procedure with Dave.

Upon successfully completing Appendix 3 requirements and the STC quiz, Dave has been given PSSP functional component authorization by his manager. With the knowledge about entering an unattended substation from his STC training and authorization, he is ready to go.

Dave has arrived at an unattended substation. He needs to follow **substation entry and exit procedures**, as well as **local information requirements**.



As we review the steps Dave takes to enter the substation, watch for helpful hints to help you remember the substation entry procedures.

Entry procedure

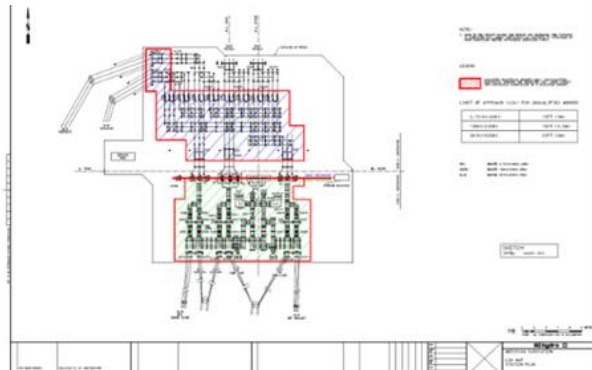


Dave is at the unattended substation and ready to follow the **entry procedure**.

Do a visual inspection

Before Dave goes into the substation, he completes a visual inspection, including checking for **limits of approach (LOA)**.

If Dave is unsure if there are any LOA issues within the substation before he goes onsite, he can access substation LOA mapping in SIS to see where he can and cannot go within the substation.



When doing a visual inspection, check for anything that looks like a security problem, such as a risk of a possible break-in.

Unlock and enter the gate

When entering, make sure you have the appropriate means to get into the substation (swipe card, appropriate key or access to a key box).

If you don't have your key with you (or the PIN code for the tethered key in the lock box), you won't be able to access the substation.

Dave enters the gate with his key.



Ensure the gate is closed and locked

If it's not an automatic gate, lock the gate behind you. If it's an automatic gate, wait for it to close and lock.

Dave locks the gate behind him, as the gate is not automatic.



Walk to and unlock the control room

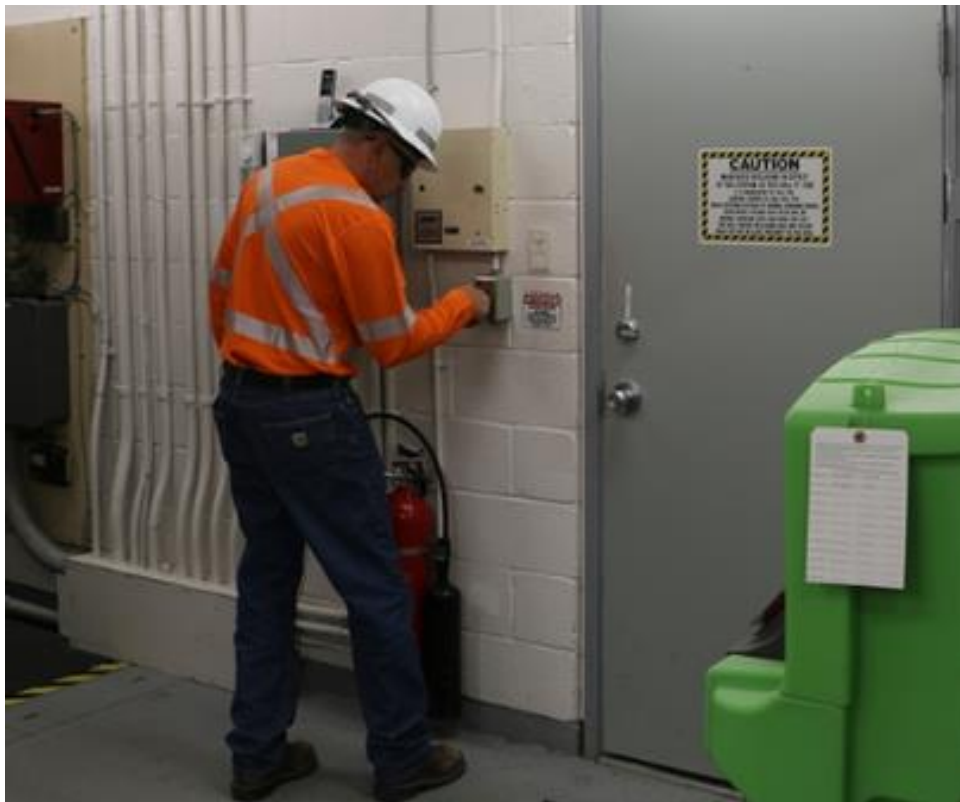
Dave walks to the control room, where he knows he'll find the log book – typically a black book kept on the control room operating desk.

In NERC CIP substations, the log book and Local Information Manual will be located in the control room or in a covered area outside the door to the control room.



Disarm the alarm

Dave disarms the alarm, as he is at a station where the security system can be disarmed.



Review operating order 1T-17 – **Entry and Exit Reporting Requirement for Attended and Unattended Power System Substations and Generating Stations** – to ensure the station is correctly secured.

Locate and sign into the log book

Once Dave locates the log book, he opens it to sign his name and enters the purpose of his visit to the substation. This confirms that he has entered the substation.



- It's important to sign the log book as soon as you enter the substation.
- Be sure to complete all required fields.
- If you are **not** signed in, other workers may think they are the last ones onsite and arm the alarm that turns off the lights when they leave – leaving you in the dark.
- Also, in the event of an emergency, a record of who is working in the substation will help ensure everyone gets out safely.
- Every time you enter and exit the substation, you must sign in and out of the log book.

Local information training

When you are in an unfamiliar substation, like Dave is, you must complete local information training. Because this is an unfamiliar substation, Dave has to review and sign the Local Information Manual. Dave knows he must find the Local Information Manual, review the station local information and sign it to acknowledge that he has read and understood its contents.



Local information training includes:

1. Locating the manual
2. Reviewing it
3. Signing the signature page

Local Information Manual

The Local Information Manual is typically found on the substation's control room desk. It is central to the local information training that you need to complete as a BC Hydro employee or contractor.

The Local Information Manual is your central resource for information specific to the substation you are working at.

The Local Information Manual houses safety information and operating procedures that are specific to that particular substation.

Being familiar with the manual will help ensure your safety during your work there.

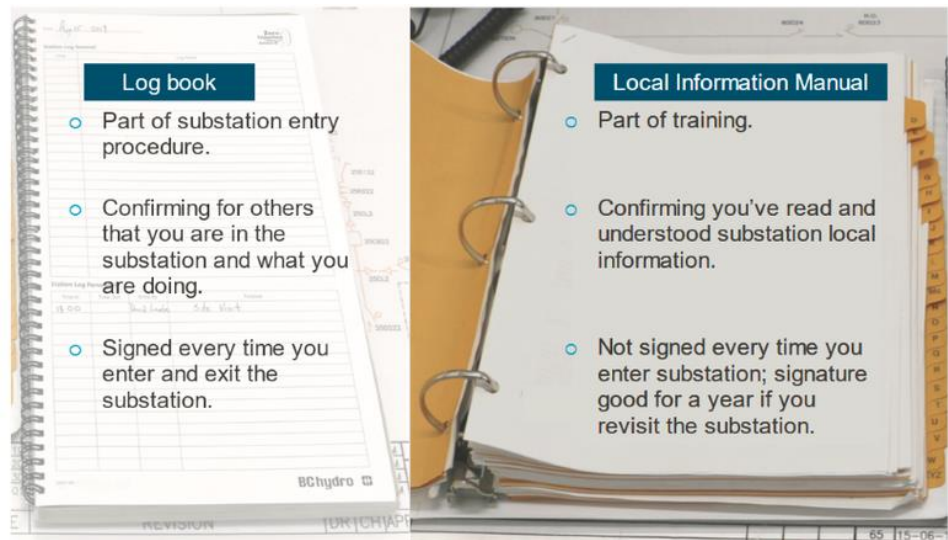
Your signature will be good for a year if you revisit that substation; after that, you'll need to re-review the manual and sign again.

- The Local Information Manual contains safety information and operating procedures specific to the substation.
- It is typically located, in non-NERC CIP substations, on the control room desk.



Note: The **log book** where you sign into the substation and the signature sheet of the **Local Information Manual** are *not* the same thing. The **log book** is part of the substation entry procedure, while the **Local Information Manual** is part of local information training when entering an unfamiliar substation. When you sign into the **log book**, it lets others in the substation know that you are there and what you are doing. When you sign the **Local Information Manual**, you are confirming that you've read and understood the sections in the binder that are relevant to your work.

How signing the Local Information Manual differs from signing the log book

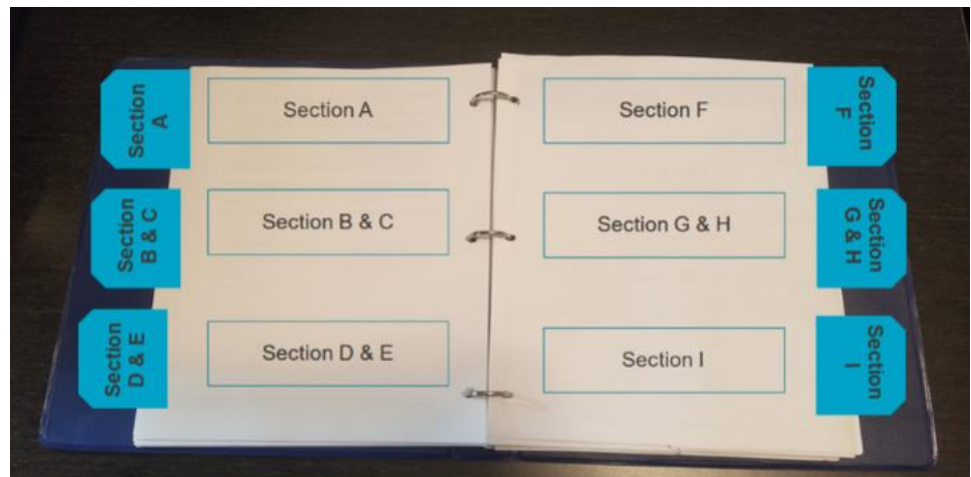


It's **mandatory** to review the Local Information Manual and sign it to acknowledge that you have read and understood its contents **prior** to beginning your work in that substation.

This ensures safety and prevents incidents.

Local Information Manual sections

As we go through the manual, you'll notice that not all sections will apply to the job you are doing. Make sure you are familiar with sections that are relevant for you. These are the sections you'll see in the Local Information Manual.



Section A – Local Information Summary

Section A provides a summary of critical information about the substation. This section should always be thoroughly reviewed.

- Substation name and location information
- Emergency numbers
- Special instructions for the station
- Hazards and precautions

| PSSP LOCAL INFORMATION SUMMARY | |
|---|--|
| HSY - HORSEY SUBSTATION | |
| Location: 760 Topaz Road, Victoria Proceed south on Blanshard Avenue. Turn right onto Topaz Road. | |
| GPS Co-ordinates: N 48:26:32, W 123:22:00, 19.34m. | |
| Telephone: (PAX) 24684 (Telus) 250-385-0813 | |
| Radio: No base station radio at HSY <i>Dial 9 to get an outside line from a pax phone</i> | |
| EMERGENCY | NON-EMERGENCY |
| Call FVO at: (PAX) 41939 (Telus) 1-604-455-1939 | PIC at: (PAX) 41731 (Telus) 1-877-313-1731 Refer to 1T-11A for details on FVO desk phone numbers and station responsibilities |
| or Radio call to: 87'200 | or Radio call to: 51'200 |
| or call Direct to: (PAX or Telus) 911 | HQ Field Operations: 1-250-727-5233 PAX: 25233 Security: 1-877-311-8611 Quantum Murray Environmental Ph: 250-381-9400 Cell: 250-480-6805 Hazco Environmental Services Ph: 250-743-4200 Cell: 250-688-0433 |
| Special Instructions <ul style="list-style-type: none"> • Mechanism shafts on SF₆ equipment pad may operate without warning. • Gate is to be locked at all times. • Sign IN/OUT Logbook (WorksafeBC requirement). • Inform PIC when entering and leaving station if required by SOO 1T-17. • The 12kV outdoor feeder section of the yard has some low energized conductors. Extra care must be taken when working in this area to maintain limits of approach. Personnel are advised not to use this area as a walkway in order to access other parts of the yard. | |

Section B – Operating One-line Diagrams

Section B is typically used for electrical work.

- Detailed diagrams of the power system
- Sections of substation, types of equipment and manufacturer and equipment ratings



Section C – Station Operating Orders

All operating orders that relate to the substation.

- Operating orders on substation operations:
 - Operating information
 - Switching
 - Voltage control
 - Protection, control and metering
 - Security system
- Sections of substation, types of equipment and manufacturer and equipment ratings

Section D – Communications

Radio systems used for communication in a substation with poor cell reception.



Section E – Special Precautions

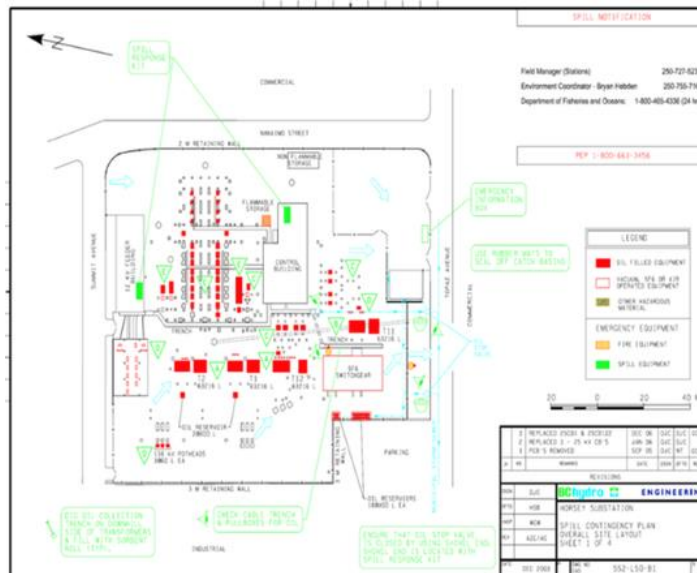
Special precautions for the substation.



Section F – Local Information Summary

Emergency responses for the substation.

- Spill Contingency Plans
- Responding to Substation Fires
- Emergency Assistance
- Event Reporting Operating Plan (6J-10)



Section G – Substation Protection Information

List of protection devices and relay types.

- Circuit/equipment functions, settings and trips

| Device or Equipment | Device Function | Phase | Type of Relay | Relay Type | Settings | Trips |
|--|--|-------|-----------------|--|--|--|
| 500kV-PT-101 500kV-PT-102 500kV-PT-103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 | A,B,C | REL-101,102,103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 |
| 500kV-PT-101 500kV-PT-102 500kV-PT-103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 | A,B,C | REL-101,102,103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 |
| 500kV-PT-101 500kV-PT-102 500kV-PT-103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 | A,B,C | REL-101,102,103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 | 500kV-PT-101 500kV-PT-102 500kV-PT-103 |

BC Hydro

BORSEY SUBSTATION - INV

Protection Information

Date: 10 October 2018

Rev: 1 of 1

Section H – PSSP References and Common Operating Orders

Used to confirm that work procedures are consistent with BC Hydro instructions for electric system operation.

- All operating orders that relate to the substation

| APPENDIX 3 – LIST OF SYSTEM OPERATING ORDERS REQUIRED BY COMPONENT | | | | | | | | |
|---|---|------------------------------|------------|-------------------|-------------|-------------|--------------|---|
| IDO | Title | Component¹ | BCH | Contractor | Catd | Call | Calls | |
| 11-50 | TAD Job Site Safety System - Overview | S, T, G | X | X | | | | |
| 11-50A | TAD Job Site Safety System - Outside Training Substation Stage | S, T, D | X | X | | | | |
| 11-50B | TAD Job Site Safety System - Control Room Job Implementation Stage | S, T, D | X | X | | | | |
| 11-50C | TAD Job Site Safety System - Return of Equipment to Service Stage | S, T, G | X | X | | | | |
| 11-50D | Backfeed From Voltage Transformer (CVT) and PTs | S | | | | | X | |
| 11-50E | Work on a De-Energized Transmission Line That is Parallel to Energization Line | S, T | | | | | X | |
| 11-50F | Switching Procedures, Designated Isolation Point and Equipment List Based On Services (DOCS) To Isolate Lines and Live Work | S, D | X | X if applicable) | | | X | |
| 11-50G | Safety Requirements in BC Hydro Expansion and Station Projects | S, T | | | | | X | |
| 11-50H | Operating Responsibility and Ownership Authority Assignment to Desks | S, T, D | X | X | | | X | |
| 11-50I | Roles and Responsibilities of PICs and Field Workers | S, T, D | X | X | | | X | |
| 11-50J | Personnel Working Alone | S | | | | | X | X |
| 11-50K | City and Grid Reporting Requirements for Advanced and Non Advanced Power System Substations and Descending Stations | S, D | X | X | | | X | X |
| 11-50L | Live Line Permits, Awareness of No Standby Time and Qualify Traps, Station Service Isolation | S, T, D, N/A | X | X | | | | |
| 11-50M | Outage Scheduling | S | | | | | X | X |
| 11-50N | PSAT Functional Commissioning Training and Authorization | S, T, D, N/A | X | X | | | X | X |
| 11-50O | Intermittent Isolation Area Feeder Bus Reducing Policy (ISV Kit and Below) | S, D, N/A | X | X | | | X | X |
| 11-50P | Commissioning Procedure for Station, Transmission and Generating Assets | S | | | | | X | X |
| 11-50Q | Commissioning Procedure for Station, Transmission and Generation Communications, Protection and Control Equipment | S | | | | | X | X |
| 11-50R | Public Safety and Incident Response | S, T | | | | | X | X |

Section I – Signature Sheet

Mandatory to sign when entering unfamiliar substations.

- Your signature acknowledges that you have read and understood the Local Information Manual
- Sometimes found at the beginning of the Local Information Manual, to make it easier to find

[illegible]

Once Dave has located and reviewed the Local Information Manual, he signs the signature sheet to complete his local information training.



Dave's work is complete and now he is ready to leave the substation. But first, there are some tasks he needs to do to secure the substation.

- ✓ **Make sure everything is left in safe condition in any area worked in.** Dave needs to make sure he leaves the work area in a safe condition. For example, if he has left a hazard, he'll need to make sure there is a barrier set up.
- ✓ **Sign out of the log book.** It's also important that Dave signs out of the log book so other workers don't assume he is still there.
- ✓ **If last to leave, arm the alarm and ensure the gate is closed and locked.**
- ✓ **Make sure the control room door is locked.**
- ✓ **Using a lock box?** If so,
 - Secure the tethered key in the lock box.
 - Scramble the PIN code so the lock box is secure.
 - Raise the weather guard over the pin code numbers.

Knowledge check

It's time to find out what you know about safely planning your substation work, entering and exiting the substation and using the log book and Local Information Manual.

Once you have answered the questions, compare your responses with those in the answer key located at the end of this guide.

1. In this activity, each statement on the left belongs in one of these three categories:

A. Before going to the substation

B. When entering the substation

C. When exiting the substation

Indicate which category each statement belongs in by placing "A," "B" or "C" in the left-hand column. You'll need to consider when you would perform the task.

| | |
|--|---|
| | Leave work area in safe condition |
| | Check that the control room door is locked |
| | Check on requirements for additional training |
| | Arm the alarm if you are the last person to leave the station |
| | Conduct visual inspection |
| | Consider PPE |
| | Use physical key or access card |
| | Sign into log book |
| | Check for security authorizations needed |

2. The log book and the signature sheet of the Local Information Manual are the same.

- ☐ True
- ☐ False

Lesson 3: Multi-employer workplaces and NERC CIP

Purpose:

In this lesson you'll learn about multi-employer workplaces (MEWs) and NERC CIP.

Objectives:

When you're finished the lesson, you'll be able to:

- Identify a multi-employer workplace (MEW).
- State who to contact if you have questions about NERC CIP training.

MEWs and NERC CIP

We're almost there. Now it's time for lesson 3, where you'll learn about multi-employer workplaces and NERC CIP.

Now that you've learned standard substation entry and exit procedures, there are more questions that you need to ask before you start your work at a substation:

- Is it a **multi-employer workplace**, abbreviated as **M-E-W**?
- What if the substation is **NERC CIP** – do you have the training and authorization to enter?



BC Hydro's electrical system is part of a connected power grid. To ensure the reliability of the grid, all North American utilities are required to follow **NERC CIP** standards (the **North American Electric Reliability Corporation**).

Some NERC CIP standards require substations to have specific training to access them.

MEWs in substations

As Dave is about to enter a substation, he sees there is a sign on the gate. He remembers from his training that this means it's a multi-employer workplace, but he can't remember what that means.



At BC Hydro, safety is at the core of **everything** we do. We're all responsible for ensuring the safety of employees, contractors and the public.

Setting **clear expectations** and taking the guesswork out of roles and responsibilities plays a big part in ensuring safety.

Identifying MEWs

How does Dave identify a MEW?

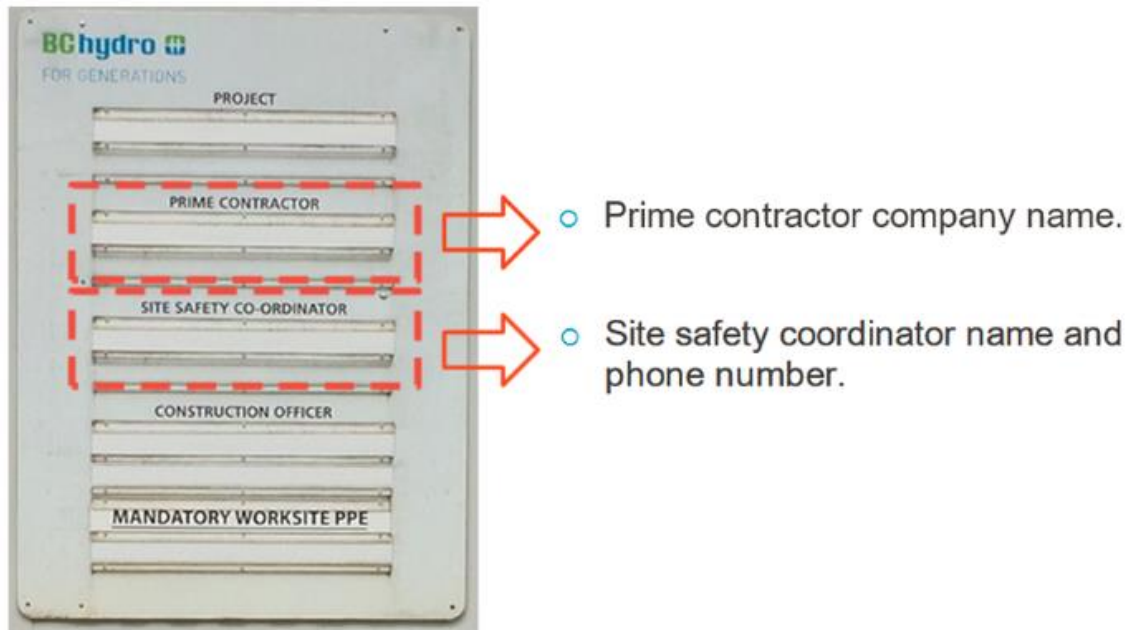
You may remember learning about MEWs in other training.

When multiple companies with crews are working in close proximity to one another, it's called a **multi-employer workplace (MEW)**.

Sometimes it's easy to see that a workplace is a multi-employer workplace; other times, it may not be so easy. So how can you tell?

When you enter the substation, you'll see a sign on the entry gate identifying the substation as a multi-employer workplace. The sign will provide important information:

- Prime contractor company name
- Site safety coordinator name and phone number



Before entering the substation, you need to make contact and check with the site safety coordinator.



You will also see information on construction officers and PPE.

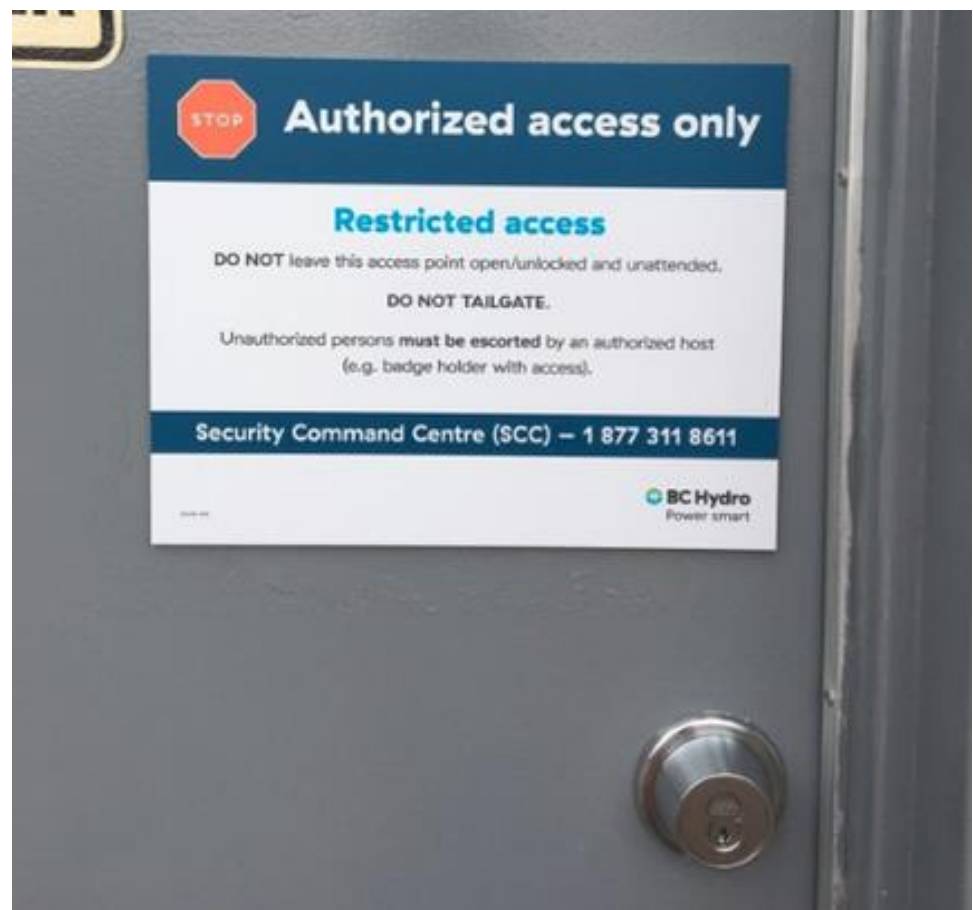
NERC CIP substations

Cyber and physical related threats and attacks are becoming more numerous, sophisticated, damaging and disruptive.

Security of the Bulk Electric System (**BES**) is essential to reliably providing customers' electricity.

To maintain **BES** reliability, the North American Electric Reliability Corporation (**NERC**) develops Critical Infrastructure Protection (**CIP**) standards which are a subset of the Mandatory Reliability Standards (**MRS**).

NERC CIP addresses **BES** cyber and physical protections with which BC Hydro must comply.



To learn more about the training that's required to enter a NERC CIP substation, speak to your BC Hydro manager or BC Hydro contract representative.

Knowledge check

Now take a few minutes to answer a few questions and confirm what you know. Once you have answered the questions, compare your responses with those in the answer key located at the end of this guide.

Ryan arrives at a substation and notices a sign indicating there is a prime contractor on site. He thinks, “I am not part of the prime contractor’s team, so I don’t need to pay attention to this sign. It doesn’t have anything to do with my work.” Is he right?

- ☐ Yes
- ☐ No

To enter a NERC CIP Physical Security Perimeter (PSP), additional NERC CP training is required.

- ☐ True
- ☐ False

Wrapping up

Now it's time to wrap up the course with this final section.

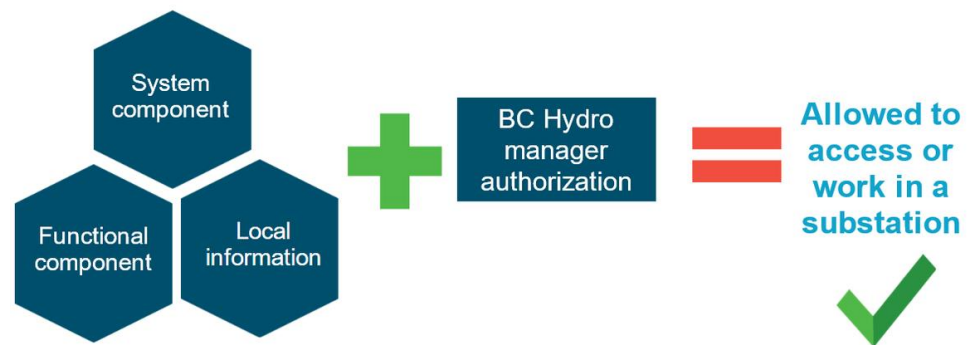
One last thing before we wrap up: let's confirm the training requirements you need to meet before you start working on a specific portion of the power system.

Training requirements

You need four things:

- System component training
- Functional component training
- Local information training
- Authorization of your BC Hydro manager

Once you have these four things, you can access or work in a substation.



It's important to note that if you will be working in or accessing a NERC CIP facility, you will be required to get an additional security authorization. For more information, contact your manager or BC Hydro contract representative.

Congratulations!

You've reached the end of the course.

Remember, the best source for the most current operating orders is always online, so check SafeHub, SIS or the contractor extranet.

Now that you've finished this course, you need to complete the exam and review your relevant operating orders from Appendix 3 based on your system component training number.

Now you'll need to complete the exam.



Knowledge check answer key

Use this answer key to check your responses to the knowledge checks you completed in some of the lessons. Please note that if your answers are not the same as those provided, you can review the material, return to the question and answer it again, or just leave it. The choice is yours.

Remember, this is not a test. These questions are for review and feedback to help you learn the material.

Lesson 1 – Answers

Functional component training covers the appropriate safety and operating procedures for the specific function of the power system.

- ☐ True
- ☐ False

It's **true**. Functional component training introduces you to the correct way to access or work on specific portions of the power system in BC Hydro – for example, substations (STC), transmission (TXC), distribution (DBC) and non-integrated areas (DGC).

Where can you locate operating orders? (Select all that apply.)

- ☐ Site Information System (SIS)
- ☐ Contractor extranet
- ☐ SafeHub

All of these are correct – you can locate operating orders on SafeHub, SIS and the contractor extranet.

Lesson 2 – Answers

In this activity, each statement on the left belongs in one of these three categories:

A. Before going to the substation

B. When entering the substation

C. When exiting the substation

Indicate which category each statement belongs in by placing “A,” “B” or “C” in the left-hand column. You’ll need to consider when you would perform the task.

| | |
|----------|---|
| C | Leave work area in safe condition |
| C | Check that the control room door is locked |
| A | Check on requirements for additional training |
| C | Arm the alarm if you are the last person to leave the station |
| B | Conduct visual inspection |
| A | Consider PPE |
| B | Use physical key or access card |
| B | Sign into log book |
| A | Check for security authorizations needed |

The log book and the signature sheet of the Local Information Manual are the same.

- ☐ True
- ☒ **False**

The answer is **false**.

Lesson 3 – Answers

Ryan arrives at a substation and notices a sign indicating there is a prime contractor on site. He thinks, “I am not part of the prime contractor’s team, so I don’t need to pay attention to this sign. It doesn’t have anything to do with my work.” Is he right?

- ☐ Yes
- ☐ **No**

No, Ryan is not right. Ryan should have recognized that the sign was an identification of a multi-employer workplace. He was not correct in thinking it doesn’t have to do with his work. He needs to ensure he follows the proper MEW procedures and related safety requirements.

To enter a NERC CIP Physical Security Perimeter (PSP), additional NERC CIP training is required

- ☐ **True**
- ☐ False

The answer is **true**.

Revision history

| Version no. | Revision content | Issue date |
|-------------|------------------|------------|
| | | |
| | | |
| | | |