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### **EXHIBITS**

#### **Exhibit A –**

1. Reliability Standards Applicable to Nova Scotia, Approved by FERC in Second Quarter 2016
2. Informational Summary of Each Reliability Standard Applicable to Nova Scotia, Approved by FERC in Second Quarter 2016
3. Reliability Standard Filed for Approval

#### **Exhibit B –** List of Currently Effective NERC Reliability Standards

#### **Exhibit C –** Updated *Glossary of Terms Used in NERC Reliability Standards*



(Exhibit C).<sup>1</sup>

## **I. NOTICE AND COMMUNICATIONS**

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## **II. REQUEST FOR APPROVAL OF RELIABILITY STANDARDS**

### **A. Background: NERC Quarterly Filing of Proposed Reliability Standards**

Pursuant to Section 215 of the Federal Power Act,<sup>2</sup> NERC has been certified by the Commission as the Electric Reliability Organization (“ERO”) in the United States.<sup>3</sup> During the second quarter of 2016, the Commission approved the Reliability Standard contained in **Exhibit A3** as mandatory and enforceable for users, owners, and operators of the Bulk-Power System within the United States. Some or all of NERC’s Reliability Standards are also mandatory in the Canadian provinces of Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario, Québec, and Saskatchewan.

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<sup>1</sup> NERC notes that the list of Reliability Standards and NERC Glossary in **Exhibit B** and **Exhibit C** were generated on or around the date of this filing, and, given the quarterly schedule on which this application is filed, these lists may include standards and definitions that became effective or were approved after the final day of the previous quarter. Only those standards and definitions highlighted for NSUAR in the present quarterly application and all previous applications should be considered for purposes of this application.

<sup>2</sup> 16 U.S.C. § 824o(f) (2012) (entrusting FERC with the duties of approving and enforcing rules in the U.S. to ensure the reliability of the Nation’s bulk power system, and with the duties of certifying an Electric Reliability Organization to develop mandatory and enforceable Reliability Standards, subject to FERC review and approval).

<sup>3</sup> *N. Am. Elec. Reliability Corp.*, 116 FERC ¶ 61,062 (“ERO Certification Order”), *order on reh’g & compliance*, 117 FERC ¶ 61,126 (2006), *aff’d sub nom. Alcoa, Inc. v. FERC*, 564 F.3d 1342 (D.C. Cir. 2009).

NERC entered into a Memorandum of Understanding (“MOU”) with the NSUARB,<sup>4</sup> and a separate MOU with Nova Scotia Power Incorporated (“NSPI”) and the Northeast Power Coordinating Council, Inc. (“NPCC”),<sup>5</sup> to provide reliability services to Nova Scotia. These MOUs became effective on December 22, 2006 and May 11, 2010, respectively. The December 22, 2006 MOU memorializes the relationship between NERC and the NSUARB formed to improve the reliability of the North American Bulk-Power System. The May 11, 2010 MOU sets forth the mutual understandings of NERC, NSPI, and NPCC regarding the approval and implementation of NERC Reliability Standards and NPCC Regional Reliability Criteria in Nova Scotia and other related matters.

On June 30, 2010, NERC submitted its first set of Reliability Standards and the *NERC Glossary* to the NSUARB, and on July 20, 2011, NSUARB issued a decision approving these documents.<sup>6</sup> In that decision, the NSUARB approved a “quarterly review” process for considering new and amended NERC Reliability Standards and criteria<sup>7</sup> and ordered that “applications will not be processed by the Board until [FERC] has approved or remanded the standards in the United States.”<sup>8</sup> The NSUARB Decision also stated that NSUARB approval is not required for the Violation Risk Factors (“VRFs”) and Violation Severity Levels (“VSLs”) associated with proposed Reliability Standards, but the NSUARB noted that it will accept VRFs and VSLs as guidance.<sup>9</sup>

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<sup>4</sup> See Memorandum of Understanding between Nova Scotia Utility and Review Board and North American Electric Reliability Corporation (signed Dec. 22, 2006).

<sup>5</sup> See Memorandum of Understanding between Nova Scotia Power Incorporated and the Northeast Power Coordinating Council, Inc. and the North American Electric Reliability Corporation (signed May 11, 2010).

<sup>6</sup> *In the Matter of an Application by North American Electric Reliability Corporation for Approval of its Reliability Standards, and an application by Northeast Power Coordinating Council, Inc. for Approval of its Regional Reliability Criteria*, NSUARB-NERC-R-10 (July 20, 2011) (“NSUARB Decision”).

<sup>7</sup> *Id.* at P 30.

<sup>8</sup> *Id.*

<sup>9</sup> *Id.* at P 33.

Based on the NSUARB Decision, NERC applications to the NSUARB only request approval for those Reliability Standards and Glossary definitions approved by FERC during the previous quarter. NERC does not seek formal approval of VRFs and VSLs associated with the Reliability Standards submitted in its quarterly applications. Rather, for informational purposes and for guidance, NERC provides a link below to the FERC-approved VRFs and VSLs associated with NERC Reliability Standards.<sup>10</sup> NERC does not include in its applications the full developmental record for the standards, which consists of the draft standards, comments received, responses to the comments by the drafting teams, and the full voting record, because the record for each standard may consist of several thousand pages. NERC will make the full developmental records available to the NSUARB or other interested parties upon request.

## **B. Overview of NERC Reliability Standards Development Process**

NERC Reliability Standards define the requirements for reliably planning and operating the North American Bulk-Power System. These standards are developed by industry stakeholders using a balanced, open, fair, and inclusive process managed by the NERC Standards Committee. The Standards Committee is facilitated by NERC staff and comprised of representatives from ten electricity stakeholder segments. Stakeholders, through the balloting process, have approved the Reliability Standard provided in **Exhibit A3**, and the standard has been adopted by the NERC Board of Trustees.

NERC develops Reliability Standards and associated definitions in accordance with Section 300 (Reliability Standards Development) and Appendix 3A (Standards Processes

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<sup>10</sup> NERC's VRF Matrix and VSL Matrix are available at: <http://www.nerc.com/pa/Stand/Pages/AllReliabilityStandards.aspx?jurisdiction=United States>. See left-hand side of webpage for downloadable documents.

Manual) of its Rules of Procedure.<sup>11</sup> NERC’s Reliability Standards development process has been approved by the American National Standards Institute as being open, inclusive, balanced, and fair. The *NERC Glossary*, most recently updated August 17, 2016, contains each term that is defined for use in one or more of NERC’s continent-wide or regional Reliability Standards approved by the NERC Board of Trustees. NERC submits the *NERC Glossary* as **Exhibit C** of this application for informational purposes.

**C. Description of Proposed Definitions and Reliability Standards, Second Quarter 2016**

As explained below, the following three FERC orders were issued in the second quarter of 2016 approving one NERC Reliability Standard and several related *NERC Glossary* terms: (1) a delegated letter order approving Reliability Standard FAC-003-4, issued on April 26, 2016;<sup>12</sup> (2) a delegated letter order approving a revision to the definition of “Special Protection System” (“SPS”), issued on June 23, 2016;<sup>13</sup> and (3) a delegated letter order approving six revised definitions related to Reporting ACE, issued on June 23, 2016.<sup>14</sup>

<b>Reliability Standard</b>	<b>Effective Date</b>
Facilities Design, Connections, and Maintenance (FAC) Standard	
FAC-003-4*	10/1/2016

\* At the time of this filing, all standards marked with an asterisk are not yet effective, but have been approved by FERC and have a future mandatory effective date.

1. FAC-003-4

On April 26, 2016, FERC approved Reliability Standard FAC-003-4 (Transmission Vegetation Management), the associated implementation plan and VRFs and VSLs, and the retirement of currently-effective Reliability Standard FAC-003-3. The purpose of Reliability

<sup>11</sup> The NERC *Rules of Procedure* are available at: <http://www.nerc.com/AboutNERC/Pages/Rules-of-Procedure.aspx>.

<sup>12</sup> *N. Am. Elec. Reliability Corp.*, Docket No. RD16-4-000 (Apr. 26, 2016) (unpublished letter order).

<sup>13</sup> *N. Am. Elec. Reliability Corp.*, Docket No. RD16-5-000 (June 23, 2016) (unpublished letter order).

<sup>14</sup> *N. Am. Elec. Reliability Corp.*, Docket No. RD16-7-000 (June 23, 2016) (unpublished letter order).

Standard FAC-003-4, which is attached herein as **Exhibit A**, is to require entities to manage vegetation located on transmission rights of way (“ROW”) and minimize encroachments from vegetation located adjacent to the ROW to reduce the risk of vegetation-related outages that could lead to Cascading. Reliability Standard FAC-003-4 applies to certain Transmission Owners and certain Generator Owners.

Reliability Standard FAC-003-4 reflects revisions developed under Project 2010-07.1 to provide a revised Minimum Vegetation Clearance Distances (“MVCDs”) based on additional testing regarding the appropriate gap factor to be used to calculate clearance distances for vegetation. The revised Reliability Standard includes higher, more conservative MVCD values to “enhance reliability and provide additional confidence by applying a more conservative approach to determining the vegetation clearing distances.”<sup>15</sup>

## 2. Six Revised NERC Glossary Definitions Related to Reporting ACE

On June 23, 2016, FERC approved revisions to the following six terms in the *NERC*

*Glossary*:

1. Reporting ACE
2. Actual Frequency
3. Actual Net Interchange
4. Scheduled Net Interchange (“NIS”)
5. Interchange Meter Error (“IME”)
6. Automatic Time Error Correction (“ATEC”)

Along with approving the abovementioned *NERC Glossary* definitions, the Commission also approved the retirement of the currently-effective versions of each of the definitions. The revised definition of the term “Reporting ACE” improves upon the existing definition, as it incorporates ATEC in the Western Interconnection and thus includes the “Lmax” upper payback limit and the

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<sup>15</sup> *N. Am. Elec. Reliability Corp.*, Docket No. RD16-4-000 at 2 (Apr. 26, 2016) (unpublished letter order).

bounds of that upper payback limit. The other five new *NERC Glossary* definitions were developed to reduce potential confusion associated with definitions embedded within the definition of the term “Reporting ACE.” The approved definitions listed above are now included in the updated *NERC Glossary* in **Exhibit C**.

### 3. Special Protection System Definition

On June 23, 2016, FERC approved the revised definition of the term “Special Protection System” in the *NERC Glossary*, the associated implementation plan, and retirement of the currently-effective definition of same term. The revised definition definition, which references the definition of the term “Remedial Action Scheme” (“RAS”), completes the transition from SPS to RAS initiated by NERC in its petition for approval of a revised definition of RAS submitted to the Commission on February 3, 2015.<sup>16</sup> In order to effect a seamless transition to the new revised term RAS, the revised definition of SPS will go into effect in the United States on “the later of the effective date of the applicable governmental authority’s order approving the revised definition of Special Protection System or the effective date of the revised definition of Remedial Action Scheme.” Accordingly, the revised definition of SPS will go into effect on April 1, 2017, or the effective date of the revised RAS definition.<sup>17</sup> The approved definition is now included in the updated *NERC Glossary* in **Exhibit C**.

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<sup>16</sup> *Petition of the North American Electric Reliability Corporation for Approval of Revisions to the Definition of “Remedial Action Scheme” and Proposed Reliability Standards*, Docket No. RM15-13-000 (filed on Feb. 3, 2015).

<sup>17</sup> The Commission approved the revised definition of RAS on November 19, 2015, which will become effective “on the first day of the first calendar quarter that is twelve (12) months after the date that the standards and definition are approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect.” *N. Am. Elec. Reliability Corp.*, Order No. 818, 153 FERC ¶ 61,228 (Nov. 19, 2015).

**III. CONCLUSION**

NERC respectfully requests that the NSUARB approve the Reliability Standard and *NERC Glossary* definitions as specified herein.

Respectfully submitted,

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August 24, 2016

**Exhibit A (1): Reliability Standards Applicable to Nova Scotia, Approved by FERC in Second Quarter 2016**

**Exhibit A (1): Reliability Standard Applicable to Nova Scotia, Approved by FERC in  
Second Quarter 2016**

<b>Reliability Standard</b>	<b>Effective Date</b>
Facilities Design, Connections, and Maintenance (FAC) Standard	
FAC-003-4*	10/1/2016

\* At the time of this filing, all standards marked with an asterisk are not yet effective, but have been approved by FERC and have a future mandatory effective date.

**Exhibit A (2): Informational Summary of Each Reliability Standard Applicable to Nova Scotia,  
Approved by FERC in Second Quarter 2016**

**Exhibit A (2): Informational Summary of Reliability Standard Applicable to Nova Scotia,  
Approved by FERC in Second Quarter 2016**

**FAC-003-4** - To maintain a reliable electric transmission system by using a defense in-depth strategy to manage vegetation located on transmission rights of way (ROW) and minimize encroachments from vegetation located adjacent to the ROW, thus preventing the risk of those vegetation related outages that could lead to Cascading.

Applicability:

- **Functional Entities**
  - **Applicable Transmission Owners**
    - Transmission Owners that own Transmission Facilities
  - **Applicable Generator Owners**
    - Generator Owners that own generation Facilities
- **Transmission Facilities:** Defined below (referred to as “applicable lines”), including but not limited to those that cross lands owned by federal, state, provincial, public, private, or tribal entities:
  - Each overhead transmission line operated at 200kV or higher.
  - Each overhead transmission line operated below 200kV identified as an element of an IROL under NERC Standard FAC-014 by the Planning Coordinator.
  - Each overhead transmission line operated below 200 kV identified as an element of a Major WECC Transfer Path in the Bulk Electric System by WECC.
  - Each overhead transmission line identified above (4.2.1. through 4.2.3.) located outside the fenced area of the switchyard, station or substation and any portion of the span of the transmission line that is crossing the substation fence.
- **Generation Facilities:** Defined below (referred to as “applicable lines”), including but not limited to those that cross lands owned by federal<sup>2</sup>, state, provincial, public, private, or tribal entities:
  - Overhead transmission lines that (1) extend greater than one mile or 1.609 kilometers beyond the fenced area of the generating station switchyard to the point of interconnection with a Transmission Owner’s Facility or (2) do not have a clear line of sight<sup>3</sup> from the generating station switchyard fence to the point of interconnection with a Transmission Owner’s Facility and are:
    - Operated at 200kV or higher; or
    - Operated below 200kV identified as an element of an IROL under NERC Standard FAC-014 by the Planning Coordinator; or
    - Operated below 200 kV identified as an element of a Major WECC Transfer Path in the Bulk Electric System by WECC.

Reliability Standard FAC-003-4 includes seven requirements and several model tables.

On March 14, 2016, the North American Electric Reliability Corporation filed a petition for approval of proposed Reliability Standard FAC-003-4 (Transmission Vegetation Management) with the Federal Energy Regulatory Commission (“FERC”) in Docket No. RD16-4-000. FERC approved FAC-003-4 on April 26, 2016.

**Exhibit A (3): Reliability Standards Filed for Approval**

**Reliability Standard FAC-003-4**

## A. Introduction

1. **Title:** Transmission Vegetation Management
2. **Number:** FAC-003-4
3. **Purpose:** To maintain a reliable electric transmission system by using a defense-in-depth strategy to manage vegetation located on transmission rights of way (ROW) and minimize encroachments from vegetation located adjacent to the ROW, thus preventing the risk of those vegetation-related outages that could lead to Cascading.
4. **Applicability:**
  - 4.1. **Functional Entities:**
    - 4.1.1. Applicable Transmission Owners
      - 4.1.1.1. Transmission Owners that own Transmission Facilities defined in 4.2.
    - 4.1.2. Applicable Generator Owners
      - 4.1.2.1. Generator Owners that own generation Facilities defined in 4.3.
  - 4.2. **Transmission Facilities:** Defined below (referred to as “applicable lines”), including but not limited to those that cross lands owned by federal<sup>1</sup>, state, provincial, public, private, or tribal entities:
    - 4.2.1. Each overhead transmission line operated at 200kV or higher.
    - 4.2.2. Each overhead transmission line operated below 200kV identified as an element of an IROL under NERC Standard FAC-014 by the Planning Coordinator.
    - 4.2.3. Each overhead transmission line operated below 200 kV identified as an element of a Major WECC Transfer Path in the Bulk Electric System by WECC.
    - 4.2.4. Each overhead transmission line identified above (4.2.1. through 4.2.3.) located outside the fenced area of the switchyard, station or substation and any portion of the span of the transmission line that is crossing the substation fence.
  - 4.3. **Generation Facilities:** Defined below (referred to as “applicable lines”), including but not limited to those that cross lands owned by federal<sup>2</sup>, state, provincial, public, private, or tribal entities:

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<sup>1</sup> EPAAct 2005 section 1211c: “Access approvals by Federal agencies.”

<sup>2</sup> *Id.*

**4.3.1.** Overhead transmission lines that (1) extend greater than one mile or 1.609 kilometers beyond the fenced area of the generating station switchyard to the point of interconnection with a Transmission Owner's Facility or (2) do not have a clear line of sight<sup>3</sup> from the generating station switchyard fence to the point of interconnection with a Transmission Owner's Facility and are:

**4.3.1.1.** Operated at 200kV or higher; or

**4.3.1.2.** Operated below 200kV identified as an element of an IROL under NERC Standard FAC-014 by the Planning Coordinator; or

**4.3.1.3.** Operated below 200 kV identified as an element of a Major WECC Transfer Path in the Bulk Electric System by WECC.

**5. Effective Date:** See Implementation Plan

**6. Background:** This standard uses three types of requirements to provide layers of protection to prevent vegetation related outages that could lead to Cascading:

- a) Performance-based defines a particular reliability objective or outcome to be achieved. In its simplest form, a results-based requirement has four components: *who, under what conditions (if any), shall perform what action, to achieve what particular bulk power system performance result or outcome?*
- b) Risk-based preventive requirements to reduce the risks of failure to acceptable tolerance levels. A risk-based reliability requirement should be framed as: *who, under what conditions (if any), shall perform what action, to achieve what particular result or outcome that reduces a stated risk to the reliability of the bulk power system?*
- c) Competency-based defines a minimum set of capabilities an entity needs to have to demonstrate it is able to perform its designated reliability functions. A competency-based reliability requirement should be framed as: *who, under what conditions (if any), shall have what capability, to achieve what particular result or outcome to perform an action to achieve a result or outcome or to reduce a risk to the reliability of the bulk power system?*

The defense-in-depth strategy for reliability standards development recognizes that each requirement in a NERC reliability standard has a role in preventing system failures, and that these roles are complementary and reinforcing. Reliability standards should not be viewed as a body of unrelated requirements, but rather should be viewed as part of a portfolio of requirements designed to achieve an overall defense-in-depth strategy and comport with the quality objectives of a reliability standard.

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<sup>3</sup> "Clear line of sight" means the distance that can be seen by the average person without special instrumentation (e.g., binoculars, telescope, spyglasses, etc.) on a clear day.

This standard uses a defense-in-depth approach to improve the reliability of the electric Transmission system by:

- Requiring that vegetation be managed to prevent vegetation encroachment inside the flash-over clearance (R1 and R2);
- Requiring documentation of the maintenance strategies, procedures, processes and specifications used to manage vegetation to prevent potential flash-over conditions including consideration of 1) conductor dynamics and 2) the interrelationships between vegetation growth rates, control methods and the inspection frequency (R3);
- Requiring timely notification to the appropriate control center of vegetation conditions that could cause a flash-over at any moment (R4);
- Requiring corrective actions to ensure that flash-over distances will not be violated due to work constraints such as legal injunctions (R5);
- Requiring inspections of vegetation conditions to be performed annually (R6); and
- Requiring that the annual work needed to prevent flash-over is completed (R7).

For this standard, the requirements have been developed as follows:

- Performance-based: Requirements 1 and 2
- Competency-based: Requirement 3
- Risk-based: Requirements 4, 5, 6 and 7

R3 serves as the first line of defense by ensuring that entities understand the problem they are trying to manage and have fully developed strategies and plans to manage the problem. R1, R2, and R7 serve as the second line of defense by requiring that entities carry out their plans and manage vegetation. R6, which requires inspections, may be either a part of the first line of defense (as input into the strategies and plans) or as a third line of defense (as a check of the first and second lines of defense). R4 serves as the final line of defense, as it addresses cases in which all the other lines of defense have failed.

Major outages and operational problems have resulted from interference between overgrown vegetation and transmission lines located on many types of lands and ownership situations. Adherence to the standard requirements for applicable lines on any kind of land or easement, whether they are Federal Lands, state or provincial lands, public or private lands, franchises, easements or lands owned in fee, will reduce and manage this risk. For the purpose of the standard the term “public lands” includes municipal lands, village lands, city lands, and a host of other governmental entities.

This standard addresses vegetation management along applicable overhead lines and does not apply to underground lines, submarine lines or to line sections inside an electric station boundary.

This standard focuses on transmission lines to prevent those vegetation related outages that could lead to Cascading. It is not intended to prevent customer outages due to tree contact with lower voltage distribution system lines. For example, localized customer service might be disrupted if vegetation were to make contact with a 69kV transmission line supplying power to a 12kV distribution station. However, this standard is not written to address such isolated situations which have little impact on the overall electric transmission system.

Since vegetation growth is constant and always present, unmanaged vegetation poses an increased outage risk, especially when numerous transmission lines are operating at or near their Rating. This can present a significant risk of consecutive line failures when lines are experiencing large sags thereby leading to Cascading. Once the first line fails the shift of the current to the other lines and/or the increasing system loads will lead to the second and subsequent line failures as contact to the vegetation under those lines occurs. Conversely, most other outage causes (such as trees falling into lines, lightning, animals, motor vehicles, etc.) are not an interrelated function of the shift of currents or the increasing system loading. These events are not any more likely to occur during heavy system loads than any other time. There is no cause-effect relationship which creates the probability of simultaneous occurrence of other such events. Therefore these types of events are highly unlikely to cause large-scale grid failures. Thus, this standard places the highest priority on the management of vegetation to prevent vegetation grow-ins.

## **B. Requirements and Measures**

- R1.** Each applicable Transmission Owner and applicable Generator Owner shall manage vegetation to prevent encroachments into the Minimum Vegetation Clearance Distance (MVCD) of its applicable line(s) which are either an element of an IROL, or an element of a Major WECC Transfer Path; operating within their Rating and all Rated Electrical Operating Conditions of the types shown below<sup>4</sup> [*Violation Risk Factor: High*] [*Time Horizon: Real-time*]:

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<sup>4</sup> This requirement does not apply to circumstances that are beyond the control of an applicable Transmission Owner or applicable Generator Owner subject to this reliability standard, including natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, wind shear, fresh gale, major storms as defined either by the applicable Transmission Owner or applicable Generator Owner or an applicable regulatory body, ice storms, and floods; human or animal activity such as logging, animal severing tree, vehicle contact with tree, or installation, removal, or digging of vegetation. Nothing in this footnote should be construed to limit the Transmission Owner's or applicable Generator Owner's right to exercise its full legal rights on the ROW.

- 1.1.** An encroachment into the MVCD as shown in FAC-003-Table 2, observed in Real-time, absent a Sustained Outage,<sup>5</sup>
  - 1.2.** An encroachment due to a fall-in from inside the ROW that caused a vegetation-related Sustained Outage,<sup>6</sup>
  - 1.3.** An encroachment due to the blowing together of applicable lines and vegetation located inside the ROW that caused a vegetation-related Sustained Outage<sup>7</sup>,
  - 1.4.** An encroachment due to vegetation growth into the MVCD that caused a vegetation-related Sustained Outage.<sup>8</sup>
- M1.** Each applicable Transmission Owner and applicable Generator Owner has evidence that it managed vegetation to prevent encroachment into the MVCD as described in R1. Examples of acceptable forms of evidence may include dated attestations, dated reports containing no Sustained Outages associated with encroachment types 2 through 4 above, or records confirming no Real-time observations of any MVCD encroachments. (R1)
- R2.** Each applicable Transmission Owner and applicable Generator Owner shall manage vegetation to prevent encroachments into the MVCD of its applicable line(s) which are not either an element of an IROL, or an element of a Major WECC Transfer Path; operating within its Rating and all Rated Electrical Operating Conditions of the types shown below<sup>9</sup> [*Violation Risk Factor: High*] [*Time Horizon: Real-time*]:
- 2.1.** An encroachment into the MVCD, observed in Real-time, absent a Sustained Outage,<sup>10</sup>
  - 2.2.** An encroachment due to a fall-in from inside the ROW that caused a vegetation-related Sustained Outage,<sup>11</sup>
  - 2.3.** An encroachment due to the blowing together of applicable lines and vegetation located inside the ROW that caused a vegetation-related Sustained Outage,<sup>12</sup>
  - 2.4.** An encroachment due to vegetation growth into the line MVCD that caused a vegetation-related Sustained Outage.<sup>13</sup>

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<sup>5</sup> If a later confirmation of a Fault by the applicable Transmission Owner or applicable Generator Owner shows that a vegetation encroachment within the MVCD has occurred from vegetation within the ROW, this shall be considered the equivalent of a Real-time observation.

<sup>6</sup> Multiple Sustained Outages on an individual line, if caused by the same vegetation, will be reported as one outage regardless of the actual number of outages within a 24-hour period.

<sup>7</sup> *Id.*

<sup>8</sup> *Id.*

<sup>9</sup> See footnote 4.

<sup>10</sup> See footnote 5.

<sup>11</sup> See footnote 6.

<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

- M2.** Each applicable Transmission Owner and applicable Generator Owner has evidence that it managed vegetation to prevent encroachment into the MVCD as described in R2. Examples of acceptable forms of evidence may include dated attestations, dated reports containing no Sustained Outages associated with encroachment types 2 through 4 above, or records confirming no Real-time observations of any MVCD encroachments. (R2)
- R3.** Each applicable Transmission Owner and applicable Generator Owner shall have documented maintenance strategies or procedures or processes or specifications it uses to prevent the encroachment of vegetation into the MVCD of its applicable lines that accounts for the following: *[Violation Risk Factor: Lower] [Time Horizon: Long Term Planning]*:
- 3.1.** Movement of applicable line conductors under their Rating and all Rated Electrical Operating Conditions;
  - 3.2.** Inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency.
- M3.** The maintenance strategies or procedures or processes or specifications provided demonstrate that the applicable Transmission Owner and applicable Generator Owner can prevent encroachment into the MVCD considering the factors identified in the requirement. (R3)
- R4.** Each applicable Transmission Owner and applicable Generator Owner, without any intentional time delay, shall notify the control center holding switching authority for the associated applicable line when the applicable Transmission Owner and applicable Generator Owner has confirmed the existence of a vegetation condition that is likely to cause a Fault at any moment *[Violation Risk Factor: Medium] [Time Horizon: Real-time]*.
- M4.** Each applicable Transmission Owner and applicable Generator Owner that has a confirmed vegetation condition likely to cause a Fault at any moment will have evidence that it notified the control center holding switching authority for the associated transmission line without any intentional time delay. Examples of evidence may include control center logs, voice recordings, switching orders, clearance orders and subsequent work orders. (R4)
- R5.** When an applicable Transmission Owner and an applicable Generator Owner are constrained from performing vegetation work on an applicable line operating within its Rating and all Rated Electrical Operating Conditions, and the constraint may lead to a vegetation encroachment into the MVCD prior to the implementation of the next annual work plan, then the applicable Transmission Owner or applicable Generator Owner shall take corrective action to ensure continued vegetation management to prevent encroachments *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*.

- M5.** Each applicable Transmission Owner and applicable Generator Owner has evidence of the corrective action taken for each constraint where an applicable transmission line was put at potential risk. Examples of acceptable forms of evidence may include initially-planned work orders, documentation of constraints from landowners, court orders, inspection records of increased monitoring, documentation of the de-rating of lines, revised work orders, invoices, or evidence that the line was de-energized. (R5)
- R6.** Each applicable Transmission Owner and applicable Generator Owner shall perform a Vegetation Inspection of 100% of its applicable transmission lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.) at least once per calendar year and with no more than 18 calendar months between inspections on the same ROW<sup>14</sup> [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*].
- M6.** Each applicable Transmission Owner and applicable Generator Owner has evidence that it conducted Vegetation Inspections of the transmission line ROW for all applicable lines at least once per calendar year but with no more than 18 calendar months between inspections on the same ROW. Examples of acceptable forms of evidence may include completed and dated work orders, dated invoices, or dated inspection records. (R6)
- R7.** Each applicable Transmission Owner and applicable Generator Owner shall complete 100% of its annual vegetation work plan of applicable lines to ensure no vegetation encroachments occur within the MVCD. Modifications to the work plan in response to changing conditions or to findings from vegetation inspections may be made (provided they do not allow encroachment of vegetation into the MVCD) and must be documented. The percent completed calculation is based on the number of units actually completed divided by the number of units in the final amended plan (measured in units of choice - circuit, pole line, line miles or kilometers, etc.). Examples of reasons for modification to annual plan may include [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*]:
- 7.1.** Change in expected growth rate/environmental factors
  - 7.2.** Circumstances that are beyond the control of an applicable Transmission Owner or applicable Generator Owner<sup>15</sup>
  - 7.3.** Rescheduling work between growing seasons
  - 7.4.** Crew or contractor availability/Mutual assistance agreements

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<sup>14</sup> When the applicable Transmission Owner or applicable Generator Owner is prevented from performing a Vegetation Inspection within the timeframe in R6 due to a natural disaster, the TO or GO is granted a time extension that is equivalent to the duration of the time the TO or GO was prevented from performing the Vegetation Inspection.

<sup>15</sup> Circumstances that are beyond the control of an applicable Transmission Owner or applicable Generator Owner include but are not limited to natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, ice storms, floods, or major storms as defined either by the TO or GO or an applicable regulatory body.

- 7.5. Identified unanticipated high priority work
  - 7.6. Weather conditions/Accessibility
  - 7.7. Permitting delays
  - 7.8. Land ownership changes/Change in land use by the landowner
  - 7.9. Emerging technologies
- M7.** Each applicable Transmission Owner and applicable Generator Owner has evidence that it completed its annual vegetation work plan for its applicable lines. Examples of acceptable forms of evidence may include a copy of the completed annual work plan (as finally modified), dated work orders, dated invoices, or dated inspection records.  
(R7)

## C. Compliance

### 1. Compliance Monitoring Process

#### 1.1. Compliance Enforcement Authority:

“Compliance Enforcement Authority” means NERC or the Regional Entity, or any entity as otherwise designated by an Applicable Governmental Authority, in their respective roles of monitoring and/or enforcing compliance with mandatory and enforceable Reliability Standards in their respective jurisdictions.

#### 1.2. Evidence Retention:

The following evidence retention period(s) identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The applicable entity shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

- The applicable Transmission Owner and applicable Generator Owner retains data or evidence to show compliance with Requirements R1, R2, R3, R5, R6 and R7, for three calendar years.
- The applicable Transmission Owner and applicable Generator Owner retains data or evidence to show compliance with Requirement R4, Measure M4 for most recent 12 months of operator logs or most recent 3 months of voice recordings or transcripts of voice recordings, unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

- If an applicable Transmission Owner or applicable Generator Owner is found non-compliant, it shall keep information related to the non-compliance until found compliant or for the time period specified above, whichever is longer.

### 1.3. Compliance Monitoring and Enforcement Program

As defined in the NERC Rules of Procedure, “Compliance Monitoring and Enforcement Program” refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated Reliability Standard.

### 1.4. Additional Compliance Information

**Periodic Data Submittal:** The applicable Transmission Owner and applicable Generator Owner will submit a quarterly report to its Regional Entity, or the Regional Entity’s designee, identifying all Sustained Outages of applicable lines operated within their Rating and all Rated Electrical Operating Conditions as determined by the applicable Transmission Owner or applicable Generator Owner to have been caused by vegetation, except as excluded in footnote 2, and including as a minimum the following:

- The name of the circuit(s), the date, time and duration of the outage; the voltage of the circuit; a description of the cause of the outage; the category associated with the Sustained Outage; other pertinent comments; and any countermeasures taken by the applicable Transmission Owner or applicable Generator Owner.

A Sustained Outage is to be categorized as one of the following:

- Category 1A — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, that are identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW;
- Category 1B — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW;
- Category 2A — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, from within the ROW;
- Category 2B — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, from within the ROW;
- Category 3 — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines from outside the ROW;
- Category 4A — Blowing together: Sustained Outages caused by vegetation and applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW;

- Category 4B — Blowing together: Sustained Outages caused by vegetation and applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW.

The Regional Entity will report the outage information provided by applicable Transmission Owners and applicable Generator Owners, as per the above, quarterly to NERC, as well as any actions taken by the Regional Entity as a result of any of the reported Sustained Outages.

Violation Severity Levels (Table 1)

R #	Table 1: Violation Severity Levels (VSL)			
	Lower VSL	Moderate VSL	High VSL	Severe VSL
R1.			The responsible entity failed to manage vegetation to prevent encroachment into the MVCD of a line identified as an element of an IROL or Major WECC transfer path and encroachment into the MVCD as identified in FAC-003-4-Table 2 was observed in real time absent a Sustained Outage.	The responsible entity failed to manage vegetation to prevent encroachment into the MVCD of a line identified as an element of an IROL or Major WECC transfer path and a vegetation-related Sustained Outage was caused by one of the following: <ul style="list-style-type: none"> <li>• <i>A fall-in from inside the active transmission line ROW</i></li> <li>• <i>Blowing together of applicable lines and vegetation located inside the active transmission line ROW</i></li> <li>• <i>A grow-in</i></li> </ul>
R2.			The responsible entity failed to manage vegetation to prevent encroachment into the MVCD of a line not identified as an element of	The responsible entity failed to manage vegetation to prevent encroachment into the MVCD of a line not identified as an element of

			an IROL or Major WECC transfer path and encroachment into the MVCD as identified in FAC-003-4-Table 2 was observed in real time absent a Sustained Outage.	an IROL or Major WECC transfer path and a vegetation-related Sustained Outage was caused by one of the following: <ul style="list-style-type: none"> <li>• <i>A fall-in from inside the active transmission line ROW</i></li> <li>• <i>Blowing together of applicable lines and vegetation located inside the active transmission line ROW</i></li> <li>• <i>A grow-in</i></li> </ul>
<b>R3.</b>		The responsible entity has maintenance strategies or documented procedures or processes or specifications but has not accounted for the inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency, for the responsible entity's applicable lines. (Requirement R3, Part 3.2.)	The responsible entity has maintenance strategies or documented procedures or processes or specifications but has not accounted for the movement of transmission line conductors under their Rating and all Rated Electrical Operating Conditions, for the responsible entity's applicable lines. (Requirement R3, Part 3.1.)	The responsible entity does not have any maintenance strategies or documented procedures or processes or specifications used to prevent the encroachment of vegetation into the MVCD, for the responsible entity's applicable lines.
<b>R4.</b>			The responsible entity experienced a confirmed	The responsible entity experienced a confirmed

			vegetation threat and notified the control center holding switching authority for that applicable line, but there was intentional delay in that notification.	vegetation threat and did not notify the control center holding switching authority for that applicable line.
<b>R5.</b>				The responsible entity did not take corrective action when it was constrained from performing planned vegetation work where an applicable line was put at potential risk.
<b>R6.</b>	The responsible entity failed to inspect 5% or less of its applicable lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.)	The responsible entity failed to inspect more than 5% up to and including 10% of its applicable lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.).	The responsible entity failed to inspect more than 10% up to and including 15% of its applicable lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.).	The responsible entity failed to inspect more than 15% of its applicable lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.).
<b>R7.</b>	The responsible entity failed to complete 5% or less of its annual vegetation work plan for its applicable lines (as finally modified).	The responsible entity failed to complete more than 5% and up to and including 10% of its annual vegetation work plan for its applicable lines (as finally modified).	The responsible entity failed to complete more than 10% and up to and including 15% of its annual vegetation work plan for its applicable lines (as finally modified).	The responsible entity failed to complete more than 15% of its annual vegetation work plan for its applicable lines (as finally modified).

## D. Regional Variances

None.

### E. Associated Documents

- [FAC-003-4 Implementation Plan](#)

### Version History

Version	Date	Action	Change Tracking
1	January 20, 2006	1. Added “Standard Development Roadmap.” 2. Changed “60” to “Sixty” in section A, 5.2. 3. Added “Proposed Effective Date: April 7, 2006” to footer. 4. Added “Draft 3: November 17, 2005” to footer.	New
1	April 4, 2007	Regulatory Approval - Effective Date	New
2	November 3, 2011	Adopted by the NERC Board of Trustees	New
2	March 21, 2013	FERC Order issued approving FAC-003-2 (Order No. 777)  FERC Order No. 777 was issued on March 21, 2013 directing NERC to “conduct or contract testing to obtain empirical data and submit a report to the Commission providing the results of the testing.” <sup>16</sup>	Revisions

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<sup>16</sup> Revisions to Reliability Standard for Transmission Vegetation Management, Order No. 777, 142 FERC ¶ 61,208 (2013)

**FAC-003-4 Transmission Vegetation Management**

2	May 9, 2013	Board of Trustees adopted the modification of the VRF for Requirement R2 of FAC-003-2 by raising the VRF from “Medium” to “High.”	Revisions
3	May 9, 2013	FAC-003-3 adopted by Board of Trustees	Revisions
3	September 19, 2013	A FERC order was issued on September 19, 2013, approving FAC-003-3. This standard became enforceable on July 1, 2014 for Transmission Owners. For Generator Owners, R3 became enforceable on January 1, 2015 and all other requirements (R1, R2, R4, R5, R6, and R7) became enforceable on January 1, 2016.	Revisions
3	November 22, 2013	Updated the VRF for R2 from “Medium” to “High” per a Final Rule issued by FERC	Revisions
3	July 30, 2014	Transferred the effective dates section from FAC-003-2 (for Transmission Owners) into FAC-003-3, per the FAC-003-3 implementation plan	Revisions
4	February 11, 2016	Adopted by Board of Trustees. Adjusted MVCD values in Table 2 for alternating current systems, consistent with findings reported in report filed on August 12, 2015 in Docket No. RM12-4-002 consistent with FERC’s directive in Order No. 777, and based on empirical testing results for flashover distances between conductors and vegetation.	Revisions
4	March 9, 2016	Corrected subpart 7.10 to M7, corrected value of .07 to .7	Errata
4	April 26, 2016	FERC Letter Order approving FAC-003-4. Docket No. RD16-4-000.	

**FAC-003 — TABLE 2 — Minimum Vegetation Clearance Distances (MVCD)<sup>17</sup>  
For Alternating Current Voltages (feet)**

( AC ) Nominal System Voltage (kV) <sup>+</sup>	( AC ) Maximum System Voltage (kV) <sup>18</sup>	MVCD (feet) Over sea level up to 500 ft	MVCD feet Over 500 ft up to 1000 ft	MVCD feet Over 1000 ft up to 2000 ft	MVCD feet Over 2000 ft up to 3000 ft	MVCD feet Over 3000 ft up to 4000 ft	MVCD feet Over 4000 ft up to 5000 ft	MVCD feet Over 5000 ft up to 6000 ft	MVCD feet Over 6000 ft up to 7000 ft	MVCD feet Over 7000 ft up to 8000 ft	MVCD feet Over 8000 ft up to 9000 ft	MVCD feet Over 9000 ft up to 10000 ft	MVCD feet Over 10000 ft up to 11000 ft	MVCD feet Over 11000 ft up to 12000 ft	MVCD feet Over 12000 ft up to 13000 ft	MVCD feet Over 13000 ft up to 14000 ft	MVCD feet Over 14000 ft up to 15000 ft
765	800	11.6ft	11.7ft	11.9ft	12.1ft	12.2ft	12.4ft	12.6ft	12.8ft	13.0ft	13.1ft	13.3ft	13.5ft	13.7ft	13.9ft	14.1ft	14.3ft
500	550	7.0ft	7.1ft	7.2ft	7.4ft	7.5ft	7.6ft	7.8ft	7.9ft	8.1ft	8.2ft	8.3ft	8.5ft	8.6ft	8.8ft	8.9ft	9.1ft
345	362 <sup>19</sup>	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft
287	302	5.2ft	5.3ft	5.4ft	5.5ft	5.6ft	5.7ft	5.8ft	5.9ft	6.1ft	6.2ft	6.3ft	6.4ft	6.5ft	6.6ft	6.8ft	6.9ft
230	242	4.0ft	4.1ft	4.2ft	4.3ft	4.3ft	4.4ft	4.5ft	4.6ft	4.7ft	4.8ft	4.9ft	5.0ft	5.1ft	5.2ft	5.3ft	5.4ft
161*	169	2.7ft	2.7ft	2.8ft	2.9ft	2.9ft	3.0ft	3.0ft	3.1ft	3.2ft	3.3ft	3.3ft	3.4ft	3.5ft	3.6ft	3.7ft	3.8ft
138*	145	2.3ft	2.3ft	2.4ft	2.4ft	2.5ft	2.5ft	2.6ft	2.7ft	2.7ft	2.8ft	2.8ft	2.9ft	3.0ft	3.0ft	3.1ft	3.2ft
115*	121	1.9ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.1ft	2.2ft	2.2ft	2.3ft	2.3ft	2.4ft	2.5ft	2.5ft	2.6ft	2.7ft
88*	100	1.5ft	1.5ft	1.6ft	1.6ft	1.7ft	1.7ft	1.8ft	1.8ft	1.8ft	1.9ft	1.9ft	2.0ft	2.0ft	2.1ft	2.2ft	2.2ft
69*	72	1.1ft	1.1ft	1.1ft	1.2ft	1.2ft	1.2ft	1.2ft	1.3ft	1.3ft	1.3ft	1.4ft	1.4ft	1.4ft	1.5ft	1.6ft	1.6ft

\* Such lines are applicable to this standard only if PC has determined such per FAC-014 (refer to the Applicability Section above)

<sup>+</sup> Table 2 – Table of MVCD values at a 1.0 gap factor (in U.S. customary units), which is located in the EPRI report filed with FERC on August 12, 2015. (The 14000-15000 foot values were subsequently provided by EPRI in an updated Table 2 on December 1, 2015, filed with the FAC-003-4 Petition at FERC)

<sup>17</sup> The distances in this Table are the minimums required to prevent Flash-over; however prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

<sup>18</sup> Where applicable lines are operated at nominal voltages other than those listed, the applicable Transmission Owner or applicable Generator Owner should use the maximum system voltage to determine the appropriate clearance for that line.

<sup>19</sup> The change in transient overvoltage factors in the calculations are the driver in the decrease in MVCDs for voltages of 345 kV and above. Refer to pp.29-31 in the Supplemental Materials for additional information.

**TABLE 2 (CONT) — Minimum Vegetation Clearance Distances (MVCD)<sup>20</sup>**  
**For Alternating Current Voltages (meters)**

( AC ) Nominal System Voltage (KV) <sup>+</sup>	( AC ) Maximum System Voltage (kV) <sup>21</sup>	MVCD meters  Over sea level up to 153 m	MVCD meters  Over 153m up to 305m	MVCD meters  Over 305m up to 610m	MVCD meters  Over 610m up to 915m	MVCD meters  Over 915m up to 1220m	MVCD meters  Over 1220m up to 1524m	MVCD meters  Over 1524m up to 1829m	MVCD meters  Over 1829m up to 2134m	MVCD meters  Over 2134m up to 2439m	MVCD meters  Over 2439m up to 2744m	MVCD meters  Over 2744m up to 3048m	MVCD meters  Over 3048m up to 3353m	MVCD meters  Over 3353m up to 3657m	MVCD meters  Over 3657m up to 3962m	MVCD meters  Over 3962 m up to 4268 m	MVCD meters  Over 4268m up to 4572m
765	800	3.6m	3.6m	3.6m	3.7m	3.7m	3.8m	3.8m	3.9m	4.0m	4.0m	4.1m	4.1m	4.2m	4.2m	4.3m	4.4m
500	550	2.1m	2.2m	2.2m	2.3m	2.3m	2.3m	2.4m	2.4m	2.5m	2.5m	2.5m	2.6m	2.6m	2.7m	2.7m	2.7m
345	362 <sup>22</sup>	1.3m	1.3m	1.3m	1.4m	1.4m	1.4m	1.5m	1.5m	1.5m	1.6m	1.6m	1.6m	1.6m	1.7m	1.7m	1.8m
287	302	1.6m	1.6m	1.7m	1.7m	1.7m	1.7m	1.8m	1.8m	1.9m	1.9m	1.9m	2.0m	2.0m	2.0m	2.1m	2.1m
230	242	1.2m	1.3m	1.3m	1.3m	1.3m	1.3m	1.4m	1.4m	1.4m	1.5m	1.5m	1.5m	1.6m	1.6m	1.6m	1.6m
161*	169	0.8m	0.8m	0.9m	0.9m	0.9m	0.9m	0.9m	1.0m	1.0m	1.0m	1.0m	1.0m	1.1m	1.1m	1.1m	1.1m
138*	145	0.7m	0.7m	0.7m	0.7m	0.7m	0.7m	0.8m	0.8m	0.8m	0.9m	0.9m	0.9m	0.9m	0.9m	1.0m	1.0m
115*	121	0.6m	0.6m	0.6m	0.6m	0.6m	0.6m	0.6m	0.7m	0.7m	0.7m	0.7m	0.7m	0.8m	0.8m	0.8m	0.8m
88*	100	0.4m	0.4m	0.5m	0.5m	0.5m	0.5m	0.6m	0.7m	0.7m							
69*	72	0.3m	0.3m	0.3m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m	0.5m	0.5m	0.5m

\* Such lines are applicable to this standard only if PC has determined such per FAC-014 (refer to the Applicability Section above)

+ Table 2 – Table of MVCD values at a 1.0 gap factor (in U.S. customary units), which is located in the EPRI report filed with FERC on August 12, 2015. (The 14000-15000 foot values were subsequently provided by EPRI in an updated Table 2 on December 1, 2015, filed with the FAC-003-4 Petition at FERC)

<sup>20</sup> The distances in this Table are the minimums required to prevent Flash-over; however prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

<sup>21</sup> Where applicable lines are operated at nominal voltages other than those listed, the applicable Transmission Owner or applicable Generator Owner should use the maximum system voltage to determine the appropriate clearance for that line.

<sup>22</sup> The change in transient overvoltage factors in the calculations are the driver in the decrease in MVCDs for voltages of 345 kV and above. Refer to pp.29-31 in the supplemental materials for additional information.

**TABLE 2 (CONT) — Minimum Vegetation Clearance Distances (MVCD)<sup>23</sup>**  
 For **Direct Current** Voltages feet (meters)

( DC ) Nominal Pole to Ground Voltage (kV)	MVCD meters  Over sea level up to 500 ft  (Over sea level up to 152.4 m)	MVCD meters  Over 500 ft up to 1000 ft  (Over 152.4 m up to 304.8 m)	MVCD meters  Over 1000 ft up to 2000 ft  (Over 304.8 m up to 609.6m)	MVCD meters  Over 2000 ft up to 3000 ft  (Over 609.6m up to 914.4m)	MVCD meters  Over 3000 ft up to 4000 ft  (Over 914.4m up to 1219.2m)	MVCD meters  Over 4000 ft up to 5000 ft  (Over 1219.2m up to 1524m)	MVCD meters  Over 5000 ft up to 6000 ft  (Over 1524 m up to 1828.8 m)	MVCD meters  Over 6000 ft up to 7000 ft  (Over 1828.8m up to 2133.6m)	MVCD meters  Over 7000 ft up to 8000 ft  (Over 2133.6m up to 2438.4m)	MVCD meters  Over 8000 ft up to 9000 ft  (Over 2438.4m up to 2743.2m)	MVCD meters  Over 9000 ft up to 10000 ft  (Over 2743.2m up to 3048m)	MVCD meters  Over 10000 ft up to 11000 ft  (Over 3048m up to 3352.8m)
±750	14.12ft (4.30m)	14.31ft (4.36m)	14.70ft (4.48m)	15.07ft (4.59m)	15.45ft (4.71m)	15.82ft (4.82m)	16.2ft (4.94m)	16.55ft (5.04m)	16.91ft (5.15m)	17.27ft (5.26m)	17.62ft (5.37m)	17.97ft (5.48m)
±600	10.23ft (3.12m)	10.39ft (3.17m)	10.74ft (3.26m)	11.04ft (3.36m)	11.35ft (3.46m)	11.66ft (3.55m)	11.98ft (3.65m)	12.3ft (3.75m)	12.62ft (3.85m)	12.92ft (3.94m)	13.24ft (4.04m)	13.54ft (4.13m)
±500	8.03ft (2.45m)	8.16ft (2.49m)	8.44ft (2.57m)	8.71ft (2.65m)	8.99ft (2.74m)	9.25ft (2.82m)	9.55ft (2.91m)	9.82ft (2.99m)	10.1ft (3.08m)	10.38ft (3.16m)	10.65ft (3.25m)	10.92ft (3.33m)
±400	6.07ft (1.85m)	6.18ft (1.88m)	6.41ft (1.95m)	6.63ft (2.02m)	6.86ft (2.09m)	7.09ft (2.16m)	7.33ft (2.23m)	7.56ft (2.30m)	7.80ft (2.38m)	8.03ft (2.45m)	8.27ft (2.52m)	8.51ft (2.59m)
±250	3.50ft (1.07m)	3.57ft (1.09m)	3.72ft (1.13m)	3.87ft (1.18m)	4.02ft (1.23m)	4.18ft (1.27m)	4.34ft (1.32m)	4.5ft (1.37m)	4.66ft (1.42m)	4.83ft (1.47m)	5.00ft (1.52m)	5.17ft (1.58m)

<sup>23</sup> The distances in this Table are the minimums required to prevent Flash-over; however prudent vegetation maintenance practices dictate that substantially greater distances will be achieved at time of vegetation maintenance.

## Guideline and Technical Basis

### Effective dates:

The Compliance section is standard language used in most NERC standards to cover the general effective date and covers the vast majority of situations. A special case covers effective dates for (1) lines initially becoming subject to the Standard, (2) lines changing in applicability within the standard.

The special case is needed because the Planning Coordinators may designate lines below 200 kV to become elements of an IROL or Major WECC Transfer Path in a future Planning Year (PY). For example, studies by the Planning Coordinator in 2015 may identify a line to have that designation beginning in PY 2025, ten years after the planning study is performed. It is not intended for the Standard to be immediately applicable to, or in effect for, that line until that future PY begins. The effective date provision for such lines ensures that the line will become subject to the standard on January 1 of the PY specified with an allowance of at least 12 months for the applicable Transmission Owner or applicable Generator Owner to make the necessary preparations to achieve compliance on that line. A line operating below 200kV designated as an element of an IROL or Major WECC Transfer Path may be removed from that designation due to system improvements, changes in generation, changes in loads or changes in studies and analysis of the network.

<u>Date that Planning Study is completed</u>	<u>PY the line will become an IROL element</u>	<u>Effective Date</u>		
		<u>Date 1</u>	<u>Date 2</u>	<u>The later of Date 1 or Date 2</u>
05/15/2011	2012	05/15/2012	01/01/2012	05/15/2012
05/15/2011	2013	05/15/2012	01/01/2013	01/01/2013
05/15/2011	2014	05/15/2012	01/01/2014	01/01/2014
05/15/2011	2021	05/15/2012	01/01/2021	01/01/2021

### Defined Terms:

#### Explanation for revising the definition of ROW:

The current NERC glossary definition of Right of Way has been modified to include Generator Owners and to address the matter set forth in Paragraph 734 of FERC Order 693. The Order pointed out that Transmission Owners may in some cases own more property or rights than are needed to reliably operate transmission lines. This definition represents a slight but significant departure from the strict legal definition of “right of way” in that this definition is based on engineering and construction considerations that establish the width of a corridor from a technical basis. The pre-2007 maintenance records are included in the current definition to allow the use of such vegetation widths if there were no engineering or construction standards that

referenced the width of right of way to be maintained for vegetation on a particular line but the evidence exists in maintenance records for a width that was in fact maintained prior to this standard becoming mandatory. Such widths may be the only information available for lines that had limited or no vegetation easement rights and were typically maintained primarily to ensure public safety. This standard does not require additional easement rights to be purchased to satisfy a minimum right of way width that did not exist prior to this standard becoming mandatory.

### **Explanation for revising the definition of Vegetation Inspection:**

The current glossary definition of this NERC term was modified to include Generator Owners and to allow both maintenance inspections and vegetation inspections to be performed concurrently. This allows potential efficiencies, especially for those lines with minimal vegetation and/or slow vegetation growth rates.

### **Explanation of the derivation of the MVCD:**

The MVCD is a calculated minimum distance that is derived from the Gallet equation. This is a method of calculating a flash over distance that has been used in the design of high voltage transmission lines. Keeping vegetation away from high voltage conductors by this distance will prevent voltage flash-over to the vegetation. See the explanatory text below for Requirement R3 and associated Figure 1. Table 2 of the Standard provides MVCD values for various voltages and altitudes. The table is based on empirical testing data from EPRI as requested by FERC in Order No. 777.

### **Project 2010-07.1 Adjusted MVCDs per EPRI Testing:**

In Order No. 777, FERC directed NERC to undertake testing to gather empirical data validating the appropriate gap factor used in the Gallet equation to calculate MVCDs, specifically the gap factor for the flash-over distances between conductors and vegetation. See, Order No. 777, at P 60. NERC engaged industry through a collaborative research project and contracted EPRI to complete the scope of work. In January 2014, NERC formed an advisory group to assist with developing the scope of work for the project. This team provided subject matter expertise for developing the test plan, monitoring testing, and vetting the analysis and conclusions to be submitted in a final report. The advisory team was comprised of NERC staff, arborists, and industry members with wide-ranging expertise in transmission engineering, insulation coordination, and vegetation management. The testing project commenced in April 2014 and continued through October 2014 with the final set of testing completed in May 2015. Based on these testing results conducted by EPRI, and consistent with the report filed in FERC Docket No. RM12-4-000, the gap factor used in the Gallet equation required adjustment from 1.3 to 1.0. This resulted in increased MVCD values for all alternating current system voltages identified. The adjusted MVCD values, reflecting the 1.0 gap factor, are included in Table 2 of version 4 of FAC-003.

The air gap testing completed by EPRI per FERC Order No. 777 established that trees with large spreading canopies growing directly below energized high voltage conductors create the

greatest likelihood of an air gap flash over incident and was a key driver in changing the gap factor to a more conservative value of 1.0 in version 4 of this standard.

### **Requirements R1 and R2:**

R1 and R2 are performance-based requirements. The reliability objective or outcome to be achieved is the management of vegetation such that there are no vegetation encroachments within a minimum distance of transmission lines. Content-wise, R1 and R2 are the same requirements; however, they apply to different Facilities. Both R1 and R2 require each applicable Transmission Owner or applicable Generator Owner to manage vegetation to prevent encroachment within the MVCD of transmission lines. R1 is applicable to lines that are identified as an element of an IROL or Major WECC Transfer Path. R2 is applicable to all other lines that are not elements of IROLs, and not elements of Major WECC Transfer Paths.

The separation of applicability (between R1 and R2) recognizes that inadequate vegetation management for an applicable line that is an element of an IROL or a Major WECC Transfer Path is a greater risk to the interconnected electric transmission system than applicable lines that are not elements of IROLs or Major WECC Transfer Paths. Applicable lines that are not elements of IROLs or Major WECC Transfer Paths do require effective vegetation management, but these lines are comparatively less operationally significant.

Requirements R1 and R2 state that if inadequate vegetation management allows vegetation to encroach within the MVCD distance as shown in Table 2, it is a violation of the standard. Table 2 distances are the minimum clearances that will prevent spark-over based on the Gallet equations. These requirements assume that transmission lines and their conductors are operating within their Rating. If a line conductor is intentionally or inadvertently operated beyond its Rating and Rated Electrical Operating Condition (potentially in violation of other standards), the occurrence of a clearance encroachment may occur solely due to that condition. For example, emergency actions taken by an applicable Transmission Owner or applicable Generator Owner or Reliability Coordinator to protect an Interconnection may cause excessive sagging and an outage. Another example would be ice loading beyond the line's Rating and Rated Electrical Operating Condition. Such vegetation-related encroachments and outages are not violations of this standard.

Evidence of failures to adequately manage vegetation include real-time observation of a vegetation encroachment into the MVCD (absent a Sustained Outage), or a vegetation-related encroachment resulting in a Sustained Outage due to a fall-in from inside the ROW, or a vegetation-related encroachment resulting in a Sustained Outage due to the blowing together of the lines and vegetation located inside the ROW, or a vegetation-related encroachment resulting in a Sustained Outage due to a grow-in. Faults which do not cause a Sustained outage and which are confirmed to have been caused by vegetation encroachment within the MVCD are considered the equivalent of a Real-time observation for violation severity levels.

With this approach, the VSLs for R1 and R2 are structured such that they directly correlate to the severity of a failure of an applicable Transmission Owner or applicable Generator Owner to manage vegetation and to the corresponding performance level of the Transmission Owner's

vegetation program's ability to meet the objective of "preventing the risk of those vegetation related outages that could lead to Cascading." Thus violation severity increases with an applicable Transmission Owner's or applicable Generator Owner's inability to meet this goal and its potential of leading to a Cascading event. The additional benefits of such a combination are that it simplifies the standard and clearly defines performance for compliance. A performance-based requirement of this nature will promote high quality, cost effective vegetation management programs that will deliver the overall end result of improved reliability to the system.

Multiple Sustained Outages on an individual line can be caused by the same vegetation. For example initial investigations and corrective actions may not identify and remove the actual outage cause then another outage occurs after the line is re-energized and previous high conductor temperatures return. Such events are considered to be a single vegetation-related Sustained Outage under the standard where the Sustained Outages occur within a 24 hour period.

If the applicable Transmission Owner or applicable Generator Owner has applicable lines operated at nominal voltage levels not listed in Table 2, then the applicable TO or applicable GO should use the next largest clearance distance based on the next highest nominal voltage in the table to determine an acceptable distance.

### **Requirement R3:**

R3 is a competency based requirement concerned with the maintenance strategies, procedures, processes, or specifications, an applicable Transmission Owner or applicable Generator Owner uses for vegetation management.

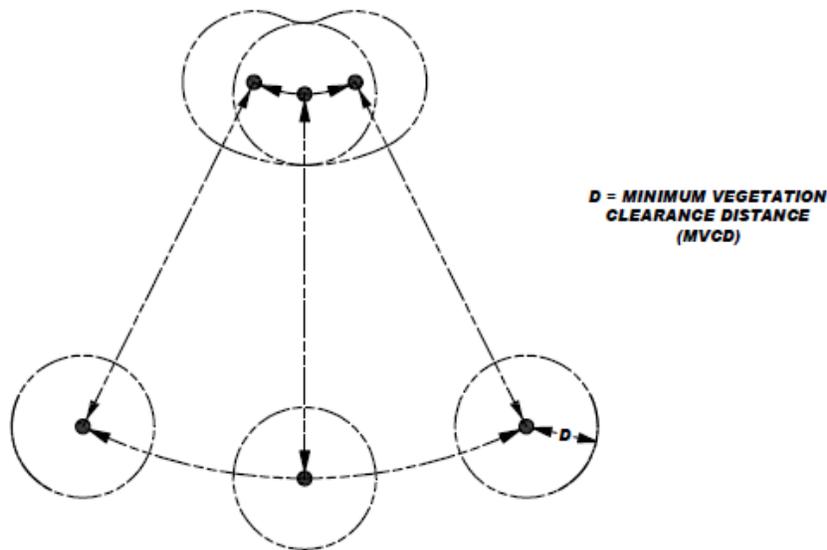
An adequate transmission vegetation management program formally establishes the approach the applicable Transmission Owner or applicable Generator Owner uses to plan and perform vegetation work to prevent transmission Sustained Outages and minimize risk to the transmission system. The approach provides the basis for evaluating the intent, allocation of appropriate resources, and the competency of the applicable Transmission Owner or applicable Generator Owner in managing vegetation. There are many acceptable approaches to manage vegetation and avoid Sustained Outages. However, the applicable Transmission Owner or applicable Generator Owner must be able to show the documentation of its approach and how it conducts work to maintain clearances.

An example of one approach commonly used by industry is ANSI Standard A300, part 7. However, regardless of the approach a utility uses to manage vegetation, any approach an applicable Transmission Owner or applicable Generator Owner chooses to use will generally contain the following elements:

1. *the maintenance strategy used (such as minimum vegetation-to-conductor distance or maximum vegetation height) to ensure that MVCD clearances are never violated*

2. *the work methods that the applicable Transmission Owner or applicable Generator Owner uses to control vegetation*
3. *a stated Vegetation Inspection frequency*
4. *an annual work plan*

The conductor's position in space at any point in time is continuously changing in reaction to a number of different loading variables. Changes in vertical and horizontal conductor positioning are the result of thermal and physical loads applied to the line. Thermal loading is a function of line current and the combination of numerous variables influencing ambient heat dissipation including wind velocity/direction, ambient air temperature and precipitation. Physical loading applied to the conductor affects sag and sway by combining physical factors such as ice and wind loading. The movement of the transmission line conductor and the MVCD is illustrated in Figure 1 below.



**Figure 1**

A cross-section view of a single conductor at a given point along the span is shown with six possible conductor positions due to movement resulting from thermal and mechanical loading.

**Requirement R4:**

R4 is a risk-based requirement. It focuses on preventative actions to be taken by the applicable Transmission Owner or applicable Generator Owner for the mitigation of Fault risk when a vegetation threat is confirmed. R4 involves the notification of potentially threatening vegetation conditions, without any intentional delay, to the control center holding switching authority for that specific transmission line. Examples of acceptable unintentional delays may

include communication system problems (for example, cellular service or two-way radio disabled), crews located in remote field locations with no communication access, delays due to severe weather, etc.

Confirmation is key that a threat actually exists due to vegetation. This confirmation could be in the form of an applicable Transmission Owner or applicable Generator Owner employee who personally identifies such a threat in the field. Confirmation could also be made by sending out an employee to evaluate a situation reported by a landowner.

Vegetation-related conditions that warrant a response include vegetation that is near or encroaching into the MVCD (a grow-in issue) or vegetation that could fall into the transmission conductor (a fall-in issue). A knowledgeable verification of the risk would include an assessment of the possible sag or movement of the conductor while operating between no-load conditions and its rating.

The applicable Transmission Owner or applicable Generator Owner has the responsibility to ensure the proper communication between field personnel and the control center to allow the control center to take the appropriate action until or as the vegetation threat is relieved. Appropriate actions may include a temporary reduction in the line loading, switching the line out of service, or other preparatory actions in recognition of the increased risk of outage on that circuit. The notification of the threat should be communicated in terms of minutes or hours as opposed to a longer time frame for corrective action plans (see R5).

All potential grow-in or fall-in vegetation-related conditions will not necessarily cause a Fault at any moment. For example, some applicable Transmission Owners or applicable Generator Owners may have a danger tree identification program that identifies trees for removal with the potential to fall near the line. These trees would not require notification to the control center unless they pose an immediate fall-in threat.

### **Requirement R5:**

R5 is a risk-based requirement. It focuses upon preventative actions to be taken by the applicable Transmission Owner or applicable Generator Owner for the mitigation of Sustained Outage risk when temporarily constrained from performing vegetation maintenance. The intent of this requirement is to deal with situations that prevent the applicable Transmission Owner or applicable Generator Owner from performing planned vegetation management work and, as a result, have the potential to put the transmission line at risk. Constraints to performing vegetation maintenance work as planned could result from legal injunctions filed by property owners, the discovery of easement stipulations which limit the applicable Transmission Owner's or applicable Generator Owner's rights, or other circumstances.

This requirement is not intended to address situations where the transmission line is not at potential risk and the work event can be rescheduled or re-planned using an alternate work methodology. For example, a land owner may prevent the planned use of herbicides to control incompatible vegetation outside of the MVCD, but agree to the use of mechanical clearing. In

this case the applicable Transmission Owner or applicable Generator Owner is not under any immediate time constraint for achieving the management objective, can easily reschedule work using an alternate approach, and therefore does not need to take interim corrective action.

However, in situations where transmission line reliability is potentially at risk due to a constraint, the applicable Transmission Owner or applicable Generator Owner is required to take an interim corrective action to mitigate the potential risk to the transmission line. A wide range of actions can be taken to address various situations. General considerations include:

- Identifying locations where the applicable Transmission Owner or applicable Generator Owner is constrained from performing planned vegetation maintenance work which potentially leaves the transmission line at risk.
- Developing the specific action to mitigate any potential risk associated with not performing the vegetation maintenance work as planned.
- Documenting and tracking the specific action taken for the location.
- In developing the specific action to mitigate the potential risk to the transmission line the applicable Transmission Owner or applicable Generator Owner could consider location specific measures such as modifying the inspection and/or maintenance intervals. Where a legal constraint would not allow any vegetation work, the interim corrective action could include limiting the loading on the transmission line.
- The applicable Transmission Owner or applicable Generator Owner should document and track the specific corrective action taken at each location. This location may be indicated as one span, one tree or a combination of spans on one property where the constraint is considered to be temporary.

### **Requirement R6:**

R6 is a risk-based requirement. This requirement sets a minimum time period for completing Vegetation Inspections. The provision that Vegetation Inspections can be performed in conjunction with general line inspections facilitates a Transmission Owner's ability to meet this requirement. However, the applicable Transmission Owner or applicable Generator Owner may determine that more frequent vegetation specific inspections are needed to maintain reliability levels, based on factors such as anticipated growth rates of the local vegetation, length of the local growing season, limited ROW width, and local rainfall. Therefore it is expected that some transmission lines may be designated with a higher frequency of inspections.

The VSLs for Requirement R6 have levels ranked by the failure to inspect a percentage of the applicable lines to be inspected. To calculate the appropriate VSL the applicable Transmission Owner or applicable Generator Owner may choose units such as: circuit, pole line, line miles or kilometers, etc.

For example, when an applicable Transmission Owner or applicable Generator Owner operates 2,000 miles of applicable transmission lines this applicable Transmission Owner or applicable

Generator Owner will be responsible for inspecting all the 2,000 miles of lines at least once during the calendar year. If one of the included lines was 100 miles long, and if it was not inspected during the year, then the amount failed to inspect would be  $100/2000 = 0.05$  or 5%. The “Low VSL” for R6 would apply in this example.

### **Requirement R7:**

R7 is a risk-based requirement. The applicable Transmission Owner or applicable Generator Owner is required to complete its annual work plan for vegetation management to accomplish the purpose of this standard. Modifications to the work plan in response to changing conditions or to findings from vegetation inspections may be made and documented provided they do not put the transmission system at risk. The annual work plan requirement is not intended to necessarily require a “span-by-span”, or even a “line-by-line” detailed description of all work to be performed. It is only intended to require that the applicable Transmission Owner or applicable Generator Owner provide evidence of annual planning and execution of a vegetation management maintenance approach which successfully prevents encroachment of vegetation into the MVCD.

When an applicable Transmission Owner or applicable Generator Owner identifies 1,000 miles of applicable transmission lines to be completed in the applicable Transmission Owner’s or applicable Generator Owner’s annual plan, the applicable Transmission Owner or applicable Generator Owner will be responsible completing those identified miles. If an applicable Transmission Owner or applicable Generator Owner makes a modification to the annual plan that does not put the transmission system at risk of an encroachment the annual plan may be modified. If 100 miles of the annual plan is deferred until next year the calculation to determine what percentage was completed for the current year would be:  $1000 - 100$  (deferred miles) = 900 modified annual plan, or  $900 / 900 = 100\%$  completed annual miles. If an applicable Transmission Owner or applicable Generator Owner only completed 875 of the total 1000 miles with no acceptable documentation for modification of the annual plan the calculation for failure to complete the annual plan would be:  $1000 - 875 = 125$  miles failed to complete then,  $125$  miles (not completed) /  $1000$  total annual plan miles = 12.5% failed to complete.

The ability to modify the work plan allows the applicable Transmission Owner or applicable Generator Owner to change priorities or treatment methodologies during the year as conditions or situations dictate. For example recent line inspections may identify unanticipated high priority work, weather conditions (drought) could make herbicide application ineffective during the plan year, or a major storm could require redirecting local resources away from planned maintenance. This situation may also include complying with mutual assistance agreements by moving resources off the applicable Transmission Owner’s or applicable Generator Owner’s system to work on another system. Any of these examples could result in acceptable deferrals or additions to the annual work plan provided that they do not put the transmission system at risk of a vegetation encroachment.

In general, the vegetation management maintenance approach should use the full extent of the applicable Transmission Owner’s or applicable Generator Owner’s easement, fee simple and

other legal rights allowed. A comprehensive approach that exercises the full extent of legal rights on the ROW is superior to incremental management because in the long term it reduces the overall potential for encroachments, and it ensures that future planned work and future planned inspection cycles are sufficient.

When developing the annual work plan the applicable Transmission Owner or applicable Generator Owner should allow time for procedural requirements to obtain permits to work on federal, state, provincial, public, tribal lands. In some cases the lead time for obtaining permits may necessitate preparing work plans more than a year prior to work start dates. Applicable Transmission Owners or applicable Generator Owners may also need to consider those special landowner requirements as documented in easement instruments.

This requirement sets the expectation that the work identified in the annual work plan will be completed as planned. Therefore, deferrals or relevant changes to the annual plan shall be documented. Depending on the planning and documentation format used by the applicable Transmission Owner or applicable Generator Owner, evidence of successful annual work plan execution could consist of signed-off work orders, signed contracts, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, or paid invoices. Other evidence may include photographs, and walk-through reports.

### **Notes:**

The SDT determined that the use of IEEE 516-2003 in version 1 of FAC-003 was a misapplication. The SDT consulted specialists who advised that the Gallet equation would be a technically justified method. The explanation of why the Gallet approach is more appropriate is explained in the paragraphs below.

The drafting team sought a method of establishing minimum clearance distances that uses realistic weather conditions and realistic maximum transient over-voltages factors for in-service transmission lines.

The SDT considered several factors when looking at changes to the minimum vegetation to conductor distances in FAC-003-1:

- avoid the problem associated with referring to tables in another standard (IEEE-516-2003)
- transmission lines operate in non-laboratory environments (wet conditions)
- transient over-voltage factors are lower for in-service transmission lines than for inadvertently re-energized transmission lines with trapped charges.

FAC-003-1 used the minimum air insulation distance (MAID) without tools formula provided in IEEE 516-2003 to determine the minimum distance between a transmission line conductor and vegetation. The equations and methods provided in IEEE 516 were developed by an IEEE Task Force in 1968 from test data provided by thirteen independent laboratories. The distances provided in IEEE 516 Tables 5 and 7 are based on the withstand voltage of a dry rod-rod air gap,

or in other words, dry laboratory conditions. Consequently, the validity of using these distances in an outside environment application has been questioned.

FAC-003-1 allowed Transmission Owners to use either Table 5 or Table 7 to establish the minimum clearance distances. Table 7 could be used if the Transmission Owner knew the maximum transient over-voltage factor for its system. Otherwise, Table 5 would have to be used. Table 5 represented minimum air insulation distances under the worst possible case for transient over-voltage factors. These worst case transient over-voltage factors were as follows: 3.5 for voltages up to 362 kV phase to phase; 3.0 for 500 - 550 kV phase to phase; and 2.5 for 765 to 800 kV phase to phase. These worst case over-voltage factors were also a cause for concern in this particular application of the distances.

In general, the worst case transient over-voltages occur on a transmission line that is inadvertently re-energized immediately after the line is de-energized and a trapped charge is still present. The intent of FAC-003 is to keep a transmission line that is in service from becoming de-energized (i.e. tripped out) due to spark-over from the line conductor to nearby vegetation. Thus, the worst case transient overvoltage assumptions are not appropriate for this application. Rather, the appropriate over voltage values are those that occur only while the line is energized.

Typical values of transient over-voltages of in-service lines are not readily available in the literature because they are negligible compared with the maximums. A conservative value for the maximum transient over-voltage that can occur anywhere along the length of an in-service ac line was approximately 2.0 per unit. This value was a conservative estimate of the transient over-voltage that is created at the point of application (e.g. a substation) by switching a capacitor bank without pre-insertion devices (e.g. closing resistors). At voltage levels where capacitor banks are not very common (e.g. Maximum System Voltage of 362 kV), the maximum transient over-voltage of an in-service ac line are created by fault initiation on adjacent ac lines and shunt reactor bank switching. These transient voltages are usually 1.5 per unit or less.

Even though these transient over-voltages will not be experienced at locations remote from the bus at which they are created, in order to be conservative, it is assumed that all nearby ac lines are subjected to this same level of over-voltage. Thus, a maximum transient over-voltage factor of 2.0 per unit for transmission lines operated at 302 kV and below was considered to be a realistic maximum in this application. Likewise, for ac transmission lines operated at Maximum System Voltages of 362 kV and above a transient over-voltage factor of 1.4 per unit was considered a realistic maximum.

The Gallet equations are an accepted method for insulation coordination in tower design. These equations are used for computing the required strike distances for proper transmission line insulation coordination. They were developed for both wet and dry applications and can be used with any value of transient over-voltage factor. The Gallet equation also can take into account various air gap geometries. This approach was used to design the first 500 kV and 765 kV lines in North America.

If one compares the MAID using the IEEE 516-2003 Table 7 (table D.5 for English values) with the critical spark-over distances computed using the Gallet wet equations, for each of the nominal voltage classes and identical transient over-voltage factors, the Gallet equations yield a more conservative (larger) minimum distance value.

Distances calculated from either the IEEE 516 (dry) formulas or the Gallet “wet” formulas are not vastly different when the same transient overvoltage factors are used; the “wet” equations will consistently produce slightly larger distances than the IEEE 516 equations when the same transient overvoltage is used. While the IEEE 516 equations were only developed for dry conditions the Gallet equations have provisions to calculate spark-over distances for both wet and dry conditions.

Since no empirical data for spark over distances to live vegetation existed at the time version 3 was developed, the SDT chose a proven method that has been used in other EHV applications. The Gallet equations relevance to wet conditions and the selection of a Transient Overvoltage Factor that is consistent with the absence of trapped charges on an in-service transmission line make this methodology a better choice.

The following table is an example of the comparison of distances derived from IEEE 516 and the Gallet equations.

**Comparison of spark-over distances computed using Gallet wet equations vs. IEEE 516-2003 MAID distances**

( AC ) Nom System Voltage (kV)	( AC ) Max System Voltage (kV)	Transient Over-voltage Factor (T)	Clearance (ft.) Gallet (wet) @ Alt. 3000 feet	Table 7 (Table D.5 for feet) IEEE 516-2003 MAID (ft) @ Alt. 3000 feet
765	800	2.0	14.36	13.95
500	550	2.4	11.0	10.07
345	362	3.0	8.55	7.47
230	242	3.0	5.28	4.2
115	121	3.0	2.46	2.1

### **Rationale:**

During development of this standard, text boxes were embedded within the standard to explain the rationale for various parts of the standard. Upon BOT approval, the text from the rationale text boxes was moved to this section.

### **Rationale for Applicability (section 4.2.4):**

The areas excluded in 4.2.4 were excluded based on comments from industry for reasons summarized as follows:

- 1) There is a very low risk from vegetation in this area. Based on an informal survey, no TOs reported such an event.
- 2) Substations, switchyards, and stations have many inspection and maintenance activities that are necessary for reliability. Those existing process manage the threat. As such, the formal steps in this standard are not well suited for this environment.
- 3) Specifically addressing the areas where the standard does and does not apply makes the standard clearer.

### **Rationale for Applicability (section 4.3):**

Within the text of NERC Reliability Standard FAC-003-3, “transmission line(s)” and “applicable line(s)” can also refer to the generation Facilities as referenced in 4.3 and its subsections.

### **Rationale for R1 and R2:**

Lines with the highest significance to reliability are covered in R1; all other lines are covered in R2.

Rationale for the types of failure to manage vegetation which are listed in order of increasing degrees of severity in non-compliant performance as it relates to a failure of an applicable Transmission Owner's or applicable Generator Owner's vegetation maintenance program:

1. This management failure is found by routine inspection or Fault event investigation, and is normally symptomatic of unusual conditions in an otherwise sound program.
2. This management failure occurs when the height and location of a side tree within the ROW is not adequately addressed by the program.
3. This management failure occurs when side growth is not adequately addressed and may be indicative of an unsound program.
4. This management failure is usually indicative of a program that is not addressing the most fundamental dynamic of vegetation management, (i.e. a grow-in under the line). If this type of failure is pervasive on multiple lines, it provides a mechanism for a Cascade.

### **Rationale for R3:**

The documentation provides a basis for evaluating the competency of the applicable Transmission Owner's or applicable Generator Owner's vegetation program. There may be many acceptable approaches to maintain clearances. Any approach must demonstrate that the

applicable Transmission Owner or applicable Generator Owner avoids vegetation-to-wire conflicts under all Ratings and all Rated Electrical Operating Conditions.

**Rationale for R4:**

This is to ensure expeditious communication between the applicable Transmission Owner or applicable Generator Owner and the control center when a critical situation is confirmed.

**Rationale for R5:**

Legal actions and other events may occur which result in constraints that prevent the applicable Transmission Owner or applicable Generator Owner from performing planned vegetation maintenance work.

In cases where the transmission line is put at potential risk due to constraints, the intent is for the applicable Transmission Owner and applicable Generator Owner to put interim measures in place, rather than do nothing.

The corrective action process is not intended to address situations where a planned work methodology cannot be performed but an alternate work methodology can be used.

**Rationale for R6:**

Inspections are used by applicable Transmission Owners and applicable Generator Owners to assess the condition of the entire ROW. The information from the assessment can be used to determine risk, determine future work and evaluate recently-completed work. This requirement sets a minimum Vegetation Inspection frequency of once per calendar year but with no more than 18 months between inspections on the same ROW. Based upon average growth rates across North America and on common utility practice, this minimum frequency is reasonable. Transmission Owners should consider local and environmental factors that could warrant more frequent inspections.

**Rationale for R7:**

This requirement sets the expectation that the work identified in the annual work plan will be completed as planned. It allows modifications to the planned work for changing conditions, taking into consideration anticipated growth of vegetation and all other environmental factors, provided that those modifications do not put the transmission system at risk of a vegetation encroachment.

**\* FOR INFORMATIONAL PURPOSES ONLY \***

**Enforcement Dates: Standard FAC-003-4 — Transmission Vegetation Management**

**United States**

<b>Standard</b>	<b>Requirement</b>	<b>Enforcement Date</b>	<b>Inactive Date</b>
FAC-003-4	All	10/01/2016	

**Exhibit B: List of Currently Effective NERC Reliability Standards**

## Resource and Demand Balancing (BAL)

BAL-001-2	<a href="#">Real Power Balancing Control Performance</a>
BAL-001-TRE-1	<a href="#">Primary Frequency Response in the ERCOT Region</a>
BAL-002-1	<a href="#">Disturbance Control Performance</a>
BAL-002-WECC-2	<a href="#">Contingency Reserve</a>
BAL-003-1.1	<a href="#">Frequency Response and Frequency Bias Setting</a>
BAL-004-0	<a href="#">Time Error Correction</a>
BAL-004-WECC-02	<a href="#">Automatic Time Error Correction (ATEC)</a>
BAL-005-0.2b	<a href="#">Automatic Generation Control</a>
BAL-006-2	<a href="#">Inadvertent Interchange</a>
BAL-502-RFC-02	<a href="#">Planning Resource Adequacy Analysis, Assessment and Documentation</a>

## Communications (COM )

COM-001-2.1	<a href="#">Communications</a>
COM-002-4	<a href="#">Operating Personnel Communications Protocols</a>

## Critical Infrastructure Protection (CIP)

CIP-002-5.1	<a href="#">Cyber Security — BES Cyber System Categorization</a>
CIP-003-6	<a href="#">Cyber Security — Security Management Controls</a>
CIP-004-6	<a href="#">Cyber Security — Personnel &amp; Training</a>
CIP-005-5	<a href="#">Cyber Security — Electronic Security Perimeter(s)</a>

CIP-006-6	<a href="#">Cyber Security — Physical Security of BES Cyber Systems</a>
CIP-007-6	<a href="#">Cyber Security — System Security Management</a>
CIP-008-5	<a href="#">Cyber Security — Incident Reporting and Response Planning</a>
CIP-009-6	<a href="#">Cyber Security — Recovery Plans for BES Cyber Systems</a>
CIP-010-2	<a href="#">Cyber Security — Configuration Change Management and Vulnerability Assessments</a>
CIP-011-2	<a href="#">Cyber Security — Information Protection</a>
CIP-014-2	<a href="#">Physical Security</a>

### **Emergency Preparedness and Operations (EOP)**

EOP-001-2.1b	<a href="#">Emergency Operations Planning</a>
EOP-002-3.1	<a href="#">Capacity and Energy Emergencies</a>
EOP-003-2	<a href="#">Load Shedding Plans</a>
EOP-004-2	<a href="#">Event Reporting</a>
EOP-005-2	<a href="#">System Restoration from Blackstart Resources</a>
EOP-006-2	<a href="#">System Restoration Coordination</a>
EOP-008-1	<a href="#">Loss of Control Center Functionality</a>
EOP-010-1	<a href="#">Geomagnetic Disturbance Operations</a>

### **Facilities Design, Connections, and Maintenance (FAC )**

FAC-001-2	<a href="#">Facility Interconnection Requirements</a>
FAC-002-2	<a href="#">Facility Interconnection Studies</a>

FAC-003-3	<a href="#">Transmission Vegetation Management</a>
FAC-008-3	<a href="#">Facility Ratings</a>
FAC-010-2.1	<a href="#">System Operating Limits Methodology for the Planning Horizon</a>
FAC-011-2	<a href="#">System Operating Limits Methodology for the Operations Horizon</a>
FAC-013-2	<a href="#">Assessment of Transfer Capability for the Near-Term Transmission Planning Horizon</a>
FAC-014-2	<a href="#">Establish and Communicate System Operating Limits</a>
FAC-501-WECC-1	<a href="#">Transmission Maintenance</a>

### **Interchange Scheduling and Coordination (INT)**

INT-004-3.1	<a href="#">Dynamic Transfers</a>
INT-006-4	<a href="#">Evaluation of Interchange Transactions</a>
INT-009-2.1	<a href="#">Implementation of Interchange</a>
INT-010-2.1	<a href="#">Interchange Initiation and Modification for Reliability</a>
INT-011-1.1	<a href="#">Intra-Balancing Authority Transaction Identification</a>

### **Interconnection Reliability Operations and Coordination (IRO)**

IRO-001-1.1	<a href="#">Reliability Coordination – Responsibilities and Authorities</a>
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IRO-003-2	<a href="#">Reliability Coordination – Wide-Area View</a>
IRO-004-2	<a href="#">Reliability Coordination – Operations Planning</a>

IRO-005-3.1a	<a href="#">Reliability Coordination — Current Day Operations</a>
IRO-006-5	<a href="#">Reliability Coordination — Transmission Loading Relief (TLR)</a>
IRO-006-EAST-2	<a href="#">Transmission Loading Relief Procedure for the Eastern Interconnection</a>
IRO-006-TRE-1	<a href="#">IROL and SOL Mitigation in the ERCOT Region</a>
IRO-006-WECC-2	<a href="#">Qualified Transfer Path Unscheduled Flow (USF) Relief</a>
IRO-008-1	<a href="#">Reliability Coordinator Operational Analyses and Real-time Assessments</a>
IRO-009-2	<a href="#">Reliability Coordinator Actions to Operate Within IROLs</a>
IRO-010-1a	<a href="#">Reliability Coordinator Data Specification and Collection</a>
IRO-014-1	<a href="#">Procedures, Processes, or Plans to Support Coordination Between Reliability Coordinators</a>
IRO-015-1	<a href="#">Notifications and Information Exchange Between Reliability Coordinators</a>
IRO-016-1	<a href="#">Coordination of Real- time Activities Between Reliability Coordinators</a>

### **Modeling, Data, and Analysis (MOD )**

MOD-001-1a	<a href="#">Available Transmission System Capability</a>
MOD-004-1	<a href="#">Capacity Benefit Margin</a>
MOD-008-1	<a href="#">Transmission Reliability Margin Calculation Methodology</a>

MOD-020-0	<a href="#">Providing Interruptible Demands and Direct Control Load Management Data to System Operators and Reliability Coordinators</a>
MOD-025-2	<a href="#">Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability</a>
MOD-026-1	<a href="#">Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions</a>
MOD-027-1	<a href="#">Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions</a>
MOD-028-2	<a href="#">Area Interchange Methodology</a>
MOD-029-1a	<a href="#">Rated System Path Methodology</a>
MOD-030-2	<a href="#">Flowgate Methodology</a>
MOD-031-1	<a href="#">Demand and Energy Data</a>
MOD-032-1	<a href="#">Data for Power System Modeling and Analysis</a>

### **Nuclear (NUC)**

NUC-001-3	<a href="#">Nuclear Plant Interface Coordination</a>
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### **Personnel Performance, Training, and Qualifications (PER )**

PER-001-0.2	<a href="#">Operating Personnel Responsibility and Authority</a>
PER-003-1	<a href="#">Operating Personnel Credentials</a>

PER-004-2 [Reliability Coordination  
— Staffing](#)

PER-005-2 [Operations Personnel  
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### Protection and Control (PRC)

PRC-001-1.1(ii) [System Protection  
Coordination](#)

PRC-002-2 [Disturbance Monitoring  
and Reporting  
Requirements](#)

PRC-004-4(i) [Protection System  
Misoperation  
Identification and  
Correction](#)

PRC-004-WECC-1 [Protection System and  
Remedial Action Scheme  
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PRC-005-1.1b [Transmission and  
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System Maintenance  
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PRC-005-2(i) [Protection System  
Maintenance](#)

PRC-005-6 [Protection System,  
Automatic Reclosing,  
and Sudden Pressure  
Relaying Maintenance](#)

PRC-006-2 [Automatic  
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Shedding](#)

PRC-006-NPCC-1 [Automatic  
Underfrequency Load  
Shedding](#)

PRC-006-SERC-01 [Automatic  
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PRC-008-0 [Implementation and  
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Shedding Equipment  
Maintenance Program](#)

PRC-010-0 [Technical Assessment of  
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	<a href="#">Effectiveness of Undervoltage Load Shedding Program</a>
PRC-011-0	<a href="#">Undervoltage Load Shedding System Maintenance and Testing</a>
PRC-015-0	<a href="#">Special Protection System Data and Documentation</a>
PRC-016-0.1	<a href="#">Special Protection System Misoperations</a>
PRC-017-0	<a href="#">Special Protection System Maintenance and Testing</a>
PRC-018-1	<a href="#">Disturbance Monitoring Equipment Installation and Data Reporting</a>
PRC-019-2	<a href="#">Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection</a>
PRC-021-1	<a href="#">Under-Voltage Load Shedding Program Data</a>
PRC-022-1	<a href="#">Under-Voltage Load Shedding Program Performance</a>
PRC-023-3	<a href="#">Transmission Relay Loadability</a>
PRC-024-2	<a href="#">Generator Frequency and Voltage Protective Relay Settings</a>
PRC-025-1	<a href="#">Generator Relay Loadability</a>

### **Transmission Operations (TOP)**

TOP-001-1a	<a href="#">Reliability Responsibilities and Authorities</a>
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TOP-004-2	<a href="#">Transmission Operations</a>
TOP-005-2a	<a href="#">Operational Reliability Information</a>
TOP-006-2	<a href="#">Monitoring System Conditions</a>
TOP-007-0	<a href="#">Reporting System Operating Limit (SOL) and Interconnection Reliability Operating Limit (IROL) Violations</a>
TOP-007-WECC-1a	<a href="#">System Operating Limits</a>
TOP-008-1	<a href="#">Response to Transmission Limit Violations</a>

### **Transmission Planning (TPL)**

TPL-001-4	<a href="#">Transmission System Planning Performance Requirements</a>
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### **Voltage and Reactive (VAR)**

VAR-001-4.1	<a href="#">Voltage and Reactive Control</a>
VAR-002-4	<a href="#">Generator Operation for Maintaining Network Voltage Schedules</a>
VAR-002-WECC-2	<a href="#">Automatic Voltage Regulators (AVR)</a>
VAR-501-WECC-2	<a href="#">Power System Stabilizer (PSS)</a>

**Exhibit C: Updated *Glossary of Terms Used in NERC Reliability Standards***

# Glossary of Terms Used in NERC Reliability Standards

Updated August 17, 2016

## Introduction:

This Glossary lists each term that was defined for use in one or more of NERC's continent-wide or Regional Reliability Standards and adopted by the NERC Board of Trustees from February 8, 2005 through August 17, 2016.

This reference is divided into two sections, and each section is organized in alphabetical order. The first section identifies all terms that have been adopted by the NERC Board of Trustees for use in continent-wide standards; the second section identifies all terms that have been adopted by the NERC Board of Trustees for use in regional standards. (WECC, NPCC and RF are the only Regions that have definitions approved by the NERC Board of Trustees. If other Regions develop definitions for approved Regional Standards using a NERC-approved standards development process, those definitions will be added to the Regional Definitions section of this glossary.)

Most of the terms identified in this glossary were adopted as part of the development of NERC's initial set of reliability standards, called the "Version 0" standards. Subsequent to the development of Version 0 standards, new definitions have been developed and approved following NERC's Reliability Standards Development Process, and added to this glossary following board adoption, with the "FERC approved" date added following a final Order approving the definition.

Immediately under each term is a link to the archive for the development of that term.

- Definitions that have been adopted by the NERC Board of Trustees but have not been approved by FERC, or FERC has not approved but has directed be modified, are shaded in blue.
- Definitions that have been remanded or retired are shaded in orange.
- Definitions that have been approved by FERC are white.

Any comments regarding this glossary should be reported to the following:

[sarcomm@nerc.com](mailto:sarcomm@nerc.com) with "Glossary Comment" in the subject line.

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Continent-wide Term	Acronym	BOT Approval Date	FERC Approval Date	Definition
Actual Frequency ( $F_A$ ) <a href="#">[Archive]</a>		2/11/2016	6/23/2016 (Becomes effective 7/1/2016)	The Interconnection frequency measured in Hertz (Hz).
Actual Net Interchange ( $NI_A$ ) <a href="#">[Archive]</a>		2/11/2016	6/23/2016 (Becomes effective 7/1/2016)	The algebraic sum of actual megawatt transfers across all Tie Lines, including Pseudo-Ties, to and from all Adjacent Balancing Authority areas within the same Interconnection. Actual megawatt transfers on asynchronous DC tie lines that are directly connected to another Interconnection are excluded from Actual Net Interchange.
Adequacy <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The ability of the electric system to supply the aggregate electrical demand and energy requirements of the end-use customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements.
Adjacent Balancing Authority <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A Balancing Authority Area that is interconnected another Balancing Authority Area either directly or via a multi-party agreement or transmission tariff.
Adjacent Balancing Authority <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	A Balancing Authority whose Balancing Authority Area is interconnected with another Balancing Authority Area either directly or via a multi-party agreement or transmission tariff.
Adverse Reliability Impact <a href="#">[Archive]</a>		2/7/2006	3/16/2007	The impact of an event that results in frequency-related instability; unplanned tripping of load or generation; or uncontrolled separation or cascading outages that affects a widespread area of the Interconnection.

Continent-wide Term	Acronym	BOT Approval Date	FERC Approval Date	Definition
Adverse Reliability Impact <a href="#">[Archive]</a>		8/4/2011		The impact of an event that results in Bulk Electric System instability or Cascading.
After the Fact <a href="#">[Archive]</a>	ATF	10/29/2008	12/17/2009	A time classification assigned to an RFI when the submittal time is greater than one hour after the start time of the RFI.
Agreement <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A contract or arrangement, either written or verbal and sometimes enforceable by law.
Alternative Interpersonal Communication <a href="#">[Archive]</a>		11/7/2012	4/16/2015 (Becomes effective 10/1/2015)	Any Interpersonal Communication that is able to serve as a substitute for, and does not utilize the same infrastructure (medium) as, Interpersonal Communication used for day-to-day operation.
Altitude Correction Factor <a href="#">[Archive]</a>		2/7/2006	3/16/2007	A multiplier applied to specify distances, which adjusts the distances to account for the change in relative air density (RAD) due to altitude from the RAD used to determine the specified distance. Altitude correction factors apply to both minimum worker approach distances and to minimum vegetation clearance distances.
Ancillary Service <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Those services that are necessary to support the transmission of capacity and energy from resources to loads while maintaining reliable operation of the Transmission Service Provider's transmission system in accordance with good utility practice. <i>(From FERC order 888-A.)</i>
Anti-Aliasing Filter <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An analog filter installed at a metering point to remove the high frequency components of the signal over the AGC sample period.

Continent-wide Term	Acronym	BOT Approval Date	FERC Approval Date	Definition
Area Control Error <a href="#">[Archive]</a>	ACE	2/8/2005	3/16/2007 (Becomes inactive 3/31/14)	The instantaneous difference between a Balancing Authority's net actual and scheduled interchange, taking into account the effects of Frequency Bias and correction for meter error.
Area Control Error <a href="#">[Archive]</a>	ACE	12/19/2012	10/16/2013 (Becomes effective 4/1/2014)	The instantaneous difference between a Balancing Authority's net actual and scheduled interchange, taking into account the effects of Frequency Bias, correction for meter error, and Automatic Time Error Correction (ATEC), if operating in the ATEC mode. ATEC is only applicable to Balancing Authorities in the Western Interconnection.
Area Interchange Methodology <a href="#">[Archive]</a>		08/22/2008	11/24/2009	The Area Interchange methodology is characterized by determination of incremental transfer capability via simulation, from which Total Transfer Capability (TTC) can be mathematically derived. Capacity Benefit Margin, Transmission Reliability Margin, and Existing Transmission Commitments are subtracted from the TTC, and Postbacks and counterflows are added, to derive Available Transfer Capability. Under the Area Interchange Methodology, TTC results are generally reported on an area to area basis.
Arranged Interchange <a href="#">[Archive]</a>		5/2/2006	3/16/2007	The state where the Interchange Authority has received the Interchange information (initial or revised).
Arranged Interchange <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	The state where a Request for Interchange (initial or revised) has been submitted for approval.

Continent-wide Term	Acronym	BOT Approval Date	FERC Approval Date	Definition
Attaining Balancing Authority <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	A Balancing Authority bringing generation or load into its effective control boundaries through a Dynamic Transfer from the Native Balancing Authority.
Automatic Generation Control <a href="#">[Archive]</a>	AGC	2/8/2005	3/16/2007	Equipment that automatically adjusts generation in a Balancing Authority Area from a central location to maintain the Balancing Authority's interchange schedule plus Frequency Bias. AGC may also accommodate automatic inadvertent payback and time error correction.
Automatic Generation Control <a href="#">[Archive]</a>	AGC	2/11/2016		A process designed and used to adjust a Balancing Authority Areas' Demand and resources to help maintain the Reporting ACE in that of a Balancing Authority Area within the bounds required by applicable NERC Reliability Standards.

Continent-wide Term	Acronym	BOT Approval Date	FERC Approval Date	Definition
<p>Automatic Time Error Correction (<math>I_{ATEC}</math>)</p> <p><a href="#">[Archive]</a></p>		2/11/2016	6/23/2016 (Becomes effective 7/1/2016)	<p>The addition of a component to the ACE equation for the Western Interconnection that modifies the control point for the purpose of continuously paying back Primary Inadvertent Interchange to correct accumulated time error. Automatic Time Error Correction is only applicable in the Western Interconnection.</p> $I_{ATEC} = \frac{PII_{accum}^{on/off\ peak}}{(1-Y)*H}$ <p>when operating in Automatic Time Error Correction Mode.</p> <p>The absolute value of <math>I_{ATEC}</math> shall not exceed <math>L_{max}</math>.</p> <p><math>I_{ATEC}</math> shall be zero when operating in any other AGC mode.</p> <ul style="list-style-type: none"> <li><math>L_{max}</math> is the maximum value allowed for <math>I_{ATEC}</math> set by each BA between <math>0.2* B_i </math> and <math>L_{10}</math>, <math>0.2* B_i  \leq L_{max} \leq L_{10}</math>.</li> <li><math>L_{10} = 1.65 * \epsilon_{10} \sqrt{(-10B_i)(-10B_S)}</math>.</li> <li><math>\epsilon_{10}</math> is a constant derived from the targeted frequency bound. It is the targeted root-mean-square (RMS) value of ten-minute average frequency error based on frequency performance over a given year. The bound, <math>\epsilon_{10}</math>, is the same for every Balancing Authority Area within an Interconnection.</li> <li><math>Y = B_i / B_S</math>.</li> <li><math>H</math> = Number of hours used to payback primary inadvertent interchange energy. The value of <math>H</math> is set to 3. <i>(Continued below)</i></li> </ul>

Continent-wide Term	Acronym	BOT Approval Date	FERC Approval Date	Definition
<p>Automatic Time Error Correction (<math>I_{ATEC}</math>)</p> <p><i>Continued...</i></p> <p><a href="#">[Archive]</a></p>		2/11/2016	6/23/2016 (Becomes effective 7/1/2016)	<ul style="list-style-type: none"> <li>• <math>B_i</math> = Frequency Bias Setting for the Balancing Authority Area (MW / 0.1 Hz).</li> <li>• <math>B_s</math> = Sum of the minimum Frequency Bias Settings for the Interconnection (MW / 0.1 Hz).</li> <li>• Primary Inadvertent Interchange (<math>PII_{hourly}</math>) is <math>(1-Y) * (II_{actual} - B_i * \Delta TE/6)</math></li> <li>• <math>II_{actual}</math> is the hourly Inadvertent Interchange for the last hour.  <math>\Delta TE</math> is the hourly change in system Time Error as distributed by the Interconnection time monitor, where:  <math>\Delta TE = TE_{end\ hour} - TE_{begin\ hour} - TD_{adj} - (t)*(TE_{offset})</math></li> <li>• <math>TD_{adj}</math> is the Reliability Coordinator adjustment for differences with Interconnection time monitor control center clocks.</li> <li>• <math>t</math> is the number of minutes of manual Time Error Correction that occurred during the hour.</li> <li>• <math>TE_{offset}</math> is 0.000 or +0.020 or -0.020.</li> <li>• <math>PII_{accum}</math> is the Balancing Authority Area's accumulated <math>PII_{hourly}</math> in MWh. An On-Peak and Off-Peak accumulation accounting is required, where:  <math display="block">PII_{accum}^{on/offpeak} = last\ period's\ PII_{accum}^{on/offpeak} + PII_{hourly}</math></li> </ul>

Continent-wide Term	Acronym	BOT Approval Date	FERC Approval Date	Definition
Available Flowgate Capability <a href="#">[Archive]</a>	AFC	08/22/2008	11/24/2009	A measure of the flow capability remaining on a Flowgate for further commercial activity over and above already committed uses. It is defined as TFC less Existing Transmission Commitments (ETC), less a Capacity Benefit Margin, less a Transmission Reliability Margin, plus Postbacks, and plus counterflows.
Available Transfer Capability <a href="#">[Archive]</a>	ATC	2/8/2005	3/16/2007	A measure of the transfer capability remaining in the physical transmission network for further commercial activity over and above already committed uses. It is defined as Total Transfer Capability less existing transmission commitments (including retail customer service), less a Capacity Benefit Margin, less a Transmission Reliability Margin.
Available Transfer Capability <a href="#">[Archive]</a>	ATC	08/22/2008	11/24/2009	A measure of the transfer capability remaining in the physical transmission network for further commercial activity over and above already committed uses. It is defined as Total Transfer Capability less Existing Transmission Commitments (including retail customer service), less a Capacity Benefit Margin, less a Transmission Reliability Margin, plus Postbacks, plus counterflows.
Available Transfer Capability Implementation Document <a href="#">[Archive]</a>	ATCID	08/22/2008	11/24/2009	A document that describes the implementation of a methodology for calculating ATC or AFC, and provides information related to a Transmission Service Provider's calculation of ATC or AFC.

Continent-wide Term	Acronym	BOT Approval Date	FERC Approval Date	Definition
ATC Path <a href="#">[Archive]</a>		08/22/2008	Not approved; Modification directed 11/24/09	Any combination of Point of Receipt and Point of Delivery for which ATC is calculated; and any Posted Path <sup>1</sup> .

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<sup>1</sup> See 18 CFR 37.6(b)(1)

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Balancing Authority <a href="#">[Archive]</a>	BA	2/8/2005	3/16/2007	The responsible entity that integrates resource plans ahead of time, maintains load-interchange-generation balance within a Balancing Authority Area, and supports Interconnection frequency in real time.
Balancing Authority <a href="#">[Archive]</a>		2/11/2016		The responsible entity that integrates resource plans ahead of time, maintains Demand and resource balance within a Balancing Authority Area, and supports Interconnection frequency in real time.
Balancing Authority Area <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The collection of generation, transmission, and loads within the metered boundaries of the Balancing Authority. The Balancing Authority maintains load-resource balance within this area.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Balancing Contingency Event <a href="#">[Archive]</a>		11/5/2015		Any single event described in Subsections (A), (B), or (C) below, or any series of such otherwise single events, with each separated from the next by one minute or less. A. Sudden loss of generation: <ul style="list-style-type: none"> <li>a. Due to                             <ul style="list-style-type: none"> <li>i. unit tripping, or</li> <li>ii. loss of generator Facility resulting in isolation of the generator from the Bulk Electric System or from the responsible entity's System, or</li> <li>iii. sudden unplanned outage of transmission Facility;</li> </ul> </li> <li>b. And, that causes an unexpected change to the responsible entity's ACE;</li> </ul> B. Sudden loss of an Import, due to forced outage of transmission equipment that causes an unexpected imbalance between generation and Demand on the Interconnection. C. Sudden restoration of a Demand that was used as a resource that causes an unexpected change to the responsible entity's ACE.
Base Load <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The minimum amount of electric power delivered or required over a given period at a constant rate.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
BES Cyber Asset <a href="#">[Archive]</a>		11/26/2012	11/22/2013 (Becomes effective 4/1/2016)	A Cyber Asset that if rendered unavailable, degraded, or misused would, within 15 minutes of its required operation, misoperation, or non-operation, adversely impact one or more Facilities, systems, or equipment, which, if destroyed, degraded, or otherwise rendered unavailable when needed, would affect the reliable operation of the Bulk Electric System. Redundancy of affected Facilities, systems, and equipment shall not be considered when determining adverse impact. Each BES Cyber Asset is included in one or more BES Cyber Systems. (A Cyber Asset is not a BES Cyber Asset if, for 30 consecutive calendar days or less, it is directly connected to a network within an ESP, a Cyber Asset within an ESP, or to a BES Cyber Asset, and it is used for data transfer, vulnerability assessment, maintenance, or troubleshooting purposes.)
BES Cyber Asset <a href="#">[Archive]</a>	BCA	2/12/2015	1/21/2016 (effective 7/1/2016)	A Cyber Asset that if rendered unavailable, degraded, or misused would, within 15 minutes of its required operation, misoperation, or non-operation, adversely impact one or more Facilities, systems, or equipment, which, if destroyed, degraded, or otherwise rendered unavailable when needed, would affect the reliable operation of the Bulk Electric System. Redundancy of affected Facilities, systems, and equipment shall not be considered when determining adverse impact. Each BES Cyber Asset is included in one or more BES Cyber Systems.
BES Cyber System <a href="#">[Archive]</a>		11/26/2012	11/22/2013 (Becomes effective 4/1/2016)	One or more BES Cyber Assets logically grouped by a responsible entity to perform one or more reliability tasks for a functional entity.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
BES Cyber System Information <a href="#">[Archive]</a>		11/26/2012	11/22/2013 (Becomes effective 4/1/2016)	Information about the BES Cyber System that could be used to gain unauthorized access or pose a security threat to the BES Cyber System. BES Cyber System Information does not include individual pieces of information that by themselves do not pose a threat or could not be used to allow unauthorized access to BES Cyber Systems, such as, but not limited to, device names, individual IP addresses without context, ESP names, or policy statements. Examples of BES Cyber System Information may include, but are not limited to, security procedures or security information about BES Cyber Systems, Physical Access Control Systems, and Electronic Access Control or Monitoring Systems that is not publicly available and could be used to allow unauthorized access or unauthorized distribution; collections of network addresses; and network topology of the BES Cyber System.
Blackstart Capability Plan <a href="#">[Archive]</a>		2/8/2005 Will be retired when EOP-005-2 becomes enforceable on (7/1/13)	3/16/2007	A documented procedure for a generating unit or station to go from a shutdown condition to an operating condition delivering electric power without assistance from the electric system. This procedure is only a portion of an overall system restoration plan.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Blackstart Resource <a href="#">[Archive]</a>		8/5/2009	3/17/2011	A generating unit(s) and its associated set of equipment which has the ability to be started without support from the System or is designed to remain energized without connection to the remainder of the System, with the ability to energize a bus, meeting the Transmission Operator’s restoration plan needs for real and reactive power capability, frequency and voltage control, and that has been included in the Transmission Operator’s restoration plan.
Blackstart Resource <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	A generating unit(s) and its associated set of equipment which has the ability to be started without support from the System or is designed to remain energized without connection to the remainder of the System, with the ability to energize a bus, meeting the Transmission Operator’s restoration plan needs for Real and Reactive Power capability, frequency and voltage control, and that has been included in the Transmission Operator’s restoration plan.
Block Dispatch <a href="#">[Archive]</a>		08/22/2008	11/24/2009	A set of dispatch rules such that given a specific amount of load to serve, an approximate generation dispatch can be determined. To accomplish this, the capacity of a given generator is segmented into loadable “blocks,” each of which is grouped and ordered relative to other blocks (based on characteristics including, but not limited to, efficiency, run of river or fuel supply considerations, and/or “must-run” status).

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk Electric System <a href="#">[Archive]</a>	BES	2/8/2005	3/16/2007 (Becomes inactive on 6/30/2014)	As defined by the Regional Reliability Organization, the electrical generation resources, transmission lines, interconnections with neighboring systems, and associated equipment, generally operated at voltages of 100 kV or higher. Radial transmission facilities serving only load with one transmission source are generally not included in this definition.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk Electric System <sup>2</sup> <a href="#">[Archive]</a>	BES	01/18/2012	6/14/2013 (Replaced by BES definition FERC approved 3/20/2014)	Unless modified by the lists shown below, all Transmission Elements operated at 100 kV or higher and Real Power and Reactive Power resources connected at 100 kV or higher. This does not include facilities used in the local distribution of electric energy. <b>Inclusions:</b> <ul style="list-style-type: none"> <li>• <b>I1</b> - Transformers with the primary terminal and at least one secondary terminal operated at 100 kV or higher unless excluded under Exclusion E1 or E3.</li> <li>• <b>I2</b> - Generating resource(s) with gross individual nameplate rating greater than 20 MVA or gross plant/facility aggregate nameplate rating greater than 75 MVA including the generator terminals through the high-side of the step-up transformer(s) connected at a voltage of 100 kV or above.</li> <li>• <b>I3</b> - Blackstart Resources identified in the Transmission Operator’s restoration plan.</li> <li>• <b>I4</b> - Dispersed power producing resources with aggregate capacity greater than 75 MVA (gross aggregate nameplate rating) utilizing a system designed primarily for aggregating capacity, connected at a common point at a voltage of 100 kV or above.</li> </ul>

<sup>2</sup> FERC issued an order on April 18, 2013 approving the revised definition with an effective date of July 1, 2013. On June 14, 2013, FERC granted NERC’s request to extend the effective date of the revised definition of the Bulk Electric System to July 1, 2014.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk Electric System <b>(Continued)</b>	BES			<p><b>I5</b> –Static or dynamic devices (excluding generators) dedicated to supplying or absorbing Reactive Power that are connected at 100 kV or higher, or through a dedicated transformer with a high-side voltage of 100 kV or higher, or through a transformer that is designated in Inclusion I1.</p> <p><b>Exclusions:</b></p> <ul style="list-style-type: none"> <li>• <b>E1</b> - Radial systems: A group of contiguous transmission Elements that emanates from a single point of connection of 100 kV or higher and:               <ul style="list-style-type: none"> <li>a) Only serves Load. Or,</li> <li>b) Only includes generation resources, not identified in Inclusion I3, with an aggregate capacity less than or equal to 75 MVA (gross nameplate rating). Or,</li> <li>c) Where the radial system serves Load and includes generation resources, not identified in Inclusion I3, with an aggregate capacity of non-retail generation less than or equal to 75 MVA (gross nameplate rating).</li> </ul> </li> </ul> <p>Note – A normally open switching device between radial systems, as depicted on prints or one-line diagrams for example, does not affect this exclusion.</p>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk Electric System <b>(Continued)</b>	BES			<ul style="list-style-type: none"> <li>• <b>E2</b> - A generating unit or multiple generating units on the customer’s side of the retail meter that serve all or part of the retail Load with electric energy if: (i) the net capacity provided to the BES does not exceed 75 MVA, and (ii) standby, back-up, and maintenance power services are provided to the generating unit or multiple generating units or to the retail Load by a Balancing Authority, or provided pursuant to a binding obligation with a Generator Owner or Generator Operator, or under terms approved by the applicable regulatory authority.</li> <li>• <b>E3</b> - Local networks (LN): A group of contiguous transmission Elements operated at or above 100 kV but less than 300 kV that distribute power to Load rather than transfer bulk power across the interconnected system. LN’s emanate from multiple points of connection at 100 kV or higher to improve the level of service to retail customer Load and not to accommodate bulk power transfer across the interconnected system. The LN is characterized by all of the following:</li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk Electric System <b>(Continued)</b>	BES			<p>a) Limits on connected generation: The LN and its underlying Elements do not include generation resources identified in Inclusion I3 and do not have an aggregate capacity of non-retail generation greater than 75 MVA (gross nameplate rating);</p> <p>b) Power flows only into the LN and the LN does not transfer energy originating outside the LN for delivery through the LN; and</p> <p>c) Not part of a Flowgate or transfer path: The LN does not contain a monitored Facility of a permanent Flowgate in the Eastern Interconnection, a major transfer path within the Western Interconnection, or a comparable monitored Facility in the ERCOT or Quebec Interconnections, and is not a monitored Facility included in an Interconnection Reliability Operating Limit (IROL).</p> <ul style="list-style-type: none"> <li>• <b>E4</b> – Reactive Power devices owned and operated by the retail customer solely for its own use. Note - Elements may be included or excluded on a case-by-case basis through the Rules of Procedure exception process.</li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk Electric System <a href="#">[Archive]</a>	BES	11/21/2013	3/20/14 (Becomes effective 7/1/2014)  (Please see the Implementation Plan for Phase 2 Compliance obligations.)	Unless modified by the lists shown below, all Transmission Elements operated at 100 kV or higher and Real Power and Reactive Power resources connected at 100 kV or higher. This does not include facilities used in the local distribution of electric energy. <b>Inclusions:</b> <ul style="list-style-type: none"> <li>• <b>I1</b> - Transformers with the primary terminal and at least one secondary terminal operated at 100 kV or higher unless excluded by application of Exclusion E1 or E3.</li> <li>• <b>I2</b> - Generating resource(s) including the generator terminals through the high-side of the step-up transformer(s) connected at a voltage of 100 kV or above with:                             <ul style="list-style-type: none"> <li>a) Gross individual nameplate rating greater than 20 MVA. Or,</li> <li>b) Gross plant/facility aggregate nameplate rating greater than 75 MVA.</li> </ul> </li> <li>• <b>I3</b> - Blackstart Resources identified in the Transmission Operator’s restoration plan.</li> <li>• <b>I4</b> - Dispersed power producing resources that aggregate to a total capacity greater than 75 MVA (gross nameplate rating), and that are connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage of 100 kV or above.</li> </ul> Thus, the facilities designated as BES are:

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk Electric System <b>(Continued)</b>	BES			<ul style="list-style-type: none"> <li>a) The individual resources, and</li> <li>b) The system designed primarily for delivering capacity from the point where those resources aggregate to greater than 75 MVA to a common point of connection at a voltage of 100 kV or above.</li> </ul> <ul style="list-style-type: none"> <li>• <b>I5</b> –Static or dynamic devices (excluding generators) dedicated to supplying or absorbing Reactive Power that are connected at 100 kV or higher, or through a dedicated transformer with a high-side voltage of 100 kV or higher, or through a transformer that is designated in Inclusion I1 unless excluded by application of Exclusion E4.</li> </ul> <p><b>Exclusions:</b></p> <ul style="list-style-type: none"> <li>• <b>E1</b> - Radial systems: A group of contiguous transmission Elements that emanates from a single point of connection of 100 kV or higher and:               <ul style="list-style-type: none"> <li>a) Only serves Load. Or,</li> <li>b) Only includes generation resources, not identified in Inclusions I2, I3, or I4, with an aggregate capacity less than or equal to 75 MVA (gross nameplate rating). Or,</li> <li>c) Where the radial system serves Load and includes generation resources, not identified in Inclusions I2, I3 or I4, with an aggregate capacity of non-retail generation less than or equal to 75 MVA (gross nameplate rating).</li> </ul> </li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk Electric System <b>(Continued)</b>	BES			<p>Note 1 – A normally open switching device between radial systems, as depicted on prints or one-line diagrams for example, does not affect this exclusion.</p> <p>Note 2 – The presence of a contiguous loop, operated at a voltage level of 50 kV or less, between configurations being considered as radial systems, does not affect this exclusion.</p> <ul style="list-style-type: none"> <li>• <b>E2</b> - A generating unit or multiple generating units on the customer’s side of the retail meter that serve all or part of the retail Load with electric energy if: (i) the net capacity provided to the BES does not exceed 75 MVA, and (ii) standby, back-up, and maintenance power services are provided to the generating unit or multiple generating units or to the retail Load by a Balancing Authority, or provided pursuant to a binding obligation with a Generator Owner or Generator Operator, or under terms approved by the applicable regulatory authority.</li> <li>• <b>E3</b> - Local networks (LN): A group of contiguous transmission Elements operated at less than 300 kV that distribute power to Load rather than transfer bulk power across the interconnected system. LN’s emanate from multiple points of connection at 100 kV or higher to improve the level of service to retail customers and not to accommodate bulk power transfer across the interconnected system. The LN is characterized by all of the following:             <ul style="list-style-type: none"> <li>a) Limits on connected generation: The LN and its underlying Elements do not include generation resources identified in Inclusions I2, I3, or I4 and do not have an aggregate capacity of non-retail</li> </ul> </li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk Electric System <b>(Continued)</b>	BES			<p>generation greater than 75 MVA (gross nameplate rating);</p> <p>b) Real Power flows only into the LN and the LN does not transfer energy originating outside the LN for delivery through the LN; and</p> <p>c) Not part of a Flowgate or transfer path: The LN does not contain any part of a permanent Flowgate in the Eastern Interconnection, a major transfer path within the Western Interconnection, or a comparable monitored Facility in the ERCOT or Quebec Interconnections, and is not a monitored Facility included in an Interconnection Reliability Operating Limit (IROL).</p> <ul style="list-style-type: none"> <li>• <b>E4</b> – Reactive Power devices installed for the sole benefit of a retail customer(s).</li> </ul> <p>Note - Elements may be included or excluded on a case-by-case basis through the Rules of Procedure exception process.</p>
Bulk-Power System <a href="#">[Archive]</a>		5/9/2013	7/9/2013	A) facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof); and (B) electric energy from generation facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Bulk-Power System <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	Bulk-Power System: (A) facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof); and (B) electric energy from generation facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy. (Note that the terms "Bulk-Power System" or "Bulk Power System" shall have the same meaning.)
Burden <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Operation of the Bulk Electric System that violates or is expected to violate a System Operating Limit or Interconnection Reliability Operating Limit in the Interconnection, or that violates any other NERC, Regional Reliability Organization, or local operating reliability standards or criteria.
Business Practices <a href="#">[Archive]</a>		8/22/2008	Not approved; Modification directed 11/24/2009	Those business rules contained in the Transmission Service Provider's applicable tariff, rules, or procedures; associated Regional Reliability Organization or regional entity business practices; or NAESB Business Practices.
Bus-tie Breaker <a href="#">[Archive]</a>		8/4/2011	10/17/2013 (Becomes effective 1/1/2015)	A circuit breaker that is positioned to connect two individual substation bus configurations.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Capacity Benefit Margin <a href="#">[Archive]</a>	CBM	2/8/2005	3/16/2007	The amount of firm transmission transfer capability preserved by the transmission provider for Load-Serving Entities (LSEs), whose loads are located on that Transmission Service Provider’s system, to enable access by the LSEs to generation from interconnected systems to meet generation reliability requirements. Preservation of CBM for an LSE allows that entity to reduce its installed generating capacity below that which may otherwise have been necessary without interconnections to meet its generation reliability requirements. The transmission transfer capability preserved as CBM is intended to be used by the LSE only in times of emergency generation deficiencies.
Capacity Benefit Margin Implementation Document <a href="#">[Archive]</a>	CBMID	11/13/2008	11/24/2009	A document that describes the implementation of a Capacity Benefit Margin methodology.
Capacity Emergency <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A capacity emergency exists when a Balancing Authority Area’s operating capacity, plus firm purchases from other systems, to the extent available or limited by transfer capability, is inadequate to meet its demand plus its regulating requirements.
Cascading <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The uncontrolled successive loss of system elements triggered by an incident at any location. Cascading results in widespread electric service interruption that cannot be restrained from sequentially spreading beyond an area predetermined by studies.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Cascading <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	The uncontrolled successive loss of System Elements triggered by an incident at any location. Cascading results in widespread electric service interruption that cannot be restrained from sequentially spreading beyond an area predetermined by studies.
Cascading Outages <a href="#">[Archive]</a>		11/1/2006 Withdrawn 2/12/2008	FERC Remanded 12/27/2007	<del>The uncontrolled successive loss of Bulk Electric System Facilities triggered by an incident (or condition) at any location resulting in the interruption of electric service that cannot be restrained from spreading beyond a pre-determined area.</del>
CIP Exceptional Circumstance <a href="#">[Archive]</a>		11/26/12	11/22/2013 (Becomes effective 4/1/2016)	A situation that involves or threatens to involve one or more of the following, or similar, conditions that impact safety or BES reliability: a risk of injury or death; a natural disaster; civil unrest; an imminent or existing hardware, software, or equipment failure; a Cyber Security Incident requiring emergency assistance; a response by emergency services; the enactment of a mutual assistance agreement; or an impediment of large scale workforce availability.
CIP Senior Manager <a href="#">[Archive]</a>		11/26/12	11/22/2013 (Becomes effective 4/1/2016)	A single senior management official with overall authority and responsibility for leading and managing implementation of and continuing adherence to the requirements within the NERC CIP Standards, CIP-002 through CIP-011.
Clock Hour <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The 60-minute period ending at :00. All surveys, measurements, and reports are based on Clock Hour periods unless specifically noted.
Cogeneration <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Production of electricity from steam, heat, or other forms of energy produced as a by-product of another process.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Compliance Monitor <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The entity that monitors, reviews, and ensures compliance of responsible entities with reliability standards.
Composite Confirmed Interchange <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	The energy profile (including non-default ramp) throughout a given time period, based on the aggregate of all Confirmed Interchange occurring in that time period.
Composite Protection System <a href="#">[Archive]</a>		8/14/2014	5/13/2015 (Becomes effective 7/1/2016)	The total complement of Protection System(s) that function collectively to protect an Element. Backup protection provided by a different Element's Protection System(s) is excluded.
Confirmed Interchange <a href="#">[Archive]</a>		5/2/2006	3/16/2007	The state where the Interchange Authority has verified the Arranged Interchange.
Confirmed Interchange <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	The state where no party has denied and all required parties have approved the Arranged Interchange.
Congestion Management Report <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A report that the Interchange Distribution Calculator issues when a Reliability Coordinator initiates the Transmission Loading Relief procedure. This report identifies the transactions and native and network load curtailments that must be initiated to achieve the loading relief requested by the initiating Reliability Coordinator.
Consequential Load Loss <a href="#">[Archive]</a>		8/4/2011	10/17/2013 (Becomes effective 1/1/2015)	All Load that is no longer served by the Transmission system as a result of Transmission Facilities being removed from service by a Protection System operation designed to isolate the fault.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Constrained Facility <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A transmission facility (line, transformer, breaker, etc.) that is approaching, is at, or is beyond its System Operating Limit or Interconnection Reliability Operating Limit.
Contingency <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The unexpected failure or outage of a system component, such as a generator, transmission line, circuit breaker, switch or other electrical element.
Contingency Event Recovery Period <a href="#">[Archive]</a>		11/5/2015		A period that begins at the time that the resource output begins to decline within the first one-minute interval of a Reportable Balancing Contingency Event, and extends for fifteen minutes thereafter.
Contingency Reserve <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The provision of capacity deployed by the Balancing Authority to meet the Disturbance Control Standard (DCS) and other NERC and Regional Reliability Organization contingency requirements.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Contingency Reserve <a href="#">[Archive]</a>		11/5/2015		The provision of capacity that may be deployed by the Balancing Authority to respond to a Balancing Contingency Event and other contingency requirements (such as Energy Emergency Alerts as specified in the associated EOP standard). A Balancing Authority may include in its restoration of Contingency Reserve readiness to reduce Firm Demand and include it if, and only if, the Balancing Authority: <ul style="list-style-type: none"> <li>• is experiencing a Reliability Coordinator declared Energy Emergency Alert level, and is utilizing its Contingency Reserve to mitigate an operating emergency in accordance with its emergency Operating Plan.</li> <li>• is utilizing its Contingency Reserve to mitigate an operating emergency in accordance with its emergency Operating Plan.</li> </ul>
Contingency Reserve Restoration Period <a href="#">[Archive]</a>		11/5/2015		A period not exceeding 90 minutes following the end of the Contingency Event Recovery Period.
Contract Path <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An agreed upon electrical path for the continuous flow of electrical power between the parties of an Interchange Transaction.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Control Center <a href="#">[Archive]</a>		11/26/12	11/22/13 (Becomes effective 4/1/16)	One or more facilities hosting operating personnel that monitor and control the Bulk Electric System (BES) in real-time to perform the reliability tasks, including their associated data centers, of: 1) a Reliability Coordinator, 2) a Balancing Authority, 3) a Transmission Operator for transmission Facilities at two or more locations, or 4) a Generator Operator for generation Facilities at two or more locations.
Control Performance Standard <a href="#">[Archive]</a>	CPS	2/8/2005	3/16/2007	The reliability standard that sets the limits of a Balancing Authority's Area Control Error over a specified time period.
Corrective Action Plan <a href="#">[Archive]</a>		2/7/2006	3/16/2007	A list of actions and an associated timetable for implementation to remedy a specific problem.
Cranking Path <a href="#">[Archive]</a>		5/2/2006	3/16/2007	A portion of the electric system that can be isolated and then energized to deliver electric power from a generation source to enable the startup of one or more other generating units.
Critical Assets <a href="#">[Archive]</a>		5/2/2006	1/18/2008 (Becomes inactive 3/31/2016)	Facilities, systems, and equipment which, if destroyed, degraded, or otherwise rendered unavailable, would affect the reliability or operability of the Bulk Electric System.
Critical Cyber Assets <a href="#">[Archive]</a>		5/2/2006	1/18/2008 (Becomes inactive 3/31/2016)	Cyber Assets essential to the reliable operation of Critical Assets.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Curtailment <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A reduction in the scheduled capacity or energy delivery of an Interchange Transaction.
Curtailment Threshold <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The minimum Transfer Distribution Factor which, if exceeded, will subject an Interchange Transaction to curtailment to relieve a transmission facility constraint.
Cyber Assets <a href="#">[Archive]</a>		5/2/2006	1/18/2008 (Becomes inactive 3/31/2016)	Programmable electronic devices and communication networks including hardware, software, and data.
Cyber Assets <a href="#">[Archive]</a>		11/26/12	11/22/2013 (Becomes effective 4/1/2016)	Programmable electronic devices, including the hardware, software, and data in those devices.
Cyber Security Incident <a href="#">[Archive]</a>		5/2/2006	1/18/2008 (Becomes inactive 3/31/2016)	Any malicious act or suspicious event that: <ul style="list-style-type: none"> <li>• Compromises, or was an attempt to compromise, the Electronic Security Perimeter or Physical Security Perimeter of a Critical Cyber Asset, or,</li> <li>• Disrupts, or was an attempt to disrupt, the operation of a Critical Cyber Asset.</li> </ul>
Cyber Security Incident <a href="#">[Archive]</a>		11/26/12	11/22/2013 (Becomes effective 4/1/2016)	A malicious act or suspicious event that: <ul style="list-style-type: none"> <li>• Compromises, or was an attempt to compromise, the Electronic Security Perimeter or Physical Security Perimeter or,</li> <li>• Disrupts, or was an attempt to disrupt, the operation of a BES Cyber System.</li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Delayed Fault Clearing <a href="#">[Archive]</a>		11/1/2006	12/27/2007	Fault clearing consistent with correct operation of a breaker failure protection system and its associated breakers, or of a backup protection system with an intentional time delay.
Demand <a href="#">[Archive]</a>		2/8/2005	3/16/2007	<ol style="list-style-type: none"> <li>1. The rate at which electric energy is delivered to or by a system or part of a system, generally expressed in kilowatts or megawatts, at a given instant or averaged over any designated interval of time.</li> <li>2. The rate at which energy is being used by the customer.</li> </ol>
Demand-Side Management <a href="#">[Archive]</a>	DSM	2/8/2005	3/16/2007	The term for all activities or programs undertaken by Load-Serving Entity or its customers to influence the amount or timing of electricity they use.
Demand-Side Management <a href="#">[Archive]</a>	DSM	5/6/2014	2/19/2015 (Becomes effective 7/1/2016)	All activities or programs undertaken by any applicable entity to achieve a reduction in Demand.
Dial-up Connectivity <a href="#">[Archive]</a>		11/26/12	11/22/2013 (Becomes effective 4/1/2016)	A data communication link that is established when the communication equipment dials a phone number and negotiates a connection with the equipment on the other end of the link.
Direct Control Load Management <a href="#">[Archive]</a>	DCLM	2/8/2005	3/16/2007	Demand-Side Management that is under the direct control of the system operator. DCLM may control the electric supply to individual appliances or equipment on customer premises. DCLM as defined here does not include Interruptible Demand.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Dispatch Order <a href="#">[Archive]</a>		08/22/2008	11/24/2009	A set of dispatch rules such that given a specific amount of load to serve, an approximate generation dispatch can be determined. To accomplish this, each generator is ranked by priority.
Dispersed Load by Substations <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Substation load information configured to represent a system for power flow or system dynamics modeling purposes, or both.
Distribution Factor <a href="#">[Archive]</a>	DF	2/8/2005	3/16/2007	The portion of an Interchange Transaction, typically expressed in per unit that flows across a transmission facility (Flowgate).
Distribution Provider <a href="#">[Archive]</a>	DP	2/8/2005	3/16/2007	Provides and operates the “wires” between the transmission system and the end-use customer. For those end-use customers who are served at transmission voltages, the Transmission Owner also serves as the Distribution Provider. Thus, the Distribution Provider is not defined by a specific voltage, but rather as performing the Distribution function at any voltage.
Distribution Provider <a href="#">[Archive]</a>	DP	11/5/2015	1/21/2016 (effective 7/1/2016)	Provides and operates the “wires” between the transmission system and the end-use customer. For those end-use customers who are served at transmission voltages, the Transmission Owner also serves as the Distribution Provider. Thus, the Distribution Provider is not defined by a specific voltage, but rather as performing the distribution function at any voltage.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Disturbance <a href="#">[Archive]</a>		2/8/2005	3/16/2007	<ol style="list-style-type: none"> <li>1. An unplanned event that produces an abnormal system condition.</li> <li>2. Any perturbation to the electric system.</li> <li>3. The unexpected change in ACE that is caused by the sudden failure of generation or interruption of load.</li> </ol>
Disturbance Control Standard <a href="#">[Archive]</a>	DCS	2/8/2005	3/16/2007	The reliability standard that sets the time limit following a Disturbance within which a Balancing Authority must return its Area Control Error to within a specified range.
Disturbance Monitoring Equipment <a href="#">[Archive]</a>	DME	8/2/2006	3/16/2007	<p>Devices capable of monitoring and recording system data pertaining to a Disturbance. Such devices include the following categories of recorders<sup>3</sup>:</p> <ul style="list-style-type: none"> <li>• Sequence of event recorders which record equipment response to the event</li> <li>• Fault recorders, which record actual waveform data replicating the system primary voltages and currents. This may include protective relays.</li> <li>• Dynamic Disturbance Recorders (DDRs), which record incidents that portray power system behavior during dynamic events such as low-frequency (0.1 Hz – 3 Hz) oscillations and abnormal frequency or voltage excursions</li> </ul>

<sup>3</sup> Phasor Measurement Units and any other equipment that meets the functional requirements of DMEs may qualify as DMEs.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Dynamic Interchange Schedule or Dynamic Schedule <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A telemetered reading or value that is updated in real time and used as a schedule in the AGC/ACE equation and the integrated value of which is treated as a schedule for interchange accounting purposes. Commonly used for scheduling jointly owned generation to or from another Balancing Authority Area.
Dynamic Interchange Schedule or Dynamic Schedule <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	A time-varying energy transfer that is updated in Real-time and included in the Scheduled Net Interchange (NIS) term in the same manner as an Interchange Schedule in the affected Balancing Authorities' control ACE equations (or alternate control processes).
Dynamic Transfer <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The provision of the real-time monitoring, telemetering, computer software, hardware, communications, engineering, energy accounting (including inadvertent interchange), and administration required to electronically move all or a portion of the real energy services associated with a generator or load out of one Balancing Authority Area into another.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Economic Dispatch <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The allocation of demand to individual generating units on line to effect the most economical production of electricity.
Electronic Access Control or Monitoring Systems <a href="#">[Archive]</a>	EACMS	11/26/12	11/22/2013 (Becomes effective 4/1/2016)	Cyber Assets that perform electronic access control or electronic access monitoring of the Electronic Security Perimeter(s) or BES Cyber Systems. This includes Intermediate Systems.
Electronic Access Point <a href="#">[Archive]</a>	EAP	11/26/12	11/22/2013 (Becomes effective 4/1/2016)	A Cyber Asset interface on an Electronic Security Perimeter that allows routable communication between Cyber Assets outside an Electronic Security Perimeter and Cyber Assets inside an Electronic Security Perimeter.
Electrical Energy <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The generation or use of electric power by a device over a period of time, expressed in kilowatt hours (kWh), megawatt hours (MWh), or gigawatt hours (GWh).
Electronic Security Perimeter <a href="#">[Archive]</a>	ESP	5/2/2006	1/18/2008 (Becomes inactive 3/31/2016)	The logical border surrounding a network to which Critical Cyber Assets are connected and for which access is controlled.
Electronic Security Perimeter <a href="#">[Archive]</a>	ESP	11/26/12	11/22/2013 (Becomes effective 4/1/2016)	The logical border surrounding a network to which BES Cyber Systems are connected using a routable protocol.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Element <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Any electrical device with terminals that may be connected to other electrical devices such as a generator, transformer, circuit breaker, bus section, or transmission line. An element may be comprised of one or more components.
Element <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	Any electrical device with terminals that may be connected to other electrical devices such as a generator, transformer, circuit breaker, bus section, or transmission line. An Element may be comprised of one or more components.
Emergency or BES Emergency <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Any 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.
Emergency Rating <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The rating as defined by the equipment owner that specifies the level of electrical loading or output, usually expressed in megawatts (MW) or Mvar or other appropriate units, that a system, facility, or element can support, produce, or withstand for a finite period. The rating assumes acceptable loss of equipment life or other physical or safety limitations for the equipment involved.
Emergency Request for Interchange <a href="#">[Archive]</a>	Emergency RFI	10/29/2008	12/17/2009	Request for Interchange to be initiated for Emergency or Energy Emergency conditions.
Energy Emergency <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A condition when a Load-Serving Entity has exhausted all other options and can no longer provide its customers' expected energy requirements.
Energy Emergency <a href="#">[Archive]</a>		11/13/2014	11/19/2015 effective 4/1/2017	A condition when a Load-Serving Entity or Balancing Authority has exhausted all other resource options and can no longer meet its expected Load obligations.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Equipment Rating <a href="#">[Archive]</a>		2/7/2006	3/16/2007	The maximum and minimum voltage, current, frequency, real and reactive power flows on individual equipment under steady state, short-circuit and transient conditions, as permitted or assigned by the equipment owner.
External Routable Connectivity <a href="#">[Archive]</a>		11/26/12	11/22/2013 (Becomes effective 4/1/2016)	The ability to access a BES Cyber System from a Cyber Asset that is outside of its associated Electronic Security Perimeter via a bi-directional routable protocol connection.
Existing Transmission Commitments <a href="#">[Archive]</a>	ETC	08/22/2008	11/24/2009	Committed uses of a Transmission Service Provider's Transmission system considered when determining ATC or AFC.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Facility <a href="#">[Archive]</a>		2/7/2006	3/16/2007	A set of electrical equipment that operates as a single Bulk Electric System Element (e.g., a line, a generator, a shunt compensator, transformer, etc.)
Facility Rating <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The maximum or minimum voltage, current, frequency, or real or reactive power flow through a facility that does not violate the applicable equipment rating of any equipment comprising the facility.
Fault <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An event occurring on an electric system such as a short circuit, a broken wire, or an intermittent connection.
Fire Risk <a href="#">[Archive]</a>		2/7/2006	3/16/2007	The likelihood that a fire will ignite or spread in a particular geographic area.
Firm Demand <a href="#">[Archive]</a>		2/8/2005	3/16/2007	That portion of the Demand that a power supplier is obligated to provide except when system reliability is threatened or during emergency conditions.
Firm Transmission Service <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The highest quality (priority) service offered to customers under a filed rate schedule that anticipates no planned interruption.
Flashover <a href="#">[Archive]</a>		2/7/2006	3/16/2007	An electrical discharge through air around or over the surface of insulation, between objects of different potential, caused by placing a voltage across the air space that results in the ionization of the air space.
Flowgate <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A designated point on the transmission system through which the Interchange Distribution Calculator calculates the power flow from Interchange Transactions.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Flowgate <a href="#">[Archive]</a>		08/22/2008	11/24/2009	<p>1.) A portion of the Transmission system through which the Interchange Distribution Calculator calculates the power flow from Interchange Transactions.</p> <p>2.) A mathematical construct, comprised of one or more monitored transmission Facilities and optionally one or more contingency Facilities, used to analyze the impact of power flows upon the Bulk Electric System.</p>
Flowgate Methodology <a href="#">[Archive]</a>		08/22/2008	11/24/2009	<p>The Flowgate methodology is characterized by identification of key Facilities as Flowgates. Total Flowgate Capabilities are determined based on Facility Ratings and voltage and stability limits. The impacts of Existing Transmission Commitments (ETCs) are determined by simulation. The impacts of ETC, Capacity Benefit Margin (CBM) and Transmission Reliability Margin (TRM) are subtracted from the Total Flowgate Capability, and Postbacks and counterflows are added, to determine the Available Flowgate Capability (AFC) value for that Flowgate. AFCs can be used to determine Available Transfer Capability (ATC).</p>
Forced Outage <a href="#">[Archive]</a>		2/8/2005	3/16/2007	<p>1. The removal from service availability of a generating unit, transmission line, or other facility for emergency reasons.</p> <p>2. The condition in which the equipment is unavailable due to unanticipated failure.</p>
Frequency Bias <a href="#">[Archive]</a>		2/8/2005	3/16/2007	<p>A value, usually expressed in megawatts per 0.1 Hertz (MW/0.1 Hz), associated with a Balancing Authority Area that approximates the Balancing Authority Area's response to Interconnection frequency error.</p>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Frequency Bias Setting <a href="#">[Archive]</a>		2/8/2005	3/16/2007 (Becomes inactive 3/31/2015)	A value, usually expressed in MW/0.1 Hz, set into a Balancing Authority ACE algorithm that allows the Balancing Authority to contribute its frequency response to the Interconnection.
Frequency Bias Setting <a href="#">[Archive]</a>		2/7/2013	1/16/2014 (Becomes effective 4/1/2015)	A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's inverse Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems.
Frequency Deviation <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A change in Interconnection frequency.
Frequency Error <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The difference between the actual and scheduled frequency. ( $F_A - F_S$ )
Frequency Regulation <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The ability of a Balancing Authority to help the Interconnection maintain Scheduled Frequency. This assistance can include both turbine governor response and Automatic Generation Control.
Frequency Response <a href="#">[Archive]</a>		2/8/2005	3/16/2007	(Equipment) The ability of a system or elements of the system to react or respond to a change in system frequency.  (System) The sum of the change in demand, plus the change in generation, divided by the change in frequency, expressed in megawatts per 0.1 Hertz (MW/0.1 Hz).

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Frequency Response Measure <a href="#">[Archive]</a>	FRM	2/7/2013	1/16/2014 (Becomes effective 4/1/2015)	The median of all the Frequency Response observations reported annually by Balancing Authorities or Frequency Response Sharing Groups for frequency events specified by the ERO. This will be calculated as MW/0.1Hz.
Frequency Response Obligation <a href="#">[Archive]</a>	FRO	2/7/2013	1/16/2014 (Becomes effective 4/1/2015)	The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection. This will be calculated as MW/0.1Hz.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Frequency Response Sharing Group <a href="#">[Archive]</a>	FRSG	2/7/2013	1/16/2014 (Becomes effective 4/1/2015)	A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members.
Generator Operator <a href="#">[Archive]</a>	GOP	2/8/2005	3/16/2007	The entity that operates generating unit(s) and performs the functions of supplying energy and Interconnected Operations Services.
Generator Operator <a href="#">[Archive]</a>	GOP	11/5/2015	1/21/2016 (effective 7/1/2016)	The entity that operates generating Facility(ies) and performs the functions of supplying energy and Interconnected Operations Services.
Generator Owner <a href="#">[Archive]</a>	GO	2/8/2005	3/16/2007	Entity that owns and maintains generating units.
Generator Owner <a href="#">[Archive]</a>	GO	11/5/2015	1/21/2016 (effective 7/1/2016)	Entity that owns and maintains generating Facility(ies).
Generator Shift Factor <a href="#">[Archive]</a>	GSF	2/8/2005	3/16/2007	A factor to be applied to a generator’s expected change in output to determine the amount of flow contribution that change in output will impose on an identified transmission facility or Flowgate.
Generator-to-Load Distribution Factor <a href="#">[Archive]</a>	GLDF	2/8/2005	3/16/2007	The algebraic sum of a Generator Shift Factor and a Load Shift Factor to determine the total impact of an Interchange Transaction on an identified transmission facility or Flowgate.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Generation Capability Import Requirement <a href="#">[Archive]</a>	GCIR	11/13/2008	11/24/2009	The amount of generation capability from external sources identified by a Load-Serving Entity (LSE) or Resource Planner (RP) to meet its generation reliability or resource adequacy requirements as an alternative to internal resources.
Host Balancing Authority <a href="#">[Archive]</a>		2/8/2005	3/16/2007	<ol style="list-style-type: none"> <li>1. A Balancing Authority that confirms and implements Interchange Transactions for a Purchasing Selling Entity that operates generation or serves customers directly within the Balancing Authority’s metered boundaries.</li> <li>2. The Balancing Authority within whose metered boundaries a jointly owned unit is physically located.</li> </ol>
Hourly Value <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Data measured on a Clock Hour basis.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Implemented Interchange <a href="#">[Archive]</a>		5/2/2006	3/16/2007	The state where the Balancing Authority enters the Confirmed Interchange into its Area Control Error equation.
Inadvertent Interchange <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The difference between the Balancing Authority's Net Actual Interchange and Net Scheduled Interchange. (I <sub>A</sub> - I <sub>S</sub> )
Independent Power Producer <a href="#">[Archive]</a>	IPP	2/8/2005	3/16/2007	Any entity that owns or operates an electricity generating facility that is not included in an electric utility's rate base. This term includes, but is not limited to, cogenerators and small power producers and all other nonutility electricity producers, such as exempt wholesale generators, who sell electricity.
Institute of Electrical and Electronics Engineers, Inc. <a href="#">[Archive]</a>	IEEE	2/7/2006	3/16/2007	

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Interactive Remote Access <a href="#">[Archive]</a>		11/26/12	11/22/2013 (Becomes effective 4/1/2016)	User-initiated access by a person employing a remote access client or other remote access technology using a routable protocol. Remote access originates from a Cyber Asset that is not an Intermediate System and not located within any of the Responsible Entity's Electronic Security Perimeter(s) or at a defined Electronic Access Point (EAP). Remote access may be initiated from: 1) Cyber Assets used or owned by the Responsible Entity, 2) Cyber Assets used or owned by employees, and 3) Cyber Assets used or owned by vendors, contractors, or consultants. Interactive remote access does not include system-to-system process communications.
Interchange <a href="#">[Archive]</a>		5/2/2006	3/16/2007	Energy transfers that cross Balancing Authority boundaries.
Interchange Authority <a href="#">[Archive]</a>	IA	5/2/2006	3/16/2007	The responsible entity that authorizes implementation of valid and balanced Interchange Schedules between Balancing Authority Areas, and ensures communication of Interchange information for reliability assessment purposes.
Interchange Authority <a href="#">[Archive]</a>	IA	11/5/2015	1/21/2016 (effective 7/1/2016)	The responsible entity that authorizes the implementation of valid and balanced Interchange Schedules between Balancing Authority Areas, and ensures communication of Interchange information for reliability assessment purposes.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Interchange Distribution Calculator <a href="#">[Archive]</a>	IDC	2/8/2005	3/16/2007	The mechanism used by Reliability Coordinators in the Eastern Interconnection to calculate the distribution of Interchange Transactions over specific Flowgates. It includes a database of all Interchange Transactions and a matrix of the Distribution Factors for the Eastern Interconnection.
Interchange Meter Error ( $I_{ME}$ ) <a href="#">[Archive]</a>		2/11/2016	6/23/2016 (Becomes effective 7/1/2016)	A term used in the Reporting ACE calculation to compensate for data or equipment errors affecting any other components of the Reporting ACE calculation.
Interchange Schedule <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An agreed-upon Interchange Transaction size (megawatts), start and end time, beginning and ending ramp times and rate, and type required for delivery and receipt of power and energy between the Source and Sink Balancing Authorities involved in the transaction.
Interchange Transaction <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An agreement to transfer energy from a seller to a buyer that crosses one or more Balancing Authority Area boundaries.
Interchange Transaction Tag or Tag <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The details of an Interchange Transaction required for its physical implementation.
Interconnected Operations Service <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A service (exclusive of basic energy and transmission services) that is required to support the reliable operation of interconnected Bulk Electric Systems.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Interconnected Operations Service <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	A service (exclusive of basic energy and Transmission Services) that is required to support the Reliable Operation of interconnected Bulk Electric Systems.
Interconnection <a href="#">[Archive]</a>		2/8/2005	3/16/2007 (Retires 6/30/2016)	When capitalized, any one of the three major electric system networks in North America: Eastern, Western, and ERCOT.
Interconnection <a href="#">[Archive]</a>		8/15/2013	4/16/2015	When capitalized, any one of the four major electric system networks in North America: Eastern, Western, ERCOT and Quebec.
Interconnection <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	A geographic area in which the operation of Bulk Power System components is synchronized such that the failure of one or more of such components may adversely affect the ability of the operators of other components within the system to maintain Reliable Operation of the Facilities within their control. When capitalized, any one of the four major electric system networks in North America: Eastern, Western, ERCOT and Quebec.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Interconnection Reliability Operating Limit <a href="#">[Archive]</a>	IROL	2/8/2005	3/16/2007 Retired 12/27/2007	The value (such as MW, MVar, Amperes, Frequency or Volts) derived from, or a subset of the System Operating Limits, which if exceeded, could expose a widespread area of the Bulk Electric System to instability, uncontrolled separation(s) or cascading outages.
Interconnection Reliability Operating Limit <a href="#">[Archive]</a>	IROL	11/1/2006	12/27/2007	A System Operating Limit that, if violated, could lead to instability, uncontrolled separation, or Cascading outages <sup>4</sup> that adversely impact the reliability of the Bulk Electric System.
Interconnection Reliability Operating Limit T <sub>v</sub> <a href="#">[Archive]</a>	IROL T <sub>v</sub>	11/1/2006	12/27/2007	The maximum time that an Interconnection Reliability Operating Limit can be violated before the risk to the interconnection or other Reliability Coordinator Area(s) becomes greater than acceptable. Each Interconnection Reliability Operating Limit's T <sub>v</sub> shall be less than or equal to 30 minutes.
Intermediate Balancing Authority <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A Balancing Authority Area that has connecting facilities in the Scheduling Path between the Sending Balancing Authority Area and Receiving Balancing Authority Area and operating agreements that establish the conditions for the use of such facilities.
Intermediate Balancing Authority <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	A Balancing Authority on the scheduling path of an Interchange Transaction other than the Source Balancing Authority and Sink Balancing Authority.

<sup>4</sup> On September 13, 2012, FERC issued an Order approving NERC's request to modify the reference to "Cascading Outages" to "Cascading outages" within the definition of IROL due to the fact that the definition of "Cascading Outages" was previously remanded by FERC.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Intermediate System <a href="#">[Archive]</a>		11/26/12	11/22/2013 (Becomes effective 4/1/2016)	A Cyber Asset or collection of Cyber Assets performing access control to restrict Interactive Remote Access to only authorized users. The Intermediate System must not be located inside the Electronic Security Perimeter.
Interpersonal Communication <a href="#">[Archive]</a>		11/7/2012	4/16/2015 (Becomes effective 10/1/2015)	Any medium that allows two or more individuals to interact, consult, or exchange information.
Interruptible Load or Interruptible Demand <a href="#">[Archive]</a>		11/1/2006	3/16/2007	Demand that the end-use customer makes available to its Load-Serving Entity via contract or agreement for curtailment.
Joint Control <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Automatic Generation Control of jointly owned units by two or more Balancing Authorities.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Limiting Element <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The element that is 1.) Either operating at its appropriate rating, or 2,) Would be following the limiting contingency. Thus, the Limiting Element establishes a system limit.
Load <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An end-use device or customer that receives power from the electric system.
Load Shift Factor <a href="#">[Archive]</a>	LSF	2/8/2005	3/16/2007	A factor to be applied to a load's expected change in demand to determine the amount of flow contribution that change in demand will impose on an identified transmission facility or monitored Flowgate.
Load-Serving Entity <a href="#">[Archive]</a>	LSE	2/8/2005	3/16/2007	Secures energy and transmission service (and related Interconnected Operations Services) to serve the electrical demand and energy requirements of its end-use customers.
Load-Serving Entity <a href="#">[Archive]</a>	LSE	11/5/2015	1/21/2016 (effective 7/1/2016)	Secures energy and Transmission Service (and related Interconnected Operations Services) to serve the electrical demand and energy requirements of its end-use customers.
Long-Term Transmission Planning Horizon <a href="#">[Archive]</a>		8/4/2011	10/17/2013 (Becomes effective 1/1/2015)	Transmission planning period that covers years six through ten or beyond when required to accommodate any known longer lead time projects that may take longer than ten years to complete.
Low Impact BES Cyber System Electronic Access Point <a href="#">[Archive]</a>	LEAP	2/12/2015	1/21/2016 (effective 7/1/2016)	A Cyber Asset interface that controls Low Impact External Routable Connectivity. The Cyber Asset containing the LEAP may reside at a location external to the asset or assets containing low impact BES Cyber Systems.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Low Impact External Routable Connectivity <a href="#">[Archive]</a>	LERC	2/12/2015	1/21/2016 (effective 7/1/2016)	Direct user-initiated interactive access or a direct device-to-device connection to a low impact BES Cyber System(s) from a Cyber Asset outside the asset containing those low impact BES Cyber System(s) via a bi-directional routable protocol connection. Point-to-point communications between intelligent electronic devices that use routable communication protocols for time-sensitive protection or control functions between Transmission station or substation assets containing low impact BES Cyber Systems are excluded from this definition (examples of this communication include, but are not limited to, IEC 61850 GOOSE or vendor proprietary protocols).
Market Flow <a href="#">[Archive]</a>		11/4/2010	4/21/2011	The total amount of power flowing across a specified Facility or set of Facilities due to a market dispatch of generation internal to the market to serve load internal to the market.
Minimum Vegetation Clearance Distance <a href="#">[Archive]</a>	MVCD	11/3/2011	3/21/2013 (Becomes effective 7/1/14)	The calculated minimum distance stated in feet (meters) to prevent flash-over between conductors and vegetation, for various altitudes and operating voltages.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Misoperation <a href="#">[Archive]</a>		2/7/2006	3/16/2007	<ul style="list-style-type: none"> <li>Any failure of a Protection System element to operate within the specified time when a fault or abnormal condition occurs within a zone of protection.</li> <li>Any operation for a fault not within a zone of protection (other than operation as backup protection for a fault in an adjacent zone that is not cleared within a specified time for the protection for that zone).</li> <li>Any unintentional Protection System operation when no fault or other abnormal condition has occurred unrelated to on-site maintenance and testing activity.</li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Misoperation <a href="#">[Archive]</a>		8/14/2014	5/13/2015 (Becomes effective 7/1/2016)	<p>The failure of a Composite Protection System to operate as intended for protection purposes. Any of the following is a Misoperation:</p> <ol style="list-style-type: none"> <li><b>1. Failure to Trip – During Fault</b> – A failure of a Composite Protection System to operate for a Fault condition for which it is designed. The failure of a Protection System component is not a Misoperation as long as the performance of the Composite Protection System is correct.</li> <li><b>2. Failure to Trip – Other Than Fault</b> – A failure of a Composite Protection System to operate for a non-Fault condition for which it is designed, such as a power swing, undervoltage, overexcitation, or loss of excitation. The failure of a Protection System component is not a Misoperation as long as the performance of the Composite Protection System is correct.</li> <li><b>3. Slow Trip – During Fault</b> – A Composite Protection System operation that is slower than required for a Fault condition if the duration of its operating time resulted in the operation of at least one other Element’s Composite Protection System.</li> </ol> <p><i>(continued below)</i></p>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
<p><b>Continued...</b> Misoperation <a href="#">[Archive]</a></p>		8/14/2014	5/13/2015 (Becomes effective 7/1/2016)	<p><b>4. Slow Trip – Other Than Fault</b> – A Composite Protection System operation that is slower than required for a non-Fault condition, such as a power swing, undervoltage, overexcitation, or loss of excitation, if the duration of its operating time resulted in the operation of at least one other Element’s Composite Protection System.</p> <p><b>5. Unnecessary Trip – During Fault</b> – An unnecessary Composite Protection System operation for a Fault condition on another Element.</p> <p><b>6. Unnecessary Trip – Other Than Fault</b> – An unnecessary Composite Protection System operation for a non-Fault condition. A Composite Protection System operation that is caused by personnel during on-site maintenance, testing, inspection, construction, or commissioning activities is not a Misoperation.</p>
<p>Most Severe Single Contingency <a href="#">[Archive]</a></p>	MSSC	11/5/2015		<p>The Balancing Contingency Event, due to a single contingency identified using system models maintained within the Reserve Sharing Group (RSG) or a Balancing Authority’s area that is not part of a Reserve Sharing Group, that would result in the greatest loss (measured in MW) of resource output used by the RSG or a Balancing Authority that is not participating as a member of a RSG at the time of the event to meet Firm Demand and export obligation (excluding export obligation for which Contingency Reserve obligations are being met by the Sink Balancing Authority).</p>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Native Balancing Authority <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	A Balancing Authority from which a portion of its physically interconnected generation and/or load is transferred from its effective control boundaries to the Attaining Balancing Authority through a Dynamic Transfer.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Native Load <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The end-use customers that the Load-Serving Entity is obligated to serve.
Near-Term Transmission Planning Horizon <a href="#">[Archive]</a>		1/24/2011	11/17/2011	The transmission planning period that covers Year One through five.
Net Actual Interchange <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The algebraic sum of all metered interchange over all interconnections between two physically Adjacent Balancing Authority Areas.
Net Energy for Load <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Net Balancing Authority Area generation, plus energy received from other Balancing Authority Areas, less energy delivered to Balancing Authority Areas through interchange. It includes Balancing Authority Area losses but excludes energy required for storage at energy storage facilities.
Net Interchange Schedule <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The algebraic sum of all Interchange Schedules with each Adjacent Balancing Authority.
Net Scheduled Interchange <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The algebraic sum of all Interchange Schedules across a given path or between Balancing Authorities for a given period or instant in time.
Network Integration Transmission Service <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Service that allows an electric transmission customer to integrate, plan, economically dispatch and regulate its network reserves in a manner comparable to that in which the Transmission Owner serves Native Load customers.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Non-Consequential Load Loss <a href="#">[Archive]</a>		8/4/2011	10/17/2013 (Becomes effective 1/1/15)	Non-Interruptible Load loss that does not include: (1) Consequential Load Loss, (2) the response of voltage sensitive Load, or (3) Load that is disconnected from the System by end-user equipment.
Non-Firm Transmission Service <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Transmission service that is reserved on an as-available basis and is subject to curtailment or interruption.
Non-Spinning Reserve <a href="#">[Archive]</a>		2/8/2005	3/16/2007	<ol style="list-style-type: none"> <li>1. That generating reserve not connected to the system but capable of serving demand within a specified time.</li> <li>2. Interruptible load that can be removed from the system in a specified time.</li> </ol>
Normal Clearing <a href="#">[Archive]</a>		11/1/2006	12/27/2007	A protection system operates as designed and the fault is cleared in the time normally expected with proper functioning of the installed protection systems.
Normal Rating <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The rating as defined by the equipment owner that specifies the level of electrical loading, usually expressed in megawatts (MW) or other appropriate units that a system, facility, or element can support or withstand through the daily demand cycles without loss of equipment life.
Nuclear Plant Generator Operator <a href="#">[Archive]</a>		5/2/2007	10/16/2008	Any Generator Operator or Generator Owner that is a Nuclear Plant Licensee responsible for operation of a nuclear facility licensed to produce commercial power.
Nuclear Plant Off-site Power Supply (Off-site Power) <a href="#">[Archive]</a>		5/2/2007	10/16/2008	The electric power supply provided from the electric system to the nuclear power plant distribution system as required per the nuclear power plant license.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Nuclear Plant Licensing Requirements <a href="#">[Archive]</a>	NPLRs	5/2/2007	10/16/2008	Requirements included in the design basis of the nuclear plant and statutorily mandated for the operation of the plant, including nuclear power plant licensing requirements for: <ol style="list-style-type: none"> <li>1) Off-site power supply to enable safe shutdown of the plant during an electric system or plant event; and</li> <li>2) Avoiding preventable challenges to nuclear safety as a result of an electric system disturbance, transient, or condition.</li> </ol>
Nuclear Plant Interface Requirements <a href="#">[Archive]</a>	NPIRs	5/2/2007	10/16/2008	The requirements based on NPLRs and Bulk Electric System requirements that have been mutually agreed to by the Nuclear Plant Generator Operator and the applicable Transmission Entities.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Off-Peak <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Those hours or other periods defined by NAESB business practices, contract, agreements, or guides as periods of lower electrical demand.
On-Peak <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Those hours or other periods defined by NAESB business practices, contract, agreements, or guides as periods of higher electrical demand.
Open Access Same Time Information Service <a href="#">[Archive]</a>	OASIS	2/8/2005	3/16/2007	An electronic posting system that the Transmission Service Provider maintains for transmission access data and that allows all transmission customers to view the data simultaneously.
Open Access Transmission Tariff <a href="#">[Archive]</a>	OATT	2/8/2005	3/16/2007	Electronic transmission tariff accepted by the U.S. Federal Energy Regulatory Commission requiring the Transmission Service Provider to furnish to all shippers with non-discriminating service comparable to that provided by Transmission Owners to themselves.
Operating Instruction <a href="#">[Archive]</a>		5/6/2014	4/16/2015 (Becomes effective 7/1/2016)	A command by operating personnel responsible for the Real-time operation of the interconnected Bulk Electric System to change or preserve the state, status, output, or input of an Element of the Bulk Electric System or Facility of the Bulk Electric System. (A discussion of general information and of potential options or alternatives to resolve Bulk Electric System operating concerns is not a command and is not considered an Operating Instruction.)

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Operating Plan <a href="#">[Archive]</a>		2/7/2006	3/16/2007	A document that identifies a group of activities that may be used to achieve some goal. An Operating Plan may contain Operating Procedures and Operating Processes. A company-specific system restoration plan that includes an Operating Procedure for black-starting units, Operating Processes for communicating restoration progress with other entities, etc., is an example of an Operating Plan.
Operating Procedure <a href="#">[Archive]</a>		2/7/2006	3/16/2007	A document that identifies specific steps or tasks that should be taken by one or more specific operating positions to achieve specific operating goal(s). The steps in an Operating Procedure should be followed in the order in which they are presented, and should be performed by the position(s) identified. A document that lists the specific steps for a system operator to take in removing a specific transmission line from service is an example of an Operating Procedure.
Operating Process <a href="#">[Archive]</a>		2/7/2006	3/16/2007	A document that identifies general steps for achieving a generic operating goal. An Operating Process includes steps with options that may be selected depending upon Real-time conditions. A guideline for controlling high voltage is an example of an Operating Process.
Operating Reserve <a href="#">[Archive]</a>		2/8/2005	3/16/2007	That capability above firm system demand required to provide for regulation, load forecasting error, equipment forced and scheduled outages and local area protection. It consists of spinning and non-spinning reserve.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Operating Reserve – Spinning <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The portion of Operating Reserve consisting of: <ul style="list-style-type: none"> <li>• Generation synchronized to the system and fully available to serve load within the Disturbance Recovery Period following the contingency event; or</li> <li>• Load fully removable from the system within the Disturbance Recovery Period following the contingency event.</li> </ul>
Operating Reserve – Supplemental <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The portion of Operating Reserve consisting of: <ul style="list-style-type: none"> <li>• Generation (synchronized or capable of being synchronized to the system) that is fully available to serve load within the Disturbance Recovery Period following the contingency event; or</li> <li>• Load fully removable from the system within the Disturbance Recovery Period following the contingency event.</li> </ul>
Operating Voltage <a href="#">[Archive]</a>		2/7/2006	3/16/2007	The voltage level by which an electrical system is designated and to which certain operating characteristics of the system are related; also, the effective (root-mean-square) potential difference between any two conductors or between a conductor and the ground. The actual voltage of the circuit may vary somewhat above or below this value.
Operational Planning Analysis <a href="#">[Archive]</a>		10/17/2008	3/17/2011	An analysis of the expected system conditions for the next day’s operation. (That analysis may be performed either a day ahead or as much as 12 months ahead.) Expected system conditions include things such as load forecast(s), generation output levels, and known system constraints (transmission facility outages, generator outages, equipment limitations, etc.).

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Operational Planning Analysis <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	An analysis of the expected system conditions for the next day's operation. (That analysis may be performed either a day ahead or as much as 12 months ahead.) Expected system conditions include things such as load forecast(s), generation output levels, Interchange, and known system constraints (transmission facility outages, generator outages, equipment limitations, etc.).
Operational Planning Analysis <a href="#">[Archive]</a>		11/13/2014	11/19/2015 (Becomes effective 1/1/2017)	An evaluation of projected system conditions to assess anticipated (pre-Contingency) and potential (post-Contingency) conditions for next-day operations. The evaluation shall reflect applicable inputs including, but not limited to, load forecasts; generation output levels; Interchange; known Protection System and Special Protection System status or degradation; Transmission outages; generator outages; Facility Ratings; and identified phase angle and equipment limitations. (Operational Planning Analysis may be provided through internal systems or through third-party services.)

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Operational Planning Analysis <a href="#">[Archive]</a>	OPA	8/11/2016		An evaluation of projected system conditions to assess anticipated (pre-Contingency) and potential (post-Contingency) conditions for next-day operations. The evaluation shall reflect applicable inputs including, but not limited to: load forecasts; generation output levels; Interchange; known Protection System and Remedial Action Scheme status or degradation, functions, and limitations; Transmission outages; generator outages; Facility Ratings; and identified phase angle and equipment limitations. (Operational Planning Analysis may be provided through internal systems or through third-party services.)
Operations Support Personnel <a href="#">[Archive]</a>		2/6/2014	6/19/2014 (effective 7/1/2016)	Individuals who perform current day or next day outage coordination or assessments, or who determine SOLs, IROLs, or operating nomograms, <sup>1</sup> in direct support of Real-time operations of the Bulk Electric System.
Outage Transfer Distribution Factor <a href="#">[Archive]</a>	OTDF	8/22/2008	11/24/2009	In the post-contingency configuration of a system under study, the electric Power Transfer Distribution Factor (PTDF) with one or more system Facilities removed from service (outaged).
Overlap Regulation Service <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A method of providing regulation service in which the Balancing Authority providing the regulation service incorporates another Balancing Authority's actual interchange, frequency response, and schedules into providing Balancing Authority's AGC/ACE equation.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Participation Factors <a href="#">[Archive]</a>		8/22/2008	11/24/2009	A set of dispatch rules such that given a specific amount of load to serve, an approximate generation dispatch can be determined. To accomplish this, generators are assigned a percentage that they will contribute to serve load.
Peak Demand <a href="#">[Archive]</a>		2/8/2005	3/16/2007	<ol style="list-style-type: none"> <li>1. The highest hourly integrated Net Energy For Load within a Balancing Authority Area occurring within a given period (e.g., day, month, season, or year).</li> <li>2. The highest instantaneous demand within the Balancing Authority Area.</li> </ol>
Performance-Reset Period <a href="#">[Archive]</a>		2/7/2006	3/16/2007	The time period that the entity being assessed must operate without any violations to reset the level of non compliance to zero.
Physical Access Control Systems <a href="#">[Archive]</a>	PACS	11/26/12	11/22/2013 (Becomes effective 4/1/2016)	Cyber Assets that control, alert, or log access to the Physical Security Perimeter(s), exclusive of locally mounted hardware or devices at the Physical Security Perimeter such as motion sensors, electronic lock control mechanisms, and badge readers.
Physical Security Perimeter <a href="#">[Archive]</a>	PSP	5/2/2006	1/18/2008 (Becomes inactive 3/31/2016)	The physical, completely enclosed (“six-wall”) border surrounding computer rooms, telecommunications rooms, operations centers, and other locations in which Critical Cyber Assets are housed and for which access is controlled.
Physical Security Perimeter <a href="#">[Archive]</a>	PSP	11/26/12	11/22/2013 (Becomes effective 4/1/2016)	The physical border surrounding locations in which BES Cyber Assets, BES Cyber Systems, or Electronic Access Control or Monitoring Systems reside, and for which access is controlled.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Planning Assessment <a href="#">[Archive]</a>		8/4/2011	10/17/2013 (Becomes effective 1/1/15)	Documented evaluation of future Transmission System performance and Corrective Action Plans to remedy identified deficiencies.
Planning Authority <a href="#">[Archive]</a>	PA	2/8/2005	3/16/2007	The responsible entity that coordinates and integrates transmission facility and service plans, resource plans, and protection systems.
Planning Authority <a href="#">[Archive]</a>	PA	11/5/2015	1/21/2016 (effective 7/1/2016)	The responsible entity that coordinates and integrates transmission Facilities and service plans, resource plans, and Protection Systems.
Planning Coordinator <a href="#">[Archive]</a>	PC	8/22/2008	11/24/2009	See Planning Authority.
Point of Delivery <a href="#">[Archive]</a>	POD	2/8/2005	3/16/2007	A location that the Transmission Service Provider specifies on its transmission system where an Interchange Transaction leaves or a Load-Serving Entity receives its energy.
Point of Receipt <a href="#">[Archive]</a>	POR	2/8/2005	3/16/2007	A location that the Transmission Service Provider specifies on its transmission system where an Interchange Transaction enters or a Generator delivers its output.
Point of Receipt <a href="#">[Archive]</a>	POR	11/5/2015	1/21/2016 (effective 7/1/2016)	A location that the Transmission Service Provider specifies on its transmission system where an Interchange Transaction enters or a generator delivers its output.
Point to Point Transmission Service <a href="#">[Archive]</a>	PTP	2/8/2005	3/16/2007	The reservation and transmission of capacity and energy on either a firm or non-firm basis from the Point(s) of Receipt to the Point(s) of Delivery.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Postback <a href="#">[Archive]</a>		08/22/2008	Not approved; Modification directed 11/24/09	Positive adjustments to ATC or AFC as defined in Business Practices. Such Business Practices may include processing of redirects and unscheduled service.
Power Transfer Distribution Factor <a href="#">[Archive]</a>	PTDF	08/22/2008	11/24/2009	In the pre-contingency configuration of a system under study, a measure of the responsiveness or change in electrical loadings on transmission system Facilities due to a change in electric power transfer from one area to another, expressed in percent (up to 100%) of the change in power transfer
Pre-Reporting Contingency Event ACE Value <a href="#">[Archive]</a>		11/5/2015		The average value of Reporting ACE, or Reserve Sharing Group Reporting ACE when applicable, in the 16-second interval immediately prior to the start of the Contingency Event Recovery Period based on EMS scan rate data.
Pro Forma Tariff <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Usually refers to the standard OATT and/or associated transmission rights mandated by the U.S. Federal Energy Regulatory Commission Order No. 888.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Protected Cyber Assets <a href="#">[Archive]</a>	PCA	11/26/2012	11/22/2013 (Becomes effective 4/1/16)	One or more Cyber Assets connected using a routable protocol within or on an Electronic Security Perimeter that is not part of the highest impact BES Cyber System within the same Electronic Security Perimeter. The impact rating of Protected Cyber Assets is equal to the highest rated BES Cyber System in the same ESP. A Cyber Asset is not a Protected Cyber Asset if, for 30 consecutive calendar days or less, it is connected either to a Cyber Asset within the ESP or to the network within the ESP, and it is used for data transfer, vulnerability assessment, maintenance, or troubleshooting purposes.
Protected Cyber Assets <a href="#">[Archive]</a>	PCA	2/12/2015	1/21/2016 (effective 7/1/2016)	One or more Cyber Assets connected using a routable protocol within or on an Electronic Security Perimeter that is not part of the highest impact BES Cyber System within the same Electronic Security Perimeter. The impact rating of Protected Cyber Assets is equal to the highest rated BES Cyber System in the same ESP.
Protection System <a href="#">[Archive]</a>		2/7/2006	3/17/2007 retired 4/1/2013	Protective relays, associated communication systems, voltage and current sensing devices, station batteries and DC control circuitry.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Protection System <a href="#">[Archive]</a> <a href="#">[Implementation Plan]</a>		11/19/2010	2/3/2012 (Became effective on 4/1/13)	Protection System – <ul style="list-style-type: none"> <li>• Protective relays which respond to electrical quantities,</li> <li>• Communications systems necessary for correct operation of protective functions</li> <li>• Voltage and current sensing devices providing inputs to protective relays,</li> <li>• Station dc supply associated with protective functions (including station batteries, battery chargers, and non-battery-based dc supply), and</li> <li>• Control circuitry associated with protective functions through the trip coil(s) of the circuit breakers or other interrupting devices.</li> </ul>
Protection System Coordination Study <a href="#">[Archive]</a>		11/5/2015		An analysis to determine whether Protection Systems operate in the intended sequence during Faults.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Protection System Maintenance Program (PRC-005-2) <a href="#">[Archive]</a>	PSMP	11/7/2012	12/19/2013 (Becomes effective 4/1/2015)	An ongoing program by which Protection System components are kept in working order and proper operation of malfunctioning components is restored. A maintenance program for a specific component includes one or more of the following activities: Verify — Determine that the component is functioning correctly. Monitor — Observe the routine in-service operation of the component. Test — Apply signals to a component to observe functional performance or output behavior, or to diagnose problems. Inspect — Examine for signs of component failure, reduced performance or degradation. Calibrate — Adjust the operating threshold or measurement accuracy of a measuring element to meet the intended performance requirement.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Protection System Maintenance Program (PRC-005-3) <a href="#">[Archive]</a>	PSMP	11/7/2013	1/22/2015 (Becomes effective 4/1/2016)	An ongoing program by which Protection System and automatic reclosing components are kept in working order and proper operation of malfunctioning components is restored. A maintenance program for a specific component includes one or more of the following activities: Verify — Determine that the component is functioning correctly. Monitor — Observe the routine in-service operation of the component. Test — Apply signals to a component to observe functional performance or output behavior, or to diagnose problems. Inspect — Examine for signs of component failure, reduced performance or degradation. Calibrate — Adjust the operating threshold or measurement accuracy of a measuring element to meet the intended performance requirement.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Protection System Maintenance Program (PRC-005-4) <a href="#">[Archive]</a>	PSMP	11/13/2014	9/17/2015 (Becomes effective 1/1/2016)	An ongoing program by which Protection System, Automatic Reclosing, and Sudden Pressure Relaying Components are kept in working order and proper operation of malfunctioning Components is restored. A maintenance program for a specific Component includes one or more of the following activities: <ul style="list-style-type: none"> <li>• Verify — Determine that the Component is functioning correctly.</li> <li>• Monitor — Observe the routine in-service operation of the Component.</li> <li>• Test — Apply signals to a Component to observe functional performance or output behavior, or to diagnose problems.</li> <li>• Inspect — Examine for signs of Component failure, reduced performance or degradation.</li> <li>• Calibrate — Adjust the operating threshold or measurement accuracy of a measuring element to meet the intended performance requirement.</li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Protection System Maintenance Program (PRC-005-6) <a href="#">[Archive]</a>	PSMP	11/5/2015	12/18/2015 (Becomes effective 1/1/2016)	An ongoing program by which Protection System, Automatic Reclosing, and Sudden Pressure Relaying Components are kept in working order and proper operation of malfunctioning Components is restored. A maintenance program for a specific Component includes one or more of the following activities: <ul style="list-style-type: none"> <li>• Verify — Determine that the Component is functioning correctly.</li> <li>• Monitor — Observe the routine in-service operation of the Component.</li> <li>• Test — Apply signals to a Component to observe functional performance or output behavior, or to diagnose problems.</li> <li>• Inspect — Examine for signs of Component failure, reduced performance or degradation.</li> <li>• Calibrate — Adjust the operating threshold or measurement accuracy of a measuring element to meet the intended performance requirement.</li> </ul>
Pseudo-Tie <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A telemetered reading or value that is updated in real time and used as a “virtual” tie line flow in the AGC/ACE equation but for which no physical tie or energy metering actually exists. The integrated value is used as a metered MWh value for interchange accounting purposes.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Pseudo-Tie <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	A time-varying energy transfer that is updated in Real-time and included in the Actual Net Interchange term (NIA) in the same manner as a Tie Line in the affected Balancing Authorities' control ACE equations (or alternate control processes).
Pseudo-Tie <a href="#">[Archive]</a>		2/11/2016		A time-varying energy transfer that is updated in Real-time and included in the Actual Net Interchange term (NIA) in the same manner as a Tie Line in the affected Balancing Authorities' Reporting ACE equation (or alternate control processes).
Purchasing-Selling Entity <a href="#">[Archive]</a>	PSE	2/8/2005	3/16/2007	The entity that purchases or sells, and takes title to, energy, capacity, and Interconnected Operations Services. Purchasing-Selling Entities may be affiliated or unaffiliated merchants and may or may not own generating facilities.
Ramp Rate or Ramp <a href="#">[Archive]</a>		2/8/2005	3/16/2007	(Schedule) The rate, expressed in megawatts per minute, at which the interchange schedule is attained during the ramp period. (Generator) The rate, expressed in megawatts per minute, that a generator changes its output.
Rated Electrical Operating Conditions <a href="#">[Archive]</a>		2/7/2006	3/16/2007	The specified or reasonably anticipated conditions under which the electrical system or an individual electrical circuit is intend/ designed to operate
Rating <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The operational limits of a transmission system element under a set of specified conditions.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Rated System Path Methodology <a href="#">[Archive]</a>		08/22/2008	11/24/2009	The Rated System Path Methodology is characterized by an initial Total Transfer Capability (TTC), determined via simulation. Capacity Benefit Margin, Transmission Reliability Margin, and Existing Transmission Commitments are subtracted from TTC, and Postbacks and counterflows are added as applicable, to derive Available Transfer Capability. Under the Rated System Path Methodology, TTC results are generally reported as specific transmission path capabilities.
Reactive Power <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The portion of electricity that establishes and sustains the electric and magnetic fields of alternating-current equipment. Reactive power must be supplied to most types of magnetic equipment, such as motors and transformers. It also must supply the reactive losses on transmission facilities. Reactive power is provided by generators, synchronous condensers, or electrostatic equipment such as capacitors and directly influences electric system voltage. It is usually expressed in kilovars (kvar) or megavars (Mvar).
Reactive Power <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	The portion of electricity that establishes and sustains the electric and magnetic fields of alternating-current equipment. Reactive Power must be supplied to most types of magnetic equipment, such as motors and transformers. It also must supply the reactive losses on transmission facilities. Reactive Power is provided by generators, synchronous condensers, or electrostatic equipment such as capacitors and directly influences electric system voltage. It is usually expressed in kilovars (kvar) or megavars (Mvar).

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Real Power <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The portion of electricity that supplies energy to the load.
Real Power <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	The portion of electricity that supplies energy to the Load.
Reallocation <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The total or partial curtailment of Transactions during TLR Level 3a or 5a to allow Transactions using higher priority to be implemented.
Real-time <a href="#">[Archive]</a>		2/7/2006	3/16/2007	Present time as opposed to future time. (From Interconnection Reliability Operating Limits standard.)
Real-time Assessment <a href="#">[Archive]</a>		10/17/2008	3/17/2011	An examination of existing and expected system conditions, conducted by collecting and reviewing immediately available data
Real-time Assessment <a href="#">[Archive]</a>		11/13/2014	Revised definition. 11/19/2015 (Becomes effective 1/1/2017)	An evaluation of system conditions using Real-time data to assess existing (pre-Contingency) and potential (post-Contingency) operating conditions. The assessment shall reflect applicable inputs including, but not limited to: load, generation output levels, known Protection System and Special Protection System status or degradation, Transmission outages, generator outages, Interchange, Facility Ratings, and identified phase angle and equipment limitations. (Real-time Assessment may be provided through internal systems or through third-party services.)

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Real-time Assessment <a href="#">[Archive]</a>	RTA	8/11/2016		An evaluation of system conditions using Real-time data to assess existing (pre-Contingency) and potential (post-Contingency) operating conditions. The assessment shall reflect applicable inputs including, but not limited to: load; generation output levels; known Protection System and Remedial Action Scheme status or degradation, functions, and limitations; Transmission outages; generator outages; Interchange; Facility Ratings; and identified phase angle and equipment limitations. (Realtime Assessment may be provided through internal systems or through third-party services.)
Receiving Balancing Authority <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The Balancing Authority importing the Interchange.
Regional Reliability Organization <a href="#">[Archive]</a>	RRO	2/8/2005	3/16/2007	<ol style="list-style-type: none"> <li>1. An entity that ensures that a defined area of the Bulk Electric System is reliable, adequate and secure.</li> <li>2. A member of the North American Electric Reliability Council. The Regional Reliability Organization can serve as the Compliance Monitor.</li> </ol>
Regional Reliability Plan <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The plan that specifies the Reliability Coordinators and Balancing Authorities within the Regional Reliability Organization, and explains how reliability coordination will be accomplished.
Regulating Reserve <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An amount of reserve responsive to Automatic Generation Control, which is sufficient to provide normal regulating margin.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Regulation Reserve Sharing Group <a href="#">[Archive]</a>		8/15/2013	4/16/2015 (Becomes effective 7/1/2016)	A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply the Regulating Reserve required for all member Balancing Authorities to use in meeting applicable regulating standards.
Regulation Service <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The process whereby one Balancing Authority contracts to provide corrective response to all or a portion of the ACE of another Balancing Authority. The Balancing Authority providing the response assumes the obligation of meeting all applicable control criteria as specified by NERC for itself and the Balancing Authority for which it is providing the Regulation Service.
Reliability Adjustment Arranged Interchange <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	A request to modify a Confirmed Interchange or Implemented Interchange for reliability purposes.
Reliability Adjustment RFI <a href="#">[Archive]</a>		10/29/2008	12/17/2009	Request to modify an Implemented Interchange Schedule for reliability purposes.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reliability Coordinator <a href="#">[Archive]</a>	RC	2/8/2005	3/16/2007	The entity that is the highest level of authority who is responsible for the reliable operation of the Bulk Electric System, has the Wide Area view of the Bulk Electric System, and has the operating tools, processes and procedures, including the authority to prevent or mitigate emergency operating situations in both next-day analysis and real-time operations. The Reliability Coordinator has the purview that is broad enough to enable the calculation of Interconnection Reliability Operating Limits, which may be based on the operating parameters of transmission systems beyond any Transmission Operator’s vision.
Reliability Coordinator <a href="#">[Archive]</a>	RC	11/5/2015	1/21/2016 (effective 7/1/2016)	The entity that is the highest level of authority who is responsible for the Reliable Operation of the Bulk Electric System, has the Wide Area view of the Bulk Electric System, and has the operating tools, processes and procedures, including the authority to prevent or mitigate emergency operating situations in both next-day analysis and real-time operations. The Reliability Coordinator has the purview that is broad enough to enable the calculation of Interconnection Reliability Operating Limits, which may be based on the operating parameters of transmission systems beyond any Transmission Operator’s vision.
Reliability Coordinator Area <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The collection of generation, transmission, and loads within the boundaries of the Reliability Coordinator. Its boundary coincides with one or more Balancing Authority Areas.
Reliability Coordinator Information System <a href="#">[Archive]</a>	RCIS	2/8/2005	3/16/2007	The system that Reliability Coordinators use to post messages and share operating information in real time.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reliability Directive <a href="#">[Archive]</a>		8/16/2012	11/19/2015 (Becomes inactive 11/19/2015)	A communication initiated by a Reliability Coordinator, Transmission Operator, or Balancing Authority where action by the recipient is necessary to address an Emergency or Adverse Reliability Impact.
Reliability Standard <a href="#">[Archive]</a>		5/9/2013	7/9/2013	A requirement, approved by the United States Federal Energy Regulatory Commission under this Section 215 of the Federal Power Act, or approved or recognized by an applicable governmental authority in other jurisdictions, to provide for reliable operation [Reliable Operation] of the bulk-power system [Bulk-Power System]. The term includes requirements for the operation of existing bulk-power system [Bulk-Power System] facilities, including cybersecurity protection, and the design of planned additions or modifications to such facilities to the extent necessary to provide for reliable operation [Reliable Operation] of the bulk-power system [Bulk-Power System], but the term does not include any requirement to enlarge such facilities or to construct new transmission capacity or generation capacity.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reliability Standard <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	A requirement, approved by the United States Federal Energy Regulatory Commission under Section 215 of the Federal Power Act, or approved or recognized by an applicable governmental authority in other jurisdictions, to provide for Reliable Operation of the Bulk-Power System. The term includes requirements for the operation of existing Bulk-Power System facilities, including cybersecurity protection, and the design of planned additions or modifications to such facilities to the extent necessary to provide for Reliable Operation of the Bulk-Power System, but the term does not include any requirement to enlarge such facilities or to construct new transmission capacity or generation capacity.
Reliable Operation <a href="#">[Archive]</a>		5/9/2013	7/9/2013	Operating the elements of the bulk-power system [Bulk-Power System] within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.
Reliable Operation <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	Operating the elements of the [Bulk-Power System] within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.
Remedial Action Scheme <a href="#">[Archive]</a>	RAS	2/8/2005	3/16/2007	See "Special Protection System"

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Remedial Action Scheme <a href="#">[Archive]</a>	RAS	11/13/2014	11/19/2015 effective 4/1/2017	<p>A scheme designed to detect predetermined System conditions and automatically take corrective actions that may include, but are not limited to, adjusting or tripping generation (MW and Mvar), tripping load, or reconfiguring a System(s). RAS accomplish objectives such as:</p> <ul style="list-style-type: none"> <li>• Meet requirements identified in the NERC Reliability Standards;</li> <li>• Maintain Bulk Electric System (BES) stability;</li> <li>• Maintain acceptable BES voltages;</li> <li>• Maintain acceptable BES power flows;</li> <li>• Limit the impact of Cascading or extreme events.</li> </ul> <p>The following do not individually constitute a RAS:</p> <ol style="list-style-type: none"> <li>a. Protection Systems installed for the purpose of detecting Faults on BES Elements and isolating the faulted Elements</li> <li>b. Schemes for automatic underfrequency load shedding (UFLS) and automatic undervoltage load shedding (UVLS) comprised of only distributed relays</li> <li>c. Out-of-step tripping and power swing blocking</li> <li>d. Automatic reclosing schemes</li> <li>e. Schemes applied on an Element for non-Fault conditions, such as, but not limited to, generator loss-of-field, transformer top-oil temperature, overvoltage, or overload to protect the Element against damage by removing it from service</li> </ol>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
<p><b>Continued</b> Remedial Action Scheme <a href="#">[Archive]</a></p>				<ul style="list-style-type: none"> <li>f. Controllers that switch or regulate one or more of the following: series or shunt reactive devices, flexible alternating current transmission system (FACTS) devices, phase-shifting transformers, variable-frequency transformers, or tap-changing transformers; and, that are located at and monitor quantities solely at the same station as the Element being switched or regulated</li> <li>g. FACTS controllers that remotely switch static shunt reactive devices located at other stations to regulate the output of a single FACTS device</li> <li>h. Schemes or controllers that remotely switch shunt reactors and shunt capacitors for voltage regulation that would otherwise be manually switched</li> <li>i. Schemes that automatically de-energize a line for a non-Fault operation when one end of the line is open</li> <li>j. Schemes that provide anti-islanding protection (e.g., protect load from effects of being isolated with generation that may not be capable of maintaining acceptable frequency and voltage)</li> <li>k. Automatic sequences that proceed when manually initiated solely by a System Operator</li> <li>l. Modulation of HVdc or FACTS via supplementary controls, such as angle damping or frequency damping applied to damp local or inter-area oscillations</li> <li>m. Sub-synchronous resonance (SSR) protection schemes that directly detect sub-synchronous quantities (e.g., currents or torsional oscillations)</li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
<p><b>Continued</b> Remedial Action Scheme <a href="#">[Archive]</a></p>				n. Generator controls such as, but not limited to, automatic generation control (AGC), generation excitation [e.g. automatic voltage regulation (AVR) and power system stabilizers (PSS)], fast valving, and speed governing
<p>Removable Media <a href="#">[Archive]</a></p>		2/12/2015	1/21/2016 (effective 7/1/2016)	Storage media that (i) are not Cyber Assets, (ii) are capable of transferring executable code, (iii) can be used to store, copy, move, or access data, and (iv) are directly connected for 30 consecutive calendar days or less to a BES Cyber Asset, a network within an ESP, or a Protected Cyber Asset. Examples include, but are not limited to, floppy disks, compact disks, USB flash drives, external hard drives, and other flash memory cards/drives that contain nonvolatile memory.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reportable Balancing Contingency Event <a href="#">[Archive]</a>		11/5/2015		Any 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. <ul style="list-style-type: none"> <li>• Eastern Interconnection – 900 MW</li> <li>• Western Interconnection – 500 MW</li> <li>• ERCOT – 800 MW</li> <li>• Quebec – 500 MW</li> </ul>
Reportable Cyber Security Incident <a href="#">[Archive]</a>		11/26/2012	11/22/2013 (Becomes effective 4/1/16)	A Cyber Security Incident that has compromised or disrupted one or more reliability tasks of a functional entity.
Reportable Disturbance <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Any event that causes an ACE change greater than or equal to 80% of a Balancing Authority’s or reserve sharing group’s most severe contingency. The definition of a reportable disturbance is specified by each Regional Reliability Organization. This definition may not be retroactively adjusted in response to observed performance.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reporting ACE <a href="#">[Archive]</a>		8/15/2013	4/16/2015 (Will not go into effect)	<p>The scan rate values of a Balancing Authority’s Area Control Error (ACE) measured in MW, which includes the difference between the Balancing Authority’s Net Actual Interchange and its Net Scheduled Interchange, plus its Frequency Bias obligation, plus any known meter error. In the Western Interconnection, Reporting ACE includes Automatic Time Error Correction (ATEC).</p> <p>Reporting ACE is calculated as follows:</p> $\text{Reporting ACE} = (\text{NI}_A - \text{NI}_S) - 10B (\text{F}_A - \text{F}_S) - \text{I}_{ME}$ <p>Reporting ACE is calculated in the Western Interconnection as follows:</p> $\text{Reporting ACE} = (\text{NI}_A - \text{NI}_S) - 10B (\text{F}_A - \text{F}_S) - \text{I}_{ME} + \text{I}_{ATEC}$ <p>Where:</p> <p><b>NI<sub>A</sub> (Actual Net Interchange)</b> is the algebraic sum of actual megawatt transfers across all Tie Lines and includes Pseudo-Ties. Balancing Authorities directly connected via asynchronous ties to another Interconnection may include or exclude megawatt transfers on those Tie lines in their actual interchange, provided they are implemented in the same manner for Net Interchange Schedule.</p> <p><b>NI<sub>S</sub> (Scheduled Net Interchange)</b> is the algebraic sum of all scheduled megawatt transfers, including Dynamic Schedules, with adjacent Balancing Authorities, and taking into account the effects of schedule ramps. Balancing Authorities directly connected via asynchronous ties to another Interconnection may include or exclude megawatt transfers on those Tie Lines in their scheduled Interchange, provided they are implemented in the same manner for Net</p>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reporting ACE <b>(Continued)</b>				<p>Interchange Actual.</p> <p><b>B (Frequency Bias Setting)</b> is the Frequency Bias Setting (in negative MW/0.1 Hz) for the Balancing Authority.</p> <p><b>10</b> is the constant factor that converts the frequency bias setting units to MW/Hz.</p> <p><b>F<sub>A</sub> (Actual Frequency)</b> is the measured frequency in Hz.</p> <p><b>F<sub>S</sub> (Scheduled Frequency)</b> is 60.0 Hz, except during a time correction.</p> <p><b>I<sub>ME</sub> (Interchange Meter Error)</b> is the meter error correction factor and represents the difference between the integrated hourly average of the net interchange actual (NIA) and the cumulative hourly net Interchange energy measurement (in megawatt-hours).</p> <p><b>I<sub>ATEC</sub> (Automatic Time Error Correction)</b> is the addition of a component to the ACE equation for the Western Interconnection that modifies the control point for the purpose of continuously paying back Primary Inadvertent Interchange to correct accumulated time error. Automatic Time Error Correction is only applicable in the Western Interconnection.</p> $I_{ATEC} = \frac{PII_{accum}^{on/off\ peak}}{(1-Y)^*H}$ <p>when operating in Automatic Time Error Correction control mode.</p> <p><b>I<sub>ATEC</sub></b> shall be zero when operating in any other AGC mode.</p> <ul style="list-style-type: none"> <li>• Y = B / BS.</li> <li>• H = Number of hours used to payback Primary Inadvertent Interchange energy. The value of H is set to 3.</li> <li>• BS = Frequency Bias for the Interconnection (MW / 0.1 Hz).</li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reporting ACE <b>(Continued)</b>				<ul style="list-style-type: none"> <li>Primary Inadvertent Interchange (<math>PII_{hourly}</math>) is <math>(1-Y) * (II_{actual} - B * \Delta TE/6)</math></li> <li><math>II_{actual}</math> is the hourly Inadvertent Interchange for the last hour.</li> <li><math>\Delta TE</math> is the hourly change in system Time Error as distributed by the Interconnection Time Monitor. Where:  <math display="block">\Delta TE = TE_{end\ hour} - TE_{begin\ hour} - TD_{adj} - (t) * (TE_{offset})</math> </li> <li><math>TD_{adj}</math> is the Reliability Coordinator adjustment for differences with Interconnection Time Monitor control center clocks.</li> <li><math>t</math> is the number of minutes of Manual Time Error Correction that occurred during the hour.</li> <li><math>TE_{offset}</math> is 0.000 or +0.020 or -0.020.</li> <li><math>PII_{accum}</math> is the Balancing Authority's accumulated <math>PII_{hourly}</math> in MWh. An On-Peak and Off-Peak accumulation accounting is required.</li> </ul> <p>Where:</p> $PII_{accum}^{on/off\ peak} = \text{last period's } PII_{accum}^{on/off\ peak} + PII_{hourly}$ <p>All NERC Interconnections with multiple Balancing Authorities operate using the principles of Tie-line Bias (TLB) Control and require the use of an ACE equation similar to the Reporting ACE defined above. Any modification(s) to this specified Reporting ACE equation that is(are) implemented for all BAs on an Interconnection and is(are) consistent with the following four principles will provide a valid alternative Reporting ACE equation</p>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reporting ACE <b>(Continued)</b>				<p>consistent with the measures included in this standard.</p> <ol style="list-style-type: none"> <li>1. All portions of the Interconnection are included in one area or another so that the sum of all area generation, loads and losses is the same as total system generation, load and losses.</li> <li>2. The algebraic sum of all area Net Interchange Schedules and all Net Interchange actual values is equal to zero at all times.</li> <li>3. The use of a common Scheduled Frequency FS for all areas at all times.</li> <li>4. The absence of metering or computational errors. (The inclusion and use of the IME term to account for known metering or computational errors.)</li> </ol>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reporting ACE <a href="#">[Archive]</a>		2/11/2016	6/23/2016 (Becomes effective 7/1/2016)	<p>The scan rate values of a Balancing Authority Area’s (BAA) Area Control Error (ACE) measured in MW includes the difference between the Balancing Authority Area’s Actual Net Interchange and its Scheduled Net Interchange, plus its Frequency Bias Setting obligation, plus correction for any known meter error. In the Western Interconnection, Reporting ACE includes Automatic Time Error Correction (ATEC).</p> <p>Reporting ACE is calculated as follows:  <math display="block">\text{Reporting ACE} = (NI_A - NI_S) - 10B (F_A - F_S) - I_{ME}</math>                     Reporting ACE is calculated in the Western Interconnection as follows:  <math display="block">\text{Reporting ACE} = (NI_A - NI_S) - 10B (F_A - F_S) - I_{ME} + I_{ATEC}</math></p> <p>Where:</p> <ul style="list-style-type: none"> <li>• <math>NI_A</math> = Actual Net Interchange.</li> <li>• <math>NI_S</math> = Scheduled Net Interchange.</li> <li>• <math>B</math> = Frequency Bias Setting.</li> <li>• <math>F_A</math> = Actual Frequency.</li> <li>• <math>F_S</math> = Scheduled Frequency.</li> <li>• <math>I_{ME}</math> = Interchange Meter Error.</li> <li>• <math>I_{ATEC}</math> = Automatic Time Error Correction.</li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
				<p>All NERC Interconnections operate using the principles of Tie-line Bias (TLB) Control and require the use of an ACE equation similar to the Reporting ACE defined above. Any modification(s) to this specified Reporting ACE equation that is(are) implemented for all BAAs on an Interconnection and is(are) consistent with the following four principles of Tie Line Bias control will provide a valid alternative to this Reporting ACE equation:</p> <ol style="list-style-type: none"> <li>1. All portions of the Interconnection are included in exactly one BAA so that the sum of all BAAs' generation, load, and loss is the same as total Interconnection generation, load, and loss;</li> <li>2. The algebraic sum of all BAAs' Scheduled Net Interchange is equal to zero at all times and the sum of all BAAs' Actual Net Interchange values is equal to zero at all times;</li> <li>3. The use of a common Scheduled Frequency <math>F_s</math> for all BAAs at all times; and,</li> <li>4. Excludes metering or computational errors. (The inclusion and use of the <math>I_{ME}</math> term corrects for known metering or computational errors.)</li> </ol>
Request for Interchange <a href="#">[Archive]</a>	RFI	5/2/2006	3/16/2007	A collection of data as defined in the NAESB RFI Datasheet, to be submitted to the Interchange Authority for the purpose of implementing bilateral Interchange between a Source and Sink Balancing Authority.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Request for Interchange <a href="#">[Archive]</a>	RFI	2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	A collection of data as defined in the NAESB Business Practice Standards submitted for the purpose of implementing bilateral Interchange between Balancing Authorities or an energy transfer within a single Balancing Authority.
Reserve Sharing Group <a href="#">[Archive]</a>	RSG	2/8/2005	3/16/2007	A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating reserves required for each Balancing Authority's use in recovering from contingencies within the group. Scheduling energy from an Adjacent Balancing Authority to aid recovery need not constitute reserve sharing provided the transaction is ramped in over a period the supplying party could reasonably be expected to load generation in (e.g., ten minutes). If the transaction is ramped in quicker (e.g., between zero and ten minutes) then, for the purposes of Disturbance Control Performance, the Areas become a Reserve Sharing Group.
Reserve Sharing Group <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating reserves required for each Balancing Authority's use in recovering from contingencies within the group. Scheduling energy from an Adjacent Balancing Authority to aid recovery need not constitute reserve sharing provided the transaction is ramped in over a period the supplying party could reasonably be expected to load generation in (e.g., ten minutes). If the transaction is ramped in quicker (e.g., between zero and ten minutes) then, for the purposes of disturbance control performance, the areas become a Reserve Sharing Group.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Reserve Sharing Group Reporting ACE <a href="#">[Archive]</a>		8/15/2013	4/16/2015	At any given time of measurement for the applicable Reserve Sharing Group, the algebraic sum of the Reporting ACEs (or equivalent as calculated at such time of measurement) of the Balancing Authorities participating in the Reserve Sharing Group at the time of measurement.
Reserve Sharing Group Reporting ACE <a href="#">[Archive]</a>		11/5/2015	(Becomes effective 7/1/2016)	At any given time of measurement for the applicable Reserve Sharing Group (RSG), the algebraic sum of the ACEs (or equivalent as calculated at such time of measurement) of the Balancing Authorities participating in the RSG at the time of measurement.
Resource Planner <a href="#">[Archive]</a>	RP	2/8/2005	3/16/2007	The entity that develops a long-term (generally one year and beyond) plan for the resource adequacy of specific loads (customer demand and energy requirements) within a Planning Authority Area.
Resource Planner <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	The entity that develops a long-term (generally one year and beyond) plan for the resource adequacy of specific loads (customer demand and energy requirements) within a Planning Authority area.
Response Rate <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The Ramp Rate that a generating unit can achieve under normal operating conditions expressed in megawatts per minute (MW/Min).
Right-of-Way <a href="#">[Archive]</a>	ROW	2/7/2006	3/16/2007	A corridor of land on which electric lines may be located. The Transmission Owner may own the land in fee, own an easement, or have certain franchise, prescription, or license rights to construct and maintain lines.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Right-of-Way <a href="#">[Archive]</a>	ROW	11/3/2011	3/21/2013 (Becomes inactive 6/30/2014)	The corridor of land under a transmission line(s) needed to operate the line(s). The width of the corridor is established by engineering or construction standards as documented in either construction documents, pre-2007 vegetation maintenance records, or by the blowout standard in effect when the line was built. The ROW width in no case exceeds the Transmission Owner’s legal rights but may be less based on the aforementioned criteria.
Right-of-Way <a href="#">[Archive]</a>	ROW	5/9/12	3/21/2013 (Becomes effective 7/1/2014)	The corridor of land under a transmission line(s) needed to operate the line(s). The width of the corridor is established by engineering or construction standards as documented in either construction documents, pre-2007 vegetation maintenance records, or by the blowout standard in effect when the line was built. The ROW width in no case exceeds the applicable Transmission Owner’s or applicable Generator Owner’s legal rights but may be less based on the aforementioned criteria.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Scenario <a href="#">[Archive]</a>		2/7/2006	3/16/2007	Possible event.
Schedule <a href="#">[Archive]</a>		2/8/2005	3/16/2007	(Verb) To set up a plan or arrangement for an Interchange Transaction. (Noun) An Interchange Schedule.
Scheduled Frequency <a href="#">[Archive]</a>		2/8/2005	3/16/2007	60.0 Hertz, except during a time correction.
Scheduled Net Interchange (NI <sub>s</sub> ) <a href="#">[Archive]</a>		2/11/2016	6/23/2016 (Becomes effective 7/1/2016)	The algebraic sum of all scheduled megawatt transfers, including Dynamic Schedules, to and from all Adjacent Balancing Authority areas within the same Interconnection, including the effect of scheduled ramps. Scheduled megawatt transfers on asynchronous DC tie lines directly connected to another Interconnection are excluded from Scheduled Net Interchange.
Scheduling Entity <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An entity responsible for approving and implementing Interchange Schedules.
Scheduling Path <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The Transmission Service arrangements reserved by the Purchasing-Selling Entity for a Transaction.
Sending Balancing Authority <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The Balancing Authority exporting the Interchange.
Sink Balancing Authority <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The Balancing Authority in which the load (sink) is located for an Interchange Transaction. (This will also be a Receiving Balancing Authority for the resulting Interchange Schedule.)

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Sink Balancing Authority <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	The Balancing Authority in which the load (sink) is located for an Interchange Transaction and any resulting Interchange Schedule.
Source Balancing Authority <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The Balancing Authority in which the generation (source) is located for an Interchange Transaction. (This will also be a Sending Balancing Authority for the resulting Interchange Schedule.)
Source Balancing Authority <a href="#">[Archive]</a>		2/6/2014	6/30/2014 (Becomes effective 10/1/2014)	The Balancing Authority in which the generation (source) is located for an Interchange Transaction and for any resulting Interchange Schedule.
Special Protection System (Remedial Action Scheme) <a href="#">[Archive]</a>	SPS	2/8/2005	3/16/2007 (Becomes inactive 3/31/2017)	An automatic protection system designed to detect abnormal or predetermined system conditions, and take corrective actions other than and/or in addition to the isolation of faulted components to maintain system reliability. Such action may include changes in demand, generation (MW and Mvar), or system configuration to maintain system stability, acceptable voltage, or power flows. An SPS does not include (a) underfrequency or undervoltage load shedding or (b) fault conditions that must be isolated or (c) out-of-step relaying (not designed as an integral part of an SPS). Also called Remedial Action Scheme.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Special Protection System (Remedial Action Scheme) <a href="#">[Archive]</a>	SPS	5/5/2016	6/23/2016 (Becomes effective 4/1/2017)	See "Remedial Action Scheme"
Spinning Reserve <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Unloaded generation that is synchronized and ready to serve additional demand.
Stability <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The ability of an electric system to maintain a state of equilibrium during normal and abnormal conditions or disturbances.
Stability Limit <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The maximum power flow possible through some particular point in the system while maintaining stability in the entire system or the part of the system to which the stability limit refers.
Supervisory Control and Data Acquisition <a href="#">[Archive]</a>	SCADA	2/8/2005	3/16/2007	A system of remote control and telemetry used to monitor and control the transmission system.
Supplemental Regulation Service <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A method of providing regulation service in which the Balancing Authority providing the regulation service receives a signal representing all or a portion of the other Balancing Authority's ACE.
Surge <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A transient variation of current, voltage, or power flow in an electric circuit or across an electric system.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Sustained Outage <a href="#">[Archive]</a>		2/7/2006	3/16/2007	The deenergized condition of a transmission line resulting from a fault or disturbance following an unsuccessful automatic reclosing sequence and/or unsuccessful manual reclosing procedure.
System <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A combination of generation, transmission, and distribution components.
System Operating Limit <a href="#">[Archive]</a>	SOL	2/8/2005	3/16/2007	<p>The value (such as MW, MVar, Amperes, Frequency or Volts) that satisfies the most limiting of the prescribed operating criteria for a specified system configuration to ensure operation within acceptable reliability criteria. System Operating Limits are based upon certain operating criteria. These include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Facility Ratings (Applicable pre- and post-Contingency equipment or facility ratings)</li> <li>• Transient Stability Ratings (Applicable pre- and post-Contingency Stability Limits)</li> <li>• Voltage Stability Ratings (Applicable pre- and post-Contingency Voltage Stability)</li> <li>• System Voltage Limits (Applicable pre- and post-Contingency Voltage Limits)</li> </ul>

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
System Operating Limit <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	The value (such as MW, Mvar, amperes, frequency or volts) that satisfies the most limiting of the prescribed operating criteria for a specified system configuration to ensure operation within acceptable reliability criteria. System Operating Limits are based upon certain operating criteria. These include, but are not limited to: <ul style="list-style-type: none"> <li>• Facility Ratings (applicable pre- and post-Contingency Equipment Ratings or Facility Ratings)</li> <li>• transient stability ratings (applicable pre- and post-Contingency stability limits)</li> <li>• voltage stability ratings (applicable pre- and post-Contingency voltage stability)</li> <li>• system voltage limits (applicable pre- and post-Contingency voltage limits)</li> </ul>
System Operator <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An individual at a control center (Balancing Authority, Transmission Operator, Generator Operator, Reliability Coordinator) whose responsibility it is to monitor and control that electric system in real time.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
System Operator <a href="#">[Archive]</a>		2/6/2014	6/19/2014 (effective 7/1/2016)	An individual at a Control Center of a Balancing Authority, Transmission Operator, or Reliability Coordinator, who operates or directs the operation of the Bulk Electric System (BES) in Real-time.
Telemetry <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The process by which measurable electrical quantities from substations and generating stations are instantaneously transmitted to the control center, and by which operating commands from the control center are transmitted to the substations and generating stations.
Thermal Rating <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The maximum amount of electrical current that a transmission line or electrical facility can conduct over a specified time period before it sustains permanent damage by overheating or before it sags to the point that it violates public safety requirements.
Tie Line <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A circuit connecting two Balancing Authority Areas.
Tie Line Bias <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A mode of Automatic Generation Control that allows the Balancing Authority to 1.) maintain its Interchange Schedule and 2.) respond to Interconnection frequency error.
Time Error <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The difference between the Interconnection time measured at the Balancing Authority(ies) and the time specified by the National Institute of Standards and Technology. Time error is caused by the accumulation of Frequency Error over a given period.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Time Error Correction <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An offset to the Interconnection’s scheduled frequency to return the Interconnection’s Time Error to a predetermined value.
TLR (Transmission Loading Relief) <sup>5</sup> Log <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Report required to be filed after every TLR Level 2 or higher in a specified format. The NERC IDC prepares the report for review by the issuing Reliability Coordinator. After approval by the issuing Reliability Coordinator, the report is electronically filed in a public area of the NERC Web site.
Total Flowgate Capability <a href="#">[Archive]</a>	TFC	08/22/2008	11/24/2009	The maximum flow capability on a Flowgate, is not to exceed its thermal rating, or in the case of a flowgate used to represent a specific operating constraint (such as a voltage or stability limit), is not to exceed the associated System Operating Limit.
Total Internal Demand <a href="#">[Archive]</a>		5/6/2014	2/19/2015 (Becomes effective 7/1/2016)	The Demand of a metered system, which includes the Firm Demand, plus any controllable and dispatchable DSM Load and the Load due to the energy losses incurred within the boundary of the metered system.
Total Transfer Capability <a href="#">[Archive]</a>	TTC	2/8/2005	3/16/2007	The amount of electric power that can be moved or transferred reliably from one area to another area of the interconnected transmission systems by way of all transmission lines (or paths) between those areas under specified system conditions.
Transaction <a href="#">[Archive]</a>		2/8/2005	3/16/2007	See Interchange Transaction.

<sup>5</sup> NERC added the spelled out term for TLR Log for clarification purposes.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Transfer Capability <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The measure of the ability of interconnected electric systems to move or transfer power <i>in a reliable manner</i> from one area to another over all transmission lines (or paths) between those areas under specified system conditions. The units of transfer capability are in terms of electric power, generally expressed in megawatts (MW). The transfer capability from "Area A" to "Area B" is <i>not</i> generally equal to the transfer capability from "Area B" to "Area A."
Transfer Distribution Factor <a href="#">[Archive]</a>		2/8/2005	3/16/2007	See Distribution Factor.
Transient Cyber Asset <a href="#">[Archive]</a>		2/12/2015	1/21/2016 (effective 7/1/2016)	A Cyber Asset that (i) is capable of transmitting or transferring executable code, (ii) is not included in a BES Cyber System, (iii) is not a Protected Cyber Asset (PCA), and (iv) is directly connected (e.g., using Ethernet, serial, Universal Serial Bus, or wireless, including near field or Bluetooth communication) for 30 consecutive calendar days or less to a BES Cyber Asset, a network within an ESP, or a PCA. Examples include, but are not limited to, Cyber Assets used for data transfer, vulnerability assessment, maintenance, or troubleshooting purposes.
Transmission <a href="#">[Archive]</a>		2/8/2005	3/16/2007	An interconnected group of lines and associated equipment for the movement or transfer of electric energy between points of supply and points at which it is transformed for delivery to customers or is delivered to other electric systems.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Transmission Constraint <a href="#">[Archive]</a>		2/8/2005	3/16/2007	A limitation on one or more transmission elements that may be reached during normal or contingency system operations.
Transmission Customer <a href="#">[Archive]</a>		2/8/2005	3/16/2007	<ol style="list-style-type: none"> <li>1. Any eligible customer (or its designated agent) that can or does execute a transmission service agreement or can or does receive transmission service.</li> <li>2. Any of the following responsible entities: Generator Owner, Load-Serving Entity, or Purchasing-Selling Entity.</li> </ol>
Transmission Customer <a href="#">[Archive]</a>		11/5/2015	1/21/2016 (effective 7/1/2016)	<ol style="list-style-type: none"> <li>1. Any eligible customer (or its designated agent) that can or does execute a Transmission Service agreement or can or does receive Transmission Service.</li> <li>2. Any of the following entities: Generator Owner, Load-Serving Entity, or Purchasing-Selling Entity.</li> </ol>
Transmission Line <a href="#">[Archive]</a>		2/7/2006	3/16/2007	A system of structures, wires, insulators and associated hardware that carry electric energy from one point to another in an electric power system. Lines are operated at relatively high voltages varying from 69 kV up to 765 kV, and are capable of transmitting large quantities of electricity over long distances.
Transmission Operator <a href="#">[Archive]</a>	TOP	2/8/2005	3/16/2007	The entity responsible for the reliability of its "local" transmission system, and that operates or directs the operations of the transmission facilities.
Transmission Operator <a href="#">[Archive]</a>	TOP	11/5/2015	1/21/2016 (effective 7/1/2016)	The entity responsible for the reliability of its "local" transmission system, and that operates or directs the operations of the transmission Facilities.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Transmission Operator Area <a href="#">[Archive]</a>		08/22/2008	11/24/2009	The collection of Transmission assets over which the Transmission Operator is responsible for operating.
Transmission Owner <a href="#">[Archive]</a>	TO	2/8/2005	3/16/2007	The entity that owns and maintains transmission facilities.
Transmission Owner <a href="#">[Archive]</a>	TO	11/5/2015	1/21/2016 (effective 7/1/2016)	The entity that owns and maintains transmission Facilities.
Transmission Planner <a href="#">[Archive]</a>	TP	2/8/2005	3/16/2007	The entity that develops a long-term (generally one year and beyond) plan for the reliability (adequacy) of the interconnected bulk electric transmission systems within its portion of the Planning Authority Area.
Transmission Planner <a href="#">[Archive]</a>	TP	11/5/2015	1/21/2016 (effective 7/1/2016)	The entity that develops a long-term (generally one year and beyond) plan for the reliability (adequacy) of the interconnected bulk electric transmission systems within its portion of the Planning Authority area.
Transmission Reliability Margin <a href="#">[Archive]</a>	TRM	2/8/2005	3/16/2007	The amount of transmission transfer capability necessary to provide reasonable assurance that the interconnected transmission network will be secure. TRM accounts for the inherent uncertainty in system conditions and the need for operating flexibility to ensure reliable system operation as system conditions change.
Transmission Reliability Margin Implementation Document <a href="#">[Archive]</a>	TRMID	08/22/2008	11/24/2009	A document that describes the implementation of a Transmission Reliability Margin methodology, and provides information related to a Transmission Operator’s calculation of TRM.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Transmission Service <a href="#">[Archive]</a>		2/8/2005	3/16/2007	Services provided to the Transmission Customer by the Transmission Service Provider to move energy from a Point of Receipt to a Point of Delivery.
Transmission Service Provider <a href="#">[Archive]</a>	TSP	2/8/2005	3/16/2007	The entity that administers the transmission tariff and provides Transmission Service to Transmission Customers under applicable transmission service agreements.
Transmission Service Provider <a href="#">[Archive]</a>	TSP	11/5/2015	1/21/2016 (effective 7/1/2016)	The entity that administers the transmission tariff and provides Transmission Service to Transmission Customers under applicable Transmission Service agreements.
Undervoltage Load Shedding Program <a href="#">[Archive]</a>	UVLS Program	11/13/2014	11/19/2015 effective 4/1/2017	An automatic load shedding program, consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Centrally controlled undervoltage-based load shedding is not included.
Vegetation <a href="#">[Archive]</a>		2/7/2006	3/16/2007	All plant material, growing or not, living or dead.
Vegetation Inspection <a href="#">[Archive]</a>		2/7/2006	3/16/2007	The systematic examination of a transmission corridor to document vegetation conditions.
Vegetation Inspection <a href="#">[Archive]</a>		11/3/2011	3/21/2013 (Becomes inactive 6/30/2014)	The systematic examination of vegetation conditions on a Right-of-Way and those vegetation conditions under the Transmission Owner's control that are likely to pose a hazard to the line(s) prior to the next planned maintenance or inspection. This may be combined with a general line inspection.

Continent-wide Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Vegetation Inspection <a href="#">[Archive]</a>		5/9/12	3/21/2013 (Becomes effective 7/1/2014)	The systematic examination of vegetation conditions on a Right-of-Way and those vegetation conditions under the applicable Transmission Owner’s or applicable Generator Owner’s control that are likely to pose a hazard to the line(s) prior to the next planned maintenance or inspection. This may be combined with a general line inspection.
Wide Area <a href="#">[Archive]</a>		2/8/2005	3/16/2007	The entire Reliability Coordinator Area as well as the critical flow and status information from adjacent Reliability Coordinator Areas as determined by detailed system studies to allow the calculation of Interconnected Reliability Operating Limits.
Year One <a href="#">[Archive]</a>		1/24/2011	11/17/2011	The first twelve month period that a Planning Coordinator or a Transmission Planner is responsible for assessing. For an assessment started in a given calendar year, Year One includes the forecasted peak Load period for one of the following two calendar years. For example, if a Planning Assessment was started in 2011, then Year One includes the forecasted peak Load period for either 2012 or 2013.

## ERCOT Regional Definitions

The following terms were developed as regional definitions for the ERCOT region:

ERCOT Regional Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Frequency Measurable Event <a href="#">[Archive]</a>	FME	8/15/2013	1/16/2014 (Becomes effective 4/1/14)	<p>An event that results in a Frequency Deviation, identified at the BA's sole discretion, and meeting one of the following conditions:</p> <ul style="list-style-type: none"> <li>i) a Frequency Deviation that has a pre-perturbation [the 16-second period of time before t(0)] average frequency to post-perturbation [the 32-second period of time starting 20 seconds after t(0)] average frequency absolute deviation greater than 100 mHz (the 100 mHz value may be adjusted by the BA to capture 30 to 40 events per year).</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>ii) a cumulative change in generating unit/generating facility, DC tie and/or firm load pre-perturbation megawatt value to post-perturbation megawatt value absolute deviation greater than 550 MW (the 550 MW value may be adjusted by the BA to capture 30 to 40 events per year).</li> </ul>
Governor <a href="#">[Archive]</a>		8/15/2013	1/16/2014 (Becomes effective	The electronic, digital or mechanical device that implements Primary Frequency Response of generating units/generating facilities or other system elements.

ERCOT Regional Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
			4/1/14)	
Primary Frequency Response <a href="#">[Archive]</a>	PFR	8/15/2013	1/16/2014 (Becomes effective 4/1/14)	The immediate proportional increase or decrease in real power output provided by generating units/generating facilities and the natural real power dampening response provided by Load in response to system Frequency Deviations. This response is in the direction that stabilizes frequency.

### NPCC Regional Definitions

The following definitions were developed for use in NPCC Regional Standards.

NPCC Regional Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Current Zero Time <a href="#">[Archive]</a>		11/04/2010	10/20/2011	The time of the final current zero on the last phase to interrupt.
Generating Plant <a href="#">[Archive]</a>		11/04/2010	10/20/2011	One or more generators at a single physical location whereby any single contingency can affect all the generators at that location.

### ReliabilityFirst Regional Definitions

The following definitions were developed for use in ReliabilityFirst Regional Standards.

RFC Regional Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Resource Adequacy <a href="#">[Archive]</a>		08/05/2009	03/17/2011	The ability of supply-side and demand-side resources to meet the aggregate electrical demand (including losses)
Net Internal Demand <a href="#">[Archive]</a>		08/05/2009	03/17/2011	Total of all end-use customer demand and electric system losses within specified metered boundaries, less Direct Control Management and Interruptible Demand
Peak Period <a href="#">[Archive]</a>		08/05/2009	03/17/2011	A period consisting of two (2) or more calendar months but less than seven (7) calendar months, which includes the period during which the responsible entity's annual peak demand is expected to occur
Wind Generating Station <a href="#">[Archive]</a>		11/03/2011		A collection of wind turbines electrically connected together and injecting energy into the grid at one point, sometimes known as a "Wind Farm."
Year One <a href="#">[Archive]</a>		08/05/2009	03/17/2011	The planning year that begins with the upcoming annual Peak Period

## WECC Regional Definitions

The following definitions were developed for use in WECC Regional Standards.

WECC Regional Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Area Control Error <sup>†</sup> <a href="#">[Archive]</a>	ACE	3/12/2007	6/8/2007 (Becomes inactive 3/31/2014)	Means the instantaneous difference between net actual and scheduled interchange, taking into account the effects of Frequency Bias including correction for meter error.
Automatic Generation Control <sup>‡</sup> <a href="#">[Archive]</a>	AGC	3/12/2007	6/8/2007	Means equipment that automatically adjusts a Control Area's generation from a central location to maintain its interchange schedule plus Frequency Bias.
Automatic Time Error Correction <a href="#">[Archive]</a>		3/26/2008	5/21/2009 (Becomes inactive 3/31/2014)	A frequency control automatic action that a Balancing Authority uses to offset its frequency contribution to support the Interconnection's scheduled frequency.
Automatic Time Error Correction <a href="#">[Archive]</a>		12/19/2012	10/16/2013 (Becomes effective 4/1/2014)	The addition of a component to the ACE equation that modifies the control point for the purpose of continuously paying back Primary Inadvertent Interchange to correct accumulated time error.
Average Generation <sup>‡</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Means the total MWh generated within the Balancing Authority Operator's Balancing Authority Area during the prior year divided by 8760 hours (8784 hours if the prior year had 366 days).
Business Day <sup>‡</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Means any day other than Saturday, Sunday, or a legal public holiday as designated in section 6103 of title 5, U.S. Code.

<b>WECC Regional Term</b>	<b>Acronym</b>	<b>BOT Approved Date</b>	<b>FERC Approved Date</b>	<b>Definition</b>
Commercial Operation <a href="#">[Archive]</a>		10/29/2008	4/21/2011	Achievement of this designation indicates that the Generator Operator or Transmission Operator of the synchronous generator or synchronous condenser has received all approvals necessary for operation after completion of initial start-up testing.
Contributing Schedule <a href="#">[Archive]</a>		2/10/2009	3/17/2011	A Schedule not on the Qualified Transfer Path between a Source Balancing Authority and a Sink Balancing Authority that contributes unscheduled flow across the Qualified Transfer Path.
Dependability-Based Misoperation <a href="#">[Archive]</a>		10/29/2008	4/21/2011	Is the absence of a Protection System or RAS operation when intended. Dependability is a component of reliability and is the measure of a device's certainty to operate when required.
Disturbance <sup>±</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Means (i) any perturbation to the electric system, or (ii) the unexpected change in ACE that is caused by the sudden loss of generation or interruption of load.

WECC Regional Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Extraordinary Contingency <sup>‡</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Shall have the meaning set out in Excuse of Performance, section B.4.c. language in section B.4.c: <i>means any act of God, actions by a non-affiliated third party, labor disturbance, act of the public enemy, war, insurrection, riot, fire, storm or flood, earthquake, explosion, accident to or breakage, failure or malfunction of machinery or equipment, or any other cause beyond the Reliability Entity's reasonable control; provided that prudent industry standards (e.g. maintenance, design, operation) have been employed; and provided further that no act or cause shall be considered an Extraordinary Contingency if such act or cause results in any contingency contemplated in any WECC Reliability Standard (e.g., the "Most Severe Single Contingency" as defined in the WECC Reliability Criteria or any lesser contingency).</i>
Frequency Bias <sup>‡</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Means a value, usually given in megawatts per 0.1 Hertz, associated with a Control Area that relates the difference between scheduled and actual frequency to the amount of generation required to correct the difference.
Functionally Equivalent Protection System <a href="#">[Archive]</a>	FEPS	10/29/2008	4/21/2011	A Protection System that provides performance as follows: <ul style="list-style-type: none"> <li>• Each Protection System can detect the same faults within the zone of protection and provide the clearing times and coordination needed to comply with all Reliability Standards.</li> <li>• Each Protection System may have different components and operating characteristics.</li> </ul>
Functionally Equivalent RAS <a href="#">[Archive]</a>	FERAS	10/29/2008	4/21/2011	A Remedial Action Scheme ("RAS") that provides the same performance as follows: <ul style="list-style-type: none"> <li>• Each RAS can detect the same conditions and provide</li> </ul>

WECC Regional Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
				mitigation to comply with all Reliability Standards. <ul style="list-style-type: none"> <li>• Each RAS may have different components and operating characteristics.</li> </ul>
Generating Unit Capability <sup>±</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Means the MVA nameplate rating of a generator.
Non-spinning Reserve <sup>±</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Means that Operating Reserve not connected to the system but capable of serving demand within a specified time, or interruptible load that can be removed from the system in a specified time.
Normal Path Rating <sup>±</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Is the maximum path rating in MW that has been demonstrated to WECC through study results or actual operation, whichever is greater. For a path with transfer capability limits that vary seasonally, it is the maximum of all the seasonal values.
Operating Reserve <sup>±</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Means that capability above firm system demand required to provide for regulation, load-forecasting error, equipment forced and scheduled outages and local area protection. Operating Reserve consists of Spinning Reserve and Nonspinning Reserve.
Operating Transfer Capability Limit <sup>±</sup> <a href="#">[Archive]</a>	OTC	3/12/2007	6/8/2007	Means the maximum value of the most critical system operating parameter(s) which meets: (a) precontingency criteria as determined by equipment loading capability and acceptable voltage conditions, (b) transient criteria as determined by equipment loading capability and acceptable voltage conditions, (c) transient performance criteria, and (d) post-contingency loading and voltage criteria.

WECC Regional Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Primary Inadvertent Interchange <a href="#">[Archive]</a>		3/26/2008	5/21/2009	The component of area (n) inadvertent interchange caused by the regulating deficiencies of the area (n).
Qualified Controllable Device <a href="#">[Archive]</a>		2/10/2009	3/17/2011	A controllable device installed in the Interconnection for controlling energy flow and the WECC Operating Committee has approved using the device for controlling the USF on the Qualified Transfer Paths.
Qualified Transfer Path <a href="#">[Archive]</a>		2/10/2009	3/17/2011	A transfer path designated by the WECC Operating Committee as being qualified for WECC unscheduled flow mitigation.
Qualified Transfer Path Curtailment Event <a href="#">[Archive]</a>		2/10/2009	3/17/2011	Each hour that a Transmission Operator calls for Step 4 or higher for one or more consecutive hours (See Attachment 1 IRO-006-WECC-1) during which the curtailment tool is functional.
Relief Requirement <a href="#">[Archive]</a>		2/10/2009	3/17/2011 (Becomes inactive 6/30/2014)	The expected amount of the unscheduled flow reduction on the Qualified Transfer Path that would result by curtailing each Sink Balancing Authority's Contributing Schedules by the percentages listed in the columns of WECC Unscheduled Flow Mitigation Summary of Actions Table in Attachment 1 WECC IRO-006-WECC-1.
Relief Requirement <a href="#">[Archive]</a>		2/7/2013	6/13/2014 (Becomes effective 7/1/2014)	The expected amount of the unscheduled flow reduction on the Qualified Transfer Path that would result by curtailing each Sink Balancing Authority's Contributing Schedules by the percentages determined in the WECC unscheduled flow mitigation guideline.
Secondary Inadvertent		3/26/2008	5/21/2009	The component of area (n) inadvertent interchange caused by

WECC Regional Term	Acronym	BOT Approved Date	FERC Approved Date	Definition
Interchange <a href="#">[Archive]</a>				the regulating deficiencies of area (i).
Security-Based Misoperation <a href="#">[Archive]</a>		10/29/2008	4/21/2011	A Misoperation caused by the incorrect operation of a Protection System or RAS. Security is a component of reliability and is the measure of a device's certainty not to operate falsely.
Spinning Reserve <sup>‡</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Means unloaded generation which is synchronized and ready to serve additional demand. It consists of Regulating reserve and Contingency reserve (as each are described in Sections B.a.i and ii).
Transfer Distribution Factor <a href="#">[Archive]</a>	TDF	2/10/2009	3/17/2011	The percentage of USF that flows across a Qualified Transfer Path when an Interchange Transaction (Contributing Schedule) is implemented. [See the WECC Unscheduled Flow Mitigation Summary of Actions Table (Attachment 1 WECC IRO-006-WECC-1).]
WECC Table 2 <sup>‡</sup> <a href="#">[Archive]</a>		3/12/2007	6/8/2007	Means the table maintained by the WECC identifying those transfer paths monitored by the WECC regional Reliability coordinators. As of the date set out therein, the transmission paths identified in Table 2 are as listed in Attachment A to this Standard.

<sup>‡</sup> FERC approved the WECC Tier One Reliability Standards in the Order Approving Regional Reliability Standards for the Western Interconnection and Directing Modifications, 119 FERC ¶ 61,260 (June 8, 2007). In that Order, FERC directed WECC to address the inconsistencies between the regional definitions and the NERC Glossary in developing permanent replacement standards. The replacement standards designed to address the shortcomings were filed with FERC in 2009.

## Change History

Date	Action
August 17, 2016	<b>Board Adopted:</b> Operational Planning Analysis and Real-time Assessment
July 13, 2016	Updated color coding of terms retired 6/30/2016 based on the terms becoming effective 7/1/2016.
June 24, 2016	<p><b>FERC approved:</b> Actual Frequency, Actual Net Interchange, Scheduled Net Interchange (NIS), Interchange Meter Error (IME), and Automatic Time Error Correction (ATEC)</p> <p>Reporting ACE: status updated</p>
June 21, 2016	<b>Correction:</b> Reserve Sharing Group Reporting ACE, and Contingency Reserve changed to 11/5/2015 Board adoption date status
May 5, 2016	<b>Board Adopted:</b> Special Protection System (SPS)
April 1, 2016	<b>Effective:</b> BES Cyber Asset, BES Cyber System, BES Cyber System Information, CIP Exceptional Circumstance, CIP Senior Manager, Cyber Assets, Cyber Security Incident, Dial-up Connectivity, Electronic Access Control or Monitoring Systems, Electronic Access Point, Electronic Security Perimeter, External Routable Connectivity, Interactive Remote Access, Intermediate System, Physical Access Control Systems, Physical Security Perimeter
March 31, 2016	<b>Inactive:</b> Critical Assets, Critical Cyber Assets, Cyber Assets, Cyber Security Incident, Electronic Security Perimeter, Physical Security Perimeter