

BC HYDRO

REAL TIME OPERATIONS

OPERATING ORDER 1T-35

COMMISSIONING PROCEDURE FOR GENERATORS, STATION AND TRANSMISSION PROJECTS

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| Denotes Revision

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http://hw/our_bus/td/maj_proj_del/stations/Pages/forms_temp.aspx

1.0 **COMMISSIONING AND TESTING PROCESS FOR BC HYDRO PROJECTS**

1.1 **General**

BC Hydro Transmission and Distribution (BC Hydro T&D) requires the following commissioning process to be adhered to for all Station and Transmission projects for which T&D has asset responsibility and which impact operating one-line diagrams. BC Hydro Generation is responsible for the commissioning process for Work Protection Practices (WPP) equipment in BC Hydro Generating Plants. The interface between the BC Hydro Generation Commissioning and BC Hydro Control Centre is further defined in Section 1.3.

Testing and Commissioning is the work performed to ensure that the equipment, or more generally the plant or device or system or software is installed and tested to confirm compliance with the technical specifications and operational requirements. This includes visual inspection, tests and measurements, verification of correct equipment and verification of correct operation.

Testing is defined as performing tests, inspections and adjustments on the equipment in the field.

Commissioning is defined as the process in which the equipment, facility or plant is verified and validated in accordance with the design objectives, specifications and factory tests. This includes the following steps:

1. Preparing and compiling the testing requirements in a Project Test Summary (PTS).
2. Assembling project reference documents from which the commissioning tests are described to the testers and executed in the field. Documents include the approved project one-line diagram and specification sheet; the installation, operation, and maintenance manuals; factory test reports; design drawings; relevant vendor drawings; and purchase orders.
3. Reviewing the Test Data Sheets for correctness and completeness, and the submission and acceptance by the Registered Professional of Record for test report coversheet sign-off.
4. Collecting the test data records which are assembled for handoff to the maintenance and operations personnel.

All appointments listed in this section may require written notification of Real Time Operations (RTO) and other parties as noted on the appointment forms included in Appendix I. Safety Requirements of the following roles are further documented in OO 1T-10.

Project Manager – Project Managers have the overall accountability to manage the implementation of assigned electric system projects.

Construction Representative – The Project Manager will appoint a Construction Representative who is delegated the responsibility for installation, equipment or circuit erection of electric system plant on all Station and Transmission construction projects which impact operating one line diagrams. The appointment of a Construction Representative requires written notification to RTO using the Construction Representative Delegation Letter included in Appendix I(a).

Professional of Record (POR) – The Professional Engineer or Limited Licensee, registered in the Province of British Columbia, who has specified the requirements for the equipment and has the direct professional responsibility of reviewing, accepting the project test sheets and preparing, sealing and issuing the Test Report Cover Sheet.

Project Controller – When required, the Project Controller’s responsibilities will include all on-site PSSP Person-In-Charge (PIC) duties until Operating Authority is formally transferred to RTO. If a Project Controller is required for the project, the Construction Representative can assume the role of Project Controller if they are qualified and PSSP Authorized unless he/she appoints a Project Controller that is qualified and PSSP authorized. Construction Representatives that are not qualified must appoint a qualified and PSSP authorized worker to perform the role of Project Controller. The appointment of a Project Controller and any transfer of Operating Authority requires written notification to RTO using the Project Controller Delegation Letter in Appendix 1(b).

Field Coordinator - The Project Manager will appoint a Field Coordinator for each project as described in Section 1.5. For Stations Projects, the Project Manager must discuss this appointment with the BC Hydro Area Manager (M2) Stations (Appendix X).

Prime Contractor – The Project Manager will appoint the Prime Contractor for construction projects where the duties are performed by a non-BC Hydro worker. If there is maintenance work by Field Operations or another contractor and project related work occurring at the same time within the same construction area then discussion must take place between the Field Operations Manager and Project Manager, or delegate, to decide who will be Prime Contractor. The appointment of a Prime Contractor requires written notification to RTO using the Prime Contractor Delegation Letter in Appendix 1(d).

1.2 **Commissioning Notice to Energize (CNE) for Station and Transmission Projects**

The form known as the Commissioning Notice to Energize (CNE) authorizes the Operating Authority to proceed with the initial system energization tests of electric system plant additions, modifications and replacements. This includes communications, protection and control equipment additions and replacements that are not being performed concurrently with high voltage power system equipment.

A CNE is required for all Level I to IV station equipment, line terminal equipment and transmission circuits which are returned for service after a major overhaul, or any work that alters the equipment rating or effectively replaces the old equipment. Level I to IV equipment is defined in SOO 1J-11.

Note: CNE’s **must** include the ratings of all equipment to be energized.

Note: A CNE is not required for transmission circuit “structure only” changes as the circuit rating is not changed.

Note: Operating Responsibility for the new equipment must be assumed by the BC Hydro Control Centre prior to initial energizing and is triggered by the release of the revised Operating One Line Diagram. Prior to energizing, if a Project Controller holds Operating Authority for all or a portion of the equipment, then this Operating Authority must be transferred in writing to the BC Hydro Control Centre using the form in attached Appendix IV.

A completed CNE requires up to three signatures based on the nature of the equipment additions or modifications.

1. **Construction Representative** – After erection, inspections and off-line testing of a construction project (or part of a project), the Construction Representative shall prepare and sign a CNE listing all equipment or circuit items including any outstanding deficiencies and safety hazards that result in operating limitations.
2. **Communications, Protection and Control Representative** is required to sign-off that equipment described on the CNE has been tested and is ready for initial energization.

Note: This is not required when communications, and protection and control, additions or modifications are not part of the work, and the installation of the equipment installed does not require any protection changes or verifications.

3. **The Field Coordinator** is required to sign the CNE to confirm all prior conditions and documentation are completed in accordance with BC Hydro standard requirements and that all equipment described above has been tested and is ready for initial energization. The Field Coordinator must confirm that equipment has been commissioned and is ready for energization by being in receipt of a signed and sealed Test Report Cover Sheets prepared by the responsible POR before signing the CNE.

A copy, e-mail or facsimile of the completed CNE (uniquely numbered) including any outstanding deficiencies, will be provided to the BC Hydro Control Centre, along with other required documentation, prior to the initial system energizing tests. (Refer to Section 1.5 for Field Coordinator selection and duties).

CNE Unique Numbering: to allow for electronic distribution, CNE numbering will be applied as follows:

YY MM DD FC ##
(year – month – day - Field Coordinator initials – sequential number)

(Example: 101215AH01 - 2010 December 15, Al Harris, # 01)

Note: If the CNE has multiple pages where equipment is energized together, each additional sheet shall be marked **Sheet x of y**.

Refer to Appendices II (a) Commissioning Notice to Energize, and II (b) Conditions To Be Met Prior To Authorizing Commissioning Notices to Energize.

1.3 **Commissioning Notice to Energize (CNE) for BC Hydro Generation Projects**

The BC Hydro Control Centre will accommodate and use BC Hydro Generation's CNE process as written in 1G-30 for commissioning additions, modifications and replacements of WPP Generation equipment at BC Hydro's generating plants, provided the CNE process conveys all the necessary information required by the BC Hydro Control Centre and conveyed to the BC Hydro Control Centre by an authorized person. The **CNE and Conditions to be met Prior to Authorizing Commissioning Notices to Energize** forms used by BC Hydro Generation, will be developed in consultation with RTO and as a minimum will convey the following information:

- A formal transfer of Operating Responsibility to BC Hydro RTO (i.e. BC Hydro Control Centre).
- a copy, email, or facsimile of the BC Hydro CNE(s) including a list of all plant equipment to be energized, (If only voice communication is available it is acceptable for an authorized person to provide the CNE number and equipment list by phone or radio to the BC Hydro Control Centre. The signed CNE will be delivered to the BC Hydro Control Centre as soon as practical after signing.)
- revised Operating Orders (or mark-ups),
- revised Operating One-Lines (or mark-ups),
- revised Alarm Operating Orders (or mark-ups),
- revised Protection Information Sheets (or mark-ups), if required,
- Initial energization sequence, including any operating restrictions.

1.4 **Commissioning Notice to Operate (CNO)**

This document is used to transfer to Field Operations the management of all remaining deficiencies, safety hazards, and limitations on normal service remaining at project completion.

Once the project is complete, has been energized, and all tests completed and documentation distributed, the Project Manager will notify the Field Manager, via the signed Commissioning Notice to Operate (CNO) form, that the project is ready for normal service. The Field Manager shall co-sign the CNO to accept the management of safety hazards and deficiencies, then return a copy of the signed CNO to the Project Manager. The Project Manager then distributes copies as appropriate.

CNO Unique Numbering: To allow for electronic distribution, CNO numbering will be applied as follows:

YY MM DD – SAP# - PSN
(year – month – day – SAP Project number – Project Short Name)

Example: 130530 – TY0055 – SVDREV15 corresponds to 30 May 2013 with SAP number TY0055 and Project Short Name for the Silverdale Reinforcement Project.

For the form, refer to Appendix II (c): Commissioning Notice to Operate.

1.5 **Field Coordinator - Selection and Duties**

The Project Manager will appoint normally one Field Coordinator for each project to be commissioned or decommissioned. This will usually be the local Transmission Manager, Substation Manager, or Communications, Protection and Control Manager, however, an alternate person may also be appointed Field Coordinator as appropriate. For large projects, multiple Field Coordinators may be assigned and they will be required to coordinate their efforts to ensure no delays occur in project commissioning. Appendix X lists the BC Hydro approved Field Coordinators throughout the province. For Stations Projects, the Project Manager must discuss this appointment with the BC Hydro Area Manager (M2) Stations (Appendix X).

The Project Manager will provide notification to RTO through use of the Field Coordinator Appointment Letter included Appendix I(c).

The Field Coordinator's normal duties and responsibilities, while subject to some variation by the Project Manager, include the following:

1. Schedule the testing and proposed in-service date of new equipment or circuit with the BC Hydro Control Centre to ensure adequate advance notice is given. EMS/SCADA changes such as addition or changes to alarm points, control points, indication points and analog points, should be submitted to Fraser Valley Office FVO/RTS SCADA Team lead at Point.Assignment@bchydro.com by the sooner of 30 working days before the scheduled in-service date, or 25 working days before the scheduled testing date. Point details such as RTU point numbers, type of point (analog, indication, control or alarm) and engineering values shall be provided. Details such as normal status of status points and alarm points (normally open or normally closed) should be submitted. For alarm points, priority level, initiating devices, alarm description and remarks should be provided. For analog points, warning and alarm levels should be recommended. **For more detailed information on SCADA EMS changes, refer to Appendix XI.**
2. Coordinate maintenance work and construction projects to optimize the number and duration of equipment outages.

3. Coordinate between the field staff and the BC Hydro Control Centre the energizing, phasing and protection load tests on the equipment.
4. Collect and accept signed CNEs from the Construction Representative, including any outstanding deficiencies and safety hazards that result in equipment operating limitations.
5. Ensure that communications, protection and control systems have been tested in accordance with the requirements as specified by the Protection and Control or Telecommunications POR(s) in the Project Test Summary and to obtain the signature of a qualified CPC representative on the CNE. By way of signature, the CPC representative certifies that the communications, protection and control equipment has been installed in accordance with the instructions from the POR.
6. Collect the Test Report Cover Sheets and verify that all testing has been performed as listed on the Project Test Summary (PTS), and also verify that all equipment not listed on the PTS (no tests required) has been inspected. (Refer to Section 1.6 for additional information). This shall include the collection of Test Report Cover Sheets associated with the communications, protection and control systems and verify that the POR or delegate has signed off that those systems have been tested and are ready for energization.
7. Review and accept the deficiencies associated with unusual conditions or equipment operating restrictions on the CNE, sign the CNE and distribute.
8. Advise the Project Manager of changes in the schedule.
9. Ensure that the BC Hydro Control Centre has received all required documentation, as detailed below, prior to energization (refer to Section 1.7 for Decommissioning Assets).
10. Review and sign the CNO and return the signed copy to the Project Manager.
11. Update the PSSP Local Component Summary Sheet and Station Local Component Book for all deficiencies, operational risks and safety hazards.

Documentation required by the BC Hydro Control Centre prior to energization includes:

1. A copy, e-mail or facsimile of the CNE(s) (uniquely numbered) including a list of all plant to be energized. (If only voice communication is available it is acceptable for an authorized person to provide the CNE number and equipment list by phone or radio to the BC Hydro Control Centre).
2. Revised Operating Orders (or mark-ups).
3. Revised Operating One-Lines (or mark-ups).
4. Revised Alarm Operating Orders (or mark-ups), if required.
5. Revised Protection Information Sheets (or mark-ups), if required.
6. Initial energization sequence, including any operating restrictions.

Refer to Appendices II (a) Commissioning Notice to Energize, and II (b) Conditions To Be Met Prior To Authorizing Commissioning Notices to Energize.

See Appendices XIII (a) and (b) for a list of operating order and one line documentation requirements for new distribution and transmission substations respectively.

Note: The Field Coordinator may not actually perform the duties and responsibilities listed above. The Field Coordinator is to ensure that they are done by the appropriate person or group.

1.6 Project Equipment and Testing

The Project Manager will provide the approved Project Test Summary (PTS), and will ensure equipment or circuit Test Reports are approved. The following steps shall be followed for all transmission system equipment, as identified in OO 1J-11. This includes

additions, modifications and replacements. (Refer to Appendix III – Test Report Cover Sheets and Appendix V: Project Equipment Testing Process Flow Chart).

1. Equipment testing shall be performed by qualified Technologists, or others, approved by BC Hydro Transmission Engineering.
2. Communications, Protection and Control testing, shall be performed by qualified Technologists, or others, approved by the BC Hydro Transmission Engineering.
3. Testing and commissioning will be carried out in accordance with BC Hydro Engineering Standards and the Project Test Summary (PTS). See Engineering Standard ES 44-B0006 for a general description of a PTS for substation equipment.
4. Testing and commissioning of Communications, Protection and Control Equipment shall be carried out in accordance to a Project Test Summary specifically for this type of equipment which shall list appropriate requirements, procedures or commissioning standards.
5. For equipment that does not have a label or mark of a certification agency, the BC Provincial ELECTRICAL SAFETY REGULATION, Section 21 (4) (b) requires the POR to certify the equipment is safe. The Equipment Specialist Engineer will sign and seal the Report and Test Cover Sheet.
6. For the types of equipment specified below, the Equipment Specialist who is the POR may transfer (in writing) the review of the test results and signing and sealing of the test cover sheet to another Professional Engineer or Limited Licensee who accepts the responsibility to become the POR. The signed test reports and signed Test Report Cover sheets, including outstanding deficiencies, are to be immediately sent to BC Hydro Engineering to ensure records are maintained. This is the responsibility of the POR. The types of equipment included are:
 - all surge arresters
 - all manually operated disconnect switches at voltage class 138 kV and below
 - air core feeder reactors
 - all current transformers and voltage transformers, at voltage class 69 kV and below
 - wavetraps
 - Communications, Protection and Control equipment
7. The Transmission Line Plant Alteration (PA) process is described in OO 1T-99.

Note: The PA document does not provide authorization to energize the circuit or equipment. Authorization is covered by the requirements of this operating order.

Appendix II (b) “**Conditions to be Met Prior to Authorizing Commissioning Notices to Energize**” provides a checklist for the Field Coordinator to assist in identifying documentation required prior to signing the CNE. It should be noted that some of the items are not applicable on transmission circuit projects.

Replacement of substation equipment, telecommunications equipment, and protection and control equipment may be listed on the PTS where applicable but testing may not be specified. Testing of this equipment is normally assigned by the Project Manager to the Field Operations Manager who has the functional responsibility in the area.

Note: System Operating Order 1T-36 defines the process for commissioning of Protection and Control and Telecommunications projects where concurrent power system equipment commissioning is not involved.

1.7 **Decommissioning Assets**

When any equipment in stations or on transmission lines is decommissioned, then as a minimum, the following information must be submitted by the Field Coordinator to the BC Hydro Control Centre. This shall include equipment that is permanently disconnected from the power system, for example a spare transformer disconnected with a permanent bus cut.

- Revised Operating Orders (or mark-ups).
- Revised Operating One-Lines (or mark-ups).
- Revised Alarm Operating Orders (or mark-ups).
- Revised Protection Information Sheets (or mark-ups).

1.8 **Control Room Procedures**

Documents and Alarms

Prior to energizing, the control room must confirm:

- All documents listed in Section 1.5 are received.
- Mimic displays are updated and correspond with the approved one line diagram.
- Alarms are confirmed enabled and AORs confirmed correct in EMS.
- Receipt of an approved energizing sequence that matches the revision held in the field.

Equipment Shown On Operating One Line Diagram Before CNE and Associated Paperwork Have Been Signed Off

Any equipment shown on the EMS display for which commissioning has not been completed will be tagged with a Not Available Tag and an accompanying CROW UC entered for cross referencing. The Not Available Tag must not be removed until the CNE has been issued and the new equipment has been fully commissioned and is available for service.

Recording of CNE Deficiencies and Operating Limitations

Any operating limitations or risks noted in the CNE will be tracked using a Caution Tag in EMS and an accompanying UC in CROW. Permanent operating limitations must be recorded in the appropriate operating orders.

1.9 **Deficiencies Noted in CNE**

It is recognized that equipment may go into energized service with deficiencies that require local procedures or restrictions. The Field Coordinator will discuss these with the Control Centre. Specific deficiencies that the BC Hydro Control Centre decides will be an operating risk will be recorded on the CNE.

It is the Project Manager's accountability to complete all outstanding deficiencies as expeditiously as practical. The BC Hydro Control Centre must be informed when deficiencies and/or operating limitations are corrected to ensure the EMS, CROW and other operating records are updated accordingly. For permanent deficiencies that cannot be resolved by the project, refer to Section 1.4.

1.10 **Energization Plan**

An energization plan is required when energizing new Level I-IV high voltage equipment.

An energizing plan must be absolutely clear on the initial conditions and configuration of all related devices. As a guiding principle and pre-condition to initial energizing, disconnect switches should be in their normal operating state (normally closed or normally open). Equipment will be energized between circuit breakers. This promotes work efficiency in the field and in the control room and minimizes the exposure of the field worker to the newly energized equipment. Exceptions are acceptable in situations where

the energizing zone contains too much new equipment and sectionalized switching is required to better locate potential faults. As well, all new protection equipment should be in service (trip switches closed, CT shorting removed, VT isolation switches closed).

The plan should be organized in sequential stages. Each step will be numbered in sequential order (like a switching order). Significant steps within a stage should describe the expected outcome (energize, parallel, etc.).

There are three basic components to initial energizing that need to be covered:

1. Energize equipment at full voltage.
2. Ensure phasing between buses is same before closing to make any loops.
3. Protection load test.

For Test #1, energizing is done in stages so that any failures are easily identified. It's like sectionalizing to find a fault. In general, all isolating disconnect switches should be closed and energizing will be between circuit breakers. Care must be taken not to make a loop before Test #2 is completed. There is no requirement to "soak" equipment unless specifically stated by the contractor for work done under BC Hydro control. The time between switching steps is usually sufficient.

For Test #2, although the bus should be visually inspected prior to energizing, an electrical phasing test is required. Choose a reference VT or CVT in the loop. Energize radially from one side of the loop to the VT. CPC then measure and record the voltage magnitude and angle there. Then, de-energize the VT and re-energize the VT from the other side of the loop. Measure the voltage magnitude and angle at the VT. Then, compare the measurement with the first one. The measurements should be the same. If so, proceed to Test 3.

The purpose of Test #3 to confirm that the voltage and current in all protections accurately represents what is flowing on the primary circuits. This is checked by configuring the bus so there is a known power flow direction and magnitude. We do not want the magnitude or flow direction to change during the test. Current measurements (magnitude and angle) are then taken at the CT blocks and relays. As well, voltage measurements are taken. These are all compared to the reference VT to ensure CT and VT polarity are connected correctly (not backwards).

IMPORTANT: CPC must confirm the load test is correct before they (and electrician) leave the station. This should be stated in the sequence.

When the protection load test is complete, RTO may configure the system to normal or as required for interim operation.

Normally, there is no requirement to perform in-situ tests. These are reserved for special equipment and described as a separate plan or stage.

A sample energization plan is appended as Appendix XII.

2.0 COMMISSIONING PROCESS FOR TRANSMISSION VOLTAGE INDEPENDENT POWER PRODUCERS, TRANSMISSION VOLTAGE CUSTOMERS, TURNKEY INSTALLATIONS AND DISTRIBUTION FEEDER TERMINATIONS IN STATIONS

2.1 Transmission Voltage Independent Power Producers (IPPs)

The assigned Project Manager will be responsible for ensuring the Transmission Independent Power Producer (IPP) meets all the necessary safety and reliability requirements for connection to the BC Hydro Transmission system, in accordance with the Project Interconnection Requirements (PIR).

Commissioning procedures will generally be the same as those for BC Hydro operated assets, with the following exceptions.

A **Declaration of Compatibility** form will be provided to the BC Hydro Control Centre, signed by a Professional Engineer on behalf of the Customer and by the BC Hydro assigned Project Manager (or delegate).

Note: If only voice communication is available, it is acceptable for an authorized person to provide the Declaration of Compatibility details and equipment list by phone or radio to the BC Hydro Control Centre. The signed Declaration of Compatibility will be delivered to the BC Hydro Control Centre as soon as practical after signing.

Several stages of energization are typical for IPPs and each stage requires a separate Declaration of Compatibility. The stages are:

- Load – to provide construction power supply.
- Generator 1st Synchronization – to allow generator commissioning.
- Generator Operating – to place generator into commercial operation (this stage does not involve RTO and the BC Hydro Control Centre does not require notification).

IPPs that utilize wind turbines may have modified Generator Operating test and acceptance criteria different than hydro or thermal powered turbines. These are described in a separate Declaration of Compatibility.

Refer to Appendix VI and VII(a) for the Flow Chart and Document for the Declaration of Compatibility IPP– Generator Facilities.

Refer to Appendix VIII(a) for Declaration of Compatibility, IPP Generator Facilities, 1st Synchronization.

A **CNE** is normally not required for the Customer's Assets, but a CNE will be required for BC Hydro T&D Assets that are commissioned in order to connect the IPP to the electric system. If BC Hydro is required to operate the Customer's Assets on successful completion of testing, a CNE must also be completed for the Customer's Assets. Refer to Appendix VIII flowchart.

If the customer constructs a transmission line to this facility it may elect to transfer the transmission line ownership to BC Hydro. Refer to Appendix VII (c) for Document of Declaration of Compatibility – Transmission Line Facilities.

In most situations, there is no requirement for site safety coordinator or construction representative because the customer is responsible for those tasks.

Other **Documentation required by the BC Hydro Control Centre prior to energization** must still be provided as detailed in Section 1.5.

2.2 Transmission Voltage Customers (TVCs)

The assigned Project Manager will be responsible for ensuring the Transmission Voltage Customer (TVC) meets all the necessary safety and reliability requirements for connection to the BC Hydro Transmission system, in accordance with the Electric Tariff Facilities Agreement.

Commissioning procedures will generally be the same as those for BC Hydro operated assets, with the following exceptions:

A **Declaration of Compatibility** form will be provided to the BC Hydro Control Centre, signed by a Professional Engineer on behalf of the Customer and by the BC Hydro assigned Project Manager or delegate. (If only voice communication is available it is acceptable for an authorized person to provide the Declaration of Compatibility details and equipment list by phone or radio to the BC Hydro Control Centre. The signed Declaration of Compatibility will be delivered to the BC Hydro Control Centre as soon as practical after signing.)

(Refer to Appendix VI and VII (b) for the Flow Chart and Document for Declaration of Compatibility – TVC Substation Load - Customer's Facilities.)

A **CNE** is normally not required for the Customer's Assets, but a CNE will be required for BC Hydro T&D Assets that are commissioned in order to connect the TVC to the electric system. If BC Hydro is required to operate the Customer's Assets on successful completion of testing, a CNE must also be completed for the Customer's Assets. Refer to Appendix IX flowchart.

If the customer constructs a transmission line to this facility it may elect to transfer the transmission line ownership to BC Hydro. (Refer to Appendix VII (c) for Document of Declaration of Compatibility – Transmission Line Facilities)

In most situations, there is no requirement for site safety coordinator or construction representative because the customer is responsible for those tasks.

Other **Documentation required by the BC Hydro Control Centre prior to energization** must still be provided as detailed in Section 1.5.

2.3 Turnkey Installations

The assigned Project Manager will be responsible for ensuring Turnkey Installations meet all the necessary safety and reliability requirements for connection to the BC Hydro Transmission system, in accordance with the Contract Specifications. For commissioning purpose, Turnkey Installations in existing BC Hydro assets managed and operated by BC Hydro shall be done with a CNE only. Only true "Green Field" BC Hydro T&D projects will be commissioned using the process described as follows.

Commissioning procedures for BC Hydro T&D green field projects will generally be the same as those for BC Hydro operated assets, with the following exceptions:

- A **Declaration of Compatibility** form will be provided to the BC Hydro Control Centre, signed by a Professional Engineer on behalf of the Prime Contractor and by the BC Hydro assigned Project Manager or delegate before the new equipment is connected to the transmission system so the contractor can perform load testing. (If only voice communication is available it is acceptable for an authorized person to provide the Declaration of Compatibility details and equipment list by phone or radio to the BC Hydro Control Centre. The signed Declaration of Compatibility will be delivered to the BC Hydro Control Centre as soon as practical after signing.) A temporary joint Operating Order should be created and issued. Details such as key contact persons, telephone numbers and procedures for Guarantee of Isolation (GOI) and Guarantee of No Reclose (GNR) should be listed in the operating order.

In most situations, there is no requirement for site safety coordinator or construction representative because the contractor is responsible for those tasks.

(Appendix VII(b) for Declaration of Compatibility – TVC Substation Load Facilities Document, Appendix VII(c) Declaration of Compatibility – Transmission Line Facilities

Document and Appendix IX for the Flow Chart for Declaration of Compatibility Process BCH Assets – Turnkey Projects).

All other Documentation required by the BC Hydro Control Centre prior to energization must still be provided as detailed in Section 1.5.

A CNE shall be completed and submitted to the BC Hydro Control Centre before BC Hydro takes over the Operating Responsibility and Operating Authority of equipment. The Field Coordinator should confirm the actual status of each device, i.e. open or close and also confirm that all personal locks have been removed and devices are locked with system locks.

2.4 Distribution Feeder Cable or Overhead Conductor Pulling, Stringing and Termination in Substations

Distribution work is done using a Plant Alteration (PA) process. Refer to OO 1D-01 Clause 4.3 for reference and replication of this procedure.

A feeder cable or overhead conductor becomes a part of the power system and therefore under BC Hydro Operating Responsibility and Operating Authority. A Safety Protection Guarantee must be issued in the following situations:

- Whenever the limits of approach cannot be maintained during pulling of the cable or stringing of the overhead conductor. The outage request must include the D2 and D3 disconnects.
- Prior to the cable being terminated or the overhead conductor connected to the system.

The Field Operations crew should inform the responsible substation manager and the one-line diagram should be updated and submitted to the BC Hydro Control Centre when the outage request is submitted for pulling (if required due to limits of approach concern) or terminating the feeder cable or connecting the overhead conductor. The EMS/SCADA mimic display should be updated and it should be treated as Level IV equipment from then on. The establishment of a Safety Protection Guarantee (SPG) prior to the termination of the feeder cable or connecting the overhead conductor to the system is mandatory. Feeder cable isolation will be issued from the station disconnects D2 and D3 (or equivalent station isolating device) and the associated field disconnects. It is the SPG holder's responsibility to remove risers if required after the permit is issued and to use grounding and blocking tags.

3.0 COMMISSIONING PROCESS FOR DISTRIBUTION IPPs

Refer to Distribution Operating Order 1D-11.

4.0 REVISION HISTORY (This order is also posted on BC Hydro’s external website)

Revised by	Revision Date	Summary of Revision
DSM	24 February 2015	Appendix VIII b – reference and compliance document updates.
Ed Froese/ DSM/MDW	26 May 2015	Section 1.5 – added reference to Appendices XIII (a) and (b). Appendix X – updated list of approved field coordinators. Appendices XIII (a) and (b) – added documentation requirements list for new distribution and transmission substations respectively. Outage Scheduling Manager added as approver to Appendix XII.
DSM	22 January 2016	Sections 1.2 and 1.5 – referenced Appendices II (a) and II (b). Appendix II (b) – added SCADA commissioning completed with FVO CPC.
F. Holland	11 February 2016	Updated Appendix X station manager.
MDW/DSM	06 April 2016	Section 1.2 – added note that CNE’s must include the ratings of equipment to be energized. Appendix II (a) – updated CNE form. Appendices VIII (a), (b), and (c) – updated version reference for technical interconnection requirements; changed “schedule” to “appendix”. Appendix VIII (c) – replaced Reliability Management System with “applicable Mandatory Reliability Standards”. Appendix X – updated approved field coordinators for LM and SI stations, and transmission circuits.



**CONSTRUCTION
REPRESENTATIVE
DELEGATION LETTER**

TO: [Assigned Construction Representative] **DATE:** [YYYY-MM-DD]

FROM: [Project Manager] **FILE:** [Project Short Name - Task]

CC: Grid Operations Construction Co-ordination (bchrtocc@bchydro.com)
[General Manager, Real Time Operations]
[Area Manager – Station/Line/Plant]
[Local Manager – Station/Line/Plant]

SUBJECT: **[Project Short Name] – [Project Title/Description]**
Construction Representative for [Site(s)]

To fulfill the requirements of Operating Order 1T-35 you have been assigned the Construction Representative role for **[description of the work]** at **[location of the work (station code)]**.

1T-35, Section 1.1 General and 1T-10, Section 2.0 document the roles and responsibilities of the Construction Representative.

Please note a transfer of delegation of the Construction Representative role requires that the Project Manager re-issues a new form to all required recipients.

If a Project Controller is required for the project, the Construction Representative can assume the role of Project Controller if they are qualified and PSSP Authorized unless he/she appoints a Project Controller that is qualified and PSSP authorized. Construction Representatives that are not qualified must appoint a qualified and PSSP authorized worker to perform the role of Project Controller.

The Project Controller’s responsibilities include all on site PSSP Person In Charge (PIC) duties until operating authority is formally transferred to Real Time Operations.

1T-10, Sections 2.0, 3.0, and 4.0 document the roles and responsibilities of the Project Controller.

Please sign and date in the space below, and return a copy of this memo to me agreeing to this appointment and acknowledging that you are qualified to perform the duties assigned.

Project Manager
[PM Name]

Date

Construction Representative
[Rep Name]

Date



PROJECT CONTROLLER DELEGATION LETTER

TO: [Selected Project Controller]

DATE: [YYYY-MM-DD]

FROM: [Construction Representative]

FILE: [Project Short Name - Task]

CC: Grid Operations Construction Co-ordination
(bchrtocc@bchydro.com)
[General Manager, Real Time Operations]
[Area Manager – Station/Line/Plant]
[Local Manager – Station/Line/Plant]
[Construction Representative]
[Project Manager]

SUBJECT: [Project Short Name] – [Project Title/Description]
Project Controller for [Site(s)]

To fulfill the requirements of Operating Order 1T-35 you have been delegated the roles and responsibilities of Project Controller for [Project Title/Description – Attach project scope for reference] at [location of the work (station code or line)].

Please note a transfer of delegation of the Project Controller role requires that the Construction Representative re-issues a revised Project Delegation form to all required recipients.

The Project Controller’s responsibilities include all on site PSSP Person In Charge (PIC) duties until operating authority is formally transferred to Real Time Operations using the Transfer of Operating Authority form indicated in Appendix IV. 1T-10, Sections 2.0, 3.0, and 4.0 document the roles and responsibilities of the Project Controller.

Please sign and date in the space below, and return a copy of this memo to me agreeing to this appointment and acknowledging that you are qualified to perform the duties assigned.

Project Controllership over equipment will remain in effect until signed over to the BC Hydro Control Centre Operating Authority as part of the CNE process documented in 1T-35, Section 1.2.

Construction Representative

Date

Project Controller

Date



**FIELD COORDINATOR
DELEGATION LETTER**

TO: [Selected Field Coordinator]

DATE: [YYYY-MM-DD]

FROM: [Project Manager]

FILE: [Project Short Name - Task]

CC: Grid Operations Construction Co-ordination
(bchrtocc@bchydro.com)
[General Manager, Real Time Operations]
[Area Manager – Station/Line/Plant]
[Local Manager – Station/Line/Plant]
[Construction Representative]
[Project Manager]

SUBJECT: [Project Short Name] – [Project Title/Description]
Field Coordinator for [Site(s)]

This letter confirms that you are appointed the Field Coordinator for the [description of the work] at [location of the work (station code)].

The Field Coordinator's normal duties and responsibilities, while subject to some variation by the Project Manager, include the following:

1. Schedule the testing and proposed in-service date of new equipment or circuit with the BC Hydro Control Centre to ensure adequate advance notice is given. EMS/SCADA changes such as addition or changes to alarm points, control points, indication points and analog points, should be submitted to Fraser Valley Office FVO/RTS SCADA Team lead at Point.Assignment@bchydro.com by the sooner of 30 working days before the scheduled in-service date, or 25 working days before the scheduled testing date. Point details such as RTU point numbers, type of point (analog, indication, control or alarm) and engineering values shall be provided. Details such as normal status of status points and alarm points (normally open or normally closed) should be submitted. For alarm points, priority level, initiating devices, alarm description and remarks should be provided. For analog points, warning and alarm levels should be recommended. **For more detailed information on SCADA EMS changes, refer to Appendix XI.**
2. Coordinate maintenance work and construction projects to optimize the number and duration of equipment outages.
3. Coordinate between the field staff and the BC Hydro Control Centre the energizing, phasing and protection load tests on the equipment.
4. Collect and accept signed CNEs from the Construction Representative, including any outstanding deficiencies and safety hazards that result in equipment operating limitations.
5. Ensure that communications, protection and control systems have been tested in accordance with the requirements as specified by the Protection and Control or Telecommunications POR(s) in the Project Test Summary and to obtain the signature of a qualified CPC representative on the CNE. By way of signature, the CPC representative certifies that the communications, protection and control equipment has been installed in accordance with the instructions from the POR.
6. Collect the Test Report Cover Sheets and verify that all testing has been performed as listed on the Project Test Summary (PTS), and also verify that all equipment not listed on the PTS (no tests required) has been inspected. (Refer to Section 1.6 for additional information). This shall include the collection of Test Report Cover Sheets associated with the communications, protection and control systems and verify that the POR or delegate has signed off that those systems have been tested and are ready for energization.
7. Review and accept the deficiencies associated with unusual conditions or equipment operating restrictions on the CNE, sign the CNE and distribute.

8. Advise the Project Manager of changes in the schedule.
9. Ensure that the BC Hydro Control Centre has received all required documentation, as detailed below, prior to energization (refer to Section 1.7 for Decommissioning Assets).
10. Review and sign the CNO and return the signed copy to the Project Manager.
11. Update the PSSP Local Component Summary Sheet and Station Local Component Book for all deficiencies, operational risks and safety hazards.

Documentation required by the BC Hydro Control Centre prior to energization includes:

1. A copy, e-mail or facsimile of the CNE(s) (uniquely numbered) including a list of all plant to be energized. (If only voice communication is available it is acceptable for an authorized person to provide the CNE number and equipment list by phone or radio to the BC Hydro Control Centre).
2. Revised Operating Orders (or mark-ups).
3. Revised Operating One-Lines (or mark-ups).
4. Revised Alarm Operating Orders (or mark-ups), if required.
5. Revised Protection Information Sheets (or mark-ups), if required.
6. Initial energization sequence, including any operating restrictions.

Note: The Field Coordinator may not actually perform the duties and responsibilities listed above. The Field Coordinator is to ensure that they are done by the appropriate person or group.

Please sign and date in the space below, and return a copy of this memo to me agreeing to this appointment and acknowledging that you are qualified to perform the duties assigned.

Project Manager

Date

Field Coordinator

Date

http://hw/our_bus/td/maj_proj_del/stations/Documents/field_coordinator.doc



**PRIME CONTRACTOR
DELEGATION LETTER**

TO: [Assigned Prime Contractor Representative] **DATE:** [YYYY-MM-DD]

FROM: [Project Manager] **FILE:** [Project Short Name - Task]

CC: Grid Operations Construction Co-ordination
bchrtocc@bchydro.com
 [General Manager, Real Time Operations]
 [Area Manager – Station/Line/Plant]
 [Local Manager – Station/Line/Plant]

SUBJECT: **[Project Short Name] – [Project Title/Description]**
Prime Contractor for [Site(s)]

To fulfill the requirements of System Operating Order 1T-35 you have been assigned the Prime Contractor role for **[description of the work]** at **[location of the work (station code)]**.

1T-35, Section 1.1 General and 1T-10, Section 2.0 document the roles and responsibilities of the Prime Contractor.

Please sign and date in the space below, and return a copy of this memo to me agreeing to this appointment and acknowledging that you are qualified to perform the duties assigned.

Project Manager
[PM Name]

Date

Authorized Representative of the Prime Contractor
[Name]

Date



CNE No. _____ YYMMDDFC## _____

Sheet x of y

COMMISSIONING NOTICE TO ENERGIZE

Project		Year/Stage	Project Short Name
Project Scope			EAR No.
Equipment or Circuit Designation	Equipment or Circuit Details		
Is the PN equipment - New/Replaced/Removed? _____			
Associated outstanding items/restrictions/notes/deficiencies (attach sheets as necessary)			
I give notice that the installation of the equipment described above is complete except as noted. This does not release me from any duties which I may have under safety practices regulations.		I give notice that the Protection & Control equipment described above has been installed and tested in accordance with instructions from the POR and has been tested and is ready for initial energization.	
_____ Date Construction Representative		_____ Date Qualified CPC Representative	
PassPort Inventory Data Reminders: <ul style="list-style-type: none"> • Refurbished – Y/N (eg. voltage regulators) • Refurbished – need Operation Reading • Transformers – include LTC nameplate data • Transformers/Circuit breakers – include bushings nameplate data • If disposed – equipment removal form to be submitted • Insulation type – oil, SF6, dry, vacuum, etc. 		I confirm all prior conditions and documentation are completed in accordance with BC Hydro standard requirements and that all equipment described above has been tested and is ready for initial energization.	
		_____ Date Field Coordinator	

Distribution: Project Manager
 (electronic) Field Operations Office
 Transmission, Passport Helpdesk
 Manager, Stations Planning
 Project File

Asset Program Manager (Station or Transmission Line)
 Construction Agency
 BC Hydro Control Centre (Real Time Operations - FVO)
 Manager, Telecom & Network Infrastructure



Standard Requirement No. xxxxx

**Conditions to be met Prior to Authorizing
 Commissioning Notices to Energize**

Project		Year/Stage	Project Short Name
Project Scope			EAR No.
Prior Requirement	Date Completed	Completed By	Comments
Equipment or circuit installation completed in accordance with project drawings and specifications			
Equipment or circuit testing completed in accordance with approved test plans and test cover sheets approved (where applicable) and on file			
SCADA commissioning completed with FVO CPC (device control, alarms, telemetry)			
Operating One Line Diagrams prepared or updated with copy to BC Hydro Control Centre			
Operating Orders(where applicable; including transmission rating changes in 5T-10) created or revised with copy to BC Hydro Control Centre			
Alarm assignments and responses complete and included with LOO (if applicable)			
Protection Information sheets created or revised with copy to BC Hydro Control Centre (if applicable)			
Initial energization sequence and switching orders reviewed with BC Hydro Control Centre			
_____ Date Field Coordinator		I give notice that the above conditions have been met as a pre-condition for authorizing a CNE associated with this phase of the noted project. This does not release me from any duties which I may have under safety practices regulations.	

Distribution: Project Manager
 (electronic) BCH Field Operations Office
 Construction Agency
 Project File



YYMMDD – SAP# - PSN

COMMISSIONING NOTICE TO OPERATE

Project Title: [Enter Project Name]	Project Short Name: [Enter PSN]
SAP Project #: [Enter #]	Project Manager: [Enter Project Manager]

PROJECT SCOPE

EQUIPMENT DESIGNATION	EQUIPMENT DETAILS
-----------------------	-------------------

(Attach sheets as necessary)

DEFICIENCIES, SAFETY HAZARDS AND RISKS

(Attach sheets as necessary)

ADDITIONAL NOTES:

I give notice that the project has been completed and, the equipment as described above is available for normal service.

I acknowledge that the equipment described has been transferred for normal service. I have reviewed and accept the management of deficiencies, hazards and risks as noted above.

 Project Manager Date

 Field Manager Date

DISTRIBUTION - Project Manager
 (electronic) Asset Investment Management
 Field Manager
 Fraser Valley Operations

Appendix III (a)

TEST REPORT COVER SHEET

Project: GTP Substation 25VT66	Date: 20 April 2012
Title: Commissioning	File:

Project Manager: J. Moore
Field Coordinator: G. Carter / P. Hulme
Commissioning: B. Sunga

The following equipment under this Engineering Project have been inspected and tested. The test results have been reviewed and indicate that the equipment is safe to energize and operate under the condition as indicated in Notes/Deficiencies.

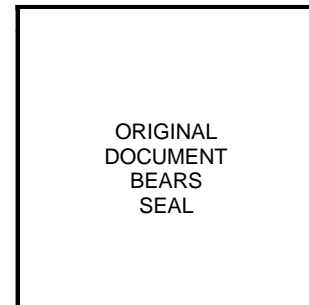
Equipment Covered:

25VT66A,B&C
Ritz
Type: VZF24-03
27.5 kV maximum voltage, 150kV BIL,
800VA, Ratios: 14400-120/72 V
Accuracies: 0.6WXY1.2Z, 1PWXY2PZ
Serial #: 11/10785533, 11/10785534, 11/10785535

Notes/Deficiencies:

Inspected/Tested by: PH / HS
BCH Engineering Field Inspection and Commissioning Procedures, dated
April 20, 2012
R.E.H
Doble test reports dated April 17, 2012

Approved by: Hanxin Zhu, P.Eng.
Reactive Equipment and Maintenance
Engineering
Transmission Engineering



Professional Seal and signature

Appendix III (b)

PROTECTION AND CONTROL TEST REPORT COVER SHEET	
Project: VCCT- MPT Substation	Date: 15/02/2014
Title: 230KV Protection & Control Commissioning	File
<p>Project Manager: Matt Drown Field Coordinator: Shane Smith CPC: Tan Lam, Wayne Tung, Samy Barakat</p> <p>The following Protection and Control equipment under this Engineering Project have been tested and commissioned. The test results have been reviewed and indicate that the equipment is safe to energize and operate under the condition as indicated in Notes/Deficiencies.</p> <p><u>Equipment Covered:</u></p> <p>2L20 PY & SY PN SEL-311-1 2L44 PY & SY PN SEL-311-1</p> <p><u>Notes/Deficiencies:</u></p> <p>Load Test and Phasing Checks to be performed after energization.</p> <p>Tested by: Wayne Tung, Samy Barakat</p> <p>Witnessed by: NA</p> <p>Test Report Reviewed by: Shah Faisal, P.Eng. Sr. Engineer PCSS, BC Hydro</p> <p>Approved by: Shah Faisal, P.Eng. Sr. Engineer PCSS, BC Hydro</p> <div style="text-align: center; border: 1px solid black; width: 150px; height: 100px; margin: 20px auto;"> ORIGINAL DOCUMENT BEARS SEAL </div> <p style="text-align: right;"><i>Professional Seal and Signature</i></p>	

Appendix III (c)

TRANSMISSION LINE - TEST REPORT COVER SHEET

Project: 1L377 Relocation	Date: 14 Feb 2014
Title: Commissioning of relocated portion of circuit	File: TY-0736

Project Manager: P. Jung
Field Coordinator: H Lennox
Professional of Record: Ming Lu
Commissioning: H Lennox/Ming lu

The following equipment under this Engineering Project have been inspected and tested. The test results have been reviewed and indicate that the equipment is safe to energize and operate under the condition as indicated in Notes/Deficiencies.

Equipment Covered:
1L377 Relocation from
Structure 12/7 to 19/6

Circuit Type: 138 kV Single Circuit Lattice Steel Tower
477 ACSR 'Hawk' Conductor
Per Contract CR 14977

Notes/Deficiencies: _____

Inspected/Tested by: H Lennox – Field Co-ordinator
Ped Zabeti – Civil Engineer
Rozlyn Lord – Structural Engineer
Ming Lu – Transmission Engineer

BCH Engineering Field Inspection and Commissioning Procedures

- Per the Project Test Summary Reports:
- Several guys need retensioning
 - A few bent and 'snow catcher' steel members need to be replaced
 - Anchor mounding not completed
 - Site drainage contouring not completed
 - Road access not cut off at several locations

Approved by: Ming Lu, PHD, P.Eng.
Transmission Engineering-Overhead
Professional of Record



Professional Seal and signature



PROJECT CONTROLLER TRANSFER OF OPERATING AUTHORITY FORM

Station and Equipment Designation OR Circuit Designation
(List all equipment to be transferred to Real Time Operations)

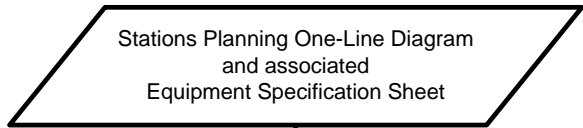
--

Effective _____ hours (hh:mm), Project Controllership over the equipment listed above is transferred to BC Hydro Real Time Operations. This serves as written notice that this equipment or circuit is deemed to be on the power system under BC Hydro Real Time Operations operating responsibility and authority.

_____ Date _____ Project Controller

Appendix V (a)

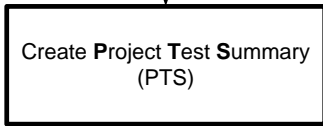
Project Major Equipment Testing Process for
Substation Equipment and Transmission Line Disconnect Switches



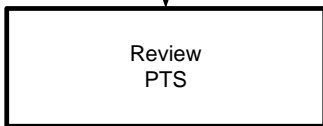
New Project Task Assignment from Project Management for the erection, gassing or oiling (as required) and testing of major station equipment or transmission line disconnect switches.

Note 1:Applies to Level I – IV equipment and level V station equipment such as batteries, chargers, AC/DC panels, transfer switches, and diesel generators.

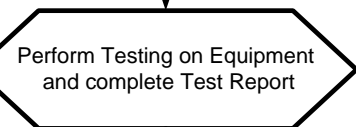
See System Operating Order 1J-11 for definition of level I through V equipment.



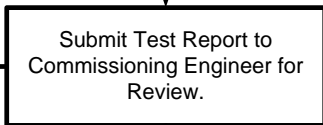
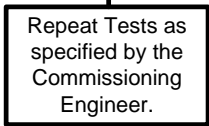
Based on the approved project Station Planning One-line, the Equipment Testing & Commissioning (ETC) Department creates a Project Test Summary (PTS) listing all major substation equipment (level I to IV and select level V) and transmission line disconnect switches to be tested including tests to be performed.



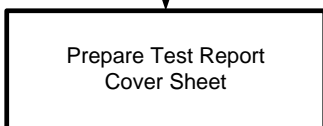
ETC Department reviews the PTS against the Stations Planning Equipment Specification sheet, equipment purchase orders, and the equipment contract specifications.



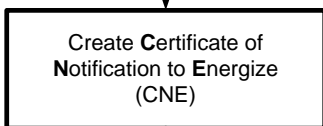
ETC Department Power/Equipment Technologists, or qualified and approved Testing personnel, performs the tests on the equipment as specified on the PTS and under the direction of the ETC department Commissioning Engineer. Signed Test Reports are submitted to the Commissioning Engineer.



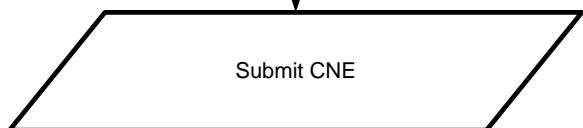
ETC Department Commissioning Engineer reviews and approves the signed Equipment Test Reports. If necessary, the Commissioning Engineer directs additional tests to be performed and a revised/signed Equipment Test Report is submitted.



The Equipment or Commissioning Engineer prepares and issues the Equipment Erection and Test Report Cover Sheet. This document signals the equipment has been installed and tested and is ready for energization.



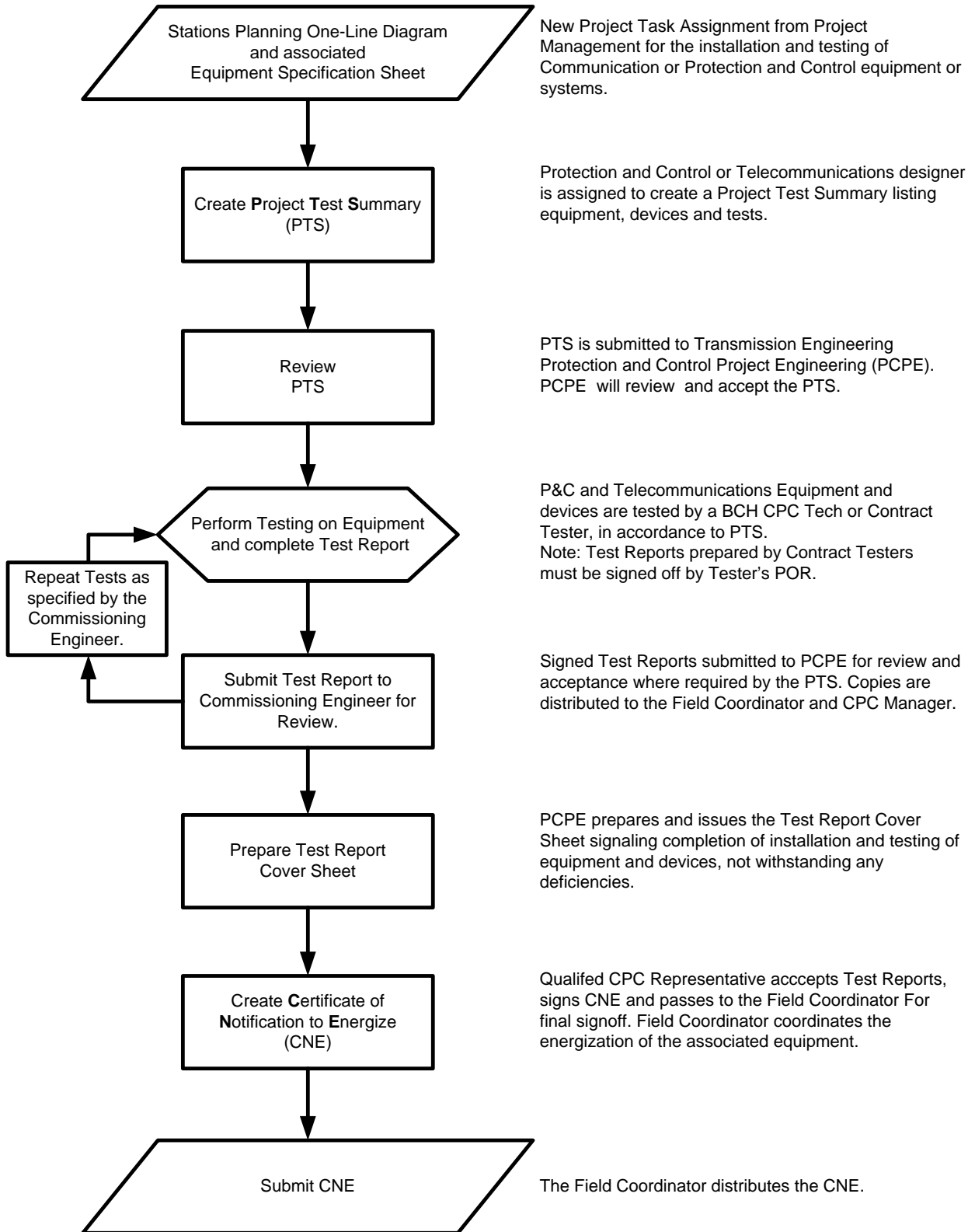
The Field Coordinator accepts the Equipment Test Reports, signs the CNE and coordinates the energization of the associated equipment.



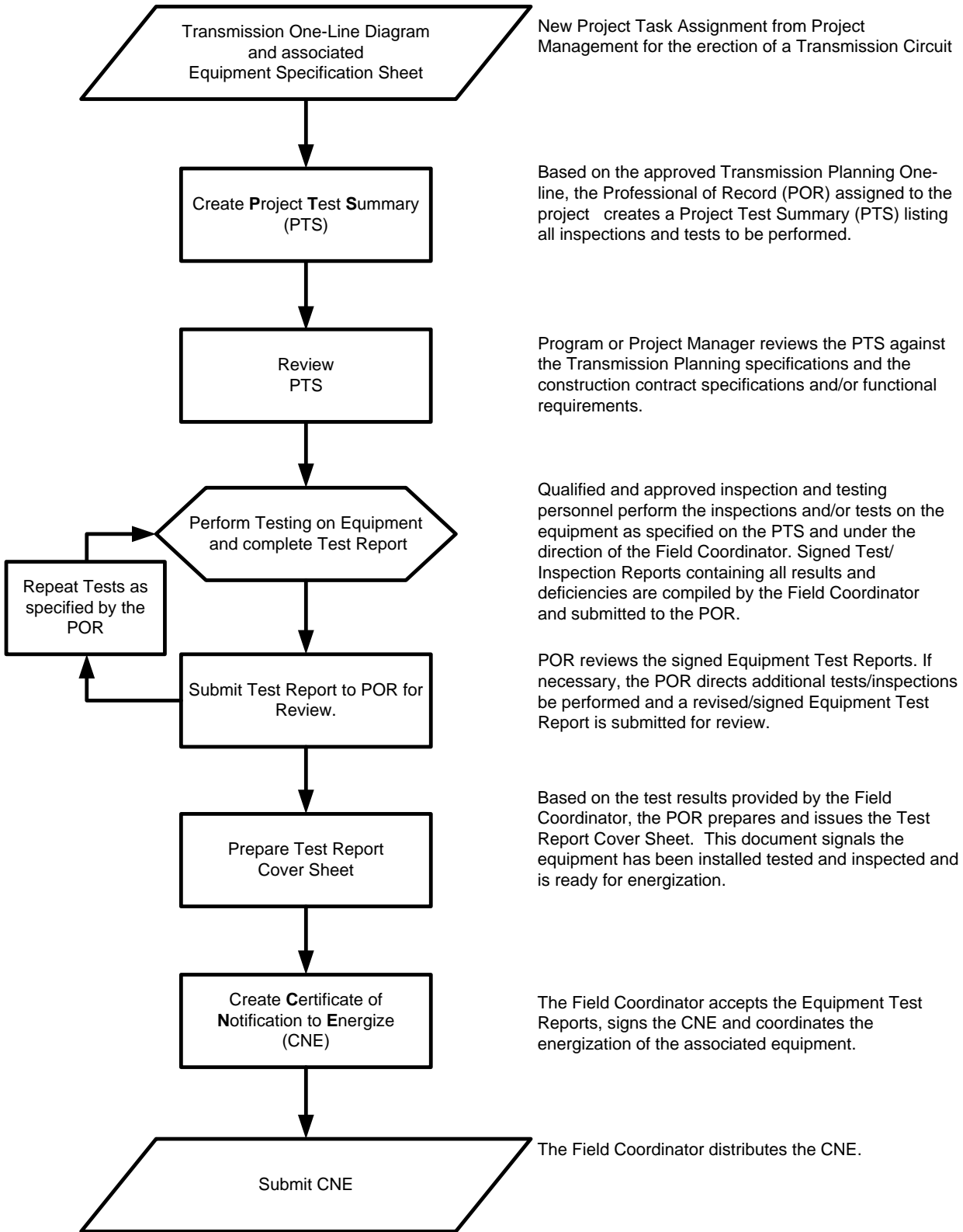
The Field Coordinator distributes the CNE.

Appendix V (b)

Project Equipment Testing Process for
 Substation Communication Protection and Control Systems



Project Equipment Testing and Inspection Process for
 Transmission Lines



New Project Task Assignment from Project Management for the erection of a Transmission Circuit

Based on the approved Transmission Planning One-line, the Professional of Record (POR) assigned to the project creates a Project Test Summary (PTS) listing all inspections and tests to be performed.

Program or Project Manager reviews the PTS against the Transmission Planning specifications and the construction contract specifications and/or functional requirements.

Qualified and approved inspection and testing personnel perform the inspections and/or tests on the equipment as specified on the PTS and under the direction of the Field Coordinator. Signed Test/Inspection Reports containing all results and deficiencies are compiled by the Field Coordinator and submitted to the POR.

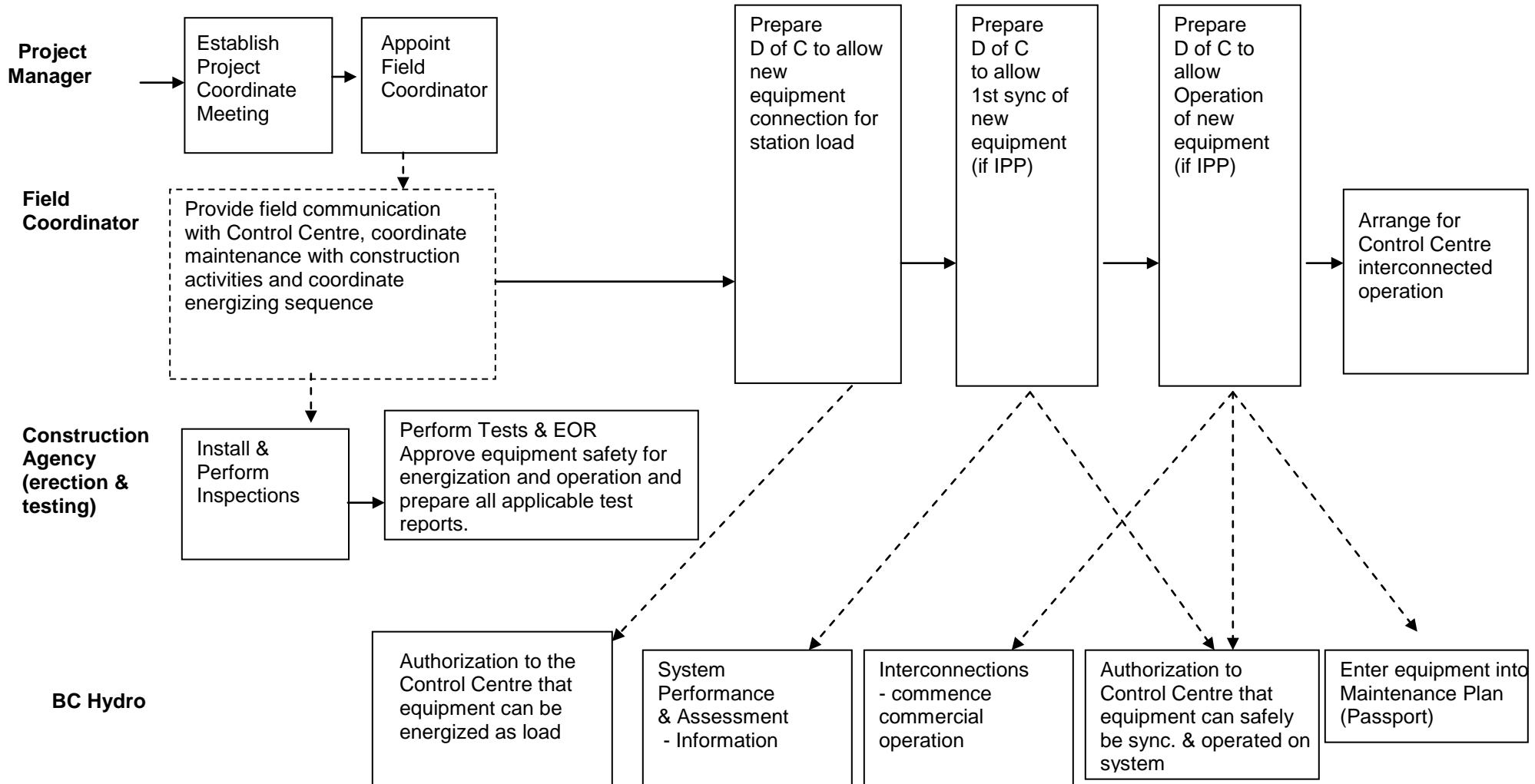
POR reviews the signed Equipment Test Reports. If necessary, the POR directs additional tests/inspections be performed and a revised/signed Equipment Test Report is submitted for review.

Based on the test results provided by the Field Coordinator, the POR prepares and issues the Test Report Cover Sheet. This document signals the equipment has been installed tested and inspected and is ready for energization.

The Field Coordinator accepts the Equipment Test Reports, signs the CNE and coordinates the energization of the associated equipment.

The Field Coordinator distributes the CNE.

Declaration of Compatibility Process (Customer Projects IPPs and TVCs)



(1) For Stations work, please consult with the BC Hydro Area Manager (M2) Stations first – see Appendix X.



**Declaration of Compatibility
 IPP Generator Facilities
 Load Only**

Customer/Station:


Pursuant to the Interconnection, the customer shall design, construct, own and maintain the customer's facilities.

Interconnection (Customer Responsibility)	Yes	No
1. Executed Interconnection (IPP) Agreement.	<input type="checkbox"/>	<input type="checkbox"/>
2. Provided a copy of Measurements Canada "Certificate of Registration".	<input type="checkbox"/>	<input type="checkbox"/>
3. Submitted the Professional Engineer's declaration(s) that the Customer System has been designed, constructed, and tested to a state suitable for operation as a load in accordance with Good Utility Practice.	<input type="checkbox"/>	<input type="checkbox"/>
4. Confirmation that the voltage fluctuation and flicker are within the guidelines specified in the Technical Interconnection Requirements for Power Generators (Section 5.2.3)	<input type="checkbox"/>	<input type="checkbox"/>

Field Verification (BC Hydro Project Manager Responsibility)	Yes	No
1. Confirmation of correct phase rotation where applicable.	<input type="checkbox"/>	<input type="checkbox"/>
2. Confirmed the coordination of the protective relay settings: <ul style="list-style-type: none"> • Line Protection. • Entrance Protection. • Electricity Quality Protection where applicable. 	<input type="checkbox"/>	<input type="checkbox"/>
3. Completed the Revenue Metering installation. Attached a copy of the BC Hydro Metering Checklist.	<input type="checkbox"/>	<input type="checkbox"/>
4. Reviewed the Customer System to confirm compliance with BC Hydro's technical requirements for operation as a load.	<input type="checkbox"/>	<input type="checkbox"/>
5. Approved the Operating Order by BC Hydro and the Customer. Customer and BC Hydro Control Centre have copies.	<input type="checkbox"/>	<input type="checkbox"/>
6. Received a copy of the Electrical Inspection Approval. Note: IPPs that have an Electricity Purchase Agreement with BCH or Powerex are exempt from taking a permit and making a declaration to the BC Safety Authority.	<input type="checkbox"/>	<input type="checkbox"/>
7. Completed the Transmission System facilities: <ul style="list-style-type: none"> • Station additions. • P&C. • Remote monitoring. • Telecommunications. 	<input type="checkbox"/>	<input type="checkbox"/>

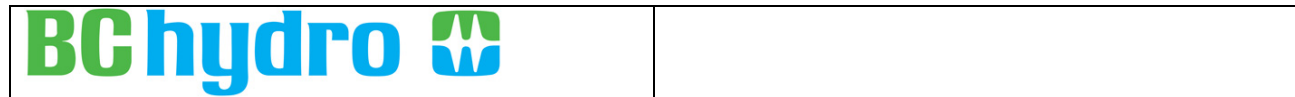
8. Completed the remote monitoring requirements consisting of generator status and telemetry, where applicable: <ul style="list-style-type: none"> • <10MVA dial up RTU/IED via business phone line. • >10MVA real time RTU/IED via dedicated communications channel. 	<input type="checkbox"/>	<input type="checkbox"/>
9. Approval by BC Hydro Real Time Operations to allow energization as a load.	<input type="checkbox"/>	<input type="checkbox"/>
10. Operating One-Line Diagram	<input type="checkbox"/>	<input type="checkbox"/>
11. If BC Hydro is to operate the customer's facilities, the customer has provided notice to permanently transfer operating responsibility and authority to BC Hydro using a CNE.	<input type="checkbox"/>	<input type="checkbox"/>
Provide explanation if "No" has been checked for any item above. 		
The undersigned do hereby declare that the above noted requirements have been satisfied and the customer is compatible for interconnection with the Transmission System for operation as a load.		
Customer or Delegate	BC Hydro or Delegate	
<i>Print Name</i>	<i>Print Name</i>	
<i>Signature</i>	<i>Signature</i>	
Date	Date	

Distribution: Project Manager
 (electronic) Area BC Hydro Field Operations Office
 Construction Agency
 BC Hydro Asset Program Manager
 BC Hydro Control Centre
 Project File
 BC Hydro Interconnections
 BC Hydro System Performance & Assessment

		
Declaration of Compatibility TVC Substation Load Customer's Facilities		
Customer/Station:		
Pursuant to the Facilities Agreement, the customer shall design, construct, own and maintain the customer's facilities.		
Interconnection (Customer Responsibility)		
	Yes	No
1. Executed Facilities (TVC) Agreement.	<input type="checkbox"/>	<input type="checkbox"/>
2. Submitted the Professional Engineer's declaration(s) that the Customer System has been designed, constructed, and tested to a state suitable for operation as a load in accordance with Good Utility Practice.	<input type="checkbox"/>	<input type="checkbox"/>
3. Confirmation that the voltage fluctuation and flicker are within the guidelines specified in the Technical Interconnection Requirements for Power Generators (Section 5.2.3)	<input type="checkbox"/>	<input type="checkbox"/>
Field Verification (BC Hydro T&D Responsibility)		
	Yes	No
1. Confirmation of correct phase rotation where applicable.	<input type="checkbox"/>	<input type="checkbox"/>
2. Confirmed the coordination of the protective relay settings: <ul style="list-style-type: none"> • Line Protection. • Entrance Protection. • Electricity Quality Protection where applicable. 	<input type="checkbox"/>	<input type="checkbox"/>
3. Completed the Revenue Metering installation. Attached a copy of the BC Hydro Metering Checklist.	<input type="checkbox"/>	<input type="checkbox"/>
4. Reviewed the Customer System to confirm compliance with BC Hydro's technical requirements for operation as a load.	<input type="checkbox"/>	<input type="checkbox"/>
5. Approved the Operating Order by BC Hydro and the Customer. Customer and BC Hydro Control Centre have copies.	<input type="checkbox"/>	<input type="checkbox"/>
6. Received a copy of the Electrical Inspection Approval.	<input type="checkbox"/>	<input type="checkbox"/>
7. Completed the Transmission System facilities: <ul style="list-style-type: none"> • Station additions. • P&C. • Remote monitoring. • Telecommunications. 	<input type="checkbox"/>	<input type="checkbox"/>
8. Completed the remote monitoring requirements consisting of generator status and telemetry, where applicable: <ul style="list-style-type: none"> • <10MVA dial up RTU/IED via business phone line. • >10MVA real time RTU/IED via dedicated communications channel. 	<input type="checkbox"/>	<input type="checkbox"/>
9. Approval by BC Hydro Real Time Operations to allow energization as a load.	<input type="checkbox"/>	<input type="checkbox"/>
10. Operating One-Line Diagram	<input type="checkbox"/>	<input type="checkbox"/>

11. If BC Hydro is to operate the customer's facilities, the customer has provided notice to permanently transfer operating responsibility and authority to BC Hydro Real Time Operations using a CNE. <input type="checkbox"/> <input type="checkbox"/>	
Provide explanation if "No" has been checked for any item above.	
The undersigned do hereby declare that the above noted requirements have been satisfied and the customer is compatible for interconnection with the Transmission System for operation as a load.	
Customer or Delegate	BC Hydro or Delegate
<i>Print Name</i>	<i>Print Name</i>
<i>Signature</i>	<i>Signature</i>
Date	Date

Distribution: Project Manager
 (electronic) Area BC Hydro Field Operations Office
 Construction Agency
 BC Hydro Asset Program Manager (Station or Transmission Line)
 BC Hydro Control Centre
 Project File
 BC Hydro Interconnections
 BC Hydro System Performance & Assessment



**Declaration of Compatibility
 Transmission Line Facilities**

Customer: _____ **Circuit Designation:** _____

Pursuant to the Interconnection or Facilities Agreement, the customer shall design, construct, own and maintain the customer's facilities, including the transmission line or alternatively pursuant to Appendix 1 of the BC Hydro Electric Tariff Supplement No. 6 (Facilities Agreement), the customer may elect to transfer the transmission line ownership to BC Hydro and if so verifies that all approvals, permits and licenses required by law have been obtained and associated rights transferred to BC Hydro in accordance with the terms and conditions in the Agreement To Own A Customer Built Transmission Line.

Interconnection (Customer Responsibility)	Yes	No
1. Executed Interconnection (IPP) or Facilities (TVC) Agreement.	<input type="checkbox"/>	<input type="checkbox"/>
2. Agreement To Own A Customer Built Transmission Line or Interim Operating Agreement executed, if applicable	<input type="checkbox"/>	<input type="checkbox"/>
3. Submitted the Professional Engineer's declaration(s) that the Customer System has been designed, constructed, and tested to a state suitable for operation in accordance with Good Utility Practice.	<input type="checkbox"/>	<input type="checkbox"/>


Field Verification (BC Hydro T&D Responsibility)	Yes	No
1. Confirmation of correct phase rotation where applicable.	<input type="checkbox"/>	<input type="checkbox"/>
2. Confirmed the coordination of the protective relay settings: <ul style="list-style-type: none"> • Line Protection. 	<input type="checkbox"/>	<input type="checkbox"/>
3. Reviewed the Customer System to confirm compliance with BC Hydro's technical requirements for operation.	<input type="checkbox"/>	<input type="checkbox"/>
4. Approved the Operating Order by BC Hydro and the Customer. Customer and BC Hydro Control Centre have copies.	<input type="checkbox"/>	<input type="checkbox"/>
5. Received a copy of the Electrical Inspection Approval.	<input type="checkbox"/>	<input type="checkbox"/>
6. Completed the Transmission Line System facilities and confirmed to meet BC Hydro requirements: <ul style="list-style-type: none"> • Property Rights. • Right of way standard, design and preparation and damage restoration. • Transmission line design and materials • Transmission line construction. • Environmental aspects. 	<input type="checkbox"/>	<input type="checkbox"/>
7. Approval by BC Hydro Real Time Operations to allow energization.	<input type="checkbox"/>	<input type="checkbox"/>
8. Operating One-Line Diagram	<input type="checkbox"/>	<input type="checkbox"/>
9. If BC Hydro is to operate the customer's facilities, the customer has provided notice to permanently transfer operating responsibility and authority to BC Hydro using a CNE.	<input type="checkbox"/>	<input type="checkbox"/>

Provide explanation if "No" has been checked for any item above.

The undersigned do hereby declare that the above noted requirements have been satisfied and the customer is compatible for interconnection with the Transmission System for operation as a transmission line and load. The transmission line will be energized upon the execution of the Agreement To Own or Transmission Line Operating Agreement or Joint Operating Order for the transmission line.


Customer or Delegate	BC Hydro or Delegate
<i>Print Name</i>	<i>Print Name</i>
<i>Signature</i>	<i>Signature</i>
Date	Date

- Distribution: Project Manager
 (electronic) Area BCH Field Operations Office
 Construction Agency
 BC Hydro Asset Program Manager (Station or Transmission Line)
 BC Hydro Control Centre
 Project File
 BC Hydro Interconnections
 BC Hydro System Performance & Assessment

		
Declaration of Compatibility IPP Generator Facilities (1st Synchronization)		
Generator:		
Pursuant to the Interconnection Agreement, the customer shall design, construct, own and maintain the Generator System.		
In accordance with the Interconnection Requirements ("60 kV to 500 kV Interconnection Requirements for Power Generators dated June 2014") and Appendix A of the Interconnection Agreement (the Project Interconnection Requirements), this declaration verifies the following:		
<u>Interconnection</u>	Yes	No
1. Executed Interconnection Agreement.	<input type="checkbox"/>	<input type="checkbox"/>
2. Provided a copy of Measurements Canada "Certificate of Registration".	<input type="checkbox"/>	<input type="checkbox"/>
3. Submitted the Professional Engineer's declaration(s) that the Generator System has been designed, constructed, and tested to a state suitable for generator commissioning in accordance with Good Utility Practice.	<input type="checkbox"/>	<input type="checkbox"/>
4. Confirmation that the voltage fluctuation and flicker are within the guidelines specified in the Technical Interconnection Requirements for Power Generators (Section 5.2.3)	<input type="checkbox"/>	<input type="checkbox"/>
5. Reviewed the Generator System to confirm compliance with BC Hydro's technical requirements for generation commissioning.	<input type="checkbox"/>	<input type="checkbox"/>
6. Approval by BC Hydro Real Time Operations to allow energization for generator commissioning.	<input type="checkbox"/>	<input type="checkbox"/>
<u>Field Verification</u>		
1. Confirmation of correct phase rotation.	<input type="checkbox"/>	<input type="checkbox"/>
2. Confirmed the coordination of the protective relay settings: <ul style="list-style-type: none"> • Line Protection. • Entrance Protection. • Electricity Quality Protection. 	<input type="checkbox"/>	<input type="checkbox"/>
3. Reviewed the Generator relay settings: <ul style="list-style-type: none"> • Excitation system controls and limiters. • Generator protective relays. 	<input type="checkbox"/>	<input type="checkbox"/>
4. Completed the Revenue Metering installation. Attached a copy of the BC Hydro Metering Checklist.	<input type="checkbox"/>	<input type="checkbox"/>
5. Approved the Operating Order by BC Hydro and the Generator. Generator and BC Hydro Control Centre have copies.	<input type="checkbox"/>	<input type="checkbox"/>
6. Received a copy of the Electrical Inspection Approval. Note: IPPs that have an Electricity Purchase Agreement with BC Hydro or Powerex are exempt from taking a permit and making a declaration to the BC Safety Authority.	<input type="checkbox"/>	<input type="checkbox"/>

7. Completed the Transmission System facilities: <ul style="list-style-type: none"> • Station additions. • P&C. • Remote monitoring. • Telecommunications. 	<input type="checkbox"/>	<input type="checkbox"/>
8. Completed the remote monitoring requirements consisting of generator status and telemetry: <ul style="list-style-type: none"> • <10MVA dial up RTU/IED via business phone line. • >10MVA real time RTU/IED via dedicated communications channel. 	<input type="checkbox"/>	<input type="checkbox"/>
9. Completed the Power Parameter Information System (PPIS) requirements.	<input type="checkbox"/>	<input type="checkbox"/>
10. Operating One-Line Diagram	<input type="checkbox"/>	<input type="checkbox"/>
11. If BC Hydro is to operate the customer's facilities, the customer has provided notice to permanently transfer operating responsibility and authority to BC Hydro Real Time Operations using a CNE.	<input type="checkbox"/>	<input type="checkbox"/>
Provide explanation if "No" has been checked for any item above. 		
The undersigned do hereby declare that the above noted requirements have been satisfied and the Generator is compatible for interconnection with the Transmission System for commissioning purposes.		
Generator or Delegate	BC Hydro Field Coordinator	
<i>Print Name</i>	<i>Print Name</i>	
<i>Signature</i>	<i>Signature</i>	
Date	Date	

Distribution: Project Manager
 (electronic) Area BC Hydro Field Operations Office
 Construction Agency
 BC Hydro Asset Program Manager (Station or Transmission Line)
 BC Hydro Control Centre
 Project File
 BC Hydro Interconnections
 BC Hydro System Performance & Assessment

		
Declaration of Compatibility – Operate Generator System IPP Hydro or Thermal Powered Turbine/Generator		
Generator:		
Pursuant to the Interconnection Agreement, the customer shall design, construct, own and maintain the Generator System.		
In accordance with the Interconnection Requirements (“60 kV to 500 kV Interconnection Requirements for Power Generators dated June 2014”) and Appendix A of the Interconnection Agreement (the Project Interconnection Requirements), this declaration verifies the following:		
<u>Interconnection</u>	Yes	No
1. Executed Standard Generator Interconnection Agreement (SGIA).	<input type="checkbox"/>	<input type="checkbox"/>
2. Provided “certificates of insurance” as per Section 18.3 in SGIA: <ul style="list-style-type: none"> • Commercial General Liability Policy. • All Risks Policy. 	<input type="checkbox"/>	<input type="checkbox"/>
3. Provided a copy of Measurements Canada “Certificate of Registration”.	<input type="checkbox"/>	<input type="checkbox"/>
4. Appointed Operating Committee members.	<input type="checkbox"/>	<input type="checkbox"/>
5. Acknowledged the need to comply with WECC and Technical Interconnection Requirements (TIR): <ul style="list-style-type: none"> • TIR Section 5.45 (Voltage and Frequency Operation During Disturbances) and 12.4 (WECC Guidelines) • Submission of the report for “Synchronous Unit Dynamic Testing/Model Validation” contained in Appendix D2 and described in Section 9.2 	<input type="checkbox"/>	<input type="checkbox"/>
6. Submitted the Professional Engineer’s declaration(s) that the Generator System has been designed, constructed, and tested to a state suitable for final operation in accordance with Good Utility Practice.	<input type="checkbox"/>	<input type="checkbox"/>
7. Confirmed that the voltage fluctuation and flicker are within the guidelines specified in the TIR for Power Generators (Section 5.2.3)	<input type="checkbox"/>	<input type="checkbox"/>
8. Submitted final documentation: <ul style="list-style-type: none"> • Operating One Line Diagram • Generator System Equipment Statement (final Generator Data Information Form (GDIF)) • Transmission Entrance Equipment Statement 	<input type="checkbox"/>	<input type="checkbox"/>
9. Confirmed the Generator System conforms with the project documentation contained within SGIA Appendix A, related to the technical requirements for generator operation (project interconnection requirements).	<input type="checkbox"/>	<input type="checkbox"/>
10. Approval by BC Hydro Real Time Operations to allow energization for generator operation.	<input type="checkbox"/>	<input type="checkbox"/>

Field Verification	Yes	No
1. Confirmation of correct phase rotation.	<input type="checkbox"/>	<input type="checkbox"/>
2. Confirmed the coordination of the protective relay settings: <ul style="list-style-type: none"> • Line Protection. • Entrance Protection. • Electricity Quality Protection. 	<input type="checkbox"/>	<input type="checkbox"/>
3. Confirmed the Generator system relay settings: <ul style="list-style-type: none"> • Governor controls. • Excitation system controls and limiters. • Generator protective relays. • Other controls if applicable, e.g. LDC, JVC 	<input type="checkbox"/>	<input type="checkbox"/>
4. Confirmed the Power System Stabilizer (PSS) settings.	<input type="checkbox"/>	<input type="checkbox"/>
5. Completed the Revenue Metering installation. Attached a copy of the BC Hydro Metering Checklist.	<input type="checkbox"/>	<input type="checkbox"/>
6. Approved the Operating Order by BC Hydro and the Generator. Generator and Control Centre have copies.	<input type="checkbox"/>	<input type="checkbox"/>
7. Received a copy of the Electrical Inspection Approval. Note: IPPs that have an Electricity Purchase Agreement with BC Hydro or Powerex are exempt from taking a permit and making a declaration to the BC Safety Authority.	<input type="checkbox"/>	<input type="checkbox"/>
8. Completed the Transmission System facilities: <ul style="list-style-type: none"> • Station additions. • P&C. • Remote monitoring. • Telecommunications. 	<input type="checkbox"/>	<input type="checkbox"/>
9. Completed the remote monitoring requirements consisting of generator status and telemetry: <ul style="list-style-type: none"> • <10MVA dial up RTU/IED via business phone line. • >10MVA real time RTU/IED via dedicated communications channel. 	<input type="checkbox"/>	<input type="checkbox"/>
10. Completed the Power Parameter Information System (PPIS) requirements before the generator's 72-hour continuous test.	<input type="checkbox"/>	<input type="checkbox"/>
11. If BC Hydro is to operate the customer's facilities, the customer has provided notice to permanently transfer operating responsibility and authority to BC Hydro Real Time Operations.	<input type="checkbox"/>	<input type="checkbox"/>
Provide explanation if "No" has been checked for any item above.		

The undersigned do hereby declare that the above noted requirements have been satisfied and the Generator is compatible for interconnection with the Transmission System for operating purposes.	
<i>Generator or Delegate</i>	<i>BC Hydro Field Coordinator</i>
<i>Print Name</i>	<i>Print Name</i>
<i>Signature</i>	<i>Signature</i>
Date	Date

Distribution: Project Manager
 (electronic) Area BC Hydro Field Operations Office
 Construction Agency
 BC Hydro Asset Program Manager (Station or Transmission Line)
 BC Hydro Control Centre
 Project File
 BC Hydro Interconnections
 BC Hydro System Performance & Assessment



**Declaration of Compatibility –Operate Generator System
 IPP Wind Powered Turbine/Generator**

Generator System:

Pursuant to the Interconnection Agreement, the customer shall design, construct, own and maintain the Generator System.

In accordance with the Interconnection Requirements (“60 kV to 500 kV Interconnection Requirements for Power Generators dated June 2014”) and Appendix A of the Interconnection Agreement (the Project Interconnection Requirements), this declaration verifies the following:

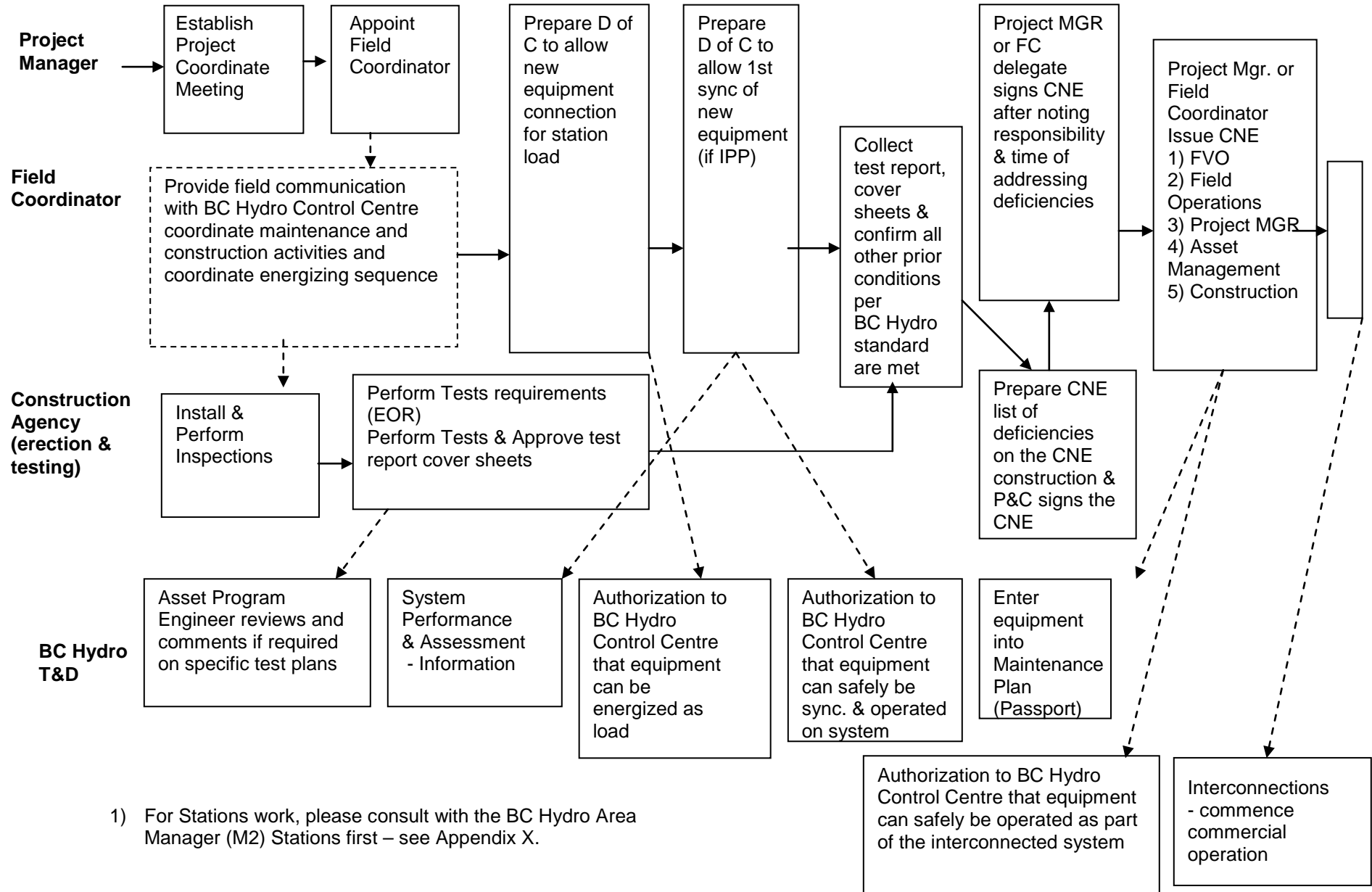
<u>Interconnection</u>	Yes	No
1. Executed Interconnection Agreement.	<input type="checkbox"/>	<input type="checkbox"/>
2. Provided “certificates of insurance” as per Section 7.3.1 and 7.3.2 of the Interconnection Agreement: <ul style="list-style-type: none"> • Commercial General Liability Policy. • All Risks Policy. 	<input type="checkbox"/>	<input type="checkbox"/>
3. Provided a copy of Measurements Canada “Certificate of Registration”.	<input type="checkbox"/>	<input type="checkbox"/>
4. Appointed Operating Committee members.	<input type="checkbox"/>	<input type="checkbox"/>
5. Confirmed compliance with BC Hydro Technical Interconnection Requirements for Power Generators - Appendix A for: <ul style="list-style-type: none"> • Voltage Ride Through. Refer to Section A2. • Ramp Up/Down Limitations. Refer to Section A8.5 • Voltage Control. Refer to Section A3. <ul style="list-style-type: none"> ○ Autonomous unit control. ○ Voltage regulation and reactive power response to control POI voltage by the Wind Farm Control Unit within full reactive power capability including other Reactive Components required to control the voltage at the POI; e.g. SVC, STATCOM, Transformer load tapchanger control. <p>The Wind Generating Facility proponent agrees to comply with the applicable Mandatory Reliability Standards requirements contained in Schedule B, Part I of the Interconnection Agreement and, if the Wind Turbine/Generator behavior does not conform to the models, is responsible for remedial action and additional costs for interconnection to the Transmission System.</p>	<input type="checkbox"/>	<input type="checkbox"/>
6. Submitted the Professional Engineer’s declaration(s) that the Generator System has been designed, constructed, and tested to a state suitable for final operation in accordance with Good Utility Practice.	<input type="checkbox"/>	<input type="checkbox"/>
7. Confirmation that the voltage fluctuation and flicker are within the guidelines specified in the Technical Interconnection Requirements for Power Generators (Section 5.2.3).	<input type="checkbox"/>	<input type="checkbox"/>

8. Submitted final documentation:	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> • Operating One Line Diagram. • Wind Farm Generation Equipment Statement – compliance with Project Interconnection Requirements • Transmission Entrance Equipment Statement – compliance with Project Interconnection Requirements. 		
9. Reviewed the Generator System to confirm compliance with all BC Hydro Technical Interconnection Requirements for wind farm generation operation.	<input type="checkbox"/>	<input type="checkbox"/>
10. Approval by BC Hydro Real Time Operations to allow interconnection for generator operation.	<input type="checkbox"/>	<input type="checkbox"/>
Field Verification	Yes	No
1. Confirmation of correct phase rotation.	<input type="checkbox"/>	<input type="checkbox"/>
2. Confirmed the coordination of the protective relay settings:	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> • Line Protection. • Entrance Protection. • Electricity Quality Protection. 		
3. Reviewed the Generator System relay settings and coordination:	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> • Excitation system controls and limiters (Wind Energy Converters and Farm Control Unit) • Generator System protective relays. 		
4. Completed the Revenue Metering installation. Attached a copy of the BC Hydro Metering Checklist.	<input type="checkbox"/>	<input type="checkbox"/>
5. Approved Operating Order by BC Hydro and the Generator. Generator and BC Hydro Control Centre have copies.	<input type="checkbox"/>	<input type="checkbox"/>
6. Received a copy of the Electrical Inspection Approval. Note: IPPs that have an Electricity Purchase Agreement with BC Hydro or Powerex are exempt from taking a permit and making a declaration to the BC Safety Authority.	<input type="checkbox"/>	<input type="checkbox"/>
7. Completed the Transmission System facilities:	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> • Station additions. • P&C. • Remote monitoring. • Telecommunications. 		
8. Completed the remote monitoring requirements consisting of generator and/or feeder status and telemetry:	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> • <10MVA dial up RTU/IED via business phone line. • >10MVA real time RTU/IED via dedicated communications channel. 		
9. Completed the Power Parameter Information System (PPIS) requirements before the generators' Commercial Operation Date (COD).	<input type="checkbox"/>	<input type="checkbox"/>
10. If BC Hydro is to operate the customer's facilities, the customer has provided notice to permanently transfer operating responsibility and authority to BC Hydro Real Time Operations.	<input type="checkbox"/>	<input type="checkbox"/>

Provide explanation if "No" has been checked for any item above.	
The undersigned do hereby declare that the above noted requirements have been satisfied and the Generator is compatible for interconnection with the Transmission System for operating purposes.	
<i>Generator or Delegate</i>	<i>BC Hydro Field Coordinator</i>
<i>Print Name</i>	<i>Print Name</i>
<i>Signature</i>	<i>Signature</i>
Date	Date

Distribution: Project Manager
 (electronic) Area BC Hydro Field Operations Office
 Construction Agency
 BC Hydro Asset Program Manager (Station or Transmission Line)
 BC Hydro Control Centre
 Project File
 BC Hydro Interconnections
 BC Hydro System Performance & Assessment

Declaration of Compatibility Process and CNE Process (BC Hydro T&D Assets - Turnkey Installations for Green Field Projects Plus Customer Projects to be Operated by BC Hydro)



Appendix X

BC HYDRO APPROVED FIELD COORDINATORS

SUBSTATIONS

Lower Mainland Substations

Stations Manager

Metro Area
FVE Area
FVW/Arnott Area
North Shore Area
Meridian
LM (all areas)

Bob Sterrett, Shane Smith

Tarek Morgan, Nick Vipond
Tom Weslowski, Richard Bailey
Ben Pancho, Craig Turnbull
John Apolzer, Greg Dziedzic
Dave Byrnell
Patrick Ywaya, Tarek Morgan

Vancouver Island Substations

Stations Manager

NVI Area
SVI Area
HVDC/VIT Area

Glen Carter

Bruce Pollock, Steve White
Paul Tutt
Ross McKenzie, David Clark

Northern Interior Substations

Stations Manager

Central/Glenannan Area
Peace Area
North Coast Area
Northern Interior

Brent von Alkier

Howie Bell, Garnet Walker
Chris Harper
Chad France, Curtis Bretherick
Brent Von Alkier

South Interior Substations

Stations Manager

Okanagan/Shuswap Area
Kootenay Area
Thompson/Nicola Area
Southern Interior

Fawn Holland

Mike Hill, Mike Claxton
Michael Robertson, Zanyar Sigarchy
Stephen Ingram, Chris Harper, Wes Hart
Fawn Holland

Transmission Circuits

All of BC

LM/VI

LM Overhead
LM Underground
VI Transmission

Steve Fowles

Enzo Bevacqua

Rafid Yonadim, Siegie Rossouw (Acting), Aidan O'Hara
Todd Wilson, Kris Kerr (Acting), Matt Barnes
Marek Smusz, Al Pineau

SI/NI

Northern Transmission
SI Transmission

Rob Lidstone

Andrew Simpson, Steve Wogan
Ian Kozicky, Brett Merkley, Paul Kramer

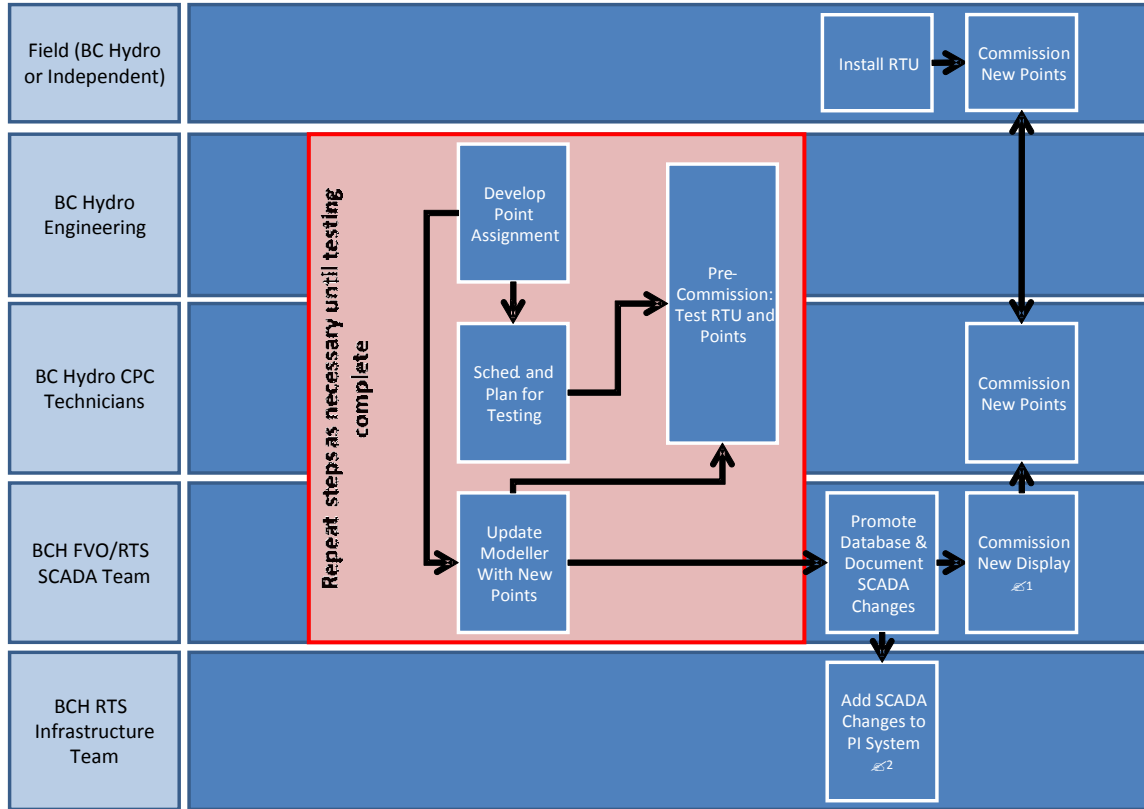
PPD FOR TRANSMISSION

ILM Project Field Coordinator

Rick Chmielewski (HATCH)

Appendix XI

BC HYDRO GRID OPERATIONS FVO/RTS SCADA Point Assignment process



Submission Guidelines

All project point assignments must be submitted to the BC Hydro EMS/SCADA Team Lead at email address, Point.Assignment@bchydro.com by the sooner of thirty (30) working days prior to the scheduled SCADA in-service date or twenty five (25) working days before the schedule pre-commissioning date. Points will only be accepted from SCADA designers identified on the BC Hydro Engineering maintained list of SCADA Designers.

For More Detailed Information

Please refer to the detailed SCADA Commissioning Procedures documentation for more information on SCADA, One Line Display and PI database changes. This document can be found on the BC Hydro Operations Support SharePoint Site:

<http://hydroshare/workgroup/OpsSupt/default.aspx>

Click on the following tabs/links: Public > Shared Documents > SCADA

You may also use the following link:

<http://hydroshare/workgroup/OpsSupt/Public/Shared%20Documents/SCADA/BCH%20SCADA%20Process%20Documentation.doc>

Appendix XII

ENERGIZING PLAN – APPROVAL SHEET AND CHECKLIST

BR1 T30

APPROVAL FOR CONTROL ROOM USE

_____ or _____
 Principal Engineer – Real Time Operations System Control Manager
 or _____
 Outage Scheduling Manager

CONTROL ROOM CHECKLIST

		Initials	Initials
1.	Are Switching Orders completed to remove tags?	YES	NO
2.	Is same Energizing Plan revision being held by the field? Confirmed by: _____(Field Coordinator)	YES	NO
3.	Energizing sequence progress: START: Date/Time: _____ PAUSE. Stage/Step: _____ Date/Time: _____ PAUSE. Stage/Step _____ Date/Time: _____ PAUSE. Stage/Step: _____ Date/Time: _____ PAUSE. Stage/Step: _____ Date/Time: _____ END: Date/Time: _____		
4.	Operators Notes:		

5.		
Completed Energizing Plan filed with log sheets?	YES	NO

Mandatory Communication Procedure

All verbal communication between the Operator and authorized field worker will utilize 3-part communication procedures:

1. The Operator will specify the sequence stage/step numbers to be completed. The authorized field worker will repeat-back the instruction, and the Operator will confirm it being correct before giving approval to proceed.
2. The field worker will notify the Operator when the sequence stage(s)/steps are completed. The Operator will repeat-back the information and the field worker will acknowledge it being correct.
3. The Operator will track the energizing progress by checking off steps on the document.

Contact Information

BR1 Substation
 FVO Grid 1 Desk

Objective

The objective of this switching is to:

- Initially energize BR1 T30, 60CB30, 60VTT30, 12VTT30, 2SA30, 60SA30, 12SA30 and connecting bus.
- Confirm BR1 T30 bus phasing.
- Load test BR1 T30 PY/SY, 60B2 PY/SY, BR1 2L19 51L protections.

Note: The new 60B1 protection installation is tentatively scheduled for 16 February 2014 and dependent on approval of a 60B1 outage.

STAGE 1: INITIAL ENERGIZING AND BUS PHASING

Pre-Conditions

- CNE received at FVO for BR1 T30, 60CB30, 60VTT30, 12VTT30, 2SA30, 60SA30, 12SA30.
- BR1 operating one line diagram revised and posted on SIS.
- BR1 PN Information Sheets revised and received at FVO.
- OO 3T-BR1-01 revised.
- OO 7T-25 revised and posted on SIS.
- TSA revised with new templates.
- All protective grounds confirmed removed from the T30 isolation zone between BR1 2D30 and BR1 60DCB30.
- T&W for T30 isolation zone returned and canceled.
- Switching completed to:
 - Remove T&W tag from BR1 2D30.
 - Remove T&W tag from BR1 60DCB30.
 - Remove T&W tag and close secondary on BR1 60VTT30.

- Remove T&W tag and close secondary on BR1 12VTT30.
- BR1 60CB30 'b' contact in the new SON Gen Shed logic has jumper removed.
- BR1 60CB30 inputs to new BR1 Gen Shed logic have jumpers removed.

Initial Configuration

The following initial configuration must be confirmed prior to proceeding with Switching:

- 2L19 in service and on load.
- 60L21 in service and on load.
- 60L22 in service and on load.

- BR1 60CB1 closed.
- BR1 60CB2 closed.
- BR1 60CB3 closed.
- BR1 60CB5 closed.

- BR1 60CB30 open.
- BR1 60DCB30 locked open.
- BR1 60VTT30 sec closed.
- BR1 12VTT30 sec closed.
- BR1 2D30 locked open in manual.
- T30 LTC on Tap #11 (230000-64500 V).

- CT inputs to T30 PY and SY protections from T30 HV CTs shorted and isolated. This will open the differential protection zone to 2D30.
- BR1 T30 PY/SY PN in service **with tripping blocked to:**
 - BR1 60CB3
 - BR1 60CB3 BF PN
 - Key to Zone C Trip to BRT
- BR1 2L19 51L PN in service **with:**
 - the CT input from T30 HV Inner CT shorted and isolated. 2L19 51L protection will not cover the zone between T30 HV bushings and 2D30.
- BR1 60B2 PY/SY PN in service, including tripping to 60CB30.

Switching

Caution: T3 off load tap position is unknown.

Caution: Total SON + WDN generation must be less than 35 MW with BR1 60CB1 open.

1. SON 60 KV Gen Shed – DISARM,
2. SON G1 – adjust output to less than 18 MW for switching.
3. BR1 60CB1 – open. 60L21 off loaded at BR1.
4. SON G1 – restore total SON+WDN output to 35 MW.
5. BR1 60CB5 – open. De-energize 60B2.
6. BR1 60DCB30 – close.
7. BR1 2D30 – lock in electrical (auto)
8. **All personnel confirmed clear of BR1 60B2.**
9. BR1 60CB5 – close. Energize 60B2 to 60CB30 and 60CB1.
10. BR1 60VT5 sec – CPC measure and record voltage magnitude and angles. This is the bus phasing reference. Notify when ready to proceed to the next step.
11. **All personnel confirmed clear of BR1 T30.**
12. BR1 60CB30 – close. Energize T30 and bus to 2D30.
Wait 15 minutes.
13. BR1 60CB30 – open. De-energize T30 and bus to 2D30.
14. BR1 60CB5 – open. De-energize 60B2.
15. CPC restore BR1 T30 PY/SY PN tripping to:
 - BR1 60CB3

- BR1 60CB3 BF PN
 - Key to Zone C Trip to BRT
16. CPC restore BR1 2L19 51L PN tripping to:
- BR1 60CB3
 - BR1 60CB3 BF PN
 - Key to Zone C Trip to BRT

Notify FVO when all protection tripping is confirmed restored to service.

17. **All personnel confirmed clear of BR1 T30 and BR1 60B2.**
18. BR1 2D30 – close. Energize T30 and bus to 60CB30.
19. BR1 60CB30 – close. Energize 60B2.
20. BR1 60VT5 sec – CPC measure and record voltage magnitude and angles. Compare the angles are same as measured in Step 10. This will confirm the T30 phasing.
21. BR1 T30 – adjust LTC (boost and buck) and measure voltage to confirm proper operation. **Do not exceed 70.0 kV.** Notify FVO when ready to proceed to Stage 2.

Note: Proceed directly to Stage 2 or de-energize T30.

STAGE 2: 60L21 PLACED ON LOAD AND PROTECTION LOAD TESTING

Switching

1. SON 60 kV Gen Shed – check DISARMED.
2. SON G1 – adjust output to less than 18 MW for switching.
3. BR1 T30 LTC – adjust voltage to match 60L21 voltage
4. BR1 60CB1 – synch close. Adjust SON generation, if required. 60L21 on load at BR1.
5. SON 60 kV Gen Shed – ARMED.
6. SON G1 – restore to normal loading.
7. CPC load test BR1 T30 PY/SY, 60B2 PY/SY, BR1 2L19 51L protections. Notify FVO when completed and results confirmed correct.

Appendix XIII (a)

NEW DISTRIBUTION SUBSTATION:

OPERATING ORDER AND ONE LINE DOCUMENTATION REQUIREMENTS

Operating Orders	
1D-51	Add Reclosing Policy for the new feeders
1T-11A	Add Operating Authority assignment for the new substation
1T-22	Update to identify special scheduling concerns if any
1T-29B	Add bus reclose policy for the new bus(s)
1T-82	Add the new substation callout information
1T-84	Add the new substation fax number
2T-05	Add worker protection grounding requirements
3T-XXX-01	New substation operating order
3T-XXX-02	New substation alarm order
3T-YYY-01	Modify all associated substation orders that are connected on the same line to include references to the new substation (if required)
5T-02	Add reclosing for newly connected lines or changes to reclosing
5T-03	Update references to line disconnect capabilities if any
5T-07	Add information for new substation current carrying capability
5T-10	Add ratings for new line sections, or if existing line is sectionalized
7T-80,81,82,82,84	Add off-load tap information
One Line Diagrams	
XXX	Add new substation to line end information for all associated substations that are connected on the same line
XXX	New substation one line diagram
Tool	Show new substation connection

Appendix XII (b)

NEW TRANSMISSION SUBSTATION:

OPERATING ORDER AND ONE LINE DOCUMENTATION REQUIREMENTS

Operating Orders	
1J-11	Update for new Level 1 or 2 transmission circuits
1T-11A	Add Operating Authority assignment for the new substation
1T-22	Update to identify special scheduling concerns if any
1T-82	Add the new substation callout information
1T-84	Add the new substation fax number
2T-05	Add worker protection grounding requirements
3T-XXX-01	New substation operating order
3T-XXX-02	New substation alarm order
3T-YYY-01	Modify all associated substation orders that are connected on the same line to include references to the new substation (if required)
5T-02	Add reclosing for newly connected lines or changes to reclosing
5T-03	Update references to line disconnect capabilities if any
5T-10	Add ratings for new line sections, or if existing line is sectionalized
7T-80,81,82,82,84	Add off-load tap information
One Line Diagrams	
XXX	Add new substation to line end information for all associated substations that are connected on the same line
XXX	New substation one line diagram
Tool	Show new substation connection