Feasibility Study Report for PSCo OASIS Request # GI-2003-1

Generation Interconnection Request for a 300 MW Wind Generation Facility

Xcel Energy Transmission Planning
~~March 2, 2004~~ Revised June 17, 2004

Executive Summary

PSCo Transmission received a generation request to determine the feasibility of interconnecting 300 MW of new Customer wind turbine generation into the PSCo transmission system at the Pawnee 230 kV Switchyard bus. The proposed commercial operation date is December 1, 2005 with a back feed date of June 1, 2005.

This request was studied as both an ER (Energy Resource) and an NR (Network Resource). The ER portion of this study determined that the customer could provide approximately 50 MW of energy before network reinforcements for delivery would be required. This determination is totally dependent upon the loading of the TOT 3 import path. In this case TOT 3 was moderately loaded to 1143 MW. A high TOT 3 scenario was also examined and it was determined that the proposed wind farm could not inject any power into the system in this case. In other words, the lower the flows on the TOT 3, the more the wind farm can inject into the system.

The estimated cost of designing and constructing the new PSCo interconnection facilities required to interconnect the new Customer wind turbine generation into the Pawnee Switchyard is $800,000. The estimated time required to engineer, permit, and construct the interconnection facilities would be at least 7 months. It is assumed that the Customer will engineer, permit, construct, and pay for their 18-20 mile 230 kV transmission line that will interconnect at the Pawnee Switchyard.

As a NR request, PSCo evaluated the network upgrades requirements to deliver the full 300 MW of the wind facility to PSCo native load customers. The cost of the network upgrades including interconnection facilities at Pawnee is estimated to be $42,850,000. The time required to engineer, permit, and construct these PSCo facilities is at least ~~14~~ 27 months after the execution of an Interconnection

Agreement. Given this, it will not be feasible to meet the requested December 1, 2005 in-service date. As requested, this study ~~It is~~ assumed that the Customer will engineer, permit, construct, and pay for their 18-20 mile 230 kV transmission line that will interconnect at Pawnee.

Powerflow studies show that the 300 MW injection into the PSCo system will create a number of overloads on the PSCo system and neighboring systems thus network upgrades are required to relieve these problems. See Appendix C for the contingency output results. These upgrades include an uprate of the existing Pawnee to Smoky Hill 230 kV line from its present 637 MVA rating to 800 MVA and the construction of a new double-circuit 834 MVA, 230 kV line from Pawnee to Ft. Lupton to replace the existing single-circuit 413 MVA rated 230 kV line.

Other impacts on TOT 3 and the neighboring utilities were monitored, but not addressed in the scope of this study. Should the Customer continue this request and move on to the System Impact Study, all impacts on the PSCo and neighboring utilities will be identified.

Introduction

PSCo Transmission received this large generator interconnection request (GI-2003-1) to interconnect two hundred (200) 1.5 MW, GE doubly fed induction generator (DFIG) wind turbines, for a total of 300 MW generation, with a commercial operation date of December 1, 2005 and a back feed date of June 1, 2005. The proposed wind farm would be located near Brush, Colorado and would interconnect into the PSCo transmission system via an 18-20 mile radial 230 kV line terminating at the PSCo Pawnee Station. The customer has requested that this Project be evaluated as a Network Resource (NR) and an Energy Resource (ER) with the energy going to PSCo customers.

Study Scope and Analysis

The Interconnection Feasibility Study preliminarily evaluated the feasibility of the proposed interconnection to the PSCo Transmission System. As per section 6.2 of the FERC LGIP, the Study considered the Base Case as well as all Generating Facilities (and with respect to (iii), any identified Network Upgrades) that, on the date the Interconnection Feasibility Study is commenced:

(i) are directly interconnected to the Transmission System;
(ii) are interconnected to Affected Systems and may have an impact on the Interconnection Request;
(iii) that have a pending higher queued Interconnection Request to interconnect to the Transmission System; and

(iv) have no Queue Position but have executed an LGIA or requested that an unexecuted LGIA be filed with FERC.

The Study consisted of power flow and short circuit analyses. The power flow analysis provided a preliminary identification of any thermal or voltage limit violations resulting for the interconnection; and for a NR request, a preliminary identification of network upgrades required to deliver the proposed generation. The short circuit analysis provided a preliminary identification of any circuit breaker short circuit capability limits exceeded as a result of the Interconnection and for a NR request, the delivery of the proposed generation.

PSCo adheres to NERC / WECC Reliability Criteria, as well as internal Company criteria for planning studies. During system intact conditions, criteria are to maintain transmission system bus voltages between 0.95 and 1.05 per-unit of system nominal / normal conditions, and steady state power flows within 1.0 per-unit of all elements thermal (continuous current or MVA) ratings. Operationally, PSCo tries to maintain a transmission system voltage profile ranging from 1.02 per-unit or higher at generation buses, to 1.0 per-unit or higher at transmission load buses. Following a single contingency element outage, transmission system steady state bus voltages must remain within 0.90 per-unit to 1.10 per-unit, and power flows within 1.0 per-unit of the elements continuous thermal ratings.

Power Flow Study Models:

The power flow study performed simulated high TOT 3 load flow cases that were created from an existing Western Electricity Coordinating Council (WECC) 2003 Heavy Summer Case Operating case. TOT 3 sensitivities were studied by changing the output of the Pawnee, Brush, and Laramie River generating stations that included a model of the full 300 MW output of this proposed wind farm interconnected at the PSCo Pawnee Generation Station. This study did not include a comprehensive analysis of TOT3. A full TOT 3 analysis would be part of a later Interconnection System Impact Study during which the Affected System Operators would need to take part in the system analysis. Appendix A details the transmission lines that comprise the TOT 3 interface.

As an NR request, the proposed generation will be scheduled to the Denver Metro Area and Southeast Colorado peaking units.

At this Feasibility Study stage, the 300 MW wind farm was modeled as two (2) 150 MW conventional generators with a 0.9 pu lag power factor and a 0.95 pu lead power factor capability (+73/-49 MVAR) to simulate the VAR requirements of the generators. This is on the assumption that Customer will be using the GE 1.5 MW DFIG turbines that will have power factor and voltage control capability, as proposed and stated in their request.

As previously stated, the Customer to PSCo point of interconnection (POI) will be located at PSCo's Pawnee 230 kV switch yard, terminating the Customer's 18-20 mile radial 230 kV line constructed from the Customer's wind turbine generation facility collector site to the PSCo Pawnee Station. As per the Customer's request, PSCo modeled the following:

- a 18 mile, 230 kV line using conventional 230 kV "H-frame" wood pole construction with a single 954 ACSR conductor per phase, with a 413 MVA rating.
- two 230-34.5 kV, 100/167 MVA Customer GSU transformers, located at the Customer collector site, will be modeled as connected grounded wye-delta, with 8% impedance.

Power Flow Study Results and Conclusions

Energy Resource (ER) Study Results:

The ER results were determined by using PTI's MUST program for performing power transfer limit analysis, and utilizing a PSS/E "saved case". Two cases were used each with the TOT 3 transfer path at a different load level. The first case had TOT 3 at 1449 MW, which showed that this wind project could not inject any amount of power into the PSCo transmission system unless network upgrades are constructed. The other case had the TOT 3 flows reduced to 1143 MW, which showed that 50 MW could be injected into the PSCo system. The amount that the wind project can inject into the PSCo is directly related to the loading of the TOT 3 interface. Appendix B shows the MUST transfer level results determining the 50 MW limit at 1143 MW TOT 3 loading. The cost of the interconnecting facilities at Pawnee is $800,000 and will take at least 7 months to complete construction.

Network Resource (NR) Study Results:

The NR study determined the network upgrades that will be required to accept the full 300 MW from the proposed wind farm. As stated earlier, the amount that can be injected into the PSCo transmission system is totally dependent upon the loading of the TOT 3 interface. This study examined 300 MW injections at the 1150 MW and 1450 MW levels. Appendix C at the end of this document will show the MUST single contingency analysis study results that determine the need for infrastructure.

These network upgrades include upgrading the existing 94-mile Pawnee to Smoky Hill 230 kV line from 637 MVA to 800 MVA and a rebuild of the

existing 64-mile Pawnee to Ft. Lupton 230 kV, 413 MVA single-circuit line to a double-circuit 834 MVA 230 kV line utilizing the existing right-of-way as much as possible. A system one-line diagram showing this infrastructure is shown below in Figure 1. Appendix D shows the one-line diagrams of the substations and their required changes.

Short Circuit Study Results

The short circuit analysis at Pawnee Switchyard consisted of faulting the 230kV bus at Pawnee switchyard with three-phase and phase to ground faults. Due to the lack of Customer-supplied, or other available wind-turbine generator short circuit model data, all fault values calculated for this Feasibility Study assume no fault current contribution from the Customer wind-turbine generators. More detailed short circuit models, and associated possible Customer generation fault contribution (or lack thereof) will need to be addressed in later studies, such as the Interconnection System Impact Study (SIS), or following Interconnection Facilities Study.

Short Circuit Fault Type	Estimated Fault Current (Symmetrical, RMS)
Present System	
Pawnee	
3-phase at 230kV bus	19,411 Amps
Single Line-to-Ground 230kV bus	22,307 Amps
System with Network Upgrades	
Pawnee	
3-phase at 230kV bus	22986 Amps
Single Line-to-Ground 230kV bus	25,337 Amps
Ft. Lupton	
3-phase at 230kV bus	27,337 Amps
Single Line-to-Ground 230kV bus	33,139 Amps
Smoky Hill	
3-phase at 230kV bus	31,241 Amps
Single Line-to-Ground 230kV bus	26,128 Amps

The fault current at all substations is within the breakers' 40kA rating; however, as shown the fault current at Ft. Lupton is approaching 83% of the breakers' rating.

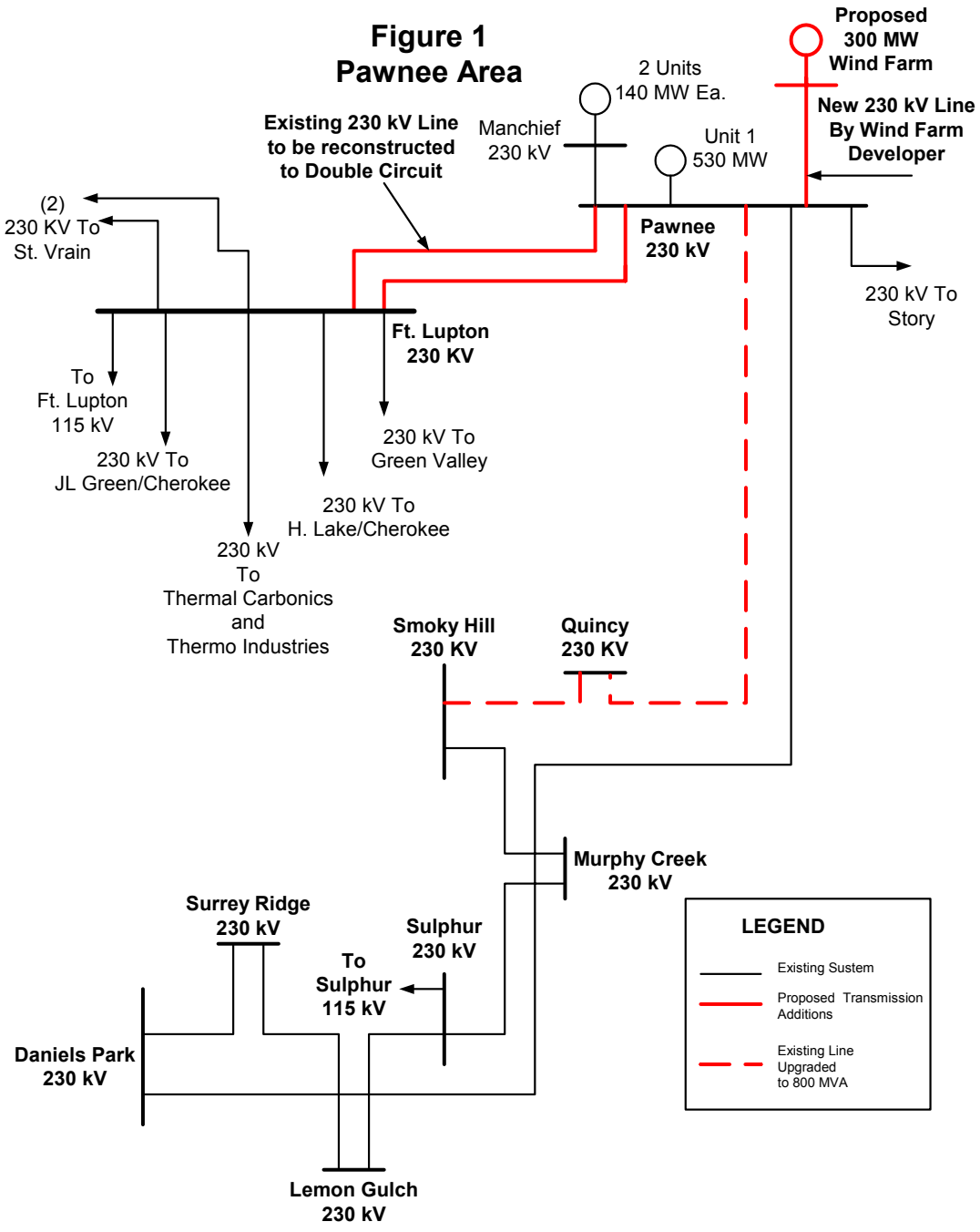
Figure 1
Pawnee Area
Proposed
300 MW
Wind Farm
2 Units
140 MW Ea.
Existing 230 kV Line
to be reconstructed
to Double Circuit
Manchief
230 kV
Unit 1
530 MW
New 230 kV Line
By Wind Farm
Developer
(2)
230 KV To
St. Vrain
Pawnee
230 kV
230 kV To
Story
Ft. Lupton
230 KV
To
Ft. Lupton
115 kV
230 kV To
JL Green/Cherokee
230 kV To
Green Valley
230 kV To
H. Lake/Cherokee
230 kV
To
Thermal Carbonics
and
Thermo Industries
Smoky Hill
230 KV
Quincy
230 KV
Murphy Creek
230 kV
Surrey Ridge
230 kV
Sulphur
230 kV
To
Sulphur
115 kV
Daniels Park
230 kV
Lemon Gulch
230 kV
LEGEND
Existing Sustem
Proposed Transmission
Additions
Existing Line
Upgraded
to 800 MVA

Costs Estimates and Assumptions:

To provide an interconnection and delivery for the Customer requested generation at the PSCo Pawnee Generation Station; network upgrades must be made on the PSCo transmission system.

The estimated indicative total cost for the PSCo network upgrades is:

$42,850,000

The estimated cost shown is an "indicative" (+/-25%) preliminary budgetary cost in 2005 dollars and is based upon typical construction costs for previously performed similar construction. These estimated costs include all applicable labor and overheads associated with the engineering, design, and construction of these new PSCo facilities. This estimate does not include any costs for any Customer-owned, supplied, and installed equipment and associated design and engineering. This estimate also does not include any costs that may, or may not be required for other entities' systems.

The following lists the improvements required to accommodate the interconnection and the delivery of the proposed 300MW facility. The cost responsibilities associated with these facilities shall be handled as per current FERC guidelines.

System Improvements (subject to change upon more detailed analysis):

PSCo Interconnection Facilities

Substation	Description	Cost
Pawnee Generation Station	Interconnect Customer's 230 kV line, which will require the relocation of the existing Pawnee to Story 230 kV line to one bay west to allow the new Customer owned line to terminate in this position. The new equipment required includes: • a new 230 kV 3000 A, 50 kA circuit breaker • 230 kV bi-directional revenue metering • two 230 kV switches • required steel supporting structures • associated control and relaying changes and additions. (See one-line in Appendix D)	$700k

	Transmission line relocation	**$50k**
	Siting and Land Rights for misc. permits	**$50k**
	Total Cost	**$800k**

PSCo Network Upgrades required to deliver the proposed 300 MW as an NR Request

	Description	**Cost**
Pawnee Generation Station	New 230 kV Line terminal to Ft. Lupton requiring the following equipment: • one new 230 kV breaker and half bay on the west side of the 230 kV switch yard • two (2) 3000 Amp, 50 kA circuit breakers • four (4) 230 kV switches • associated steel • electrical bus work • associated metering, control, and relaying (See One-line in Appendix D)	$1000k
Ft. Lupton Substation	New 230 kV 2000 Amp Line Terminal to Pawnee which will require rearranging of the existing line terminations for the Henry Lake and Green Valley lines. The following equipment will be required: • a new 230 kV breaker and a half bay on the east side of the station • three (3) 230 kV 3000 Amp 50 kA circuit breakers that includes replacing one 1600 Amp breaker • four (4) 230 kV switches • misc. supporting steel • electrical bus work • associated metering control and relaying (See One-line in Appendix D)	$1,100k
Smoky Hill Substation	Upgrade existing facilities on the Pawnee 230 kV line terminal which includes the	$300k

	Description	Cost
	following: • replace an underrated 230 kV 1600 Amp circuit breaker with a new 3000 Amp 50 kA circuit breaker • associated metering, control, and relaying	
Transmission	Rebuild existing 413 MVA 230 kV line from Pawnee to Ft. Lupton with new double circuit 230 kV 834 MVA line utilizing existing ROW as much as possible	$38,500k
	Uprate the existing Pawnee to Quincy/Smoky Hill 230kV Line to 800 MVA from 636 MVA.	$500k
Siting and Permitting	Obtain necessary siting, permits, and ROW as required	$650k
	TOTAL COST	**$42,050k**

Assumptions:

Substations

- PSCo (or its contractor) crews will perform all construction and wiring associated with PSCo-owned and maintained equipment.

- The existing 2000 Amp circuit breakers at Pawnee on the existing Ft. Lupton 230 kV line will not be replaced with 3000 Amp circuit breakers, limiting the line rating to 796 MVA or 95% of the 834 MVA line rating. This condition also exists at Ft. Lupton for both 230 kV line circuit breakers. This is subject to change upon re-evaluation in future studies.

- One 1600 Amp circuit breaker will be replaced at Ft. Lupton with a 3000 Amp, 50 kA circuit breaker.

- The location of the modified line terminations at Ft. Lupton is driven by the transmission line locations.

- The estimated time for design and construction of PSCo interconnection facilities at Pawnee Generation Station is at least 7 months.

- The estimated time for design and construction for the PSCo network upgrades is at least ~~14 months~~ **27 months** after authorization to proceed has been received, and based upon other identified assumptions for Siting and Land Rights, and Transmission (see below).

Transmission Engineering and Line Construction:

The last span into Pawnee from the Customer owned 230 kV line will be a slack span between the PSCo substation dead-end and the Customer's last structure, which is assumed to be a dead-end tangent structure.

Phase raisers required for a number structures on the Pawnee-Smoky Hill 230 kV line uprate along with one new tangent tower near Smoky Hill.

New Pawnee-Ft. Lupton double circuit 230 kV line has a two conductor bundled 954 ACSR conductors per phase. Rebuild is constructed within existing ROW except for 5-mile piece near Ft. Lupton.

Siting and Land Rights:

Assume no new land requirements at all substations and only minimal ROW (5 miles long x 75' wide) for the Pawnee-Ft. Lupton rebuild. Assume land use permitting in Weld County and City of Aurora with minimal requirements elsewhere.

Colorado State Land board issues will need to be addressed in future studies.

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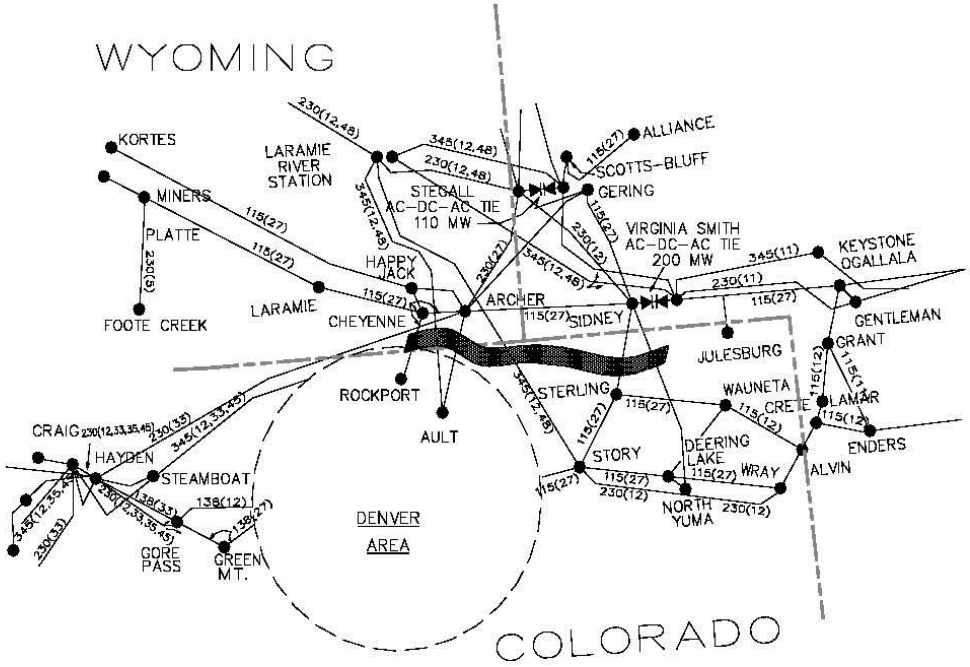
APPENDIX A
TOT 3 DETAILS

Revised February 2003

36. TOT 3



Revised February 2003

36. TOT 3

Accepted Rating ☒
Existing Rating ☐
Other ☐

Location:	Border between Northeast Colorado and Southeast Wyoming
Definition:	Sum of the flows on the following transmission lines: Line — Metered End Archer-Ault 230 kV — Archer Laramie River-Ault 345 kV — Laramie River Laramie River-Story 345 kV — Laramie River Cheyenne-Rockport 115 kV — Cheyenne Sidney-Sterling 115 kV — Sidney Sidney-N. Yuma 230 kV — Sidney
Transfer Limit:	North to South: 1605 MW (Maximum) South to North: Not defined Depending on local generation levels, DC tie levels and direction, the real-time rating can range between a maximum of 1605 W and a minimum of 843 MW. Typically, the real-time rating is calculated dynamically and updated every minute based on Table 1B.
Critical Disturbance that limits the transfer capability:	The critical disturbances and limiting elements vary with the various scenarios. Reference Table 1B for further information.
When:	Rating was first established in 1981. The current rating was established in July 1999 with publication of the "Comprehensive Progress Report for the Revised Rating of the TOT 3 Transfer Path." The study was conducted by Western and the revised rating was jointly proposed by: Western Area Power Administration (WAPA) - Loveland Tri-State Generation & Transmission Association, Inc. (TSGT) Public Service Company of Colorado (PSC) Basin Electric Power Cooperative (BEPC)
System Conditions:	This rating is independent of transfer levels between major areas of WECC. The transfer limit is impacted by local area generation and the direction and magnitude of DC tie flows. Historically, the flows have all been north to south across the path. Under certain operating conditions when TOT 3 is loaded to its limit, the TOT 5 capability cannot be used since additional schedule on TOT 5 will overload TOT 3.

Revised February 2000

Study Criteria:	(Summary) System intact: • Per unit voltages between 0.95 p.u. and 1.05 p.u. • All lines and transformers loaded to less than continuous rating. Single contingency outage conditions: • Per unit voltages between 0.90 p.u. and 1.10 p.u. • All lines loaded to less than 15-minute emergency ratings. • All transformers loaded to less than 30-minute emergency ratings. • Transient voltage swings down to 0.7 p.u. permitted.
Remedial Actions Required:	Remedial actions are required to achieve the rated transfer capability. Following an outage, all overloaded lines and transformers must have their loadings reduced to continuous ratings within 15 minutes. This is accomplished by reducing schedules and adjusting generation.
Formal Operating Procedure:	There is a formal operating procedure dated November 1999. WAPA-Loveland is the operating agent and uses real-time flows to monitor the path.
Allocation:	The transfer capability of the path is divided between WAPA, Missouri Basin Power Project (MBPP), Public Service Company of Colorado (PSC), and Tri-State Generation & Transmission (TSGT). TSGT and BEPC are members of MBPP.
Interaction w/Other Transfer Paths:	None
Contact Person:	Thu-Hong Tran Western Area Power Administration Rocky Mountain Region P. O. Box 3700 Loveland, CO 80539-3003 (970) 461-7404 (970) 461-7213 - fax trant@wapa.gov

APPENDIX B
MUST TRANSFER REPORT

Xcel Energy

AC FCITC Single Study – BASE CASE TRANSFER LIMIT

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 *** MUST 6.01  ***  WED, FEB 18 2004   9:01 ***
     WECC (2006HS1__REV  GEN DSP 12/22/03 JDW)
     FROM 2006 BUDGET CASE - TOT 3 1148
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Contin.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.CON
Exclud.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\tot3 1148.exc

 Study transfer level -      500.0 MW. Total violations: 2558
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First violation - 50.3 MW.

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Study transfer. From PAWNEE         To DENVER        . Transfer level -    500.0 MW


      AC       DC    Delta L: Limiting constraint                          PreShft PostShf           AC_TDF    DC_TDF
   FCITC    FCITC    FCITC C: Contingency description                  Ncon MVA/MW  MVA/MW  Rating  Average
    73.1     50.3     22.8 L:70192 FTLUPTON 230 70311 PAWNEE   230 1          389.4   414.2   413.5  0.33869 -0.32975
                           C:70311 PAWNEE   230 70343 QUINCY   230 1      251
                             Open 70311 PAWNEE   230 70343 QUINCY   230 1

    79.8     74.6      5.3 L:70192 FTLUPTON 230 70311 PAWNEE   230 1          387.2   414.2   413.5  0.33808 -0.32975
                           C:70343 QUINCY   230 70396 SMOKYHIL 230 1      257
                             Open 70343 QUINCY   230 70396 SMOKYHIL 230 1

   108.9    112.6     -3.7 L:73088 HOYT     115 73464 ADENA    115 1          103.5   109.0   109.0  0.05005 -0.05032
                           C:73020 BEAVERCK 115 73031 BRUSHTAP 115 1      396
                             Open 73020 BEAVERCK 115 73031 BRUSHTAP 115 1

   139.7    118.6     21.1 L:73031 BRUSHTAP 115 73305 EFMORGTP 115 1          114.6   121.9   121.7  0.05236  0.05097
                           C:73020 BEAVERCK 115 73464 ADENA    115 1      399
                             Open 73020 BEAVERCK 115 73464 ADENA    115 1

   156.7    137.8     18.9 L:70192 FTLUPTON 230 70311 PAWNEE   230 1          362.8   413.9   413.5  0.32562 -0.31149
                           C:70139 DANIELPK 230 70311 PAWNEE   230 1      128
                             Open 70139 DANIELPK 230 70311 PAWNEE   230 1
```

Exclude Report

```
 *** MUST 6.01  ***  WED, FEB 18 2004  13:34 ***
     2006HSHN BUDGET(RAL LATEST) JDW ADJUSTED
     BASE CASE NO CHANGES
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Contin.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.CON
Exclud.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\tot3 1148.exc


 *** There are no excluded contingencies


 ===== List of excluded Monitored Branches:


 73009 ARCHER   230 73190 STEGALL  230 1  LN Excluded in the base case and all contingencies

 73020 BEAVERCK 115 73464 ADENA    115 1  LN Excluded in the base case and all contingencies

 73023 BIJOUTAP 115 73379 FMWEST   115 1  LN Excluded in the base case and all contingencies

 73211 WELD  LM 115 73212 WELD  LM 230 1  TR Excluded in the base case and all contingencies
```

AC FCITC Single Study – TOT 3 at 1449 MW MW

```
 *** MUST 6.01  ***  WED, FEB 18 2004  15:03 ***
     2006HSHN HI TOT3
     BASE CASE
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Monit.File  S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.MON
Contin.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.CON
Exclud.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\tot3 1148.exc

 Study transfer level -      500.0 MW. Total violations: 3384
 First violation      -    -1025.8 MW.

Study transfer. From PAWNEE         To DENVER        . Transfer level -    500.0 MW
```

AC FCITC	DC FCITC	Delta FCITC	L: Limiting constraint C: Contingency description	Ncon	PreShft MVA/MW	PostShf MVA/MW	Rating	AC_TDF Average	DC_TDF
-1135.9	-1025.8	-110.1	L:73088 HOYT 115 73103 L.MEADOW 115 1 C:73020 BEAVERCK 115 73031 BRUSHTAP 115 1 Open 73020 BEAVERCK 115 73031 BRUSHTAP 115 1	396	62.7	40.3	40.0	0.01973	0.02198
-815.9	-764.7	-51.2	L:73088 HOYT 115 73103 L.MEADOW 115 1 C:73031 BRUSHTAP 115 73305 EFMORGTP 115 1 Open 73031 BRUSHTAP 115 73305 EFMORGTP 115 1	417	56.7	40.1	40.0	0.02029	0.02198
-378.9	-416.6	37.7	L:73088 HOYT 115 73103 L.MEADOW 115 1 C:73305 EFMORGTP 115 73379 FMWEST 115 1 Open 73305 EFMORGTP 115 73379 FMWEST 115 1	630	48.3	40.3	40.0	0.02127	0.02198
-305.3	-355.2	49.9	L:70474 WINDSOR 230 73011 AULT 230 1 C:70471 WELD PS 230 73212 WELD LM 230 1 Open 70471 WELD PS 230 73212 WELD LM 230 1	322	532.0	494.2	494.8	0.12401	-0.10294

```
-295.4  -305.6    10.2 L:70474 WINDSOR  230 73011 AULT     230 1         535.3   494.2   494.8  0.13923 -0.11705
                       C:70410 ST.VRAIN 230 70471 WELD  PS 230 1     290
                         Open 70410 ST.VRAIN 230 70471 WELD  PS 230 1
```

APPENDIX C
MUST CONTINGENCY REPORTS

Xcel Energy

Branch Violations – 1148 MW TOT 3 Base Case

MUST 6.01 *** FRI, FEB 06 2004 10:32
WECC (2006HS1__REV GEN DSP 12/22/03 JDW)
FROM 2006 BUDGET CASE - TOT 3 1148
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Monit.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.MON
Contin.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.CON
Exclud.File none

***** Report on violations ********

Branches with MVA flow more than 100.0 % of nominal rating

** From bus ** ** To bus ** CKT	TP	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
70005 BRUSHCPP 115 73013 B.CK PS 115 2	LN	236.5	122.7	**187.0**	126.5	6	70005 BRUSHCPP 115 73013 B.CK PS 115 1
70005 BRUSHCPP 115 73013 B.CK PS 115 1	LN	236.0	115.1	**162.0**	145.7	7	70005 BRUSHCPP 115 73013 B.CK PS 115 2
70439 UNC 115 70502 QF UNC 13.8 1	TR	77.0	76.1	76.8	100.3	8	70010 QF MNFRT13.8 70290 MONFORT 115 1
70264 LITTLET2 115 70463 WATERTON 115 1	LN	139.9	56.4	**135.0**	103.6	24	70037 ARAPAHOB 115 70165 ENGLE3TP 115 1
70336 PUEB-TAP 115 70412 STEM BCH 115 1	LN	120.9	24.1	77.0	157.0	119	70122 COMANCHE 230 70459 WALSENBG 230 1
70336 PUEB-TAP 115 70456 W.STATON 115 1	LN	128.5	29.0	77.0	166.9	119	70122 COMANCHE 230 70459 WALSENBG 230 1
70412 STEM BCH 115 70458 WALSENBG 115 1	LN	93.1	16.7	77.0	120.9	119	70122 COMANCHE 230 70459 WALSENBG 230 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	77.7	76.1	76.8	101.1	320	70470 WELD PS 115 70471 WELD PS 230 2
70439 UNC 115 70502 QF UNC 13.8 1	TR	77.0	76.1	76.8	100.3	321	70470 WELD PS 115 73211 WELD LM 115 1
73211 WELD LM 115 73212 WELD LM 230 1	TR	163.0	95.7	**150.0**	108.7	322	70471 WELD PS 230 73212 WELD LM 230 1
73008 ARCHER 115 73043 CHEYENNE 115 1	LN	95.7	54.1	80.0	119.6	373	73008 ARCHER 115 73480 CROWCRK 115 1
73009 ARCHER 230 73190 STEGALL 230 1	LN	370.4	235.5	**319.0**	116.1	384	73012 AULT 345 73108 LAR.RIVR 345 1
73013 B.CK PS 115 73014 B.CK PS 230 1	TR	231.8	23.9	**224.0**	103.5	386	73013 B.CK PS 115 73020 BEAVERCK 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	63.1	8.7	40.0	157.7	396	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73103 L.MEADOW 115 73213 WIGGINS 115 1	LN	60.6	6.4	59.6	101.7	396	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	80.4	52.5	80.0	100.6	399	73020 BEAVERCK 115 73464 ADENA 115 1
73039 CARTERLK 115 73058 FLATIRON 115 1	LN	84.8	49.3	80.0	106.0	406	73026 BOYD 115 73027 BOYD 230 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	57.1	8.7	40.0	142.9	417	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73039 CARTERLK 115 73058 FLATIRON 115 1	LN	87.7	49.3	80.0	109.6	494	73078 HARMONY 230 73199 TIMBERLN 230 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	48.9	8.7	40.0	122.2	630	73305 EFMORGTP 115 73379 FMWEST 115 1

DRAFT

** From bus **	** To bus **	CKT	TP	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
73384 BIRDSALE 115	73386 BIRDSALS34.5	1	TR	28.3	18.0	27.0	105.0	642	73382 BIRDSAL213.8 73386 BIRDSALS34.5 1
73384 BIRDSALE 115	73386 BIRDSALS34.5	1	TR	29.5	18.0	27.0	109.2	643	73383 BIRDSAL313.8 73386 BIRDSALS34.5 1
73384 BIRDSALE 115	73386 BIRDSALS34.5	1	TR	28.0	18.0	27.0	103.7	823	GEN.Outage:73382 BIRDSAL213.8
73384 BIRDSALE 115	73386 BIRDSALS34.5	1	TR	28.0	18.0	27.0	103.7	824	GEN.Outage:73383 BIRDSAL313.8

Branch Violations – 1148 MW BASE WITH NEW 300 MW GENERATION ADDED

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 *** MUST 6.01  ***  FRI, FEB 06 2004  10:53 ***
                       WECC (2006HS1__REV  GEN DSP 12/22/03 JDW)
                       TOT 3 @ 1135 MW / BRUSH WIND ADDED03 JDW)
Subsys.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.SUB
Monit.File  S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.MON
Contin.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.CON
Exclud.File none


 ************** Report on violations ********************
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Branches with MVA flow more than 100.0 % of nominal Rating

*** From bus ***	To bus ***	CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
70005 BRUSHCPP 115	73013 B.CK PS 115	2	LN	237.5	123.3	**187.0**	127.0	6	70005 BRUSHCPP 115 73013 B.CK PS 115 1
70005 BRUSHCPP 115	73013 B.CK PS 115	1	LN	236.9	115.7	**162.0**	146.2	7	70005 BRUSHCPP 115 73013 B.CK PS 115 2
70439 UNC 115	70502 QF UNC 13.8	1	TR	77.5	76.4	76.8	100.9	11	70010 QF MNFRT13.8 70290 MONFORT 115 1
70264 LITTLET2 115	70463 WATERTON 115	1	LN	141.2	55.1	**135.0**	104.6	27	70037 ARAPAHOB 115 70165 ENGLE3TP 115 1
70439 UNC 115	70502 QF UNC 13.8	1	TR	77.2	76.4	76.8	100.5	97	70106 CHEROK4 22.0 70108 CHEROKEE 115 1
70336 PUEB-TAP 115	70412 STEM BCH 115	1	LN	117.6	23.1	77.0	152.7	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70336 PUEB-TAP 115	70456 W.STATON 115	1	LN	125.2	27.7	77.0	162.6	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70412 STEM BCH 115	70458 WALSENBG 115	1	LN	90.4	16.5	77.0	117.4	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70192 FTLUPTON 230	70311 PAWNEE 230	1	LN	454.4	340.4	**413.5**	109.9	131	70139 DANIELPK 230 70311 PAWNEE 230 1
70439 UNC 115	70502 QF UNC 13.8	1	TR	77.1	76.4	76.8	100.4	131	70139 DANIELPK 230 70311 PAWNEE 230 1
70439 UNC 115	70502 QF UNC 13.8	1	TR	77.0	76.4	76.8	100.2	182	70192 FTLUPTON 230 70311 PAWNEE 230 1
73023 BIJOUTAP 115	73379 FMWEST 115	1	LN	80.8	61.9	80.0	101.0	182	70192 FTLUPTON 230 70311 PAWNEE 230 1
70439 UNC 115	70502 QF UNC 13.8	1	TR	76.9	76.4	76.8	100.2	200	70209 GREELEY 115 70290 MONFORT 115 1
70192 FTLUPTON 230	70311 PAWNEE 230	1	LN	486.6	340.4	**413.5**	117.7	254	70311 PAWNEE 230 70343 QUINCY 230 1
70439 UNC 115	70502 QF UNC 13.8	1	TR	77.4	76.4	76.8	100.7	254	70311 PAWNEE 230 70343 QUINCY 230 1

73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	81.4	61.9	80.0	101.7	254	70311 PAWNEE 230 70343 QUINCY 230 1
70192 FTLUPTON 230 70311 PAWNEE 230 1	LN	484.2	340.4	**413.5**	117.1	260	70343 QUINCY 230 70396 SMOKYHIL 230 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	77.3	76.4	76.8	100.7	260	70343 QUINCY 230 70396 SMOKYHIL 230 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	81.0	61.9	80.0	101.3	260	70343 QUINCY 230 70396 SMOKYHIL 230 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	77.0	76.4	76.8	100.3	265	70350 RAWHIDE 24.0 73165 RAWHIDE 230 1
***** From bus *** To bus *** CKT**	**Tp**	**ContMVA**	**BaseFlow**	**Rating**	**Loading%**	**Ncon**	**Contingency**
70439 UNC 115 70502 QF UNC 13.8 1	TR	76.8	76.4	76.8	100.1	288	70406 ST.VR 2 18.0 70410 ST.VRAIN 230 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	76.8	76.4	76.8	100.1	289	70407 ST.VR 3 18.0 70410 ST.VRAIN 230 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	76.9	76.4	76.8	100.2	290	70408 ST.VR 4 18.0 70410 ST.VRAIN 230 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	77.1	76.4	76.8	100.4	291	70409 ST.VRAIN22.0 70410 ST.VRAIN 230 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	76.8	76.4	76.8	100.0	310	70444 VALMONT 115 70446 VALMONT 20.0 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	78.1	76.4	76.8	101.7	323	70470 WELD PS 115 70471 WELD PS 230 2
73211 WELD LM 115 73212 WELD LM 230 1	TR	162.7	92.5	**150.0**	108.5	325	70471 WELD PS 230 73212 WELD LM 230 1
73008 ARCHER 115 73043 CHEYENNE 115 1	LN	97.0	54.9	80.0	121.3	376	73008 ARCHER 115 73480 CROWCRK 115 1
70192 FTLUPTON 230 70311 PAWNEE 230 1	LN	441.3	340.4	**413.5**	106.7	387	73012 AULT 345 73108 LAR.RIVR 345 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	77.2	76.4	76.8	100.6	387	73012 AULT 345 73108 LAR.RIVR 345 1
73009 ARCHER 230 73190 STEGALL 230 1	LN	390.0	245.4	**319.0**	122.3	387	73012 AULT 345 73108 LAR.RIVR 345 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	89.6	61.9	80.0	112.0	387	73012 AULT 345 73108 LAR.RIVR 345 1
73305 EFMORGTP 115 73031 BRUSHTAP 115 1	LN	125.2	96.7	**121.7**	102.9	387	73012 AULT 345 73108 LAR.RIVR 345 1
73013 B.CK PS 115 73014 B.CK PS 230 1	TR	232.1	35.8	**224.0**	103.6	389	73013 B.CK PS 115 73020 BEAVERCK 115 1
73015 B.CK TRI 115 73020 BEAVERCK 115 1	LN	206.0	28.1	**200.0**	103.0	389	73013 B.CK PS 115 73020 BEAVERCK 115 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	76.9	76.4	76.8	100.1	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73020 BEAVERCK 115 73464 ADENA 115 1	LN	118.7	74.3	**109.0**	108.9	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	68.6	8.9	40.0	171.4	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73088 HOYT 115 73464 ADENA 115 1	LN	116.6	72.3	**109.0**	107.0	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73103 L.MEADOW 115 73213 WIGGINS 115 1	LN	66.0	6.6	59.6	110.8	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	93.8	61.9	80.0	117.2	402	73020 BEAVERCK 115 73464 ADENA 115 1
73305 EFMORGTP 115 73031 BRUSHTAP 115 1	LN	128.2	96.7	**121.7**	105.3	402	73020 BEAVERCK 115 73464 ADENA 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	41.9	8.9	40.0	104.7	404	73023 BIJOUTAP 115 73379 FMWEST 115 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	77.0	76.4	76.8	100.2	409	73026 BOYD 115 73027 BOYD 230 1
73039 CARTERLK 115 73058 FLATIRON 115 1	LN	84.4	49.5	80.0	105.6	409	73026 BOYD 115 73027 BOYD 230 1
73020 BEAVERCK 115 73464 ADENA 115 1	LN	114.7	74.3	**109.0**	105.2	420	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	62.6	8.9	40.0	156.6	420	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73088 HOYT 115 73464 ADENA 115 1	LN	112.6	72.3	**109.0**	103.3	420	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73103 L.MEADOW 115 73213 WIGGINS 115 1	LN	60.2	6.6	59.6	101.0	420	73031 BRUSHTAP 115 73305 EFMORGTP 115 1

*** From bus *** To bus *** CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
73008 ARCHER 115 73043 CHEYENNE 115 1	LN	80.9	54.9	80.0	101.2	436	73043 CHEYENNE 115 73480 CROWCRK 115 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	76.8	76.4	76.8	100.0	497	73078 HARMONY 230 73199 TIMBERLN 230 1
73039 CARTERLK 115 73058 FLATIRON 115 1	LN	89.1	49.5	80.0	111.4	497	73078 HARMONY 230 73199 TIMBERLN 230 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	92.9	61.9	80.0	116.1	506	73088 HOYT 115 73464 ADENA 115 1
73305 EFMORGTP 115 73031 BRUSHTAP 115 1	LN	127.3	96.7	**121.7**	104.6	506	73088 HOYT 115 73464 ADENA 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	54.4	8.9	40.0	136.1	633	73305 EFMORGTP 115 73379 FMWEST 115 1
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	28.5	17.9	27.0	105.4	645	73382 BIRDSAL213.8 73386 BIRDSALS34.5 1
***** From bus *** To bus *** CKT**	**Tp**	**ContMVA**	**BaseFlow**	**Rating**	**Loading%**	**Ncon**	**Contingency**
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	29.5	17.9	27.0	109.2	646	73383 BIRDSAL313.8 73386 BIRDSALS34.5 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	76.8	76.4	76.8	100.1	700	73531 LINCOLNT 230 73413 MIDWAYBR 230 1
70439 UNC 115 70502 QF UNC 13.8 1	TR	77.1	76.4	76.8	100.4	767	GEN.Outage:70106 CHEROK4 22.0
70439 UNC 115 70502 QF UNC 13.8 1	TR	76.8	76.4	76.8	100.0	778	GEN.Outage:70409 ST.VRAIN22.0
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	28.0	17.9	27.0	103.7	825	GEN.Outage:73382 BIRDSAL213.8
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	28.0	17.9	27.0	103.7	826	GEN.Outage:73383 BIRDSAL313.8

Branch Violations – NEW 300 MW GENERATION AND INFRASTRUCTURE

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 *** MUST 6.01  ***  FRI, FEB 06 2004  13:17 ***
     WECC (2006HS1__REV  GEN DSP 12/22/03 JDW)
      TOT 3 @ 1135 MW / BRUSH WIND ADDED WITH 2ND PAW-FT. LUPTON
Subsys.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.SUB
Monit.File  S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.MON
Contin.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.CON
Exclud.File none


 ************** Report on violations ********************
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Branches with MVA flow more than 100.0 % of nominal rating

** From bus **	** To bus **	CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
70005 BRUSHCPP	115 73013 B.CK PS	115 2	LN	237.0	123.0	**187.0**	126.7	6	70005 BRUSHCPP 115 73013 B.CK PS 115 1
70005 BRUSHCPP	115 73013 B.CK PS	115 1	LN	236.4	115.4	**162.0**	145.9	7	70005 BRUSHCPP 115 73013 B.CK PS 115 2
70439 UNC	115 70502 QF UNC	13.8 1	TR	77.1	76.2	76.8	100.4	11	70010 QF MNFRT13.8 70290 MONFORT 115 1
70264 LITTLET2	115 70463 WATERTON	115 1	LN	140.4	53.9	**135.0**	104.0	27	70037 ARAPAHOB 115 70165 ENGLE3TP 115 1
70336 PUEB-TAP	115 70412 STEM BCH	115 1	LN	117.5	23.4	77.0	152.6	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70336 PUEB-TAP	115 70456 W.STATON	115 1	LN	125.1	28.1	77.0	162.5	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70412 STEM BCH	115 70458 WALSENBG	115 1	LN	90.3	16.5	77.0	117.3	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70439 UNC	115 70502 QF UNC	13.8 1	TR	77.9	76.2	76.8	101.4	324	70470 WELD PS 115 70471 WELD PS 230 2
70439 UNC	115 70502 QF UNC	13.8 1	TR	77.1	76.2	76.8	100.4	325	70470 WELD PS 115 73211 WELD LM 115 1
73211 WELD LM	115 73212 WELD LM	230 1	TR	162.6	103.1	**150.0**	108.4	326	70471 WELD PS 230 73212 WELD LM 230 1
73008 ARCHER	115 73043 CHEYENNE	115 1	LN	94.6	53.4	80.0	118.2	377	73008 ARCHER 115 73480 CROWCRK 115 1
73009 ARCHER	230 73190 STEGALL	230 1	LN	349.3	228.2	**319.0**	109.5	388	73012 AULT 345 73108 LAR.RIVR 345 1
73013 B.CK PS	115 73014 B.CK PS	230 1	TR	231.9	24.2	**224.0**	103.5	390	73013 B.CK PS 115 73020 BEAVERCK 115 1

73088	HOYT	115	73103	L.MEADOW	115	1	LN	59.2	8.7	40.0	148.0	400	73020	BEAVERCK	115	73031	BRUSHTAP	115	1
73039	CARTERLK	115	73058	FLATIRON	115	1	LN	85.4	48.4	80.0	106.7	410	73026	BOYD	115	73027	BOYD	230	1
73088	HOYT	115	73103	L.MEADOW	115	1	LN	53.2	8.7	40.0	133.1	421	73031	BRUSHTAP	115	73305	EFMORGTP	115	1
73039	CARTERLK	115	73058	FLATIRON	115	1	LN	85.7	48.4	80.0	107.2	498	73078	HARMONY	230	73199	TIMBERLN	230	1
**	From bus	**	**	To bus	**	CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency									
73179	SIDNEY	115	73180	SIDNEY	230	1	TR	168.1	115.5	**167.0**	100.6	569	73143	N.YUMA	230	73180	SIDNEY	230	1
73088	HOYT	115	73103	L.MEADOW	115	1	LN	44.9	8.7	40.0	112.2	634	73305	EFMORGTP	115	73379	FMWEST	115	1
73384	BIRDSALE	115	73386	BIRDSALS	34.5	1	TR	28.3	18.0	27.0	104.9	646	73382	BIRDSAL2	13.8	73386	BIRDSALS	34.5	1
73384	BIRDSALE	115	73386	BIRDSALS	34.5	1	TR	29.5	18.0	27.0	109.2	647	73383	BIRDSAL3	13.8	73386	BIRDSALS	34.5	1
73384	BIRDSALE	115	73386	BIRDSALS	34.5	1	TR	28.0	18.0	27.0	103.7	826	GEN.Outage:73382 BIRDSAL2 13.8									
73384	BIRDSALE	115	73386	BIRDSALS	34.5	1	TR	28.0	18.0	27.0	103.7	827	GEN.Outage:73383 BIRDSAL3 13.8									

Branch Violations – TOT 3 1450 MW BASE

*** MUST 6.01 *** FRI, FEB 06 2004 13:39 ***
2006HSHN HI TOT3
BASE CASE
Subsys.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.SUB
Monit.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.MON
Contin.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.CON
Exclud.File none

********** Report on violations **********

Branches with MVA flow more than 100.0 % of nominal rating

** From bus ** ** To bus ** CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
70005 BRUSHCPP 115 73013 B.CK PS 115 2	LN	236.7	122.8	187.0	126.6	6	70005 BRUSHCPP 115 73013 B.CK PS 115 1
70005 BRUSHCPP 115 73013 B.CK PS 115 1	LN	236.2	115.3	162.0	145.8	7	70005 BRUSHCPP 115 73013 B.CK PS 115 2
70264 LITTLET2 115 70463 WATERTON 115 1	LN	140.7	58.0	135.0	104.2	24	70037 ARAPAHOB 115 70165 ENGLE3TP 115 1
70073 CALIFOR1 115 70299 NORTH542 115 1	LN	151.0	121.2	150.0	100.7	29	70039 ARGO 115 70108 CHEROKEE 115 1
70087 CAPHILL1 115 70300 NORTH547 115 1	LN	157.6	115.7	150.0	105.1	29	70039 ARGO 115 70108 CHEROKEE 115 1
70087 CAPHILL1 115 70300 NORTH547 115 1	LN	152.1	115.7	150.0	101.4	71	70073 CALIFOR1 115 70299 NORTH542 115 1
70073 CALIFOR1 115 70299 NORTH542 115 1	LN	164.5	121.2	150.0	109.7	77	70088 CAPHILL2 115 70215 HARRISPS 115 1
70073 CALIFOR1 115 70299 NORTH542 115 1	LN	155.7	121.2	150.0	103.8	98	70107 CHEROKEE 230 70324 LACOMBE 230 1
70087 CAPHILL1 115 70300 NORTH547 115 1	LN	156.0	115.7	150.0	104.0	98	70107 CHEROKEE 230 70324 LACOMBE 230 1
70215 HARRISPS 115 70259 LEETSDAL 115 1	LN	152.5	107.6	150.0	101.6	98	70107 CHEROKEE 230 70324 LACOMBE 230 1
70073 CALIFOR1 115 70299 NORTH542 115 1	LN	155.3	121.2	150.0	103.6	107	70108 CHEROKEE 115 70276 MAPLETO1 115 1
70087 CAPHILL1 115 70300 NORTH547 115 1	LN	152.4	115.7	150.0	101.6	110	70108 CHEROKEE 115 70299 NORTH542 115 2
70336 PUEB-TAP 115 70412 STEM BCH 115 1	LN	108.4	25.8	77.0	140.8	119	70122 COMANCHE 230 70459 WALSENBG 230 1
70336 PUEB-TAP 115 70456 W.STATON 115 1	LN	115.8	30.6	77.0	150.4	119	70122 COMANCHE 230 70459 WALSENBG 230 1
70412 STEM BCH 115 70458 WALSENBG 115 1	LN	82.9	18.1	77.0	107.7	119	70122 COMANCHE 230 70459 WALSENBG 230 1

73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	239.5	210.1	**239.0**	100.2	128	70139 DANIELPK 230 70311 PAWNEE 230 1
70073 CALIFOR1 115 70299 NORTH542 115 1	LN	150.9	121.2	**150.0**	100.6	151	70149 DENVTM 230 70324 LACOMBE 230 1
**** From bus ** ** To bus ** CKT**	**Tp**	**ContMVA**	**BaseFlow**	**Rating**	**Loading%**	**Ncon**	**Contingency**
70087 CAPHILL1 115 70300 NORTH547 115 1	LN	150.5	115.7	**150.0**	100.4	151	70149 DENVTM 230 70324 LACOMBE 230 1
70073 CALIFOR1 115 70299 NORTH542 115 1	LN	150.1	121.2	**150.0**	100.1	236	70276 MAPLETO1 115 70300 NORTH547 115 1
70192 FTLUPTON 230 70311 PAWNEE 230 1	LN	417.5	283.0	**413.5**	101.0	251	70311 PAWNEE 230 70343 QUINCY 230 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	241.0	210.1	**239.0**	100.8	251	70311 PAWNEE 230 70343 QUINCY 230 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	83.1	52.6	80.0	103.9	252	70311 PAWNEE 230 73192 STORY 230 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	257.0	210.1	**239.0**	107.5	252	70311 PAWNEE 230 73192 STORY 230 1
70192 FTLUPTON 230 70311 PAWNEE 230 1	LN	415.2	283.0	**413.5**	100.4	257	70343 QUINCY 230 70396 SMOKYHIL 230 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	240.4	210.1	**239.0**	100.6	257	70343 QUINCY 230 70396 SMOKYHIL 230 1
70410 ST.VRAIN 230 70474 WINDSOR 230 1	LN	516.8	364.4	**495.0**	104.4	290	70410 ST.VRAIN 230 70471 WELD PS 230 1
70474 WINDSOR 230 73011 AULT 230 1	LN	535.3	382.8	**494.8**	108.2	290	70410 ST.VRAIN 230 70471 WELD PS 230 1
70410 ST.VRAIN 230 70474 WINDSOR 230 1	LN	513.2	364.4	**495.0**	103.7	322	70471 WELD PS 230 73212 WELD LM 230 1
70474 WINDSOR 230 73011 AULT 230 1	LN	532.0	382.8	**494.8**	107.5	322	70471 WELD PS 230 73212 WELD LM 230 1
73211 WELD LM 115 73212 WELD LM 230 1	TR	185.6	104.5	**150.0**	123.8	322	70471 WELD PS 230 73212 WELD LM 230 1
73008 ARCHER 115 73043 CHEYENNE 115 1	LN	97.9	55.4	80.0	122.4	373	73008 ARCHER 115 73480 CROWCRK 115 1
73009 ARCHER 230 73190 STEGALL 230 1	LN	442.6	261.8	**319.0**	138.7	384	73012 AULT 345 73108 LAR.RIVR 345 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	86.3	52.6	80.0	107.9	384	73012 AULT 345 73108 LAR.RIVR 345 1
73031 BRUSHTAP 115 73305 EFMORGTP 115 1	LN	121.9	87.4	**121.7**	100.2	384	73012 AULT 345 73108 LAR.RIVR 345 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	239.3	210.1	**239.0**	100.1	384	73012 AULT 345 73108 LAR.RIVR 345 1
73013 B.CK PS 115 73014 B.CK PS 230 1	TR	231.1	19.7	**224.0**	103.2	386	73013 B.CK PS 115 73020 BEAVERCK 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	62.7	7.9	40.0	156.8	396	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73103 L.MEADOW 115 73213 WIGGINS 115 1	LN	60.2	5.7	59.6	101.0	396	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	81.0	52.6	80.0	101.3	399	73020 BEAVERCK 115 73464 ADENA 115 1
73039 CARTERLK 115 73058 FLATIRON 115 1	LN	84.8	50.3	80.0	106.0	406	73026 BOYD 115 73027 BOYD 230 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	56.7	7.9	40.0	141.7	417	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73008 ARCHER 115 73043 CHEYENNE 115 1	LN	81.8	55.4	80.0	102.3	433	73043 CHEYENNE 115 73480 CROWCRK 115 1
70474 WINDSOR 230 73011 AULT 230 1	LN	507.3	382.8	**494.8**	102.5	494	73078 HARMONY 230 73199 TIMBERLN 230 1
73039 CARTERLK 115 73058 FLATIRON 115 1	LN	94.3	50.3	80.0	117.9	494	73078 HARMONY 230 73199 TIMBERLN 230 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	80.1	52.6	80.0	100.2	503	73088 HOYT 115 73464 ADENA 115 1
73150 PEETZ 115 73191 STERLING 115 1	LN	87.6	55.4	85.1	103.0	565	73143 N.YUMA 230 73180 SIDNEY 230 1
73179 SIDNEY 115 73180 SIDNEY 230 1	TR	175.8	119.6	**167.0**	105.3	565	73143 N.YUMA 230 73180 SIDNEY 230 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	48.3	7.9	40.0	120.8	630	73305 EFMORGTP 115 73379 FMWEST 115 1

73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	28.4	18.0	27.0	105.0	642	73382 BIRDSAL213.8 73386 BIRDSALS34.5 1
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	29.5	18.0	27.0	109.1	643	73383 BIRDSAL313.8 73386 BIRDSALS34.5 1
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	28.0	18.0	27.0	103.7	824	GEN.Outage:73382 BIRDSAL213.8
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	28.0	18.0	27.0	103.8	825	GEN.Outage:73383 BIRDSAL313.8

Branch Violations – 1450 BASE WITH NEW 300 MW GENERATION

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 *** MUST 6.01  ***  THU, FEB 19 2004  15:09 ***
     2006HSHN HI TOT3 WITH 300 MW BRUSH WIND FARM
     BASE CASE
Subsys.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.SUB
Monit.File  S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.MON
Contin.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.CON
Exclud.File none


 ************** Report on violations ********************
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Branches with MVA flow more than 100.0 % of nominal rating

** From bus **	To bus ** CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
70005 BRUSHCPP 115	73013 B.CK PS 115 2	LN	237.9	123.5	187.0	127.2	6	70005 BRUSHCPP 115 73013 B.CK PS 115 1
70005 BRUSHCPP 115	73013 B.CK PS 115 1	LN	237.3	116.0	162.0	146.5	7	70005 BRUSHCPP 115 73013 B.CK PS 115 2
70264 LITTLET2 115	70463 WATERTON 115 1	LN	142.5	56.8	135.0	105.6	27	70037 ARAPAHOB 115 70165 ENGLE3TP 115 1
70073 CALIFOR1 115	70299 NORTH542 115 1	LN	152.5	122.2	150.0	101.6	32	70039 ARGO 115 70108 CHEROKEE 115 1
70087 CAPHILL1 115	70300 NORTH547 115 1	LN	159.1	116.6	150.0	106.1	32	70039 ARGO 115 70108 CHEROKEE 115 1
70087 CAPHILL1 115	70300 NORTH547 115 1	LN	153.4	116.6	150.0	102.3	74	70073 CALIFOR1 115 70299 NORTH542 115 1
70073 CALIFOR1 115	70299 NORTH542 115 1	LN	151.3	122.2	150.0	100.9	78	70087 CAPHILL1 115 70300 NORTH547 115 1
70073 CALIFOR1 115	70299 NORTH542 115 1	LN	165.5	122.2	150.0	110.4	80	70088 CAPHILL2 115 70215 HARRISPS 115 1
73531 LINCOLNT 230	73413 MIDWAYBR 230 1	LN	239.3	234.3	239.0	100.1	97	70106 CHEROK4 22.0 70108 CHEROKEE 115 1
70073 CALIFOR1 115	70299 NORTH542 115 1	LN	158.2	122.2	150.0	105.4	101	70107 CHEROKEE 230 70324 LACOMBE 230 1
70087 CAPHILL1 115	70300 NORTH547 115 1	LN	158.5	116.6	150.0	105.7	101	70107 CHEROKEE 230 70324 LACOMBE 230 1
70073 CALIFOR1 115	70299 NORTH542 115 1	LN	156.8	122.2	150.0	104.5	110	70108 CHEROKEE 115 70276 MAPLETO1 115 1
70087 CAPHILL1 115	70300 NORTH547 115 1	LN	153.7	116.6	150.0	102.5	113	70108 CHEROKEE 115 70299 NORTH542 115 2
73531 LINCOLNT 230	73413 MIDWAYBR 230 1	LN	248.9	234.3	239.0	104.1	118	70119 COMAN 1 24.0 70122 COMANCHE 230 1
73531 LINCOLNT 230	73413 MIDWAYBR 230 1	LN	247.2	234.3	239.0	103.4	119	70120 COMAN 2 24.0 70122 COMANCHE 230 1

** From bus **	** To bus **	CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
70336 PUEB-TAP	70412 STEM BCH	115 1	LN	105.3	24.8	77.0	136.7	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70336 PUEB-TAP	70456 W.STATON	115 1	LN	112.6	29.3	77.0	146.3	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70412 STEM BCH	70458 WALSENBG	115 1	LN	80.3	17.8	77.0	104.3	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70192 FTLUPTON 230	70311 PAWNEE	230 1	LN	485.3	355.7	413.5	117.4	131	70139 DANIELPK 230 70311 PAWNEE 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	269.8	234.3	239.0	112.9	131	70139 DANIELPK 230 70311 PAWNEE 230 1
70073 CALIFOR1 115	70299 NORTH542	115 1	LN	153.2	122.2	150.0	102.2	154	70149 DENVTM 230 70324 LACOMBE 230 1
70087 CAPHILL1 115	70300 NORTH547	115 1	LN	152.9	116.6	150.0	101.9	154	70149 DENVTM 230 70324 LACOMBE 230 1
73023 BIJOUTAP 115	73379 FMWEST	115 1	LN	82.7	62.4	80.0	103.3	182	70192 FTLUPTON 230 70311 PAWNEE 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	258.7	234.3	239.0	108.2	182	70192 FTLUPTON 230 70311 PAWNEE 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	239.6	234.3	239.0	100.3	189	70192 FTLUPTON 230 70529 JLGREEN 230 1
70073 CALIFOR1 115	70299 NORTH542	115 1	LN	151.5	122.2	150.0	101.0	239	70276 MAPLETO1 115 70300 NORTH547 115 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	239.9	234.3	239.0	100.4	248	70297 NIWOT 230 70544 ISABELLE 230 1
70192 FTLUPTON 230	70311 PAWNEE	230 1	LN	517.5	355.7	413.5	125.1	254	70311 PAWNEE 230 70343 QUINCY 230 1
73023 BIJOUTAP 115	73379 FMWEST	115 1	LN	84.1	62.4	80.0	105.1	254	70311 PAWNEE 230 70343 QUINCY 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	272.0	234.3	239.0	113.8	254	70311 PAWNEE 230 70343 QUINCY 230 1
73023 BIJOUTAP 115	73379 FMWEST	115 1	LN	82.0	62.4	80.0	102.5	255	70311 PAWNEE 230 73192 STORY 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	264.5	234.3	239.0	110.7	255	70311 PAWNEE 230 73192 STORY 230 1
70192 FTLUPTON 230	70311 PAWNEE	230 1	LN	515.0	355.7	413.5	124.5	260	70343 QUINCY 230 70396 SMOKYHIL 230 1
73023 BIJOUTAP 115	73379 FMWEST	115 1	LN	83.7	62.4	80.0	104.6	260	70343 QUINCY 230 70396 SMOKYHIL 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	271.4	234.3	239.0	113.6	260	70343 QUINCY 230 70396 SMOKYHIL 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	239.6	234.3	239.0	100.2	292	70410 ST.VRAIN 230 70447 VALMONT 230 1
70410 ST.VRAIN 230	70474 WINDSOR	230 1	LN	541.6	380.6	495.0	109.4	293	70410 ST.VRAIN 230 70471 WELD PS 230 1
70474 WINDSOR 230	73011 AULT	230 1	LN	560.3	399.2	494.8	113.2	293	70410 ST.VRAIN 230 70471 WELD PS 230 1
70410 ST.VRAIN 230	70471 WELD PS	230 1	LN	511.5	318.5	500.0	102.3	294	70410 ST.VRAIN 230 70474 WINDSOR 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	240.1	234.3	239.0	100.5	295	70410 ST.VRAIN 230 70544 ISABELLE 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	239.5	234.3	239.0	100.2	318	70461 WASHINGT 230 70529 JLGREEN 230 1
70410 ST.VRAIN 230	70474 WINDSOR	230 1	LN	535.0	380.6	495.0	108.1	325	70471 WELD PS 230 73212 WELD LM 230 1
70474 WINDSOR 230	73011 AULT	230 1	LN	554.1	399.2	494.8	112.0	325	70471 WELD PS 230 73212 WELD LM 230 1
73211 WELD LM 115	73212 WELD LM	230 1	TR	186.3	106.9	150.0	124.2	325	70471 WELD PS 230 73212 WELD LM 230 1
70410 ST.VRAIN 230	70471 WELD PS	230 1	LN	521.2	318.5	500.0	104.2	326	70474 WINDSOR 230 73011 AULT 230 1
70471 WELD PS 230	73212 WELD LM	230 1	LN	603.6	396.6	600.0	100.6	326	70474 WINDSOR 230 73011 AULT 230 1
73199 TIMBERLN 230	73078 HARMONY	230 1	LN	476.0	370.4	472.1	100.8	326	70474 WINDSOR 230 73011 AULT 230 1
73531 LINCOLNT 230	73413 MIDWAYBR	230 1	LN	240.1	234.3	239.0	100.5	368	73006 ANTON 115 73125 LSCHANCE 115 1

73008 ARCHER 115 73043 CHEYENNE 115 1	LN	99.4	56.3	80.0	124.3	376	73008 ARCHER 115 73480 CROWCRK 115 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	240.7	234.3	**239.0**	100.7	378	73009 ARCHER 230 73190 STEGALL 230 1
70192 FTLUPTON 230 70311 PAWNEE 230 1	LN	488.3	355.7	**413.5**	118.1	387	73012 AULT 345 73108 LAR.RIVR 345 1
73009 ARCHER 230 73190 STEGALL 230 1	LN	462.1	271.5	**319.0**	144.9	387	73012 AULT 345 73108 LAR.RIVR 345 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	98.6	62.4	80.0	123.3	387	73012 AULT 345 73108 LAR.RIVR 345 1
73024 BLKHLWTP 115 73044 COBBLKTP 115 1	LN	85.4	49.2	85.1	100.4	387	73012 AULT 345 73108 LAR.RIVR 345 1
73024 BLKHLWTP 115 73552 AULT 115 1	LN	87.6	51.5	85.1	102.9	387	73012 AULT 345 73108 LAR.RIVR 345 1
73030 BRIGHTNW 115 73493 SANDCRK 115 1	LN	86.7	58.7	85.1	101.9	387	73012 AULT 345 73108 LAR.RIVR 345 1
**** From bus ** To bus ** CKT**	**Tp**	**ContMVA**	**BaseFlow**	**Rating**	**Loading%**	**Ncon**	**Contingency**
73305 EFMORGTP 115 73031 BRUSHTAP 115 1	LN	134.9	97.4	**121.7**	110.8	387	73012 AULT 345 73108 LAR.RIVR 345 1
73145 NUNN 115 73552 AULT 115 1	LN	87.8	51.8	85.1	103.2	387	73012 AULT 345 73108 LAR.RIVR 345 1
73379 FMWEST 115 73305 EFMORGTP 115 1	LN	121.0	83.9	**121.0**	100.0	387	73012 AULT 345 73108 LAR.RIVR 345 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	266.2	234.3	**239.0**	111.4	387	73012 AULT 345 73108 LAR.RIVR 345 1
73013 B.CK PS 115 73014 B.CK PS 230 1	TR	231.4	38.1	**224.0**	103.3	389	73013 B.CK PS 115 73020 BEAVERCK 115 1
73015 B.CK TRI 115 73016 B.CK TRI 230 1	TR	224.4	39.4	**224.0**	100.2	389	73013 B.CK PS 115 73020 BEAVERCK 115 1
73015 B.CK TRI 115 73020 BEAVERCK 115 1	LN	223.5	38.9	**200.0**	111.8	389	73013 B.CK PS 115 73020 BEAVERCK 115 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	242.0	234.3	**239.0**	101.2	396	73017 B.SANDY 115 73318 LIMON 115 1
73020 BEAVERCK 115 73464 ADENA 115 1	LN	120.3	75.3	**109.0**	110.4	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	68.3	7.9	40.0	170.7	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73088 HOYT 115 73464 ADENA 115 1	LN	118.2	73.3	**109.0**	108.5	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73103 L.MEADOW 115 73213 WIGGINS 115 1	LN	65.7	5.6	59.6	110.3	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	240.4	234.3	**239.0**	100.6	399	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	94.8	62.4	80.0	118.5	402	73020 BEAVERCK 115 73464 ADENA 115 1
73305 EFMORGTP 115 73031 BRUSHTAP 115 1	LN	129.4	97.4	**121.7**	106.4	402	73020 BEAVERCK 115 73464 ADENA 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	41.5	7.9	40.0	103.6	404	73023 BIJOUTAP 115 73379 FMWEST 115 1
73039 CARTERLK 115 73058 FLATIRON 115 1	LN	83.8	50.5	80.0	104.7	409	73026 BOYD 115 73027 BOYD 230 1
73020 BEAVERCK 115 73464 ADENA 115 1	LN	116.2	75.3	**109.0**	106.6	420	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	62.3	7.9	40.0	155.8	420	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73088 HOYT 115 73464 ADENA 115 1	LN	114.2	73.3	**109.0**	104.7	420	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73103 L.MEADOW 115 73213 WIGGINS 115 1	LN	59.9	5.6	59.6	100.4	420	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	240.0	234.3	**239.0**	100.4	420	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	254.1	234.3	**239.0**	106.3	421	73034 BURL PSC 115 73209 WANIBETP 115 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	254.5	234.3	**239.0**	106.5	422	73034 BURL PSC 115 73485 BURL KC 115 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	258.7	234.3	**239.0**	108.2	427	73035 BURLNGTN 115 73485 BURL KC 115 1

73008 ARCHER 115 73043 CHEYENNE 115 1	LN	83.2	56.3	80.0	104.0	436	73043 CHEYENNE 115 73480 CROWCRK 115 1
70410 ST.VRAIN 230 70474 WINDSOR 230 1	LN	507.7	380.6	**495.0**	102.6	497	73078 HARMONY 230 73199 TIMBERLN 230 1
70474 WINDSOR 230 73011 AULT 230 1	LN	526.8	399.2	**494.8**	106.5	497	73078 HARMONY 230 73199 TIMBERLN 230 1
73039 CARTERLK 115 73058 FLATIRON 115 1	LN	95.6	50.5	80.0	119.5	497	73078 HARMONY 230 73199 TIMBERLN 230 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	239.7	234.3	**239.0**	100.3	502	73084 HELL TAP 115 73185 SO. FORK 115 1
73023 BIJOUTAP 115 73379 FMWEST 115 1	LN	93.9	62.4	80.0	117.4	506	73088 HOYT 115 73464 ADENA 115 1
73305 EFMORGTP 115 73031 BRUSHTAP 115 1	LN	128.5	97.4	**121.7**	105.6	506	73088 HOYT 115 73464 ADENA 115 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	239.1	234.3	**239.0**	100.0	507	73088 HOYT 115 73493 SANDCRK 115 1
73179 SIDNEY 115 73180 SIDNEY 230 1	TR	172.4	121.6	**167.0**	103.2	568	73143 N.YUMA 230 73180 SIDNEY 230 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	250.0	234.3	**239.0**	104.6	613	73207 WAANIBE 115 73209 WANIBETP 115 1
**** From bus ** To bus ** CKT**	**Tp**	**ContMVA**	**BaseFlow**	**Rating**	**Loading%**	**Ncon**	**Contingency**
73020 BEAVERCK 115 73464 ADENA 115 1	LN	110.4	75.3	**109.0**	101.3	633	73305 EFMORGTP 115 73379 FMWEST 115 1
73088 HOYT 115 73103 L.MEADOW 115 1	LN	54.0	7.9	40.0	135.1	633	73305 EFMORGTP 115 73379 FMWEST 115 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	239.2	234.3	**239.0**	100.1	633	73305 EFMORGTP 115 73379 FMWEST 115 1
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	28.5	17.9	27.0	105.4	645	73382 BIRDSAL213.8 73386 BIRDSALS34.5 1
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	29.5	17.9	27.0	109.2	646	73383 BIRDSAL313.8 73386 BIRDSALS34.5 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	241.8	234.3	**239.0**	101.2	675	73397 DRAKE N 115 73429 DRAKE 7 13.8 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	241.8	234.3	**239.0**	101.2	705	73418 RD_NIXON20.0 73419 RD_NIXON 230 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	240.5	234.3	**239.0**	100.6	709	73419 RD_NIXON 230 73507 NIXON1CC18.0 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	241.2	234.3	**239.0**	100.9	710	73419 RD_NIXON 230 73508 NIXON2CC18.0 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	241.2	234.3	**239.0**	100.9	711	73419 RD_NIXON 230 73509 NIXON3CC18.0 1
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	239.2	234.3	**239.0**	100.1	767	GEN.Outage:70106 CHEROK4 22.0
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	250.9	234.3	**239.0**	105.0	768	GEN.Outage:70119 COMAN 1 24.0
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	249.0	234.3	**239.0**	104.2	769	GEN.Outage:70120 COMAN 2 24.0
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	240.1	234.3	**239.0**	100.5	799	GEN.Outage:70577 FTNVL1-213.8
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	28.0	17.9	27.0	103.7	826	GEN.Outage:73382 BIRDSAL213.8
73384 BIRDSALE 115 73386 BIRDSALS34.5 1	TR	28.0	17.9	27.0	103.7	827	GEN.Outage:73383 BIRDSAL313.8
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	242.3	234.3	**239.0**	101.4	828	GEN.Outage:73418 RD_NIXON20.0
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	242.1	234.3	**239.0**	101.3	832	GEN.Outage:73429 DRAKE 7 13.8
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	240.5	234.3	**239.0**	100.6	838	GEN.Outage:73507 NIXON1CC18.0
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	241.2	234.3	**239.0**	100.9	839	GEN.Outage:73508 NIXON2CC18.0
73531 LINCOLNT 230 73413 MIDWAYBR 230 1	LN	241.2	234.3	**239.0**	100.9	840	GEN.Outage:73509 NIXON3CC18.0

Branch Violations - 1450 MW TOT 3 WITH NEW GEN AND INFRASTRUCTURE

*** MUST 6.01 *** FRI, FEB 06 2004 14:28 ***

2006HSHN HI TOT3 WITH 300 MW BRUSH WIND FARM
2ND PAWNEE-FT. LUPTON 230 KV LINE ADDED

Subsys.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.SUB
Monit.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.MON
Contin.File S:\LDC-LI\Tra\2Jim\TRANSMISSION REQUESTS\enXco\cases\MUst Files\NECO.CON
Exclud.File none

********** Report on violations **********

Branches with MVA flow more than 100.0 % of nominal rating

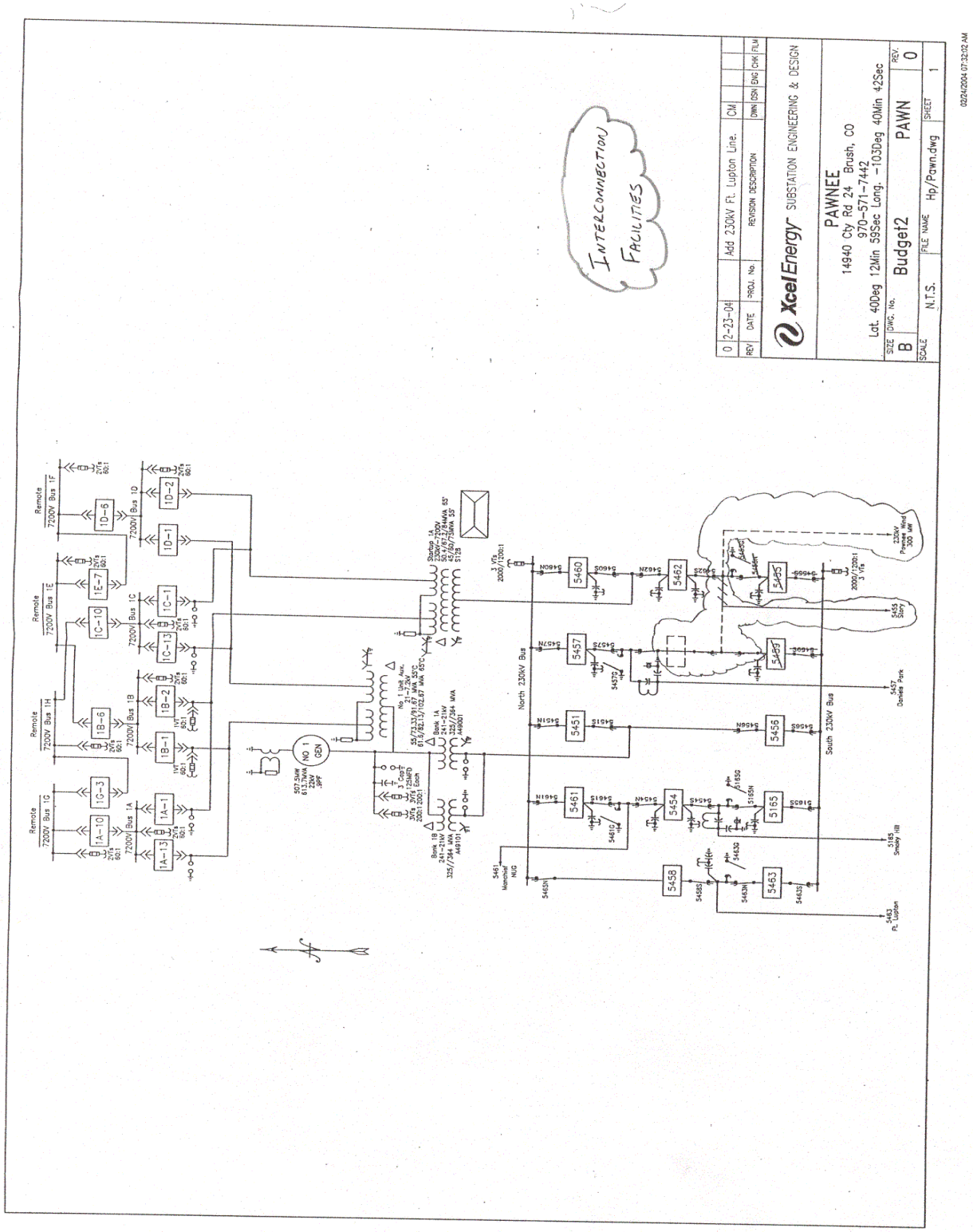
** From bus **	** To bus **	CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
70005 BRUSHCPP 115	73013 B.CK PS 115	2	LN	237.3	123.1	187.0	126.9	6	70005 BRUSHCPP 115 73013 B.CK PS 115 1
70005 BRUSHCPP 115	73013 B.CK PS 115	1	LN	236.7	115.6	162.0	146.1	7	70005 BRUSHCPP 115 73013 B.CK PS 115 2
70264 LITTLET2 115	70463 WATERTON 115	1	LN	141.5	55.3	135.0	104.8	27	70037 ARAPAHOB 115 70165 ENGLE3TP 115 1
70073 CALIFOR1 115	70299 NORTH542 115	1	LN	156.9	125.7	150.0	104.6	32	70039 ARGO 115 70108 CHEROKEE 115 1
70087 CAPHILL1 115	70300 NORTH547 115	1	LN	164.6	120.7	150.0	109.7	32	70039 ARGO 115 70108 CHEROKEE 115 1
70087 CAPHILL1 115	70300 NORTH547 115	1	LN	154.2	120.7	150.0	102.8	33	70039 ARGO 115 70323 PLATTEPS 115 1
70192 FTLUPTON 230	70529 JLGREEN 230	1	LN	509.7	446.6	495.0	103.0	51	70048 GREENVAL 230 70192 FTLUPTON 230 1
70461 WASHINGT 230	70529 JLGREEN 230	1	LN	502.8	439.7	495.0	101.6	51	70048 GREENVAL 230 70192 FTLUPTON 230 1

** From bus **	** To bus **	CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
70087 CAPHILL1	115 70300 NORTH547	115 1	LN	158.5	120.7	**150.0**	105.7	74	70073 CALIFOR1 115 70299 NORTH542 115 1
70073 CALIFOR1	115 70299 NORTH542	115 1	LN	155.8	125.7	**150.0**	103.9	78	70087 CAPHILL1 115 70300 NORTH547 115 1
70073 CALIFOR1	115 70299 NORTH542	115 1	LN	171.3	125.7	**150.0**	114.2	80	70088 CAPHILL2 115 70215 HARRISPS 115 1
70108 CHEROKEE	115 70299 NORTH542	115 2	LN	171.3	125.7	**170.9**	100.2	80	70088 CAPHILL2 115 70215 HARRISPS 115 1
70073 CALIFOR1	115 70299 NORTH542	115 1	LN	165.9	125.7	**150.0**	110.6	101	70107 CHEROKEE 230 70324 LACOMBE 230 1
70087 CAPHILL1	115 70300 NORTH547	115 1	LN	167.5	120.7	**150.0**	111.7	101	70107 CHEROKEE 230 70324 LACOMBE 230 1
70215 HARRISPS	115 70259 LEETSDAL	115 1	LN	163.8	106.4	**150.0**	109.2	101	70107 CHEROKEE 230 70324 LACOMBE 230 1
70192 FTLUPTON	230 70529 JLGREEN	230 1	LN	524.2	446.6	**495.0**	105.9	103	70107 CHEROKEE 230 70362 RIVERDAL 230 1
70461 WASHINGT	230 70529 JLGREEN	230 1	LN	517.2	439.7	**495.0**	104.5	103	70107 CHEROKEE 230 70362 RIVERDAL 230 1
70073 CALIFOR1	115 70299 NORTH542	115 1	LN	161.3	125.7	**150.0**	107.5	110	70108 CHEROKEE 115 70276 MAPLETO1 115 1
70087 CAPHILL1	115 70300 NORTH547	115 1	LN	158.8	120.7	**150.0**	105.9	113	70108 CHEROKEE 115 70299 NORTH542 115 2
70336 PUEB-TAP	115 70412 STEM BCH	115 1	LN	105.1	25.0	77.0	136.4	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70336 PUEB-TAP	115 70456 W.STATON	115 1	LN	112.4	29.6	77.0	146.0	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70412 STEM BCH	115 70458 WALSENBG	115 1	LN	80.2	17.9	77.0	104.1	122	70122 COMANCHE 230 70459 WALSENBG 230 1
70087 CAPHILL1	115 70300 NORTH547	115 1	LN	154.2	120.7	**150.0**	102.8	152	70148 DENVTM 115 70323 PLATTEPS 115 1
70073 CALIFOR1	115 70299 NORTH542	115 1	LN	161.1	125.7	**150.0**	107.4	154	70149 DENVTM 230 70324 LACOMBE 230 1
70087 CAPHILL1	115 70300 NORTH547	115 1	LN	162.0	120.7	**150.0**	108.0	154	70149 DENVTM 230 70324 LACOMBE 230 1
70215 HARRISPS	115 70259 LEETSDAL	115 1	LN	157.9	106.4	**150.0**	105.3	154	70149 DENVTM 230 70324 LACOMBE 230 1
70192 FTLUPTON	230 70605 HENRYLAK	230 1	LN	457.9	353.3	**435.0**	105.3	190	70192 FTLUPTON 230 70529 JLGREEN 230 1
70605 HENRYLAK	230 70362 RIVERDAL	230 1	LN	436.1	331.7	**435.0**	100.3	190	70192 FTLUPTON 230 70529 JLGREEN 230 1
70192 FTLUPTON	230 70529 JLGREEN	230 1	LN	544.3	446.6	**495.0**	110.0	191	70192 FTLUPTON 230 70605 HENRYLAK 230 1
70461 WASHINGT	230 70529 JLGREEN	230 1	LN	537.3	439.7	**495.0**	108.5	191	70192 FTLUPTON 230 70605 HENRYLAK 230 1
70192 FTLUPTON	230 70605 HENRYLAK	230 1	LN	441.2	353.3	**435.0**	101.4	193	70200 GLENN PS 230 70461 WASHINGT 230 1
70073 CALIFOR1	115 70299 NORTH542	115 1	LN	156.0	125.7	**150.0**	104.0	240	70276 MAPLETO1 115 70300 NORTH547 115 1
70192 FTLUPTON	230 70529 JLGREEN	230 1	LN	499.3	446.6	**495.0**	100.9	249	70297 NIWOT 230 70544 ISABELLE 230 1
73023 BIJOUTAP	115 73379 FMWEST	115 1	LN	81.1	45.3	80.0	101.4	256	70311 PAWNEE 230 73192 STORY 230 1
73531 LINCOLNT	230 73413 MIDWAYBR	230 1	LN	268.9	216.0	**239.0**	112.5	256	70311 PAWNEE 230 73192 STORY 230 1
70192 FTLUPTON	230 70529 JLGREEN	230 1	LN	538.2	446.6	**495.0**	108.7	271	70605 HENRYLAK 230 70362 RIVERDAL 230 1
70461 WASHINGT	230 70529 JLGREEN	230 1	LN	531.2	439.7	**495.0**	107.3	271	70605 HENRYLAK 230 70362 RIVERDAL 230 1
70192 FTLUPTON	230 70529 JLGREEN	230 1	LN	497.0	446.6	**495.0**	100.4	293	70410 ST.VRAIN 230 70447 VALMONT 230 1
70474 WINDSOR	230 73011 AULT	230 1	LN	497.4	359.0	**494.8**	100.5	294	70410 ST.VRAIN 230 70471 WELD PS 230 1
70192 FTLUPTON	230 70529 JLGREEN	230 1	LN	501.0	446.6	**495.0**	101.2	296	70410 ST.VRAIN 230 70544 ISABELLE 230 1
70192 FTLUPTON	230 70605 HENRYLAK	230 1	LN	456.3	353.3	**435.0**	104.9	319	70461 WASHINGT 230 70529 JLGREEN 230 1

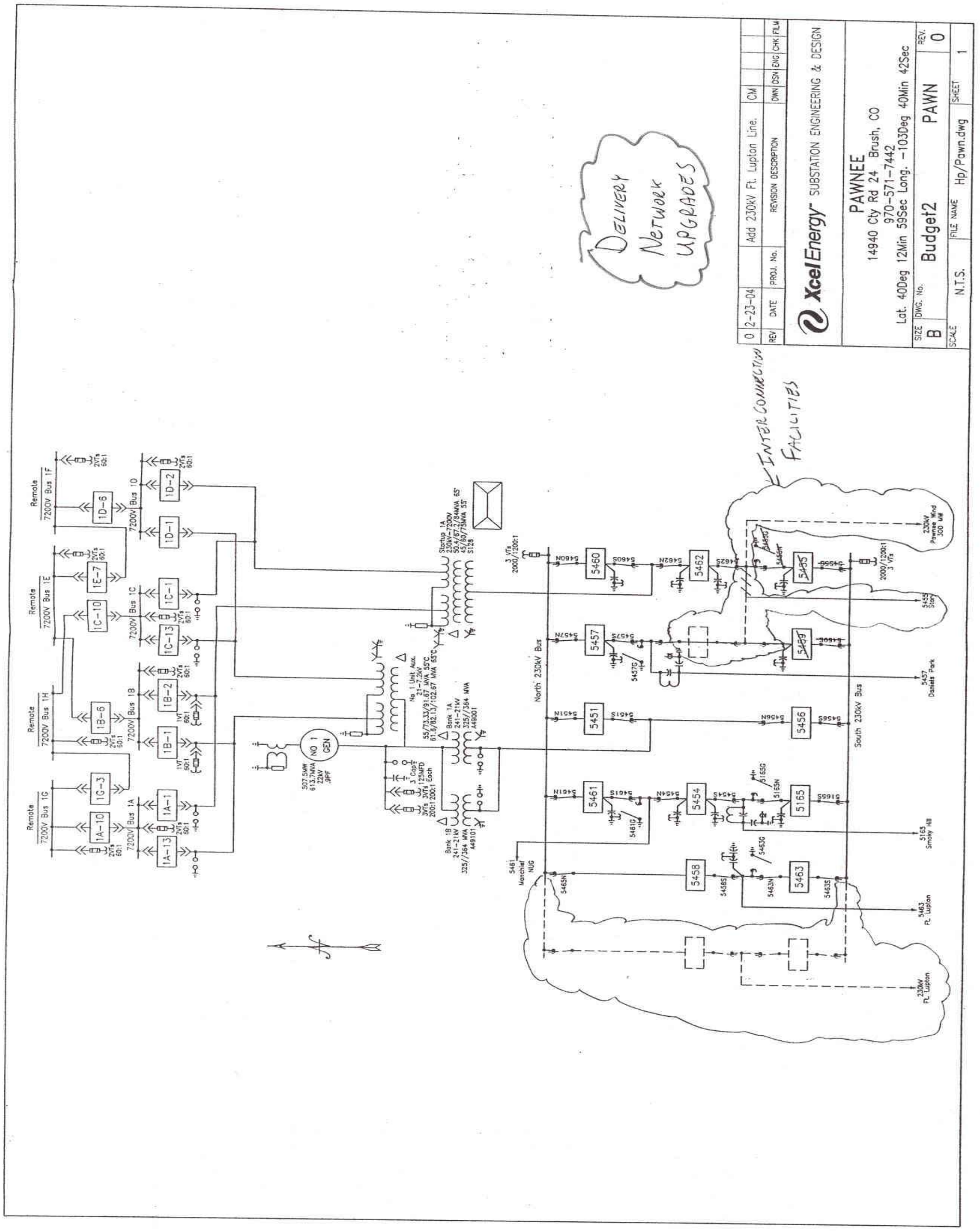
** From bus **	** To bus **	CKT	Tp	ContMVA	BaseFlow	Rating	Loading%	Ncon	Contingency
70474 WINDSOR 230	73011 AULT 230	1	LN	498.3	359.0	**494.8**	100.7	326	70471 WELD PS 230 73212 WELD LM 230 1
73211 WELD LM 115	73212 WELD LM 230	1	TR	187.3	117.8	**150.0**	124.8	326	70471 WELD PS 230 73212 WELD LM 230 1
73008 ARCHER 115	73043 CHEYENNE 115	1	LN	96.7	54.7	80.0	120.9	377	73008 ARCHER 115 73480 CROWCRK 115 1
70311 PAWNEE 230	73192 STORY 230	1	LN	616.4	315.4	**576.0**	107.0	388	73012 AULT 345 73108 LAR.RIVR 345 1
73009 ARCHER 230	73190 STEGALL 230	1	LN	417.1	254.1	**319.0**	130.8	388	73012 AULT 345 73108 LAR.RIVR 345 1
73013 B.CK PS 115	73014 B.CK PS 230	1	TR	231.3	14.7	**224.0**	103.2	390	73013 B.CK PS 115 73020 BEAVERCK 115 1
73088 HOYT 115	73103 L.MEADOW 115	1	LN	58.2	7.7	40.0	145.5	400	73020 BEAVERCK 115 73031 BRUSHTAP 115 1
73039 CARTERLK 115	73058 FLATIRON 115	1	LN	84.4	49.0	80.0	105.5	410	73026 BOYD 115 73027 BOYD 230 1
73088 HOYT 115	73103 L.MEADOW 115	1	LN	52.2	7.7	40.0	130.5	421	73031 BRUSHTAP 115 73305 EFMORGTP 115 1
73531 LINCOLNT 230	73413 MIDWAYBR 230	1	LN	239.9	216.0	**239.0**	100.4	428	73035 BURLNGTN 115 73485 BURL KC 115 1
73008 ARCHER 115	73043 CHEYENNE 115	1	LN	80.6	54.7	80.0	100.7	437	73043 CHEYENNE 115 73480 CROWCRK 115 1
73039 CARTERLK 115	73058 FLATIRON 115	1	LN	91.9	49.0	80.0	114.9	498	73078 HARMONY 230 73199 TIMBERLN 230 1
73150 PEETZ 115	73191 STERLING 115	1	LN	92.1	58.3	85.1	108.2	569	73143 N.YUMA 230 73180 SIDNEY 230 1
73179 SIDNEY 115	73180 SIDNEY 230	1	TR	177.9	118.3	**167.0**	106.6	569	73143 N.YUMA 230 73180 SIDNEY 230 1
73088 HOYT 115	73103 L.MEADOW 115	1	LN	43.8	7.7	40.0	109.5	634	73305 EFMORGTP 115 73379 FMWEST 115 1
73384 BIRDSALE 115	73386 BIRDSALS34.5	1	TR	28.3	18.0	27.0	104.8	646	73382 BIRDSAL213.8 73386 BIRDSALS34.5 1
73384 BIRDSALE 115	73386 BIRDSALS34.5	1	TR	29.5	18.0	27.0	109.1	647	73383 BIRDSAL313.8 73386 BIRDSALS34.5 1
73384 BIRDSALE 115	73386 BIRDSALS34.5	1	TR	28.0	18.0	27.0	103.7	827	GEN.Outage:73382 BIRDSAL213.8
73384 BIRDSALE 115	73386 BIRDSALS34.5	1	TR	28.0	18.0	27.0	103.7	828	GEN.Outage:73383 BIRDSAL313.8

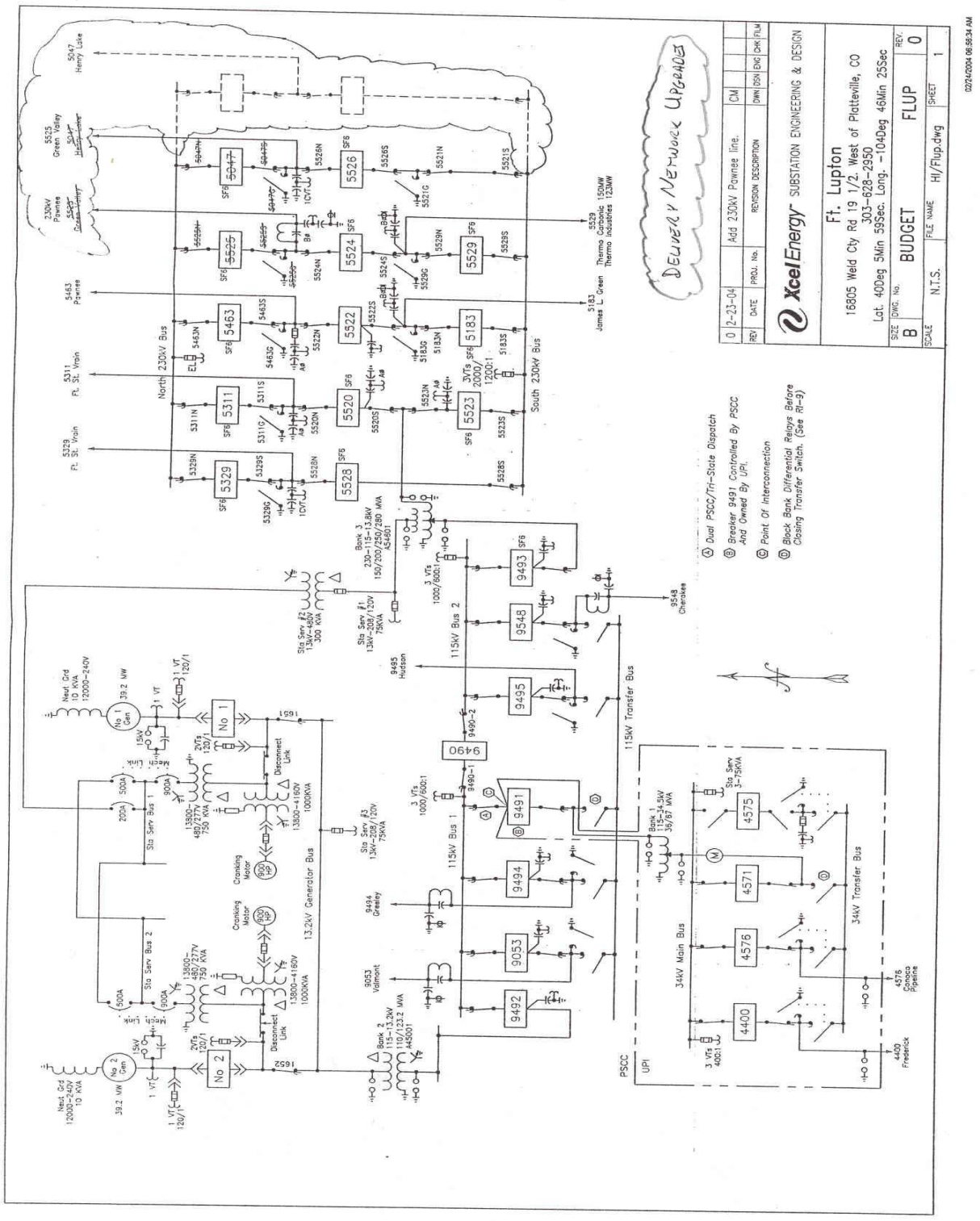
APPENDIX D

ONE-LINES


INTERCONNECTION FACILITIES
Xcel Energy SUBSTATION ENGINEERING & DESIGN
PAWNEE
14940 Cty Rd 24 Brush, CO
970-571-7442
Lat. 40Deg 12Min 59Sec Long. -103Deg 40Min 42Sec
Add 230KV Ft. Lupton Line.
2-23-04
Budget2
PAWN
Hp/Pawn.dwg
N.T.S.
North 230KV Bus
South 230KV Bus
NO 1 GEN
Remote 7200V Bus 1F
Remote 7200V Bus 1E
Remote 7200V Bus 1H
Remote 7200V Bus 1G
7200V Bus 1D
7200V Bus 1C
7200V Bus 1B
7200V Bus 1A
5460
5462
5457
5451
5456
5461
5454
5165
5458
5463
5453 Ft. Lupton
5455 Story
5457 Daniels Park
5165 Smoky Hill
5461 Monument NUG

.


Delivery Network Upgrades
Interconnection Facilities
0 2-23-04 Add 230kV Ft. Lupton Line. CM
REV DATE PROJ. No. REVISION DESCRIPTION DWN DSN ENG CHK FILM
Xcel Energy SUBSTATION ENGINEERING & DESIGN
PAWNEE
14940 Cty Rd 24 Brush, CO
970-571-7442
Lat. 40Deg 12Min 59Sec Long. -103Deg 40Min 42Sec
SIZE B
DWG. No. Budget2
PAWN
REV. 0
SCALE N.T.S.
FILE NAME Hp/Pawn.dwg
SHEET 1
North 230kV Bus
South 230kV Bus


Ft. Lupton
16805 Weld Cty Rd 19 1/2. West of Platteville, CO
303-628-2950
Lat. 40Deg 5Min 59Sec. Long. -104Deg 46Min 25Sec
BUDGET
FLUP
Add 230kV Pownee line.
Dual PSCC/Tri-State Dispatch
Breaker 9491 Controlled By PSCC And Owned By UPI.
Point Of Interconnection
Block Bank Differential Relays Before Closing Transfer Switch. (See RT-9)
115kV Transfer Bus
115kV Bus 1
115kV Bus 2
34kV Transfer Bus
34kV Main Bus
13.2kV Generator Bus
North 230kV Bus
South 230kV Bus
PSCC
UPI