

NERC Industry Recommendation **(regarding Inverter based generation** **connected to the BPS)**

Summary Report to EC

G.Smith 8/10/18

With corrections 8/12/2018 H. Schrayshuen

Objective

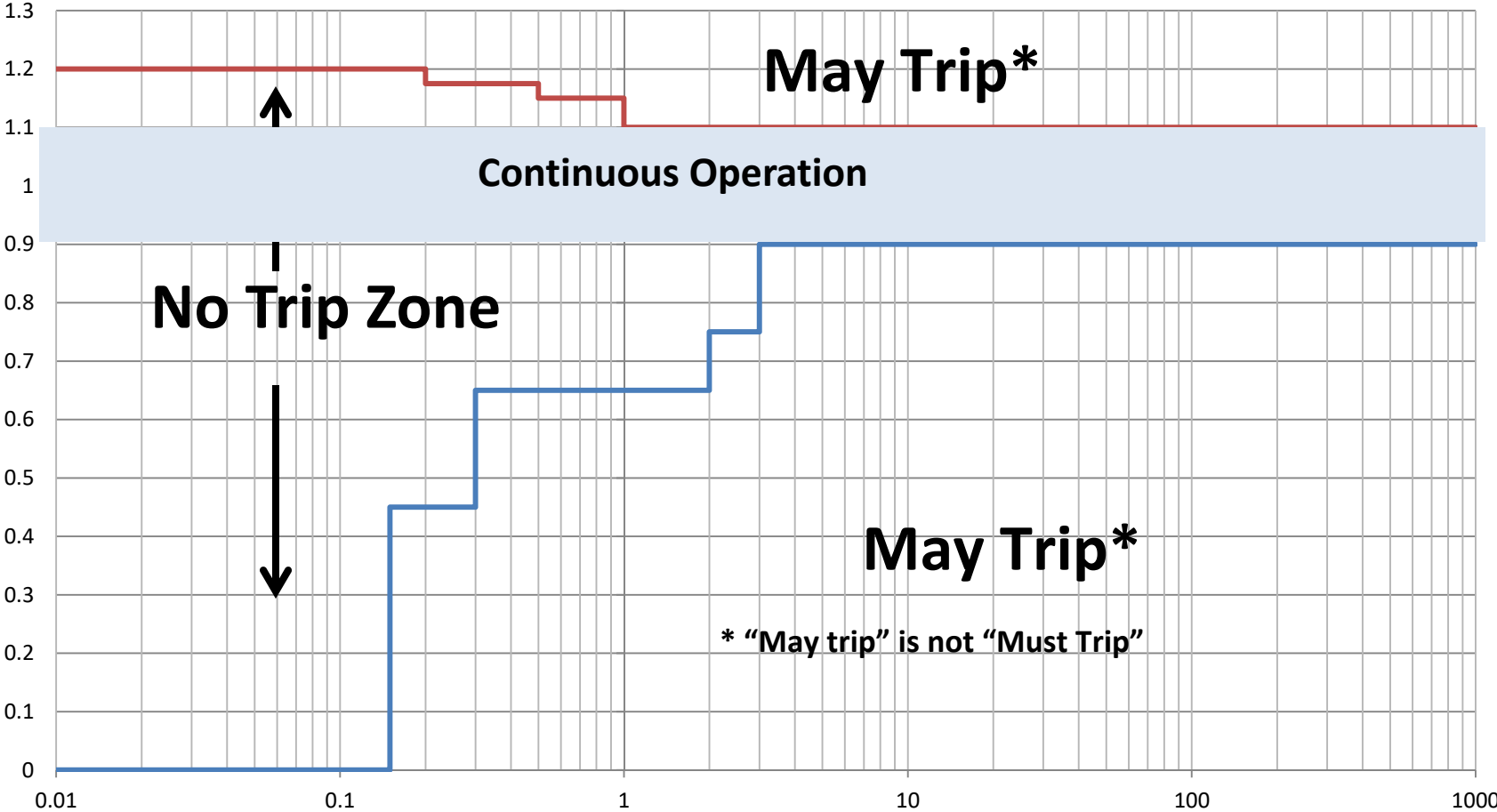
This Level 2 Industry Recommendation alerts industry to these adverse characteristics observed with BPS-connected solar PV resources, and provides recommended actions to address fault ride-through and timely restoration of current injection by all inverter-based resources connected to the BPS.

Momentary Cessation vs Tripping

- **Tripping opens the circuit breaker**
- **In Momentary Cessation, the inverter stops commutating but remains connected**
 - **Current to the BPS is interrupted**
 - **When Voltage recovers, current returns to set value**
 - **Desired ramp up in less than 1 second**
 - **This ramp rate not to be confused with power control ramp rates which are much slower**

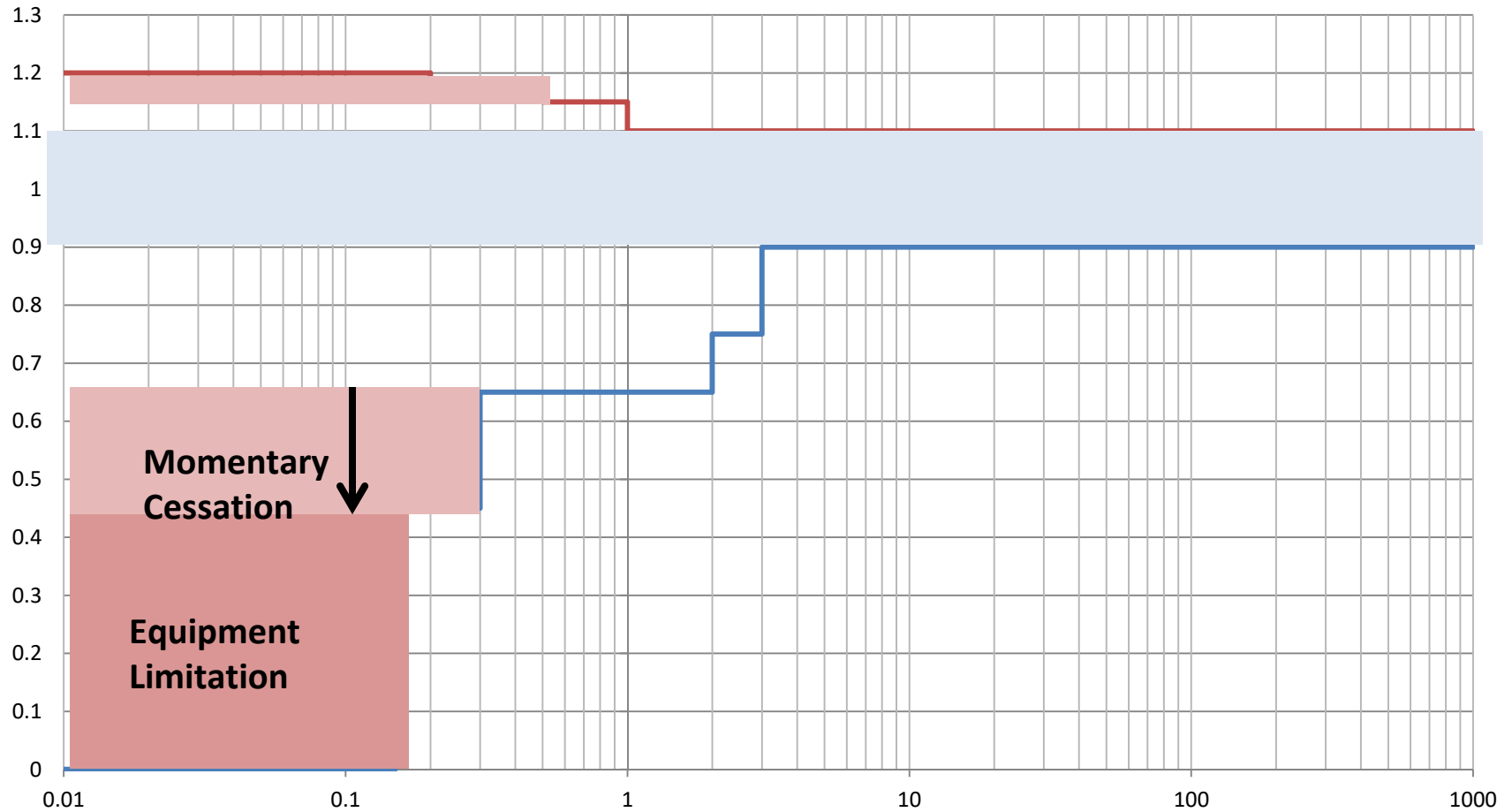
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Voltage Ride Through per PRC-024



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Minimize Momentary Cessation



Recommendation 1a

- **GO's** should ensure Models accurately represent dynamic behavior
 - **GO's** report to **TP's, TPC's, RC's, TO's** and **BA's**
 - If Momentary Cessation-update models
 - If no updates-confirm
 - 7/31/18

Recommendation 1b

- **GO's** work with manufacturers to Eliminate or Minimize Momentary Cessation
 - If can't be eliminated, identify changes
 - Provide changes and models to TP's and TPC's
 - Reduce delay to 1 to 3 cycles
 - Ramp $\leq 100\%$ /second
 - Report 7/31/18

Recommendation 2

- **GO's**
- Momentary Cessation Recovery Prompt
 - Not at Power Control Ramp Rates

Recommendation 3

- **GO's**
- Expand No Trip or Ride Thru Capability
 - Outside “no trip” not “must trip”
 - Base settings on equipment limitations
 - Filter voltage to avoid instantaneous trip

Recommendation 4

- **GO's**
- DC Reverse Current Settings
 - Review and Desensitize
 - Base on equipment limitations

Recommendation 5

- **GO's**
- Provide Responses by 7/31/18

Recommendation 6

- **6a – TP's,PC's,TO's,RC's**
 - Track, retain and analyze models to perform assessments of reliability risk
 - 12/7/18 or 120 days after changes
- **6b – TP's,PC's,TO's,RC's**
 - Track, retain, and analyze the proposed dynamic model(s) supplied by the Generator Owners to minimize/eliminate momentary cessation
 - 12/7/18 or 120 days after changes

All per NERC's Rules of Procedure