

Standard Development Roadmap

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed:

1. NPCC Regional Standards Committee (RSC) authorized posting UFLS RSAR development on August 20, 2008.
2. UFLS RSAR posted on NPCC website on August 25, 2008.
3. NPCC Reliability Coordinating Committee (RCC) approved the Task Force on System Studies (TFSS) as the lead task force to initiate drafting a UFLS Regional Standards on September 4, 2008.
4. NPCC UFLS Regional Standard Drafting Team initial meeting on January 27, 2009.
5. First draft posted on the NPCC Website July 13, 2009 for a 45 day comment period.
6. Second draft posted on the NPCC Website May 26, 2010 for a 45 day comment period.

Description of Current Draft:

This is the third draft of the proposed standard.

Future Development Plan:

Anticipated Action	Anticipated Date
1. Post the initial draft of the standard for 45 day comment period.	July 13, 2009 to August 27, 2009
2. Respond to comments on the first posting and post revised standard and implementation plan for a 45 day comment period.	September 2009 to May 2010 May 26, 2010 to July 9 th , 2010
3. Respond to comments on the 2nd posting.	July 2010 to October 2010
4. Obtain RSC approval to move the standard forward to balloting.	November 2010
5. Post the standard and implementation plan for a 30 day pre ballot review.	December 2010
6. Conduct a ten day ballot.	December 2010

7. Respond to ballot comments and post revised standard and implementation plan for a 45 day comment period.	May, 2011.
8. Respond to comments on the 3rd posting.	July 2011
9. Obtain RSC approval to move the standard forward to balloting.	August 2011
10. Post the standard and implementation plan for a 30 day pre ballot review.	August 2011
11. Conduct a ten day ballot.	September 2011
12. Membership Approval.	September 2011.

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the NERC Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the NPCC Glossary.

In the standards, defined terms are indicated with its first letter capitalized.

A. Introduction

1. **Title:** **Automatic Underfrequency Load Shedding**
2. **Number:** PRC-006-NPCC-1
3. **Purpose:** To provide a regional reliability standard that ensures the development of an effective automatic underfrequency load shedding (UFLS) program in order to preserve the security and integrity of the bulk power system during declining system frequency events in coordination with the NERC UFLS reliability standard characteristics.
4. **Applicability:**
 - 4.1. Generator Owner
 - 4.2. Planning Coordinator
 - 4.3. Distribution Provider
 - 4.4. Transmission Owner
5. **(Proposed) Effective Date:** To be established.

B. Requirements

- R1** Each Planning Coordinator shall conduct system studies and/or use real time power flow data captured from actual system events to identify anticipated islands within the NPCC region to establish requirements for entities aggregating their UFLS programs in Requirement R3 and R4 and requirements for compensatory load shedding in Requirement R18. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]
- R2** Each Planning Coordinator shall, in accordance with its system studies, identify to the Regional Entity the generation facilities within its Planning Coordinator Area necessary to support the UFLS program performance characteristics. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

R3 Each Planning Coordinator shall provide to Transmission Owners, Distribution Providers, and /or Generator Owners within thirty days upon written request the information on anticipated islands derived from each Planning Coordinator’s system studies as determined by Requirement R1 and /or real time power flow data pertinent to requirements for aggregating UFLS programs and/or providing for compensatory load shedding. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

R4 Each Distribution Provider and Transmission Owner in the Eastern Interconnection portion of NPCC shall implement an automatic UFLS program, reflecting normal operating conditions excluding outages, for its Facilities or shall collectively implement by mutual agreement with one or more Distribution Providers and Transmission Owners within the same island identified in Requirement R1, an aggregated automatic UFLS program that sheds Load based on frequency thresholds, total nominal operating time, and amounts specified in one of the following tables: [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

- Distribution Providers and Transmission Owners with 100 MW or more of peak net Load shall implement a UFLS program with the following attributes:

UFLS Table 1:

UFLS Stage	Frequency Threshold (Hz)	Total Nominal Operating Time (s)	Load Shed at Stage as % of TO or DP Load	Cumulative Load Shed as % of TO or DP Load
1	59.5	0.30	6.5 – 7.5	6.5 – 7.5
2	59.3	0.30	6.5 – 7.5	13.5 – 14.5
3	59.1	0.30	6.5 – 7.5	20.5 – 21.5
4	58.9	0.30	6.5 – 7.5	27.5 – 28.5
Anti-Stall	59.5	10.0	2 – 3	29.5 – 31.5

- Distribution Providers and Transmission Owners with 50 MW or more and less than 100 MW of peak net Load shall implement a UFLS program with the following attributes:

UFLS Table 2:

UFLS Stage	Frequency Threshold (Hz)	Total Nominal Operating Time (s)	Load Shed at Stage as % of TO or DP Load	Cumulative Load Shed as % of TO or DP Load
1	59.5	0.30	14-25	14-25
2	59.1	0.30	14-25	28-50

- Distribution Providers and Transmission Owners with 25 MW or more and less than 50 MW of peak net Load shall implement a UFLS program with the following attributes:

UFLS Table 3:

UFLS Stage	Frequency Threshold (Hz)	Total Nominal Operating Time (s)	Load Shed at Stage as % of TO or DP Load	Cumulative Load Shed as % of TO or DP Load
1	59.5	0.30	28-50	28-50

R5 Each Distribution Provider or Transmission Owner that must arm its load to trip on under frequency in order to meet its requirements as specified and by doing so exceeds the tolerances and/or deviates from the number of stages and frequency set points of the UFLS program as specified in the tables contained in Requirement R4 above, as applicable depending on their total peak net Load shall: [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

- 5.1 Inform their Planning Coordinator of the need to exceed the stated tolerances of UFLS Table 1 if applicable and
- 5.2 Provide their Planning Coordinator with a technical study that demonstrates that the Distribution Providers or Transmission Owners specific deviations from the requirements of UFLS Table 1 will not have a significant adverse impact on the bulk power system.
- 5.3 Inform their Planning Coordinator of the need to exceed the stated tolerances of UFLS Table 2 or Table 3, and in the case of Table 2 only, the need to deviate from providing two stages of UFLS, if applicable, and
- 5.4 Provide their Planning Coordinator with an analysis demonstrating that no alternative load shedding solution is available that would allow the Distribution Provider or Transmission Owner to comply with UFLS Table 2 or Table 3

R6 Each Distribution Provider and Transmission Owner in the Eastern Interconnection portion of NPCC with peak net Load connected to its Facilities shall ensure that the total nominal operating time includes the under frequency relay operating time plus any interposing auxiliary relay operating times, communications time, and the rated breaker interrupting time, such that: [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

- 6.1 The under frequency relay operating time shall be measured from the time the frequency passes through the frequency threshold set point, using a test rate of linear frequency decay of 0.2 Hz per second.
- 6.2 The underfrequency relay operating time and any subsequent testing of the UFLS relays shall utilize a test rate of linear frequency decay of 0.2 Hz per second if the relay operating time is dependent on the rate of frequency decay.

R7 Each Distribution Provider and Transmission Owner in the Québec Interconnection portion of NPCC shall implement an automatic UFLS program for its Facilities or shall collectively implement by mutual agreement with one or more Distribution Providers and Transmission Owners within the same island, identified in Requirement R1, an aggregated automatic UFLS program that sheds Load based on the frequency thresholds, slopes, total nominal operating time and amounts specified in the following table: [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

UFLS Table 4

	Rate	Frequency (Hz)	MW at peak (*Load must be fixed at all times.)	Mvar at peak	Total Nominal Operating Time (s)
Threshold Stage 1	—	58.5	1000*	1000	0.30
Threshold Stage 2	—	58.0	800*	800	0.30
Threshold Stage 3	—	57.5	800	800	0.30
Threshold Stage 4	—	57.0	800	800	0.30
Threshold Stage 5 (anti-stall)	—	59.0	500	500	20.0
Slope Stage 1	-0.3 Hz/s	58.5	400	400	0.30
Slope Stage 2	-0.4 Hz/s	59.8	800*	800	0.30
Slope Stage 3	-0.6 Hz/s	59.8	800*	800	0.30
Slope Stage 4	-0.9 Hz/s	59.8	800	800	0.30

- R8** Each Distribution Provider and Transmission Owner in the Québec Interconnection portion of NPCC with peak net load connected to its Facilities shall insure that the total nominal operating time includes the underfrequency relay operating time plus any interposing auxiliary relay operating times, communications time, and the rated breaker interrupting time. The underfrequency relay operating time shall be measured from the time when the frequency passes through the frequency threshold set point. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]
- R9** Each Distribution Provider and Transmission Owner shall set their underfrequency relays with the following minimum time delay:
- 9.1 Eastern Interconnection – 100 ms
 - 9.2 Québec Interconnection – 200 ms
- [Violation Risk Factor: High] [Time Horizon: Long Term Planning]
- R10** Each Planning Coordinator shall develop, implement and maintain a program to establish the appropriate inhibit thresholds (such as but not limited to voltage, current and time) to be utilized within its region's UFLS Program to insure that the inhibit settings do not adversely affect the UFLS program. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]
- R11** Each Planning Coordinator shall provide to Transmission Owners and Distribution Providers within its program area the specific inhibit thresholds applicable to each Transmission Owner or Distribution Providers within 30 days of the initial determination of the required inhibit threshold settings or for changes to those settings. [Violation Risk Factor: High] [Time Horizon: Operations Planning]
- R12** Each Distribution Provider and Transmission Owner shall implement the inhibit threshold settings based on the notification provided by the Planning Coordinator in accordance with Requirement R11. [Violation Risk Factor: High] [Time Horizon: Operations Planning]

- R13** Each Distribution Provider and Transmission Owner shall develop and submit an implementation plan within 90 days of the request from the Planning Coordinator for approval by the Planning Coordinator in accordance with R11. [Violation Risk Factor: High] [Time Horizon: Operations Planning]
- R14** Each Transmission Owner and Distribution Provider shall annually provide documentation, with no more than 15 months between updates, to its Planning Coordinator of the actual net load that would be shed by the UFLS relays at each UFLS stage coincident with their integrated hourly peak during the previous year, as determined by measuring actual metered load through the switches that would be opened by the UFLS relays. [Violation Risk Factor: Lower] [Time Horizon: Long Term Planning]
- R15** Each Generator Owner shall set each generator under frequency trip relay, if so equipped, below the appropriate generator under frequency trip protection settings threshold curve in Figure 1, except as otherwise exempted in Requirements R18 and R21. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]
- R16** Each Generator Owner shall transmit the generator under frequency trip setting and time constant to its Planning Coordinator within 45 days of the Planning Coordinator's request. [Violation Risk Factor: High] [Time Horizon: Operations Planning]
- R17** Each Generator Owner with a new generating unit, scheduled to be in service on or after the effective date of this Standard, or an existing generator increasing its net capability by greater than 10% shall: [Violation Risk Factor: High] [Time Horizon: Long Term Planning]
- 17.1 Ensure that the generating unit does not trip directly or indirectly for underfrequency conditions above the appropriate generator tripping threshold curve in Figure 1.

- 17.2 Design auxiliary system(s) or devices used for the control and protection of auxiliary system(s), necessary for the generating unit operation such that they will not trip the generating unit during under frequency conditions above the appropriate generator under frequency trip protection settings threshold curve in Figure 1.
- 17.3 Transmit the generator underfrequency trip setting and time constant to the Planning Coordinator.

R18 Each Generator Owner of existing non-nuclear units in service prior to the effective date of this standard that have underfrequency protections set to trip above the appropriate curve in Figure 1 shall: [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

- 18.1 Set the underfrequency protection to operate at the lowest frequency possible as demonstrated by the plant design and licensing limitations..
- 18.2 Transmit the existing under frequency settings and any changes to the under frequency settings along with the technical basis for the settings to the Planning Coordinator.
- 18.3 Have compensatory load shedding, as provided by a Distribution Provider or Transmission Owner that is adequate to compensate for the loss of their generator due to early tripping.

R19 Each Planning Coordinator in Ontario, Quebec and the Maritime provinces shall apply the methodology described in Attachment A to determine the compensatory load shedding that is required in Requirement R18.3 for generating units in its respective NPCC area. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

R20 Each Generator Owner, Distribution Provider or Transmission Owner within the Planning Coordinator area of ISO-NE or the New York ISO shall apply the methodology described in Attachment B to determine the compensatory load shedding that is required in Requirement R18.3 for generating units in its respective NPCC area. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

R21 Each Generator Owner of existing nuclear generating plants with units that have under frequency relay threshold settings above the Eastern Interconnection generator tripping curve in Figure 1, based on their licensing design basis, are required to adhere to the following: [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

- 21.1 Set the under frequency protection to operate at as low a frequency as possible in accordance with the plant design and licensing limitations but not greater than 57.8Hz.
- 21.2 Set the frequency trip setting upper tolerance to no greater than + 0.1 Hz.
- 21.3 Transmit the initial frequency trip setting and any changes to the setting and the technical basis for the settings to the Planning Coordinator.

R22 Each Transmission Owner and Distribution Provider shall annually provide, with no more than 15 months between updates, its UFLS program data to its Planning Coordinator in accordance with R23 for inclusion in the Planning Coordinator's data base. [Violation Risk Factor: Lower] [Time Horizon: Long Term Planning]

R23 Each Planning Coordinator shall develop and maintain its UFLS program data base. The Planning Coordinator shall update its UFLS program database within four months of receiving the Requirement R22 information. This data base shall include the following information: [Violation Risk Factor: Lower] [Time Horizon: Operations Planning]

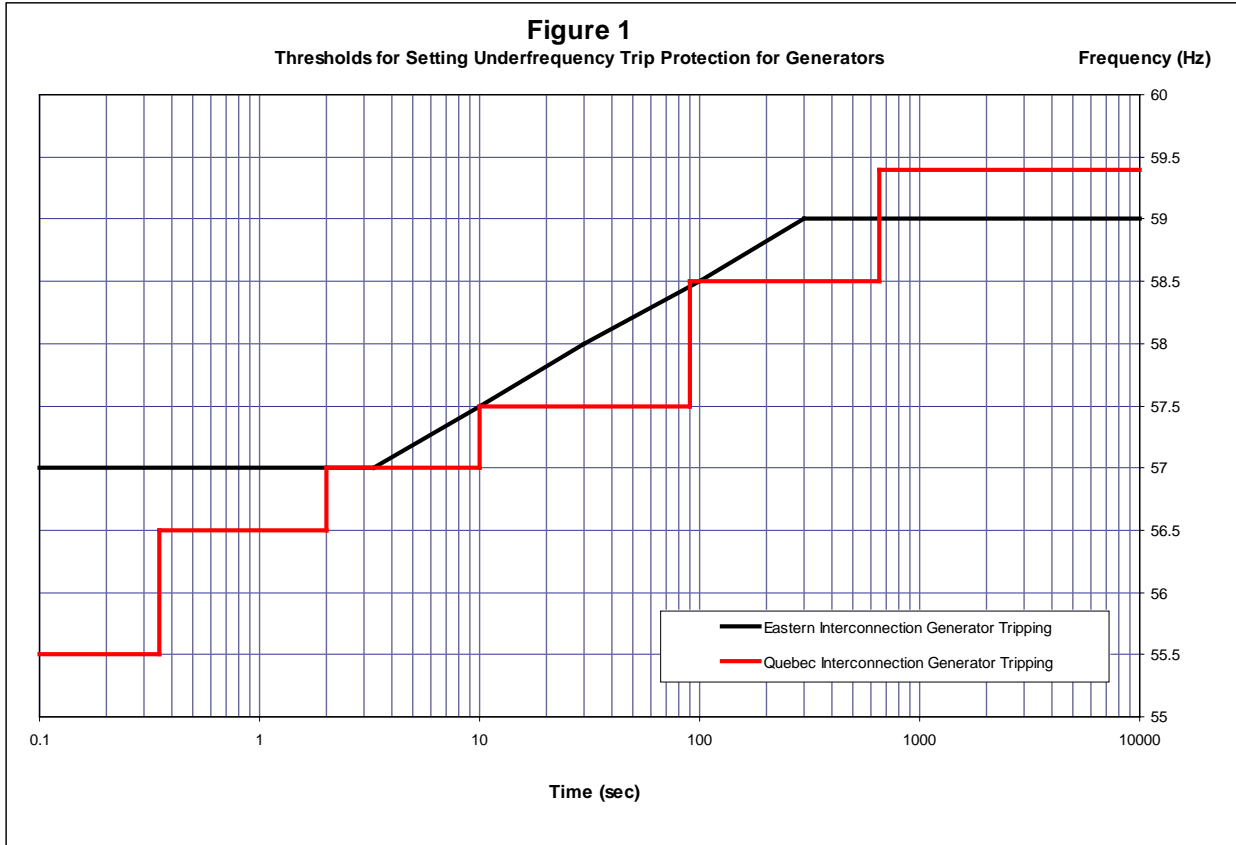
- 23.1 For each UFLS relay, including those used for compensatory load shedding, the amount and location of load shed at peak the corresponding frequency threshold and time delay settings.
- 23.2 The buses at which the Load is modeled in the NPCC library power flow case.
- 23.3 A list of all generating units that may be tripped for underfrequency conditions above the appropriate generator underfrequency trip protection settings threshold curve in Figure 1, including the frequency trip threshold and time delay for each protection system.
- 23.4 The location and amount of additional elements to be switched for voltage control that are coordinated with UFLS program tripping.
- 23.5 A list of all UFLS relay inhibit functions along with the corresponding settings and locations of these relays.

R24 Each Planning Coordinator shall assess that the NPCC UFLS program requirements within its Planning Coordinator area are satisfied as implemented by Transmission Owners, Distribution Providers, and Generator Owners. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

R25 Each Planning Coordinator shall notify Distribution Providers, Transmission Owners, and Generator Owners within its Planning Coordinator area of changes to load distribution needed to satisfy UFLS program requirements.[Violation Risk Factor: High] [Time Horizon: Long Term Planning]

R26 Each Distribution Provider, Transmission Owner and Generator Owner shall implement the load distribution changes based on the notification provided by the Planning Coordinator in accordance with Requirement R25. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]

R27 Each Distribution Provider, Transmission Owner and Generator Owner shall develop and submit an implementation plan within 90 days of the request from the Planning Coordinator for approval by the Planning Coordinator in accordance with Requirement R25. [Violation Risk Factor: High] [Time Horizon: Operations Planning]



C. Measures

- M1** Each Planning Coordinator shall have evidence such as reports, system studies and/or real time power flow data captured from actual system events and other dated documentation that demonstrates it meets Requirement R1.
- M2.** Each Planning Coordinator shall have evidence such as dated documentation that demonstrates that it meets requirement R2.
- M3** Each Planning Coordinator shall have evidence such as dated documentation that demonstrates that it meets Requirement R3.
- M4** Each Distribution Provider and Transmission Owner in the Eastern Interconnection portion of NPCC shall have evidence such as documentation or reports containing the location and amount of load to be tripped, and the corresponding frequency thresholds, on those circuits included in its UFLS program to achieve the individual and cumulative percentages identified in Requirement R4.
- M5** Each Distribution Provider or Transmission Owner shall have evidence such as reports, analysis, system studies and dated documentation that demonstrates that it meets Requirement R5.
- M6** Each Distribution Provider and Transmission Owner shall have evidence such as reports, data sheets and other test documentation that demonstrates that it meets Requirement R6.
- M7** Each Distribution Provider and Transmission Owner in the Québec Interconnection shall have evidence such as documentation or reports containing the location and amount of load to be tripped and the corresponding frequency thresholds on those circuits included in its UFLS program to achieve the load values identified in Table 4 of Requirement R7.
- M8** Each Distribution Provider and Transmission Owner in the Québec Interconnection shall have evidence such as reports, data sheets and other test documentation that demonstrates that it meets Requirement R8.
- M9** Each Distribution Provider and Transmission Owner shall have evidence such as documentation or reports that their underfrequency relays have been set with the minimum time delay, in accordance with Requirement R9.

- M10** Each Planning Coordinator shall have evidence such as reports, system studies or analysis that demonstrates that it meets Requirement R10.
- M11** Each Planning Coordinator shall provide evidence such as letters, emails, or other dated documentation that demonstrates that it meets Requirement R11.
- M12** Each Distribution Provider and Transmission Owner shall provide evidence such as test reports, data sheets or other documentation that demonstrates that it meets Requirement R12.
- M13** Each Distribution Provider and Transmission Owner shall provide evidence such as letters, emails or other dated documentation that demonstrates that it meets Requirement R13.
- M14** Each Distribution Provider and Transmission Owner shall provide evidence such as reports, spreadsheets or other dated documentation submitted to its Planning Coordinator that indicates the frequency set point, the net amount of load shed and the percentage of its peak load at each stage of its UFLS program coincident with the integrated hourly peak of the previous year that demonstrates that it meets Requirement R14.
- M15** Each Generator Owner shall provide evidence such as reports, data sheets, spreadsheets or other documentation that demonstrates that it meets Requirement R15.
- M16** Each Generator Owner shall provide evidence such as emails, letters or other dated documentation that demonstrates that it meets Requirement R16
- M17** Each Generator Owner shall provide evidence such as reports, data sheets, specifications, memorandum or other documentation that demonstrates that it meets Requirement R17.
- M18** Each Generator Owner with existing non-nuclear units in service prior to the effective date of this Standard which have under frequency tripping that is not compliant with Requirement R14 shall provide evidence such as reports, spreadsheets, memorandum or dated documentation demonstrating that it meets Requirement R18.

- M19** Each Planning Coordinator in Ontario, Quebec and the Maritime provinces shall provide evidence such as emails, memorandum or other documentation that demonstrates that it followed the methodology described in Attachment A and meets Requirement R19.
- M20** Each Generator Owner, Distribution Provider or Transmission Owner within the Planning Coordinator area of ISO-NE or the New York ISO shall provide evidence such as emails, memorandum, or other documentation that demonstrates that it followed the methodology described in Attachment B and meets Requirement R20.
- M21** Each Generator Owner of nuclear units that have been specifically identified by NPCC as having generator trip settings above the generator trip curve in Figure 1 shall provide evidence such as letters, reports and dated documentation that demonstrates that it meets Requirement R21.
- M22** Each Distribution Provider and Transmission Owner shall provide evidence such as reports, spreadsheets and other dated documentation that demonstrates that it meets Requirement R22.
- M23** Each Planning Coordinator shall provide evidence such as spreadsheets, system studies, or other documentation that demonstrates that it meets the requirements of Requirement R23.
- M24** Each Planning Coordinator shall provide evidence such as reports, system studies and/or real time power flow data captured from actual system events that demonstrates that it meets the requirements of R24.
- M25** Each Planning Coordinator shall provide evidence such as emails, memorandum or other dated documentation that it meets Requirement R25.
- M26** Each Distribution Provider, Transmission Owner and Generator Owner shall provide evidence such as reports, spreadsheets or other documentation that demonstrates that it meets Requirement R26.

M27 Each Distribution Provider, Transmission Owner and Generator Owner shall provide evidence such as letters, emails or other dated documentation that demonstrates it meets Requirement R27

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

NPCC Compliance Committee

1.2. Compliance Monitoring Period and Reset Time Frame

Not Applicable

1.3. Data Retention

The Distribution Provider and Transmission Owner shall keep evidences for three calendar years for Measures 4, 5, 6,7,8,9,12,13,14, and 22.

The Planning Coordinator shall keep evidence for three calendar years for Measures 1, 2, 3, 10, 11, 19, 23, 24, and 25.

The Distribution Provider, Transmission Owner, and Generator Owner shall keep evidences for three calendar years for Measure 20, 26, and 27.

The Generator Owner shall keep evidence for three calendar years for Measures 15,16,17,18, and 21.

1.4. Compliance Monitoring and Assessment Processes

Self -Certifications.

Spot Checking.

Compliance Audits.

Self- Reporting.

Compliance Violation Investigations.

Complaints.

1.5. Additional Compliance Information

None.

2. Violation Severity Levels

Requirement	Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	N/A	N/A	N/A	The Planning Coordinator did not conduct system studies or use real time power flow data captured from actual system events to identify anticipated islands within the NPCC region used to establish requirements for entities aggregating their UFLS programs, and requirements for compensatory load shedding.
R2	N/A	N/A	N/A	The Planning Coordinator did not identify the generation facilities within its Planning Coordinator Area necessary to support the UFLS program.
R3	N/A	N/A	N/A	The Planning Coordinator failed to provide to Transmission Owners, Distribution Providers, and /or Generator Owners within thirty (30) days upon written request the information on anticipated islands derived from each Planning Coordinator’s system studies as determined by Requirement R1 and /or real time power flow data pertinent to requirements for aggregating

				UFLS programs and/or providing for compensatory load shedding.
R4	N/A	N/A	N/A	The Distribution Provider or Transmission Owner failed to implement an automatic UFLS program reflecting normal operating conditions excluding outages, for its Facilities or collectively implemented by mutual agreement with one or more Distribution Providers and Transmission Owners within the same island identified in Requirement R1, an aggregated automatic UFLS program that sheds Load based on frequency thresholds, total nominal operating time, and amounts specified in the appropriate included tables.
R5	N/A	The Distribution Provider or Transmission Owner armed its load to trip on underfrequency in order to meet its minimum obligations and by doing so exceeded the tolerances and/or deviated from the number of stages and frequency set points of the UFLS program as specified in the tables contained in Requirement R4, as applicable depending on their total peak net Load, but did not inform the Planning Coordinator of the need to exceed the stated tolerances of UFLS Table 2 or Table 3, and in the case of Table 2 only, the need to deviate from	The Distribution Provider or Transmission Owner armed its load to trip on underfrequency in order to meet its minimum obligations and by doing so exceeded the tolerances and/or deviated from the number of stages and frequency set points of the UFLS program as specified in the tables contained in Requirement R4, as applicable depending on their total peak net Load, but did not provide the Planning Coordinator with an analysis demonstrating that no alternative load shedding solution is available that would allow the Distribution	The Distribution Provider or Transmission Owner did not arm its load to trip on underfrequency in order to meet its minimum obligations and in doing so exceeded the tolerances and/or deviated from the number of stages and frequency set points of the UFLS program as specified in the tables contained in Requirement R4, as applicable depending on their total peak net Load.

		providing two stages of UFLS.	Provider or Transmission Owner to comply with the appropriate table.	
R6	N/A	N/A	The Distribution Provider or Transmission Owner in the Eastern Interconnection portion of NPCC with peak net Load connected to its Facilities shall ensure that the total nominal operating time includes the underfrequency relay operating time plus any interposing auxiliary relay operating times, communications time, and the rated breaker interrupting time, but did not measure the underfrequency relay operating time from the time the frequency passes through the frequency threshold set point, using a test rate of linear frequency decay of 0.2 Hz per second, OR the measurement and any subsequent testing of the UFLS relays did not utilize a test rate of linear frequency decay of 0.2 Hz per second if the relay operating times is dependent on the rate of frequency decay.	The Distribution Provider or Transmission Owner in the Eastern Interconnection portion of NPCC with peak net Load connected to its Facilities did not ensure that the total nominal operating time included the underfrequency relay operating time plus any interposing auxiliary relay operating times, communications time, and the rated breaker interrupting time.

R7	N/A	N/A	N/A	The Distribution Provider or Transmission Owner did not implement an automatic UFLS program for its facilities, or did not implement collectively by the mutual agreement with one or more Distribution Providers and Transmission Owners within the same island an aggregated automatic UFLS program based on the frequency thresholds, slopes, total nominal operating time, and the amounts shown in the table.
R8	N/A	N/A	N/A	The Distribution Provider or Transmission Owner did not ensure that total nominal operating time included the underfrequency relay operating time plus any interposing auxiliary relay operating times, communications time, and the rated breaker interrupting time, or the underfrequency relay operating time was not measured from the time when the frequency passes through the frequency threshold set point.
R9	N/A	N/A	N/A	The Distribution Provider or Transmission Owner failed to set their underfrequency relays with the minimum time delay requirement.
R10	N/A	N/A	N/A	The Planning Coordinator failed to develop, implement, and maintain a program to establish the appropriate voltage inhibit

				threshold to be used within its region's UFLS program.
R11	N/A	N/A	N/A	The Planning Coordinator failed to provide to Transmission Owners and Distribution Providers within its program area the specific inhibit thresholds applicable to each Transmission Owner or Distribution Provider within thirty (30) days of the initial determination of the required inhibit threshold settings or for changes to those settings.
R12	N/A	N/A	N/A	The Distribution Provider or Transmission Owner failed to implement the inhibit threshold settings based on the notification provided by the Planning Coordinator in accordance with Requirement R11.
R13	N/A	N/A	N/A	The Distribution Provider or Transmission Owner shall develop and submit an implementation plan within ninety (90) days of the request from the Planning Coordinator for approval by the Planning Coordinator in accordance with R11.
R14	The Transmission Owner or Distribution Provider exceeded the annual documentation	The Transmission Owner or Distribution Provider exceeded the annual documentation	The Transmission Owner or Distribution Provider exceeded the annual documentation submission	The Transmission Owner or Distribution Provider did not provide documentation to its

	submission to its Planning Coordinator by up to thirty (30) days, OR exceeded by up to thirty (30) the fifteen (15) months between updates provided to its Planning Coordinator of the actual net load that would be shed by the UFLS relays, as determined by measuring actual metered load through the switches that would be opened by the UFLS relays, that were armed to shed at each UFLS stage coincident with their integrated hourly peak during the previous year.	submission to its Planning Coordinator by up to sixty (60) days, OR exceeded by up to sixty (60) days the fifteen (15) months between updates provided to its Planning Coordinator of the actual net load that would be shed by the UFLS relays, as determined by measuring actual metered load through the switches that would be opened by the UFLS relays, that were armed to shed at each UFLS stage coincident with their integrated hourly peak during the previous year.	to its Planning Coordinator by up to ninety (90) days, OR exceeded by up to ninety (90) the fifteen (15) months between updates provided to its Planning Coordinator of the actual net load that would be shed by the UFLS relays, as determined by measuring actual metered load through the switches that would be opened by the UFLS relays, that were armed to shed at each UFLS stage coincident with their integrated hourly peak during the previous year.	Planning Coordinator of actual net load data or updates to the data that would be shed by the UFLS relays, as determined by measuring actual metered load through the switches that would be opened by the UFLS relays, that were armed to shed at each UFLS stage coincident with their integrated hourly peak during the previous year.
R15	N/A	N/A	N/A	The Generator Owner failed to ensure that its generating units do not trip for underfrequency conditions above the appropriate generator underfrequency trip protection settings threshold curve unless exempted.
R16	N/A	N/A	N/A	The Generator Owner did not transmit the generator underfrequency trip setting and time constant to its Planning Coordinator within forty-five (45) days of the Planning Coordinator's request.
R17	N/A	N/A	The Generator Owner did not transmit the generator underfrequency trip setting and time setting to the Planning	The Generator Owner failed to design auxiliary systems or devices used for the control and protection of auxiliary systems

			Coordinator.	necessary for the generating unit operation such that they will not trip the generating unit during underfrequency conditions above the appropriate generator underfrequency trip protection settings threshold curve.
R18	N/A	N/A	N/A	The Generator Owner of existing non-nuclear units in service prior to the effective date of this standard, and which have underfrequency tripping set to trip above the curve, did not set the underfrequency protection to operate at the lowest frequency possible as demonstrated by the plant design and licensing limitations, OR did not transmit the initial underfrequency settings and any changes to the underfrequency settings and the technical basis for those settings to the Planning Coordinator. OR did not have compensatory load shedding that was adequate to compensate for the loss of their generator due to early tripping.
R19	N/A	N/A	N/A	The Planning Coordinator did not apply the methodology described in Attachment A to determine the compensatory load shedding that is required.
R20	N/A	N/A	N/A	The Generator Owner, Distribution Provider, or

				Transmission Owner did not apply the methodology described in Attachment B to determine the compensatory load shedding that is required.
R21	N/A	N/A	N/A	The Generator Owner of existing boiling water nuclear generating plants with units that have underfrequency relay threshold settings above the Eastern Interconnection generator tripping curve based on their licensing design basis did not set the protection to operate at as low a frequency as possible in accordance with the plant design and licensing limitations, but not greater than 57.8Hz., OR reduce the frequency trip setting tolerance on those units with threshold setting tolerances greater than +0.1Hz., OR did not transmit the initial frequency trip settings or any changes to the settings to the Planning Coordinator.
R22	The Transmission Owner or Distribution Provider exceeded the annual documentation submission to its Planning Coordinator by up to thirty (30) days, OR exceeded by up to thirty (30) days the fifteen (15) months between updates provided to its Planning Coordinator of UFLS program data.	The Transmission Owner or Distribution Provider exceeded the annual documentation submission to its Planning Coordinator by up to sixty (60) days, OR exceeded by up to sixty (60) days the fifteen (15) months between updates provided to its Planning Coordinator of UFLS program	The Transmission Owner or Distribution Provider exceeded the annual documentation submission to its Planning Coordinator by up to ninety (90) days, OR exceeded by up to ninety (90) days the fifteen (15) months between updates provided to its Planning Coordinator of UFLS program data.	The Transmission Owner or Distribution Provider did not provide its UFLS program data or updates to its Planning Coordinator.

		data.		
R23	The Planning Coordinator did not update its UFLS program data base within four months of receiving the requisite information, or did not have data for one of the parameters listed in 23.1 through 23.5.	The Planning Coordinator did not update its UFLS program data base within four months of receiving the requisite information, or did not have data for two of the parameters listed in 23.1 through 23.5.	The Planning Coordinator did not update its UFLS program data base within four months of receiving the requisite information, or did not have data for three of the parameters listed in 23.1 through 23.5	The Planning Coordinator did not develop or maintain its UFLS program data base.
R24	N/A	N/A	N/A	The Planning Coordinator did not assess that the NPCC UFLS program requirements within its Planning Coordinator area are satisfied as implemented by Transmission Owners, Distribution Providers, and Generator Owners.
R25	N/A	N/A	N/A	The Planning Coordinator did not notify its Distribution Providers, Transmission Owners, and Generator Owners of changes to load distribution needed to satisfy UFLS program requirements.
R26	N/A	N/A	N/A	The Distribution Provider, Transmission Owner, or Generator Owner did not implement the load distribution changes based on the notification provided by the Planning Coordinator.
R27	N/A	N/A	The Distribution Provider, Transmission Owner, or Generator Owner did not submit an implementation plan within ninety (90) days of the request from the	The Distribution Provider, Transmission Owner, or Generator Owner did not develop an implementation plan at the request of the Planning

			Planning Coordinator.	Coordinator.
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PRC-006-NPCC-1 Attachment A

Compensatory Load Shedding Criteria for Ontario, Quebec, and the Maritime Provinces:

The Planning Coordinator in Ontario, Quebec and the Maritime provinces is responsible for establishing the compensatory load shedding requirements for all existing non-nuclear units in its NPCC area with under frequency protections set to trip above the appropriate curve in Figure 1. In addition, it is the Planning Coordinator's responsibility to communicate these requirements to the appropriate Distribution Provider or Transmission Owner and to ensure that adequate compensatory load shedding is provided in all islands identified in Requirement R1 in which the unit may operate.

The methodology below provides a set of criteria for the Planning Coordinator to follow for determining compensatory load shedding requirements:

1. The Planning Coordinator shall identify, compile and maintain an updated list of all existing non-nuclear generating units in service prior to the effective date of this standard that have under frequency protections set to trip above the appropriate curve in Figure 1. The list shall include the following information for each unit:
 - 1.1 Generator name and generating capacity
 - 1.2 Under frequency protection trip settings, including frequency trip set points and time delays
 - 1.3 Physical and electrical location of the unit
 - 1.4 All islands within which the unit may operate, as identified in Requirement R1
2. For each generating unit identified in (1) above, the Planning Coordinator shall establish the requirements for compensatory load shedding based on criteria outlined below:
 - 2.1 Arrange for a Distribution Provider or Transmission Owner that owns UFLS relays within the island(s) identified by the Planning Coordinator in Requirement R1 within which the generator may operate to provide compensatory load shedding.
 - 2.2 The compensatory load shedding that is provided by the Distribution Provider or Transmission Owner shall be in addition to the amount that the Distribution Provider or Transmission Owner is required to shed as specified in Requirement R4..
 - 2.3 The compensatory load shedding shall be provided at the UFLS program stage (or threshold stage for Quebec) with a frequency threshold setting that corresponds to the highest frequency at which the subject generator will trip above the appropriate curve in Figure 1 during an underfrequency event. If the highest

frequency at which the subject generator will trip above the appropriate curve in Figure 1 does not correspond to a specific UFLS program stage threshold setting, the compensatory load shedding shall be provided at the UFLS program stage with a frequency threshold setting that is higher than the highest frequency at which the subject generator will trip above the appropriate curve in Figure 1.

- 2.4 The amount of compensatory load shedding shall be equivalent ($\pm 5\%$) to the average net generator megawatt output for the prior two calendar years, as specified by the Planning Coordinator, plus expected station loads to be transferred to the system upon loss of the facility. The net generation output should only include those hours when the unit was a net generator to the electric system.

In the specific instance of a generating unit that has been interconnected to the electric system for less than two calendar years, the amount of compensatory load shedding shall be equivalent ($\pm 5\%$) to the maximum claimed seasonal capability of the generator over two calendar years, plus expected station loads to be transferred to the system upon loss of the facility.

PRC-006-NPCC-1 Attachment B

Compensatory Load Shedding Criteria for ISO-NE and NYISO:

The Generator Owner in the New England states or New York State are responsible for establishing a compensatory load shedding program for all existing non-nuclear units with underfrequency protection set to trip above the appropriate curve in Figure 1 of this standard. The Generator Owner shall follow the methodology below to determine compensatory load shedding requirements:

1. The Generator Owner shall identify and compile a list of all existing non-nuclear generating units in service prior to the effective date of this standard that has under frequency protection set to trip above the appropriate curve in Figure 1. The list shall include the following information associated with each unit:
 - 1.1 Generator name and generating capacity
 - 1.2 Under frequency protection trip settings, including frequency trip set points and time delays
 - 1.3 Physical and electrical location of the unit
 - 1.4 Smallest island within which the unit may operate as identified by the Planning Coordinator in Requirement R1 of this Standard.
2. For each generating unit identified in (1) above, the Generator Owner shall establish the requirements for compensatory load shedding based on criteria outlined below:
 - 2.1 In cases where a Distribution Provider or Transmission Owner has coordinated protection settings with the Generator Owner to cause the generator to trip above the appropriate curve in Figure 1, the Distribution Provider or Transmission Owner is responsible to provide the appropriate amount of compensatory load to be shed within the smallest island identified by the Planning Coordinator in Requirement R1 of this standard.
 - 2.2 In cases where a Generator Owner has a generator that cannot physically meet the set points defined by the appropriate curve in Figure 1, the Generator Owner shall arrange for a Distribution Provider or Transmission Owner to provide the appropriate amount of compensatory load to be shed within the smallest island identified by the Planning Coordinator in Requirement R1 of this standard.
 - 2.3 The compensatory load shedding that is provided by the Distribution Provider or Transmission Owner shall be in addition to the amount that the Distribution

Provider or Transmission Owner is required to shed as specified in Requirement R4.

2.4 The compensatory load shedding shall be provided at the UFLS program stage with the frequency threshold setting at or closest to but above the frequency at which the subject generator will trip.

2.5 The amount of compensatory load shedding shall be equivalent ($\pm 5\%$) to the average net generator megawatt output for the prior two calendar years, as specified by the Planning Coordinator, plus expected station loads to be transferred to the system upon loss of the facility. The net generation output should only include those hours when the unit was a net generator to the electric system.

In the specific instance of a generating unit that has been interconnected to the electric system for less than two calendar years, the amount of compensatory load shedding shall be equivalent ($\pm 5\%$) to the maximum claimed seasonal capability of the generator over two calendar years, plus expected station loads to be transferred to the system upon loss of the facility.