Reserve Deployment Events

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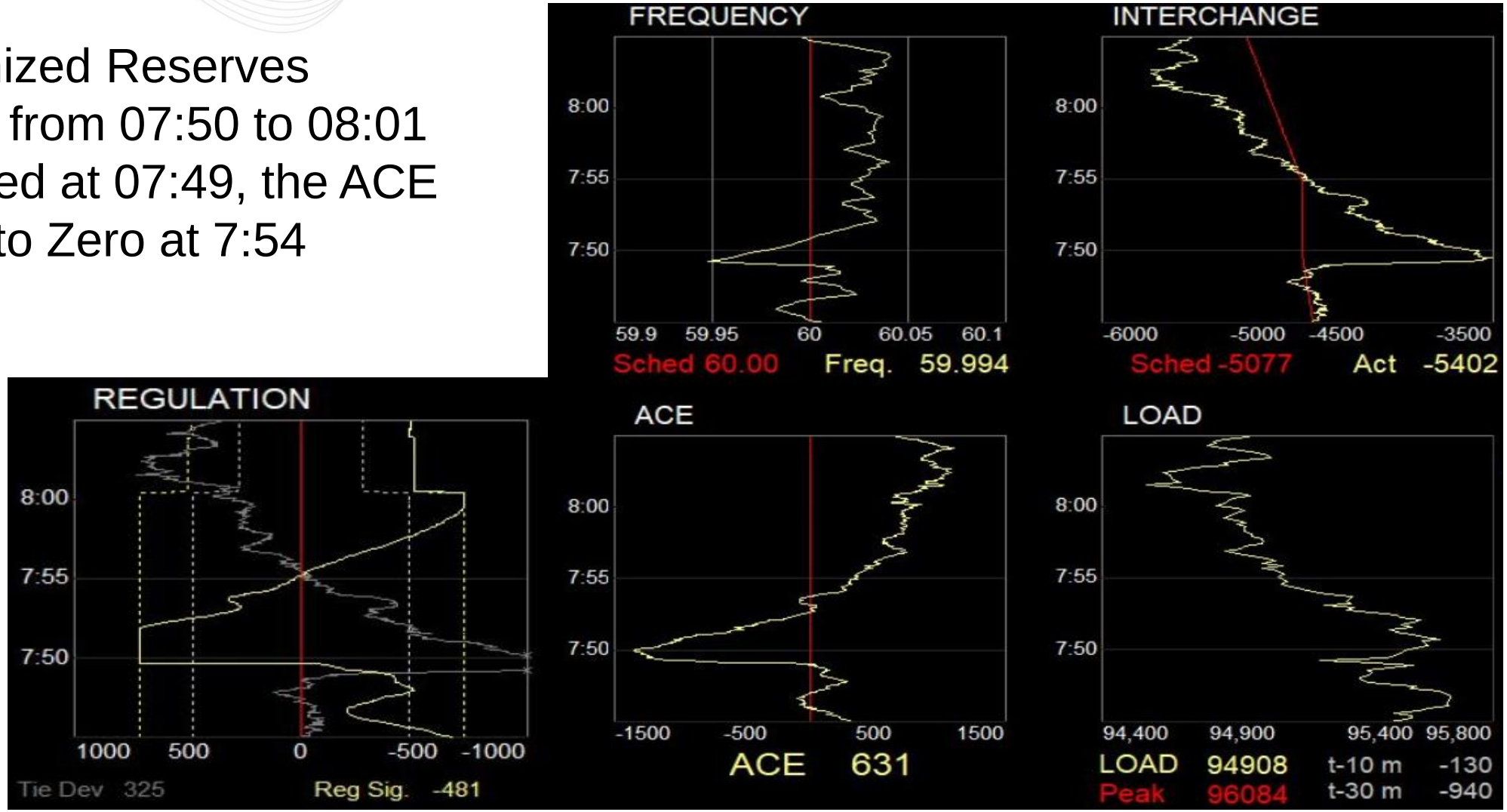
Example - Loss of a unit loaded at 1310 MWs

- Synchronized Reserves deployed from 07:50 to 08:01
- Unit tripped at 07:49, the ACE returned to Zero at 7:54



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Prompt Deployment

- Reserves need to be deployed rapidly especially after a significant MW loss from a unit
  - Takes SCED longer to see the unit lost due to the move to 5-min execution times
  - Can’t afford to wait for slower moving actions like interchange
- System conditions prior to reserve deployment varies
  - Regulation may already be full raise
  - ACE could be negative due to load or prior generation loss

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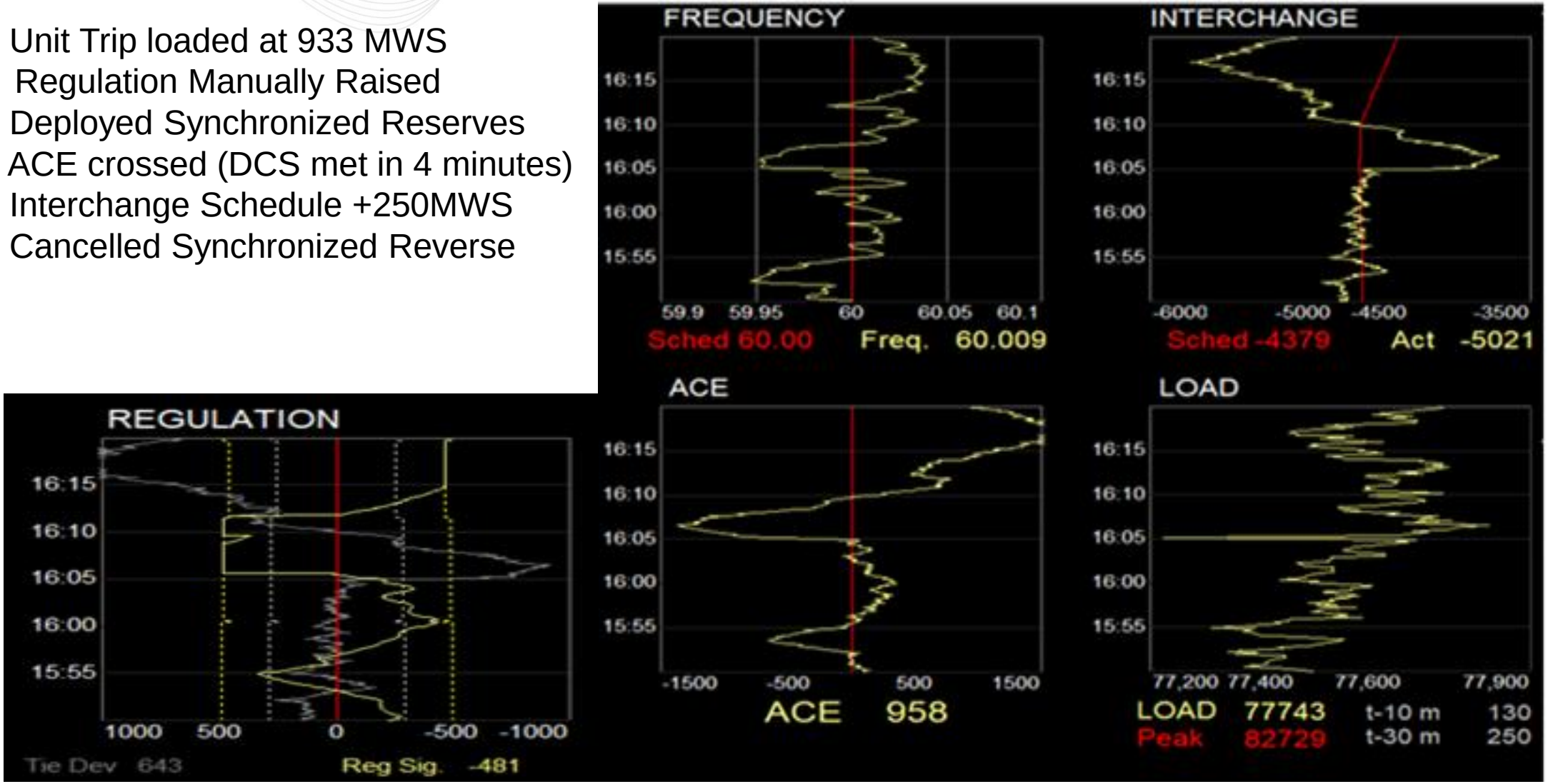
Loss of a Unit Loaded at 933 MWs

- 1605 Unit Trip loaded at 933 MWS
  - Regulation Manually Raised
- 1606 Deployed Synchronized Reserves
- 1609 ACE crossed (DCS met in 4 minutes)
- 1615 Interchange Schedule +250MWS
- 1615 Cancelled Synchronized Reverse



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ACE Excursions

- Sustained Low Area Control Error (ACE)
  - NERC Standard BAL-002 - Disturbance Control Standard (DCS)
  - Deployment of reserves to recover from loss of generation
- Sustained High Area Control Error (ACE)
  - NERC Standard BAL-001- Real Power Balancing Control Performance
  - Reducing generation post deployment including de-committing units

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Yukon Constraint During 933 MW Loss Event

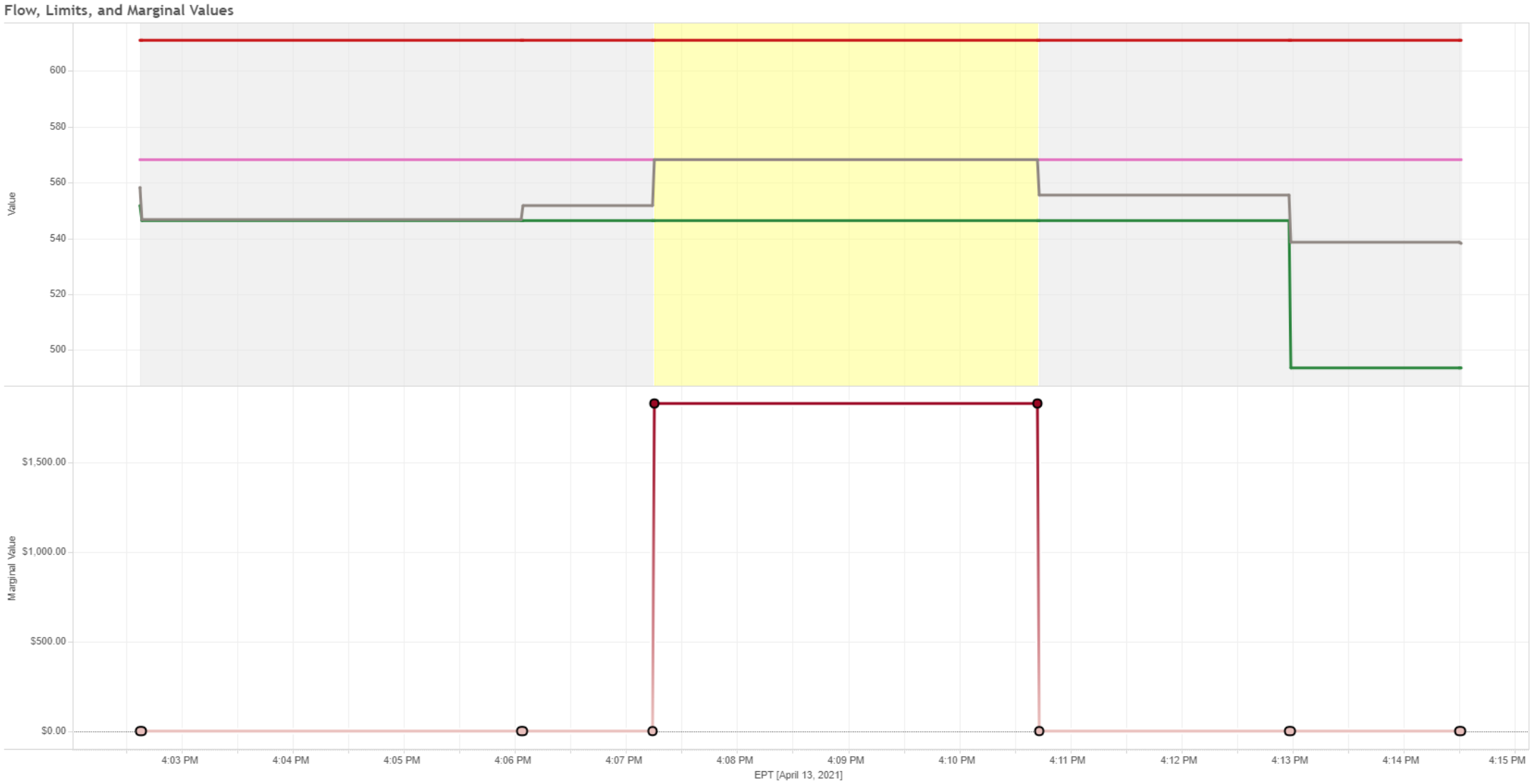
Select Date
4/13/2021

Select Constraint Name
YUKON TRAN 2 XFORMER H 500 ...

Contingency Description
500/138.Yukon.TR5

Measure Names
- Avg. Solution Flow (Visualize)
- Initial Flow
- Controlled Limit
- EMS Limit

Binding State
- Not binding
- Binding



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Bagley Constraint During 933 MW Loss Event

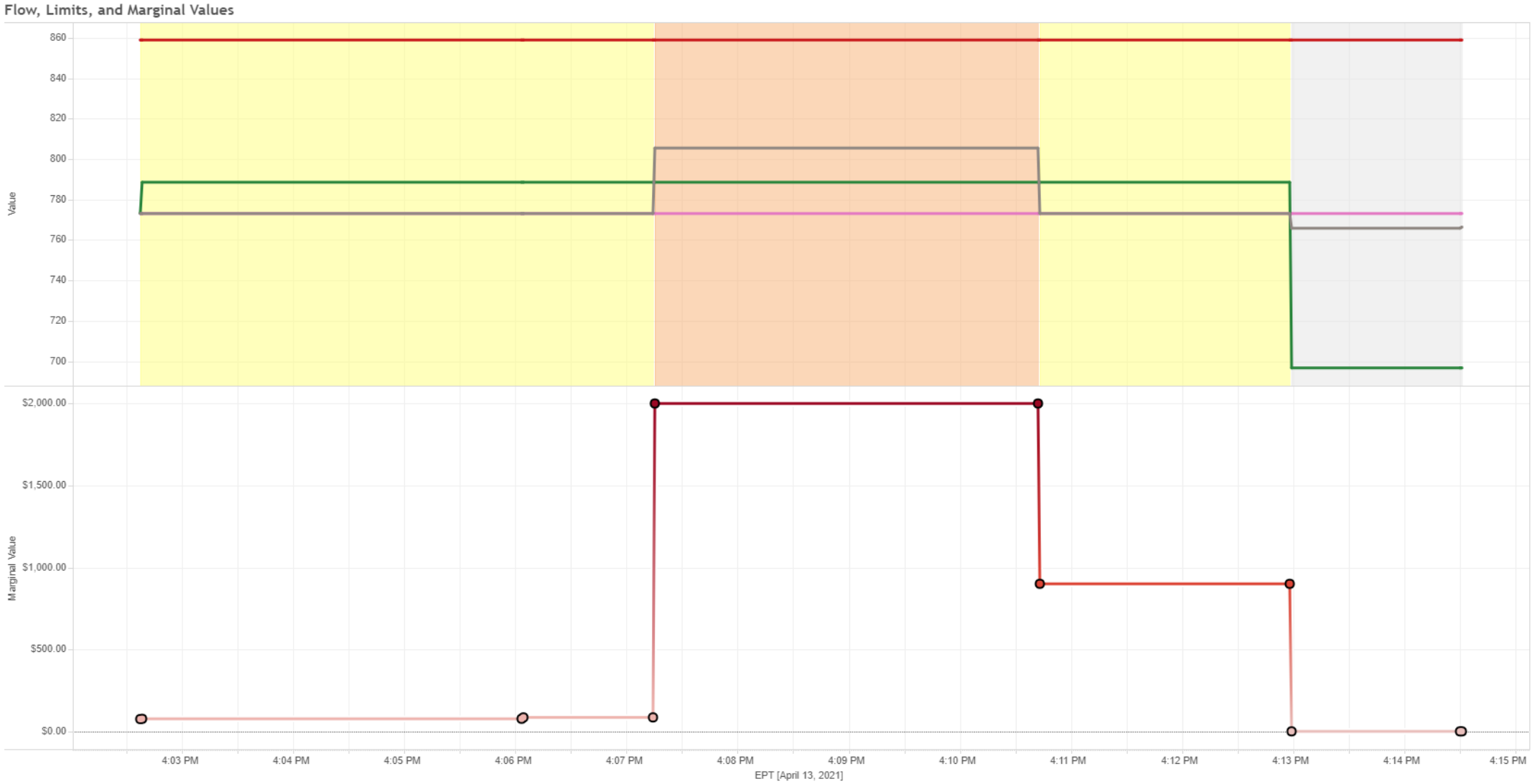
Select Date
4/13/2021

Select Constraint Name
BAGLEY-RAPHAERD 2305 B 230 KV

Contingency Description
L500.Brighton-Conastone.5011

Measure Names
- Avg. Solution Flow (Visualize)
- Initial Flow
- Controlled Limit
- EMS Limit

Binding State
- Not binding
- Binding
- Violation



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Constraints During Events

- Lack of controlled reserve deployment impacts constraint control
  - Previously controlled constraints can go into violation
  - Unpredictable response from resources
  - Rapid system wide ramping creates volatility
- Operators take reactive manual controlling actions
  - SCED case does not help with control even if unit loss is reflected due to basepoints being ignored during event
  - Can take several intervals after event end to control constraint

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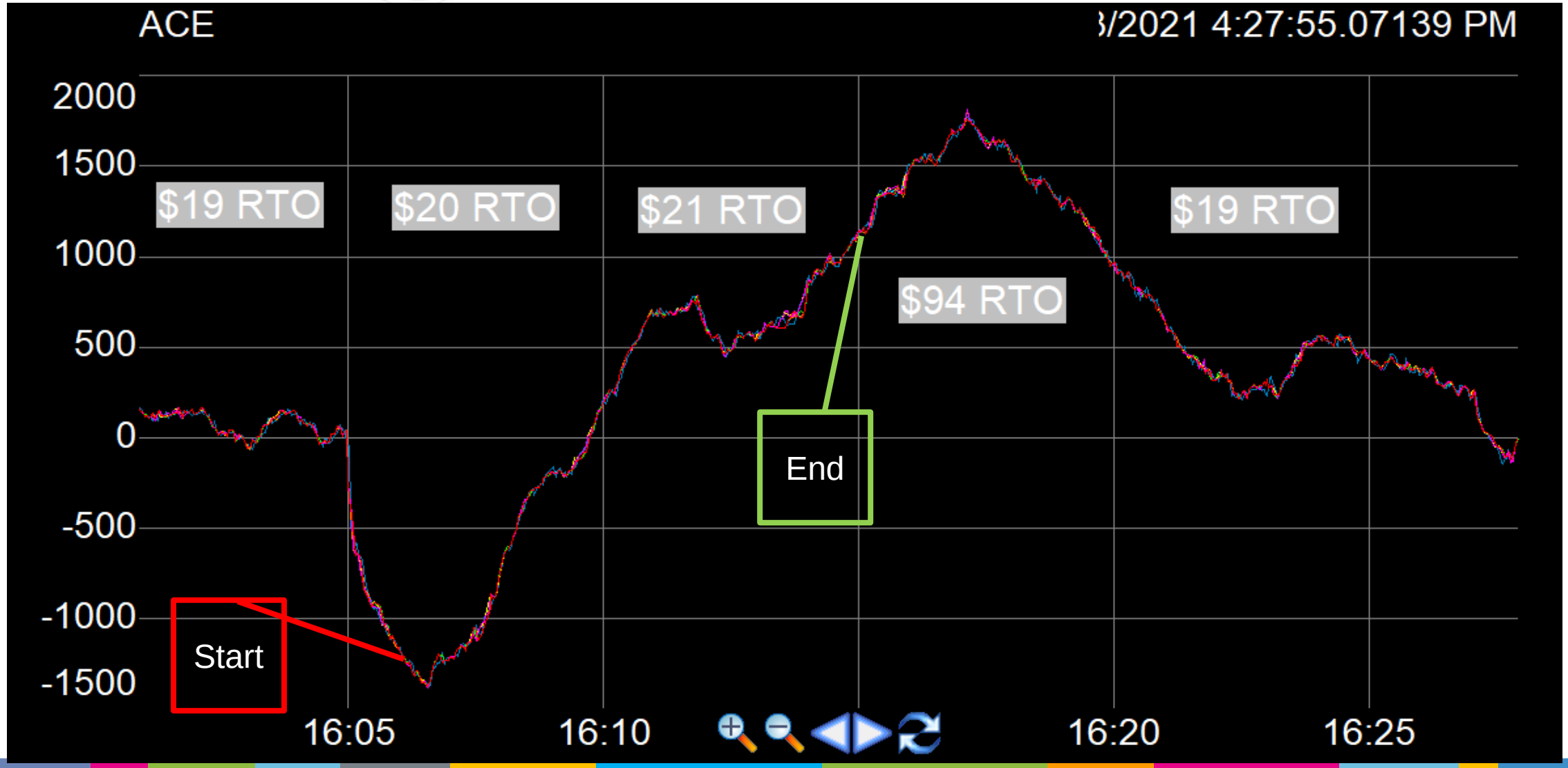
Pricing During 933 MW Loss Event



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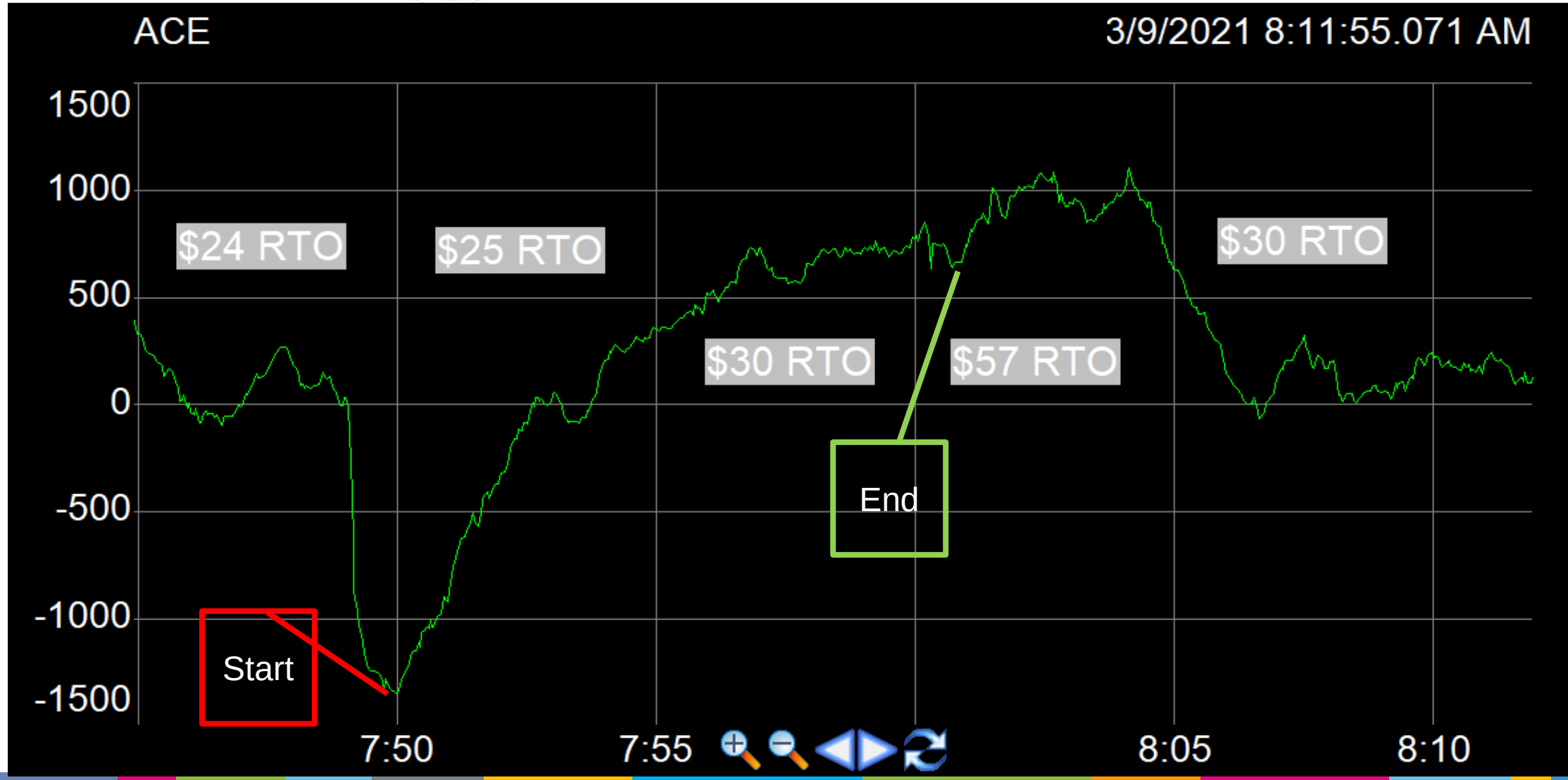
Pricing During 1310 MW Loss Event



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Pricing During Events

- Pricing at the start of events do not reflect system conditions
  - Based on last approved case without lost unit, basepoints may be pushing units down
  - Typically low prices despite efforts to approve highest available case
- Pricing during events may conflict with dispatch instructions
  - Highest prices observed after recovery, sometimes seen at the interval of largest ACE overshoot
  - First SCED case with lost unit also includes significant recovery
  - Short-term 5-min dispatch and pricing impacts

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Reserve Deployment Events

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