Loss of Source Analysis - PJM

Northeast Coordinated System Plan
IPSAC07
December 11, 2008

ISO new england

ISO NEW YORK INDEPENDENT SYSTEM OPERATOR℠
Building the Energy Markets of Tomorrow . . . Today

pjm

Loss of Source Study

- Interregional study to determine the limit of PJM west to east transfer capabilities for various loss of source contingencies both inside and outside of PJM's system
- To identify most severe loss of source contingency
- To identify the west to east transfer limit on the Juniata 500X interface in the PJM system
- NYISO and PJM economically dispatch their systems to observe transmission security limits considering
  - Contingency limits internal to their systems
  - A loss-of-source contingency in New England base on real time condition
- Operation of sources in New England base on real time operating condition provided that the contingency loss-of-source in New England is less severe than the internal contingencies

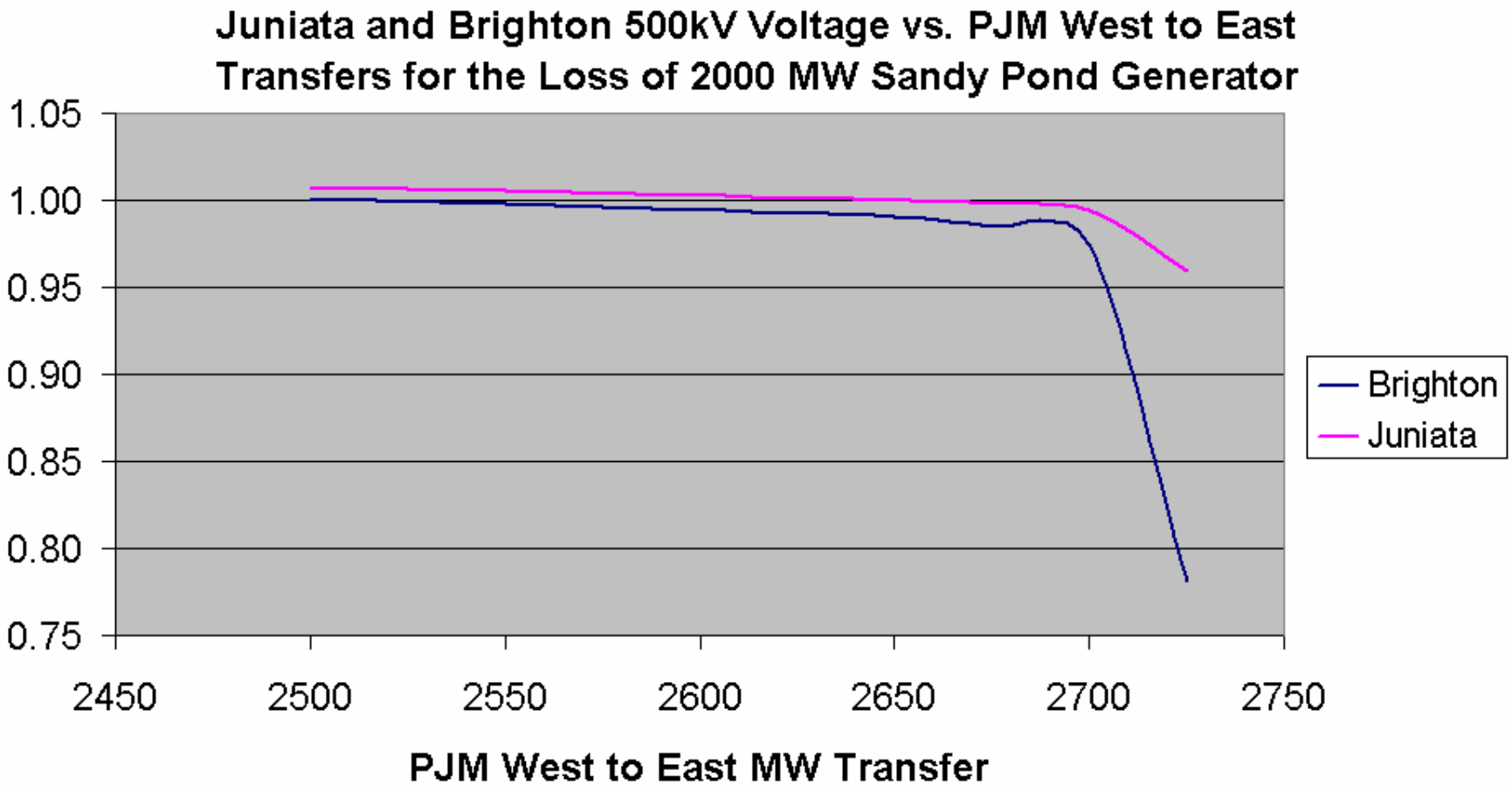
Assumptions

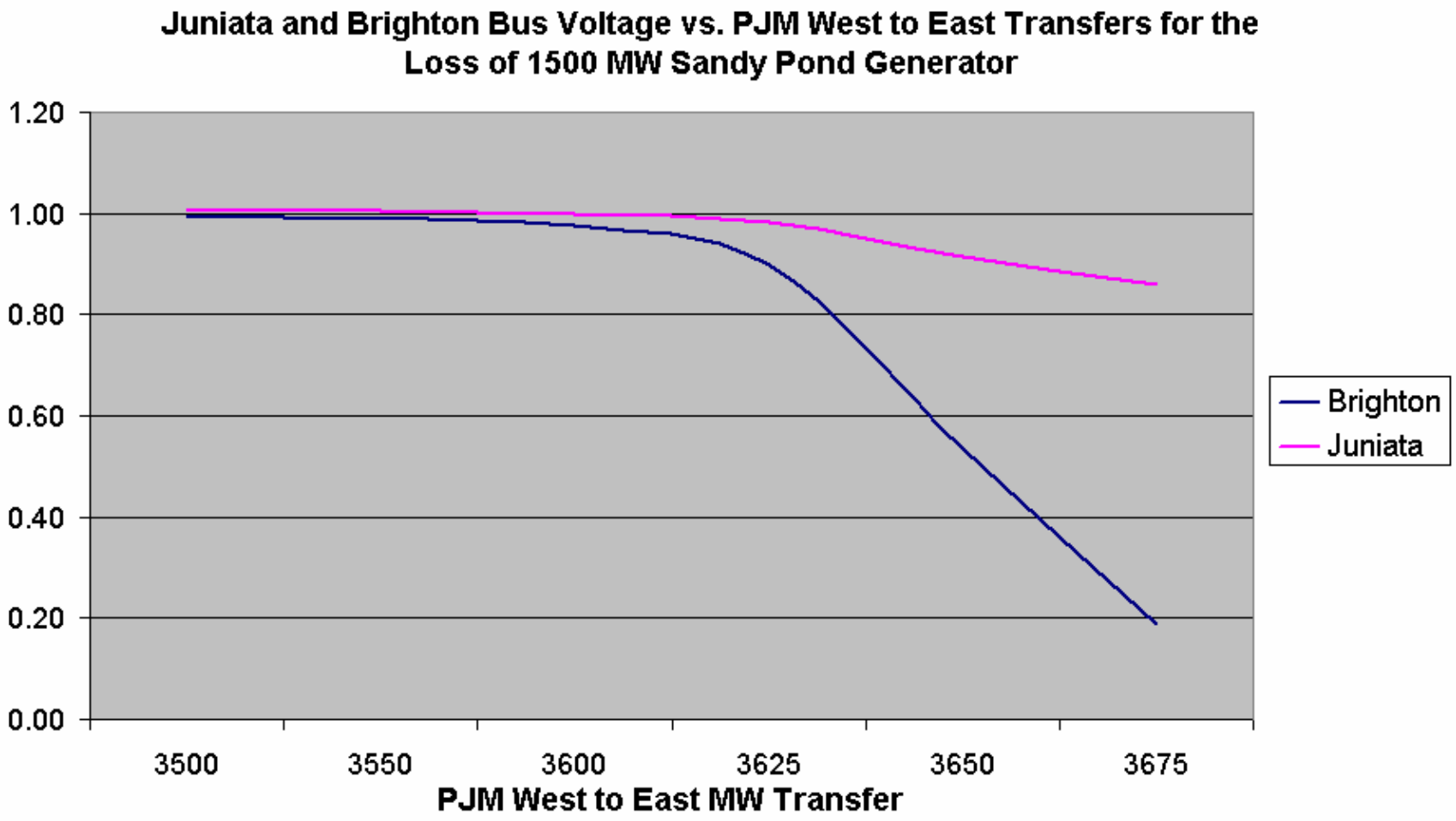
- Reflects major improvements in New England
  - Boston 345kV Transmission Reliability Project
  - Southwest Connecticut Reliability Project
  - Others
- Includes new ties between New York and PJM
  - Neptune project (PJM Queue G07_MTX) modeled at 685 MW exporting to LIPA according to its firm withdrawal rights
  - PJM Queue G22_MTX modeled at 300 MW exporting to ConEd according to its firm withdrawal rights
- TRAIL: 502 Junction - Mt Storm - MeadowBrook - Loudoun 500kV circuit
- PATH: Amos – Kemptown circuit
- Susquehanna - Lackawanna - Jefferson – Roseland 500kV circuit

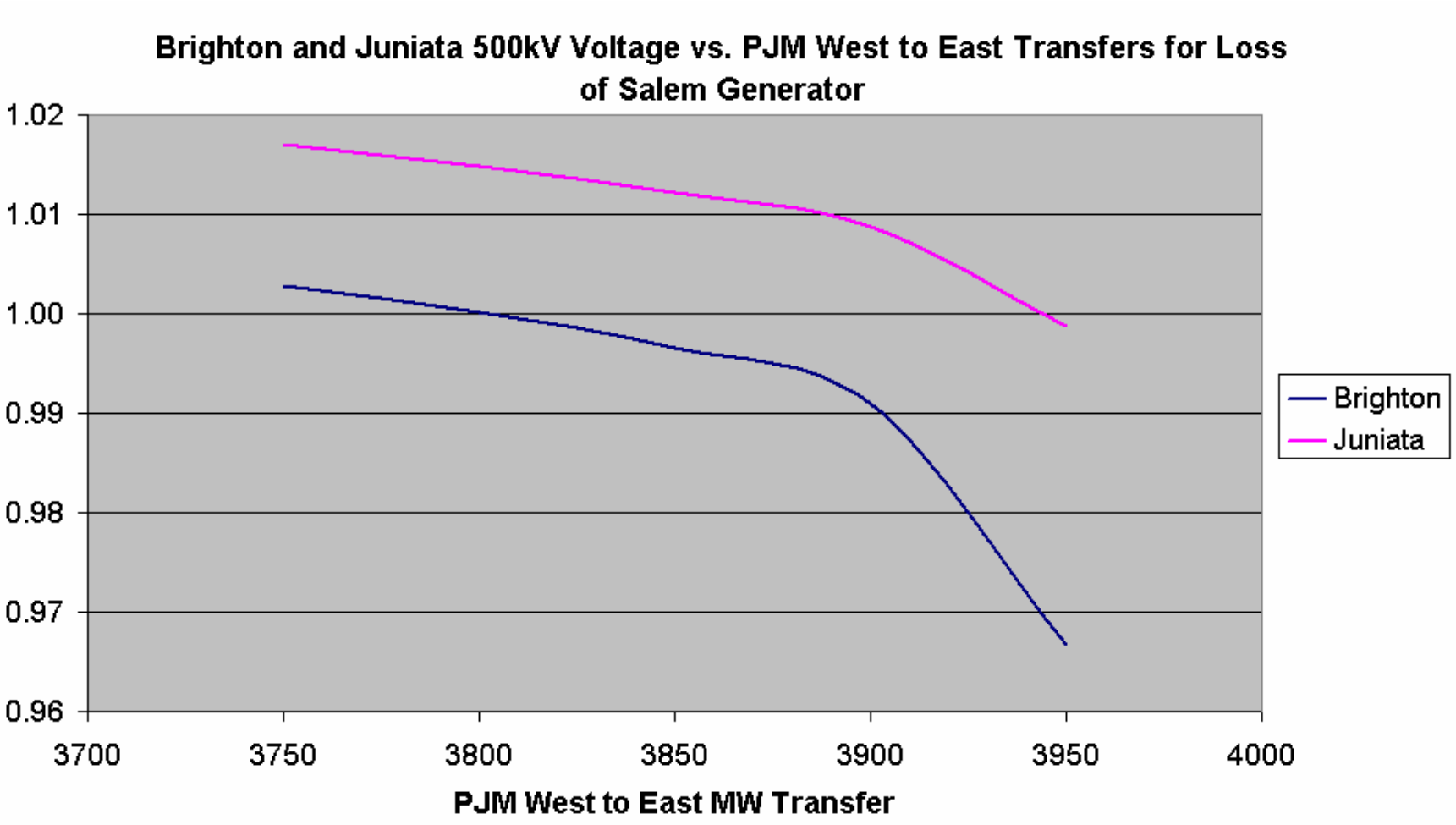
Tested Contingencies - Generation

- Indian Point #2
- Somerset
- Nine Mile Point
- Ravenswood
- Sandy Pond 1500 MW
- Sandy Pond 2000 MW
- Seabrook
- Millstone

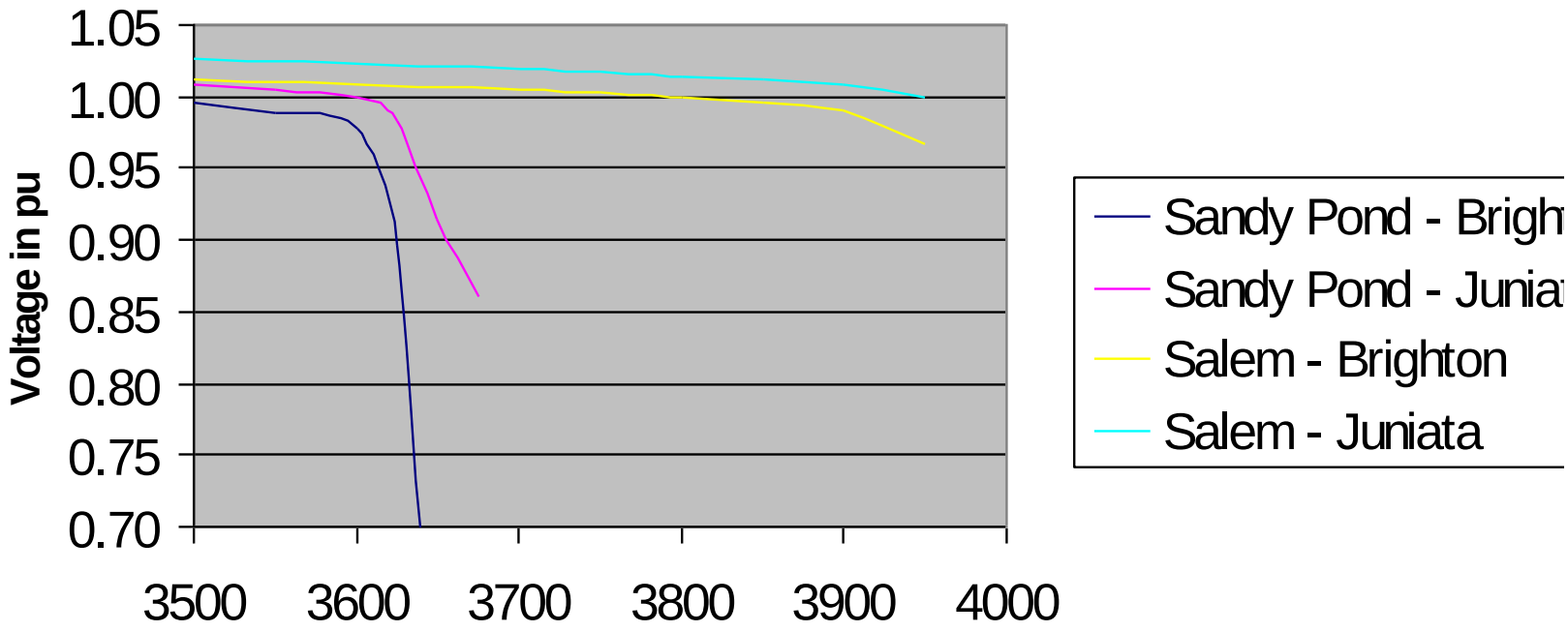
- Salem
- Hope Creek
- Calvert Cliffs
- Limerick
- Peach Bottom
- Susquehanna


Juniata and Brighton 500kV Voltage vs. PJM West to East Transfers for the Loss of 2000 MW Sandy Pond Generator
1.05
1.00
0.95
0.90
0.85
0.80
0.75
2450
2500
2550
2600
2650
2700
2750
PJM West to East MW Transfer
Brighton
Juniata


Juniata and Brighton Bus Voltage vs. PJM West to East Transfers for the Loss of 1500 MW Sandy Pond Generator
1.20
1.00
0.80
0.60
0.40
0.20
0.00
3500
3550
3600
3625
3650
3675
PJM West to East MW Transfer
Brighton
Juniata


Brighton and Juniata 500kV Voltage vs. PJM West to East Transfers for Loss of Salem Generator
1.02
1.01
1.00
0.99
0.98
0.97
0.96
3700
3750
3800
3850
3900
3950
4000
PJM West to East MW Transfer
Brighton
Juniata

Juniata and Brighton 500kV Voltages versus PJM West to East Transfer for the Loss of Sandy Pond 1500MW and Salem Generator



Results

- Loss Sandy Pond at 2000 MW is more limiting than PJM internal contingencies.
- The limiting buses in PJM were Juniata and Brighton
- Maximum PJM West to East Transfer Capability were limited to approximately 3800MW for PJM's most limiting contingency which is the loss of Salem Unit.
- Maximum PJM West to East Transfer Capability were limited to approximately 3500MW due to Loss of 1500MW at Sandy Pond.
- Backbone projects in the 2012 case of PJM system have increased the West To East transfer capability.
  - For the 2009 case model, PJM West to East Transfer Capability was limited to approximately 450MW for the lost of 2000MW at Sandy Pond.
- The pickup factor on for the PJM West to East Transfer on Juniata 500X Interface for the Hydro Quebec-Sandy Pond contingency at 1500 MW is 30.0%.

Stability Analysis - PJM

Northeast Coordinated System Plan
IPSAC07
December 11, 2008

ISO new england

ISO NEW YORK INDEPENDENT SYSTEM OPERATOR℠
Building the Energy Markets of Tomorrow . . . Today

pjm

Stability Analysis - Purpose of Study

- Assess transient angular and voltage stability
- Test the robustness of system under normal and severe contingencies for each region.
- Assess the impact of PJM's 500KV expansion on adjacent regions for stability.
- Tested Criteria
  - 3-Phase fault with normal clearing time
  - Single line to ground fault with delayed clearing time
  - Double line to ground fault with delayed clearing time
  - Simultaneous loss of multiple elements without a fault

ISO-NE and NYISO Contingencies

- Loss of Substation
- Loss of R.O.W
- Loss of Line Section
- Loss of Generating Unit
- Loss of Double Circuit

Conclusion

- The stability analysis results indicate that the interconnected power system would be stable.
- Satisfactory damping capabilities were demonstrated.
- The system was stable for the most severe contingencies tested in ISO-NE and NY
- The study also indicated no voltage instability was observed.
- No first swing instability was observed in the analysis
- No system wide cascading voltage were identified
- Additional analysis is planned for the 2009 NPCC Overall Transmission Review