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NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Winter Preparation for Severe Weather Events

Jule Tate, Associate Director, Event Analysis

Richard Hackman, Senior Reliability Advisor, Reliability Risk Management

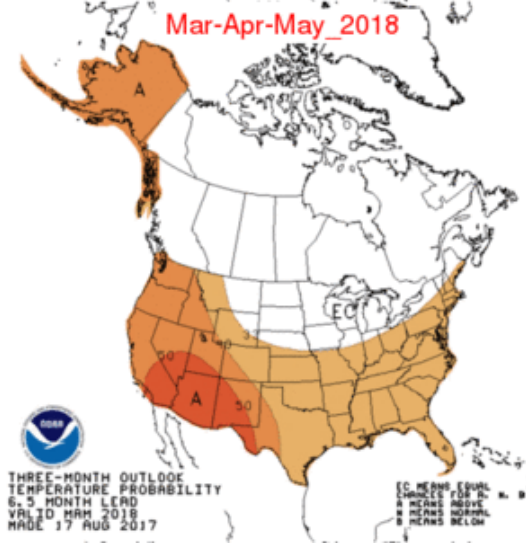
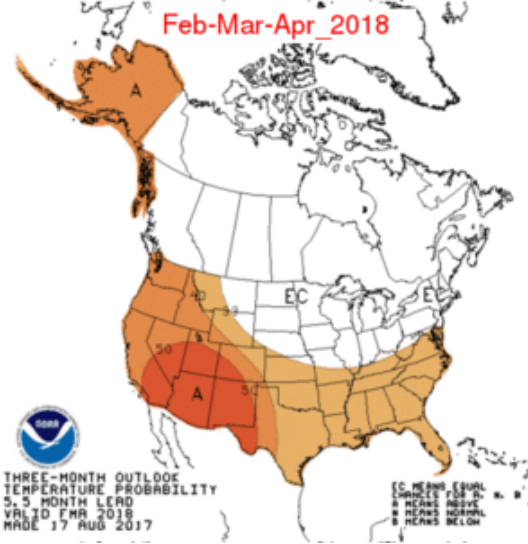
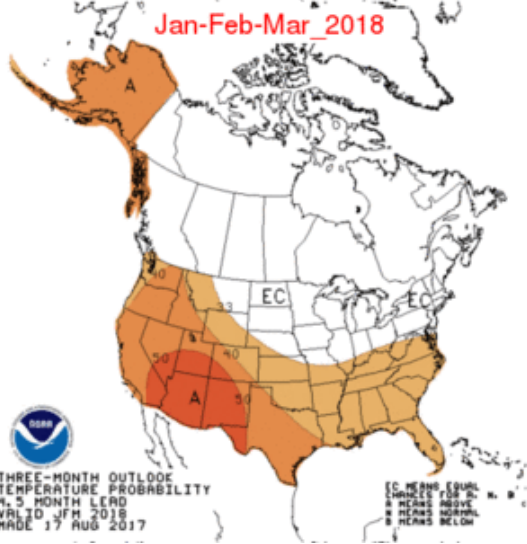
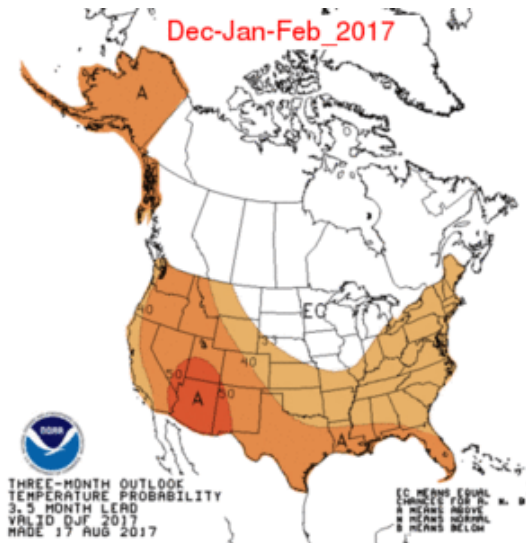
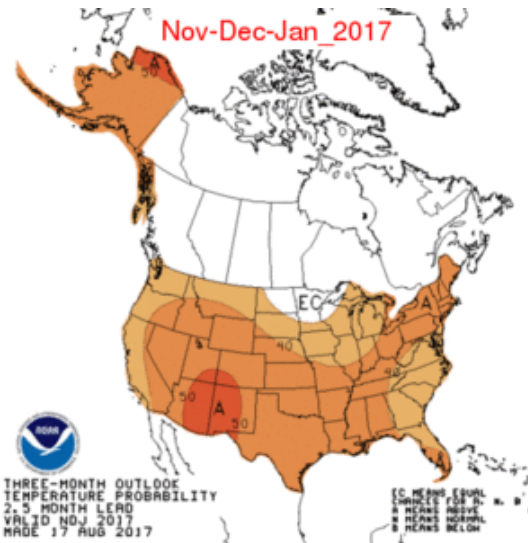
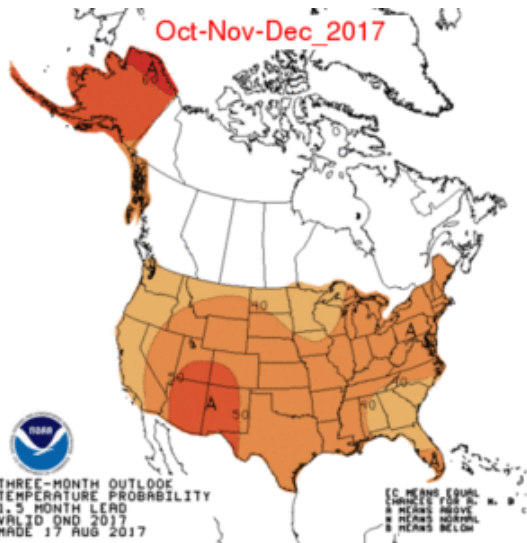
Mark Olson, Senior Engineer, Reliability Assessments

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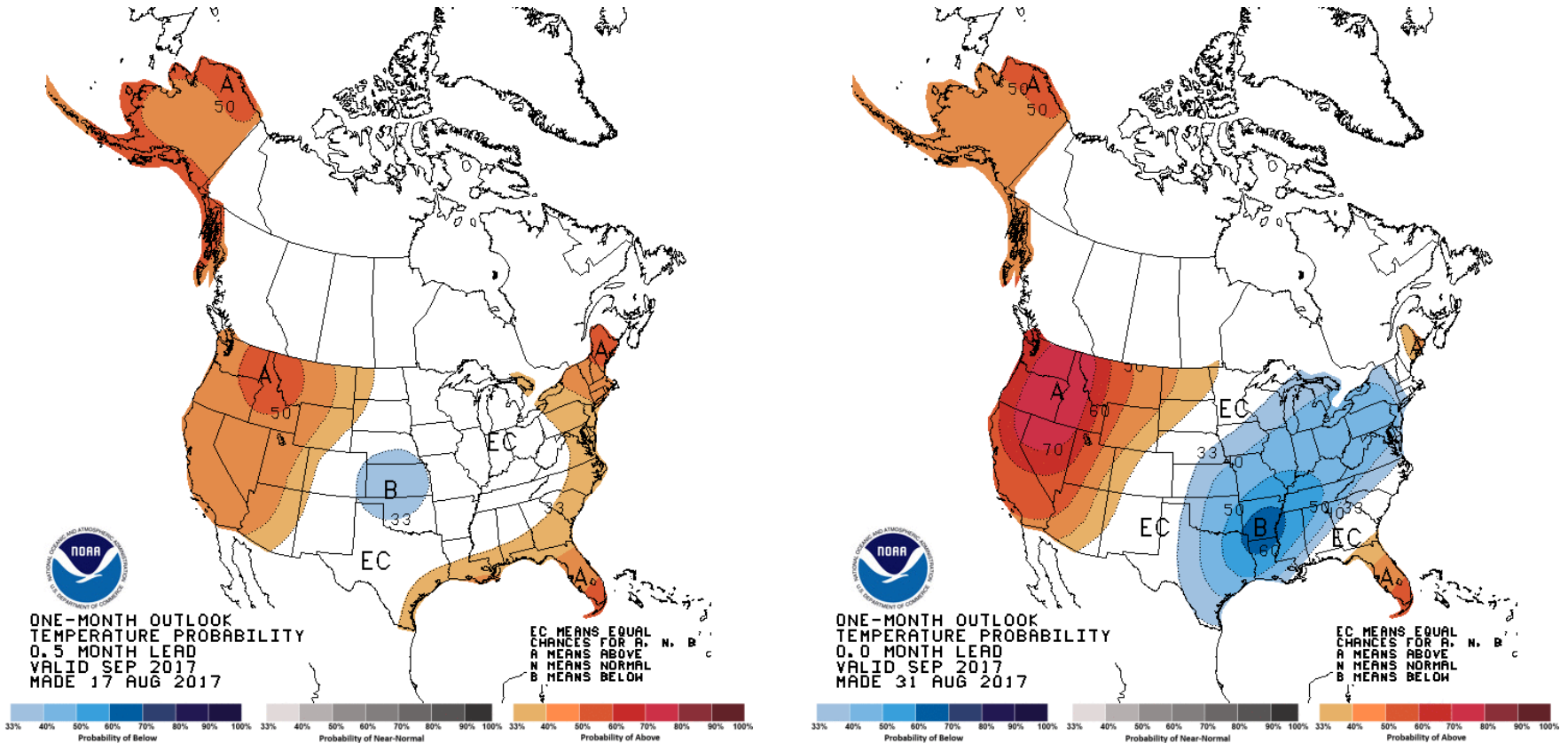


- Overview Of Reference Materials
- Cold Weather Training Packet Update
- Gas-Electric Interdependency Special Short-Term Assessment
- 2017-18 Winter Reliability Assessment
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- Provide the industry with reports and training materials in preparation for the upcoming winter weather forecasts.



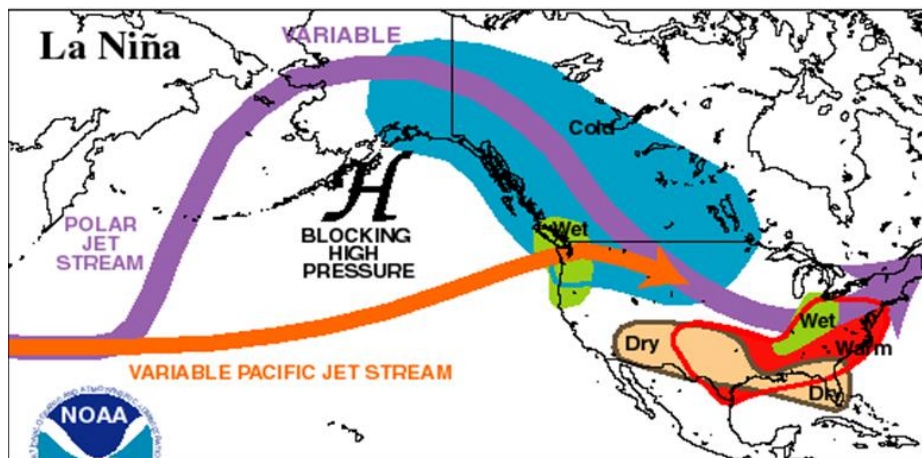
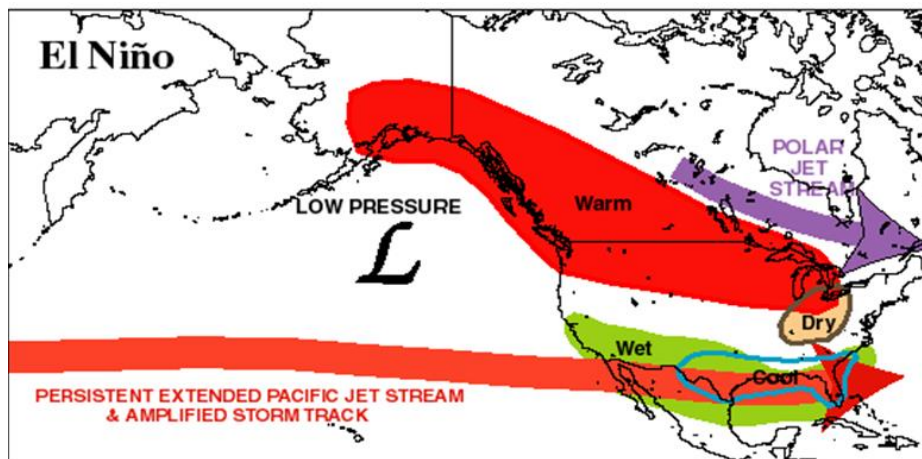
...But your mileage may vary...



NOAA forecasts for September 2017 made two weeks apart.

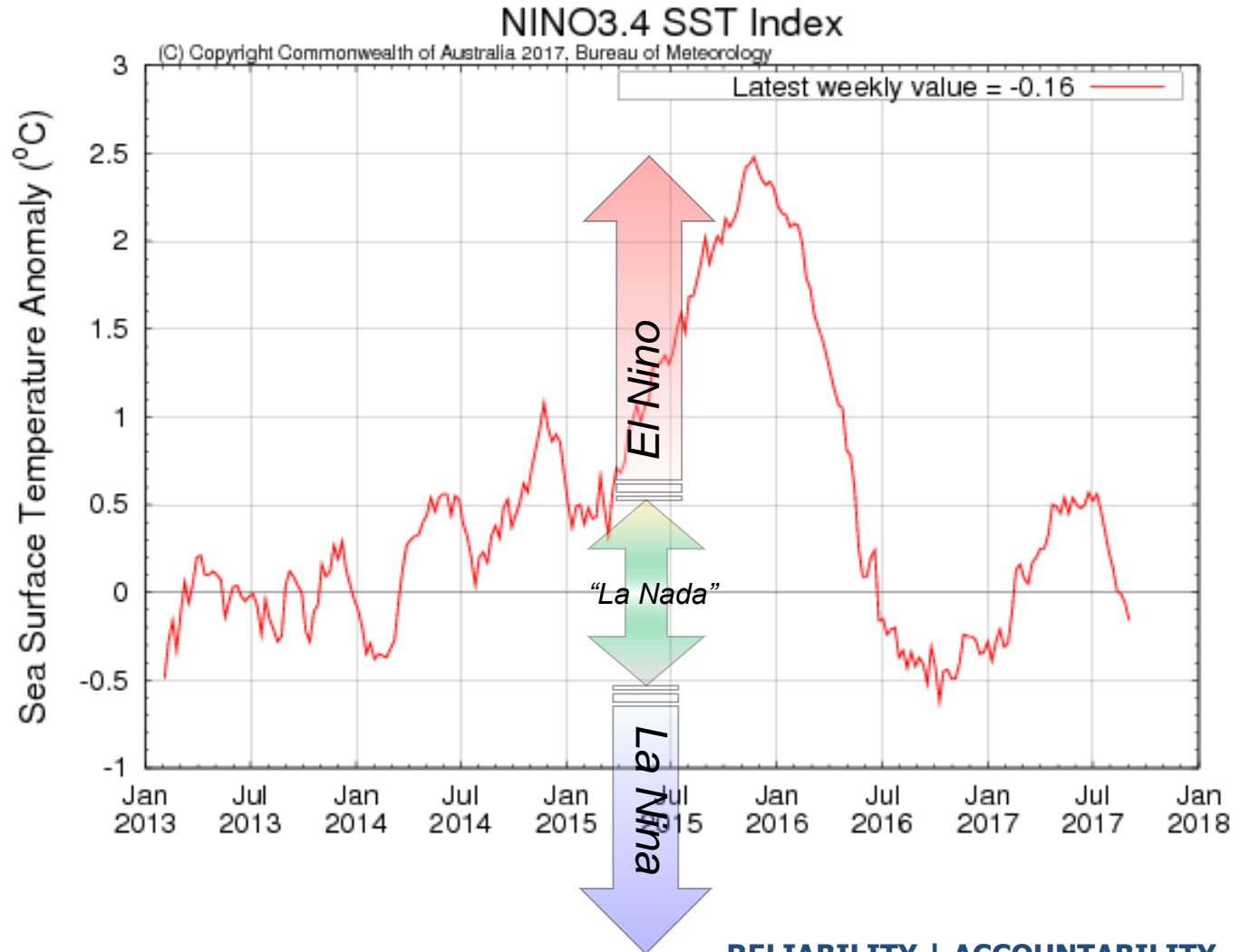
El Niño Southern Oscillation (ENSO) has a major influence on North American weather.

The effects we feel lag the changes in ocean surface temperatures by a couple of months.

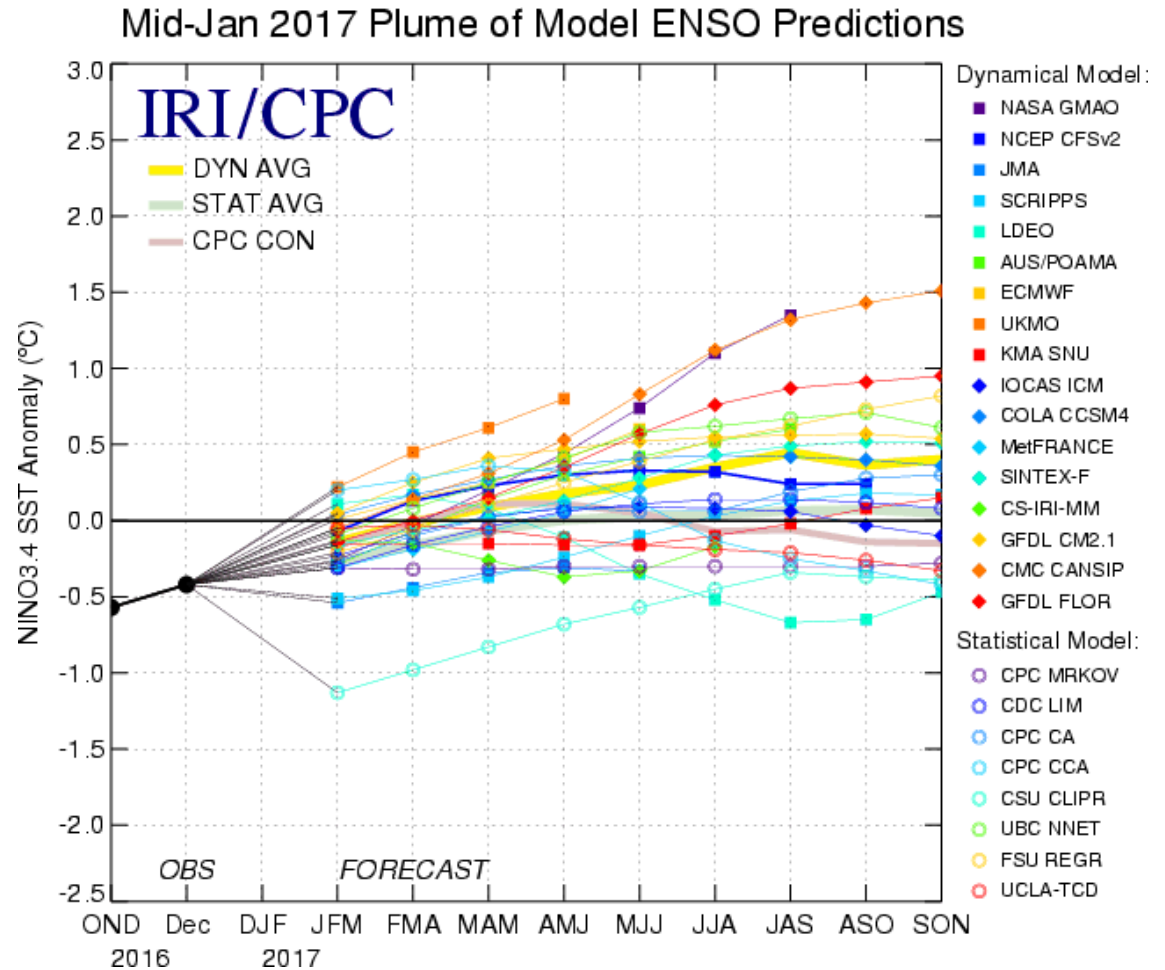


Climate Prediction Center/NCEP/NWS

During the past year, we had a strong El Niño, which sent a lot of rain to the west coast, and gave us a mostly mild winter.



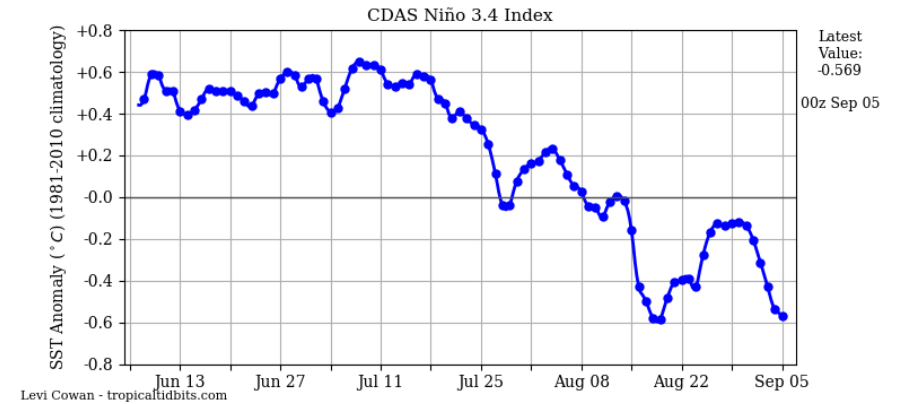
Earlier in the year, a trend toward a La Nada or a mild El Niño was predicted.



Observed temperatures cooled that prediction down and gave us a new one (lower right).

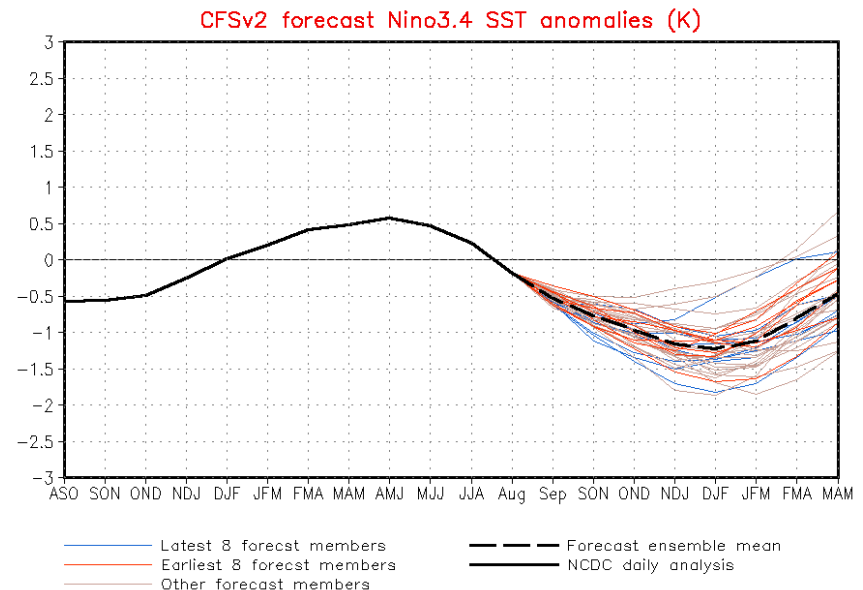
NOAA's long range forecast may look dramatically different in October.

It's best to be prepared.



NWS/NCEP/CPC

Last update: Tue Sep 5 2017
Initial conditions: 26Aug2017-4Sep2017



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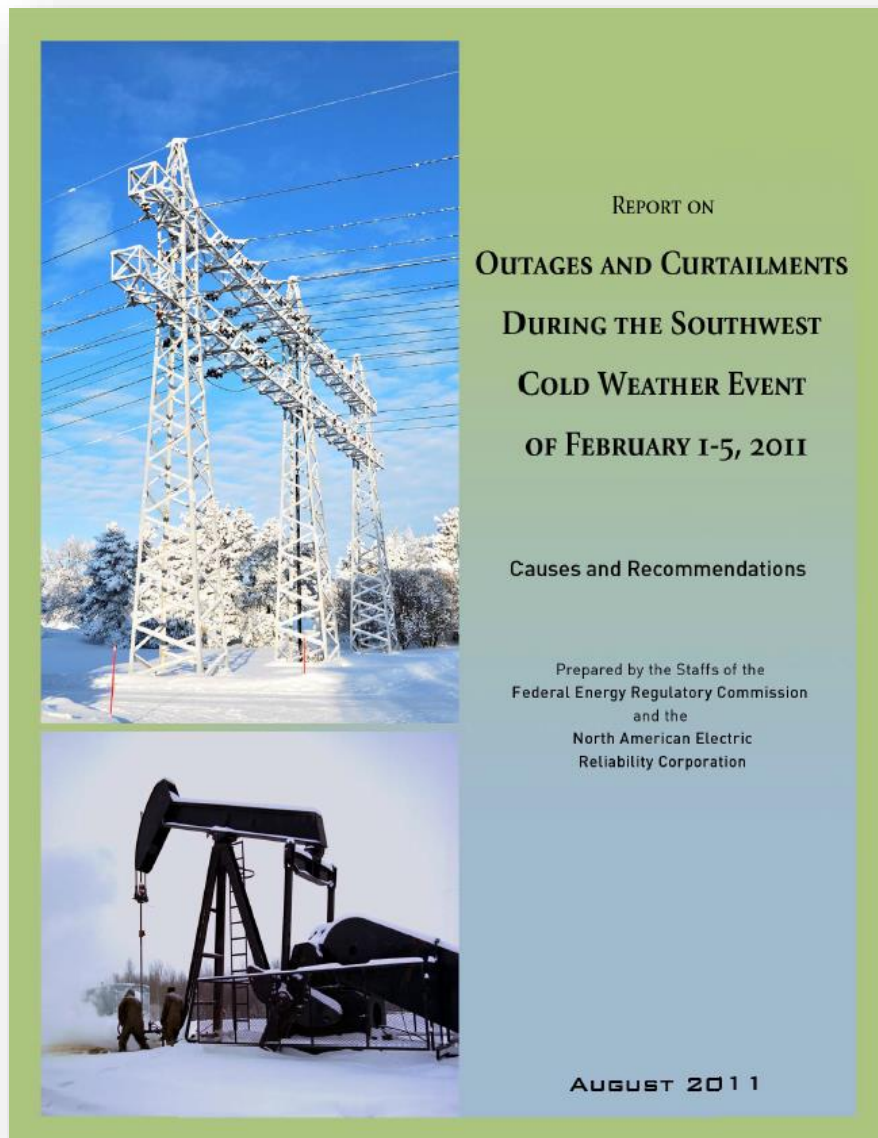
Overview of Cold Weather Reference Materials

Richard Hackman, Senior Reliability Advisor, Reliability Risk Management

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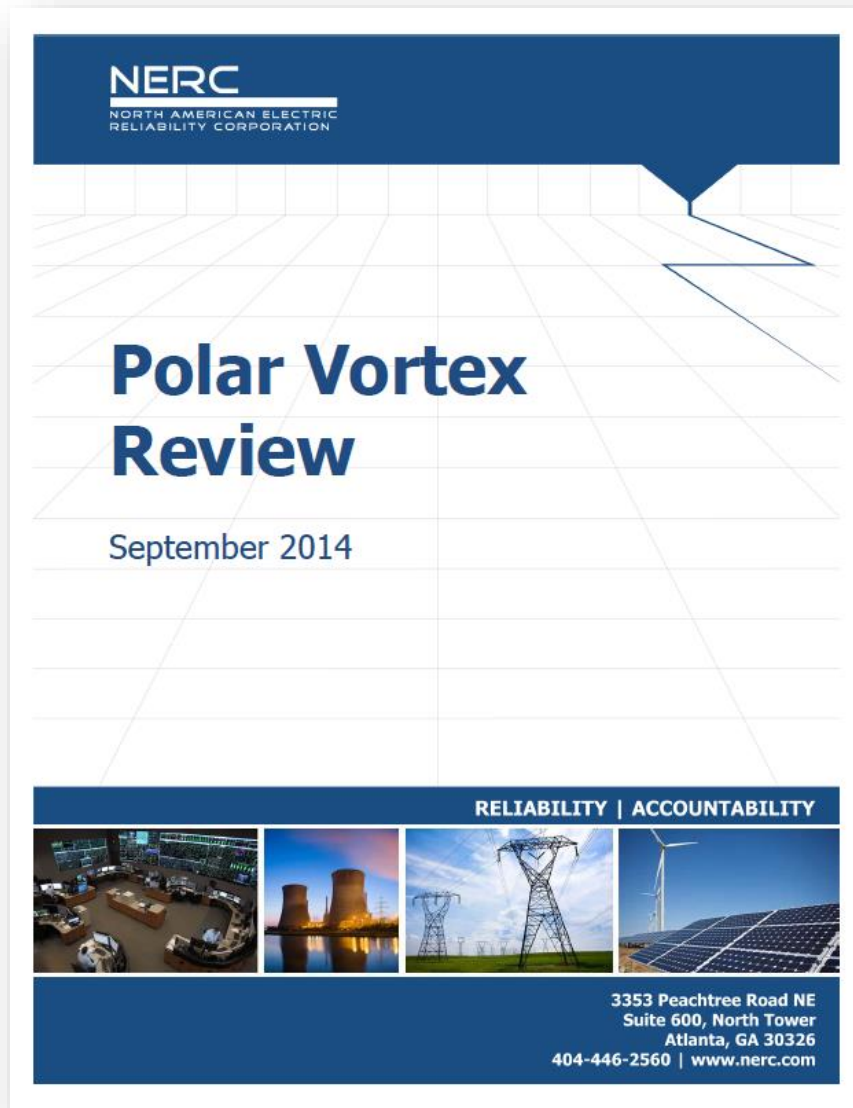


- [Report on February 1-5, 2011 Southwest Cold Weather](#)
- [Lessons Learned - Southwest Cold Weather Event](#)
- [Polar Vortex Review](#)
- [Previous Cold Weather Event Analysis](#)
- [Reliability Guideline: Generating Unit Winter Weather Readiness](#)
- [2015 Winter Review](#)
- [Cold Weather Training Packet Refresher](#)

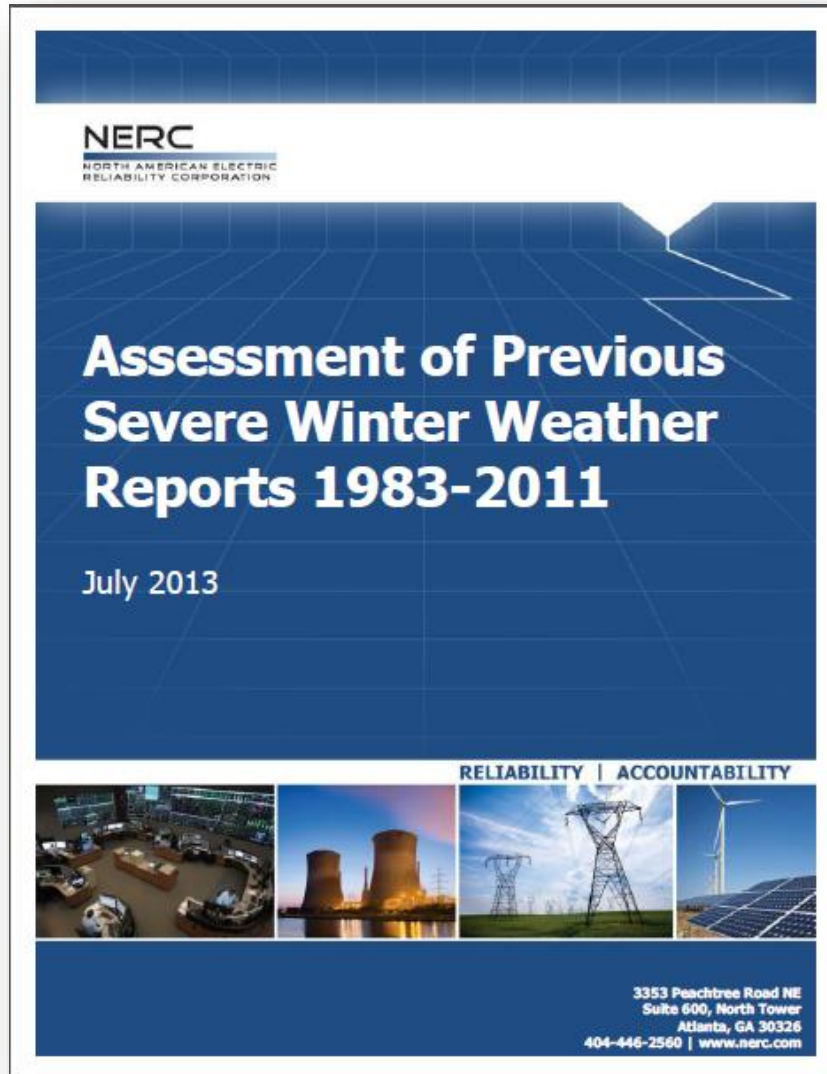


Report on February 1-5, 2011 Southwest Cold Weather

- 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](#)



Previous Cold Weather Event Analysis

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.

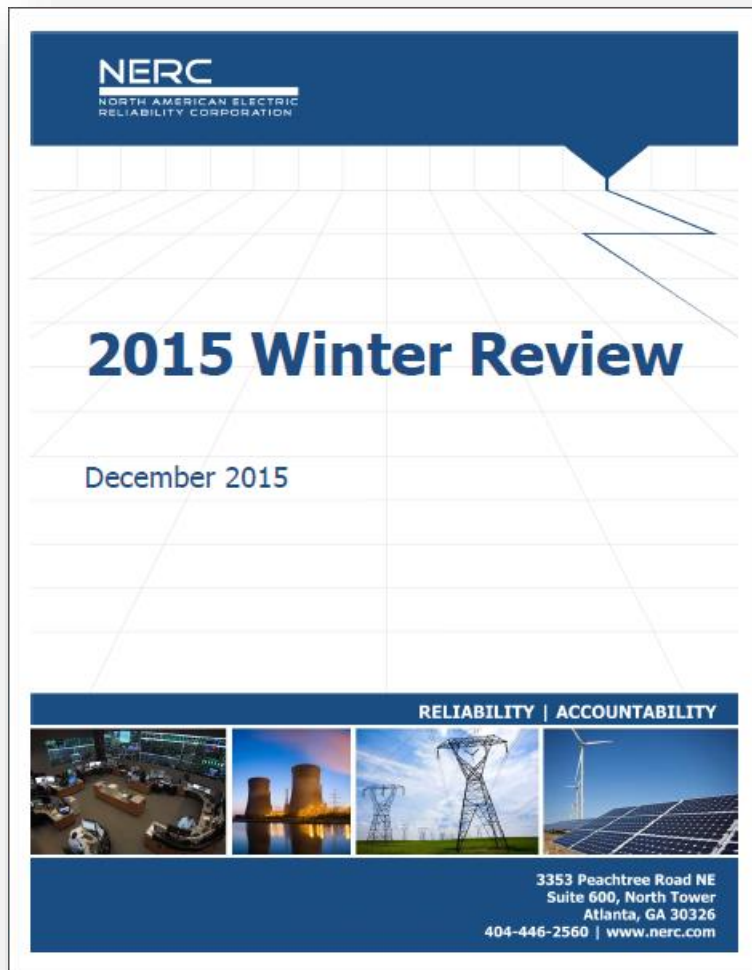
Guideline Details:

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.

Reliability Guideline: Generating Unit Winter Weather Readiness



2015 Winter Review



The North American Electric Reliability Corporation (NERC) is a not-for-profit international regulatory authority whose mission is to assure the reliability of the bulk power system in North America. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel. NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico. NERC is the electric reliability organization for North America, subject to oversight by the Federal Energy Regulatory Commission and governmental authorities in Canada. NERC's jurisdiction includes users, owners, and operators of the bulk power system, which serves more than 334 million people.

Headlines & News

- ▶ **NERC to Host Fourth Annual Monitoring and Situational Awareness Conference**
August 22, 2018
- ▶ **International Collaboration Highlighted at NERC Board of Trustees Meeting**
August 11, 2018
- ▶ **George Hawkins Appointed to National Infrastructure Advisory Council**
August 08, 2018
- ▶ **Statement on PERC's July Open Meeting**
July 21, 2018
- ▶ **NERC Highlights 10-Year Anniversary as the ERO**
July 20, 2018
- ▶ **NERC Signs Agreement with EU Energy Directorate**
July 14, 2018

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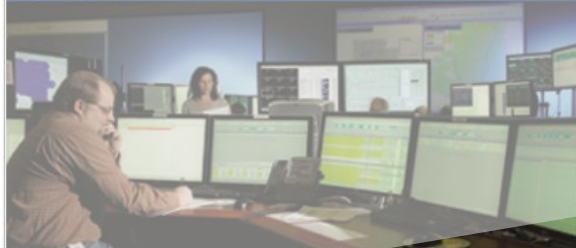
Standards



NERC's Standards program ensures the reliability of the bulk power system by developing quality reliability standards in a timely manner that are effective, clear, consistent and technically sound.

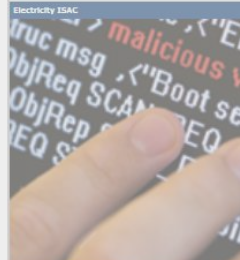
▶ Standards News

Reliability Risk Management



The Reliability Risk Management program's goals are to enhance reliability and serve as a learning initiative by providing timely lessons learned from system events, conditions, and trends.

▶ Lessons Learned



Electricity ISAC

E-ISAC gathers security information, coordinates incident response, across interdependent sectors, and with government.

▶ E-ISAC

Compliance & Enforcement



The focus of NERC's Compliance & Enforcement program is to improve the reliability of the bulk power system in North America by fairly and consistently enforcing compliance with NERC standards.

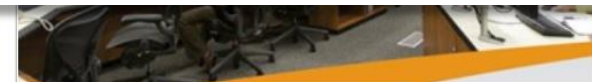
▶ Reliability Assurance Initiative

Reliability Risk Management



The Reliability Risk Management program's goals are to enhance reliability and serve as a learning initiative by providing timely lessons learned from system events, conditions, and trends.

▶ **Lessons Learned**



Training, Education, and System Operator Certification provides training and education for staff and industry on reliability standards, the compliance monitoring and enforcement processes, and other supporting reliability functional areas. It also ensures personnel operating the bulk power system are certified to operate the system reliably.

▶ Training, Education, and System Operator Certification

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About NERC | Governance | Committees | Program Areas & Departmental Activities

Event Analysis

- EA Program
- 1200 MW Fault Induced Solar Photovoltaic Resource Interruption Disturbance Report
- 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

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EA Program

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ed

ed from NERC's various activities. They are not intended to be amendments in any existing Reliability Standards. Compliance with these standards may be amended from time to time. Implementation of Reliability Standards.

ssons Learned Quick Reference Guide.

	Date

- Overview Of Reference Materials
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Cold Weather Training Packet

Richard Hackman, Senior Reliability Advisor, Reliability Risk Management

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- 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
 - <http://www.nerc.com/pa/rrm/ea/Pages/February-2011-Southwest-Cold-Weather-Event.aspx>
- 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
 - How does this effect/apply to me/us?
 - How can we take necessary prevention (reliability assurance) steps, etc?
 - Emphasize key learning points – LL from event
 - Wrap-up and review
 - NERC provided discussion questions

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- [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

[Program Areas & Departments](#) > [Reliability Risk Management](#) > [Event Analysis](#) > [Cold Weather Training Materials](#)

Cold Weather Training Materials

Cold Weather Training Materials		
Type	Title	Date
	Winter Weather Preparedness	12/29/2015
	2015 Winter Review Report	12/18/2015
	2015 Winter Performance Update	9/2/2015
	Polar Vortex Review 2014	9/1/2015
	Survey to Assess the Effectiveness of Severe Winter Weather Preparation materials	6/23/2014
	Winter Preparation for Severe Weather Events - Webinar Q&A	10/25/2013
	Extreme Winter Weather Events - Training Presentation	10/2/2013
	Practical Activities Handout	10/2/2013
	Extreme Winter Weather Events - Instructor's Manual	10/2/2013
	Winter Preparation for Severe Weather Event - Webinar Presentation	10/2/2013
	Reliability Guideline: Generating Unit Winter Weather Readiness	8/9/2013
	FERC NERC Findings and Recommendations	8/16/2011

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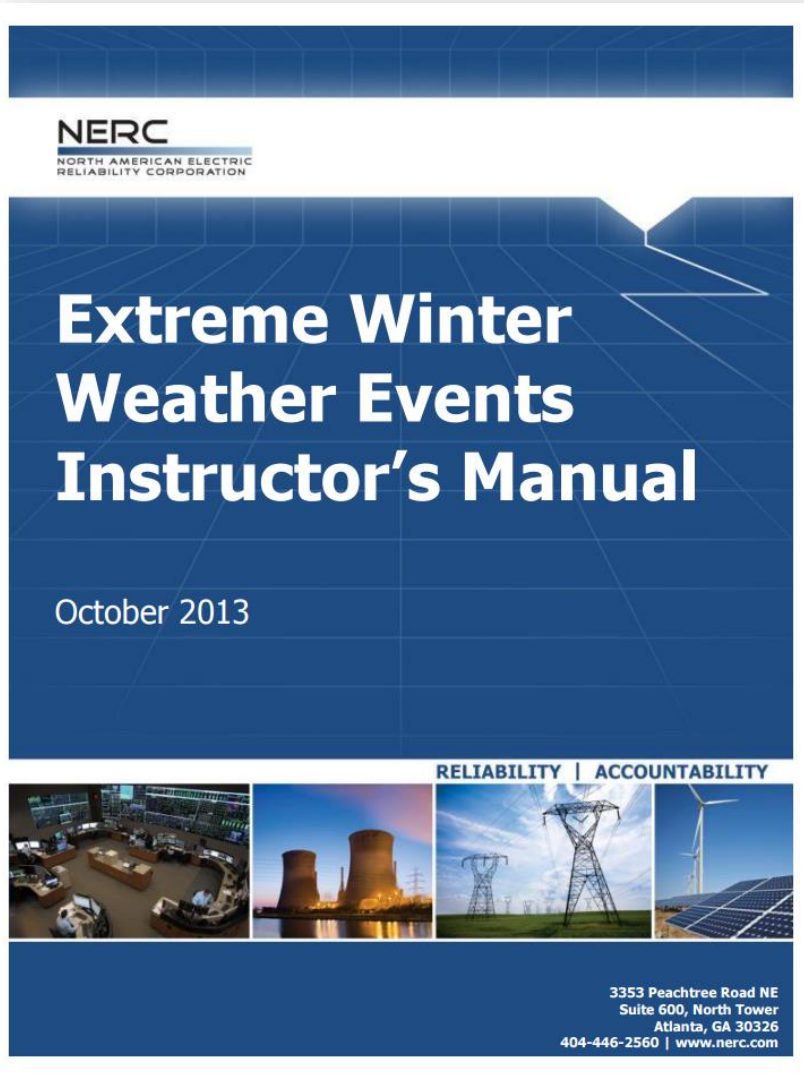
Extreme Winter Weather Events

Instructor's Manual

October 2, 2013

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Contents of Instructor's Manual

Introduction

Course Overview

Training Coordination tips

Course Goals and Outcomes

Trainer Tools and Tips

Presentation Deck with Key Messages

Agenda	
Lesson #	Lesson Title & Description
1	Introduction – Objectives – Purpose – Audience
2	February 2011 – Overview of the Severe Cold Weather Event
3	FERC & NERC
4	Precedence – Previous Events
5	Winter Readiness
6	Elements of Winter Weather Preparations
7	Lessons Learned
8	Question & Answer / Supplemental Photos
9	Wrap-up / Q&A
10	Evaluation
Breaks as appropriate	

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

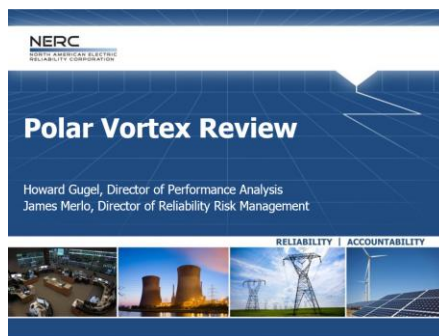
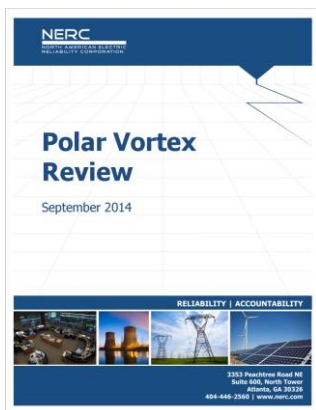
- January 2014 Polar Vortex Review--

<http://www.nerc.com/pa/rrm/Pages/January-2014-Polar-Vortex-Review.aspx>

- Polar Vortex Review--<http://www.nerc.com/pa/rrm/ea/Pages/February-2011-Southwest-Cold-Weather-Event.aspx>

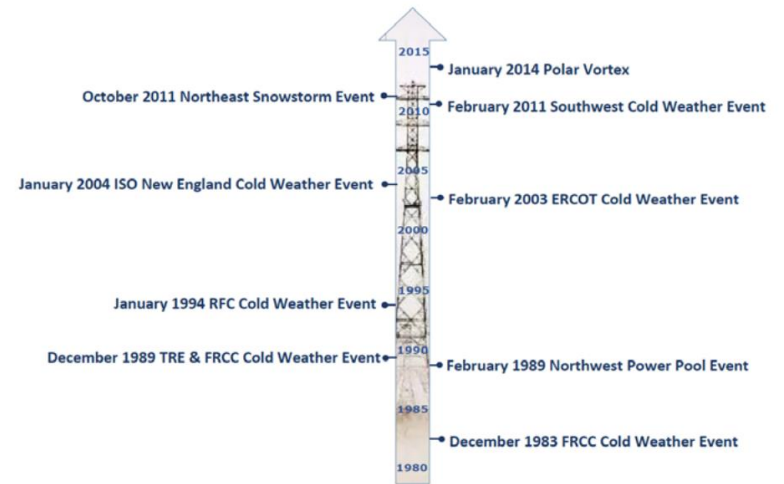
- 2015 Winter Performance Update--

<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.

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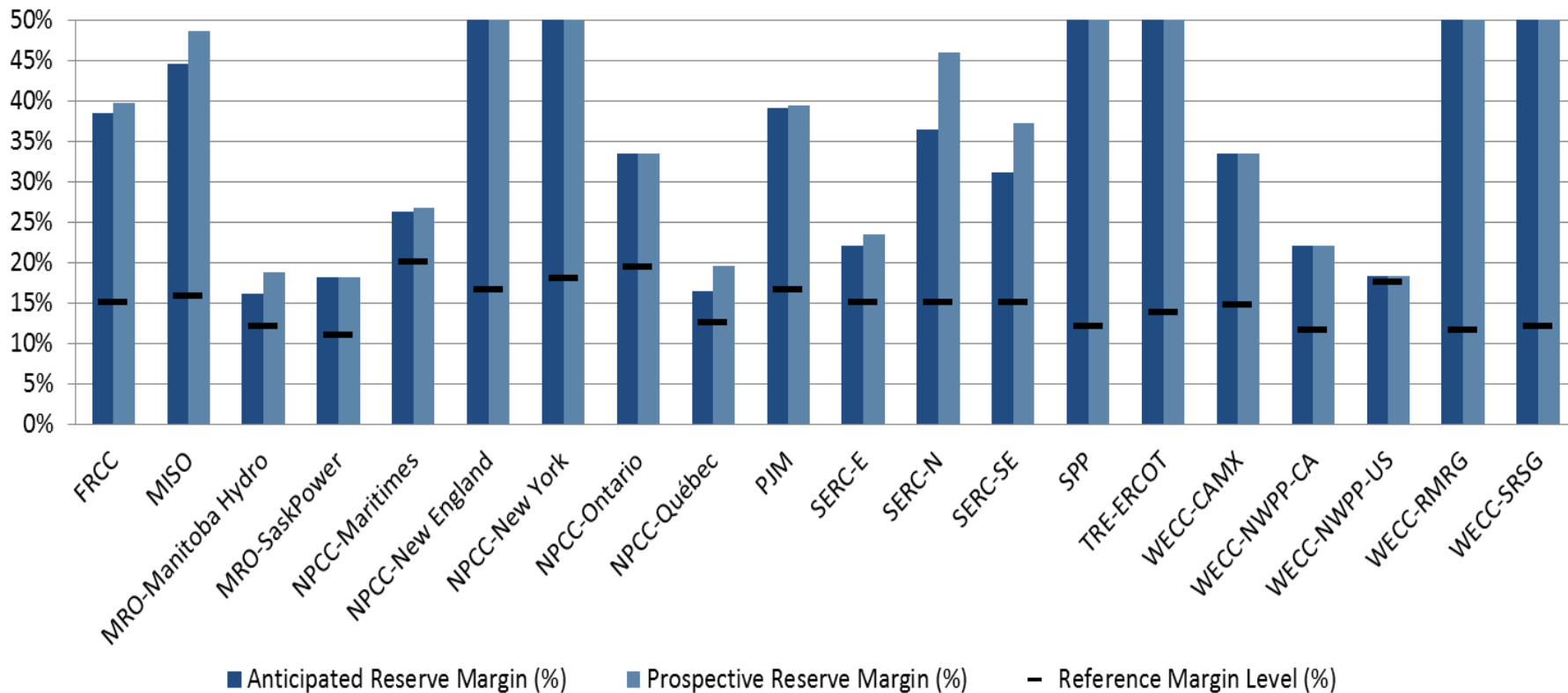
2017-2018 Winter Reliability Assessment

Mark Olson, Senior Engineer, Reliability Assessments
Winter Readiness Webinar
September 7, 2017

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Reserve Margins are Sufficient for Each Assessment Area



- Reliability-focused programs are being implemented for winter preparedness in assessment areas
- Impacts from Hurricane Harvey are still being assessed but are not expected to be a risk to the BPS during the winter period
- New reliability issues are not anticipated with the limited-basis return to service of Aliso Canyon gas storage facility

Winter Preparedness Remains a Priority in Assessment Areas

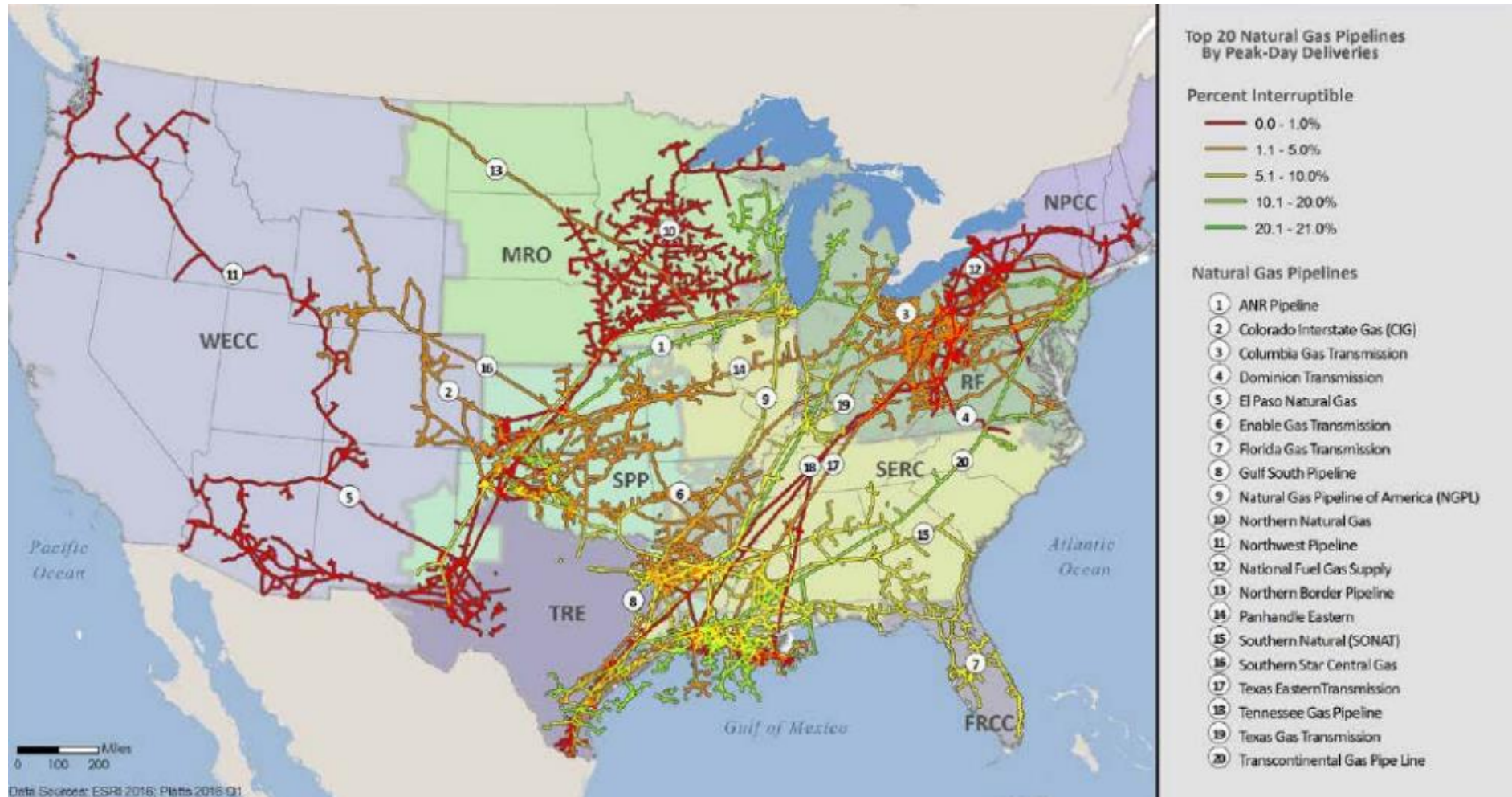


NERC assessment areas are prepared for the upcoming winter season



Top-20 Gas Pipelines by Peak-Day Delivery Arrangement

Red pipelines mean there were no interruptible flows on-peak





Questions and Answers