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The Touchstone Energy logo consists of three stylized human figures in red, blue, and orange, standing on a green base that resembles a stylized 'E' or a wave.

System Impact Study for 50 MW Generation Expansion at Craig Unit 3

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Principle Investigator: Vince Leung

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Executive Summary

The existing Craig Generating Station, located in northwestern Colorado, consists of three coal-fired generating units. Power Management/Generation of Tri-State Generation and Transmission Association, Inc. (Tri-State) proposed to install a new turbine rotor at Craig Unit 3 to increase its generation by 50 MW by September 2005. They requested a system impact study to determine if this project will result in any potential transmission problems.

Craig Unit 3 has a net capacity of 408 MW and is connected to the 345 kV grid via a 420 MVA rated (at 55°C), 345/22 kV generation step-up transformer. The capacity of this generating unit will increase to 458 MW after the proposed generation expansion project. As a result, the existing step-up transformer will no longer be adequate to serve the full generation from Unit 3. It needs to be replaced with a transformer with a rating of about 500 MVA.

The net generating capacity of the existing Craig Generating Station is 1,264 MW. This capacity will increase to 1,314 after the proposed generation expansion project.

Based on the modified 2004 heavy summer case with the 50 MW generation addition at Craig Unit 3, both the steady-state power flow study and the transient stability study showed that there were no voltage or loading violations of the planning criteria. Based on the system conditions simulated in this study, the conclusion of this report is that the existing system can adequately support the proposed 50 MW generation expansion at Craig Unit 3. This conclusion does not assess or address ownership or capacity rights in the transmission system of western Colorado. Further, since this generation project is not expected to require any system reinforcements, a facilities study is not needed.

Objective

The existing Craig Generating Station, located in northwestern Colorado, consists of three coal-fired generating units. Power Management/Generation of Tri-State Generation and Transmission Association, Inc. (Tri-State) proposed to install a new turbine rotor at Craig Unit 3 to increase its generation by 50 MW by September 2005. They requested a system impact study to determine if this project will result in any potential transmission problems.

The unit generation for the existing Craig Generating Station is tabulated below:

Craig Unit No.	Net Capacity (MW)
1	428
2	428
3	408
Total	<hr/> 1,264

With the 50 MW generation addition, Craig Unit 3 will have a new capacity of 458 MW. The total net capacity for Craig will increase to 1,314 MW.

Planning Criteria

System normal criteria require that bus voltages be within the range of 0.95 to 1.05 per unit. Transmission line flows must not exceed 80 percent of its continuous rating, and transformer flows must not exceed 100 percent of its maximum nameplate rating. System adjustments including shunt capacitor and reactor switching, generator voltage regulation, transformer tap and phase shifter adjustments, and area interchanges are allowed to be changed.

Single contingency outage criteria require that bus voltages be within the range of 0.90 and 1.10 per unit. Furthermore, the voltage magnitude at a bus during a single contingency outage cannot drop by more than 0.05 per unit from the system normal condition. Transmission lines and transformers flows must not exceed 100 percent of their continuous ratings. All system adjustments were allowed in the outage simulations.

Tri-State's system planning criteria are consistent with the Western Electricity Coordinating Council (WECC) and the North American Electric Reliability Council (NERC) system reliability criteria.

Study Methodology

The WECC 2004 heavy summer operating case (2004HS2A) was selected to perform the study. To stress the system, the case was modified to maximize the generation output at both the Craig and Hayden Generation Stations. The Laramie River swing generator was adjusted to offset the generation increase from Craig and Hayden. The added 50 MW generation at Craig Unit 3 was absorbed by scaling up 50 MW of load in eastern Colorado.

In addition to a system normal analysis, a contingency analysis and transient stability analysis were completed for selected single line outages in the study area. These analyses will identify any transmission overload and low voltage problems that do not satisfy reliability criteria. The analyses were performed with the GE/PSLF power flow program, version 13.1.

Base Case Data

The relevant power flow data of western Colorado transmission system (Zones 790 and 791) for the modified 2004 heavy summer case are shown in Attachment 1. The data include: major path flows, buses, loads, generation, switchable shunt capacitors/reactors, line and transformer impedances.

Study Results

The modified 2004 heavy summer case with 50 MW generation added at Craig Unit 3 was simulated under normal conditions. The results identified the following violations of the planning criteria:

Craig Unit 3 has a net capacity of 408 MW and is connected to the 345 kV grid via a 420 MVA rated (at 55°C), 345/22 kV generation step-up transformer. The capacity of this generating unit will increase to 458 MW after the proposed generation expansion project. As a result, the existing step-up transformer will no longer be adequate to serve the full generation from Unit 3. It needs to be replaced with a transformer with a rating of about 500 MVA.

The contingency analysis included the following 11 single line outages:

- 1) Craig - Bear Ears - Bonanza 345 kV
- 2) Craig - Ault 345 kV
- 3) Craig - Rifle 345 kV
- 4) Craig - Rife 230 kV
- 5) Craig - Hayden #1 230 kV
- 6) Hayden - Archer 230 kV
- 7) Hayden - Wolcott 230 kV
- 8) Hayden - Gore Pass 230 kV
- 9) Hayden - Artesia 138 kV
- 10) Hayden - Gore Pass 138 kV
- 11) Hayden - Axial Basin 138 kV

The results showed that there were no voltage or loading violations except for the Craig Unit 3 generation step-up transformer as mentioned in the study for the normal system conditions.

The transient stability analysis included the following 13 simulations with the following resulting plots included:

- Plot 1: 3- ϕ Craig 345 kV Fault and Loss of the Craig - Bear Ears - Bonanza 345 kV Line
- Plot 2: 3- ϕ Bonanza 345 kV Fault and Loss of the Craig - Bear Ears - Bonanza 345 kV Line
- Plot 3: 3- ϕ Craig 345 kV Fault and Loss of the Craig - Ault 345 kV Line
- Plot 4: 3- ϕ Craig 345 kV Fault and Loss of the Craig - Rifle 345 kV Line
- Plot 5: 3- ϕ Craig 230 kV Fault and Loss of the Craig - Rifle 230 kV Line
- Plot 6: 3- ϕ Craig 230 kV Fault and Loss of the Craig - Hayden #1 230 kV Line
- Plot 7: 3- ϕ Hayden 230 kV Fault and Loss of the Craig - Hayden #1 230 kV Line
- Plot 8: 3- ϕ Hayden 230 kV Fault and Loss of the Hayden - Archer 230 kV Line
- Plot 9: 3- ϕ Hayden 230 kV Fault and Loss of the Hayden - Gore Pass 230 kV Line
- Plot 10: 3- ϕ Hayden 230 kV Fault and Loss of the Hayden - Wolcott 230 kV Line
- Plot 11: 3- ϕ Hayden 138 kV Fault and Loss of the Hayden - Artesia 138 kV Line
- Plot 12: 3- ϕ Hayden 138 kV Fault and Loss of the Hayden - Gore Pass 138 kV Line
- Plot 13: 3- ϕ Hayden 138 kV Fault and Loss of the Hayden - Axial Basin 138 kV Line

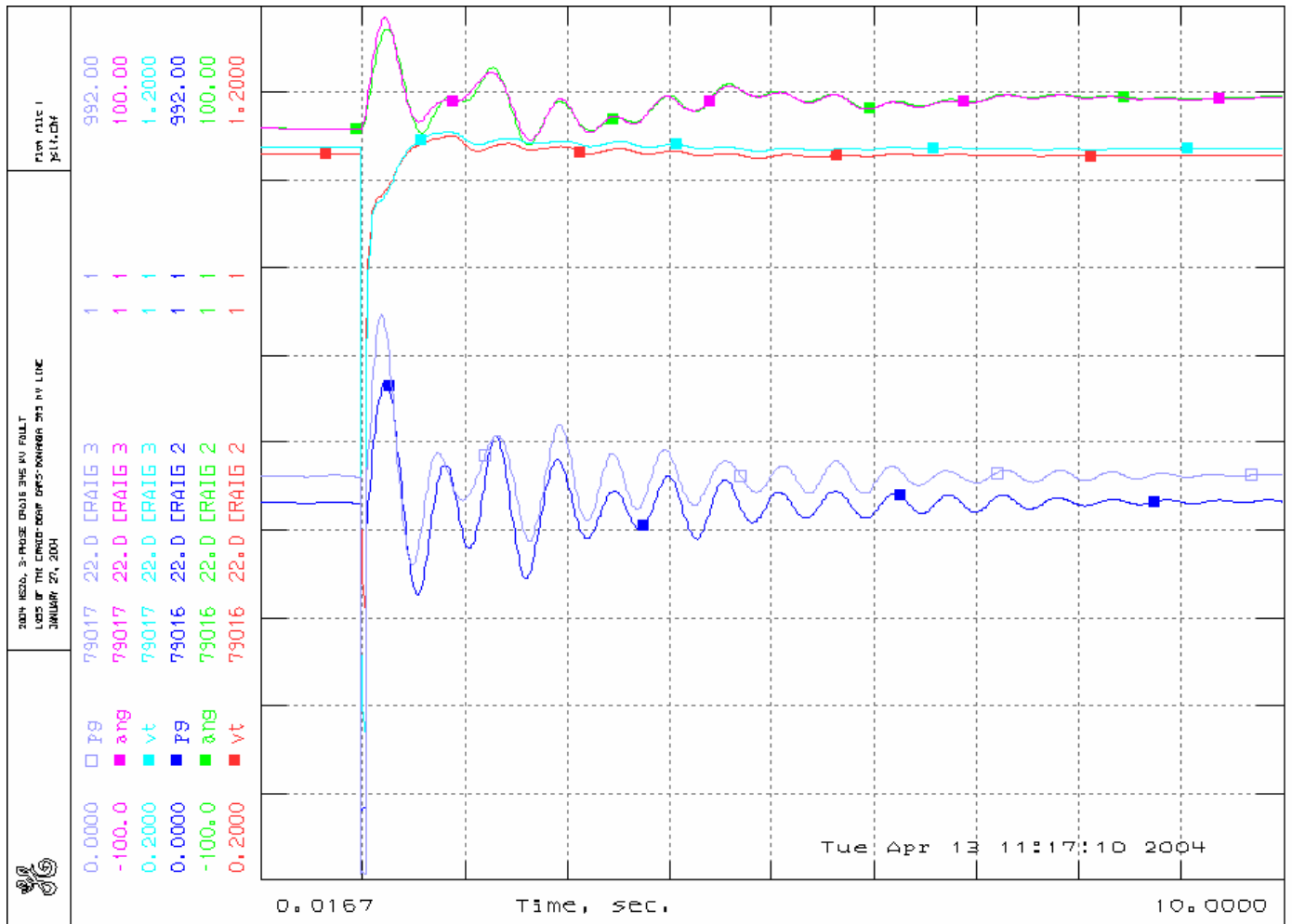
All plots include the generator output power in MW, the generator terminal per unit voltage and the generator rotor angle in degrees. They all showed good damping and no oscillatory concerns. The duration of the 345 kV, 230 kV and 138 kV 3- ϕ faults were 3 cycles (0.05 second), 4 cycles (0.0667 second) and 6 cycles (0.1 second), respectively.

Conclusion and Recommendation

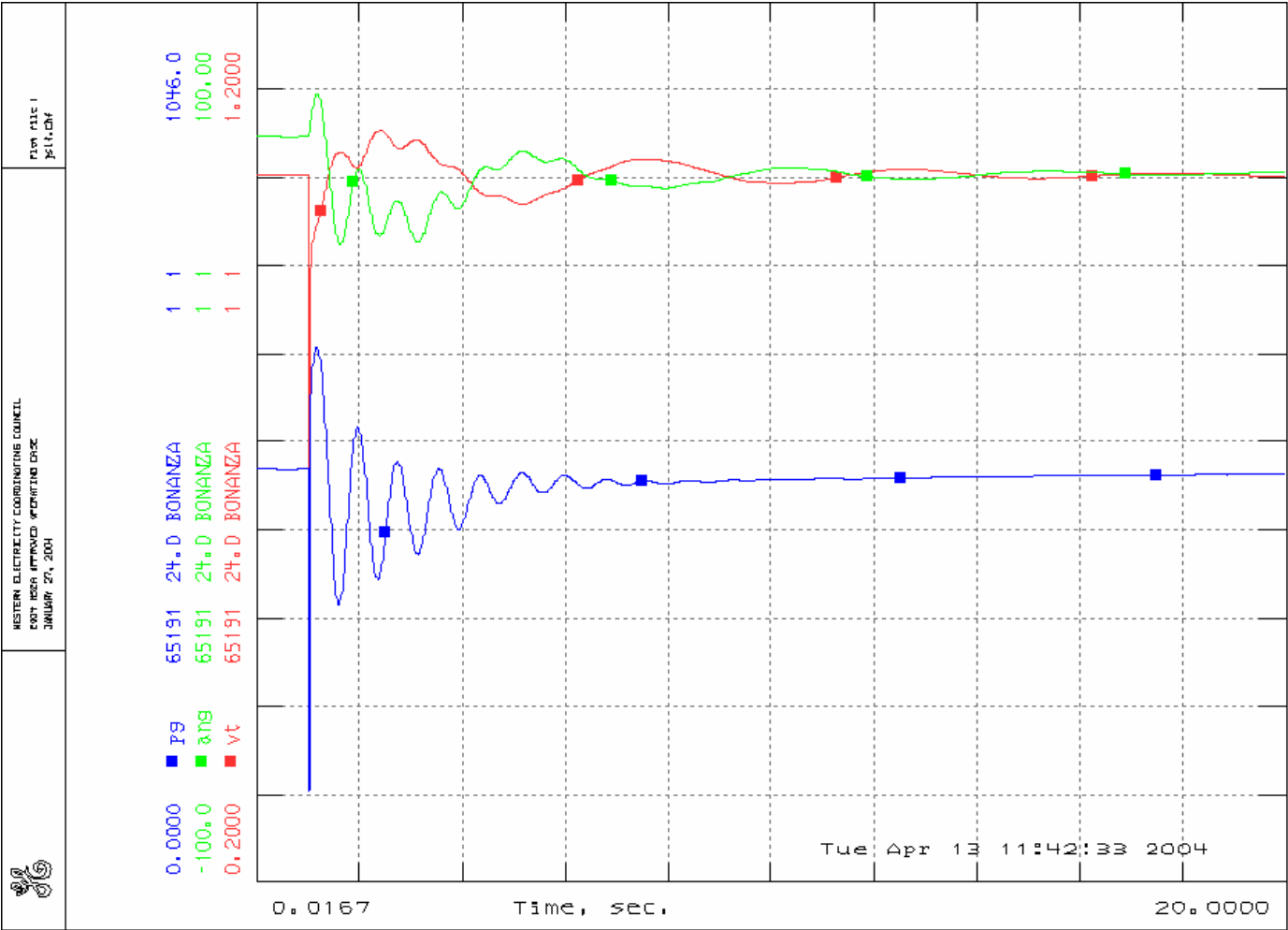
Based on the modified 2004 heavy summer case with the 50 MW generation addition at Craig Unit 3, the results showed that there were no voltage or loading violations of the planning criteria. Thus it is concluded that the existing system can adequately support the proposed 50 MW generation expansion at Craig Unit 3. This conclusion does not assess or address ownership or capacity rights in the transmission system of western Colorado. Further, since this generation project is not expected to require any system reinforcements, a facilities study is not needed.

Tri-State needs to review the sizing of the existing 420 MVA, 345/22 kV generation step-up transformer for Craig Unit 3. The transformer overloaded at the higher generation level, and may need to be replaced. The minimum rating of a replacement transformer needs to be approximately 500 MVA, to adequately serve the full 458 MW generation output from Unit 3 in addition to VAR flow.

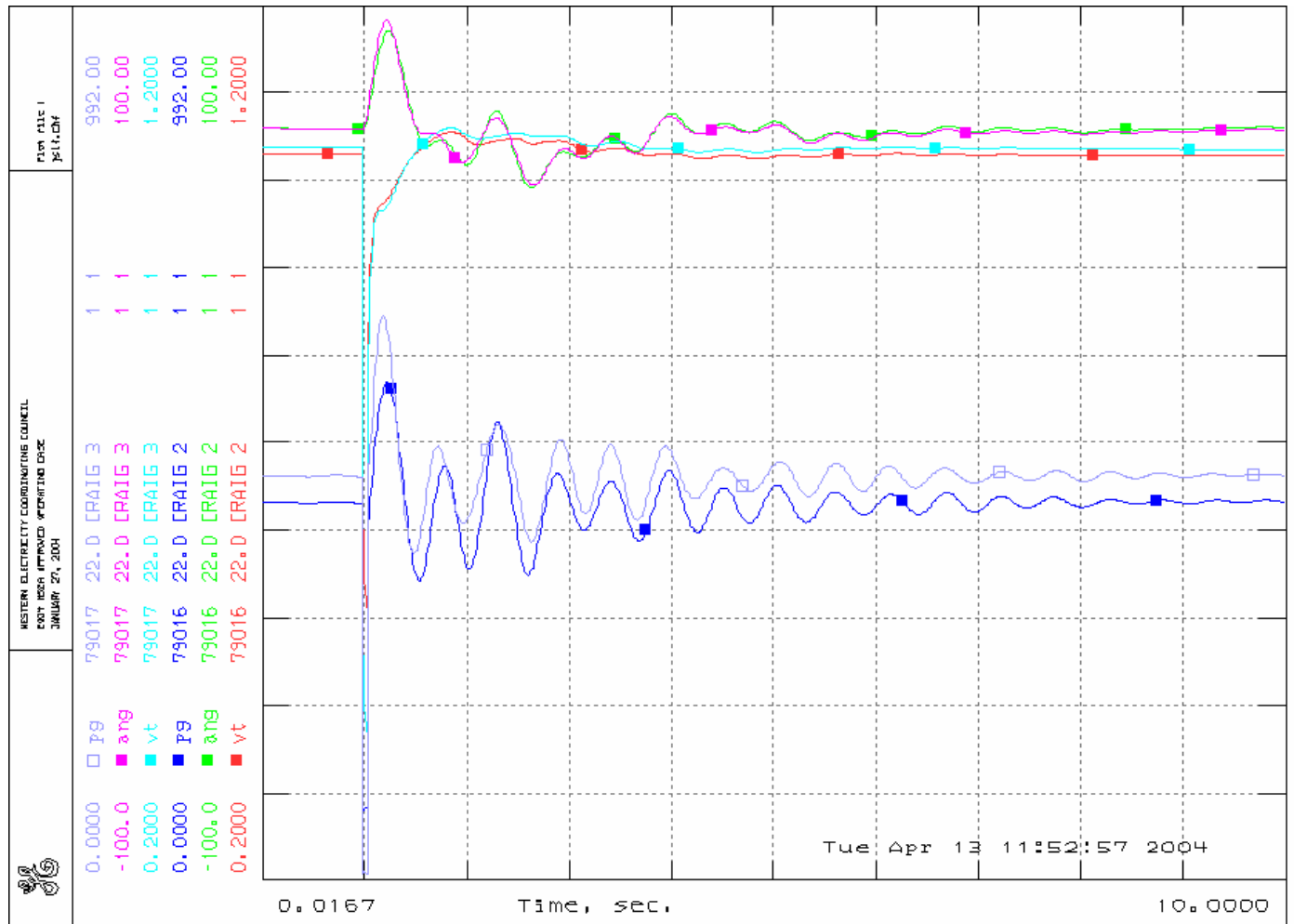
Plot 1: 3- ϕ Craig 345 kV Fault and Loss of the Craig - Bear Ears - Bonanza 345 kV Line



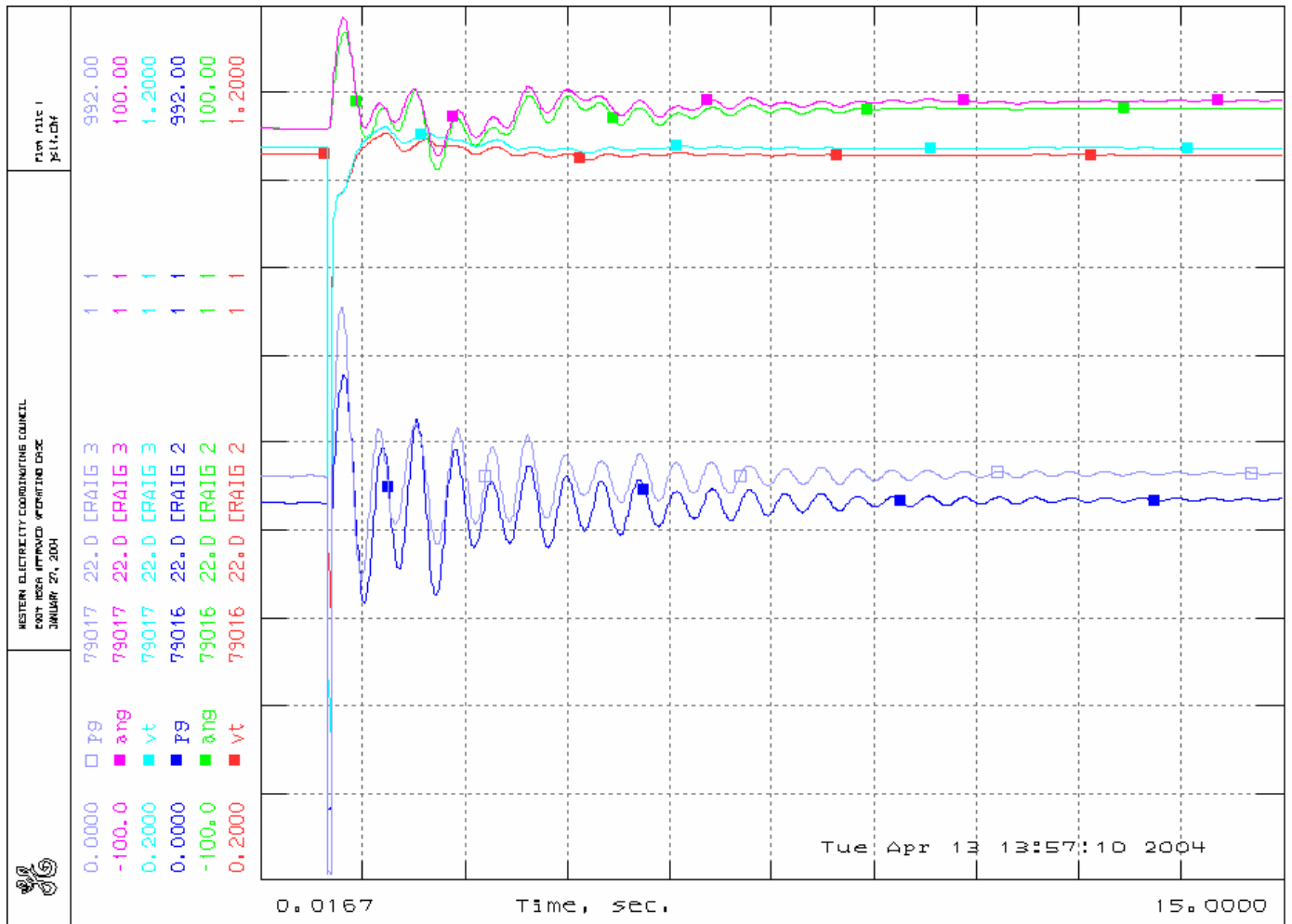
Plot 2: 3- ϕ Bonanza 345 kV Fault and Loss of the Craig - Bear Ears - Bonanza 345 kV Line



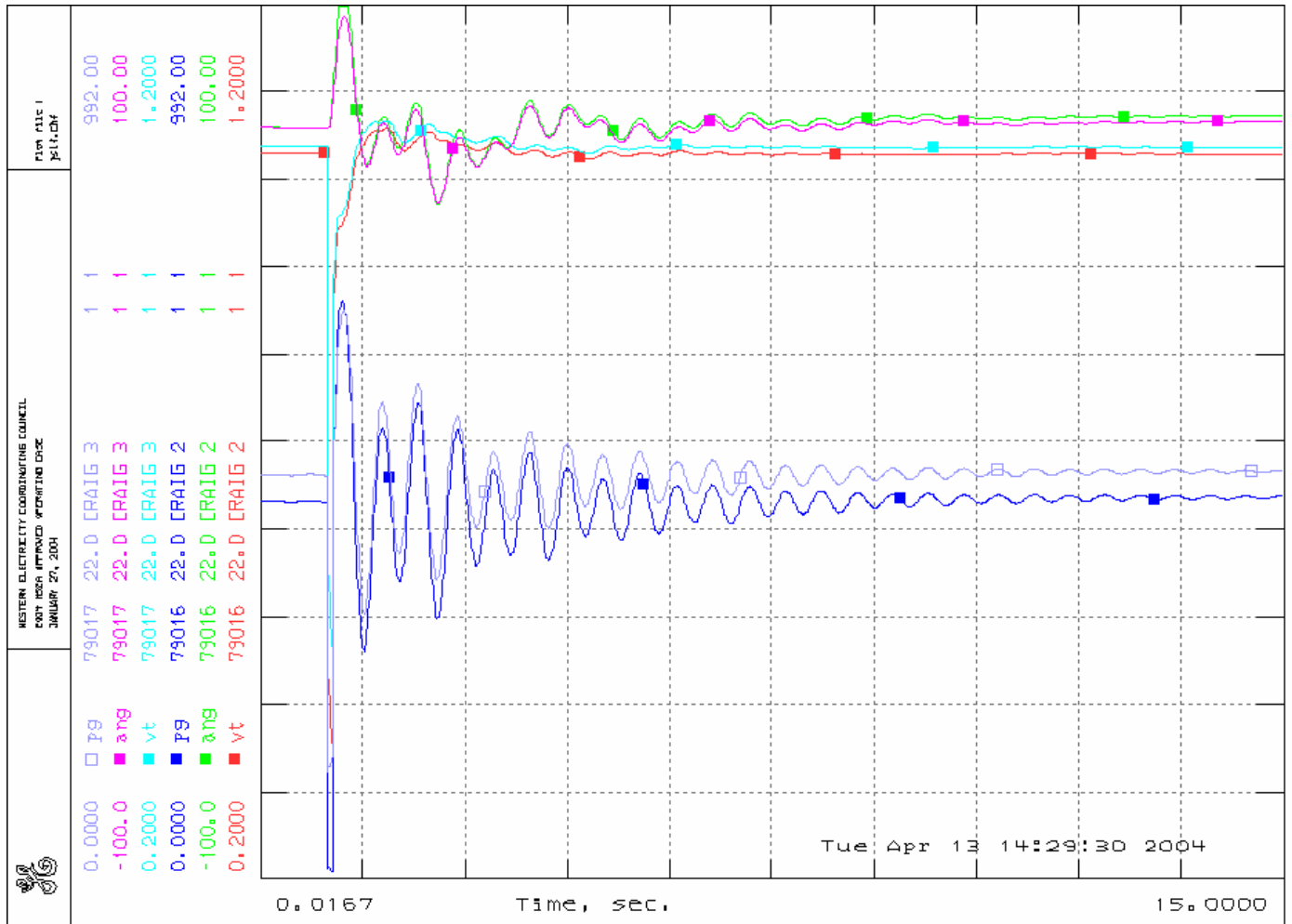
Plot 3: 3- ϕ Craig 345 kV Fault and Loss of the Craig - Ault 345 kV Line



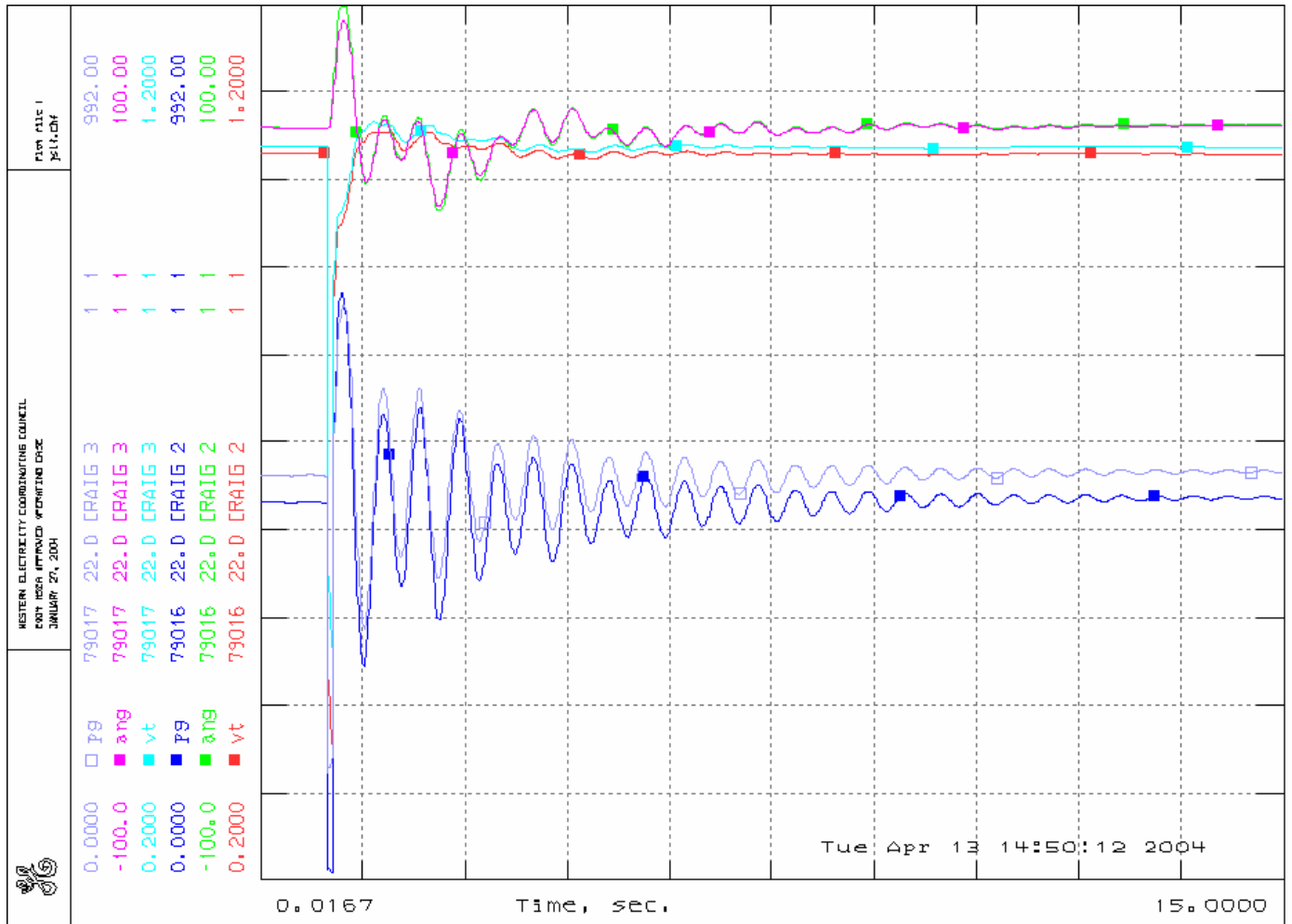
Plot 4: 3- ϕ Craig 345 kV Fault and Loss of the Craig - Rifle 345 kV Line



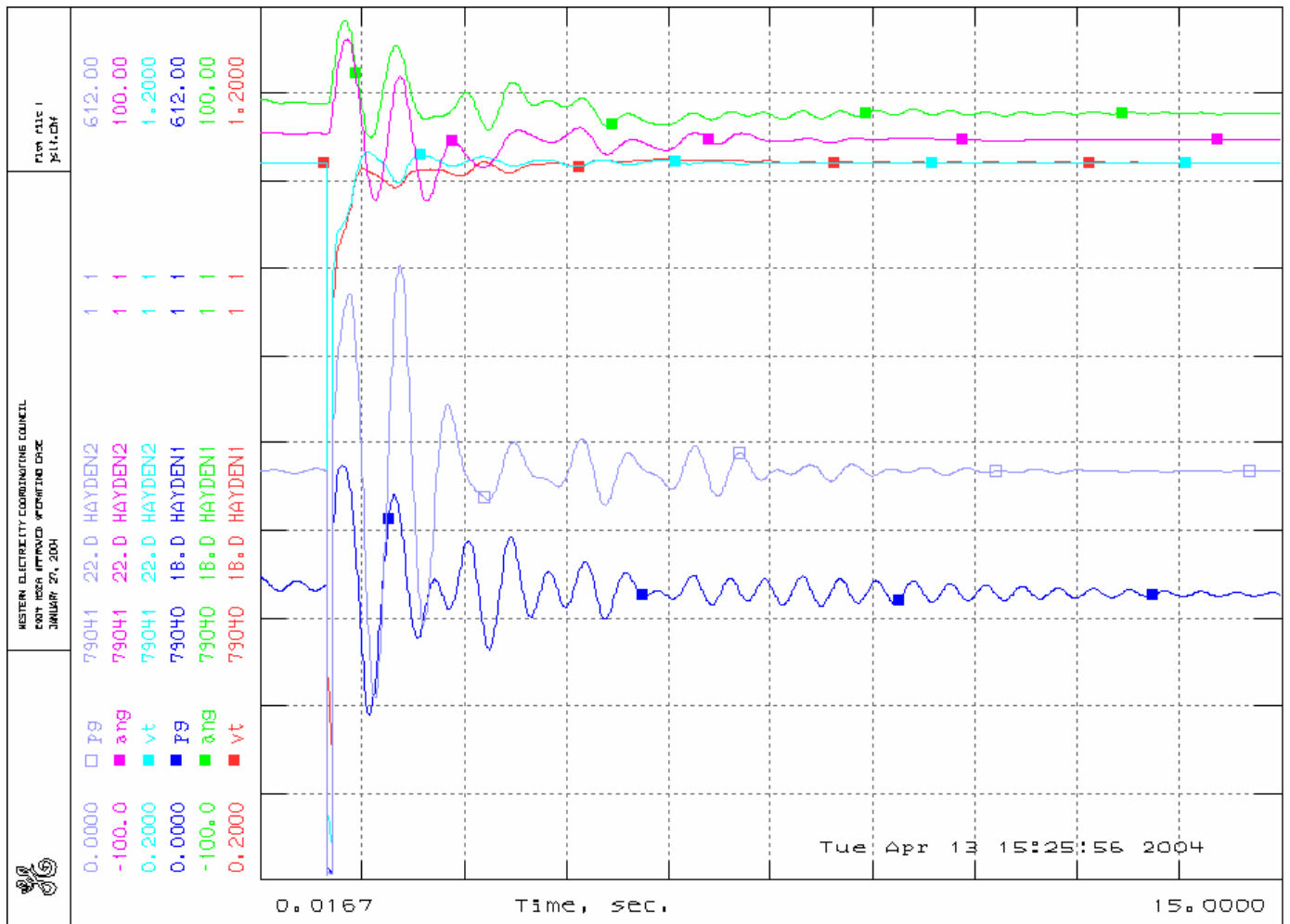
Plot 5: 3- ϕ Craig 230 kV Fault and Loss of the Craig - Rifle 230 kV Line



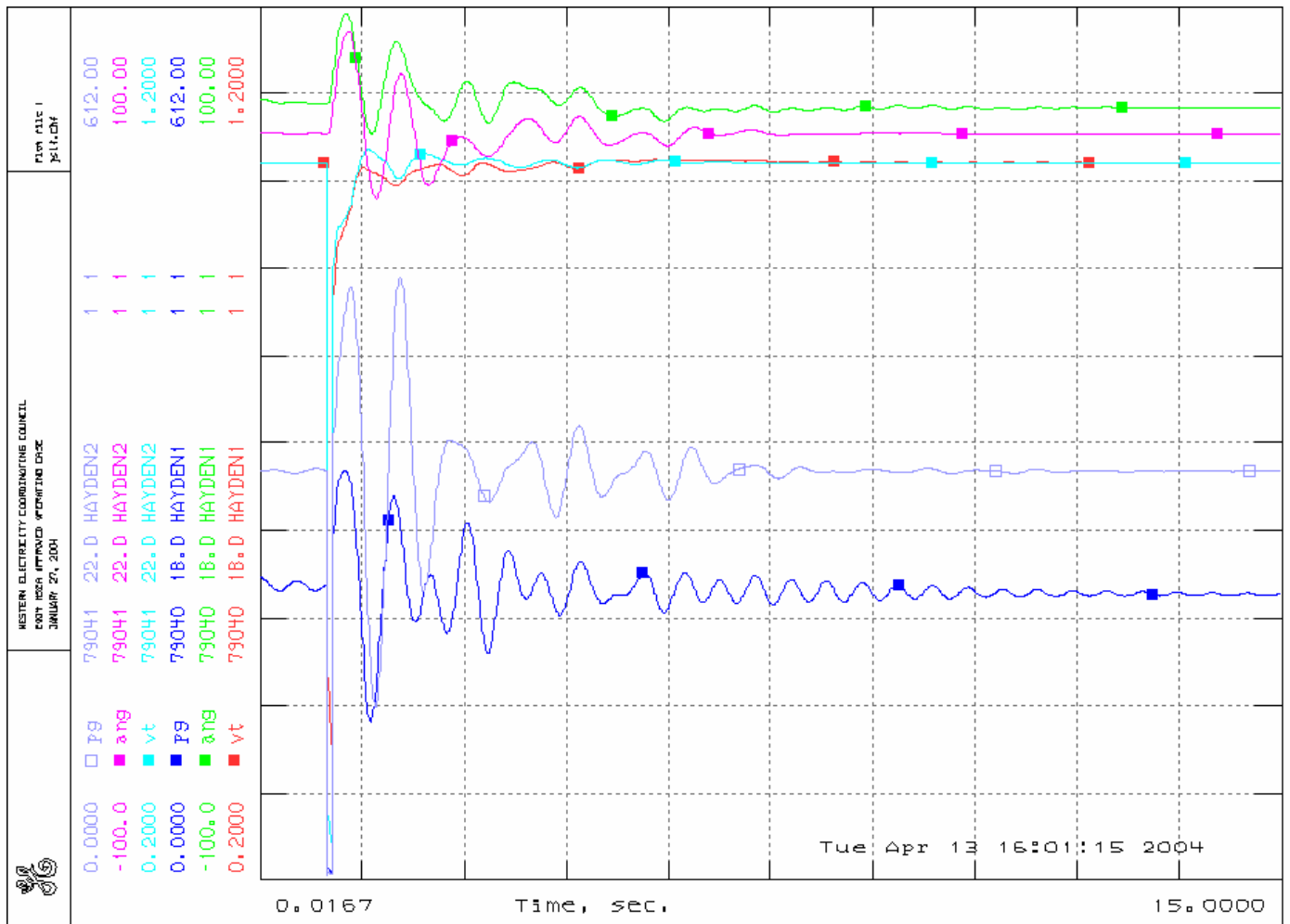
Plot 6: 3- ϕ Craig 230 kV Fault and Loss of the Craig - Hayden #1 230 kV Line



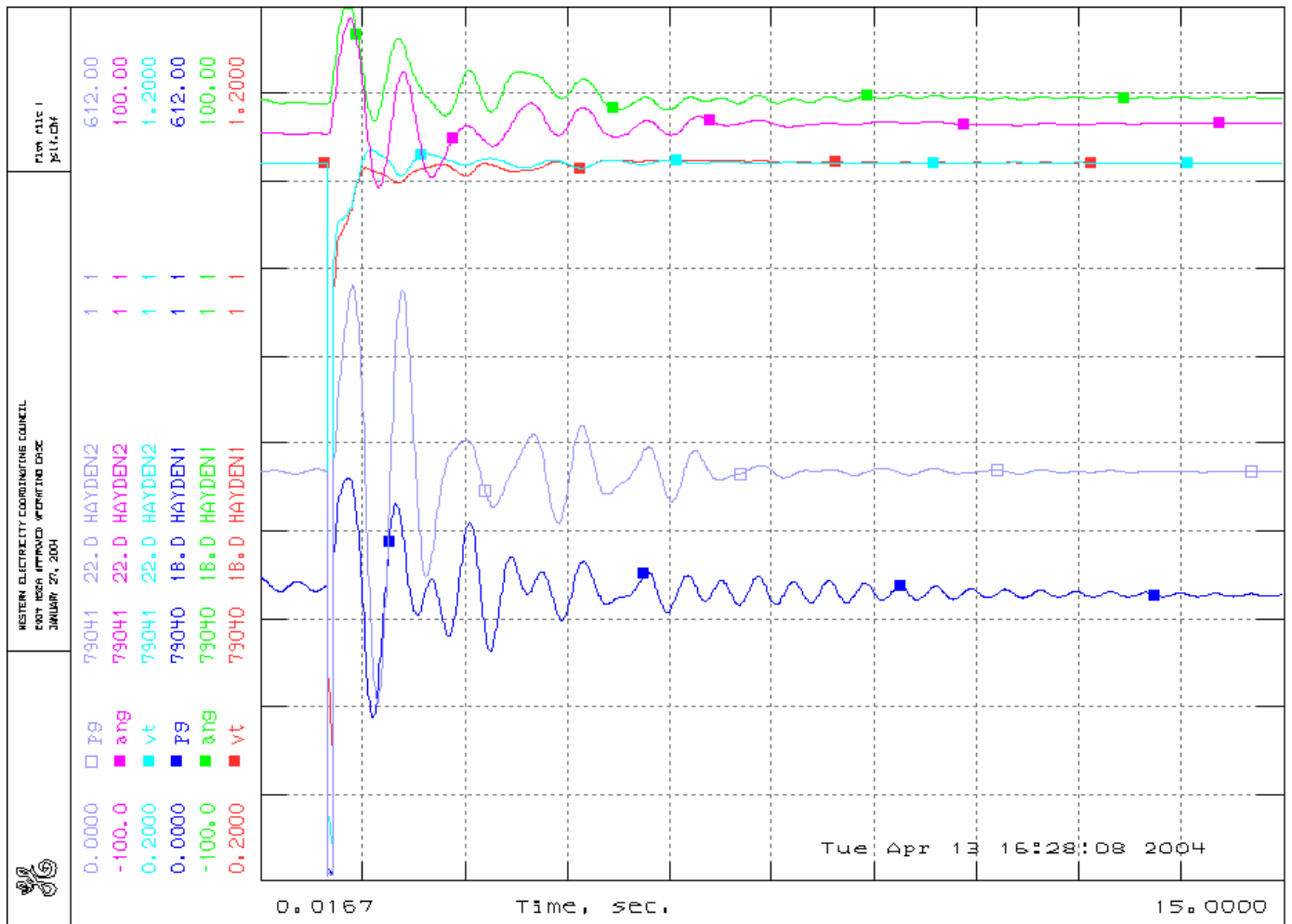
Plot 7: 3- ϕ Hayden 230 kV Fault and Loss of the Craig - Hayden #1 230 kV Line



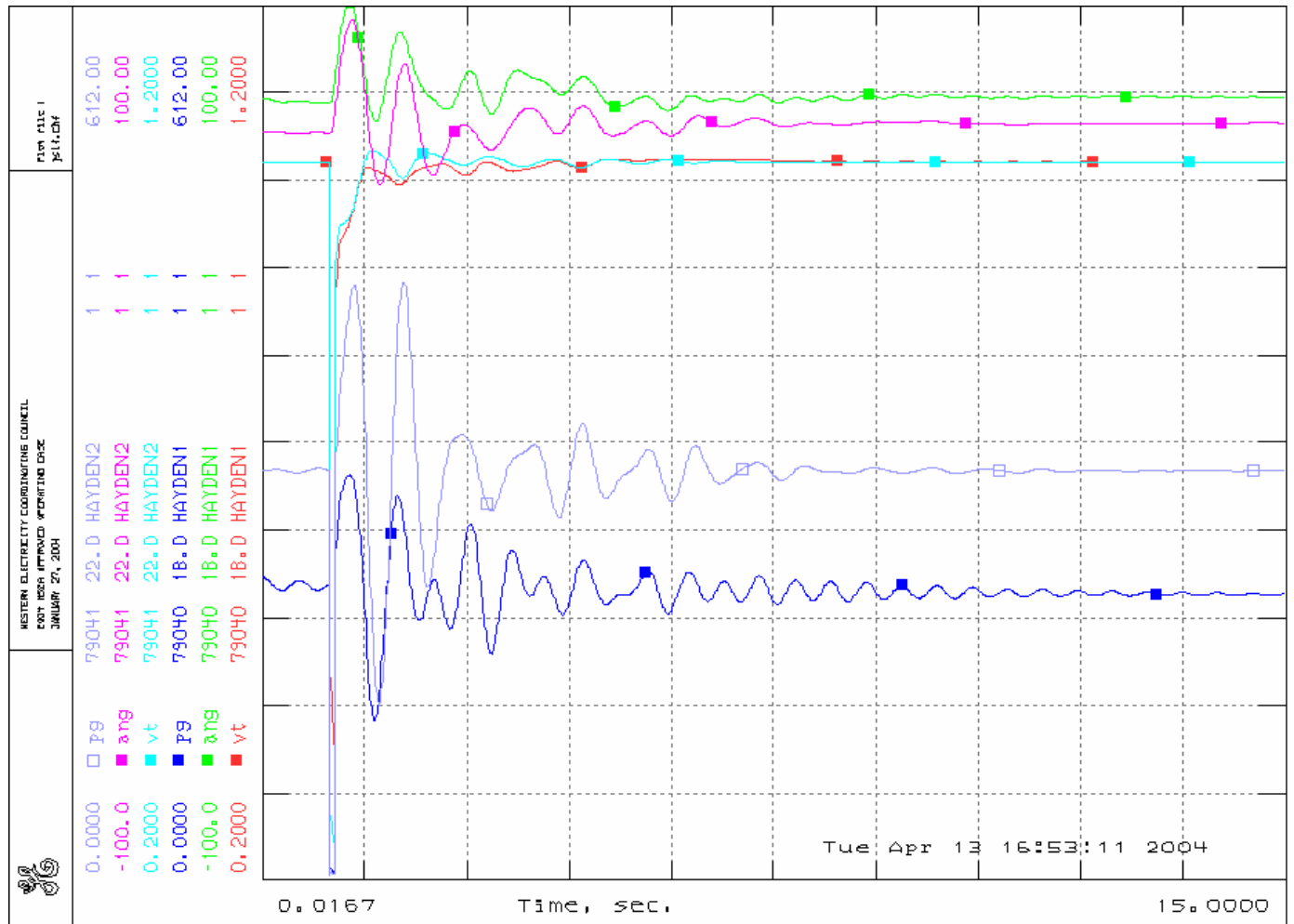
Plot 8: 3-φ Hayden 230 kV Fault and Loss of the Hayden - Archer 230 kV Line



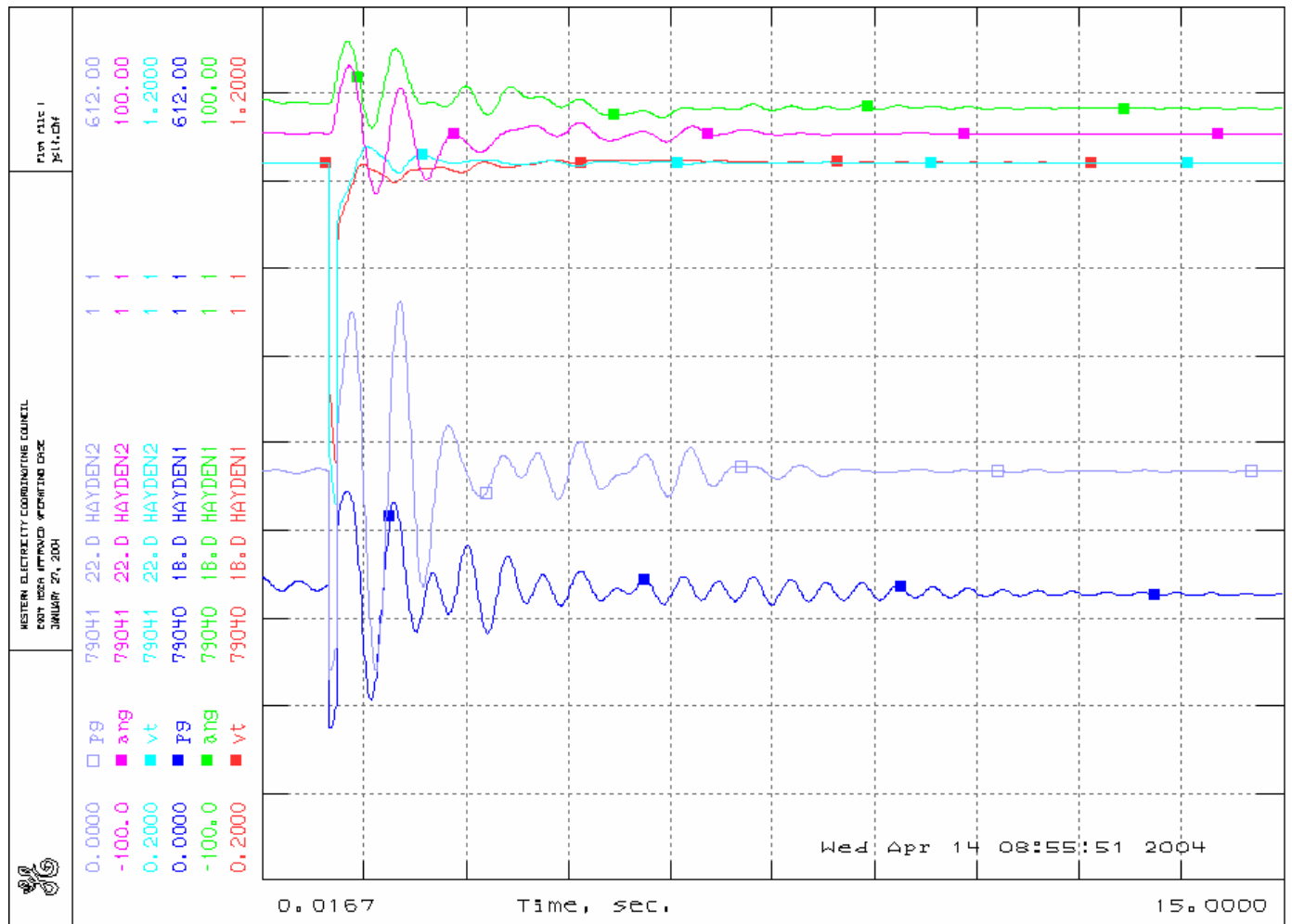
Plot 9: 3- ϕ Hayden 230 kV Fault and Loss of the Hayden - Gore Pass 230 kV Line



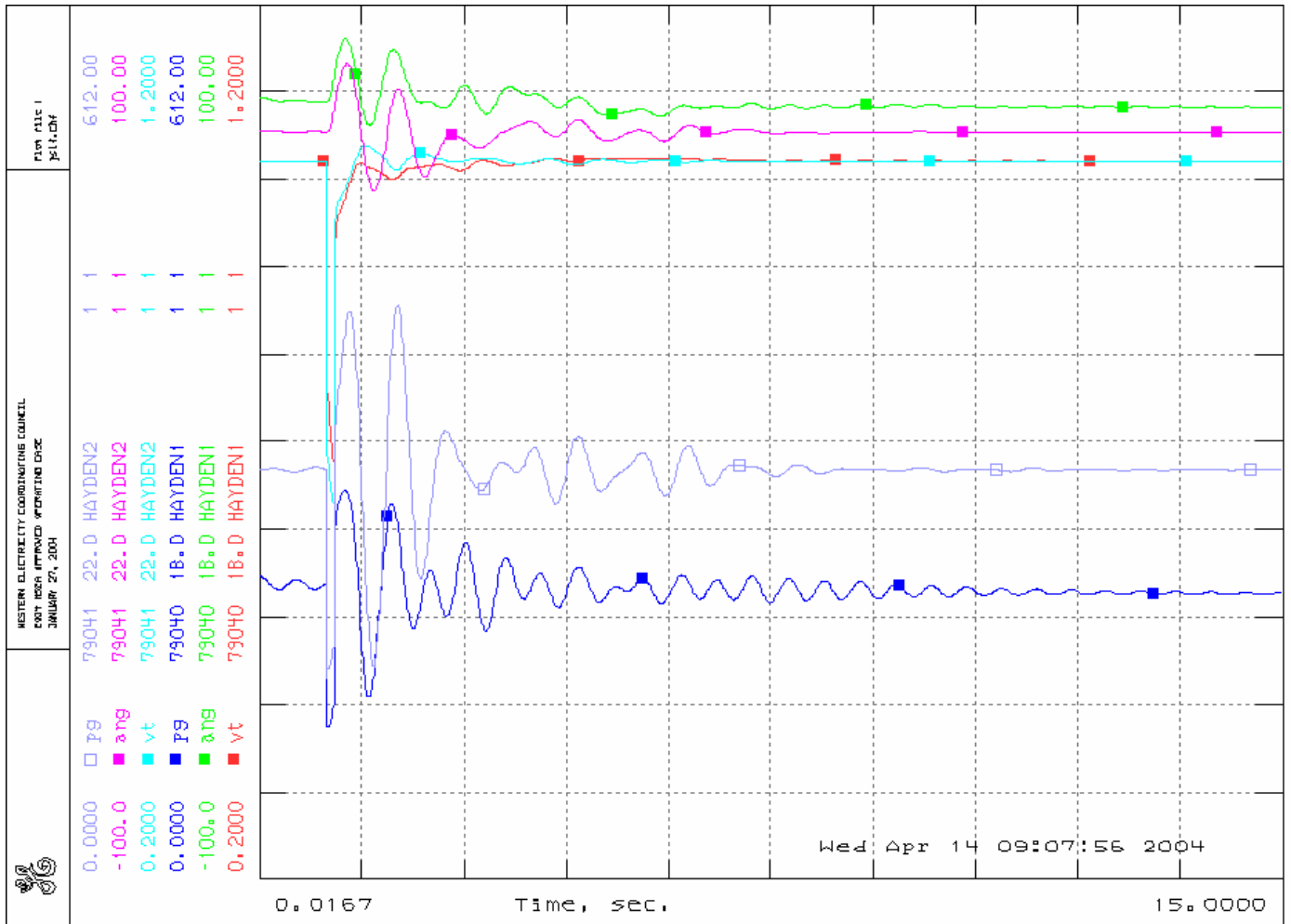
Plot 10: 3- ϕ Hayden 230 kV Fault and Loss of the Hayden - Wolcott 230 kV Line



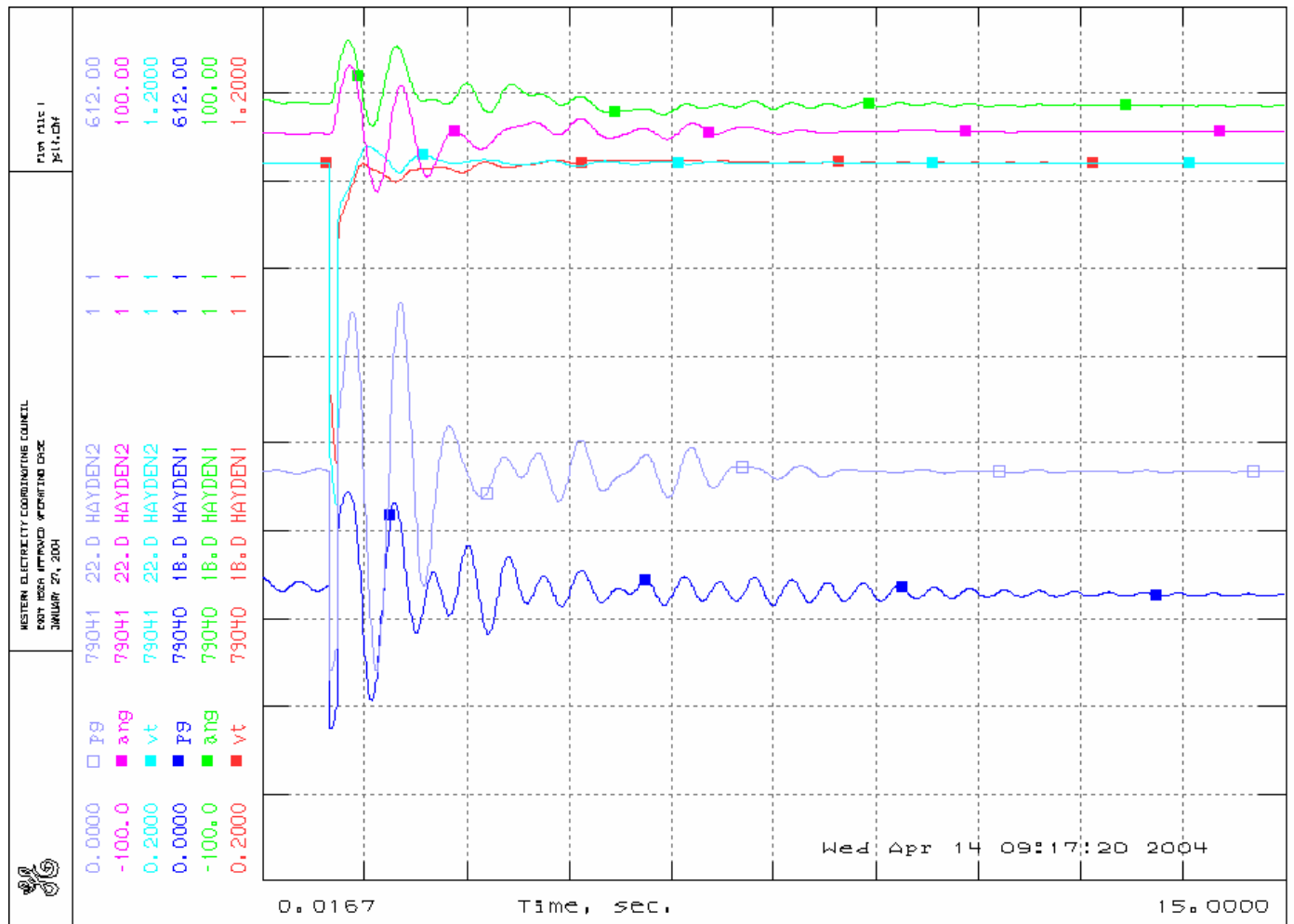
Plot 11: 3- ϕ Hayden 138 kV Fault and Loss of the Hayden - Artesia 138 kV Line



Plot 12: 3- ϕ Hayden 138 kV Fault and Loss of the Hayden - Gore Pass 138 kV Line



Plot 13: 3- ϕ Hayden 138 kV Fault and Loss of the Hayden - Axial Basin 138 kV Line



WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

-NUM-	-----NAME-----	--PNET--	--QNET--	-MVA1-	-MVA2-	-MVA3-	-MVA4-
1	ALBERTA - BRITISH COLUMBIA	-400.1	-51.1	1000.0	-1200.0	0.0	0.0
2	ALBERTA - SASKATCHEWAN	0.1	0.0	150.0	-150.0	0.0	0.0
76	ALTURAS PROJECT	216.6	-35.4	300.0	-300.0	0.0	0.0
21	ARIZONA - CALIFORNIA	4009.6	385.0	5700.0	0.0	0.0	0.0
53	BILLINGS - YELLOWTAIL	-35.7	-9.5	400.0	-400.0	0.0	0.0
33	BONANZA WEST	583.4	-120.2	785.0	0.0	0.0	0.0
17	BORAH WEST	1318.5	-60.8	2307.0	0.0	0.0	0.0
19	BRIDGER WEST	2013.4	326.5	2200.0	0.0	0.0	0.0
55	BROWNLEE EAST	1405.0	-39.4	1750.0	0.0	0.0	0.0
45	CA INDEPENDENT - MEXICO (CFE)	0.7	-16.1	408.0	-408.0	0.0	0.0
80	CENTENNIAL 500KV PROJECT	977.4	46.9	0.0	0.0	0.0	0.0
50	CHOLLA - PINNACLE PEAK	789.3	36.6	1200.0	0.0	0.0	0.0
66	COI	4254.6	-659.7	4800.0	-3675.0	0.0	0.0
54	CORONADO - SILVER KING - KYRENE	605.1	103.5	1100.0	0.0	0.0	0.0
77	CRYSTAL - ALLEN	243.9	-27.7	950.0	0.0	0.0	0.0
59	EAGLE MTN 230/161 KV - BLYTHE 16	-42.9	-3.8	72.0	-72.0	0.0	0.0
49	EAST OF COLORADO RIVER (EOR)	4058.9	214.5	7550.0	0.0	0.0	0.0
62	ELDORADO - MCCULLOUGH 500 KV	754.0	-234.7	2598.0	-2598.0	0.0	0.0
58	ELDORADO - MEAD 230 KV LINES	-72.5	21.4	1140.0	-1140.0	0.0	0.0
23	FOUR CORNERS 345/500	-110.2	-42.3	840.0	-840.0	0.0	0.0
18	IDAHO - MONTANA	-289.9	80.5	337.0	-337.0	0.0	0.0
14	IDAHO - NORTHWEST	-218.3	-311.8	2400.0	-1200.0	0.0	0.0
16	IDAHO - SIERRA	332.1	-42.4	500.0	-360.0	0.0	0.0
42	IID - SCE	294.3	-40.5	600.0	0.0	0.0	0.0
29	INTERMOUNTAIN - GONDER 230 KV	141.2	-42.1	200.0	0.0	0.0	0.0
28	INTERMOUNTAIN - MONA 345 KV	2.9	-35.3	1400.0	-1200.0	0.0	0.0
60	INYO - CONTROL 115 KV TIE	-51.4	5.1	56.0	-56.0	0.0	0.0
27	IPP DC LINE	1647.6	802.5	1920.0	-1400.0	0.0	0.0
61	LUGO - VICTORVILLE 500 KV LINE	1143.1	299.9	1950.0	-900.0	0.0	0.0
64	MARKETPLACE - ADELANTO	553.5	-313.6	1200.0	-1200.0	0.0	0.0
75	MIDPOINT - SUMMER LAKE	217.7	-401.0	1500.0	-400.0	0.0	0.0
15	MIDWAY - LOS BANOS	426.0	130.8	3900.0	0.0	0.0	0.0
8	MONTANA - NORTHWEST	1030.5	-115.3	2200.0	-600.0	0.0	0.0
73	NORTH OF JOHN DAY	6012.3	131.4	7900.0	-7900.0	0.0	0.0

WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

-NUM-	-----NAME-----	--PNET--	--QNET--	-MVA1-	-MVA2-	-MVA3-	-MVA4-
43	NORTH OF SAN ONOFRE	898.0	251.9	2440.0	0.0	0.0	0.0
26	NORTHERN - SOUTHERN CALIFORNIA	2698.2	-66.7	3000.0	-2400.0	0.0	0.0
48	NORTHERN NEW MEXICO (NM2)	1511.8	106.4	1665.0	-1665.0	0.0	0.0
3	NORTHWEST - CANADA	-2300.7	323.3	2000.0	-3150.0	0.0	0.0
65	PACIFIC DC INTERTIE (PDCI)	2002.3	-297.6	3100.0	-3100.0	0.0	0.0
25	PACIFICORP/PG&E 115 KV INTERCON.	74.4	-30.5	80.0	-30.0	0.0	0.0
20	PATH C	-312.7	108.8	1000.0	-1000.0	0.0	0.0
32	PAVANT, INTRMTN - GONDER 230 KV	255.5	-56.6	245.0	-150.0	0.0	0.0
63	PERKINS - MEAD - MARKETPLACE 500	0.5	-126.1	1300.0	0.0	0.0	0.0
24	PG&E - SPP	-15.1	32.2	160.0	-160.0	0.0	0.0
52	SILVER PEAK - CONTROL 55 KV	12.4	-3.3	18.0	-18.0	0.0	0.0
44	SOUTH OF SAN ONOFRE	1252.0	-45.6	1900.0	-200.0	0.0	0.0
51	SOUTHERN NAVAJO	1093.9	112.1	2264.0	0.0	0.0	0.0
47	SOUTHERN NEW MEXICO (NM1)	736.9	-125.9	1048.0	-1048.0	0.0	0.0
22	SOUTHWEST OF FOUR CORNERS	1361.7	-186.4	2325.0	0.0	0.0	0.0
41	SYLMAR - SCE	30.0	23.7	1200.0	-1200.0	0.0	0.0
500	Southern CA Imports	13456.9	-1577.1	0.0	0.0	0.0	0.0
30	TOT 1A	239.6	-55.9	650.0	0.0	0.0	0.0
31	TOT 2A	425.9	-87.4	690.0	0.0	0.0	0.0
34	TOT 2B	-7.6	105.9	780.0	-850.0	0.0	0.0
78	TOT 2B1	109.7	72.9	560.0	-600.0	0.0	0.0
79	TOT 2B2	-117.3	32.9	265.0	-300.0	0.0	0.0
35	TOT 2C	100.8	-57.5	300.0	-300.0	0.0	0.0
36	TOT 3	1200.4	-219.5	1424.0	0.0	0.0	0.0
37	TOT 4A	404.8	-24.6	810.0	0.0	0.0	0.0
38	TOT 4B	8.7	-28.5	680.0	0.0	0.0	0.0
39	TOT 5	662.8	-146.3	1675.0	0.0	0.0	0.0
40	TOT 7	464.1	-212.3	890.0	0.0	0.0	0.0
9	WEST OF BROADVIEW	1989.2	-97.7	2573.0	0.0	0.0	0.0
4	WEST OF CASCADES - NORTH	3094.8	-684.4	9800.0	-9800.0	0.0	0.0
5	WEST OF CASCADES - SOUTH	3425.6	-370.8	7000.0	-7000.0	0.0	0.0
46	WEST OF COLORADO RIVER (WOR)	5830.5	-374.6	10118.0	-10118.0	0.0	0.0
10	WEST OF COLSTRIP	2099.4	67.8	2598.0	0.0	0.0	0.0
11	WEST OF CROSSOVER	2102.3	57.4	2598.0	0.0	0.0	0.0
6	WEST OF HATWAI	1607.2	-369.9	2800.0	0.0	0.0	0.0

WESTERN ELECTRICITY COORDINATING COUNCIL
2004 HS2A APPROVED OPERATING CASE

BUS-NO-	--NAME--	--KV--	TP	VSCHED	-V-PU-	--DEG--	-AR	ZONE	-Vmax-	-Vmin-	YI	MI	DI	YO	MO	DO	OWN
79027	GALLEGOS	115.00	1	1.0176	1.0437	20.71	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79028	GLEN PS	230.00	1	0.9761	1.0039	12.52	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79031	GLENCANY	230.00	1	0.9846	1.0247	9.00	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79032	GLENCANY	345.00	1	0.9906	1.0194	7.64	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79043	KAYENTA	230.00	1	1.0022	1.0431	11.38	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79062	SHIPROCK	115.00	1	1.0139	1.0259	21.28	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79063	SHIPROCK	230.00	1	1.0204	1.0286	21.82	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79064	SHIPROCK	345.00	1	1.0248	1.0251	23.08	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79093	NAVAJO	230.00	1	0.9752	1.0032	14.12	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79095	SHIPROCK	500.00	1	1.0401	1.0251	23.08	19	790	1.1000	0.9000	1	01	50	1	01	50	27
79096	LNGHOUSE	230.00	1	0.9815	0.9780	23.47	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79097	ANIMAS	115.00	1	1.0048	1.0250	21.17	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79098	BERGIN	115.00	1	1.0095	1.0346	20.96	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79100	FOOTHILLS	115.00	1	1.0061	1.0271	21.22	19	791	1.1000	0.9000	1	01	50	1	01	50	4
79101	FRUITAP	115.00	1	1.0119	1.0261	21.27	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79102	FRUITLND	115.00	1	1.0119	1.0261	21.27	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79105	GLADETAP	115.00	1	1.0035	1.0210	21.88	19	791	1.1000	0.9000	1	01	50	1	01	50	4
79106	HOODMESA	115.00	1	1.0061	1.0259	21.26	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79109	LAPLATA	115.00	1	1.0033	1.0204	21.82	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79112	MESA FM	115.00	1	1.0065	1.0245	21.12	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79113	NAVAJO	115.00	1	1.0095	1.0346	20.79	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79114	SAN JUAN	115.00	1	1.0095	1.0346	20.79	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79116	SULLIVAN	115.00	1	1.0057	1.0257	21.23	19	790	1.1000	0.9000	1	01	50	1	01	50	4
79150	GLENC1-2	13.80	2	1.0200	1.0200	15.73	19	790	1.1000	0.9000	1	01	50	1	01	50	50
79151	GLENC3-4	13.80	2	1.0000	1.0000	15.68	19	790	1.1000	0.9000	1	01	50	1	01	50	50
79152	GLENC5-6	13.80	2	1.0000	1.0000	15.73	19	790	1.1000	0.9000	1	01	50	1	01	50	50
79153	GLENC7-8	13.80	2	1.0000	1.0000	12.54	19	790	1.1000	0.9000	1	01	50	1	01	50	50
79001	ARTESIA	138.00	1	1.0100	1.0193	60.67	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79002	AXIAL	138.00	1	1.0000	1.0050	59.74	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79005	BEARS	345.00	1	1.0325	1.0301	65.28	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79007	BLUEMESA	115.00	1	1.0000	1.0000	47.69	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79008	GRANGER	69.00	1	1.0000	1.0279	63.99	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79009	LYMAN SW	69.00	1	1.0000	1.0171	62.34	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79010	MANILA	69.00	1	1.0000	0.9970	59.97	73	790	1.1000	0.9000	1	01	50	1	01	50	27

WESTERN ELECTRICITY COORDINATING COUNCIL
2004 HS2A APPROVED OPERATING CASE

BUS-NO-	--NAME--	--KV--	TP	VSCHED	-V-PU-	--DEG-	-AR	ZONE	-Vmax-	-Vmin-	YI	MI	DI	YO	MO	DO	OWN
79011	CAHONE	115.00	1	0.9800	1.0044	29.78	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79012	CORTEZ	115.00	1	0.9900	1.0108	27.80	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79013	CRAIG	230.00	1	1.0250	1.0250	66.78	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79014	CRAIG	345.00	1	1.0300	1.0300	65.32	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79015	CRAIG 1	22.00	2	1.0200	1.0294	73.41	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79016	CRAIG 2	22.00	2	1.0400	1.0294	73.41	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79017	CRAIG 3	22.00	2	1.0300	1.0369	72.52	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79019	MORRO1-2	12.50	2	1.0000	1.0000	53.15	73	790	1.1000	0.9000	1	01	50	1	01	50	50
79020	CURECANT	115.00	1	1.0250	0.9977	46.27	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79021	CURECANT	230.00	1	0.9900	1.0010	45.74	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79023	DURANGO	115.00	1	1.0050	1.0126	23.74	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79026	FLAMGORG	138.00	1	1.0000	1.0110	61.89	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79029	FLAMGORG	69.00	1	1.0000	0.9845	58.79	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79030	FONTNLLLE	69.00	1	1.0000	1.0387	66.20	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79036	GRANDJCT	345.00	1	0.9800	0.9891	47.61	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79037	GUNNISON	115.00	1	0.9900	1.0028	45.80	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79038	HAYDEN	138.00	1	1.0150	1.0213	63.75	73	791	1.1000	0.9000	1	01	50	1	01	50	26
79039	HAYDEN	230.00	1	1.0000	1.0186	65.33	73	791	1.1000	0.9000	1	01	50	1	01	50	26
79040	HAYDEN1	18.00	2	1.0200	1.0200	72.46	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79041	HAYDEN2	22.00	2	1.0200	1.0200	70.66	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79042	HOTCHKIS	115.00	1	0.9800	0.9880	45.69	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79044	LOSTCANY	115.00	1	1.0150	1.0161	27.93	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79045	LOSTCANY	230.00	1	0.9900	1.0088	30.52	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79046	MEEKER	138.00	1	1.0000	0.9998	57.55	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79048	MONTROSE	115.00	1	1.0150	0.9882	42.46	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79049	MONTROSE	345.00	1	0.9800	0.9992	41.46	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79050	NORTHFRK	115.00	1	0.9800	0.9932	46.88	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79052	NUCLA	115.00	1	0.9900	1.0062	38.54	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79054	PONCHABR	230.00	1	1.0000	1.0100	42.92	73	791	1.1000	0.9000	1	01	50	1	01	50	26
79059	RIFLE WA	230.00	1	1.0000	0.9934	54.46	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79060	SANJN PS	345.00	1	1.0000	1.0188	25.01	73	790	1.1000	0.9000	1	01	50	1	01	50	65
79061	SHIP PS	230.00	1	1.0100	1.0211	23.78	73	790	1.1000	0.9000	1	01	50	1	01	50	65
79067	VERNAL	138.00	1	1.0100	1.0181	60.65	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79070	NORTHFRK	230.00	1	0.9900	0.9943	47.53	73	790	1.1000	0.9000	1	01	50	1	01	50	73

WESTERN ELECTRICITY COORDINATING COUNCIL
2004 HS2A APPROVED OPERATING CASE

BUS-NO-	--NAME--	--KV--	TP	VSCHED	-V-PU-	--DEG-	-AR	ZONE	-Vmax-	-Vmin-	YI	MI	DI	YO	MO	DO	OWN
79071	HESPERUS	115.00	1	1.0150	1.0272	25.38	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79072	HESPERUS	345.00	1	0.9800	1.0092	28.71	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79073	BLUEDOOR	115.00	1	0.9900	1.0111	27.75	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79074	E.CORTEZ	115.00	1	1.0000	1.0125	27.76	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79075	EMPIRETS	115.00	1	0.9900	1.0117	28.11	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79076	AM EAST	115.00	1	0.9900	0.9923	21.58	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79077	BAYFIELD	115.00	1	1.0150	0.9981	21.94	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79078	BODO	115.00	1	0.9900	1.0128	23.77	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79079	BULLOCK	115.00	1	0.9700	0.9841	42.29	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79080	CASCADEL	115.00	1	1.0150	1.0116	28.86	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79081	CRSTBUTT	115.00	1	0.9800	0.9958	45.12	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79082	HAPPYCAN	115.00	1	0.9700	0.9852	42.30	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79083	JUANITA	115.00	1	0.9700	0.9834	46.04	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79084	LAKECITY	115.00	1	0.9900	0.9993	47.38	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79085	NORTHMSA	115.00	1	0.9700	0.9839	42.68	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79086	PAGOSA	115.00	1	1.0150	1.0047	20.40	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79088	ROCKWOOD	115.00	1	0.9700	1.0155	27.71	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79089	SHENDOAH	115.00	1	0.9900	1.0125	24.50	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79090	SKITO	115.00	1	0.9900	1.0025	45.83	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79099	FLOR.RIV	115.00	1	1.0150	0.9920	21.62	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79103	GARNET M	115.00	1	0.9700	0.9756	43.42	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79104	GARNETAP	115.00	1	0.9700	0.9805	43.85	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79107	HOVEN NO	115.00	1	0.9900	1.0046	28.69	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79108	HOVENWEP	115.00	1	0.9900	0.9992	26.95	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79110	MAIN CO	115.00	1	1.0150	1.0052	27.79	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79111	MANCOSTP	115.00	1	1.0000	1.0138	26.36	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79115	SPRCKTAP	115.00	1	0.9700	0.9854	42.47	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79117	Y.JACK 2	115.00	1	0.9900	1.0043	28.69	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79118	Y.JACK W	115.00	1	0.9900	1.0038	27.99	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79120	MOQUI C	115.00	1	0.9900	1.0044	27.73	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79121	SANDCANY	115.00	1	0.9900	1.0023	27.44	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79122	TOWAOC	115.00	1	1.0000	1.0118	27.97	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79123	FONTNLE	4.20	2	1.0200	1.0272	68.51	73	790	1.1000	0.9000	1	01	50	1	01	50	50
79154	FLGORG1	12.50	2	1.0000	1.0000	67.16	73	790	1.1000	0.9000	1	01	50	1	01	50	50

WESTERN ELECTRICITY COORDINATING COUNCIL
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BUS-NO-	--NAME--	--KV--	TP	VSCHED	-V-PU-	--DEG-	-AR	ZONE	-Vmax-	-Vmin-	YI	MI	DI	YO	MO	DO	OWN
79155	FLGORG2	12.50	2	1.0000	1.0000	67.16	73	790	1.1000	0.9000	1	01	50	1	01	50	50
79156	FLGORG3	12.50	2	1.0000	1.0000	67.16	73	790	1.1000	0.9000	1	01	50	1	01	50	50
79157	BMESA1-2	12.50	2	0.9800	0.9857	52.82	73	790	1.1000	0.9000	1	01	50	1	01	50	50
79158	NUCLA 1	13.80	2	1.0000	1.0062	38.54	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79159	NUCLA 2	13.80	2	1.0000	1.0000	38.56	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79160	NUCLA 3	13.80	2	1.0000	1.0000	42.83	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79161	NUCLA 4	13.80	2	1.0000	1.0000	42.54	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79162	CRYSTAL	12.50	2	1.0000	1.0000	51.31	73	790	1.1000	0.9000	1	01	50	1	01	50	50
79163	MORROWPT	230.00	1	1.0000	1.0012	45.98	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79166	MOLINA-L	4.20	2	1.0200	1.0070	51.62	73	790	1.1000	0.9000	1	01	50	1	01	50	50
79172	MOLINA-U	4.20	2	1.0200	1.0200	53.64	73	790	1.1000	0.9000	1	01	50	1	01	50	50
79174	MOLINA-L	115.00	1	0.9900	1.0012	51.49	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79175	MOLINA-U	115.00	1	0.9900	1.0019	51.53	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79176	MCPHEE	2.40	2	1.0000	1.0295	31.95	73	790	1.1000	0.9000	1	01	50	1	01	50	50
79177	MCPHEE	12.47	1	0.9800	1.0268	30.12	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79179	GRT CUT	115.00	1	0.9800	1.0117	28.24	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79180	GRCUT TP	115.00	1	0.9800	1.0116	28.23	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79191	COYOTE G	115.00	1	1.0000	1.0183	22.43	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79192	SOCANAL	115.00	1	0.9800	0.9924	44.09	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79250	AMATLAS	230.00	1	1.0100	0.9938	54.53	73	790	1.1000	0.9000	1	01	50	1	01	50	65
79251	QFATLAS1	13.80	2	1.0000	1.0000	61.72	73	790	1.1000	0.9000	1	01	50	1	01	50	65
79252	QFATLAS2	13.80	2	1.0000	1.0000	54.53	73	790	1.1000	0.9000	1	01	50	1	01	50	65
79253	CRYSTAL	115.00	1	1.0000	1.0002	47.04	73	790	1.1000	0.9000	1	01	50	1	01	50	26
79260	ELPASOTP	115.00	1	1.0000	1.0187	22.37	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79190	DALLASCR	115.00	1	0.9800	0.9935	44.08	73	791	1.1000	0.9000	1	01	50	1	01	50	26
79187	NORWOOD	115.00	1	1.0000	1.0057	36.40	73	791	1.1000	0.9000	1	01	50	1	01	50	27
79257	AMES	115.00	1	0.9800	1.0065	32.15	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79194	BURROBDG	115.00	1	0.9500	1.0080	31.17	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79262	CEMNT CK	115.00	1	0.9600	1.0088	30.65	73	791	1.1000	0.9000	1	01	50	1	01	50	73
79178	GRT CUT	12.47	1	0.9800	1.0139	28.74	73	790	1.1000	0.9000	1	01	50	1	01	50	27
79193	MCKENZIX	115.00	1	1.0000	0.9933	44.08	73	790	1.1000	0.9000	1	01	50	1	01	50	65
79256	SILVERTN	115.00	1	0.9800	1.0088	30.65	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79189	SUNSH SM	115.00	1	0.9500	1.0060	32.43	73	790	1.1000	0.9000	1	01	50	1	01	50	73
79188	TELLURID	115.00	1	1.0000	0.9955	31.11	73	791	1.1000	0.9000	1	01	50	1	01	50	27

WESTERN ELECTRICITY COORDINATING COUNCIL

2004 HS2A APPROVED OPERATING CASE

BUS-NO-	--NAME--	--KV--	TP	VSCHED	-V-PU-	--DEG-	-AR	ZONE	-Vmax-	-Vmin-	YI	MI	DI	YO	MO	DO	OWN
79164	TOWAOC	6.90	2	1.0000	1.0000	31.90	73	790	1.1000	0.9000	1	01	50	1	01	50	50
73506	LAPORTAP	115.00	1	1.0000	1.0131	50.11	73	791	1.1000	0.9000	1	01	50	1	01	50	93
73551	W CANON	230.00	1	1.0000	1.0201	45.26	73	791	1.1000	0.9000	1	01	50	1	01	50	73

WESTERN ELECTRICITY COORDINATING COUNCIL
2004 HS2A APPROVED OPERATING CASE

BUS-NO-	--NAME--	--KV--	ID	ST	-PLOAD-	-QLOAD-	-IPLD-	-IQLOD-	-GLOAD-	-BLOAD-	-AR	ZON	-PMOTR-	-QMOTR-	YI	MI	DI	YO	MO	DO	OWN
79076	AM EAST	115.00	TS	1	8.20	2.70	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79097	ANIMAS	115.00	WA	1	6.00	2.00	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79002	AXIAL	138.00	TS	1	12.26	4.03	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79077	BAYFIELD	115.00	TS	1	17.06	5.61	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79098	BERGIN	115.00	WA	1	0.00	0.00	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79073	BLUEDOOR	115.00	TS	1	4.93	1.62	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79078	BODO	115.00	TS	1	45.62	15.01	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79079	BULLOCK	115.00	TS	1	21.26	6.99	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79011	CAHONE	115.00	TS	1	4.27	1.40	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79080	CASCADEL	115.00	TS	1	4.90	1.61	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79012	CORTEZ	115.00	TS	1	6.29	2.07	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79191	COYOTE G	115.00	TS	1	1.23	0.41	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79013	CRAIG	230.00	PS	1	20.40	6.71	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	65
79013	CRAIG	230.00	WA	1	0.90	0.30	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	26
79081	CRSTBUTT	115.00	TS	1	8.78	2.89	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79020	CURECANT	115.00	TS	1	0.42	0.14	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79074	E.CORTEZ	115.00	TS	1	6.84	2.25	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79075	EMPIRETS	115.00	TS	1	7.83	2.58	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79029	FLAMGORG	69.00	DG	1	22.00	7.24	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	58
79099	FLOR.RIV	115.00	TS	1	73.81	24.28	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79100	FOOTHILS	115.00	WA	1	0.00	0.00	0.00	0.00	0.00	0.00	19	791	0.00	0.00	1	01	50	1	01	50	4
79103	GARNET M	115.00	TS	1	22.38	7.36	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79031	GLENCANY	230.00	UN	1	25.00	8.30	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79032	GLENCANY	345.00	DG	1	16.00	5.30	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79082	HAPPYCAN	115.00	TS	1	15.15	4.98	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79038	HAYDEN	138.00	WA	1	0.50	0.17	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	26
79042	HOTCHKIS	115.00	TS	1	5.63	1.85	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79108	HOVENWEP	115.00	TS	1	13.86	4.56	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79083	JUANITA	115.00	TS	1	27.17	8.94	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79043	KAYENTA	230.00	WA	1	29.80	9.80	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79084	LAKECITY	115.00	TS	1	2.70	0.89	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79109	LAPLATA	115.00	WA	1	3.00	1.00	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79096	LNGHOUSE	230.00	WA	1	26.20	8.60	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79111	MANCOSTP	115.00	TS	1	2.56	0.84	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73

WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

BUS-NO-	--NAME--	--KV--	ID	ST	-PLOAD-	-QLOAD-	-IPLD-	-IQLOD-	-GLOAD-	-BLOAD-	-AR	ZON	-PMOTR-	-QMOTR-	YI	MI	DI	YO	MO	DO	OWN
79046	MEEKER	138.00	TS	1	17.92	5.90	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79112	MESA FM	115.00	WA	1	6.00	2.00	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79120	MOQUI C	115.00	TS	1	2.64	0.87	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79093	NAVAJO	230.00	AP	1	0.00	0.00	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79085	NORTHMSA	115.00	TS	1	4.68	1.54	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79052	NUCLA	115.00	TS	1	4.93	1.62	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79086	PAGOSA	115.00	TS	1	9.73	3.20	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79088	ROCKWOOD	115.00	TS	1	2.50	0.82	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79114	SAN JUAN	115.00	WA	1	2.00	0.70	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79121	SANDCANY	115.00	TS	1	2.64	0.87	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79089	SHENDOAH	115.00	TS	1	2.96	0.97	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79062	SHIPROCK	115.00	WA	1	20.00	6.60	0.00	0.00	0.00	0.00	19	790	0.00	0.00	1	01	50	1	01	50	1
79090	SKITO	115.00	TS	1	4.66	1.53	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
79192	SOCANAL	115.00	TS	1	1.79	0.59	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79188	TELLURID	115.00	TS	1	9.05	2.98	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	73
79067	VERNAL	138.00	DG	1	4.00	1.32	0.00	0.00	0.00	0.00	73	790	0.00	0.00	1	01	50	1	01	50	58
79118	Y.JACK W	115.00	TS	1	13.86	4.56	0.00	0.00	0.00	0.00	73	791	0.00	0.00	1	01	50	1	01	50	73
TOTAL LOADS					572.3	188.5															

WESTERN ELECTRICITY COORDINATING COUNCIL
2004 HS2A APPROVED OPERATING CASE

BUS-NO-	--NAME--	--KV--	ID	ST	-PGEN-	-PMAX-	-QGEN-	-QMAX-	-QMIN-	--IREG--	--NAME--	--KV--	-G	-B	-TT	-A	-D	-QRF	-VSCHED	-V-ACT-	AR
79157	BMESA1-2	12.50	1	1	40.0	43.2	-5.9	19.0	-11.5	79007	BLUEMESA	115.00	0	0	0	0	1	0.50	1.0000	1.0000	73
79157	BMESA1-2	12.50	2	1	20.0	43.2	-2.9	19.0	-11.5	79007	BLUEMESA	115.00	0	0	0	0	1	0.50	1.0000	1.0000	73
79015	CRAIG 1	22.00	1	1	428.0	428.0	38.6	216.0	-216.0	79013	CRAIG	230.00	0	0	0	0	1	0.50	1.0250	1.0250	73
79016	CRAIG 2	22.00	1	1	428.0	428.0	38.6	216.0	-216.0	79013	CRAIG	230.00	0	0	0	0	1	0.50	1.0250	1.0250	73
79017	CRAIG 3	22.00	1	1	458.0	458.0	45.2	216.0	-216.0	79014	CRAIG	345.00	0	0	0	0	1	1.00	1.0300	1.0300	73
79162	CRYSTAL	12.50	1	1	20.8	27.5	-0.2	5.0	-2.4	79162	CRYSTAL	12.50	0	0	0	0	1	1.00	1.0000	1.0000	73
79154	FLGORG1	12.50	1	1	40.0	50.0	-4.3	22.8	-16.0	79154	FLGORG1	12.50	0	0	0	0	1	1.00	1.0000	1.0000	73
79155	FLGORG2	12.50	1	1	40.0	50.0	-4.3	20.5	-21.6	79155	FLGORG2	12.50	0	0	0	0	1	1.00	1.0000	1.0000	73
79156	FLGORG3	12.50	1	1	40.0	50.0	-4.3	22.0	-20.9	79156	FLGORG3	12.50	0	0	0	0	1	1.00	1.0000	1.0000	73
79123	FONTNLE	4.20	1	1	6.0	10.0	-2.0	4.0	-2.0	79123	FONTNLE	4.20	0	0	0	0	1	1.00	1.0200	1.0272	73
79150	GLENC1-2	13.80	2	1	130.0	165.0	7.2	46.0	-42.0	79150	GLENC1-2	13.80	0	0	0	0	0	1.00	1.0200	1.0200	19
79150	GLENC1-2	13.80	1	1	130.0	165.0	7.2	52.0	-45.0	79150	GLENC1-2	13.80	0	0	0	0	0	1.00	1.0200	1.0200	19
79151	GLENC3-4	13.80	4	1	130.0	165.0	-11.2	44.0	-42.0	79151	GLENC3-4	13.80	0	0	0	0	0	1.00	1.0000	1.0000	19
79151	GLENC3-4	13.80	3	1	130.0	165.0	-11.2	48.0	-48.0	79151	GLENC3-4	13.80	0	0	0	0	0	1.00	1.0000	1.0000	19
79152	GLENC5-6	13.80	6	1	130.0	165.0	-11.1	50.0	-46.0	79152	GLENC5-6	13.80	0	0	0	0	0	1.00	1.0000	1.0000	19
79152	GLENC5-6	13.80	5	1	130.0	165.0	-11.1	50.0	-48.0	79152	GLENC5-6	13.80	0	0	0	0	0	1.00	1.0000	1.0000	19
79153	GLENC7-8	13.80	7	1	0.0	157.0	-28.2	42.0	-37.0	79153	GLENC7-8	13.80	0	0	0	0	0	1.00	1.0000	1.0000	19
79153	GLENC7-8	13.80	8	1	130.0	157.0	-22.2	50.0	-45.0	79153	GLENC7-8	13.80	0	0	0	0	0	1.00	1.0000	1.0000	19
79040	HAYDEN1	18.00	1	1	212.0	212.0	13.3	70.0	-70.0	79040	HAYDEN1	18.00	0	0	0	0	1	1.00	1.0200	1.0200	73
79041	HAYDEN2	22.00	1	1	286.0	286.0	9.8	130.0	-130.0	79041	HAYDEN2	22.00	0	0	0	0	1	1.00	1.0200	1.0200	73
79176	MCPHEE	2.40	1	1	1.0	1.3	0.0	0.0	0.0	79176	MCPHEE	2.40	0	0	0	0	1	1.00	1.0000	1.0295	73
79166	MOLINA-L	4.20	1	1	3.0	4.9	2.3	2.3	-1.2	79166	MOLINA-L	4.20	0	0	0	0	1	1.00	1.0200	1.0070	73
79172	MOLINA-U	4.20	1	1	6.0	8.6	2.6	4.1	-2.0	79172	MOLINA-U	4.20	0	0	0	0	1	1.00	1.0200	1.0200	73
79019	MORRO1-2	12.50	1	1	75.0	80.0	4.0	42.0	-38.0	79019	MORRO1-2	12.50	0	0	0	0	1	1.00	1.0000	1.0000	73
79019	MORRO1-2	12.50	2	1	75.0	80.0	4.0	42.0	-38.0	79019	MORRO1-2	12.50	0	0	0	0	1	1.00	1.0000	1.0000	73
79158	NUCLA 1	13.80	1	0	0.0	15.0	0.9	13.8	-13.8	79158	NUCLA 1	13.80	0	0	0	0	1	1.00	1.0000	1.0062	73
79159	NUCLA 2	13.80	1	1	0.0	15.0	-1.0	13.8	-13.8	79159	NUCLA 2	13.80	0	1	0	0	1	1.00	1.0000	1.0000	73
79160	NUCLA 3	13.80	1	1	12.0	15.0	-1.1	13.8	-13.8	79160	NUCLA 3	13.80	0	1	0	0	1	1.00	1.0000	1.0000	73
79161	NUCLA 4	13.80	1	1	60.0	70.0	-3.2	34.2	-34.2	79161	NUCLA 4	13.80	0	1	0	0	1	1.00	1.0000	1.0000	73
79251	QFATLAS1	13.80	1	1	21.0	33.0	2.2	22.0	-22.0	79251	QFATLAS1	13.80	0	1	0	0	1	1.00	1.0000	1.0000	73
79251	QFATLAS1	13.80	2	1	16.0	18.0	1.7	11.0	-11.0	79251	QFATLAS1	13.80	0	1	0	0	1	1.00	1.0000	1.0000	73
79252	QFATLAS2	13.80	3	1	0.0	18.0	1.8	11.0	-11.0	79252	QFATLAS2	13.80	0	1	0	0	1	1.00	1.0000	1.0000	73
79252	QFATLAS2	13.80	4	0	0.0	18.0	1.3	11.0	-11.0	79252	QFATLAS2	13.80	0	0	0	0	1	1.00	1.0000	1.0000	73
79164	TOWAOC	6.90	1	1	8.0	12.0	-1.9	4.3	-6.3	79164	TOWAOC	6.90	0	0	0	0	1	1.00	1.0000	1.0000	73

WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	ID	CK	SE	ST	--G-PU--	--B-PU--	-VSCHED	-V-ACT-	-AR	ZON	YI	MI	DI	YO	MO	DO	OWN
73012	AULT	345.0	79014	CRAIG	345.0	t1	1	1	1	0.0000	0.5000	1.0100	1.0158	73	791	40	01	1	39	12	31	46
79014	CRAIG	345.0	79058	RIFLE	345.0	t1	1	1	1	0.0000	-0.2500	1.0300	1.0300	73	791	40	01	1	39	12	31	1
79031	GLENCANY	230.0	0		0.0	c4		0	1	0.0000	0.5500	0.9846	1.0247	19	790	40	01	1	39	12	31	4
79031	GLENCANY	230.0	0		0.0	c3		0	1	0.0000	0.5500	0.9846	1.0247	19	790	40	01	1	39	12	31	4
79031	GLENCANY	230.0	0		0.0	c1		0	0	0.0000	0.5500	0.9846	1.0247	19	790	40	01	1	39	12	31	4
79031	GLENCANY	230.0	0		0.0	c2		0	1	0.0000	0.5500	0.9846	1.0247	19	790	40	01	1	39	12	31	4
79036	GRANDJCT	345.0	79058	RIFLE	345.0	t1	1	1	1	0.0000	-0.3000	0.9800	0.9891	73	790	40	01	1	39	12	31	1
79049	MONTROSE	345.0	79072	HESPERUS	345.0	f1	1	1	1	0.0000	0.3000	0.9800	0.9992	73	790	40	01	1	39	12	31	1
79049	MONTROSE	345.0	79072	HESPERUS	345.0	t1	1	1	1	0.0000	0.3000	0.9800	0.9992	73	790	40	01	1	39	12	31	1
79095	SHIPROCK	500.0	14002	MOENKOPI	500.0	f	1	1	0	0.0000	-1.1300	1.0401	1.0251	19	790	40	01	1	39	12	31	4
79095	SHIPROCK	500.0	14002	MOENKOPI	500.0	f	1	2	0	0.0009	0.0000	1.0401	1.0251	19	790	40	01	1	39	12	31	1
79095	SHIPROCK	500.0	14002	MOENKOPI	500.0	t	1	2	0	0.0009	0.0000	1.0401	1.0251	19	790	40	01	1	39	12	31	4

WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

--Bus--	--Name--	--kv--	ID	ST	Typ	--Reg--	--Name--	--kv--	-AR	ZONE	-vsch-	-vact-	vband	-bact-	-bmin-	-bmax-	-n	-bstp	-n	-bstp	-n	-bstp	-n
79077	BAYFIELD	115.0	1	1	4	79077	BAYFIELD	115.0	73	791	1.0150	0.9981	0.025	0.000	0.000	0.000	1	0.08	1	0.08	0	0.00	0
79080	CASCADEL	115.0	1	1	4	79080	CASCADEL	115.0	73	791	1.0150	1.0116	0.025	0.000	0.000	0.000	1	0.08	1	0.08	1	0.15	0
79086	PAGOSA	115.0	1	1	4	79086	PAGOSA	115.0	73	791	1.0150	1.0047	0.025	0.075	0.000	0.000	1	0.08	1	0.08	1	0.08	0
79099	FLOR.RIV	115.0	1	1	4	79099	FLOR.RIV	115.0	73	791	1.0150	0.9920	0.025	0.000	0.000	0.000	1	0.08	1	0.08	1	0.08	0
79110	MAIN CO	115.0	1	1	4	79110	MAIN CO	115.0	73	791	1.0150	1.0052	0.025	0.000	0.000	0.000	1	0.08	1	0.08	1	0.08	0

WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	(-R--PU-	---X-PU)	--B-PU-	-MVA1-	-MVA2-	-MVA3-	-MVA4-
79076	AM EAST	115.0	79077	BAYFIELD	115.0	1	1	1	0.0213	0.1192	0.0117	128.0	0.0	0.0	0.0
79076	AM EAST	115.0	79099	FLOR.RIV	115.0	1	1	1	0.0040	0.0222	0.0031	128.0	0.0	0.0	0.0
79097	ANIMAS	115.0	79112	MESA FM	115.0	1	1	1	0.0109	0.0381	0.0049	76.7	77.0	76.7	77.0
79097	ANIMAS	115.0	79116	SULLIVAN	115.0	1	1	1	0.0048	0.0127	0.0015	59.8	60.0	59.8	60.0
73009	ARCHER	230.0	79039	HAYDEN	230.0	1	1	1	0.0219	0.2367	0.4472	320.0	0.0	0.0	0.0
79001	ARTESIA	138.0	66278	RANGELY	138.0	1	1	1	0.0234	0.0873	0.0220	115.0	160.0	0.0	0.0
79001	ARTESIA	138.0	79038	HAYDEN	138.0	1	1	1	0.1015	0.4303	0.1175	146.0	0.0	0.0	0.0
79001	ARTESIA	138.0	79067	VERNAL	138.0	1	1	1	0.0240	0.0966	0.0247	146.0	0.0	0.0	0.0
73012	AULT	345.0	79014	CRAIG	345.0	1	1	1	0.0061	0.0927	1.4628	956.0	0.0	0.0	0.0
79002	AXIAL	138.0	79038	HAYDEN	138.0	1	1	1	0.0368	0.1540	0.0393	124.0	0.0	0.0	0.0
79002	AXIAL	138.0	79046	MEEKER	138.0	1	1	1	0.0265	0.1109	0.0283	124.0	0.0	0.0	0.0
79077	BAYFIELD	115.0	79086	PAGOSA	115.0	1	1	1	0.0690	0.2369	0.0282	85.0	0.0	0.0	0.0
79005	BEARS	345.0	65193	BONANZA	345.0	1	1	1	0.0027	0.0515	0.9077	896.0	0.0	0.0	0.0
79005	BEARS	345.0	79014	CRAIG	345.0	1	1	1	0.0000	0.0003	0.0039	1727.0	0.0	0.0	0.0
79098	BERGIN	115.0	79114	SAN JUAN	115.0	1	1	1	0.0364	0.1473	0.0204	100.6	100.0	100.6	100.0
79098	BERGIN	115.0	79100	FOOTHILLS	115.0	1	1	1	0.0139	0.0799	0.0111	100.6	100.0	100.6	100.0
79073	BLUEDOOR	115.0	79074	E.CORTEZ	115.0	1	1	1	0.0093	0.0329	0.0045	146.0	0.0	0.0	0.0
79007	BLUEMESA	115.0	79020	CURECANT	115.0	1	1	1	0.0177	0.0694	0.0089	100.0	0.0	0.0	0.0
79007	BLUEMESA	115.0	79084	LAKECITY	115.0	1	1	1	0.0466	0.1954	0.0240	80.0	0.0	0.0	0.0
79007	BLUEMESA	115.0	79090	SKITO	115.0	1	1	1	0.0298	0.1350	0.0179	100.0	0.0	0.0	0.0
79079	BULLOCK	115.0	79115	SPRCKTAP	115.0	1	1	1	0.0059	0.0176	0.0022	85.0	0.0	0.0	0.0
79079	BULLOCK	115.0	79082	HAPPYCAN	115.0	1	1	1	0.0052	0.0154	0.0019	85.0	0.0	0.0	0.0
79194	BURROBDG	115.0	79257	AMES	115.0	1	1	1	0.0148	0.0520	0.0066	146.0	146.0	146.0	0.0
79194	BURROBDG	115.0	79256	SILVERTN	115.0	1	1	1	0.0077	0.0272	0.0035	146.0	146.0	146.0	0.0
79011	CAHONE	115.0	79117	Y.JACK 2	115.0	1	1	1	0.0113	0.0726	0.0092	140.0	0.0	0.0	0.0
79011	CAHONE	115.0	79052	NUCLA	115.0	1	1	1	0.1010	0.2644	0.0307	77.0	0.0	0.0	0.0
79011	CAHONE	115.0	79180	GRCUT TP	115.0	1	1	1	0.0428	0.1124	0.0980	110.0	0.0	0.0	0.0
79080	CASCADEL	115.0	79088	ROCKWOOD	115.0	1	1	1	0.0205	0.0722	0.0093	95.0	0.0	0.0	0.0
79080	CASCADEL	115.0	79256	SILVERTN	115.0	1	1	1	0.0264	0.0959	0.0115	174.0	174.0	174.0	0.0
79173	COLBRAN	115.0	79174	MOLINA-L	115.0	1	1	1	0.0067	0.0140	0.0027	85.0	85.0	85.0	85.0
79012	CORTEZ	115.0	79075	EMPIRETS	115.0	1	1	1	0.0162	0.0551	0.0077	146.0	0.0	0.0	0.0
79012	CORTEZ	115.0	79073	BLUEDOOR	115.0	1	1	1	0.0063	0.0215	0.0030	113.9	0.0	0.0	0.0
79191	COYOTE G	115.0	79260	ELPASOTP	115.0	1	1	1	0.0020	0.0060	0.0007	85.0	85.0	85.0	0.0
79014	CRAIG	345.0	79058	RIFLE CU	345.0	1	1	1	0.0030	0.0408	0.7319	740.0	740.0	740.0	740.0

WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	(-R--PU-	---X-PU)	--B-PU-	-MVA1-	-MVA2-	-MVA3-	-MVA4-
79013	CRAIG	230.0	79059	RIFLE WA	230.0	1	1	1	0.0064	0.0891	0.3131	478.0	0.0	0.0	0.0
79013	CRAIG	230.0	79039	HAYDEN	230.0	2	1	1	0.0036	0.0378	0.0714	540.0	0.0	0.0	0.0
79013	CRAIG	230.0	79039	HAYDEN	230.0	1	1	1	0.0039	0.0410	0.0773	442.0	0.0	0.0	0.0
79081	CRSTBUTT	115.0	79090	SKITO	115.0	1	1	1	0.0426	0.1500	0.0192	146.0	0.0	0.0	0.0
79021	CURECANT	230.0	79070	NORTHFRK	230.0	1	1	1	0.0041	0.0434	0.0818	442.0	0.0	0.0	0.0
79020	CURECANT	115.0	79253	CRYSTAL	115.0	1	1	1	0.0163	0.0640	0.0083	121.0	0.0	0.0	0.0
79021	CURECANT	230.0	79163	MORROWPT	230.0	1	1	1	0.0003	0.0028	0.0054	182.0	200.0	200.0	0.0
79021	CURECANT	230.0	79054	PONCHABR	230.0	1	1	1	0.0118	0.1255	0.2378	442.0	430.0	430.0	0.0
79020	CURECANT	115.0	79192	SOCANAL	115.0	1	1	1	0.0179	0.0811	0.0108	120.0	0.0	0.0	0.0
79021	CURECANT	230.0	79045	LOSTCANY	230.0	1	1	1	0.0138	0.1400	0.2552	442.0	0.0	0.0	0.0
79190	DALLASCR	115.0	79193	MCKENZIX	115.0	1	1	1	0.0142	0.0578	0.0073	174.0	174.0	174.0	0.0
79023	DURANGO	115.0	79077	BAYFIELD	115.0	1	1	1	0.0385	0.0983	0.0119	139.0	0.0	0.0	0.0
79023	DURANGO	115.0	79089	SHENDOAH	115.0	1	1	1	0.0087	0.0314	0.0038	244.0	0.0	0.0	0.0
79023	DURANGO	115.0	79191	COYOTE G	115.0	1	1	1	0.0378	0.1136	0.0139	85.0	0.0	0.0	0.0
79023	DURANGO	115.0	79078	BODO	115.0	1	1	1	0.0013	0.0072	0.0010	204.0	0.0	0.0	0.0
79075	EMPIRETS	115.0	79180	GRCUT TP	115.0	1	1	1	0.0035	0.0092	0.0011	89.6	0.0	0.0	0.0
79026	FLAMGORG	138.0	79067	VERNAL	138.0	1	1	1	0.0398	0.1572	0.0416	146.0	0.0	0.0	0.0
79026	FLAMGORG	138.0	79067	VERNAL	138.0	2	1	1	0.0398	0.1572	0.0416	146.0	0.0	0.0	0.0
79100	FOOTHILS	115.0	79106	HOODMESA	115.0	1	1	1	0.0022	0.0117	0.0016	100.6	100.0	100.6	100.0
79101	FRUITAP	115.0	79102	FRUITLND	115.0	1	1	1	0.0001	0.0006	0.0001	100.6	100.0	100.6	100.0
79101	FRUITAP	115.0	79106	HOODMESA	115.0	1	1	1	0.0137	0.0782	0.0109	100.6	100.0	100.6	100.0
79027	GALLEGOS	115.0	79098	BERGIN	115.0	1	1	1	0.0237	0.1351	0.0187	100.6	100.0	100.6	100.0
79103	GARNET M	115.0	79104	GARNETAP	115.0	1	1	1	0.0099	0.0350	0.0045	146.0	0.0	0.0	0.0
79105	GLADETAP	115.0	79109	LAPLATA	115.0	1	1	1	0.0123	0.0443	0.0057	76.7	80.0	76.7	80.0
79105	GLADETAP	115.0	79106	HOODMESA	115.0	1	1	1	0.0205	0.0735	0.0094	76.7	80.0	76.7	80.0
79105	GLADETAP	115.0	79260	ELPASOTP	115.0	1	1	1	0.0150	0.0458	0.0054	85.0	85.0	85.0	85.0
79028	GLEN PS	230.0	79093	NAVAJO	230.0	1	1	1	0.0033	0.0110	0.0691	440.0	480.0	440.0	480.0
79036	GRANDJCT	345.0	79058	RIFLE CU	345.0	1	1	1	0.0020	0.0291	0.4700	1619.0	1619.0	1619.0	1619.0
79034	GRANDJCT	115.0	79048	MONTROSE	115.0	1	1	1	0.0795	0.3006	0.0370	76.5	76.5	76.5	76.5
79036	GRANDJCT	345.0	79049	MONTROSE	345.0	1	1	1	0.0020	0.0283	0.4659	1619.0	0.0	0.0	0.0
79008	GRANGER	69.0	79009	LYMAN SW	69.0	1	1	1	0.2985	0.4497	0.0073	25.1	0.0	0.0	0.0
79008	GRANGER	69.0	79030	FONTNLL	69.0	1	1	1	0.3800	0.5700	0.0073	18.0	0.0	0.0	0.0
79179	GRT CUT	115.0	79180	GRCUT TP	115.0	1	1	1	0.0035	0.0091	0.0058	89.6	0.0	0.0	0.0
79037	GUNNISON	115.0	79090	SKITO	115.0	1	1	1	0.0008	0.0036	0.0004	100.0	0.0	0.0	0.0

WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	(-R--PU-	---X-PU)	--B-PU-	-MVA1-	-MVA2-	-MVA3-	-MVA4-
79071	HESPERUS	115.0	79078	BODO	115.0	1	1	1	0.0089	0.0554	0.0074	204.0	0.0	0.0	0.0
79071	HESPERUS	115.0	79088	ROCKWOOD	115.0	1	1	1	0.0407	0.1674	0.0219	95.0	0.0	0.0	0.0
79071	HESPERUS	115.0	79099	FLOR.RIV	115.0	1	1	1	0.0165	0.0926	0.0129	128.0	0.0	0.0	0.0
79106	HOODMESA	115.0	79116	SULLIVAN	115.0	1	1	1	0.0012	0.0069	0.0010	100.6	100.0	100.6	100.0
79042	HOTCHKIS	115.0	79050	NORTHFRK	115.0	1	1	1	0.0117	0.0411	0.0053	146.0	0.0	0.0	0.0
79042	HOTCHKIS	115.0	79104	GARNETAP	115.0	1	1	1	0.0236	0.0703	0.0088	85.0	0.0	0.0	0.0
79107	HOVEN NO	115.0	79117	Y.JACK 2	115.0	1	1	1	0.0094	0.0600	0.0080	140.0	0.0	0.0	0.0
79108	HOVENWEP	115.0	79121	SANDCANY	115.0	1	1	1	0.0038	0.0619	0.0082	140.0	0.0	0.0	0.0
79043	KAYENTA	230.0	79096	LNGHOUSE	230.0	1	2	1	0.0023	0.0228	0.0414	398.4	400.0	398.4	400.0
79043	KAYENTA	230.0	79063	SHIPROCK	230.0	1	1	1	0.0000	-0.1040	0.0000	440.0	480.0	440.0	480.0
79043	KAYENTA	230.0	79063	SHIPROCK	230.0	1	2	1	0.0162	0.1611	0.2949	440.0	480.0	440.0	480.0
79043	KAYENTA	230.0	79096	LNGHOUSE	230.0	1	1	1	0.0000	-0.1040	0.0000	398.4	400.0	398.4	400.0
73105	LAPORTE	115.0	73506	LAPORTAP	115.0	1	1	1	0.0043	0.0317	0.0043	189.0	0.0	0.0	0.0
79044	LOSTCANY	115.0	79122	TOWAOC	115.0	1	1	1	0.0035	0.0319	0.0030	167.0	0.0	0.0	0.0
79044	LOSTCANY	115.0	79111	MANCOSTP	115.0	1	1	1	0.0159	0.0573	0.0070	244.0	244.0	244.0	0.0
79044	LOSTCANY	115.0	79074	E.CORTEZ	115.0	1	1	1	0.0131	0.0447	0.0061	146.0	0.0	0.0	0.0
79044	LOSTCANY	115.0	79075	EMPIRETS	115.0	1	1	1	0.0209	0.0547	0.0063	244.0	0.0	0.0	0.0
79045	LOSTCANY	230.0	79061	SHIP PS	230.0	1	1	1	0.0085	0.0902	0.1714	442.0	0.0	0.0	0.0
79009	LYMAN SW	69.0	79010	MANILA	69.0	1	1	1	0.4538	0.6735	0.0073	25.1	0.0	0.0	0.0
79110	MAIN CO	115.0	79122	TOWAOC	115.0	1	1	1	0.0059	0.0529	0.0049	167.0	167.0	167.0	0.0
79110	MAIN CO	115.0	79121	SANDCANY	115.0	1	1	1	0.0064	0.0400	0.0053	140.0	0.0	0.0	0.0
79110	MAIN CO	115.0	79120	MOQUI C	115.0	1	1	1	0.0140	0.0501	0.0013	95.0	0.0	0.0	0.0
79110	MAIN CO	115.0	79118	Y.JACK W	115.0	1	1	1	0.0037	0.0259	0.0033	140.0	0.0	0.0	0.0
79010	MANILA	69.0	79029	FLAMGORG	69.0	1	1	1	0.2389	0.3545	0.0073	25.1	0.0	0.0	0.0
79177	MCPHEE	12.5	79178	GRT CUT	12.5	1	1	1	1.4340	2.4800	0.0000	50.0	0.0	0.0	0.0
79046	MEEKER	138.0	66278	RANGELY	138.0	1	1	1	0.0606	0.2210	0.0550	115.0	160.0	0.0	0.0
79046	MEEKER	138.0	79056	RIFLE CU	138.0	1	1	1	0.0378	0.1584	0.0404	124.0	124.0	124.0	124.0
79174	MOLINA-L	115.0	79175	MOLINA-U	115.0	1	1	1	0.0067	0.0140	0.0027	76.5	76.5	76.5	0.0
79048	MONTROSE	115.0	79115	SPRCKTAP	115.0	1	1	1	0.0059	0.0207	0.0027	95.0	0.0	0.0	0.0
79048	MONTROSE	115.0	79192	SOCANAL	115.0	1	1	1	0.0140	0.0633	0.0084	120.0	0.0	0.0	0.0
79049	MONTROSE	345.0	79072	HESPERUS	345.0	1	1	1	0.0035	0.0561	1.0014	1619.0	0.0	0.0	0.0
79048	MONTROSE	115.0	79052	NUCLA	115.0	1	1	1	0.0610	0.2198	0.0269	244.0	147.0	0.0	0.0
79048	MONTROSE	115.0	79082	HAPPYCAN	115.0	1	1	1	0.0051	0.0186	0.0022	95.0	0.0	0.0	0.0
79093	NAVAJO	230.0	79096	LNGHOUSE	230.0	1	1	1	0.0066	0.0658	0.1197	398.4	400.0	398.4	400.0

WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	SE	ST	(-R--PU-	---X-PU)	--B-PU-	-MVA1-	-MVA2-	-MVA3-	-MVA4-
79113	NAVAJO	115.0	79114	SAN JUAN	115.0	1	1	1	0.0015	0.0059	0.0007	100.6	100.0	100.6	100.0
79050	NORTHFRK	115.0	79083	JUANITA	115.0	1	1	1	0.0165	0.0582	0.0075	146.0	0.0	0.0	0.0
79085	NORTHMSA	115.0	79115	SPRCKTAP	115.0	1	1	1	0.0052	0.0184	0.0024	85.0	0.0	0.0	0.0
79085	NORTHMSA	115.0	79104	GARNETAP	115.0	1	1	1	0.0273	0.0814	0.0101	85.0	0.0	0.0	0.0
79187	NORWOOD	115.0	79189	SUNSH SM	115.0	1	1	1	0.0460	0.1617	0.0207	174.0	174.0	174.0	0.0
79052	NUCLA	115.0	79187	NORWOOD	115.0	1	1	1	0.0247	0.0866	0.0111	174.0	174.0	174.0	0.0
70327	PONCHA	115.0	79037	GUNNISON	115.0	1	1	1	0.1037	0.3212	0.0404	113.0	113.0	113.0	113.0
70358	RIFLE PS	230.0	79059	RIFLE WA	230.0	1	1	1	0.0000	0.0006	0.0000	500.0	500.0	500.0	500.0
79059	RIFLE WA	230.0	79070	NORTHFRK	230.0	1	1	1	0.0076	0.0803	0.1514	442.0	0.0	0.0	0.0
79060	SANJN PS	345.0	79072	HESPERUS	345.0	1	1	1	0.0015	0.0234	0.4128	1619.0	0.0	0.0	0.0
79089	SHENDOAH	115.0	79111	MANCOSTP	115.0	1	1	1	0.0198	0.0713	0.0087	244.0	0.0	0.0	0.0
79062	SHIPROCK	115.0	79101	FRUITAP	115.0	1	1	1	0.0050	0.0297	0.0041	100.6	100.0	100.6	100.0
79095	SHIPROCK	500.0	14002	MOENKOPI	500.0	1	1	0	0.0000	-0.0001	0.0000	2147.8	0.0	0.0	0.0
79095	SHIPROCK	500.0	14002	MOENKOPI	500.0	1	2	0	0.0018	0.0419	3.3446	1567.5	0.0	0.0	0.0
79095	SHIPROCK	500.0	14002	MOENKOPI	500.0	1	3	0	0.0000	-0.0001	0.0000	2147.8	0.0	0.0	0.0
79062	SHIPROCK	115.0	79112	MESA FM	115.0	1	1	1	0.0269	0.0966	0.0123	76.7	77.0	76.7	77.0
79064	SHIPROCK	345.0	14101	FOURCORN	345.0	1	1	0	0.0003	0.0042	0.0715	1200.0	1320.0	1200.0	1320.0
79063	SHIPROCK	230.0	14211	FOURCORN	230.0	1	1	1	0.0013	0.0128	0.0298	400.0	440.0	400.0	440.0
79256	SILVERTN	115.0	79262	CEMNT CK	115.0	1	1	1	0.0026	0.0087	0.0012	146.0	146.0	146.0	0.0
79192	SOCANAL	115.0	79193	MCKENZIX	115.0	1	1	1	0.0185	0.0752	0.0095	174.0	174.0	174.0	0.0
79189	SUNSH SM	115.0	79257	AMES	115.0	1	1	1	0.0040	0.0142	0.0018	146.0	146.0	146.0	0.0
79188	TELLURID	115.0	79189	SUNSH SM	115.0	1	1	1	0.0752	0.2648	0.0341	174.0	174.0	174.0	0.0
79067	VERNAL	138.0	65192	BONANZA	138.0	1	1	1	0.0089	0.0962	0.0292	192.0	0.0	0.0	0.0
79117	Y.JACK 2	115.0	79118	Y.JACK W	115.0	1	1	1	0.0070	0.0470	0.0062	140.0	0.0	0.0	0.0

WESTERN ELECTRICITY COORDINATING COUNCIL
 2004 HS2A APPROVED OPERATING CASE

--FROM-	---FR---	-BKV-	---TO--	---TO---	-BKV-	CK	S	MVA-	VnomF	VnomT	(--R---	--X---	--Bmag-	Tz	MVA1	MVA2	MVA3	MVA4	aloss	TERT
79122	TOWAOC	115	79164	TOWAOC	7	1	1	100	115.0	6.9	0.0846	0.8462	0.0000	0	13	0	0	0	0	0
79163	MORROWPT	230	79019	MORRO1-2	13	1	1	100	230.0	12.5	0.0000	0.0833	0.0000	0	192	0	0	0	0	0
79174	MOLINA-L	115	79166	MOLINA-L	4	1	1	100	115.0	4.2	0.0852	0.1435	0.0000	0	6	0	0	0	0	0
79175	MOLINA-U	115	79172	MOLINA-U	4	1	1	100	115.0	4.2	0.0438	0.6471	0.0000	0	10	0	0	0	0	0
79177	MCPHEE	12	79176	MCPHEE	2	1	1	100	12.5	2.4	0.3373	3.3700	0.0000	0	2	0	0	0	0	0
79179	GRT CUT	115	79178	GRT CUT	12	1	1	100	115.0	12.5	0.2860	0.8930	0.0000	0	3	0	0	0	0	0
79250	AMATLAS	230	79251	QFATLAS1	14	1	1	100	230.0	13.8	0.0020	0.3363	0.0000	0	62	0	0	0	0	0
79250	AMATLAS	230	79252	QFATLAS2	14	1	1	100	230.0	13.8	0.0020	0.3363	0.0000	0	62	0	0	0	0	0
79253	CRYSTAL	115	79162	CRYSTAL	13	1	1	100	115.0	12.5	0.0157	0.3580	0.0000	0	33	0	0	0	0	0
79053	PINPKBRB	345	19062	PINPK	230	1	1	360	345.0	230.0	0.0002	0.0581	0.0000	0	600	720	600	720	1	0
79053	PINPKBRB	345	19062	PINPK	230	2	1	360	345.0	230.0	0.0002	0.0581	0.0000	0	600	720	600	720	1	0
79053	PINPKBRB	345	19062	PINPK	230	3	1	360	345.0	230.0	0.0002	0.0592	0.0000	0	600	720	600	720	1	0
79060	SANJN PS	345	10292	SAN_JUAN	345	1	1	100	345.0	345.0	0.0000	0.0122	0.0000	0	600	0	0	0	1	0
73551	W CANON	230	70550	W CANON	115	1	1	100	230.0	115.0	0.0000	0.0890	0.0000	0	100	100	100	100	0	0
79061	SHIP PS	230	79063	SHIPROCK	230	1	1	100	230.0	230.0	0.0000	0.0276	0.0000	0	400	0	0	0	1	0