

Information Documents are not authoritative. Information Documents are for information purposes only and are intended to provide guidance. In the event of any discrepancy between an Information Document and any Authoritative Document(s)<sup>1</sup> in effect, the Authoritative Document(s) governs.

## 1 Purpose

This Information Document relates to the following Authoritative Documents:

- Section 205.5 of the ISO rules, *Spinning Reserve Technical Requirements and Performance Standards* (“Section 205.5”);
- Section 205.6 of the ISO rules, *Supplemental Reserve Technical Requirements and Performance Standards* (“Section 205.6”); and
- Alberta Reliability Standard BAL-002-WECC-AB1-2, *Contingency Reserves* (“BAL-002-WECC-AB1-2”).

The purpose of this Information Document is to assist pool participants in understanding spinning reserve and supplemental reserve. This Information Document is likely of most interest to market participants who currently provide or may in the future provide supplemental reserve or spinning reserve.

## 2 What is Contingency Reserve?

Spinning and supplemental reserves (collectively referred to as contingency reserves) are used to restore the balance between the supply and demand for electricity following an unexpected event affecting the reliable operation of the interconnected electric system, such as the sudden loss of a generating unit or a disruption to one of the interties linking Alberta to a neighbouring jurisdiction. Contingency reserves provide capacity the AESO system controller can call on with short notice to correct any imbalance.

Spinning reserves are the fastest acting contingency reserve. Generators or loads providing spinning reserves are synchronized to the grid (the turbine is “spinning” but not generating power). This feature allows the reserve to be provided very quickly. In addition to responding quickly, spinning reserves also provide frequency support to the system. Supplemental reserve is similar to spinning reserve except that providers of supplemental reserve are not required to be synchronized to the grid and respond to frequency deviations.

These reserves can come from the supply side (generators increasing their output to the system) or from the demand side (load curtailment by reducing demand from large electrical consumers). Sufficient contingency reserve is required to reduce the area control error to zero, or to its pre-disturbance level, within fifteen minutes of a contingency. The Alberta balancing authority area is operated using reasonable best efforts to recover from any multiple supply contingency within fifteen minutes, with all available resources, including assistance from neighbouring balancing authority areas. In accordance with subsection 10(1) in Section 205.5 and subsection 6(1) of Section 205.6, real power must be delivered to the interconnected electric system within ten minutes of receiving a directive to provide the power to replace a loss of supply on the system.

## 3 Eligibility to Provide Contingency Reserve

Spinning and supplemental reserve may be provided by a pool asset with one or more resources that meet the eligibility criteria in subsection 3(1) of Section 205.5 and in subsection 3 of Section 205.6, respectively. A spinning reserve resource may be a single resource that individually meets the eligibility criteria in subsection 3(1) of Section 205.5, or an aggregate of resources controlled by a single governor or a governor system that collectively meet the eligibility criteria in subsection 3(1) of Section 205.5. A supplemental reserve resource may be a single resource that individually meets the eligibility criteria in

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<sup>1</sup> “Authoritative Documents” is the general name given by the AESO to categories of documents made by the AESO under the authority of the *Electric Utilities Act* and associated regulations, and that contain binding legal requirements for either market participants or the AESO, or both. AESO Authoritative Documents include: the ISO rules, the Alberta reliability standards, and the ISO tariff.

subsection 3 of Section 205.6, or an aggregate of resources that collectively meet the eligibility criteria in subsection 3 of Section 205.6. The pool asset must be qualified by the AESO to provide contingency reserve in accordance with subsection 4(1) of each rule.

Spinning reserve resources require a governor system that dynamically responds to a change in frequency to provide an automatic response. Under section 3(1)(b)(iii) of Section 205.5, in the case of synchronous generators, the maximum operating range of a spinning reserve resource is usually the difference of the maximum authorized real power (MARP) value and the minimum stable generation (MSG) value of the resource. In the case of battery storage system, the maximum operating range of a regulating reserve resource is the difference of (maximum authorize charging power plus maximum authorized discharging power) and (maximum authorized charging power or maximum authorized discharging power).

Market participants can apply to the AESO to provide contingency reserves by completing and submitting the application form on the AESO's website. In accordance with subsection 2(2) of Section 205.5 and Section 205.6, the AESO must receive a completed application before it can make any determination on resource eligibility and pool asset qualification.

## 4 Procurement

The AESO procures spinning reserve and supplemental reserve based on spinning reserve and supplemental reserve levels identified in the *7 Day Forecast of Operating Reserves Volumes* report located on the [AESO website](#). The AESO's contingency reserve requirements are set out in Alberta reliability standards BAL-002-AB-1 and BAL-002-WECC-AB1-2.

The AESO normally procures spinning reserve and supplemental reserve through the Alberta Watt-Ex Exchange, operated by Watt-Ex, but may use other means under certain circumstances. The AESO may adjust the volume of contingency reserve in real-time based on actual system conditions. Refer to Information Document #2013-005R, *Operating Reserve*, for more information on procurement.

## 5 Dispatches and Directives

### 5.1 Dispatches

When the AESO issues a dispatch to a pool asset to provide supplemental reserve or spinning reserve, the dispatch is sent with one of the following acronyms to indicate the service type:

- SUPG – to identify a generating unit connected to the interconnected electric system that is supplying supplemental reserve;
- SUPL – to identify a load connected to the interconnected electric system that is supplying supplemental reserve; or
- SR – to identify any type of asset providing spinning reserve.

A pool asset that receives a dispatch to provide contingency reserve is required to move into a position such that the pool asset is capable of providing the real power set out in the dispatch within the tolerances set out in subsection 5(1) of Section 205.5 and Section 205.6. This tolerance is applied at the pool asset level. For example, when multiple spinning reserve resources within the same pool asset are providing spinning reserve at the same time, the tolerance applies to the pool asset as a whole and not to each resource individually.

### 5.2 Directives

In each contingency reserve directive, the AESO indicates the requested real power quantity, the remaining quantity of contingency reserve attributed to that pool asset and the time the directive was issued.

During an under frequency event, if a pool asset has already provided some or all of the requested real power quantity through the action of the governor system, that quantity may be subtracted from

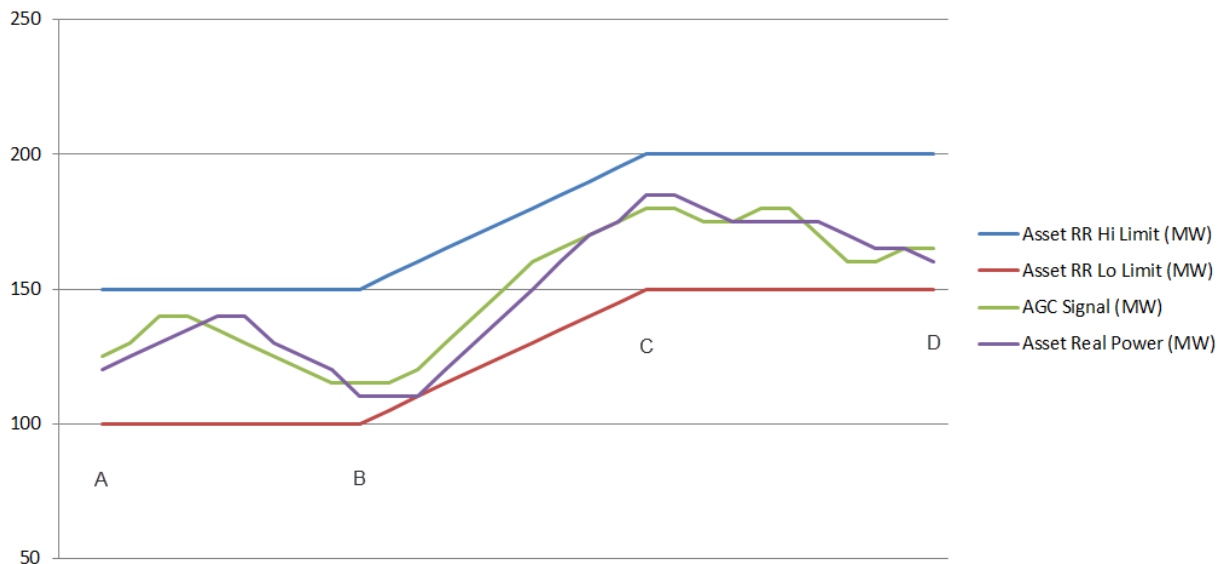
the requested real power quantity. Even if the frequency returns to normal, the total requested real power quantity must continue to be supplied in accordance with subsection 10 of Section 205.5 or subsection 6 of Section 205.6.

When a pool asset is providing both regulating reserve and contingency reserve (i.e. spinning reserve or supplemental reserve), and is subject to a directive for contingency reserve, the directive performance requirements outlined in subsection 10 of Section 205.5 or subsection 6 of Section 205.6 may be met in the following manner:

Some or all of the real power increase set out in the contingency reserve directive may be provided by:

- increasing the low and high limit values of the regulating reserve range above their instantaneous values at the time of the contingency reserve directive; and
- continuing to provide the full dispatched amount of regulating reserve in accordance with Section 205.4 of the ISO rules, *Regulating Reserve Technical Requirements and Performance Standards*.

In such a case, the increase in the low limit value is considered to be part or all of the real power increase required in subsection 10 of Section 205.5 or subsection 6 of Section 205.6.



- A Pool asset at energy dispatch (100MW), RR dispatch (50MW), contingency reserve dispatch (50MW).
- B Pool asset receives contingency reserve directive (50MW).
- B to C Pool asset ramps up to provide response to contingency reserve directive (50MW), full RR range provided while ramping, RR provided in accordance with Section 205.4 while ramping.
- C Pool asset at energy dispatch (100MW), RR dispatch (50MW), contingency reserve directive (50MW).

As an example, when a pool asset is comprised of two or more generating units, the real power increase set out in the contingency reserve directive may be provided through the cumulative response from those generating units not providing regulating reserve and adjustments, as described above, to generating units providing regulating reserve.

For all cases other than those contemplated by subsection 4 of Section 205.2, of the ISO rules, *Issuing Dispatches and Directives for Operating Reserve* when an asset with a current energy

dispatch level receives a directive for contingency reserve, compliance with the combined energy dispatch and contingency reserve directive is assessed against the requirements in subsection 10 of Section 205.5 or subsection 6 of Section 205.6, as applicable. The AESO considers any real power provided pursuant to subsection 10(2) of Section 205.5 and subsection 6(2) of Section 205.6 that is in excess of the quantities set out in subsection 10(1) of Section 205.5 and subsection 6(1) of Section 205.6 to form part of a pool participant's response to the amount of real power set out in the directive.

While the provision of the required real power increase in response to a contingency directive is critical for the reliable operation of the interconnected electric system, the provision of real power in excess of the directed amount can also pose a risk to reliability. Contingency reserve providers are cautioned to keep this in mind when responding to a directive for contingency reserve.

## 6 Test Description

The pool asset providing contingency reserve may be tested in accordance with subsection 12 of Section 205.5 and subsection 8 of Section 205.6. The pool asset providing contingency reserve is made available to the AESO system controller according to a pre-arranged schedule for at least an eight hour period. A general guideline for testing is set out in the contingency reserve test description below, and illustrated in Appendices 1 through 3 of this Information Document. The contingency reserve test may be adjusted in real time, as deemed necessary by the AESO, based on system conditions and/or observed responses from the pool asset undergoing the test.

During the eight hour period, the AESO issues a dispatch to the spinning reserve or supplemental reserve provider. The pool asset providing spinning reserve or supplemental reserve must be in position, within fifteen minutes of receiving the dispatch, to provide the real power quantity as indicated in the dispatch, in accordance with subsection 5 of Sections 205.5 and 205.6. At some random times during the eight hour testing period, the AESO issues directives to reduce or increase the real power corresponding to the declared quantity of spinning reserve or supplemental reserve.

The response of the pool asset providing the spinning reserve or supplemental reserve is monitored for the following characteristics, which both the pool participant and the AESO record:

- a) the initial real power of the pool asset providing spinning reserve or supplemental reserve at the dispatch time;
- b) that the pool asset providing spinning reserve or supplemental reserve has positioned itself to provide supplemental reserve within fifteen minutes of the AESO dispatch;
- c) the real power of the pool asset providing spinning reserve or supplemental reserve at the time of the directive;
- d) the delay between the time of the AESO directive and the start of the real power response from the pool asset providing spinning reserve or supplemental reserve;
- e) for a generating asset, that the maximum real power from the pool asset providing spinning reserve or supplemental reserve is delivered within ten minutes of the AESO directive; or  
for a load asset, that the real power is reduced by the pool asset providing spinning reserve or supplemental reserve within ten minutes of the AESO directive; and
- f) the maximum and minimum real power from the pool asset providing spinning reserve or supplemental reserve during the ten to sixty minute time period following the AESO directive.

## 7 North West Power Pool Reserve Sharing Agreement

The North West Power Pool Reserve Sharing Agreement may be invoked in the event of both single and multiple contingencies. As a member of the North West Power Pool Reserve Sharing Agreement, the AESO is obligated to provide contingency reserve to another balancing authority if requested. The documentation for the North West Power Pool Reserve Sharing Program can be found on the North West Power Pool website at: [www.nwpp.org](http://www.nwpp.org).

## 8 Appendices

Appendix 1 – *Test Sequence for a Generator Pool Asset Supplying Spinning Reserve or Supplemental Reserve that is Synchronized to the Interconnected Electric System*

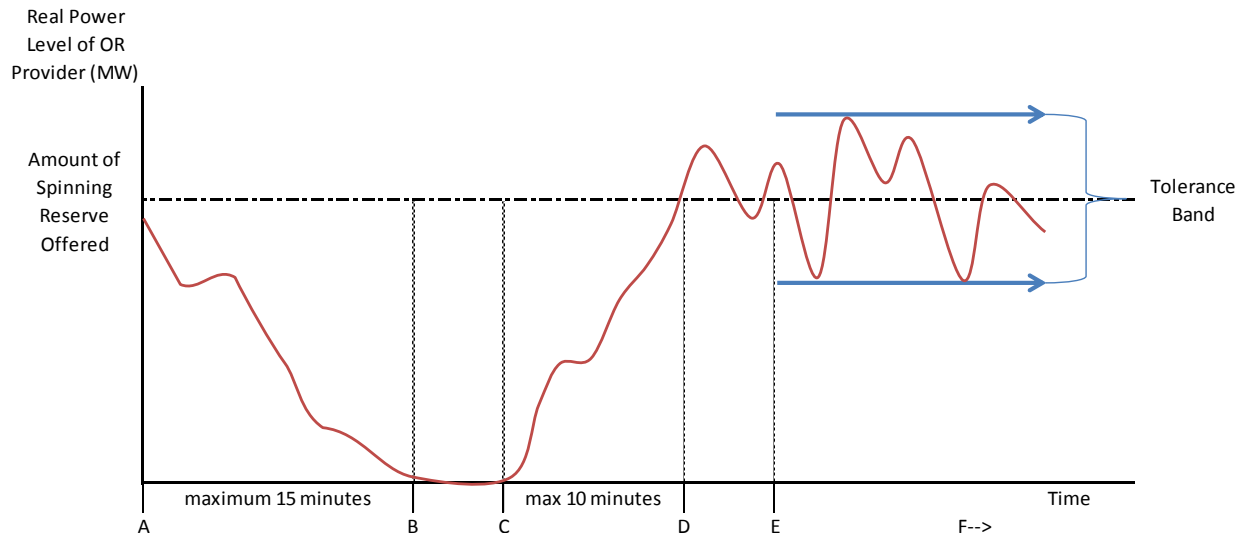
Appendix 2 – *Test Sequence for a Generator Pool Asset Supplying Supplemental Reserve that is Not Synchronized to the Interconnected Electric System*

Appendix 3 – *Test Sequence for a Load Pool Asset Supplying Supplemental or Spinning Reserve to the Interconnected Electric System*

### Revision History

Posting Date	Description of Changes
2018-02-01	Revisions to align with amended Operating Reserve rules in effect as of February 1, 2018
2017-03-14	Section 5.2 amended
2017-02-09	Section 5.2 amended
2016-09-28	Administrative amendments
2014-12-23	Initial Release

## Appendix 1 – Test Sequence for a Generator Pool Asset Supplying Spinning Reserve or Supplemental Reserve that is Synchronized to the Interconnected Electric System



This figure illustrates a possible response from a pool asset that is synchronized to the interconnected electric system and is providing either spinning reserve or supplemental reserve. It is assumed that there are no energy market dispatches during the test time period. The meaning of the labeled points is as follows:

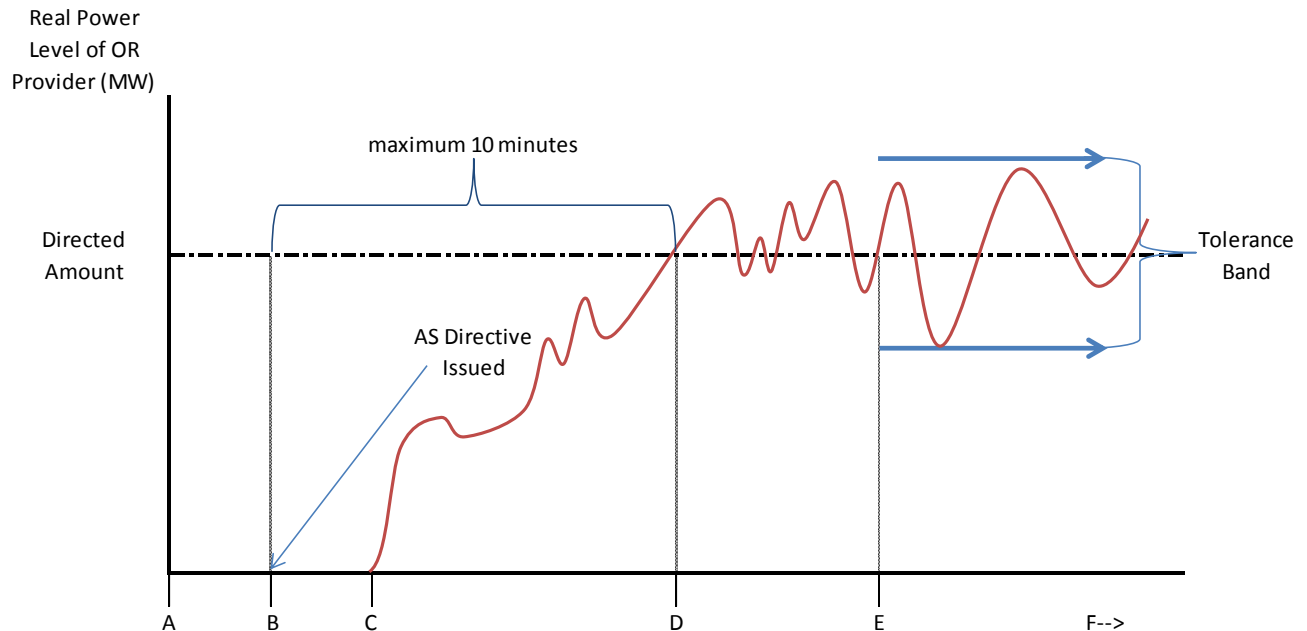
- A represents the real power of the pool asset providing spinning or supplemental reserve prior to the beginning of the test.
- B represents the AESO's dispatch to the pool asset providing spinning or supplemental reserve volume. Within fifteen (15) minutes the spinning or supplemental reserve asset(s) should be at a real power level to provide the supplemental reserve volume requested by the AESO.
- B to C at this point there may be up to an eight hour delay before the AESO issues a directive.
- C to D the AESO issues a directive to deploy a volume of spinning or supplemental reserve. Within ten minutes of the AESO directive the pool asset providing spinning or supplemental reserve should be providing a quantity of real power equal to the instantaneous amount of real power of the pool asset at the time of the directive plus the amount of real power set out in the directive.
- D to E represents the spinning or supplemental reserve asset(s) that, from the first time the spinning or supplemental reserve asset achieves this quantity to fifteen minutes after the time of the directive, maintains an average quantity of real power that is equal to or more than the instantaneous amount of real power of the pool asset at the time of the directive plus the amount of real power set out in the directive.
- E to F represents the spinning or supplemental reserve asset(s) that, for each consecutive ten minute interval starting fifteen minutes following the receipt of a directive, maintains an average quantity of real power that is equal to the instantaneous amount of real power of the pool asset at the time of the directive plus the amount of real power set out in the directive, within a tolerance of:
  - (a) five MW for a load pool asset or a generating pool asset with a maximum capability of two hundred MW or less; or

# Information Document Contingency Reserve ID #2013-007R



- (b) ten MW for a load pool asset or a generating pool asset with a maximum capability of greater than two hundred MW.

## Appendix 2 – Test Sequence for a Generator Pool Asset Supplying Supplemental Reserve that is Not Synchronized to the Interconnected Electric System

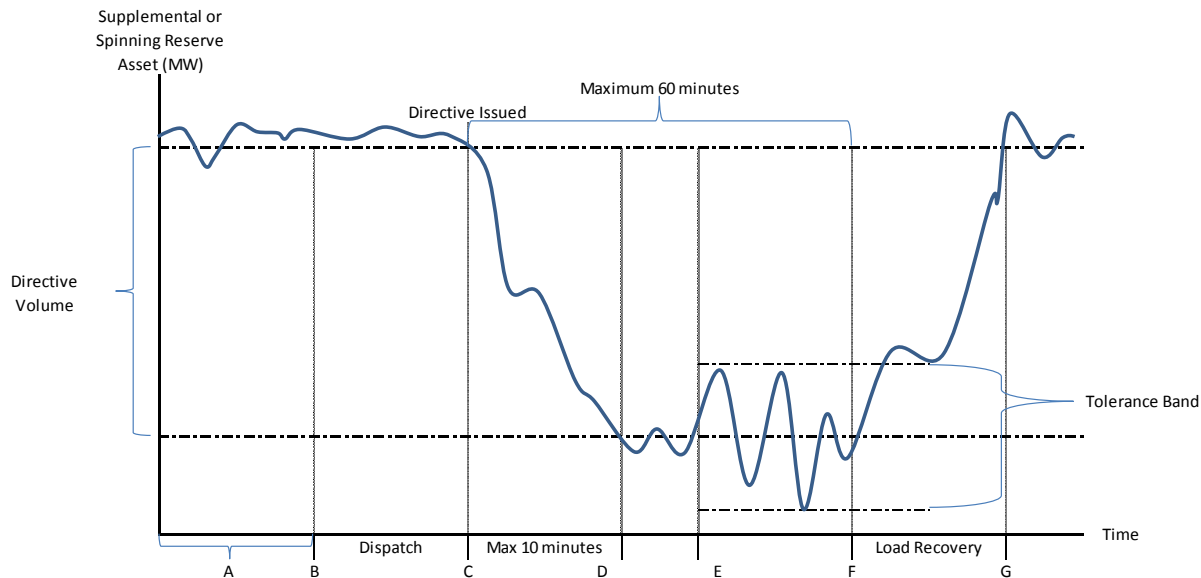


This figure shows a possible response from a generator that is not synchronized to the interconnected electric system providing supplemental reserve. The meaning of the labeled points is as follows:

- A represents the off-line state of the asset providing supplemental reserve prior to the beginning of the test.
- B to C represents a delay in synchronizing to the interconnected electric system.
- C to D represents the supplemental reserve asset(s) ramping to deliver the volume of supplemental reserve directed by the AESO. Within ten minutes of the directive, the asset providing supplemental reserve should be providing a quantity of real power equal to the instantaneous amount of real power of the pool asset at the time of the directive plus the amount of real power set out in the directive.
- D to E represents the supplemental reserve asset(s) that, from the first time the supplemental reserve asset achieves this quantity to fifteen minutes after the time of the directive, maintains an average quantity of real power that is equal to or more than the instantaneous amount of real power of the pool asset at the time of the directive plus the amount of real power set out in the directive.
- E to F represents the supplemental reserve asset(s) that, for each consecutive ten minute interval starting fifteen minutes following the receipt of a directive, maintains an average quantity of real power that is equal to the instantaneous amount of real power of the pool asset at the time of the directive plus the amount of real power set out in the directive, within a tolerance of:
  - (a) five MW for a load pool asset or a generating pool asset with a maximum capability of two hundred MW or less; or
  - (b) ten MW for a load pool asset or a generating pool asset with a maximum capability of greater than two hundred MW



## Appendix 3 – Test Sequence for a Load Pool Asset Supplying Supplemental or Spinning Reserve to the Interconnected Electric System



This figure illustrates a possible response from a load pool asset that is providing either spinning reserve or supplemental reserve. The meaning of the labeled points is as follows:

- A represents the real power of the supplemental or spinning reserve asset(s) prior to the beginning of the test.
- B represents the dispatch by the AESO to the pool asset providing supplemental or spinning reserve volume. Within fifteen minutes the supplemental reserve asset(s) should be at a real power level to provide the supplemental reserve volume requested by the AESO.
- B to C at this point there may be up to an eight hour delay before the AESO issues a directive.
- C to D the AESO issues a directive to reduce the volume of supplemental or spinning reserve corresponding to the volume of the directive. Within ten minutes of the directive, the asset providing spinning or supplemental reserve should be providing a quantity of real power equal to the instantaneous amount of real power of the pool asset at the time of the directive plus the amount of real power set out in the directive.
- D to E represents the spinning or supplemental reserve asset(s) that, from the first time the spinning or supplemental reserve asset achieves this quantity to fifteen minutes after the time of the directive, maintains an average quantity of real power that is equal to or more than instantaneous amount of real power of the pool asset at the time of the directive plus the amount of real power set out in the directive.
- E to F represents the spinning or supplemental reserve asset(s) that, for each consecutive ten minute interval starting fifteen minutes following the receipt of a directive, maintain an average quantity of real power that is equal to the instantaneous amount of real power of the pool asset at the time of the directive plus the amount of real power set out in the directive, within a tolerance of:
  - (a) five MW for a load pool asset or a generating pool asset with a maximum capability of two hundred MW or less; or
  - (b) ten MW for a load pool asset or a generating pool asset with a maximum capability of greater than two hundred MW.

F to G is the load recovery period. The AESO has cancelled the directive or the time has exceeded sixty minutes and the supplemental or spinning reserve asset(s) restores the real power output to the pre directive level.