NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

ERO Enterprise CMEP Practice Guide

Cold Weather Preparedness
January 2025

Background

The ERO Enterprises'[1] mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid. One of the keyways NERC accomplishes the mission is through implementation of its Compliance Monitoring and Enforcement Program (CMEP). The CMEP includes obligations for CMEP staff to conduct specific compliance monitoring activities consistent with professional auditing standards, such as audits and spot-checks. Additionally, the CMEP includes obligations to understand the risk an entity poses to the reliability and security of the Bulk Electric System (BES), or how the entity is mitigating that risk as part of risk-based compliance monitoring. In support of successful implementation of, and compliance with, the North American Electric Reliability Corporation (NERC) Reliability Standards, the ERO Enterprise adopted the Compliance Guidance Policy.[2] The Compliance Guidance Policy outlines the purpose, development, use, and maintenance of guidance for implementing Reliability Standards. According to the Compliance Guidance Policy, Compliance Guidance includes two types of guidance – Implementation Guidance and CMEP Practice Guides.[3] CMEP practice guides may address a variety of topics along the full spectrum of CMEP activities.

Purpose

CMEP Practice Guides are developed solely by the ERO Enterprise to reflect the independent, objective professional judgment of ERO Enterprise CMEP staff and, at times, may be initiated following policy discussions with industry stakeholders. Following their development, the guides are posted on the NERC website for transparency purposes. It should be noted, especially to registered entities using this guide for reference, that some aspects of this guide assist CMEP staff directly in determining compliance; other aspects of this guide assist CMEP staff in understanding how an entity mitigates risk in order to inform risk-based compliance monitoring. This understanding of how entity controls mitigate risk can affect monitoring activities, including requests for information and adjustments to an entity's compliance oversight plan.

The purpose of this CMEP Practice Guide is to provide guidance to CMEP staff around understanding entity risk and evaluating entity practices and controls, relative to cold weather preparedness, during CMEP activities. In light of the February 2021 Texas cold weather event, the FERC approval[4] of the Cold Weather

[1] The ERO Enterprise consists of NERC and the Regional Entities.
[2] The ERO Enterprise Compliance Guidance Policy is located on the NERC website here.
[3] Implementation Guidance provides a means for registered entities to develop examples or approaches to illustrate how registered entities could comply with a Standard that are vetted by industry and endorsed by the ERO Enterprise. CMEP Practice Guides differ from Implementation Guidance in that they address how ERO Enterprise CMEP staff executes compliance monitoring and enforcement activities, rather than examples of how to implement the Standard.
[4] EOP-011-4, IRO-010-4, and TOP-003-5 approval and EOP-012-2 approval

Reliability Standards,[5] and the series of *Cold Weather Preparations for Extreme Weather*[6] *Events Alerts,*[7] of the Cold Weather Reliability Standards[8], and the series of *Cold Weather Preparations for Extreme Weather*[9] *Events Alerts*[10] it is necessary to understand how entities are taking steps to mitigate this risk. The initial set of Cold Weather Reliability Standards became enforceable on April 1, 2023. Project 2021-07 Extreme Cold Weather Grid Operations, Preparedness, and Coordination Standards became effective October 1, 2024. It is important to understand entity plans for, and progress toward, mitigating risk for extreme cold weather. As part of current and ongoing CMEP activities, CMEP staff will conduct cold weather preparedness revises and applicable compliance monitoring activities, in support of NERC Alerts, enforceable Reliability Standards, and Reliability Standards subject to future enforcement.

The registered functions included in the scope of this Practice Guide include Reliability Coordinator (RC), Transmission Operator (TOP), Balancing Authority (BA), Generator Owner (GO), Generator Operator (GOP), and Planning Authority/Planning Coordinator (PA/PC). CMEP staff will consider the data points provided by the questions that follow. Additional resources include the *Reliability Guideline Generating Unit Winter Weather Readiness – Current Industry Practices*[11] document, and the *NERC Information Resources on Cold Weather Preparation and BPS Impacts*[12] document.

Questions for Understanding Entity Cold Weather Preparedness Risk Mitigation and Practices

CMEP staff shall consider the data points provided by the following questions to gain an understanding of how an entity mitigates risk relative to cold weather preparedness. The risk mitigation practices and controls identified through these questions can affect monitoring activities, including requests for information and adjustments to an entity's compliance oversight plan and future monitoring activities.

Reliability Coordinator (RC):

1. What is your definition, or criteria, for "cold weather" relative to your documented data specifications for Real-time monitoring, and for performing Operational Planning Analyses (OPA) and Real-time Assessments (RTA) (IRO-010-4 R1, TOP-002-5 R8)?
2. What other cold weather data specification provisions do you, and will you, consider in addition to those identified in the Reliability Standards (IRO-010-4 R1)?
    a. How were those provisions determined?

[5] Project 2019-06 Cold Weather and Project 2021-07 Extreme Cold Weather Grid Operations, Preparedness, and Coordination
[6] Extreme Cold Weather as defined in the *Polar Vortex Review* dated September 2014; Extreme Cold Weather conditions occurred in lower latitudes than normal, resulting in temperatures 20 to 30° F below average.
[7] https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/NERC%20Alert%20R-2021-08-18-01%20Extreme%20Cold%20Weather%20Events.pdf, NERC Alert R-2022-09-12-01 Cold Weather Events II, NERC Alert
[8] Project 2019-06 Cold Weather and Project 2021-07 Extreme Cold Weather Grid Operations, Preparedness, and Coordination
[9] Extreme Cold Weather as defined in the *Polar Vortex Review* dated September 2014; Extreme Cold Weather conditions occurred in lower latitudes than normal, resulting in temperatures 20 to 30° F below average.
[10] https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/NERC%20Alert%20R-2021-08-18-01%20Extreme%20Cold%20Weather%20Events.pdf, NERC Alert R-2022-09-12-01 Cold Weather Events II, NERC Alert
[11] Reliability Guideline: Generating Unit Winter Weather Readiness - Version 4 (nerc.com)
[12] https://www.nerc.com/pa/rrm/ea/PapersDocumentsAssessmentsDL/NERC_info_cold_weather_prep_bps_impacts_20231130.pdf#search=NERC%20Information%20Resources%20on%20Cold%20Weather%20Preparation%20and%20BPS%20Impacts

   b. Were other provisions considered based on your area's geographical location and typical weather?

3. Have you defined what the expectations are for generating unit(s) cold weather data (e.g., "availability" based on cold unit start-up and warm unit start-up (IRO-010-4 R1))?
4. How do you maintain situational awareness concerning weather impacts in your RC Area and neighboring RC Areas (IRO-008-3 R4, IRO-014-3 R1, IRO-017-1 R1)?
5. How will you coordinate the "extreme cold weather period" as defined in Balancing Authority's cold weather Operating Process with the cold weather data used in Real-time monitoring, OPA and RTA (IRO-010-4 R1, TOP-002-5 R8)?
6. Do you perform Real-time voltage stability analysis during cold weather and under high transfer conditions (IRO-008-3 R1-R4)?
7. How do you benchmark the planning and operations models for extreme cold weather events (IRO-008-2 R1-R4)?
8. Explain any validation controls associated with generating unit(s) operating limitations included within a BA's Operating Plan or Operating Process for extreme cold weather periods?
9. Do you perform periodic impact studies to determine which elements of adjacent RC systems have the most impact on your system (e.g., how an out of service element in an adjacent RC Area affects your system voltages, Facility loadings, or other conditions (IRO-008-3 R1, IRO-014-3 R1))?
   a. Does this include adjacent RC systems interconnected by DC ties?
10. Do you conduct periodic Capacity Emergency and Energy Emergency readiness drills simultaneous with transmission Emergency drills with your BA(s) and TOP(s)?
    a. Do these drills include load shed (e.g., manual, automatic, etc.) and Transmission Loading Relief (TLR) exercises (IRO-006-5 R1)?
11. How do you manage awareness and actions associated with natural gas generation resources that receive their gas supplies from a common gas supply (e.g., single point of failure results in loss of multiple units)?
    a. Do your system maps, energy management system (EMS) screens, etc. indicate resources that receive their gas supplies from a common gas supply?

       b. Do your system maps, EMS screens, etc. indicate natural gas critical infrastructure load locations?

Balancing Authority (BA):

1. How do you maintain the documented specification for the data necessary to perform Real-time monitoring and analysis functions (TOP-003-5, IRO-010-4 R3-R4)?
   a. Describe how your data specification includes provisions for notification of BES generating unit(s) during local forecasted cold weather and accounts for operating limitations based on:

i. Capability and availability
ii. Fuel supply and inventory concerns
iii. Fuel switching capabilities; and
iv. Environmental constraints

b. Describe how your data specification includes provisions for notification of BES generating unit(s) during local forecasted cold weather and account for generating unit(s) minimum:
   i. Design temperature
   ii. Historical operating temperature
      (1) Does this include a minimum "historical" period (i.e., based on no less than five (5) years of operational data), and if not, why?
      (2) Does this include the most recent extreme cold weather event data available if outside the five (5) year timeframe?
      (3) Current cold weather performance temperature determined by an engineering analysis

c. What other data is captured to support extreme cold weather operations and how is this type of information gathered and utilized to support reliable operations?

d. Describe your data specification details for items 1.a.i, 1.a.ii, 1.a.iii, and 1.iv (e.g., Is the capability gross, net, or emergency? Is the availability considering cold unit start-up and warm-unit start-up? etc.)

2. Does your Operating Process, Operating Plan, or data specification for extreme cold weather include and use the generating unit(s) calculated Extreme Cold Weather Temperature (ECWT)? Do you analyze the differences between the ECWT, and operating limitations provided by Generator Owners (TOP-002-5 R8, TOP-002-5 R4, TOP-003-5 R2)?

3. Do you have any geographical displays or any other tools that indicate generating unit location and their associated temperatures (e.g., design temperature ECWT, etc.) that are accessible to your System Operators?

4. Describe your Reliability Coordinator-reviewed Operating Plan(s) to mitigate Capacity Emergencies and Energy Emergencies within your BA Area (EOP-011-4 R2, BAL-002-3 R1)?

   a. Describe how the Operating Plan(s) manage the relationship of critical natural gas infrastructure loads and load management (e.g., Interruptible Load, curtailable Load, demand response, operator-controlled manual load-shedding and automatic Load shedding).

5. Describe how the Operating Plan(s) processes to prepare for and mitigate Capacity Emergencies and Energy Emergencies determines reliability impacts of cold weather conditions and extreme weather conditions

   a. How are cold weather and extreme weather defined? Indicate what, if any, section(s) of the Plan contain these definitions.

6. Do you review the distribution of reserves to ensure they are usable and deliverable during extreme cold weather event contingencies (IRO-017-1 R2, BAL-002-3 R1)?
    a. Does this review consider transmission constraints, other demands on reserve sharing resources and, as applicable, the possibility that more than one Reserve Sharing Group member might experience simultaneous Emergencies?
    b. Does this review include loss of certain gas supply lines supporting multiple units, loss of renewables (e.g., wind turbine icing, solar panel icing/snow coverage, battery performance, etc.)?
    c. How often is the review completed during an extreme cold weather event period?
7. Describe your methodology to determine an adequate reserve margin during the extreme cold weather period. Is the reserve margin calculation dynamic (e.g., periodically re-calculated based on conditions)? Do you consider increasing the reserve requirement during extreme cold weather events to compensate for the probability that a number of generating units might fail based on the conditions and operating limitations provided?
8. Do you conduct periodic Capacity Emergency and Energy Emergency readiness drills simultaneous with transmission Emergency drills with your RC and TOP?
    a. Do these drills include load shed and Transmission Loading Relief (TLR) exercises (IRO-006-5 R1)?
9. Describe your methodology to determine a five-day hourly forecast. What criteria do you use to determine expected generation resource commitments with generation unit(s) supplied data for operation limitations (e.g., capability and availability)? How do you consider different temperature gradients across your system in developing the five-day hourly forecast (e.g., Northwestern portion of your footprint is expected to be in extreme cold weather with possible precipitation, but Southeastern portion is not expected to endure similar temperatures or precipitation (TOP-002-5 R8))?
10. How do you manage awareness and actions associated with natural gas generation resources that receive their gas supplies from a common gas supply (e.g., single point of failure results in loss of multiple units)?
    a. Do your system maps, EMS screens, etc. indicate resources that receive their gas supplies from a common gas supply?
    b. Do your system maps, EMS screens, etc. indicate natural gas critical infrastructure load locations?
    c. Do you maintain contact information for gas suppliers?

Transmission Operator (TOP)/Transmission Owner (TO):

1. What is your definition, or criteria, for “cold weather” relative to your documented data specifications for Real-time monitoring, and for performing OPA and RTA (TOP-003-5 R1)?

2. How is cold weather considered in your list of data and information needed for Real-time monitoring, and for performing OPA and RTA (TOP-003-5 R1.1)?
3. What is your provision for notification, during local forecasted cold weather, of current Protection System and Remedial Action Scheme (RAS) status or degradation that impacts System reliability (TOP-003-5 R1.23)?
4. How do you maintain a documented specification for the data necessary to perform Real-time monitoring, OPA, and RTA (TOP-003-5 R1)?
    a. Describe how your data specification includes provisions for notification of BES generating unit(s) during local forecasted cold weather and account for operating limitations based on (TOP-003-5 R1):
        i. Capability and availability (e.g., "availability" based on cold unit start-up and warm unit start-up)
        ii. Fuel supply and inventory concerns (e.g., fuel supply in terms of hours of operation or forecasted availability)
        iii. Fuel switching capabilities (e.g., timelines, limitations, etc.)
        iv. Environmental constraints (e.g., emissions, noise limitations)
    b. Describe how your data specification includes provisions for notification of BES generating unit(s) during local forecasted cold weather and generating unit(s) minimum:
        i. Design temperature
        ii. Historical operating temperature
            (1) Does this include expectations for a minimum "historical" period (i.e., based on no less than five (5) years of operational data), and if not, why?
            (2) Does this include the most recent extreme cold weather event data available if outside the five (5) year timeframe?
        iii. Current cold weather performance temperature determined by an engineering analysis
5. Describe your Reliability Coordinator-reviewed Operating Plan(s) to mitigate operating Emergencies in your TOP Area during extreme cold weather.
    a. Describe how the Operating Plan(s) include processes to prepare for and mitigate Emergencies including provisions to determine reliability impacts of:
        i. Cold weather conditions
        ii. Extreme weather conditions
6. How do you ensure transmission facilities are capable of performing during cold weather conditions? Note: Most cold weather breaker trips relate to low air in the breaker, low sulfur hexa-fluoride (SF6) gas pressure, failed or inadequate heaters, bad contacts, or gas leaks.

7. How do you ensure SF6 gas in breakers, metering, and other equipment is at the correct pressure and temperature to operate during extreme cold weather?
8. How do you ensure transformer operation in cold weather? NOTE: Some options include checking heaters in control cabinets, verifying main tank oil levels are appropriate for the actual oil temperature, checking bushing oil levels, and checking nitrogen pressure if necessary.
9. Do you conduct periodic Capacity Emergency and Energy Emergency readiness drills simultaneous with transmission Emergency drills with your RC and BA, including load shed and TLR exercises?
10. Describe your process and tools used to determine the relationship between operator-controlled/automatic Load shedding and the following load-types: designated critical loads, UFLS, UVLS, and designated critical natural gas infrastructure loads.
    a. Are there internal controls that manage the selection of each load type and compare the designation against other load types?
    b. How are the different load types displayed to the System Operator?
    c. What indicators are provided to System Operators for loads that may be in more than one load shed program (e.g., manual load shed and UFLS for same location)?
11. How do you manage awareness and actions associated with natural gas generation resources that receive their gas supplies from a common gas supply (e.g., single point of failure results in loss of multiple units)?
    a. Do your system maps, EMS screens, etc. indicate resources that receive their gas supplies from a common gas supply?
    b. Do your system maps, EMS screens, etc. indicate natural gas critical infrastructure load locations?
    c. Do you maintain contact information for gas suppliers? Is it available to your System Operators?

Generator Owner (GO)/Generator Operator (GOP):

Extreme Cold Weather Temperature and cold weather data (EOP-012-2 R1)

1. Do operators receive alarms associated with temperature when nearing the Extreme Cold Weather Temperature (ECWT), design temperature, historical temperature, or engineering analysis-based temperature? What actions result if the operators receive such an alarm (EOP-012-2 R1)?
2. What process do you have in place to evaluate the fidelity of data used to determine (and recalculate) ECWT? Is there an approval process for the ECWT determination? What is the process for updating your unit's ECWT (EOP-012-2 R1)?
3. When was the last time you assessed your unit's temperature design parameters(EOP-012-2 R1)?
    a. Did the assessment determine at what temperature heat tracing and insulation can prevent water or moisture in Generator Cold Weather Critical Components from freezing?

i. Was this considered for both on-line and off-line conditions?

b. Describe how the assessment considered wind chill factor and potential need for windbreaks/enclosures/portable heat sources.

c. Describe how the assessment considered freezing precipitation.

d. Did the assessment consider all temperature-affected generator, turbine, boiler equipment, Fixed Fuel Supply Components, and associated ancillary equipment and controls?

e. Describe how the assessment identified components/systems (including Generator Cold Weather Critical Components) that have the potential to:

i. Initiate automatic unit runback schemes

ii. Adversely affect environmental controls

iii. Adversely affect the delivery of fuel

iv. Initiate a Generator Cold Weather Reliability Event

f. Did the assessment consider the life expectancy of freeze protection measures to meet desired performance during extreme cold weather (e.g., pipe insulation may be effective for a certain amount of time, but would become less effective over time)?

g. What, if any, unit modifications have you made based on the assessment?

Generator cold weather preparedness plan (EOP-012-2 R4)

1. Describe your cold weather preparedness plan(s) for your generating units.

a. Describe how you manage or determine the following:

i. Generating unit(s) freeze protection measures based on geographical location and plant configuration.

ii. Annual inspection and maintenance of generating unit(s) Generator Cold Weather Critical Component freeze protection measures.

iii. Inspection and maintenance of other freeze protection measures not called out in the cold weather preparedness plan (i.e., those freeze protection measures not applied to Generator Cold Weather Critical Components.)

iv. Generating unit(s) cold weather data, including Generating unit(s) operating limitations in cold weather, and account for:

(1) Capability and availability

(2) Fuel supply and inventory concerns

(3) Fuel switching capabilities

(4) Environmental constraints

(5) Generating unit design temperature, or historical operating temperature, or current cold weather performance temperature determined by an engineering analysis

(6) Does the analysis include a minimum "historical" period (i.e., based on no less than five (5) years of operational data), and if not, why?

(7) Does the analysis include the most recent extreme cold weather event data available if outside the five (5) year timeframe?

b. Describe your process to determine:

i. The identification of Generator Cold Weather Critical Components

ii. Types of freeze protection measures on Generator Cold Weather Critical Components

iii. How measures reduce cooling effects of wind and, where applicable, freezing precipitation

iv. Inspection and maintenance activities for **all** freeze protection measures (even those not on Generator Cold Weather Critical Components). NOTE: From a compliance perspective, Requirement 4 Part 4 is exclusively limited to freeze protection measures on Generator Cold Weather Critical Components. CMEP staff may ask questions about any freeze protection measure, but the annual maintenance and inspection Requirement is limited to those Generator Cold Weather Critical Component freeze protection measures documented in Requirement R4 Part 4.4.

2. What level of corporate management ensures a weather (cold and extreme) preparation procedure exists for each operating location? Who ensures that the procedure was implemented (e.g., corporate management, business unit management, plant management, etc.)? Who is responsible for updates and notifications of updates (EOP-012-2 R4)?

3. Do you have any automated tools to manage the maintenance and inspection of freeze protection measures? Are Generator Cold Weather Critical Components flagged in some way to ensure annual maintenance and inspection occurs per Requirement R4 Part 4.4? Do Generator Cold Weather Critical Components receive priority in terms of maintenance and inspection? How do you ensure freeze protection measures are inspected just prior to and during cold weather periods? Does post maintenance and testing results factor into future maintenance and testing plans (EOP-012-2 R4)?

4. Describe your inspection and maintenance program, specifically how it addresses extreme cold weather (EOP-012-2 R4).

a. How do you track cold weather maintenance activities in a work management system?

i. Are they designated as "cold weather" activities?

ii. Are Generator Cold Weather Critical Components and associated freeze protection measures called out?

iii. Are maintenance activities associated directly with a cold weather preparedness plan?

b. If maintenance activities associated with a freeze protection measure covered within a cold weather preparedness plan, how is training of personnel cross-referenced?

c. Does the program consider accountability for ensuring inspection and maintenance are performed?

d. How are cold weather inspection and maintenance activities prioritized?

e. How are intervals for cold weather inspection and maintenance established (e.g., are there increased inspections during periods of cold weather that are captured within and outside of a work management system?)?

f. How do you ensure required/scheduled cold weather inspection and maintenance is performed?

g. Does the program include inspection of heat tracing circuit power supplies, breakers, fuses, connections, controls, and thermostats prior to winter and forecasted extreme cold weather?

h. Does the program include inspection of thermal insulation and windbreaks prior to winter and forecasted extreme cold weather?

i. Does it include key internal and external communication points and protocols? How are affected entities notified of a progressing cold weather event that may impact the generating facility?

j. Are any third-party contractors involved in the inspection and maintenance of freeze protection measures for Generator Cold Weather Critical Components? If so, how do you manage training on the cold weather preparedness plan for the associated site(s)?

5. How are issues identified during cold weather inspection and maintenance activities tracked to completion (EOP-012-2 R4)?

   a. Are processes and procedures evaluated after each cold weather event (even those not meeting the criteria of a Generator Cold Weather Reliability Event)?

   b. Who is responsible for procedure review, updates, approval, and notification?

6. Does the inspection and maintenance program include a winter preparedness/extreme cold weather checklist (EOP-012-2 R4)?

   a. If so, how is the checklist kept current?

   b. Is there a checklist for inspections *during* extreme cold weather?

   c. What is the periodicity of walkdowns during extreme cold weather and are those part of your inspection program? Are checks incorporated into operator rounds or are they supplemental?

7. Do you rely on any third-party contractors to implement your cold weather preparedness plans (EOP-012-2 R4 R5)?

8. What is your plan if fuel is curtailed or becomes unavailable? (e.g., gas, coal, oil, etc. (EOP-012-2 R1))

   a. For bulk fuel, do you have capability to bunker fuel to prevent freezing piles? If not, what measures are in place to prevent freezing?

9. Do your procedures include communication and coordination with fuel providers (suppliers and pipelines) regarding fuel availability during an Emergency (EOP-012-2 R1)?
    a. Does this include contingency plans when weather makes such delivery impossible (e.g., icy roads, deep snow, frozen rivers, etc.)?
10. Is your unit capable of fuel switching (EOP-012-2 R1)?
    a. If so, how often do you verify this capability will function as expected during cold weather?
    b. Have you informed other entities about any operating limitations when using the alternate fuel?
    c. Can it be done automatically or on demand? If so, are operators trained and is this function routinely tested?
11. Do you have a process in place to obtain an emissions waiver in the event one is needed to operate (EOP-012-2 R1)?
12. What process have you developed to identify a Generator Cold Weather Reliability Event (EOP-012-2 R6)?
13. What process is in place to develop, track, and implement Corrective Action Plans (EOP-012-2 R7)?
14. What approval process is in place for CAPS and Generator Cold Weather Constraint declarations (EOP-012-2 R7 R8)?
15. What process is in place to develop justification for any declaration needed where Corrective Action Plan actions cannot or will not be implemented (EOP-012-2 R7 R8)?
16. How do you apply the Generator Cold Weather Constraint criteria (EOP-012-2 R7 R8)?
    a. What data do you monitor or develop to understand, in terms of freeze protection measures, what technology is available, expected performance results, implementation coverage for comparable units, and geographically similar winter climate conditions (local and broad in nature (e.g., extreme cold weather occurs across North America))? When do you update results based on the monitoring of the data?
    b. Does your criteria involve “cost” or “good practice” as a basis for the declaration? NOTE: If CMEP staff encounter an entity that uses cost or good practice for a constraint justification, CMEP staff should notify entity that there is current standards development in response to FERC directive to remove these as a declaration basis (see FERC Order issued on June 27, 2024 in dockets No. RD24-5-000 and RD24-1-000 and NERC standards development Project 2024-03). CMEP staff should consider whether an Area of Concern is appropriate based on facts and circumstances.
17. How often is winter-specific, cold weather preparedness plan plant-specific training provided to operators and support personnel (EOP-012-2 R5)?
    a. Who delivers the training and how is that decision made?
    b. What tracking tools are in place to maintain awareness of who receives this training?

c. How are contractors and new hires trained if hired after annual training has been completed?

d. Are both Generator Operator and Generation Owner personnel trained at the same time with the same materials? How do you ensure personnel comprehend the training (e.g., Are there quizzes? Do supervisors inspect implemented freeze protection measures called out in the cold weather preparedness plan(s)?)?

e. What do you cover in the training?

   i. Note: Training could include the capabilities and limitations of the freeze protection monitoring system, proper methods to check insulation integrity, the reliability and output of heat tracing, prioritization of repair orders when problems are discovered, identification and monitoring of Generator Cold Weather Critical Components, etc.

Generator cold weather preparedness training (EOP-012-2 R5)

1. How do you ensure all applicable contractors, operators, maintenance, and associated support personnel receive winter-specific and plant-specific training for implementing the cold weather preparedness plan (EOP-012-2 R5)?
2. What is your plant staffing policy regarding anticipated extreme cold weather events?
   a. Do you schedule additional personnel, or assign designated stand-by status?
   b. Do you stage supplies (e.g., food, water, PPE, cost, etc.) for staff in case of extended hours?

Internal Controls

1. How do you manage awareness and actions associated with natural gas generation resources that receive their gas supplies from a common gas supply (e.g., single point of failure results in loss of multiple units)?
   a. Do your system maps, EMS screens, etc. indicate resources that receive their gas supplies from a common gas supply?
   b. Do you maintain contact information for gas suppliers at the generating unit(s) site(s)?
2. Does your organization conduct fleet-wide winter preparation meetings, training exercises, or both to share best practices and lessons learned? If so, how often do these occur?
3. How do you ensure winterization supplies and equipment are in place before the winter season?
4. Does your organization participate in industry associations to share and gain insights on cold weather preparedness?

Planning Authority/Planning Coordinator (PA/PC):

1. How is unit availability during extreme cold weather events accounted for in your winter assessment for the upcoming winter?
   a. How do you know there will be sufficient generation and reserves for the upcoming winter?

   b. How do you address partial system impact of an extreme cold weather event (i.e., extreme cold weather expected in only a portion of area being studied)?

2. Have you included sensitivity studies in your winter assessment?
   a. Did the sensitivity studies identify system stress points?
   b. How did you share any stress point information with appropriate RC, BA, and TOP so they can improve and refine strategies used during extreme cold weather events?
3. To what extent have you included planned outages, limited operations, generating unit(s) minimum operating temperature, ambient temperature limitations, and any likely loss of fuel sources in your winter assessment? How did you receive the generating unit(s) minimum temperature?
4. Have you performed seasonal transfer studies and sensitivity analyses which model same direction simultaneous transfers (e.g., north to south, south to north, west to east, etc.) to determine constrained facilities? If so, did these seasonal transfer studies include:
   a. Intra-market power transfers, without offsetting transfers in a way that would reduce the impact on determining constrained facilities
   b. Transfers of IBR generation output to load areas using near-peak IBR generation levels
   c. Simultaneous generation outages in adjacent RC footprints
   d. Increasing simultaneous transfers to levels where constraints cannot be fully alleviated
   e. Loss of multiple natural gas generation resources that receive their gas supplies from a common gas supply
5. Do you perform periodic impact studies to determine which elements of adjacent PC systems have the most impact on your system (IRO-008-2 R1, IRO-014-3 R1)?
   a. E.g., how an out of service element in an adjacent PC area affects your system voltages, facility loadings, or other conditions.
   b. Does this include those interconnected by DC ties?
6. To what level are load management programs and subsequent usage (e.g., natural gas critical infrastructure, UFLS, operator-controlled manual Load shedding, automatic Load shedding, etc.) used in the winter assessment? Do you consider site specific load management (e.g., 10 MWs at Company A station X versus 10 MWs for Company A's footprint)?
7. Have you jointly developed and studied more-extreme condition scenarios for seasonal extreme conditions with Transmission Planners? If so, did this include:
   a. Removing generation units entirely to represent actual generation outages versus scaling of generating unit outputs
   b. Modeling system loads to ensure the study accurately tests the system for the extreme conditions

c. Modeling and studying actual extreme events experienced in your PC area
d. Modeling and studying actual extreme events experienced in other PC areas
e. Modeling the loss of multiple generation units due to a cyber-attack of a natural gas suppliers control system
f. Sharing results with operations staff for training purposes

BA, TOP, GO, and GOP:

1. How do you verify the adequacy of fuel switch capable units to remain on-line during natural gas curtailments?
2. Does your fuel switching verification consider:
   a. The time required to switch equipment
   b. The unit capacity while on alternate fuel
   c. Operator training and experience
   d. Fuel switching equipment problems
   e. Boiler and combustion control adjustments needed to operate on alternate fuel
3. What steps do you take to verify Blackstart resources are operational prior to extreme cold weather events?
   a. Does this include verification of operator availability and training?
4. How are you made aware of ambient operating temperature limitations of Blackstart resources?
5. Do you have any tools that are provided to the operators that clearly indicate fuel switching capability, Blackstart generating unit(s) physical location, generating unit(s) minimum temperature, and ECWT?
6. How do BA/TOP obtain forecasts of real output capability from GO/GOP's prior to anticipated extreme cold weather events?
   a. Do forecasts take into account both 1) the temperature beyond which the availability of the generating unit cannot be assumed, and 2) the potential for natural gas curtailments?
   b. Do BAs make proactive decisions prior to extreme cold weather, including but not limited to:
      i. Requesting cancellation of planned outages
      ii. Directing advanced fuel switching
      iii. Directing startup of units with startup times greater than one day
      iv. Directing startup of units that have a history of problems starting below a forecasted temperature
         (1) Requesting startup of seasonally mothballed units

(2) Making advance requests for conservation

7. Do your procedures include communication and coordination with fuel providers (suppliers and pipelines) regarding fuel availability during an Emergency?
   a. Does this include contingency plans when weather makes such delivery impossible (e.g., icy roads, deep snow, frozen rivers, etc.)
8. Are you aware of the generation resources that could be affected by the outage of a:
   a. Common pipeline section(s)
   b. Common compressor station(s)
   c. Cyber-attack of a common control system

CMEP Staff Considerations

The following considerations can be used across multiple Reliability Standards, but the examples will focus on the cold weather Reliability Standards (e.g., EOP-011, EOP-012, TOP-002, TOP-003, IRO-010).

Calculated Values

When a Requirement requires an entity to calculate a value (directly or indirectly) CMEP staff should evaluate several aspects of the entity's internal control environment.

- Does the entity have a documented process that provides roles, responsibilities, expectations, data source, and an approval process for outputs (as well as the process itself)?
- How does the entity ensure data integrity?
- How does the entity ensure calculation integrity?
- Is there peer review during and after the calculation?
- If industry guidance or ERO Enterprise guidance is available, does the entity leverage the guidance?
- What tools does the entity use to derive the calculations?
- Where is the source data retained?
- If edits were made to source data to alleviate anomalies (e.g., numerical field inadvertently corrupted with text at the data source), how are those edits captured, reviewed, and approved?
- Does the source include all necessary fields to provide input to the calculation (i.e., is wind speed and precipitation information available)?
- Does the entity use contractors in the development of calculation results?
- What oversight does the entity provide for the contractors and the output received?

Data Collection

When a Requirement requires a value to be provided to another entity CMEP staff should evaluate how the overall interaction is completed. Does the entity get notified of changes in data specification (e.g., types of

data, periodic expectations, format expectations)? How does the entity manage supplying the data correctly per the data specification (e.g., net versus gross, MVA versus amps, etc.)? Is there a procedure or process that is followed? Who owns the process or procedure and are there periodic reviews? Does the process address actions if the data specification is not clear? How does the entity ensure the data is received? Are additional notifications provided for any updates on the data provided? How does an entity maintain timely provision of data?

Training

When a Requirement requires an entity to train its personnel (or other entity's personnel) CMEP staff should evaluate several aspects of the entity's control environment. Does the entity have a dedicated trainer or training department? How are training modules/lessons developed? What peer review and approval process is in place for training materials? How does an entity track personnel training status and are contractors included? Is training scheduled well in advance and what is the attendance rate? If training is missed, what is the makeup policy? How is training updated (are there triggers or is it simply an annual review of materials)? Do training materials include NERC Lessons Learned references, Major Event reports, Reliability Guidelines, ERO Enterprise outreach, Implementation Guidance, or Practice Guide materials? What approach does an entity take (e.g., virtual, in-person, computer-based, etc.) and how is that managed effectively? If training is excluded for certain employees is that explained and tracked accordingly? Does training occur with onboarding or any other off-cycle trigger (e.g., changes in cold weather preparedness plan after initial training)?

Timing

When a Requirement requires entities to perform an action, supply information, or notify others within a certain timeframe CMEP staff should evaluate how the entity manages the timelines effectively. Does the entity have an automated reminder with escalation points as time period nears (or is surpassed)? Are reminders sent to individuals or a broader audience? How does an entity track the various timing requirements (and validate the actions were performed)? Is there a review process for the management of timeframes that is triggered (e.g., changes in Standards) or periodic? How does the entity manage long term timeframe reviews (e.g., 12 years)?

Implementation

When a Requirement requires entities to implement a process, an action**,** or something similar CMEP staff should evaluate the internal controls associated with the implementation efforts. Does the entity have a clearly written implementation process that describes roles, responsibilities, actions, expectations, peer reviews, approvals, and process review timelines? How does an entity ensure consistent implementation? Is there training involved? Are implementation tools for tracking used? If an implementation effort does not meet expected timeframes, what notifications (internal and external) occur? Does the entity re-evaluate all locations when implementation efforts do not meet expectations in one location?

Future Versions

CMEP staff may acknowledge the forward-thinking actions of the entity and evaluate the control environment regarding those efforts. CMEP staff and registered entity staff should feel comfortable about

discussing the status of new or upcoming Standards knowing that compliance conclusions are based on the enforceable version.

Revision History

Revision History		
Version	**Date**	**Revision Details**
1.0	10/12/2021	Initial Publication
2.0	1/1/2025	Major revision