



2010 LOCAL TRANSMISSION PLAN

PREPARED
BY
BLACK HILLS CORPORATION
TRANSMISSION PLANNING

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1. Introduction

In June of 2009, the Black Hills/Colorado Electric (BHCE) filed with FERC Attachment K to the Open Access Transmission Tariff (OATT) to meet the requirements outlined in FERC Order 890. Through their Attachment K filing, BHCE created the Transmission Coordination and Planning Committee (TCPC) as the forum to conduct long-range planning studies while promoting stakeholder input and involvement. This report, intended to serve as the 2010 Local Transmission Plan (LTP), will outline the 2010 study cycle and present the findings of the planning study.

1.1. Black Hills Colorado Electric Transmission System Background

Black Hills Colorado Electric (referred to hereinafter as the Transmission Provider) owns certain transmission facilities with transmission service pursuant to a FERC-approved Open Access Transmission Tariff (“OATT”). A diagram of the expected 2014 BCHE transmission system is shown in Figure 1. This diagram includes the current transmission system as well as planned system upgrades through calendar year 2013 as studied in this assessment.

1.2. Stakeholder Participation

All interested parties were encouraged to participate in the 2010 TCPC study process. An open stakeholder kick-off meeting was held via webinar on December 8, 2009 to inform stakeholders of the proposed study plan and to provide an opportunity for suggestions and feedback on the study process. Requests for data pertaining to the modeling and evaluation of the transmission system were made by the Transmission Provider. Meeting notices were distributed via email and posted along with presentation materials on the Black Hills Colorado Electric OASIS page at <http://www.oatioasis.com/bhct/index.html>.

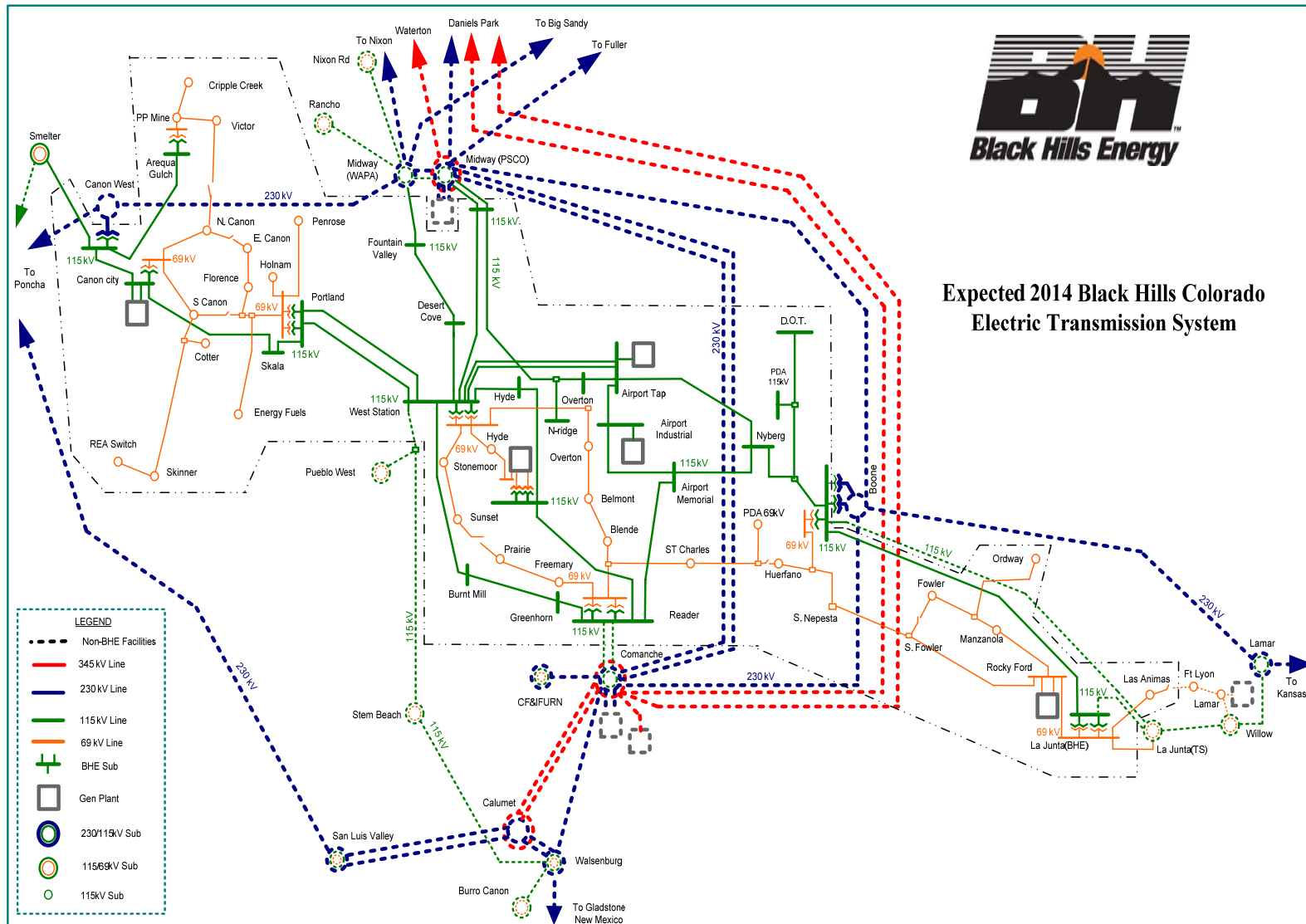


Figure 1: Expected 2014 Black Hills Colorado Electric Transmission System

2. Study Methodology

The BHCE transmission system was evaluated with planned system additions for 2014 and 2020 under both peak summer and off-peak winter load levels to identify any deficiencies in system performance. Steady state voltage and thermal analyses was performed, and additional upgrades were identified and modeled as necessary to mitigate any reliability criteria violations. A list of prior and forced outages used in the 2010 LTP study process was included in Appendix A.

2.1. Study Criteria

The criteria described in 2.1.1 and 2.1.2 are consistent with the NERC TPL Reliability Standards, WECC TPL – (001 thru 004) – WECC – 1 – CR – System Performance Criteria and Colorado Coordinated Planning Group’s Voltage Coordination Guide.

2.1.1. *Steady State Voltage Criteria*

Under system intact conditions, steady state bus voltages must remain between 0.95 and 1.05 per unit. Following a Category B or C contingency, bus voltages must remain between 0.90 and 1.10 per unit. Pre-existing voltage violations outside the localized study area were ignored during the evaluation.

2.1.2. *Steady State Thermal Criteria*

All line and transformer loading must be less than 100% of their established continuous rating for system normal conditions (NERC/WECC Category A). All line and transformer loadings must be less than 100% of their established continuous or emergency rating under outage conditions (NERC/WECC Category B and C). Category D outages are to be evaluated for risk and consequence.

2.1.3. *Transient Voltage and Frequency Criteria*

NERC Standards require that the system remain stable and within applicable thermal ratings and voltage limits for Category A, B, and C disturbances. The WECC Disturbance – Performance Table of Allowable Effects on Other Systems states the following requirements:

- Category B: Any transient voltage dip must not exceed 25% at load buses or 30% at non-load buses. The dip also must not exceed 20% for more than 20 cycles at load buses. Frequency must not drop below 59.6 Hz for 6 or more cycles at a load bus.
- Category C: Any transient voltage dip must not exceed 30% at load buses or 30% at non-load buses. The dip also must not exceed 20% for more than 40 cycles at load buses. Frequency must not drop below 59.0 Hz for 6 or more cycles at a load bus.

2.2. Study Area

The 2010 LTP study area will include all BHCE transmission equipment as well as neighboring transmission system elements roughly bound by Poncha to the west, Walsenburg to the south, Lamar to the east, and Daniels Park to the north. Points of interconnection between BHCE and neighboring utilities are shown in Table 1.

Table 1: BHCE Transmission System Interconnection Points

Interconnection Name	Interconnecting Utility¹
Midway (PSCo)	PSCo
Midway (WAPA)	WAPA, CSU, TSG&T
Boone	PSCo, TSG&T
Reader	PSCo
Cañon West	WAPA, PSCo
West Station	TSG&T

2.3. Study Case Development

The baseline cases for the 2010 LTP Study were chosen based upon WECC Base Case availability, planned transmission system and resource upgrades, and previously completed planning studies. A complete list of individual case changes for each scenario is available upon request.

2.3.1. 2014 Heavy Summer Study Case

An updated 2009 CCPG study case was used as the starting point for the 2014 summer peak analysis. Updates to the case loads, resources, and topology were solicited from neighboring systems and applied to the model. Significant resource additions to the transmission system from the 2010 existing configuration included the addition of a 360 MW plant at Baculite Mesa, 25 MW of generation at the new Calumet 230 kV bus, and 217 MW of generation online at the San Luis Valley 230 kV bus. It was assumed that 9.7 MW of generation was dispatched from the solar resource modeled at San Luis Valley. Comanche 3 was dispatched at 750 MW net.

Significant transmission additions to the existing system for 2014 included a second Reader-Comanche 115 kV line, a second Boone 230:115 kV transformer, a double circuit 230 kV line from San Luis Valley to a new 345:230 kV substation at Calumet, a second 230 kV circuit from Calumet to Walsenburg, and a double circuit 345 kV line from Calumet to Comanche. All projects submitted in the 2010 BHCE Colorado Rule 3206 filing were also included in the 2014 study case.

2.3.2. 2014 Light Winter Study Case

¹ CSU means Colorado Springs Utilities; WAPA means Western Area Power Administration and TSG&T means Tri-State Generation and Transmission Association, Inc.

An updated 2009 CCPG study case was used as the starting point for the 2014 winter off-peak analysis. System topology was updated to match the 2014 Heavy Summer case, and the loads and resources were adjusted accordingly.

2.3.3. 2020 Heavy Summer Study Case

The 2020HS DEEP study case was used as the starting point for the 2020 summer peak analysis. The case originated as the 2020 HPX study case with the HPX project removed. Updates to the case loads, resources, and topology were solicited from neighboring utilities and applied to the model. There were several changes affecting the BHCE transmission system modeled for the 2020 analysis. The La Junta 115:69 kV transformers were replaced with larger 42 MVA units. A new generation resource was added to meet the demand requirements according to the 2008 BHCE Electric Resource Plan (ERP). The plant was placed at Baculite Mesa for this study; however actual plant design and location will be identified during the LGI and/or regulatory process. It was assumed that 7.5 MW of generation was dispatched from the 317.5 MW solar resource modeled at the San Luis Valley 230 kV bus.

2.3.4. 2020 Light Winter Study Case

The 2009 CCPG study case was used as the starting point for the 2020 light winter analysis. System topology was updated to match the 2020 Heavy Summer case, and the loads and resources were adjusted accordingly.

2.4. Transmission Planning Assumptions

The 2010 LTP study was performed for both the 2014 and 2020 time frames with the following assumptions:

- All existing and planned facilities and the effects of control devices and protection systems were accurately represented in the system model.
- Projected firm transfers were represented per load and resource updates from each stakeholder.
- Existing and planned reactive power resources were modeled to ensure adequate system performance.
- There were no specific planned outages identified for the 2014 and 2020 study periods. A series of prior outages on facilities deemed to be most critical by the transmission planner was simulated to identify potential risks associated with such outages in the study time frame. A list of the evaluated prior and forced outages is included in Appendix A.
- For system intact solutions, transformer taps and switched shunts were allowed to adjust. Following a contingency, adjustment of these devices was disabled. For all solutions, area interchange control and phase shifter adjustments were disabled, while DC tap adjustment was enabled. A fixed slope decoupled Newton solution method was utilized through the analysis.

Each scenario described in Section 2.3 was evaluated to meet the requirements of all applicable NERC and WECC reliability standards and criteria.

3. Evaluation of the BHCE Transmission System

3.1. Steady-State Analysis

The thermal overload or low voltage violations listed below were not included in the summary of study results due to irrelevant nature of the violation with respect to the BHCE system.

- Stem Beach-area voltage/overload violations following the loss of the West Station-Stem Beach 115 kV line (all scenarios)
- Stem Beach and Walsenburg-area voltage/overload violations following the loss of both Calumet-Walsenburg 230 kV lines (all scenarios)
- Curecanti-South Canal-Montrose 115 kV line overloads (2020LW)
- Fuller 230:115 transformer overloads (<105%) following MidwayBR-Rancho 115 kV contingency (2014HS)

3.1.1. 2014 Heavy Summer Results

The 2014 summer peak case exhibited thermal overloads on several Black Hills transmission system elements:

- The Cañon City-West Cañon 115 kV line reached its 120 MVA thermal limit following the N-1-1 loss of both West Station-Portland 115 kV lines. The limit could be increased to 151 MVA by removing the CT limitation.
- The Overton-Baculite Mesa 115 kV line reached 102% of its 122 MVA conductor-limited rating following the loss of both Baculite Mesa-West Station 115 kV lines. This overload could be mitigated by reducing generation at Baculite Mesa by 20 MW, blocking the Lamar DC Tie or rebuilding the line segment.
- Three 115:69 kV transformers serve the Cañon City 69 kV load center, two at Portland and one at Cañon City. Several voltage/thermal overload violations were identified following the loss of transformation capacity serving the area. The Portland #2 115:69 kV transformer reached 110% of its 25 MVA continuous rating following the prior outage of the Portland #1 transformer. When combined with the Cañon City 115:69 kV transformer contingency, overloads exceeded 220%. Critical contingencies and resulting overloads were similar to a lesser degree for the Portland #2 transformer prior outage. The Cañon City 115:69 kV transformer prior outage caused various thermal overload and low voltage violations when combined with the Arequa Gulch-West Cañon 115 kV line or Portland 115/69 kV transformer contingencies. These violations varied depending on how the 69 kV system was configured following the prior outage, but none of the evaluated

configurations eliminated all violations. The issues associated with the loss of any of the 115:69 kV transformation sources in the Cañon City area as described above indicated the need not only for additional transformation capacity, but an additional 115:69 kV path to eliminate overloads related to N-1-1 outages. This is a local 69 kV load service issue and has minimal impact to the surrounding transmission system.

- Pre-contingent low voltages occurred at the Arequa Gulch 115 kV (0.798), Cripple Creek 69 kV (0.917), and Victor 69 kV (0.925) buses following the prior outage of the Arequa Gulch-West Cañon 115 kV line. These voltages assume generation at PP Mine was online. By adding a 13 MVAR capacitor at Arequa Gulch, the sub-0.95 p.u. violations were mitigated without PP Mine generation. The cap size required to hold Arequa Gulch voltage at 1.0 p.u. was 17 MVAR. This configuration was adequate for all simulated N-1-1 outages involving the Arequa Gulch-West West Cañon 115 kV prior outage. Additionally, the North Canon W.-Victor 69 kV line reached 99% of its 24 MVA rating for this prior outage without PP Mine generation. The rating is based on a CT limitation. Generation at PP Mine could be dispatched to reduce loading, or the CT limitation could be removed thereby increasing the thermal rating to 41 MVA.

3.1.2. 2014 Light Winter Results

The 2014 light winter analysis results were less severe than the summer results due to reduced load levels and higher facility ratings.

- The prior/forced outage combination of the Boone-Comanche and Boone-MidwayPS 230 kV lines resulted in the Boone-DOT Tap 115 kV line reaching 102% of its 100 MVA rating. The overload was attributed to the resource injections at Lamar, and could be mitigated through a reduction in Lamar area generation. Additionally, removal of the existing Boone-DOT Tap 115 kV CT limitation would increase the line rating to the 122 MVA conductor limit.
- The Cañon City 115:69 kV transformer prior outage caused various thermal overload and low voltage violations on the area 69 kV system when combined with the Arequa Gulch-West Cañon 115 kV contingency. The violations varied depending on how the 69 kV system was configured following the prior outage. As described in section 3.1.1, issues associated with the loss of a 115:69 kV transformation source in the Cañon City area 69 kV system reiterated the need for an additional 115:69 kV path to eliminate criteria violations related to N-1-1 outages.
- Pre-contingent low voltages occurred at the Arequa Gulch 115 kV (0.816), Cripple Creek 69 kV (0.937), and Victor 69 kV (0.943) buses following the prior outage of the Arequa Gulch-West Cañon 115 kV line. These voltages assume generation at PP Mine was online. Adding at least a 10 MVAR

capacitor at Arequa Gulch mitigated this violation without PP Mine generation. To maintain system intact voltage at 1.0 p.u., the cap size increased to 14 MVAR. This configuration was adequate for all simulated N-1-1 outages involving the Arequa Gulch-West West Cañon 115 kV prior outage.

3.1.3. 2020 Heavy Summer Results

The 2020 summer peak case exhibited several thermal overload and voltage violations.

- The Overton-Baculite Mesa 115 kV line reached 108% of its 122 MVA conductor rating following the loss of both Baculite Mesa-West Station 115 kV lines. This overload was mitigated by reducing total generation at Baculite Mesa by 70 MW or rebuilding the nearly five mile section of line with larger conductor.
- The Portland #2 115:69 kV transformer reached 120% of its 25 MVA continuous rating following the prior outage of the Portland #1 transformer. When combined with the Cañon City 115:69 kV transformer contingency, overloads exceeded 238%. Critical contingencies and resulting overloads were typically similar to a lesser degree for the Portland #1 transformer. The Cañon City 115:69 kV transformer prior outage caused various thermal overload and low voltage violations when combined with the Arequa Gulch-West Cañon 115 kV line, Arequa Gulch 115:69 kV transformer, or the Portland #1 transformer contingencies. The violations varied depending on how the 69 kV system was configured following the prior outage. As described in section 3.1.1, issues associated with the loss of a 115:69 kV transformation source in the Cañon City area 69 kV system reiterated the need for an additional 115:69 kV path to eliminate criteria violations related to N-1-1 outages.
- Pre-contingent low voltages occurred at the Arequa Gulch 115 kV (0.802), Cripple Creek 69 kV (0.921), and Victor 69 kV (0.929) buses following the prior outage of the Arequa Gulch-West Cañon 115 kV line. These voltages assume generation at PP Mine was online. Adding a 13 MVAR capacitor at Arequa Gulch mitigated this violation without PP Mine generation. To maintain system intact voltage at 1.0 p.u. at the Arequa Gulch 115 kV bus, the cap size increased to 17 MVAR. This configuration was adequate for all simulated N-1-1 outages involving the Arequa Gulch-West West Cañon 115 kV prior outage. Similar to the 2014HS scenario, the North Canon W.-Victor 69 kV line reached 100% of its 24 MVA rating for this prior outage without PP Mine generation. The rating is based on a CT limitation, which could be removed thereby increasing the thermal rating to 41 MVA. Alternatively, generation at PP Mine could be dispatched to reduce loading to acceptable levels.

- The MidwayBR 230:115 kV transformer reached 108% of its 100 MVA rating following the prior outage of the Desert Cove-West Station 115 kV line and the MidwayBR-Nixon 230 kV line. This is a known system issue.

3.1.4. 2020 Light Winter Results

The 2019-20 light winter results were similar to the heavy summer results but less severe.

- The Portland #2 115:69 kV transformer reached 120% of its 25 MVA continuous rating following the prior outage of the Portland #1 transformer. When combined with the Cañon City 115:69 kV transformer contingency, overloads exceeded 179%. Critical contingencies and resulting overloads were typically similar to a lesser degree for the Portland #1 transformer. The Cañon City 115:69 kV transformer prior outage caused various 69 kV thermal overload and low voltage violations when combined with the Arequa Gulch-West Cañon 115 kV line, Arequa Gulch 115:69 kV transformer, or the Portland #1 transformer contingencies. The violations varied depending on how the 69 kV system was configured following the prior outage. As described in section 3.1.1, issues associated with the loss of a 115:69 kV transformation source in the Cañon City area 69 kV system reiterated the need for an additional 115:69 kV path to eliminate criteria violations related to N-1-1 outages.
- System intact low voltages occurred at the Arequa Gulch 115 kV (0.813), Cripple Creek 69 kV (0.934), and Victor 69 kV (0.94) buses following the prior outage of the Arequa Gulch-West Cañon 115 kV line. Adding a 10 MVAR capacitor at Arequa Gulch mitigated the violations. To maintain system intact voltage at 1.0 p.u. at the Arequa Gulch 115 kV bus, the cap size increased to 14 MVAR. This configuration was adequate for all simulated N-1-1 outages involving the Arequa Gulch-West West Cañon 115 kV prior outage.
- The MidwayBR 230:115 kV transformer reached a maximum of 109% of its 100 MVA rating following a prior outage on the MidwayBR-West Station 115 kV line and the MidwayBR-Nixon 230 kV line. This is a known system issue.
- Overloads on the 115 kV lines between Palmer, Flying Horse, and Kettle Creek, as well as the Ray Lewis-Poncha line and the MidwayPS 230:115 kV transformer were the result of a Daniels Park-Comanche 345 kV prior outage and various 230 or 345 kV contingencies between Comanche and Daniels Park or Waterton. All overloads were mitigated by reducing generation south of the BCHE system. These overloads are unrelated to the performance of the BHCE system and will be mitigated through operational studies and guidelines to be coordinated between affected parties.

3.1.5. Category D Outage Analysis

Several significant Category D outages were selected to identify the impacts of each outage on the remaining transmission system. These buses were deemed significant because they interconnect four or more network elements. The outages were simulated by disconnecting the bus and all associated network elements at the each of the following substations: MidwayBR 230 kV, Reader 115 kV, West Station 115 kV, Baculite Mesa 115 kV, Boone 115 kV, Portland 115 kV, Cañon City 115 kV, and West Cañon 115 kV. The simulation of Category D outages in each load scenario did not result in system instability or cascading outages.

3.2. Transient Analysis

Transient analysis was performed to evaluate the dynamic characteristics of the transmission system in proximity to the BHCE footprint following various disturbances. System loads were modeled using the WECC generic motor load penetration of 20 percent, with the under voltage load shedding function disabled to provide a worst-case representation of system performance. Several planned wind generation projects external to the BHCE system lacked the necessary dynamic models for the simulation. If the models for a similar sized project were unavailable, the generation was netted with the load at that bus and a load model representation was used. The critical outage combinations evaluated in the transient analysis were selected based on significance with respect to proximity to local generation. The 3-phase faults listed in Table 2 were simulated for both 2014 scenarios and the 2020LW scenario.

Transient analysis was not performed for the 2020HS scenario. Through various regional planning studies, a large number of changes were made to the original WECC-approved power flow case without the corresponding updates to the dynamics data. This created insurmountable problems when trying to initialize the case for dynamic simulation. It was determined that the 2020LW case provided an adequate representation of long-term dynamic system performance.

Table 2: Transient Analysis Fault Summary

Prior Outage	Faulted Bus	Cleared Element	Fault Duration (cycles)
System Intact	None	No Fault	NA
System Intact	Bac. Mesa 115 kV	Both Baculite Mesa-West Station 115 kV lines	5.0
System Intact	Comanche 230 kV	Comanche-MidwayPS 230 kV line	5.0
System Intact	Comanche 230 kV	Comanche-Boone 230 kV line	5.0
System Intact	Comanche 345 kV	Comanche-Daniels Park 345 kV line	4.0
Bac. Mesa-Overton 115 kV line	Bac. Mesa 115 kV	Baculite Mesa-West Station #1 115 kV line	5.0
Bac. Mesa-Overton 115 kV line	Bac. Mesa 115 kV	Both Baculite Mesa-West Station 115 kV lines	5.0
Comanche-Boone 230 kV line	Comanche 230 kV	Comanche-MidwayPS 230 kV line	5.0
Comanche-MidwayPS 230 kV line	Comanche 230 kV	Comanche-MidwayPS 230 kV line	5.0
Comanche-Dan. Park 345 kV line	Comanche 345 kV	Comanche-Daniels Park 345 kV line	4.0

For each ten second simulation, plots including local machine parameters, bus voltages, and frequencies at various points on the transmission system were created. Due to the large quantity of plots created, they are not included in this report but are available upon request.

3.2.1. Transient Analysis Results

There were two issues identified during the initial transient analysis:

- A stability problem was found with the two large synchronous motors at TSG&T's Rosebud 115 kV bus in the New Mexico system model for faults at the Comanche 230 kV and 345 kV buses. This stability problem was also recently encountered in Xcel's Comanche 3 100 MW Uprate study. Since these machines are relatively small and electrically distant from the Comanche Substation, they were taken out of service in the dynamics simulations.
- A post-contingent frequency criteria violation at the CF&IFURN 230 kV bus following a fault on the Comanche 230 kV bus. The largest dip remained below the 59.6 Hz threshold for 8.1 cycles in the 2014HS scenario only. Xcel Energy was consulted regarding this issue. A detailed planning study of the area was recently performed by Xcel planning staff and the frequency dip in

question was not encountered. Due to the rarity of the occurrence, the cause of the frequency dip in this study was associated with inconsistent modeling. The issue will be monitored in future planning studies to substantiate this assumption.

With the exception of the two minor issues mentioned above, all dynamic simulations resulted in acceptable results for each evaluated study scenario. There were no post-contingent voltage violations or additional frequency criteria violations, and all system oscillations were adequately damped.

4. Transmission System Expansion

The following transmission projects have been identified as possible solutions to mitigate the reliability criteria violations mentioned in Section 3.1.

4.1. Arequa Gulch 115 kV reactive voltage support

A 14-17 MVAR capacitor in service at the Arequa Gulch 115 kV bus would mitigate low voltages at Arequa Gulch and also the nearby 69kV system under 2020 high load scenarios. Further analysis of Arequa Gulch load growth and local generation dispatch availability will be necessary to determine the required upgrades.

4.2. North Cañon-Victor 69 kV line CT replacement

The North Cañon-Victor 69 kV line is currently CT limited to 24 MVA. If the limiting MRCT ratio was changed to a minimum of 500:5 at North Cañon, the new line rating would be 41 MVA based on the conductor thermal limit. This upgrade would require the concurrent implementation of the upgrades in section 4.1, as well as re-coordination of the distance relay settings. Further analysis of the load growth in the Arequa Gulch area, as well as local generation dispatch availability will be necessary to determine the urgency of the proposed upgrade.

4.3. Cañon City-West Cañon 115 kV line CT replacement

The Cañon City-West Cañon 115 kV line is currently CT limited to 120 MVA. If the limiting metering and relaying CTs at Cañon City were replaced, the new line rating would be 151 MVA based on the conductor thermal limit. The estimated cost of this project is \$350,000.

4.4. Boone-DOT Tap 115 kV line CT ratio change

The Boone-DOT Tap 115 kV line is currently CT limited to 100 MVA. If the limiting MRCT ratio was changed to 800:5, the new line rating would be 120 MVA based on the conductor thermal limit. This upgrade would require relay re-coordination and replacement of metering devices. The estimated cost of this project is \$10,000.

4.5. Additional 115:69 kV transformation in the Cañon City area

The N-1-1 loss of two of the three 230:69 kV transformers feeding the Cañon City area created low 69 kV system voltages and thermal overload issues on the remaining transformer under peak demand levels. Adding a second 115:69 kV transformer at Cañon City resolved these voltage and thermal overload violations through 2020. Further analysis of this issue will be necessary to develop a comprehensive long term solution.

4.6. Rebuild Baculite Mesa-Overton 115 kV line

The loss of both Baculite Mesa-West Station 115 kV lines created a thermal overload condition on the Baculite Mesa-Overton 115 kV line in the heavy summer load scenarios. The overload can be mitigated through operating procedures in the 2014 case, but should be rebuilt to avoid such overloads prior to the 2020 time frame. The estimated cost of rebuilding the five mile line segment was estimated at \$2,000,000.

5. Conclusions

An open and transparent process was utilized in conducting the 2010 Local Transmission Plan study. Stakeholders were provided several opportunities for involvement and input into the study process and scope. Through this process, the TCPC participants believe they have fulfilled the requirements of Attachment K to the Open Access Transmission Tariff (OATT).

The suggested transmission system additions identified in the 2010 LTP were found to be adequate through the 2020 timeframe. The need for additional voltage support at the Arequa Gulch 115 kV bus was confirmed in the assessment, as well as several current transformer replacements. Increased 115:69 kV transformation capability in the Cañon City area by 2014 was identified as one solution to avoid violations under peak load with double transformer outage conditions. The rebuilding of the Baculite Mesa-Overton 115 kV line mitigated all overloads on this line through the 2020 time frame. Operating procedures delayed the need for this upgrade until after the 2014 study period.

Assessment of the identified system enhancements will continue through additional transmission planning studies and the TCPC study process. This will ensure the BHCE transmission system will effectively meet the requirements for all transmission customers.

Appendix A:

Steady State Analysis: Prior and Forced Outages

Steady State Prior Outages

PO 345 SERIES		PO 230 SERIES		PO 115 SERIES		PO 69 SERIES		PO X SERIES		PO GEN SERIES	
LABEL	DESCRIPTION	LABEL	DESCRIPTION	LABEL	DESCRIPTION	LABEL	DESCRIPTION	LABEL	DESCRIPTION	LABEL	DESCRIPTION
POSYSINT	SYSTEM INTACT	PO 230-1	BOONE-MIDWAYPS	PO 115-3	FTN VALLEY-MIDWAYBR	PO69-1	ROCKY FORD-LAJUNTAW	POX-1	MIDWAYPS 345:230	POGEN-1	CANON_59
PO 345-2	DANPARK-COMANCHE 1	PO 230-2	BOONE-COMANCHE	PO 115-4	FTN VALLEY-DESERT COVE	PO69-2	BLENDE-ST. CHARLES	POX-2	COMANCHE 345:230-1	POGEN-2	COMANCHE 3
PO 345-3	CALUMET-COMANCHE-2	PO 230-3	BOONE-LAMAR	PO 115-5	DESERT COVE-WEST STATION	PO69-3	WEST STATION-STONEMOOR	POX-3	LAMAR 230:115	POGEN-3	APT GEN 1
PO 345-4		PO 230-4	COMANCHE-MIDWAYPS-1	PO 115-6	MIDWAYPS-WEST STATION	PO69-4	READER-FREEMARY	POX-4	BOONE 230:115-1	POGEN-4	
PO 345-5		PO 230-5	MIDWAYPS-MIDWAYBR	PO 115-7	MIDWAYPS-NORTHBRIDGE	PO69-5	PORTLAND-HIGHLAND	POX-5	WEST CANON 230:115	POGEN-5	
PO 345-6		PO 230-9	MIDWAYBR-WEST CANON	PO 115-8	OVERTON-NORTHBRIDGE	PO69-6		POX-6	COMANCHE 230:115-1	POGEN-6	
PO 345-7		PO 230-10	WEST CANON-PONCHA	PO 115-9	OVERTON-BACULITE MESA	PO69-7		POX-7	WALSENBURG 230:115-1	POGEN-7	
PO 345-8		PO 230-11	CALUMET-COMANCHE	PO 115-10	BACULITE MESA-WEST STATION-1	PO69-8		POX-8	MIDWAYPS 230:115	POGEN-8	
PO 345-9		PO 230-12	CALUMET-SAN LUIS VALLEY-2	PO 115-11	BACULITE MESA-WEST STATION-2	PO69-9		POX-9	MIDWAYBR 230:115	POGEN-9	
PO 345-10		PO 230-13	CALUMET-WALSENBURG-2	PO 115-12	HYDE PARK-WEST STATION	PO69-10		POX-10	LAJUNTAW 115:69-1	POGEN-10	
PO 345-11		PO 230-14		PO 115-13	HYDE PARK-PUEBLO	PO69-11		POX-11	BOONE 115:69	POGEN-11	
PO 345-12		PO 230-15		PO 115-14	PUEBLO-READER	PO69-12		POX-12	READER 115:69-1	POGEN-12	
PO 345-13		PO 230-16		PO 115-15	PORTLAND-WEST STATION	PO69-13		POX-13	WEST STATION 115:69-1	POGEN-13	
PO 345-14		PO 230-17		PO 115-16	PUEBLO TAP-STEM BEACH	PO69-14		POX-14	PORTLAND 115:69-1	POGEN-14	
PO 345-15		PO 230-18		PO 115-17	PUEBLO TAP-WEST STATION	PO69-15		POX-15	CANON CITY 115:69	POGEN-15	
PO 345-16		PO 230-19		PO 115-18	BURNT MILL-WEST STATION	PO69-16		POX-16	AREQUA GULCH 115:69	POGEN-16	
PO 345-17		PO 230-20		PO 115-19	BURNT MILL-GREENHORN	PO69-17		POX-17	CALUMET 345:230-2	POGEN-17	
PO 345-18		PO 230-21		PO 115-20	GREENHORN-READER	PO69-18		POX-18		POGEN-18	
PO 345-19		PO 230-22		PO 115-21	READER-AIRPORT MEMORIAL	PO69-19		POX-19		POGEN-19	
PO 345-20		PO 230-23		PO 115-22	AIRPORT PARK-AIRPORT MEMORIAL	PO69-20		POX-20		POGEN-20	
PO 345-21		PO 230-24		PO 115-23	AIRPORT PARK-BACULITE MESA	PO69-21		POX-21		POGEN-21	
PO 345-22		PO 230-25		PO 115-24	NYBERG-BACULITE MESA	PO69-22		POX-22		POGEN-22	
PO 345-23		PO 230-26		PO 115-25	NYBERG-AIRPORT MEMORIAL	PO69-23		POX-23		POGEN-23	
PO 345-24		PO 230-27		PO 115-26	NYBERG-DOT TAP	PO69-24		POX-24		POGEN-24	
PO 345-25		PO 230-28		PO 115-27	BOONE-DOT TAP	PO69-25		POX-25		POGEN-25	
PO 345-26		PO 230-29		PO 115-28	BOONE-LAJUNTAW	PO69-26		POX-26		POGEN-26	
PO 345-27		PO 230-30		PO 115-29	BOONE-LAJUNTAT	PO69-27		POX-27		POGEN-27	
PO 345-28		PO 230-31		PO 115-30	LAJUNTAT-LAJUNTAW	PO69-28		POX-28		POGEN-28	
PO 345-29		PO 230-32		PO 115-31	COMANCHE-READER-1	PO69-29		POX-29		POGEN-29	
PO 345-30		PO 230-33		PO 115-32	COMANCHE-READER-2	PO69-30		POX-30		POGEN-30	
PO 345-31		PO 230-34		PO 115-33	PORTLAND-SKALA	PO69-31		POX-31		POGEN-31	
PO 345-32		PO 230-35		PO 115-34	CANON CITY-SKALA	PO69-32		POX-32		POGEN-32	
PO 345-33				PO 115-35	CANON CITY-WEST CANON	PO69-33		POX-33		POGEN-33	
PO 345-34				PO 115-36	AREQUA GULCH-WEST CANON	PO69-34		POX-34		POGEN-34	
PO 345-35				PO 115-37	SMELTER-WEST CANON	PO69-35		POX-35		POGEN-35	

Steady State Forced Outages

1	GLADSTON 230-WALS 230 #1 ROSEBUD RAS	34	COMANCHE 230.00-MIDWAYPS 230.00 #2	67	SMELTER 115.00-W CANON 115.00 #1	100	DANIELPK 230.00-DANIELPK 345.00 #T3
2	BACULITE-W.STATON 115 #1&2	35	COMANCHE 230.00-CALUMET 230.00 #1	68	STMBEACH 115.00-WALSENBG 115.00 #1	101	DANIELPK 230.00-DANIELPK 345.00 #T4
3	MIDWAYPS-W.STATON+MIDWAYPS-NTHRIDGE 115	36	DANIELPK 230.00-MARCY 230.00 #1	69	DESRTCOV 115.00-W.STATON 115.00 #1	102	LAJUNTAW 115.00-LAJUNTAW 69.00 #T1
4	BOONE-NYBERG 115	37	DANIELPK 230.00-SURREYRG 230.00 #1	70	WALSENBG 230.00-CALUMET 230.00 #1	103	LAJUNTAW 115.00-LAJUNTAW 69.00 #T2
5	MIDWAYBR-FTN VALLEY-DESERTCOVE 115	38	DANIELPK 230.00-PRAIRIE3 230.00 #1	71	WALSENBG 230.00-CALUMET 230.00 #2	104	LAJUNTAT 115.00-LAJUNTAT 69.00 #T1
6	MIDWAYPS-OVERTON 115	39	DANIELPK 230.00-PRAIRIE1 230.00 #1	72	MIDWAYPS 345.00-WATERTON 345.00 #1	105	LAJUNTAT 115.00-LAJUNTAT 69.00 #T2
7	READER-BELMONT 69	40	DANIELPK 230.00-WATERTON 230.00 #1	73	WILOW_CK 115.00-LAJUNTAT 115.00 #1	106	LAMAR CO 115.00-LAMAR CO 230.00 #T1
8	WEST STATION-BELMONT 69	41	DANIELPK 230.00-SANTEFE 230.00 #1	74	DANIELPK 345.00-COMANCHE 345.00 #1	107	MIDWAYPS 115.00-MIDWAYPS 230.00 #T1
9	WEST STATION-STEM BEACH 115	42	DANIELPK 230.00-MIS_SITE 230.00 #1	75	DANIELPK 345.00-COMANCHE 345.00 #2	108	MIDWAYPS 230.00-MIDWAYPS 345.00 #T2
10	BURNT MI 115.00-GREENHORN 115.00 #1	43	DANIELPK 230.00-FULLER 230.00 #1	76	COMANCHE 345.00-CALUMET 345.00 #1	109	AREQUGCH 115.00-PP_MINE 69.00 #T1
11	BURNT MI 115.00-W.STATON 115.00 #1	44	HYDEPARK 115.00-PUEBPLNT 115.00 #1	77	COMANCHE 345.00-CALUMET 345.00 #2	110	WALSENBG 115.00-WALSENBG 230.00 #T1
12	GREENHORN 115.00-READER 115.00 #1	45	HYDEPARK 115.00-W.STATON 115.00 #1	78	MIDWAYBR 115.00-RANCHO 115.00 #1	111	WALSENBG 115.00-WALSENBG 230.00 #T2
13	OVERTON 115.00-BACULITE 115.00 #1	46	LAJUNTAT 115.00-LAJUNTAW 115.00 #1	79	MIDWAYBR 115.00-RD_NIXON 115.00 #1	112	WATERTON 230.00-WATERTON 345.00 #T1
14	OVERTON 115.00-NTHRIDGE 115.00 #1	47	LAMAR CO 230.00-LAMAR DC 230.00 #1	80	MIDWAYBR 230.00-RD_NIXON 230.00 #1	113	W CANON 115.00-W CANON 230.00 #T1
15	PDA 5 115.00-DOT 115.00 #1	48	LAMAR CO 230.00-COLO GRN 230.00 #1	81	MIDWAYBR 230.00-LINCOLNT 230.00 #1	114	CALUMET 345.00-CALUMET 230.00 #T1
16	PDA 5 115.00-DOT TAP 115.00 #1	49	MIDWAYPS 115.00-W.STATON 115.00 #1	82	MIDWAYBR 230.00-W CANON 230.00 #1	115	CALUMET 345.00-CALUMET 230.00 #T2
17	NYBERG 115.00-BACULITE 115.00 #1	50	MIDWAYPS 115.00-MIDWAYBR 115.00 #1	83	PONCHABR 230.00-CURRECANTI 230.00 #1	116	MIDWAYBR 115.00-MIDWAYBR 230.00 #1
18	NYBERG 115.00-DOT TAP 115.00 #1	51	MIDWAYPS 230.00-MIDWAYBR 230.00 #1	84	BOONE 115.00-BOONE 230.00 #T1	117	CANON 55 13.800 C1
19	NYBERG 115.00-APT MEM 115.00 #1	52	MIDWAYPS 230.00-FULLER 230.00 #1	85	BOONE 115.00-BOONE 230.00 #T2	118	CANON 59 13.800 C1
20	APT PARK 115.00-BACULITE 115.00 #1	53	RAY LEWI 115.00-PONCHA 115.00 #1	86	BOONE 115.00-BOONE 69.00 #T1	119	CHEROK4 22.000 C4
21	APT PARK 115.00-APT MEM 115.00 #1	54	PONCHA 115.00-SARGENT 115.00 #1	87	CANONCTY 115.00-CANONCTY 69.00 #T1	120	COMAN 1 24.000 C1
22	BACULITE 115.00-W.STATON 115.00 #1	55	PONCHA 115.00-SMELTER 115.00 #1	88	W.STATON 115.00-W.STATON 69.00 #T1	121	COMAN 2 24.000 C2
23	BACULITE 115.00-W.STATON 115.00 #2	56	PONCHA 115.00-N.GUNNSN 115.00 #1	89	W.STATON 115.00-W.STATON 69.00 #T2	122	COMAN 3 24.000 C3
24	BOONE 115.00-LAJUNTAT 115.00 #1	57	PORTLAND 115.00-SKALA 115.00 #1	90	READER 115.00-READER 69.00 #T1	123	LAMAR DC 230.00 DC
25	BOONE 115.00-LAJUNTAW 115.00 #1	58	PORTLAND 115.00-W.STATON 115.00 #1	91	READER 115.00-READER 69.00 #T2	124	APT_GEN1 13.800 G1
26	BOONE 230.00-COMANCHE 230.00 #1	59	PORTLAND 115.00-W.STATON 115.00 #2	92	PORTLAND 115.00-PORTLAND 69.00 #T1	125	APT_GEN2 13.800 G1
27	BOONE 230.00-LAMAR CO 230.00 #1 + RAS	60	PUEBPLNT 115.00-READER 115.00 #1	93	PORTLAND 115.00-PORTLAND 69.00 #T2	126	CALUMET_W1 34.500 W1
28	BOONE 230.00-MIDWAYPS 230.00 #1	61	READER 115.00-APT MEM 115.00 #1	94	COMANCHE 115.00-COMANCHE 230.00 #T1	127	RD_NIXON 20.000 1
29	CANONCTY 115.00-SKALA 115.00 #1	62	SANLSVLY 230.00-CALUMET 230.00 #1	95	COMANCHE 115.00-COMANCHE 230.00 #T2	128	
30	CANONCTY 115.00-W CANON 115.00 #1	63	SANLSVLY 230.00-CALUMET 230.00 #2	96	COMANCHE 230.00-COMANCHE 345.00 #T3	129	
31	COMANCHE 115.00-READER 115.00 #1	64	SANLSVLY 230.00-PONCHABR 230.00 #1	97	COMANCHE 230.00-COMANCHE 345.00 #T4	130	
32	COMANCHE 115.00-READER 115.00 #2	65	WEST CANON 230.00-PONCHABR 230.00 #1	98	DANIELPK 115.00-DANIELPK 230.00 #T1	131	
33	COMANCHE 230.00-MIDWAYPS 230.00 #1	66	AREQUGCH 115.00-W CANON 115.00 #1	99	DANIELPK 230.00-DANIELPK 345.00 #T2	132	