



OPERATING RESERVES


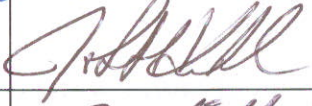

Technical Requirements

Technical Requirements for Provision of Spinning Reserves

Version 2.0

Change History

Date	Version	Detail	Changes By
Dec. 10, 2004	2.0	Re-release under AESO heading. No change to content.	Darren McCrank

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1.0 INTRODUCTION

A party offering a Spinning Reserve Resource (SRR) to the Alberta Electric System Operator (AESO) must satisfy the technical requirements outlined in the sections below. A party offering SRR (hereinafter referred to as a SRP) located outside the Alberta Control Area is required to comply with the applicable AESO's *Technical Requirements for the Provision of Spinning Reserves from Resources that are External to the Alberta Control Area*.

For the definition of the meanings of capitalized words in this document please refer to the Glossary of Terms for Technical Requirements for Ancillary Services.

2.0 TECHNICAL REQUIREMENTS

2.1 SPINNING RESERVE RESOURCE (SRR) AND SPINNING RESERVE PROVIDER (SRP)

1. Spinning Reserve Resources must be equipped with operating speed governors, set to a droop as established by the WECC standard.
2. The SRP must provide the AESO with a copy of the Test Report for Synchronous Generator Testing and Model Validation for the Spinning Reserve Resource being offered. (WECC Synchronous Generator Testing Program)
3. The SRP must submit a completed form to the AESO (see *Technical Specification and Contact Information* in the Due Diligence section).
4. The Spinning Reserve Resource must be able to provide at minimum, ten (10) MWs of Spinning Reserve.
5. The maximum volume of Spinning Reserves offered must be within the maximum Real Power capacity and minimum Real Power capacity of the Spinning Reserve Resource declared by the SRP.
6. Upon receipt of a AS Dispatch from the System Controller to Activate a volume of Spinning Reserves, the SRP shall, within fifteen (15) minutes, Position the Real Power of the Spinning Reserve Resource to supply the dispatched volume of Spinning Reserves.
7. In the event that the SRP receives an Energy Market Dispatch after it has Positioned the Resource to provide Spinning Reserves, it shall continue to be responsible for being able to deliver the dispatched volume of Spinning Reserve from the new level of Real Power output of the Generation Unit.
8. Upon receipt of an AS Directive from the System Controller to Deploy a volume of Spinning Reserves, the SRP shall, within ten (10) minutes, deliver the volume of Real Power of the Spinning Reserve Resource corresponding to the Directive volume. The amount of Real Power change within ten (10) minutes of the AS Directive shall be 100 to 110% of the AS Directive volume.
9. The volume of Real Power deployed following an AS Directive from the System Controller shall be measured as the change of Real Power output of the Generation Unit in the ten (10)

minute period following the instant the Directive is issued by the System Controller. The AS volume is calculated as;

$$\text{AS Volume} = \text{Max Real Power}|_{10\text{minutes}} - \text{Initial Real Power}$$

Where; Max Real Power_{|10minutes} = Maximum instantaneous Real Power Output in the ten (10) minute period following the AS Directive

Initial Real Power = Real Power Output at the time of the AS Directive

10. A Spinning Reserve Resource shall be capable of continuous Real Power delivery corresponding to the AS Directive volume for up to sixty (60) minutes following the System Controller AS Directive. Continuous delivery means:
 - a. in the event of no additional Energy Market Dispatches, the Real Power output of the Generation unit shall be that attained after the ten (10) minutes following the receipt of the AS Directive +/- a deadband. The deadband shall be no greater than five percent (5%) of the AS Directive volume or one (1) MW, whichever is greater;
 - b. in the event of an Energy Market Dispatch, in the raise direction, before the sixty (60) minutes of deployment are up, the energy dispatch volume shall be added to the Real Power output of the Generation Unit. The deadband shall apply to the total Generation Unit output;
 - c. in the event of an Energy Market Dispatch, in the lower direction, before the sixty (60) minutes of deployment are up, the energy dispatch volume shall be subtracted from the Real Power output of the Generation Unit. The deadband shall apply to the total Generation Unit output; and
 - d. in the event of an Energy Market Dispatch during the first ten (10) minutes following the AS Directive, the Real Power output of the Generation Unit shall deliver the AS Directive volume within the first ten (10) minutes and the additional Energy Market Dispatch shall be attained at the time indicated in such Dispatch. The deadband shall apply to the total Generation Unit output.

The Figures 1a through 1e at the end of this section 2.1 illustrate some possible AS Dispatch and AS Directive events, including the response of the unit to them. This list of figures is not intended to be comprehensive, and is provided only as an aid to understanding the requirements.

11. If the offer for Spinning Reserve is flexible, the SRP shall accept an AS Dispatch of a portion of the maximum Spinning Reserve volume offered.
12. During the period of time from ten (10) minutes to sixty (60) minutes following a System Controller AS Directive to Deploy the Spinning Reserves, the SRP must be willing to accept a cancellation of the AS Directive by the System Controller. The System Controller may issue a new AS Dispatch to re-Activate and re-Position the Real Power of the Spinning Reserve Resource.
13. If after sixty (60) minutes, the System Controller has not cancelled the AS Directive, then the SRP may return the Spinning Reserve Resource to a Real Power output level not less than that which the Generation Unit had prior to the System Controller AS Directive.

14. Spinning Reserve Resources that participate in Remedial Action Schemes (RAS) may be ineligible to provide Spinning Reserves while the RAS is in effect. The AESO will advise the SRP when a Spinning Reserve Resource is ineligible to provide Spinning Reserves because of RAS.

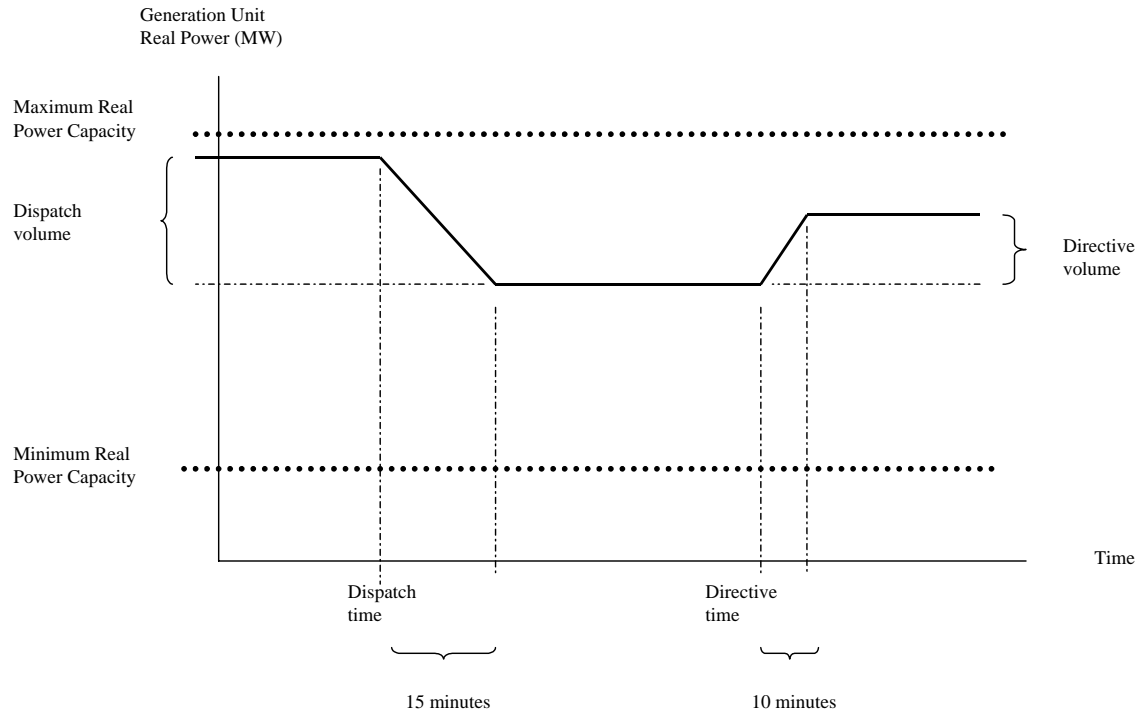


Figure 1a: Response of a Generation Unit to a Spinning Reserve Dispatch and Directive when the Generation Unit is at (or close to) Maximum Real Power capacity output prior to the Spinning Reserve Dispatch. Note that the Dispatch and Directive volumes do not have to be the same volume if the Spinning Resource is flagged as flexible in the Ancillary Service merit order. In this case there are no Energy Market Dispatches affecting the Generation Unit during the time period shown.

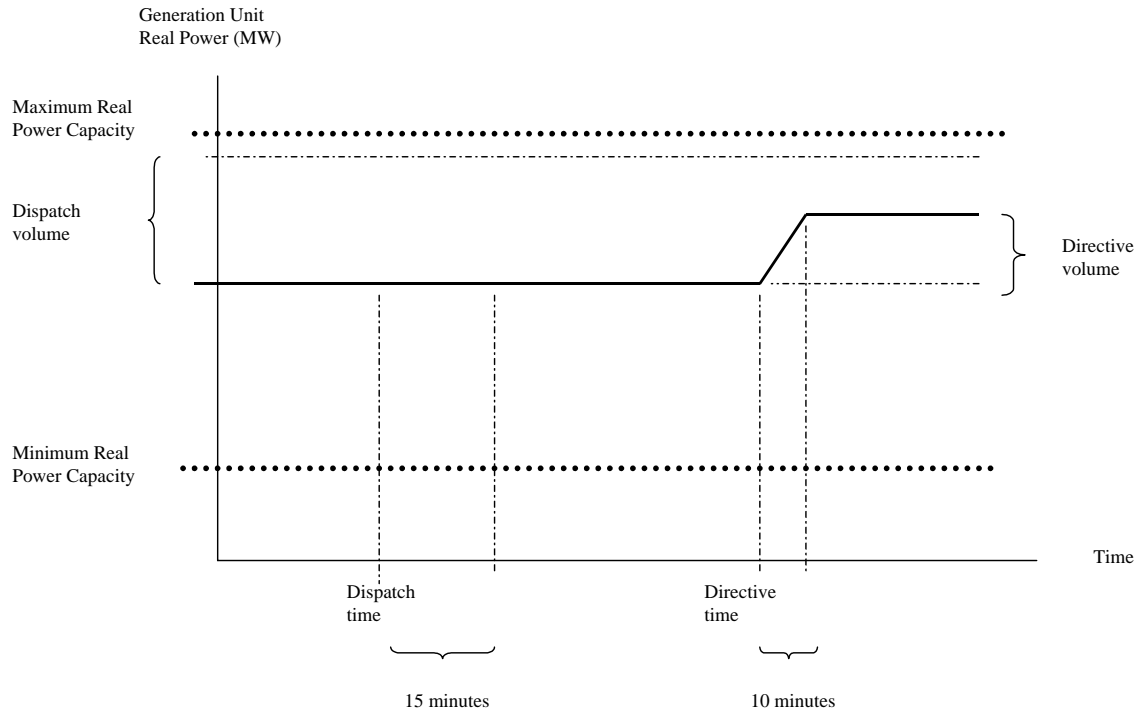


Figure 1b: Response of a Generation Unit to a Spinning Reserve Dispatch and Directive when the Generation Unit is below Maximum Real Power capacity output prior to the Spinning Reserve Dispatch. Positioning of the Generation Unit does not involve any change in the Real Power output of the Generation Unit. Note that the Dispatch and Directive volumes do not have to be the same volume if the Spinning Resource is flagged as flexible in the Ancillary Service merit order. In this case there are no Energy Market Dispatches affecting the Generation Unit during the time period shown.

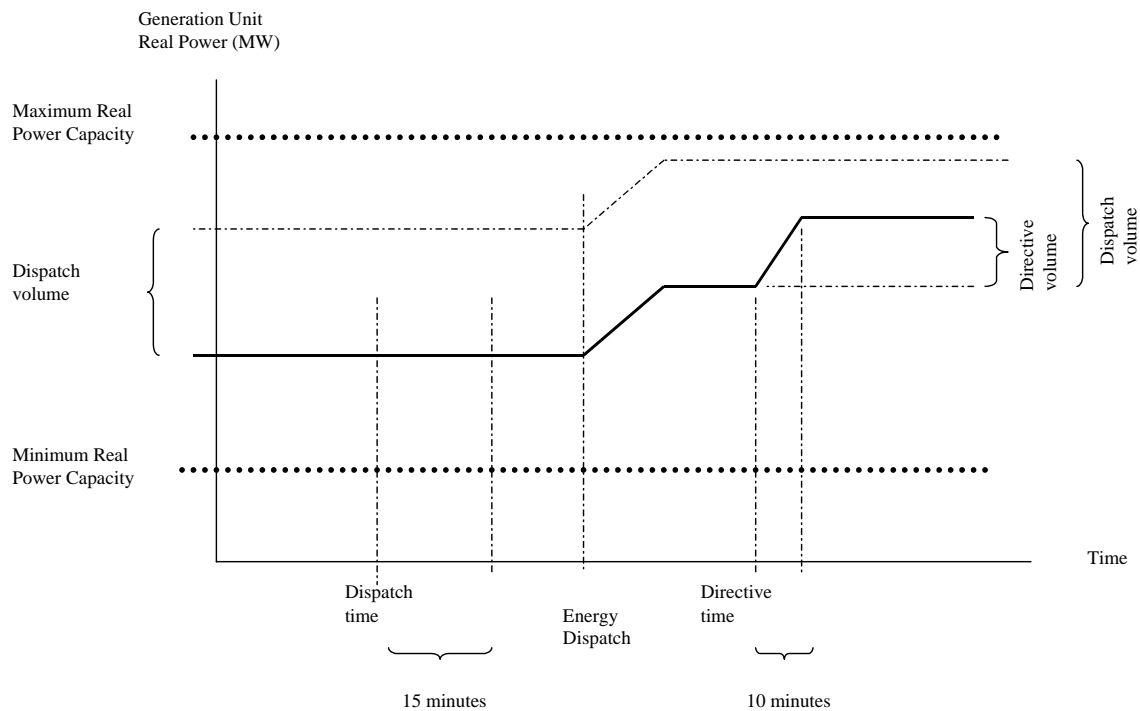


Figure 1c: Response of a Generation Unit to a Spinning Reserve Dispatch and Directive when the Generation Unit is below Maximum Real Power capacity output prior to the Spinning Reserve Dispatch. Positioning of the Generation Unit does not involve any change in the Real Power output of the Generation Unit. Note that the Dispatch and Directive volumes do not have to be the same volume if the Spinning Resource is flagged as flexible in the Ancillary Service merit order. In this case there is an Energy Market Dispatch in between the time when the Resource receives the Spinning Reserve Dispatch and when it receives the Spinning Reserve Directive. Figure 1c indicates how the commitment to provide the dispatched Spinning Reserve Volume follows the Energy Market Dispatch. The commitment to provide the dispatched Spinning Reserve volume would follow in a similar manner had the Energy Market Dispatch been in a direction to lower the Real Power output of the Resource.

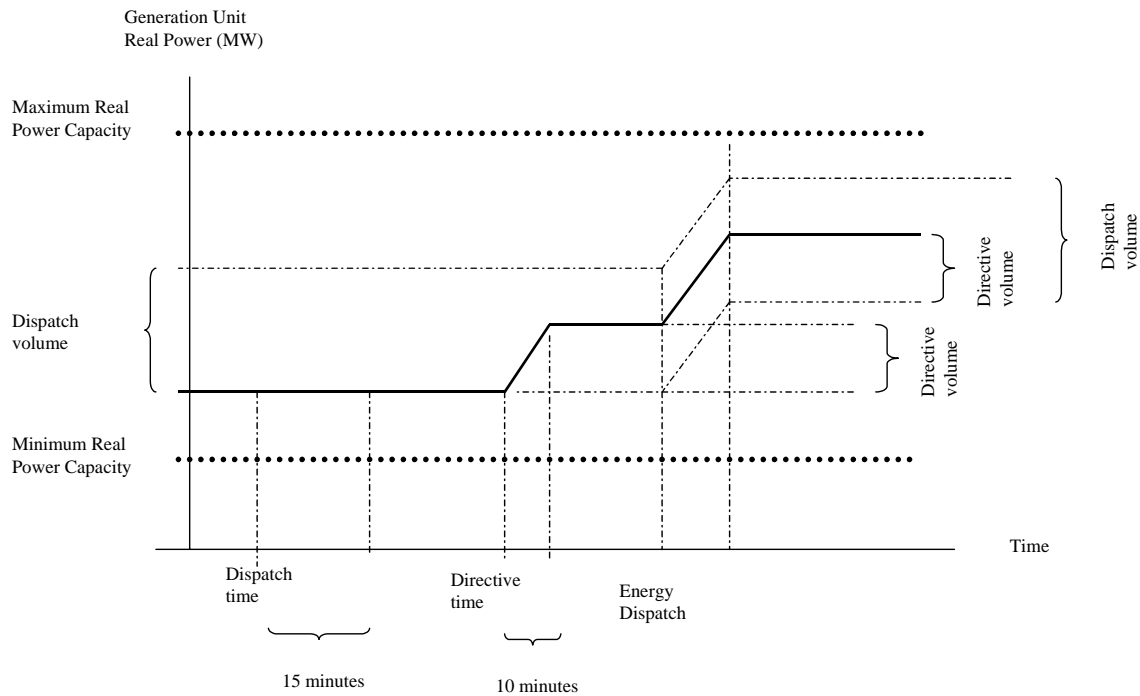


Figure 1d: Response of a Generation Unit to a Spinning Reserve AS Dispatch and AS Directive when the Generation Unit is below Maximum Real Power capacity output prior to the Spinning Reserve AS Dispatch. Positioning of the Generation Unit does not involve any change in the Real Power output of the Generation Unit. Note that the Dispatch and Directive volumes do not have to be the same volume if the Spinning Resource is flagged as flexible in the Ancillary Service merit order. In this case there is an Energy Market dispatch while the AS Directive is in force. Figure 1d indicates how the commitment to continue providing the deployed energy for the Spinning Reserve volume follows the Energy Market Dispatch. The commitment to provide the Spinning Reserve deployed energy volume would follow in a similar manner had the Energy Market Dispatch been in a direction to lower the Real Power output of the Resource.

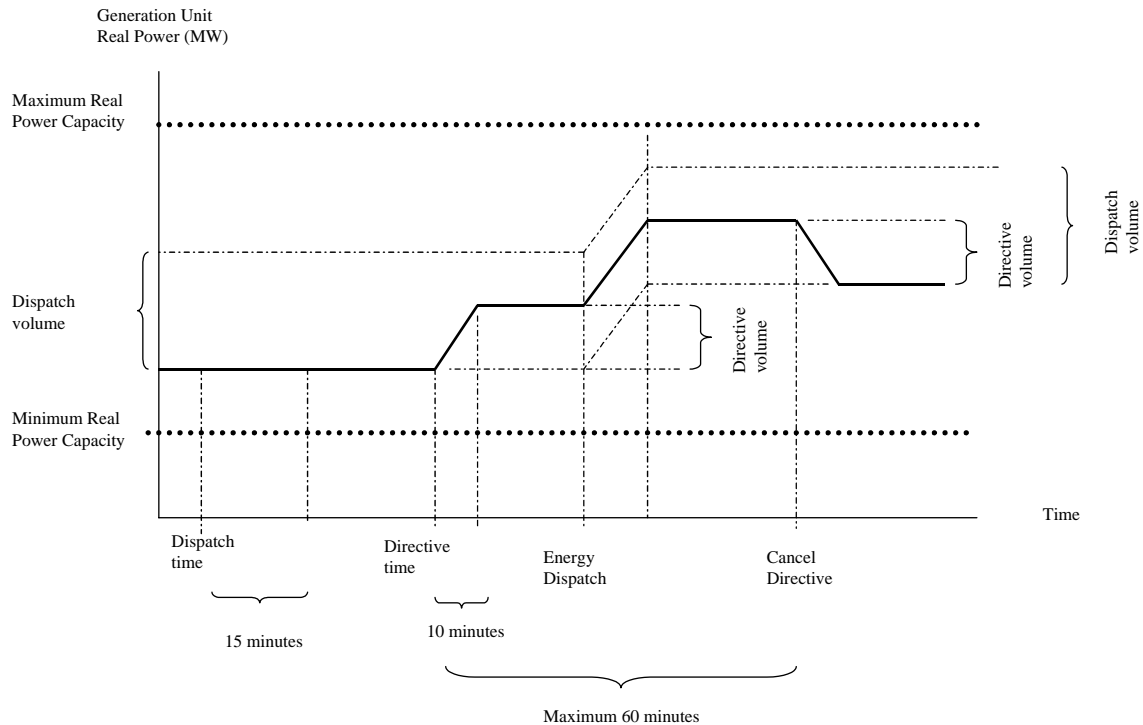


Figure 1e: This figure indicates a response that is similar to that shown in Figure 1d, except that the AS Directive is cancelled. The figure shows how the commitment to continue providing the dispatched volume of Spinning Reserve continues even after the AS Directive is cancelled. The commitment remains until such time as the AS Dispatch for Spinning Reserve is released.

2.2 SPINNING RESERVE RESOURCE RESPONSE TO FREQUENCY DEVIATION

The requirement for response to frequency deviations overrides the requirements for “stability” described in Section 2.1, items 8, 9 and 10.

1. The Real Power of the Spinning Reserve Resource must respond to frequency deviations in the power system without assistance by the Generation Unit operator. The Real Power shall increase automatically when frequency decreases below 60 Hz and the Real Power shall decrease automatically when system frequency increases above 60 Hz.
2. The Spinning Reserve Resource governor deadband shall not be more than 0.036 Hz.
3. The Spinning Reserve Resource shall not be operated with a governor load limiter that prevents the contracted volume of Spinning Reserve to be delivered following a System Controller AS Directive.
4. The Spinning Reserve Resource shall not be operated with a governor load limiter that prevents Real Power response to power system frequency deviations.

2.3 TELEMETRY AND COMMUNICATIONS

1. The Spinning Reserve Resource must have telemetry of the quantities listed below to the Energy Management System (EMS) operated by the System Controller. The telemetry provided must have the update rate indicated for each quantity:

- a) Spinning Reserve Resource Gross Real-Power (MW) (10 second refresh rate or faster);
 - b) Spinning Reserve Resource breaker status. Such status may be actually made up of more than one physical breaker. In the latter case, the status of all breakers that must be closed / opened for the Spinning Reserve Resource to be connected / removed from AIES must be available (updated in 10s of a change in status or faster).
2. The accuracy of the analog telemetry must be at least +/- 2% of the actual value.
 3. The resolution of the analog telemetry must be 0.5 % or better.
 4. The availability of the telemetry system must be 99.8% or better.
 5. The SRP is expected to maintain a “control centre” for the Spinning Reserve Resource being offered that is staffed 24 hours a day, 7 days a week.
 6. Both primary and backup voice communications between the control centre of the System Controller and the control centre of the SRP must be provided by the SRP.
 7. The SRP shall be able to communicate with the System Controller using voice or electronic means, as set out in the AESO Operating Policies and Procedures (OPP's).

3.0 OPERATIONAL REQUIREMENTS

The SRP must follow all applicable ISO OPP's published by the AESO with respect to the operation of Spinning Reserve.

4.1 TEST REQUIREMENTS

In order to conduct a test, as described in the contract for Ancillary Services Supply, the Spinning Reserve Resource shall be made available to the System Controller for Spinning Reserve according to a pre-arranged schedule with the System Controller for at least an 8-hour period.

The System Controller will issue an AS Dispatch to the Spinning Reserve Provider to Activate the Spinning Reserve Resource.

The Spinning Reserve Resource shall within fifteen (15) minutes be Activated and ready to deliver the AS Dispatch volume of Spinning Reserves.

During the 8-hour period, the System Controller shall issue a random AS Directive for the Spinning Reserve Resource to deliver the Real Power corresponding to the declared volume of Spinning Reserve.

The Spinning Reserve Resource response characteristics shall be monitored and recorded by the SRP and System Controller as follows:

- The initial Real Power of the Spinning Reserve Resource at the Dispatch Time.
- That Spinning Reserve Resource has Positioned itself to provide Spinning Reserve within fifteen (15) minutes of the System Controller AS Dispatch.
- The Real Power of the Spinning Reserve Resource at the time of the AS Directive.
- Time delay to start Real Power response from the Spinning Reserve Resource from the time of the System Controller AS Directive.
- The instantaneous Real Power output from the Spinning Reserve Resource that occurred within 10 minutes of the System Controller AS Directive.
- The Real Power output from the Spinning Reserve Resource during the ten (10) to sixty (60) minute time period following the System Controller AS Directive.

A possible Generation Unit response is shown in Figure 2. It is assumed that there are no Energy Market Dispatches during the test time period. The meaning of the labeled points is as follows:

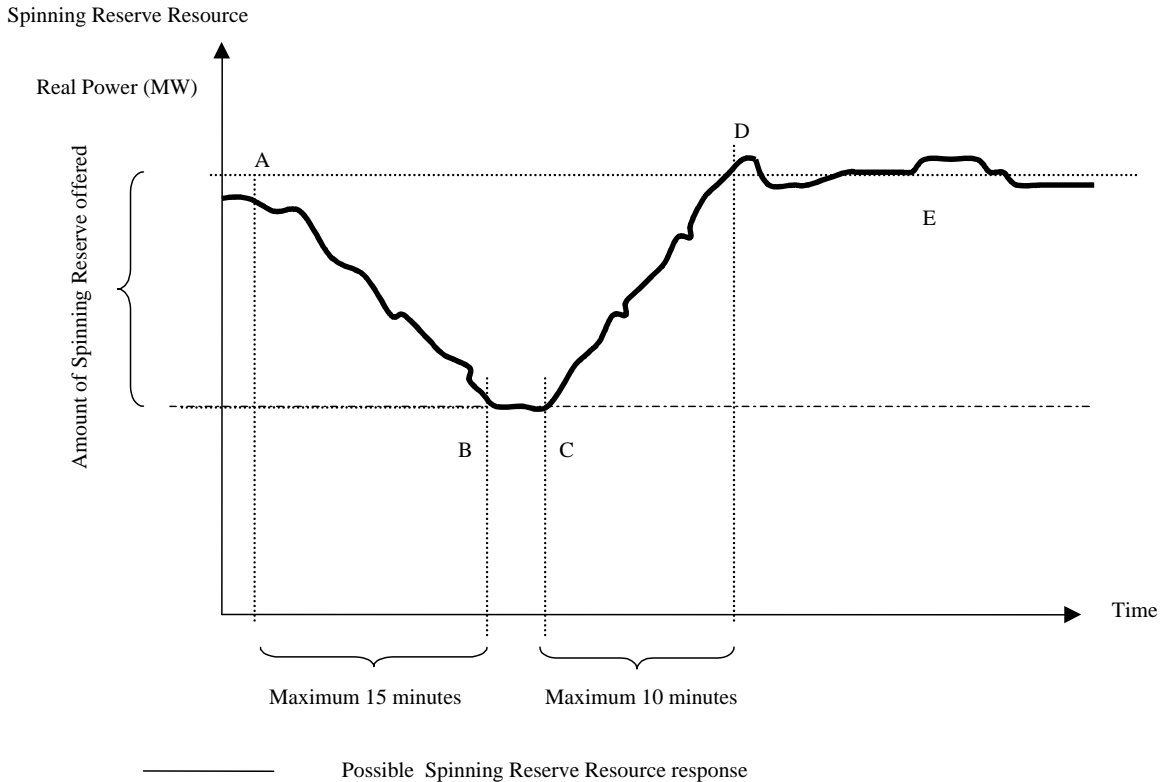
A - represents the Real Power of the Spinning Reserve Resource prior to the beginning of the test.

B – represents the Spinning Reserve Provider being dispatched by the System Controller to Activate the Spinning Reserve volume. Within fifteen (15) minutes the Spinning Reserve Resource shall be at a Real Power level that allows it to provide the Spinning Reserve volume requested by the System Controller.

B to C – At this point there may be up to an 8-hour delay before the System Controller issues a AS Directive.

C to D – The System Controller will issue an AS Directive to Deploy a volume of Spinning Reserve. Within ten (10) minutes of the System Controller AS Directive the Real Power shall meet 100% to 110% of Spinning Reserve volume of the AS Directive.

D to E – The Real Power of the Spinning Reserve Resource shall remain within 95% to 105% (or +/- 1 MW, whichever is greater) of the Spinning Reserve volume.



Test sequence for Spinning Reserve Resources

Figure 2