**VERSION 6**
**Date Posted: 10/20/2005**

# Northern States Power Company/Northern States Power Company (Wisconsin)

## Meeting Notice
## In Compliance with 18 C.F.R. Part 358.5(a)(2)

**The Transmission Provider must ensure that any employee of its Marketing or Energy Affiliates is prohibited from obtaining information about the Transmission Provider's transmission system (including, but not limited to, information about available transmission capability, price, curtailments, storage, ancillary services, balancing, maintenance activity, capacity expansion plans or similar information) through access to information not posted on the OASIS or Internet website or that is not otherwise also available to the general public without restriction.**

To: SW MN -Twin Cities EHV Study Group

Re: SW MN Twin Cities EHV Study to be discussed at
Xcel Energy Offices, Lower Level, Bay 2
414 Nicollet Mall, Minneapolis, MN
on Wednesday October 19, 2005 9:00 am - 1:00 pm Central Time

For those participating via telephone: 303-571-7777 Conf ID: 33

AGENDA

1. Introductions, Review Study Purpose/Scope/Goals
   -- Relationship to CapX 2020 vision plan & MISO Exploratory Studies' results
   -- SW Minnesota generation outlet
   -- Coordination with Big Stone II development

2. Review Study Schedule

3. Review Study Assumptions

4. Review Base Transmission Plan configuration

5. Review "System Alternative" configuration

6. Review of powerflow maps
   (System intact & relevant contingencies)

7. Review of revised TLTG (Base Plan, Big Stone outlet operated at 345 kV)

8. Review Dynamic Stability results

9. Constrained Interface Analysis Summary
   (revised to show incremental outlet accommodated)

10. Review of Draft Report

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Documents in the Meeting Material file for this meeting are:
20051019-SWMNTC-EHV-Meeting-NSP-Doc1-df-summary1.pdf
20051019-SWMNTC-EHV-Meeting-NSP-Doc2-base.plan.double.2000MW_tbl-output.pdf
20051019-SWMNTC-EHV-Meeting-NSP-Doc3-base.plan.single.2000MW_tbl-output.pdf
20051019-SWMNTC-EHV-Meeting-NSP-Doc4-system.alt.2000MW_tbl-output.pdf
20051019-SWMNTC-EHV-Meeting-NSP-Doc5-disturbances.index.pdf
20051019-SWMNTC-EHV-Meeting-NSP-Doc6-system.alt.original.pdf
20051019-SWMNTC-EHV-Meeting-NSP-Doc7-system.alt.revised.pdf
20051019-SWMNTC-EHV-Meeting-NSP-Doc8-base.plan.single.pdf
20051019-SWMNTC-EHV-Meeting-NSP-Doc9-base.plan.double.pdf

Additional Information for Documents 2 thru 5

Attached are materials relating to the stability simulations we have been working on for this project.

Sorry that we are behind schedule on this; as we mentioned at the last meeting, we ran into multiple software, hardware, and model problems that had to be diagnosed and overcome.

There are three attachments that are summary sheets for the classic NMORWG faults, plus some on the new facilities, for each of the following configurations:

- Base Plan, single circuit
- Base Plan, double circuit on Lyon Co-Franklin-Helena 345 kV
- System Alternative (revised configuration)

The fourth attachment is an index to the fault names.

Here's what we have to share:

Stability summaries for the following transmission configurations, all at the 2000 MW SW Minnesota generation level show the following:

1. "Base Plan": Represents the "Base Plan" facilities (Brookings Co-Lyon Co-Franklin-Helena-Lk Marion-Hampton Corner 345 kV and Lyon Co-Hazel 345 kV). This case has dynamic voltage violations for the nbz fault:

Arrowhead 230 kV and other MP buses at .77 pu (criterion is .82).

[Although the summary sheet shows .79 pu, the voltage scan feature quit sampling before the actual bottom of the swing, which is at .77 pu]

However, if we reconfigure the Forbes 500 kV bus to enable the SVC to stay on line following the disturbance (fault 'nmz') we see no voltage violations.

There are high voltages flagged in the Manitoba Hydro system for several faults; however these are actually acceptable spikes of very short duration.

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2. "Base Plan, Double Circuit": represents double-circuit construction on the Lyon Co-Franklin-Helena section of the Base Plan's 345 kV. This case has dynamic voltage violations for the nbz fault:

   Arrowhead 230 kV and other MP buses at .79 pu (criterion is .82);

   However, if we reconfigure the Forbes 500 kV bus to enable the SVC to stay on line following the disturbance (fault 'nmz') we see no voltage violations.

   There are high voltages flagged in the Manitoba Hydro system for several faults; however these are actually acceptable spikes of very short duration.

3. "System Alternative" represents the revised System Alternative; it has a Brookings Co-Lyon Co-Hazel-W Waconia-Blue Lk 345 kV line and a W Waconia-Helena-Lk Marion-Hampton Corner 345 kV.

   This case has dynamic voltage violations for the nbz fault:

   Arrowhead 230 kV and other MP buses at .78 pu (criterion is .82);

   However, if we reconfigure the Forbes 500 kV bus to enable the SVC to stay on line following the disturbance (fault 'nmz') we see no voltage violations.

   There are high voltages flagged in the Manitoba Hydro system for several faults; however these are actually acceptable spikes of very short duration.

We will be sending out the actual "squiggle plots" and "report files" for these simulations later today.

From these simulations, it appears that any of the options can be made to work adequately. However, since we know that we need to address the Manitoba throughflow issue, the "Base Plan, double circuit" option is of greatest practical interest.

Additional Information (as of 10/17/05)

For those who would like to see the stability plots corresponding to each of the simulations listed in the summary sheets sent in transmittal #2 last Friday, they can be downloaded from the following FTP site:

ftp://mail.exceleng.net/Public/Xcel/SW%20MN-Twin%20Cities%20EHV/

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The Username is "Xcel" and the Password is "w1r3".
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The folder names indicate the system configuration:

- Base Plan
- Base Plan with double circuit on Lyon Co-Franklin-Helena 345 kV
- System Alternate (revised).

The individual file names indicate the fault involved (e.g., "nbz", "mat", "pcs", etc.).

All these simulations are at the 2000 MW SW Minnesota generation level, which is slightly higher than the MW "stopping points" suggested by the thermal (TLTG) analysis work we have done for each configuration.

Additional information for Documents 6 thru 9

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Documents 6 –9 provide summary logsheets and pdf plots showing system intact and contingent flows for the following system configurations:

1. Base Plan, with double circuit on Lyon Co-Franklin-Helena 345 kV

2. System Alternate (original)
   [has Brookings Co-Lyon Co at 115, Lyon Co-Hazel-Blue Lk 345 kV]

2. System Alternate (revised)
   [has Brookings Co-Lyon Co as 345 kV rather than original 115 kV, and Twin Cities "South Outer 345 kV Loop"]

For each configuration, there are plots at the 1200 and 2000 MW SW Minnesota generation level.
The file names indicate

- the configuration ("Base.dckt" or "SysAlt")
- the power level ("1200" or "2000")
- the contingency (the last digit is keyed to the logsheet contingency numbering)

Post Meeting Document
20051019-SWMNTC-EHV-Meeting-NSP-Doc10-TLTG OPK 10-17-05 Summary.pdf

As promised at the Study Group meeting on 10-19-2005, the file labeled above is the latest revision of the TLTG summary spreadsheet for all the transmission configurations we have studied.

The only revision since the last transmittal (on 10-7-2005) is on the "Base Configuration, Big Stone-Canby-Hazel at 345 kV" scenario [tab "Base Config (BGS @ 345)".] The TLTG for this configuration has been re-run (due to a model configuration error we had detected) and the corresponding tabulation revised. There now is also a related graph ("Cost0") which compares the Big Stone-Canby-Hazel 230 and 345 kV scenarios' costs.

From this Graph it is seen that regardless of which voltage the Big Stone southern outlet line is operated at, there is a natural "stopping point" (due to a step increase in cost) at approximately 1880 - 1890 MW total SW Minnesota generation outlet. In either scenario, this is the point at which the Wilmarth-Lakefield 345 kV overload is reached (for the Lyon Co-Franklin 345 kV outage). In the 345 kV outlet scenario, 1880 MW is also the point at which the McLeod-Panther 230 kV overload occurs.

Richard Gonzalez