BC HYDRO

REAL TIME OPERATIONS

OPERATING ORDER 1T – 61

BC HYDRO OPERATING RESERVE
AND NWPP RESERVE SHARING PROCEDURES
Supersedes 1T-61 issued 28 March 2014

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Denotes Revision
1.0 **PURPOSE**

This Operating Order (OO) describes BC Hydro Balancing Authority (BCHA)'s various types of operating reserves, the continuous monitoring process of available reserves and actions to be taken when resources available to BC Hydro Real Time Operations (RTO) are not adequate to meet the reserve requirement.

This OO also describes BCHA’s involvement in the Northwest Power Pool (NWPP) Reserve Sharing Program and procedures for sharing Contingency Reserve with other participants under this program. BC Hydro RTO is responsible for maintaining and delivering of BCHA Contingency Reserve Obligation (CRO) according to the NWPP Reserve Sharing Program, and settlement for any energy involved.

This operating order meets British Columbia Utility Commission (BCUC) compliance requirements for applicable BAL-002 standards.

Reference documents related to this Operating Order:

- Operating Order 1T-63 Delivery of SRO on behalf of AESO
- Operating Order 1T-59 Dynamic Scheduling to CAISO
- Operating Order 1T-65 Dynamic Scheduling to NWMT
- Operating Order 1T-86 Dynamic Scheduling to CHPD
- Operating Order 1T-60 Wholesale Transmission Service

- NWPP Reserve Sharing Program Documentation

- WECC Standard BAL-002-WECC-2 BC Contingency Reserves

- NERC Standard BAL-002-1 Disturbance Control Performance

- NERC Standard EOP-001-2.1b Emergency Operations Planning

- NERC Standard EOP-002-3.1 Capacity and Energy Emergencies
2.0 **GENERAL**

The reliable operation of the Interconnected System requires that adequate generating capacity be available at all times to:

- Maintain scheduled frequency.
- Supply load and interchange schedules, including margin for errors in forecasting.
- Meet Disturbance Control Standard (DCS) for generating resources lost due to forced outages of generation or transmission equipment.

BCHA Balancing Authority (BA) is a participant of the NWPP RSG for the purpose of maintaining minimum Contingency Reserve (WECC Standard BAL-002-WECC) and meeting the DCS’s requirements (NERC Standard BAL-002).

The NWPP Reserve Sharing Program, originally known as the NWPP Pro-Rata Reserve Sharing (PRRS) Program, is agreed to by all NWPP RSG’s participating BAs to ensure equity among participants, accuracy in the monitoring of the NWPP reserves and a faster response to reserve sharing requests.

As a participating BA, BCHA is responsible for maintaining its Contingency Reserve Obligation (CRO) to the NWPP RSG including the Minimum Operating Reserve - Spinning (previously known as Spinning Reserve Obligation or SRO). The NWPP Corporation which acts as the Agent for the NWPP RSG is responsible for administering the Reserve Sharing Program and all compliance reporting related to BAL-002-1 in whole and to BAL-002-WECC-2 requirements applicable to Contingency Reserve (R1 and R2) on behalf of the group.

In accordance with the RS Program, BCHA will deliver upon request Contingency Reserve as Assistance Reserve to participants of the NWPP RSG to the maximum of the BCHA CRO less any portion of the CRO already deployed. The maximum delivery time of Assistance Reserve is 60 minutes for any single contingency.

The NWPP RS Program allows any participating BA to purchase power from other participating BAs to fulfill its own CRO. The Alberta Electric System Operator has such a contract for Spinning Reserve with BC Hydro for which BCHA is obligated to carry out upon request. Refer to OO 1T-63 for procedures on delivery of Contract SRO to the NWPP RSG on behalf of the Alberta Electric System Operator Balancing Authority.

BCHA may also act as the Host Balancing Authority for resources within the BA boundary that wish to supply on-demand reserve contracts to other BAs. Generation capacity required to supply such contracts, either by static or dynamic delivery method, must be added into BC Hydro applicable types of reserve requirement (Contingency, Spinning, and Regulating). Refer to applicable OOs (1T-60 Wholesale Transmission Services, 1T-59 Dynamic Scheduling to CAISO, 1T-65 Dynamic Scheduling to NWMT and 1T-86 Dynamic Scheduling to CHPD) for details. BCHA is responsible for maintaining sufficient amount of additional operating reserve to satisfy these export contracts as well as to replace any recallable (interruptible) imports, as required in R3 and R4 of BAL-002-WECC-2. BCHA is responsible for any compliance reporting related to these two standard requirements and must also provide the NWPP RSG with documentation to demonstrate compliance of the group.
3.0 DEFINITIONS AND RESPONSIBILITIES

3.1 Definitions

Contingency Reserve

In accordance with the NERC definition, Contingency Reserve is the provision of capacity deployed by the Balancing Authority to meet the Disturbance Control Standard (DCS) and other NERC and Regional Reliability Organization (WECC) contingency requirements.

Contingency Reserve Obligation (CRO), Requirement (CRR) and Available (CRA)

Contingency Reserve Obligation (CRO) is the minimum amount of contingency reserve BCHA must carry as its share of the NWPP RSG’s minimum contingency reserve (i.e. NWPP CRO) and is calculated in accordance with the NWPP RSG Program Documentation.

Assuming the NWPP RSG participants are collectively able to meet the group’s minimum Contingency Reserve for MSSC by sharing contingency reserve, each participating BA’s base CRO is **3% of its Load plus 3% of its Generation**. At times, this base CRO may be adjusted upward to account for the inability of the NWPP RS group and/or the applicable RS zone to meet their minimum Contingency Reserve for MSSC, resulting in the total CRO for each BA (e.g. the totCRO_CA as detailed in Appendix A of the NWPP Reserve Sharing Program Documentation). Furthermore, BCHA may have to add on another upward adjustment if the total Contingency Reserve Available within the RSG is not enough to cover the RSG’s total Contingency Reserve Obligation (e.g. the additional adjustment for CR shortfall).

In real time, for each AGC cycle, BCHA
- computes and sends (via ICCP datalink) its MSSC, Load and Generation to the NWPP RS Computer, and
- receives (via ICCP datalink) the totCRO_CA and the additional adjustment for CR shortfall computed and allocated to BCHA by the NWPP RS Computer. The sum of these two amounts is considered to be the CRO in use for BCHA.

Contingency Reserve Requirement (CRR) is the CRO plus reserves needed to deliver for all on-demand capacity contracts (all non-spinning, spinning and regulating reserve) BCHA carries on behalf of its internal entities for other Balancing Authorities, plus reserves needed to replace any recallable (interruptible) imports into BCHA.

Contingency Reserve Available (CRA) includes any unloaded portion of online generating units that can be loaded up in 10 minutes, any capacity of offline units that can be brought online and loaded up in 10 minutes, any amount of recallable (interruptible) energy exports and interruptible loads, and any on-demand contingency and spinning reserve contracts available from other BAs.

Spinning Reserve Obligation (SRO), Requirement (SRR) and Available (SRA)

BCHA’s Spinning Reserve Obligation (SRO) aka Minimum Operating Reserve-Spinning is 50% of its CRO.

Spinning Reserve Requirement (SRR) is the SRO plus spinning reserves needed to deliver all on-demand spinning and regulating reserve contracts BCHA carries on behalf of its internal entities for other Balancing Authorities.

Spinning Reserve Available (SRA) includes any unloaded portion of online generating units, either On or Off AGC control, that can be loaded up in 10 minutes, and any on-demand spinning reserve contracts available from other BAs.
**Regulating Reserve Obligation (RRO), Requirement (RRR) and Available (RRA)**

Regulating Reserve Obligation (RRO) aka Regulating Margin is the minimum amount of regulating reserve BCHA needs to respond to the fluctuation of its generation vs. demand imbalance. Although not required by any Reliability Standards, BCHA strives to maintain its Regulating Reserve Obligation (RRO), in either Raise or Lower direction, at 100 MW to ensure its compliance to NERC Control Performance Standard.

Regulating Reserve Requirement (RRR), Raise or Lower, is the RRO plus all on-demand regulating reserve, Raise or Lower, contracts BCHA carries on behalf of its internal entities for other Balancing Authorities.

Regulating Reserve Available (RRA):
- **Raise** Regulating Reserve Available includes any unloaded portion of units on AGC for regulation control up to their upper regulating limit.
- **Lower** Regulating Reserve Available includes any loaded portion of units on AGC for regulation control that is above their lower regulating limit.

AGC automatically dispatches Regulating Reserve (Raise or Lower) as required by AGC algorithm.

### 3.2 Treatment of FortisBC (FBC) in Reserve Calculations

As FortisBC is located within the BCHA Balancing Authority Area, all of its load and generation are included in the BCHA CRO and SRO calculations. However, with the exception of BRD, BRX and WAN, FBC units are not included in the available Contingency or Spinning Reserve calculations.

FBC is a member of the NWPP but not of the NWPP RSG. FBC can only make reserve requests to BC Hydro by phone.

FBC and BC Hydro have an agreement in place where BC Hydro assumes all of FBC’s CRO and SRO. When FBC suffers a loss of generation that is greater than their CRO, a reserve amount equal to their CRO is considered to be delivered from BC Hydro reserves automatically. FBC then only needs to make a request for an additional reserve amount equal to the difference between their lost generation and their CRO.

BC Hydro RTO will keep records of any reserves requested by FBC and will verify the integrated energy value of these requests against an eTag submitted by FBC. FBC may submit these after the fact eTags up to seven days after the reserve request is made and will notify RTO and Market Operations via email when an eTag has been submitted.

### 3.3 Treatment of Independent Power Producers (IPPs) in Reserve Calculations

All IPP generation outputs, either telemetered or manually entered, are included in the calculation of BCHA’s load and generation and, therefore, are included in the calculation of BCHA CRO and SRO.

Since IPP units are not dispatched by RTO, their available capacity is not included in the calculation of Spinning or Contingency Reserve Available.

### 3.4 Treatment of Rio-Tinto Alcan in Reserve Calculations

The BC Hydro - Rio-Tinto Alcan agreement requires that Rio-Tinto Alcan maintain its Operating Reserves "in accordance with established criteria", however it does not require that
Rio-Tinto Alcan make these reserves available to others under any given conditions. BC Hydro does not carry Operating Reserve for the Rio-Tinto Alcan generation. The actual status of Rio-Tinto Alcan's on-line generation and load are not factored into the load or reserve calculations.

For the purpose of calculating BC Hydro BA reserve requirements, the Alcan-BCH transfer is considered as a part of BC Hydro generation when BC Hydro is importing from Alcan. When BC Hydro is exporting to Alcan, the BCH-Alcan transfer is not considered as BC Hydro Load but the generation supplying that transfer is accounted for in BC Hydro Generation.

3.5 Treatment of Generation Delivered as Dynamically Scheduled Energy to CAISO

Dynamically Scheduled Energy to CAISO is deemed Unit Contingent generation by the CAISO and contingency reserve required for it will be carried by CAISO. These are recognized as Designated Dynamically Scheduled Exports from BCHA. Generation delivered for these Dynamic Schedules is subtracted from BCHA Generation for BA CRO calculation purpose.

3.6 Responsibility for Load-Resource Balance Planning

For each operating hour, the BC Hydro’s Planning, Scheduling and Operations Shift Engineer (PSOSE) is responsible for forecasting the BCHA BA hourly load, setting the interchange commitment, and planning sufficient generation capacity to be dispatched to meet these obligations plus the necessary CRR, SRR and RRR for the entire Balancing Authority Area.

3.7 Responsibility for Meeting CR and SR Requirements

BCUC-approved WECC Reliability Standard BAL-002-WECC-2 defines Requirements to maintain Contingency Reserve, including Spinning Reserve, each hour for the BCHA BA. Failure to do so results in penalties that increase with the severity of the violation. Various reserve parameters are monitored in real time using instantaneous values but standard compliance is measured after-the-fact using hourly averaged values.

The RTO Generation Coordinator (GC) is responsible and authorized to take actions necessary to maintain BCHA’s CRA and SRA as established by the NWPP RSG. The GC is also responsible for ensuring that BCHA’s CRA and SRA meet or exceed the Contingency Reserve requirement (CRR) and Spinning Reserve Requirement (SRR) which are always equal to or larger than CRO and SRO respectively.

The only exception is the first sixty minutes following an event requiring the activation of Contingency Reserve (CRA is being used up to respond to the event and is therefore allowed to be less than CRR in this case) or when BCHA BA is using its reserve to meet a Capacity or Energy Emergency under OO 6T-25. In an EEA 2 or 3 the BA may encroach on BC Hydro’s operating reserves as necessary to mitigate the energy emergency and avoid shedding of firm load.)

3.7.1 Prior-To-The-Hour Preparation

Prior to the hour, the GC will assess the BA’s ability to meet the hour’s CRR and SRR. Should the GC determine that the system may not meet these requirements, he/she shall discuss the concerns with the on-shift SCM and will refer to Operating Order 6T-25 to implement a strategy to mitigate the shortfall.

3.7.2 Recovery of CRA to meet CRR
BCHA’s CRA must be recovered to meet its CRR within 60 minutes of the initiation of an internal disturbance. Any reserves received from other NWPP members must also end within 60 minutes. Cuts to next hour export schedules or increasing imports may be required. The GC, Interchange Operator and SCM shall coordinate with PSOSE and Powerex if necessary to ensure this recovery.

3.8 Distribution of Available Reserves

Available reserves shall be distributed as widely as possible throughout the system. The Alstom Energy Management System (EMS) tracks available contingency reserve and spinning reserve at generating unit level and groups them for each region of BCHA BA area.

4.0 EMS IMPLEMENTATION OF RESERVE MONITORING

The BCHA BA is responsible for ensuring compliance with WECC and NWPP reserve requirements. The Alstom Energy Management System (EMS) accomplishes this by performing a number of reserve-related comparisons every AGC cycle. The EMS is also configured to allow BCHA participation in the NWPP PRRS program.

The EMS monitors these items:

Requirement vs Actual - Instantaneous: CRR vs CRA and SRR vs SRA

The EMS generates alarms when the amount available is less than required, i.e.:

- CONTINGENCY RESERVE ALERT will be generated whenever CRA is less than CRR. The alarm will reset when CRA >110% of the CRR.
- SPINNING RESERVE ALERT will be generated whenever SRA is less than SRR. The alarm will reset when SRA >110% of the SRR.

Obligation vs Actual - Hourly: CRO vs CRA

The EMS generates an HOURLY CONTINGENCY RESERVE ALERT alarm whenever the current hourly average CRA < CRO. The alarm will reset when current hourly average CRA ≥ CRO or at the beginning of the next hour. Return to normal text is CONTINGENCY RESERVE – OK.

4.1 Calculation of Contingency Reserve Requirement (CRR)

\[
\text{CRR} = \text{CRO} - \text{Used CR} + (100\% \text{ of Interruptible Import schedules and DSO 216 schedules, see Note 1}) + (\text{the undelivered portion of all Contingency Reserve contracts, Spinning Reserve contracts, Regulating Reserve contracts, see Note 2}).
\]

Where:

\[
\text{CRO} = \text{totCRO}_{\text{BCHA}} + \text{adjustment allocated by the NWPP for the pool's CR shortfall}.
\]

These 2 components of the CRO are computed by the NWPP RS Computer (based on Load and Generation amounts provided by BCHA) and allocated to BCHA, with:

- \text{totCRO}_{\text{BCHA}} = 3\% \text{ of BCHA Load} + 3\% \text{ of BCHA Gen} + \text{any CRO adjustment the NWPP has required to ensure the NWPP has sufficient reserves to meet the Pool's MSSC and/or the RS zone's MSSC; and}
- the adjustment allocated by the NWPP for the Pool's CR shortfall exists only when the total CR available in the Pool is less than its aggregate CRO.
Used CR: any amount of CR already deployed in response to internal or external Qualifying Events which includes all of

- Internal Used CR = lost generation + manually entered used CR.
  - “Lost generation” amount is the actual amount of lost generation - the difference in BA generation just before and at the peak of a disturbance (i.e. when frequency bottoms) - automatically captured in EMS when it exceeds 120 MW and simultaneously causes the frequency to drop by more than 0.02 Hz.
  - “Manually entered used CR” should be used to record any lost gen that was not automatically recorded, any failure to start of generator if desired, and any CR deliveries not made under PRRS program (i.e. reserve deliveries made to FortisBC, other bilateral deliveries by phone), if desired.

- External Used CR = amount of CR delivered under PRRS program. This is automatically recorded whenever there is a delivery from BCHA.

Each Used CR amount expires 60 minutes after being initiated.

**Note 1:** DSO 216 schedules are import schedules from the BPA BA that are subject to BPA’s DSO 216. These schedules, though being Firm purchases, may be curtailed up to 100% if their source generation is lost and, therefore, are treated as interruptible import schedules for CRR calculation purpose.

**Note 2:** Currently, only the undelivered portion of reserve contracts by way of Dynamic Schedules is tracked in real time. The undelivered portion of reserve contracts by way of regular capacity schedules is considered to be equal to the whole amount of the contracts for the hour. This should provide a more conservative value of CRR.

### 4.2 Calculation of Spinning Reserve Requirement (SRR)

\[
\text{SRR} = \text{SRO} + \text{the undelivered portion of all Spinning Reserve and Regulating Reserve contracts (see Note 3).}
\]

Where:

\[
\text{SRO} = 50\% \text{ of CRO}
\]

**Note 3:** Currently, only the undelivered portion of reserve contracts by way of Dynamic Schedules is tracked in real time. The undelivered portion of reserve contracts by way of regular capacity schedules is considered to be equal to the whole amount of the contracts for the hour. This should provide a more conservative value of SRR.

### 5.0 NWPP PRO RATA RESERVE SHARING (PRRS) PROGRAM

In effect since May 01, 2002 the NWPP PRRS Program (or Reserve Sharing Program) is an automated system for implementing Reserve Sharing among NWPP RSG members. All BA members of the NWPP RSG are able to electronically communicate, via ICCP data link, with the Program. When a member has suffered a loss of resource which is a Qualifying Event greater than its own CRO or has declared an Energy Emergency Alert 2, it is permitted to submit a Reserve Sharing request equal to the deficient amount. The computer request would be processed by the NWPP and non-contingent members allocated (on a pro-rata basis) an Assistant Reserve contribution drawn from their CRO, first to the members within the same zone then to members in adjacent zones and beyond if necessary.

For complete details of the program, refer to the NWPP Reserve Sharing Program Documentation.
NWPP Reserve Sharing Zones

5.1 BCHA Requesting Reserve Sharing

Before BCHA can request Reserve Sharing, it must commit to deploy CR up to its CRO to respond to loss of generation or have an Energy Emergency Alert (EEA) 2 or 3 declared by the Peak RC for the BCHA BA.

Following loss of generation resources, Reserve Sharing shall only be requested by the BA for contingencies that are greater than its CRO. These include any loss of on-line generation (i.e. BC Hydro, FortisBC, Rio-Tinto Alcan, or IPP) that causes a sudden and immediate drop in ACE or a failure-to-start of a large unit which does not cause an ACE change.

Following declaration of an Energy Emergency Alert 2 or 3, Reserve Sharing shall only be requested by BCHA when the MW required to alleviate the EEA is greater than the CRO.

5.1.1 Recovering from a Small Contingency: Lost Gen < CRO

If Lost Generation <CRO, a CR sharing request made in PRRS program will not be accepted by the program. Use BCHA’s own reserves to recover within 15 minutes of the initial event.
5.1.2 Recovering from a Large Contingency: Lost Gen > CRO

For contingencies that are greater than the CRO, a BA may request Reserve Sharing from the NWPP. If there is a value in the MINIMUM SUGGESTED RS\(^1\) field then Reserve Sharing must be requested. The GC should request Reserve Sharing within 4 minutes of the initiating event and strive to return ACE to its pre-disturbance level or zero (whichever lower) within 15 minutes to avoid possible penalties for non-compliance under the NERC DCS. **It is recommended to ensure the NWPP ACE is returned to its pre-disturbance level or zero (whichever lower) within 15 minutes as well since all Reportable Events for the RSG is measured by the NWPP ACE.**

The GC shall:

1. Initiate a Reserve Sharing request:
   - **Confirm that the “LOST GEN” field captured the disturbance,**
     
     If not, manually enter a value to ensure that the “Total Internal Used CR” is greater than the CRO (if Used CR is not greater than CRO, any request for Reserve Sharing will either be reduced or ignored).
   - **Enter the amount of Contingency Reserve being requested.**
     
     In the Request Target field, set the amount at least equal to the MINIMUM SUGGESTED RS amount if existed. The common practice is setting the initial requested amount close to the difference between the LOST GEN amount and CRO, and then reducing it gradually as BC Hydro reserve recovered.
   - **Check the “Enable Reserve Sharing Request” flag (set to “ON”).**
     
     After approximately 45 seconds, an import schedule should come back from the NWPP RS computer and set a confirmation flag to ON (ON means reserve sharing is active; OFF means reserve sharing is NOT active or CANCELLED) which should cause an immediate improvement in ACE. Normally the amount of the import schedule is greater than the original request because all sending parties round their contributions up to the nearest MW.

Then

2. Dispatch available generation by at least the CRO amount;
3. Have the Interchange Operator cut all interruptible export schedules, if needed.
4. Direct Grid Operators to drop all interruptible loads, if needed.

5.1.3 Reserve Request during Energy Emergency Alert (EEA) Level 2 or 3

In an Energy Emergency where the Peak RC has declared BC Hydro an Energy Deficient Entity under Energy Emergency Alert Level 2 or 3, BC Hydro may request Reserve Sharing from NWPP. Operating Order 6T-25 details BA response while operating in an Energy Emergency.

\(^1\) The MINIMUM SUGGESTED value is the CR deficit calculated as [LOST GEN minus CRA], hence whenever BCH\(_{\text{A}}\) CRA is less than the LOST GEN amount there will be a deficit and reserve sharing request will have to be made.

**Example:** If BCH\(_{\text{A}}\) lost 1200 MW of generation and its CRA at the time of the contingency was 1000 MW then the deficit would be 200 MW. The GC will have to make a reserve sharing request for at least 200 MW in order to sufficiently recover the disturbance.
5.1.4 **Rules for BC Hydro requesting (receiving) CR**

- After a major contingency, BC Hydro should recover CRA to exceed CRO as promptly as practicable, but in no event longer than 60 minutes from the initiating event.
- The same request can be increased or decreased at any time during the 60-minute duration. Increases are subject to NWPP approval. To make a change: enter the desired value for the request target, not the net change. DO NOT uncheck the Enable Reserve Sharing Request” flag as it will end the original request.
- The original request is auto-ramped down to zero from 55 to 65 minutes (net 60 minutes) if not ended prior to 55 minutes.

**To end the request manually:** enter a request target of 0 and/or uncheck the Enable Reserve Sharing Request” flag.

**Important note:** If you uncheck the “Enable Reserve Sharing Request” flag (toggle it to OFF) it will cancel the current request immediately. It is only acceptable to initiate another request (for another 60 minutes duration) if there is another contingency that would cause a LOST GEN > the CRO at that time.

5.1.5 **Extending an existing Reserve Sharing request:**

Subsequent internal gen loss contingencies during a RS delivery to BCH A may require additional amount of RS or an extension of the current RS delivery to be requested from the pool. If that is desired, the GC shall (see the attached screenshot for the **steps**):

**Step 1:** Check the Request Extension checkbox, then
**Step 2:** Enter a new Request Target value which can be higher than the current value or keep the target unchanged. The NWPP RS Computer shall automatically accept the extension request, and
**Step 3:** Both Telemetered Remaining Time timers will be reset to 65 minutes and the Telemetered Target value for the Import schedule will change to reflect the new request value, if entered.
**Step 4:** BCH AGC will then automatically uncheck the Request Extension flag, making it available for subsequent extension if needed.

This request extension feature essentially allows restarting a current request with a higher or unchanged request target. The process for reducing the request target or stopping a request remains unchanged.
5.2 BC Hydro Delivering Reserve Sharing

When BC Hydro receives from the NWPP RS Computer an assigned contribution to a RS request, several things will happen simultaneously:

- A MW amount equal to the assigned contribution will show up in the Telemetered Target field with the Export direction and the Status flag will show ON. This indicates an export schedule being added to ACE, resulted in a lower ACE.
- AGC will response to dispatch generation for the additional export schedule. The dispatched generation must be fully in place within 10 minutes.
- A Priority 1 alarm will be received in the EMS that reads PRRS DELIVERY STARTED; REVIEW REG OBJ AND CTRL DIRECTION.

The amount of Contingency Reserve that BCHA delivers will be the lesser of the NWPP request and the CR Delivery Limit which is the BCHA CRO less all internal / external Used CR. The amount of reserve being delivered can change in real time if our CRO changes or the available transmission between BC Hydro and the requesting NWPP member decreases in real-time.

Other rules for BC Hydro Delivering CR:

- Multiple requests will be accepted, with total delivery limited to BCHA CRO less all internal Used CR.
- All requests are limited to 60 minutes in duration. The remaining time displayed is always associated with the last request executed.
- Individual request is auto-ramped down to zero from 55 to 65 minutes (net 60 minutes) if not done so prior to 55 minutes by the requesting entity.
- When the delivery ends, a Priority 1 alarm will be received in the EMS that reads PRRS DELIVERY COMPLETE.

5.3 Monthly Testing of the NWPP PRRS Program

To ensure all components of the program work properly when needed, the NWPP will conduct a monthly test, on the first Tuesday of the month, involving each member Balancing Authority area. A WECCNet message will be sent during the hour prior to the test as a warning.

6.0 ENERGY SETTLEMENT

A RSG Participant that received Contingency Reserve must compensate all Participants that delivered the Reserve, either financially or by return of energy. Participants that request Reserve will settle with responding Participants according to the responding Participants’ elected settlement method.

Each Participant must declare its choice of settlement method to the NWPP RSG Committee. Each Participant’s current choice of settlement method will be its default method of settlement until the Participant notifies the RSG Committee of a change. A Participant may change its declaration of settlement method up to twice each year, on or about February 1 and July 1.

Currently, BC Hydro’s default method is financial settlement for any Reserve it delivers to other Participants.

Financial Method of Settlement:

Transactions are recorded automatically in MODS from e-tag data generated from the NWPP. Market Operations is responsible for arranging settlement among all parties involved.

Return of Energy (Physical) Method of Settlement:

BC Hydro is responsible for arranging for all physical settlements for the CR it delivered (i.e. to receive returning energy from other BAs). Energy must be returned in-kind (on-peak / off-peak) within 168 hours of the reserve being delivered.

Settlements and Billings Department (Market Operations is responsible for informing BC Hydro (Powerex) of transactions that require physical settlement and their details.

The following sections describe settlement principles and actions taken by Grid Operations for all reserve related energy transactions involving BC Hydro BA.

6.1 Settlement Principles

NWPP members have agreed to the following:

- Settlement for the delivered reserve is based on the delivering party’s choice of settlement method.
- When there is a discrepancy in the amount of energy delivered between the two members, the amount calculated, rounded and provided by the NWPP and shall be considered accurate and final. It shall be used as settlement data.
- The cost of energy used for financial settlement shall be based on the Settlement Price elected and determined by the NWPP RSG as indicated in the RS Program documentation, applicable for the hours of delivery.
For physical settlement, the returning energy must be arranged using standard scheduling practices. All associated transmission and losses cost are not exempt and must be borne by the responding participant (the party receiving the returning energy).

6.2 **Recording Reserve Sharing Transactions**

The RTO GC is responsible for executing all reserve delivery requests and assisting in retaining transaction information. Transactions are recorded automatically in MODS from e-tag data generated from the NWPP.

6.2.1 **Recording Transmission Schedules**

The delivery of contingency reserve is exempted from any cost associated with transmission wheeling or losses, as agreed upon by all NWPP members. Place markers for the transmission reservations used to support PRRS eTags are stored in MODS and verified against the e-tag transmission allocation generated by the NWPP.

6.2.2 **Recording Energy Schedules**

Depending on the NWPP reserve sharing assignment, BC Hydro may have transactions with several NWPP RSG members. Energy schedules are recorded automatically in MODS from e-tag data generated from the NWPP RSG.

6.2.3 **Recording CR delivered to FortisBC**

Contingency reserve delivered to FortisBC is not covered under the NWPP RS Program.

Since FortisBC is internal to the BC Hydro BA, CR delivery to FortisBC occurs automatically (no ramping is required). The FBC System Dispatcher will communicate by phone to the RTO GC, the duration (maximum 60 minutes) and CR amount needed by FBC. Following delivery of CR, FBC will email confirmation of the delivery to the Interchange Operator mailbox at the Control Centre. Email confirmation will be verified as correct and retained by the Interchange Operator for future verification against an eTag for the transaction submitted by FBC.

Note: since FBC CRO is automatically delivered from BC Hydro upon their contingency, the amount of reserve FBC requests from BC Hydro is for the portion of reserve needed in addition to their CRO to cover their lost generation.

No further reporting is required.

Fortis must submit an e-tag for the transaction within 7 days of the delivery.

7.0 **OFF-NORMAL CONDITIONS –RESERVE REQUESTS BY PHONE**

Request for reserve sharing between two adjacent BAs shall be used only as a backup measure when the NWPP RS program is inaccessible or inoperable.

7.1 **ICCP Datalink Not Working**
If ICCP data links are not working, the details of the RS Program will not be communicated between the NWPP RSG members and the NWPP RS Computer. Treat this circumstance as if the RS Computer is not working (section 7.2).

7.2 NWPP RS Computer Not Working

When a failure of the RS Computer is suspected, it is imperative that the RTO GC telephone the BPA and AESO Generation Dispatchers and confirm that they are actively participating in Reserve Sharing, and assess how much CR they can deliver if requested, based on their CRO and available transmission for importing into BCHA. The RTO GC must be aware that during a failure of the NWPP RS Computer and without confirmation from BPA and AESO that adequate CR can be imported, the BC Hydro CRO, although appears constant due to not being updated by the RS Computer, should be assumed to be equal to the BC Hydro MSSC, and the CRA must suffice accordingly.

See section 7.4 and 7.5 for applicable telephone procedure.

If an internal contingency occurred during a failure of the RS Computer and there is any question about being able to recover ACE within the allowable 15 minute window, then commit all available BCHA reserves (i.e., any reserves available in excess of the BCHA CRO) to restoring ACE.

7.3 Other Off-normal Conditions:

7.3.1 RS Computer failure during an ongoing RS transaction:
- RS transactions in all BA’s involved will immediately go to zero,
- ACE will immediately jump by same but opposite amount of the ongoing transaction,
- Make telephone requests if further RS is still needed.

7.3.2 OTC Exceedance Event During a RS Transaction:

The amount of Assistance Reserve being delivered during the first 5 minutes of a delivery is based on the transmission room available captured at 5 minutes before the request was made. After that, if the PRRS program detects an OTC being exceeded it will adjust the amount to maintain the path flow equal to the OTC.

7.4 Bilateral Delivery of RS (phone procedure) by BC Hydro

This procedure should only be used to response to reserve sharing requests by the adjacent BPA and AESO when the RS program is not available.

The BC Hydro Generation Coordinator shall:

1. Check for transmission availability on the applicable path, this should be reflected in the RS delivery limit. No need to make extra transmission available.
2. Record the time of the initiating event from the requestor.
3. Agree to deliver only up to the RS delivery limit and duration of the ramp.
4. Ramp the RS energy schedule in AGC using the EMS back up schedule feature.
5. Terminate the delivery with a 10 minute ramp starting 55 minutes after the initiating event, unless otherwise agreed prior to that.
6. Pass on related information to the BC Hydro Interchange Operator for recording.

7.5 Bilateral Requesting of RS (phone procedure) by BC Hydro
This procedure should only be used to make reserve sharing request with the adjacent BPA and AESO when the PRRS program is not available.

The BC Hydro Generation Coordinator shall:

1. With consideration given to available transmission for import on each applicable path, agree on the amount requested, start time and duration of the ramp.
2. Ramp the RS energy schedule in AGC using the EMS back up schedule feature.
3. Make arrangements to recover/replace lost generation within the BC Hydro control area within 60 minutes of initiating event.
4. Reduce / terminate the request as internal reserves become available.
5. Pass on related information to the BC Hydro Interchange Operator for recording.

8.0 ALARMS

Shown below is a list of BC Hydro EMS alarms associated with Reserve Monitor and the NWPP RS program:

<table>
<thead>
<tr>
<th>Alarm Text</th>
<th>Refer to</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTINGENCY RESERVE ALERT</td>
<td>Section 4.0</td>
</tr>
<tr>
<td>SPINNING RESERVE ALERT</td>
<td>Section 4.0</td>
</tr>
<tr>
<td>HOURLY CONTINGENCY RESERVE ALERT</td>
<td>Section 4.0</td>
</tr>
<tr>
<td>CONTINGENCY RESERVE – OK</td>
<td>Section 4.0</td>
</tr>
<tr>
<td>PRRS DELIVERY STARTED; REVIEW REG OBJ AND CTRL DIRECTION</td>
<td>Section 5.2</td>
</tr>
<tr>
<td>PRRS DELIVERY COMPLETE</td>
<td>Section 5.2</td>
</tr>
</tbody>
</table>

9.0 TRACKING AND REPORTING REQUIREMENT

9.1 Insufficient CRO/SRO or CRR Reports

The NWPP Corporation is responsible for providing evidence on behalf of the NWPP RSG for compliance related to R1 and R2 of WECC standard BAL-002-WECC-2 which deal with maintaining CRO and SRO. To assist, BC Hydro reports to the NWPP RS Computer its CRO, CRA, SRO and SRA real time values. The NWPP RSG, using RS real time software, then monitors and compares each member BA’s CRA/SRA against its CRO/SRO. An insufficient CRO/SRO report will be sent to BC Hydro’s representative whenever our CRA/SRA drops below CRO/SRO for longer than 10 minutes, or if the CRA/SRA has not been fully restored to at least the CRO/SRO 60 minutes after the initiation of a disturbance.

The BCHA BA is responsible for providing evidence on its own behalf for compliance related to R3 and R4 of WECC standard BAL-002-WECC-2 which deal with maintaining additional reserves on top of its CRO. BC Hydro RTO achieves this by using Dispatch Compliance Monitoring (DCM) software to monitor and compare its CRA against its CRR. An insufficient CRR (known as OR-Operating Reserve in DCM) report will be captured in DCM if BCHA has not maintained hourly average CRA > hourly average CRR. Currently, there is no periodic report required for BAL-002-WECC R3 and R4 but captured evidence must be retained for auditing purpose as specified in the standard.

9.2 DCS Reportable Disturbance Reports

The NWPP Corporation is responsible for providing to WECC any DCS related reports on behalf of all member BAs, upon verifying reports sent in by the BAs.

- For CR Delivery from BC Hydro to another entity, including FortisBC: No report to NWPP Corp. Staff is required.
  - A report to NWPP Corp. Staff is required:
whenever a reserve sharing request is made by BCHA, regardless of the size of the contingency, and
whenever BCHA experiences an internal forced outage that is greater than the NWPP RSG’s Internal Tracking and Activation Threshold, aka reportable disturbance threshold (currently set at 35% of the NWPP MSSC at the time of the disturbance), with or without a reserve sharing request made.

The GC is responsible for notifying the SCM of the lost generation and the amount of CR requested from the RSG. The SCM is responsible for sending to the NWPP Staff a “NWPP RSG Verification Form” via email within two working days following the initiation of the disturbance.

The form is auto-generated by the DCM application at xx:15 and xx:45 if a reportable disturbance has been detected and completed during the prior half-hour. It can also be manually generated if missed by the DCM auto-capturing feature.

10.0 REVISION HISTORY

<table>
<thead>
<tr>
<th>Revised By</th>
<th>Revision Date</th>
<th>Summary of Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. Nguyen</td>
<td>12 August 2005</td>
<td>Major revision to incorporate PRRS and SSOR.</td>
</tr>
<tr>
<td>T. Nguyen</td>
<td>27 January 2006</td>
<td>Clarified procedures for energy and capacity cutting to maintain reserves. Updated tracking and reporting requirement. Other minor changes.</td>
</tr>
<tr>
<td>T. Nguyen</td>
<td>27 April 2006</td>
<td>Clarified the use of interruptible export schedules and interruptible loads that have been designated as part of the available operating reserve. Updated SSOR procedure. Other minor changes.</td>
</tr>
<tr>
<td>T. Nguyen</td>
<td>19 February 2007</td>
<td>Converted to SOO. Section 3.2 modified and Appendix 3 added to include WAN and BRD in BCTC’s pool of available reserve. Section 9.0 removed (converted to SOO 1T-62 SSOR)</td>
</tr>
<tr>
<td>Gord Rawlings</td>
<td>8 November 2007</td>
<td>Section 3.7 modified to meet the requirements of SOO 6T-25</td>
</tr>
<tr>
<td>DSG</td>
<td>26 September 2011</td>
<td>Updated after BCTC/BCH merger.</td>
</tr>
<tr>
<td>DSP</td>
<td>28 March 2014</td>
<td>Updated and aligned with 30 July 2013 issuance of 6T-25. Major Revision so no Change Bars included.</td>
</tr>
<tr>
<td>TMN</td>
<td>15 March 2016</td>
<td>Major revision to incorporate NWPP RS program changes due to BAL-002-WECC-2, other EMS related changes, and to clarify various roles in compliance monitoring and reporting.</td>
</tr>
</tbody>
</table>