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September 29, 2015

Federal Energy Regulatory Commission  
Attention: Mr. Loye Hull  
Office of Electric Reliability  
1800 Dual Highway, Suite 201  
Hagerstown, MD 21740

**RE: Docket No. AD11-9-000; Follow-up Actions in Response to the Joint FERC-NERC Staff Report on the 2011 Southwest Cold Weather Event and 2014 Polar Vortex and 2014 Winter Storm Events**

SERC Reliability Corporation (SERC) submits the following response to the July 31, 2015 letter from the Office of Electric Reliability regarding Follow-up Actions in Response to the Joint FERC-NERC Staff Report on the 2011 Southwest Cold Weather Event and 2014 Polar Vortex and 2014 Winter Storm Events.

We would be pleased to meet with you by phone or in person to review any responses which you may feel require further discussion. If you have any questions regarding this response, please contact me at (704) 414-5230 or [rlindensmith@serc1.org](mailto:rlindensmith@serc1.org).

Sincerely,

A handwritten signature in black ink, appearing to read 'Rebecca Lindensmith', written over a light blue horizontal line.

Rebecca Lindensmith  
Legal Counsel

cc: Gerry Cauley, NERC

SERC Response to FERC Data and Documents Request dated July 31, 2015  
Docket No. AD11-9-000  
Question No. 1

1. **During 2015, the Regional Entities experienced two periods of extremely cold weather, January 7-9 and February 15-20, in which numerous generating units tripped, were derated, or failed to start due to frozen equipment.**
  - a. **For each time period, identify the specific cause related to frozen equipment by number of units and total MW lost (e.g., failed heat trace, frozen instrumentation, frozen equipment, fuel curtailment, emissions, etc.).**
  - b. **Of the units with frozen equipment, identify the number of units and MW of generation that were exposed to ambient temperatures below the design basis of the plant.**

**A Generating Unit Data Excel spreadsheet referenced here is attached in Appendix A to provide the requested regional data.**

### Generating Unit Data

Region	Number of Units	Coldest Winter Period/s	Specific Cause	Total MW Lost	Units Lost when Operated below Design Temp	Total MW Lost when Operated below Design Temp	Notes
			Failed Heat Trace				
			Frozen water systems				Note 1
			Other cold-related issues				Note 2
			Improper operating conditions				Note 3
			Frozen Instruments and Instrument Lines				Note 4
			Steam drum level measurements				
			Frozen lines, valves and switches				
			Frozen pumps, motors and breakers				
			Fuel - Frozen Coal				
			Fuel Curtailment - Fuel Oil				
			Fuel Curtailment - Natural Gas				
			Wind Curtailment				Note 5
			Emmissions				
Notes							
1 - Included are frozen hydro unit intakes and generating unit cooling water systems							
2 - Included are cold hydraulic oil							
3 - Included are low temp from induced draft fan, loss of circulating water supply, erratic drum pressure, low steam temperature							
4 - Except for steam drum levels							
5 -Wind generation forced off due to low ambient temperature limits or blade icing							

#### **Response:**

SERC conducted post-event reviews of the January 7-9, 2015 and February 15-20, 2015 winter storm events for its region. Based on the reviews, SERC concluded that the winter events did not have a significant impact on the SERC Region. SERC requested additional information from the registered Generator Owners (GOs) and Generator Operators (GOPs) in the SERC Region through a special data collection effort conducted on August 17, 2015. (*See Attachment A: August 17, 2015 SERC Data Request.*) In this data collection effort, SERC requested information about specific causes of frozen equipment and frozen equipment exposure to ambient temperatures below the design basis of the plant, during the 2015 winter events.

Entities responded using the specific cause categories identified in the Generating Unit Data Excel spreadsheet. SERC aggregated responses submitted by entities into the completed Generating Unit Data Excel spreadsheet, which is included as Attachment B. (*See Attachment B: Worksheet – FERC Data Request 2015 Docket No. AD11-9 – SERC Region.*)

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### January 7-9, 2015 Winter Storm Event

(a) Based on registered entity responses, for the January 7-9, 2015 winter event period, the following table shows the specific causes related to frozen equipment by number of units and total MWs lost for the SERC Region:

Number of Units	Specific Cause	Total MW Lost	Units Lost when Operated below Design Temp	Total MW Lost when Operated below Design Temp	Notes
11	Failed Heat Trace	3,332.00	8	1,454	
1	Frozen water systems	300.00	-	-	Note 1
4	Other cold-related issues	547.00	-	-	Note 2
2	Improper operating conditions	971.00	-	-	Note 3
20	Frozen Instruments and Instrument Lines	4,522.00	7	876	Note 4
5	Steam drum level measurements	1,862.80	-	-	
8	Frozen lines, valves and switches	1,895.00	-	-	
1	Frozen pumps, motors and breakers	255.00	-	-	
-	Fuel - Frozen Coal	-	-	-	
-	Fuel Curtailment - Fuel Oil	-	-	-	
3	Fuel Curtailment - Natural Gas	230.80	-	-	
-	Wind Curtailment	-	-	-	Note 5
1	Emissions	18.70	-	-	
56	<b>TOTAL</b>	13,934	15	2,330	

#### Notes

1 - Included are frozen hydro unit intakes and generating unit cooling water systems

2 - Included are cold hydraulic oil

3 - Included are low temp from induced draft fan, loss of circulating water supply, erratic drum pressure, low steam temperature

4 - Except for steam drum levels

5 - Wind generation forced off due to low ambient temperature limits or blade icing

(b) As reported by registered GOs and GOPs, for the January 7-9, 2015 winter event period, of the units with frozen equipment, 15 units (2,330 MW) of generation were exposed to ambient temperatures below the design basis.

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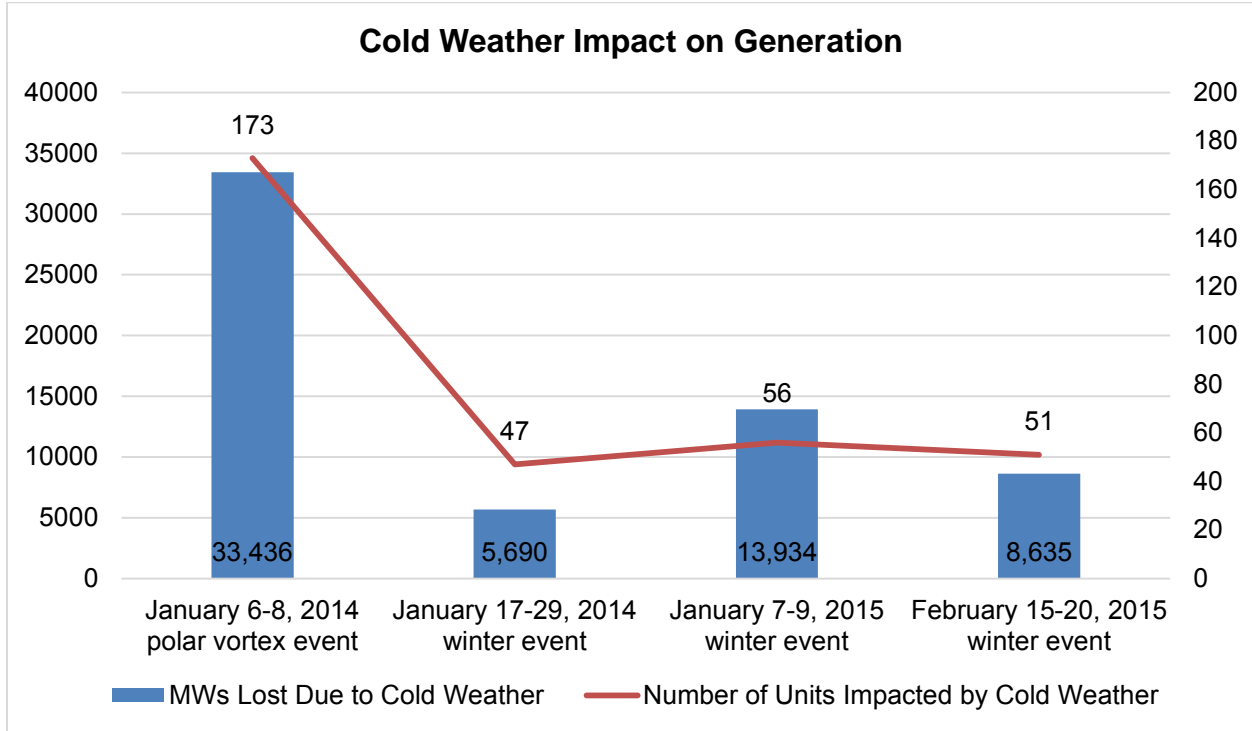
### February 15-20, 2015 Winter Storm Event

(a) Based on registered entity responses, for the February 15-20, 2015 winter storm event, the following table shows the specific causes related to frozen equipment by number of units and total MWs lost for the SERC Region:

Number of Units	Specific Cause	Total MW Lost	Units Lost when Operated below Design Temp	Total MW Lost when Operated below Design Temp	Notes
4	Failed Heat Trace	937.00	-	-	
1	Frozen water systems	26.00	-	-	Note 1
5	Other cold-related issues	560.00	-	-	Note 2
2	Improper operating conditions	580.00	-	-	Note 3
12	Frozen Instruments and Instrument Lines	3,105.00	6	1,584	Note 4
4	Steam drum level measurements	177.80	-	-	
13	Frozen lines, valves and switches	2,411.00	4	885	
1	Frozen pumps, motors and breakers	220.00	-	-	
2	Fuel - Frozen Coal	29.00	-	-	
-	Fuel Curtailment - Fuel Oil	-	-	-	
2	Fuel Curtailment - Natural Gas	333.00	-	-	
-	Wind Curtailment	-	-	-	Note 5
5	Emissions	256.00	-	-	
51	<b>TOTAL</b>	8,635	10	2,469	
Notes					
1 - Included are frozen hydro unit intakes and generating unit cooling water systems					
2 - Included are cold hydraulic oil					
3 - Included are low temp from induced draft fan, loss of circulating water supply, erratic drum pressure, low steam temperature					
4 - Except for steam drum levels					
5 - Wind generation forced off due to low ambient temperature limits or blade icing					

(b) As reported by registered GOs and GOPs, for the February 15-20, 2015 winter storm event, of the units with frozen equipment, 10 units (2,469 MW) of generation were exposed to ambient temperatures below the design basis.

The following graph shows the total number of generating units and MWs lost due to generating units that tripped, were derated, or failed to start due to frozen equipment reported during each of the 2014 and 2015 cold weather events for the SERC Region:



The graph shows that fewer units were impacted by the events in 2015 than in 2014.

**2. Identify how many units saw a repeat of the same issues from the prior year, including actions being taken by the Regional Entities to prevent a recurrence. To the extent the Regional Entity contacts any affected registered entities, this should include describing what the Regional Entity learned regarding completed and ongoing activities by registered entities.**

**Response:**

Registered entities reported that 10 units that were affected in 2014 also experienced negative effects from the cold weather in 2015. The details of the affected units are provided below:

- Units 1-3 experienced frozen transmitters in both 2014 and 2015. The entity is stripping and replacing heat trace on critical transmitters.
- Unit 4 experienced frozen instrumentation in 2014 and 2015. The entity is implementing a revision of its plant freeze protection procedure. The purpose of this revision is to provide specific instructions for preparing the plant for cold weather operations, operating the plant in cold weather conditions, and modified round sheets to include validation of working freeze protection measures.
- Unit 5 experienced a derate when the forced draft (FD) fan tripped on vibration in 2014 and 2015. The vibration was associated with ice build-up on the fan rotor airfoils. The FD fan tripped on high vibration. The ice build-up occurred when combustion gases leaked past an isolation damper and back into the fan inlet. The isolation damper was not a 100 percent insulation damper. The entity is replacing the isolation damper with a guillotine style, 100 percent isolation damper.
- Unit 6 experienced frozen instrumentation lines in 2014, due to conductive losses from the pipe hangers and convective losses from high winds. In 2014 the entity upgraded the unit's pipe hangers, insulation, and heat trace equipment. In 2015 the insulation and heat trace were installed, but failed. Entity will perform heat trace testing prior to the upcoming winter season.
- Unit 7 experienced a frozen demineralized water line in both 2014 and 2015. The entity is taking steps to bury the line underground prior to the upcoming winter season.
- Unit 8 experienced a failed heat trace in both 2014 and 2015. Entity is installing heat tracing and insulation and is replacing an air compressor.
- Unit 9 experienced a derate in 2014 and 2015 due to the inability to get adequate fuel to the station, due to cold weather and freezing of the fuel. The station is proactively taking steps to keep the fuel from freezing.
- Unit 10 experienced instrumentation pipe freezing in 2014 and 2015. The unit was also removed from service in January 2014 and February 2015 due to fuel supply issues. The entity has reviewed and addressed issues involving heat trace circuits, filled any gaps in insulation and may run the unit during forecasted cold weather to alleviate the impacts of cycling or starting in frigid conditions.

SERC has performed or plans to perform the following activities to address weather-related issues in the SERC Region and to minimize recurrences of the same issues from the prior year:

1. In the 2014 SERC Reliability Risk Team (RRT) report, the RRT identified extreme cold weather as a major risk for the SERC Region.<sup>1</sup> To address, the SERC technical committees included plans to perform reliability assessments and analyses within their annual scope of work to address the major risks, emerging reliability concerns, and changing drivers, including cold weather issues. For example, during the fourth quarter of 2015, SERC's Resource Adequacy Working Group (RAWG) plans to initiate an extreme weather event probabilistic sensitivity analysis. This work will better define SERC's increased outage risk given statistically higher system loading in conditions similar to the 2014 Polar Vortex.
2. SERC considered the risks identified by the RRT efforts and included cold weather impacts on transmission and generation as a regional risk focus area. SERC identified Standards and Requirements associated with the risk and considered those Standards and Requirements in the 2015 Regional Compliance Monitoring Plan.<sup>2</sup>
3. In 2015, the SERC RRT considered and included severe cold weather as an operation risk element in its risk report. This was provided for SERC staff's consideration in the development of the 2016 SERC Regional Compliance Monitoring Plan.

As part of SERC's 2014-2015 winter assessment process, entities identified lessons learned during the 2014 Polar Vortex and reported that they would be reviewing plans and procedures to implement those lessons, or they have already implemented those lessons.<sup>3</sup> SERC registered entities also identified emergency procedures that were used successfully during the Polar Vortex. Also, in response to the special data collection effort SERC conducted on August 17, 2015, registered entities reported completed and ongoing activities to help prevent against any impact of cold weather on unit operations.

SERC learned registered entities engaged in the following completed and ongoing activities to address issues arising from cold weather events:

#### Load Forecasting Procedures

- Incorporate assumptions for peak winter loads and analysis of "super-peak" conditions.
- Consider increased reserve margins.

#### Operating Procedures

- Incorporate modified load shedding procedures to address execution methodologies associated with timing and sequencing.
- Enhance system control emergency procedures to improve communications.

<sup>1</sup> SERC Reliability Corp., 2014 SERC Reliability Risk Team Report, at 14-17 (June 19, 2015), available at [http://www.serc1.org/docs/default-source/program-areas/reliability-assessment/performance-analysis/2014-reliability-risk-team-\(rrt\)-report.pdf](http://www.serc1.org/docs/default-source/program-areas/reliability-assessment/performance-analysis/2014-reliability-risk-team-(rrt)-report.pdf).

<sup>2</sup> N. Am. Electric Reliability Corp., 2015 ERO Compliance Monitoring and Enforcement Implementation Plan, at 54 (last revised Aug. 17, 2015), available at [http://www.nerc.com/pa/comp/Resources/ResourcesDL/Final\\_2015%20CMEP%20IP\\_V\\_1.2%20\(Posted\\_08172015\).pdf](http://www.nerc.com/pa/comp/Resources/ResourcesDL/Final_2015%20CMEP%20IP_V_1.2%20(Posted_08172015).pdf).

<sup>3</sup> N. Am. Electric Reliability Corp., 2014-2015 Winter Reliability Assessment, at 39-40 (2014), available at [http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/2014WRA\\_final.pdf](http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/2014WRA_final.pdf).

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- Ensure a single point of contact between system control and distribution dispatch.
- Develop a procedure for system controllers to take breaks during extended emergency situations.
- Initiate early startup procedures for units with expected exposure to cold temperatures.
- Ensure proper scheduling of dispatchers and field crews, as well as advanced housing during cold weather conditions.
- Develop lessons learned and follow-up plans from each cold weather event to increase reliability.

#### Plant Maintenance Procedures

- Implement a winter readiness protection plan prior to the winter season.
  - Maintain freeze protection checklists and winter preparation lists.
  - Complete readiness checks in the fall prior to the winter runs.
  - Review and implement a systematic freeze protection procedure annually.
- Ensure heating and freeze protection for new and existing equipment.
  - Improve staging of auxiliary heat sources.
  - Develop a consistent design basis for freeze protection on new units.
  - Apply enclosures for equipment in a permanent structure.
- Repair heat trace and add insulation to the previously affected equipment.
  - Utilize heat-trace mapping and improved areas of concern.
  - Performing heat trace testing prior to winter season.
- Utilize portable heaters to some pump enclosures.

#### Fuel Supply and Inventory

- Ensure fuel flexibility in real-time operation plans.
- Acquired more oil and pipeline space from the supplier.



**3. What policy and procedural changes, if any, since last year's data request, have been made by system operators in your region to ensure that they are aware of generators' ability to run at extreme cold ambient temperatures?**

**Response:**

To gather the requested information from system operating personnel in the SERC Region, on August 17, 2015, SERC sent a data request to registered TOPs, BAs, and RCs in the SERC Region. (See *Attachment A: August 17, 2015 SERC Data Request.*) Each applicable registered entity in SERC has a formal policy or procedure to communicate with generators to determine the status of the generation.

Many entities reported that their existing policies and procedures were sufficient and have proven to be adequate in maintaining reliable operations during winter weather conditions.

Since last year's data request, registered entities also reported taking actions to increase the situational awareness of system operators. Actions included:

**Training**

- Provided training for system operators on winter operational planning and cold weather issues, including the following topics:
  - Extreme cold weather patterns and associated peak load conditions
  - Generator weather protection design philosophies
  - Projected fuel inventories
  - Winter resource planning
  - Emergency communications protocol review
  - Projected available resources and reserve margins for the upcoming 2015 winter

**Procedures**

- Reviewed and updated cold weather operations procedure for system operators, including system operators' manual which defines when an event of extreme temperature exists and sets parameters for system operators to ensure proper operation.
- Initiated a winter preparedness procedure, which includes checking equipment for operation and replacing it as needed.
- Updated the site communication procedure to ensure the system operator is informed in real time of any emerging issues that could affect availability.

**Operations**

- Provided winterization protective measures for each unit and provided low operating temperature ranges for the system operators.
- Developed a winter weather freeze plan to coordinate and ensure protection measures are in place for each generator.
- Increased reserve margin during the winter season.
- Made arrangements for increased man-power availability during cold weather events.
- Increased testing of simple cycle combustion turbines prior to cold weather during the winter of 2014/2015.

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Other

- Hired an outside engineering firm to conduct a cold weather freeze study for generators.

MISO and PJM are registered in both the SERC and ReliabilityFirst regions. ReliabilityFirst and SERC coordinated to provide the response for MISO and PJM. For responsive information involving these entities, please see ReliabilityFirst's response to this data request.

**4. What outreach activities (e.g., site visits, surveys, and workshops) related to generator winterization and entity preparedness have your Regional Entities planned (or completed) for winter 2015-2016?**

**For each outreach activity, provide the following where applicable:**

- i. Title, date(s) and explanation of the outreach activity, including topics covered;**
- ii. Level of industry participation;**
- iii. Observations and areas for improvement identified as a result of the outreach activity; and**
- iv. Any documents prepared for or as a result of the outreach activities (e.g., presentations, survey results, etc.).**

**Response:**

The following outreach activities focus on (or have portions that focus on) generator cold weather preparedness:

<b>Date</b>	<b>Title</b>	<b>Outreach Activity and Topics Covered</b>	<b>Level of Industry Participation</b>
January 22-23, 2015	SERC Operations Planning Subcommittee (OPS) Meeting	SERC staff met with the OPS and discussed cold weather issues and events.	17 attendees
March 17-18, 2015	SERC Operating Committee (OC) Meeting	SERC OC gave a presentation, including lessons learned and an overview of the impact of cold weather events from the RC, BA, and TOP perspectives. (See <i>Attachment C: 2015 Spring OC Cold Weather Presentations.</i> )	64 attendees
April 14, 2015	SERC Operators Training Conference	SERC provided training and perspectives from several entities on impact of cold weather events. (See <i>Attachment D: 2015 SERC Operator Training Conference – Winterization Preparedness Presentation.</i> )	145 attendees

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April 28, 2015	SERC Operators Training Conference	SERC provided training and perspectives from several entities on impact of cold weather events. <i>(See Attachment D: 2015 SERC Operator Training Conference – Winterization Preparedness Presentation.)</i>	120 attendees
June 11-12, 2015	SERC Operations Planning Subcommittee (OPS) meeting	SERC staff met with the OPS and discussed cold weather issues and events.	15 attendees
September 24-25, 2015	SERC Operations Planning Subcommittee (OPS) meeting	SERC staff met with the OPS and discussed cold weather issues and events.	19 attendees
September 29, 2015	SERC Operators Training Conference	SERC provided training and perspectives from several entities on impact of cold weather events. <i>(See Attachment D: 2015 SERC Operator Training Conference – Winterization Preparedness Presentation.)</i>	118 attendees (estimated)
October 5-7, 2015	SERC OC Reliability Coordinator Subcommittee (RCS) Meeting	SERC OC RCS will discuss entity winterization plans for the upcoming year.	8-10 attendees (estimated)
October 6-7, 2015	SERC Operating Committee (OC) Meeting	SERC OC will give a presentation, including lessons learned and an overview of the impact of cold weather events from the RC, BA, and TOP perspectives. Also, SERC staff will present a summary of the 2014-2015 Post Winter Seasonal Analysis report. <i>(See Attachment E: Fall 2015 SERC OC Meeting – Winter Preparedness Presentations.)</i>	60-70 attendees (estimated)

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October 14, 2015	SERC Staff Outreach Activity	SERC staff visiting a registered entity to discuss cold weather preparedness.	3-4 attendees (estimated)
October 21, 2015	SERC Staff Outreach Activity	SERC staff visiting a registered entity to discuss cold weather preparedness and situation awareness and events analysis program.	3-4 attendees (estimated)
October 27-28, 2015	SERC Compliance Seminar	SERC staff to give a presentation on cold weather issues and events, including: <ul style="list-style-type: none"> <li>• Policy and procedure changes made by system operators in the SERC region to ensure that they are aware of generators' ability to run at extreme cold ambient temperatures; and</li> <li>• Completed and ongoing activities by registered entities to prevent a recurrence of issues from the prior year.</li> </ul>	170 attendees (estimated)
November 2015	SERC TRANSMISSION Newsletter article	SERC will provide an article on winter preparation in the November 2015 newsletter to registered entities.	The newsletter will be distributed to all SERC stakeholders, including registered entities.
November 2015	SERC Generation Subcommittee (GS) reliability notice	SERC GS will distribute a reliability notice containing information on cold weather preparedness to registered GOs and GOPs.	The notice will be distributed to all registered GOs and GOPs (220 total contacts).
November 2015	SERC Staff Outreach Activity	SERC staff visiting a registered entity to discuss cold weather preparedness and situation awareness and events analysis program.	3-4 attendees (estimated)

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As a result of the outreach activities, the entities identified load forecasting and generator winterization as areas for improvement. The entities also plan to increase training on cold weather preparedness.

In addition to SERC outreach activities, NERC routinely sponsors educational opportunities about generator winterization preparedness that SERC encourages GS and OC registered entities to participate in. (See *Attachment F: Email RE: NERC Winter Preparation for Severe Weather Webinar – September 3, 2015.*) Further, in the *September 2015 SERC TRANSMISSION Newsletter* sent to registered entities, SERC provided links to the following NERC material on cold weather events and issues:

- 1) January 2014 Polar Vortex Review
- 2) Southwest Cold Weather Event Report
- 3) Lessons Learned from Southwest Cold Weather Event
- 4) Previous Cold Weather Event Analysis
- 5) Reliability Guideline: Generating Unit Winter Weather Readiness

(See *Attachment G: September 2015 SERC Transmission Newsletter.*)<sup>4</sup>

SERC's website contains an outreach webpage which lists all SERC outreach seminars, trainings, and meetings, and makes the materials from these activities readily available to all registered entities.<sup>5</sup>

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<sup>4</sup> The Sept. 2015 SERC Transmission Newsletter can also be found at <http://serc1.org/docs/default-source/outreach/communications/serc-transmission-newsletter/2015-serc-transmission-newsletters/201509---serc-transmission.pdf?sfvrsn=2>.

<sup>5</sup> The SERC Outreach webpage can be found at <http://www.serc1.org/outreach>.

- 5. Some Regional Entities have previously conducted generating site visits to review and assess the preparations made for the 2014-2015 winter.**
- a. Is your Regional Entity considering or planning generating unit site visits in preparation for winter 2015-2016? If so, indicate the number of site visits planned and describe what subjects or issues will be reviewed during the site visit. If not, please explain the reason for not conducting site visits.**
  - b. For all Regional Entities indicate how the particular site visit was chosen (e.g., due to the unit experiencing freezing issues during 2014-2015).**

**Response:**

SERC staff has plans to conduct three site visits with registered entities prior to the 2015-2016 winter. These visits will focus on winter weather readiness. Following the model developed after SERC's 2014 site visit, SERC will present its winter weather readiness program questionnaire and checklist, designed to identify generator readiness and possible areas for improvement. (See *Attachment H: SERC Plant Outreach Agenda Questions*.)<sup>6</sup> The questionnaire and checklist include questions on procedures, work orders, and corporate protocols about winterization or for operations during cold weather periods. SERC staff will also discuss any causes identified by an entity for issues that developed during prior winter season, as well as the entity's proposed or completed activities to address.

However, SERC is also placing a special focus on the ten units who experienced effects from the cold weather during both the 2013-2014 winter season and the 2014-2015 winter season. The three site visits planned for 2015 were chosen because the entity experienced issues in one or both of the last two winter seasons, given the desire to focus on readiness as we approach the upcoming winter season. For the others, SERC staff is working through its technical committees, in addition to its existing plans to focus on cold weather preparedness, to ensure each entity is considering lessons learned and best practices in its preparations for the upcoming winter.

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<sup>6</sup> The SERC Plant Outreach Agenda Questions is also available on SERC's website to facilitate sharing with all GO and GOPs in the SERC Region. It can be found at <http://www.serc1.org/docs/default-source/program-areas/reliability-assessment/performance-analysis/situation-awareness/winter-preparedness/plant-outreach-agenda-detailed-questions---winterization.pdf?sfvrsn=2>.

- 6. For generating units with limited hours of operation (such as operating permit limitations), what action has the Regional Entity taken (or plans to take) to determine whether the unit will be available to operate in extreme cold weather. Provide any changes made since last year's data response (such as obtaining an operating permit limit variance, etc.**

**Response:**

In 2015, SERC issued two data requests to collect information from all of its generators to determine whether units would be available to operate in extreme weather. On July 14, 2015, as part of SERC's 2015-2016 winter assessment process, SERC requested that registered BAs provide detail on any environmental or regulatory restrictions that could impact unit availability or reliability during the winter season. *(See Attachment I: July 14, 2015 SERC Data Request.)* On August 17, 2015, SERC requested additional information from registered GOs and GOPs within its region, to determine whether units with limited hours of operation will be available to operate in extreme weather during the upcoming 2015-2016 winter season. *(See Attachment A: August 17, 2015 SERC Data Request.)*

Registered entities reported that they have identified units that could be impacted by annual or seasonal environmental and/or regulatory restrictions. Entities manage these restrictions in the daily operation of the system while maintaining reliability by installing controls and retrofits, and by implementing primary and dual-fuel improvements. Most entities reported annual or biannual testing along with plant-specific procedures for dealing with environmental restrictions during extreme weather. Some entities reported that they placed selected generating units in continuous slow-roll operation (true stand-by mode of operation) during extreme cold periods to ensure the units would be available to startup quickly, if needed. One entity reported that for its units with environmental permit limitations which restrict run time, the units are available to operate, once the transmission system operator declares a state of emergency and the entity notifies the state environmental agency of the emergency and the need to operate the units. One entity reported it obtained a permit modification for certain facilities to allow for increased NOx emissions when ambient temperatures drop below 50F. No entities reported insufficient operating permit carbon emission limitations that would prevent the units from operating during the 2015-2016 winter season.



**7. List any new issues seen in your region in winter 2014-15 but not seen in prior year cold weather events in your region, including a description of any associated corrective action plans.**

**Response:**

To gather the requested information for the SERC Region, on August 17, 2015, SERC sent a data request to registered GOs, GOPs, TOs, TOPs, BAs, and RCs in the SERC Region. (See *Attachment A: August 17, 2015 SERC Data Request.*) Registered entities identified the following as new issues seen in the SERC region during the 2014/2015 winter season and the corresponding corrective action plans implemented:

- Additional freeze protection system failures and inadequate insulation that resulted in frozen pipes and equipment. To correct this issue, entities took the following actions:
  - Repaired heat trace equipment.
  - Upgraded and installed additional insulation.
  - Added portable or supplemental heaters.
  - Installed external enclosure temperature sensors.
  - Implemented design modifications.
  - Increased operator rounds to hourly when operating below 30F.
  - Modified winterization procedure to include auxiliary equipment and systems.
  - Installed desiccant dryers.
  - Proved systems were operable in advance of extreme weather conditions.
- Frozen liquid fuel oil and fuel curtailment. To correct this issue, entities took the following actions:
  - Drafted specific procedures for cold weather preparation.
  - Installed additional recirculation lines to warm fuel oil.
- Fire water protection system freeze damage. To correct this issue, the entity added heaters.
- Heavy transmission line loading and a public appeal to shed load (e.g., 69 kV transmission line shed 5 MW) to meet increasing demand on low ambient temperature days. There was no corrective action plan associated with this issue because dealing with line overloads is a part of typical operating activity.
- Building dampers and heaters mis-operated. To prevent reoccurrence, the entity repaired the dampers and heaters.

MISO and PJM are registered in both the SERC and ReliabilityFirst regions. ReliabilityFirst and SERC coordinated to provide the response for MISO and PJM. For responsive information involving these entities, please see ReliabilityFirst's response to this data request.

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Attachment A: August 17, 2015 SERC Data Request

**Attachment A**  
**August 17, 2015 SERC Data Request**

Contents:

1. Letter sent to SERC Registered Entities
2. Narrative Questions
3. GO and GOP Additional Questions



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August 17, 2015

SERC Data Collection Task Force Contacts; and  
Generator Owners, Generator Operators, Transmission Owners, Transmission Operators,  
Balancing Authorities, and Reliability Coordinators Primary and Secondary Compliance  
Contacts

**RE: Request for response to the SERC Survey for FERC Data Request dated 07-31-2015**

SERC is conducting a follow-up survey on the cold weather events occurring January 7-9, 2015 and February 15-20, 2015. Your response to this survey will provide SERC with data to respond to a mandatory FERC data and document request, dated July 31, 2015 (Docket No. AD11-9-000). Further, this survey is part of SERC's efforts to address the issues identified during the winter events. SERC is requesting that your company, as a Generator Owner (GO), Generator Operator (GOP), Transmission Owner (TO), Transmission Operator (TOP), Balancing Authority (BA), and/or Reliability Coordinator (RC), complete this survey.

To complete the SERC survey for FERC Data Request dated 07-31-2015, submit your responses to the [Reliability Portal](#).

The survey consists of four narrative questions for GOs and GOPs; one narrative question for TOPs, BAs, and RCs, and one narrative question for GOs, GOPs, TOs, TOPs, BAs, and RCs. You will find a word version of the narrative questions for your convenience posted [here](#) on the public website, but please submit all responses via the Reliability Portal. GOs and GOPs that respond "YES" to questions #1 and/or #2, should also complete the spreadsheet posted [here](#) on the public website. Attach the completed workbook to the written assessment form and submit responses via the Reliability Portal.

Please complete this survey by **September 9, 2015**.

SERC will hold a data request kick-off WebEx for Registered Entities on August 19, 2015 at 9:30 a.m. For WebEx details, click [here](#).

If you have any questions, please contact SERC Reliability Assessments staff at [RAstaff@serc1.org](mailto:RAstaff@serc1.org). Thank you for your participation.

Sincerely,



Gary J. Taylor  
Vice President and Chief Operating Officer



## SERC Survey for FERC Data Request dated 07-31-2015 Narrative Questions

*This template is intended to be an aid in gathering the elements required for responding to a mandatory FERC data request, dated July 31, 2015. Responses for the following questions should be entered and submitted using the [SERC Reliability Portal](#) interface. The due date for all submittals is **September 9, 2015**.*

*GO and GOP registered entities that answer "YES" to questions #1 and/or #2 must also complete a spreadsheet and attach it to the written assessment form. Here is the [link](#) to the public website for the Excel file.*

*Please be as descriptive as possible in your response. If a question is not applicable to your company or registration, enter N/A in the space provided.*

### GO and GOP Questions

**These questions should be answered by GOs and GOPs only. All other registered entities can enter N/A.**

1. During the time period January 7-9, 2015, did your company have one or more generating units that tripped, were derated, or failed to start due to frozen equipment? (Answer Yes or No.) If yes, please attach the completed supplemental Excel workbook to this survey.
2. During the time period February 15-20, 2015, did your company have one or more generating units that tripped, were derated, or failed to start due to frozen equipment? (Answer Yes or No.) If yes, please attach the completed supplemental Excel workbook to this survey.
3. Identify how many units saw a repeat of the same issues from the prior year. Describe completed and ongoing activities taken by your company to prevent a recurrence.
4. For generating units with limited hours of operation (such as operating permit limitations), what actions has your company taken (or what actions does your company plan to take) to determine whether the units will be available to operate in extreme weather? Explain how your company plans to make this assessment, including any review or testing of units with dual fuel capacity. Provide any changes made since last year's (September 26, 2014) data response to determine whether the unit will be available to operate in extreme cold weather (such as obtaining an operating permit limit variance, etc.).

### GO, GOP, TO, TOP, BA, and RC Question

**These questions should be answered by GOs, GOPs, TOs, TOPs, BAs, and RCs only. All other registered entities can enter N/A.**

5. List any new issues seen by your company in winter 2014/2015 but not seen by your company in prior year cold weather events, including a description of any associated corrective action plans.

### TOP, BA, and RC Question

**These questions should be answered by TOPs, BAs, and RCs only. All other registered entities can enter N/A.**

6. Since last year's data request (September 26, 2014), what policy and procedural changes, if any, have been made in your company to ensure that your system operators are aware of generators' ability to run at extreme cold ambient temperatures?

Entity Name	
Contact Name	
Contact E-Mail	
Contact Telephone	

**Applicable time Period: January 7-9, 2015**

During the time period January 7-9, 2015, numerous generating units tripped, were derated, or failed to start due to frozen equipment.

A. For the time period above, identify below the specific cause related to frozen equipment by number of units and total MW lost.

B. Of the units with frozen equipment, identify the number of units and MW of generation that were exposed to ambient temperatures below the design basis of the plant.

If a unit tripped, operated at a derated capacity, and/or failed to start within the same day due to frozen equipment, include only the single largest "Total MW Lost" for that unit in the summary below.

Region	Total Number of Units	Coldest Winter Period/s	Specific Cause	Total MW Lost	Number of Units Lost when Operated below Design Temp	Total MW Lost when Operated below Design Temp	Notes	Comments
SERC		01/07/2015 - 01/09/2015	Failed Heat Trace					
SERC		01/07/2015 - 01/09/2015	Frozen water systems				Note 1	
SERC		01/07/2015 - 01/09/2015	Other cold-related issues				Note 2	
SERC		01/07/2015 - 01/09/2015	Improper operating conditions				Note 3	
SERC		01/07/2015 - 01/09/2015	Frozen Instruments and Instrument Lines				Note 4	
SERC		01/07/2015 - 01/09/2015	Steam drum level measurements					
SERC		01/07/2015 - 01/09/2015	Frozen lines, valves and switches					
SERC		01/07/2015 - 01/09/2015	Frozen pumps, motors and breakers					
SERC		01/07/2015 - 01/09/2015	Fuel - Frozen Coal					
SERC		01/07/2015 - 01/09/2015	Fuel Curtailment - Fuel Oil					
SERC		01/07/2015 - 01/09/2015	Fuel Curtailment - Natural Gas					
SERC		01/07/2015 - 01/09/2015	Wind Curtailment				Note 5	
SERC		01/07/2015 - 01/09/2015	Emissions					
<b>TOTAL</b>	<b>0</b>			<b>0</b>	<b>0</b>	<b>0</b>		

Notes

1 - Included are frozen hydro unit intakes and generating unit cooling water systems

2 - Included are cold hydraulic oil

3 - Included are low temp from induced draft fan, loss of circulating water supply, erratic drum pressure, low steam temperature

4 - Except for steam drum levels

5 -Wind generation forced off due to low ambient temperature limits or blade icing

**Applicable time Period: February 15-20, 2015**

During the time period February 15-20, 2015, numerous generating units tripped, were derated, or failed to start due to frozen equipment.

A. For the time period above, identify below the specific cause related to frozen equipment by number of units and total MW lost.

B. Of the units with frozen equipment, identify the number of units and MW of generation that were exposed to ambient temperatures below the design basis of the plant.

If a unit tripped, operated at a derated capacity, and/or failed to start within the same day due to frozen equipment, include only the single largest "Total MW Lost" for that unit in the summary below.

Region	Total Number of Units	Coldest Winter Period/s	Specific Cause	Total MW Lost	Number of Units Lost when Operated below Design Temp	Total MW Lost when Operated below Design Temp	Notes	Comments
SERC		02/15/2015 - 02/20/2015	Failed Heat Trace					
SERC		02/15/2015 - 02/20/2015	Frozen water systems				Note 1	
SERC		02/15/2015 - 02/20/2015	Other cold-related issues				Note 2	
SERC		02/15/2015 - 02/20/2015	Improper operating conditions				Note 3	
SERC		02/15/2015 - 02/20/2015	Frozen Instruments and Instrument Lines				Note 4	
SERC		02/15/2015 - 02/20/2015	Steam drum level measurements					
SERC		02/15/2015 - 02/20/2015	Frozen lines, valves and switches					
SERC		02/15/2015 - 02/20/2015	Frozen pumps, motors and breakers					
SERC		02/15/2015 - 02/20/2015	Fuel - Frozen Coal					
SERC		02/15/2015 - 02/20/2015	Fuel Curtailment - Fuel Oil					
SERC		02/15/2015 - 02/20/2015	Fuel Curtailment - Natural Gas					
SERC		02/15/2015 - 02/20/2015	Wind Curtailment				Note 5	
SERC		02/15/2015 - 02/20/2015	Emissions					
<b>TOTAL</b>	<b>0</b>			<b>0</b>	<b>0</b>	<b>0</b>		

Notes

1 - Included are frozen hydro unit intakes and generating unit cooling water systems

2 - Included are cold hydraulic oil

3 - Included are low temp from induced draft fan, loss of circulating water supply, erratic drum pressure, low steam temperature

4 - Except for steam drum levels

5 -Wind generation forced off due to low ambient temperature limits or blade icing

SERC Response to FERC Data and Documents Request dated July 31, 2015  
Docket No. AD11-9-000  
Attachment B: Worksheet – FERC Data Request 2015 Docket No. AD11-9 –  
SERC Region

**Attachment B**

*Worksheet – FERC Data Request 2015 Docket No. AD11-9 – SERC Region  
Excel workbook submitted with this response.*



SERC Response to FERC Data and Documents Request dated July 31, 2015

Docket No. AD11-9-000

Attachment C: 2015 Spring OC Cold Weather Presentations

**Attachment C**  
**2015 Spring OC Cold Weather Presentations**

Contents:

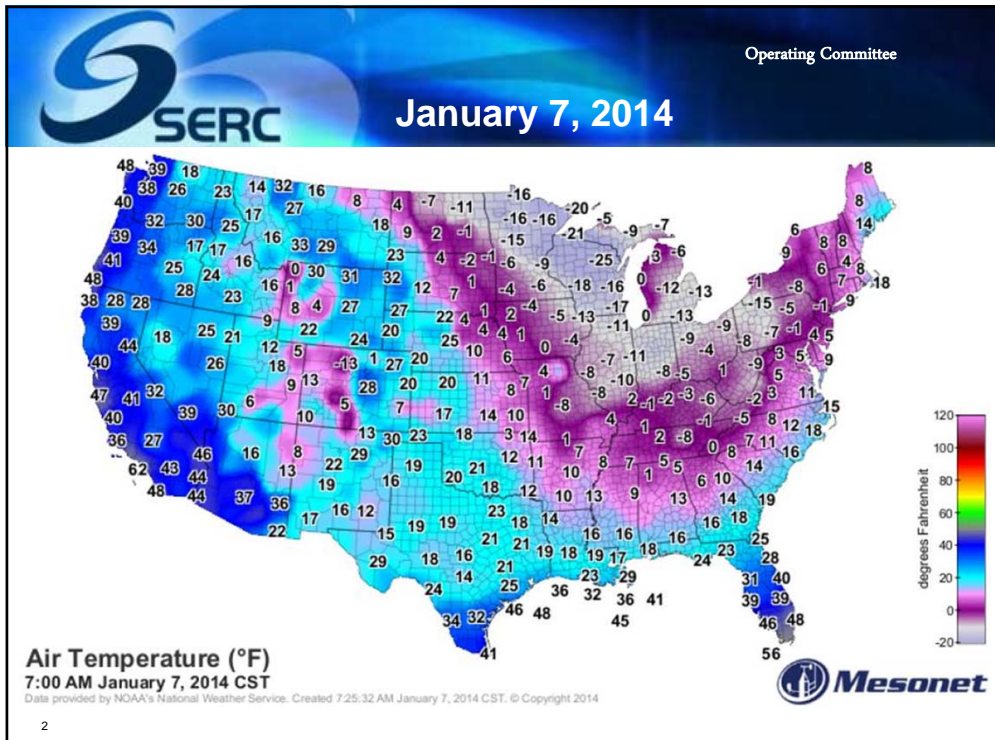
- a. SERC Winterization Efforts – Experiences and Potential Improvements Presentation
- b. Entity 2014 and 2015 Cold Weather Lessons Learned

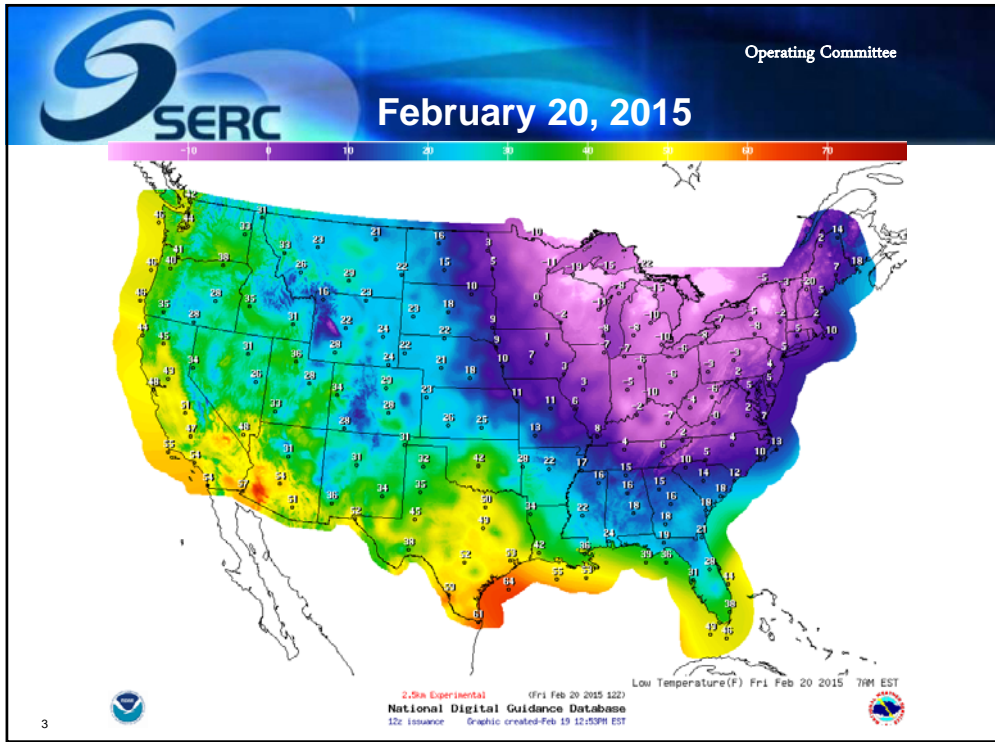


## SERC Winterization Efforts -Experiences and Potential Improvements

**SERC Operating Committee Meeting  
March 17, 2015  
Charlotte, NC**

1







Operating Committee

## Questions?

6

# Duke Energy 2014 and 2015 Cold Weather Lessons Learned

Sam Holeman

1

## 2014 Polar Vortex

Some of the lessons learned that were implemented were:

- System Operation Super Peak Analysis – 10% greater peak load than planning model forecast
- Implemented Cold Weather Check's to Transmission equipment.
- Focused approach for fuel oil operations on simple cycle CT's during winter months when gas availability is limited.
- Validated dual fuel capability for CCs/CTs including ongoing periodic maintenance and testing of equipment to ensure reliable capability of running on oil.
- Developed a consistent alert level model across Duke Energy Carolinas and Duke Energy Progress and review if this alert level model can be used for the entire Duke footprint.
- Review Cold Weather design for generation facilities . Operate and monitor generation facilities to ensure reliable operation during extreme cold weather events.

2

## 2015 Winter Lessons Learned

Recommendations, facts and lessons learned from the 2015 Cold Weather Events:

Recommendations:

- Load Forecasting model are historically not as accurate during extreme weather events. A recommendation is to dedicate resources to review and tune the model to reflect current weather trends and load modeling.
- Continue to review historical cold weather related generation impacts and share those with all Duke generation facilities and the industry. Implement cold weather practices to ensure reliable generation operations. Winter Weather/Summer Weather Prep Webinars in place
- Define communication requirements, identify single point of contact to convey a message that is simple and executes the expectations that the message intended.

Facts:

- Duke Energy Carolinas set an all time peak on 2/20/15 for hour ending 0800. Integrated load was 21101 MWH's with DMS programs shaving approximately 400 to 500 MW's. Total Summer Capacity is 21737 MW's. – Winter Capacity is 22505
  - Super Peak – 21,470 MWhrs DEC
  - Super Peak – 14,525 MWhrs DEP
- Duke Energy Progress set an all time peak on 2/20/15 for hour ending 0800. Integrated load was 15501 with DSM programs shaving approximately 400 MW's. Total Summer Capacity is 14991 MW's. Winter Capacity is 16110

3

## 2015 Winter Lessons Learned

Lessons Learned:


- By implementing the Transmission System equipment checks – Transmission operations had considerably less equipment alarms.
- Operational planning and operation of generation facilities (CC's and CT's) – running CC units in 2 on 1 or 3 on 1 modes and starting simple cycle CT's before extreme cold weather allowed these units to operate in a secure mode.
- Outage coordination – allowing units to begin the outage season before the end of winter could impact reliability.
- Cold weather impacts to generation were less than the 2014 Polar Vortex but continue to appear during cold weather events.
- Resource Planning for Extreme Peak Conditions – Reserve requirements, capacity purchases or load shed?

4

SERC Response to FERC Data and Documents Request dated July 31, 2015  
Docket No. AD11-9-000

Attachment D: 2015 SERC Operator Training Conference –  
Winterization Preparedness Presentation

**Attachment D**  
**2015 SERC Operator Training Conference – Winterization Preparedness Presentation**



2015 SERC Operator Training Conference

## Winterization Preparedness

**Kim Thomas**  
Reliability Specialist  
SERC Reliability Corporation

1




2015 SERC Operator Training Conference

## 2014 Severe Weather Events

- SERC experienced two noteworthy Cold Weather Events in 2014
  - Polar Vortex: January 6-8, 2014
    - Measurable impact on SERC Region
  - Winter Storm: January 17-29, 2014
    - Inconsequential for SERC Region (not discussed further)

2






2015 SERC Operator Training Conference

## Recent Weather Events

- January 2014 Polar Vortex Event
  - Was a GENERATION Event
  - NOT a Transmission Event
- Near-term precedent exist for this type of event
  - 2011 Southwest Cold Weather Event
    - From February 1-5, 2011, over 250 electric generating units in ERCOT, WECC and SPP experienced outages. By number of units, 52% were directly weather-related.
    - Resulted in FERC directives

3




2015 SERC Operator Training Conference

## 2014 Polar Vortex Reports and Findings

- Polar Vortex Event Reports and Data Request
  - SERC: SERC Polar Vortex Report, April 2014
    - SERC formulated a data request and RCs distributed to SERC Entities; SERC written report sent to NERC
  - NERC: Polar Vortex Review, September 2014
    - Regional Entities (RE) submitted regional reports to NERC
    - NERC published ERO report (see [www.NERC.com](http://www.NERC.com))
  - FERC: SERC Polar Vortex Response, November 2014
    - Data and Document Request from FERC to REs
      - 13 RE Specific Questions / RE specific questions
      - No FERC Report published as of this date
      - No directives as of this date (relative to 2011 Southwest Outage)

4




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## SERC Polar Vortex Response To FERC

(The Dates and Process – 2 month duration)

- September 26, 2014: FERC submitted Data and Document Request to SERC
- October 10, 2014: SERC submitted a “refined” Request to SERC Entities:
  - GOs, GOPs, TOs, TOPs, RCs and BAs
- October 31, 2014: Registered Entity responses received
- November 25, 2014: SERC submitted a formal response to FERC

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## SERC Polar Vortex Response To FERC (The Findings)

SERC Top 5 Specific Causes Related to Frozen Equipment By Number of Units and Total MWs		
SPECIFIC CAUSE	NUMBER OF UNITS	TOTAL MWs LOST
Instrumentation	50	12,657
Steam Drum Level Measurements	29	6,712 (Controllable)
Control Air Systems, Control Drives, Valve Actuators, Valves	25	4,752
Insulation / Heat Tracing - Damaged/Defective/Inadeq.	29	3,515 (Controllable)
Fuel - Coal/NG Supply/Fuel Oil	12	1,947

Note: 206 units (14,513 MW) of generation were exposed to ambient temperatures below its design basis.

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## Procedural or Policy Changes Implemented by System Operators

(FERC Data & Document Request Responses)

1. Procedural improvements to communication protocols from the plants to central dispatch concerning unit status, equipment outages, and level of freeze protection.
2. “Winter Weather Freeze Plan” developed to address winter weather hazards to generation facilities, including plant personnel and equipment.
3. Engineering firm hired to perform detailed site inspections and review the freeze protection systems and winter weather preparation procedures.

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## Procedural or Policy Changes Implemented by System Operators

4. Created or updated procedures applicable to communications of generators’ ability to run at extreme ambient conditions, adding additional communication responsibilities and additional conference calls between generators operators (GOP) and the local BA.
5. Implemented a winterization procedure checklist which requires completion, exceptions, and anomalies to be reported to system operators.

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## Procedural or Policy Changes Implemented by System Operators

6. Changed operational policies to maintain additional reserves, maintain situational awareness of fuel availability and performance, and start generating units in advance.
7. Instituted special morning meetings specifically when a cold weather event is expected, in order to coordinate activities between appropriate representatives of various departments within system operations, transmission, and generation.

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## Procedural or Policy Changes Implemented by System Operators

8. Modified conservative operations procedures, which include declaring conservation operations for extreme weather events and steps to take, such as restoring or cancelling outages and requesting suspension of all non-essential work at plants.
9. Updated requirements to include a "Cold Weather Preparation Guideline and Checklist," which will be used by generator owners and operators to identify and prioritize components, systems, and areas of vulnerability

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## SERC SAEA Winterization Outreach Events (Past and Future)

- October 29, 2014: SERC SAEA began Outreach Activity for Cold Weather Events and Winterization efforts
  - Visited one plant in the SERC region during 2014
  - One of the questions on the FERC Data and Document Request asked if REs were performing Winterization Outreach Activities
  - 1 to 3 Additional Winterization Outreach Visits budgeted for 2015
    - SERC Entities will be selected by 2014 experience and BA region

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## What Else Can I Do To Prepare?

- Review NERC continuing education training program module, “Extreme Winter Weather Recommendations and Guidelines” on the SERC public Website
- Implement the nine (9) Procedural or Policy Changes suggested for implementation by System Operators and discussed in this presentation.
- Consider Dual-Fuel and Fuel Switching Opportunities (incorporate testing)
- Be mindful of Electric & Natural Gas Interdependency (curtailment & gas press. issues)

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## The End Result

- We control our destiny...
- Implement Comprehensive Cold Weather Plans (Generator and Transmission Operators) that incorporate the following principles:
  - Maintain a Questioning Attitude
  - Never Accept Status Quo Results
  - Utilize Defense In-Depth Principles
  - Implement a Multiple Contingency Approach
  - Utilize Existing Resources (NERC Guide, etc.)
  - Insist on a Comprehensive Weatherization Plan
  - Communicate, Communicate and Communicate...

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 2015 SERC Operator Training Conference



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SERC Response to FERC Data and Documents Request dated July 31, 2015

Docket No. AD11-9-000


Attachment E: Fall 2015 SERC OC Meeting –  
Winter Preparedness Presentations

**Attachment E**

**Fall 2015 SERC OC Meeting – Winter Preparedness Presentations**

Contents:

- a. SERC Cold Weather Preparations Presentation
- b. SERC 2014-2015 Post Winter Seasonal Analysis Report Presentation



# **SERC Cold Weather Preparations**

**SERC Operating Committee Meeting  
October 6, 2015  
Charlotte, NC**

**Sammy Roberts  
Duke Energy Progress**

1

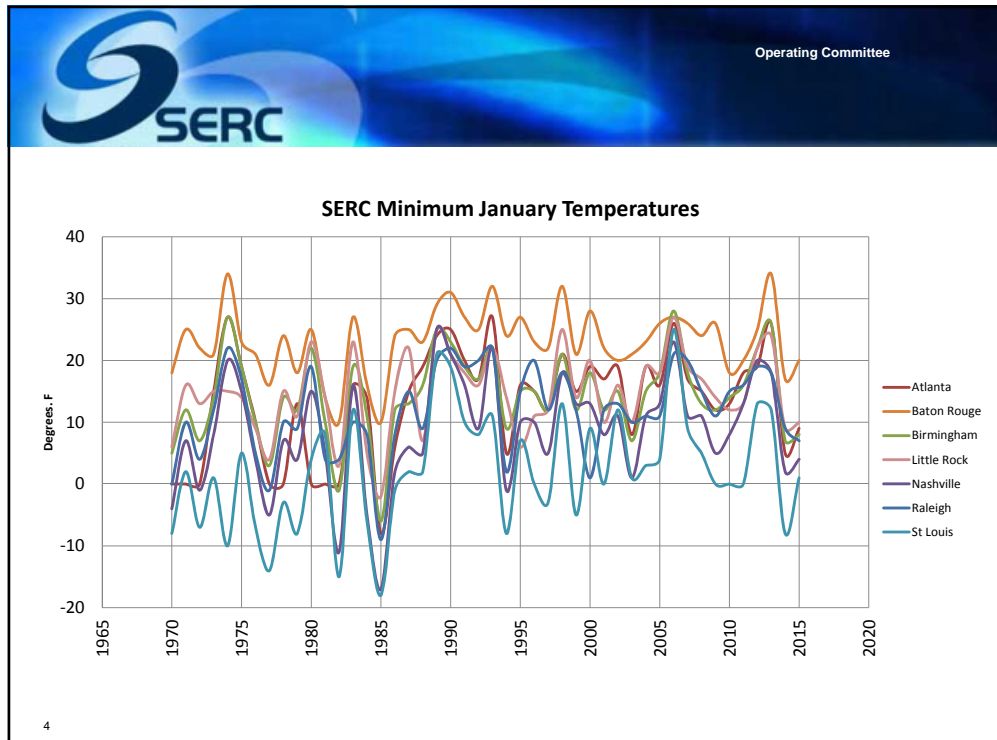
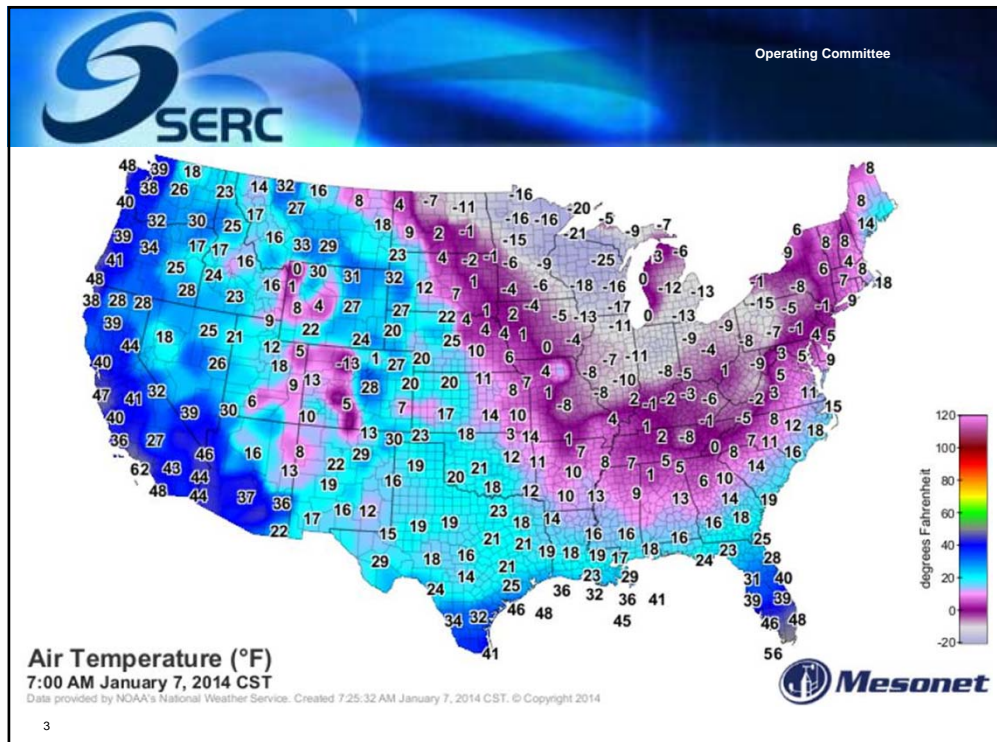


Operating Committee

## **Topics**

- SERC Region
  - Historical Cold Weather including Recent Cold Weather
- Preventing Getting Lulled to Sleep
- Being Prepared... for the Worst





 Operating Committee

## Keep Checking Those Generators

- Winter Weather Preparation Check Lists
- Heat Trace Audits
- Insulation Audits

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**Construction Installation Quality**

6




7




**Plant Modifications**

8

Operating Committee



## Best Practice




Best practice wind break and flooring to prevent tunneling effect.

Insulated transmitter boxes

Source: ERCOT

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## Generation Retirements → New Generators

- Be concerned about new heat tracing... especially in new plants
- Last thing that gets installed when COD deadline is fast approaching
- 10% – 45% that are not installed correctly or not functioning properly
- Tell new generators to be conservative with wind breaks

Source: ERCOT

10

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## What's Going to Continue to Change?

- Generation Retirements
- New Generators
- New Employees

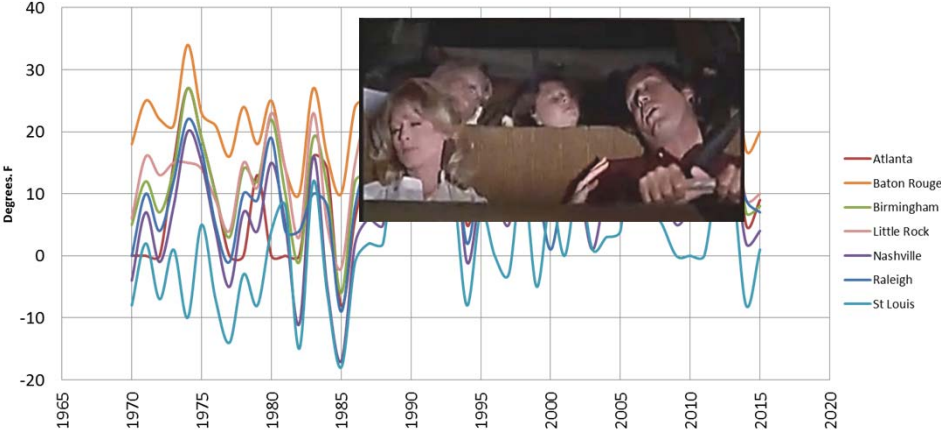
***Procedures and Checklists institutionalize knowledge gained in these events as people and generation resources change...and combat our memory loss issues as we go through several winters without severe cold weather.***

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## Don't Get Lulled to Sleep Again

SERC Minimum January Temperatures



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## Event


- February 1 through 5, 2011 temperatures in parts of Texas were below freezing for up to 100 hours.
- Event affected ERCOT, Southern portion of WECC, and SPP region.
- Generators tripped due to instrumentation and sensing lines freezing.
- Several gas CBs tripped due to SF6 pressure reaching low pressure setpoint.
- ERCOT declared EEA3 and interrupted 4000 MW of firm load to alleviate supply/demand imbalance.



Operating Committee

## Lessons Learned


- Rotational Load Shed
- Plant Onsite Material and Personnel for a Winter Weather Event
- Plant Operator Training to Prepare for a Winter Weather Event
- Transmission Facilities and Winter Weather Operations
- Plant Instrument and Sensing Equipment Freezing Due to Heat Trace and Insulation Failures
- Plant Fuel Switching and Cold weather



Operating Committee

## Plant Operator Training to Prepare for a Winter Weather Event


- Plant operators should be trained on freeze protection plan and emergency winter operation plan
- Plant operators accepted critical metering indications as accurate without validating through comparison with other readings
- Plant operators should use 3-part communications when receiving or giving instructions



Operating Committee

## Transmission Facilities and Winter Weather Operations


- Preparations for winter operations:
  - Power transformers should have equipment checked
    - Control cabinet heaters working correctly
    - Oil is at appropriate level for oil temperature
    - Bushing oil levels are appropriate
  - SF6 gas in CBs
    - At correct pressure to operate correctly in cold weather
    - Heaters and support circuits functioning properly
  - Minimum operating temperature for all transmission facilities should be known



Operating Committee

## Plant Instrument and Sensing Equipment Freezing Due to Heat Trace and Insulation Failures

- Pressure, water level, and flow transmitters froze causing generators to trip
  - Purge sensing lines prior to winter operation to eliminate moisture
  - Ensure proper freeze protection measures are applied to critical instrumentation and sensing lines



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## Plant Fuel Switching and Cold weather

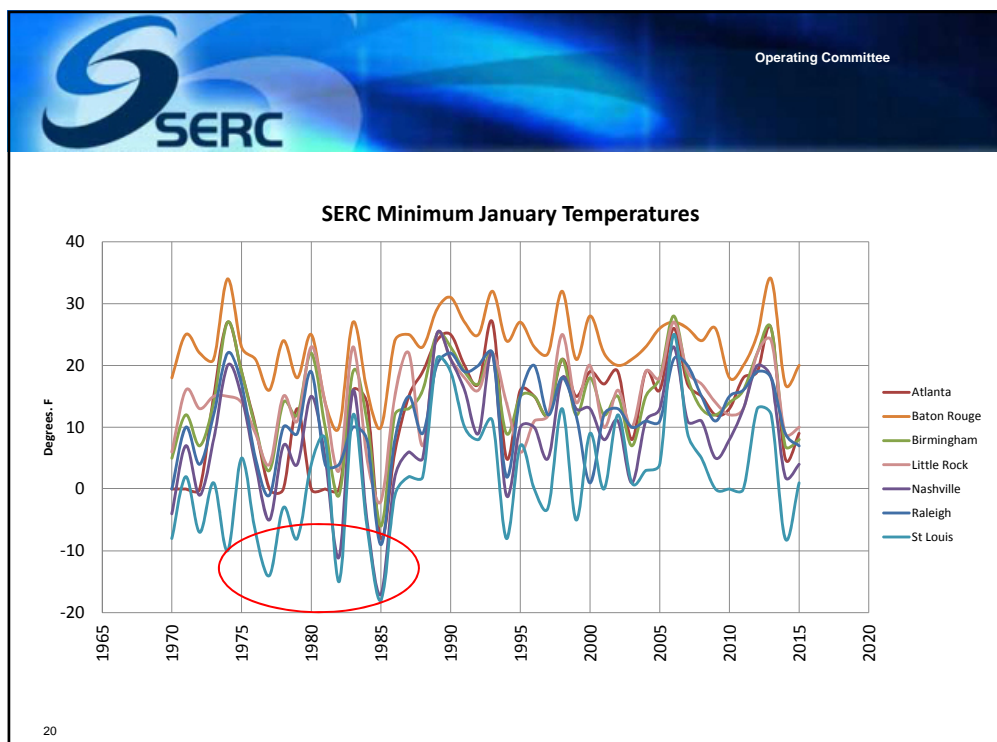
- Dual fuel capable generation units should test fuel switching capability prior to severe winter weather operations




Operating Committee

## SERC Recommendations

- Keep pushing awareness of lessons learned to Transmission, Generation, and Distribution peers and consider instituting heat trace and insulation audits
- Prepare for each winter as if it going to be the historical cold winter





Operating Committee

**Questions?**

21

The image shows a presentation slide with a blue header. On the left side of the header is the SERC logo, which consists of a stylized 'S' followed by the letters 'SERC'. On the right side of the header, the text 'Operating Committee' is displayed. The main body of the slide is white and contains the word 'Questions?' in a large, bold, blue font centered on the page. In the bottom-left corner of the slide, the number '21' is printed.

Operating Committee




# Operating Committee Meeting

**October 6, 2015  
Charlotte, NC**

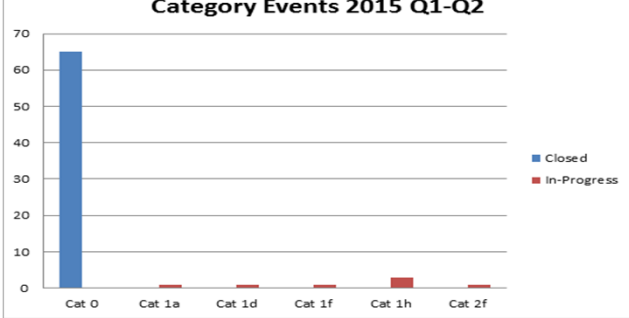
**Alex Shestopal  
Reliability Engineer**

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Operating Committee



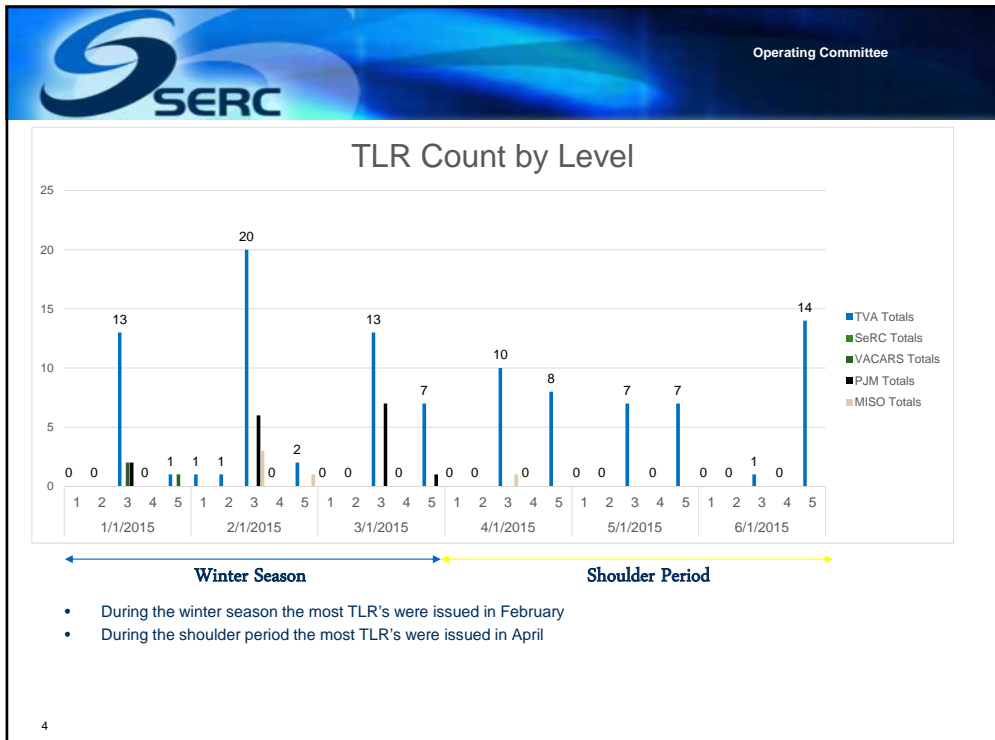
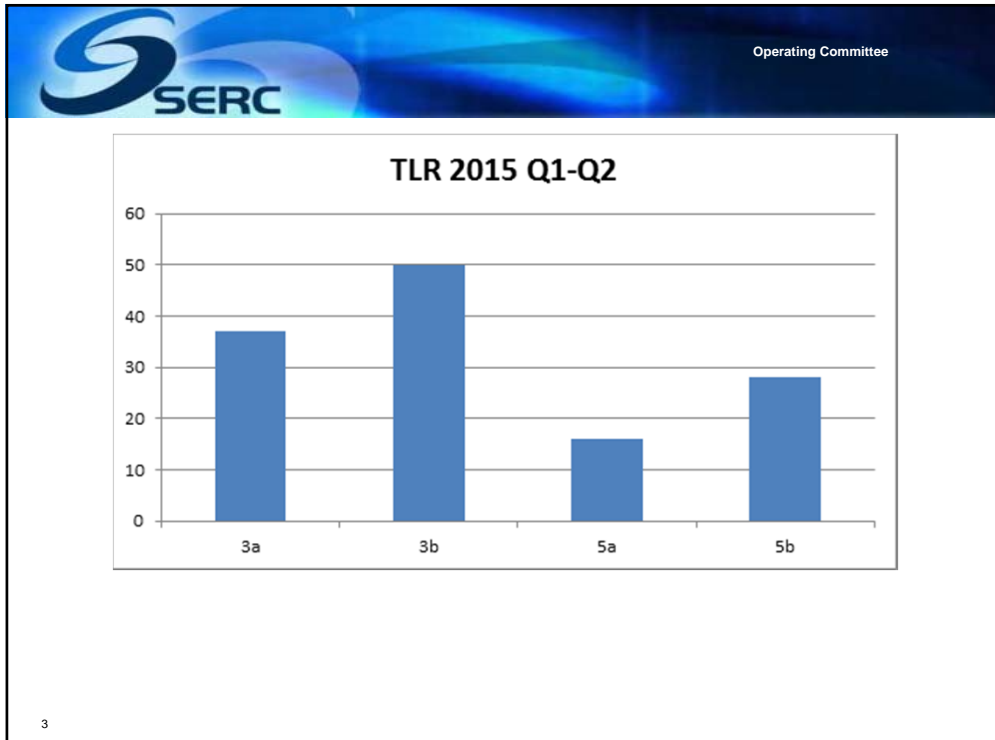
## Category Events 2015 Q1-Q2

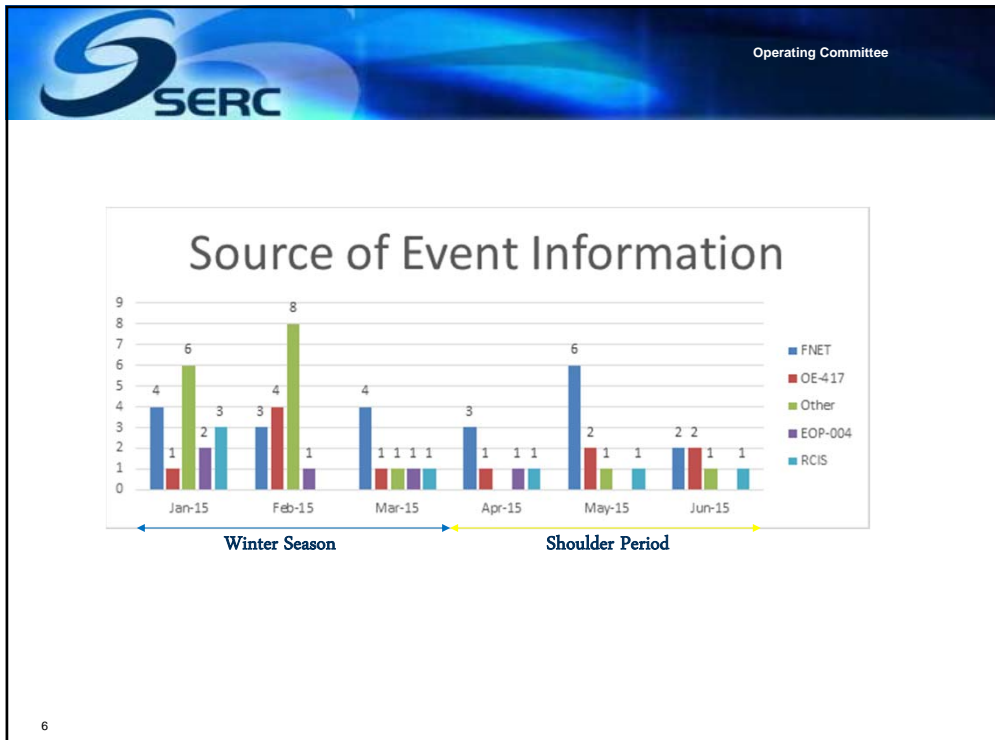
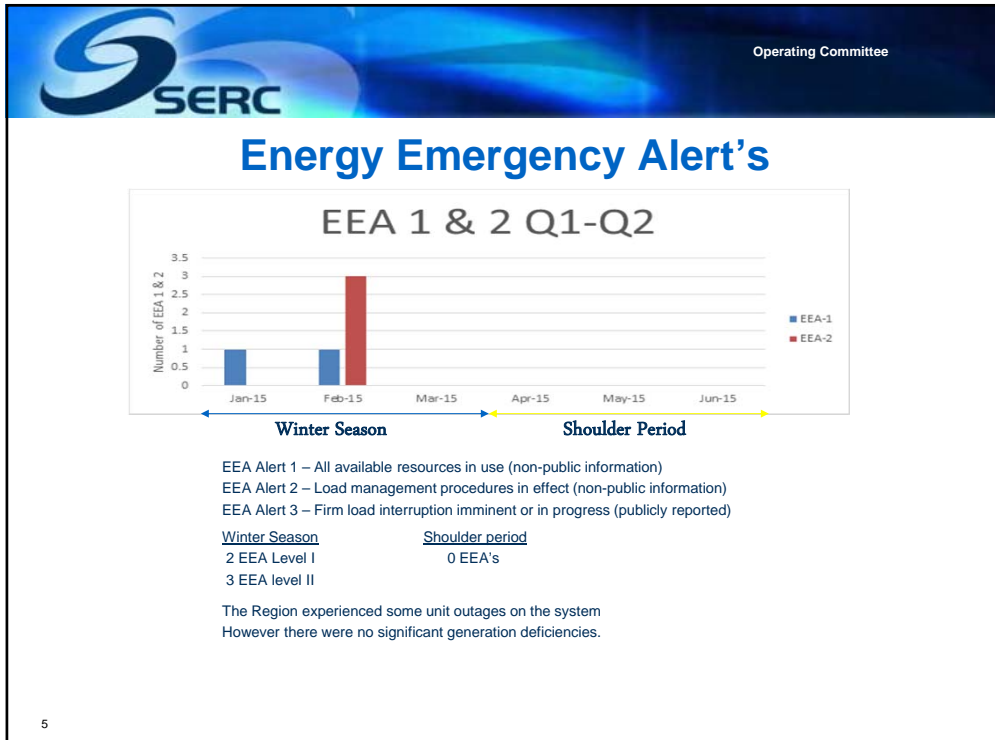



Category	Closed	In-Progress
Cat 0	65	0
Cat 1a	0	1
Cat 1d	0	1
Cat 1f	0	1
Cat 1h	0	3
Cat 2f	0	1

Cat 0 = Non-qualifying event.  
Cat 1a = An unexpected outage, contrary to design, of three or more bulk power system (BPS) facilities.  
Cat 1d = System-wide voltage reduction of three percent or more that lasts more than 15 continuous minutes due to a BPS emergency.  
Cat 1f = Unplanned evacuation from a control center facility with BPS Supervisory Control and Data Acquisition (SCADA) functionality for 30 minutes or more.  
Cat 1h = Loss of monitoring or control, at a control center, such that it significantly affects the registered entity's ability to make operating decisions for 30 continuous minutes or more.

2







Operating Committee

**Questions?**

7

The image shows a presentation slide with a blue header. On the left side of the header is the SERC logo, which consists of a stylized 'S' followed by the letters 'SERC'. On the right side of the header, the text 'Operating Committee' is displayed. The main body of the slide is white and contains the word 'Questions?' in a large, bold, blue font centered on the page. In the bottom-left corner of the slide, the number '7' is visible.

SERC Response to FERC Data and Documents Request dated July 31, 2015  
Docket No. AD11-9-000  
Attachment F: Email re: NERC Winter Preparation for Severe Weather Webinar –  
September 3, 2015

**Attachment F**  
**Email re: NERC Winter Preparation for Severe Weather Webinar – September 3, 2015**

**From:** Kim Thomas  
**To:** [gs\\_roster@list-serc1.org](mailto:gs_roster@list-serc1.org); "OC\_plus@list-serc1.org" ([OC\\_plus@list-serc1.org](mailto:OC_plus@list-serc1.org)) ([OC\\_plus@list-serc1.org](mailto:OC_plus@list-serc1.org))  
**Cc:**  
**Subject:** NERC Winter Preparation for Severe Cold Weather Webinar - Thursday, 9/3/2015 at 2 PM Eastern  
**Date:** Wednesday, September 02, 2015 9:51:10 AM  
**Attachments:** [image001.jpg](#)

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SERC GS and OC Personnel:

Please note that NERC will conduct a "Winter Preparation for Severe Cold Weather Webinar" tomorrow, September 3, 2015, from 2:00 p.m. to 3:00 p.m. Eastern. This event has historically been extremely informative regarding electric utility winter preparation activities and your company's participation is highly recommended. Use the link below to register and access this event:  
<http://www.nerc.com/Pages/Calendar.aspx>

Regards,

Kim Thomas  
Reliability Specialist  
SERC Reliability Corporation



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SERC Response to FERC Data and Documents Request dated July 31, 2015  
Docket No. AD11-9-000

Attachment G: September 2015 SERC Transmission Newsletter

**Attachment G**  
**September 2015 SERC Transmission Newsletter**



“On August 3, 2015, the EPA announced the release of the final rule under Section 111(D) of The Clean Air Act (Clean Power Plan).”

September 2015

Volume 2: Issue 9

## SERC CONNECTION

*Maria Haney, Manager, Reliability Assessments & Performance Analysis*

### Clean Power Plan

On August 3, 2015, the EPA announced the release of the final rule under Section 111(D) of The Clean Air Act (Clean Power Plan). In an effort to promote effective and efficient administration of bulk power system (BPS) reliability, SERC Reliability Corporation will assess the rule's reliability impacts within the SERC Region. Results from the analysis will be used to inform discussions regarding the reliability impacts to generation and transmission adequacy during the rule's compliance period. In addition, SERC's analysis will inform NERC's Clean Power Plan reliability assessments efforts which are conducted on a national level.



[SERC Comments on Clean Power Plan](#)

## INSIDE SERC

- ◆ **SERC Staff Realignment**  
[Organizational realignment](#) was announced by President and CEO Scott Henry. A new [organization chart](#) is posted on the SERC website. Additional information will appear in the next newsletter.
- ◆ **Congratulations**  
PMP certification achieved by [Lisa Welch](#) and CISM certification achieved by [Bill Peterson](#). ↓

## REGISTERED ENTITIES

- ◆ **SERC OC Rep News**  
Troy Blalock is a Power System Reliability Specialist III at South Carolina Electric & Gas Company, and serves as the SERC representative on the NERC Resources Subcommittee. Troy has provided information on: [BAL-001-2](#), [BAL-003-1](#), and the [Eastern Interconnection Frequency Initiative](#).

## HOT TOPICS

- ◆ **SERC CIP Bulletin**  
The [SERC CIP Bulletin](#) has helpful information monthly.
- ◆ **New Website Feedback**  
Please provide your feedback via a [five-minute survey](#).
- ◆ **Registered Entity Forum**  
Send [REF Steering Committee representatives](#) questions. ↓

## NOTE THE NEWS

- ◆ The ERO Implementation Plan has been updated. [Appendix A5](#) pertaining to the SERC Region, has been posted on the website.
- ◆ The [2015 SERC Reliability Review Subcommittee's Annual Report](#) has been posted to the website. ↓

## FOR YOUR CALENDAR

SERC [Upcoming Events](#) / [Calendar](#)

### SERC and NERC Events

**NERC September 3**  
[Winter Preparation for Severe Cold Weather Webinar](#)

**SERC September 8**  
[Finance and Audit Committee](#)

**SERC September 9**  
[Board Executive Committee](#)

“ A challenge only becomes an obstacle when you bow to it.” *Ray Davis*

## Inside SERC

Continued

- ◆ **Special Thanks**  
[NERC thanked](#) SERC's Fred Rains and John Wolfmeyer for assistance with the assessment of potential BES inclusions and exclusions.
- ◆ **Remember**  
 Spotlight your company by [submitting photographs](#) for SERC's use or send newsletter suggestions to: [support@serc1.org](mailto:support@serc1.org).

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## Hot Topics

Continued

anonymously for discussion during the CIP and/or Fall Compliance Seminars. If you would like to be an REF rep, here are [details](#).

- ◆ **BAL-001-2**  
 The [BAL-001-2](#): *Real Power Balancing Control Performance* Standard becomes enforceable on July 1, 2016. It retires the calculation of CPS-2 and replaces it with the Balancing Authority ACE Limit (BAAL). Registered BAs will need to adapt their performance calculations, any displays, alarms, and data retention capabilities to meet the revised standard by that date. Additional information is in [Troy Blalock's article](#).
- ◆ **Special Protection System**  
 SERC article on [Special Protection Systems](#) has been posted.
- ◆ **Login Issue**  
 If you experience an issue logging into the SERC public website and/or portal due to a recent security change in the Compliance Portal, see the question indicated **NEW** in the *Portal and Website* category on the [FAQ & Lessons Learned](#) page of the website.
- ◆ **SERC Regional Criteria**  
 The *Regional Criteria: Actual and Forecast Demands Rev 10* ([technical justification](#)) is currently in the retirement process given that MOD-031-1 is currently effective and becomes enforceable on July 1, 2016. The proposal for retirement will be presented for approval to the SERC Engineering Committee at the fall 2015 meeting. Upon official approval of the retirement, the document will be removed from the SERC website.
- ◆ **Identity Theft**  
 The U.S. Secret Service released a [guide](#) with checklists and step-by-step instructions on what to do and who to contact to mitigate risk associated with identity theft.

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## Note the News

Continued

The [NERC Newsroom](#) features announcements and [newsletters](#).

- ◆ [NERC Reliability Leadership Summit](#) identified key priorities for North American bulk power system.
- ◆ NERC posted information on Project 2015-03 [Periodic Review of System Operating Limit Standards](#).
- ◆ NERC [announced](#) historic anniversaries and Board approval of resolutions on ES-ISAC strategic review.

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## For Your Calendar

Continued

- ◆ **SERC September 9 - 10**  
[Protection and Control Subcommittee](#)
- ◆ **NERC September 10**  
[Remedial Action Schemes PRC-012-2 Webinar](#)
- ◆ **NERC September 10**  
[CIP V5 Transition Update Webinar](#)
- ◆ **SERC September 16 - 17**  
[Near-Term Study Group](#)
- ◆ **NERC September 24**  
[CIP V5 Transition Update Webinar](#)
- ◆ **SERC September 24 - 25**  
[Operations Planning Subcommittee](#)
- ◆ **SERC September 28 - 29**  
[CIP Compliance Seminar](#)
- ◆ **NERC September 29 - 30**  
[Monitoring and Situational Awareness Technical Conference](#)
- ◆ **SERC September 29 - October 1**  
[System Operator Conference](#)
- ◆ **NERC September 30 - October 1**  
[Fault Induced Delayed Voltage Recovery & Dynamic Load Modeling Workshop](#)
- ◆ **SERC September 30 - October 2**  
[CIP Security Reliability Program Seminar](#)

## Plan Ahead

- ◆ [Fall Joint Meetings of the Standing Committees](#)  
 October 5 - 7
- ◆ [Fall Compliance Seminar](#)  
 October 27 - 28
- ◆ Power System Restoration Drill  
[Charlotte, NC](#) / [Jackson, MS](#)  
 October 28 - 29

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Docket No. AD11-9-000

Attachment H: SERC Plant Outreach Agenda Questions

**Attachment H**  
**SERC Plant Outreach Agenda Questions**



SERC Reliability Corporation  
3701 Arco Corporate Drive | Suite 300  
Charlotte, NC 28273  
704.357.7372 | Fax 704.357.7914 | www.serc1.org

## SERC Plant Outreach Agenda Questions

### Safety Brief [Plant Personnel]

### Introductions [All attendees]

### Plant Information (Plant Personnel)      Units/Technology/Primary Fuel/Secondary Fuel (if applicable)

### SERC Personnel Introductory Comments and Overview of Visit Purpose [Kim Thomas and Devan Hoke]

- (I) FERC September 26, 2014 Data and Document Request to Regional Entities
  - a. Request asked if “Regional Entities [are] considering or planning generating unit site visits in preparation for the 2014-2015 Winter? If so, indicate the number of site visits planned and describe what subjects or issues will be reviewed during the site visit. If not, please explain the reason for not conducting site visits [and] indicate if the particular site visit was chosen due to the unit experiencing freezing issues during 2013-2014.”
- (II) January 2014 Polar Vortex event was a generation event – not a transmission event
- (III) Overview purpose is to gauge the emphasis GO’s/GOP’s are placing on their winter weather readiness program and its effectiveness.

### Winter Weather Readiness Program [Plant Personnel]

- (I) Roles and Expectations
  - a. Senior Management  
What correspondence or discussions have Senior Management had during the last 12 months with Plant Management/Workers/Contractors regarding your plants winter weather readiness program?
  - b. Plant Management  
What correspondence or discussions have Plant Management had during the last 12 months with Plant Workers/Contractors regarding your plants winter weather readiness program?
  - c. Plant Workers/Contractors



- (II) Processes, Procedures and Checklist(s)
  - a. Describe Process
    - i. To formally recognize strengths
    - ii. To formally recognize weaknesses
    - iii. Implementation (Work Ticket, Checklist, Procedure, etc.)
    - iv. How is the need for winterization:
      - 1. Materials identified?
      - 2. Installation locations identified?
    - v. Overall timeline
  - b. Review Procedure/Checklist
    - i. Update using Lessons Learned after every winter event to institutionalize knowledge from prior events?
    - ii. Who is Document Owner?
    - iii. Who, What, When and How of Field Implementation
      - 1. Who installs winterization materials (contractors, plant personnel, etc.)?
      - 2. What
      - 3. When are winterization materials installed (start and end dates) and removed?
      - 4. How
  - c. Readiness Reviews
    - i. Timing and Implementation
    - ii. Integrated in Pre-Job Briefings?
    - iii. Identify any activity plant has taken that may be unique and of benefit to industry
  - d. Process to Evaluate Improvement Opportunities
    - i. Describe feedback loop and impediments
    - ii. Implemented on a corporate or plant level basis?
  - e. Identify Lessons Learned
    - i. How communicated (personnel, plant, corporate)?
    - ii. How implemented?



- (III) Evaluation of Potential Problem Areas
  - a. How identify and prioritize components, systems, and other areas of vulnerability?
  - b. Define use of tarps, portable heaters, etc.
  - c. Are temporary winterization materials (tarps, wind breaks, etc.) left in place for next season or removed after winter season?
  - d. Describe evaluation process for use of temporary measures (tarps) in lieu of a permanent installation.
  - e. Environmental challenges (NPDES, Air Permit, etc.) and current plans and processes to mitigate
- (IV) Testing/Surveillance
  - a. Freeze protection alarm systems
  - b. Special treatment for Black-start Emergency generators (if applicable)?
  - c. Fuel switching (if applicable)
  - d. Is unit low ambient temperature design basis/value known for freeze protection systems?
  - e. Net unit capacity rating adequately reflect cold weather operation? Winterization impact on net unit capacity rating?
- (V) Training
  - a. Routine maintenance activities
    - i. Identification of crushed or partially missing insulation
    - ii. Insulation removal and reinstallation techniques
    - iii. Identification of insufficient insulation
  - b. Incorporation of Good Industry Practices
  - c. Operations personnel
  - d. Maintenance personnel
  - e. Webinars
  - f. Corporate Cold Weather Training Module



g. Lessons Learned

Has any of the following Lessons Learned been incorporated into Plant processes?

i. 13 published for Southwest February 1-5, 2011 Event

ii. January 2014 Polar Vortex & Cold Weather Events

(VI) Risk Assessment



SERC Response to FERC Data and Documents Request dated July 31, 2015

Docket No. AD11-9-000

Attachment I: July 14, 2015 SERC Data Request

**Attachment I**  
**July 14, 2015 SERC Data Request**

## Teresa Glaze

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**From:** Teresa Glaze on behalf of RAStaff  
**Sent:** Tuesday, July 14, 2015 2:25 PM  
**To:** dctf@list-serc1.org  
**Cc:** RAStaff  
**Subject:** SERC Data Request: 2015/2016 Winter Assessment

### Applies to entities registered as BA, GOP, TO, TOP

The following forms requiring input for the 2015/2016 Winter Assessment have been posted to the [SERC RA Portal](#). All forms are due no later than July 31, 2015.

FORM NAME	APPLIES TO ENTITIES REGISTERED AS	COMMENTS
WRITTEN ASSESSMENT	BA	<p>For each question, please provide a thorough response from the BA perspective.</p> <p>A template for gathering questions offline is available <a href="#">HERE</a> on the public website. All responses should be submitted using the portal form.</p>
TRANSMISSION – SUMMARY	TO, TOP	Please verify that all transmission additions & changes have been updated with the latest projected in-service dates and status information before submitting the form.
PLANT & GENERATOR SUMMARY	BA	Please ensure that the list of generating units is complete for your BA.
PLANT & GENERATOR DATA	GOP	While there is no scheduled form for plants and generators, it is the responsibility of the GOP to maintain the list of generating units in the RA Portal. Please ensure that all existing and future generator data is current.

The scheduled forms can be found by selecting **Reliability Assessments -> Current Forms** from the left-hand menu in the RA portal.

The plant and generator forms can be found by selecting **Reliability Assessments -> Plants & Generators** from the left-hand menu in the RA portal.

The transmission addition and change detail forms can be found by selecting **Reliability Assessments -> Transmission Additions & Changes** from the left-hand menu in the RA portal.

Please direct all questions and comments to [rastaff@serc1.org](mailto:rastaff@serc1.org).

## Teresa Glaze

Senior Technical Analyst  
 SERC Reliability Corporation, Inc.  
 3701 Arco Corporate Drive, Suite 300  
 Charlotte, NC 28273



## 2015-16 Winter Reliability Assessment Narrative Write-up Questions

**This template is intended to be an aid in gathering the elements required for the 2015 LTRA. Responses for the following questions should be entered and submitted using the SERC portal interface. The due date for all submittals is **July 31, 2015**.**

**Please be as descriptive as possible in your response. If a question is not applicable to your company, enter N/A in the space provided.**

### Planning Reserve Margin

1) If the Anticipated Reserve Margin is below the Reference Margin Level for the upcoming winter, list the contributing factors that resulted in this shortfall and explain actions to be taken to address potential resource adequacy issues.

### Demand

2) Provide a brief overview of the winter demand forecast. Describe any notable increases or decreases in the demand forecast since the prior year, including contributing factors (e.g., footprint changes, economic outlook, short-term weather outlook, demand-side management, distributed resources, behind-the-meter generation, or changes to the load forecasting method used)

3) Describe any cases where projected demand growth in a localized area is significantly above or below the average for the rest of the Balancing Authority Area. Discuss the expected duration as well as any reliability impacts.

4) Provide the extreme weather demand forecast (e.g., 90/10 demand). Explain how it is determined by the Balancing Authority Area for the upcoming winter season.

### Demand-Side Management

5) Describe existing and recently introduced Demand Response programs in the Balancing Authority Area.

6) Explain the impacts of Demand Response programs and how these programs will contribute to maintaining reliability during the upcoming winter.

### Generation

7) Summarize new capacity additions in the Balancing Authority Area since the prior winter assessment, as well as those expected to occur during the upcoming winter season. Responses should be provided for notable capacity additions and summarized for all applicable generation types (Coal, Petroleum, Natural Gas, Nuclear, Hydro, Pumped Storage, Geothermal, Biomass, Wind, Solar, and Other).

8) Describe any known concerns (fuel supply, fuel delivery, cooling water, environmental restrictions etc.) that could impact generator availability during the upcoming winter season. Explain any resulting reliability impacts and explain how these impacts will be managed.



## 2015-16 Winter Reliability Assessment Narrative Write-up Questions

9) Regarding variable resources, briefly describe any changes to how expected on-peak capacity values are calculated for wind, solar, and hydro. Provide answers for all that apply within the Balancing Authority Area's resource mix. Further, explain any enhancements that have been made to how these values are calculated. Additional detail should be provided in the Methods and Assumptions document.

### Capacity Transfers

10) Briefly explain the capacity transfers (imports/exports) in the Balancing Authority Area for the upcoming winter; include mention of any new Firm capacity contracts for the upcoming winter. If applicable, summarize projected subregional transfers for the upcoming winter.

11) Describe capacity transfer coordination between neighboring Balancing Authority Areas.

### Transmission and System Enhancements

12) Discuss any transmission constraints and corresponding impacts on system reliability. Also describe any project delays for any transmission facilities (lines or transformers) expected to impact reliability during the assessment period and measures that will be taken to address them.

13) Describe any dynamic and/or steady state reactive power limited areas in the Balancing Authority Area and the Mitigation Plans to address them prior to the upcoming winter.

14) Describe any significant new transmission facilities (i.e., lines, transformers, etc.), equipment, upgrades, or technologies planned for implementation within the Balancing Authority Area during the assessment period. (Examples include: SVC, FACTS controllers, HVdc, synchrophasors, etc.)

15) Describe any new Under Voltage Load-Shedding (UVLS) schemes (including how much load (MW) is targeted) expected to be implemented during the upcoming winter. For existing UVLS schemes, describe any change in how the device(s) will be used in the Balancing Authority Area (including any change in how much load (MW) is targeted). Also, provide a brief summary of the overall UVLS in the Balancing Authority Area.

16) Discuss any Special Protection Systems (SPS) or Remedial Action Schemes (RAS) planned, or that have recently been added in the Balancing Authority Area. Explain their application (e.g., generation reductions, transmission line trips, load curtailment, etc.). Also, identify whether each SPS/RAS is permanent or temporary. If an SPS/RAS will be removed during the assessment period, describe any system upgrades, enhancements, or operating procedures that may be necessary to replace it.

17) Are UVLS schedules expected to be met for the upcoming winter? If not, explain what mitigation efforts are planned.

### Seasonal Reliability Issues



## 2015-16 Winter Reliability Assessment Narrative Write-up Questions

- 18) Describe any special operating studies (including any extreme weather conditions, drought studies, etc.) performed for the upcoming winter season. Also, explain any unique operational challenges recently observed and how they were mitigated.
- 19) Describe any new operating procedures resulting from integration of variable resources (i.e. wind, solar, etc.).
- 20) Describe any availability concerns or other constraints regarding the use of Demand Response programs. Description should be in terms of availability and performance. (If DR is deployed, what is the expectation that some of these resources will not perform?) Include any restrictions on how many times Demand Response resources can be deployed.
- 21) Explain any environmental and/or regulatory restrictions (e.g., emissions, water levels, local ordinances, etc.) that could adversely impact reliability during the winter season. Have these considerations been reflected in the winter assessment? If these considerations have not been reflected in the assessment, explain how these potential risks are being addressed.
- 22) At a high level, describe any significant issues (e.g., extended transmission or generation outages, modification to existing operational procedures, increased dependency on transfers, or identification of critical units for seasonal reliability) identified in neighboring Balancing Authority Areas, subregions, or across any other inter- and intraregional areas that have the potential to impact operations in your area. Additionally, identify the means in which these issues are coordinated and communicated between the neighboring areas.
- 23) Front Section Item: Does your Region or Balancing Authority Area have a topic for the front section of the overall report? If so, please provide specific data, supporting facts, graphs, charts, and detailed description of the topic.
- 24) Are there reserve zones located within the each subregion or reliability coordinator area of SERC? If not what test has been performed to substantiate not having zonal reserve requirements? If so please list how the zonal reserve area is broken up for the respective subregion or reliability coordinator area.

### Seasonal Operational Awareness

- 25) What policies and/or procedures are in place for system operations to provide situational awareness regarding a generator's ability to perform at extreme ambient temperatures?
- 26) What plans are in place to keep track of hourly and daily operational capability of the generators with operational limits (e.g. operating permit limitations, etc.)?
- 27) Describe current policies and/or procedures that assess the operability/readiness of Dual Fuel Resources during extreme weather.
- 28) What measures are in place for 2015-16 winter to assure an adequate supply of demineralized water for emissions control?
- 29) How is the potential generator fuel unavailability or non-deliverability being incorporated into the seasonal planning studies/assessment?
- 30) How are extreme weather scenarios being incorporated into your seasonal planning studies/assessments?



## 2015-16 Winter Reliability Assessment Narrative Write-up Questions

31) Describe any transmission equipment that may be affected by extreme ambient temperatures and what mitigating actions have been taken or are in place to mitigate the issues.

32) Identify major load pockets (Major cities, high industrial load area, BA load regions).

33) What were the substantial\* N-1 contingencies greater than 100kV identified in the 2015/16 winter study? If there were no documented joint operating agreements that cleared the contingencies, was an IROL test\*\* performed on the substantial contingencies? Were the constraints communicated to neighboring RC, BA, and TOPs as potential reliability issues?

Note:

\*Substantial N-1 contingencies are transmission facilities/lines/equipment that is loaded above 100 percent its emergency rating.

\*\*An IROL test 1) is the process of removing a substantial N-1 contingency from the model and continuing to open the next overloaded element until there are no overloads. 2) tabulate the load loss after the system levels out with no more overloads.

34) Is TLR data from a minimum of three months prior to the winter seasonal taken into account for the seasonal study?

Region	Number of Units	Coldest Winter Period/s	Specific Cause	Total MW Lost
SERC	11	January 7-9	Failed Heat Trace	3,332.00
SERC	1	January 7-9	Frozen water systems	300.00
SERC	4	January 7-9	Other cold-related issues	547.00
SERC	2	January 7-9	Improper operating conditions	971.00
SERC	20	January 7-9	Frozen Instruments and Instrument Lines	4,522.00
SERC	5	January 7-9	Steam drum level measurements	1,862.80
SERC	8	January 7-9	Frozen lines, valves and switches	1,895.00
SERC	1	January 7-9	Frozen pumps, motors and breakers	255.00
SERC	-	January 7-9	Fuel - Frozen Coal	-
SERC	-	January 7-9	Fuel Curtailment - Fuel Oil	-
SERC	3	January 7-9	Fuel Curtailment - Natural Gas	230.80
SERC	-	January 7-9	Wind Curtailment	-
SERC	1	January 7-9	Emmissions	18.70

## Notes

1 - Included are frozen hydro unit intakes and generating unit cooling water systems

2 - Included are cold hydraulic oil

3 - Included are low temp from induced draft fan, loss of circulating water supply, erratic drum pressure

4 - Except for steam drum levels

5 - Wind generation forced off due to low ambient temperature limits or blade icing





Units Lost when Operated below Design Temp	Total MW Lost when Operated below Design Temp	Notes
8	1,454	
-	-	Note 1
-	-	Note 2
-	-	Note 3
7	876	Note 4
-	-	
-	-	
-	-	
-	-	
-	-	
-	-	Note 5
-	-	
ire, low steam temperature		



Region	Number of Units	Coldest Winter Period/s	Specific Cause	Total MW Lost
SERC	4	February 15-20	Failed Heat Trace	937.00
SERC	1	February 15-20	Frozen water systems	26.00
SERC	5	February 15-20	Other cold-related issues	560.00
SERC	2	February 15-20	Improper operating conditions	580.00
SERC	12	February 15-20	Frozen Instruments and Instrument Lines	3,105.00
SERC	4	February 15-20	Steam drum level measurements	177.8
SERC	13	February 15-20	Frozen lines, valves and switches	2,411.00
SERC	1	February 15-20	Frozen pumps, motors and breakers	220.00
SERC	2	February 15-20	Fuel - Frozen Coal	29.00
SERC	-	February 15-20	Fuel Curtailment - Fuel Oil	-
SERC	2	February 15-20	Fuel Curtailment - Natural Gas	333.00
SERC	-	February 15-20	Wind Curtailment	-
SERC	5	February 15-20	Emmissions	256.00

## Notes

1 - Included are frozen hydro unit intakes and generating unit cooling water systems

2 - Included are cold hydraulic oil

3 - Included are low temp from induced draft fan, loss of circulating water supply, erratic drum pressure

4 - Except for steam drum levels

5 -Wind generation forced off due to low ambient temperature limits or blade icing

Units Lost when Operated below Design Temp	Total MW Lost when Operated below Design Temp	Notes
-	-	
-	-	Note 1
-	-	Note 2
-	-	Note 3
6	1,584	Note 4
-	-	
4	885	
-	-	
-	-	
-	-	
-	-	Note 5
-	-	
ure, low steam temperature		

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