

DOCKET 08-SPPE-1	
DATE	JUL 18 2008
RECD.	SEP 09 2008

**CITY OF RIVERSIDE-ELECTRIC OPERATIONS
STANDARD PRACTICE**

No. 120.000
 Title: System Reliability
 File: SP-Equipment reliability (2).doc

Page 1 of 2
 Date: 7/18/08

Supersedes No. NEW Page of Dated:

PURPOSE: To document Riverside Public Utility's (RPU) policy on system operations and system reliability.

GENERAL: RPU is under the jurisdiction of Southern California Edison (SCE) in accord with our Wholesale Distribution Access Tariff agreement. RPU as the Distribution Customer and SCE as the Distribution Provider will, among other things, communicate any outages that would affect the other party through their respective dispatch centers, and RPU will comply with SCE's Operational Procedures and System Operation Bulletins that affect RPU's system. For example, SCE's OP-44 for a N-1 of an A bank at Vista Substation may require RPU to shed load. If RPU could not comply with any order because doing so would violate safety, equipment, regulatory, or statutory requirements, the RPU System Dispatcher would inform the SCE System Dispatcher immediately.

RPU is also under the jurisdiction of California Independent System Operators (CAISO) in accordance with our Metered Sub-System agreement (MSS).

According to the MSS Agreement between CAISO and RPU:
 Article V – Operations, Section 5.2 Safety and Reliability "Riverside shall operate and maintain Riverside's system in accordance with applicable safety and reliability standards, WECC and NERC requirements, regulatory requirements, operating guidelines, and good utility practices so as to avoid a material impact on the ISO Control Grid. . . (and be) in compliance with the requirements applicable to Utility Distribution Companies in the ISO procedures and standards."

Article VII – Emergency Operations, section 7. . . "In the event of a system emergency or the ISO determines a system emergency is threatened or imminent, Riverside shall, in accordance of Good Utility Practice: (a) comply with all directions from the ISO concerning the management and alleviation of a threatened or actual system emergency. . ." and (b) comply with all procedures concerning system emergencies set out in the Riverside EEP (Electric Emergency Plan), ISO Protocols, and ISO Operating Procedures. . ."

If RPU could not comply with any order because doing so would violate safety, equipment, regulatory, or statutory requirements, the RPU System Dispatcher would inform CAISO immediately.

PREPARED BY: _____	REVIEWED BY: _____	APPROVED BY: _____
DATE: _____	DATE: _____	DATE: _____

No. 120.000
Title: System Reliability
File: SP-Equipment reliability (2).doc

Date: 7/18/08

RPU's substation, sub-transmission, and distribution systems are monitored by our Supervisory Control and Data Acquisition (SCADA) system. All critical points are monitored and alarm points and levels set according to standing RPU policy.

Normal operating limits are determined as the most restrictive component in a circuit, line, protection, bank or equipment.

Level 1 alarms are set at 80% of the normal operating limits allowing System Dispatchers to start considering load relief possibilities before the line or equipment reaches it's operating limit.

Level 2 alarms are set at 100% of the normal operating limit to make sure that if the load relief efforts have not been sufficient that more aggressive measures be taken for the protection of the equipment.

RPU's emergency rating is 125% of the normal operating limit and is not be exceeded for more than a few minutes. If load relief on the overloaded equipment by splitting the sub-transmission system, paralleling banks, or shifting load to other circuits, is not sufficient then load shedding must be started to protect the equipment from failure. Load shedding practices and available circuits are identified in Standard Practice 190.001 "Stage 3 Emergency Involuntary Load Curtailment."

Attachments: 2008 Contingency Overloads_complete_17Jul08.pdf

N-1 CONTINGENCY TABLES FOR THE EXISTING RIVERSIDE PUBLIC UTILITIES ELECTRIC TRANSMISSION SYSTEM - JULY 2006

LIST OF ASSUMPTIONS AND ADDITIONAL NOTES - -

1. When is remedial action required, following the loss of a single 69 kV transmission line (an N-1)?
It is assumed that a loading of 110% or less requires no remedial action.
It is assumed that a loading of 111% to 124% may require remedial action.
Factors to consider are -
 - Can the line be reclosed successfully?
 - Time of day (Has the peak already occurred and is now declining?)
 - Wind speed (If the wind is above ~2 miles per hour, the rating of the conductor will be above the stated value in the tables)
 - Can generation be brought on-line rapidly?It is assumed that a loading of 125% and greater requires IMMEDIATE ACTION! DO NOT CONSIDER THE FACTORS LISTED ABOVE.
ACTION MUST BE TAKEN IMMEDIATELY!
2. If RERC or Springs Generation is off-line, do not consider bringing generation on-line as a remedial action to reduce loading, if the loading is already exceeding 125%. This level of loading must be reduced immediately.
Open lines as indicated in the tables, or drop customer load with management approval.
3. Remedial action recommendations are based on the probability that RERC Generation is on-line at high levels of system load and Springs Generation is off-line.
4. The system load level shown in the Tables is the sum of the load supplied at Vista, plus the generation on-line at RERC and Springs.

Line names - -

V-LC	Vista - La Colina 69 kV Line
H-U	Hunter - University 69 kV Line
OC-LC	Orangecrest - La Colina 69 kV Line
OC-S	Orangecrest - Springs 69 kV Line
V-A-H	Vista - Alumax - Hunter 69 kV Line
V-H	Vista - Hunter 69 kV Line
LC-U	La Colina - University 69 kV Line
V-MV	Vista - Mountain View 69 kV Line
P-R	Plaza - Riverside 69 kV Line

19-Jul-06

TABLE 1: N-1 Overload Cases - 430 MW

Printed: 7/19/2006

System Loading Level = 430 MW (Load at Vista Substation + Springs Generation + RERC Generation)

<u>Case Number</u>	<u>Line Outage</u>	<u>Results</u>					<u>Remedial Action</u>
		<u>RERC / Springs Generation</u>	<u>Line overloaded</u>	<u>Line loading (Amperes)</u>	<u>Normal line rating (Amperes)</u>	<u>Percent of Normal Rating</u>	<u>Potential remedial action</u>
1.	V-LC	0	H-U	900	850	106%	No action recommended.
2.	H-U	0	V-LC	870	850	102%	No action recommended.
3.	V-A-H	0	V-H	870	850	102%	No action recommended.

RPU Electric System Power Flow
 Base Case 427 MW at Vista / 419 MW Load
 (p1427_14Jul06.dcr ...)

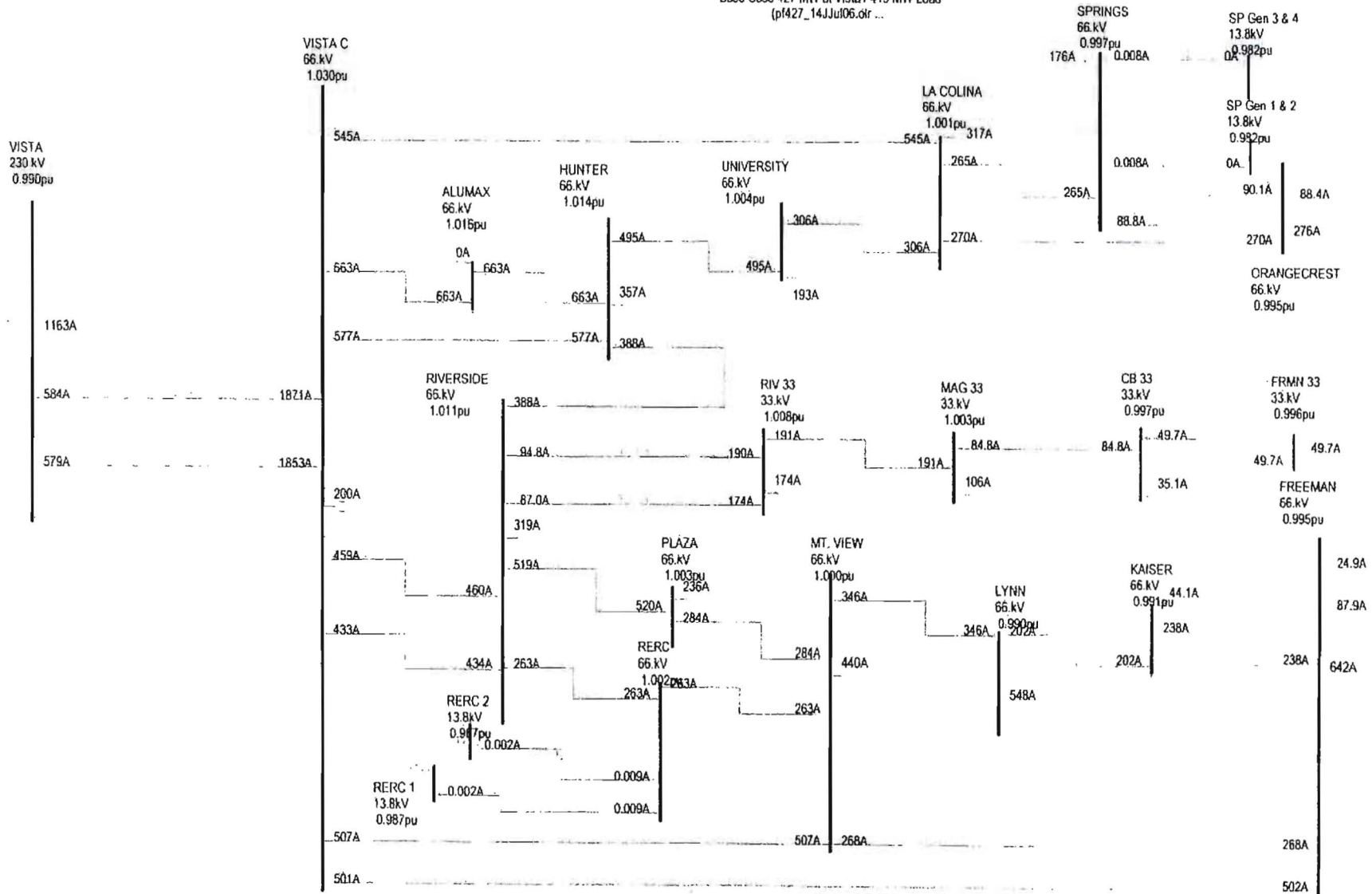


TABLE 1: N-1 Overload Cases - 450 MW

Printed: 7/19/2006

System Loading Level = 450 MW (Load at Vista Substation + Springs Generation + RERC Generation)

<u>Case Number</u>	<u>Line Outage</u>	<u>RERC / Springs Generation</u>	<u>Results</u>				<u>Remedial Action</u>
			<u>Line overloaded</u>	<u>Line loading (Amperes)</u>	<u>Normal line rating (Amperes)</u>	<u>Percent of Normal Rating</u>	<u>Potential remedial action</u>
1.	V-LC	0	H-U	970	850	114%	If H-U loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S).
2.	H-U	0	V-LC	930	850	109%	No action recommended.
3.	V-A-H	0	V-H	920	850	108%	No action recommended.

RPU Electric System Power Flow
 Base Case 449 MW at Vista
 (pf449_14Jul06 otr) ...

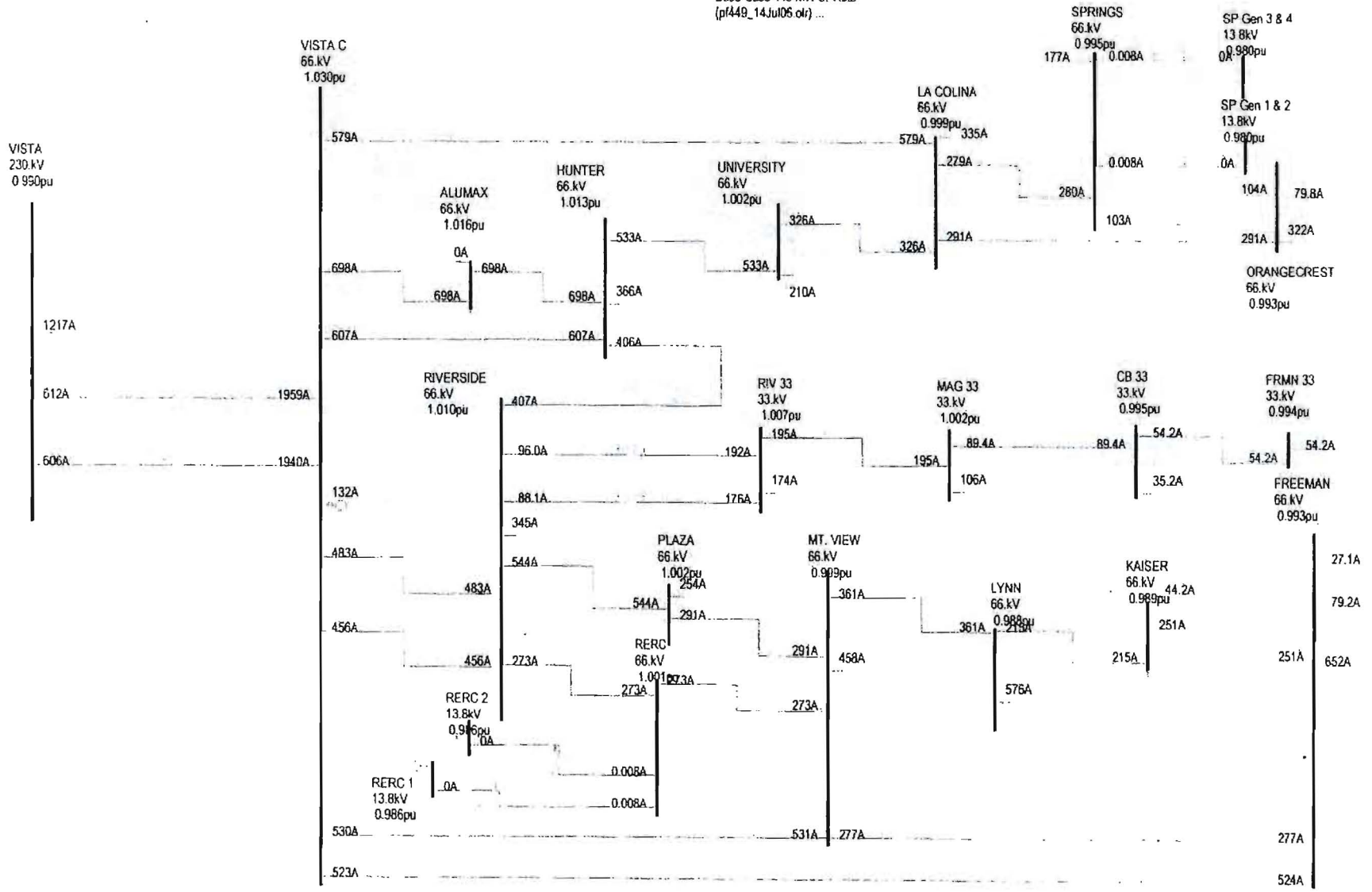


TABLE 1: N-1 Overload Cases - 470 MW

Printed: 7/19/2006

System Loading Level = 470 MW (Load at Vista Substation + Springs Generation + RERC Generation)

<u>Case Number</u>	<u>Line Outage</u>	<u>RERC / Springs Generation</u>	<u>Results</u>				<u>Remedial Action</u>
			<u>Line overloaded</u>	<u>Line loading (Amperes)</u>	<u>Normal line rating (Amperes)</u>	<u>Percent of Normal Rating</u>	<u>Potential remedial action</u>
1.	V-LC	0	H-U	1020	850	120%	If H-U loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S).
2.	H-U	0	V-LC	980	850	115%	If V-LC loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S).
3.	V-A-H	0	V-H	960	850	113%	If V-H loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open H-R (CB# 3 at H)

RPU Electric System Power Flow
Base Case 470 MW at Vista / 460 MW Load
(pf470_14Jul06.cir) ...

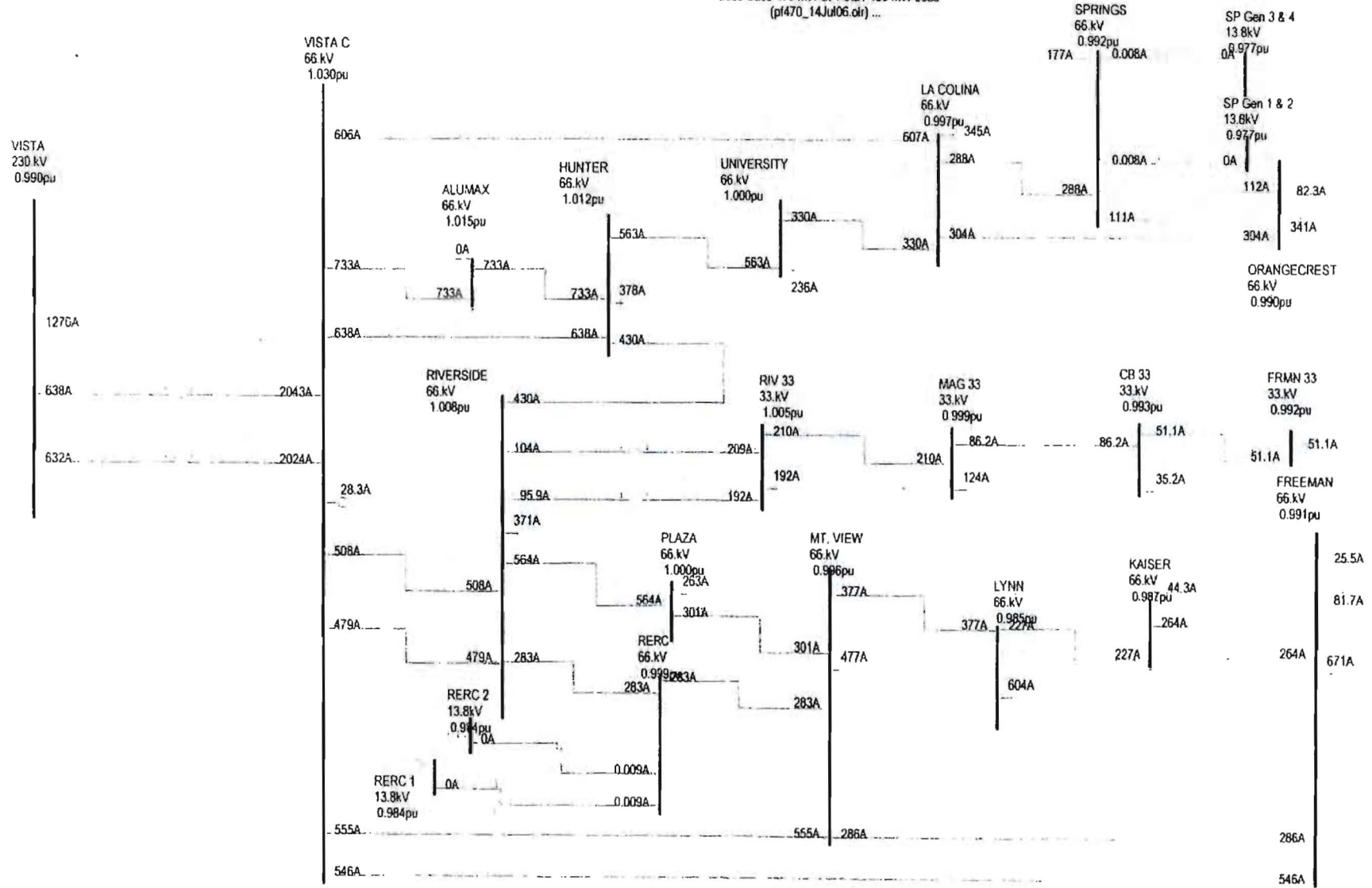


TABLE 1: N-1 Overload Cases - 490 MW

System Loading Level = 490 MW (Load at Vista Substation + Springs Generation + RERC Generation)

Results							Remedial Action
Case Number	Line Outage	RERC / Springs Generation	Line overloaded	Line loading (Amperes)	Normal line rating (Amperes)	Percent of Normal Rating	Potential remedial action
1.	V-LC	0	H-U	1090	850	128%	<p>Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub. There are no overloads following this action.</p> <p>If H-U loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S).</p> <p>Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p>
	V-LC	RERC @ 98 MW	H-U	1030	850	121%	
	V-LC	Springs @ 36 MW	H-U	860	850	101%	
2.	H-U	0	V-LC	1050	850	124%	<p>If V-LC loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub.</p> <p>If V-LC loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub.</p> <p>If all units at Springs are on-line, no action is recommended.</p>
	H-U	RERC @ 98 MW	V-LC	980	850	115%	
	H-U	Springs @ 36 MW	V-LC	840	850	99%	
3.	V-A-H		V-H	1000	850	118%	If V-H loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open H-R (CB# 3 at H)
4.	V-H		V-A-H	1080	1000	108%	No action recommended.

RPU Electric System Power Flow
 Base Case 489 MW at Vista
 (pl489_14Jul06.csk) ...

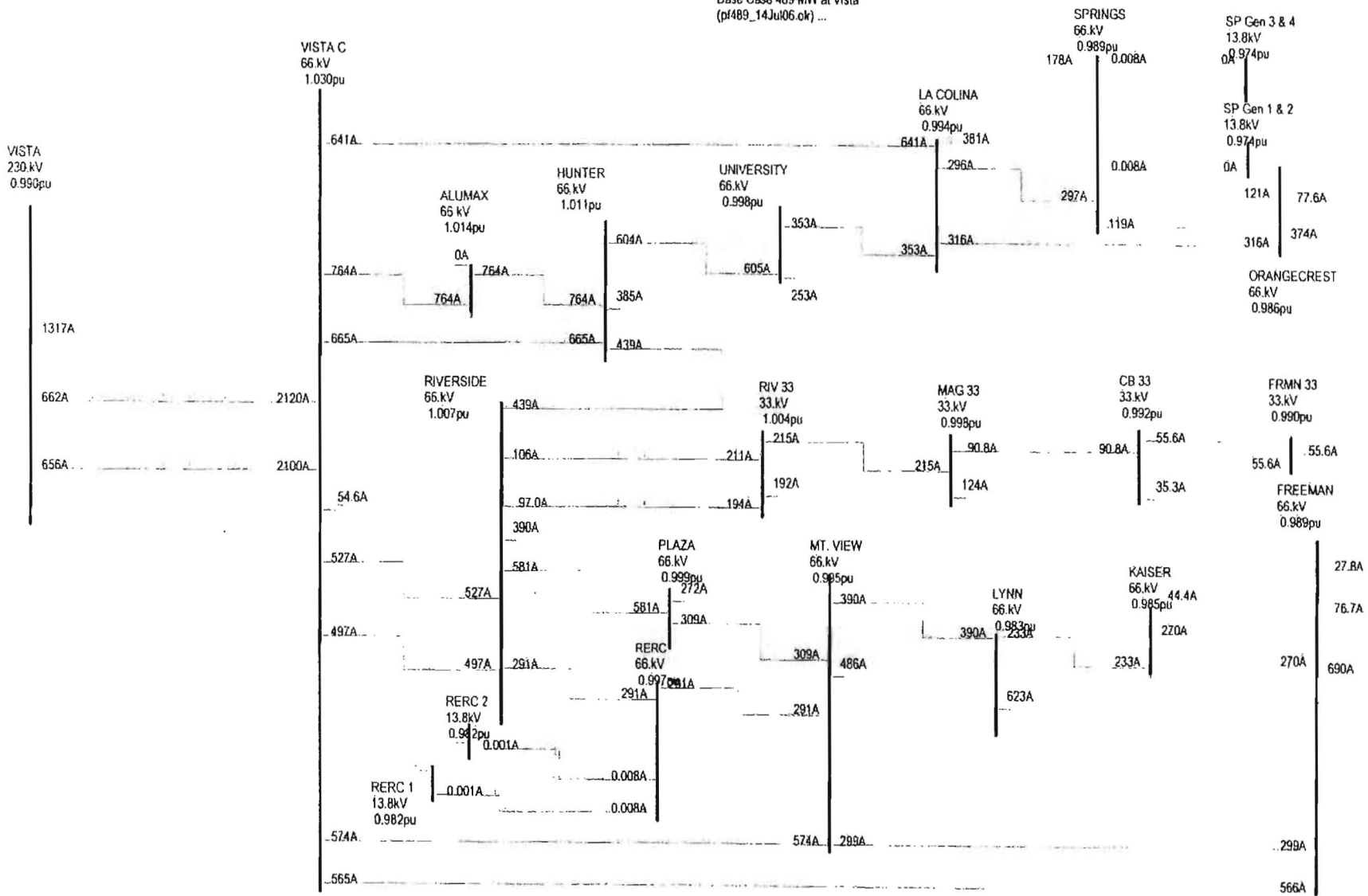


TABLE 1: N-1 Overload Cases - 510 MW

System Loading Level = 510 MW (Load at Vista Substation + Springs Generation + RERC Generation)

Case Number	Line Outage	Results					Remedial Action
		RERC / Springs Generation	Line overloaded	Line loading (Amperes)	Normal line rating (Amperes)	Percent of Normal Rating	
1.	V-LC	0	H-U	1150	850	135%	<p><u>Potential remedial action</u></p> <p>Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub. There are no overloads following this action.</p> <p>Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub. There are no overloads following this action.</p> <p>Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p>
	V-LC	RERC @ 98 MW	H-U	1090	850	128%	
	V-LC	Springs @ 36 MW	H-U	910	850	107%	
2.	H-U	0	V-LC	1100	850	129%	<p>Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub. There are no overloads following this action.</p> <p>If the V-LC loading is below 1060 amps (125%), remedial action may not be necessary.</p> <p>Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p>
	H-U	RERC @ 98 MW	V-LC	1030	850	121%	
	H-U	Springs @ 36 MW	V-LC	890	850	105%	
3.	V-A-H	0	V-H	1050	850	124%	<p>If V-H loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open H-R (CB# 3 at H)</p> <p>If both units at RERC are on-line, no action is recommended.</p> <p>Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p>
	V-A-H	RERC @ 98 MW	V-H	880	850	104%	
	V-A-H	Springs @ 36 MW	V-H	970	850	114%	
4.	V-H	0	V-A-H	1130	1000	113%	<p>If V-A-H loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open H-R (CB# 3 at H)</p>

RPU Electric System Power Flow
 Base Case 509 MW at Vista
 (p1509_14Jul06.cdr) ...

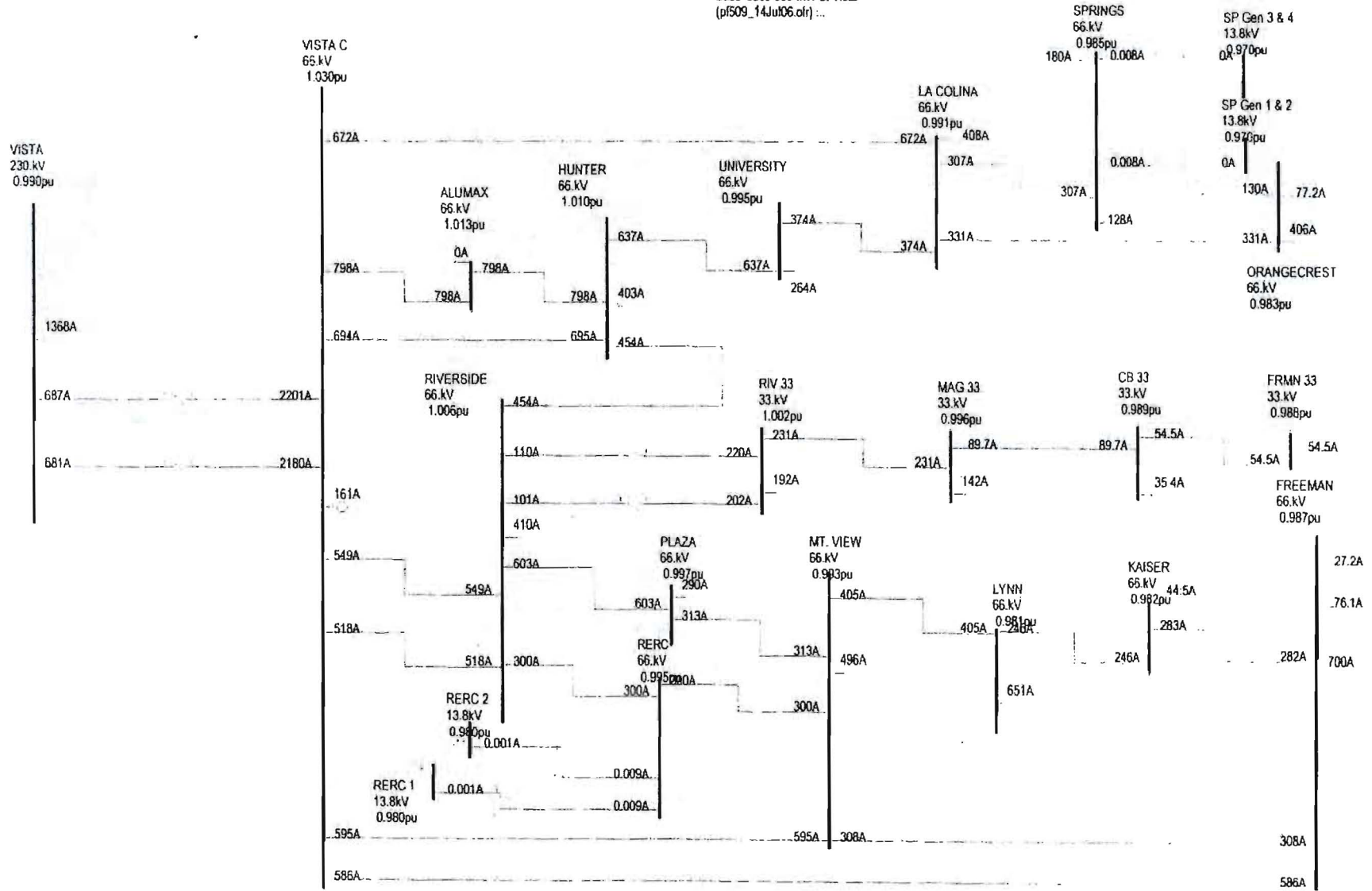


TABLE 1: N-1 Overload Cases - 530 MW

System Loading Level = 530 MW (Load at Vista Substation + Springs Generation + RERC Generation)

Case Number	Line Outage	Results					Remedial Action
		RERC / Springs Generation	Line overloaded	Line loading (Amperes)	Normal line rating (Amperes)	Percent of Normal Rating	
1.	V-LC	0	H-U	1220	850	144%	<p style="text-align: center;"><u>Potential remedial action</u></p> <p>Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). The H-U is loaded to 920 amps (108%) following this operation.</p> <hr/> <p>Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). This feeds OC from Freeman Sub. The H-U is loaded to 910 amps (107%) following this operation.</p> <hr/> <p>Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p> <hr/> <p>If V-LC loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). The LC-U is loaded to 640 amps (75%) following this operation.</p>
	V-LC	RERC @ 98 MW	H-U	1160	850	136%	
	V-LC	Springs @ 36 MW	H-U	980	850	115%	
	V-LC	0	LC-U	950	850	112%	
2.	H-U	0	V-LC	1170	850	138%	<p>Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). This feeds OC from Freeman Sub. The V-LC is loaded to 930 amps (109%) following this operation.</p> <hr/> <p>Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). The V-LC is loaded to 930 amps (109%) following this operation.</p> <hr/> <p>Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p>
	H-U	RERC @ 98 MW	V-LC	1100	850	129%	
	H-U	Springs @ 36 MW	V-LC	950	850	112%	
3.	V-A-H	0	V-H	1100	850	129%	<p>Open H-R (CB# 3 at H). The V-H is loaded to 1010 amps (119%) following this operation. If additional relief is necessary, open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). This feeds OC from Freeman Sub. The V-H is loaded to 770 amps (90%) following these operations.</p> <hr/> <p>If both units at RERC are on-line, no action is recommended.</p> <hr/> <p>Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p>
	V-A-H	RERC @ 98 MW	V-H	920	850	108%	
	V-A-H	Springs @ 36 MW	V-H	1010	850	119%	
4.	V-H	0	V-A-H	1180	1000	118%	<p>If V-A-H loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open H-R (CB# 3 at H). The V-A-H is loaded to 1050 amps (105%) following this operation.</p>
5.	LC-U	0	V-LC	980	850	115%	<p>If V-LC loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S).</p>

RPU Electric System Power Flow
 Base Case 531 MW at Vista
 (pl531_14Jul06.cir) ...

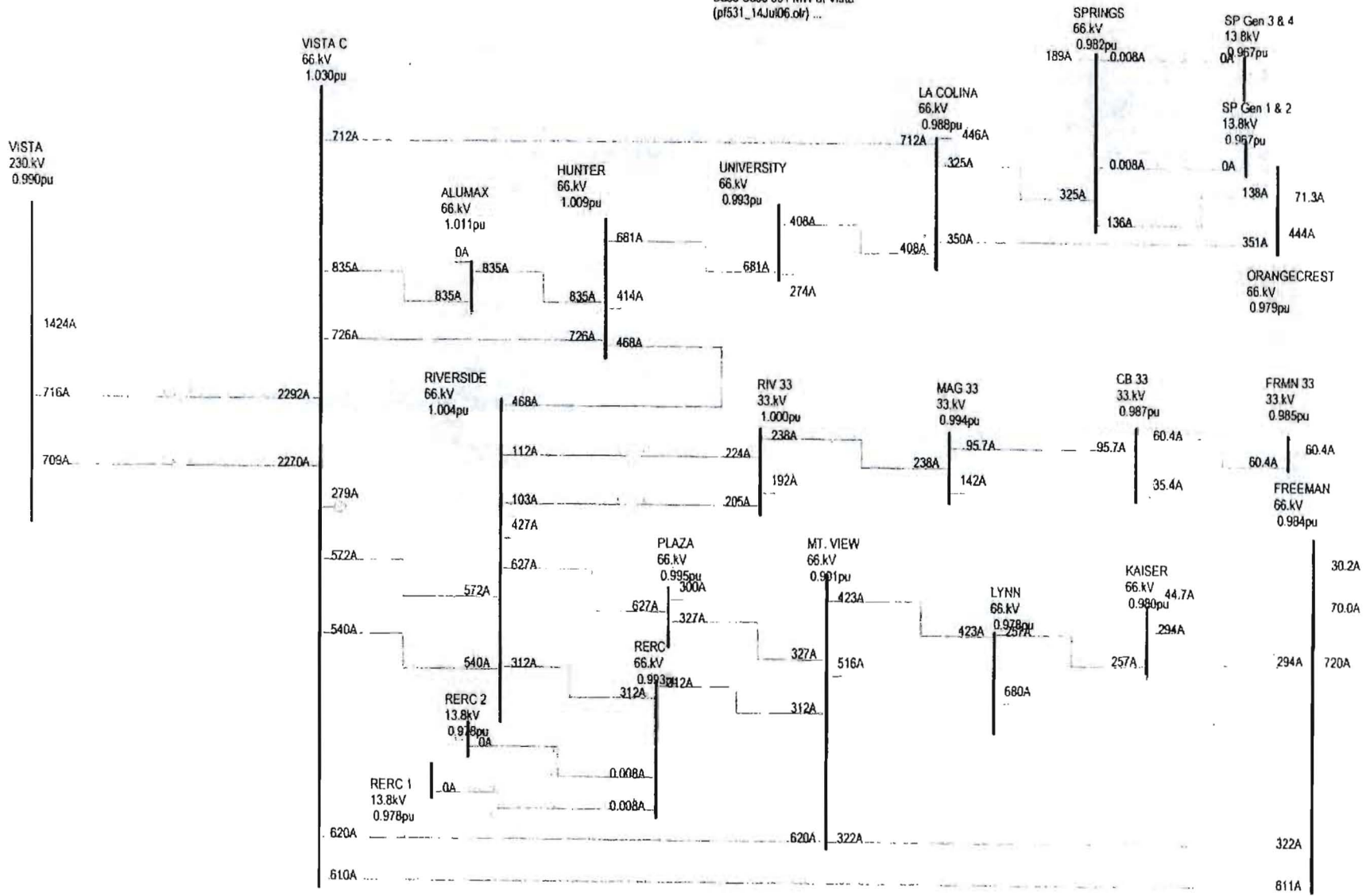


TABLE 1: N-1 Overload Cases - 550 MW

System Loading Level = 550 MW (Load at Vista Substation + Springs Generation + RERC Generation)

Case Number	Line Outage	Results					Remedial Action
		RERC / Springs Generation	Line overloaded	Line loading (Amperes)	Normal line rating (Amperes)	Percent of Normal Rating	
1.	V-LC	0	H-U	1280	850	151%	<p style="text-align: center;"><u>Potential remedial action</u></p> <p>Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). The H-U is loaded to 950 amps (112%) following this operation.</p> <p>Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). This feeds OC from Freeman Sub. The H-U is loaded to 940 amps (111%) following this operation.</p> <p>Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p> <hr/> <p>If LC-U loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). The LC-U is loaded to 650.amps (76%) following this operation.</p>
	V-LC	RERC @ 98 MW	H-U	1220	850	144%	
	V-LC	Springs @ 36 MW	H-U	1040	850	122%	
	V-LC	0	LC-U	980	850	115%	
2.	H-U	0	V-LC	1230	850	145%	<p>Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). This feeds OC from Freeman Sub. The V-LC is loaded to 950 amps (112%) following this operation.</p> <p>Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). The V-LC is loaded to 950 amps (112%) following this operation.</p> <p>Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p>
	H-U	RERC @ 98 MW	V-LC	1160	850	136%	
	H-U	Springs @ 36 MW	V-LC	1000	850	118%	
3.	V-A-H	0	V-H	1140	850	134%	<p>Open H-R (CB# 3 at H). The V-H is loaded to 1040 amps (122%) following this operation. If additional relief is necessary, open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). This feeds OC from Freeman Sub. The V-H is loaded to 780 amps (92%) and the V-MV is loaded to 880 amps (104%) following these operations.</p> <p>If V-H loading is below 1060 amps (125%), remedial action may not be necessary.</p> <p>Operation of Springs Gen may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.</p>
	V-A-H	RERC @ 98 MW	V-H	960	850	113%	
	V-A-H	Springs @ 36 MW	V-H	1050	850	124%	
4.	V-H		V-A-H	1220	1000	122%	<p>If V-A-H loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open H-R (CB# 3 at H). The V-A-H is loaded to 1080 amps (108%) following this operation.</p>
5.	LC-U		V-LC	1020	850	120%	<p>If V-LC loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S).</p>

RPU Electric System Power Flow
 Base Case 649 MW at Vista
 (pf549_14Jul06 otr) ...

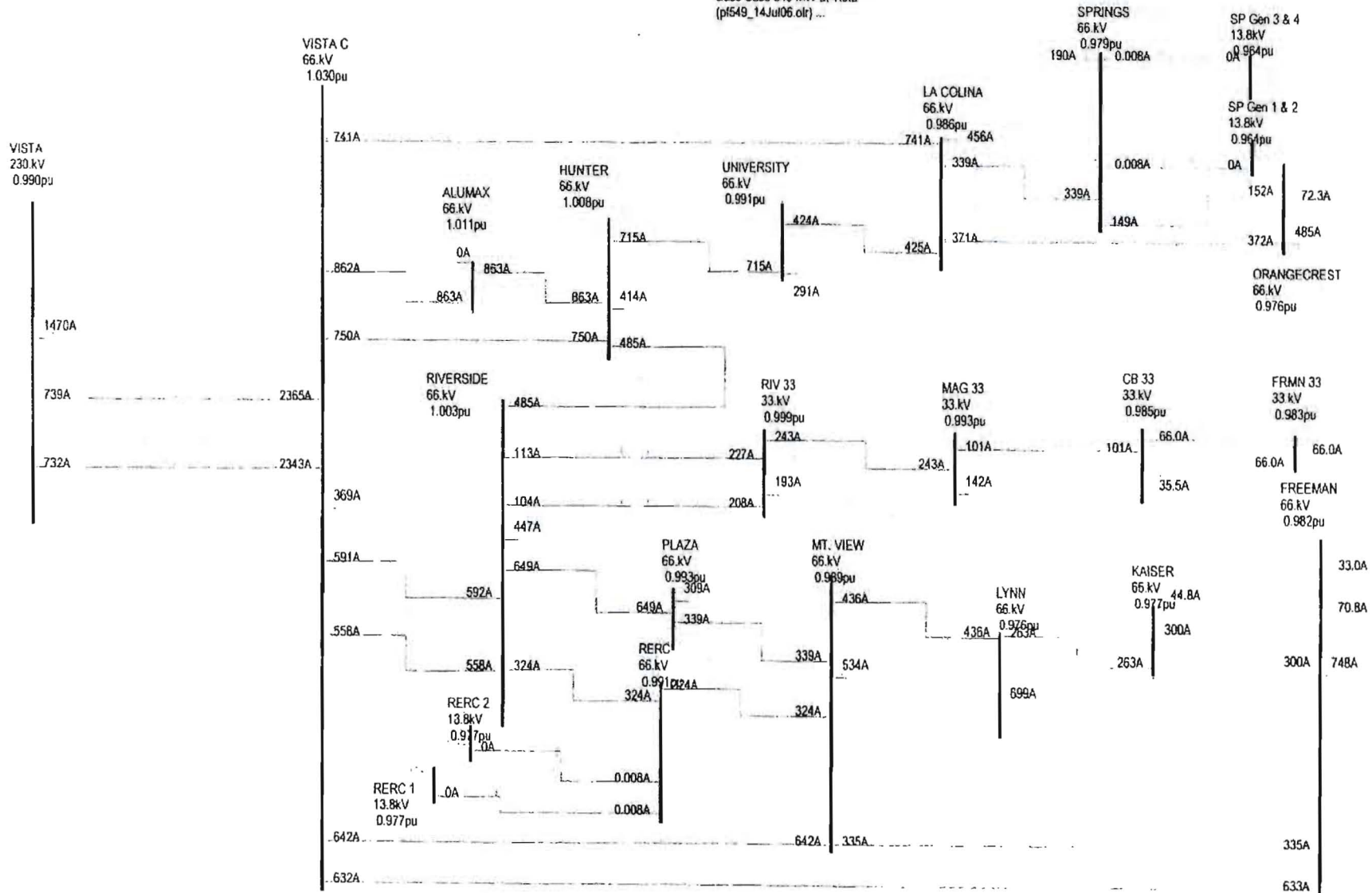


TABLE 1: N-1 Overload Cases - 570 MW

System Loading Level = 570 MW (Load at Vista Substation + Springs Generation + RERC Generation)

Results							Remedial Action
Case Number	Line Outage	RERC / Springs Generation	Line overloaded	Line loading (Amperes)	Normal line rating (Amperes)	Percent of Normal Rating	Potential remedial action
1.	V-LC	0	H-U	1340	850	158%	Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). The H-U is loaded to 980 amps (115%) following this operation.
	V-LC	RERC @ 98 MW	H-U	1280	850	151%	Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub. The H-U is loaded to 970 amps (114%) following this operation.
	V-LC	Springs @ 36 MW	H-U	1090	850	128%	Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub. The H-U is loaded to 630 amps (114%) following this operation, with all Springs units on line.
	V-LC	0	LC-U	1030	850	121%	If LC-U loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). The LC-U is loaded to 670 amps (79%) following this operation.
	V-LC	0	V-H	1000	850	118%	If V-H loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). The V-H is loaded to 920 amps (108%) following this operation.
2.	H-U	0	V-LC	1290	850	152%	Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub. The V-LC is loaded to 980 amps (115%) following this operation.
	H-U	RERC @ 98 MW	V-LC	1210	850	142%	Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). The V-LC is loaded to 980 amps (115%) following this operation.
	H-U	Springs @ 36 MW	V-LC	1060	850	125%	Operation of Springs Gen is effective, but may take too long to implement if the units are off line when the contingency occurs. Use other remedial action.
3.	V-A-H	0	V-H	1180	850	139%	Open H-R (CB# 3 at H). The V-H is loaded to 1080 amps (127%) following this operation. Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). This feeds OC from Freeman Sub. The V-H is loaded to 800 amps (94%) and the V-MV is loaded to 920 amps (108%) following these operations.
	V-A-H	RERC @ 98 MW	V-H	1000	850	118%	If V-H loading is below 1060 amps (125%), remedial action may not be necessary.
	V-A-H	Springs @ 36 MW	V-H	1090	850	128%	Open H-R (CB# 3 at H). The V-H is loaded to 950 amps (112%) following this operation.
4.	V-H	0	V-A-H	1270	1000	127%	Open H-R (CB# 3 at H). The V-A-H is loaded to 1120 amps (112%) following this operation.
5.	LC-U	0	V-LC	1070	850	126%	Open OC-LC (CB#'s 8 & 9 at OC) and OC-S (CB#'s 5 & 6 at S). The V-LC is loaded to 660 amps (78%) following this operation.
6.	V-MV	0	P-R	960	850	113%	If P-R loading is below 1060 amps (125%), remedial action may not be necessary.

RPU Electric System Power Flow
 Base Case 569 MW at Vista
 (pf569_14Jul06.dfr) ...

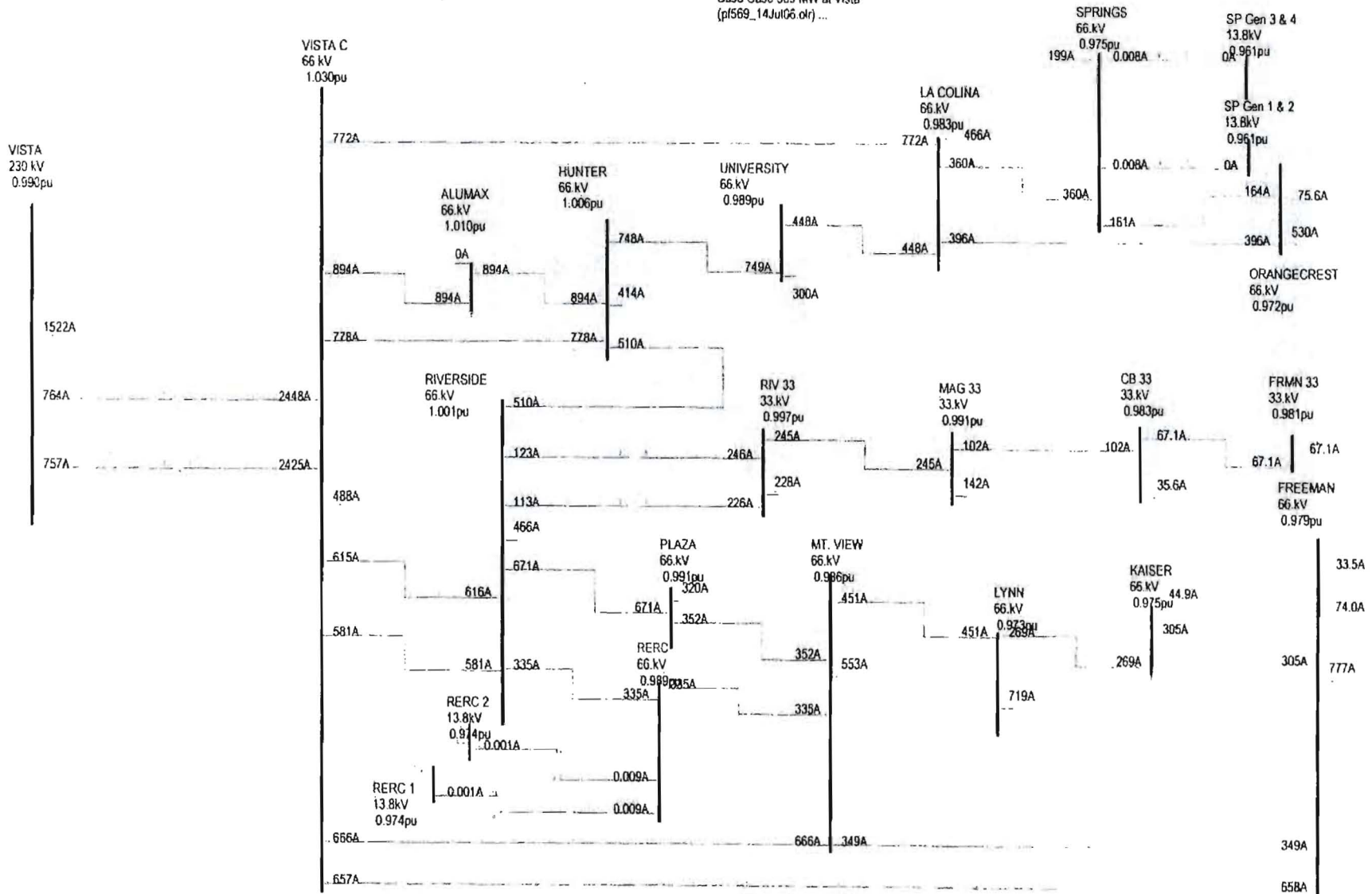


TABLE 1: N-1 Overload Cases - 615 MW

System Loading Level = 615 MW (Load at Vista Substation + Springs Generation + RERC Generation)

Case Number	Line Outage	RERC / Springs Generation	Results				Remedial Action
			Line overloaded	Line loading (Amperes)	Normal line rating (Amperes)	Percent of Normal Rating	
1.	V-LC	RERC @ 98 MW	H-U	1390	850	164%	<p>Potential remedial action</p> <p>Open OC-LC (CB#s 8 & 9 at OC) and LC-S (CB#s 5 & 6 at S). This feeds OC from Freeman Sub. The H-U is loaded to 1040 amps (123%) and OC voltage drops 7% following this operation. Load tap changers at OC should reduce the voltage drop. Load shedding may be necessary.</p> <hr/> <p>Open OC-LC (CB#s 8 & 9 at OC) and LC-S (CB#s 5 & 6 at S). The LC-U is loaded to 740 amps (87%) following this operation.</p> <hr/> <p>If V-H loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). The V-H is loaded to 890 amps (105%) following this operation.</p>
	V-LC	RERC @ 98 MW	LC-U	1080	850	127%	
	V-LC	RERC @ 98 MW	V-H	960	850	113%	
2.	H-U	RERC @ 98 MW	V-LC	1310	850	154%	Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). This feeds OC from Freeman Sub. The V-LC is loaded to 1050 amps (123%) following this operation. Load shedding may be necessary.
3.	V-A-H	RERC @ 98 MW	V-H	1120	850	132%	Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). This feeds OC from Freeman Sub. The V-H is loaded to 1050 amps (124%) and OC voltage drops 7% following this operation. Load tap changers at OC should reduce the voltage drop. Load shedding may be necessary.
4.	LC-U	RERC @ 98 MW	V-LC	1090	850	128%	Open OC-LC (CB#s 8 & 9 at OC) and OC-S (CB#s 5 & 6 at S). The V-LC is loaded to 720 amps (85%) and OC voltage drops 7% following these operations. Load tap changers at OC should reduce the voltage drop.
5.	V-H	RERC @ 98 MW	V-A-H	1190	1000	119%	If V-A-H loading is below 1250 amps (125%), remedial action may not be necessary. If relief is necessary, open H-R (CB# 3 at H), OC-LC (CB#s 8 & 9 at OC) and LC-S (CB#s 5 & 6 at S). The V-A-H is loaded to 900 amps (106%) and OC voltage drops 7% following these operations. Load tap changers at OC should reduce the voltage drop.
6.	MV-RERC	RERC @ 98 MW	P-R	1060	850	125%	If P-R loading is below 1060 amps (125%), remedial action may not be necessary. If relief is necessary, open F-MV (CB# 4 at MV). The P-R is loaded to 940 amps (111%) and H-U is loaded to 930 amps (109%).
7.	P-R	RERC @ 98 MW	MV-RERC	1160	1000	116%	If MV-RERC loading is below 1250 amps (125%), remedial action may not be necessary. If relief is necessary, open R-RERC (CB#s 5 & 6 at RERC). The MV-RERC is loaded to 860 amps (101%) and H-U is loaded to 920 amps (108%).

RPU Electric System Power Flow
 Base Case 619 MW at Vista
 (pf619_2009 normal_existing.cir) ...

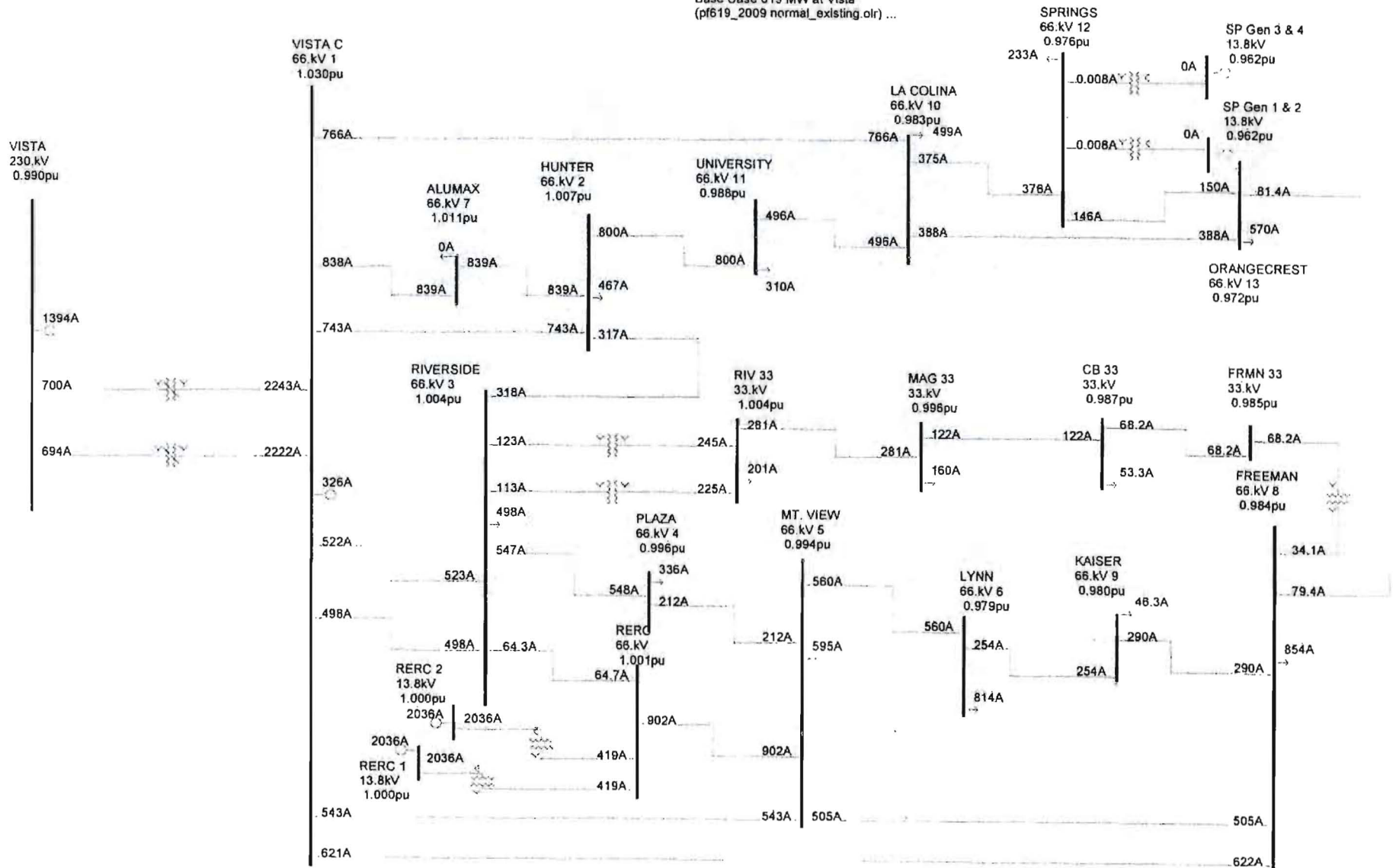


TABLE 2: N-2 Overload Cases

- - - THIS IS NOT A COMPLETE LISTING - - lesser overloads can occur with other line outage combinations

System Loading Level = 430 MW

System Loading Level = 570 MW

Results						Results						Remedial Action
Case Number	#1 Line Outage	#2 Line Outage	Line overloaded	Line loading (Amperes)	Emergency line rating (Amperes)	Case Number	#1 Line Outage	#2 Line Outage	Line overloaded	Line loading (Amperes)	Emergency line rating (Amperes)	Potential remedial action
1. (C)	V-LC	H-U	F-OC	1500	1060	1. (C)	V-LC	H-U	F-OC	>1600	1060	1. With Springs Gen at 36 MW, F-OC is at 1300 amps. - DROP LOAD AT OC / S / LC / U
2.	H-U	F-OC	V-LC	1250	1060	2.	H-U	F-OC	V-LC	1560	1060	1. With Springs Gen at 36 MW, V-LC is at 1140 amps. - DROP LOAD AT OC / S / LC / U IF NEEDED.
3.	V-LC	F-OC	H-U	1220	1060	3.	V-LC	F-OC	H-U	1500	1060	1. With Springs Gen at 36 MW, H-U is at 1130 amps. - DROP LOAD AT OC / S / LC / U IF NEEDED.
4.	V-LC	V-F	H-U	1190	1060	4.	V-LC	V-F	H-U	1540	1060	1. With Springs Gen at 36 MW, V-H is at 1270 amps. 2. With RERC Gen at 98 MW, H-U is at 1170 amps. - DROP LOAD AT OC / S / LC / U
5.	V-LC	V-A-H	V-H	1160	1060	5.	V-LC	V-A-H	V-H	1580	1060	1. With Springs Gen at 36 MW, V-H is at 1420 amps. 2. With RERC Gen at 98 MW, V-H is at 1200 amps. - DROP LOAD AT OC / S / LC / U
6. (C)	V-LC	LC-U	F-OC	1150	1060	6. (C)	V-LC	LC-U	F-OC	1500	1060	1. With Springs Gen at 36 MW, F-OC is at 1330 amps. - DROP LOAD AT OC / S / LC / U

There are 2 additional overload cases.

There are 19 additional overload cases.

NOTE: (C) Line #1 and Line #2 share the same wood poles ("common-mode" outage).

TABLE 3: Additional N-2 Overload Cases, sorted highest loading to lowest

Printed: 5/12/2006

System Loading Level = 570 MW

Results					
Case Number	#1 Line Outage	#2 Line Outage	Line overloaded	Line loading (Amperes)	Emergency line rating (Amperes)
1. (C)	V-LC	H-U	F-OC	>1600	1050
2.	H-U	F-OC	V-LC	1560	1060
3	V-LC	F-OC	H-U	1500	1060
4.	V-LC	V-F	H-U	1540	1060
5.	V-LC	V-A-H	V-H	1580	1060
6. (C)	V-LC	LC-U	F-OC	1500	1060
7.	V-F	H-U	V-LC	1470	1060
8.	V-A-H	V-R1	V-H	1440	1060
9.	V-LC	V-H	V-A-H	1680	1250
10.	V-A-H	V-R2	V-H	1420	1060
11.	V-F	V-A-H	V-H	1420	1060
12.	V-LC	V-MV	H-U	1410	1060
13	V-LC	H-R	H-U	1380	1060
14.	V-A-H	V-MV	V-H	1380	1060
15.	H-U	F-MV	V-LC	1370	1060
16.	V-LC	V-R1	H-U	1330	1060
17. (C)	V-MV	RERC-R	P-R	1330	1060
18.	V-F	V-MV	P-R	1300	1060
19.	V-F	V-H	V-A-H	1470	1250
20.	V-H	V-A-H	V-LC	1190	1060
21.	V-F	HL-MV	F-MV	1190	1060
22.	V-R1	H-R	V-R2	1180	1060
23. (C)	V-R1	V-R2	H-R	1370	1250
24. (C)	V-F	P-R	V-MV	1120	1060
25.	V-MV	P-R	RERC-R	1110	1060

NOTE: (C) Line #1 and Line #2 share the same wood poles (common mode outage)

TABLE 4

N-2 Overload Cases, sorted by Line #1

System Loading Level = 570 MW

Case Number	#1 Line Outage	#2 Line Outage	Results		
			Line overloaded	Line loading (Amperes)	Emergency line rating (Amperes)
15.	H-U	F-MV	V-LC	1370	1060
2.	H-U	F-OC	V-LC	1560	1060
14.	V-A-H	V-MV	V-H	1380	1060
8.	V-A-H	V-R1	V-H	1440	1060
10.	V-A-H	V-R2	V-H	1420	1060
21.	V-F	HL-MV	F-MV	1190	1060
7.	V-F	H-U	V-LC	1470	1060
24.	V-F	P-R	V-MV	1120	1060
11.	V-F	V-A-H	V-H	1420	1060
19.	V-F	V-H	V-A-H	1470	1250
18.	V-F	V-MV	P-R	1300	1060
20.	V-H	V-A-H	V-LC	1190	1060
3.	V-LC	F-OC	H-U	1600	1060
13.	V-LC	H-R	H-U	1380	1060
1.	V-LC	H-U	F-OC	>1600	1060
6.	V-LC	LC-U	F-OC	1500	1060
5.	V-LC	V-A-H	V-H	1580	1060
4.	V-LC	V-F	H-U	1540	1060
9.	V-LC	V-H	V-A-H	1680	1250
12.	V-LC	V-MV	H-U	1410	1060
16.	V-LC	V-R1	H-U	1330	1060
25.	V-MV	P-R	RERC-R	1110	1060
17.	V-MV	RERC-R	P-R	1330	1060
22.	V-R1	H-R	V-R2	1180	1060
23.	V-R1	V-R2	H-R	1370	1250

N-2 Overload Cases, sorted by Line #2

Printed: 5/12/2006

System Loading Level = 570 MW

Case Number	#1 Line Outage	#2 Line Outage	Results		
			Line overloaded	Line loading (Amperes)	Emergency line rating (Amperes)
15	H-U	F-MV	V-LC	1370	1060
2.	H-U	F-OC	V-LC	1560	1060
3.	V-LC	F-OC	H-U	1500	1060
21.	V-F	HL-MV	F-MV	1190	1060
13.	V-LC	H-R	H-U	1380	1060
22.	V-R1	H-R	V-R2	1180	1060
7.	V-F	H-U	V-LC	1470	1060
1.	V-LC	H-U	F-OC	>1600	1060
6.	V-LC	LC-U	F-OC	1500	1060
24.	V-F	P-R	V-MV	1120	1060
25.	V-MV	P-R	RERC-R	1110	1060
17.	V-MV	RERC-R	P-R	1330	1060
11.	V-F	V-A-H	V-H	1420	1060
20.	V-H	V-A-H	V-LC	1190	1060
5.	V-LC	V-A-H	V-H	1580	1060
4.	V-LC	V-F	H-U	1540	1060
19.	V-F	V-H	V-A-H	1470	1250
9.	V-LC	V-H	V-A-H	1680	1250
14.	V-A-H	V-MV	V-H	1380	1060
18.	V-F	V-MV	P-R	1300	1060
12.	V-LC	V-MV	H-U	1410	1060
8.	V-A-H	V-R1	V-H	1440	1060
16.	V-LC	V-R1	H-U	1330	1060
10.	V-A-H	V-R2	V-H	1420	1060
23.	V-R1	V-R2	H-R	1370	1250

TABLE 3: Additional N-2 Overload Cases, sorted highest loading to lowest

Printed: 5/12/2006

System Loading Level = 570 MW

Results					
Case Number	#1 Line Outage	#2 Line Outage	Line overloaded	Line loading (Amperes)	Emergency line rating (Amperes)
1. (C)	V-LC	H-U	F-OC	>1600	1060
2.	H-U	F-OC	V-LC	1560	1060
3.	V-LC	F-OC	H-U	1500	1060
4.	V-LC	V-F	H-U	1540	1060
5.	V-LC	V-A-H	V-H	1580	1060
6. (C)	V-LC	LC-U	F-OC	1500	1060
7.	V-F	H-U	V-LC	1470	1060
8.	V-A-H	V-R1	V-H	1440	1060
9.	V-LC	V-H	V-A-H	1680	1250
10.	V-A-H	V-R2	V-H	1420	1060
11.	V-F	V-A-H	V-H	1420	1060
12.	V-LC	V-MV	H-U	1410	1060
13.	V-LC	H-R	H-U	1380	1060
14.	V-A-H	V-MV	V-H	1380	1060
15.	H-U	F-MV	V-LC	1370	1060
16.	V-LC	V-R1	H-U	1330	1060
17. (C)	V-MV	RERC-R	P-R	1330	1060
18.	V-F	V-MV	P-R	1300	1060
19.	V-F	V-H	V-A-H	1470	1250
20.	V-H	V-A-H	V-LC	1190	1060
21.	V-F	HL-MV	F-MV	1190	1060
22.	V-R1	H-R	V-R2	1180	1050
23. (C)	V-R1	V-R2	H-R	1370	1250
24. (C)	V-F	P-R	V-MV	1120	1060
25.	V-MV	P-R	RERC-R	1110	1060

NOTE: (C) Line #1 and Line #2 share the same wood poles ('common-mode' outage)

TABLE 4

N-2 Overload Cases, sorted by Line #1

System Loading Level = 570 MW

Case Number	#1 Line Outage	#2 Line Outage	Results		
			Line overloaded	Line loading (Amperes)	Emergency line rating (Amperes)
15.	H-U	F-MV	V-LC	1370	1060
2.	H-U	F-OC	V-LC	1560	1060
14.	V-A-H	V-MV	V-H	1380	1060
8.	V-A-H	V-R1	V-H	1440	1060
10.	V-A-H	V-R2	V-H	1420	1060
21.	V-F	HL-MV	F-MV	1190	1060
7.	V-F	H-U	V-LC	1470	1060
24.	V-F	P-R	V-MV	1120	1060
11.	V-F	V-A-H	V-H	1420	1060
19.	V-F	V-H	V-A-H	1470	1250
18.	V-F	V-MV	P-R	1300	1060
20.	V-H	V-A-H	V-LC	1190	1060
3.	V-LC	F-OC	H-U	1500	1060
13.	V-LC	H-R	H-U	1380	1060
1.	V-LC	H-U	F-OC	>1600	1060
6.	V-LC	LC-U	F-OC	1500	1060
5.	V-LC	V-A-H	V-H	1580	1060
4.	V-LC	V-F	H-U	1540	1060
9.	V-LC	V-H	V-A-H	1680	1250
12.	V-LC	V-MV	H-U	1410	1060
16.	V-LC	V-R1	H-U	1330	1060
25.	V-MV	P-R	RERC-R	1110	1060
17.	V-MV	RERC-R	P-R	1330	1060
22.	V-R1	H-R	V-R2	1180	1060
23.	V-R1	V-R2	H-R	1370	1250

N-2 Overload Cases, sorted by Line #2

Printed: 5/12/2006

System Loading Level = 570 MW

Case Number	#1 Line Outage	#2 Line Outage	Results		
			Line overloaded	Line loading (Amperes)	Emergency line rating (Amperes)
15.	H-U	F-MV	V-LC	1370	1060
2.	H-U	F-OC	V-LC	1560	1060
3.	V-LC	F-OC	H-U	1500	1060
21.	V-F	HL-MV	F-MV	1190	1060
13.	V-LC	H-R	H-U	1380	1060
22.	V-R1	H-R	V-R2	1180	1060
7.	V-F	H-U	V-LC	1470	1060
1.	V-LC	H-U	F-OC	>1600	1060
6.	V-LC	LC-U	F-OC	1500	1060
24.	V-F	P-R	V-MV	1120	1060
25.	V-MV	P-R	RERC-R	1110	1060
17.	V-MV	RERC-R	P-R	1330	1060
11.	V-F	V-A-H	V-H	1420	1060
20.	V-H	V-A-H	V-LC	1190	1060
5.	V-LC	V-A-H	V-H	1580	1060
4.	V-LC	V-F	H-U	1540	1060
19.	V-F	V-H	V-A-H	1470	1250
9.	V-LC	V-H	V-A-H	1680	1250
14.	V-A-H	V-MV	V-H	1380	1060
18.	V-F	V-MV	P-R	1300	1060
12.	V-LC	V-MV	H-U	1410	1060
8.	V-A-H	V-R1	V-H	1440	1060
16.	V-LC	V-R1	H-U	1330	1060
10.	V-A-H	V-R2	V-H	1420	1060
23.	V-R1	V-R2	H-R	1370	1250