Contents

Revision History

Revised By:	Reviewed By:	Revision Date	Summary of Revision(s)
Asher Steed	Eric Desjardins	June 26, 2019	Initial Version
Asher Steed		August 26, 2019	Added Revision History Section A - Added references to BCUC Order G199-19 approving BC Hydro's RC registration. Section H - Added reference to CAISO RC Coordination agreement.
Asher Steed	Eric Desjardins Tania Jones	August 28, 2020	Introduction – Change Regional Reliability Organization (RRO) to Region, remove references to Teck Metals Ltd. as they have deregistered as Transmission Operator Section H - remove references to Peak Reliability

Introduction

The North American Electric Reliability Corporation (NERC) Standards and the Mandatory Reliability Standards (MRS) adopted by the British Columbia Utilities Commission (BCUC) require every Region, subregion, or interregional coordinating group to establish a Reliability Coordinator to continually assess transmission reliability and coordinate emergency operations among the operating entities within the region and across the regional boundaries.

BC Hydro and Power Authority serves as both the Reliability Coordinator and the Balancing Authority for the Province of British Columbia, within the Western Electricity Coordinating Council. The Reliability Coordinator functions are under the functional authority of the Manager, Provincial Reliability Coordination Operations, who reports to the Director of Transmission and Distribution System Operations. The department performing the Reliability Coordinator functions is referred to as the British Columbia Reliability Coordinator or BCRC. The BCRC reliability area is defined as the physical footprint of the province of British Columbia. The BCRC is recognized as the RC for the BC Hydro Balancing Authority and for the following Transmission Operators: BC Hydro and FortisBC.

British Columbia is synchronously interconnected to the Province of Alberta and to the State of Washington. BC Hydro has established a Reliability Coordinator Standards of Conduct ensuring functional separation and independence, and aligning the transmission activities, planning, and operations to BCUC, NERC and FERC standards. All power marketing activities are carried out by BC Hydro's wholly owned subsidiary, Powerex Corp. which exists in a separate headquarters than the BC Hydro Control Centres.

The BCRC is responsible for the bulk electric system (BES) reliability within its Reliability Coordination Area. BES reliability functions include assessment of real-time, current day and next-day operating conditions, loading relief procedures, re-dispatch of generation, coordination of transmission and generation outages and ordering curtailment of transactions and/or load or other actions as deemed necessary to maintain or restore BES reliability. BCRC policies and procedures are consistent with those of the B.C. MRS.

The BCRC authorized personnel have the authority to approve or cancel planned transmission and generation outages within its RC area (including those to its telecommunication system, monitoring and analysis capabilities).

A. Responsibilities – Authorization

Reliable Operations – The British Columbia Utilities Commission, through Order G-199-19, has granted the BCRC with the authority to act as necessary to support and maintain the Reliable Operation of the Bulk Electric System of B.C. and the Western Interconnection. Through the authority granted by Order G-199-19, the BC Reliability Coordinator (BCRC) has the responsibility and authority to act to address the reliability of the RC area, in both real-time and next-day operations, by issuing Operating Instructions to the B.C. MRS Registered Entities to take actions up to and including shedding firm load. The BCRC authorized personnel have the responsibility and authority to direct these actions without obtaining prior approval from higher level personnel within BC Hydro.

The BCRC has a wide-area view, operating tools, processes and procedures and the authority given by Order G-199-19 to prevent or mitigate emergency operating situations in real-time, current-day operations, and next-day operations. More detail is provided in appropriate sections of this document.

The BCRC has clear decision-making authority to act and to direct actions to be taken by B.C MRS Registered Entities within its Reliability Coordination Area to preserve the integrity and reliability of the Bulk Electric System. The BCRC responsibilities and authorities are clearly defined in the governing documents.

The BCRC has not delegated any of its Reliability Coordinator responsibilities.

Independence – The BCRC, as the Reliability Coordinator for the Province of B.C., does and will act first and foremost in the best interest of its Reliability Coordination Area and the Western Interconnection before that of any other entity. The expectation of independence is clearly identified in the governing documents included in Appendix A.

BCRC Operating Instruction Compliance – As indicated in BCUC Order G-199-19, the B.C. MRS Registered Entities in the BCRC area are obligated to comply with the BCRC Operating Instructions, unless such actions cannot be physically implemented or will violate safety, equipment, regulatory, or statutory requirements. Under these circumstances, the entity shall, without delay, inform the BCRC authorized personnel of the inability to perform the instruction, so that the BCRC authorized personnel may implement alternate actions.

B. Responsibilities – Delegation of Tasks

The BCRC has not delegated any of its Reliability Coordinator responsibilities.

C. Common Tasks for Next-Day and Current-Day Operations

This section documents how the BCRC conducts current-day and next-day reliability analysis for its Reliability Coordination Area.

1. **Determination of Interconnection Reliability Operating Limits (IROLs**) – The BCRC has a System Operating Limits Methodology for the operation horizon which includes establishing and communicating IROLs. The RC will determine the need for establishing IROLs based on studies performed one or more days prior to real-time that identify instability, Cascading or uncontrolled separation affecting an undetermined area or a wide area of the system. Presently, there are no IROLs identified in the BCRC Area.

   When establishing IROLs, the BCRC will coordinate with impacted entities to develop an Operating plan that identifies facilities that are critical to the derivation of the IROL, the value of the IROL and its associated Tv, the associated contingencies, and to ensure that all entities understand their role in the plan.

2. **Operation to prevent the likelihood of a SOL or IROL exceedance in another area of the Interconnection and operation when there is a difference in limits** - The BCRC, through agreements with its RC neighbours, coordinates operations to prevent the likelihood of an SOL or IROL exceedance in another area. These agreements include data exchange to support the reliable operation of the Interconnection as described in Section H.

   TOPs in the BCRC Area are required to follow Operating Instructions provided by the BCRC per BC MRS and operate to BC MRS to prevent the likelihood that a disturbance, action, or non-action in its Reliability Coordination Area will result in an SOL or IROL exceedance in another area of the Interconnection. When there is a difference in derived limits, the BCRC utilizes the most conservative limit until the difference is resolved.

3. **Operation under known and studied conditions and re-posturing without delay and no longer than 30 minutes** - The BCRC ensures that entities within its RC Area always operate under known and studied conditions and that they return their systems to a secure operating state following contingency events within approved timelines, regardless of the number of contingency events that occur or the status of their monitoring, operating and analysis tools. The BCRC also ensures its BA and TOPs re-posture the system to within all IROLs following contingencies within T*v* or 30 minutes, whichever is shorter.

The BCRC conducts next business day Operational Planning Analyses (OPA) utilizing planned outages, forecasted loads, generation commitment, and expected net interchange. The analyses include contingency analysis, voltage security analysis on key interfaces. These analyses model peak conditions for the day and are conducted utilizing Single Contingency (N-1) as well as credible Multiple Contingency analysis. The OPA considers Operating Plans developed by BA and TOPs, and the BCRC will ensure that these plans get revised with additional mitigation actions as needed for potential exceedances determined in the next-day Operational Planning Analysis. Results and mitigation are documented in the next-day Operational Planning Analysis Report (OPA) and distributed to BCRC Reliability staff.

The BCRC OPA Report is posted on the BCRC Extranet secure web site for the BA and TOPs in the BCRC Reliability Coordination Area and neighbours to view and download. The BCRC OPA report includes significant generation outages, significant line outages, projected constraints, load forecast, generation unit commitments, and interchange schedules. The BCRC OPA is reviewed with TOPs, the BC Hydro BA, and neighbouring RCs where expected system conditions for the day are discussed, along with action required to mitigate any abnormal conditions. Additional conference calls are conducted with the same group when conditions warrant.

4. **Communicating SOLs and IROLs** – The BCRC monitors BES Facilities, the status of Remedial Action Schemes, and non-BES facilities identified as necessary by the BCRC, within its Reliability Coordinator Area and neighbouring Reliability Coordinator Areas to identify any SOL exceedances and to determine any IROL Limit exceedances within its Reliability Coordinator Area. The RC Operator is able to monitor the reliability and security of the BCRC Area through the monitoring of pre-contingency SOL and IROL exceedances identified by EMS alarms and State Estimator, and monitoring post-contingency SOL and IROL exceedances identified by Contingency Analysis results.

   SOLs are established in the BCRC Area by Transmission Operators consistent with the BCRC's System Operating Limit Methodology. The BCRC communicates IROLs within its wide-area view and provides updates to IROLs in reports, conference calls, and real-time via voice and messaging.

5. **BCRC process for issuing operating instructions** – The BCRC has implemented a communication protocol for the issuing/receiving of operating instructions. The BCRC issues operating instructions in a clear, concise and definitive manner. The BCRC ensures

that the person receiving the operating instruction repeats the information back correctly, and acknowledges the response as correct or repeats the original statement again to resolve any misunderstandings. The BCRC's process for issuing operating instructions is documented in 8T-11 Communication Protocols procedure.

D. Next Day Operations

This section documents how the BCRC conducts the next-day Operational Planning Analysis (OPA) for its Reliability Coordination Area.

Reliability Analysis and System Studies - The BCRC performs an OPA to assess planned operations for the next business day (and weekends/holidays that fall before the next business day) to ensure that the Bulk Power System can be operated reliably in pre- and post-contingency conditions. One study is typically performed for the entire BCRC Area.

Each business day and more often as required, the BCRC performs an OPA including equipment outages, forecast loads, generation commitments, and expected net interchange. All BES facilities and some non-BES facilities in the BCRC Area are monitored for all contingency cases and the base case. Base case flows on all monitored facilities are compared against their normal rating and pre-determined stability limits, and post-contingent flows for all monitored facilities are compared against their emergency rating. Voltage stability analysis is conducted on key critical interfaces to determine a flow limits.

The OPA considers Operating Plans developed by BA and TOPs. The BCRC will ensure that these plans get revised with additional mitigation actions as needed for potential exceedances identified in the next-day operational planning analysis. The BCRC will communicate with impacted entities to address potential exceedances immediately as they are identified.

Information Sharing – The BA, and TOPs in the BCRC Reliability Coordination Area and neighbouring RCs provide to the BCRC all information required for system studies, such as equipment outages, load forecast, generation unit commitments as per 8T-20 BCRC Data Specification and through data sharing agreements. The entities in the BCRC Reliability Coordination Area provide generation and transmission facility statuses per BCRC outage coordination requirements. BCRC Reliability Coordination Area load forecast is provided by the BC Hydro BA and is independently calculated in the BCRC EMS. Known interchange transactions involving the BCRC area are provided in the Western Interchange Tool (WIT).

Sharing of Study Results - The BCRC shares the results of its next-Day OPA with BCRC Reliability staff, entities within its Reliability Coordination Area and with other RCs. Study results for the next day up to and including the next business day typically are available no later than 14:00 Pacific Prevailing Time, unless circumstances warrant otherwise.

The next-day OPA is distributed to BCRC Reliability staff and is posted on the BCRC Extranet secure website for the BA/TOPs in the BCRC Reliability Coordination Area and neighbouring RCs to view and download.

E. Current Day Operations

This section documents how the RC conducts current-day reliability analysis for the RC area.

1. The BCRC uses a suite of real time network analysis tools to continuously monitor all Bulk Electric System (BES) and relevant Non-BES facilities within the BCRC Area and adjacent areas, as necessary, to ensure that the BCRC is able to determine any potential SOL and IROL violations within its Reliability Coordination Area.

   The BCRC utilizes a state estimator, real-time contingency analysis and real-time voltage stability analysis as the primary tools to monitor facilities. The BCRC models all transmission elements in the BCRC Area operated at voltages greater than 25kV. The model also has extensive representation of neighbouring facilities in order to provide an effective wide-area view. The BC Hydro State Estimator Model currently includes over 8,000 buses. This model is typically updated weekly and may be updated on demand when deemed necessary.

   Real Time Contingency Analysis (RTCA) is performed on approximately 700 contingencies, defined by BCRC engineering staff, using the state estimator model approximately every 4 minutes. Contingencies include all BES equipment and critical non-BES facilities in the BCRC Area and neighbouring contingencies that would impact facilities located within the BCRC Area. The actions from Remedial Action Schemes modeled within the EMS are included when RTCA contingencies are applied.

   Real Time Voltage Stability Analysis (RTVSA) is performed on the 7 defined contingencies that make up the Interior-Lower Mainland path. RTVSA utilizes the most recent state estimator solution as its base case and provides updated results every 3-4 minutes.

   SCADA alarming and RTCA pre-contingency results is utilized to alert the BCRC of any actual low of high voltages or facilities loaded beyond their normal or emergency limits.

   In addition to the above applications, the BCRC uses several displays to maintain a wide area view for real-time and N-1 conditions. Transmission facilities assessed as critical are depicted on the e-terra vision overview for the BCRC Area and neighbouring areas. RTCA results as well as flows (MW and MVAR), indication of facilities out of service, and high/low voltage warning and alarming can be displayed on this overview. The RC Overview display monitors actual generation, frequency, and real and reactive reserves. The RC Voltage display monitors important substation voltages rated at 138kV and

above. Substation one-line diagrams are used for station level monitoring and information.

As required by the RC to RC coordination agreements it has with its neighbouring RCs, the BCRC will make reasonable efforts to provide notice to a neighbouring RC if the BCRC identifies an operational concern in that RC's area (e.g. declining voltages, excessive reactive flows, or an IROL exceedance). The BCRC directs action to provide emergency assistance to all Reliability Coordination neighbours, during declared emergencies, which is required to mitigate the operational concern to the extent that the same entities are taking in kind steps and the assistance would be effective.

2. The BCRC maintains awareness of the status of all current critical facilities whose failure, degradation or disconnection could result in an SOL or IROL exceedance within its Reliability Coordination Area via State Estimator, RTCA, SCADA alarming, and transmission displays. The BCRC is aware of the status of any facilities that may be required to assist Reliability Coordination Area restoration objectives via these same displays and tools.

3. The BCRC is continuously aware of conditions within its Reliability Coordination Area and includes this information in its reliability assessments via automatic updates to the state estimator, e-terra vision, and transmission displays. The BCRC monitors its Reliability Coordination Area parameters, including the following:

   3.1 Current status of Bulk Electric System elements (including critical auxiliaries such as Automatic Voltage Regulators), and system loading are monitored by state estimator, RTCA, SCADA Alarming, e-terra vision, and transmission displays. TOPs are required to report to the BCRC when Automatic Voltage Regulators are not in-service and when Remedial Action Schemes are not available or degraded or the corresponding teleprotection fails.

   3.2 Current pre-contingency element conditions (voltage, thermal, or stability) are monitored by state estimator, SCADA Alarming, e-terra vision, and transmission displays.

   3.3 Current post-contingency element conditions (voltage, thermal, or stability) are monitored by RTCA, e-terra vision and transmission displays.

3.4 System real reserves are monitored versus required on the RC Overview display. Reactive reserves versus required are monitored via monitoring adequacy of calculated post-contingent steady state voltages versus voltage limits, voltage stability interfaces against limits, and reactive reserves versus required when applicable.

3.5 Capacity and energy adequacy conditions - via monitoring reserve requirements and regional reporting.

3.6 Current ACE for the Balancing Area is displayed on a BAAL chart to the BCRC. When ACE exceeds BAAL the operating point will be depicted outside the BAAL limits and the RC Operator will receive an alarm.

3.7 Planned generation dispatches for the BCRC Area are provided to the BCRC in the form of the unit commitment plan.

3.8 Planned transmission or generation outages are reported to the BCRC via the Control Room Operating Window (CROW) application.

Contingency Events are monitored by state estimator, RTCA, SCADA Alarming, e-terra vision, and transmission displays. The BA and TOPs are required to report Contingency Events to the BCRC.

4. The BCRC monitors Bulk Power System parameters that may have significant impacts upon its Reliability Coordination Area and neighboring Reliability Coordination areas with respect to:

4.1 The BCRC maintains awareness of all Interchange Transactions that wheel-through, source, or sink in its Reliability Coordination via NERC E-tags and OATI displays. Interchange Transaction information is made available to all RCs via NERC E-tags.

4.2 The BCRC evaluates and assesses any additional Interchange Transactions that would exceed IROL or SOLs by comparing current system conditions and limits to RTCA results. As flows approach their IROL or SOLs, the BCRC evaluates the incremental loading next-hour transactions would have on the SOLs or IROLs and determines if action needs to be taken to prevent an SOL or IROL exceedance. The BCRC has the authority to direct all actions necessary and may utilize all resources to address a potential or actual IROL exceedance up to and including load shedding.

4.3 The BCRC monitors the BC Balancing Area Operating Reserves versus required to ensure the required amount of Operating Reserves are provided and available as required to meet NERC Control Performance Standards. The BCRC is alerted if reserves fall below required. If necessary, the BCRC will direct the Balancing Area to replenish reserves including obtaining assistance from neighbours as needed.

4.4 The BCRC identifies the cause of potential or actual SOL or IROL exceedances via analysis of state estimator results, RTCA results, SCADA Alarming of outages, transmission displays of changes, and Interchange Transaction impacts. The BCRC will initiate control actions including transmission switching, generation redispatch, and/or emergency procedures to relieve the potential or actual IROL exceedance without delay, and no longer than 30 minutes. The BCRC is authorized to direct utilization of all resources, including load shedding, to address a potential or actual IROL exceedance.

4.5 The BCRC communicates start and end times for time error corrections to the Balancing Authority within its RC Area. The BCRC communicates Geo-Magnetic Disturbance forecast information to BAs, TOPs, and will assist in development of any required response plan. The BCRC uses a dedicated messaging system to communicate timer error correction and GMD forecast information to its Balancing Authority.

4.6 The BCRC participates in NERC Hotline discussions, assists in the assessment of reliability of the Regions and the overall interconnected system, and coordinates actions in anticipated or actual emergency situations. The BCRC will disseminate this information within its area as appropriate.

4.7 The BCRC monitors system frequency and its Balancing Authority's performance and will direct any necessary rebalancing required for the BA to return to CPS and Disturbance Control Standard (DCS) compliance. The BCRC receives a visual indication when ACE exceeds BAAL and/or L10. When necessary, the BCRC directs the Balancing Authority to return to within BAAL and/or L10. The BCRC will direct its BA to utilize all resources, including firm load shedding, as necessary to relieve an emergency condition. The NWPP Reserve Sharing program is normally the resource used by the BCRC's Balancing Authority to relieve an emergency condition associated with CPS and DCS compliance.

4.8 The BCRC coordinates with neighbouring RCs, BAs and TOPs, as needed, on the development and implementation of Operating Plans, Procedures, and Processes to mitigate potential or actual SOL and IROL exceedances. The BCRC coordinates pending generation and transmission maintenance outages with other RCs, as necessary, in both the real-time and next-day reliability analysis timeframes. The BCRC participates in periodic conference calls with neighbouring RCs as necessary.

4.9 The BCRC will assist its BA in arranging for assistance from neighboring RCs or Balancing Authorities via the Energy Emergency Alert (EEA) notification process and will conference parties together as appropriate.

4.10 The BCRC monitors the BC Balancing Authority to identify the sources of large ACE that may be contributing to frequency, time error, or inadvertent interchange and directs corrective actions with its Balancing Authority.

4.11 The TOPs within the BCRC Reliability Area must inform the BCRC of all changes in status of Remedial Action Schemes (RAS) including any degradation or potential failure to operate as expected by the TOP. The BCRC factors these RAS changes into its reliability analyses.

5. The BCRC issues alerts, as appropriate, to its BA and TOPs when it foresees a transmission problem (such as an SOL or IROL exceedance, loss of reactive reserves, etc.) within its Reliability Area that requires notification. The BCRC issues alerts, as appropriate, to all RCs via the Reliability Coordinator Information System when it foresees a transmission problem (such as an SOL or IROL exceedance, loss of reactive reserves, etc.) within its Reliability Area that requires notification.

6. The BCRC confirms Real-time Assessment results via analyzing results of state estimator/RTCA, and discussions with local TOPs and neighbouring RCs. The BCRC identifies options to mitigate potential or actual SOL or IROL exceedances via examining existing operating plans, system knowledge, and power flow analysis to identify and implement only those actions as necessary as to always act in the best interests of the interconnection.

F. Emergency Operations

The BCRC utilizes the BCRC Emergency Operating Procedures, posted on the BCRC extranet site, to return the transmission system to within any applicable IROLs within the required mitigation times.

The BCRC Emergency Operating Procedures document the processes and procedures the BCRC follows when directing its BA and TOPs to re-dispatch generation, reconfigure transmission, manage Interchange Transactions, or shed firm load, to return the system to a reliable state. The BCRC coordinates its alert and emergency procedures with other RCs via seam coordination agreements listed in Section H.

The BCRC will monitor system frequency and its Balancing Authority's performance. If the BCRC determines that its BA is contributing to a frequency excursion, the BCRC will direct the BA to use all resources available, including load shedding, to comply with CPS and Contingency Reserve requirements.

The BCRC utilizes the BCRC Emergency Operating Procedures when it is experiencing a potential or actual Energy Emergency within its BA, Reserve-Sharing Group, or Load-Serving Entity within its Reliability Coordination Area. The BCRC Emergency Operating Procedures document the processes and procedures the BCRC uses to mitigate the emergency condition, including a request for emergency assistance if required.

G. System Restoration

1. **Knowledge of members' Restoration Plans** - The BCRC is knowledgeable of the restoration plans of each of the Transmission Operators in its RC Area and has a written copy of each plan in its possession. The BCRC verifies that the most current plans are on file on an annual basis. Additionally, the BCRC Reliability Coordinators are trained on individual plans during regular training sessions.

   During system restoration, the BCRC monitors restoration progress and acts to coordinate any needed assistance.

2. **BCRC Restoration Plan** - The BCRC Restoration Plan includes all BAs and TOPs in its Reliability Coordination Area. The BCRC takes action to restore normal operations once an operating emergency has been mitigated in accordance with its Restoration Plan. This Restoration Plan is drilled at least annually.

   The BCRC approves, communicates and coordinates the re-synchronizing of major system islands or synchronizing points so as not to cause a burden on member or adjacent Reliability Coordination Areas.

3. **Dissemination of Information** - The BCRC will disseminate information regarding restoration to neighbouring RCs and BAs/TOPs not immediately involved in restoration by posting pertinent information on the RCIS and/or via direct phone call. The BCRC will also use the NERC Hotline for periodic updates to other RCs if required.

H. Coordination Agreements and Data Sharing

Coordination Agreements:

The BCRC has executed RC coordination agreements with:

1. Alberta Electric System Operator (AESO)
2. California Independent System Operator (RC West/CAISO)

Data Sharing - The BCRC determines the data requirements to support its reliability coordination tasks and requests such data from entities internal and external to B.C., including adjacent RCs. The BCRC provides for data exchange with entities internal and external to B.C. and adjacent Reliability Coordinators via a secure network. Entities subject to data requests provide data to RCRC via mutually agreeable transfer methods identified in the BCRC's IRO-010 Data Specification. BCRC provides data to entities outside BCRC via direct links and mutually agreeable transfer methods identified in IRO-010 Data Specifications.

I. Facility

The BCRC performs the RC function at the BC Hydro Fraser Valley Office (FVO) located in Langley, British Columbia. FVO has the necessary facilities for the BCRC to perform their responsibilities. The backup facility, in nearby Surrey, BC provides the functional workspace for personnel to perform the Reliability Coordinator function. The FVO and Back Up Control Centre (BUCC) have the necessary voice and data communication links to appropriate entities within the BCRC Area to perform their responsibilities. These communication facilities are staffed and available to act in addressing a real-time emergency condition.

1. **Adequate Communication Links** – The BCRC has adequate, redundant telecommunications circuits providing both voice and data connectivity with its members. The BCRC maintains satellite phones, Voice over IP phones, cell phones, and redundant, diversely routed telecommunications circuits.

2. **Multi-directional Capabilities** – The BCRC has multi-directional communications capabilities with its members, and with neighbouring RCs, for both voice and data exchange to meet reliability needs of the Interconnection.

3. **Real-time Monitoring** - The BCRC RC has detailed real-time monitoring capability of its Reliability Coordination Area and extensive representation of neighbouring facilities to ensure that potential or actual System Operating Limit or Interconnection Reliability Operating Limit exceedances are identified.

   The BCRC monitors Bulk Power System elements (generators, transmission lines, buses, transformers, breakers, etc.) that could result in SOL or IROL exceedances within its Reliability Coordination Area. The BCRC monitors both real and reactive power system flows, and operating reserves, and the status of the Bulk Power System elements that are, or could be, critical to SOLs and IROLs and system restoration requirements within its Reliability Coordination Area.

4. **Study and Analysis Tools**

   4.1 The BCRC has adequate analysis tools, including state estimation, pre-and post-contingency analysis capabilities (thermal, stability, and voltage), and wide-area overview displays. The BCRC has detailed monitoring capability of the BCRC Reliability Area and sufficient monitoring capability of the surrounding Reliability Areas to ensure potential reliability issues are identified. The BCRC continuously

monitors key transmission facilities in its area in conjunction with the Members monitoring of local facilities and issues.

The BCRC ensures that SOL and IROL monitoring and derivations continue if the main monitoring system is unavailable. The BCRC has backup facilities that shall be exercised if the main monitoring system is unavailable.

The systems used by the BCRC include:

- State Estimator and Contingency Analysis
- Status and Analog Alarming
- Overview Displays of the BCRC Transmission System
- One line diagrams for the entire BCRC Transmission System
- Transient Stability Analysis (TSA-PM)
- Voltage Security Assessment (VSA)

The BCRC utilizes these tools, which provide information that is easily understood and interpreted by the BCRC operating personnel. The alarm management is designed to classify alarms in priority for heightened awareness of critical alarms.

4.2 The BCRC controls its RC analysis tools, including approvals for planned maintenance. The BCRC has procedures in place to mitigate the effects of analysis tool outages.

J. Staffing

Staff Adequately Trained and NERC Certified – The BCRC maintains trained RCs on duty at all times. In addition, one or more Reliability Coordinator Engineers are on shift from 8:00 AM to 4:00 PM M-F. The BCRC staffs all operating positions that meet the following criteria with personnel that are NERC-certified for the applicable functions:

- Positions that have the primary responsibility, either directly or through communications with others, for the real-time operation of the interconnected Bulk Power System.

- Positions directly responsible for complying with B.C. MRS and NERC Standards.

The BCRC operating personnel all complete training using realistic simulations of system emergencies, in addition to other training required to maintain qualified operation personnel.

Comprehensive Understanding - The BCRC operating personnel have an extensive understanding of the BA and TOPs within the BCRC Reliability Coordination Area, including the operating staff, operating practices and procedures, restoration priorities and objectives, outage plans, equipment capabilities, and operational restrictions.

The BCRC operating personnel place particular attention on SOLs and IROLs and inter-tie facility limits. The BCRC ensures protocols are in place to allow BCRC operating personnel to have the best available information at all times.

The BCRC's System Operator Training process describes the process by which System Operations personnel are trained to perform their duties, both at entry level and in continuous training status. The BCRC also uses the Operator Training Manual to establish training and documentation requirements for System Operators in the form of position specific curricula, NERC certification Guidelines, On-the-Job qualification Guides, and Technical Qualification Training Checklists. The Technical Qualification Training Checklists contain competencies for the RC System Operator position and other operation positions. An analysis of each operator position was conducted by Subject Matter Experts (SME), Management, and training representatives to develop the checklists. These checklists provide a way to identify, track status, and document completion of required initial training for any new System Operator.

Standards of Conduct – The BCRC operates independently of BC Hydro marketing function employees and BC Hydro's wholly owned market subsidiary, Powerex Corp. The BCRC also operates independently from the BC Hydro BA and TOP. RC Operators do not pass information or data to any marketing function employees that is not made publicly available. The BCRC staff has completed training on the BC Hydro RC Standards of Conduct and on the Transmission Standards of Conduct. Refresher training on both BC Hydro Standards of Conduct is conducted every year. Training records are maintained.

Appendix A – BCRC Governing Documents

1. Reliability Coordinator Standards of Conduct
2. Reliability Coordinator Registered Entities Oversight Group Terms of Reference
3. Reliability Coordinator BA/TOP Operations Working Group Terms of Reference