

System Operations Subcommittee February Meeting Update

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Operating Committee

March 6, 2025



SOS Specific Items

- Update on standards & compliance. Update on latest and upcoming eDART release
- Update on latest DTS meeting
- Review of M01 & M37
- Reviewed Winter Voltage Reduction Action Test.





- Reviewed IROL load shed drill results
- Discussed February Operational events
- Discussed winter voltage reduction action test and next steps
- Discussed pre emergency load management event in Dominion



Review of Voltage Reduction Test Results and Pre Emergency Load Management Event

SOS Update to OC

Pre Emergency Load Management Event

Pre-Emergency Load Mgmt Reduction Action (1 Event)

Effective	Effective		Deview
Start Time	End Time	Message	Region
02.19.2025	02.19.2025	A Pre-Emergency Load Mgmt Reduction Action has been issued.	DOM
16:20	22:15	Load reduction start times can be found by clicking on the	
		hyperlink(s) in the Regions column. Load reductions should	
		continue until released by PJM. Reductions are mandatory based	
		on product requirements. CSPs should review DR Hub for	
		specific registration details. Lead Time(s) dispatched:	
		Quick_30,Long_120 . Product(s) dispatched: Capacity	
		Performance DR	
		Additional Comments: SZ_DOM_ASHBURN_116472939	

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- Transmission line in Dominion had to come out of service due to a bad potential transformer
 - Risk of not taking line out = equipment catastrophically failing
 - There was a nearby transmission line already out of service tree down – high winds earlier in week
 - Generation and Switching solutions maximized
 - Flows were very close to N-5 exceedance criteria



Summary Continued

- Studies indicated that later in evening as load increased that we would have to issue pre contingency load shed due to N-5 analysis
 - Pre emergency load management was issued in a subzone in Dominion to relieve flows on circuits to mitigate risk
 - Transmission line returned at 22:10 and pre emergency load management was canceled at 22:15
 - Load management mandatory participation ended at 21:00

N-5 Cascade Analysis



5.4.1 Post-Contingency Load Dump Limit Exceedance Analysis (Cascade Analysis)

As indicated in section 5.4, a PCLLRW is issued after all other means of transmission constraint control have been exhausted or until sufficient generation is on-line to control the constraint within designated limits and timelines as identified in PJM Manual 03, Transmission Operations, Section 2 – Thermal Operating Guidelines. However, if post-contingency flows were to exceed the 15-minute Load Dump rating and the contingency were to occur, there is a concern that the facility may trip before actions could be implemented to reduce the flow within limits. To prepare for this potential N-2 (initial contingency plus the overloaded facility) and prevent a cascade, PJM will perform up to an N-5 analysis on facilities over 115% of their 15-minute Load Dump rating.

As indicated in PRC-023 R1.2 and R1.11, transmission line relays and transformer overload protection relays are set so they do not operate at or below 115% of the facility's highest emergency rating. For PJM facilities, the highest rating is the Load Dump rating. Therefore, PJM will perform the following cascade analysis for any facility that reaches or exceeds 115% of its Load Dump limit:

Note:

NOTE 1: In the event the post-contingency load dump exceedance was caused by the sudden loss of a generating resource or transmission element, the PJM dispatcher will immediately take action to mitigate the overload. The cascade analysis will be performed if it is determined there is not sufficient controlling actions to mitigate the initial overload below 115% of the load dump rating within 30-minutes of its identification.

Cascade Analysis:

- If a facility approaches 115% of its Load Dump limit post-contingency, the PJM operator will study the loss of the contingency element and the overloaded facility.
 - If the study results indicate no additional facilities will be overloaded over 115% of their Load Dump limit, this is determined to be a localized event and no additional precontingency actions will be taken.
 - If the study results in an additional facility(s) over 115% of its Load Dump rating, the
 operator will continue the analysis to also simulate trip the additional facilities. This
 analysis will be performed tripping a maximum of 5 facilities. If the study indicates



What is a potential transformer?

- A potential transformer (PT), also known as a voltage transformer (VT), is a specialized type of transformer used primarily to measure and monitor voltage levels in high-voltage electrical systems. Unlike <u>power transformers</u> that handle high power levels, potential transformers are designed for precision in scaling down high voltages to a lower, safer level. This transformation allows for accurate voltage measurement and monitoring, ensuring that systems operate within safe parameters.
- <u>https://ttesusa.com/blog/what-is-a-potential-transformer-learn-</u> <u>everything-you-need-to-know/</u>



- In response to the question at the March 6th regarding the amount of load management requested during the Feb 19th pre emergency load management event.
- Approximately 85 MWs of pre emergency load management was requested in the Ashburn subzone area
 - The amount of CSPs (Curtailment Service Provider) clears the confidentiality threshold
 - CSPs have until April 14th to submit data to PJM
 - Response data will be compiled and presented at a future DISRS meeting
 - Upcoming DISRS meeting information can be found at <u>https://www.pjm.com/committees-and-groups/subcommittees/disrs</u>



Voltage Reduction Action Test Results

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- Voltage Reduction Action is implemented when load relief is still needed to maintain tie schedules.
 - Emergency procedure after Deploy All Resource Action
 - Emergency procedure before Manual Load Dump.
 - Voltage Reduction Capability = Synchronized Reserves
- Winter Storm Elliot recommendation to test and validate voltage reduction.
- Test Goal is for Transmission Owners to exercise seldom used Emergency Procedures:
 - Ensure TO are prepared and capable of initiating emergency procedure
 - Validate anticipated response of critical emergency procedure
 - Review test results and lessons learned
 - Update PJM manual and internal procedures as appropriate

pjm	Test Overview
	Parameters
Seasons	Winter Voltage Reduction Test
Load Level	Above Seasonal Upper Quartile
Duration	30 minutes
Time	07:00 – 07:30 Eastern Time
Zones	RTO – February 5
Voltage Reduction Step 1	5%
Alternate Date	RTO - February 12





Average Temperatures Across RTO





February 5 – Real Power



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PJM RTO Generator Reactive Output

- RTO showed a reduction of generator MVAR output by 2,560 MVARs
- Drill validated importance of increasing lagging MVAR reserves to enhance transfer capability.







- EHV Voltage Increase:
 - 500 kV increased 2 5 kV
 - 345 kV increased 1 2 kV
 - 230 kV increased 2 6 kV







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