



GENERATOR INTERCONNECTION REQUEST

BHCT-G8
Interconnection System Impact Study

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TRANSMISSION PLANNING

May 17, 2011

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Executive Summary

Black Hills Corporation (BHC) conducted a System Impact Study (SIS) in response to the request to provide interconnection service for the proposed generation facility under the guidance of the Black Hills Colorado Transmission (BHCT) Open Access Transmission Tariff Large Generator Interconnection Procedures (LGIP). This section summarizes the SIS results for the BHCT-G8 interconnection request.

Disclaimer

The results of this SIS are highly dependent on the assumed system topology and the timing of projects in the vicinity of the proposed interconnection, which are subject to change. Interconnection Service in and of itself does not convey any right to receive transmission service to any specific customer or Point of Delivery. It should be noted that carrying out the system upgrades identified in this report does not guarantee transmission service for the customer. Transmission Service should be requested through the BHCT OASIS and the request will be granted on a first-come, first serve basis.

Background

A valid interconnection request for the 29 MW project was received from the interconnection customer (IC) on December 20, 2010. The IC elected to forgo the Feasibility Study and proceed with the SIS phase of the LGIP. The proposed project consists of sixteen (16) Vestas V-100 wind turbine generators (WTG), and will connect with the Black Hills Colorado 115 kV transmission system at a new 115 kV substation located at the wind project site in Huerfano County, Colorado. The IC requested that the project be evaluated as a Network Resource (NR) as well as an Energy Resource (ER) on the BHCT system. The requested commercial operation date of the project is December 1, 2012.

Analyses consisted of computer-based power flow analysis, transient stability analysis, and short circuit/fault duty analysis. This study modeled the proposed generation interconnection under 2015 Summer Peak conditions, and transient stability analysis also included a 2015 winter off-peak scenario. Select contingencies which stressed the transmission system were simulated. Power flow and transient stability results were monitored for BHCT and other neighboring systems. Short circuit impacts were monitored for the buses in the immediate project area.

The criteria applied in this study are consistent with NERC/WECC Reliability Criteria. For more detailed information on the criteria used for each analysis, refer to Section 2.2.

Results

No detrimental impacts to the BHCE and surrounding transmission system were identified as a result of the interconnection of the BHCT-G8 wind generation project.

Conclusions

The 29-MW injection from BHCT-G8 (ER or NR) could be accommodated at the POI with the following required network upgrades:

- Reader 115 kV substation upgrades to accommodate an additional 115 kV line
- A new 115 kV substation at the BHCT-G8 POI
- A new 36 mile 115 kV circuit from Reader to the new POI substation

In addition to the network upgrades mentioned above, a 5 MVAR shunt reactor at the POI substation will be required of the Interconnection Customer.

The estimated cost of the aforementioned system upgrades is \$15,550,000. The estimated completion time for the system upgrades is approximately 16 months.

1. Introduction

Black Hills Colorado Electric (BHCE) owns certain transmission facilities with transmission service pursuant to a FERC-approved Open Access Transmission Tariff (“OATT”). A valid request was received from the Interconnection Customer (IC) on December 20, 2010 to provide interconnection service for the proposed generation facility under the guidance of the Black Hills Colorado Transmission (BHCT) OATT Large Generator Interconnection Procedures (LGIP). The IC elected to forgo the Feasibility Study and proceed with the SIS phase of the LGIP. The proposed project consists of sixteen (16) Vestas V-100 wind turbine generators nominally rated at 1.815 MW each, and will connect with the BHCT 115 kV system at a new substation in Huerfano County, Colorado. The IC requested that the project be evaluated as a Network Resource (NR) and an Energy Resource (ER) on the BHCT system. The requested commercial operation date of the project is December 1, 2012.

1.1. Study Scope

The study considered the impacts of the interconnection request by analyzing the transmission system before and after the interconnection of the proposed project. The study included steady state and transient stability analysis for both the 2015 peak summer and off-peak winter load scenarios. The study also included short circuit analysis and provided a cost estimate and implementation schedule for suggested system upgrades, if applicable, to accommodate the proposed project.

1.2. Study Area

The study area included 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. A diagram of the study area is shown in Figure 1. Points of interconnection between BHCE and neighboring utilities are shown in Table 1.

Table 1: BHCE Transmission System Interconnection Points

Interconnection Name	Interconnecting Utility ¹
Midway (PSCo)	PSCo
Midway (WAPA)	WAPA, CSU, TSG&T
Boone	PSCo, TSG&T
Reader	PSCo
Cañon West	WAPA, PSCo
West Station	TSG&T

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

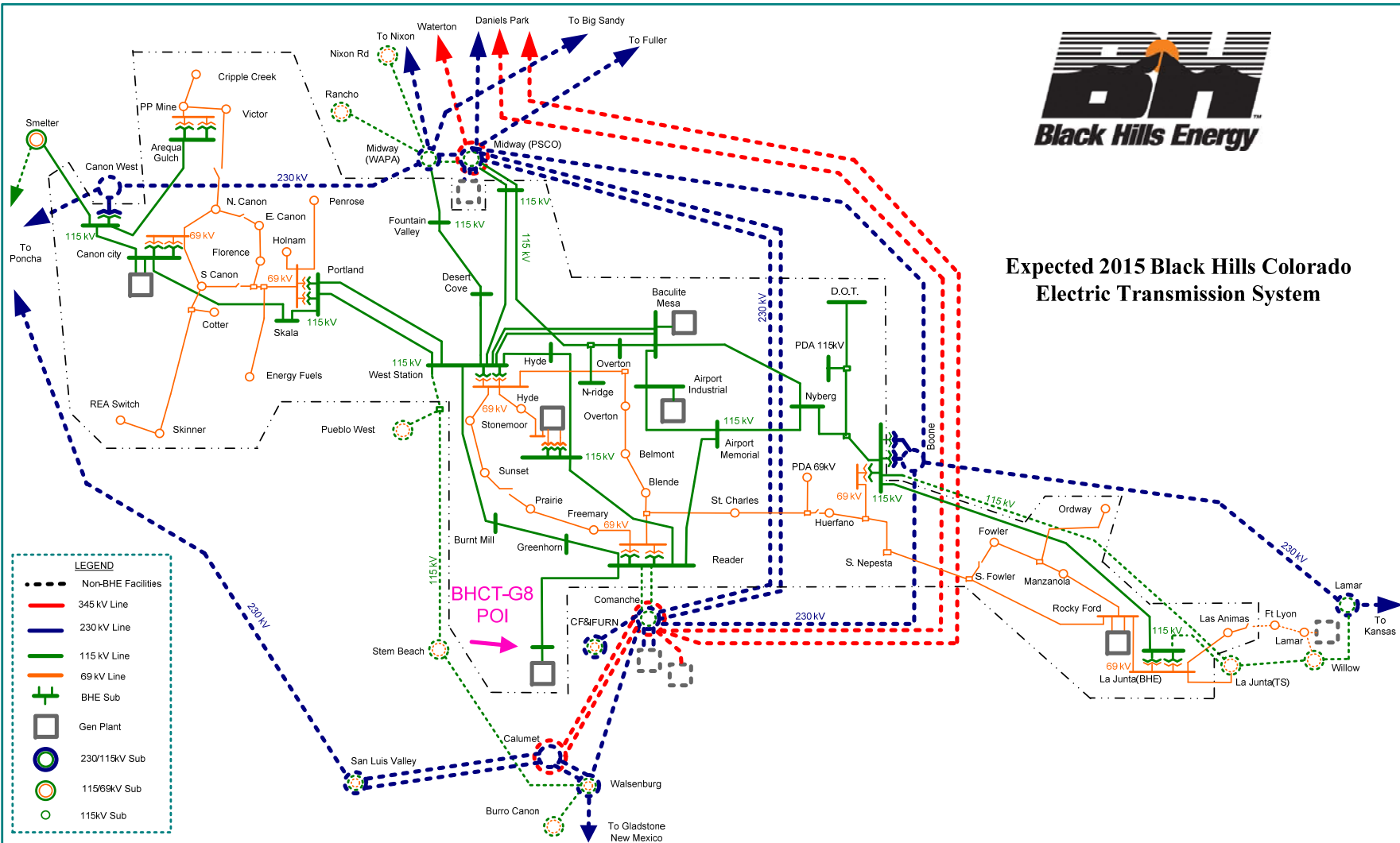


Figure 1: BHCT-G8 SIS Study Area Map

1.3. Benchmark Cases

The peak load study scenario utilized the 2015 heavy summer study case compiled in 2010 by Tri-State G&T for their LGIP studies (2015HS_LGIP_TriState_10_22_10.sav). This case originated from a WECC approved base case (15hs2a1p.sav).

The off-peak load study scenario utilized the 2015 light autumn study case, also compiled by TSG&T for the same LGIP study work (2015LA_LGIP_TriState_2-1-11.sav). This case originated from the 2015HS case mentioned above.

Both benchmark cases were reviewed by area utilities to ensure accurate representation of regional area loads, resources, and transmission system configurations for that particular time frame.

Several modifications were made to the case prior to performing the analysis to create the desired system configuration. A list of the modifications used to create the pre-project benchmark power flow cases is included in Appendix A. Modifications were made to the transient stability data for each scenario, and are also listed in Appendix A. Additional assumptions pertaining to the Benchmark cases include:

- 15 MVAR capacitor modeled at Arequa Gulch as identified in the 2010 TCPC Study
- A Canon City 115:69 kV #2 transformer was modeled as identified in the 2010 TCPC Study
- The Rocky Ford 69 kV capacitor was assumed in service for all scenarios
- The La Junta-Rocky Ford 69 kV line was rated at 41 MVA pending a CT replacement
- The MidwayPS-Northridge 115 kV line was rated at 122 MVA pending a CT replacement
- Rocky Ford diesel units were dispatched at 10 MW for the following prior outages:
 - Blende-St. Charles 69 kV line
 - La JuntaW 115:69 kV transformer
 - Boone 115:69 kV transformer
 - Boone-La JuntaW 115 kV line
- The MidwayBR 230:115 kV transformer rating was assumed to be 150 MVA based on comments in the 2010 CCPG Compliance Study Report.
- Rebuilt Baculite Mesa-Overton 115 kV line was assumed per the 2010 TCPC Study

1.4. Sensitivity Cases

Two sensitivity scenarios incorporating changes to the base case assumptions listed in Section 1.3 were evaluated to reduce uncertainty associated with those assumptions. The first sensitivity replaced the MidwayBR 230:115 kV transformer 150 MVA rating with the actual 100 MVA existing rating to identify any impacts on the transformer from the proposed generation project in the event that the transformer is not replaced in the study time frame. The 150 MVA rating was initially used to mitigate benchmark case overloads following certain N-1-1 contingencies. N-1 contingencies were simulated for the heavy summer and light autumn load scenarios for the sensitivity analysis.

The second sensitivity scenario removed the proposed San Luis Valley-Calumet-Comanche transmission project. Both sensitivity cases were evaluated for N-1 contingencies.

1.5. Project Model

The proposed project was represented in the power flow model as 16 individual WTGs rated at 1.815 MW each, operated with +0.59/-0.87 MVAR capability. Each generator step-up (GSU) transformer increased the voltage from 0.69 kV to 34.5 kV. The high side of each GSU will interconnect to an underground collector system with assumed equivalent impedance of $0.016 + j0.059$ per unit, and a susceptance of 0.032 per unit. A single 115:34.5 kV station transformer rated at 35 MVA was modeled in the absence of actual design data. The transformer impedance was assumed to be $0.00181 + j0.08998$ per unit. A one-line diagram of the BHCT-G8 project is shown in Figure 2.

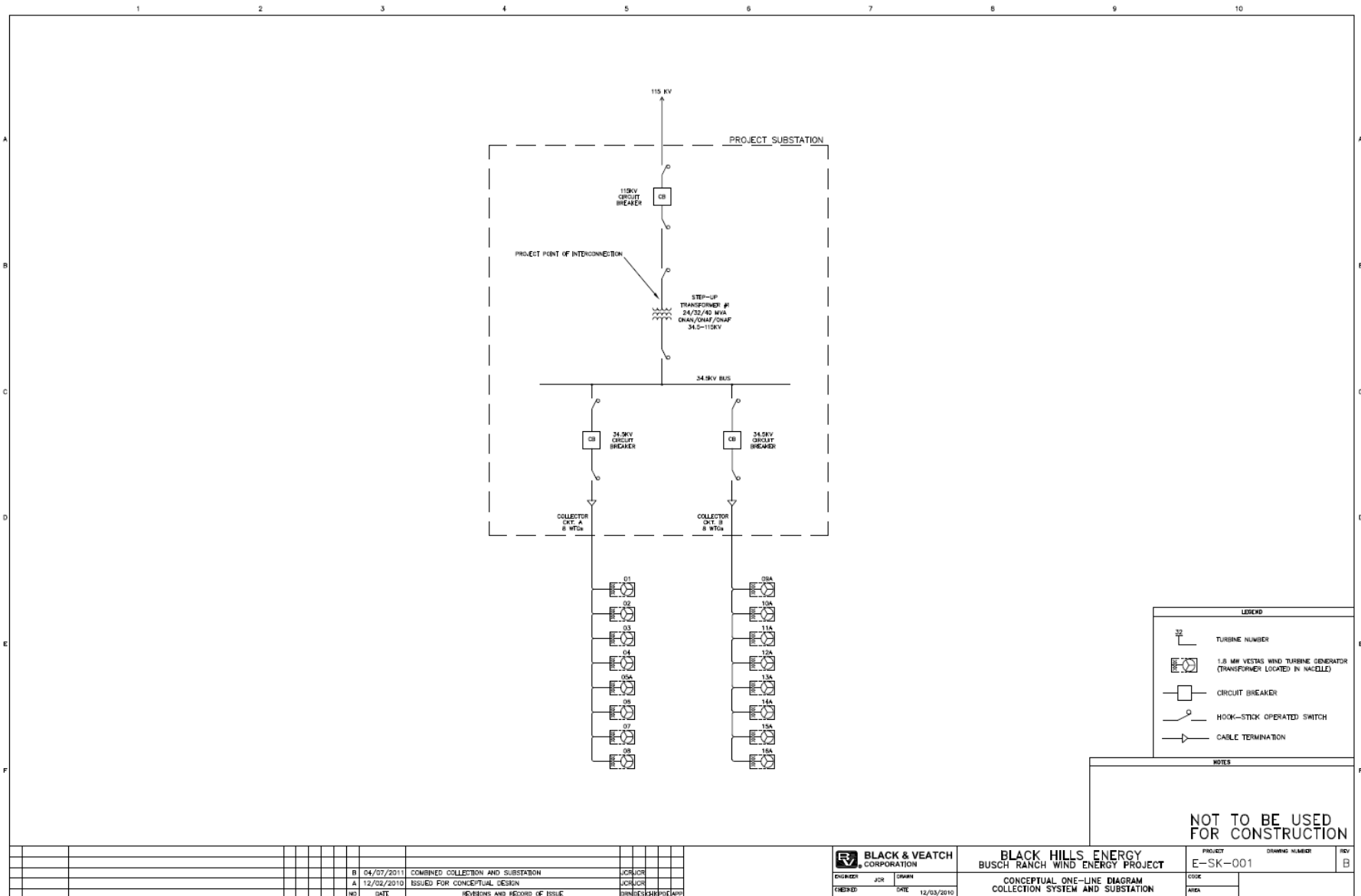


Figure 2: BHCT-G8 Wind Project One-Line Diagram

The transient stability models developed by Vestas for the V-100 WTGs were supplied by the IC and were used to represent the proposed project. These models are included in Appendix A.

1.6. Network Facility Alternatives

The assessment evaluated the following transmission options for connecting the new 115 kV POI substation to the existing BHCE system:

- A new 33 mile 115 kV transmission line with 795 ACSR conductor connecting to the existing Greenhorn 115 kV substation.
- A new 36 mile 115 kV transmission line with 795 ACSR conductor connecting to the existing Reader 115 kV substation. This configuration is shown in Figure 1 above.

The Greenhorn option would require significant cost to expand the existing substation to accommodate the proposed 115 kV line as well as future system growth. The Reader option would require 3 miles of additional 115 kV line, but substantially lower substation expansion costs and would efficiently accommodate future system growth. Due to these factors, the Reader option was the chosen configuration for the new BHCE facilities.

1.7. Interconnection Requirements

1.7.1. Reactive Power Requirements

The proposed project shall maintain a composite power delivery at continuous rated power output at the POI at a power factor within the range of 0.95 leading to 0.95 lagging, across the range of near 0% to 100% of facility MW rating, with the magnitude of VAR calculated on the basis of nominal POI voltage (1.0 p.u. V). The design shall consider the effects of step-up transformer reactance and voltage taps/turns ratios, and bus-fed auxiliary load. Based on the plant data supplied by the IC and the results of the SIS, the proposed project may need supplemental reactive voltage support equipment to meet these requirements.

If BHC requires additional reactive or voltage regulation to mitigate known system weaknesses, BHC will negotiate with the generator owner for any additional capability beyond the minimum requirements stated above.

Refer to BHC's *Facility Connection Requirements* document for details on excitation systems, voltage regulation, governor requirements, etc.

2. Study Methodology

This section summarizes the methods used to derive the power flow, voltage flicker, transient stability, and short circuit results.

2.1. Assumptions

The SIS was performed 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.

- Existing and planned reactive power resources were modeled to ensure adequate system performance.
- There were no specific planned outages identified for the 2015 study period. 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 2015 time frame. A list of the evaluated prior and forced outages is included in Appendix B.

The power flow analysis was performed with pre-contingency solution parameters that allowed adjustment of load tap-changing (LTC) transformers, static VAR devices including switched shunt capacitors and reactors, and DC taps. Post-contingency solution parameters allowed adjustment of DC taps and adjustment of switched shunt elements outside the study area. Area interchange control was disabled and generator VAR limits were applied automatically for all solutions. The solution method implemented for all cases was a fixed-slope decoupled Newton solution.

2.2. Reliability Criteria

The criteria described in this section 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.

2.2.1. 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.

2.2.2. 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.

2.2.3. 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.

2.3. Power Flow Analysis

All power flow analysis was conducted with version 30.3 of PTI's PSS/e software. Power flow results were monitored and reported for transmission system elements in the study area described in Section 1.2. Power flow analysis was used to evaluate the thermal and voltage performance of the system under Category A, B, and C disturbance conditions. Refer to Appendix B for a complete list of simulated prior and forced outages.

Thermal loading was reported when a modeled transmission element was loaded over 99% of its appropriate MVA rating modeled in the power flow database and when the incremental increase in loading from Pre-Project to Post-Project exceeded 2%. Transmission voltage violations were reported when the criteria described in Section 2.2.1 were not met.

The proposed project was evaluated as a 29 MW NR, dispatched against existing network resource generation to identify the maximum allowable resource injection the existing transmission system could reliably accommodate. The project was also evaluated as a 29 MW ER, dispatched against Pawnee generation in northern Colorado. Table 2 and Table 3 list the generation dispatch used for each of the aforementioned resource designations for the heavy summer and light autumn demand scenarios, respectively.

In addition to the individual BHCT-G8 assessment, a scenario was created to analyze the impacts of BHCT-G8 in tandem with the BHCT-G6 project, which is currently in the BHCT queue. BHCT-G6 is a 100 MW gas-fired generation interconnection request higher in the BHCT queue, but with an in-service date of January 1, 2013 (one month after BHCT-G8). The BHCT-G6 project will interconnect at the Baculite Mesa 115 kV substation, and was evaluated as an NR. The generation dispatch profiles of the simultaneous interconnection requests are also shown at the bottom of Table 2 and Table 3.

Table 2: 2015HS Generation Dispatch Scenarios

SCENARIO	CANON_55 70083	CANON_59 70084	E_CANON 70160	PP_MINE 70306	PUB_DSLS 70334	PUEBPLNT G1 70337	PUEBPLNT G2 70337	R.F.DSLS 70344	APT_DSLS 70548	APT_GEN1 70911	APT_GEN2 70912	APT_GEN3 70913	APT_GEN3 70913	APT_GEN3 70913	APT_GEN4 70914	APT_GEN4 70914	APT_GEN4 70914	MBPP-2 73130	PAWNEE 70310	BHCT-G6 70915	BHCT-G8 (70880-70895)
BENCHMARK	17	22	0	0	10	20	7	10	10	80	80	40	40	20	40	40	20	600	505	0	0
G8-NR	17	22	0	0	10	18	0	0	0	80	80	40	40	20	40	40	20	600	505	0	29
G8-ER	17	22	0	0	10	20	7	10	10	80	80	40	40	20	40	40	20	600	476	0	29
G8-NR + G6-100NR	0	0	0	0	0	0	0	0	0	80	80	40	40	20	40	40	20	595	476	100	29
G8-ER + G6-100NR	0	0	0	0	0	0	0	0	0	80	80	40	40	20	40	40	20	595	476	100	29

Indicates a change from Benchmark generation dispatch

Table 3: 2015LA Generation Dispatch Scenarios

SCENARIO	CANON_55 70083	CANON_59 70084	E_CANON 70160	PP_MINE 70306	PUB_DSLS 70334	PUEBPLNT G1 70337	PUEBPLNT G2 70337	R.F.DSLS 70344	APT_DSLS 70548	APT_GEN1 70911	APT_GEN2 70912	APT_GEN3 70913	APT_GEN3 70913	APT_GEN3 70913	APT_GEN4 70914	APT_GEN4 70914	APT_GEN4 70914	MBPP-2 73130	PAWNEE 70310	BHCT-G6 70915	BHCT-G8 (70880-70895)
BENCHMARK	16.5	22	0	0	0	0	0	0	0	80	80	40	40	0	22	0	0	300	200	0	0
G8-NR	16.5	22	0	0	0	0	0	0	0	80	80	40	33	0	0	0	0	300	200	0	29
G8-ER	16.5	22	0	0	0	0	0	0	0	80	80	40	40	0	22	0	0	300	171	0	29
G8-NR + G6-100NR	0.0	0	0	0	0	0	0	0	0	80	80	11	0	0	0	0	0	300	200	100	29
G8-ER + G6-100NR	0.0	0	0	0	0	0	0	0	0	80	80	40	0	0	0	0	0	300	171	100	29

Indicates a change from Benchmark generation dispatch

2.4. Transient Stability Analysis

The objective of the transient stability analysis is to determine the ability of generators to remain in synchronism with one another by surviving the first swing of a disturbance such as a ground fault and subsequent breaker action on the transmission system. Transient stability also simulates the ability of the system as a whole to return to a given steady-state equilibrium after being moved away from it by a small perturbation.

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. The transient stability contingencies were simulated out to 10 seconds to ensure a damped system response. The disturbances evaluated in the transient analysis were selected based on significance with respect to proximity to local generation. The 3-phase faults listed in Table 4 were simulated for the 2015 peak and off-peak scenarios.

Table 4: Simulated Transient Stability Disturbances

Disturbance Description	Faulted Bus	Cleared Element	Fault Duration (cycles)
System Intact	None	No Fault	NA
Reader-Airport Memorial 115	Reader 115 kV	Reader-Airport Memorial 115 line	5.0
Baculite Mesa-Nyberg 115	Bac. Mesa 115 kV	Baculite Mesa-Nyberg 115 line	5.0
Baculite Mesa-Overton 115	Bac. Mesa 115 kV	Baculite Mesa-Overton 115 line	5.0
Baculite Mesa-Airport Park 115	Bac. Mesa 115 kV	Baculite Mesa-Airport Park 115 line	5.0
Bac. Mesa-W. Station 115	Bac. Mesa 115 kV	Baculite Mesa-West Station #1 115 line	5.0
Bac. Mesa-W. Station (both) 115 kV lines	Bac. Mesa 115 kV	Both Baculite Mesa-West Station 115 lines	5.0
Reader-Comanche 115	Reader 115 kV	Reader-Comanche 115 line	5.0
Reader-Greenhorn 115	Reader 115 kV	Reader-Greenhorn 115 line	5.0
West Station-MidwayPS 115	W. Station 115 kV	West Station-MidwayPS 115 line	5.0
Comanche-Boone 230	Comanche 230 kV	Comanche-Boone 230 kV line	5.0
Comanche-MidwayPS 230	Comanche 230 kV	Comanche-MidwayPS 230 line	5.0
Comanche-Dan. Park 345	Comanche 345 kV	Comanche-Daniels Park 345 kV line	4.0

The following parameters were monitored in the 2015HS scenario to evaluate system stability performance.

- Rotor angle plots provide a measure for determining how the proposed generation unit would swing with respect to other generating units in the area. This information is used to determine if a machine would remain in synchronism or go out-of-step from the rest of the system following a disturbance.
- Bus voltage plots, in conjunction with the relative rotor angle plots, provide a means of detecting out-of-step conditions. The bus voltage plots are useful in assessing the magnitude and duration of post-disturbance voltage dips and peak-to-peak voltage oscillations. Bus voltage plots also give an indication of system damping and the level to which voltages are expected to recover in the steady state conditions.
- Bus frequency plots provide information on magnitude and duration of post-fault frequency swings with the new project in service. These plots indicate the extent of possible over-frequency or under-frequency excursions, which can occur due to an area's imbalance between load and generation.

Other parameters plotted for the 2015HS scenario included generator field and terminal voltage, generator rotor speed, and real and reactive power output. Only bus voltage and frequency plots were created for the 2015LA scenario, due to the consistently favorable system response in the 2015HS simulations.

2.5. Low Voltage Ride Through Analysis

The current WECC Low Voltage Ride Through (LVRT) Standard requires generators to remain in-service for 3-phase faults with normal clearing (4-9 cycles) and single line-to-ground faults with delayed clearing that result in a GSU high side voltage of 0.15 per unit or greater. The FERC LVRT requirement specified in Order 661-A, however, requires generation to remain on-line for GSU high side voltages of 0 per unit for similar faults. The more stringent FERC standard was applied as the LVRT requirement for this study.

The LVRT analysis utilized the 2015HS scenario with the BHCT-G8 project at 100% of rated output. A 9-cycle 3-phase fault was applied at the 115 kV POI to verify if the proposed project would meet the LVRT requirements.

2.6. Short Circuit Analysis

The objective of the short circuit analysis is to determine the impact, if any, that the proposed generation will have on system fault current. The existing fault current levels were identified and compared to post-project fault current levels to determine if existing fault interrupting devices exceeded their rating under simulated fault conditions as a result of the additional generation. It was assumed that all future fault interrupting devices would be designed to accommodate the fault levels identified in this analysis. The software used in this fault analysis was the ASPEN short circuit program.

3. Results

The objective of this study was to assess the reliability impacts of the proposed project on the transmission system. This study was not intended to examine pre-existing problems unrelated

to the proposed plant, but rather to determine whether the transmission system meets BHCE's performance criteria when the plant is in-service. Under that assumption, a number of pre-existing criteria violations were identified during the analysis that were not included in the results section of the report. The following issues were omitted from the report:

- Operational issues on the 69 kV system related to load service
- Pre-existing issues identified in the benchmark pre-project case
- Reliability issues directly associated with the Canon City-area generation dispatch

As mentioned in Section 2.3, a sensitivity analysis was performed with BHCT-G6, a 100 MW generation project in service. The impacts of the additional 100 MW were identified in the BHCT-G6 SIS report, and network upgrades were specified. The BHCT-G6 project did not have a material impact on the BHCT-G8 interconnection request.

As described in Section 1.4, a sensitivity analysis changed the MidwayBR 230:115 kV transformer rating to 100 MVA. The system intact loading on the transformer was 54.4 MVA from the 230 kV to 115 kV bus prior to adding BHCT-G8. Additionally, the existing 100 MVA MidwayBR transformer did not overload under any simulated N-1 contingencies. The addition of the BHCT-G8 project reduced the prevailing system intact flow on this transformer by approximately 0.4 MVA to 54 MVA. Similar to the system performance prior to modeling BHCT-G8, no simulated N-1 contingencies resulted in overloads on the existing 100 MVA transformer. It is concluded that the addition of BHCT-G8 to the BHCE transmission system does not result in any negative impacts to loading on the MidwayBR 230:115 kV transformer.

A second sensitivity analysis was performed for the HS and LA scenarios to evaluate the impacts of the BHCT-G8 project without the San Luis Valley-Calumet-Comanche transmission project in place. Single N-1 contingencies were simulated for the two load scenarios, and no impacts were identified as a result of the BHCT-G8 interconnection.

3.1. Power Flow Analysis

The differences in the power flow study results between the BHCT-G8 project modeled as an ER and a NR were negligible. All results mentioned in this section will refer to the project modeled as a Network Resource.

3.1.1. 2015 Heavy Summer Results

No adverse impacts to the BHCE and surrounding transmission system were identified in the 2015HS power flow analysis as a result of the interconnection of the BHCT-G8 project.

3.1.2. 2015 Light Autumn Results

No adverse impacts to the BHCE and surrounding transmission system were identified in the 2015LA power flow analysis as a result of the interconnection of the BHCT-G8 project.

3.2. Transient Stability Analysis

The difference in the transient stability study results between the BHCT-G8 project modeled as an ER and a NR were negligible. 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 various simulated faults. 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 study area, they were taken out of service in all dynamic simulations.
- A post-contingent frequency criteria violation at the CF&IFURN 230 kV bus following a fault on the Comanche 230 kV bus. 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. Due to the large size of plot files created in this analysis, plots were not included in the study report, but are available on request.

3.2.1. 2015 Heavy Summer Results

No adverse impacts to the BHCE and surrounding transmission system were identified in the 2015HS transient analysis as a result of the BHCT-G8 interconnection. The system response to all disturbances was adequately damped and exhibited no voltage or frequency violations.

3.2.2. 2015 Light Autumn Results

No adverse impacts to the BHCE and surrounding transmission system were identified in the 2015LA transient analysis as a result of the BHCT-G8 interconnection. The system response to all disturbances was adequately damped and exhibited no voltage or frequency violations.

3.3. Low Voltage Ride Through Results

There were no indications of generator separation or tripping as a result of the 9-cycle fault at the POI. The BHCT-G8 project met all applicable LVRT requirements.

3.4. Short Circuit Analysis

The short circuit analysis was initially performed without the proposed interconnection project. This gave the base case fault duties of the interrupting devices. Then the proposed project was put in service and the short circuit study was repeated. The incremental fault duty difference between the two studies gave the impact of the new generator on the existing interrupting devices in the study area. The short circuit fault currents for simulated faults at all of the moderately impacted substations are shown in Table 5. The BHCT-G8 POI bus was connected to the Reader 115 kV substation for the short circuit analysis.

It should be noted that the values in Table 5 represent the largest bus phase current for the listed fault. Bus faults extending further from the proposed POI than the buses listed in Table 5 were not included in the final analysis due to little or no fault current contribution from the proposed generation project. Detailed fault analysis results are available upon request.

Table 5: Short Circuit Fault Current Summary

Bus Fault	Fault Current Without BHCT-G8 (A)				Fault Current With BHCT-G8 (A)				BHCT-G8 Contribution (A)			
	3 L-G	2 L-G	1 L-G	L-L	3 L-G	2 L-G	1 L-G	L-L	3 L-G	2 L-G	1 L-G	L-L
Airport Ind. Park 115	18692	17558	15438	16270	18795	17641	15482	16356	103	83	44	86
Airport Memorial 115	18393	17115	14348	15985	18520	17217	14397	16090	127	102	49	105
Baculite Mesa 115	25813	27597	28106	22472	25952	27719	28209	22587	139	122	103	115
Burnt Mill 115	12853	11744	9256	11136	12972	11834	9271	11234	119	90	15	98
Comanche 115	23920	24945	25387	20736	24508	25436	25806	21220	588	491	419	484
DOT Tap 115	12578	11834	9997	10895	12603	11854	10007	10916	25	20	10	21
Greenhorn 115	19197	18343	16552	16637	19562	18611	16574	16936	365	268	22	299
Northridge 115	10447	9683	7599	9056	10467	9698	7606	9072	20	15	7	16
Nyberg 115	16035	14825	11977	13918	16101	14878	12000	13972	66	53	23	54
Overton 115	14071	13186	10827	12208	14110	13215	10841	12239	39	29	14	31
Pueblo 115	17110	16106	13502	14829	17310	16268	13579	14994	200	162	77	165
Reader 115	23893	23839	23674	20714	24497	24337	24050	21211	604	498	376	497
West Station 115	22963	21931	19692	19914	23159	22083	19776	20075	196	152	84	161

Table 6 contains a comparison of the maximum fault current experienced at the faulted bus for any of the simulated faults, as well as the rating of the interrupt devices at that bus.

Table 6: Short Circuit Analysis Result Summary

Substation	115 kV Device Number	Interrupt Rating (Amps)	Max Post-Project Bus Fault Current (Amps)
Airport Industrial Park	115-1	40KA	18795
	115-2	40KA	
	115-4	40KA	
Airport Memorial	115-1	40KA	18520
	115-2	40KA	
	115-4	40KA	
Baculite Mesa	115-1	40KA	28209
	115-2	40KA	
	115-3	40KA	
	115-4	40KA	
	115-5	40KA	
	115-6	40KA	
	115-8	40KA	
	115-9	40KA	
	115-10	40KA	
	115-11	40KA	
	115-12	40KA	
	115-13	40KA	
	115-14	40KA	
	115-15	40KA	
	Burnt Mill	115-1	
115-2		40KA	
Comanche	9980	63KA	25806
	9981	63KA	
	9982	63KA	
	9984	40KA	
	9985	40KA	
	9986	63KA	
Greenhorn	115-1	40KA	19562
	115-2	40KA	
Nyberg	115-1	40KA	16101
	115-2	40KA	
	115-3	40KA	
Overton	TBD	TBD	14110
Pueblo	115-1	20KA	17310
	115-2	20KA	
Reader	115-1	40KA	24497
	115-2	40KA	
	115-3	40KA	
	115-4	40KA	
	115-5	40KA	
	115-6	40KA	
	115-8	40KA	
115-9	40KA		
West Station	115-1	40KA	23159
	115-3	40KA	
	115-4	17.5KA	
	115-5	17.5KA	
	115-6	25KA	
	115-7	17.5KA	
	115-8	17.5KA	
	115-9	17.5KA	
	115-10	25KA	
	115-11	25KA	
	115-12	25KA	
	115-14	40KA	
	115-15	40KA	
115-16	40KA		
115-17	40KA		

The results of the short circuit analysis show that the maximum fault current with the proposed generation remained considerably less than the minimum interruption rating of any affected existing fault interrupt devices.

3.5. Reactive Power Analysis

The BHCT-G8 project produced a 4 MVAR injection at the POI substation when the WTGs were offline due to the charging effects of the collector system. The reactive power injection did not result in system voltages outside the allowable range. However, the resulting power factor measured at the POI was outside the 0.95 lead/lag requirement due to the purely reactive injection of the project at zero real power output. The project is nearly ‘VAR neutral,’ but shunt reactive support will be required at the interconnection substation to meet the reactive power requirements specified in Section 1.7.1.

3.6. Results Summary

Based on the results of the SIS as described in Section 3, the BHCE transmission system can reliably accommodate a 29-MW injection from the BHCT-G8 project. At least 5 MVAR of reactive voltage support will be required of the interconnection customer to offset the effects of collector system charging under low generation output conditions, as well as direct-assigned terminal and metering equipment at the POI.

It should be noted that the results described in this report do not guarantee transmission service for the customer. Transmission Service should be requested through the BHCT OASIS and the request will be granted on a first-come, first serve basis.

4. Cost and Construction Schedule Estimates

The cost estimates represent good faith estimates necessary to interconnect to the system. The non-binding, good faith cost and time estimates are tabulated below. All estimates are in 2011 dollars.

4.1. Network Upgrades

Network upgrade estimates are anticipated to consist of the \$15,550,000 listed in Table 7.

Table 7: BHCE System Upgrades

System Upgrade	Estimated Cost
Reader 115 kV Line Terminal	\$500,000
New POI 115 kV Substation	\$1,900,000
Reader-POI 115 kV line (36 mi. 795 ACSR)	\$13,150,000
Total Estimated Costs	\$15,550,000

The transmission line costs in Table 7 are estimates based on a preliminary line route and estimated ROW costs. These costs are subject to change once the final line route is defined and ROW negotiations are completed along the entire line route.

The summary provided in Table 8 below shows a total estimated completion time of approximately 16 months, assuming work is performed concurrently.

Table 8: System Upgrade Implementation Schedule

Work Description	Schedule	
	Design	Construction
Reader 115 kV substation upgrade	6 Months	4 Months
New POI 115 kV substation	10 Months	6 Months
New 115 kV line from Reader to POI sub.	4 Months	8 Months

5. Conclusions

Based on the assumptions specified in this report, the interconnection SIS identified the following network upgrades to the BHCE transmission system to accommodate the full 29 MW request:

- Reader 115 kV substation upgrades to accommodate another 115 kV terminal
- A new 115 kV POI substation
- A new 36 mile 115 kV line from Reader to the new POI substation

In addition to the network upgrades in Section 4.1, a 5 MVAR shunt reactor at the POI substation will be required of the Interconnection Customer.

The cost of the interconnection facilities was estimated to be \$15,550,000. The estimated time frame for completion of these upgrades is approximately 16 months.

Appendix A

Benchmark Case Power Flow & Dynamics Model Updates

2015HS BENCHMARK POWER FLOW CASE UPDATES

```
#THIS FILE CONTAINS BLACK HILLS ENERGY'S UPDATES TO THE '2015HS_LGIP_TriState_10_22_10.sav' CASE
#TO CREATE THE 2015HS BHCT-G6 & BHCT-G8 SIS BENCHMARK CASE
#CREATED 1/18/11 WRW

# CHANGE CASE TITLE
psspy.case_title_data(r""2011 BHCT-G6 SIS CASE"",r""2015 HEAVY SUMMER"")

#CHANGE BUS NAMES
psspy.bus_data(70022,[_i,_i,_i,_i],[_f,_f,_f, 1.0052,_f],r""NYBERG"")
psspy.bus_data(70031,[_i,_i,_i,_i],[_f,_f,_f,_f],r""BACULITE"")

# CREATE BUS FOR THE NEW AIRPORT PLANT
psspy.bus_data(70915,[2,70,712,66],[_f,_f, 13.8,_f,_f],r""APT_GEN5"")

# AIRPORT PLANT REMOTE BUS DATA
psspy.plant_data(70915,70031,[_f,_f])

# CREATE GENERATOR FOR THE NEW AIRPORT PLANT
psspy.machine_data(70915,r""G1"",[1,66,_i,_i,_i],[100.0,_f, 80.0,-40.0, 80.0,0.0, 155.0, 0.0031, 0.142,_f,_f,_f, 1.0,_f,_f,_f])

# CREATE GSO TRANSFORMER FROM THE NEW AIRPORT GENERATOR TO THE PLANT BUS
psspy.two_winding_data(70915,70031,r""U1"",[1,70031,66,_i,_i,_i,33,_i,70915,70031,0,0,2,1,1],[0.0, 0.06, 100.0, 13.8, 13.8,_f, 115.0, 115.0, 160.0, 160.0, 160.0, 1.0,_f,_f,_f,_f,_f,_f, 1.2,
0.95,_f,_f],r""APT_GEN5"")

# BRANCH DATA
psspy.branch_data(70004,70352,r""1"",[_i,_i,_i,_i,_i,_i],[ 0.001097, 0.006178, 0.00011, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.branch_data(70060,70159,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 100.0, 100.0, 100.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.branch_data(70236,70339,r""1"",[_i,_i,_i,_i,_i,_i],[ 0.002523, 0.014208, 0.000253, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.branch_data(70236,70456,r""1"",[_i,_i,_i,_i,_i,_i],[ 0.002204, 0.012411, 0.000221, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.branch_data(70415,70455,r""1"",[_i,_i,_i,_i,_i,_i],[ 0.01491,_f,_f, 48.0, 48.0, 48.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.branch_data(70330,70456,r""2"",[_i,_i,_i,_i,_i,_i],[ 0.015656, 0.088171, 0.0015716, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f, 15.7,_f,_f,_f,_f])
psspy.branch_data(70330,70456,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 122.0, 122.0, 122.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.purgbrn(70456,73412,r""1"")
psspy.branch_data(70247,70472,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 120.0, 120.0, 120.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
FAC-009 AND RELIEVE OVERLOADS
psspy.branch_data(70007,70031,r""1"",[_i,_i,_i,_i,_i,_i],[ 0.00339, 0.019094, 0.00034, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
TCPC STUDY, VALIDATED IN INITIAL BENCHMARK CASE RESULTS
psspy.branch_data(70181,70353,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 74.0, 74.0, 74.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
STATION-STONEMOORE PRIOR OUTAGE
psspy.branch_data(70415,70455,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 72.0, 72.0, 72.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
STONEMOORE FOR READER-FREEMARY PRIOR OUTAGE
psspy.branch_data(73412,73416,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 95.0, 95.0, 95.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
PER IGOR KORMAZ EMAIL
psspy.branch_data(70352,70549,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.branch_data(70030,70031,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.branch_data(70030,70549,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.branch_data(70031,70456,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
psspy.branch_data(70031,70456,r""2"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 222.0, 222.0, 222.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
#psspy.branch_data(70294,70451,r""1"",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 24.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
TCPC, NOT USED AT THIS TIME
#psspy.branch_data(70060,70159,r""1"","",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 120.0, 120.0, 120.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
TCPC, NOT USED AT THIS TIME
#psspy.branch_data(70086,70550,r""1"","",[_i,_i,_i,_i,_i,_i],[_f,_f,_f, 151.0, 151.0, 151.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f])
TCPC, NOT USED AT THIS TIME

# UPDATE TRANSFORMER DATA
psspy.two_winding_data(70352,70353,r""T1"",[_i,70353,_i,_i,_i,_i,_i,70353,70353,-1,1,2,2,_i],[_f, 0.1567,_f, 70.297, 69.0,_f, 115.0, 115.0, 80.0, 80.0, 100.0,_f,_f,_f,_f,_f,_f, 75.9, 62.1, 1.03,
1.01,_f,_f],r""READER"") #REPLACE READER #1 TRANSFORMER
psspy.two_winding_data(70352,70353,r""T2"",[_i,70353,_i,_i,_i,_i,_i,70353,70353,-1,1,2,2,_i],[_f, 0.1567,_f, 70.297, 69.0,_f, 115.0, 115.0, 80.0, 80.0, 100.0,_f,_f,_f,_f,_f,_f, 75.9, 62.1, 1.03,
1.01,_f,_f],r""READER"") #REPLACE READER #2 TRANSFORMER
```



```

psspy.load_data( 70318 ,"WP",[i,i,i,i],[ 7, 1.2,_f,_f,_f,_f])#PENROSE
psspy.load_data( 70319 ,"WP",[i,i,i,i],[ 1.3, 0.4,_f,_f,_f,_f])#PHILLIPS
psspy.load_data( 70329 ,"WP",[i,i,i,i],[ 1.2, 0.5,_f,_f,_f,_f])#PORTLAND 69
psspy.load_data( 70330 ,"WP",[i,i,i,i],[ 26.1, 5.2,_f,_f,_f,_f])#PORTLAND 115
psspy.load_data( 70332 ,"WP",[i,i,i,i],[ 18.1, 3,_f,_f,_f,_f])#PRAIRIE
psspy.load_data( 70338 ,"WP",[i,i,i,i],[ 10, 2.3,_f,_f,_f,_f])#PUEBLO 69
psspy.load_data( 70339 ,"WP",[i,i,i,i],[ 24.1, 2.6,_f,_f,_f,_f])#PUEBLO 115
psspy.load_data( 70366 ,"WP",[i,i,i,i],[ 9.8, 2,_f,_f,_f,_f])#ROCKY FORD
psspy.load_data( 70370 ,"WP",[i,i,i,i],[ 6.8, 2.2,_f,_f,_f,_f])#S CANON
psspy.load_data( 70378 ,"WP",[i,i,i,i],[ 10.8, 5.1,_f,_f,_f,_f])#AREQUA GULCH
psspy.load_data( 70390 ,"WP",[i,i,i,i],[ 9.2, 4.6,_f,_f,_f,_f])#SKALA
psspy.load_data( 70391 ,"WP",[i,i,i,i],[ 2.9, 1,_f,_f,_f,_f])#SKINNER
psspy.load_data( 70405 ,"WP",[i,i,i,i],[ 9.7, 3.4,_f,_f,_f,_f])#ST CHARLES
psspy.load_data( 70415 ,"WP",[i,i,i,i],[ 14.8, 0.5,_f,_f,_f,_f])#STONEMOOR
psspy.load_data( 70422 ,"WP",[i,i,i,i],[ 13.6, 3.4,_f,_f,_f,_f])#SUNSET
psspy.load_data( 70449 ,"WP",[i,i,i,i],[ 26, 6.6,_f,_f,_f,_f])#DESERT COVE
psspy.load_data( 70451 ,"WP",[i,i,i,i],[ 1, 1,_f,_f,_f,_f])#VICTOR
psspy.load_data( 70549 ,"WP",[i,i,i,i],[ 9.5, 2.4,_f,_f,_f,_f])#APT_MEM

# SWITCHED SHUNT DATA
psspy.switched_shunt_data(70931,[i,i,i,i,i,i,i,i,i,i],[_f,_f,_f,_f,_f,_f,_f,_f,-40.0,_f],"") #SLV SOLAR REACTOR
psspy.switched_shunt_data(70374,[i,i,i,i,i,i,i,i,i,i],[_f,_f,_f,_f,_f,_f,_f,_f,-20.0,_f],"") #SLV 115 REACTOR
psspy.switched_shunt_data(70460,[i,i,i,i,i,i,i,i,i,i],[_f,_f,_f,_f,_f,_f,_f,_f,16.2,_f],"") #WALSH CAP FIXED ON
psspy.switched_shunt_data(70378,[3,i,i,i,i,i,i,i,i,i],[5.0,_f,_f,_f,_f,_f,_f,1.03,0.97,10.0,_f],"") #ADD AREQUA GULCH 115 CAPACITOR (15 MVAR)

#####
#####

#THIS SECTION CREATES THE DETAILED REPRESENTATION OF THE BHCT-G8 WIND INTERCONNECTION
#THAT INTERCONNECTS TO THE GREENHORN 115KV BUS. THE PROJECT CONSISTS OF 16 VESTAS
#V-100 WIND TURBINES. BUS NUMBERS ARE NOT WECC-APPROVED.

psspy.bus_data(70916,[ 1,70,712,66],[_f,_f, 115.0,1.0,50.0],r""BHCT-G8"" ) #115 KV STATION BUS
psspy.bus_data(70917,[ 1,70,712,66],[_f,_f, 34.5,1.0,50.0],r""BHCT-G8"" ) #34.5 KV STATION BUS
psspy.bus_data(70918,[ 1,70,712,66],[_f,_f, 34.5,1.0,50.0],r""BHCT-G8B"" ) #34.5 KV COLLECTOR BUS

#CREATE 690V WTG TERMINAL BUSES
psspy.bus_data(70880,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG1"" )
psspy.bus_data(70881,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG2"" )
psspy.bus_data(70882,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG3"" )
psspy.bus_data(70883,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG4"" )
psspy.bus_data(70884,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG5"" )
psspy.bus_data(70885,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG6"" )
psspy.bus_data(70886,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG7"" )
psspy.bus_data(70887,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG8"" )
psspy.bus_data(70888,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG9"" )
psspy.bus_data(70889,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG10"" )
psspy.bus_data(70890,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG11"" )
psspy.bus_data(70891,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG12"" )
psspy.bus_data(70892,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG13"" )
psspy.bus_data(70893,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG14"" )
psspy.bus_data(70894,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG15"" )
psspy.bus_data(70895,[ 2,70,712,66],[_f,_f, 0.70,1.0,50.0],r""G8-WTG16"" )

#INSERT WTG PLANT DATA (CONTROL TERMINAL BUS)
psspy.plant_data(70880,_i,[_f,_f])
psspy.plant_data(70881,_i,[_f,_f])
psspy.plant_data(70882,_i,[_f,_f])
psspy.plant_data(70883,_i,[_f,_f])
psspy.plant_data(70884,_i,[_f,_f])
psspy.plant_data(70885,_i,[_f,_f])
psspy.plant_data(70886,_i,[_f,_f])
psspy.plant_data(70887,_i,[_f,_f])
psspy.plant_data(70888,_i,[_f,_f])
psspy.plant_data(70889,_i,[_f,_f])
psspy.plant_data(70890,_i,[_f,_f])
psspy.plant_data(70891,_i,[_f,_f])
psspy.plant_data(70892,_i,[_f,_f])

```

```
psspy.plant_data(70893,_i,[_f,_f])
psspy.plant_data(70894,_i,[_f,_f])
psspy.plant_data(70895,_i,[_f,_f])
```

#INSERT MACHINE DATA

```
psspy.machine_data(70880,r""1""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70881,r""2""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70882,r""3""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70883,r""4""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70884,r""5""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70885,r""6""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70886,r""7""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70887,r""8""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70888,r""9""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70889,r""10""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70890,r""11""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70891,r""12""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70892,r""13""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70893,r""14""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70894,r""15""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
psspy.machine_data(70895,r""16""",[ 0, 66,_i,_i,_i],[ 1.8,_f, 0.59,-0.87, 1.8,0.0, 2.0,_f, 0.0676,_f,_f,_f,_f,_f,_f])
```

#INSERT G5U TRANSFORMER DATA

```
psspy.two_winding_data(70918,70880,r""1""",[1,70880,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70881,r""1""",[1,70881,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70882,r""1""",[1,70882,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70883,r""1""",[1,70883,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70884,r""1""",[1,70884,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70885,r""1""",[1,70885,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70886,r""1""",[1,70886,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70887,r""1""",[1,70887,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70888,r""1""",[1,70888,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70889,r""1""",[1,70889,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70890,r""1""",[1,70890,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70891,r""1""",[1,70891,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70892,r""1""",[1,70892,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70893,r""1""",[1,70893,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70894,r""1""",[1,70894,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
psspy.two_winding_data(70918,70895,r""1""",[1,70895,66,_i,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1""")
```

#INSERT STATION XFMR DATA (ASSUMED)

```
psspy.two_winding_data(70916,70917,r""1""",[1,70916,26,_i,_i,_i,33,_i,70916,70916,_i,1,1,2,1],[ 0.00181, 0.08998, 21.0, 1.0, 115.0,0.0,0, 1.0, 34.5, 35.0,0.0,0.0,0, 1.0,_f,_f,_f,0.0,0.0, 1.1, 0.9, 1.1, 0.9,0.0,0.0],""")
```

#INSERT 115 KV TIE LINE (ASSUME 33 MILES OF 795 DRAKE 26/7; 4FT/SEC; 104 DEG F AMBIENT; 100 DEG C COND)

```
psspy.branch_data(70004,70916,r""1""",[1,_i,66,_i,_i,_i],[ 0.032908, 0.18533, 0.0033026, 222.0, 222.0, 222.0,_f,_f,_f,_f, 33.0,_f,_f,_f,_f])
```

#INSERT 34.5 KV COLLECTOR SYSTEM APPROXIMATION (ASSUME 35 MVA RATING)

```
psspy.branch_data(70917,70918,r""1""",[1,_i,66,_i,_i,_i],[ 0.016, 0.059, 0.032, 35.0, 35.0, 35.0,_f,_f,_f,_f,_f,_f,_f,_f])
```



```

psspy.two_winding_data(70352,70353,r""T2"",[_i,70353,_i,_i,_i,_i,_i,70353,70353,-1,1,2,2,_i],[_f,0.1567,_f,70.297,69.0,_f,115.0,115.0,80.0,80.0,100.0,_f,_f,_f,_f,_f,75.9,62.1,1.03,
1.01,_f,_f],r""READER"" #REPLACE READER #2 TRANSFORMER
psspy.two_winding_data(70306,70378,r""T1"",[1,70306,66,_i,_i,_i,33,_i,70306,70306,-1,1,2,2,1],[0.1E-03,0.0529,18.0,69.0,69.0,_f,_f,115.0,30.0,30.0,30.0,_f,_f,_f,_f,_f,75.9,62.1,1.1,
0.9,_f,_f],r""AREQUUGH"" #INSERT AREQUA GULCH XFMRs
psspy.two_winding_data(70306,70378,r""T2"",[1,70306,66,_i,_i,_i,33,_i,70306,70306,-1,1,2,2,1],[0.1E-03,0.0529,18.0,69.0,69.0,_f,_f,115.0,30.0,30.0,30.0,_f,_f,_f,_f,_f,75.9,62.1,1.1,
0.9,_f,_f],r""AREQUUGH"" #INSERT AREQUA GULCH XFMRs
psspy.mbidbrn(70654,70777,r""U1"",r""T1"" )
#UPDATE COMANCHE3 G5U ID
psspy.two_winding_data(70085,70086,r""T1"",[_i,70086,_i,_i,_i,_i,_i,70085,70085,0,1,2,2,_i],[0.0071,0.12981,_f,69.0,69.0,_f,115.0,115.0,56.0,56.0,56.0,_f,_f,_f,_f,_f,75.9,62.1,
1.1,0.9,_f,_f],r""CANONCTY"" #UPDATE FIRST CANON CITY 115:69 XFMR
psspy.two_winding_data(70085,70086,r""T2"",[_i,70086,_i,_i,_i,_i,_i,70085,70085,0,1,2,2,_i],[0.0071,0.12981,_f,69.0,69.0,_f,115.0,115.0,56.0,56.0,56.0,_f,_f,_f,_f,_f,75.9,62.1,
1.1,0.9,_f,_f],r""CANONCTY"" #ADD SECOND CANON CITY 115:69 XFMR
psspy.two_winding_data(73412,73413,r""1"",[_i,_i,_i,_i,_i,_i,_i,0,0,_i,_i,_i],[_f,_f,_f,_f,_f,_f,150.0,150.0,150.0,_f,_f,_f,_f,_f,_f,_f],r""MIDWAYBR"" )
#UPRATE MIDWAYBR XFMR TO 150 MVA PER CCGP STUDY COMMENTS
psspy.two_winding_data(70249,70250,r""T1"",[_i,_i,_i,_i,_i,_i,_i,-1,1,_i,_i,_i],[0.00899,0.1567,_f,_f,_f,_f,42.0,42.0,42.0,_f,_f,_f,_f,_f,_f,_f],r""LAJUNTAW"" )
#REPLACE LAJUNTAW 115:69 TRANSFORMER T1
psspy.two_winding_data(70249,70250,r""T2"",[_i,_i,_i,_i,_i,_i,_i,-1,1,_i,_i,_i],[0.00899,0.1567,_f,_f,_f,_f,42.0,42.0,42.0,_f,_f,_f,_f,_f,_f,_f],r""LAJUNTAW"" )
#REPLACE LAJUNTAW 115:69 TRANSFORMER T2

# MACHINE DATA
psspy.mbidmac(70777,r""C1"",r""C3"" ) #UPDATE COMANCHE3 ID
psspy.machine_data(73129,r""1"",[_i,_i,_i,_i,_i],[531.5,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #ADJUST LRS GEN DISPATCH TO MEET L&R

# BHCE MACHINE DISPATCH DATA
psspy.machine_data(70084,r""C1"",[_i,_i,_i,_i],[22.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #CANON_59
psspy.machine_data(70083,r""C1"",[_i,_i,_i,_i],[16.5,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #CANON_55
psspy.machine_data(70160,r""G1"",[0,_i,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #E_CANON
psspy.machine_data(70306,r""G1"",[0,_i,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #PP_MINE
psspy.machine_data(70334,r""G1"",[0,_i,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #PUB_DSLS
psspy.machine_data(70337,r""G1"",[0,_i,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #PUBBPLNT
psspy.machine_data(70337,r""G2"",[0,_i,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #PUBBPLNT
psspy.machine_data(70344,r""G1"",[0,_i,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #R.F.DIESELS
psspy.machine_data(70548,r""G1"",[0,_i,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_DSLS
psspy.machine_data(70911,r""G1"",[1,66,_i,_i],[80.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_PLNT
psspy.machine_data(70912,r""G1"",[1,66,_i,_i],[80.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_PLNT
psspy.machine_data(70913,r""S1"",[0,66,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_PLNT
psspy.machine_data(70913,r""G1"",[1,66,_i,_i],[40.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_PLNT
psspy.machine_data(70913,r""G2"",[1,66,_i,_i],[40.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_PLNT
psspy.machine_data(70914,r""S1"",[0,66,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_PLNT
psspy.machine_data(70914,r""G1"",[1,66,_i,_i],[22.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_PLNT
psspy.machine_data(70914,r""G2"",[0,66,_i,_i],[0.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_PLNT
psspy.machine_data(70915,r""G1"",[0,66,_i,_i],[100.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #APT_PLNT
psspy.machine_data(36411,r""1"",[_i,_i,_i,_i],[1000.0,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f,_f] #REDUCE DIABLE TO INCREASE SWING GEN TO POSITIVE VALUE

# LOAD DATA (ASSUMED 300 MW TOTAL BHCE LOAD)
psspy.purgload(70306,r""WP"" ) #DELETE PP MINE LOAD (MOVED TO 115)
psspy.purgload(70305,r""WP"" ) #DELETE OVERTON 69 LOAD (MOVED TO 115)
psspy.load_data(70002,"WP",[_i,_i,_i],[11.2,4.1,_f,_f,_f]) #BURNT MILL
psspy.load_data(70004,"WP",[_i,_i,_i],[3,2.1,_f,_f,_f]) #GREENHORN
psspy.load_data(70007,"WP",[_i,_i,_i],[5.4,1.4,_f,_f,_f]) #OVERTON 115
psspy.load_data(70019,"WP",[_i,_i,_i],[0.8,0.3,_f,_f,_f]) #PDA 115
psspy.load_data(70030,"WP",[_i,_i,_i],[24.5,4.3,_f,_f,_f]) #APT_PARK
psspy.load_data(70049,"WP",[_i,_i,_i],[10.6,1.8,_f,_f,_f]) #BBELMONT
psspy.load_data(70051,"WP",[_i,_i,_i],[11.2,1.2,_f,_f,_f]) #BLENDE
psspy.load_data(70086,"WP",[_i,_i,_i],[14.3,4.2,_f,_f,_f]) #CANON CITY 115
psspy.load_data(70130,"WP",[_i,_i,_i],[4.6,0.7,_f,_f,_f]) #CRIPPLE CREEK
psspy.load_data(70158,"WP",[_i,_i,_i],[2,0.6,_f,_f,_f]) #DOT
psspy.load_data(70160,"WP",[_i,_i,_i],[9.6,3.5,_f,_f,_f]) #EAST CANON
psspy.load_data(70176,"WP",[_i,_i,_i],[4,0.9,_f,_f,_f]) #FLORENCE
psspy.load_data(70178,"WP",[_i,_i,_i],[2.6,0.1,_f,_f,_f]) #FOWLER
psspy.load_data(70181,"WP",[_i,_i,_i],[9.1,0.1,_f,_f,_f]) #FREEMARY
psspy.load_data(70193,"WP",[_i,_i,_i],[1.2,0.5,_f,_f,_f]) #FOUNTAIN VALLEY
psspy.load_data(70220,"WP",[_i,_i,_i],[2.4,0.7,_f,_f,_f]) #HIGHLAND
psspy.load_data(70235,"WP",[_i,_i,_i],[1.4,0.8,_f,_f,_f]) #HUERFANO
psspy.load_data(70236,"WP",[_i,_i,_i],[14.1,3.4,_f,_f,_f]) #HYDE PARK
psspy.load_data(70250,"WP",[_i,_i,_i],[2.2,0.1,_f,_f,_f]) #LAJUNTAW
psspy.load_data(70275,"WP",[_i,_i,_i],[2,0.6,_f,_f,_f]) #MANZANOLA
psspy.load_data(70293,"WP",[_i,_i,_i],[5.8,1,_f,_f,_f]) #N CANON

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```
psspy.two_winding_data(70918,70895,r""1"",[1,70895,66,_i,_i,_i,_i,70918,_i,_i,0,2,2,_i],[ 0.008163, 0.089629, 1.9, 34.5, 34.5,_f, 0.70, 0.70, 2.5, 2.5, 2.5,_f,_f,_f,_f,_f, 36.225, 32.775,_f,_f,_f,_f],r""WTG1"")

#INSERT STATION XFMR DATA (ASSUMED)
psspy.two_winding_data(70916,70917,r""1"",[1,70916,26,_i,_i,_i,33,_i,70916,70916,_i,1,1,2,1],[ 0.00181, 0.08998, 21.0, 1.0, 115.0,0.0, 1.0, 34.5, 35.0,0.0,0.0, 1.0,_f,_f,0.0,0.0, 1.1, 0.9, 1.1, 0.9,0.0,0.0], "")

#INSERT 115 KV TIE LINE (ASSUME 36 MILES OF 795 DRAKE 26/7; 4FT/SEC; 104 DEG F AMBIENT; 100 DEG C COND)
psspy.branch_data(70352,70916,r""1"",[1,_i,66,_i,_i,_i],[ 0.035899, 0.20218, 0.003603, 222.0, 222.0, 222.0,_f,_f,_f,_f, 36.0,_f,_f,_f])

#INSERT 34.5 KV COLLECTOR SYSTEM APPROXIMATION USING (ASSUME 35 MVA RATING)
psspy.branch_data(70917,70918,r""1"",[1,_i,66,_i,_i,_i],[ 0.016, 0.059, 0.032, 35.0, 35.0, 35.0,_f,_f,_f,_f,_f,_f,_f,_f])
```

2015HS AND 2015LA DYNAMIC DATA UPDATES

- LOADS SCALED ABOVE 5 MW WERE ADDED TO THE DYRE FILE AND THE MOTOR LOAD FILE: E CANON, S CANON, AREQUA GULCH
- COMANCHE3 MODELS WERE UPDATE WITH THE MODELS FROM PSCO'S LGI STUDY TO INCREASE CAPACITY AT COMANCHE3, AND THE UNIT WAS REMOVED FROM THE MCRE FILE
- SET UVLS PARAMETER TO 0 FOR ALL LOADS
- INCLUDED ALL UPDATED BHCE DYRE MODELS AND ADDED V-100 MODELS FOR EACH WTG AS SHOWN BELOW

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70777 'GENROU' C3 7.33 0.017 0.81 0.026 3.88 0.0 2.22 2.19 0.305 0.456 0.266 0.192 0.219 0.895 / COMAN_3 27.000
70777 'EKST1' C3 0.008 999.0 -999.0 0.53 2.39 192.5 0.029 6.5 -2.27 0.22 0.0 1.0 / COMAN_3 27.000
70777 'IEEBE1' C3 3 0 0.008 0.000016 2.5 0.0 0.15 0.0 0.15 0.07 0.15 0.07 1.5 1.5 -1.0 0.05 -0.05 0.0 0.0 / COMAN_3 27.000
70777 'IEEBE1' C3 0 0 20.0 0.1 0.0 0.05 3.4 -3.4 1.05 0.0 0.4 0.31 0.0 11.31 0.69 0.0 0.0 0.0 0.0 0.0 / COMAN_3 27.000
70083 'GENROU' C1 8.40 0.200E-01 1.00 0.8000E-01 4.50 0.00 1.500 1.10 0.20500 0.60 0.1810 0.1200 0.1300 0.43300 / CANON_55 13.800
70084 'GENROU' C1 5.000 0.2000E-01 0.50000 0.400E-01 3.4100 0.00 1.250 1.100 0.2050 0.60 0.1590 0.120 0.14 0.489 / CANON_59 13.800
70160 'GENROU' G1 7.00000 0.300000E-01 0.750000 0.500000E-01 1.20000 0.00000 2.10000 2.00000 0.200000 0.500000 0.180000
0.150000 0.500000E-01 0.300000 / E_CANON 69.000
70306 'GENROU' G1 7.00000 0.300000E-01 0.750000 0.500000E-01 1.20000 0.00000 2.10000 2.00000 0.200000 0.500000 0.180000
0.150000 0.500000E-01 0.300000 / PP_MINE 69.000
70334 'GENROU' G1 7.00000 0.300000E-01 0.750000 0.500000E-01 1.20000 0.00000 2.10000 2.00000 0.200000 0.500000 0.180000
0.150000 0.500000E-01 0.300000 / R.F.DSLS 4.160
70337 'GENROU' G1 5.5000 0.200000E-01 0.500 0.4000E-01 4.07200 0.00 1.06200 0.7790 0.233 0.4710 0.18300 0.856000E-01 0.1570 0.7360 /
PUEBPLNT 14.000
70337 'GENROU' G2 7.00000 0.300000E-01 0.750000 0.500000E-01 4.50000 0.00000 2.10000 2.00000 0.200000 0.500000 0.180000
0.150000 0.500000E-01 0.300000 / PUEBPLNT 14.000
70344 'GENROU' G1 7.00000 0.300000E-01 0.750000 0.500000E-01 1.20000 0.00000 2.10000 2.00000 0.200000 0.500000 0.180000
0.150000 0.500000E-01 0.300000 / R.F.DSLS 4.160
70548 'GENROU' G1 7.00000 0.300000E-01 0.750000 0.500000E-01 1.20000 0.00000 2.10000 2.00000 0.200000 0.500000 0.180000
0.150000 0.500000E-01 0.300000 / APT_DSLS 4.160
70084 'IEEEVC' C1 0.00000 0.300000E-01 / CANON_59 13.800
70083 'EKST1' C1 0.00000 10.00000 -10.00000 0.300000 9.00000 220.000 0.200000E-01 7.05000
-5.64000 0.00000 0.00000 1.00000 / CANON_55 13.800
70084 'ESST4B' C1 0.00000 4.70500 1.47000 1.00000 -8.80000 0.00000 1.00000 0.00000 1.00000 1.00000 -8.80000
0.00000 0.00000 0.00000 10.0000 0.500000E-01 0.00000 0.00000 / CANON_59 13.800
70160 'ESST4B' G1 0.200000E-01 3.15000 3.15000 1.00000 -8.87000 0.200000E-01 1.00000 0.00000 1.00000 -8.87000
0.00000 6.50000 0.00000 8.00000 0.800000E-01 0.00000 0.00000 / E_CANON 69.000
70306 'ESST4B' G1 0.200000E-01 3.15000 3.15000 1.00000 -8.87000 0.200000E-01 1.00000 0.00000 1.00000 -8.87000
0.00000 6.50000 0.00000 8.00000 0.800000E-01 0.00000 0.00000 / PP_MINE 69.000
70334 'ESST4B' G1 0.200000E-01 3.15000 3.15000 1.00000 -8.87000 0.200000E-01 1.00000 0.00000 1.00000 -8.87000
0.00000 6.50000 0.00000 8.00000 0.800000E-01 0.00000 0.00000 / PUB_DSLS 4.160
70337 'ESST4B' G2 0.200000E-01 3.15000 3.15000 1.00000 -8.87000 0.200000E-01 1.00000 0.00000 1.00000 -8.87000
0.00000 6.50000 0.00000 8.00000 0.800000E-01 0.00000 0.00000 / PUEBPLNT 14.000
70344 'ESST4B' G1 0.200000E-01 3.15000 3.15000 1.00000 -8.87000 0.200000E-01 1.00000 0.00000 1.00000 -8.87000
0.00000 6.50000 0.00000 8.00000 0.800000E-01 0.00000 0.00000 / R.F.DSLS 4.160
70548 'ESST4B' G1 0.200000E-01 3.15000 3.15000 1.00000 -8.87000 0.200000E-01 1.00000 0.00000 1.00000 -8.87000
0.00000 6.50000 0.00000 8.00000 0.800000E-01 0.00000 0.00000 / APT_DSLS 4.160
70337 'REXSYS' G1 0.00000 150.0000 0.00000 1.00000 0.150000 0.00000 0.00000 0.00000 0.00000 0.00000 10.0000
-10.00000 0.110000 0.150000 0.00000 0.00000 2.00000 1.00000 0.00000 0.00000 0.00000 1.00000
-1.00000 0.00000 0.00000 1.20000 0.00000 0.00000 2.40000 0.100000 3.00000 0.210000
0.00000 / PUEBPLNT 14.000
70083 'GGOV1' C1 -1 0
0.490000E-01 1.00000 1.00000 -1.00000 1.02000 102.000 0.00000 1.00000
1.00000 0.00000 0.400000 1.01000 0.990100E-02 1.00000 1.00000 0.00000
3.00000 1.00000 1.00000 10.00 0.00000 99.0 -99.0 0.0000
99.0 10.0000 1.00000 16.5000 0.00000 1.00000 1.00000 99.0000
-99.0000 / CANON_55 13.800
70084 'GGOV1' C1 -1 0
0.506000E-01 1.00000 1.00000 -1.00000 0.990000 99.0000 0.00000 1.00000
1.00000 0.00000 0.300000 1.01000 0.990100E-02 1.00000 1.00000 0.00000
3.00000 1.00000 1.00000 10.00 0.00000 99.00 -99.00 0.00000
99.00 10.0000 1.00000 22.0000 0.00000 1.00000 1.00000 99.0000
-99.0000 / CANON_59 13.800
70337 'IEEBE1' G1 0 0 18.7500 0.00000 0.00000 0.0000 0.30 0.100000 -1.100000 1.10000 -0.0050 0.30000
1.00000 0.00000 1.00000 0.00000 0.0000 0.0000 0.00000 / PUEBPLNT 14.000
70911 'GENROU' G1 12.5000 0.500000E-01 3.80000 0.500000E-01 1.73800 0.00000 2.30000 2.10000 0.196000 0.240000 0.142000
0.800000E-01 1.860000 3.750000 / BAC_MSA1 13.800
70912 'GENROU' G1 12.5000 0.500000E-01 3.80000 0.500000E-01 1.73800 0.00000 2.30000 2.10000 0.196000 0.240000 0.142000
0.800000E-01 1.860000 3.750000 / BAC_MSA2 13.800
70911 'EX2000' G1 0 1
15.2790 15.2790 9.12000 0.00000 16.5505 1.32404 1.00000 -1.0000
10.0000 1.00000 1.20000 20.0000 1.00000 0.47000 1.20000 0.00000
0.71720 6.70000 0.19000 9.00000 1.95000 1.09000 0.00000 0.00000
1.40000 1.02000 1.00000 1.25000 1.10000 120.000 1.20000 60.0000
1.36000 30.0000 1.90000 11.0000 1.00000 1.00000 1.00000 1.00000
1.00000 -1.0000 1.00000 0.00000 1.20000 / BAC_MSA1 13.800
70912 'EX2000' G1 0 1
15.2790 15.2790 9.12000 0.00000 16.5505 1.32404 1.00000 -1.0000
10.0000 1.00000 1.20000 20.0000 1.00000 0.47000 1.20000 0.00000
0.71720 6.70000 0.19000 9.00000 1.95000 1.09000 0.00000 0.00000
1.40000 1.02000 1.00000 1.25000 1.10000 120.000 1.20000 60.0000
1.36000 30.0000 1.90000 11.0000 1.00000 1.00000 1.00000 1.00000
1.00000 -1.0000 1.00000 0.00000 1.20000 / BAC_MSA2 13.800
70911 'GGOV1' G1 1 1
0.500000E-01 1.00000 0.500000E-01 -0.500000E-01 3.00000 1.20000 0.00000 1.00000
1.00000 0.100000 0.400000 1.50000 0.15000 0.10000 0.00000 0.00000
3.00000 1.00000 0.200000 1.00000 0.00000 99.0000 -99.0000 0.00000
99.0000 10.0000 0.100000 108.190 0.00000 4.00000 5.00000 99.0000
-99.0000 / BAC_MSA1 13.800
70912 'GGOV1' G1 1 1
0.500000E-01 1.00000 0.500000E-01 -0.500000E-01 3.00000 1.20000 0.00000 1.00000
1.00000 0.100000 0.400000 1.50000 0.15000 0.10000 0.00000 0.00000
3.00000 1.00000 0.200000 1.00000 0.00000 99.0000 -99.0000 0.00000
99.0000 10.0000 0.100000 108.190 0.00000 4.00000 5.00000 99.0000
-99.0000 / BAC_MSA2 13.800
70911 'PSS2A' G1 1 0 3 0 5 1 2.0000 2.00000 0.00000 2.00000 0.00000 2.0000 2.0000 0.5750
1.00000 0.500000 0.100000 15.0000 0.15000 0.30000E-01 0.150000 0.30000E-01 0.100000 -1.100000 / BAC_MSA1 13.800
70912 'PSS2A' G1 1 0 3 0 5 1 2.0000 2.00000 0.00000 2.00000 0.00000 2.0000 2.0000 0.5750

```


1.00000 0.500000 0.100000 15.0000 0.15000 0.30000E-01 0.150000 0.30000E-01 0.100000 --.100000 / BAC_MSA5 13.800
70880 'USRMDL' '1' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70880 '1' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70880 '1' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWVWRC' 8 0 3 21 7 5 70880 '1' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70880 '1'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70880 '1'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVPR' 0 2 7 20 0 11 70880 '1' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWVPR' 0 2 3 4 0 1 70880 '1' 0
56.4000 0.2000 63.6000 0.2000 /
70881 'USRMDL' '2' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70881 '2' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70881 '2' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWVWRC' 8 0 3 21 7 5 70881 '2' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70881 '2'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70881 '2'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVPR' 0 2 7 20 0 11 70881 '2' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWVPR' 0 2 3 4 0 1 70881 '2' 0
56.4000 0.2000 63.6000 0.2000 /
70882 'USRMDL' '3' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70882 '3' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70882 '3' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWVWRC' 8 0 3 21 7 5 70882 '3' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70882 '3'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70882 '3'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVPR' 0 2 7 20 0 11 70882 '3' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWVPR' 0 2 3 4 0 1 70882 '3' 0
56.4000 0.2000 63.6000 0.2000 /
70883 'USRMDL' '4' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70883 '4' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70883 '4' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWVWRC' 8 0 3 21 7 5 70883 '4' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70883 '4'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70883 '4'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVPR' 0 2 7 20 0 11 70883 '4' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWVPR' 0 2 3 4 0 1 70883 '4' 0
56.4000 0.2000 63.6000 0.2000 /
70884 'USRMDL' '5' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301

```

161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70884 '5' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70884 '5' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWVWRC' 8 0 3 21 7 5 70884 '5' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70884 '5'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70884 '5'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVWPT' 0 2 7 20 0 11 70884 '5' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWVWPT' 0 2 3 4 0 1 70884 '5' 0
56.4000 0.2000 63.6000 0.2000 /
70885 'USRMDL' '6' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70885 '6' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70885 '6' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWVWRC' 8 0 3 21 7 5 70885 '6' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70885 '6'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70885 '6'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVWPT' 0 2 7 20 0 11 70885 '6' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWVWPT' 0 2 3 4 0 1 70885 '6' 0
56.4000 0.2000 63.6000 0.2000 /
70886 'USRMDL' '7' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70886 '7' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70886 '7' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWVWRC' 8 0 3 21 7 5 70886 '7' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70886 '7'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70886 '7'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVWPT' 0 2 7 20 0 11 70886 '7' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWVWPT' 0 2 3 4 0 1 70886 '7' 0
56.4000 0.2000 63.6000 0.2000 /
70887 'USRMDL' '8' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70887 '8' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70887 '8' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWVWRC' 8 0 3 21 7 5 70887 '8' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70887 '8'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70887 '8'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVWPT' 0 2 7 20 0 11 70887 '8' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWVWPT' 0 2 3 4 0 1 70887 '8' 0
56.4000 0.2000 63.6000 0.2000 /
70888 'USRMDL' '9' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70888 '9' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70888 '9' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203

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809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWPNRC' 8 0 3 21 7 5 70888 '9' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70888 '9'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70888 '9'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVPRT' 0 2 7 20 0 11 70888 '9' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWFPRT' 0 2 3 4 0 1 70888 '9' 0
56.4000 0.2000 63.6000 0.2000 /
70889 'USRMDL' '10' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70889 '10' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70889 '10' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWPNRC' 8 0 3 21 7 5 70889 '10' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70889 '10'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70889 '10'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVPRT' 0 2 7 20 0 11 70889 '10' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWFPRT' 0 2 3 4 0 1 70889 '10' 0
56.4000 0.2000 63.6000 0.2000 /
70890 'USRMDL' '11' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70890 '11' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70890 '11' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWPNRC' 8 0 3 21 7 5 70890 '11' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70890 '11'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70890 '11'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVPRT' 0 2 7 20 0 11 70890 '11' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWFPRT' 0 2 3 4 0 1 70890 '11' 0
56.4000 0.2000 63.6000 0.2000 /
70891 'USRMDL' '12' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70891 '12' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70891 '12' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWPNRC' 8 0 3 21 7 5 70891 '12' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70891 '12'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70891 '12'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVPRT' 0 2 7 20 0 11 70891 '12' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWFPRT' 0 2 3 4 0 1 70891 '12' 0
56.4000 0.2000 63.6000 0.2000 /
70892 'USRMDL' '13' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70892 '13' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70892 '13' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWPNRC' 8 0 3 21 7 5 70892 '13' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000

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0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70892 '13'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70892 '13'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVVRT' 0 2 7 20 0 11 70892 '13' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWFPRT' 0 2 3 4 0 1 70892 '13' 0
56.4000 0.2000 63.6000 0.2000 /
70893 'USRMDL' '14' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70893 '14' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70893 '14' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWFWRC' 8 0 3 21 7 5 70893 '14' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70893 '14'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70893 '14'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVVRT' 0 2 7 20 0 11 70893 '14' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWFPRT' 0 2 3 4 0 1 70893 '14' 0
56.4000 0.2000 63.6000 0.2000 /
70894 'USRMDL' '15' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70894 '15' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70894 '15' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWFWRC' 8 0 3 21 7 5 70894 '15' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70894 '15'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70894 '15'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVVRT' 0 2 7 20 0 11 70894 '15' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWFPRT' 0 2 3 4 0 1 70894 '15' 0
56.4000 0.2000 63.6000 0.2000 /
70895 'USRMDL' '16' 'VWCORE' 1 1 2 27 13 74 1 0
1800.0000 692.8203 809.6643 700.0000 2.6200 0.6750 0.0160
1.5013 8.3264 1.5013 8.3264 30.0000 0.2000 1.2000
0.1000 0.0018 0.6983 0.0385 1.2774 0.0000 422.2301
161.5343 0.0300 0.0000 0.0300 0.3000 0.0000 /
0 'USRMDL' 0 'VWVARS' 8 0 2 0 0 21 70895 '16' /
0 'USRMDL' 0 'VWLVRT' 8 0 3 23 10 15 70895 '16' 1
0.8500 0.0010 0.2000 12.5000 50.0000 0.0000 0.0000
0.5000 1.0000 2.6200 0.6750 1.2000 0.5000 692.8203
809.6643 0.3500 0.0500 0.2500 0.0200 3.0000 4.0000
60.0000 0.0160 /
0 'USRMDL' 0 'VWFWRC' 8 0 3 21 7 5 70895 '16' 1
1.0000 0.5556 -0.5556 0.7567 0.9372 0.9500 0.9000
0.2000 0.2000 1.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 /
0 'USRMDL' 0 'VWMECH' 8 0 2 7 8 0 70895 '16'
1800.0000 422.2301 4263.0788 574.0000 68.5000 9743.0000 38.3000 /
0 'USRMDL' 0 'VWMEAS' 8 0 2 3 8 5 70895 '16'
0.1000 0.1000 0.1000 /
0 'USRMDL' 0 'VWVVRT' 0 2 7 20 0 11 70895 '16' 1 1 0 0 0
0.7500 0.0001 0.8500 0.4000 0.9000 60.0000 1.1000
60.0000 1.1350 0.2000 1.2000 0.1200 0.0000 0.2000
0.7000 2.6500 0.8500 11.0000 0.9000 60.0000 /
0 'USRMDL' 0 'VWFPRT' 0 2 3 4 0 1 70895 '16' 0
56.4000 0.2000 63.6000 0.2000 /

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Appendix B

Power Flow Analysis: Prior and Forced Outage List

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	SYTEM INTACT	PO 230-1	BOONE-MIDWAYPS	PO 115-1	MIDWAYBR-RANCHO	PO69-1	ROCKY FORD-LAJUNTAW	POX-1	MIDWAYPS 345:230	POGEN-1	COMANCHE 3
PO 345-2	DAN PARK-COMANCHE-1	PO 230-2	BOONE-COMANCHE	PO 115-2	MIDWAYBR-NIXON	PO69-2	BLENDE-ST. CHARLES***	POX-2	COMANCHE 345:230-T3	POGEN-2	APT GEN 1
PO 345-3	CALUMET-COMANCHE-2	PO 230-3	BOONE-LAMAR	PO 115-3	FTN VALLEY-MIDWAYBR	PO69-3	WEST STATION-STONEMOOR	POX-3	LAMAR 230:115	POGEN-3	SLV SOLAR
PO 345-4		PO 230-4	COMANCHE-MIDWAYPS-1	PO 115-4	FTN VALLEY-DESERT COVE	PO69-4	READER-FREEMARY	POX-4	BOONE 230:115-1	POGEN-4	FTNVLY 1&2
PO 345-5		PO 230-5	MIDWAYPS-FULLER	PO 115-5	DESERT COVE-WEST STATION	PO69-5	PORTLAND-HIGHLAND	POX-5	WEST CANON 230:115	POGEN-5	RD-NIXON
PO 345-6		PO 230-6	MIDWAYBR-NIXON	PO 115-6	MIDWAYPS-WEST STATION	PO69-6		POX-6	COMANCHE 230:115-T1	POGEN-6	
PO 345-7		PO 230-7	MIDWAYBR-LINCOLN	PO 115-7	MIDWAYPS-NORTHBRIDGE	PO69-7		POX-7	WALSENBURG 230:115-1	POGEN-7	
PO 345-8		PO 230-8	MIDWAYBR-WEST CANON	PO 115-8	OVERTON-NORTHBRIDGE	PO69-8		POX-8	MIDWAYPS 230:115	POGEN-8	
PO 345-9		PO 230-9	WEST CANON-PONCHA	PO 115-9	OVERTON-BACULITE MESA	PO69-9		POX-9	MIDWAYBR 230:115	POGEN-9	
PO 345-10		PO 230-10	CALUMET-COMANCHE	PO 115-10	BACULITE MESA-WEST STATION-1	PO69-10		POX-10	LAJUNTAW 115:69-1***	POGEN-10	
PO 345-11		PO 230-11	CALUMET-SAN LUIS VALLEY-1	PO 115-11		PO69-11		POX-11	BOONE 115:69***	POGEN-11	
PO 345-12		PO 230-12	CALUMET-WALSENBURG-2	PO 115-12	HYDE PARK-WEST STATION	PO69-12		POX-12	READER 115:69-T1	POGEN-12	
PO 345-13		PO 230-13		PO 115-13	HYDE PARK-PUEBLO	PO69-13		POX-13	WEST STATION 115:69-1	POGEN-13	
PO 345-14		PO 230-14		PO 115-14	PUEBLO-READER	PO69-14		POX-14	PORTLAND 115:69-T1	POGEN-14	
PO 345-15		PO 230-15		PO 115-15	PORTLAND-WEST STATION	PO69-15		POX-15	CANON CITY 115:69	POGEN-15	
PO 345-16		PO 230-16		PO 115-16	PUEBLO TAP-STEM BEACH	PO69-16		POX-16	AREQUA GULCH 115:69	POGEN-16	
PO 345-17		PO 230-17		PO 115-17	PUEBLO TAP-WEST STATION	PO69-17		POX-17	CALUMET 345:230-2	POGEN-17	
PO 345-18		PO 230-18		PO 115-18	BURNT MILL-WEST STATION	PO69-18		POX-18		POGEN-18	
PO 345-19		PO 230-19		PO 115-19	BURNT MILL-GREENHORN	PO69-19		POX-19		POGEN-19	
PO 345-20		PO 230-20		PO 115-20	GREENHORN-READER	PO69-20		POX-20		POGEN-20	
PO 345-21		PO 230-21		PO 115-21	READER-AIRPORT MEMORIAL	PO69-21		POX-21		POGEN-21	
PO 345-22		PO 230-22		PO 115-22	AIRPORT PARK-AIRPORT MEMORIAL	PO69-22		POX-22		POGEN-22	
PO 345-23		PO 230-23		PO 115-23	AIRPORT PARK-BACULITE MESA	PO69-23		POX-23		POGEN-23	
PO 345-24		PO 230-24		PO 115-24	NYBERG-BACULITE MESA	PO69-24		POX-24		POGEN-24	
PO 345-25		PO 230-25		PO 115-25	NYBERG-AIRPORT MEMORIAL	PO69-25		POX-25		POGEN-25	
PO 345-26		PO 230-26		PO 115-26	NYBERG-DOT TAP	PO69-26		POX-26		POGEN-26	
PO 345-27		PO 230-27		PO 115-27	BOONE-DOT TAP	PO69-27		POX-27		POGEN-27	
PO 345-28		PO 230-28		PO 115-28	BOONE-LAJUNTAW***	PO69-28		POX-28		POGEN-28	
PO 345-29		PO 230-29		PO 115-29	BOONE-LAJUNTAT	PO69-29		POX-29		POGEN-29	
PO 345-30		PO 230-30		PO 115-30	LAJUNTAT-LAJUNTAW	PO69-30		POX-30		POGEN-30	
PO 345-31		PO 230-31		PO 115-31	COMANCHE-READER-1	PO69-31		POX-31		POGEN-31	
PO 345-32		PO 230-32		PO 115-32		PO69-32		POX-32		POGEN-32	
PO 345-33		PO 230-33		PO 115-33	PORTLAND-SKALA	PO69-33		POX-33		POGEN-33	
PO 345-34		PO 230-34		PO 115-34	CANON CITY-SKALA	PO69-34		POX-34		POGEN-34	
PO 345-35		PO 230-35		PO 115-35	CANON CITY-WEST CANON	PO69-35		POX-35		POGEN-35	
PO 345-36		PO 230-36		PO 115-36	AREQUA GULCH-WEST CANON	PO69-36		POX-36		POGEN-36	
PO 345-37		PO 230-37		PO 115-37	SMELTER-WEST CANON	PO69-37		POX-37		POGEN-37	

*** INDICATES MUST RUN GENERATION WAS UTILIZED FOR THIS PRIOR OUTAGE

INDICATES THIS PRIOR OUTAGE WAS SIMULATED IN THE DYNAMIC STABILITY ASSESSMENT

STEADY STATE FORCED OUTAGES

1	GLADSTON 230-WALS 230 #1 ROSEBUD RAS	35	DANIELPK 230.00-WATERTON 230.00 #1	69	S_CANON 69.000-S_CAN.W 69.000 #1	103	PONCHA 69.000-PONCHA 115.00 #T2
2	BACULITE-W.STATON 115 #1&2	36	DANIELPK 230.00-FULLER 230.00 #1	70	SANLSVLY 230.00-CALUMET 230.00 #2	104	READER 115.00-READER 69.00 #T2
3	MIDWAYPS-W.STATON+MIDWAYPS-NTHRIDGE 115	37	E_CANON 69.000-FLORENCE 69.000 #1	71	SANLSVLY 230.00-PONCHABR 230.00 #1	105	PORTLAND 115.00-PORTLAND 69.00 #T2
4	BOONE-NYBERG 115	38	E_CANON 69.000-NCANON 69.000 #1	72	AREQUGCH 115.00-W.CANON 115.00 #1	106	SANLSVLY 115.00-SANLSVLY 230.00 #T1
5	MIDWAYBR-FTN VALLEY-DESERTCOVE 115	39	HLND-FLO-ECAN-NCAN 69.00	73	SMELTER 115.00-W CANON 115.00 #1	107	SANLSVLY 230.00-SLVSOLAR 22.000 #U1
6	MIDWAYPS-OVERTON 115	40	FREEMARY 69.000-PRAIRIE 69.000 #1	74	STMBEACH 115.00-WALSENBG 115.00 #1	108	STMBEACH 115.00-STMBEACH 69.000 #T1
7	BURNT MI 115.00-GREENHORN 115.00 #1	41	FREEMARY 69.000-READER 69.000 #1	75	STONMOOR 69.000-SUNSETPK 69.000 #1	109	W.STATON 69.000-W.STATON 115.00 #T2
8	BURNT MI 115.00-W.STATON 115.00 #1	42	HIGHLND 69.000-PORTLAND 69.000 #1	76	STONMOOR 69.000-W.STATON 69.000 #1	110	WALSENBG 69.000-WALSENBG 115.00 #T1
9	GREENHORN 115.00-READER 115.00 #1	43	HIGHLND 69.000-S_CANON 69.000 #1	77	DESRTC OV 115.00-W.STATON 115.00 #1	111	WALSENBG 115.00-WALSENBG 230.00 #T3
10	GREEHORN 115.00-BHCT-G8 115.00 #1	44	HYDEPARK 115.00-PUEBPLNT 115.00 #1	78	WALSENBG 230.00-CALUMET 230.00 #1	112	WATERTON 115.00-WATERTON 230.00 #T1
11	OVERTON 115.00-BACULITE 115.00 #1	45	HYDEPARK 115.00-W.STATON 115.00 #1	79	MIDWAYPS 345.00-WATERTON 345.00 #1	113	WATERTON 230.00-WATERTON 345.00 #T3
12	NYBERG 115.00-BACULITE 115.00 #1	46	LAJUNTAT 115.00-LAJUNTAW 115.00 #1	80	DANIELPK 345.00-COMANCHE 345.00 #2	114	W CANON 115.00-W CANON 230.00 #T1
13	NYBERG 115.00-APT MEM 115.00 #1	47	LAJUNTAT 115.00-WILOW_CK 115.00 #1	81	COMANCHE 345.00-CALUMET 345.00 #1	115	CALUMET 345.00-CALUMET 230.00 #T1
14	APT PARK 115.00-BACULITE 115.00 #1	48	LAJUNTAT 69.000-LAJUNTAW 69.000 #1	82	MIDWAYBR 115.00-RANCHO 115.00 #1	116	MIDWAYBR 115.00-MIDWAYBR 230.00 #1
15	APT PARK 115.00-APT MEM 115.00 #1	49	LAJUNTAW 69.000-PHLP5_TP 69.000 #1	83	MIDWAYBR 115.00-RD_NIXON 115.00 #1	117	RD_NIXON 115.00-RD_NIXON 230.00 #1
16	BACULITE 115.00-W.STATON 115.00 #2	50	LAJUNTAW 69.000-ROCKYFRD 69.000 #1	84	MIDWAYBR 230.00-RD_NIXON 230.00 #1	118	FULLER 230.00-FULLER 115.00 #1
17	READER-BELMONT 69	51	LAMAR_CO 115.00-VILAS 115.00 #1	85	MIDWAYBR 230.00-LINCOLNT 230.00 #1	119	CANON 55 13.800 C1
18	WEST STATION-BELMONT 69	52	LAMAR_CO 115.00-WILOW_CK 115.00 #1	86	MIDWAYBR 230.00-W CANON 230.00 #1	120	CANON 59 13.800 C1
19	BLENDE 69.000-ST.CHAS. 69.000 #1	53	MANZANOL 69.000-ROCKYFRD 69.000 #1	87	W CANON 230.00-PONCHABR 230.00 #1	121	COMAN 1 24.000 C1
20	BOONE 115.00-LAJUNTAT 115.00 #1	54	MIDWAYPS 115.00-W.STATON 115.00 #1	88	PONCHABR 230.00-PARLIN 230.00 #1	122	COMAN 2 24.000 C2
21	BOONE 115.00-LAJUNTAW 115.00 #1	55	MIDWAYPS 230.00-FULLER 230.00 #1	89	BOONE 115.00-BOONE 230.00 #T2	123	E_CANON 69.000 G1
22	BOONE 230.00-COMANCHE 230.00 #1	56	NCANON_W 69.000-VICTOR 69.000 #1	90	BOONE 115.00-BOONE 69.00 #T1	124	PP_MINE 69.000 G1
23	BOONE 230.00-LAMAR CO 230.00 #1 + RAS	57	PPMINE-VICTOR-CRPLECRK 69.00	91	CANONCTY 115.00-CANONCTY 69.00 #T2	125	PUB_DSLS 4.1600 G1
24	BOONE 230.00-MIDWAYPS 230.00 #1	58	PDA_TAP 69.000-ST.CHAS. 69.000 #1	92	COMANCHE 115.00-COMANCHE 230.00 #T2	126	PUEBPLNT 14.000 G1
25	BOONE-ROCKY FORD 69.00	59	PONCHA 115.00-SARGENT 115.00 #1	93	COMANCHE 230.00-COMANCHE 345.00 #T4	127	PUEBPLNT 14.000 G2
26	BOONE_TP 69.000-HUERFANO 69.000 #1	60	PONCHA 115.00-SMELTER 115.00 #1	94	DANIELPK 115.00-DANIELPK 230.00 #T1	128	R.F_DSLS 4.1600 G1
27	CANON CITY-NORTH CANON W 69.00	61	PORTLAND 115.00-SKALA 115.00 #1	95	DANIELPK 230.00-DANIELPK 345.00 #T2	129	APT_DSLS 4.1600 G1
28	CANON CITY-SOUTH CANON W 69.00	62	PORTLAND 115.00-W.STATON 115.00 #1	96	LAJUNTAT 115.00-LAJUNTAT 69.00 #T2	130	COMAN 3 24.000 C3
29	CANONCTY 115.00-SKALA 115.00 #1	63	PORTLAND 115.00-W.STATON 115.00 #2	97	LAJUNTAW 115.00-LAJUNTAW 69.00 #T2	131	APT_GEN1 13.800 G1
30	CANONCTY 115.00-W CANON 115.00 #1	64	PRAIRIE 69.000-SUNSETPK 69.000 #1	98	LAMAR CO 115.00-LAMAR CO 230.00 #T1	132	APT_GEN2 13.800 G1
31	CF&IFURN 230.00-COMANCHE 230.00 #1	65	WEST STATION-STEMBEACH115	99	MIDWAYPS 115.00-MIDWAYPS 230.00 #T1	133	RD_NIXON 20.000 1
32	COMANCHE 115.00-READER 115.00 #2	66	PUEBPLNT 69.000-W.STATON 69.000 #1	100	MIDWAYPS 230.00-MIDWAYPS 345.00 #T2	134	
33	COMANCHE 230.00-MIDWAYPS 230.00 #2	67	PUEBPLNT 115.00-READER 115.00 #1	101	MIDWAYPS 230.00-FTNVL3&4 13.800 #U2	135	
34	COMANCHE 230.00-CALUMET 230.00 #1	68	READER 115.00-APT_MEM 115.00 #1	102	AREQUGCH 115.00-PP_MINE 69.00 #T1	136	