

DRAFT

Addendum For The Outer Metro 115 kV Transmission Development Plan

This study is performed to make amendments to the “Outer Metro 115 kV transmission development plan” prepared for the area between Glencoe – West Waconia – Scott Co substations. The objectives of the study were:

1. To add the 2nd Carver Co transformer to the models and verify the transmission deficiencies in the area.
2. The City of Glencoe is planning to build a new distribution substation West of the existing substation. This study will modify the plans to accommodate the City’s needs.
3. To eliminate the need for a new 115/69 kV substation at Biscay Jc.
4. To identify alternative to converting the Chaska downtown substation to 115 kV.

The following are the recommended modifications to the plan in order to eliminate the need for a 115/69 kV substation at Biscay Jc and accommodate all the needs for the new Glencoe West substation.

1. Move the load from Plato to the proposed 115/12.5 kV distribution substation at Glencoe (2011).
2. Convert High Island substation to 115 kV along with the line from Biscay Jc (2011).
3. Add 2x4 MVAR cap bank at Lester Prairie or existing Plato substation (2011).
4. Close the 69 kV line between Helen and Biscay Jc. This will allow Lester Prairie load to be served out of Hutchinson (2011).
5. Build double circuit 69 kV line between Glencoe East and Glencoe West substations. Circuit #1 connects Helen to Lester Prairie and Circuit #2 connects the Glencoe East and West substations on the distribution side.
6. The Glencoe East – Glencoe West 115 kV line should be on a separate route from the double circuit 69 kV line.

The need for West Waconia 115/69 kV transformer is eliminated due to the existence of the 2nd transformer at Carver Co.

The City of Glencoe also requested for a 69 kV line tie between the two Glencoe substations. To achieve this, the existing 69 kV line from Glencoe East – Biscay Junction needs to be retained. The existing 69 kV line from Biscay Jc to Glencoe East substation location needs to be rebuilt to double circuit 69 kV line. One of the two circuits will tie the two Glencoe substations and the other circuit connects Helen with Lester Prairie. This also results in the new 115 kV line from Glencoe East sub to Glencoe West sub to be on a new route.

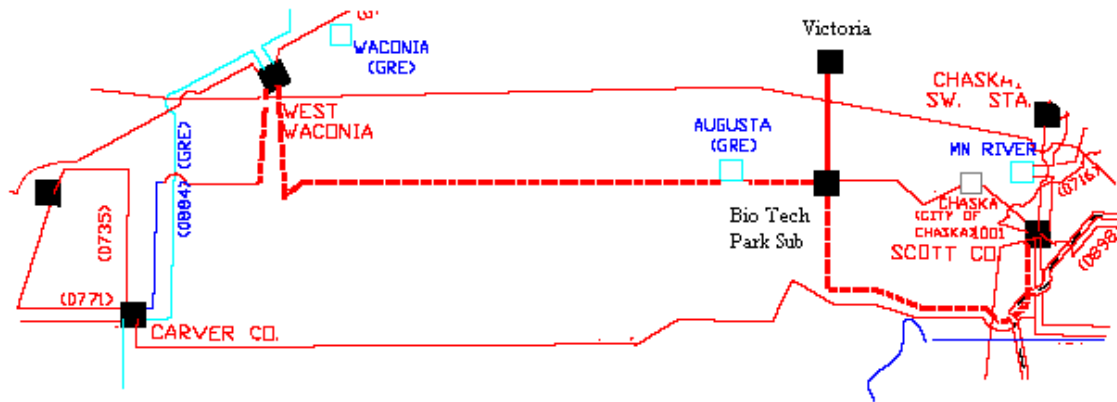


Figure 2

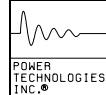
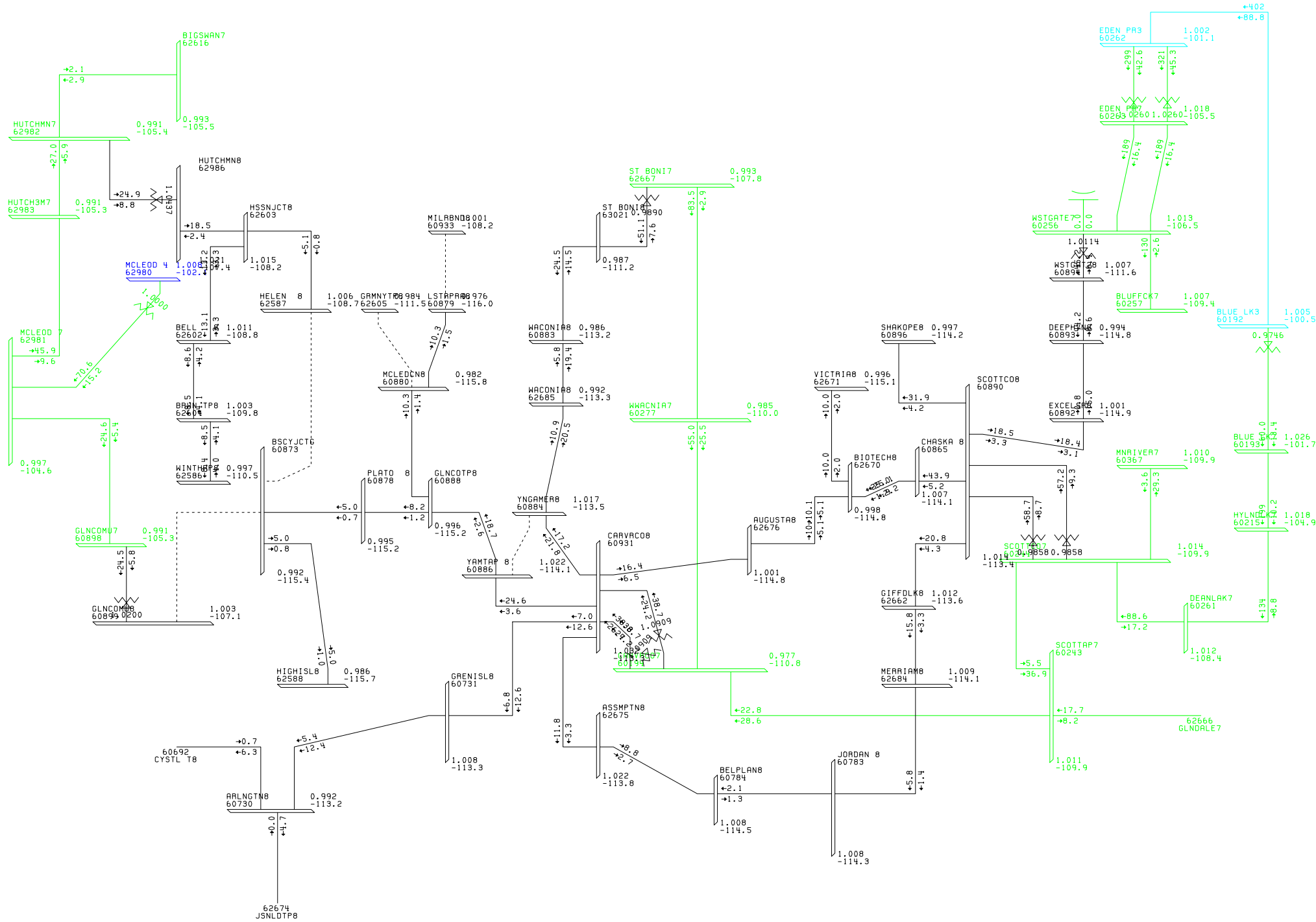
Full ACCC analysis is not performed, as the system topology is not significantly different from the original plan-A proposed in the “Outer Metro 115 kV Transmission Development Study”. The powerflow maps for the modified plans are shown in Appendix A with the following contingencies:

- 1) System Intact
- 2) Loss of Hutchinson – Hassen 69 kV line
- 3) Loss of Hassen – Helen 69 kV
- 4) Loss of Sherman – Winsted 69 kV line
- 5) Loss of Scott Co –Glendale – Carver Co 115 kV line + Loss of Scott Co – Chaska (Bio Tech park) double circuit.

Conclusion:

- No voltage violations were observed with the modified plan.
- No Thermal violations were observed with the modified plan.
- If the new 115 kV line from Chaska Bio tech park to Scott Co is double circuited with the existing 115 kV line from Carver Co to Scott Co, a new 345 kV source will be needed at West Waconia by 2016.

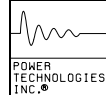
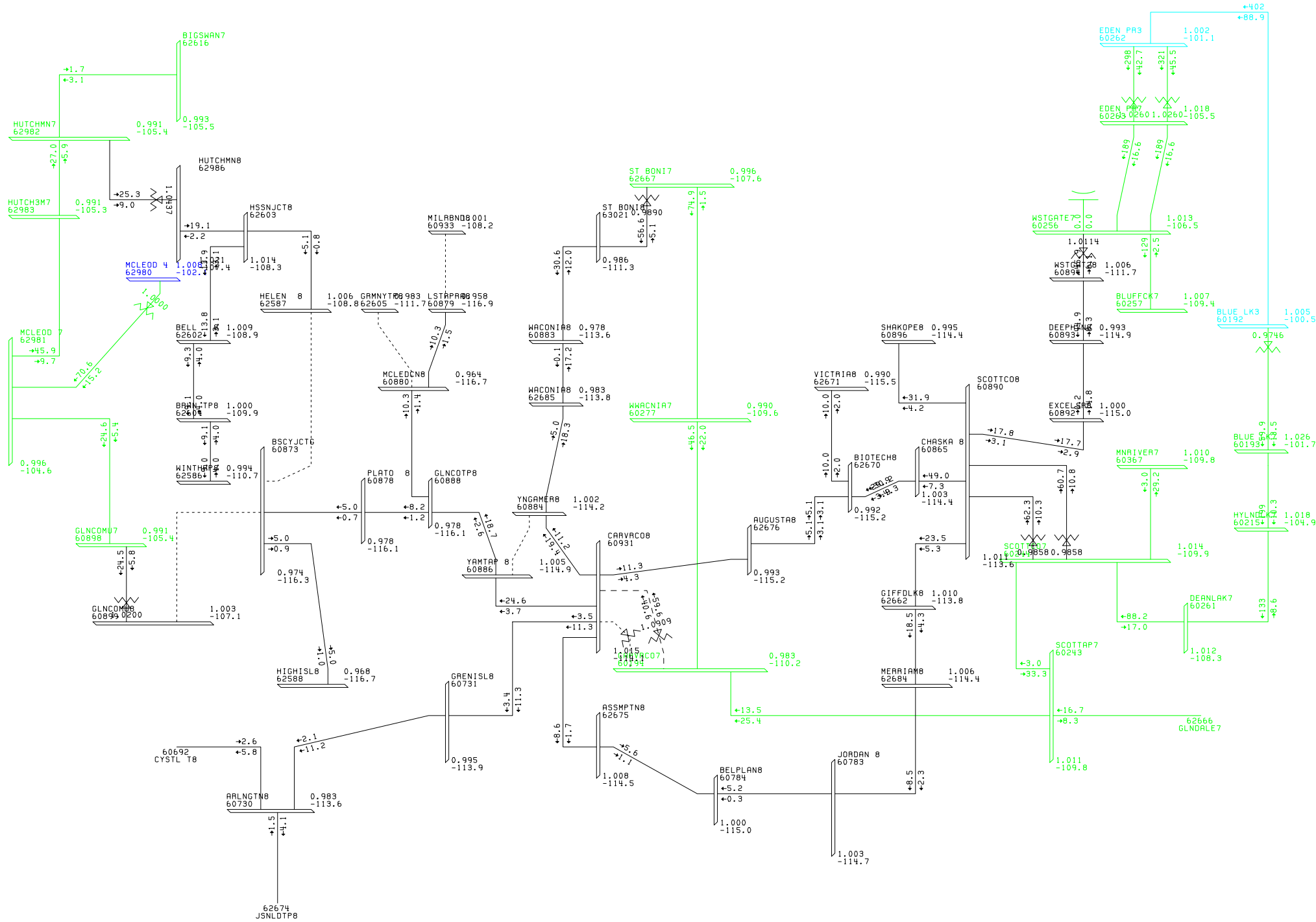
Base Case Powerflow Maps



2006 MAPP SERIES: 2011 SUMMER PEAK
 FINAL
 SYSTEM INTACT MON, NOV 05 2007 8:39

100% RATEA
 0.950UV 1.050OV
 KV: ≤69 , ≤115 , ≤230

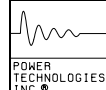
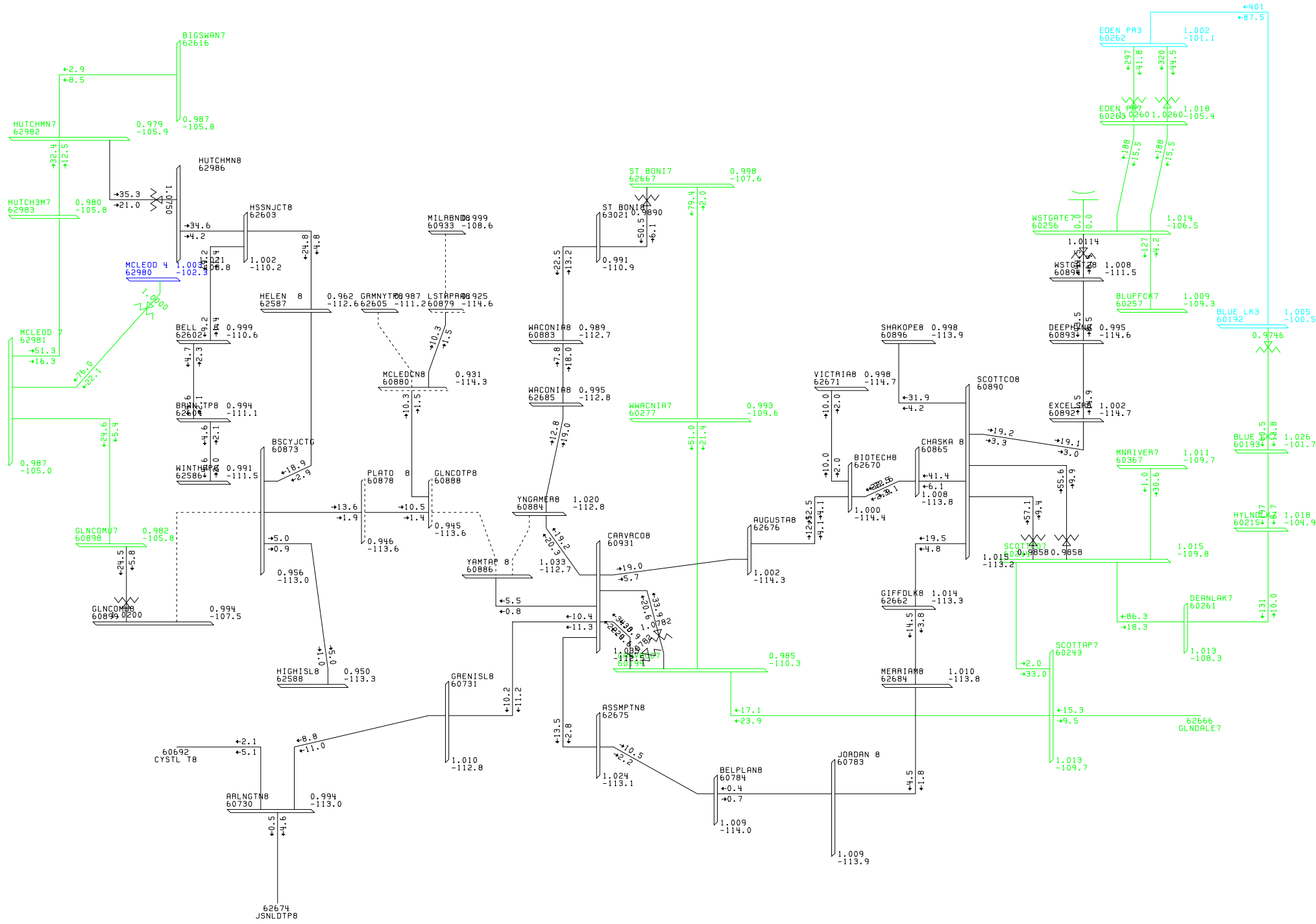
BUS - VOLTAGE (PU) /ANGLE
 BRANCH - MW/MVAR
 EQUIPMENT - MW/MVAR



2006 MAPP SERIES: 2011 SUMMER PEAK
 FINAL
 LOSS OF CARVER CO TR#1 MON, NOV 05 2007 8:39

100% RATEA
 0.950UV 1.050OV
 KV: ≤69 , ≤115 , ≤230

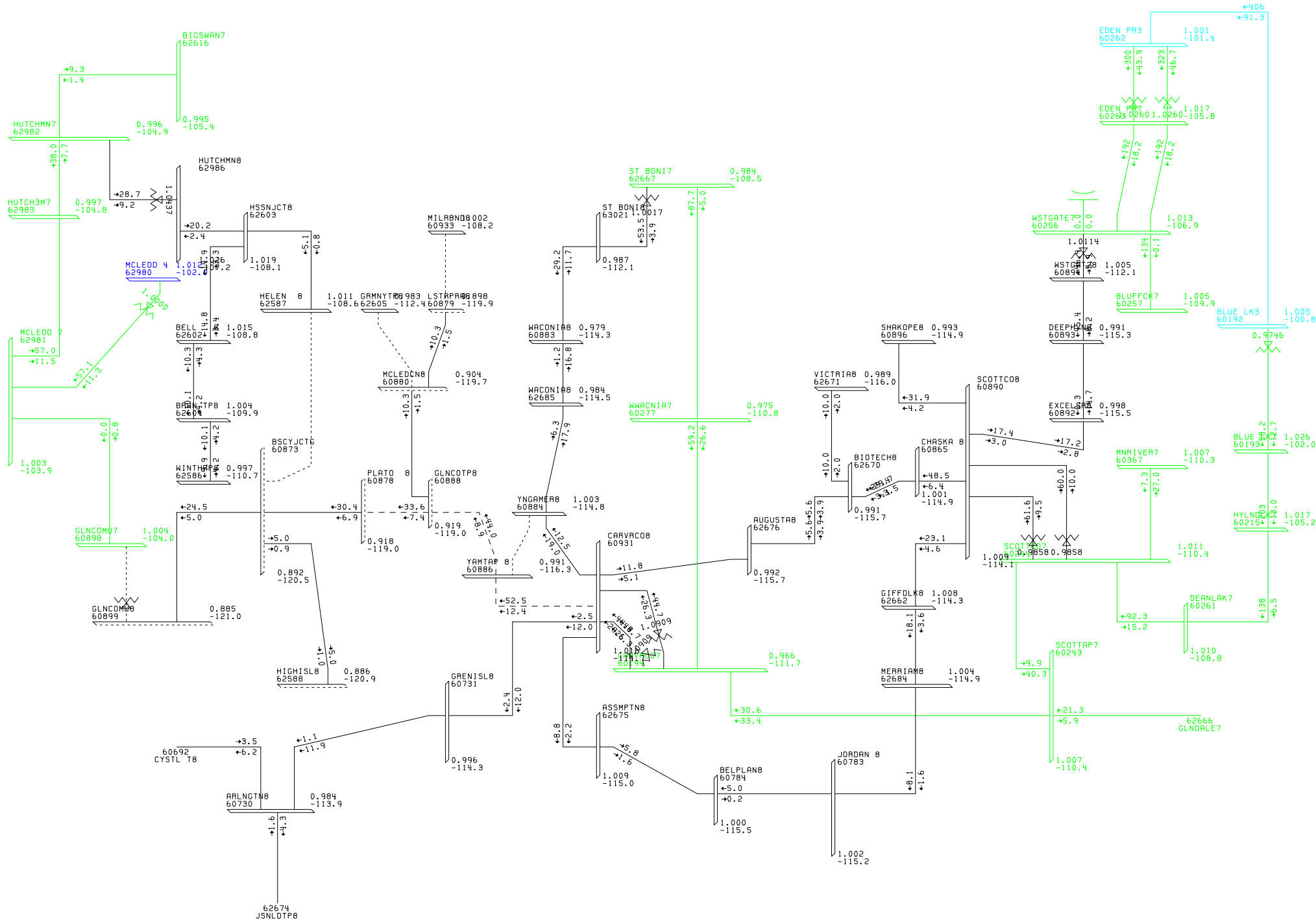
BUS - VOLTAGE (PU) /ANGLE
 BRANCH - MW/MVAR
 EQUIPMENT - MW/MVAR



2006 MAPP SERIES: 2011 SUMMER PEAK
 FINAL
 LOSS OF YOUNGAMERICA-PLATO MON, NOV 05 2007 8:57

100% RATE
 0.950UV 1.050UV
 KV: ≤69 , ≤115 , ≤230

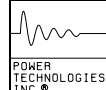
BUS - VOLTAGE (PU) /ANGLE
 BRANCH - MW/MVAR
 EQUIPMENT - MW/MVAR



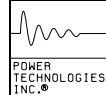
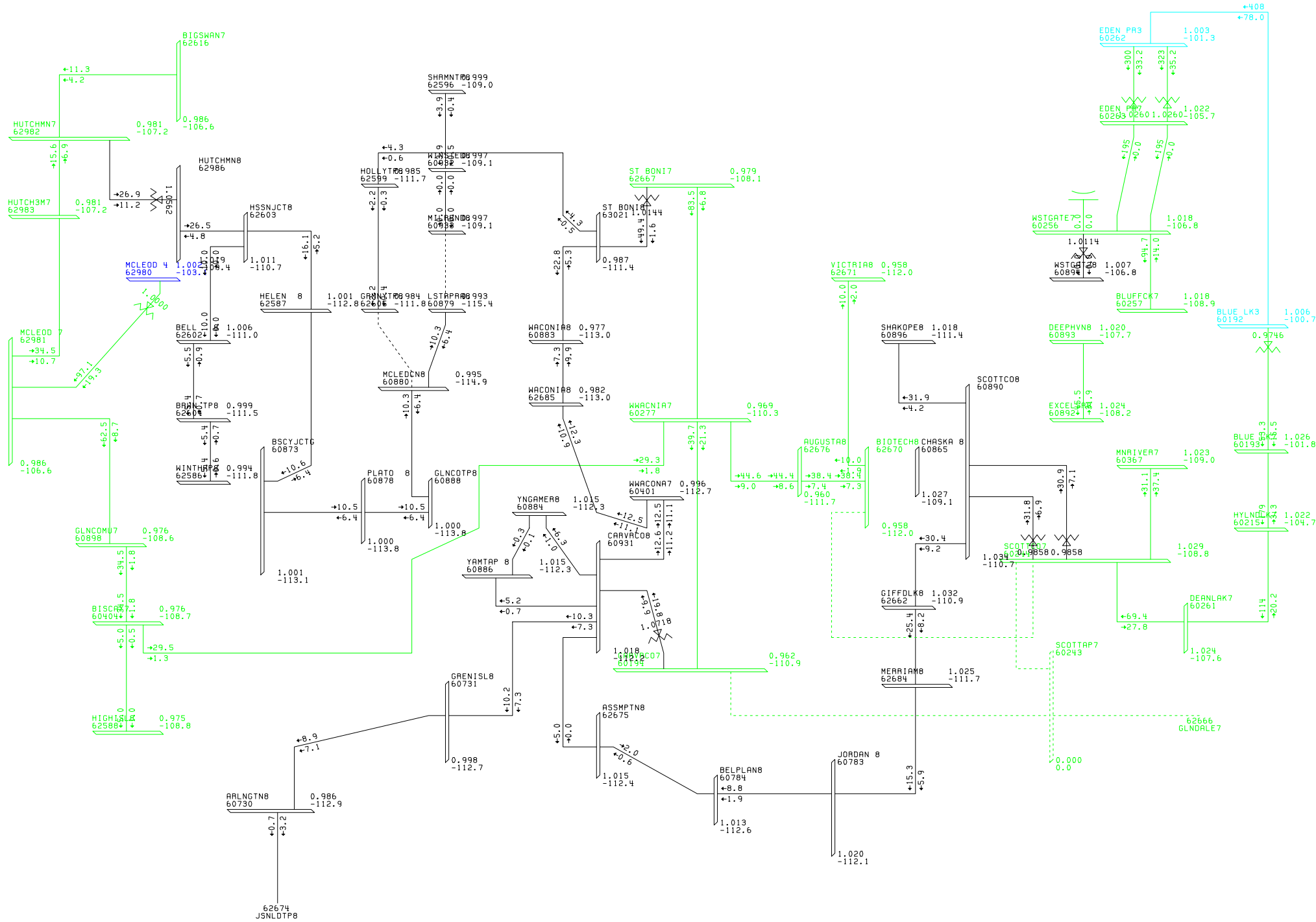
2006 MAPP SERIES: 2011 SUMMER PEAK
 FINAL
 LOSS OF MCLEOD-GLENCOE115 KV S MON, NOV 05 2007 8:37

100% RATEA
 0.950 UV 1.050 UV
 KV: ≤69 , ≤115 , ≤230

BUS - VOLTAGE (PU) / ANGLE
 BRANCH - MW/MVAR
 EQUIPMENT - MW/MVAR



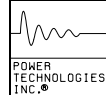
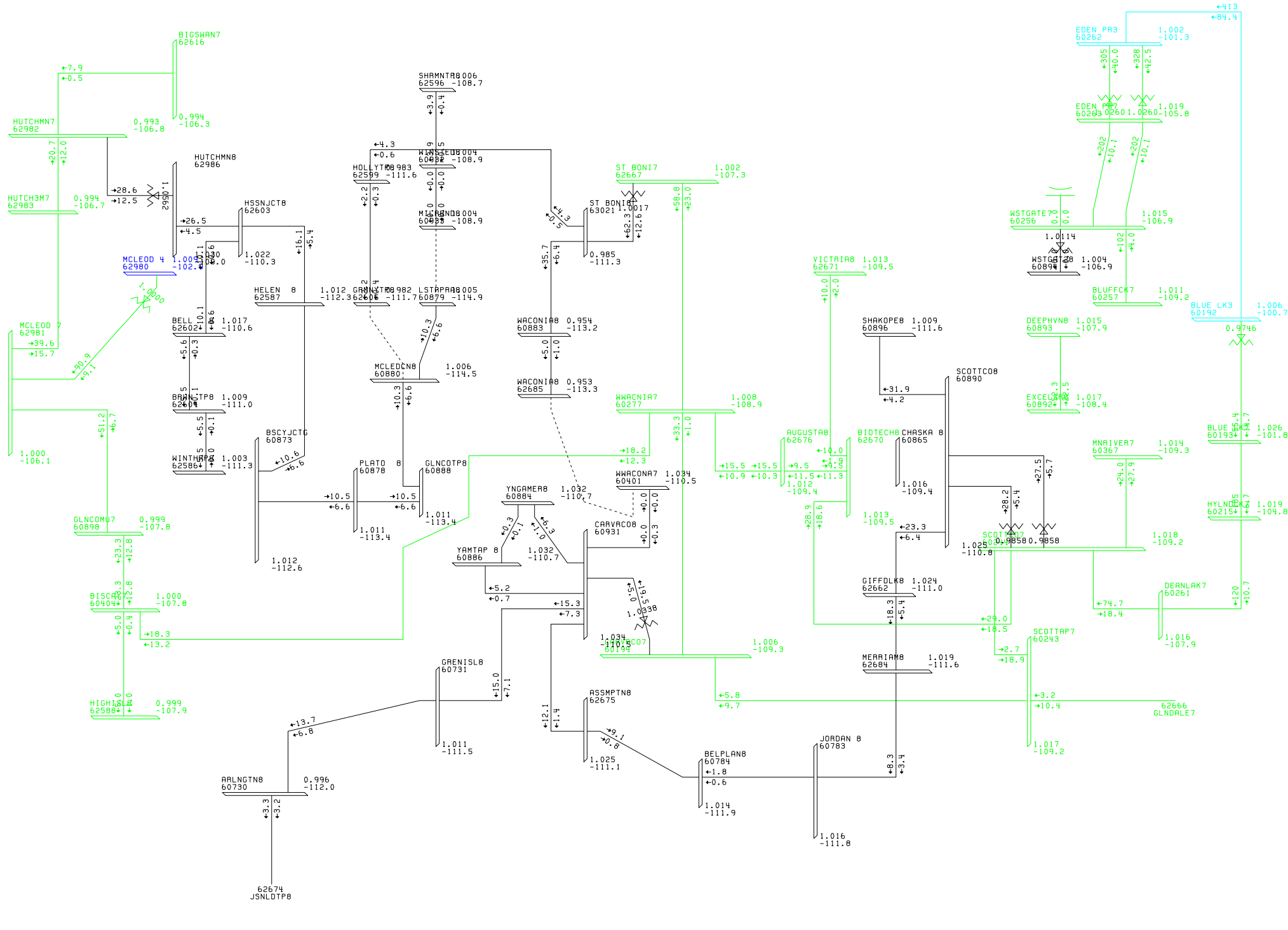
Option A Powerflow Maps



2006 MAPP SERIES: 2011 SUMMER PEAK
 FINAL
 LOSS OF BIOTECH-SCOTT DBL CKT MON, NOV 05 2007 9:28

100% RATEA
 0.950UV 1.050OV
 KV: ≤69 , ≤115 , ≤230

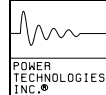
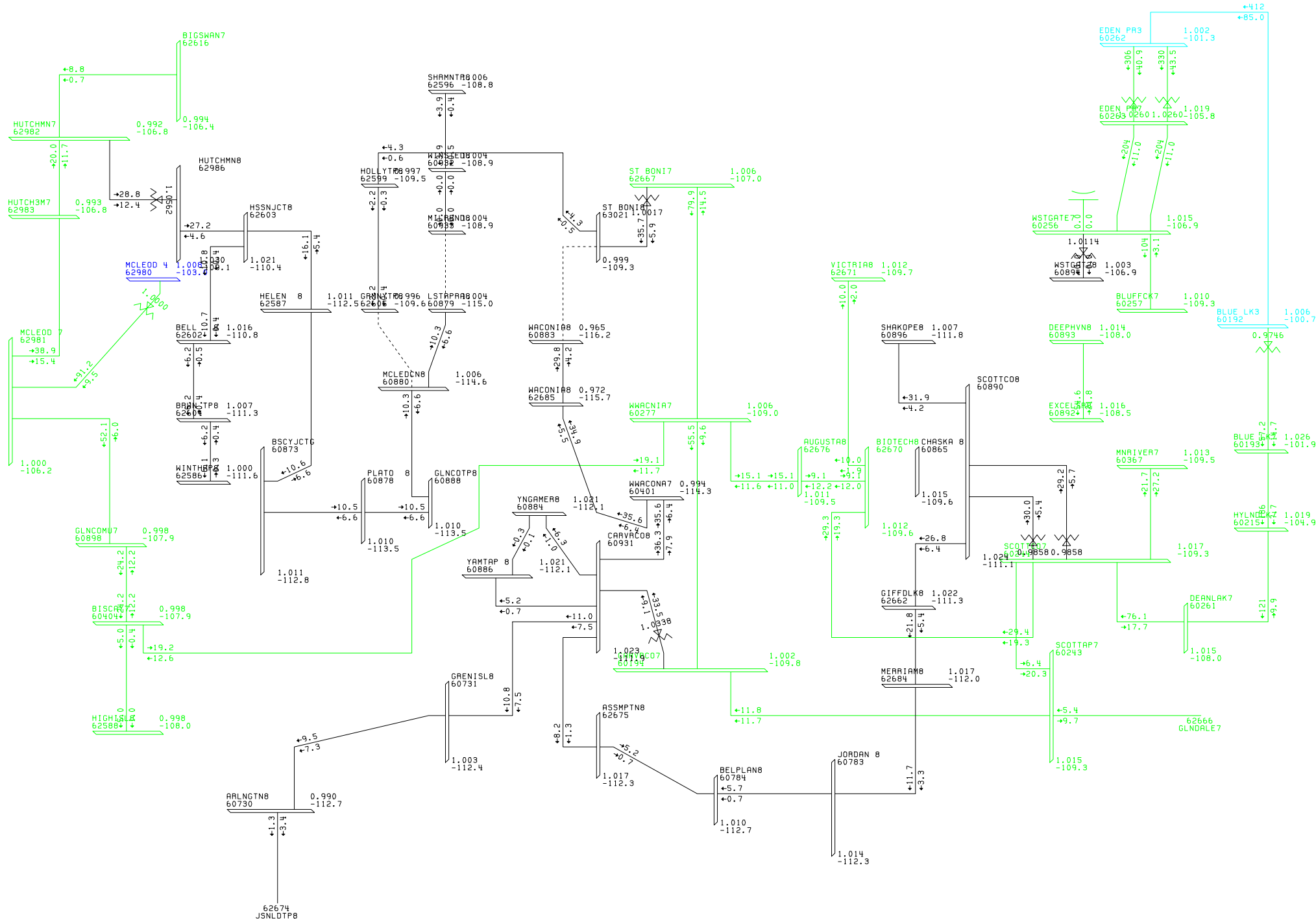
BUS - VOLTAGE (PU) / ANGLE
 BRANCH - MW/MVAR
 EQUIPMENT - MW/MVAR



2006 MAPP SERIES: 2011 SUMMER PEAK
 FINAL
 OPTION A: SYSTEM INTACT MON, NOV 05 2007 9:16

100% RATEA
 0.950UV 1.050OV
 KV: ≤69 , ≤115 , ≤230

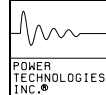
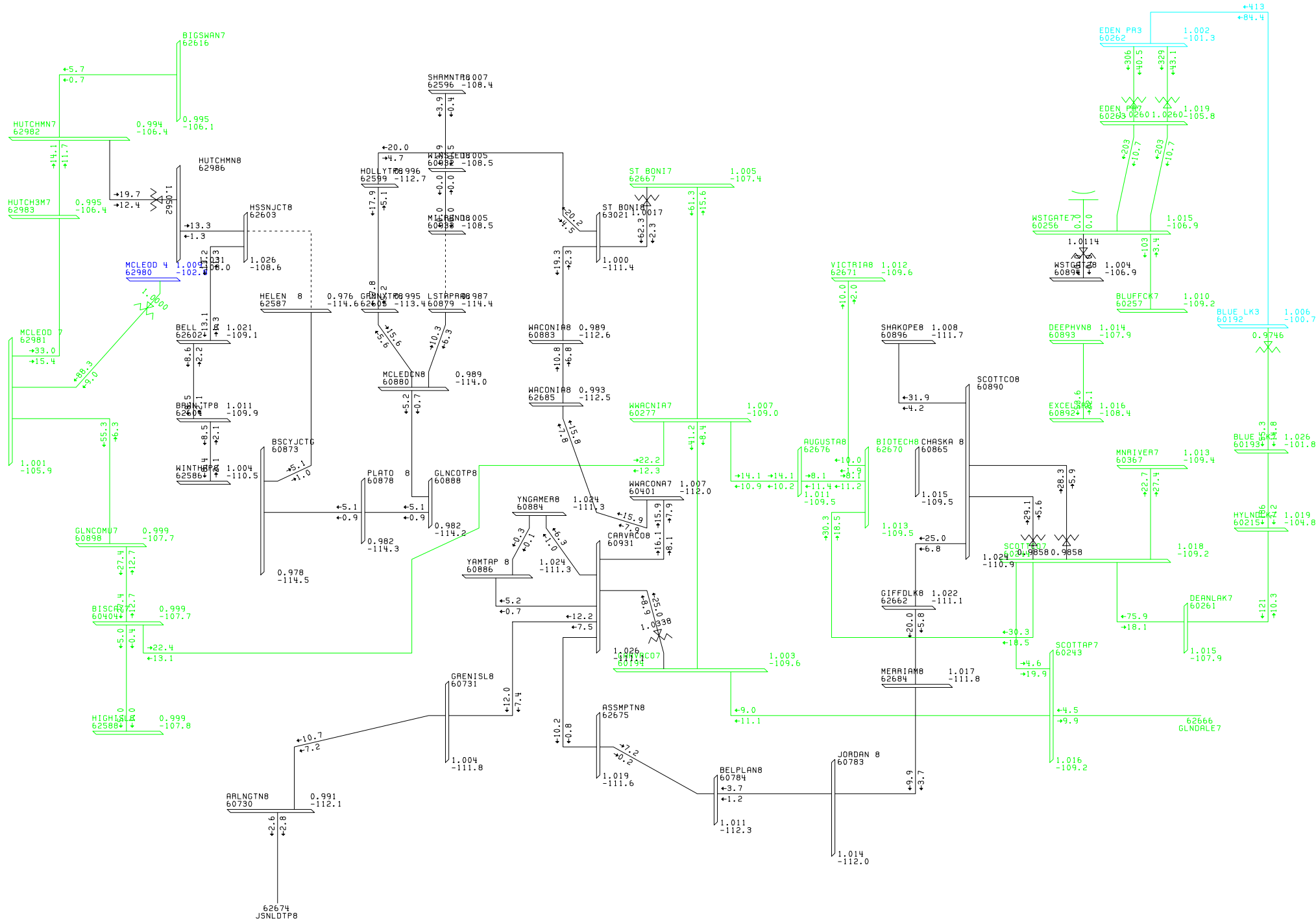
BUS - VOLTAGE (PU) /ANGLE
 BRANCH - MW/MVAR
 EQUIPMENT - MW/MVAR



2006 MAPP SERIES: 2011 SUMMER PEAK
 FINAL
 OPTION A: LOSS OF STBONI-WACON MON, NOV 05 2007 9:17

100% RATEA
 0.950UV 1.050OV
 KV: ≤69 , ≤115 , ≤230

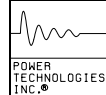
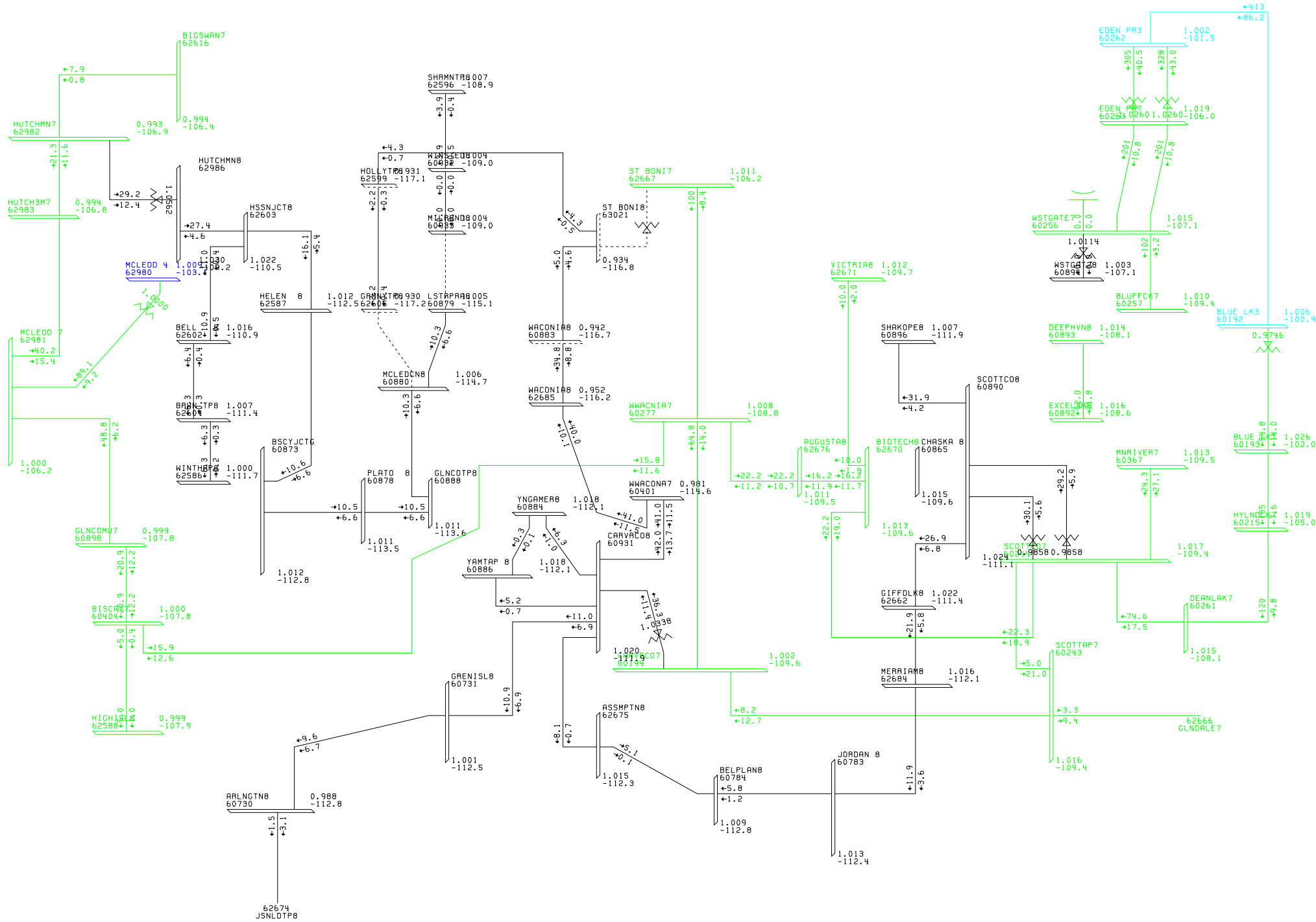
BUS - VOLTAGE (PU) /ANGLE
 BRANCH - MW/MVAR
 EQUIPMENT - MW/MVAR



2006 MAPP SERIES: 2011 SUMMER PEAK
 FINAL
 LOSS OF HELENJC-HELEN 69 KV LI MON, NOV 05 2007 9:25

100% RATEA
 0.950UV 1.050OV
 KV: ≤69 , ≤115 , ≤230

BUS - VOLTAGE (PU) /ANGLE
 BRANCH - MW/MVAR
 EQUIPMENT - MW/MVAR



2006 MAPP SERIES: 2011 SUMMER PEAK
 FINAL
 LOSS OF STBONI TRANSFORMER MON, NOV 05 2007 9:20

100% RATEA
 0.950UV 1.050UV
 KV: ≤69 , ≤115 , ≤230

BUS - VOLTAGE (PU) / ANGLE
 BRANCH - MW/MVAR
 EQUIPMENT - MW/MVAR