



# 2016 and 2020 Final LCR Study Results - Fresno

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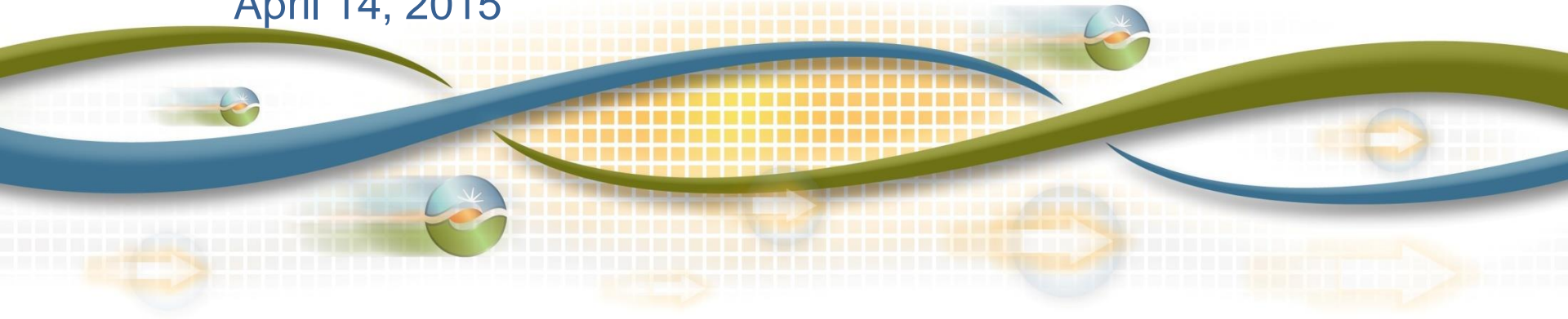
Senior Regional Transmission Engineer

Vera Hart

Regional Transmission Engineer

Stakeholder Teleconference

April 14, 2015



# Fresno LCR Area



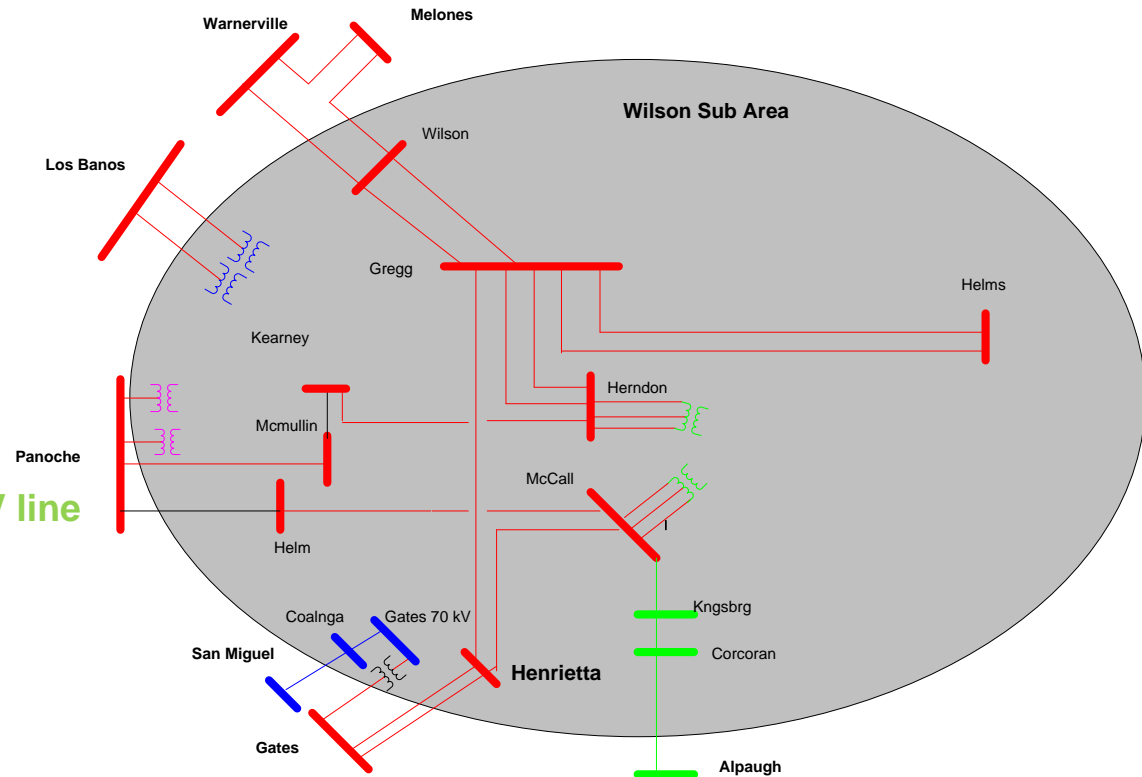
# Greater Fresno Area

## Electrical Boundaries and LCR Sub-Areas

### Electrical Boundaries:

- Gates – McCall 230 kV line
- Gates – Gregg 230 kV line
- Panoche – Kearney 230 kV line
- Panoche – Helm 230 kV line
- Warnerville – Wilson 230 kV line
- Melones – Wilson 230 kV line
- Panoche 230/115 kV transformer #1
- Panoche 230/115 kV transformer #2
- Smyrna – Alpaugh – Corcoran 115 kV line
- Los Banos #3 230/70 kV transformer
- Los Banos #4 230/70 kV transformer
- San Miguel – Coalinga #1 70 kV line
- Gates 230/70 kV transformer #1

### LCR Sub-Areas:



# Fresno Area Load and Resources (MW)

		<b>2016</b>	<b>2020</b>
Load	=	3275	3515
AAEE	=	-35	-93
Transmission Losses	=	91	90
<b>Total Load</b>	=	<b>3331</b>	<b>3512</b>
Market Generation	=	2647	2647
Muni Generation	=	168	168
QF Generation	=	114	114
<b>Total Qualifying Capacity</b>	=	<b>2929</b>	<b>2929</b>

# New transmission projects modeled:

1. Fresno Reliability (stages: 2014, 2015, 2016, 2016)
2. Cressey - Gallo 115 kV Line (2016)
3. Lemoore 70 kV Disconnect Switches Replacement (2016)
4. Kearney 230/70 kV Transformer Addition (2017)
5. Kearney - Caruthers 70 kV Line Reconductor (2017)
6. Caruthers - Kingsburg 70 kV Line Reconductor (2017)
7. Reedley-Dinuba 70 kV Line Reconductor (2017)
8. Reedley-Orosi 70 kV Line Reconductor (2017)
9. Helm - Kerman 70 kV Line Reconductor (2017)
10. Ashlan - Gregg and Ashlan - Herndon 230 kV Line Reconductor (2017)
11. Oakhurst/Coarsegold UVLS (2017)
12. Gregg - Herndon #2 230 kV Line Circuit Breaker Upgrade (2017)
13. Los Banos - Livingston Jct - Canal 70 kV Switch Replacement (2017)
14. Warnerville - Bellota 230 kV Line Reconductoring (2017)
15. Gates No. 2 500/230 kV Transformer (2018)

## New transmission projects modeled: (cont.)

16. Series Reactor on Warnerville-Wilson 230 kV Line (2018)
17. Reedley 70 kV Reinforcement (2018)
18. Reedley 115/70 kV Transformer Capacity Increase (2018)
19. Cressey - North Merced 115 kV Line Addition (2018)
20. Kearney - Kerman 70 kV Line Reconductor (2018)
21. Kearney - Herndon 230kV Line Reconductor (2019)
22. McCall - Reedley #2 115 kV Line (2019)
23. Oro Loma - Mendota 115 kV Conversion Project (2019)
24. Wilson 115 kV Area Reinforcement (2019)
25. Borden 230 kV Voltage Support (2019)
26. Northern Fresno 115 kV Area Reinforcement (2019)
27. Kerchhoff PH #2 - Oakhurst 115 kV Line (2020)
28. Oro Loma 70 kV Area Reinforcement (2020)

# Fresno Area LCR

## 2016 Hanford Sub-Area

### Limiting Contingencies:

#### Category C:

- L-1/T-1: McCall-Kingsburg #2 115 kV & Henrietta 230/115kV TB #3
- Constraint McCall-Kingsburg #1 115kV line

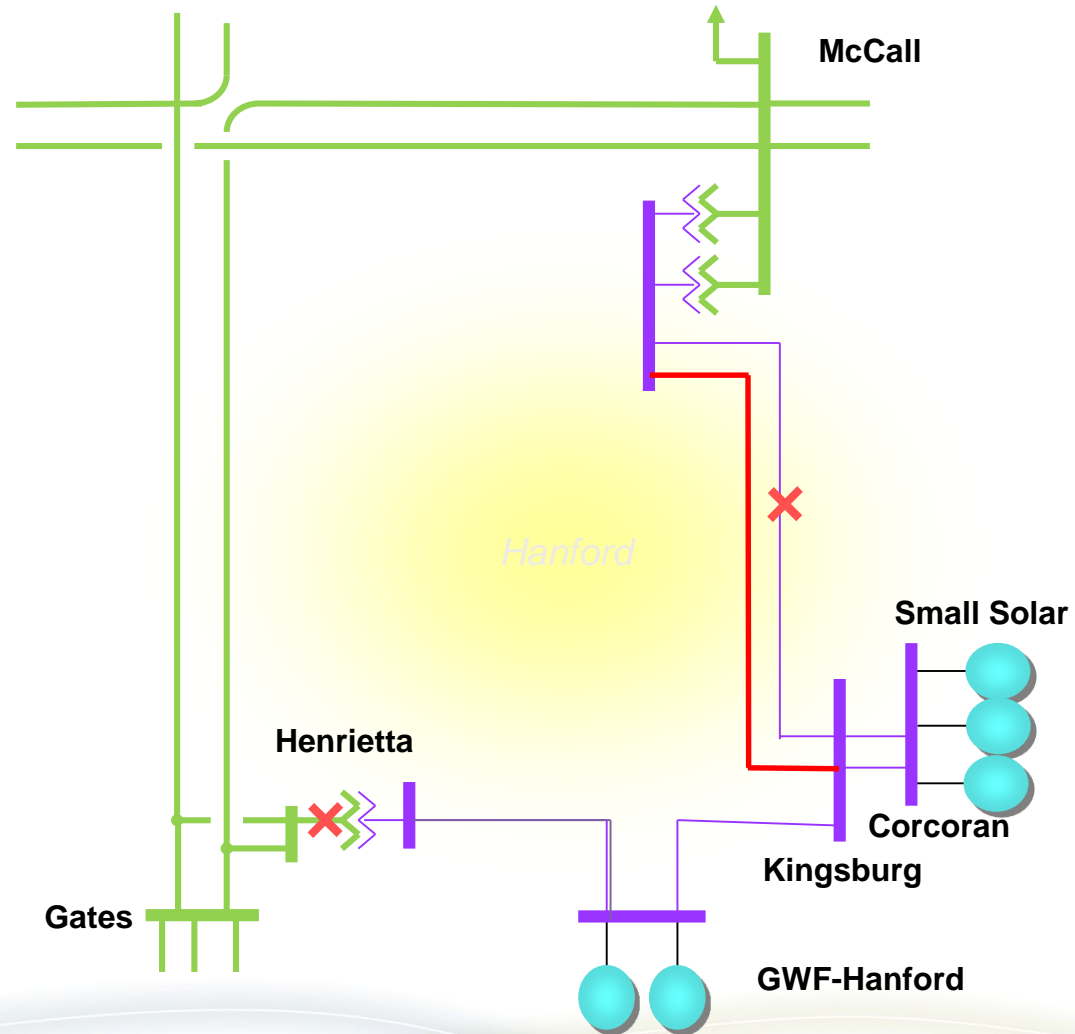
Category B: No LCR need

### LCR Results (MW):

Contingency	Cat. C
LCR	91

Including:

QF	0
Muni	0
Deficiency	0





# Fresno Area LCR

## 2016 Coalinga Sub-Area

### Limiting Contingencies:

#### Category C:

- T-1/L-2: Gates 230/70kV TB #5 and Panoche-Schindler #1 & #2 115kV common tower lines
- Constraint:
  - Voltage instability

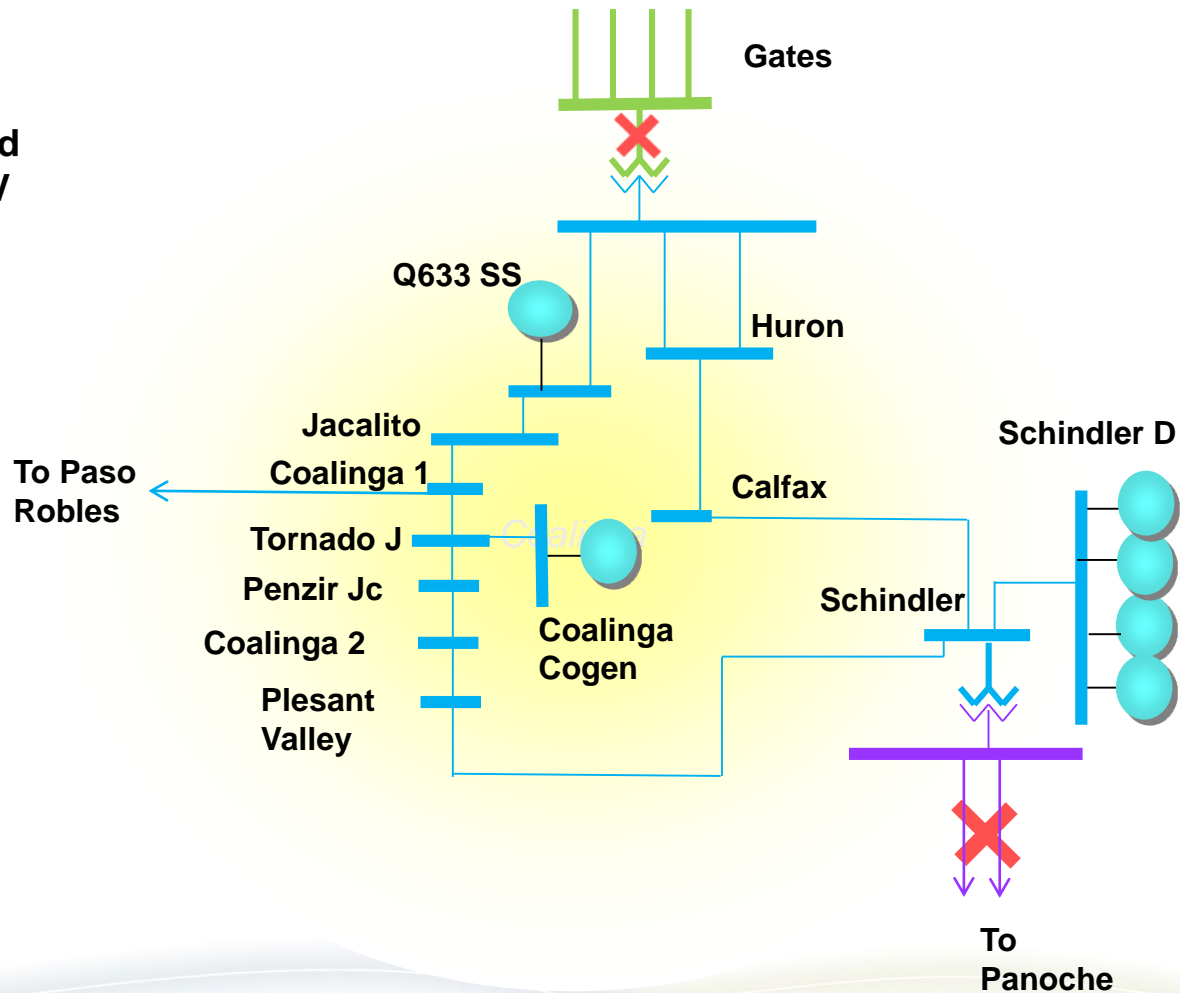
#### Category B: No LCR need

#### LCR Results (MW):

Contingency	Cat. C
LCR	93

Including:

QF	2
Muni	0
Deficiency	24





# Fresno Area LCR

## 2016 Borden Sub-Area

### Limiting Contingencies:

Category B: No LCR need

Category C:

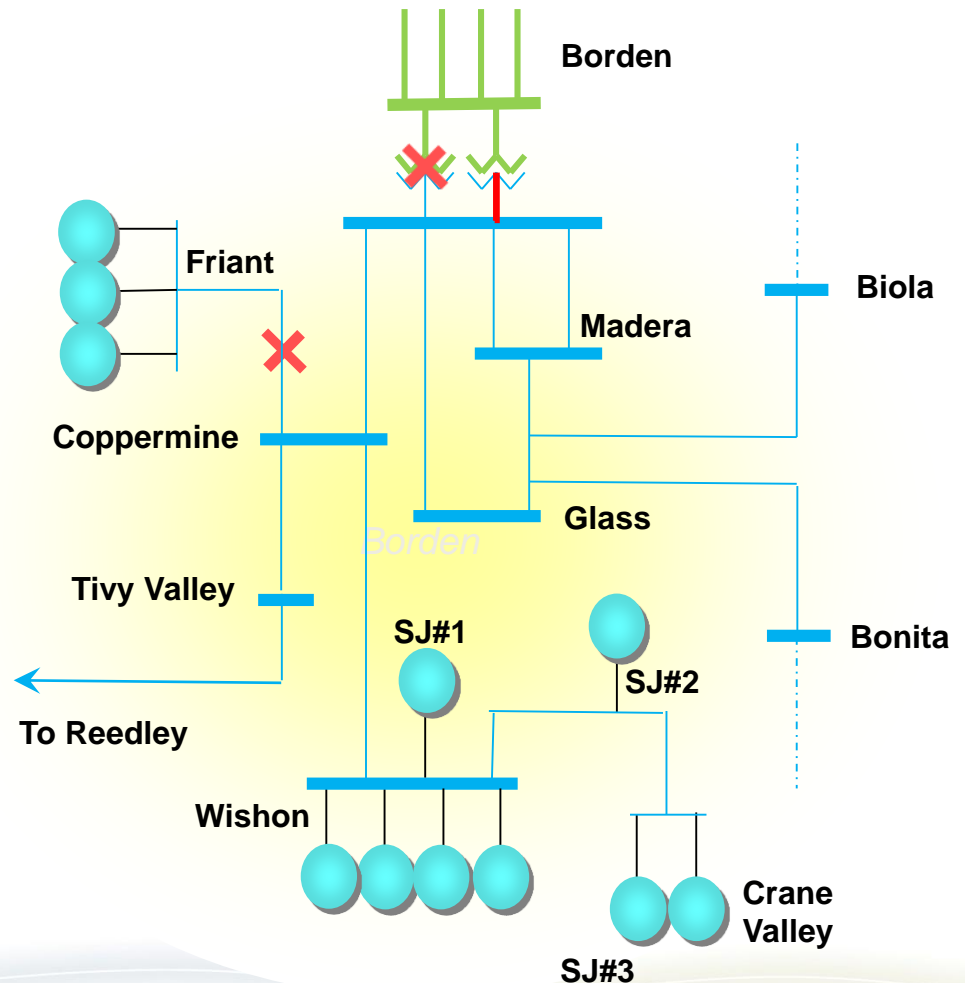
- L-1/T-1: Friant - Coppermine 70 kV and Borden 230/70 kV # 4
- Constraint: Borden 230/70 kV # 1

### LCR Results (MW):

Contingency	Cat. B	Cat. C
LCR	0	23

Including:

QF	0	16
Muni	0	0
Deficiency	0	0



# Fresno Area LCR

## 2016 Reedley Sub-Area

### Limiting Contingencies:

#### Category C:

- L-1-1: McCall-Reedley (McCall-Wahtoke) 115 kV & Sanger-Reedley 115kV
- Constraint: Kings River-Sanger-Reedley 115 kV

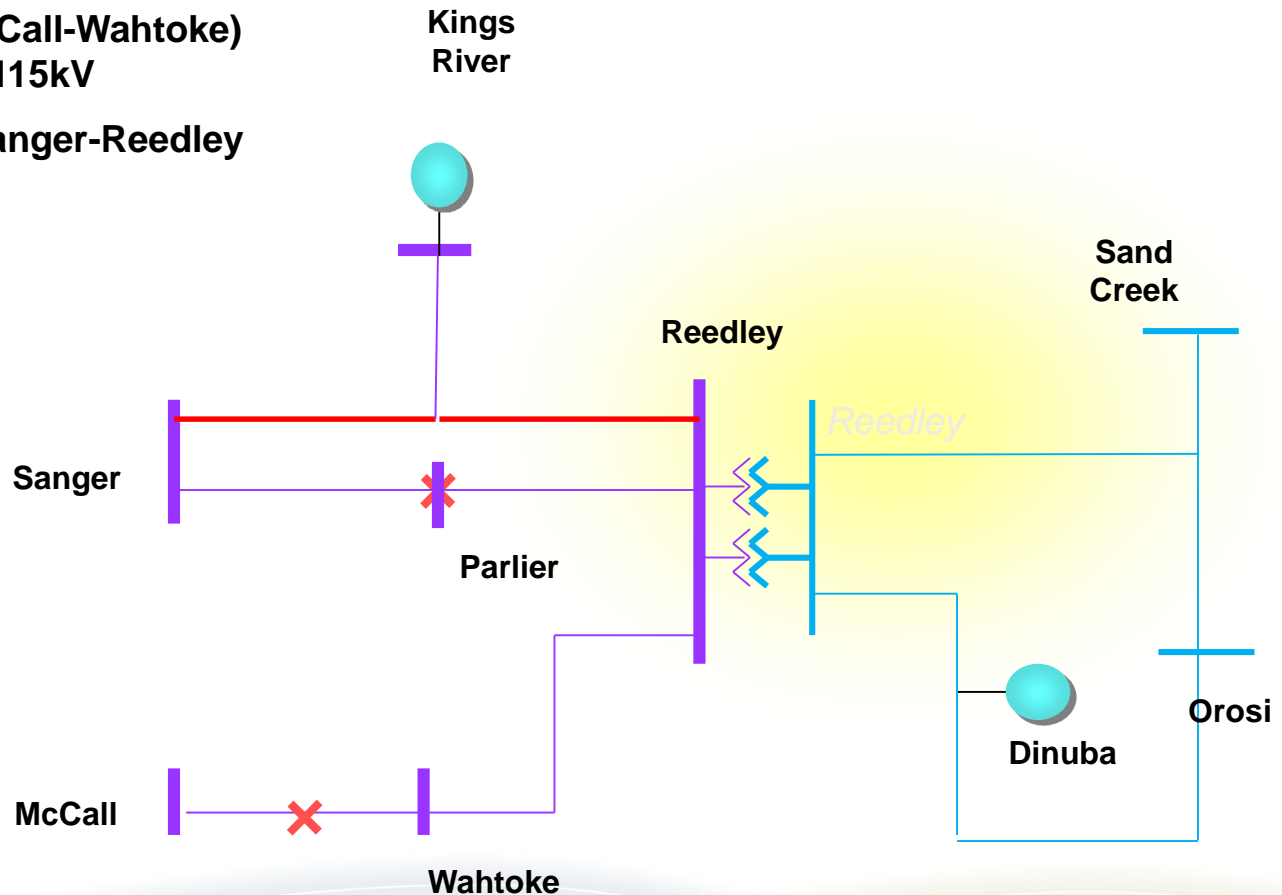
#### Category B: No LCR need

#### LCR Results (MW):

Contingency	Cat. C
LCR	60

Including:

QF	0
Muni	0
Deficiency	50



# Fresno Area LCR

## 2016 Herndon Sub-Area

### Limiting Contingency:

#### Category B:

- G-1/L-1: Herndon-Barton 115kV & Kerckhoff 2 PH
- Constraint: Herndon-Manchester 115kV

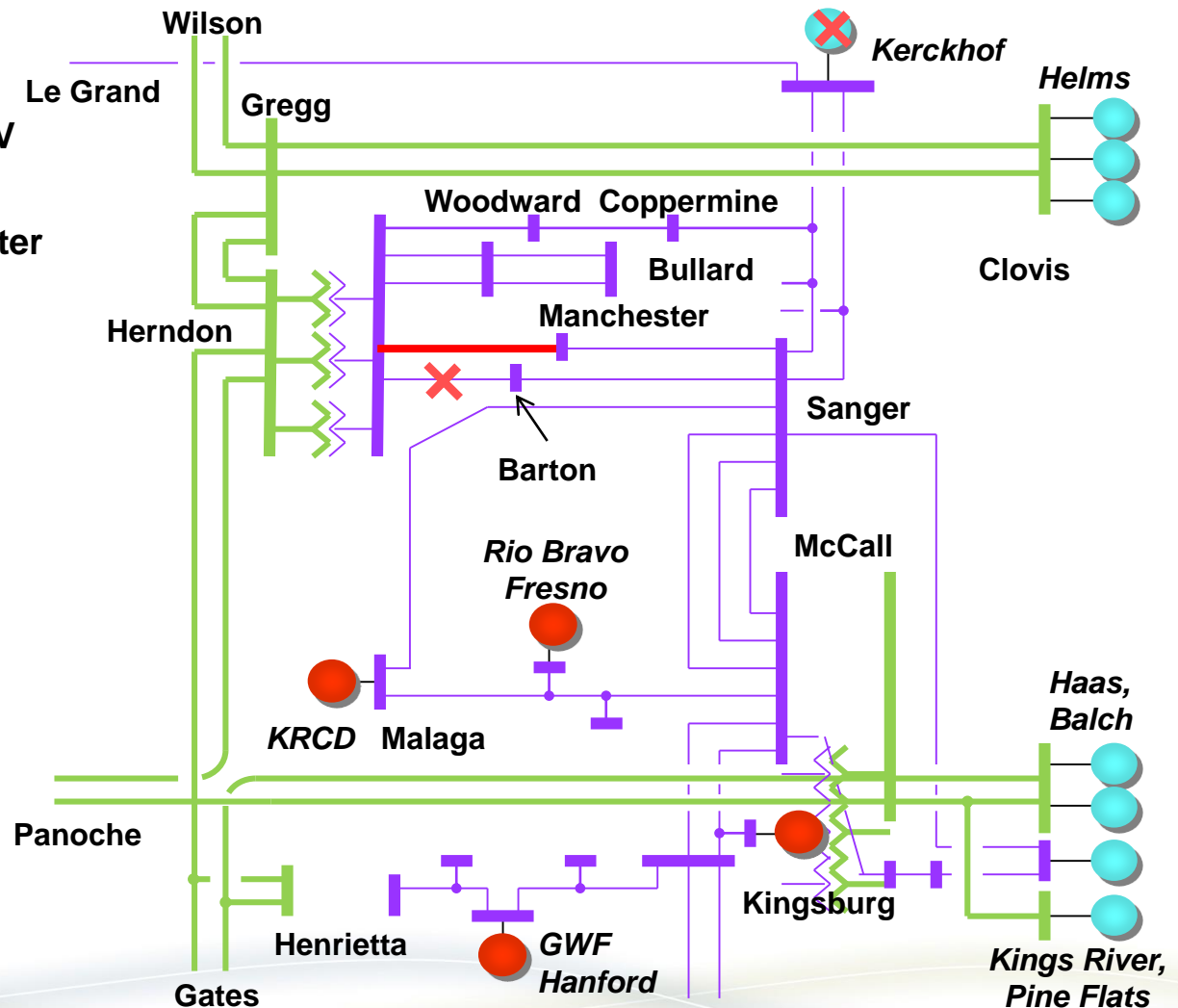
#### Category C: Same as Category B

### LCR Results (MW):

Contingency	Cat. B
LCR	503

Including:

QF	24
Muni	66
Deficiency	0



# Fresno Area LCR

## 2016 Wilson Sub-Area

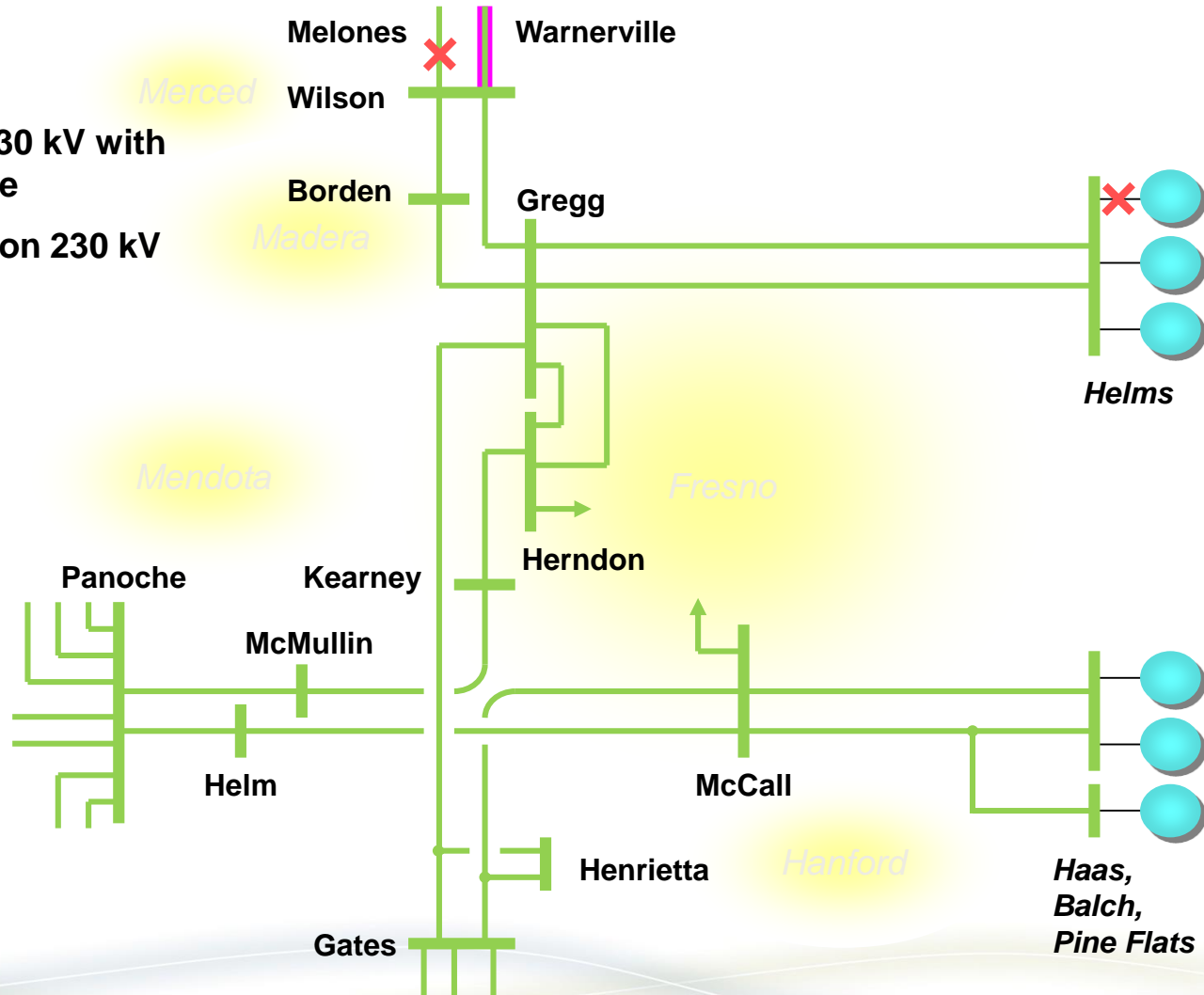
### Limiting Contingencies:

#### Category B:

- G-1/L-1: Melones – Wilson 230 kV with one Helms unit out of service
- Constraint: Warnerville-Wilson 230 kV

#### Category C:

- See next page



### LCR Results (MW):

Contingency	Cat. B
LCR	2445

Including:

QF	114
Muni	168
Deficiency	0



# Fresno Area LCR

## 2016 Wilson Sub-Area

### Limiting Contingencies:

#### Category C: - Contingency 1

- L-1/G-1: Melones – Wilson 230 kV followed by one Helms unit out
- Constraint: Warnerville-Wilson 230 kV
- LCR: 2445 MW

#### Category C: - Contingency 2

- L-2: Gregg-Helms #1 & #2 230 kV
- Constraint: Warnerville-Wilson 230 kV
- LCR: 1618 MW not including Helms

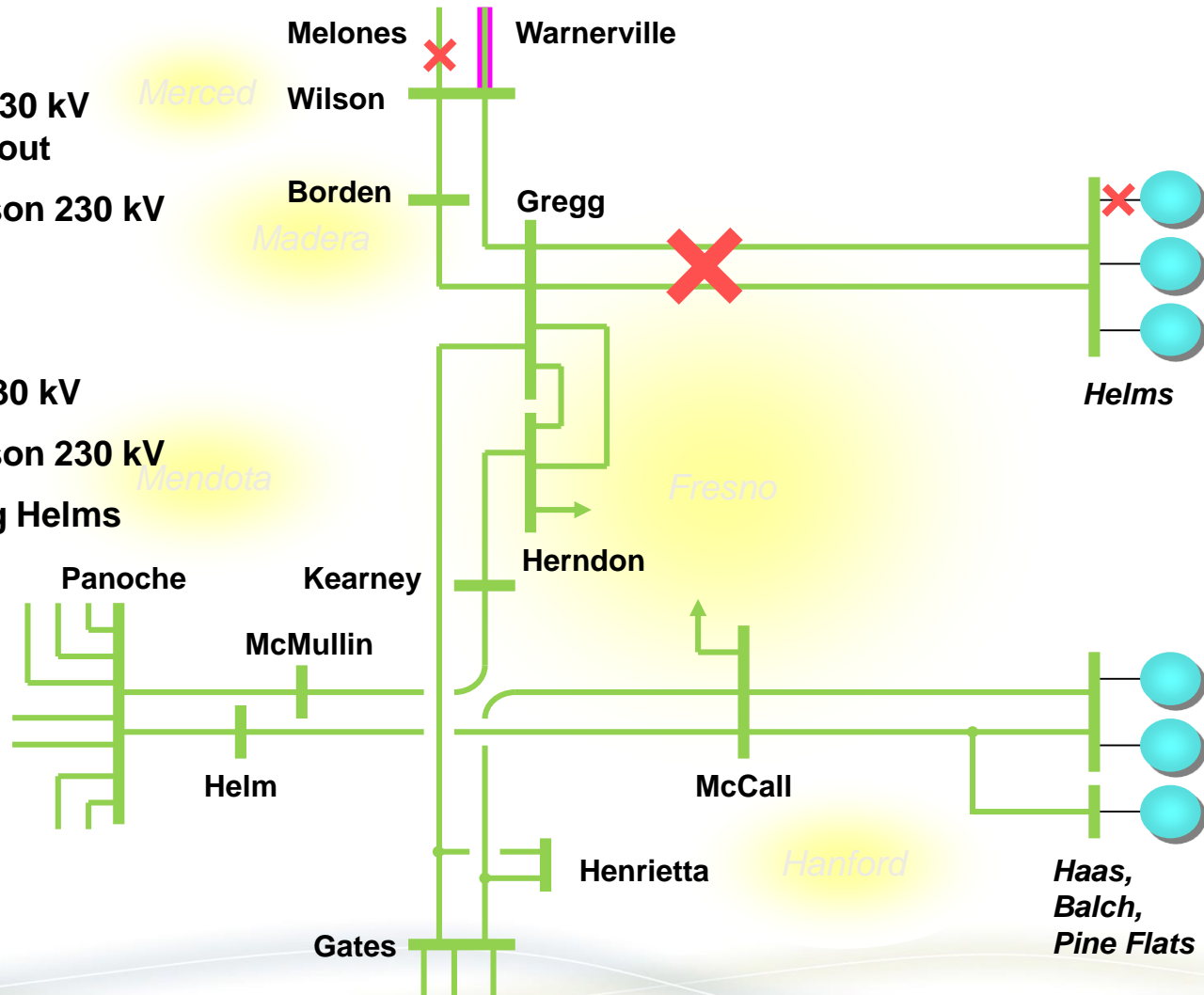
#### Units

#### LCR Results (MW):

Contingency	Cat. C
LCR	2445

Including:

QF	114
Muni	168
Deficiency	0



# Fresno Area LCR

## 2020 Hanford Sub-Area

### Limiting Contingencies:

Category B: No LCR need

Category C:

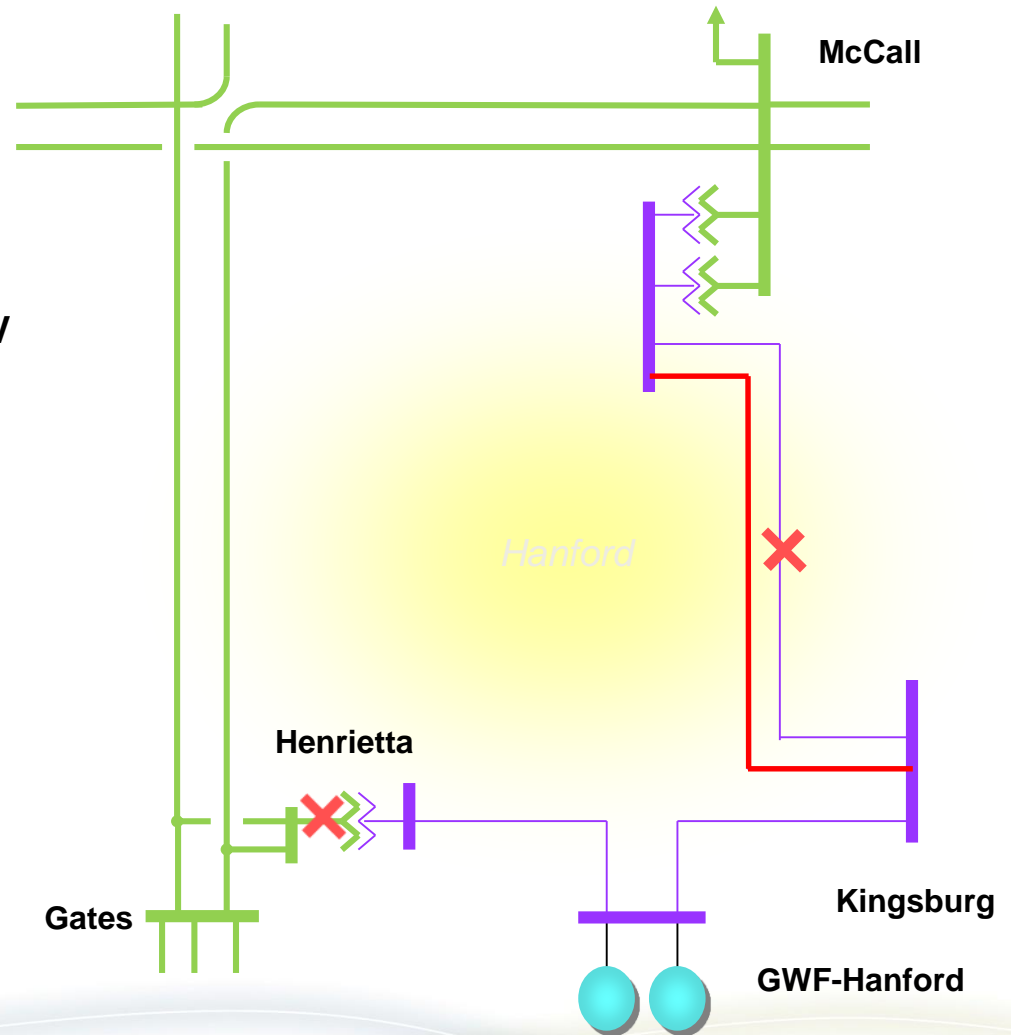
- L-1/T-1: McCall-Kingsburg #2 115 kV & Henrietta 230/115 kV T/F
- Constraint: McCall-Kingsburg # 1 115 kV

### LCR Results (MW):

Contingency	Cat. B	Cat. C
2020 LCR	0	67

Including:

QF	0	0
Muni	0	0
Deficiency	0	0



# Fresno Area LCR

## 2020 Coalinga Sub-Area

### Limiting Contingencies:

#### Category C:

- T-1/L-2: Gates 230/70kV TB #5 and Panoche-Schindler #1 & #2 115kV common tower lines
- Constraint:
  - Low voltage in the pocket

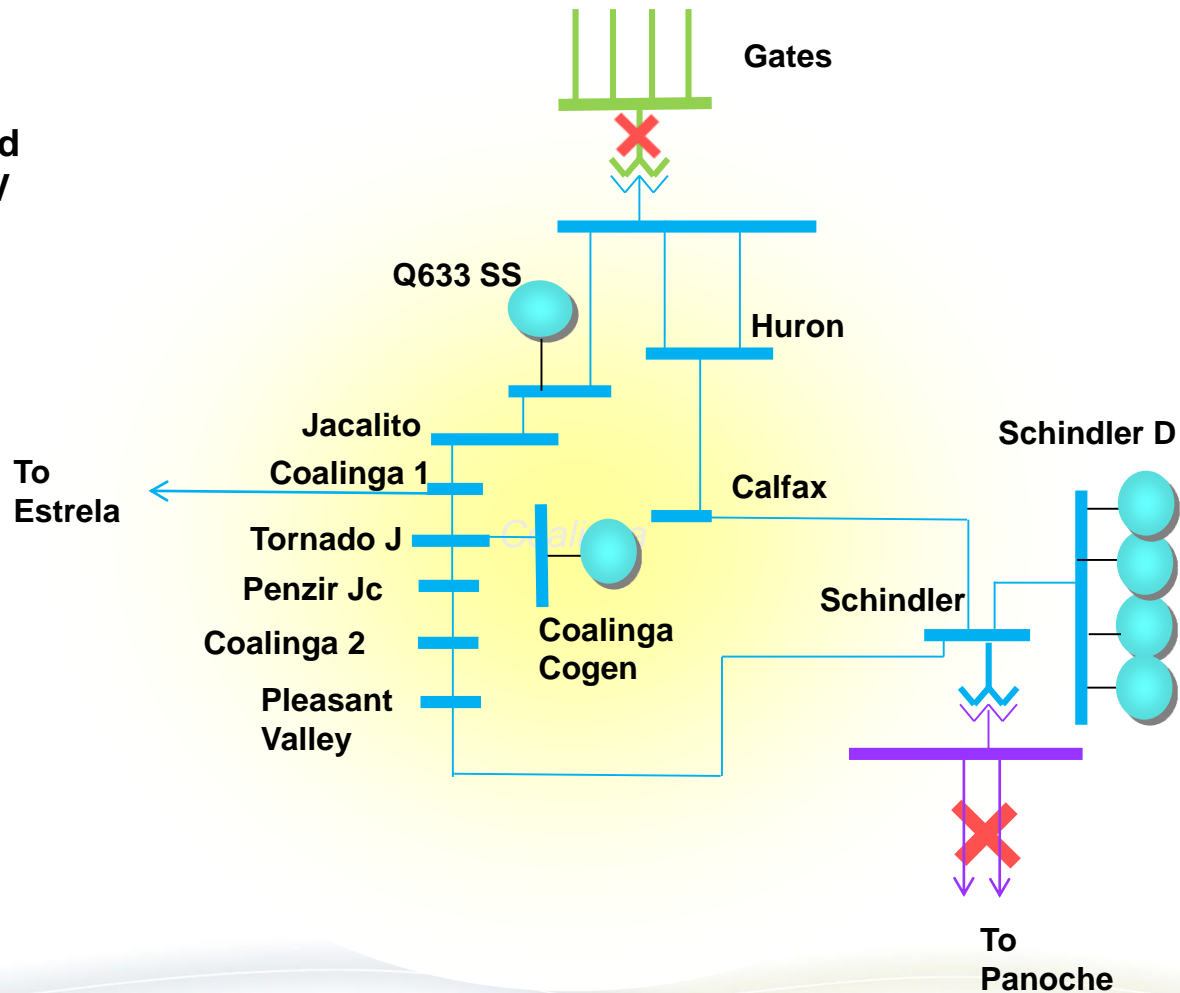
#### Category B: No LCR need

#### LCR Results (MW):

Contingency	Cat. C
2020 LCR	90

Including:

QF	2
Muni	0
Deficiency	21





# Fresno Area LCR

## 2020 Borden Sub-Area

### Limiting Contingencies:

Category B: No LCR need

Category C:

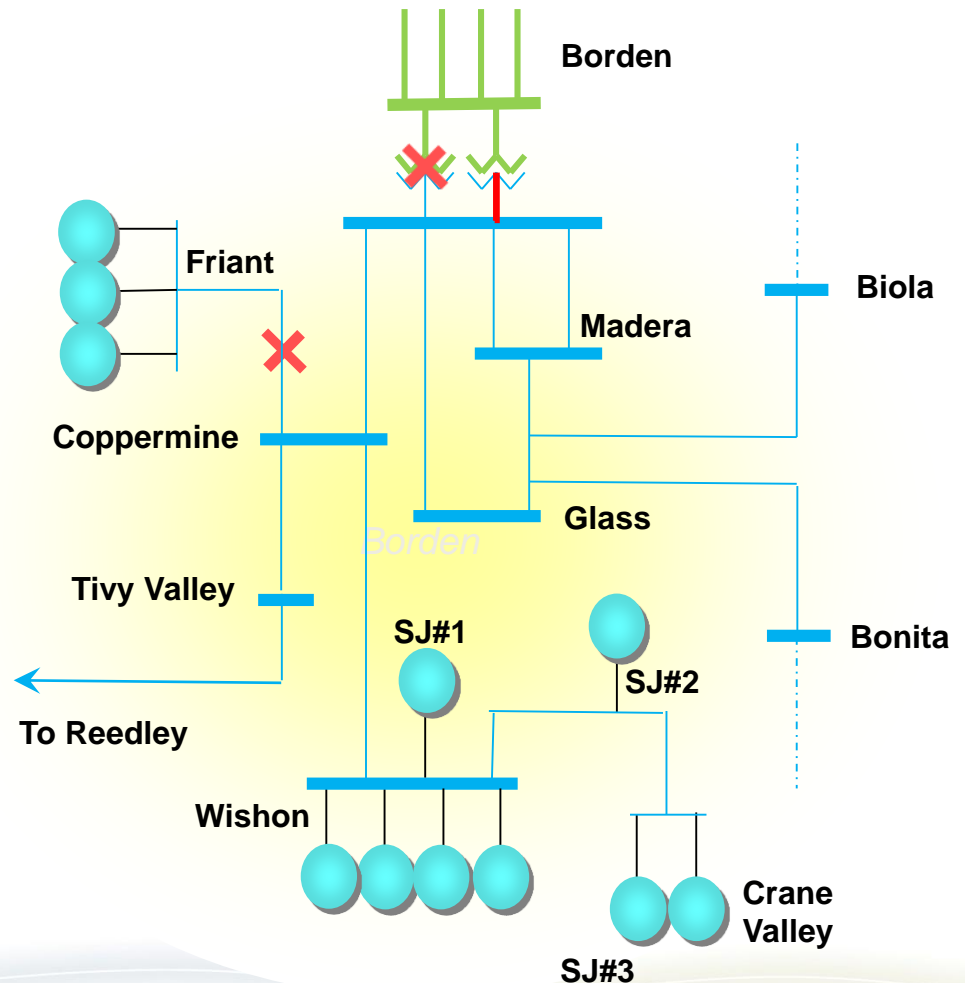
- L-1/T-1: Friant - Coppermine 70 kV and Borden 230/70 kV # 4
- Constraint: Borden 230/70 kV # 1

### LCR Results (MW):

Contingency	Cat. B	Cat. C
2020 LCR	0	34

Including:

QF	0	16
Muni	0	0
Deficiency	0	0



# Fresno Area LCR

## 2020 Reedley Sub-Area

**Eliminated due to McCall-Reedley # 2 115 kV line project.**

# Fresno Area LCR

## 2020 Herndon Sub-Area

**Eliminated due to Northern Fresno 115 kV area reinforcement project.**

# Fresno Area LCR

## 2020 Wilson Sub-Area

### Limiting Contingencies:

#### Category B:

- L-1: Panoche-Mendota 115 kV line & one Helms unit out
- Constraint: Panoche-Oro Loma 115 kV- (From Panoche Jn To Hammonds)

#### Category C:

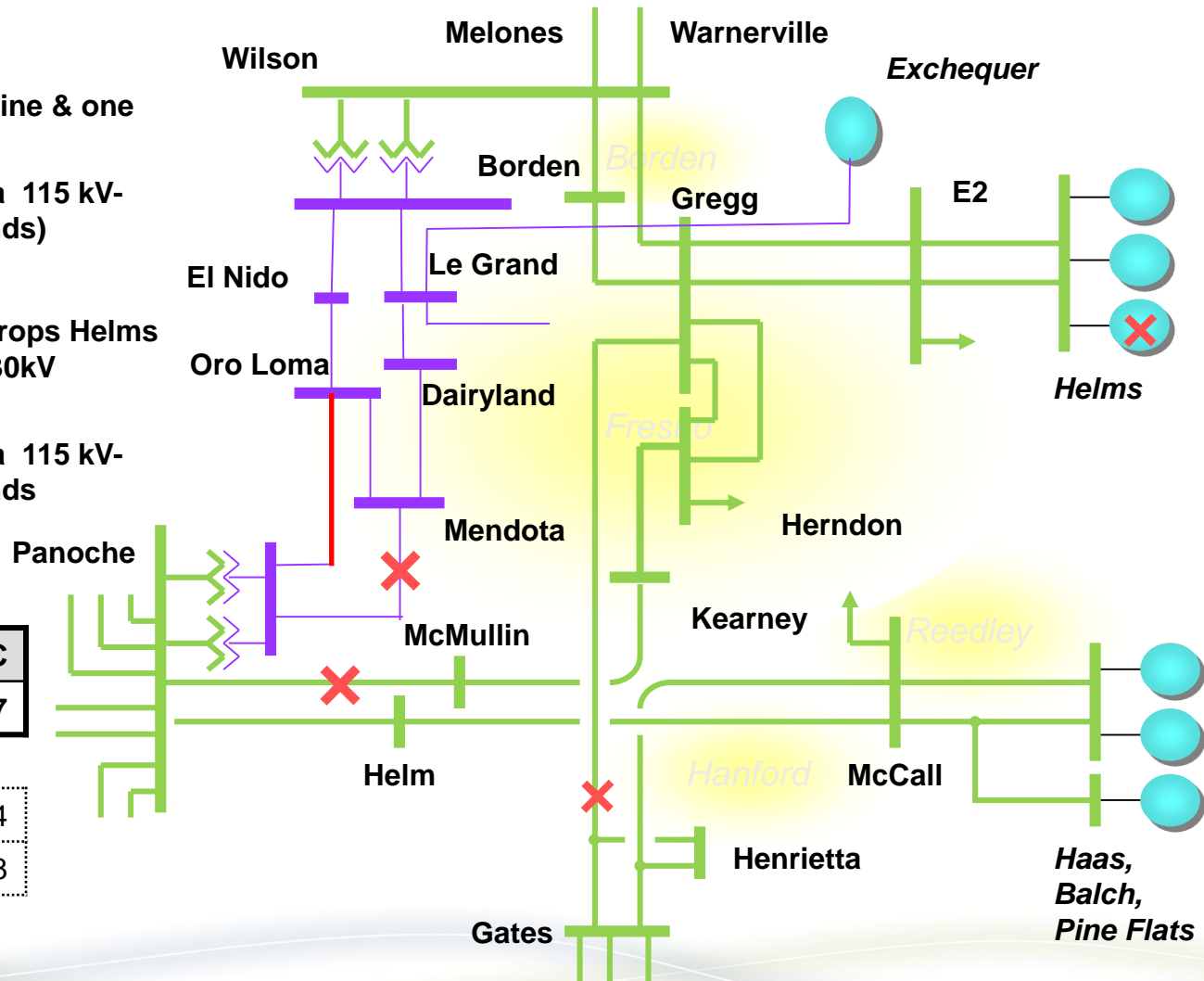
- L-2: Gates-Gregg 230kV line (drops Helms Unit #3) & Panoche-Kearney 230kV common tower lines
- Constraint: Panoche-Oro Loma 115 kV- (From Panoche Jn To Hammonds)

### LCR Results (MW):

Contingency	Cat. B	Cat. C
2020 LCR	1471	1867

Including:

QF	114	114
Muni	168	168



# Changes

## Since last year:

- 1) 2016 load increased by 114 MW vs. 2015
- 2) LCR has increased by 80 MW due to load increase
- 3) 2020 load increased by 254 MW vs. 2019
- 4) LCR has increased by 299 MW mostly due to load increase and new identified limiting element

## Since last stakeholder meeting:

- 1) Updated NQC
- 2) Small change to the Coalinga sub-area LCR needs

**Your comments and questions are welcome.**

For written comments, please send to: [RegionalTransmission@caiso.com](mailto:RegionalTransmission@caiso.com)