

Rush Creek Task Force (CCPG)

June 22, 2017

1. Introduction

- ❖ See Attendance list

2. Anti-trust Reminder

- ❖ Patrick reviewed the anti-trust guidelines with the group. The guidelines are attached to the meeting agenda.

3. Approve Meeting Notes

a. May 25, 2017 Meeting

- ❖ Patrick sent the draft notes on June 7, 2017
- ❖ Chris Neil emailed his comments to the group on June 8.
- ❖ Patrick sent out updated draft notes on June 16, 2017.
- ❖ No further corrections were provided at this meeting.
- ❖ Motion was made by PSCo and seconded by Tri-State to approve the notes.
 - Discussion: Chris Neil objected to the statement in the notes that his proposed Green Valley alternative does not network the Rush Creek Gen-Tie, believing it is not a true statement.
 - No other discussion.
- ❖ Vote: one objection by Chris Neil.
 - May 25, 2017 meeting notes were approved.

4. Action Item Review

- ❖ Reviewed the action items from the May 25, 2017 meeting:

Item	Action	Status
1	Draft Benefits Language	Tom stated this will be covered in the report
2	Transient Stability Analysis	Discuss Today
3	Cost Estimates	Discuss Today
4	Summarize results with narrative / draft report	Ongoing.
5	Review power flow in Alts 5a and 5b	Discuss Today

4a. (added to agenda) Power Flow Review

- ❖ Based on comments from Chris Neil at the last meeting, Patrick reviewed the power flow for Alternatives 5a and 5b using Siemens PSS software. The power flow for these alternatives showed increased flow on the Story-Henry Lake, Story-Pawnee, Pawnee-Missile Site, and Pawnee-Fort Lupton 230 kV lines following loss of the Missile Site-Rush Creek I 345 kV line with minimal flow north from Story to Laramie River Station.
- ❖ Alternative 5a, for example, shows approximately 700 MW flowing to Missile Site in normal operation, 325 MW to Big Sandy, 225 MW to Story, and 85 MW to Burlington. From Story, about 150 MW flows on the 345 kV line to Keota and negligible north from there.

- ❖ Alternative 5b, for example, shows approximately 500 MW flowing over the line to Daniels Park, 400 MW to Missile Site, 150 MW to Big Sandy, and 45 MW to Burlington. Whenever the Daniels Park line is present in a study, it receives the majority flow.

5. Review Transient Stability Results

- ❖ PSCo reviewed a Power Point Presentation showing the scope of the transient analysis and plots of the benchmark for Heavy Summer and Light Spring scenarios.
- ❖ The analysis showed stable, damped oscillations following various 3-phase faults around Missile Site substation for the benchmark and Alternatives 4, 5, 5a, 5b, and 8.
- ❖ The analysis showed unstable voltage collapse for Alternative 1. The limit of this alternative was an incremental amount of 300 MW. Patrick explained that under the fault, the power flows out to Burlington. The transmission system out there is not able to handle a large influx of power.
- ❖ Other alternatives are expected to have similar results to the sample size of alternatives analyzed with similar components.

6. Review Cost Estimates

- ❖ PSCo reviewed a Power Point Presentation with indicative level cost estimates (no defined level of accuracy) for all the alternatives.
- ❖ Estimates included the following with escalation to 2025 dollars:
 - Alt 1: \$148M
 - Alt 2: \$59M
 - Alt 3: \$70M
 - Alt 4: \$169M
 - Alt 5: \$207M
 - Alt 5a: \$319M
 - Alt 5b: \$540M
 - Alt 6: \$193M
 - Alt 7: \$211M
 - Alt 8: \$376M
 - Alt 8a: \$295M
 - Alt 9: \$310M
 - Alt 9a: \$333M
- ❖ PSCo explained the reasoning for having estimates being escalated to 2025 dollars was to align with the 10-year time frame of the reliability studies.
- ❖ PSCo agreed to consider providing more detail for the cost estimates.
- ❖ Results should be available by the next meeting.

7. Discuss Report Outline

- ❖ PSCo reviewed the draft report outline that was sent out to the task force on June 16.
- ❖ Chris Neil noted the report should include process and schedule.
- ❖ Participants indicated the benefits discussion should reference benefits other than injection capability.
- ❖ PSCo explained that the purpose of the study and report is to meet the requirements of the Settlement Agreement.
- ❖ PSCo indicated that any party could use the RCTF study as a reference if any alternative was considered for implementation.

8. Stakeholder Comments

- ❖ Chris Neil suggested the summary results table in the report should capture injection capability only up to the first limit shown and not further.
- ❖ PSCo noted that the analysis is assuming all new fictitious generation is located at Rush Creek I. In the event all generation come into Rush Creek II the analysis would change substantially for alternatives like 5a following loss of the Rush Creek I – Rush Creek II 345 kV line.
 - Participants suggested a new Alt 5c which would change Alt 5a by moving the Rush Creek I termination of the Rush Creek I – Big Sandy 345 kV line to terminate at Rush Creek II which would alleviate the issue.
 - PSCo will include Alternative 5c in the analysis.
- ❖ Chris Neil pointed out that the Settlement Agreement (page 18) states that PSCo is to provide an update on the cost of building Pawnee-Daniels Park to bring the cost estimate up to +/- 10% level of accuracy. This report is to be filed with the Commission prior to commencing construction of the Pawnee-Daniels Park Project. The Company is also to file semi-annual status reports. PSCo indicated that this was outside the scope of the RCTF, but that PSCo Regulatory would follow up.

9. Action Items

Item	Action	Resp
1	Power flow analysis for Alt 5c	PSCo
2	Cost estimate for Alt 5c	PSCo
3	Consider providing additional details for cost estimates	PSCo
4	Draft report for review before the July meeting	PSCo
5	Check on Status of Settlement Agreement Cost Reporting	PSCo

10. Next Meeting

- ❖ July 25, 2017; 1:00 PM

11. Attendees List

Rush Creek Task Force				
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Harvey Alicia Xcel Energy alicia.d.harvey@xcel.com Alicia ^{LA} Harvey

12. Attachment A – Transient Stability and Cost Estimates Power Point Presentation

Rush Creek Task Force

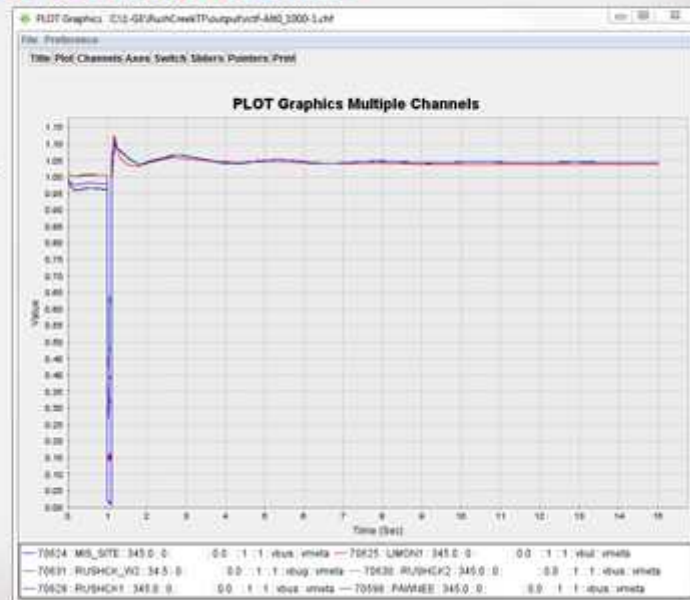
Transient Stability Analysis &
Cost Estimates
June 22, 2017

Transient Stability Analysis

- Performed transient stability analysis for various incremental generation output for the benchmark and alternative cases
- Heavy Summer & Light Spring scenarios
- Assumed 3-phase faults close-in at Missile Site with loss of the following:
 1. Missile Site-Rush Creek I 345 kV Line
 2. Missile Site-Smoky Hill 345 kV Line
 3. Missile Site-Smoky Hill & Missile Site-Daniels Park 345 kV double circuit tower line
- Normal clearing time of 6 cycles

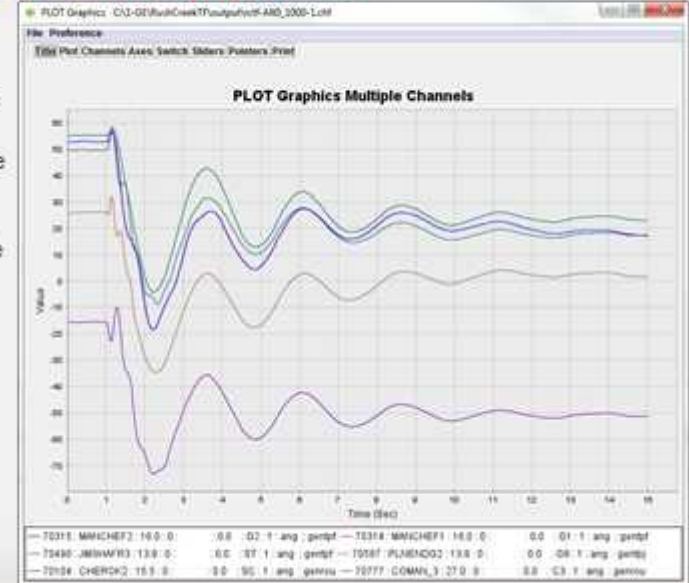
Benchmark Stability Results

- Heavy Summer
- +1000 MW
- Loss of Gen-Tie
- Plot showing bus voltage (per unit)



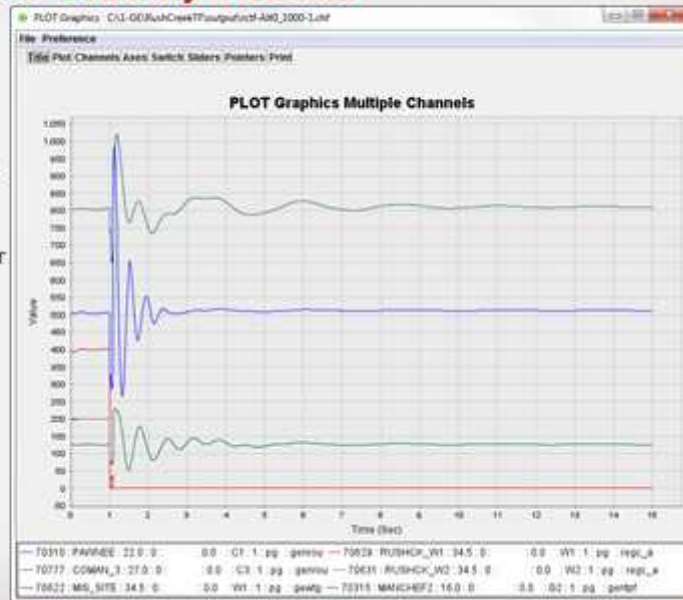
Benchmark Stability Results

- Heavy Summer
- +1000 MW
- Loss of Gen-Tie
- Plot showing generator angle (degrees)



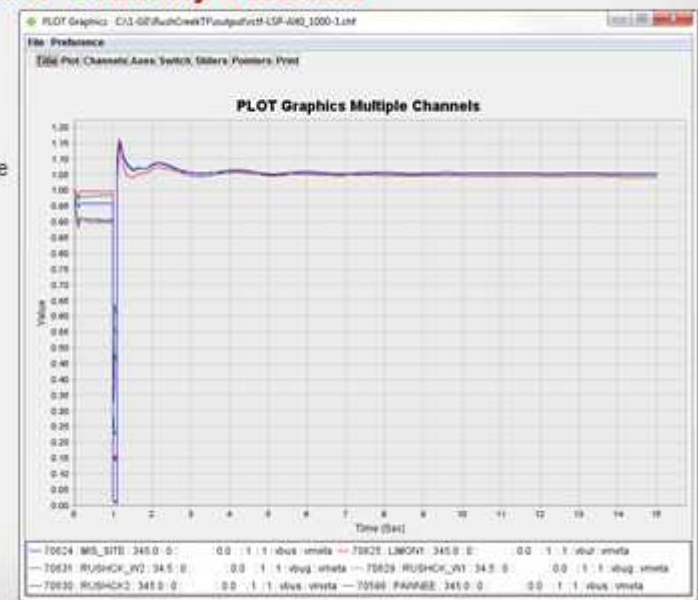
Benchmark Stability Results

- Heavy Summer
- +1000 MW
- Loss of Gen-Tie
- Plot showing generator power output (MW)



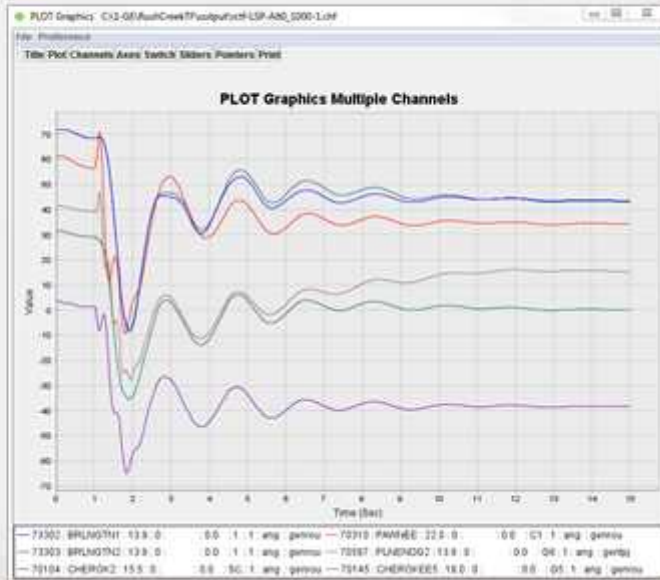
Benchmark Stability Results

- Light Spring
- +1000 MW
- Loss of Gen-Tie
- Plot showing bus voltage (per unit)



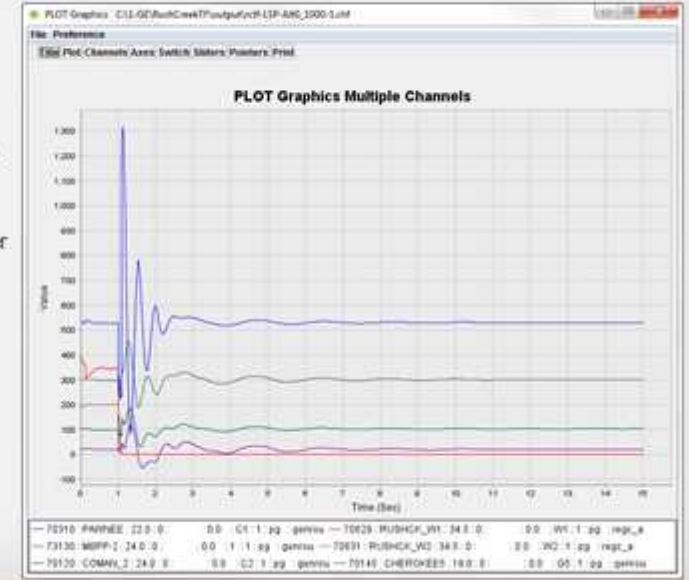
Benchmark Stability Results

- Light Spring
- +1000 MW
- Loss of Gen-Tie
- Plot showing generator angle (degrees)



Benchmark Stability Results

- Light Spring
- +1000 MW
- Loss of Gen-Tie
- Plot showing generator power output (MW)



Preliminary Stability Results of Alternatives

Alternative	Incremental MW Studied	Heavy Summer Results	Light Spring Results
Benchmark	1000	Stable	Stable
1	300	Unstable	Unstable
4	850	Stable	Stable
5	550	Stable	Stable
5a	1400	Stable	Stable
5b	1000	Stable	Stable
8	850	Stable	Stable

Indicative Cost Estimates

Alt	Description	Cost Estimate (Millions)
1	RCII – Burlington	\$148
2	RCI – Big Sandy	\$59
3	RCII – Limon Wind	\$79
4	Missile – RCI – RCII	\$169
5	RCII – Burlington, RCI – Big Sandy	\$207
5a	Alt 5 plus Big Sandy – Story	\$319
5b	Alt 5a plus RCI – Daniels Park	\$540
6	RCII – Burlington, RCI – Limon Wind	\$193
7	RCII – Burlington, RCII – Limon Wind	\$211
8	RCI – Daniels Park, RCII – Burlington	\$376
8a	RCI – new station, RCII – Burlington	\$295
9	RCI – Daniels Park, RCI – RCII	\$310
9a	Alt 9 plus loop Midway-Waterton to Daniels	\$333