

**MH TSR Group Study  
Additional Impact Analysis  
Study Scope  
9/21/09**

Through the course of the SIS, the Study Group identified a need for studying additional scenarios, beyond the scope of the MH TSR System Impact Study as originally defined. This need for additional work primarily resulted from considerations such as physical build-outs, impact of the proposed transmission on reserve requirements, and operating situations to mention a few.

- The magnitude of the TSRs and the proposed transmission warrants these studies.
- This study is proposed to be performed in parallel to the Facilities Study.
- The final scope of work needs to be developed.

**I. STUDY ASSUMPTIONS**

In general, assumptions made during the SIS would be utilized.

- a. Models
  - i. 2017 Summer peak (thermal)
  - ii. 2017 Winter peak (thermal)
  - iii. 2017 Summer off-peak (stability)
- b. Study Region
  - i. MRO region (MH, MP, ATC, GRE, OTP, XEL, SMMPA, MDU, ITC Midwest, WAPA, MEC, MRES, DPC, BEPC, MPC)
- c. Higher-queued requests
  - i. Impacts of all relevant TSRs queued ahead of the study TSRs would be considered in the study. MISO and non-MISO queues would be considered.

**II. ANALYSES**

1. Reactive support requirements for both Option 1 and Option 3 to mitigate potential overvoltage issues under open-ended line conditions
2. Sensitivity to MPC Center – Prairie 345 kV proposed line. Tie-in Option 1 at Prairie
3. CapX Group 1 upsizing
  - a. To determine if the double-circuited CapX facilities (for example, Maple River – Monticello) can be used as alternatives to the south 500 kV line in Option 1.
4. LaCrosse – W. Middleton 345 kV sensitivity
  - a. To determine if LaCrosse – W. Middleton 345 kV can be a possible alternative for mitigating transient voltage violation at Minong 161 kV obviating the need for additional capacitor banks at Stone Lake as well as thermal overloads observed (as identified through original SIS)

5. Impact of prior-outages on MH export limits, HVDC reduction and reserve requirements
  - a. Determine MHEX transfer capability for the prior-outage of the new (Options 1 & 3) and existing MH-US tie-lines
6. Benefits and costs of tying Option 3 into the 500 (or 230?) kV system at Forbes
  - a. Perform limited sensitivity around the area for Option 3. Does it help under prior outage conditions?
  - b. Transient stability – test local disturbances for transient performance;
  - c. Thermal analyses – perform initial linear screen using DC contingency analysis. If significant differences observed compared to original results, perform nonlinear (AC) analysis to verify findings.
7. Additional analyses required should HVDC reduction be not available as a mitigation measure
8. Study to determine if TSRs can be accommodated while respecting TRM

### III. FACILITIES STUDY/ENGINEERING WORK

1. New substation east of King (on King – Eau Claire?) for Option 3 termination
  - a. More of a physical limitation issue. Limited sensitivity analysis sufficient.
2. Lines should be designed with single-pole tripping & reclose (more of an engineering study to determine benefits of such a scheme; should include it in the scope of the Facilities Study).

### IV. SCHEDULE

- a. Study kick-off call
  - i. Finalize Scope
- b. Set study agreements in place
  - i. Use additional study agreements, or use existing ones (prefer using existing)?
  - ii. Get consultant on board (RFP, SSA)
- c. Study completion
  - i. Regular, periodic updates provided
  - ii. Interim work results would be shared
  - iii. Final study report issued