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Dear Doug:

Thank you for the opportunity to provide comments on the recent *AESO Recommendation Paper: Rule 6.6 Review.* ENMAX appreciates the AESO's willingness to modify this rule based on stakeholder feedback. Generally, we believe the rule is headed in the right direction.

I do have some questions and comments on various sections of the paper, as follows.

Section 2.3

ENMAX agrees that additional definition and clarity would benefit participants and the market. ENMAX therefore supports the AESO's intent to clearly set out the discretion that is available to it when monitoring dispatch variances.

Section 3

ENMAX agrees with the three basic principles set out in the document: intentional deviations and variances resulting from a lack of due diligence must be discouraged, the practical limitations of the generating units must be taken into consideration, and appropriate tolerances are required to ensure market integrity and a reliable electric system.

Section 3.1

ENMAX appreciates that the AESO does not wish to involve itself in the relationship between PPA Buyers and PPA Owners, and indeed, it is appropriate that the AESO exclude itself from commercial arrangements between "market participants" (as that term is defined in the *Electric Utilities Act*). However, it makes no sense to hold a party accountable for events over which it has no control. More importantly, imposing obligations on parties that are not in a position to comply with them (since they don't have "their fingers on the buttons") cannot result in a reliable power system. Consequently, ENMAX does not agree that Rule 6.6 should continue to apply to pool participants notwithstanding any other contractual arrangements.

To that end, it may be appropriate for the AESO to have "operating agreements" in place that are (at least somewhat) independent of existing STS contracts whenever those contracts are with parties other than the plant operators. ENMAX notes that Section 20(3) of the EUA states that a *market participant* must comply with AESO rules, and that under Section 1(1)(ee), any person that *supplies*, *generates*, or *exchanges* electric energy is a market participant.

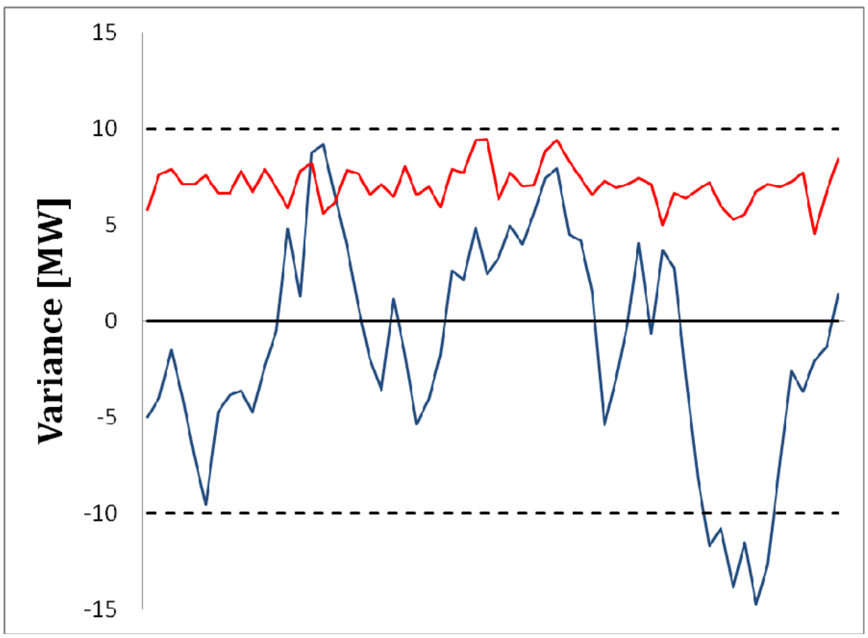
Section 3.2

Clearly, several factors must be considered when establishing generating unit dispatch tolerances. On the one hand, there are natural limitations on a plant operator's ability to control unit output, even during steady-state operation. Since it would be unfair to penalize an operator for a failure to control unit output within a tighter band than the unit is physically capable of, any single tolerance band must accommodate the least-controllable unit on the system. On the other hand, as noted in the MSA's report on dispatch compliance, certain generators take advantage of their units' controllability and routinely generate very close to the compliance limit. This is evident in Figure 4, which shows a plateau in the variance duration curve at the -5 MW threshold that one would not expect if dispatch variances were entirely random. ENMAX, like the AESO, is concerned about balancing the need to accommodate the real physical attributes of each unit without giving a "free pass" to the more controllable units. That certain units are more controllable is evident from Figures 2 through 4.

There are several, non-mutually-exclusive possibilities for addressing this dilemma. The first is to set dispatch tolerances based on the capabilities of individual units or classes of units. In making this suggestion, ENMAX is assuming that the differences among the units are statistically significant. There is not enough information in the tables to assess this.

A second possibility is to use, as a dispatch compliance measure, the number of zero-crossings (or a similar measure such as the mean time between zero crossings) over a certain period. A zero crossing occurs when the dispatch variance changes from positive to negative or negative to positive. In the following figure, the dispatch variances of two hypothetical units are shown. Each is assumed to have an allowable variance of ±10 MW. The variations in the output of the blue unit are clearly much larger than those of the red unit, and the blue unit has breached the lower tolerance level while the red unit has operated entirely within the tolerance band. Nevertheless, it appears that the blue unit, which exhibited many more zero crossings than the red unit, was trying to comply with the dispatch level. The red unit, meanwhile, was operating at about 7 MW above its dispatch, either intentionally in violation of the dispatch level or because of an operational problem. Not surprisingly, the magnitudes of the mean and median dispatch variances of the blue unit over the period are much smaller than those of the red unit, which means that limits on the mean and median dispatch variances over (probably rolling) periods are also likely to be useful compliance measures. The number of zero-crossings has the advantage of being simple to observe.

Note that, with a lower limit on the number of zero crossings in a given period, it is highly unlikely that plant operators would intentionally push their units away from the AESO-provided dispatch levels (i.e., exaggerate the magnitude of the natural fluctuations in unit output) because it would take that much more effort to bring them back across zero (or to zero in the case of desynchronization). Thus, it may not even be necessary to specify tolerance bands in either of the forms ±X MW or ±Y percent. In ENMAX's view, these compliance measures should help alleviate the AESO's concern, stated at page 12, that generators might continually operate near the increased tolerance levels.



Other possibilities for compliance monitoring, again not mutually exclusive of the others, include the dispatch-variance-weighted mean system marginal price, the *runs test*, and the correlation between system marginal prices and dispatch variances. Operating a unit consistently above or below the assigned dispatch level during periods of high (or low) SMP will result in a weighted-average SMP and a correlation coefficient that are statistically significantly different from zero. The runs test is a statistical test that calculates the probability that a sequence like P P P P P N N P P P P P N P, where P represents a positive dispatch variance and N represents a negative variance, resulted by chance from a random process. Consistent operation of a unit away from its dispatch level would violate this test as well.

While statistical measures of a unit's compliance with dispatch instructions may be more complex than a simple ±X tolerance band, they are more indicative of actual plant behaviour and likely less prone to gaming by highly-controllable units. Statistical measures of the extent to which supply matches demand are already an integral part of NERC operating standards (see, for example, BAL-001-0, *Real Power Balancing Control Performance*), and a variation between supply and demand is identical to a variation between actual and dispatched unit outputs in the sense that both represent deviations from target values. Also, a zero-crossing requirement is conceptually similar to the requirement, in BAL-002-0, *Disturbance Control Performance,* that a balancing authority return its area control error ("ACE") to zero (or to its pre-disturbance value) within 15 minutes. In ENMAX's view, statistical measures of compliance deserve further exploration.

Without going into detail, there are some additional concepts from statistical process control (such as control charts and control limits) that may be useful for dispatch compliance monitoring. I would be happy to discuss some of these concepts with you.

Section 3.3

Generally, ENMAX supports the concept that reasonable delays in responding to a dispatch should be allowed. However, we are concerned that the analysis used to estimate the delay time might be biased (in a statistical sense). The reason for the concern is that, as noted at page 13, delay times greater than 20 minutes were excluded from the study <u>and</u> outliers were removed using a 95% confidence factor. ENMAX is concerned that this procedure may have biased the standard deviation downwards. Since setting the allowable delay time to be only one standard deviation from the mean results in a substantial fraction of the delays actually experienced lying outside the proposed delay times,[1] those proposed delay times may be far less than what they have been in actual practice. Similar comments likely apply to the ramp-rate analysis. Thus, while ENMAX supports the use of a "compliance zone" like that shown on page 14, we are not convinced that the parameters defining that zone are correct.

Section 3.4

It is hopefully clear from our comments above that ENMAX agrees that the rule should allow for normal fluctuations in unit output. The statistical measures proposed above will facilitate the identification of normal and abnormal dispatch variances. Since a unit may fail a statistical compliance test for legitimate operational reasons, ENMAX supports the inclusion in Rule 6.6 of factors the AESO may consider when evaluating deviations from dispatch levels.

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[1] For a random variable that follows a normal distribution, 32% of the observations lie outside the range $\mu \pm 1\sigma$. Since delay times cannot be normally distributed (because delay times less than zero are not possible), ENMAX does not know what percentage of delay times might lie outside the interval used by the AESO.

Section 3.5

ENMAX supports the inclusion in Rule 6.6 of provisions related to positioning a unit to provide operating reserves. We caution, however, that the first movement of the unit during such positioning may not necessarily be in the desired direction, given the random fluctuations that are a normal part of plant operation.

Sections 3.6 and 3.7

ENMAX supports the AESO's recommendations on governor action and ramping below minimum stable generation.

Section 3.8

In ENMAX's view it is meaningless for a unit that has trouble controlling its output within (say) ±5 MW to submit offers with 1 MW block sizes. It is equally meaningless, and certainly contrary to a fair, efficient, and openly competitive market, to have assets that do not even synchronize to the grid remain in compliance with a dispatch. Thus, ENMAX supports the AESO's recommended changes. We note once more, however, that the first movement of a unit in response to a dispatch will not necessarily be in the desired direction. We also note that a rule that provides for a maximum zero-crossing time would eliminate the synchronization and desynchronization issues, and would also help avoid spurious event references to the MSA.

Sections 4.1 and 4.2

As noted above, measures like zero-crossing times can eliminate the potential for generators to consistently operate at the top or bottom of a dispatch tolerance band, regardless of the width of that band or the characteristics of the particular unit. Other measures, such as the weighted average SMP, the SMP/dispatch-variance correlation, and the runs test can help detect price-chasing and self-dispatching. Analysis of the characteristics of individual units could also eliminate the small blocks of "phantom" energy in the merit order, and would help alleviate situations in which the AESO does not know whether a unit will get to its dispatch level (since an inability to achieve a zero crossing would be cause to inform the AESO). Each of these statistical procedures is consistent with procedures used by NERC to monitor supply/demand balance and area control error. ENMAX therefore urges the AESO to consider these, and potentially other, measures before finalizing Rule 6.6.

If you have any questions, please call me at 403-689-6377. As noted earlier, I would be happy to discuss these and other compliance monitoring procedures with you.

Yours truly,

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Director, Regulatory Affairs