NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

April 6, 2016

VIA ELECTRONIC FILING

Rachelle Verret Morphy
Saskatchewan Electric Reliability Authority
2025 Victoria Avenue
Regina, Saskatchewan, Canada S4P 0S1

RE: *North American Electric Reliability Corporation*

Dear Ms. Morphy:

The North American Electric Reliability Corporation ("NERC") hereby submits Supplemental Information for Notice of Filing of the North American Electric Reliability Corporation of Proposed Reliability Standard BAL-002-2. NERC requests, to the extent necessary, a waiver of any applicable filing requirements with respect to this filing.

Please contact the undersigned if you have any questions.

Respectfully submitted,

/s/ Holly A. Hawkins

Holly A. Hawkins
Associate General Counsel for the North American Electric Reliability Corporation

Enclosure

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BEFORE THE
CROWN INVESTMENT CORPORATION
OF THE PROVINCE OF SASKATCHEWAN

NORTH AMERICAN ELECTRIC)
RELIABILITY CORPORATION)

SUPPLEMENTAL INFORMATION FOR NOTICE OF FILING OF THE NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION OF PROPOSED RELIABILITY STANDARD BAL-002-2

The North American Electric Reliability Corporation ("NERC")[1] hereby submits supplemental information ("Supplement") to its February 18, 2016 filing regarding proposed Reliability Standard BAL-002-2 (Disturbance Control Standard – Contingency Reserve for Recovery from a Balancing Contingency Event) (the "Filing").[2] This Supplement will further clarify the extent to which BAL-002-2 interacts with other Reliability Standards to promote Bulk Power System reliability.

Specifically, this Supplement provides further clarity regarding the significance of the Most Severe Single Contingency ("MSSC") as the upper bounds for events that qualify as Reportable Balancing Contingency Events ("RBCE")[3] under Reliability Standard BAL-002-2 and the way in which other Reliability Standards are necessary and appropriate to address events beyond MSSC. In doing so, this Supplement explains how such Reliability Standards apply to

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[1] Terms not otherwise defined herein are defined in the proposed Reliability Standard BAL-005-1 and the *NERC Glossary*.

[2] *Notice of Filing of the North American Electric Reliability Corporation of Proposed Reliability Standard BAL-002-2*, (filed February 18, 2016); *see also*, *Clarifying Supplemental Information for Notice of FIling of BAL-002-2* ("Clarifying Supplemental Information"), (filed Feb. 26, 2016) (clarifying that Reliability Standard TOP-007-0, which was referenced in the Filing as operating in conjunction with Reliability Standard BAL-002-2 to control system frequency by addressing transmission line loading ("TLL") in the event of a transmission overload, has been retired and will be covered in TOP-001-3, EOP-003-2, IRO-009-2, and IRO-008-2).

[3] The proposed definition of RCBE, as in the Filing on February 18, 2016, is "[a]ny Balancing Contingency Event occurring within a one-minute interval of an initial sudden decline in ACE based on EMS scan rate data that results in a loss of MW output less than or equal to the Most Severe Single Contingency, and greater than or equal to the lesser amount of: (i) 80% of the Most Severe Single Contingency, or (ii) the amount listed below for the applicable Interconnection. Prior to any given calendar quarter, the 80% threshold may be reduced by the responsible entity upon written notification to the Regional Entity. Eastern Interconnection – 900 MW • Western Interconnection – 500 MW • ERCOT – 800 MW • Quebec – 500 MW."

an event(s) that exceeds MSSC and assign responsibilities to Balancing Authorities ("BA"), Reserve Sharing Groups ("RSG"), Transmission Operators ("TOP"), and Reliability Coordinators ("RC") to ensure Bulk Electric System ("BES") reliability. This framework effectively preserves reliability by ensuring that loss due to RBCEs (*i.e.,* events that are less than or equal to the MSSC) is managed according to Reliability Standard BAL-002-2, while events causing losses beyond an entity's MSSC are supported by Reliability Standards better designed to manage the greater risks posed by such events. Finally, this Supplement provides examples illustrating how Reliability Standards working in concert with BAL-002-2 ensure the balancing of demand and resources and the restoration of Reporting ACE and Contingency Reserves during events above MSSC in support of the overarching purpose underlying Reliability Standard BAL-002-2.

I. SUPPLEMENTAL INFORMATION

The stated purpose of proposed Reliability Standard BAL-002-2 is "[t]o ensure the Balancing Authority or Reserve Sharing Group balances resources and demand and returns the Balancing Authority's or Reserve Sharing Group's Area Control Error to defined values (subject to applicable limits) following a Reportable Balancing Contingency Event." Requirements R1 and R3 of proposed Reliability Standard BAL-002-2 apply to entities that have experienced an RBCE. Therefore, these Requirements do not apply if an event causes a loss of MW greater than the MSSC.

The MSSC is the appropriate threshold under BAL-002-2, because it helps ensure that an entity is prepared to recover from the event(s) that causes the greatest MW loss of resource output used by the RSG or BA. The proposed standard requires responsible entities to rebalance the affected system within 15 minutes of an RBCE. If an event causes loss of capacity greater

than MSSC and available Contingency Reserves are not adequate to balance the system, Reliability Standards other than BAL-002-2 require the entity to restore operating conditions to address Transmission loading concerns (i.e., Interconnection Reliability Operating Limit ("IROL") or System Operating Limit ("SOL") exceedances) and maintain operations within normal frequency limits (as required under BAL-001-2 and BAL-003-1). As described in the Filing and Exhibit B of the Filing, proper calculation of MSSC is critical for reliability and is required under Requirement R2 of proposed Reliability Standard BAL-002-2.[4] Finally, previous NERC research illustrates that these events occur on an infrequent basis.[5]

Entities must recover from an event(s) that exceeds MSSC through the coordinated application of Reliability Standards BAL-001-2, BAL-003-1, TOP-007-0,[6] EOP-002-3, EOP-011-1, IRO-008-2, and IRO-009-2. These standards collectively require BAs, RSGs, TOPs, and RCs to exercise respective operational and oversight authority to maintain frequency, balance load and demand, and operate within SOLs. This integrated operation of Reliability Standards takes into account an entity's real-time challenges upon loss larger than MSSC and the resources necessary to continue to serve load and prepare to restore Contingency Reserves in spite of such

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[4] *See*, Filing, *supra* note 2 at pp. 22-23, (explaining that Requirement R2 of BAL-002-2 requires restoration of MSSC after a RCBE subject to an additional Balancing Contingency Event); *see also*, *id*., Exhibit B (explaining that the determination of the Responsible Entity's MSSC is "not an economic issue" and that Responsible Entities are "compelled and highly motivated to determine the MSSC correctly since it allows them to maintain reliability and to be consistent and compliant with other NERC Reliability Standards such as BAL-001 and various TPL Standards.").

[5] *2012 State of Reliability* (May 2012) (tracking the occurrence of Adequate Level of Reliability ("ALR") 2-5 (Disturbance Control Events Greater Than the Most Severe Single Contingency) since 2006. For the period from 2006 until 2011, ninety disturbance events exceeded the MSSC. During that time, the greatest number of events in any given year was less than 30 events. Evaluation of this data illustrates that events greater than MSSC occur very infrequently. Notably, the metric reports the number of DCS events greater than MSSC, regardless of the size of a BA or RSG and of the number of reporting entities within a Regional Entity. As such, a high number of DCS events greater than MSSC may indicate an issue for the respective BA or RSG and not the respective Regional Entity.), accessible online at http://www.nerc.com/files/2012_sor.pdf.

[6] As explained in the Clarifying Supplemental Information, the Federal Energy Regulatory Commission ("FERC") approved the retirement of Reliability Standard TOP-007-0 in Order No. 817 on November 19, 2015. Effective April 1, 2017, the responsibilities under that standard are now covered by TOP-001-3, EOP-003-2, IRO-009-2, and IRO-008-2.

an event. As Reporting ACE is a prospective equity measure, these coordinated standards will ensure restoration of Reporting ACE on an incremental basis through a series of interrelated responsibilities without subjecting the grid to undue risk or needless curtailment of firm load.

The following supplemental information includes: (i) a detailed description of each Reliability Standard that is implicated when an event exceeds an entity's MSSC; and (ii) illustrative examples of events that require the coordinated application of such Reliability Standards to best ensure Reliable Operation of the BES and adequate recovery of Reporting ACE and Contingency Reserves.

a. Coordinated Suite of Reliability Standards

As referenced in the Filing, BAL-002-2 is designed to operate alongside several existing and soon to be effective Reliability Standards, thereby strengthening the coordinated suite of Reliability Standards designed to address frequency, output loss, transmission loading, and reactive measures to prevent degradation of a system after a contingency event or series of events.[7] Specifically, in instances where contingency events cause a loss greater than an entity's MSSC and are thus not within the scope of Reliability Standard BAL-002-2, the following Reliability Standards will apply to the affected entity and its RC: Reliability Standards BAL-001-2, BAL-003-1, TOP-007-0,[8] EOP-002-3, EOP-011-1, IRO-008-2 and IRO-009-2.

Similar to BAL-002-2, these Reliability Standards require actions that encourage the balancing of resources and demand. These standards operate autonomously and synchronously to ensure that responsible entities institute measures to maintain real time system reliability and to return Reporting ACE and Contingency Reserves to acceptable levels. Thus, each of these Reliability Standards supports the overarching policy objective reflected in the stated purpose of

[7] Filing, *supra* note 2, at pp. 13-14.
[8] *Supra* note 10.

Reliability Standard BAL-002-2, excerpted above, while fulfilling its independent stated purpose.

1. BAL-001-2

The purpose of Reliability Standard BAL-001-2 is "[t]o control Interconnection frequency within defined limits." The standard accomplishes this purpose, in part, by requiring each BA to operate such that it meets the Control Performance Standard 1 ("CPS1") and controls its clock-minute average of Reporting ACE so that it does not exceed its clock-minute Balancing Authority ACE Limit ("BAAL") for more than 30 minutes.[9] Compliance with BAL-001-2 will require entities to balance resources upon an event greater than an entity's MSSC because the BAAL tightens the acceptable limits for Reporting ACE, thus reducing frequency deviation. Reliability Standard BAL-001-2 is a more appropriate frequency control measure for events that cause MW loss larger than the BA's MSSC because it allows flexibility for entities to incrementally restore frequency while maintaining reliability when an entity has deployed all of its Contingency Reserves due to loss greater than MSSC.

Compliance with Requirement R1 addresses events greater than an entity's MSSC by requiring the BA to respond to assure the responsible entity meets CPS1. Requirement R1 of BAL-001-2 requires the BA to operate such the BA meets the CPS1 on an ongoing basis. Calculated in accordance with Attachment 1 of Reliability Standard BAL-001-2, CPS1 is a long-term measure of frequency control performance that uses statistical relationships between ACE and frequency to assign each BA a share of the responsibility for control of steady-state

[9] *See,* Filing, *supra* note 2, at Exhibit H (reflecting the consideration of BAL-001-2 throughout the development of proposed Reliability Standard BAL-002-2).

interconnection frequency. When BAs in an Interconnection are compliant with the CPS1 measure, the Interconnection will have a frequency within defined limits.[10]

Additionally, Requirement R2 of BAL-001-2 requires BAs to operate such that an entity's BAAL is not exceeded for a period of greater than 30 consecutive minutes. The BAAL, which is a limit on Reporting ACE, is instituted based on, among other things, the prevailing frequency of the Interconnection in which the entity is located. If frequency and Reporting ACE are both low (or both high), BAL-001-2 BAAL will require the responsible entity to respond accordingly. Therefore, when an event greater than MSSC occurs, Interconnection frequency deviations will tighten the BAAL, independent of the Reporting ACE recovery measures in BAL-002-2. This will require entities to restore Reporting ACE within a tighter control limit (or within a limit appropriate for Reliable Operation). As a result of this "tightening" of the BAAL, BAs have a very limited period of time to take short-term risks under Requirement R1 of BAL-001-2 that may otherwise place a BA in a position from which it cannot recover. Accordingly, BAAL strengthens the control on reliability created by CPS1 (given that CPS1 is a long-term measure of total risk over a 12 month period). These requirements support BAL-002-2 as they apply in situations when an event(s) causes losses greater than MSSC and to events that fall within exemptions under Requirements R1.3 and R3.[11]

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[10] When BAs in an Interconnection are compliant with the CPS1 measure, then the Interconnection is, by basic mathematics principles, guaranteed to have a root mean square ("RMS") frequency error less than the Interconnection's Epsilon 1. Epsilon 1 is the constant derived from a targeted frequency bound for each Interconnection (i.e., the Eastern Interconnection Epsilon 1 is 0.018 Hz, the Western Interconnection Epsilon 1 is 0.0228 Hz, the ERCOT Interconnection Epsilon 1 is 0.030 Hz, and the Quebec Interconnection Epsilon 1 is 0.021 Hz). If the shape of the frequency error distribution does not change, then guaranteeing the RMS limit will also guarantee that the frequency error will not exceed the reliability limit as determined by the under-frequency relay limit set in BAL-003-1.

[11] *See*, *infra* p. 13-16 (clarifying the impact of BAL-001-2 with illustrative examples).

The 30-minute time frame for restoration of Reporting ACE,[12] which is longer than the 15-minute time frame allowed to return Reporting ACE to defined limits under BAL-002-2,[13] is appropriate for events with MW loss greater than the MSSC as it allows the BA and RC to evaluate system conditions and take appropriate actions while still maintaining reliability.[14] NERC's research prior to development of Reliability Standard BAL-001-2 indicated that restoration of Reporting ACE under BAL-001-2 could take up to several hours without effecting reliability; however, the standard drafting team for BAL-002-2 concluded that 30 minutes was a reasonable time and complemented IROL and SOL standards including, but not limited to, Reliability Standards TOP-001-3, IRO-008-2, and IRO-009-2.[15]

2. BAL-003-1

The purpose of Reliability Standard BAL-003-1 is "[t]o require sufficient Frequency Response from the Balancing Authority (BA) to maintain Interconnection Frequency within

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[12] *See*, *Directed Research to Validate Balance Resources and Demand Standard's Procedures and Define Frequency-related Limits, Final Integrated Report, Phases I and II* ("Priority-based Control Engineering Research")(published on Sept. 26, 2005) (Supporting the standard drafting teams conclusion that 30 minutes is a conservative estimate for the time required to address frequency issues, as explained in its discussion of R3.8 on page 36 of the research, Priority-Based Control Engineering ("PCE") used the NERC Generating Availability Data System (common known as "GADS") database to study the amount of recovery time that would affect reliability. PCE determined that a time frame greater than 30 minutes could be used for addressing issues without detrimentally impacting reliability.), accessible online at http://www.nerc.com/pa/Stand/2007%2018%20Reliability%20Based%20Control%20FieldTrial%20Tools/PCEreportBRD-SDT_CERTSfinal.pdf.

[13] The 15-minute threshold was developed by the standard drafting team based on Contingency Reserve requirements, as the Contingency Reserve must be deployed to address a Balancing Contingency Event. Further, as mentioned in footnote 10, the standards drafting team determined that a previous technical study showed that a 30-minute time frame for recovery of ACE under the BAAL measure would be adequate.

[14] Pursuant to FERC's suggestion in paragraph 38 of Order No. 810, NERC continues to monitor the effect of BAL-002-1 in relation to the BAAL in Reliability Standard BAL-001-2, as it did in the Field Trial Report associated with the development of BAL-001-2. Given that BAL-001-2 was approved in April 2015, NERC does not have two years of BAL-001-2 data to analyze; however, the field trials prepared in relation to BAL-001-2 show that the 15-minute rules associated with BAL-002 affected how quickly operators responded to BAAL exceedances under BAL-001-2. Operators tended to respond to BAAL exceedances immediately to ensure that the entity would be able to fully recover from the BAAL. *See*, *Real Power Balancing Control Performance Reliability Standard*, Order No. 810, 151 FERC ¶ 61,048 (2015); *see also*, Priority-based Control Engineering Research, *supra* note 12.

[15] *See*, Priority-based Control Engineering Research, *supra* note 12.

predefined bounds by arresting frequency deviations and supporting frequency until the frequency is restored to its scheduled value. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting." The standard accomplishes its stated purpose by requiring entities to maintain frequency response to fulfill its obligations and implement correct Frequency Bias Settings in its operational calculations.[16] Reliability Standard BAL-003-1 is more appropriate and effective in supporting real-time frequency when large events occur (events that cause MW loss greater than the MSSC) than BAL-002-2 (which applies to the contingent BA or RSG) because BAL-003-1 requires all BAs to support the frequency response needs of the entire Interconnection while still supporting the more immediate goal of resource and demand balancing.

Whereas Reliability Standard BAL-002-2 applies based on individual BA and RSG events, BAL-003-1 operates to ensure stable frequency of the entire Interconnection and thus requires entities to maintain proportionate frequency response capability. In order to preserve appropriate interconnection frequency in real time, BAL-003-1 may require a BA to utilize its curtailment of last resort (i.e. triggering underfrequency load shedding relays) upon frequency deviations caused by an event causing loss greater than the entity's MSSC. In addition, a BA must carry enough frequency responsive reserves to meet its Frequency Response Obligation ("FRO"), defined by the NERC Glossary as the BA's proportional share of reserves required by its respective interconnection FRO. The reserves required under BAL-003-1 are deployed automatically and instantaneously. The ACE calculation required in BAL-003-1 is structured to ensure that once deployed, primary frequency response will not be discontinued based on a normal ACE calculation until the frequency error is corrected. Thus, Reliability Standard BAL-

[16] *See, e.g.*, Filing at Exhibit H, p. 802.

003-1 promotes real time reliability by requiring all BAs to support frequency in its Interconnection and avoid unnecessary loss of load service, regardless of where the loss of resource occurred.

3. TOP-007-0 (TOP-001-3, EOP-003-2, IRO-008-2, and IRO-009-2)

The purpose of Reliability Standard TOP-007-0 is to ensure that "SOL and IROL violations are being reported to the Reliability Coordinator so that the Reliability Coordinator may evaluate actions being taken and direct additional corrective actions as needed." As explained in the Clarifying Supplemental Information, although FERC approved the retirement of Reliability Standard TOP-007-0, the obligations related to transmission line loading under TOP-007-0 will be covered by TOP-001-3, EOP-003-2, IRO-008-2, and IRO-009-2.[17] Accordingly, this Supplement discusses the standards in lieu of Reliability Standard TOP-007-0. These standards require the RC, as the entity with "the highest level of authority" and with the "wide-area view necessary for situational awareness," to coordinate with TOPs and BAs to monitor SOL and IROL exceedances in real time and direct mitigation of those exceedances.[18] These Reliability Standards reflect the importance of thorough RC engagement in resolving events greater than a BA's MSSC.

First, Reliability Standard TOP-001-3 requires TOPs and BAs to address critical transmission events. Specifically, TOP-001-3 requires TOs to take actions with respect to transmission line loading in Emergencies and requires TOs and BAs to operate within defined transmission operating limits. Second, taking into account the health of the broader

[17] *See, e.g.*, Filing at Exhibit H, pp. 1046, 1864 (reflecting drafting team consideration of Reliability Standard TOP-007-0).

[18] Further, Reliability Standard IRO-001-4 provides broad authority for RCs to issue Operating Instructions to address the reliability of its Reliability Coordinator Area. *See*, Filing at Exhibit H (reflecting consideration of IRO Reliability Standards).

Interconnection, Requirements R1, R5, and R8 of EOP-003-2 address events where energy imbalance may cause Interconnection issues such as uncontrolled failures or cascading outages. Under EOP-003-2, BAs and TOPs are required to shed load to respond to real-time emergencies rather than risk cascading generation or system outages.[19] Finally, Reliability Standards IRO-008-2 and IRO-009-2 require the RC, the entity with the appropriate wide area view, to monitor the reliability of the BES in the RC area and address any identified potential or actual reliability concerns. This can include directing a BA or TOP to shed firm load if needed to address issues beyond the BA or TOP system view.

The coordinated application of Reliability Standards TOP-001-3, EOP-003-2, IRO-008-2, and IRO-009-2 is critical to assuring reliability upon the occurrence of an event greater than the MSSC, because they address transmission line loading issues that may arise while entities are taking actions to return real time frequency and Reporting ACE to required levels. Notably, the RC plays a vital role in ensuring that entities take preventative measures to avoid system interruptions and to restore system conditions. For instance, the RC is responsible for determining reliability limits within its RC area, monitoring the Interconnection, and directing entities to take appropriate actions to secure real-time operations. When an event occurs that is greater than the MSSC, the RC will be in the best position to identify if an entity needs to shed load to address a reliability issue. The affected entity does not have this unique perspective, as the affected entity may not see the effects of its actions beyond its area and may take actions that could ultimately be detrimental to the BES.

4. EOP-002-3 (EOP-011-1)

[19] Manual load shedding is not required nor needed when frequency is approximately 60 Hz and transmission lines are within limits although an entity has a negative ACE. Manual load shedding when frequency is at 60 Hz is normally considered detrimental to the reliability of the grid since frequency will then go above the nominal frequency point, which could, in rare instances, cause additional contingency events.

The purpose of Reliability Standard EOP-002-3 is to ensure that "Reliability Coordinators and Balancing Authorities are prepared for capacity and energy emergencies." The Reliability Standard achieves this by requiring the BA and RC to collaborate in deciding upon actions to ensure reliability of their respective areas during emergencies. Although FERC approved the retirement of Reliability Standard EOP-002-3, effective April 1, 2017, the obligations related energy and capacity emergencies will be covered by EOP-011-1. The purpose of Reliability Standard EOP-011-1 is "[t]o address the effects of operating Emergencies by ensuring each Transmission Operator and Balancing Authority has developed Operating Plan(s) to mitigate operating Emergencies, and that those plans are coordinated within a Reliability Coordinator Area." Reliability Standard EOP-011-1 accomplishes this by requiring TOPs and BAs to collaborate with RCs in the design and implementation of Operating Plans created to address energy emergencies. As the RC (and, in some cases, the BA) has the perspective to determine whether an event causing loss greater than an entity's MSSC is an Emergency under EOP-011-1, recovery under Reliability Standard EOP-011-1 provides a more effective and efficient means to address reliability concerns for emergency situations than Reliability Standard BAL-002-2.[20]

Reliability Standard EOP-011-1 is an emergency operations standard and requires responsible entities to take actions when an RC has declared an Emergency. These preventative measures, which are instituted when the RC declares an Emergency, ensure stabilization of the system to alleviate capacity and energy emergencies. Requirements R1 and R2 of Reliability Standard EOP-011-1 require the TOP and BA to develop Operating Plans to address emergency

[20] *See, e.g.*, Filing at Exhibit J (providing an illustration how EOP-011-1 works in coordination with other Reliability Standards).

operations (in consultation with the RC under Requirements R3 and R4), and Requirements R5 and R6 require the RC to address real-time operations during Emergencies.

An Emergency is defined in the NERC Glossary as a critical situation based on a condition that puts the BES at immediate risk. However, forward-looking energy accounting, such as Reporting ACE, does not affect an emergency determination.[21] In the case of a significant loss of generation greater than an entity's MSSC, the RC, as the entity with visibility into all of the BAs within the RC's purview, has the best perspective to determine if an imbalance is causing an immediate reliability problem. When the RC declares that an Emergency exists under EOP-011-1, the affected entity is not required to restore Reporting ACE within 15 minutes under BAL-002-2 because the RC has determined that the entity is in a critical position and cannot be expected to restore operating conditions without direction and assistance. Allowing the RC to direct actions in these instances, rather than having a single entity take actions without the same wide area view, will ensure Reliable Operations in the event of a large contingency causing an Emergency situation.

While entities are recovering from an emergency under EOP-011-1, entities continue to be responsible for compliance with Requirement R2 of BAL-001-2 and requirements under BAL-003-1, as discussed in the respective sections. In other words, entities still must ensure that Reporting ACE does not exceed its clock-minute BAAL for more than 30 minutes and must maintain and utilize frequency response, as necessary, while in an emergency. The entity will be penalized for any failure to meet these obligations. When an entity has restored normal operations under EOP-011-1 and the Energy Emergency Alert declared by the RC is over, the

[21] The term "Emergency" is defined in the *NERC Glossary* as "[a]ny abnormal system condition that requires automatic or immediate manual action to prevent or limit the failure of transmission facilities or generation supply that could adversely affect the reliability of the Bulk Electric System."

entity will continue to be responsible for compliance with all of the abovementioned standards, as well as BAL-002-2.

b. Illustrative Examples

NERC provides two examples that illustrate coordinated operation of the abovementioned Reliability Standards during event(s) where the Reporting ACE recovery in BAL-002-2 would be adjusted or the entity would not be required to restore Reporting ACE under BAL-002-2 R1.

1. Example 1

An entity with an MSSC of 1000 MW in the Eastern Interconnection experiences a contingency event that causes an 850 MW unit loss, and 90 seconds later, the same entity experiences another event that causes a 150 MW unit loss.[22] The loss of the 850 MW unit is an RBCE because total loss of resources is greater than 80 percent of the entity's MSSC but less than its MSSC; accordingly, obligations under BAL-002-2 apply. The second event occurred after the one-minute threshold for determining whether two nearly simultaneous events are an RBCE, so the loss of the 150MW unit is not part of the reportable event. However, because the second event occurred during the Contingency Event Recovery Period, the compliance obligation (i.e., the Reporting ACE recovery) will be adjusted for the loss of the second unit.[23] As explained below, through the coordinated application of Reliability Standards applicable to this situation, the entity is required to deploy reserves, arrest frequency deviations, and restore

[22] This example is the same example provided as Example 8 in Exhibit A of the Filing. NERC takes this opportunity to provide this example for further illustration and to elaborate on the interactions between BAL-002-2 and other Reliability Standards described in this Supplement in the context of this example.

[23] Assuming that the entity had a Reporting ACE of zero at the time of the event, Requirement R1.1 will require that the entity correct its Reporting ACE to -150 MW within the Contingency Event Recovery Period. (Reporting ACE Recovery = 0 (Reporting ACE) – 150 MW (Loss of Second Resource) = -150 MW (Reporting ACE required for compliance).

Reporting ACE, and in collaboration with other entities, is required to address transmission issues and take more extreme measures if needed.

First, under BAL-002-2, the entity will be required to deploy Contingency Reserves and restore these reserves in response to the initial unit loss; the entity will then have an additional 90 seconds to restore its Contingency Reserves to the level of its MSSC to take into account the second event that occurred during the period following the initial event. Assuming the entity is not able restore its Reporting ACE to zero because of the second unit loss, the entity is still required to operate within the BAAL under Reliability Standard BAL-001-2 and, in the event of an exceedance, must bring the Reporting ACE to within the bounds of the BAAL within 30 minutes.[24] Additionally, the BA must act pursuant to BAL-003-1 to support interconnection frequency by deploying frequency responsive reserves to arrest frequency deviations in real time, and, pursuant to Reliability Standard TOP-001-3, the TO and BA must address transmission operating limits when balancing load and demand. Finally, in exercising its wide area view, the RC may proscribe any necessary actions under IRO-008-2 and IRO-009-2 and may declare an Emergency under EOP-011-1 to mitigate an operating Emergency, if necessary.

2. Example 2

A disturbance occurs that causes voltage and frequency fluctuations that triggers loss of others units, thereby effecting a total loss of 2,800 MW of generation for a BA (for purposes of this example, the BA is a member of an RSG). This total loss is in excess of the RSG's MSSC. The entity requests reserves from the RSG, but due to Transmission limitations, the amount of deliverable reserves is limited to an amount less than the loss of generation. While this multiple contingency series of events is unlikely, the coordinated suite of NERC Reliability Standards is

[24] *See*, *supra* p. 6 (explaining continued applicability of BAL-001-2 during events greater than MSSC and events that fall within exemptions to BAL-002-2).

designed to maintain Reliable Operation of the BES and will balance resources within the Interconnection and the contingent BA while minimizing load curtailment.

As a preliminary matter, because the events occurred successively and instigated a MW loss greater than the entity's MSSC, entities would not be required to return Reporting ACE to predefined values within 15 minutes as specified in BAL-002-2. However, the entity would be required to minimize Reporting ACE deviations such that Reporting ACE is within the BAAL in less than 30 minutes under BAL-001-2. If an entity's Reporting ACE remains outside of the BAAL as calculated in BAL-001-2 for a period of time that exceeds 30 minutes, that entity will violate Reliability Standard BAL-001-2.[25] Additionally, while restoring Reporting ACE and arresting the frequency deviation, the BA will be required to work with TOs and its RC to eliminate transmission loading issues under Reliability Standards TOP-001-3, IRO-008-2, and IRO-009-2. These standards will apply throughout the event period to ensure the BA is working toward returning the BES to a stable operating position. Finally, within 105 minutes after the last loss of resource, the entity will be required to correct its Reporting ACE within 15 minutes of another RCBE pursuant to Requirement R1 of BAL-002-2 unless the entity is in an Energy Emergency Alert ("EEA") Level 3 under EOP-011-1. This interlocking coordination of standards thus ensures that the BA or RSG experiencing a large event will take necessary actions to establish reliability and will communicate and coordinate with the RC or TO, to the extent necessary, to ensure the reliability of the BES.

In addition to the standards that address BA operations, certain Reliability Standards address the required actions of an RC necessary to mitigate frequency deviations and maintain reliability during this event. First, given its wide area view, the RC can identify issues caused by

[25] *Id.*

this large event and may issue instructions to the BA under Requirement R1 of IRO-001-4, thus requiring the BA to take necessary actions to control reliability. Second, Reliability Standards IRO-008-2 and IRO-009-2 require the RC to act to address IROL exceedances, performance of Real-time Assessments, and notification to impacted TOPs and BAs of SOL or IROL issues identified by a Real-time Assessment. Third, given the multiple consecutive events that occurred causing unit losses exceeding the MSSC, the RC will assess the significance of the event and may declare an Emergency under Reliability Standards EOP-011-1. If the RC deems the event an Emergency, the RC will communicate this declaration and may direct the BA to take necessary actions to establish reliability. Meanwhile, the BA will take actions as described in its respective Operating Plan developed pursuant to EOP-011-1.[26] This illustrates how NERC Reliability Standards work in concert to address scenarios within and above the MSSC.

[26] Given its magnitude, the event described in Example 2 would likely be included in the events used for evaluation of frequency response under BAL-003-1. As an additional matter, this event will qualify for the NERC Event Analysis process under which NERC performs a root cause analysis, creates a detailed timeline of events, and gathers supporting documentation. This information will then be made available for further analysis by NERC to ensure that the standards or other operating processes address identified gaps in reliability and could be addressed.

Respectfully submitted,

/s/ Andrew C. Wills

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