

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Winter Preparation for Severe Weather Events

October 2, 2013

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- Provide the industry with reports and training materials in preparation for the upcoming winter weather forecasts and entity cold weather preparedness.

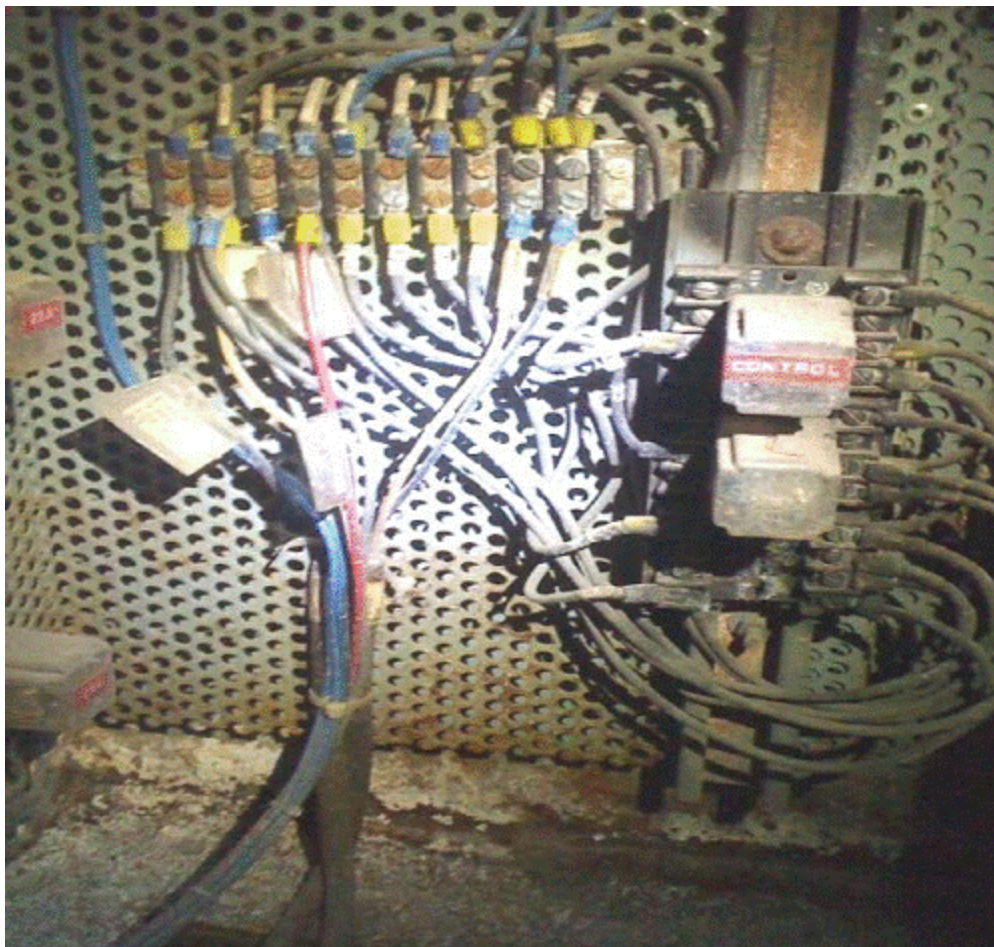
- Overview of Southwest Cold Weather Event of February 1-5, 2011
- Assessment of Previous Severe Winter Weather
- Reliability Guideline Presentation
- NERC Winter Reliability Assessment Preview 2013-14
- Risk Assessment
- Cold Weather Training Module
- Questions and Answers

- **Background**
 - The southwest region of the United States experienced unusually cold and windy weather during the first week of February 2011.
 - Lows during this period were below freezing temperatures for five consecutive mornings.
 - In addition, sustained high winds of over 20 mph produced severe wind chill factors.

- **Impacts**
 - **Increased Energy Demand**
 - New winter peak demand were set for many registered entities.
 - **Generation losses due to frozen equipment and fuel issues**
 - 225 units tripped, de-rated or failed to start
 - Except for nuclear facilities, all power plant types including coal/lignite, simple cycle gas, combined cycle gas and wind resources experienced problems
 - **1.3 million customers lost power**

- **Generation Preparation**
 - Many generators failed to adequately prepare for the 2011 winter storm, including the following:
 - Heat traces failed or not adequate
 - Wind breaks missing or not adequate
 - Insulation removed, damaged, not adequate
 - Instrument cabinet heating elements failed or not adequate
 - Freeze protection equipment not on hand

Corroded Freeze Protection Panel



Inspect and maintain heat tracing equipment on all generating units.



Wind break was too Short

Plan to erect adequate wind breaks and enclosures, where needed.

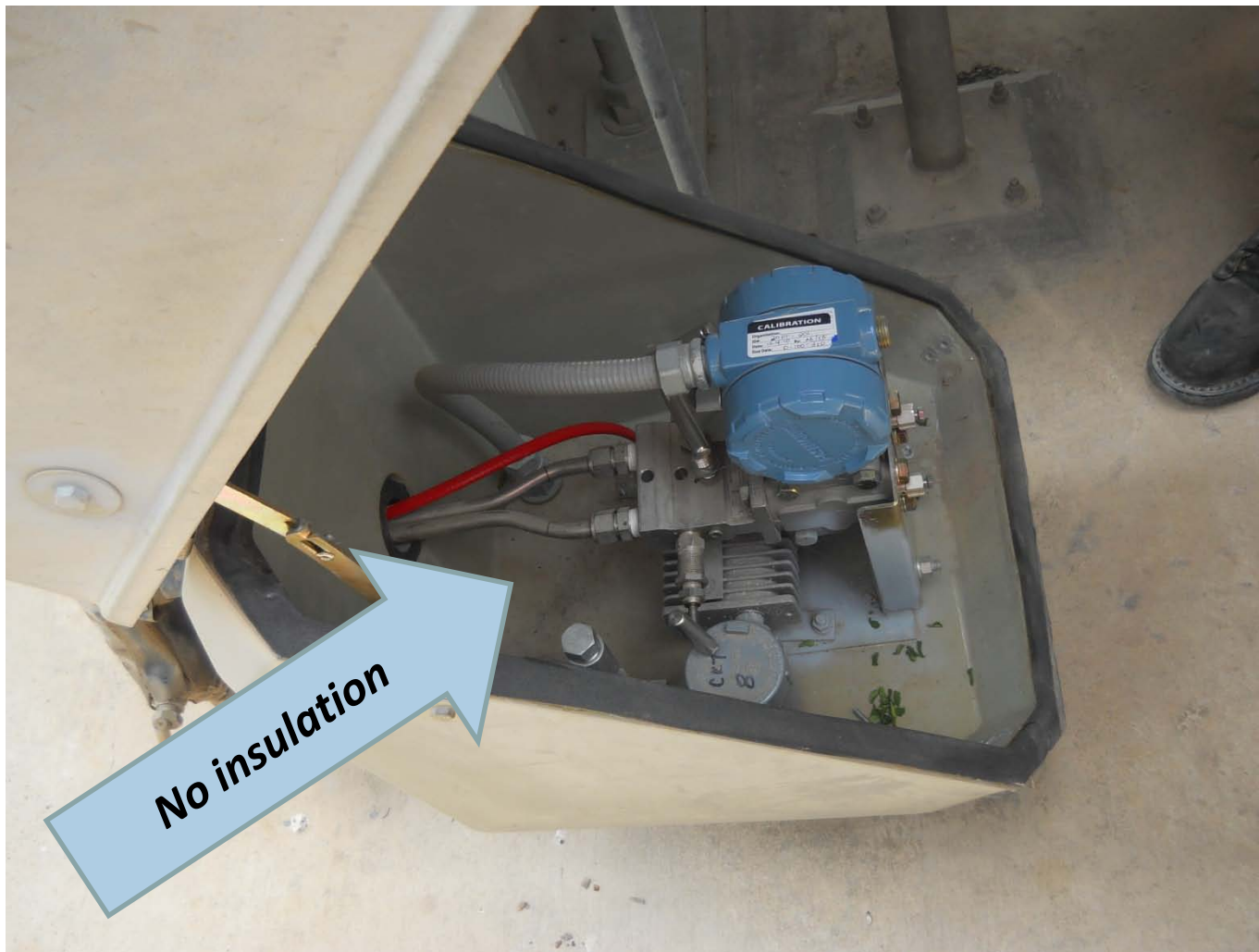


Feedwater Sensor Froze

Wind Break



*Inspect and
maintain
thermal
insulation on
all units.*



*No heat lamp
in instrument
cabinet.*

- Precedence
 - Prior severe cold weather in the same geographical region in 1989, 2003, 2006, 2008, and 2010.
 - Impacts to generation were the same.
 - Finding, Recommendations, and Lessons Learned are similar
 - Limited institutionalization of the recommendations and lessons.

- Follow-up Activities
 - 13 lessons learned (LL) published
 - Assessment of Previous Severe Winter Weather Reports 1983-2011
 - Reliability Guideline on “Generating Unit Winter Weather Readiness – Current Industry Practices.”
 - Training package from the Winter Weather Operations LL
 - Annual webinars on winter weather preparation

- Overview of Southwest Cold Weather Event of February 1-5, 2011
- **Assessment of Previous Severe Winter Weather**
- Reliability Guideline
- NERC Winter Reliability Assessment Preview 2013-14
- Risk Assessment
- Cold Weather Training Module
- Questions and Answers

- Purpose
 - This report provides a review and comparison of the previous events with the February 2011 cold weather event.
- Conclusion
 - Of the 11 cold weather incidents documented in the last 30 years (1983-2013), three cold weather events were comparable in size and scope to the February 2011 event.

- Background
 - Prior severe cold weather, in the same geographical region and magnitude, was cited in the report on the Southwest Cold Weather Event.
 - The NERC Operating Committee (OC) requested the Event Analysis Subcommittee (EAS) to conduct a comprehensive review of the event reports.
 - The subordinate Trends Working Group (TWG) developed an Assessment of Previous Severe Winter Weather Reports 1983-2011

- Posted on NERC website on July 9, 2013.
 - Eight prior severe cold weather Event Reports
 - NERC Event Analysis Cause Codes of Southwest Cold Weather Event of February 1-5, 2011 (some examples of contributing causes below)
 - The designs and other documentation for equipment were incomplete.
 - Industry or in-house experience relating to a current problem that existed prior to the event, but was not assimilated by the organization.
 - A process for supplying personnel with appropriate materials or tools did not exist.
 - Management's methods for monitoring the success of initiatives were ineffective in identifying shortcomings in the implementation.
 - All essential components were not included in the required inspection.
 - Management direction created insufficient awareness of the impact of actions on reliability

The screenshot displays the NERC website interface. At the top left is the NERC logo. To the right is a search bar and navigation links for 'Login', 'Account Log-In/Register', and 'Contact Us'. Below this is a horizontal navigation menu with categories: 'About NERC', 'Governance', 'Standing Committees & Other', 'Program Areas & Departments', 'Filings & Orders', 'Newsroom', and 'Resources'. A dropdown menu is open under 'Program Areas & Departments', listing: 'Standards', 'Critical Infrastructure', 'Reliability Assessment & Performance Analysis', 'Reliability Risk Management' (highlighted), 'Compliance & Enforcement', and 'Training & Operator Certification'. The main content area features a large image of wind turbines and solar panels on the left, and a text block on the right that begins with 'The North American Electric Bulk-Power System in...'. The footer contains a 'Headlines & News' section with several news items, a 'Calendar' section with a grid of topics, and a 'View All Events' link. The text 'RELIABILITY | ACCOUNTABILITY' is repeated in the bottom right corner.

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February 2011 Southwest Cold Weather Event

September 2011 Southwest Blackout Event

October 2011 Northeast Snow Storm Event

2003 Northeast Blackout Information

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)

Program Areas & Departments > Reliability Risk Management

Reliability Risk Management

NERC’s Reliability Risk Management (RRM) group carries out the ERO’s statutory responsibility by performing assessments (including Real-time or near-Real-time assessments) of the reliability and adequacy of the Bulk-Power System and by identifying potential issues of concern relating to system, equipment, entity and human performance that may indicate the possible need to develop new or modified Reliability Standards.




RRM includes four primary functions: (1) Bulk-Power System awareness; (2) event analysis; (3) training; and (4) operator certification. This group focuses directly on proactive awareness of Bulk-Power System conditions and all events over a threshold of impact. RRM analyzes events and addresses the most significant risks to Bulk-Power System reliability, ensuring that industry is well informed of system events, emerging trends, risk analysis, lessons learned and expected actions. These functions may also identify areas in which new or enhanced compliance monitoring and enforcement initiatives are warranted, pursuant to the ERO’s statutory responsibility to monitor, enforce and achieve compliance with mandatory Reliability Standards.

Program Contacts

- Operations Manager
- Situational Awareness
- Human Performance
- Event Analysis

Calendar

[View Reliability Risk Management Events](#)



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Standing Committees & Other
Program Areas & Departments
Filings & Orders
Newsroom
Resources

Event Analysis

- EA Program
- February 2011 Southwest Cold Weather Event
- September 2011 Southwest Blackout Event
- October 2011 Northeast Snow Storm Event
- 2003 Northeast Blackout Information
- 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

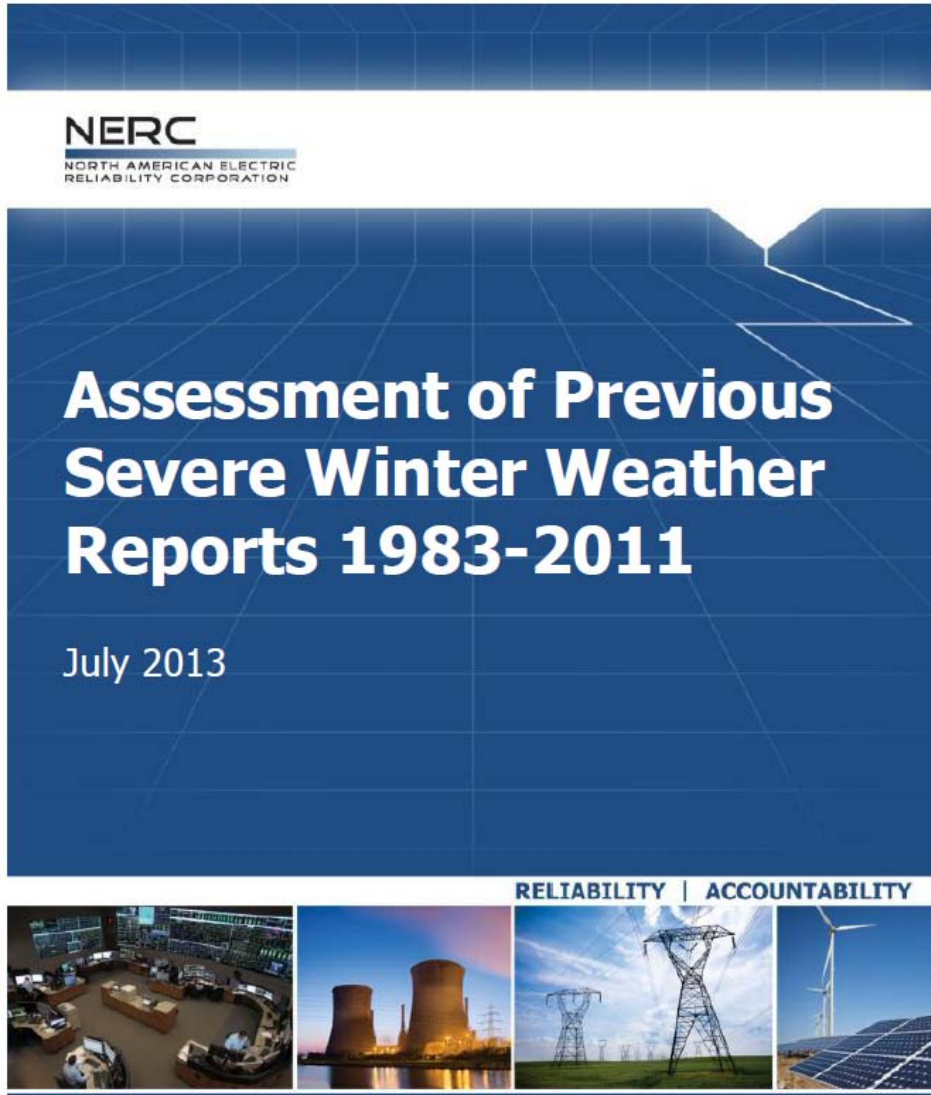
Webinars

Program Areas & Departments > Reliability Risk Management > Event Analysis > February 2011 Southwest Cold Weather Event

February 2011 Southwest Cold Weather Event

On Aug 16, 2011, the Federal Energy Regulatory Commission (FERC) and North American Electric Reliability Corporation (NERC) released a staff report making recommendations to help prevent a recurrence of rolling blackouts and natural gas curtailments experienced by customers in the Southwest during extreme cold weather the first week of February 2011. Concluding a six-month inquiry, the task force found a majority of the electric outages and gas shortages were due to weather-related causes. In total, approximately 1.3 million electric customers were out of service at the peak of the event on February 2, and a total of 4.4 million were affected over the course of the event from February 2 through February 4. Natural gas customers also experienced extensive curtailments of service during the event. These curtailments were longer in duration than the electric outages, because re-lighting customers' equipment has to be accomplished manually at each customer's location. Local distribution companies (LDCs) interrupted gas service to more than 50,000 customers in New Mexico, Arizona and Texas; New Mexico was the hardest hit with outages of over 30,000 customers. On May 9, 2011 FERC and NERC announced their staffs would create a joint task force to combine their separate inquiries. This report is a product of that effort.

February 2011 Southwest Cold Weather Event		
Type	Title	Date
Lessons Learned - Southwest Cold Weather Event (13)		
Previous Cold Weather Event Analysis (10)		
	Assessment of Previous Severe Winter Weather Reports 1983-2011	7/9/2013
	December 24-27, 1983 - FRCC Cold Weather Event	7/1/2013
	February 1-8, 1989 - Northwest Power Pool Event	7/1/2013
	January 14 - 16, 2004 - ISO New England Cold Weather Event	7/1/2013
	January 14 - 16, 2004 - ISO New England Cold Weather Event - Management Response	7/1/2013
	February 21, 2003 - ERCOT Cold Weather Event	7/1/2013
	December 21-24, 1989 - TRE and FRCC Cold Weather Event	7/1/2013
	Week of January 16, 1994 - RFC Cold Weather Event	7/1/2013
	February 21, 2003 - ERCOT Cold Weather Event - PUC Report	7/1/2013
	Southwest Cold Weather Event of February 1-5, 2011 - NERC Event Analysis Cause Codes	12/31/2012
Southwest Cold Weather Event (3)		
Webinars and Information - Southwest Cold Weather Event (3)		



Previous Cold Weather Event Analysis

- Overview of Southwest Cold Weather Event of February 1-5, 2011
- Assessment of Previous Severe Winter Weather
- **Reliability Guideline**
- NERC Winter Reliability Assessment Preview 2013-14
- Risk Assessment
- Cold Weather Training Module
- Questions and Answers

- Purpose
 - Provides general concepts that may be considered when developing a winter weather readiness program
 - Shares current winter weather readiness practices and procedures from across the industry
 - To be applied as appropriate based on geographic location, technology and plant configuration

- **Background**
 - The Reliability Issues Steering Committee (RISC) recommended the OC develop a guideline that assists entities in preparing for cold weather.
 - The OC formed a drafting team to develop a “Winter Preparation Reliability Guideline”
 - “Draft” Guideline was presented to the OC on November 20, 2012.
 - Latest version approved by the OC on March 5, 2013



The North American Electric Reliability Corporation is a not-for-profit entity whose mission is to ensure 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. Entities under NERC's jurisdiction are the users, owners and operators of the Bulk-Power System, which serves more than 334 million people.

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Headlines & News

- ▶ **Annual Stakeholder Perception Survey Underway**
September 10, 2013
- ▶ **NERC Board Approves 2014 Budget, ESCC Charter and Adopts 3 Reliability Standards**
August 16, 2013
- ▶ **Statement on the 2003 Blackout 10th Anniversary**
August 14, 2013
- ▶ **NERC Pleased with Senators' Efforts on Cybersecurity Act of 2013**
July 30, 2013
- ▶ **NERC, NATF Sign Memorandum of Understanding to Improve Cooperation, Coordination of Reliability Activities**
July 10, 2013
- ▶ **NERC Identifies Key Initiatives, Priorities for Bulk Power System Reliability at FERC Technical Conference**
July 09, 2013

[Newsroom Archives](#)

Calendar

Standards	Reliability Risk Management
Critical Infrastructure	Compliance
Reliability Assessment & Performance Analysis	Training & Operator Certification
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Reliability Issues Steering Committee

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Standing Committees and Other

Through NERC's technical committees, experts from all segments of the electric industry contribute their knowledge to promote the reliability of the North American Bulk-Power System. [Click here to download the latest NERC Roster.](#)

[Click here for upcoming NERC meetings.](#)

Committees, Subcommittees, Working Groups and Task Forces

Compliance & Certification Committee (CCC)	Operating Committee (OC)	Reliability Issues Steering Committee (RISC)
<ul style="list-style-type: none"> ERO Monitoring Subcommittee (EROMS) Organization Registration and Certification Subcommittee (ORCS) Performance Measures Working Group (PMWG) Procedures Subcommittee (PROCS) Standards Interface Subcommittee (SIS) <p>Critical Infrastructure Protection Committee (CIPC)</p> <ul style="list-style-type: none"> Critical Infrastructure Protection Committee Executive Committee (CIPCEC) Cyber Security Subcommittee (CSS) <ul style="list-style-type: none"> Control Systems Security Working Group (CSSWG) Cyber Attack Tree Task Force (CATTFF) Cyber Security Analysis Working Group (CSAWG) Operations Subcommittee (OS) <ul style="list-style-type: none"> Electricity Sector Information Sharing Task Force (ESISTF) HILF Implementation Task Force (HITF) 	<ul style="list-style-type: none"> Real-time Application of PMUs to Improve Reliability Task Force (RAPIRTF) Severe Impact Resilience Task Force (SIRTF) Event Analysis Subcommittee (EAS) Interchange Subcommittee (IS) Joint Electric Scheduling Subcommittee (JESS) Operating Reliability Subcommittee (ORS) Data Exchange Working Group (DEWG) Distribution Factor Working Group (DFWG) Interchange Distribution Calculator Working Group (IDCWG) System Data eXchange Self-Directed Work Team (SDX SDWT) Real-time Tools Best Practices Task Force (RTBPTF) Reliability Coordinator Working Group (RCWG) Reliability Fundamental Working Group (RFWG) Telecommunications Working Group (TWG) Personnel Subcommittee (PS) Resources Subcommittee (RS) 	<p>Standards Committee (SC)</p> <ul style="list-style-type: none"> Functional Model Working Group (FMWG) Standards Committee Communications and Planning Subcommittee (SCCPS) Standards Committee Process Subcommittee (SCPS) Project Management and Oversight Subcommittee (PMOS) <p>Other</p> <ul style="list-style-type: none"> Adequate Level of Reliability Task Force (ALRTF) Critical Infrastructure Strategic Coordinated Action Plan (CISCAP) Electricity Sector Information Sharing and Analysis Center Pandemic Influenza Working Group (ES-ISAC-PIWG) Electricity Sub-sector Coordinating Council (ESCC) Legal Advisory Committee (LAC) Power Flow and Dynamic Model Development and Validation Regional Standards Group (RSG) <li style="text-align: right;">Regional Reliability Standards

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[Committees > Operating Committee \(OC\)](#)

Operating Committee (OC)

The Operating Committee supports the NERC reliability mission by executing the policies, directives, and assignments of the Board of Trustees, and advising the Board on operating reliability matters. The Operating Committee also maintains a work plan that prioritizes the existing and future work of the committee and its subgroups consistent with the business and strategic plans of NERC. The Operating Committee's responsibilities include the following functions:

- Assess, analyze, and report on bulk electric system operating reliability performance.
- Coordinate operating reliability matters with Reliability Regions and other organizations.
- Enable the reliable operation of interconnected bulk electric systems by facilitating information exchange and coordination among reliability service organizations.
- Assist the development and implementation of standards for the reliable operation of bulk electric systems.
- Advise the Compliance and Certification functions on

Committee Resources

[Agendas, Highlights, and Minutes](#)

[2012 Election](#)

[2013 Election](#)

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- [Standards Committee](#)
- [Other](#)

Committees > [Operating Committee \(OC\)](#) > [Reliability Guidelines](#)

Reliability Guidelines

Reliability Guidelines		
Type	Description	Date
	Reliability Guideline: Operating Reserve Management (Clean)	9/20/2013
	Reliability Guideline: Operating Reserve Management (Redline)	9/20/2013
	Comment Form - Reliability Guideline: Operating Reserve Management	7/18/2013
	Reliability Guideline: Operating Reserve Management - Draft	7/18/2013
	Reliability Guideline: Generating Unit Winter Weather Readiness (Approved by the Operating Committee on March 5, 2013)	3/5/2013
	Reliability Guideline: System Operator Communications - Current Industry Practices (Approved by the Operating Committee on September 19, 2012)	9/21/2012

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.

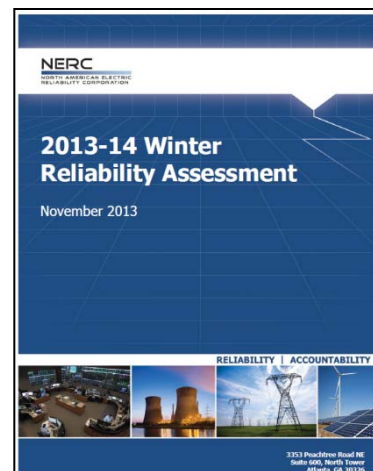
Assumptions:

- A. Each BPS generation owner and operator is responsible and accountable for maintaining generating unit reliability.

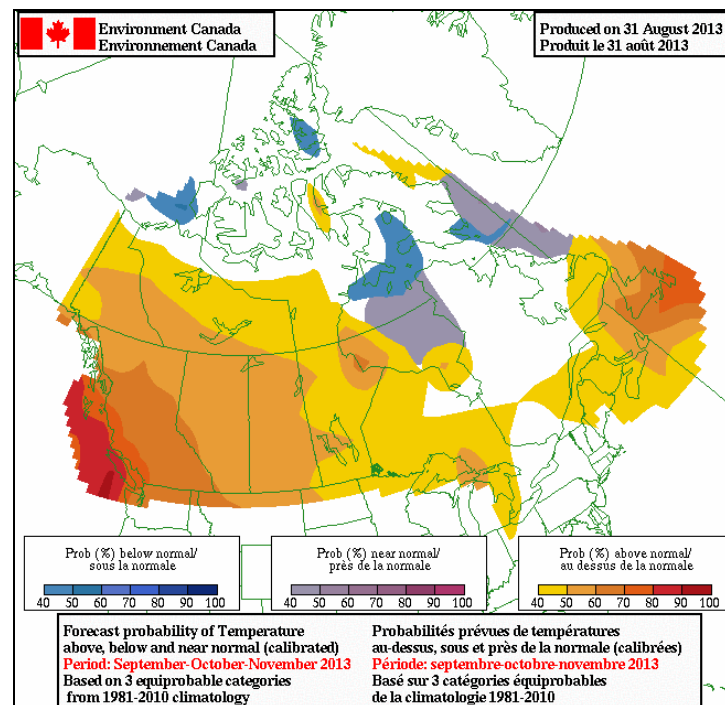
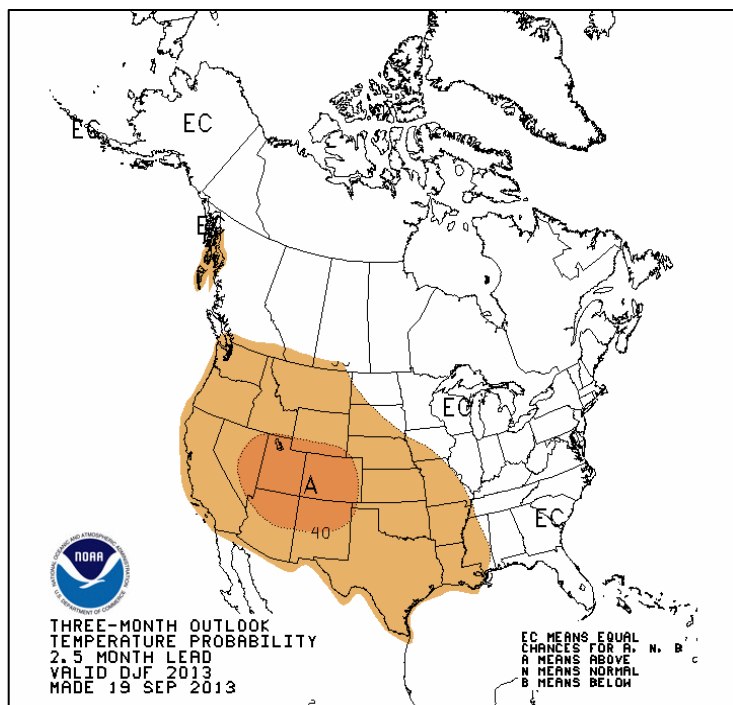
Reliability Guideline: Generating Unit Winter Weather Readiness

- Overview of Southwest Cold Weather Event of February 1-5, 2011
- Assessment of Previous Severe Winter Weather
- Reliability Guideline
- **NERC Winter Reliability Assessment Preview 2013-14**
- Risk Assessment
- Cold Weather Training Module
- Questions and Answers

- Data and information collected by NERC Assessment Areas.
 - Resource adequacy
 - Seasonal reliability issues
 - Trends, best practices, and general information sharing between assessment areas and industry
- Expected release: November 21, 2013



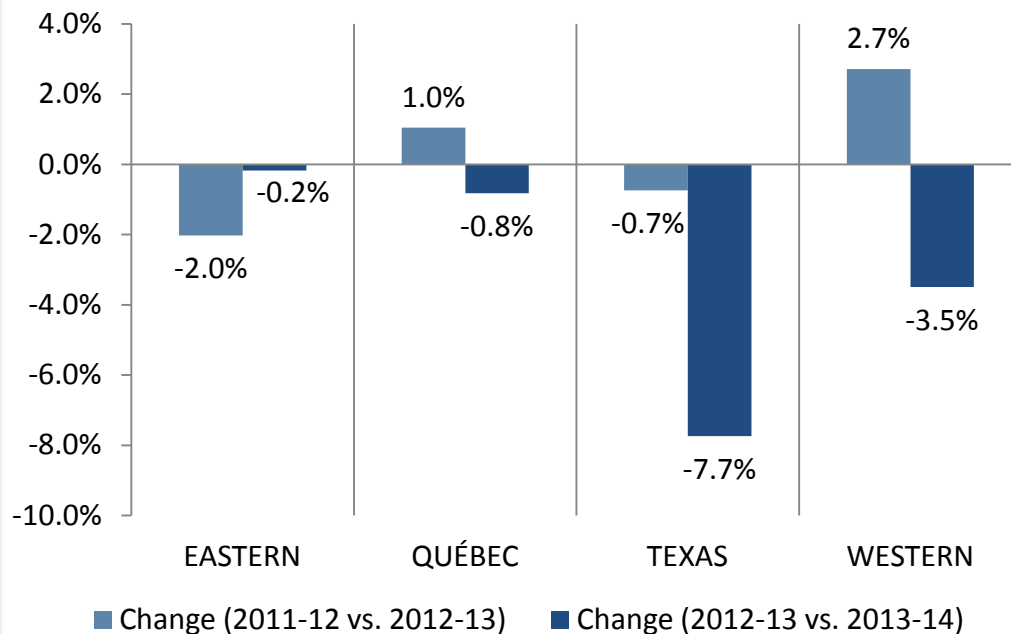
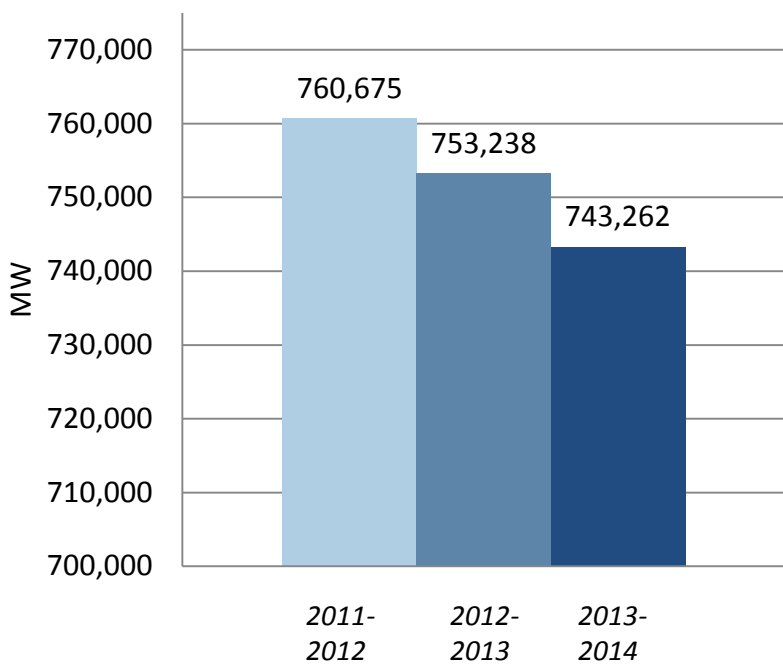
- NOAA Winter Outlook
- Natural Resources Canada and Environment Canada



- Consistent approach to examine forecasted peak load and resources expected to be available during peak.
- Reserves can address higher than anticipated forced outages caused by infrequent but severe weather events, but are only effective if:
 - Units are adequately maintained;
 - There is access to fuel (dual-fuel units);
 - Units are tested for switching capability.
- For summer-peaking areas, increased maintenance outages performed during the winter season.

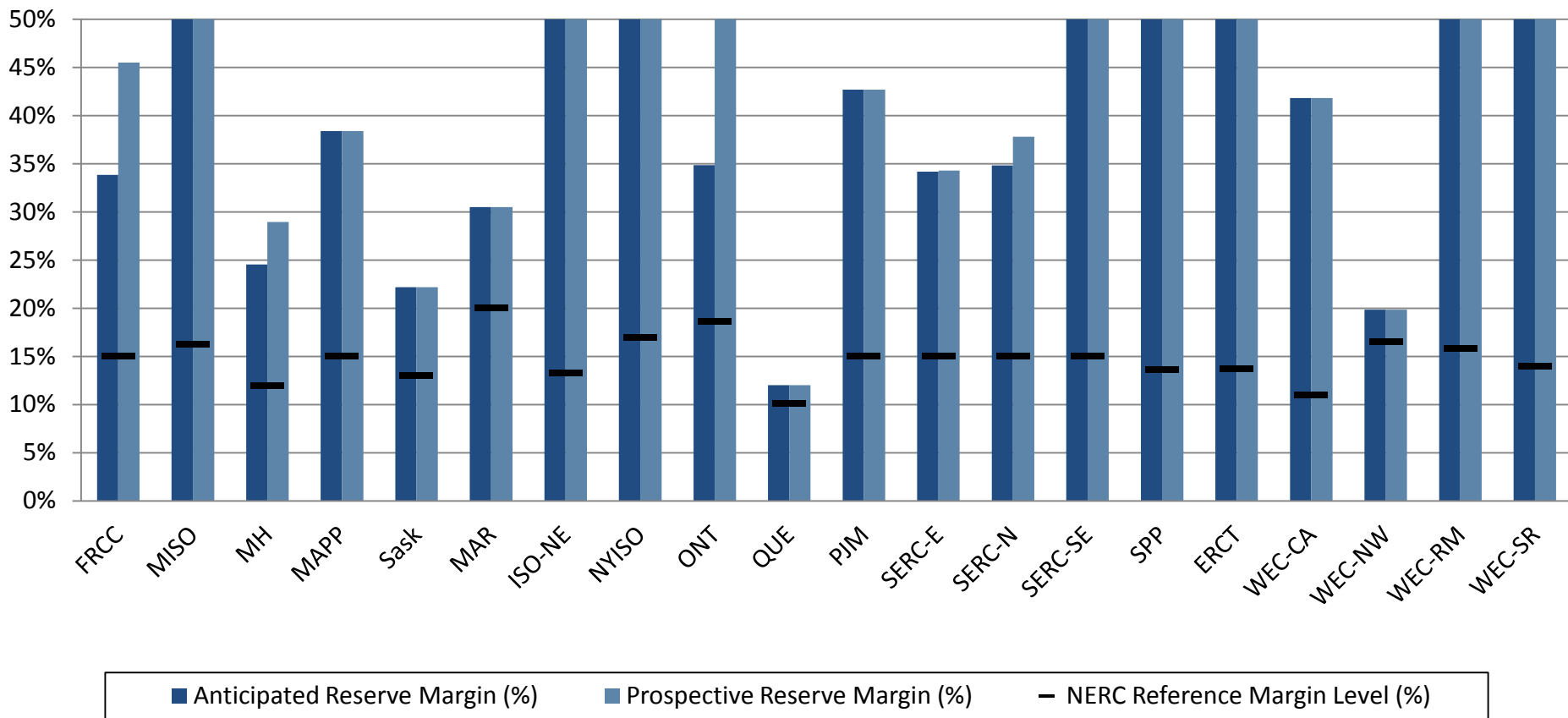
- Fuel supply and deliverability issues heightened during the winter.
- ISO-NE Winter Reliability Solutions (2013-14):
 - Key fuel availability enhancements
 - Serves as a bridge to promote market solutions
- Other initiatives underway in ISO-NE:
 - Increased monitoring of gas pipelines
 - Direct communication with pipeline operators
 - Daily Communication between control room staff and all dual-fuel generators
 - System Operations to conduct monthly fuel surveys

- Winter load forecasts in decline:
 - Prior season inputs in models yield lower load forecasts.
 - Lower/uncertain expectations for economic growth.



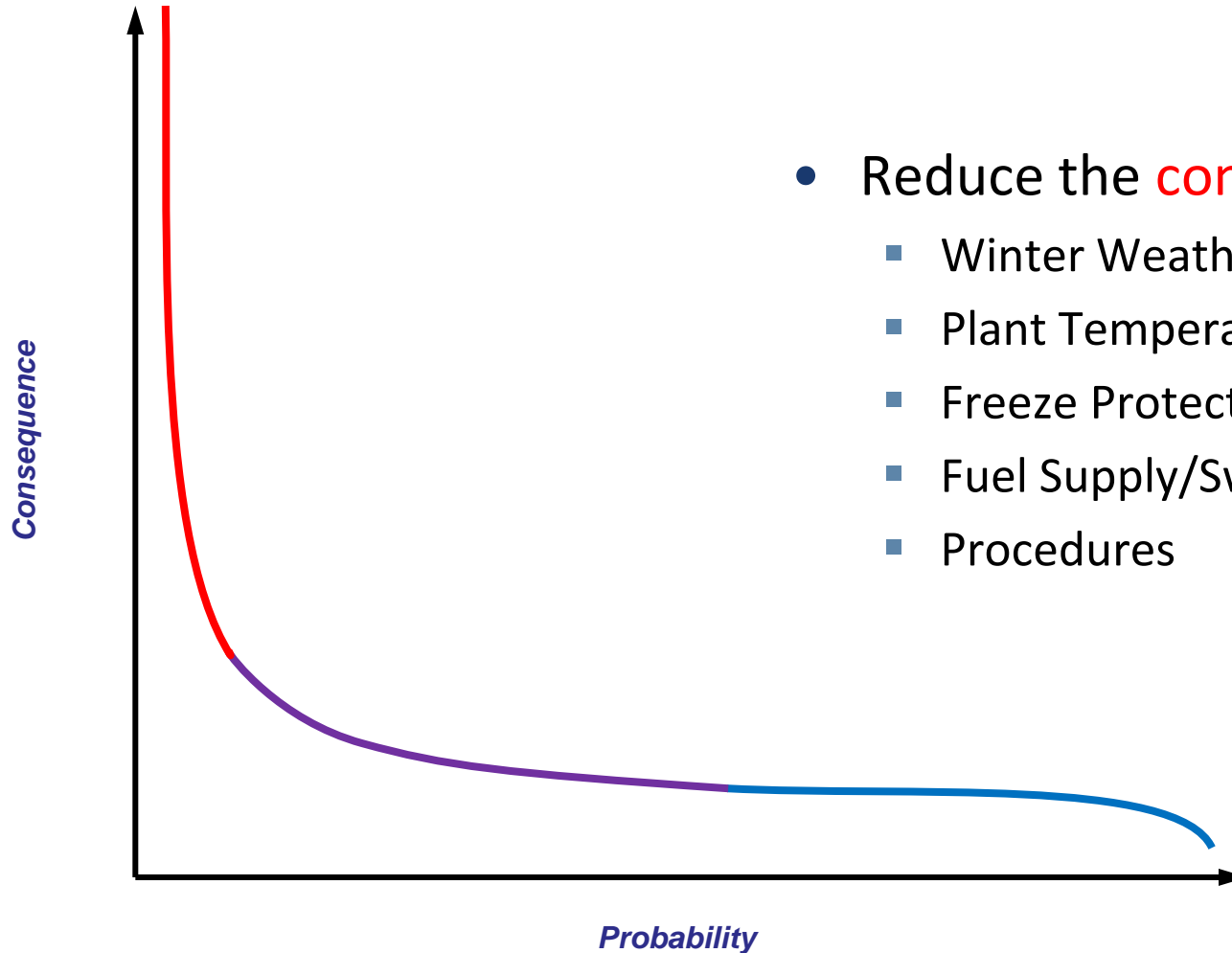
PRELIMINARY DATA – DO NOT QUOTE OR CITE AS RESULTS ARE SUBJECT TO CHANGE

Winter Planning Reserve Margins

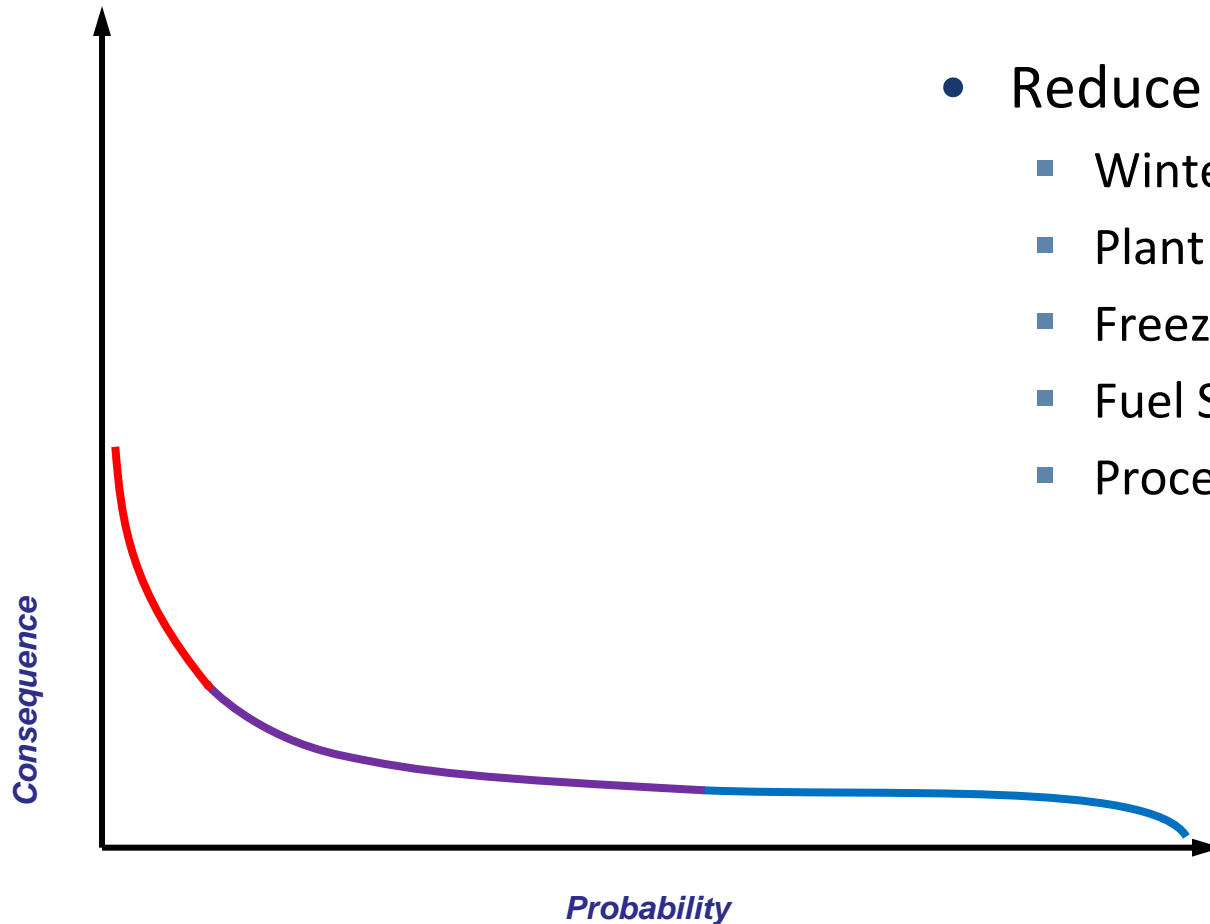


PRELIMINARY DATA – DO NOT QUOTE OR CITE AS RESULTS ARE SUBJECT TO CHANGE

- Overview of Southwest Cold Weather Event of February 1-5, 2011
- Assessment of Previous Severe Winter Weather
- Reliability Guideline
- Seasonal Forecast
- **Risk Assessment**
- Cold Weather Training Module
- Questions and Answers



- Reduce the **consequence**
 - Winter Weather Forecast
 - Plant Temperature Design
 - Freeze Protection Equipment
 - Fuel Supply/Switching
 - Procedures



- Reduce the **consequence**
 - Winter Weather Forecast
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- Questions and Answers

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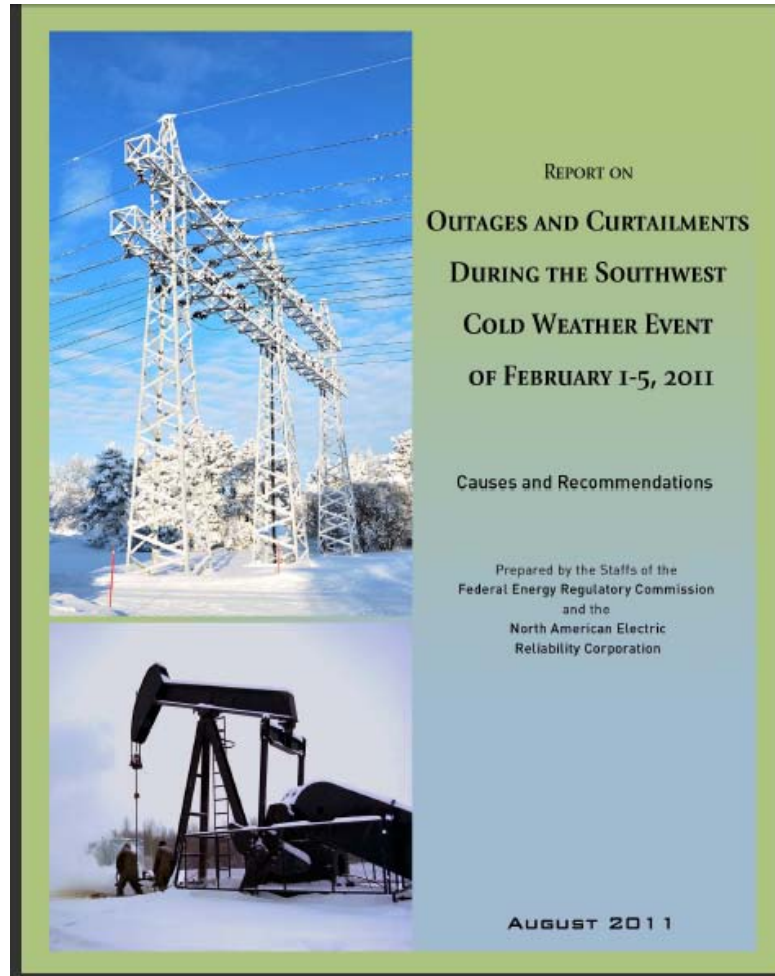
Overview of Training Packet

October 2, 2013

Jerimiah McClary, Manager of Training and Education

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- 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 did it happen: Weaknesses or failures of Bulk-Power System (BPS), human performance (HP) issues?
 - 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.?
 - Emphasis Key Learning Points – LL from event
 - Wrap-up and review
 - NERC provided discussion questions

- While extreme cold weather events are not common in the Southwest, they do occur every few years. This document is a tool to assist you in better preparing your location for potential threats.
- The recommendations are to be used in conjunction with your current winterization practices.
- The training is intended to assist in improved reliability.

Source: *Outages and Curtailments during the Southwest Cold Weather Event of February 1–5, 2011*

- Provide timely, relevant information to assist registered entities prepare 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

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





- Understand the content of the Cold Weather Training Packet and where the tools are located.
- Knowledge of the tools in the packet to create customized training for respective entities.
- Understanding of the Practical Activities and how to conduct the learning/discussion sections.

[Program Areas & Departments > Reliability Risk Management > Event Analysis > February 2011 Southwest Cold Weather Event](#)






February 2011 Southwest Cold Weather Event

On Aug 16, 2011, the Federal Energy Regulatory Commission (FERC) and North American Electric Reliability Corporation (NERC) released a staff report making recommendations to help prevent a recurrence of rolling blackouts and natural gas curtailments experienced by customers in the Southwest during extreme cold weather the first week of February 2011. Concluding a six-month inquiry, the task force found a majority of the electric outages and gas shortages were due to weather-related causes. In total, approximately 1.3 million electric customers were out of service at the peak of the event on February 2, and a total of 4.4 million were affected over the course of the event from February 2 through February 4. Natural gas customers also experienced extensive curtailments of service during the event. These curtailments were longer in duration than the electric outages, because relighting customers' equipment has to be accomplished manually at each customer's location. Local distribution companies (LDCs) interrupted gas service to more than 50,000 customers in New Mexico, Arizona and Texas; New Mexico was the hardest hit with outages of over 30,000 customers. On May 9, 2011 FERC and NERC announced their staffs would create a joint task force to combine their separate inquiries. This report is a product of that effort.

February 2011 Southwest Cold Weather Event

Type	Title	Date
 Lessons Learned - Southwest Cold Weather Event (13)		
 Previous Cold Weather Event Analysis (10)		
 Southwest Cold Weather Event (3)		
 Webinars and Information - Southwest Cold Weather Event (3)		

Cold Weather Training Materials

Type	Title	Date
	Extreme Winter Weather Events - Instructor's Manual	10/2/2013
	Extreme Winter Weather Events - Training Presentation	10/2/2013
	Practical Activities Handout	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

Instructors Guide

October 2, 2013

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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
<i>Breaks as appropriate</i>	

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.

Contents of Instructors Manual

Introduction

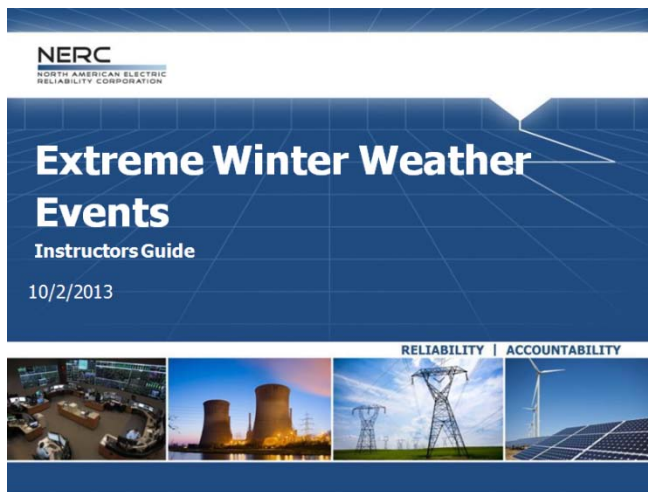
Course overview

Training Coordination tips

Course Goals and Outcomes

Trainer Tools and Tips

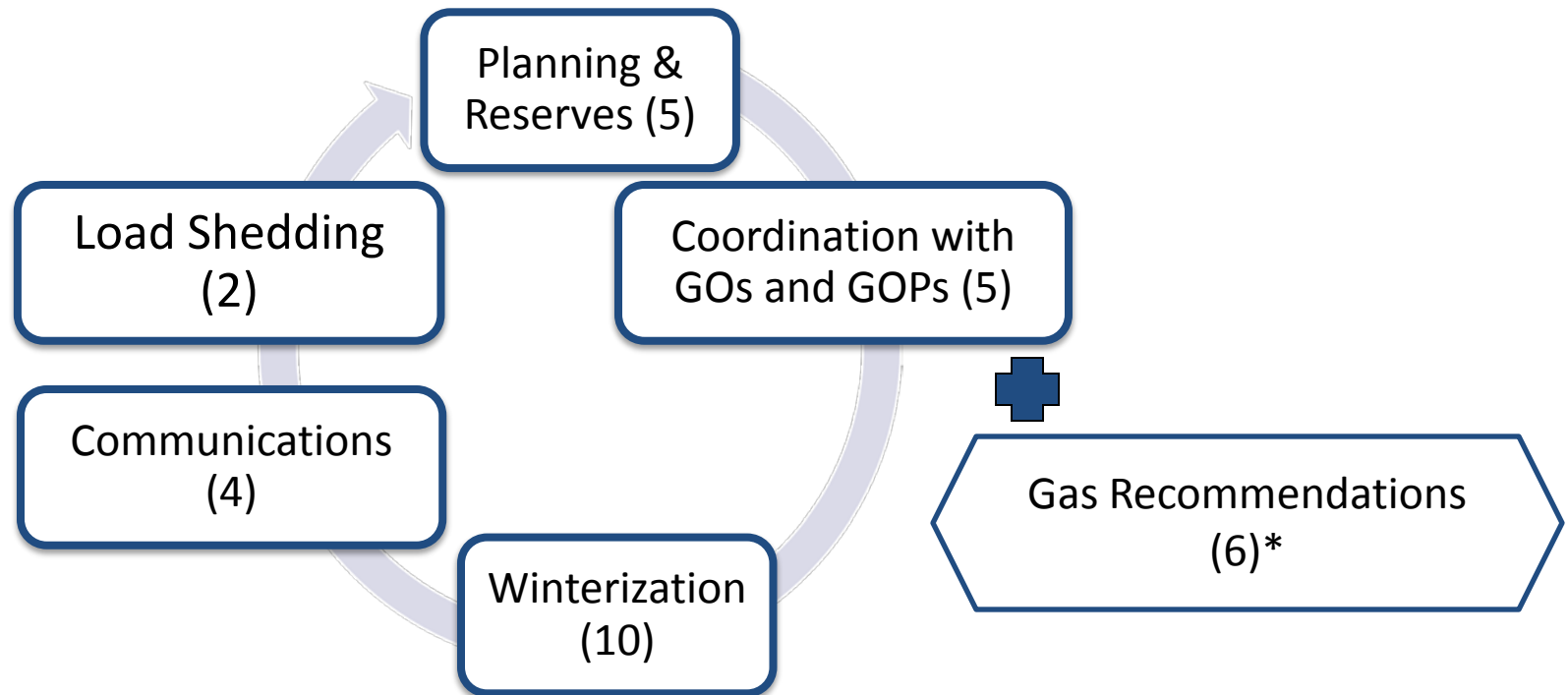
Presentation deck with Key messages



Review of the Exercises & Instructions



On August 15, 2011, 26 Electrical Recommendations and six Gas Recommendations were issued.



Source: *Outages and Curtailments During Southwest Cold Weather Event February 1–5, 2011*

Practical Activity 1

26 Electrical Recommendations

Estimated Time	30 minutes
Lesson Objective	Participants will identify areas in their entity where the recommendations can be reviewed and possibly implemented to improve reliability.
Lesson Summary	There are many ways to ensure reliability, by taking a critical look back on prior incidents and make changes based on the findings you stand a greater chance of improved future reliability.
Materials Required	<ul style="list-style-type: none"> • Recommendations based on the FERC/NERC final report. (p.197-217) • Practical Activity Handout 1 – 26 Electrical Recommendations • Flipchart to capture thoughts and ideas
Recommended Activity	<ul style="list-style-type: none"> • Tell the participants to review the selected recommendations from the report and compare them to current practices • Discuss ways in which to implement/activate recommendations from the report • Capture ideas on flipchart
Delivery Tips	<ul style="list-style-type: none"> • Be sure to try to cover each of the recommendations that are specific to your entity. • Get input and ideas from as many individuals as possible. • Call time even if the group was unable to determine responses for each of the designated topics. – DON'T EXCEED planned time. [if more time required, entity and plan as needed] • Off-topic or detailed comments can be added to the parking lot – encourage this process.

Print Handout located on the Cold Weather Training site for this activity

[FERC/NERC 26 Recommendations for Activity 1](#)

Evaluate Potential Problem Areas (PPAs)

In the spaces provided in the handout, list some of the systems in your facility that could potentially be affected by cold weather in the PPAs identified.

PPAs:	Local Areas of Concern:
Initiate an automatic unit trip	
Impact unit start-up	
Initiate automatic unit runback schemes and/or cause partial outages	
Cause damage to the unit	
Adversely affect environmental controls that could cause full or partial outages	
Adversely affect the delivery of fuel or water to the units	
Cause other operational problems such as slowed or impaired field devices	
Create a safety hazard	

Practical Activity 2

Potential Problem Areas

Estimated Time	15 minutes
Lesson Objective	Participants will identify Potential Problem Areas, based on those identified in the final report. The focus of the activity is to focus on those areas that can have a detrimental impact on reliability.
Lesson Summary	There are many ways to ensure reliability, by focusing on areas that were identified based on previous events allow us to begin to eliminate areas that may pose a problem in future severe cold weather instances. Being proactive and making changes based on the findings, you stand a greater chance of improved future reliability.
Materials Required	<ul style="list-style-type: none"> • Recommendations based on Reliability Guidelines Generating Unit Winter Weather Readiness – Current Industry Practices • Practical Activity 2 Handout • Flip chart to capture thoughts and ideas
Recommended Activity	<ul style="list-style-type: none"> • Tell the participants they are the subject matter experts in the entity and you are depending on them to identify and discuss Potential Problem Areas. • Discuss ways in which to correct/improve reliability in these identified areas. • Capture ideas on flipchart
Delivery Tips	<ul style="list-style-type: none"> • Be sure to try to cover each of the areas that are specific to your environment. • Also, try to get input and ideas from as many individuals as possible. • Call time even if they were unable to determine responses for each of the designated topics. – DON'T EXCEED planned time. • Any additional comments and or thoughts can be added to the parking lot.

Use the Handout in Packet 1-5
[Practical Activity Handout](#)

Instructions: With a partner or group, identify items on the list in your facility and locations. Create a checklist of areas to monitor based on the Typical Problem Areas identified below.

#	Local TPAs	Locations and Labeling in Your Facility to Check before Cold Weather Event
1	Pressure Transmitters and Sensing Lines	
2	Flow Transmitters and Sensing Lines	
3	Instrument Air System	
4	Motor-Operated and Solenoid Valves	
5	Drain Lines and Steam Vents	
6	Emergency Generators	
7	Water Pipes and Fire Suppression Systems	
8	Fuel Supply	

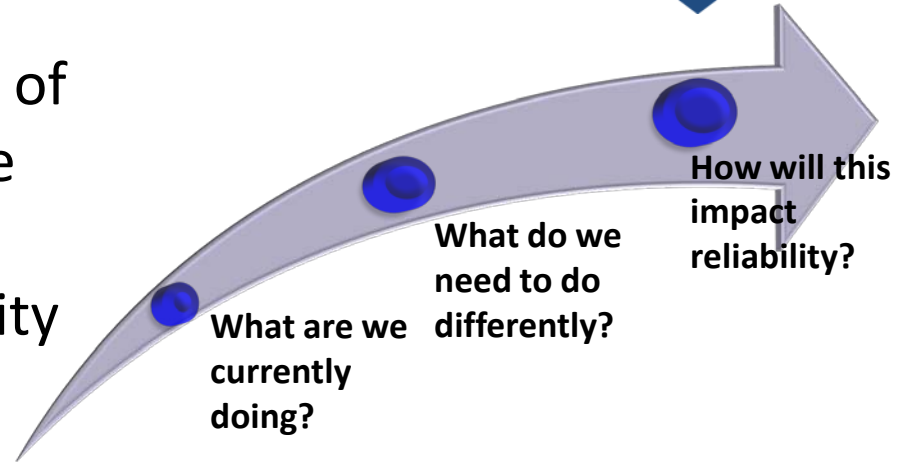
Practical Activity 3:

⊕ Typical Problem Areas

Estimated Time	15 minutes
Lesson Objective	Participants will identify Typical Problem Areas, based on those identified in the final report. The focus of the activity is to center on those areas that on the surface appear to be properly protected, but upon closer inspection there are exposed portions that lead to freezing.
Lesson Summary	To ensure reliability, the focus should not only be on the larger parts of a system but the smaller components. Any areas that are exposed can lead to failure of the system. To fully insulate a component and leave a valve, handle or flange exposed, the overall reliability could be compromised during an extreme cold weather event.
Materials Required	<ul style="list-style-type: none"> • Short list of Typical Problem Areas as related to your entity (list should be considered as a primer list to begin the class discussions) • Practical Activity Handout 3 – Typical Problem Areas • Flip chart to capture thoughts and ideas
Recommended Activity	<ul style="list-style-type: none"> • Tell the participants they are the subject matter experts in the entity and you are depending on them to identify and discuss Typical Problem Areas. • Discuss ways in which to begin to correct/improve/reliability in these identified areas. • Capture ideas on flipchart
Delivery Tips	<ul style="list-style-type: none"> • Be sure to try to cover each of the areas that are specific to your entity. • Also, try to get input and ideas from as many individuals as possible. • Call time even if they were unable to determine responses for each of the designated topics. – DON'T EXCEED planned time. • Any additional comments and or thoughts can be added to the parking lot – provide additional paper, sticky notes for this

Local Reliability Guidelines

In the spaces provided, list some of the guidelines you currently have in place in your facility based on the areas outlined in the Reliability Guidelines.



Topic	Reliability Recommendation	What can we do to impact reliability?
I.	Safety	
II.	Management Roles	
III.	Evaluation	
IV.	Process and Procedures	
V.	Training	
VI.	Communications	

Practical activity 4:

⊕ Reliability Checkup

Estimated Time	20 minutes
Lesson Objective	Participants will identify components of their local Reliability Guidelines to compare them to the guidelines that were recommended in the overall report. During the discussions, individuals should seek areas in which they can improve on their current guidelines and areas where there are no current guidelines and discuss ways to develop guidelines.
Lesson Summary	There have been several Cold Weather events in the past that have lead to outages on the system. In each instances there have been recommendations, and some changes based on those recommendations. To ensure future success, there has to be systems put in place and the processes institutionalized and monitored on a regular basis to ensure reliability.
Materials Required	<ul style="list-style-type: none"> • Reliability Guidelines Recommendations • Practical Activity Handout 4 – Local Reliability Guidelines • Flipchart to Capture thoughts and ideas
Recommended Activity	<ul style="list-style-type: none"> • Tell the participants they are the subject matter experts in the entity and you are depending on them to identify and discuss potential areas of exposure. • Discuss ways in which to begin to correct improve/reliability in these identified areas. • Capture ideas on flipchart
Delivery Tips	<ul style="list-style-type: none"> • Be sure to try to cover each of the areas that are specific to your entity. • Also, try to get input and ideas from as many individuals as possible. • Call time even if they were unable to determine responses for each of the designated topics. – DON'T EXCEED planned time. • Any additional comments and or thoughts can be added to the parking lot – provide additional paper, sticky notes for this

Local Procedures Review

In the spaces provided, list some of the local procedures you currently have in place in your facility based on the areas outlined in Attachment 1.

Local Procedures	Yes/No	Details
Work Management System		
Critical Instrumentations and Equipment Protection (identification of exposure)		
Process and Procedures: Heat Trace and Other Protection Options (missing or broken insulation)		
Supplies		
Staffing		
Communications		
Special Operations Instructions		

Practical activity 5:

Local Procedure Review














Estimated Time	15 minutes
Lesson Objective	Participants will identify components of the Winter Weather Preparations Procedures as recommended in the attachment 1 document. During the exercise, individuals should review the documents and procedures that are currently being followed to see where improvements in reliability are to be made.
Lesson Summary	Based on the final report, these areas are addressed in a timely and routine manner an entity will reduce the incident of a disruption in their system. Reviewing and preparation will increase reliability.
Materials Required	<ul style="list-style-type: none"> • Recommendations based on list from Attachment 1 • Practical Activity Handout 5 – Local Procedures Review • Flip Chart to capture any thoughts and ideas
Recommended Activity	<ul style="list-style-type: none"> • Tell the participants they are the subject matter experts in the entity and you are depending on them to identify and discuss potential areas of exposure. • Discuss ways in which to begin to correct/improve/reliability in these identified areas. • Capture ideas on flipchart or via scribe
Delivery Tips	<ul style="list-style-type: none"> • Be sure to try to cover each of the areas that are specific to your entity. • Also, try to get input and ideas from as many individuals as possible. • Call time even if they were unable to determine responses for each of the designated topics. – DON'T EXCEED planned time. • Any additional comments and or thoughts can be added to the parking lot – provide additional paper, sticky notes for this

Review the LLs based on applicable audience.

- Talk through the LLs.
 - Question and Answer session
- Discuss how a similar situation could have happened in your facility.
- Discuss what steps can be taken to prevent a comparable occurrence in your facility.

February 2011 Southwest Cold Weather Event

On Aug 16, 2011, the Federal Energy Regulatory Commission (FERC) and North American Electric Reliability Corporation (NERC) released a staff report making recommendations to help prevent a recurrence of rolling blackouts and natural gas curtailments experienced by customers in the Southwest during extreme cold weather the first week of February 2011. Concluding a six-month inquiry, the task force found a majority of the electric outages and gas shortages were due to weather-related causes. In total, approximately 1.3 million electric customers were out of service at the peak of the event on February 2, and a total of 4.4 million were affected over the course of the event from February 2 through February 4. Natural gas customers also experienced extensive curtailments of service during the event. These curtailments were longer in duration than the electric outages, because relighting customers' equipment has to be accomplished manually at each customer's location. Local distribution companies (LDCs) interrupted gas service to more than 50,000 customers in New Mexico, Arizona and Texas; New Mexico was the hardest hit with outages of over 30,000 customers. On May 9, 2011 FERC and NERC announced their staffs would create a joint task force to combine their separate inquiries. This report is a product of that effort.

February 2011 Southwest Cold Weather Event		
Type	Title	Date
Lessons Learned - Southwest Cold Weather Event (13)		
	Wind Farm Winter Storm Issues	9/12/2012
	Transformer Oil Level Issues During Cold Weather	9/12/2012
	Winter Storm Inlet Air Duct Icing	9/12/2012
	Capacity Awareness During an Energy Emergency Event	9/12/2012
	Gas and Electricity Interdependency	9/12/2012
	Rotational Load Shed	3/6/2012
	Plant Operator Training to Prepare for a Winter Weather Event	1/6/2012
	Transmission Facilities and Winter Weather Operations	1/6/2012
	Plant Onsite Material and Personnel Needed for a Winter Weather Event	1/6/2012
	Plant Instrument and Sensing Equipment Freezing due to Heat Trace and Insulation Failures	10/19/2011
	Plant Fuel Switching and Cold Weather	10/19/2011
	Adequate Maintenance and Inspection of Generator Freeze Protection	9/29/2011
	Generating Unit Temperature Design Parameters and Extreme Weather Conditions	9/28/2011

Lessons Learned Developed in response to the Cold Weather Event of February 1–5, 2011

"audience" indicates appropriate audience for the Lesson Learned -

TOPIC	Target Audience											
	Transmission Owners	Transmission Operators	Load Serving Entities	Distribution Providers	Generator Owners	Generator Operators	Reliability Coordinators	Balancing Authority	Plant Owners	Plant Operators	Interchange Authority	Purchase-Selling Entity
Rotation Load Shed	<u>Audience</u>	<u>Audience</u>	<u>Audience</u>	<u>Audience</u>								
Transmission Facilities and Winter Weather Operations	<u>Audience</u>	<u>Audience</u>			<u>Audience</u>	<u>Audience</u>						
Plant Fuel Switching Cold Weather							<u>Audience</u>	<u>Audience</u>	<u>Audience</u>	<u>Audience</u>		
Generating Unit Temperature Design Parameters and Extreme Weather Conditions					<u>Audience</u>	<u>Audience</u>	<u>Audience</u>	<u>Audience</u>				
Adequate Maintenance and Inspection of Generator Freeze Protections					<u>Audience</u>	<u>Audience</u>						
Plant Instrument and Sensing Equipment due to heat trace and Insulation failures					<u>Audience</u>	<u>Audience</u>						
Plant On-Site Material & Personnel needed for a Winter Weather Event					<u>Audience</u>	<u>Audience</u>						
Plant Operator Training and Prepare for a Winter Weather Event					<u>Audience</u>	<u>Audience</u>		<u>Audience</u>				
Capacity Awareness During an Energy Emergency Event	<u>Audience</u>	<u>Audience</u>			<u>Audience</u>	<u>Audience</u>	<u>Audience</u>	<u>Audience</u>			<u>Audience</u>	<u>Audience</u>
Winter Storm Inlet Air Duct Icing					<u>Audience</u>	<u>Audience</u>						
Wind Farm Inter Storm Issues					<u>Audience</u>	<u>Audience</u>		<u>Audience</u>				
Transformer Oil Level Issues During Cold Weather	<u>Audience</u>	<u>Audience</u>			<u>Audience</u>	<u>Audience</u>		<u>Audience</u>				
Gas and Electric Interdependency					<u>Audience</u>	<u>Audience</u>	<u>Audience</u>	<u>Audience</u>				

Prior to class print and make copies for review and discussions

Rotational Load Shed

Primary Interest Groups:

Transmission Owners, Transmission Operators, Load-Serving Entities, Distribution Providers

Transmission Facilities and Winter Weather Operations

Primary Interest Groups:

Generator Owners, Generator Operators, Transmission Owners, Transmission Operators

Plant Fuel Switching and Cold Weather

Primary Interest Groups:

Reliability Coordinators, Balancing Authorities, Plant Owners, Plant Operators

Generating Unit Temperature Design Parameters and Extreme Weather Conditions

Primary Interest Groups:

Generator Owners, Generator Operators, Balancing Authorities, Reliability Coordinators

Adequate Maintenance and Inspection of Generator Freeze Protection

Primary Interest Groups:

Generators Owners, Generator Operators

Plant Instrument and Sensing Equipment Freezing due to Heat Trace and Insulation Failures

Primary Interest Groups:

Generator Owners, Generator Operators

Plant Onsite Material and Personnel Needed for a Winter Weather Event

Primary Interest Groups:

Generator Owners, Generator Operators

Southwest Cold Weather Event

Plant Operator Training to Prepare for a Winter Weather Event

Primary Interest Groups:

Generator Owners, Generator Operators, Balancing Authorities

Capacity Awareness During an Energy Emergency Event

Primary Interest Groups:

Transmission Owners , Transmission Operators , Reliability Coordinator , Generator Owners , Generator Operators , Balancing Authority, Interchange Authority , Purchase-Selling Entity

Gas and Electric Interdependency

Primary Interest Groups:

Reliability Coordinator, Balancing Authorities , Generator Operators, Generator Owners , Transmission Owners, Transmission Operators (TOP) Distribution Providers (DP)

Transformer Oil Level Issues During Cold Weather

Primary Interest Groups:

Transmission Operators , Transmission Owners , Balancing Authorities , Generator Operators, Generator Owners

Winter Storm Inlet Air Duct Icing

Primary Interest Groups:

Generator Operators , Generator Owners

Southwest Cold Weather Event

Wind Farm Winter Storm Issues

Primary Interest Groups:

Balancing Authorities, Generator Operators, Generator Owners

- Cold Weather Training Packet is customizable to fit the needs of your organization
- Over 80 slides with information on the Cold Weather outage for training purposes
- 13 LLs 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

- Cold Weather Events: Lessons Learned
- Cold Weather Events Training Documents
 - <http://www.nerc.com/pa/rrm/ea/Pages/February-2011-Southwest-Cold-Weather-Event.aspx>

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

- 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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