



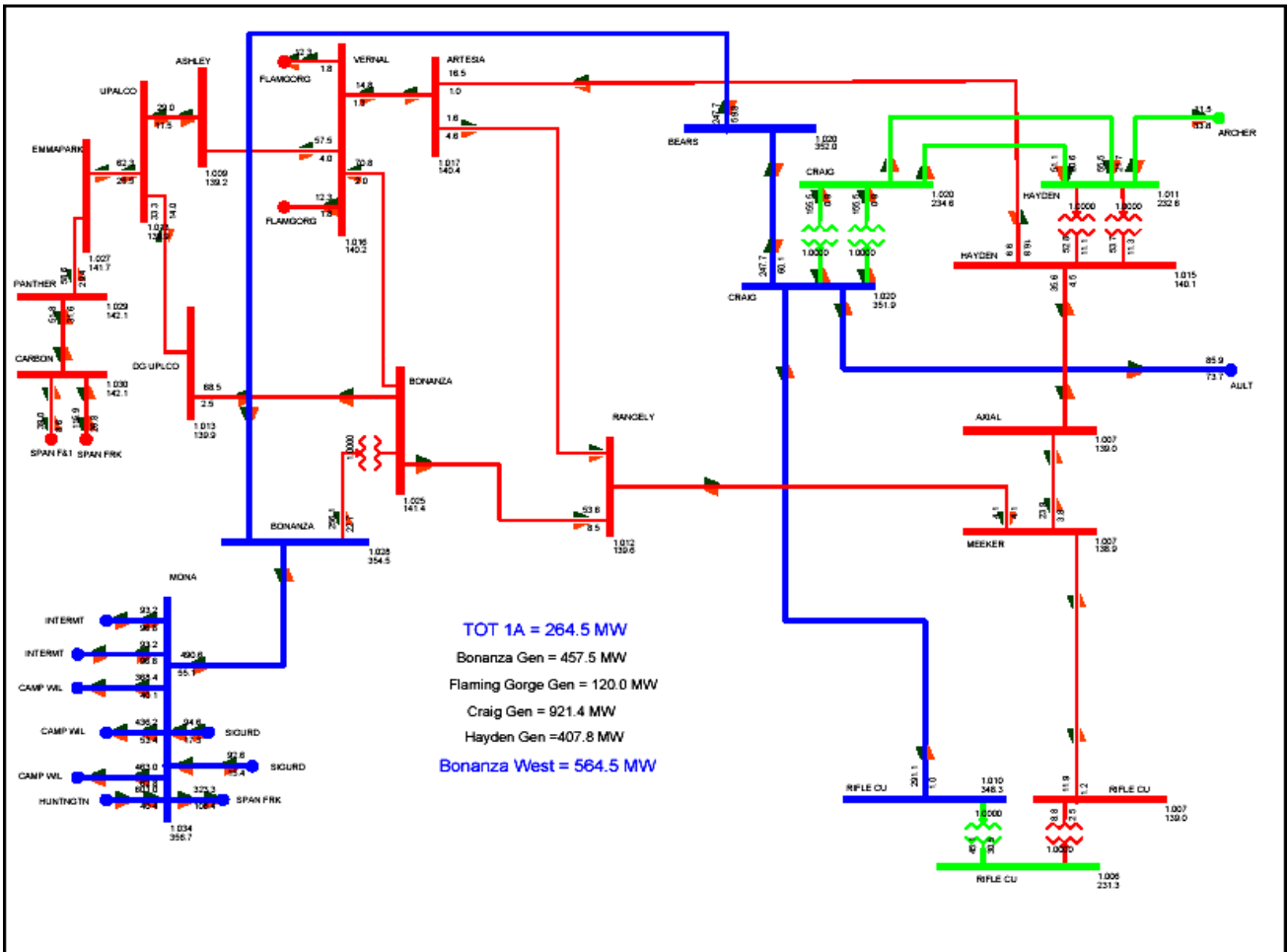
TOT1A SYSTEM IMPACT STUDY
November 1, 2005

For PacifiCorp
Study Conducted By: Rita Leyba

I. INTRODUCTION

On March 29, 2005 Western Area Power Administration and PacifiCorp signed an agreement for Western Area Power Administration to perform a System Impact Study on TOT 1A to address the required transmission additions to accommodate PacifiCorp's request of 141 MW.

A map of the major transmission lines near and around TOT 1A is provided below.



WESTERN ELECTRICITY COORDINATING COUNCIL
 2005 HSC-SAP APPROVED CASE
 TUE, FEB 15 2005 14:40

Bus - VOLTAGE (KV/PU) 100.0%RATEA
 Branch - MW/MVAR 1.050OV 0.950UV
 Equipment - MWMVAR KV: <=115.000 <=138.000 <=230.000 <=345.000 >345.000

Figure 1 – Major Transmission Lines near and around TOT 1A

II. Purpose

The purpose of this study is to determine the transmission system additions required to increase the total transfer capability of the TOT 1A Transfer Path by 141 MW. Increases for TOT 1A are expected by 2008.

TOT 1A is currently rated 650 MW. The capacity is split between Hayden - Artesia 138 kV, Meeker – Southwest Ranglely 138 kV, and Bears Ears – Bonanza (345 kV). TOT 1A is jointly owned by Tri-State, Colorado River Storage Project (CRSP), Utah Associated Municipal Power Systems (UAMPS), and Platte River Power Authority (PRPA). Of the existing 650 MW of ATC on TOT 1A the firm rights are allocated as follows:

Existing Allocations		Proposed Allocations	
CRSP	401 MW	CRSP	401 MW
TRI-STATE	144 MW	TRI-STATE	144 MW
UAMPS	63 MW	UAMPS	63 MW
PRPA	<u>42 MW</u>	PRPA	42 MW
Total	650 MW	*TBD	<u>141 MW</u>
		TOTAL	791 MW

* TBD (To be determined)

III. Procedure

The Siemens PSS/E Version 30.1.2 and the WECC 2008 HS was used for this System Impact Study. The target increase for TOT 1A is 791 MW to accommodate the request for PacifiCorp. Changes to this base case include the following:

The WECC 2008 HS base case flow on TOT 1A was 260.4 MW and the Bonanza West flow was 542.4 MW. Generation was raised in Areas 70 (Xcel Energy) and 73 (Western Area/Colorado/Missouri – WACM) and decreased in Area 65 (PacifiCorp) in order to bring the base case to 650 MW. See Appendix A.

Several contingencies were run after TOT 1A was increased. They are as follows:

1. Bonanza – Mona 345 kV
2. Bears Ears – Bonanza 345 kV
3. Carbon – Spanish Fork 138 kV
4. Emma Park – Panther 138 kV
5. Emma Park – Upalco 138 kV
6. Clifton – Grand Junction 230 kV
7. Grand Junction 230 kV – Grand Junction 345 kV

8. Bears Ears – Craig 345 kV
 9. Hayden – Foidel CK 230 kV
 10. Hayden – Artesia 138 kV
 11. Meeker – Ranglely 138 kV
 12. TBD – New Transmission line
- See Appendix B & C

The Flaming Gorge KY2A Transformer resistance and reactance were changed to .00050 and .02250. Western Area Power Administration will be replacing KY2A with a 250 MVA transformer and will leave KY2B as a 100 MVA transformer.

A 138 kV line was added from Hayden to Vernal. After adding in the line, power flows reduced slightly from Hayden – Artesia, Bears Ears – Bonanza, and Meeker – Southwest Ranglely. TOT 1A went from 652.6 MW to 669.9 MW. Bonanza West went from 760.8 MW to 764.3 MW. The new line from Hayden – Vernal carried 53.1 MW. Generation was increased in Areas 70 (Xcel Energy) and 73 (Western Area/Colorado/Missouri - WACM) and decreased in Area 65 (PacifiCorp) to bring TOT 1A to 791 MW. See Appendix D

Several contingencies were run after TOT 1A was increased to 791 MW. They are as follows:

1. Bonanza – Mona 345 KV
 2. Bears Ears – Bonanza 345 kV
 3. Carbon – Spanish Fork 138 kV
 4. Emma Park – Panther 138 kV
 5. Emma Park – Upalco 138 kV
 6. Clifton – Grand Junction 230 kV
 7. Grand Junction 230 kV – Grand Junction 345 kV
 8. Bears Ears – Craig 345 kV
 9. Hayden – Foidel CK 230 kV
 10. Hayden – Artesia 138 kV
 11. Meeker – Ranglely 138 kV
 12. TBD – New Transmission line
- See Appendix E & F.

Voltage Monitored Buses are as follows: See Appendix G

Zones 656, 662, 670, 708, 790, and 791

Monitored Transmission Lines: See Appendix H

Zones 656, 662, 670, 708, 790, & 791

Transformers are as follows: See Appendix I

Zones 656, 662, 670, 708, 790, & 791

IV. Criteria

1. System Intact

Voltages will remain within the required 0.95 to 1.05 per unit range. Transmission lines and transformers may not exceed 100% of the nominal rating.

2. Single Contingency

Voltages will remain between 0.90 and 1.10 per unit. Transmission lines and transformers may not exceed either 100% of their nominal rating or an established emergency rating.

V. FINDINGS

- 138 kV line from Hayden - Vernal

After stressing the base case in a number of different ways, there were several overloads and low voltages that occurred. See Appendix J through P

The low voltages occurred around the Grand Junction Area, Bonanza – Mona Area, and Carbon – Spanish Fork Area. A shunt capacitor was added to solve the voltage problems. Also, a few overloads occurred in the Bonanza – Mona Area. This was solved by adding a series reactor in the Emma Park Area as Deseret G & T has proposed.

- 345 kV line from Bears Ears – Bonanza

After stressing the base case with the new line from Bears Ears – Bonanza, several overloads and low voltages occurred. See Appendix Q through U

The low voltages occurred around the Grand Junction Area and Bonanza – Mona Area. A shunt capacitor was added to solve the voltage problems. Also, a few overloads occurred in the Bonanza – Mona Area. This was solved by adding a series reactor in the Emma Park Area as Deseret G & T has proposed. The Bonanza-Mona line remains overloaded. This problem will be solved once the ratings are changed by the affected parties.

VI. CONCLUSION

The TOT 1A transfer capability could be increased by 141 MW with either a new 345 kV line from Bears Ears to Bonanza or a new 138 kV line from Hayden to Vernal.

- **138 kV Costs**

Transmission additions and modifications are required to prevent unacceptable Conditions on the regional system. The **estimated** cost for system upgrades associated with delivery of a 138 kV line is **\$25,403,600.00**. **2006** Costs include: Planning, lands and rights, environmental, surveys, geologic investigations, designs and specifications, and construction supervision. The total estimated time to construct the system upgrades associated with the interconnection and delivery of the 141 MW is a minimum of forty-eight (48) months from the signing of the Interconnection Agreement.

The basic upgrades for a stand-alone project consist of the following:

Hayden - Vernal 138-kV: 145 miles of wood H frame construction with 556 ACSR on 150ft ROW.

- Construction cost = \$16,500,000 (\$125,000/mile X 132 miles)
- ROW costs (150 ft ROW) = \$3,603,600 (18.2 acres/mile X 132 miles X \$1,500/Acre)
- T-Line Survey = \$792,000 (\$6,000/mile X 132 miles) includes land and geology surveys
- Project Overhead (Project Management, Design, Environmental, Land, Construction Management) = \$2,508,000 (19,000 X 132 miles)
- Project Total = \$23,403,600.00

Breaker Additions at Hayden and Vernal:

(Both are Main and Transfer so one breaker at each end).

138-kV bay addition in a main & transfer (one breaker, 3-switches, control & protection, steel, foundations, etc).

- Bay Addition = \$1,400,000.00 (\$700,000/bay x 2)
- Project Overhead (Project Management, Design, Construction Management, Commissioning) = \$600,000
- Project Total = \$2,000,000

Estimated Project Total = \$25,403,600.00

The Shunt Capacitor Bank was not included in this estimate. Xcel Energy is planning on resolving the low/high voltages affecting the Grand Junction Area.

- **345 kV Costs**

Transmission additions and modifications are required to prevent unacceptable conditions on the regional system. The **estimated** cost for system upgrades associated with delivery of a 345 kV line is **\$67,907,600.00**. **2006** Costs include:

Planning, lands and rights, environmental, surveys, geologic investigations, designs and specifications, and construction supervision. The total estimated time to construct the system upgrades associated with the interconnection and delivery of the 141 MW is a minimum of forty-eight (48 months from the signing of the Interconnection Agreement.

The basic upgrades for a stand-alone project consist of the following:

Bears-Ears Bonanza 345-kV: 102 miles of lattice 345-kV with 2-1565 ACSR (bundled conductor) on 175 foot ROW

- Construction cost = \$56,100,000 (\$550,000/mile X 102 miles)
- ROW costs (175 ft ROW) = \$3,243,600.00 (21.2 acres/mile X 102 miles X \$1,500/Acre)
- T-Line Survey = \$714,000 (\$7,000/mile X 102 miles) includes land, geology and surveys for tower leg extensions.
- Project Overhead (Project Management, Design, Environmental, Land, Construction Management) = \$2,550,000 (25,000/mile X 102 miles)
- Project Total = \$62,607,600.00

Breaker Additions at Bonanza and Bears Ears:

345-kV bay addition in a main & transfer (two breakers, 3-switches, control & protection, steel, foundations, etc).

Bonanza Terminal:

- Bay Addition = \$3,200,000.00
- Project Overhead (Project Management, Design, Construction Management, Commissioning) = \$500,000.00
- Project Total = \$3,700,000.00

Bears Ears Terminal-single breaker

- Bay Addition = \$1,250,000.00
- Project Overhead (Project Management, Design, Construction Management, Commissioning) = \$350,000.00
- Project Total = \$1,600,000.00

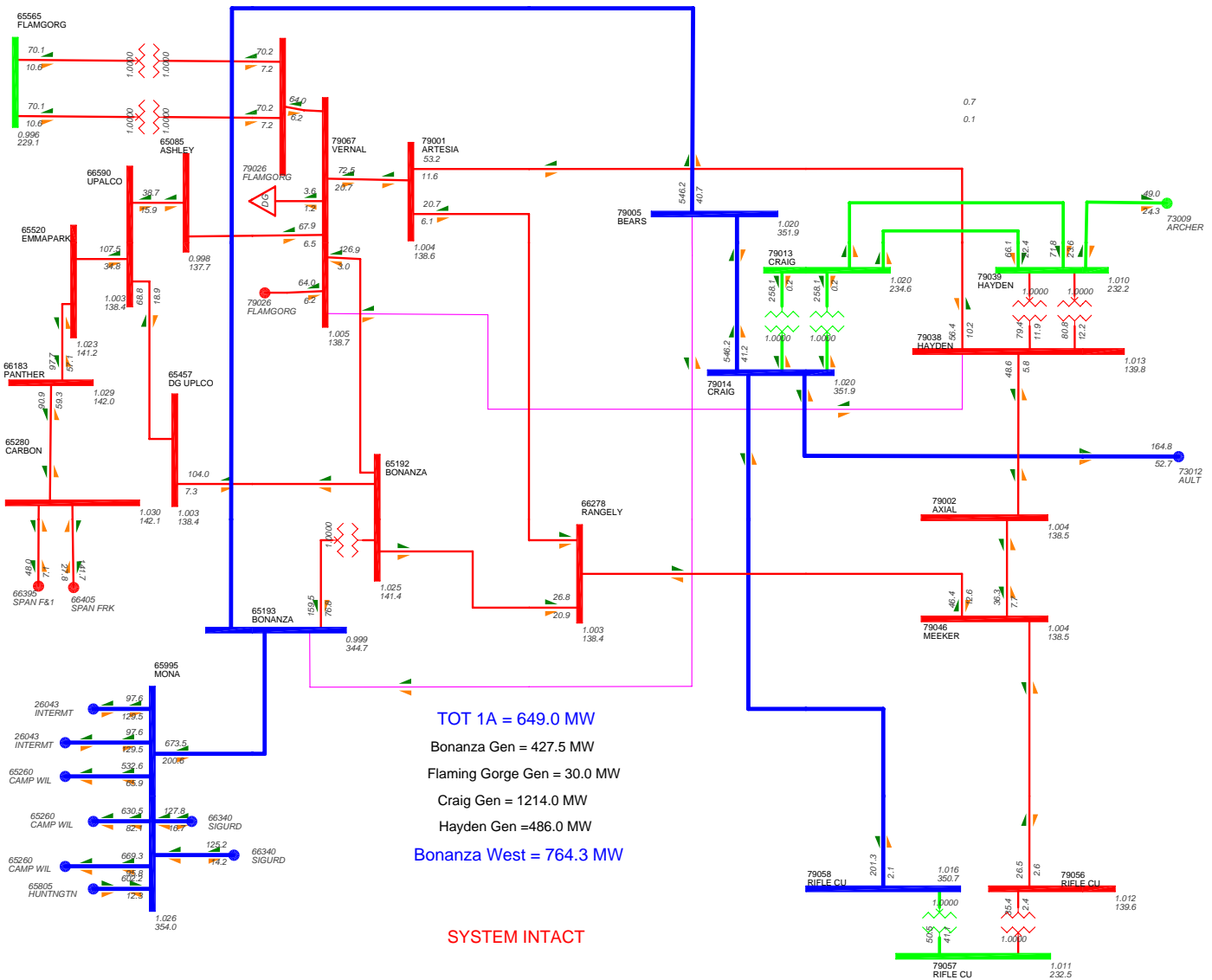
Estimated Project Total = \$67,907,600.00

The Shunt Capacitor Bank was not included in this estimate. Xcel Energy is planning to resolve the existing low/high voltages affecting the Grand Junction Area.

In any event it is a WECC process that approves or establishes path ratings. If PacifiCorp desires to continue the process, the facility enhancements, some of which are on the Deseret Power System and some are on the PacifiCorp System,

will need to be coordinated with those affected systems.

Appendix A 650 TOT 1A DIAGRAM



WESTERN ELECTRICITY COORDINATING COUNCIL
2008 HS2-SA APPROVED CASE
WED, OCT 26 2005 14:18

Bus - VOLTAGE (KV/PU)
Branch - MW/MVAR
Equipment - MW/MVAR

100 OPERATES
1.050CV - 0.950UV

KV: <=115.000 <=138.000 <=230.000 <=345.000 >345.000

Appendix B

650 MW AC CONTINGENCY SOLUTION (ACCC)

PROCESSING THE MONITORED ELEMENT DESCRIPTION FILE...

PROCESSING THE CONTINGENCY DESCRIPTION FILE...

Trip Branch from Bus 65193 TO Bus 79005 CKT 2

Trip Branch from Bus 79038 TO Bus 79067

NO CONTINGENCY EVENTS SPECIFIED--CONTINGENCY 'NEW_TRANS' SKIPPED

WORKING CASE HAS LARGEST MISMATCH OF	0.00	MW	AT	BUS	26003	[ADELANTO	500.00]
	0.01	MVAR	AT	BUS	40287	[COULEE	500.00]

PROCESSING CONTINGENCY 'BNZ_MNA' (#1 OF 8):

TRIP BRANCH FROM BUS 65193	[BONANZA	345.00]	TO BUS 65995	[MONA	345.00]
SET BUS 65191	[BONANZA	24.000]	GENERATION TO 0	MW	

PROCESSING CONTINGENCY 'BNZ_BEAR' (#2 OF 8):

TRIP BRANCH FROM BUS 65193	[BONANZA	345.00]	TO BUS 79005	[BEARS	345.00]	CKT 1
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PROCESSING CONTINGENCY 'CRBN_SPNF' (#3 OF 8):

TRIP BRANCH FROM BUS 65280	[CARBON	138.00]	TO BUS 66405	[SPAN FRK	138.00]	CKT 2
TRIP BRANCH FROM BUS 65280	[CARBON	138.00]	TO BUS 66395	[SPAN F&1	138.00]	CKT 1

PROCESSING CONTINGENCY 'EMPK_PNTR' (#4 OF 8):

TRIP BRANCH FROM BUS 65520	[EMMAPARK	138.00]	TO BUS 66183	[PANTHER	138.00]
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PROCESSING CONTINGENCY 'EMPK_UPLC' (#5 OF 8):

TRIP BRANCH FROM BUS 65520	[EMMAPARK	138.00]	TO BUS 66590	[UPALCO	138.00]
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PROCESSING CONTINGENCY 'HYDN_FOID' (#6 OF 8):

TRIP BRANCH FROM BUS 70231	[HOPKINS	115.00]	TO BUS 79003	[BASALT	115.00]
TRIP BRANCH FROM BUS 79039	[HAYDEN	230.00]	TO BUS 79091	[FOIDELCK	230.00]

PROCESSING CONTINGENCY 'HYDN_ARTS' (#7 OF 8):

TRIP BRANCH FROM BUS 79038	[HAYDEN	138.00]	TO BUS 79001	[ARTESIA	138.00]
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PROCESSING CONTINGENCY 'MKR_RNGLY' (#8 OF 8):

TRIP BRANCH FROM BUS 79046	[MEEKER	138.00]	TO BUS 66278	[RANGELY	138.00]
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Appendix C

650 MW ACC CONTINGENCY SOLUTION (ACCC) REPORT

ACCC OVERLOAD REPORT: MONITORED ELEMENTS LOADED ABOVE 100.0 % OF RATING SET B
 INCLUDES VOLTAGE REPORT

DISTRIBUTION FACTOR FILE: P:\TOT1A\TOT1A.dfx
 SUBSYSTEM DESCRIPTION FILE: P:\TOT1A\TOT1A.SUB
 MONITORED ELEMENT FILE: P:\TOT1A\TOT1A.MON
 CONTINGENCY DESCRIPTION FILE: P:\TOT1A\TOT1A.CON

-----MONITORED BRANCH----->				CONTINGENCY	RATING	FLOW	%
65192	BONANZA	138.00	65193*BONANZA	345.00 1 BNZ_BEAR	392.0	421.5	107.5

MONITORED VOLTAGE REPORT:

SYSTEM	CONTINGENCY	<----- B U S ----->			V-CONT	V-INIT	V-MAX	V-MIN
'VOLTAGE	DEVIATION BNZ_BEAR	66278	RANGELY	138.00	0.94682	1.00295	0.05000	0.05000
'VOLTAGE	DEVIATION BNZ_BEAR	79001	ARTESIA	138.00	0.95065	1.00418	0.05000	0.05000
'VOLTAGE	DEVIATION BNZ_BEAR	79046	MEEKER	138.00	0.94358	1.00357	0.05000	0.05000

CONTINGENCY LEGEND:

LABEL	EVENTS
BNZ_MNA	: TRIP BRANCH FROM BUS 65193 [BONANZA 345.00] TO BUS 65995 [MONA 345.00] SET BUS 65191 [BONANZA 24.000] GENERATION TO 0 MW
BNZ_BEAR	: TRIP BRANCH FROM BUS 65193 [BONANZA 345.00] TO BUS 79005 [BEARS 345.00] CKT 1
CRBN_SPNF	: TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66405 [SPAN FRK 138.00] CKT 2 TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66395 [SPAN F&1 138.00] CKT 1
EMPK_PNTR	: TRIP BRANCH FROM BUS 65520 [EMMAPARK 138.00] TO BUS 66183 [PANTHER 138.00]
EMPK_UPLC	: TRIP BRANCH FROM BUS 65520 [EMMAPARK 138.00] TO BUS 66590 [UPALCO 138.00]
HYDN_FOID	: TRIP BRANCH FROM BUS 70231 [HOPKINS 115.00] TO BUS 79003 [BASALT 115.00] TRIP BRANCH FROM BUS 79039 [HAYDEN 230.00] TO BUS 79091 [FOIDELCK 230.00]
HYDN_ARTS	: TRIP BRANCH FROM BUS 79038 [HAYDEN 138.00] TO BUS 79001 [ARTESIA 138.00]
MKR_RNGLY	: TRIP BRANCH FROM BUS 79046 [MEEKER 138.00] TO BUS 66278 [RANGELY 138.00]

Appendix E

791 MW AC CONTINGENCY SOLUTION (ACCC)

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SIEMENS POWER TECHNOLOGIES INTERNATIONAL
150000 BUS POWER SYSTEM SIMULATOR--PSS/E-30.1.2
Initiated at load flow entry point on WED, OCT 26 2005 10:04
WESTERN ELECTRICITY COORDINATING COUNCIL
2008 HS2-SA APPROVED CASE
CASE P:\TOT1A\791MW-SRD Hi TOT1A.sav WAS SAVED ON FRI, OCT 14 2005 11:06
DEFAULT OPTIONS MODIFIED:
DEFAULT SWITCHED SHUNT: LOCKED
ITER      DELTAP      BUS      DELTAQ      BUS      DELTA/V/      BUS      DELTAANG      BUS
0          0.0000(    26100    )    0.0000(    40367    )
          0.00001(    33846    )    0.00000(    33846)
1          0.0000(    26100    )    0.0000(    40367    )

REACHED TOLERANCE IN 1 ITERATIONS
LARGEST MISMATCH: 0.00 MW 0.01 MVAR 0.01 MVA AT BUS 24132 [SANBRDNO 230.00]
SYSTEM TOTAL ABSOLUTE MISMATCH: 0.47 MVA

SWING BUS SUMMARY:
BUS# X-- NAME --X BASKV      PGEN      PMAX      PMIN      QGEN      QMAX      QMIN
30000 PTSB 7 20.000      156.5      710.0      0.0      141.6      370.0     -300.0

PROCESSING THE SUB-SYSTEM DESCRIPTION FILE...
PROCESSING THE MONITORED ELEMENT DESCRIPTION FILE...
PROCESSING THE CONTINGENCY DESCRIPTION FILE...
Trip Branch from Bus 65193 TO Bus 79005 CKT 2
NO CONTINGENCY EVENTS SPECIFIED--CONTINGENCY 'NEW_TRANS' SKIPPED
WORKING CASE HAS LARGEST MISMATCH OF 0.00 MW AT BUS 26100 [SYLMAR4 230.00]
0.00 MVAR AT BUS 40367 [DWORSHAK 115.00]

PROCESSING CONTINGENCY 'BNZ_MNA' (#1 OF 8):
TRIP BRANCH FROM BUS 65193 [BONANZA 345.00] TO BUS 65995 [MONA 345.00]
SET BUS 65191 [BONANZA 24.000] GENERATION TO 0 MW

PROCESSING CONTINGENCY 'BNZ_BEAR' (#2 OF 8):
TRIP BRANCH FROM BUS 65193 [BONANZA 345.00] TO BUS 79005 [BEARS 345.00] CKT 1
*** SOLUTION NOT CONVERGED: ITERATION LIMIT EXCEEDED ***
LARGEST MISMATCH IS 1.60 MVA AT BUS 10010 [AMBROSIA 115.00]
TOTAL MISMATCH IS 13.19 MVA

PROCESSING CONTINGENCY 'CRBN_SPNF' (#3 OF 8):
TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66405 [SPAN FRK 138.00] CKT 2
TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66395 [SPAN F&1 138.00] CKT 1

PROCESSING CONTINGENCY 'EMPK_PNTR' (#4 OF 8):
TRIP BRANCH FROM BUS 65520 [EMMAPARK 138.00] TO BUS 66183 [PANTHER 138.00]

PROCESSING CONTINGENCY 'HYDN_FOID' (#5 OF 8):
TRIP BRANCH FROM BUS 70231 [HOPKINS 115.00] TO BUS 79003 [BASALT 115.00]
TRIP BRANCH FROM BUS 79039 [HAYDEN 230.00] TO BUS 79091 [FOIDELCK 230.00]

PROCESSING CONTINGENCY 'HYDN_ARTS' (#6 OF 8):
TRIP BRANCH FROM BUS 79038 [HAYDEN 138.00] TO BUS 79001 [ARTESIA 138.00]

PROCESSING CONTINGENCY 'MKR_RNGLY' (#7 OF 8):
TRIP BRANCH FROM BUS 79046 [MEEKER 138.00] TO BUS 66278 [RANGELY 138.00]

PROCESSING CONTINGENCY 'HYDN_VNL' (#8 OF 8):

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Appendix F

791 MW ACC CONTINGENCY SOLUTION (ACCC) REPORT

ACCC OVERLOAD REPORT: MONITORED ELEMENTS LOADED ABOVE 100.0 % OF RATING SET B
INCLUDES VOLTAGE REPORT

DISTRIBUTION FACTOR FILE: P:\TOT1A\TOT1A.dfx
SUBSYSTEM DESCRIPTION FILE: P:\TOT1A\TOT1A.SUB
MONITORED ELEMENT FILE: P:\TOT1A\TOT1A.MON
CONTINGENCY DESCRIPTION FILE: P:\TOT1A\TOT1A.CON

<----- MONITORED BRANCH -----> CONTINGENCY RATING FLOW %

MONITORED VOLTAGE REPORT:

SYSTEM	CONTINGENCY	<----- B U S ----->	V-CONT	V-INIT	V-MAX	V-MIN
VOLTAGE	DEVIATION BNZ_MNA	65193 BONANZA	345.00	1.02036	0.96919	0.05000

CONTINGENCY LEGEND:

LABEL	EVENTS
BNZ_MNA	: TRIP BRANCH FROM BUS 65193 [BONANZA 345.00] TO BUS 65995 [MONA 345.00] SET BUS 65191 [BONANZA 24.000] GENERATION TO 0 MW
CRBN_SPNF	: TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66405 [SPAN FRK 138.00] CKT 2 TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66395 [SPAN F&1 138.00] CKT 1
EMPK_PNTR	: TRIP BRANCH FROM BUS 65520 [EMMAPARK 138.00] TO BUS 66183 [PANTHER 138.00]
HYDN_FOID	: TRIP BRANCH FROM BUS 70231 [HOPKINS 115.00] TO BUS 79003 [BASALT 115.00] TRIP BRANCH FROM BUS 79039 [HAYDEN 230.00] TO BUS 79091 [FOIDELCK 230.00]
HYDN_ARTS	: TRIP BRANCH FROM BUS 79038 [HAYDEN 138.00] TO BUS 79001 [ARTESIA 138.00]
MKR_RNGLY	: TRIP BRANCH FROM BUS 79046 [MEEKER 138.00] TO BUS 66278 [RANGELY 138.00]
HYDN_VNL	: TRIP BRANCH FROM BUS 79038 [HAYDEN 138.00] TO BUS 79067 [VERNAL 138.00]

Appendix G

VOLTAGE MONITORED BUSES IN ZONES: 656, 662, 670, 708, 790, and 791

Bus Number	Bus Name	Base kV	Area Number	Area Name	Zone Number	Zone	Owner Name
						Name	
65022	AMER FRK	138	65	PACE	662	UT UT VA	PAC
65023	AMER FRK	46	65	PACE	662	UT UT VA	PAC
65085	ASHLEY	138	65	PACE	656	UT EA UT	PAC
65086	ASHLEY	69	65	PACE	656	UT EA UT	PAC
65167	BLACKHWK	138	65	PACE	656	UT EA UT	PAC
65168	BLACKHWK	69	65	PACE	656	UT EA UT	PAC
65192	BONANZA	138	65	PACE	670	UT DG&T	UAMP
65193	BONANZA	345	65	PACE	670	UT DG&T	UAMP
65280	CARBON	138	65	PACE	656	UT EA UT	PAC
65308	CEDAR HI	138	65	PACE	662	UT UT VA	PAC
65325	CHERWOOD	138	65	PACE	662	UT UT VA	PAC
65326	CHERWOOD	12.5	65	PACE	662	UT UT VA	PAC
65355	COLUMBIA	138	65	PACE	656	UT EA UT	PAC
65356	COLUMBIA	46	65	PACE	656	UT EA UT	PAC
65457	DG UPLCO	138	65	PACE	670	UT DG&T	UAMP
65482	EAGLE MT	138	65	PACE	662	UT UT VA	PAC
65510	EMERY	345	65	PACE	656	UT EA UT	PAC
65515	EMERY	138	65	PACE	656	UT EA UT	PAC
65516	EMERY	69	65	PACE	656	UT EA UT	PAC
65520	EMMAPARK	138	65	PACE	656	UT EA UT	PAC
65521	EMMAPARK	46	65	PACE	656	UT EA UT	PAC
65640	GENEVA	138	65	PACE	662	UT UT VA	PAC
65650	GILLESPE	138	65	PACE	662	UT UT VA	UAMP
65651	GILLESPE	46	65	PACE	662	UT UT VA	UAMP
65745	HALE	138	65	PACE	662	UT UT VA	PAC
65746	HALE	46	65	PACE	662	UT UT VA	PAC
65755	HELPER	138	65	PACE	656	UT EA UT	PAC
65756	HELPER	46	65	PACE	656	UT EA UT	PAC
65760	HELPER T	138	65	PACE	656	UT EA UT	PAC
65765	HIGHLANX	138	65	PACE	662	UT UT VA	PAC
65766	HIGHLANX	46	65	PACE	662	UT UT VA	PAC
65767	HIGHLANX	12.5	65	PACE	662	UT UT VA	PAC
65770	HIGHLD T	138	65	PACE	662	UT UT VA	PAC
65805	HUNTINGTN	345	65	PACE	656	UT EA UT	PAC
65810	HUNTINGTN	138	65	PACE	656	UT EA UT	PAC
65811	HUNTINGTN	46	65	PACE	656	UT EA UT	PAC
65855	JERUSALM	138	65	PACE	662	UT UT VA	PAC
65856	JERUSALM	46	65	PACE	662	UT UT VA	PAC
65867	JORDANEL	138	65	PACE	662	UT UT VA	PAC
65935	MCFADDEN	138	65	PACE	656	UT EA UT	PAC
65936	MCFADDEN	69	65	PACE	656	UT EA UT	PAC
65950	MIDWAY	138	65	PACE	662	UT UT VA	UAMP
65951	MIDWAY	46	65	PACE	662	UT UT VA	UAMP
65995	MONA	345	65	PACE	656	UT EA UT	PAC
66015	MOUND SW	138	65	PACE	656	UT EA UT	PAC
66070	NEBO	138	65	PACE	662	UT UT VA	PAC
66071	NEBO	46	65	PACE	662	UT UT VA	PAC

66183	PANTHER	138	65	PACE	656	UT EA UT	PAC
66225	PINTO	345	65	PACE	656	UT EA UT	PAC
66235	PINTO PS	345	65	PACE	656	UT EA UT	PAC
66248	PLGROVE	138	65	PACE	662	UT UT VA	PAC
66249	PLGROVE	46	65	PACE	662	UT UT VA	PAC
66278	RANGELY	138	65	PACE	670	UT DG&T	UAMP
66362	SARA TAP	138	65	PACE	662	UT UT VA	PAC
66363	SARATOGA	138	65	PACE	662	UT UT VA	PAC
66364	SARATOGA	12.5	65	PACE	662	UT UT VA	PAC
66389	SOLDRHOL	138	65	PACE	662	UT UT VA	PAC
66395	SPAN F&1	138	65	PACE	656	UT EA UT	PAC
66400	SPAN FRK	345	65	PACE	662	UT UT VA	PAC
66405	SPAN FRK	138	65	PACE	662	UT UT VA	PAC
66406	SPAN FRK	46	65	PACE	662	UT UT VA	PAC
66415	SPHINX T	138	65	PACE	656	UT EA UT	PAC
66441	SUMM CRK	138	65	PACE	662	UT UT VA	PAC
66442	SUMM CRK	12.5	65	PACE	662	UT UT VA	PAC
66450	SUNNYSID	138	65	PACE	656	UT EA UT	PAC
66451	SUVPS	138	65	PACE	662	UT UT VA	PAC
66485	TANNER	138	65	PACE	662	UT UT VA	UAMP
66486	TANNER	46	65	PACE	662	UT UT VA	UAMP
66555	TIMP	138	65	PACE	662	UT UT VA	PAC
66556	TIMP	46	65	PACE	662	UT UT VA	PAC
66577	TRI CITY	138	65	PACE	662	UT UT VA	PAC
66590	UPALCO	138	65	PACE	656	UT EA UT	PAC
66645	WALLBURG	138	65	PACE	662	UT UT VA	PAC
66646	WALLBURG	12.5	65	PACE	662	UT UT VA	PAC
70076	CAMEO	69	70	PSCOLORA	708	ZONERW	PSC
70077	CAMEO	100	70	PSCOLORA	708	ZONERW	PSC
70078	CAMEO	230	70	PSCOLORA	708	ZONERW	PSC
70080	CAMEO1	13.8	70	PSCOLORA	708	ZONERW	PSC
70081	CAMEO2	13.8	70	PSCOLORA	708	ZONERW	PSC
70082	CAMP	69	70	PSCOLORA	708	ZONERW	PSC
70089	CARBNDAL	115	70	PSCOLORA	708	ZONERW	PSC
70113	CLIFTON	230	70	PSCOLORA	708	ZONERW	PSC
70140	DEBEQUE	69	70	PSCOLORA	708	ZONERW	PSC
70180	FRUITA	13.8	70	PSCOLORA	708	ZONERW	PSC
70183	FRUITA	69	70	PSCOLORA	708	ZONERW	PSC
70201	GLENWOOD	115	70	PSCOLORA	708	ZONERW	PSC
70205	GRANDJCT	230	70	PSCOLORA	708	ZONERW	PSC
70206	GRANDJPS	230	70	PSCOLORA	708	ZONERW	PSC
70207	GRANDVLY	69	70	PSCOLORA	708	ZONERW	PSC
70214	GRANDJCT	69	70	PSCOLORA	708	ZONERW	PSC
70231	HOPKINS	115	70	PSCOLORA	708	ZONERW	PSC
70232	HOPKINS	230	70	PSCOLORA	708	ZONERW	PSC
70233	HORIZON	230	70	PSCOLORA	708	ZONERW	PSC
70288	MITCHLCR	115	70	PSCOLORA	708	ZONERW	PSC
70296	NEWCASTL	115	70	PSCOLORA	708	ZONERW	PSC
70302	OILSHALE	69	70	PSCOLORA	708	ZONERW	PSC
70309	PARACHUT	230	70	PSCOLORA	708	ZONERW	PSC

70349	RAMSEY	25	70	PSCOLORA	708	ZONERW	PSC
70358	RIFLE PS	230	70	PSCOLORA	708	ZONERW	PSC
70359	RIFLE CU	69	70	PSCOLORA	708	ZONERW	PSC
70363	ROARNGFK	115	70	PSCOLORA	708	ZONERW	PSC
70385	SHOSHA&B	4	70	PSCOLORA	708	ZONERW	PSC
70386	SHOSHONE	69	70	PSCOLORA	708	ZONERW	PSC
70387	SHOSHONE	115	70	PSCOLORA	708	ZONERW	PSC
70388	SILTUSBR	115	70	PSCOLORA	708	ZONERW	PSC
70436	UINTAH	69	70	PSCOLORA	708	ZONERW	PSC
70437	UINTAH	13.8	70	PSCOLORA	708	ZONERW	PSC
70438	UINTAH	230	70	PSCOLORA	708	ZONERW	PSC
70440	UNIONOIL	69	70	PSCOLORA	708	ZONERW	PSC
70454	VINELAND	69	70	PSCOLORA	708	ZONERW	PSC
70525	MTHARRIS	138	70	PSCOLORA	708	ZONERW	PSC
70535	COOLEYMA	230	70	PSCOLORA	708	ZONERW	PSC
70541	ASPEN PS	115	70	PSCOLORA	708	ZONERW	PSC
79003	BASALT	115	70	PSCOLORA	708	ZONERW	PSC
70540	BASLTDST	115	70	PSCOLORA	708	ZONERW	PSC
79004	BASALT	230	70	PSCOLORA	708	ZONERW	PSC
79006	BEAVERCU	115	70	PSCOLORA	708	ZONERW	PSC
79018	CRYSTLPS	115	70	PSCOLORA	708	ZONERW	PSC
79033	GOREPASS	230	70	PSCOLORA	708	ZONERW	TRI
79034	GRANDJCT	115	70	PSCOLORA	708	ZONERW	PSC
79035	GRANDJCT	138	70	PSCOLORA	708	ZONERW	PSC
79047	COLBRAN	138	70	PSCOLORA	708	ZONERW	WAUC
79056	RIFLE CU	138	70	PSCOLORA	708	ZONERW	PSC
79057	RIFLE CU	230	70	PSCOLORA	708	ZONERW	PSC
79058	RIFLE CU	345	70	PSCOLORA	708	ZONERW	PSC
79065	STEAMBT	230	70	PSCOLORA	708	ZONERW	PSC
79066	VAIL	115	70	PSCOLORA	708	ZONERW	PSC
79068	WOLCOTT	115	70	PSCOLORA	708	ZONERW	PSC
79069	WOLCOTT	230	70	PSCOLORA	708	ZONERW	PSC
79091	FOIDELCK	230	70	PSCOLORA	708	ZONERW	PSC
79092	AVON	115	70	PSCOLORA	708	ZONERW	PSC
79173	COLBRAN	115	70	PSCOLORA	708	ZONERW	WAUC
70219	STILLWTR	115	70	PSCOLORA	708	ZONERW	PSC
70572	RIFLE CU	115	70	PSCOLORA	708	ZONERW	PSC
79027	GALLEGOS	115	19	WAPA L.C	790	ZONER4	DSW
79028	GLEN PS	230	19	WAPA L.C	790	ZONER4	DSW
79031	GLENCANY	230	19	WAPA L.C	790	ZONER4	DSW
79032	GLENCANY	345	19	WAPA L.C	790	ZONER4	DSW
79043	KAYENTA	230	19	WAPA L.C	790	ZONER4	DSW
79062	SHIPROCK	115	19	WAPA L.C	790	ZONER4	DSW
79063	SHIPROCK	230	19	WAPA L.C	790	ZONER4	DSW
79064	SHIPROCK	345	19	WAPA L.C	790	ZONER4	DSW
79093	NAVAJO	230	19	WAPA L.C	790	ZONER4	DSW
79095	SHIPROCK	500	19	WAPA L.C	790	ZONER4	WAUC
79096	LNGHOUSE	230	19	WAPA L.C	790	ZONER4	DSW
79097	ANIMAS	115	19	WAPA L.C	790	ZONER4	DSW
79098	BERGIN	115	19	WAPA L.C	790	ZONER4	DSW

79100	FOOTHILLS	115	19	WAPA L.C	791	ZONE69	DSW
79101	FRUITAP	115	19	WAPA L.C	790	ZONER4	DSW
79102	FRUITLND	115	19	WAPA L.C	790	ZONER4	DSW
79105	GLADETAP	115	19	WAPA L.C	791	ZONE69	DSW
79106	HOODMESA	115	19	WAPA L.C	790	ZONER4	DSW
79109	LAPLATA	115	19	WAPA L.C	790	ZONER4	DSW
79112	MESA FM	115	19	WAPA L.C	790	ZONER4	DSW
79113	NAVAJO	115	19	WAPA L.C	790	ZONER4	DSW
79114	SAN JUAN	115	19	WAPA L.C	790	ZONER4	DSW
79116	SULLIVAN	115	19	WAPA L.C	790	ZONER4	DSW
79150	GLENC1-2	13.8	19	WAPA L.C	790	ZONER4	NPR
79151	GLENC3-4	13.8	19	WAPA L.C	790	ZONER4	NPR
79152	GLENC5-6	13.8	19	WAPA L.C	790	ZONER4	NPR
79153	GLENC7-8	13.8	19	WAPA L.C	790	ZONER4	NPR
79001	ARTESIA	138	73	WAPA R.M	790	ZONER4	WALM
79002	AXIAL	138	73	WAPA R.M	790	ZONER4	TRI
79005	BEARS	345	73	WAPA R.M	790	ZONER4	WALM
79007	BLUEMESA	115	73	WAPA R.M	790	ZONER4	WALM
79008	GRANGER	69	73	WAPA R.M	790	ZONER4	WAUC
79009	LYMAN SW	69	73	WAPA R.M	790	ZONER4	WAUC
79010	MANILA	69	73	WAPA R.M	790	ZONER4	WAUC
79011	CAHONE	115	73	WAPA R.M	790	ZONER4	TRI
79012	CORTEZ	115	73	WAPA R.M	790	ZONER4	TRI
79013	CRAIG	230	73	WAPA R.M	790	ZONER4	TRI
79014	CRAIG	345	73	WAPA R.M	791	ZONE69	TRI
79015	CRAIG 1	22	73	WAPA R.M	790	ZONER4	TRI
79016	CRAIG 2	22	73	WAPA R.M	790	ZONER4	TRI
79017	CRAIG 3	22	73	WAPA R.M	790	ZONER4	TRI
79019	MORRO1-2	12.5	73	WAPA R.M	790	ZONER4	NPR
79020	CURECANT	115	73	WAPA R.M	790	ZONER4	TRI
79021	CURECANT	230	73	WAPA R.M	790	ZONER4	WALM
79023	DURANGO	115	73	WAPA R.M	790	ZONER4	TRI
79026	FLAMGORG	138	73	WAPA R.M	790	ZONER4	WALM
79029	FLAMGORG	69	73	WAPA R.M	790	ZONER4	WALM
79030	FONTNLE	69	73	WAPA R.M	790	ZONER4	WALM
79036	GRANDJCT	345	73	WAPA R.M	790	ZONER4	WALM
79037	GUNNISON	115	73	WAPA R.M	790	ZONER4	WALM
79038	HAYDEN	138	73	WAPA R.M	791	ZONE69	WALM
79039	HAYDEN	230	73	WAPA R.M	791	ZONE69	WALM
79040	HAYDEN1	18	73	WAPA R.M	790	ZONER4	WALM
79041	HAYDEN2	22	73	WAPA R.M	790	ZONER4	WALM
79042	HOTCHKIS	115	73	WAPA R.M	790	ZONER4	TRI
79044	LOSTCANY	115	73	WAPA R.M	790	ZONER4	WALM
79045	LOSTCANY	230	73	WAPA R.M	790	ZONER4	WALM
79046	MEEKER	138	73	WAPA R.M	790	ZONER4	TRI
79048	MONTROSE	115	73	WAPA R.M	790	ZONER4	WALM
79049	MONTROSE	345	73	WAPA R.M	790	ZONER4	WALM
79050	NORTHFRK	115	73	WAPA R.M	790	ZONER4	WALM
79052	NUCLA	115	73	WAPA R.M	790	ZONER4	TRI
79054	PONCHABR	230	73	WAPA R.M	791	ZONE69	WALM

79059	RIFLE WA	230	73	WAPA R.M	790	ZONER4	WALM
79060	SANJN PS	345	73	WAPA R.M	790	ZONER4	PSC
79061	SHIP PS	230	73	WAPA R.M	790	ZONER4	PSC
79067	VERNAL	138	73	WAPA R.M	790	ZONER4	WALM
79070	NORTHFRK	230	73	WAPA R.M	790	ZONER4	TRI
79071	HESPERUS	115	73	WAPA R.M	790	ZONER4	TRI
79072	HESPERUS	345	73	WAPA R.M	790	ZONER4	TRI
79073	BLUEDOOR	115	73	WAPA R.M	790	ZONER4	TRI
79074	E.CORTEZ	115	73	WAPA R.M	790	ZONER4	TRI
79075	EMPIRETS	115	73	WAPA R.M	791	ZONE69	TRI
79076	AM EAST	115	73	WAPA R.M	791	ZONE69	TRI
79077	BAYFIELD	115	73	WAPA R.M	791	ZONE69	TRI
79078	BODO	115	73	WAPA R.M	791	ZONE69	TRI
79079	BULLOCK	115	73	WAPA R.M	791	ZONE69	TRI
79080	CASCADEL	115	73	WAPA R.M	791	ZONE69	TRI
79081	CRSTBUTT	115	73	WAPA R.M	791	ZONE69	TRI
79082	HAPPYCAN	115	73	WAPA R.M	791	ZONE69	TRI
79083	JUANITA	115	73	WAPA R.M	791	ZONE69	TRI
79084	LAKECITY	115	73	WAPA R.M	791	ZONE69	TRI
79085	NORTHMSA	115	73	WAPA R.M	791	ZONE69	TRI
79086	PAGOSA	115	73	WAPA R.M	791	ZONE69	TRI
79088	ROCKWOOD	115	73	WAPA R.M	791	ZONE69	TRI
79089	SHENDOAH	115	73	WAPA R.M	791	ZONE69	TRI
79090	SKITO	115	73	WAPA R.M	791	ZONE69	TRI
79099	FLOR.RIV	115	73	WAPA R.M	791	ZONE69	TRI
79103	GARNET M	115	73	WAPA R.M	791	ZONE69	TRI
79104	GARNETAP	115	73	WAPA R.M	791	ZONE69	TRI
79107	HOVEN NO	115	73	WAPA R.M	791	ZONE69	TRI
79108	HOVENWEP	115	73	WAPA R.M	791	ZONE69	TRI
79110	MAIN CO	115	73	WAPA R.M	791	ZONE69	TRI
79111	MANCOSTP	115	73	WAPA R.M	791	ZONE69	TRI
79115	SPRCKTAP	115	73	WAPA R.M	791	ZONE69	TRI
79117	Y.JACK 2	115	73	WAPA R.M	791	ZONE69	TRI
79118	Y.JACK W	115	73	WAPA R.M	791	ZONE69	TRI
79120	MOQUI C	115	73	WAPA R.M	790	ZONER4	TRI
79121	SANDCANY	115	73	WAPA R.M	790	ZONER4	TRI
79122	TOWAOC	115	73	WAPA R.M	790	ZONER4	TRI
79123	FONTNLE	4.2	73	WAPA R.M	790	ZONER4	NPR
79154	FLGORG1	12.5	73	WAPA R.M	790	ZONER4	NPR
79155	FLGORG2	12.5	73	WAPA R.M	790	ZONER4	NPR
79156	FLGORG3	12.5	73	WAPA R.M	790	ZONER4	NPR
79157	BMESA1-2	12.5	73	WAPA R.M	790	ZONER4	NPR
79158	NUCLA 1	13.8	73	WAPA R.M	790	ZONER4	WAUC
79159	NUCLA 2	13.8	73	WAPA R.M	790	ZONER4	WAUC
79160	NUCLA 3	13.8	73	WAPA R.M	790	ZONER4	WAUC
79161	NUCLA 4	13.8	73	WAPA R.M	790	ZONER4	WAUC
79162	CRYSTAL	12.5	73	WAPA R.M	790	ZONER4	NPR
79163	MORROWPT	230	73	WAPA R.M	790	ZONER4	WAUC
79166	MOLINA-L	4.2	73	WAPA R.M	790	ZONER4	NPR
79172	MOLINA-U	4.2	73	WAPA R.M	790	ZONER4	NPR

79174	MOLINA-L	115	73	WAPA R.M	790	ZONER4	WAUC
79175	MOLINA-U	115	73	WAPA R.M	790	ZONER4	WAUC
79176	MCPHEE	2.4	73	WAPA R.M	790	ZONER4	NPR
79177	MCPHEE	12.5	73	WAPA R.M	790	ZONER4	WAUC
79179	GRT CUT	115	73	WAPA R.M	790	ZONER4	WAUC
79180	GRCUT TP	115	73	WAPA R.M	790	ZONER4	WAUC
79191	COYOTE G	115	73	WAPA R.M	791	ZONE69	TRI
79192	SOCANAL	115	73	WAPA R.M	790	ZONER4	TRI
79250	AMATLAS	230	73	WAPA R.M	790	ZONER4	PSC
79251	QFATLAS1	13.8	73	WAPA R.M	790	ZONER4	PSC
79252	QFATLAS2	13.8	73	WAPA R.M	790	ZONER4	PSC
79253	CRYSTAL	115	73	WAPA R.M	790	ZONER4	WALM
79260	ELPASOTP	115	73	WAPA R.M	791	ZONE69	TRI
79190	DALLASCR	115	73	WAPA R.M	791	ZONE69	WALM
79187	NORWOOD	115	73	WAPA R.M	791	ZONE69	WAUC
79257	AMES	115	73	WAPA R.M	790	ZONER4	TRI
79194	BURROBDG	115	73	WAPA R.M	790	ZONER4	TRI
79262	CEMNT CK	115	73	WAPA R.M	791	ZONE69	TRI
79178	GRT CUT	12.5	73	WAPA R.M	790	ZONER4	WAUC
79193	MCKENZIX	115	73	WAPA R.M	790	ZONER4	PSC
79256	SILVERTN	115	73	WAPA R.M	790	ZONER4	TRI
79189	SUNSH SM	115	73	WAPA R.M	790	ZONER4	TRI
79188	TELLURID	115	73	WAPA R.M	791	ZONE69	WAUC
79164	TOWAOC	6.9	73	WAPA R.M	790	ZONER4	NPR
73506	LAPORTAP	115	73	WAPA R.M	791	ZONE69	PRP
73551	W CANON	230	73	WAPA R.M	791	ZONE69	TRI
79183	ROUBDTAP	115	73	WAPA R.M	790	ZONER4	TRI
79051	KAYENT&1	230	19	WAPA L.C	790	ZONER4	DSW
79055	KAYENT&A	230	19	WAPA L.C	790	ZONER4	DSW
79119	SHIPRO&1	500	19	WAPA L.C	790	ZONER4	WAUC
79124	SHIPRO&2	500	19	WAPA L.C	790	ZONER4	WAUC
79025	FLAGST&1	345	19	WAPA L.C	790	ZONER4	DSW
79087	FLAGST&A	345	19	WAPA L.C	790	ZONER4	DSW

Appendix H

MONITORED TRANSMISSION LINES IN ZONES: 656, 662, 670, 708, 790, and 791

From Bus	From Bus Name		To Bus	To Bus Name	Id	Line R (pu)	Line X (pu)	
10292	SAN_JUAN	345.00	79064	SHIPROCK	345.00	1	0	0.001
14002	MOENKOPI	500.00	79124	SHIPRO&2	500.00	1	0	-0.0001
14101	FOURCORN	345.00	66235	PINTO PS	345.00	1	0.0056	0.0511
14101	FOURCORN	345.00	79064	SHIPROCK	345.00	1	0.0003	0.0042
26043	INTERMT	345.00	65995	MONA	345.00	1	0.0018	0.0245
26043	INTERMT	345.00	65995	MONA	345.00	2	0.0018	0.0245
65022	AMER FRK	138.00	65745	HALE	138.00	1	0.00561	0.0368
65022	AMER FRK	138.00	66577	TRI CITY	138.00	1	0.00097	0.00844
65085	ASHLEY	138.00	66590	UPALCO	138.00	1	0.0496	0.1495
65085	ASHLEY	138.00	79067	VERNAL	138.00	1	0.016	0.0482
65167	BLACKHWK	138.00	65935	MCFADDEN	138.00	1	0.00721	0.04082
65192	BONANZA	138.00	65457	DG UPLCO	138.00	1	0.0186	0.213
65192	BONANZA	138.00	66278	RANGELY	138.00	1	0.0092	0.0998
65192	BONANZA	138.00	79067	VERNAL	138.00	1	0.0089	0.0962
65193	BONANZA	345.00	65995	MONA	345.00	1	0.0048	0.0821
65193	BONANZA	345.00	79005	BEARS	345.00	1	0.0027	0.05154
65255	CAMP TAP	138.00	65482	EAGLE MT	138.00	1	0.00927	0.02997
65260	CAMP WIL	345.00	65995	MONA	345.00	1	0.00237	0.02816
65260	CAMP WIL	345.00	65995	MONA	345.00	2	0.0022	0.0238
65260	CAMP WIL	345.00	65995	MONA	345.00	3	0.0018	0.0224
65260	CAMP WIL	345.00	66400	SPAN FRK	345.00	1	0.00127	0.01716
65280	CARBON	138.00	65755	HELPER	138.00	1	0.001	0.0067
65280	CARBON	138.00	65760	HELPER T	138.00	1	0.0018	0.0074
65280	CARBON	138.00	66183	PANTHER	138.00	1	0.00132	0.00397
65280	CARBON	138.00	66395	SPAN F&1	138.00	1	0.1678	0.2375
65280	CARBON	138.00	66405	SPAN FRK	138.00	2	0.0357	0.2029
65308	CEDAR HI	138.00	65770	HIGHLD T	138.00	1	0.0016	0.00914
65308	CEDAR HI	138.00	66248	PLGROVE	138.00	1	0.00339	0.02182
65325	CHERWOOD	138.00	65640	GENEVA	138.00	1	0.00255	0.0092
65325	CHERWOOD	138.00	65745	HALE	138.00	1	0.00255	0.0092
65355	COLUMBIA	138.00	66015	MOUND SW	138.00	1	0.0144	0.03
65355	COLUMBIA	138.00	66450	SUNNYSID	138.00	1	0.003	0.0091
65457	DG UPLCO	138.00	66590	UPALCO	138.00	1	0	0.0001
65482	EAGLE MT	138.00	66362	SARA TAP	138.00	1	0.00618	0.01998
65510	EMERY	345.00	65805	HUNTINGTN	345.00	1	0.0009	0.0099
65510	EMERY	345.00	66340	SIGURD	345.00	1	0.0035	0.0373
65510	EMERY	345.00	66340	SIGURD	345.00	2	0.0035	0.0372
65520	EMMAPARK	138.00	66183	PANTHER	138.00	1	0.00826	0.02489
65520	EMMAPARK	138.00	66590	UPALCO	138.00	1	0.0657	0.198
65640	GENEVA	138.00	66555	TIMP	138.00	1	0.0001	0.0008
65650	GILLESPE	138.00	65745	HALE	138.00	1	0	0.003
65745	HALE	138.00	66405	SPAN FRK	138.00	1	0.0075	0.0644
65745	HALE	138.00	66485	TANNER	138.00	1	0.0031	0.0269
65745	HALE	138.00	66645	WALLBURG	138.00	1	0.0135	0.0402

65760	HELPER T	138.00	65952	MEADS	138.00	1	0.01176	0.03549
65765	HIGHLANX	138.00	65770	HIGHLD T	138.00	1	0.0008	0.0042
65770	HIGHLD T	138.00	65905	MICRON1	138.00	1	0.0027	0.015
65805	HUNTINGTN	345.00	65995	MONA	345.00	1	0.00237	0.02816
65805	HUNTINGTN	345.00	66225	PINTO	345.00	1	0.0088	0.08
65805	HUNTINGTN	345.00	66400	SPAN FRK	345.00	1	0.00399	0.04291
65810	HUNTINGTN	138.00	65935	MCFADDEN	138.00	1	0.0098	0.0295
65855	JERUSALM	138.00	66070	NEBO	138.00	1	0.0358	0.1077
65867	JORDANEL	138.00	65950	MIDWAY	138.00	1	0.01442	0.04343
65867	JORDANEL	138.00	66360	SILVR CR	138.00	1	0.01088	0.03277
65925	MART MAR	138.00	66070	NEBO	138.00	1	0.0404	0.1216
65950	MIDWAY	138.00	66389	SOLDRHOL	138.00	1	0.00351	0.01055
65952	MEADS	138.00	66015	MOUND SW	138.00	1	0.02744	0.08281
65995	MONA	345.00	66340	SIGURD	345.00	1	0.0038	0.0341
65995	MONA	345.00	66340	SIGURD	345.00	2	0.0033	0.0348
66015	MOUND SW	138.00	66415	SPHINX T	138.00	1	0.0356	0.1071
66070	NEBO	138.00	66441	SUMM CRK	138.00	1	0.0143	0.04832
66183	PANTHER	138.00	66707	WILLOW C	138.00	1	0.00023	0.00066
66248	PLGROVE	138.00	66577	TRI CITY	138.00	1	0.00204	0.01776
66278	RANGELY	138.00	79001	ARTESIA	138.00	1	0.0234	0.0873
66278	RANGELY	138.00	79046	MEEKER	138.00	1	0.06061	0.22103
66355	SIGURDPS	230.00	79031	GLENCANY	230.00	1	0.033	0.2427
66362	SARA TAP	138.00	66363	SARATOGA	138.00	1	0.00137	0.00778
66362	SARA TAP	138.00	66577	TRI CITY	138.00	1	0.00701	0.02265
66389	SOLDRHOL	138.00	66645	WALLBURG	138.00	1	0.00519	0.02461
66395	SPAN F&1	138.00	66405	SPAN FRK	138.00	1	0.0014	0.3239
66400	SPAN FRK	345.00	66578	TRI CITY	345.00	1	0.00082	0.01103
66405	SPAN FRK	138.00	66451	SUVPS	138.00	1	0.0152	0.05134
66405	SPAN FRK	138.00	66485	TANNER	138.00	1	0.0042	0.0359
66405	SPAN FRK	138.00	66555	TIMP	138.00	1	0.015	0.0872
66441	SUMM CRK	138.00	66451	SUVPS	138.00	1	0.0152	0.05134
66555	TIMP	138.00	66577	TRI CITY	138.00	1	0.00014	0.00073
70053	BLUERIVR	230.00	79033	GOREPASS	230.00	1	0.0022	0.0343
70076	CAMEO	69.000	70140	DEBEQUE	69.000	1	0.14219	0.24906
70076	CAMEO	69.000	70454	VINELAND	69.000	1	0.0258	0.0558
70078	CAMEO	230.00	70309	PARACHUT	230.00	1	0.0049	0.0309
70078	CAMEO	230.00	70438	UINTAH	230.00	1	0.00485	0.04409
70082	CAMP	69.000	70207	GRANDVLY	69.000	1	0.09127	0.07121
70082	CAMP	69.000	70440	UNIONOIL	69.000	1	0.15573	0.12149
70089	CARBNDAL	115.00	70231	HOPKINS	115.00	1	0.00677	0.02832
70113	CLIFTON	230.00	70205	GRANDJCT	230.00	1	0.00097	0.00883
70113	CLIFTON	230.00	70206	GRANDJPS	230.00	1	0.00062	0.00561
70140	DEBEQUE	69.000	70207	GRANDVLY	69.000	1	0.09756	0.17088
70183	FRUITA	69.000	70436	UINTAH	69.000	1	0.0972	0.0711
70201	GLENWOOD	115.00	70288	MITCHLCR	115.00	1	0.00271	0.01243
70201	GLENWOOD	115.00	70363	ROARNGFK	115.00	1	0.00172	0.00791
70201	GLENWOOD	115.00	70386	SHOSHONE	69.000	1	0.04309	0.07632
70206	GRANDJPS	230.00	70233	HORIZON	230.00	1	0.0007	0.006
70207	GRANDVLY	69.000	70302	OILSHALE	69.000	1	0.07358	0.12887
70214	GRANDJCT	69.000	70454	VINELAND	69.000	1	0.0502	0.10856

70219	STILLWTR	115.00	70388	SILTUSBR	115.00	1	0.00145	0.00665
70219	STILLWTR	115.00	70572	RIFLE CU	115.00	1	0.01086	0.04991
70231	HOPKINS	115.00	70363	ROARNGFK	115.00	1	0.01	0.04985
70231	HOPKINS	115.00	70387	SHOSHONE	115.00	1	0.0315	0.0449
70231	HOPKINS	115.00	79003	BASALT	115.00	1	0.05031	0.07266
70232	HOPKINS	230.00	70274	MALTA	230.00	1	0.0149	0.0912
70232	HOPKINS	230.00	70358	RIFLE PS	230.00	1	0.0057	0.041
70233	HORIZON	230.00	70438	UINTAH	230.00	1	0.00194	0.01711
70274	MALTA	230.00	79004	BASALT	230.00	1	0.00407	0.05
70288	MITCHLCR	115.00	70296	NEWCASTL	115.00	1	0.01451	0.06667
70296	NEWCASTL	115.00	70388	SILTUSBR	115.00	1	0.00579	0.02662
70302	OILSHALE	69.000	70359	RIFLE CU	69.000	1	0.0853	0.1451
70309	PARACHUT	230.00	70358	RIFLE PS	230.00	1	0.0075	0.0473
70327	PONCHA	115.00	79037	GUNNISON	115.00	1	0.1037	0.3212
70358	RIFLE PS	230.00	79059	RIFLE WA	230.00	1	0	0.0006
70358	RIFLE PS	230.00	79250	AMATLAS	230.00	1	0.00081	0.00536
70375	SAN LUIS	230.00	79054	PONCHABR	230.00	1	0.0096	0.0757
70525	MTHARRIS	138.00	79038	HAYDEN	138.00	1	0.00049	0.00198
70535	COOLEYMA	230.00	79004	BASALT	230.00	1	0.0039	0.03595
70535	COOLEYMA	230.00	79069	WOLCOTT	230.00	1	0.00226	0.02057
70540	BASLTDST	115.00	70541	ASPEN PS	115.00	1	0.01479	0.08878
70540	BASLTDST	115.00	79003	BASALT	115.00	1	0.00074	0.00406
70541	ASPEN PS	115.00	79003	BASALT	115.00	1	0.02056	0.0932
73009	ARCHER	230.00	79039	HAYDEN	230.00	1	0.0219	0.2367
73012	AULT	345.00	79014	CRAIG	345.00	1	0.0061	0.0927
73072	GOREPASS	138.00	79038	HAYDEN	138.00	1	0.0823	0.2446
73105	LAPORTE	115.00	73506	LAPORTAP	115.00	1	0.00428	0.03172
73149	OVERLAND	115.00	73506	LAPORTAP	115.00	1	0.00352	0.01088
73156	POUDRE	115.00	73506	LAPORTAP	115.00	1	0.00146	0.01071
73413	MIDWAYBR	230.00	73551	W CANON	230.00	1	0.0067	0.0665
73551	W CANON	230.00	79054	PONCHABR	230.00	1	0.0067	0.0665
79001	ARTESIA	138.00	79038	HAYDEN	138.00	1	0.1015	0.4303
79001	ARTESIA	138.00	79067	VERNAL	138.00	1	0.02405	0.09665
79002	AXIAL	138.00	79038	HAYDEN	138.00	1	0.03677	0.15402
79002	AXIAL	138.00	79046	MEEKER	138.00	1	0.02647	0.11093
79003	BASALT	115.00	79018	CRYSTLPS	115.00	1	0.016	0.057
79004	BASALT	230.00	79069	WOLCOTT	230.00	1	0.0061	0.0586
79005	BEARS	345.00	79014	CRAIG	345.00	1	0	0.0003
79006	BEAVERCU	115.00	79068	WOLCOTT	115.00	1	0.0173	0.0623
79006	BEAVERCU	115.00	79092	AVON	115.00	1	0.0093	0.0329
79007	BLUEMESA	115.00	79020	CURECANT	115.00	1	0.01768	0.06938
79007	BLUEMESA	115.00	79084	LAKECITY	115.00	1	0.04661	0.19538
79007	BLUEMESA	115.00	79090	SKITO	115.00	1	0.0298	0.13503
79008	GRANGER	69.000	79009	LYMAN SW	69.000	1	0.2985	0.4497
79008	GRANGER	69.000	79030	FONTNLE	69.000	1	0.38	0.57
79009	LYMAN SW	69.000	79010	MANILA	69.000	1	0.4538	0.6735
79010	MANILA	69.000	79029	FLAMGORG	69.000	1	0.2389	0.3545
79011	CAHONE	115.00	79052	NUCLA	115.00	1	0.10105	0.26444
79011	CAHONE	115.00	79117	Y.JACK 2	115.00	1	0.0113	0.0726
79011	CAHONE	115.00	79180	GRCUT TP	115.00	1	0.0428	0.1124

79012	CORTEZ	115.00	79073	BLUEDOOR	115.00	1	0.0063	0.02149
79012	CORTEZ	115.00	79075	EMPIRETS	115.00	1	0.01622	0.05509
79013	CRAIG	230.00	79039	HAYDEN	230.00	1	0.00387	0.04104
79013	CRAIG	230.00	79039	HAYDEN	230.00	2	0.00359	0.0378
79013	CRAIG	230.00	79059	RIFLE WA	230.00	1	0.00644	0.08915
79014	CRAIG	345.00	79058	RIFLE CU	345.00	1	0.00302	0.04077
79020	CURECANT	115.00	79192	SOCANAL	115.00	1	0.0179	0.08113
79020	CURECANT	115.00	79253	CRYSTAL	115.00	1	0.01632	0.06402
79021	CURECANT	230.00	79045	LOSTCANY	230.00	1	0.0138	0.14
79021	CURECANT	230.00	79054	PONCHABR	230.00	1	0.01179	0.1255
79021	CURECANT	230.00	79070	NORTHFRK	230.00	1	0.0041	0.04344
79021	CURECANT	230.00	79163	MORROWPT	230.00	1	0.00035	0.00284
79023	DURANGO	115.00	79077	BAYFIELD	115.00	1	0.03848	0.09833
79023	DURANGO	115.00	79078	BODO	115.00	1	0.00128	0.0072
79023	DURANGO	115.00	79089	SHENDOAH	115.00	1	0.0087	0.03136
79023	DURANGO	115.00	79191	COYOTE G	115.00	1	0.03777	0.11363
79024	FLAGSTAF	345.00	79025	FLAGST&1	345.00	1	0	-0.0454
79024	FLAGSTAF	345.00	79087	FLAGST&A	345.00	2	0	-0.0454
79025	FLAGST&1	345.00	79032	GLENCANY	345.00	1	0.0057	0.065
79026	FLAMGORG	138.00	79067	VERNAL	138.00	1	0.03979	0.1572
79026	FLAMGORG	138.00	79067	VERNAL	138.00	2	0.03979	0.1572
79027	GALLEGOS	115.00	79098	BERGIN	115.00	1	0.0237	0.1351
79028	GLEN PS	230.00	79093	NAVAJO	230.00	1	0.00327	0.011
79032	GLENCANY	345.00	79087	FLAGST&A	345.00	2	0.0055	0.0654
79033	GOREPASS	230.00	79039	HAYDEN	230.00	1	0.0041	0.06411
79034	GRANDJCT	115.00	79048	MONTROSE	115.00	1	0.0795	0.3006
79035	GRANDJCT	138.00	79047	COLBRAN	138.00	1	0.02431	0.08782
79036	GRANDJCT	345.00	79049	MONTROSE	345.00	1	0.00201	0.02831
79036	GRANDJCT	345.00	79058	RIFLE CU	345.00	1	0.00199	0.02911
79037	GUNNISON	115.00	79081	CRSTBUTT	115.00	1	0.04247	0.1383
79037	GUNNISON	115.00	79090	SKITO	115.00	1	0.0008	0.0036
79038	HAYDEN	138.00	79067	VERNAL	138.00	1	0.11275	0.51776
79039	HAYDEN	230.00	79091	FOIDELCK	230.00	1	0.0007	0.0103
79042	HOTCHKIS	115.00	79050	NORTHFRK	115.00	1	0.01169	0.04115
79042	HOTCHKIS	115.00	79104	GARNETAP	115.00	1	0.02361	0.07035
79043	KAYENTA	230.00	79051	KAYENT&1	230.00	1	0	-0.10397
79043	KAYENTA	230.00	79055	KAYENT&A	230.00	1	0	-0.10397
79044	LOSTCANY	115.00	79074	E.CORTEZ	115.00	1	0.01307	0.04466
79044	LOSTCANY	115.00	79075	EMPIRETS	115.00	1	0.02092	0.05467
79044	LOSTCANY	115.00	79111	MANCOSTP	115.00	1	0.01589	0.05727
79044	LOSTCANY	115.00	79122	TOWAOC	115.00	1	0.0035	0.0319
79045	LOSTCANY	230.00	79061	SHIP PS	230.00	1	0.00848	0.09019
79046	MEEKER	138.00	79056	RIFLE CU	138.00	1	0.03778	0.15841
79047	COLBRAN	138.00	79056	RIFLE CU	138.00	1	0.04534	0.1833
79048	MONTROSE	115.00	79052	NUCLA	115.00	1	0.061	0.21981
79048	MONTROSE	115.00	79082	HAPPYCAN	115.00	1	0.00511	0.01859
79048	MONTROSE	115.00	79115	SPRCKTAP	115.00	1	0.00589	0.02071
79048	MONTROSE	115.00	79183	ROUBDTAP	115.00	1	0.0375	0.1349
79048	MONTROSE	115.00	79192	SOCANAL	115.00	1	0.01398	0.06332
79049	MONTROSE	345.00	79072	HESPERUS	345.00	1	0.00354	0.05606

79050	NORTHFRK	115.00	79083	JUANITA	115.00	1	0.01653	0.0582
79051	KAYENT&1	230.00	79063	SHIPROCK	230.00	1	0.0162	0.1611
79052	NUCLA	115.00	79187	NORWOOD	115.00	1	0.0157	0.0552
79055	KAYENT&A	230.00	79096	LNGHOUSE	230.00	1	0.00229	0.02277
79057	RIFLE CU	230.00	79059	RIFLE WA	230.00	1	0.00053	0.00485
79059	RIFLE WA	230.00	79070	NORTHFRK	230.00	1	0.00756	0.08026
79060	SANJN PS	345.00	79072	HESPERUS	345.00	1	0.00149	0.02338
79062	SHIPROCK	115.00	79101	FRUITAP	115.00	1	0.005	0.0297
79062	SHIPROCK	115.00	79112	MESA FM	115.00	1	0.0269	0.0966
79065	STEAMBT	230.00	79091	FOIDELCK	230.00	1	0.0015	0.0142
79065	STEAMBT	230.00	79091	FOIDELCK	230.00	2	0.0015	0.0142
79066	VAIL	115.00	79068	WOLCOTT	115.00	1	0.0324	0.1168
79066	VAIL	115.00	79092	AVON	115.00	1	0.00924	0.03584
79069	WOLCOTT	230.00	79091	FOIDELCK	230.00	1	0.0095	0.0853
79071	HESPERUS	115.00	79078	BODO	115.00	1	0.00886	0.05543
79071	HESPERUS	115.00	79088	ROCKWOOD	115.00	1	0.04074	0.16745
79071	HESPERUS	115.00	79099	FLOR.RIV	115.00	1	0.01651	0.0926
79073	BLUEDOOR	115.00	79074	E.CORTEZ	115.00	1	0.00928	0.03288
79075	EMPIRETS	115.00	79180	GRCUT TP	115.00	1	0.0035	0.00915
79076	AM EAST	115.00	79077	BAYFIELD	115.00	1	0.02125	0.1192
79076	AM EAST	115.00	79099	FLOR.RIV	115.00	1	0.00396	0.02218
79077	BAYFIELD	115.00	79086	PAGOSA	115.00	1	0.06897	0.23691
79079	BULLOCK	115.00	79082	HAPPYCAN	115.00	1	0.00518	0.01541
79079	BULLOCK	115.00	79115	SPRCKTAP	115.00	1	0.0059	0.0176
79080	CASCADEL	115.00	79088	ROCKWOOD	115.00	1	0.02054	0.07219
79080	CASCADEL	115.00	79256	SILVERTN	115.00	1	0.02636	0.09594
79081	CRSTBUTT	115.00	79090	SKITO	115.00	1	0.04258	0.14999
79085	NORTHMSA	115.00	79104	GARNETAP	115.00	1	0.02733	0.08143
79085	NORTHMSA	115.00	79115	SPRCKTAP	115.00	1	0.00524	0.01841
79089	SHENDOAH	115.00	79111	MANCOSTP	115.00	1	0.01978	0.07128
79093	NAVAJO	230.00	79096	LNGHOUSE	230.00	1	0.0066	0.06578
79095	SHIPROCK	500.00	79119	SHIPRO&1	500.00	1	0	-0.0001
79097	ANIMAS	115.00	79112	MESA FM	115.00	1	0.0109	0.0381
79097	ANIMAS	115.00	79116	SULLIVAN	115.00	1	0.0048	0.0127
79098	BERGIN	115.00	79100	FOOTHILS	115.00	1	0.0139	0.0799
79098	BERGIN	115.00	79114	SAN JUAN	115.00	1	0.0364	0.1473
79100	FOOTHILS	115.00	79106	HOODMESA	115.00	1	0.0022	0.0117
79101	FRUITAP	115.00	79102	FRUITLND	115.00	1	0.0001	0.0006
79101	FRUITAP	115.00	79106	HOODMESA	115.00	1	0.0137	0.0782
79103	GARNET M	115.00	79104	GARNETAP	115.00	1	0.00993	0.03497
79103	GARNET M	115.00	79183	ROUBDTAP	115.00	1	0.0167	0.0597
79105	GLADETAP	115.00	79106	HOODMESA	115.00	1	0.0205	0.0735
79105	GLADETAP	115.00	79109	LAPLATA	115.00	1	0.0123	0.0443
79105	GLADETAP	115.00	79260	ELPASOTP	115.00	1	0.01502	0.04577
79106	HOODMESA	115.00	79116	SULLIVAN	115.00	1	0.0012	0.0069
79107	HOVEN NO	115.00	79117	Y.JACK 2	115.00	1	0.0094	0.06
79108	HOVENWEP	115.00	79121	SANDCANY	115.00	1	0.00378	0.06192
79110	MAIN CO	115.00	79118	Y.JACK W	115.00	1	0.0037	0.0259
79110	MAIN CO	115.00	79120	MOQUI C	115.00	1	0.014	0.0501
79110	MAIN CO	115.00	79121	SANDCANY	115.00	1	0.00638	0.03998

79110	MAIN CO	115.00	79122	TOWAOC	115.00	1	0.0059	0.0529
79113	NAVAJO	115.00	79114	SAN JUAN	115.00	1	0.0015	0.0059
79117	Y.JACK 2	115.00	79118	Y.JACK W	115.00	1	0.007	0.047
79119	SHIPRO&1	500.00	79124	SHIPRO&2	500.00	1	0.00177	0.04189
79173	COLBRAN	115.00	79174	MOLINA-L	115.00	1	0.0067	0.014
79174	MOLINA-L	115.00	79175	MOLINA-U	115.00	1	0.0067	0.014
79177	MCPHEE	12.470	79178	GRT CUT	12.470	1	1.434	2.48
79179	GRT CUT	115.00	79180	GRCUT TP	115.00	1	0.0035	0.0091
79187	NORWOOD	115.00	79189	SUNSH SM	115.00	1	0.0596	0.2096
79188	TELLURID	115.00	79189	SUNSH SM	115.00	1	0.07523	0.26476
79189	SUNSH SM	115.00	79257	AMES	115.00	1	0.00404	0.01421
79190	DALLASCR	115.00	79193	MCKENZIX	115.00	1	0.0142	0.0578
79191	COYOTE G	115.00	79260	ELPASOTP	115.00	1	0.00197	0.006
79192	SOCANAL	115.00	79193	MCKENZIX	115.00	1	0.0185	0.0752
79194	BURROBDG	115.00	79256	SILVERTN	115.00	1	0.00773	0.02721
79194	BURROBDG	115.00	79257	AMES	115.00	1	0.01478	0.05199
79256	SILVERTN	115.00	79262	CEMNT CK	115.00	1	0.00255	0.00873

Appendix I

MONITORED TRANSFORMER IN ZONES: 656, 662, 670, 708, 790, and 791

From Bus	From Bus Name		To Bus	To Bus Name		Id	Name
10111	GALLEGOS	230.00	79027	GALLEGOS	115.00	1	GALLEGOS
10292	SAN_JUAN	345.00	79060	SANJN PS	345.00	1	SAN_JUAN
65022	AMER FRK	138.00	65023	AMER FRK	46.000	1	AMER FRK
65085	ASHLEY	138.00	65086	ASHLEY	69.000	1	ASHLEY
65085	ASHLEY	138.00	65086	ASHLEY	69.000	2	ASHLEY
65167	BLACKHWK	138.00	65168	BLACKHWK	69.000	1	BLACKHWK
65191	BONANZA	24.000	65192	BONANZA	138.00	1	BONANZA
65192	BONANZA	138.00	65193	BONANZA	345.00	1	BONANZA
65270	CARBN G1	13.800	65280	CARBON	138.00	1	CARBN G1
65275	CARBN G2	13.800	65280	CARBON	138.00	1	CARBN G2
65325	CHERWOOD	138.00	65326	CHERWOOD	12.500	1	CHERWOOD
65325	CHERWOOD	138.00	65326	CHERWOOD	12.500	2	CHERWOOD
65355	COLUMBIA	138.00	65356	COLUMBIA	46.000	1	COLUMBIA
65490	EHUNTR 1	24.000	65510	EMERY	345.00	1	EHUNTR 1
65490	EHUNTR 1	24.000	65510	EMERY	345.00	2	EHUNTR 1
65495	EHUNTR 2	24.000	65510	EMERY	345.00	1	EHUNTR 2
65495	EHUNTR 2	24.000	65510	EMERY	345.00	2	EHUNTR 2
65500	EHUNTR 3	22.000	65510	EMERY	345.00	1	EHUNTR 3
65501	EHUNTR 4	22.000	65510	EMERY	345.00	1	EHUNTR 4
65510	EMERY	345.00	65515	EMERY	138.00	1	EMERY
65510	EMERY	345.00	65515	EMERY	138.00	2	EMERY
65515	EMERY	138.00	65516	EMERY	69.000	1	EMERY
65520	EMMAPARK	138.00	65521	EMMAPARK	46.000	1	EMMAPARK
65565	FLAMGORG	230.00	79026	FLAMGORG	138.00	1	FLAMGORG
65565	FLAMGORG	230.00	79026	FLAMGORG	138.00	2	FLAMGORG
65640	GENEVA	138.00	65645	GENVA GN	13.800	1	GENVA GN
65650	GILLESPE	138.00	65651	GILLESPE	46.000	1	GILLESPE
65650	GILLESPE	138.00	65651	GILLESPE	46.000	2	GILLESPE
65745	HALE	138.00	65746	HALE	46.000	1	HALE
65755	HELPER	138.00	65756	HELPER	46.000	1	HELPER
65755	HELPER	138.00	65756	HELPER	46.000	2	HELPER
65755	HELPER	138.00	65756	HELPER	46.000	3	HELPER
65765	HIGHLANX	138.00	65766	HIGHLANX	46.000	1	HIGHLANX
65765	HIGHLANX	138.00	65767	HIGHLANX	12.500	1	HIGHLANX
65795	HUNTN G1	22.000	65805	HUNTINGTN	345.00	1	HUNTN G1
65795	HUNTN G1	22.000	65805	HUNTINGTN	345.00	2	HUNTN G1
65800	HUNTN G2	22.000	65805	HUNTINGTN	345.00	1	HUNTN G2
65800	HUNTN G2	22.000	65805	HUNTINGTN	345.00	2	HUNTN G2
65805	HUNTINGTN	345.00	65810	HUNTINGTN	138.00	1	HUNTINGTN
65805	HUNTINGTN	345.00	65810	HUNTINGTN	138.00	2	HUNTINGTN
65810	HUNTINGTN	138.00	65811	HUNTINGTN	46.000	1	HUNTINGTN
65855	JERUSALM	138.00	65856	JERUSALM	46.000	1	JERUSALM
65935	MCFADDEN	138.00	65936	MCFADDEN	69.000	1	MCFADDEN
65950	MIDWAY	138.00	65951	MIDWAY	46.000	1	MIDWAY
65995	MONA	345.00	65996	MONA G	18.000	1	MONA

65995	MONA	345.00	65997	MONA S	13.800	1	MONA
66070	NEBO	138.00	66071	NEBO	46.000	1	NEBO
66225	PINTO	345.00	66226	PINT MP2	100.00	2	PINT MP2
66225	PINTO	345.00	66227	PINT MP3	100.00	3	PINT MP3
66225	PINTO	345.00	66235	PINTO PS	345.00	1	PINTO PS
66248	PLGROVE	138.00	66249	PLGROVE	46.000	1	PLGROVE
66363	SARATOGA	138.00	66364	SARATOGA	12.500	1	SARATOGA
66400	SPAN FRK	345.00	66405	SPAN FRK	138.00	1	SPAN FRK
66400	SPAN FRK	345.00	66405	SPAN FRK	138.00	2	SPAN FRK
66405	SPAN FRK	138.00	66406	SPAN FRK	46.000	1	SPAN FRK
66405	SPAN FRK	138.00	66406	SPAN FRK	46.000	2	SPAN FRK
66405	SPAN FRK	138.00	66406	SPAN FRK	46.000	3	SPAN FRK
66441	SUMM CRK	138.00	66442	SUMM CRK	12.500	1	SUMM CRK
66445	SUNNY G1	13.800	66450	SUNNYSID	138.00	1	SUNNY G1
66485	TANNER	138.00	66486	TANNER	46.000	1	TANNER
66485	TANNER	138.00	66486	TANNER	46.000	2	TANNER
66555	TIMP	138.00	66556	TIMP	46.000	1	TIMP
66577	TRI CITY	138.00	66578	TRI CITY	345.00	1	TRI CITY
66645	WALLBURG	138.00	66646	WALLBURG	12.500	1	WALLBURG
70076	CAMEO	69.000	70077	CAMEO	100.00	1	CAMEO
70076	CAMEO	69.000	70080	CAMEO1	13.800	1	CAMEO
70076	CAMEO	69.000	70081	CAMEO2	13.800	1	CAMEO
70077	CAMEO	100.00	70078	CAMEO	230.00	1	CAMEO
70180	FRUITA	13.800	70183	FRUITA	69.000	1	FRUITA
70205	GRANDJCT	230.00	79036	GRANDJCT	345.00	1	GRANDJCT
70214	GRANDJCT	69.000	79034	GRANDJCT	115.00	1	GRANDJCT
70231	HOPKINS	115.00	70232	HOPKINS	230.00	1	HOPKINS
70349	RAMSEY	25.000	79056	RIFLE CU	138.00	1	RIFLE CU
70359	RIFLE CU	69.000	79056	RIFLE CU	138.00	1	RIFLE CU
70385	SHOSHA&B	4.0000	70386	SHOSHONE	69.000	1	SHOSHONE
70385	SHOSHA&B	4.0000	70386	SHOSHONE	69.000	2	SHOSHONE
70385	SHOSHA&B	4.0000	70386	SHOSHONE	69.000	3	SHOSHONE
70385	SHOSHA&B	4.0000	70387	SHOSHONE	115.00	1	SHOSHONE
70436	UINTAH	69.000	70437	UINTAH	13.800	1	UINTAH
70437	UINTAH	13.800	70438	UINTAH	230.00	1	UINTAH
70550	W CANON	115.00	73551	W CANON	230.00	1	W CANON
70572	RIFLE CU	115.00	79057	RIFLE CU	230.00	1	RIFLE CU
73072	GOREPASS	138.00	79033	GOREPASS	230.00	1	GOREPASS
79003	BASALT	115.00	79004	BASALT	230.00	1	BASALT
79007	BLUEMESA	115.00	79157	BMESA1-2	12.500	1	BMESA1-2
79013	CRAIG	230.00	79014	CRAIG	345.00	1	CRAIG
79013	CRAIG	230.00	79014	CRAIG	345.00	2	CRAIG
79013	CRAIG	230.00	79015	CRAIG 1	22.000	1	CRAIG 1
79013	CRAIG	230.00	79016	CRAIG 2	22.000	1	CRAIG 2
79014	CRAIG	345.00	79017	CRAIG 3	22.000	1	CRAIG 3
79019	MORRO1-2	12.500	79163	MORROWPT	230.00	1	MORRO1-2
79020	CURECANT	115.00	79021	CURECANT	230.00	1	CURECANT
79026	FLAMGORG	138.00	79029	FLAMGORG	69.000	1	FLAMGORG
79026	FLAMGORG	138.00	79154	FLGORG1	12.500	1	FLGORG1
79026	FLAMGORG	138.00	79155	FLGORG2	12.500	1	FLGORG2

79026	FLAMGORG	138.00	79156	FLGORG3	12.500	1	FLGORG3
79028	GLEN PS	230.00	79031	GLENCANY	230.00	1	GLENCANY
79030	FONTNLE	69.000	79123	FONTNLE	4.2000	1	FONTNLE
79031	GLENCANY	230.00	79032	GLENCANY	345.00	1	GLENCANY
79031	GLENCANY	230.00	79032	GLENCANY	345.00	2	GLENCANY
79031	GLENCANY	230.00	79153	GLENC7-8	13.800	1	GLENCANY
79032	GLENCANY	345.00	79150	GLENC1-2	13.800	1	GLENCANY
79032	GLENCANY	345.00	79151	GLENC3-4	13.800	1	GLENCANY
79032	GLENCANY	345.00	79152	GLENC5-6	13.800	1	GLENCANY
79034	GRANDJCT	115.00	79035	GRANDJCT	138.00	1	GRANDJCT
79038	HAYDEN	138.00	79039	HAYDEN	230.00	1	HAYDEN
79038	HAYDEN	138.00	79039	HAYDEN	230.00	2	HAYDEN
79039	HAYDEN	230.00	79040	HAYDEN1	18.000	1	HAYDEN1
79039	HAYDEN	230.00	79041	HAYDEN2	22.000	1	HAYDEN2
79044	LOSTCANY	115.00	79045	LOSTCANY	230.00	1	LOSTCANY
79047	COLBRAN	138.00	79173	COLBRAN	115.00	1	COLBRAN
79048	MONTROSE	115.00	79049	MONTROSE	345.00	1	MONTROSE
79050	NORTHFRK	115.00	79070	NORTHFRK	230.00	1	NORTHFRK
79050	NORTHFRK	115.00	79070	NORTHFRK	230.00	2	NORTHFRK
79052	NUCLA	115.00	79158	NUCLA 1	13.800	1	NUCLA 1
79052	NUCLA	115.00	79159	NUCLA 2	13.800	1	NUCLA 2
79052	NUCLA	115.00	79160	NUCLA 3	13.800	1	NUCLA 3
79052	NUCLA	115.00	79161	NUCLA 4	13.800	1	NUCLA 4
79056	RIFLE CU	138.00	79057	RIFLE CU	230.00	1	RIFLE CU
79057	RIFLE CU	230.00	79058	RIFLE CU	345.00	1	RIFLE CU
79061	SHIP PS	230.00	79063	SHIPROCK	230.00	1	SHIPROCK
79062	SHIPROCK	115.00	79063	SHIPROCK	230.00	1	SHIPROCK
79063	SHIPROCK	230.00	79064	SHIPROCK	345.00	1	SHIPROCK
79064	SHIPROCK	345.00	79095	SHIPROCK	500.00	1	SHIPROCK
79064	SHIPROCK	345.00	79095	SHIPROCK	500.00	2	SHIPROCK
79068	WOLCOTT	115.00	79069	WOLCOTT	230.00	1	WOLCOTT
79068	WOLCOTT	115.00	79069	WOLCOTT	230.00	2	WOLCOTT
79071	HESPERUS	115.00	79072	HESPERUS	345.00	1	HESPERUS
79122	TOWAOC	115.00	79164	TOWAOC	6.9000	1	TOWAOC
79162	CRYSTAL	12.500	79253	CRYSTAL	115.00	1	CRYSTAL
79166	MOLINA-L	4.2000	79174	MOLINA-L	115.00	1	MOLINA-L
79172	MOLINA-U	4.2000	79175	MOLINA-U	115.00	1	MOLINA-U
79176	MCPHEE	2.4000	79177	MCPHEE	12.470	1	MCPHEE
79178	GRT CUT	12.470	79179	GRT CUT	115.00	1	GRT CUT
79250	AMATLAS	230.00	79251	QFATLAS1	13.800	1	QFATLAS1
79250	AMATLAS	230.00	79252	QFATLAS2	13.800	1	QFATLAS2

Appendix J OVERLOADS AND LOW VOLTAGES

ACCC OVERLOAD REPORT: MONITORED ELEMENTS LOADED ABOVE 100.0 % OF RATING SET B
INCLUDES VOLTAGE REPORT

DISTRIBUTION FACTOR FILE: C:\Documents and Settings\Rleyba\Desktop\TOT1A\TOT1A.dfx
SUBSYSTEM DESCRIPTION FILE: C:\Documents and Settings\Rleyba\Desktop\TOT1A\TOT1A.SUB
MONITORED ELEMENT FILE: C:\Documents and Settings\Rleyba\Desktop\TOT1A\TOT1A.MON
CONTINGENCY DESCRIPTION FILE: C:\Documents and Settings\Rleyba\Desktop\TOT1A\TOT1A.CON

<----- MONITORED BRANCH ----->				CONTINGENCY	RATING	FLOW	%
65192 BONANZA	138.00	79067*VERNAL	138.00	1 BNZ_MNA_R	212.0	213.0	104.3
65280*CARBON	138.00	66395 SPAN F&1	138.00	1 CRBN_SPNF	113.0	127.2	109.3
66395 SPAN F&1	138.00	66405*SPAN FRK	138.00	1 CRBN_SPNF	113.0	122.1	109.2
70231*HOPKINS	115.00	79003 BASALT	115.00	1 HYDN_FOID	66.9	71.1	103.1

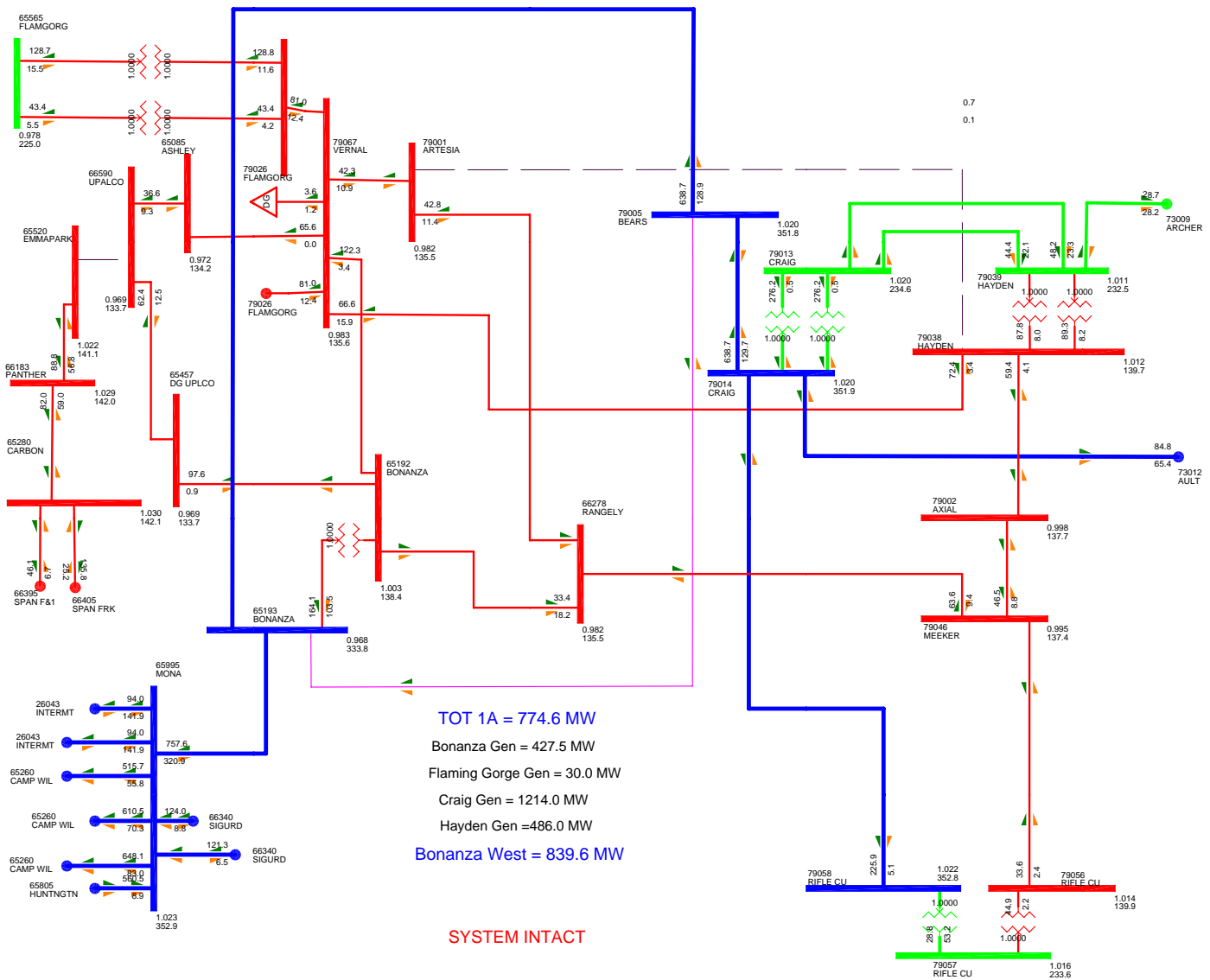
MONITORED VOLTAGE REPORT:

SYSTEM	CONTINGENCY	<----- B U S ----->	V-CONT	V-INIT	V-MAX	V-MIN
'VOLTAGE	' RANGE BNZ_MNA_R	66590 UPALCO	138.00	0.89582	0.96869	1.10000
'VOLTAGE	DEVIATION BNZ_MNA_R	65193 BONANZA	345.00	1.02043	0.96752	0.05000
'VOLTAGE	DEVIATION BNZ_MNA_R	66590 UPALCO	138.00	0.89582	0.96869	0.05000
'VOLTAGE	RANGE CRBN_SPNF	66395 SPAN F&1	138.00	0.83351	0.96389	1.10000
'VOLTAGE	DEVIATION CRBN_SPNF	66395 SPAN F&1	138.00	0.83351	0.96389	0.05000
'VOLTAGE	DEVIATION CLFT_GRDJ	70113 CLIFTON	230.00	0.92090	0.99963	0.05000
'VOLTAGE	DEVIATION CLFT_GRDJ	70206 GRANDJPS	230.00	0.92156	0.99811	0.05000
'VOLTAGE	DEVIATION CLFT_GRDJ	70233 HORIZON	230.00	0.92419	0.99795	0.05000
'VOLTAGE	DEVIATION CLFT_GRDJ	70438 UINTAH	230.00	0.93547	1.00065	0.05000
'VOLTAGE	DEVIATION GRDJ_GRDJ	70113 CLIFTON	230.00	0.92423	0.99963	0.05000
'VOLTAGE	DEVIATION GRDJ_GRDJ	70205 GRANDJCT	230.00	0.92431	1.00291	0.05000
'VOLTAGE	DEVIATION GRDJ_GRDJ	70206 GRANDJPS	230.00	0.92480	0.99811	0.05000
'VOLTAGE	DEVIATION GRDJ_GRDJ	70233 HORIZON	230.00	0.92730	0.99795	0.05000
'VOLTAGE	DEVIATION GRDJ_GRDJ	70438 UINTAH	230.00	0.93821	1.00065	0.05000

CONTINGENCY LEGEND:

LABEL	EVENTS
BNZ_MNA_R	: TRIP BRANCH FROM BUS 65193 [BONANZA 345.00] TO BUS 65995 [MONA 345.00] TRIP BRANCH FROM BUS 65457 [DG UPLCO 138.00] TO BUS 66590 [UPALCO 138.00] SET BUS 65191 [BONANZA 24.000] GENERATION TO 0 MW
CRBN_SPNF	: TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66405 [SPAN FRK 138.00] CKT 2
EMPK_PNTR	: TRIP BRANCH FROM BUS 65520 [EMMAPARK 138.00] TO BUS 66183 [PANTHER 138.00]
CLFT_GRDJ	: TRIP BRANCH FROM BUS 70113 [CLIFTON 230.00] TO BUS 70205 [GRANDJCT 230.00]
GRDJ_GRDJ	: TRIP BRANCH FROM BUS 70205 [GRANDJCT 230.00] TO BUS 79036 [GRANDJCT 345.00]
GRNG_LYMN	: TRIP BRANCH FROM BUS 79008 [GRANGER 69.000] TO BUS 79009 [LYMAN SW 69.000]
GRNG_FNTNL	: TRIP BRANCH FROM BUS 79008 [GRANGER 69.000] TO BUS 79030 [FONTNLE 69.000]
LYMN_MNLA	: TRIP BRANCH FROM BUS 79009 [LYMAN SW 69.000] TO BUS 79010 [MANILA 69.000]
MNLA_FLMG	: TRIP BRANCH FROM BUS 79010 [MANILA 69.000] TO BUS 79029 [FLAMGORG 69.000]
FNTL_FNTL	: TRIP BRANCH FROM BUS 79030 [FONTNLE 69.000] TO BUS 79123 [FONTNLE 4.2000]
HYDN_FOID	: TRIP BRANCH FROM BUS 79039 [HAYDEN 230.00] TO BUS 79091 [FOIDELCK 230.00]
MKR_RNGLY	: TRIP BRANCH FROM BUS 79046 [MEEKER 138.00] TO BUS 66278 [RANGELY 138.00]

Appendix K HAYDEN-ARTESIA LINE OUTAGE



WESTERN ELECTRICITY COORDINATING COUNCIL
2008 HS2-SA APPROVED CASE
WED, OCT 26 2005 14:58

Bus - VOLTAGE (KV/PU)
Branch - MW/MVAR
Equipment - MW/MVAR

100.0% RATES
1.0500V - 0.9500V
KV: <=115.000 <=138.000 <=230.000 <=345.000 >345.000

Appendix L HAYDEN-ARTESIA ACC REPORT

HAYDEN-ARTESIA

ACCC OVERLOAD REPORT: MONITORED ELEMENTS LOADED ABOVE 100.0 % OF RATING SET B
INCLUDES VOLTAGE REPORT

DISTRIBUTION FACTOR FILE: P:\TOT1A\TOT1A.dfx
SUBSYSTEM DESCRIPTION FILE: P:\TOT1A\TOT1A.SUB
MONITORED ELEMENT FILE: P:\TOT1A\TOT1A.MON
CONTINGENCY DESCRIPTION FILE: P:\TOT1A\TOT1A.CON

<----- MULTI-SECTION LINE -----> <----- MONITORED BRANCH ----->
-----> CONTINGENCY RATING FLOW %

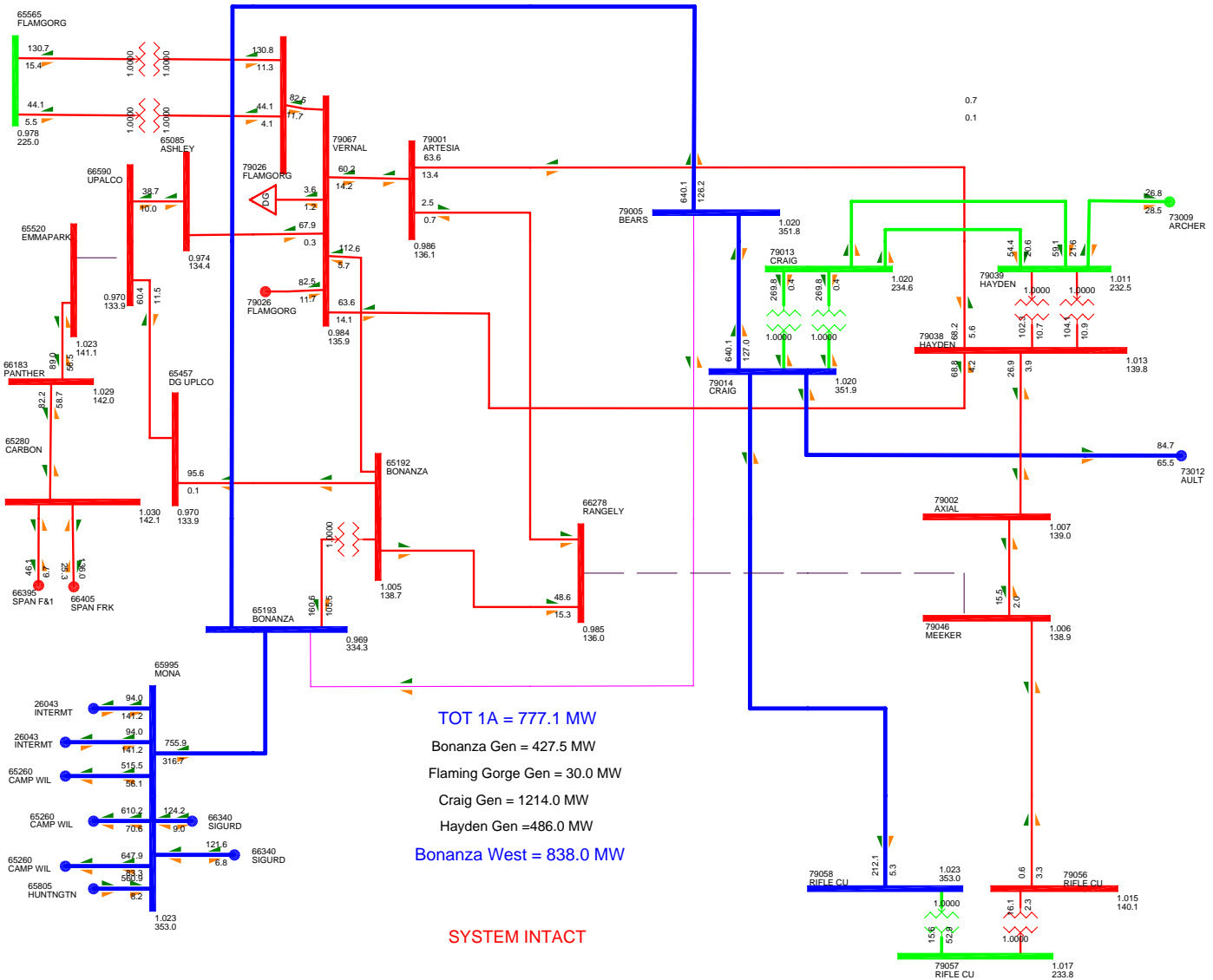
MONITORED VOLTAGE REPORT:

SYSTEM	CONTINGENCY	----- B U S -----		V-CONT	V-INIT	V-MAX	V-MIN
'VOLTAGE	DEVIATION	BNZ_MNA					
		65193	BONANZA	345.00	1.01858	0.96752	0.05000

CONTINGENCY LEGEND:

LABEL	EVENTS
BNZ_MNA	: TRIP BRANCH FROM BUS 65193 [BONANZA 345.00] TO BUS 65995 [MONA 345.00] SET BUS 65191 [BONANZA 24.000] GENERATION TO 0 MW
CRBN_SPNF	: TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66405 [SPAN FRK 138.00] CKT 2 TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66395 [SPAN F&1 138.00] CKT 1
EMPK_PNTR	: TRIP BRANCH FROM BUS 65520 [EMMAPARK 138.00] TO BUS 66183 [PANTHER 138.00]
HYDN_FOID	: TRIP BRANCH FROM BUS 70231 [HOPKINS 115.00] TO BUS 79003 [BASALT 115.00] TRIP BRANCH FROM BUS 79039 [HAYDEN 230.00] TO BUS 79091 [FOIDELCK 230.00]
MKR_RNGLY	: TRIP BRANCH FROM BUS 79046 [MEEKER 138.00] TO BUS 66278 [RANGELY 138.00]
HYDN_VNL	: TRIP BRANCH FROM BUS 79038 [HAYDEN 138.00] TO BUS 79067 [VERNAL 138.00]

Appendix M MEEKER-RANGLEY LINE OUTAGE



TOT 1A = 777.1 MW
 Bonanza Gen = 427.5 MW
 Flaming Gorge Gen = 30.0 MW
 Craig Gen = 1214.0 MW
 Hayden Gen = 486.0 MW
 Bonanza West = 838.0 MW

SYSTEM INTACT

WESTERN ELECTRICITY COORDINATING COUNCIL
2008 HS2-SA APPROVED CASE
WED, OCT 26 2005 15:11

Bus - VOLTAGE (KV/PU)
Branch - MW/MVAR
Equipment - MW/MVAR
100 OPERATES
1.050CV - 0.950UV
KV: <=115.000 <=138.000 <=230.000 <=345.000 >345.000

Appendix N MEEKER-RANGLEY ACC REPORT

MEEKER-RANGELEY
 ACCC OVERLOAD REPORT: MONITORED ELEMENTS LOADED ABOVE 100.0 % OF RATING SET B
 INCLUDES VOLTAGE REPORT

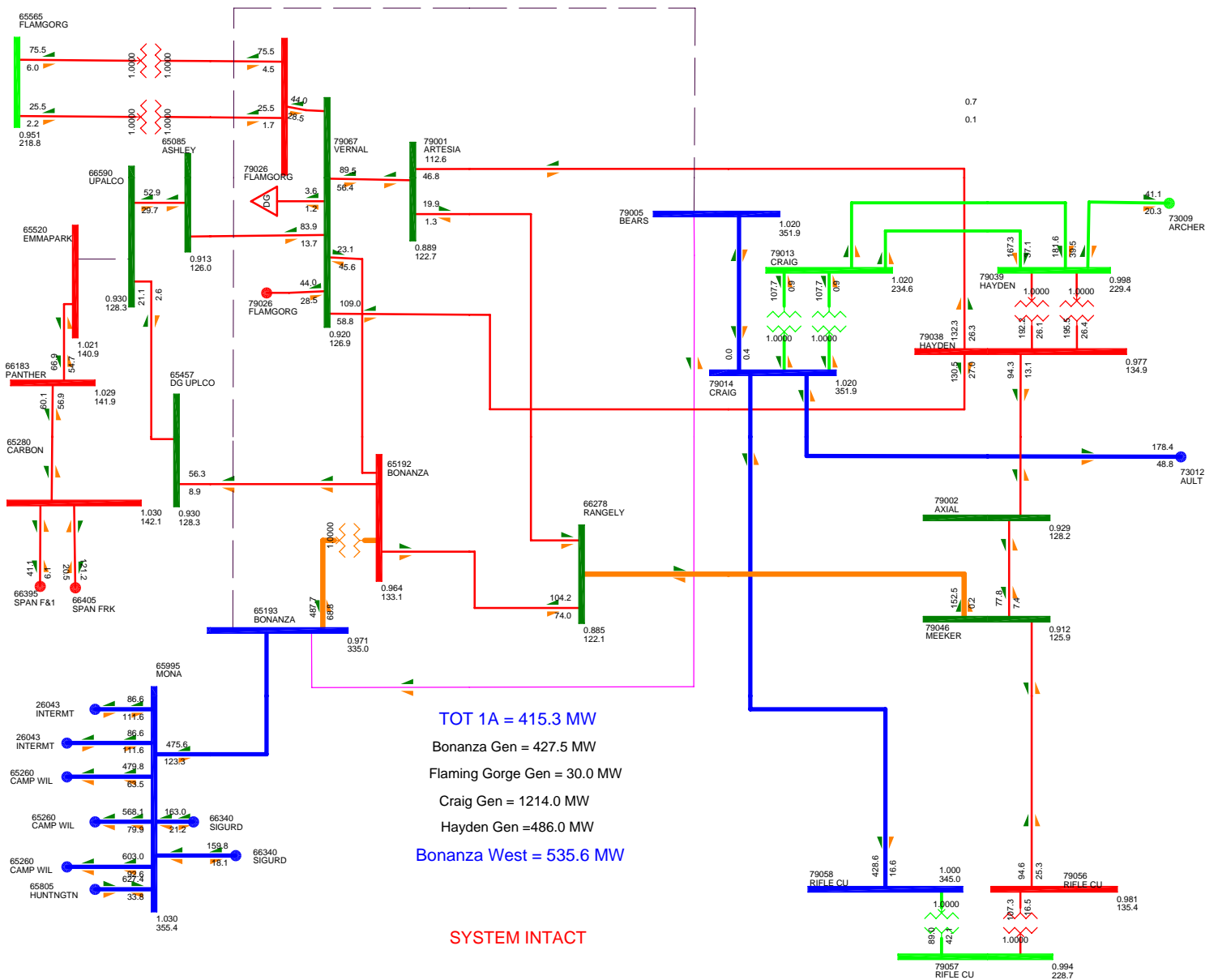
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 SUBSYSTEM DESCRIPTION FILE: P:\TOT1A\TOT1A.SUB
 MONITORED ELEMENT FILE: P:\TOT1A\TOT1A.MON
 CONTINGENCY DESCRIPTION FILE: P:\TOT1A\TOT1A.CON

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<----- MONITORED BRANCH -----> CONTINGENCY   RATING   FLOW   %
MONITORED VOLTAGE REPORT:
SYSTEM          CONTINGENCY <----- B U S ----->   V-CONT   V-INIT   V-MAX   V-MIN

CONTINGENCY LEGEND:
LABEL           EVENTS
BNZ_MNA         : TRIP BRANCH FROM BUS 65193 [BONANZA      345.00] TO BUS 65995 [MONA          345.00]
                  SET BUS 65191 [BONANZA      24.000] GENERATION TO 0 MW
CRBN_SPNF       : TRIP BRANCH FROM BUS 65280 [CARBON     138.00] TO BUS 66405 [SPAN FRK 138.00] CKT 2
                  TRIP BRANCH FROM BUS 65280 [CARBON     138.00] TO BUS 66395 [SPAN F&1 138.00] CKT 1
EMPK_PNTR       : TRIP BRANCH FROM BUS 65520 [EMMAPARK    138.00] TO BUS 66183 [PANTHER     138.00]
HYDN_FOID       : TRIP BRANCH FROM BUS 70231 [HOPKINS     115.00] TO BUS 79003 [BASALT      115.00]
                  TRIP BRANCH FROM BUS 79039 [HAYDEN     230.00] TO BUS 79091 [FOIDELCK    230.00]
HYDN_ARTS       : TRIP BRANCH FROM BUS 79038 [HAYDEN     138.00] TO BUS 79001 [ARTESIA     138.00]
HYDN_VNL        : TRIP BRANCH FROM BUS 79038 [HAYDEN     138.00] TO BUS 79067 [VERNAL      138.00]
  
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Appendix O BEARS EARS-BONANZA LINE OUTAGE



Appendix P

BEARS EARS-BONANZA ACC REPORT

ACCC OVERLOAD REPORT: MONITORED ELEMENTS LOADED ABOVE 100.0 % OF RATING SET B
INCLUDES VOLTAGE REPORT

DISTRIBUTION FACTOR FILE: P:\TOT1A\TOT1A.dfx
SUBSYSTEM DESCRIPTION FILE: P:\TOT1A\TOT1A.SUB
MONITORED ELEMENT FILE: P:\TOT1A\TOT1A.MON
CONTINGENCY DESCRIPTION FILE: P:\TOT1A\TOT1A.CON

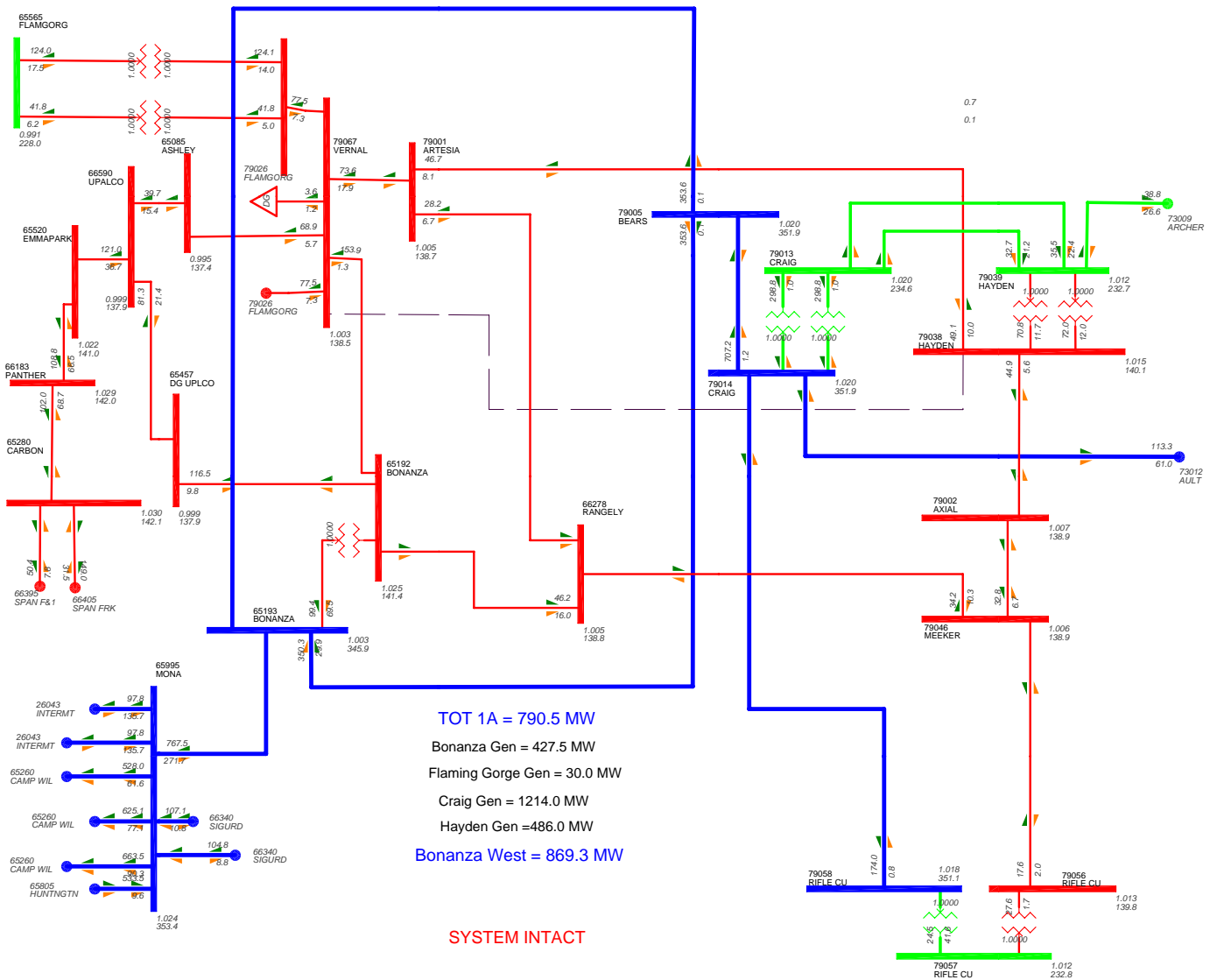
<----- MONITORED BRANCH -----> CONTINGENCY RATING FLOW %

MONITORED VOLTAGE REPORT:
SYSTEM CONTINGENCY <----- B U S -----> V-CONT V-INIT V-MAX V-MIN

CONTINGENCY LEGEND:

LABEL	EVENTS
BNZ_MNA	: TRIP BRANCH FROM BUS 65193 [BONANZA 345.00] TO BUS 65995 [MONA 345.00] SET BUS 65191 [BONANZA 24.000] GENERATION TO 0 MW
CRBN_SPNF	: TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66405 [SPAN FRK 138.00] CKT 2 TRIP BRANCH FROM BUS 65280 [CARBON 138.00] TO BUS 66395 [SPAN F&1 138.00] CKT 1
EMPK_PNTR	: TRIP BRANCH FROM BUS 65520 [EMMAPARK 138.00] TO BUS 66183 [PANTHER 138.00]
HYDN_FOID	: TRIP BRANCH FROM BUS 70231 [HOPKINS 115.00] TO BUS 79003 [BASALT 115.00] TRIP BRANCH FROM BUS 79039 [HAYDEN 230.00] TO BUS 79091 [FOIDELCK 230.00]
MKR_RNGLY	: TRIP BRANCH FROM BUS 79046 [MEEKER 138.00] TO BUS 66278 [RANGELY 138.00]
HYDN_VNL	: TRIP BRANCH FROM BUS 79038 [HAYDEN 138.00] TO BUS 79067

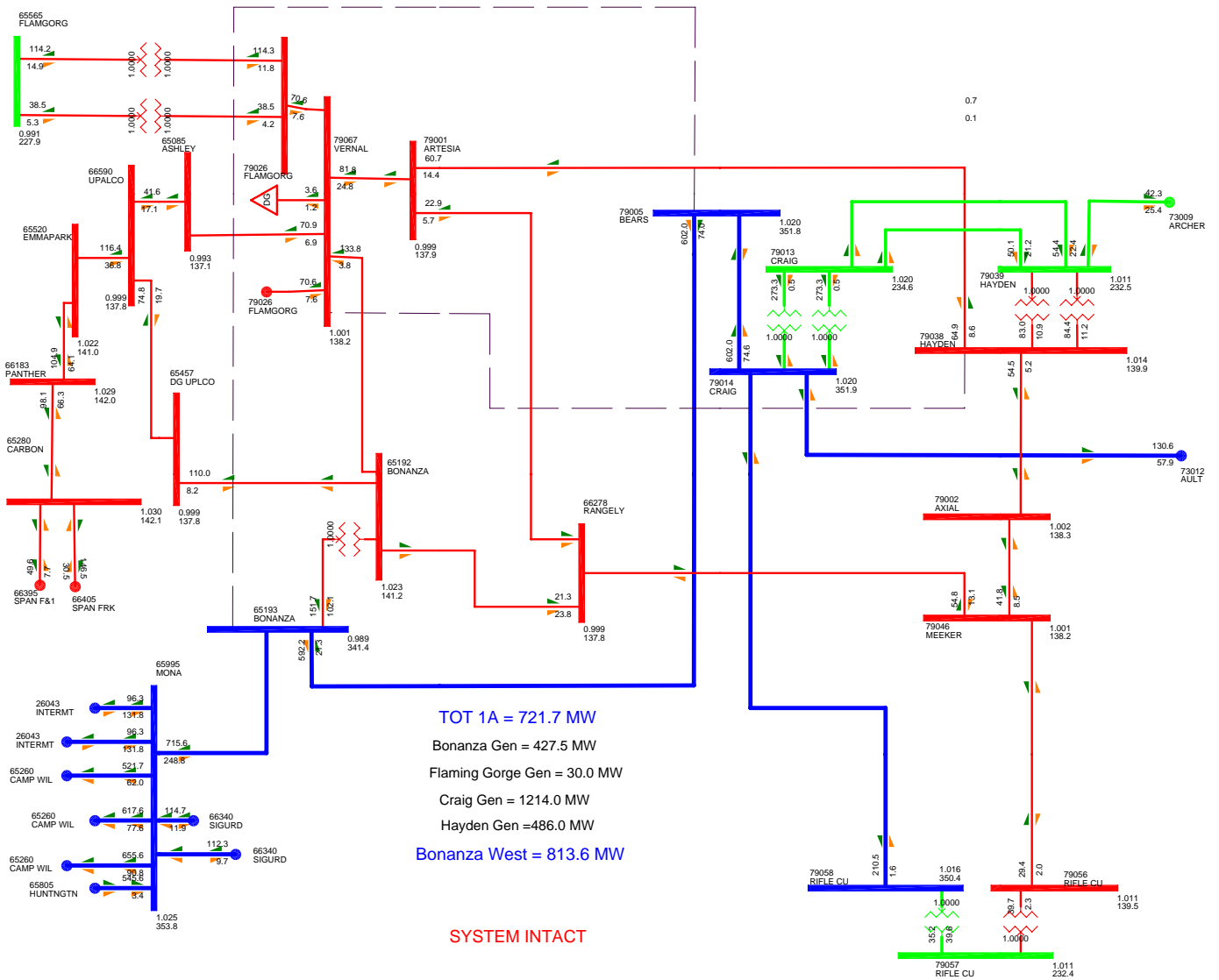
Appendix Q NEW 345 KV LINE BEARS EARS-BONANZA CIRCUIT 2



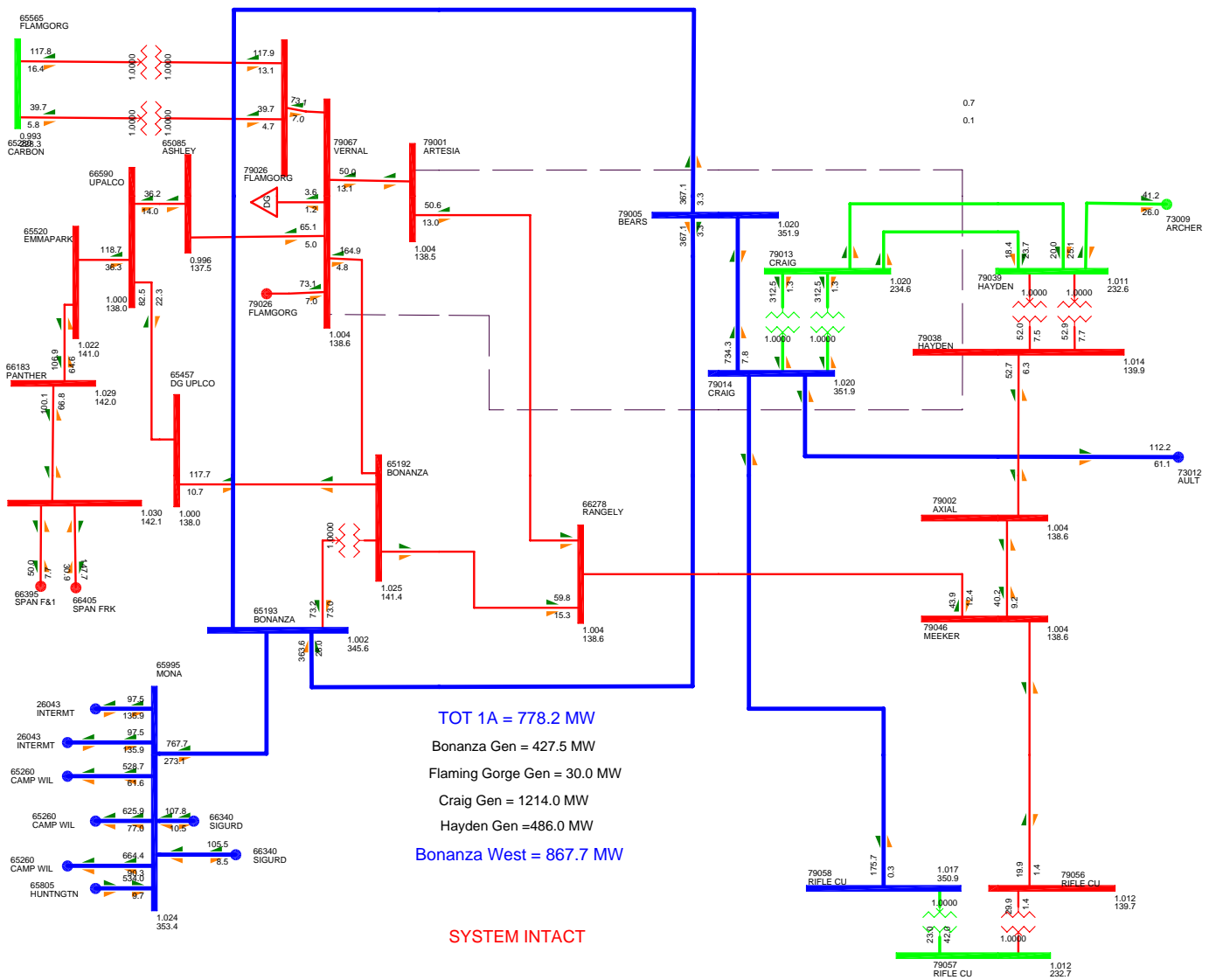
WESTERN ELECTRICITY COORDINATING COUNCIL
2018 HS2-SA APPROVED CASE
MON, OCT 31 2016 12:59

Bus - VOLTAGE (KV/PU)
Branch - MW/MVAR
Equipment - MW/MVAR
100.0% RATES
1.0500V 0.9500UV
KV: <=115.000 <=138.000 <=230.000 <=345.000 >345.000

Appendix R BEARS EARS-BONANZA CIRCUIT 1 LINE OUTAGE



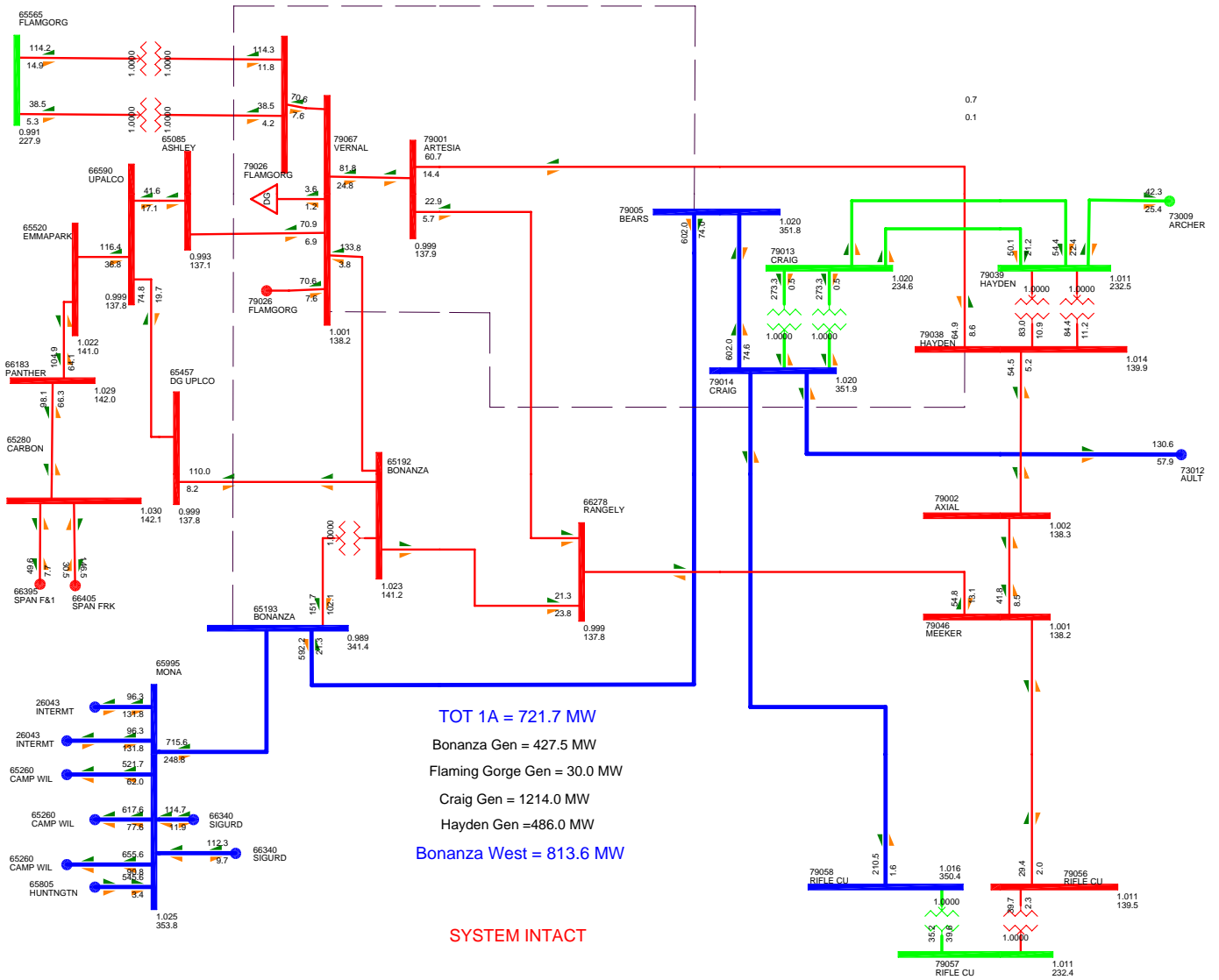
Appendix T HAYDEN-ARTESIA LINE OUTAGE



WESTERN ELECTRICITY COORDINATING COUNCIL
2008 HSZ-SA APPROVED CASE
MON, OCT 31 2005 13:11

Bus - VOLTAGE (KV/PU)
Branch - MW/MVAR
Equipment - M/MWVAR
100.0% RATES
1.0500V 0.9500V
KV: <=115.000 <=138.000 <=230.000 <=345.000 >345.000

Appendix U BEARS EARS-BONANZA CIRCUIT 1 LINE OUTAGE



Bus - VOLTAGE (KV/PU)
Branch - MW/MVAR
Equipment - MW/MVAR
100.0% RATES
1.0500V 0.9500V
KV: <=115.000 <=138.000 <=230.000 <=345.000 >=345.000