Winter Preparation for Severe Weather Events

September 1, 2016
Jule Tate, Associate Director, Event Analysis
Matthew Lewis, Manager of Training and Education
Pooja Shah, Senior Engineer, Reliability Assessment
• Overview Of Reference Materials
• Cold Weather Training Packet Update
• Gas-Electric Interdependency Special Short-Term Assessment
• 2016-17 Winter Reliability Assessment
• Questions and Answers
Objective

- Provide the industry with reports and training materials in preparation for the upcoming winter weather forecasts.
• Overview Of Reference Materials
• Cold Weather Training Packet Update
• Gas-Electric Interdependency Special Short-Term Assessment
• 2016-17 Winter Reliability Assessment
• Questions and Answers
Overview of Cold Weather Reference Materials

September 1, 2016
Jule Tate, Associate Director, Event Analysis
• Report on February 1-5, 2011 Southwest Cold Weather
• Lessons Learned - Southwest Cold Weather Event
• Polar Vortex Review
• Previous Cold Weather Event Analysis
• Reliability Guideline: Generating Unit Winter Weather Readiness
• 2015 Winter Review
• Cold Weather Training Packet Refresher
Report on February 1-5, 2011
Southwest Cold Weather

Report on February 1-5, 2011
Southwest Cold Weather
Lesson Learned – Southwest Cold Weather Event

- Generating Unit Temperature Design Parameters and Extreme Winter Conditions
- Adequate Maintenance and Inspection of Generator Freeze Protection
- Plant Instrument and Sensing Equipment Freezing Due to Heat Trace and Insulation Failures
- Plant Fuel Switching and Cold Weather
- Transmission Facilities and Winter Weather Operations
- Wind Farm Winter Storm Issues
- Electricity and Natural Gas Interdependency
Polar Vortex Review

September 2014
Reliability Guideline

Generating Unit Winter Weather Readiness –
Current Industry Practices

Preamble:
It is in the public interest for NERC to develop guidelines that are useful for maintaining or enhancing the reliability of the bulk power system (BPS). Reliability Guidelines provide suggested guidance on a particular topic for use by BPS users, owners, and operators according to each entity's circumstances. Reliability Guidelines are not to be used to provide binding norms, establish mandatory reliability standards, or create parameters by which compliance to standards is monitored or enforced.

Purpose:
This Reliability Guideline is applicable to electricity sector organizations responsible for the operation of the BPS. Although this guideline was developed as a result of an unusual cold weather event in an area not normally exposed to freezing temperatures, it provides a general framework for developing an effective winter weather readiness program for generating units throughout North America. The focus is on maintaining individual unit reliability and preventing future cold weather related events. This document is a collection of industry practices compiled by the NERC Operating Committee (OC). While the incorporation of these practices is strictly voluntary, developing a winter weather readiness program using these practices is highly encouraged to promote and achieve the highest levels of reliability for these high impact weather events.

Assumptions:
A. Each BPS generation owner and operator is responsible and accountable for maintaining generating unit reliability.
B. Entities should develop and apply plant-specific winter weather readiness plans, as appropriate, based on factors such as geographical location, technology and plant configuration.

Guideline Details:
An effective winter weather readiness program, which includes severe winter weather event preparedness, should generally address the following components: (I) Safety; (II) Management Roles and Expectations; (III) Processes and Procedures; (IV) Evaluation of Potential Problem Areas; (V) Testing; (VI) Training; and (VII) Communications. This program will be referred to hereafter as a winter weather preparation procedure.

I. Safety
Safety remains the top priority during winter weather events. Job safety briefings should be conducted during preparation for and in response to these events.
Event Analysis

EA Program
April 2015 Washington D.C. Area Low-Voltage Disturbance Event
Cold Weather Training Materials
January 2014 Polar Vortex Review
October 2012 Hurricane Sandy Event Analysis Report
October 2011 Northeast Snowstorm Event
September 2011 Southwest Blackout Event
February 2011 Southwest Cold Weather Event
August 2003 Northeast Blackout Event
Lessons Learned
Energy Emergency Alerts

Bulk Power System Awareness
About Alerts
Alerts
Facility Ratings Alert
Transmission Loading Relief (TLR) Procedure
Reliability Coordinators
TLR Logs
Human Performance
Committees
Operating Committee (OC)
Planning Committee (PC)
Conferences and Workshops
Webinars/Training and Outreach Videos

Lessons Learned

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• Overview Of Reference Materials
• Cold Weather Training Packet Update
• Gas-Electric Interdependency Special Short-Term Assessment
• 2016-17 Winter Reliability Assessment
• Questions and Answers
Cold Weather Training Packet
Update

September 1, 2016
Matthew Lewis, Manager of Training and Education
• Provide timely, relevant information to assist registered entities in preparing for extreme winter weather occurrences.
• Identify key outputs and causes that led to significant loss of capacity.
• Outline importance of maintaining thorough winterization practices.
  ▪ February 2011 cold weather event.
  ▪ Comparison between 1989 and 2011 and other significant events.
• Discuss guidelines for winter weather preparedness.
This package offers training materials that are customizable, user-friendly, educational, and ready to use.

This package is located on www.nerc.com and available for all Regions and registered entities for use in cold weather preparation.

Cold weather resource page

Included in this package:
- Instructors Manual
- Presentation – PowerPoint version
- Handouts for Students
- Links to website with all related events and resources

This package can be customized to users specifications.
• Introduction/learning objectives
• Purpose
• Targeted learning audience
  ▪ What happened: Event details extracted from the LL materials
  ▪ Why it happened: Shortcomings of bulk power system (BPS), human performance (HP) challenges, etc.
  ▪ Recommendations: Applicable functional recommendations will be added to the training packets.
  ▪ Entity perspective: Learning activities are tailored to include local relevance
    o How does this effect/apply to me/us?
    o How can we take necessary prevention (reliability assurance) steps, etc?
  ▪ Emphasize key learning points – LL from event
    o Wrap-up and review
    o NERC provided discussion questions
Cold Weather Training Site

Cold Weather Training Materials

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<td>2015 Winter Review Report</td>
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<td>Survey to Assess the Effectiveness of Severe Winter Weather Preparation materials</td>
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<td>Reliability Guidelines: Generating Unit Winter Weather Readiness</td>
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<td>PECR NERC Findings and Recommendations</td>
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## Contents of Instructor’s Manual

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## Agenda

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**Course Outcomes**

At the conclusion of this session, attendees will be able to:

- Identify the contributing factors that caused the event and the consequences, as described in the event report.
- Discuss potential cold weather vulnerabilities in their respective work environments.
- Identify preventative actions that can be taken when faced with infrequent cold weather disturbances.
• January 2014 Polar Vortex Event
  § January 2014 Polar Vortex Review--
  § Polar Vortex Review--http://www.nerc.com/pa/rrm/ea/Pages/February-2011-
  Southwest-Cold-Weather-Event.aspx
  § 2015 Winter Performance Update--
  http://www.nerc.com/pa/rrm/ea/Pages/February-2011-Southwest-Cold-
  Weather-Event.aspx
Please click on the image above to navigate to an external site to view the video.
• Cold Weather Training Packet is customizable to fit the needs of your organization.
• Over 80 slides with information on cold weather outage for training purposes.
• Lessons learned for review and discussion.
• Complete instructor manual to facilitate a training course.
• Practical activities to support understanding of topic.
• Interactive links throughout package to additional resources.
• Training support from NERC staff on cold weather training needs.
• Overview Of Reference Materials
• Cold Weather Training Packet Update
• Gas-Electric Interdependency Special Short-Term Assessment
• 2016-17 Winter Reliability Assessment
• Questions and Answers
What is the new “Short-Term Special Assessment”?

- NERC continues to coordinate between the two industries
  - Electric
  - Natural Gas
- Historically, reliability concerns in winter
  - This report found summer season can also be impacted
- Aliso Canyon storage facility
NERC’s Annual Long-Term Natural Gas Trend

Anticipated Natural Gas Additions Under-Forecasted each LTRA Reporting Year

- 2008 Base
- 2010 Base
- 2012 Base
- 2014 Base
- 2016 Base
- 2008 Gas
- 2010 Gas
- 2012 Gas
- 2014 Gas
- 2016 Gas

GW


320 340 360 380 400 420 440 460 480

2016 LTRA

RELIABILITY | ACCOUNTABILITY
• Generation Availability Risk Assessment
• Assessment Period: Peak periods for Summer 2016, 2017; Winter 2016/17, 2017/18
• Short-term challenges related to natural gas infrastructure
• Leverage existing studies from industry and Regions

Areas Highly-Dependent on Natural Gas-Fired Capacity

ISO-NE

NYISO

ERCOT

CAISO

- Gas-fired
- Other
Gas Availability Risk Assessment

Overview

- **Gas-Fired Capacity**
- **Dual-Fuel Capacity**
- **Non-Gas-Fired Capacity**

Based on GADS Performance Data

- **Firm Import Capability**
- **Average Forced Non-Gas Outages**
- **Average Forced Gas Outages**
- **Maximum Forced Gas Outages (in excess of average)**

Separate Area-Specific NG Scenario
- Refers to loss of a major pipelines during the peak

Extreme (90/10) Peak Load Forecast
- Normal (50/50) Peak Load Forecast

Anticipated Capacity | Net Imports (Firm) | At-Risk Capacity | Extreme Scenario
Gas Availability Risk Assessment

Interpreting Results

Potential Capacity Deficiency Risk

Reduced Capacity Deficiency Risk

Anticipated Capacity

Net Imports (Firm)

At-Risk Capacity

Extreme Scenario

GW
ISO-NE Winter 2016/17
Gas Operational Risk

![Bar chart showing gas operational risk metrics]

- Anticipated Capacity
- Net Imports (Firm)
- At-Risk Capacity
- Extreme Scenario

GW (Gigawatts)
CA-MX Winter 2016/17
Gas Operational Risk

The graph illustrates the gas operational risk with the following categories:

- **Anticipated Capacity**: Approximately 50 GW
- **Net Imports (Firm)**: Around 20 GW
- **At-Risk Capacity**: About 10 GW
- **Extreme Scenario**: Close to 60 GW

The data suggests a high level of risk in the extreme scenario category.
• Aliso Canyon is a critical element of the Los Angeles (LA) Basin natural gas delivery system
  ▪ Supports winter peak heating demand
  ▪ Maintains pressure in gas distribution system (More challenging with rapid power plant ramping)
• Aliso Canyon currently has about 15 Bcf of working gas out of a total capacity of 86 Bcf
• Injections will not resume until safety testing or isolation of remaining 114 wells is completed
Aliso Canyon: LA Basin Power Supply

Potential Impacted Generation

LA Basin:
- 9,800 MW natural gas generation
- ~95% of total local capacity

Rest of Southern California:
- >15,000 MW natural gas generation

Maximum Import Capacity

- 5,500 MW DC capacity
- 14,900 MW AC capacity
- 20,400 MW total*

* Typically limited to 17,000 - 18,000 MW
• Aliso Canyon Winter Action Plan and Technical Report Released
• Under normal weather conditions, no Aliso Canyon withdrawals, and reasonable utilization rates of pipeline deliveries – electric system reliability issues are not likely.
• Gas is expected to be interrupted and curtailed to electric generation.
  ▪ Transmission support biggest contributor to offset capacity reduction
• Winter peak day, coldest day 1-in-10-year period may pose challenges:
  ▪ Gas curtailment
  ▪ Potential for some support by withdrawing from Aliso Canyon
Key Findings & Recommendations

• The electric and gas industries should consider mitigation measures – use of dual-fuel generators and firm natural gas delivery contracts.

• Risks to natural gas generation during summer season – it’s not just a winter problem

• Expand gas-electric planning and coordination – current industry best practice in some areas

• Operational coordination between gas and electric industries decrease likelihood of wide-spread outage
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Reserve Margins are Sufficient for Each Assessment Area
Winter Preparedness Remains a Priority for All Assessment Areas

Across the board, NERC assessment areas are prepared for the upcoming winter season and no challenges are anticipated.
• Extreme cold weather is a challenge for reliability but can be sufficiently managed with a forward looking assessment of the upcoming winter season, proper planning and risk-based preparation
Questions and Answers

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