An aerial photograph of Lake Elsinore, a large reservoir in Southern California. The lake is surrounded by a mix of developed areas, including residential neighborhoods and commercial zones, and undeveloped land. In the background, rolling hills and mountains are visible under a clear sky. The text is overlaid on the upper portion of the image.

# Lake Elsinore Advanced Pump Storage (LEAPS)

and

# Talega-Escondido / Valley-Serrano (TE/VS)

## Transmission Project

## **Why This Project Is The Solution for SONGS Retirement**

June 2013

The Nevada Hydro Company

# Background

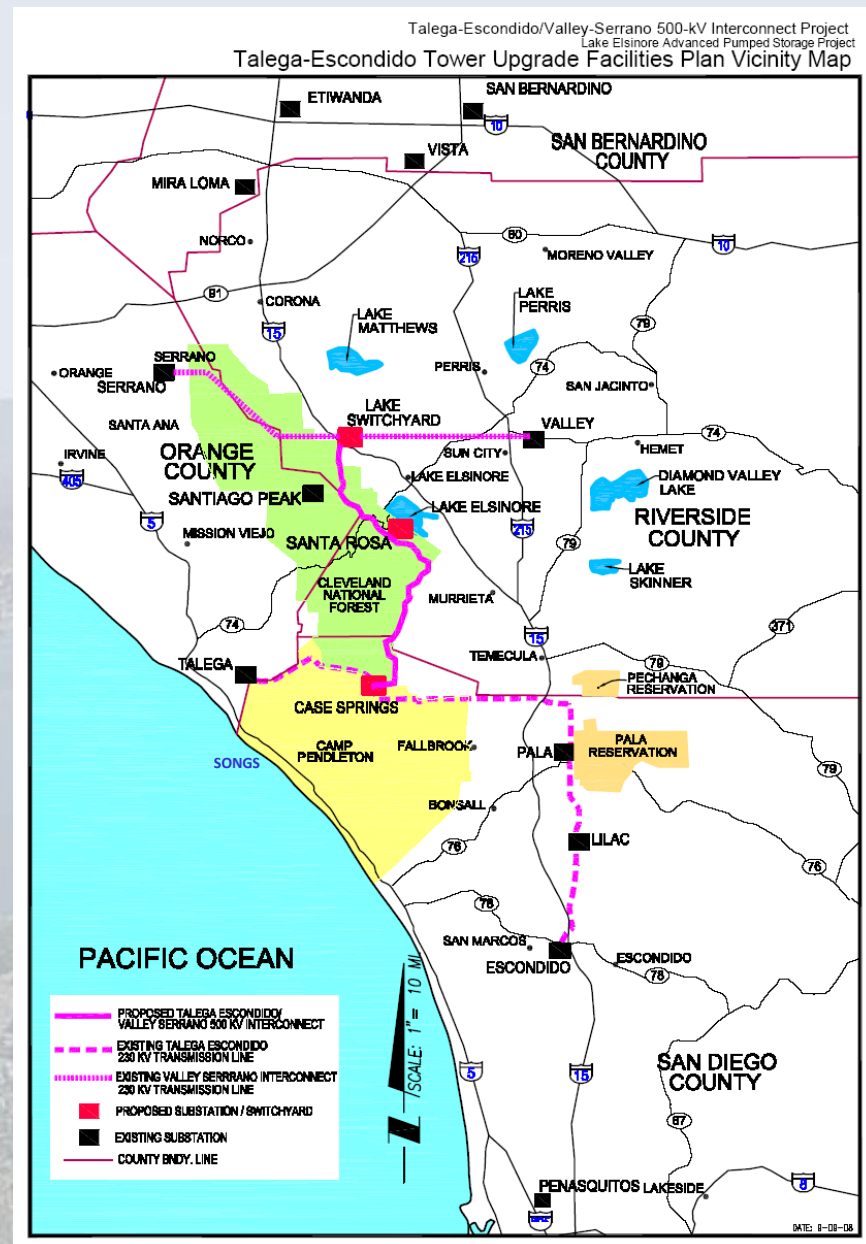
- Lake Elsinore Advanced Pump Storage (**LEAPS**) (FERC Project 14227) is a 500 MW advanced pumped storage project located roughly 20 miles from the now-shuttered SONGS facility.
- The Talega-Escondido / Valley-Serrano 500 kV Interconnect (**TE/VS Interconnect**) brings 500 kV transmission less than 10 miles from SONGS.

# Projects Have Been Assessed

- Economic and reliability benefits of the project are well known:
  - CAISO has studied a number of times over the years.
  - Nevada Hydro provided expert testimony to PUC.
- CEC identified as critical Statewide resource.



# Location

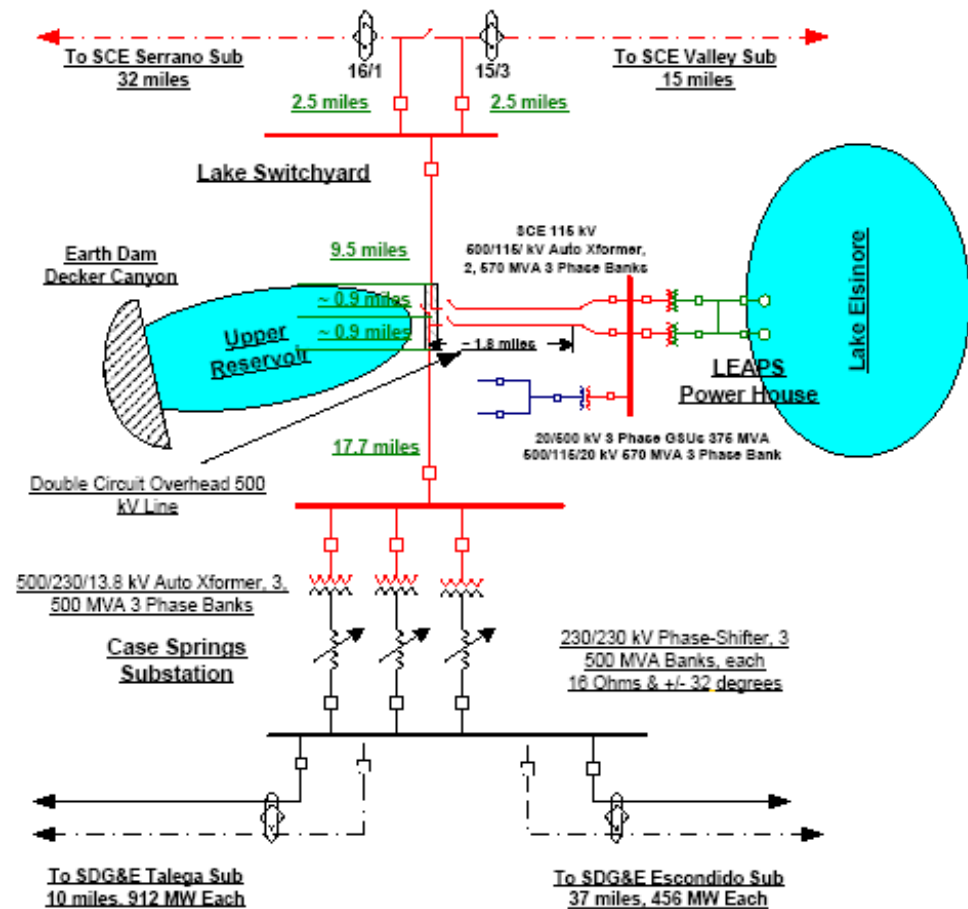


THE NEVADA HYDRO COMPANY, INC.

# One-Line Diagram

## Lake Elsinore Advanced Pump Storage Project Conceptual Single Line Diagram

Rev 17 July 08



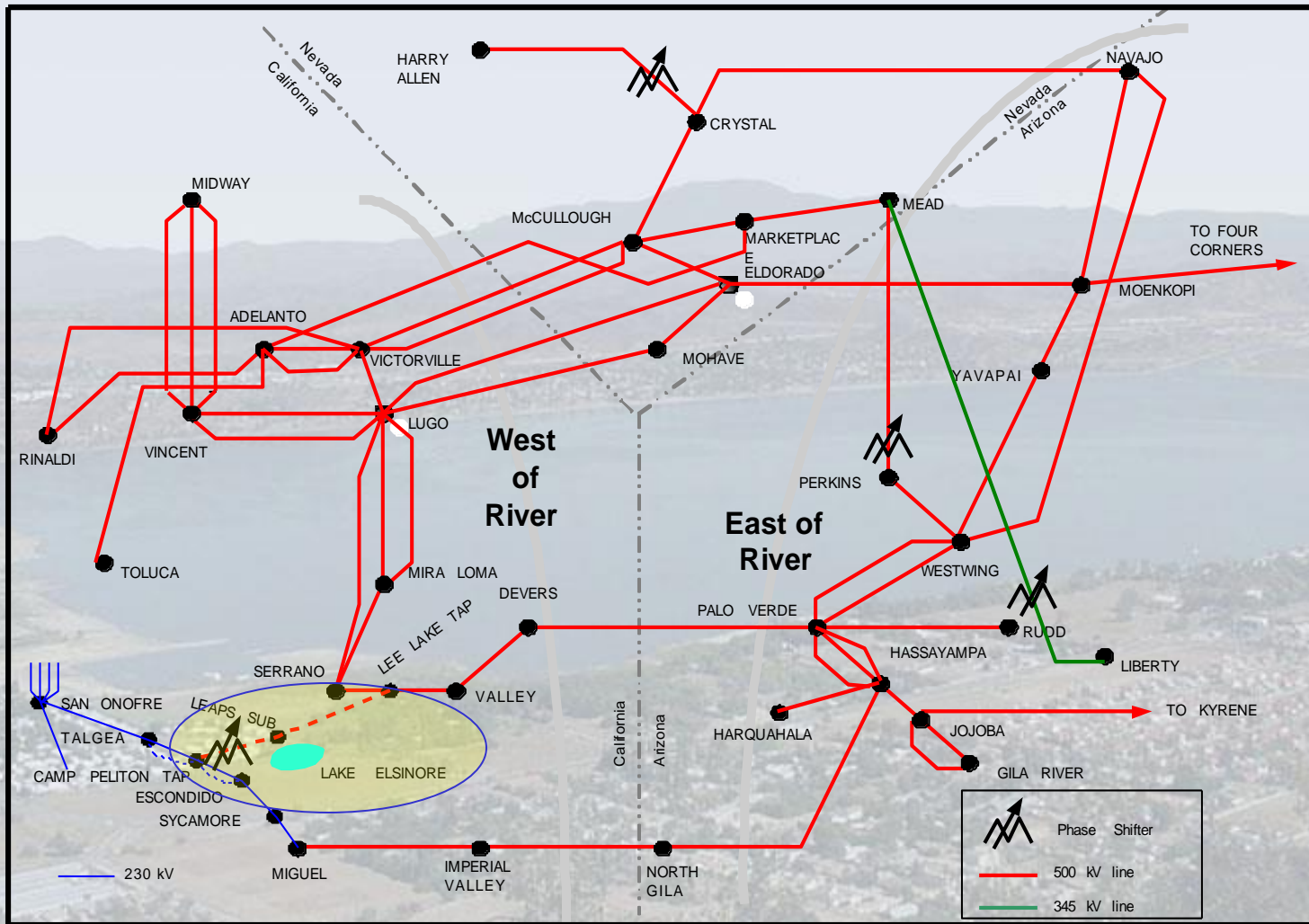
### Notes:

1. LEAPS 500 kV Line, conductors double bundled (two per phase) Bluebird 1256 ACSR.
2. Talega - Case Springs 230 kV, single conductor Falcon 1033 ACSR, double circuit.
3. Case Springs - Escondido 230 kV, double bundled Falcon 1033 ACSR, double circuit.
4. GIL rated at 4000 amps continuous load.



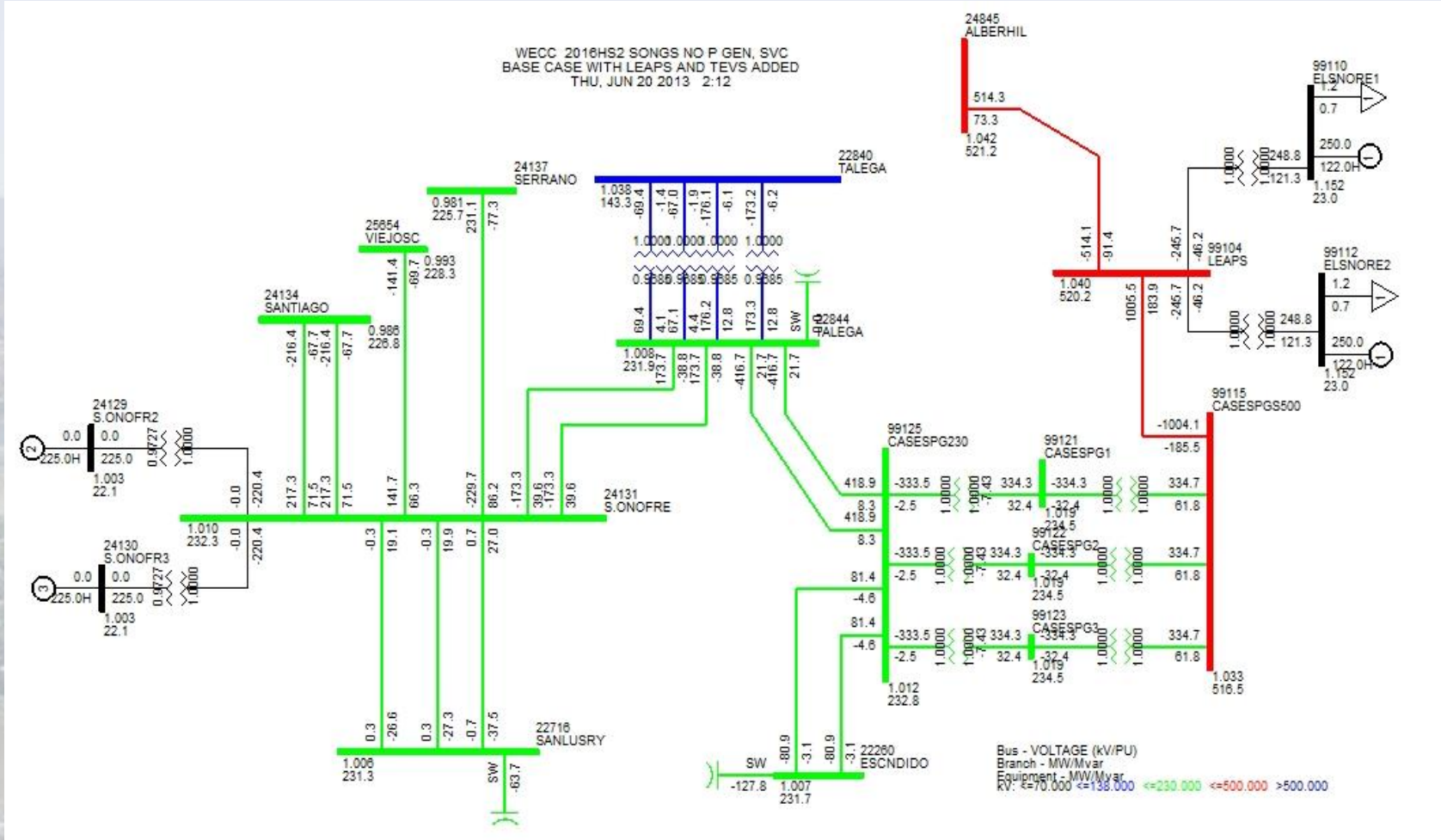
THE NEVADA HYDRO COMPANY, INC.

# System Map and Connection





# Base TE/VS-LEAPS Plan



# Proposed Extension to the TE/VS Interconnect

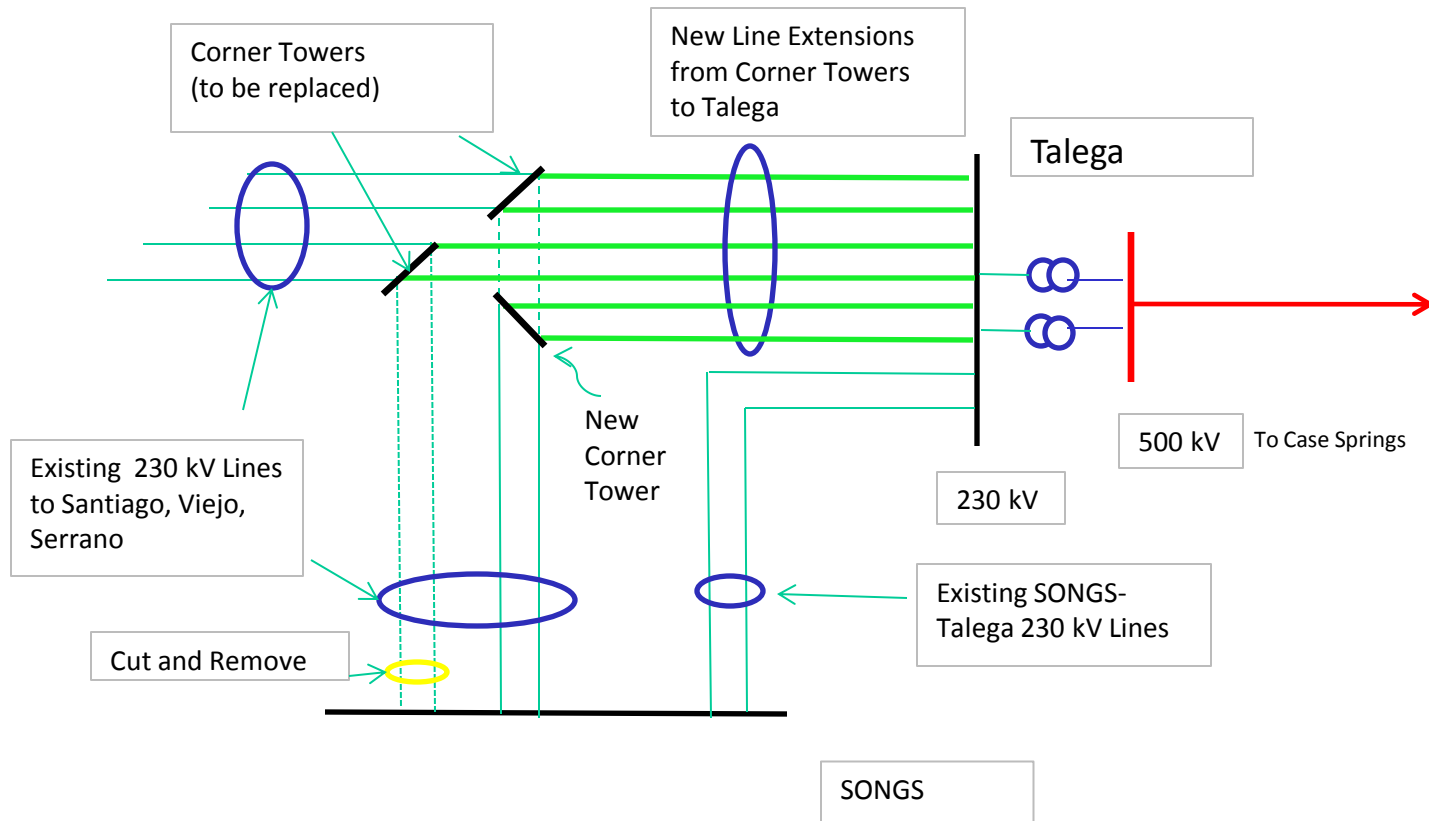
- As proposed, the TE/VS Interconnect links into the Talaga-Escondido line at the proposed Case Springs substation at 230 kV.
- Proposal extends from Case Springs to the Talega substation at 500 kV rather than at 230 kV.



# Extended TE/Vs- LEAPS Plan



# Extended TE/VS- LEAPS Plan



Changes to Re-route SCE 230 kV lines from SONGS into Talega to provide interconnection of 500 kV into L.A. Basin area



Bus - VOLTAGE (kV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar  
kV: <=138.000 <=230.000 <=345.000 <=500.000 >500.000



# Modeling Assumptions

- 2016 modeling data, without SONGS
- Cases without LEAPS and TE/VS
  - Base Case
  - G-1 (Loss of Otay Mesa) , and N-1 (IV-N. Gila )
  - N-1-1 loss of IV-Miguel and Sunrise

# Base Case: SONGS Area

WECC 2016HS2, SONGS NO P GEN, SVC  
BASE CASE, SAME NET TIES AS WECC CASE  
THU, JUN 13 2013 11:23

Bus - VOLTAGE (KV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar  
KV: <=138.000 <=230.000 <=345.000 <=500.000 >500.000

SONGS North -440.3 MW

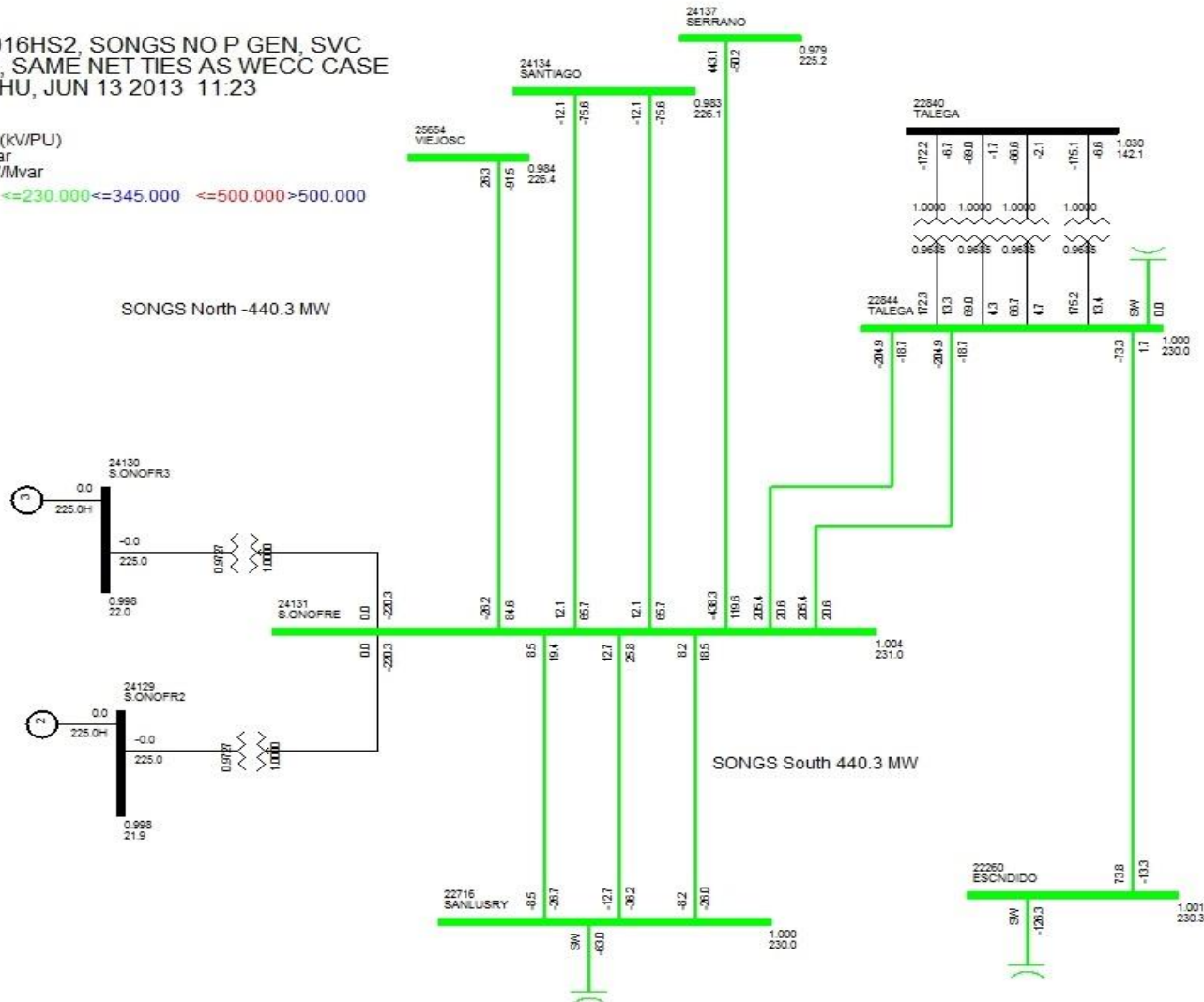
SONGS South 440.3 MW

Nevada Hydro Company

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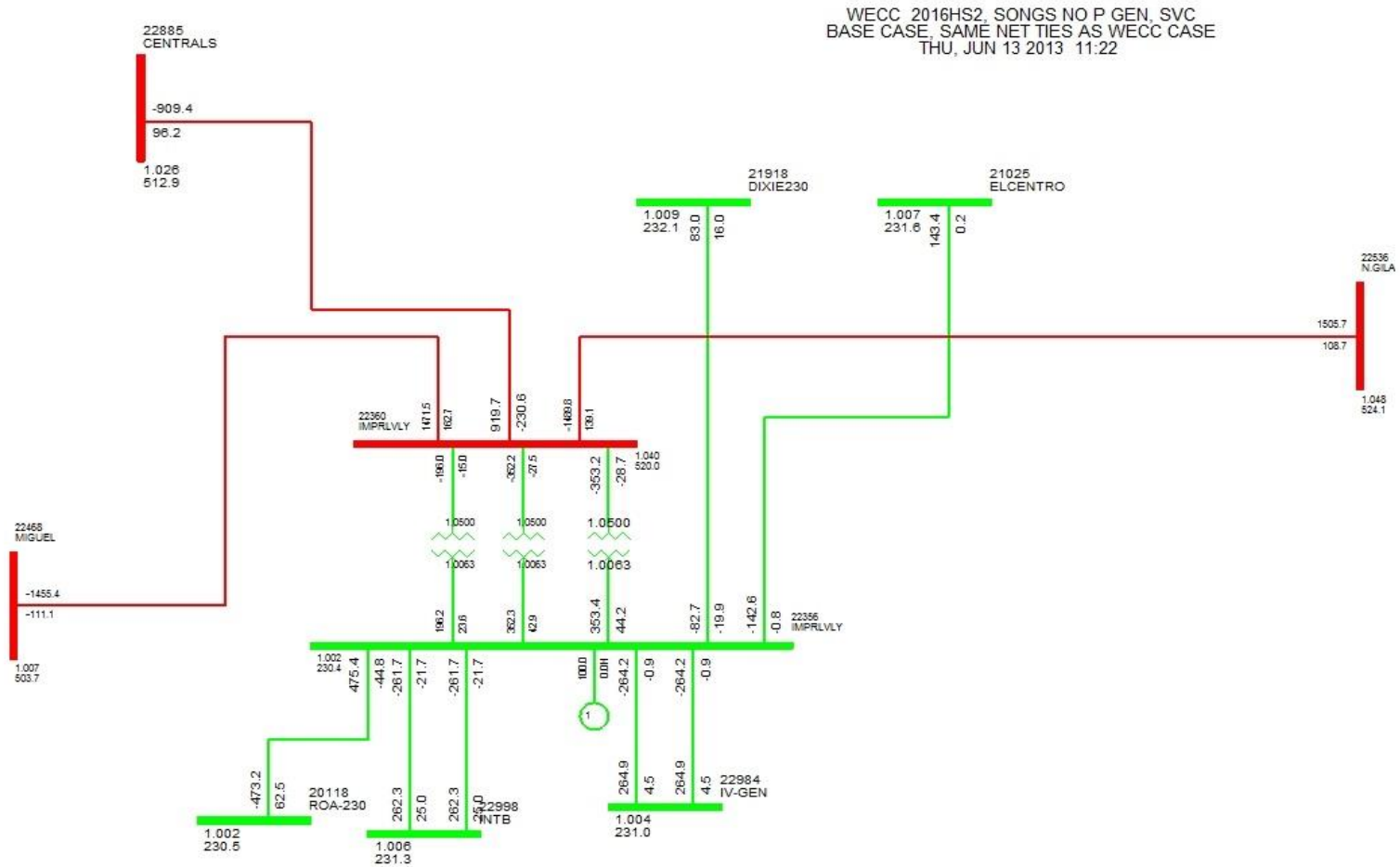
Bus - VOLTAGE (kV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar  
kV: <=138.000 <=230.000 <=345.000 <=500.000 >500.000

SONGS North -440.3 MW



SONGS South 440.3 MW

# Base Case: Imperial Valley (IV) Area



Imperial Valley 500 kV and Connections



# Base Case: Serrano Area

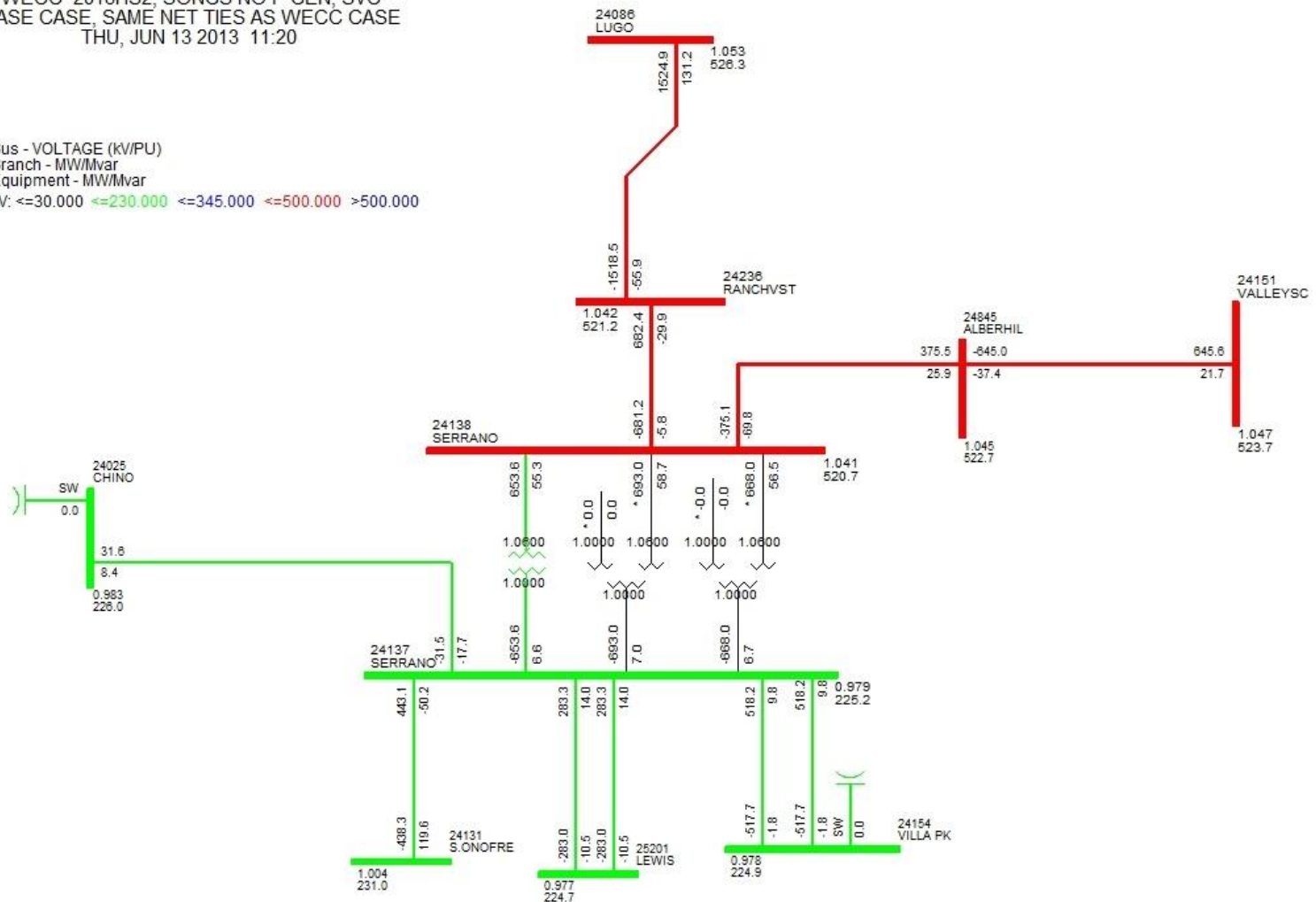
WECC 2016HS2, SONGS NO P GEN, SVC  
BASE CASE, SAME NET TIES AS WECC CASE  
THU, JUN 13 2013 11:20

Bus - VOLTAGE (kV/PU)

Branch - MW/Mvar

Equipment - MW/Mvar

KV: <=30.000 <=230.000 <=345.000 <=500.000 >500.000

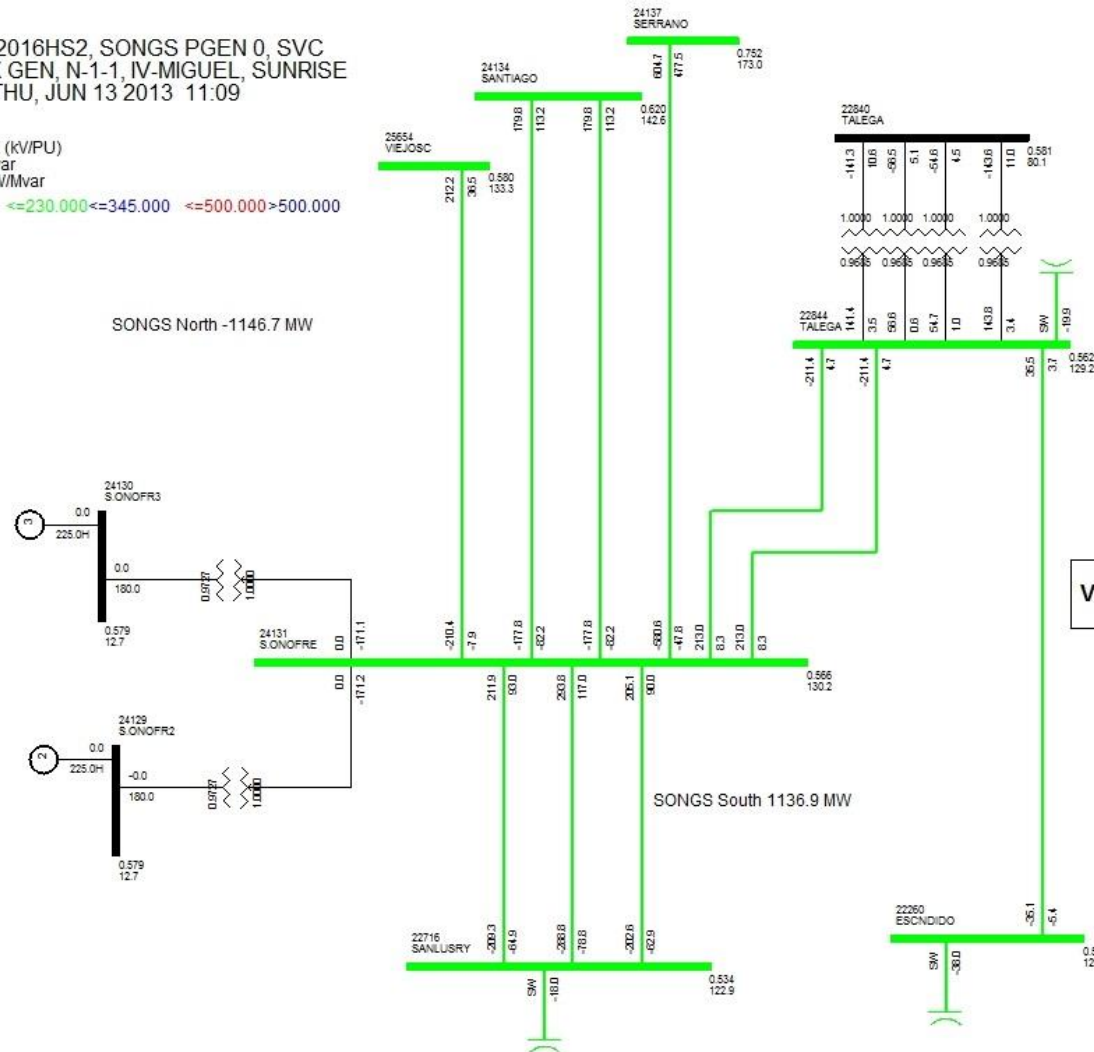


# N-1-1 on Base Case: Songs Area

WECC 2016HS2, SONGS PGEN 0, SVC  
SDGE MAX GEN, N-1-1, IV-MIGUEL, SUNRISE  
THU, JUN 13 2013 11:09

Bus - VOLTAGE (kV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar

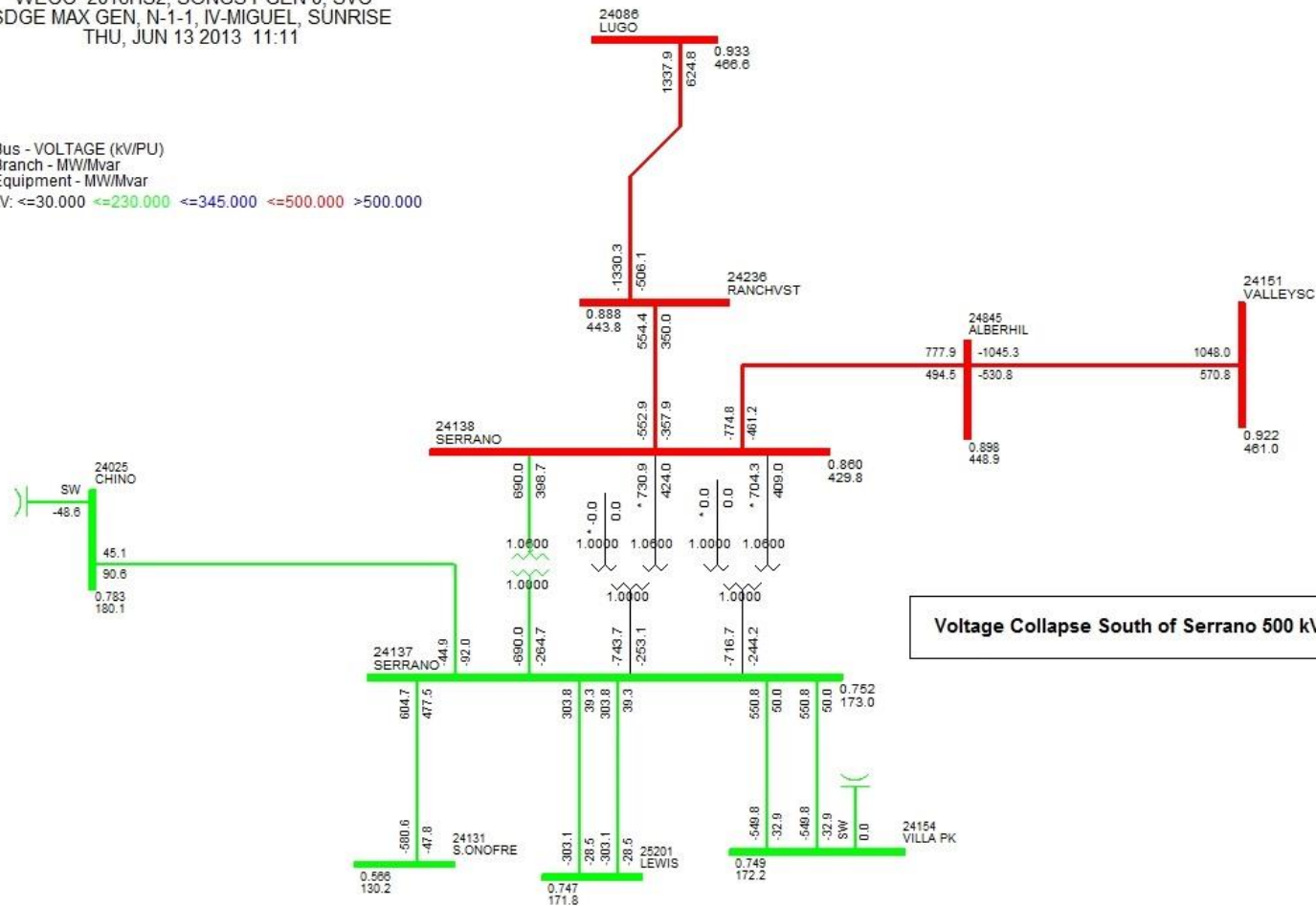
kV: <=138.000 <=230.000 <=345.000 <=500.000 >500.000



# N-1-1 on Base Case: Serrano Area

WECC 2016HS2, SONGS PGEN 0, SVC  
SDGE MAX GEN, N-1-1, IV-MIGUEL, SUNRISE  
THU, JUN 13 2013 11:11

Bus - VOLTAGE (kV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar  
KV: <=30.000 <=230.000 <=345.000 <=500.000 >500.000





# N-1-1 on Base Case: (IV) Area

WECC 2016HS2, SONGS PGEN 0, SVC  
SDGE MAX GEN, N-1-1, IV-MIGUEL, SUNRISE  
THU, JUN 13 2013 11:12

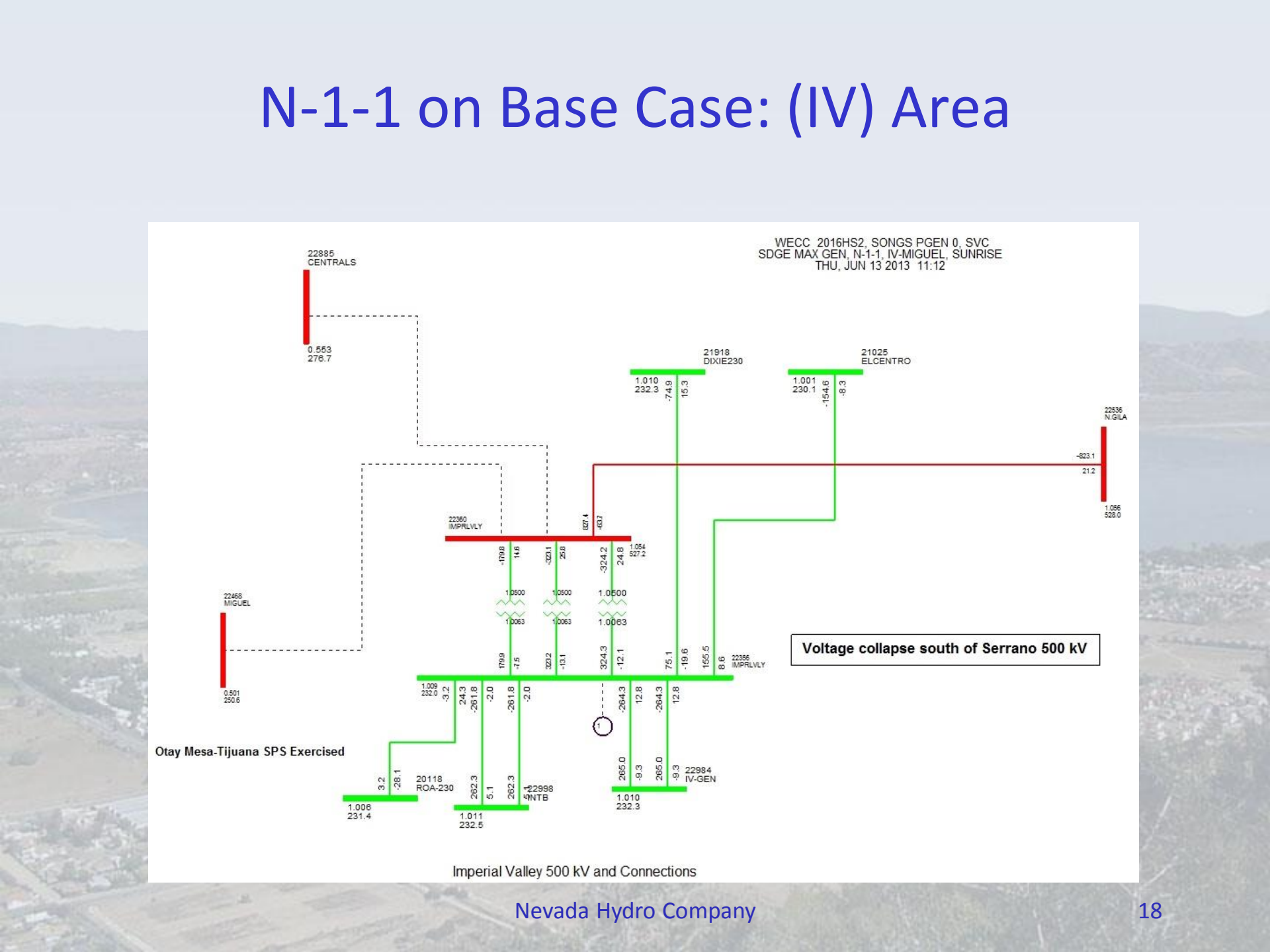
Voltage collapse south of Serrano 500 kV

Otay Mesa-Tijuana SPS Exercised

Imperial Valley 500 kV and Connections

Nevada Hydro Company

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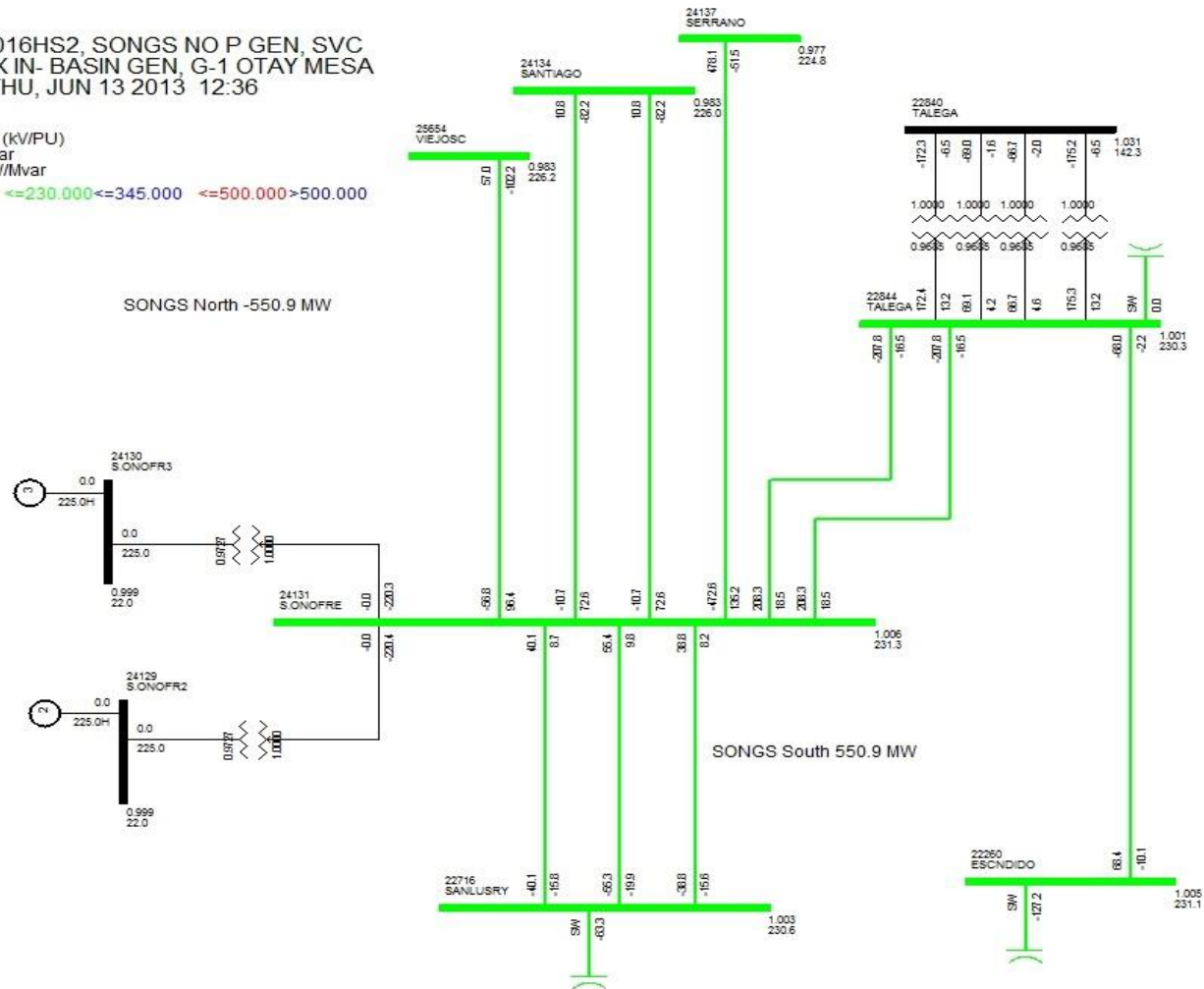
# San Diego High Gen, G-1 (Otay)

## SONGS Area

WECC 2016HS2, SONGS NO P GEN, SVC  
SDGE MAX IN- BASIN GEN, G-1 OTAY MESA  
THU, JUN 13 2013 12:36

Bus - VOLTAGE (kV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar

KV: <=138.000 <=230.000 <=345.000 <=500.000 >500.000



# San Diego High Gen, G-1 (Otay)

## Serrano Area

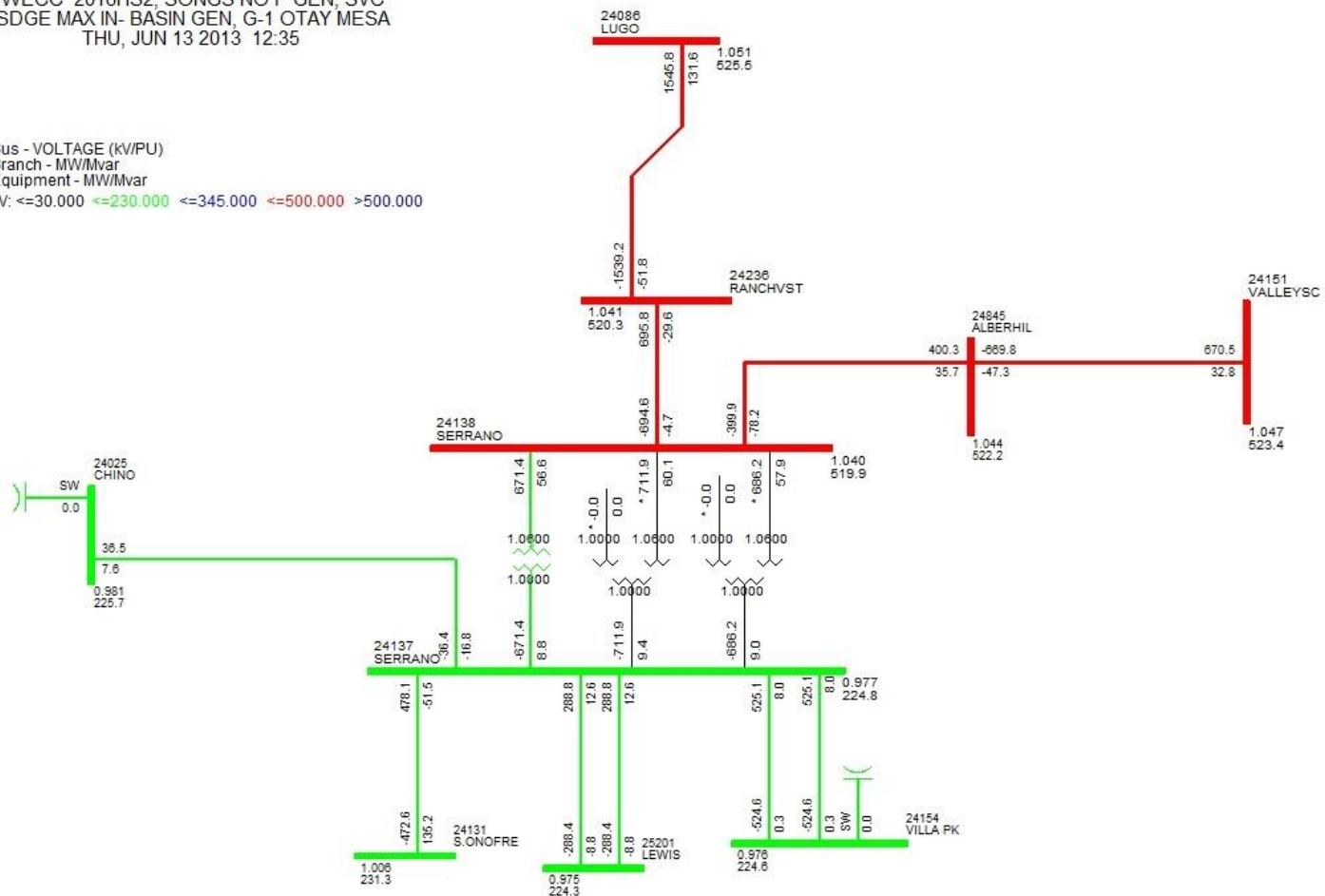
WECC 2016HS2, SONGS NO P GEN, SVC  
SDGE MAX IN- BASIN GEN, G-1 OTAY MESA  
THU, JUN 13 2013 12:35

Bus - VOLTAGE (kV/PU)

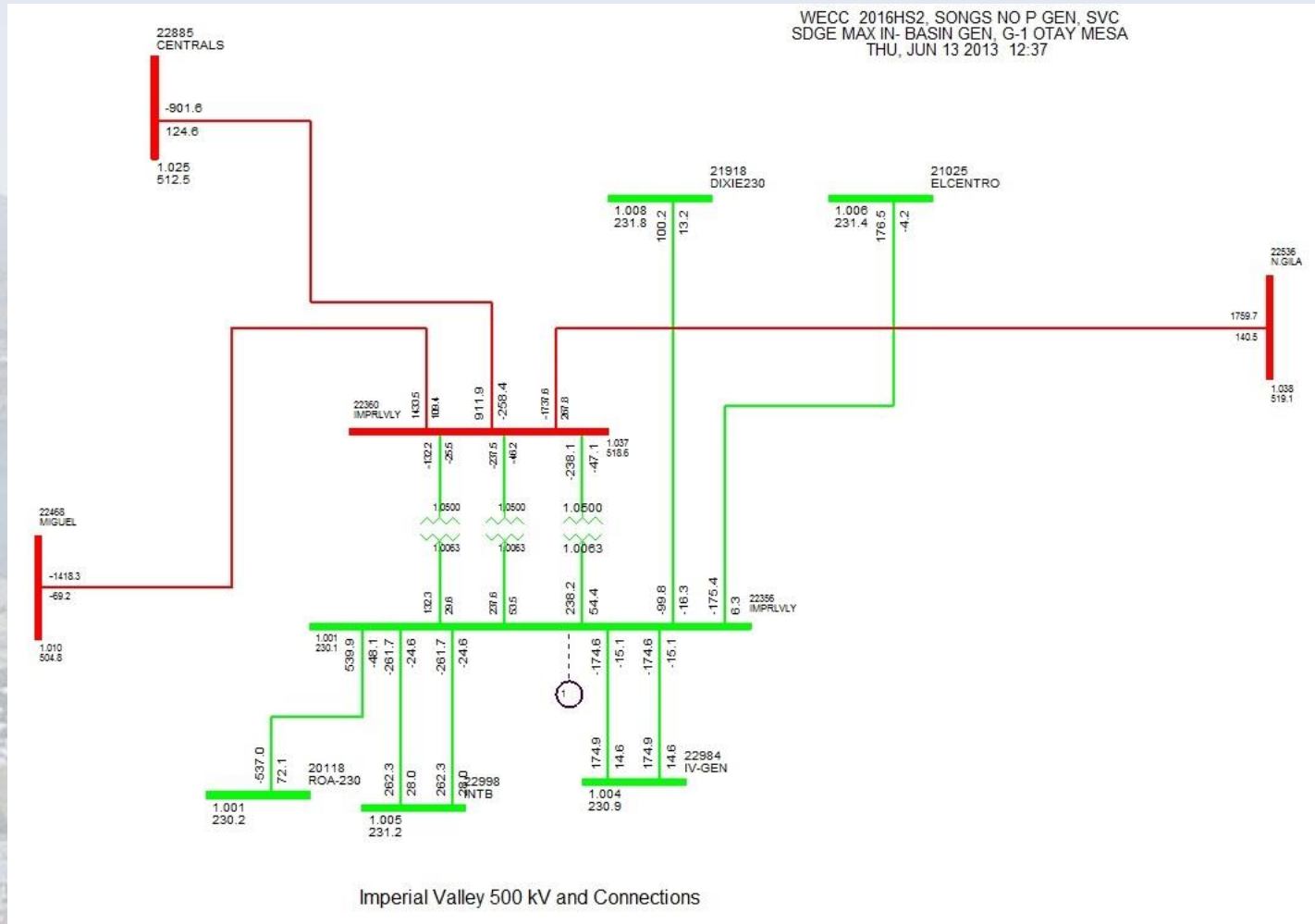
Branch - MW/Mvar

Equipment - MW/Mvar

kV: <=30.000 <=230.000 <=345.000 <=500.000 >500.000



# San Diego High Gen- G-1 (Otay) IV Area





# San Diego High Gen, G-1,N-1 (IV-N. Gila)

## SONGS Area

WECC 2016HS2, SONGS NO P GEN, SVC  
SDGE MAX IN-BASIN GEN, G-1 OTAY MESA, N-1 IV-MIGUEL  
THU, JUN 13 2013 12:56

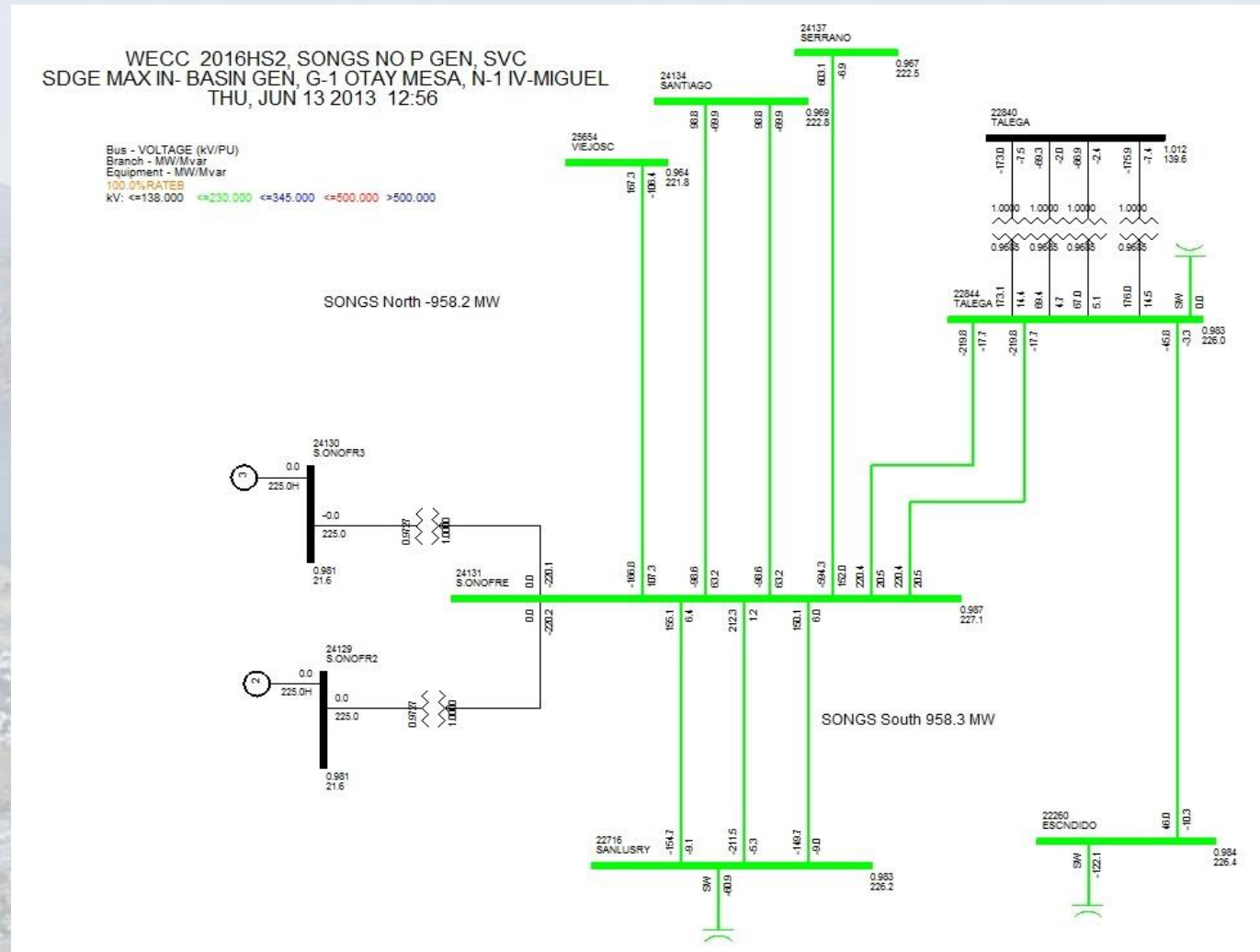
Bus - VOLTAGE (kV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar  
100.0% RATES  
KV: <=138.000 <=230.000 <=345.000 <=500.000 >500.000

SONGS North -958.2 MW

SONGS South 958.3 MW

Nevada Hydro Company

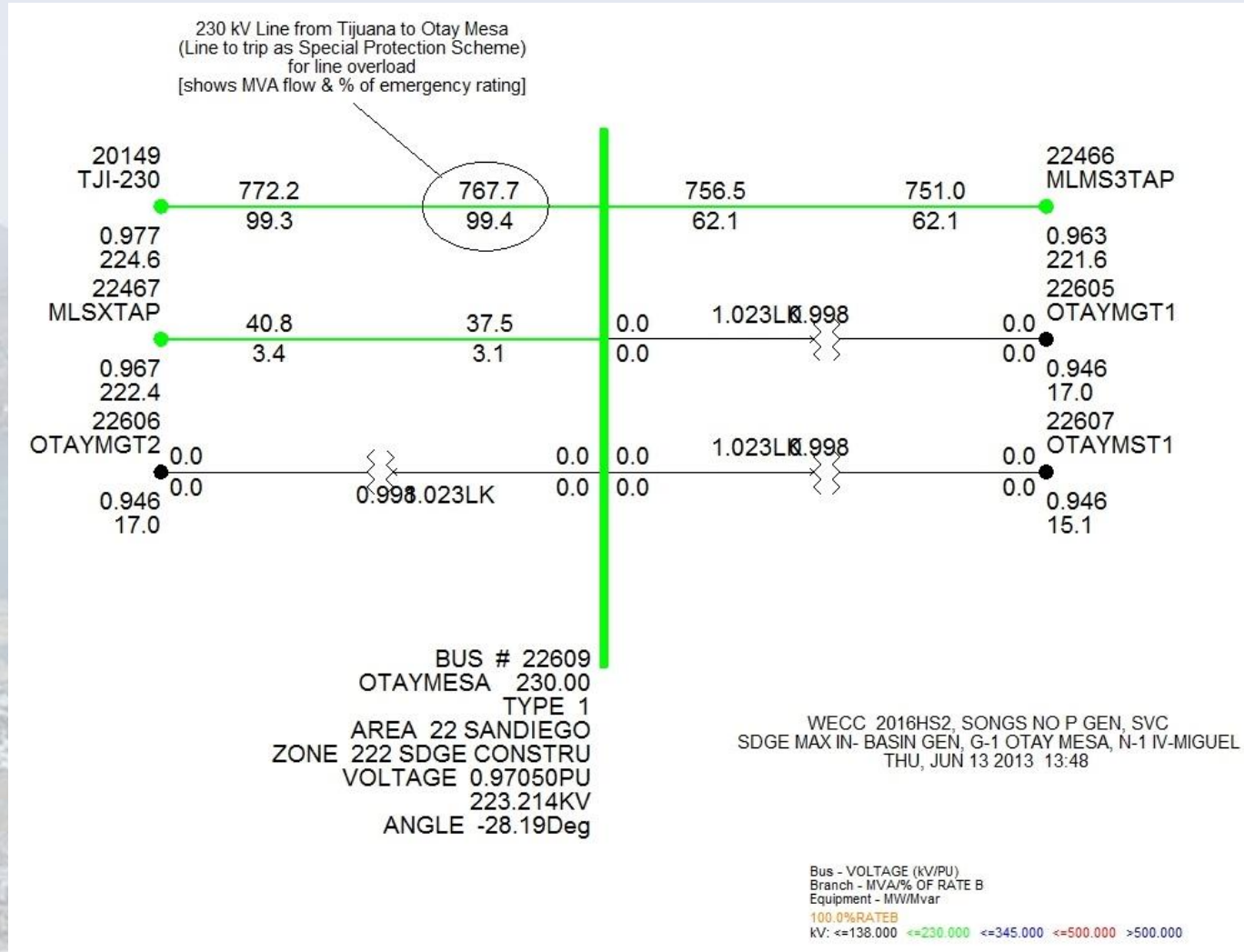
22



## 23

# San Diego High Gen, G-1, N1

## Otay Mesa Area





# Conclusion

- Base Plan without TE/VS
- Category C (N-1-1) contingency - loss of Imperial Valley-Miguel 500 kV line and then loss of the Sunrise 500 kV line:
  - even with all possible generation in the area south of Serrano all the way to the Mexican border at full output,
  - **full blackout of the LA Basin and the San Diego area.**
- G-1, N-1 Just Survives if all San Diego Gen at Max.
- Additional transmission needed to assure reliability.

# Addition of TE/VS-LEAPS

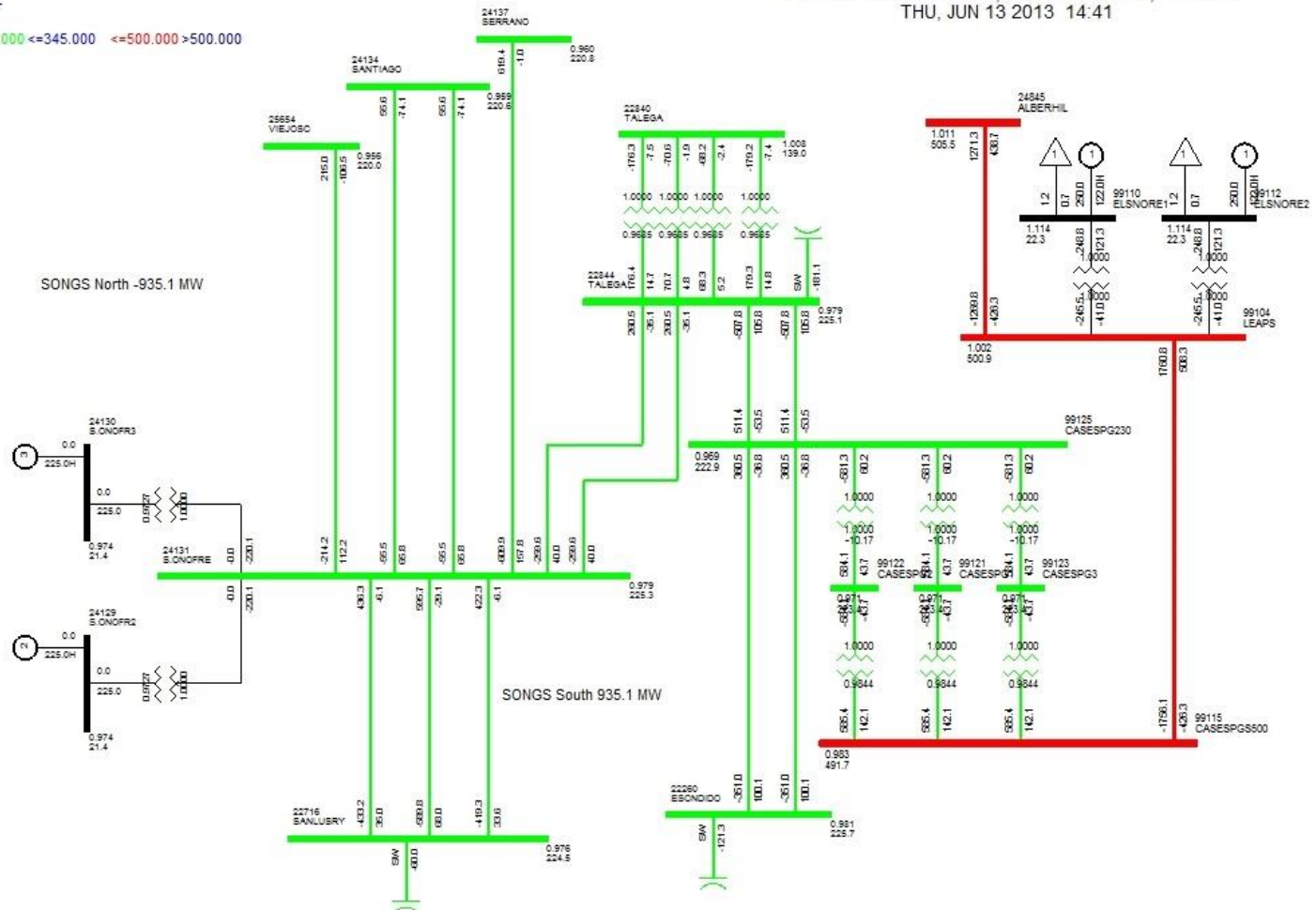
## Modeling Assumptions

- 2016 modeling data, without SONGS
- Cases with LEAPS and TE/VS added to Base Case
  - N-1-1 loss of IV-Miguel and Sunrise

# LEAPS-TE/VS, San Diego High Gen, N-1-1 SONGS Area

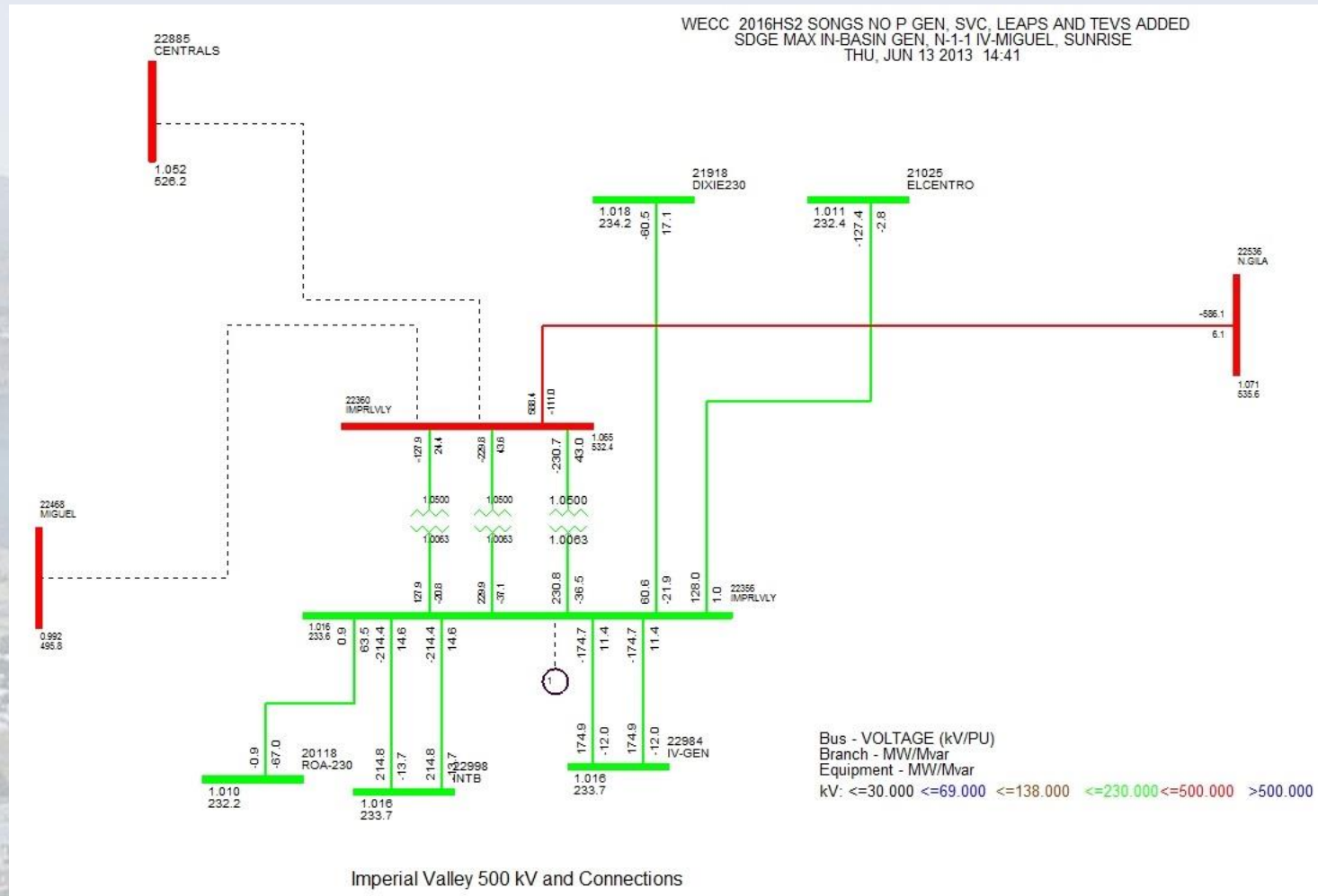
Bus - VOLTAGE (KV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar  
100.0%RATEB  
KV: <=30.000 <=230.000 <=345.000 <=500.000 >500.000

WECC 2016HS2 SONGS NO P GEN, SVC, LEAPS AND TEVS ADDED  
SDGE MAX IN-BASIN GEN, N-1-1 IV-MIGUEL, SUNRISE  
THU, JUN 13 2013 14:41





# LEAPS-TE/VIS San Diego High Gen, N-1-1 IV Area

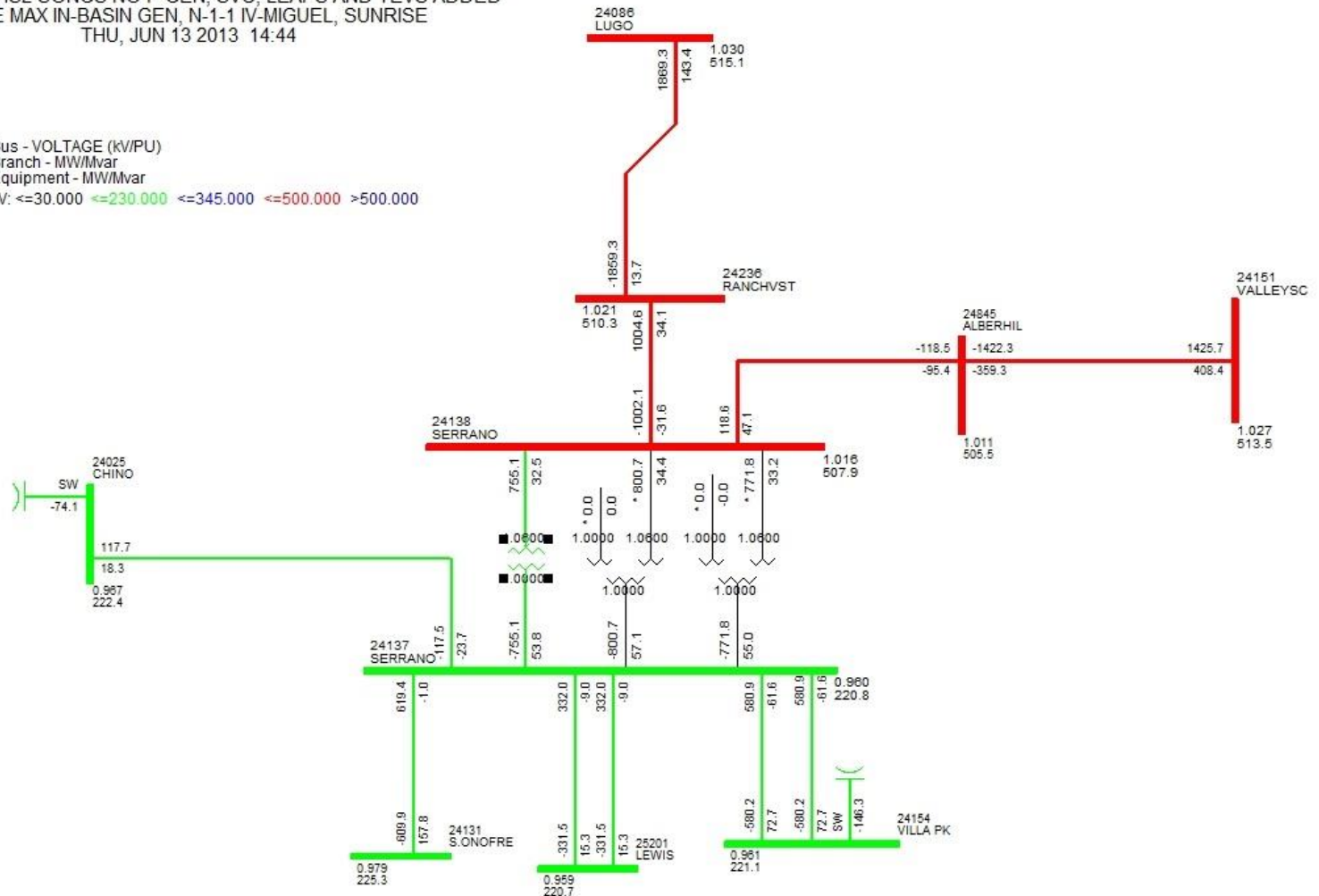


# LEAPS-TE/VIS, San Diego High Gen, N-1-1 Serrano Area

WECC 2016HS2 SONGS NO P GEN, SVC, LEAPS AND TEVS ADDED  
SDGE MAX IN-BASIN GEN, N-1-1 IV-MIGUEL, SUNRISE  
THU, JUN 13 2013 14:44

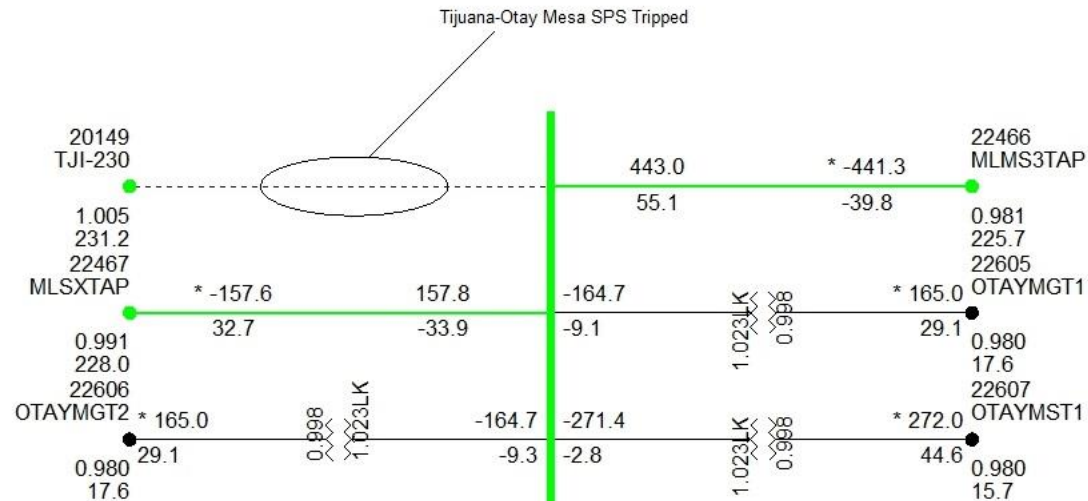
Bus - VOLTAGE (kV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar

kV: <=30.000 <=230.000 <=345.000 <=500.000 >500.000



# LEAPS-TE/VS San Diego High Gen, N-1-1 Otay Mesa Area

WECC 2016HS2 SONGS NO P GEN, SVC, LEAPS AND TEVS ADDED  
SDGE MAX IN-BASIN GEN, N-1-1 IV-MIGUEL, SUNRISE  
THU, JUN 13 2013 14:48



BUS # 22609  
OTAYMESA 230.00  
TYPE 1  
AREA 22 SANDIEGO  
ZONE 222 SDGE CONSTRU  
VOLTAGE 0.98968PU  
227.626KV  
ANGLE -50.15Deg



# Conclusion

- Plan with TE/VS
- Category C (N-1-1) contingency - loss of Imperial Valley-Miguel 500 kV line and then loss of the Sunrise 500 kV line:
  - **Provides survival of retirement of SONGS**

# Talega Extension

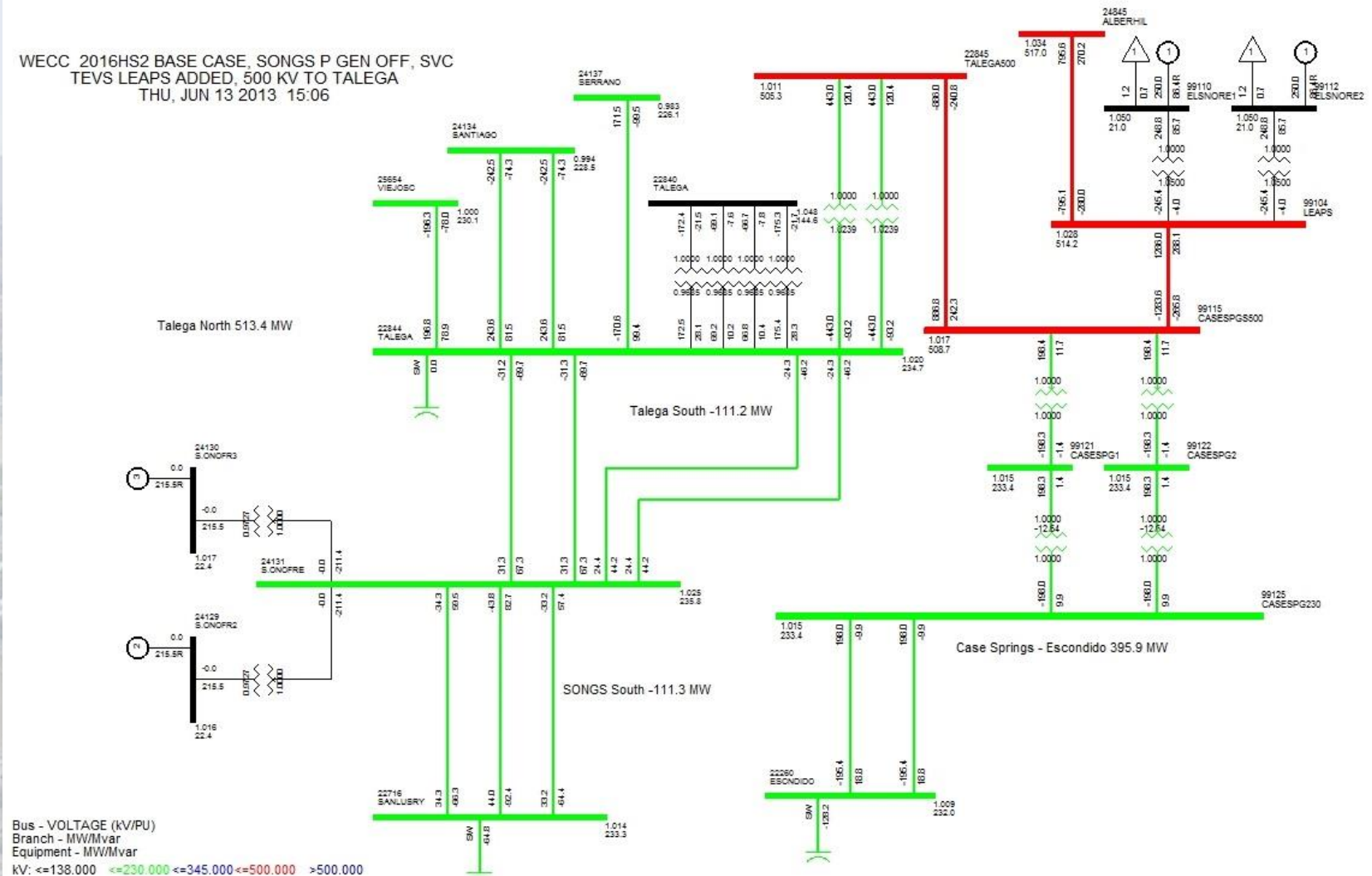
## Modeling Assumptions

- 2016 modeling data, without SONGS
- Cases with LEAPS and TE/VS added to Base Case
- 500 kV line added from Case Springs to Talega to TEVS-LEAPS plan,
  - High generation in San Diego basin, no contingency
  - High generation in San Diego basin, N-1-1
- TEVS added to base case, 500 kV line from Case Springs to Talega
  - High generation in San Diego basin, no contingency
  - High generation in San Diego basin, N-1-1

# Base Case: TE/Vs-LEAPS (with Talega Extension)

## SONGS Area

WECC 2016HS2 BASE CASE, SONGS P GEN OFF, SVC  
TEVS LEAPS ADDED, 500 KV TO TALEGA  
THU, JUN 13 2013 15:06



# Base Case: TE/Vs-LEAPS with Talega 500 kV Serrano Area

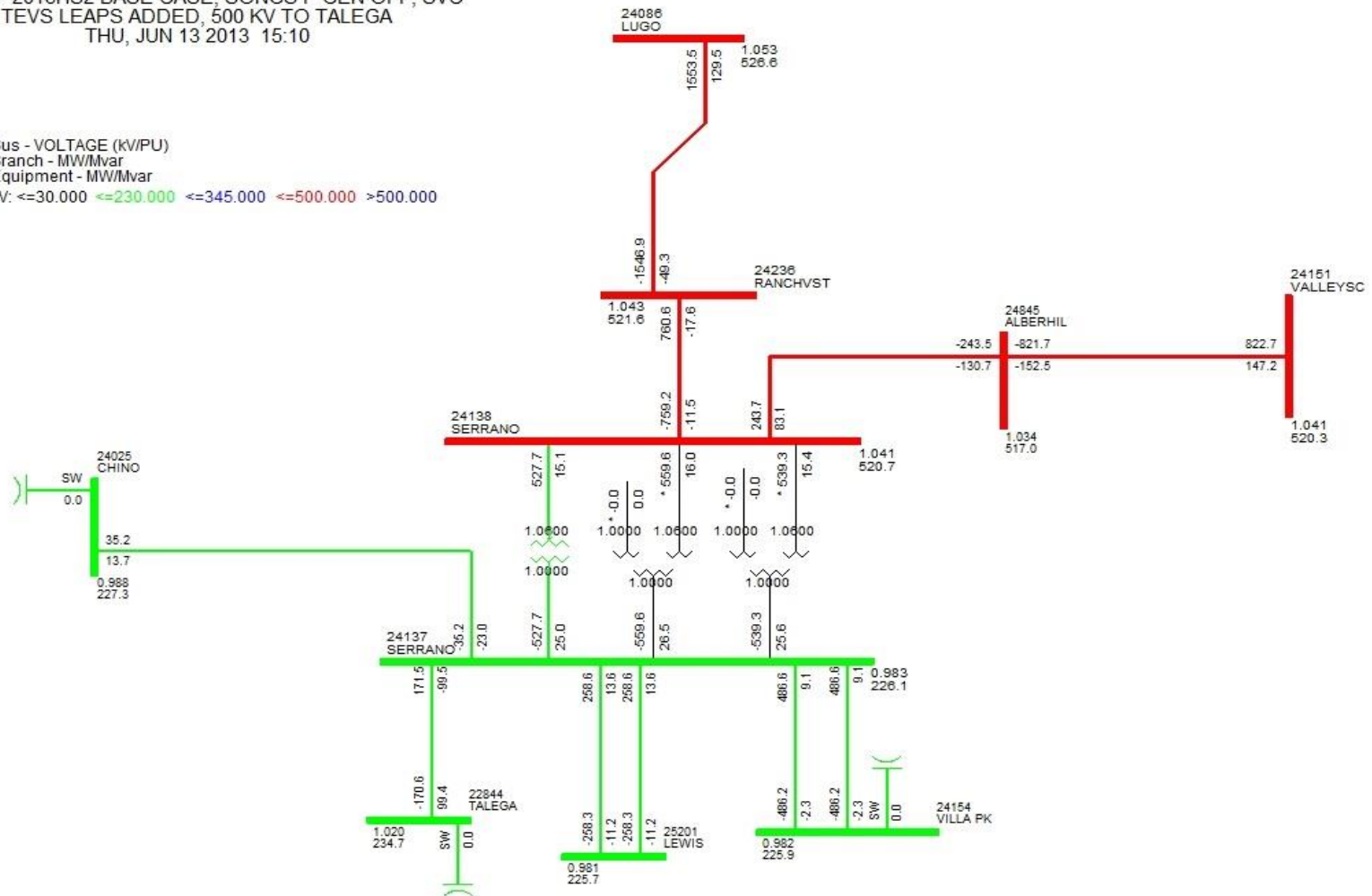
WECC 2016HS2 BASE CASE, SONGS P GEN OFF, SVC  
TEVS LEAPS ADDED, 500 KV TO TALEGA  
THU, JUN 13 2013 15:10

Bus - VOLTAGE (KV/PU)

Branch - MW/Mvar

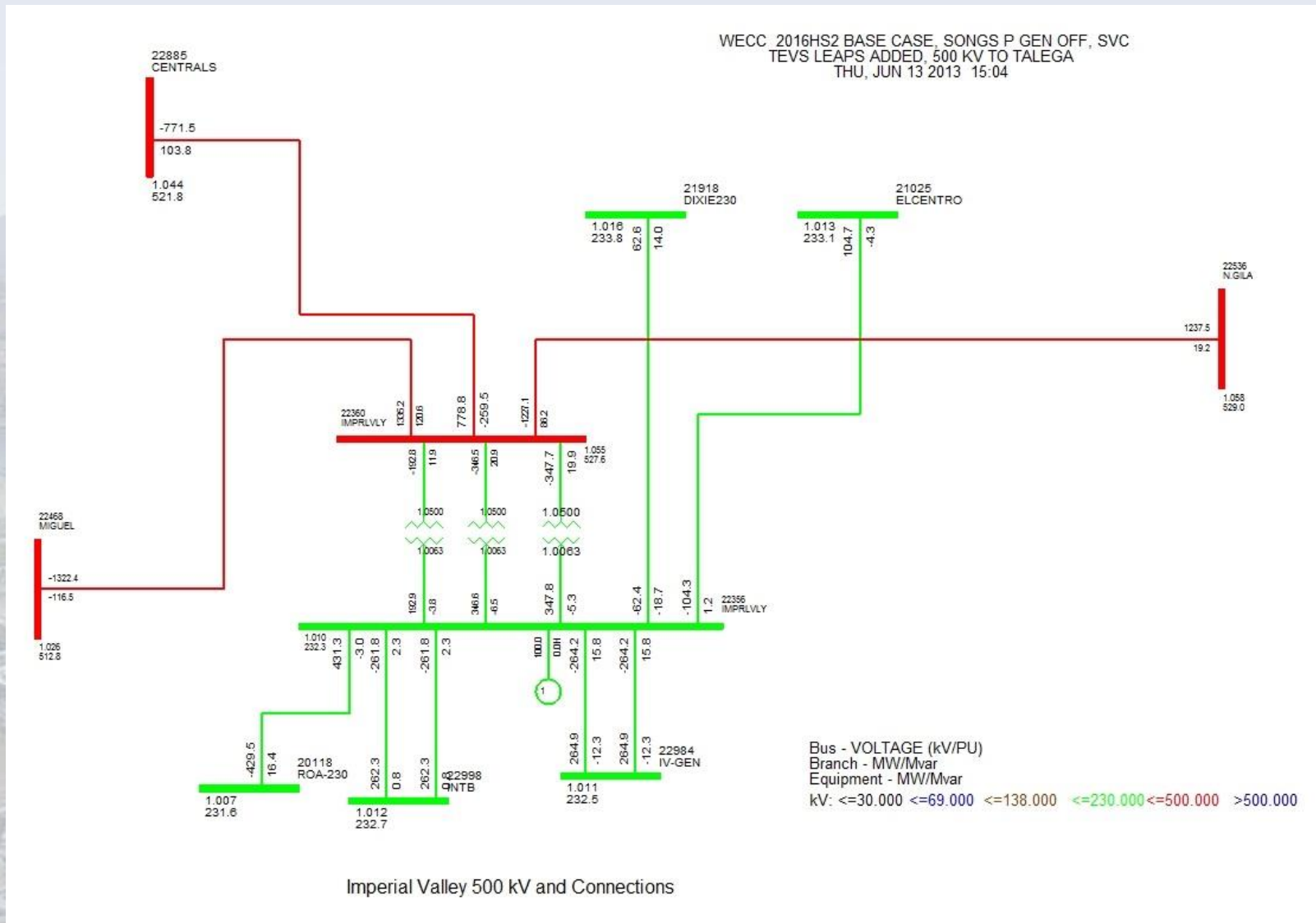
Equipment - MW/Mvar

KV: <=30.000 <=230.000 <=345.000 <=500.000 >500.000



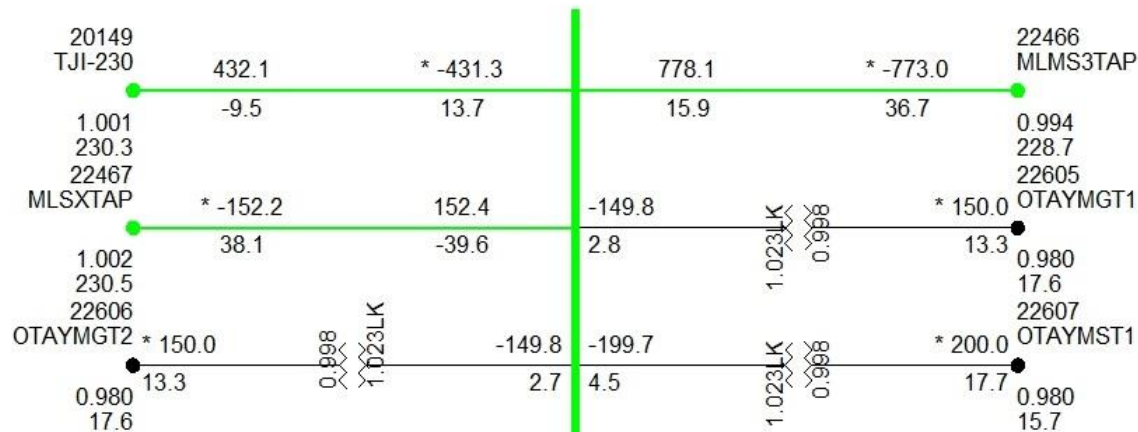


# Base Case: TE/Vs-LEAPS(with Talega Extension) IV Area

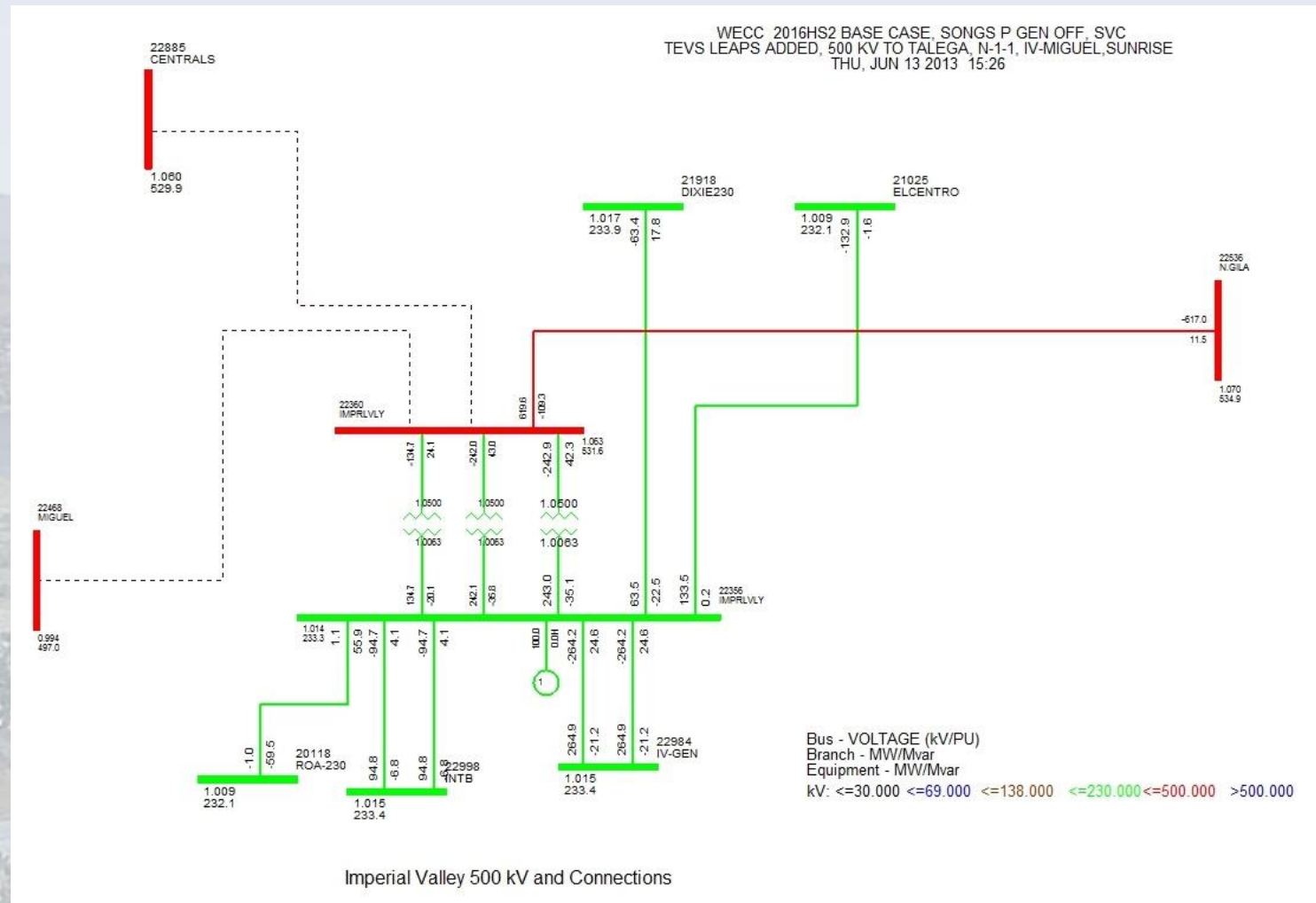


# Base Case: TE/VS LEAPS with Talega 500 kV Otay Mesa Area

WECC 2016HS2 BASE CASE, SONGS P GEN OFF, SVC  
TEVS LEAPS ADDED, 500 KV TO TALEGA  
THU, JUN 13 2013 15:05

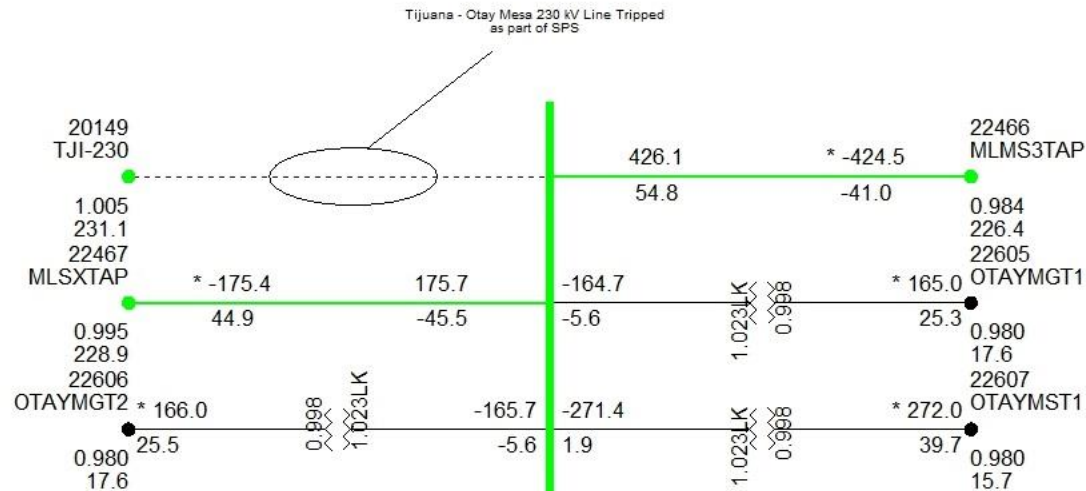


# LEAPS-TE/VIS, San Diego High Gen, N-1-1 IV Area



# LEAPS-TE/VIS, San Diego High Gen, N-1-1 Otay Mesa Area

WECC 2016HS2 BASE CASE, SONGS P GEN OFF, SVC  
TEVS LEAPS ADDED, 500 KV TO TALEGA, N-1-1, IV-MIGUEL, SUNRISE  
THU, JUN 13 2013 15:26



BUS # 22609  
OTAYMESA 230.00  
TYPE 1  
AREA 22 SANDIEGO  
ZONE 222 SDGE CONSTRU  
VOLTAGE 0.99233PU  
228.236KV  
ANGLE -49.33Deg

Bus - VOLTAGE (kV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar  
100.0%RATEB  
kV: <=30.000 <=230.000 <=345.000 <=500.000 >500.000

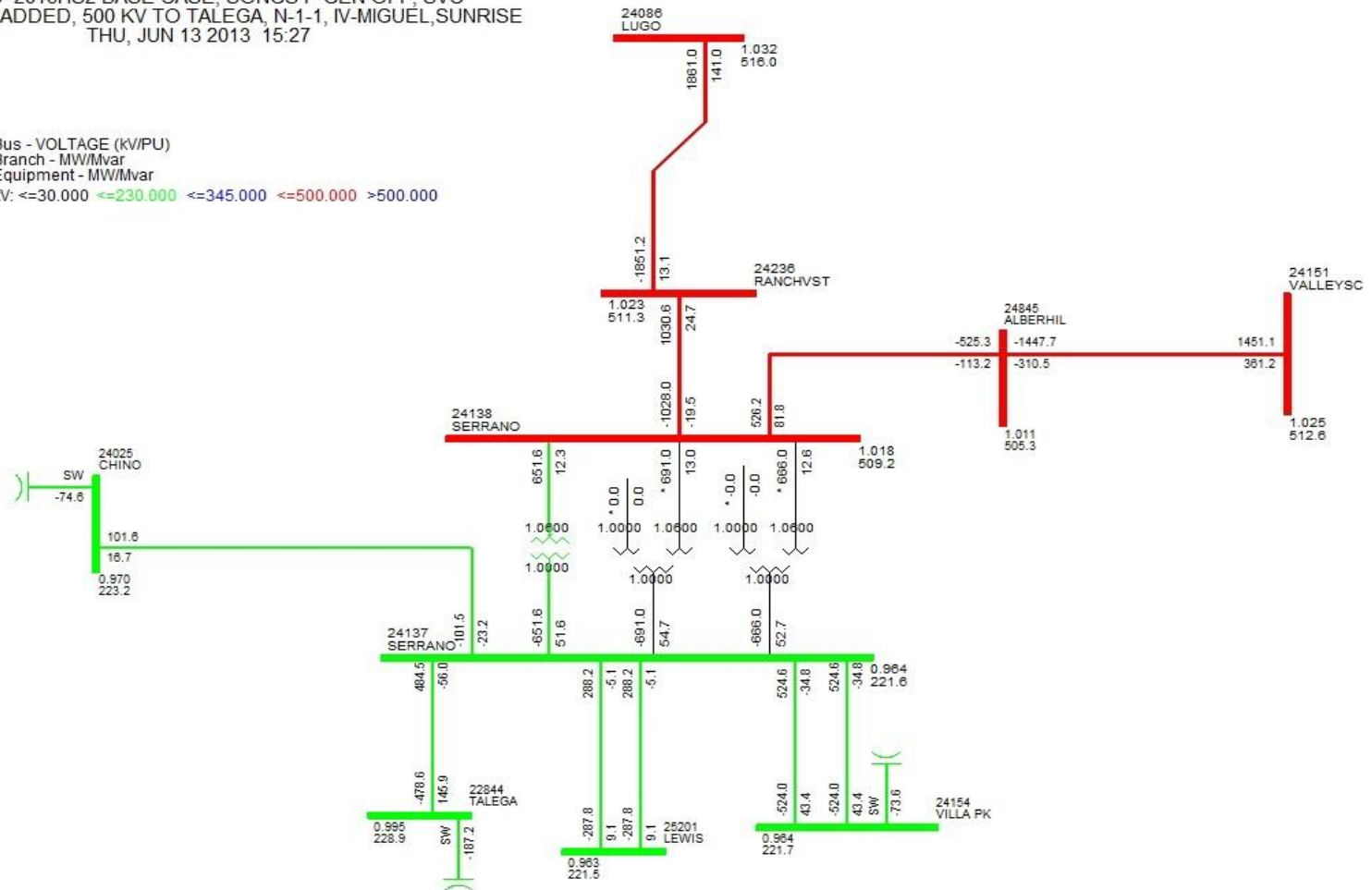


# LEAPS-TE/VS, San Diego High Gen, n-1-1 Serrano Area

WECC 2016HS2 BASE CASE, SONGS P GEN OFF, SVC  
TEVS LEAPS ADDED, 500 KV TO TALEGA, N-1-1, IV-MIGUEL, SUNRISE  
THU, JUN 13 2013 15:27

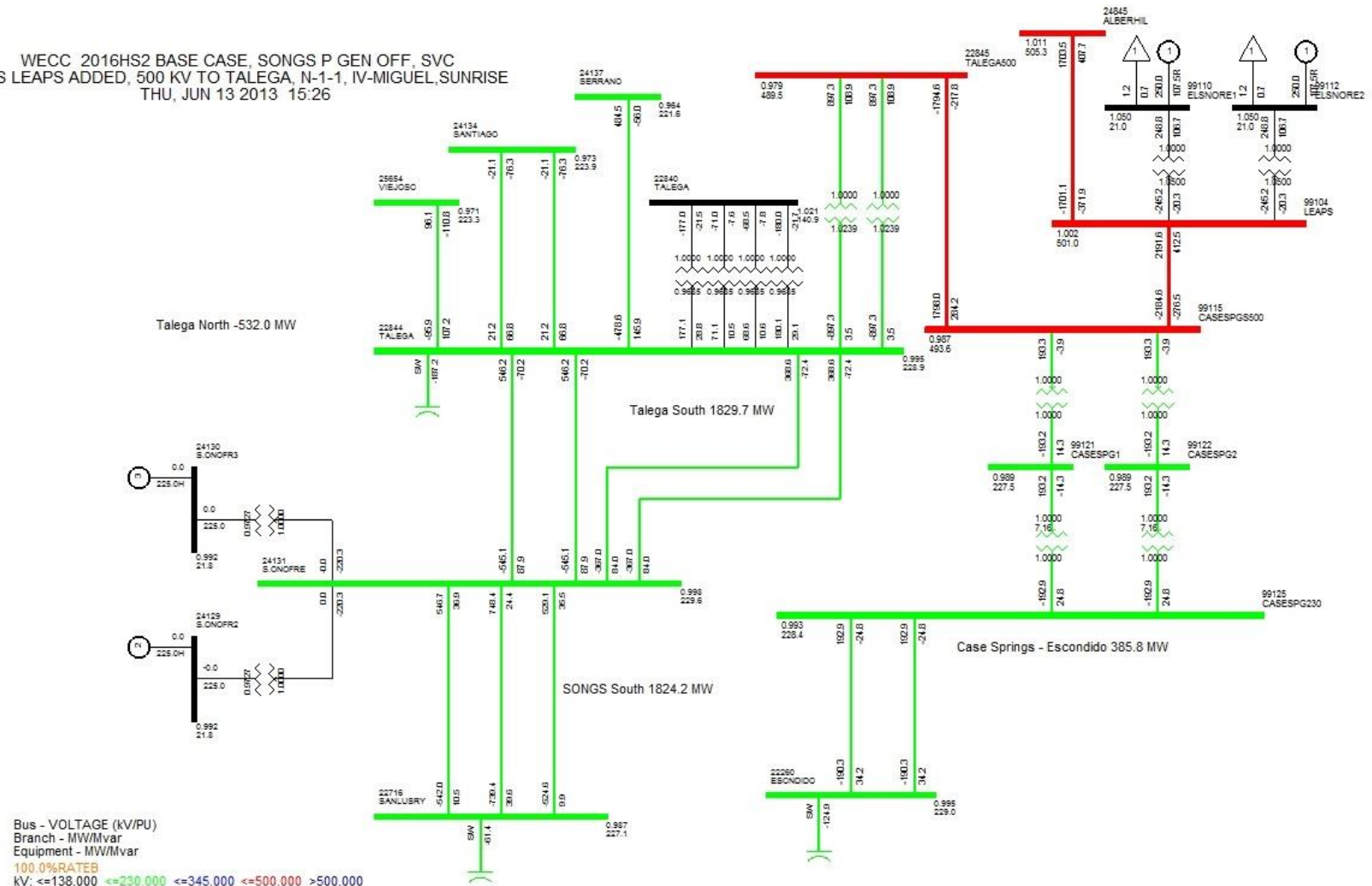
Bus - VOLTAGE (kV/PU)  
Branch - MW/Mvar  
Equipment - MW/Mvar

kV: <=30.000 <=230.000 <=345.000 <=500.000 >500.000



# LEAPS-TE/VS, San Diego High Gen, N-1-1 Songs Area

WECC 2016HS2 BASE CASE, SONGS P GEN OFF, SVC  
TEVS LEAPS ADDED, 500 KV TO TALEGA, N-1-1, IV-MIGUEL, SUNRISE  
THU, JUN 13 2013 15:26



# Conclusions

- TE/VS-LEAPS with Talega Extension provides additional margin of deliverability
- Category C (N-1-1) contingency - loss of Imperial Valley-Miguel 500 kV line and then loss of the Sunrise 500 kV line:
  - More easily provides reliable service to region
  - **Provides capability to improve both retirement of SONGS and OTC retirements**

# Conclusions

1. TE/VIS-LEAPS provides near-term reliability needs for retirement of SONGS.
2. TE/VIS-LEAPS with 500 kV extension to Talega provides additional capability to assure reliability with SONGS and Once-through-Cooling Generation retirement.
3. TE/VIS-LEAPS is “Shovel ready” pending CPUC approval.