

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and Bay - Summer Peak**



Thermal Overloads

| ID | Overloaded Facility | Worst Contingency | Category | Category Description | Loading (%) | | | Potential Mitigation Solutions |
|------------|---|---|----------|----------------------|------------------|------------------|------------------|---|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-T-1 | Bridgeville - Garberville 60 kV Line #1 Between BRDGVLL - FRUTLDJT | Normal Conditions | A | | 103% | 105% | 32% | New Bridgeville - Garberville 115kVline will mitigate the overload. Adjust generation at Humboldt bay in the interim |
| | | GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP115KV) | B | L-1 | 99% | 101% | 32% | |
| | | BUS FAULT AT EGLE RCK 115 kV | C | Bus | 101% | 97% | 33% | |
| | | BUS FAULT AT MENDOCNO with 115kV CB102 stuck | C | Breaker | 107% | 101% | 32% | |
| | | GEYSER # 3 - CLOVERDALE 115K line & Cortina - Mendocino No.1 115 kV Line | C | L-1-1 | 116% | 118% | 35% | |
| NCNB-S-T-2 | Bridgeville - Garberville 60 kV Line #1 Between FRUTLDJT-FTSWRDJ | Normal Conditions | A | | 104% | 105% | 32% | New Bridgeville - Garberville 115kVline will mitigate the overload. Adjust generation at Humboldt bay in the interim |
| | | GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP115KV) | B | L-1 | 101% | 102% | 32% | |
| | | BUS FAULT AT Eagle Rock 115.0kV | C | Bus | 104% | 98% | 33% | |
| | | BUS FAULT AT Mendocino with 115kV breaker # CB102 stuck | C | Breaker | 109% | 111% | 32% | |
| | | GEYSER # 3 - CLOVERDALE 115K line & Cortina - Mendocino No.1 115 kV Line | C | L-1-1 | 118% | 120% | 35% | |
| NCNB-S-T-3 | Bridgeville - Garberville 60 kV Line #1 Between GRBRVLL - FTSWRDJT | Normal Conditions | A | | 102% | 103% | 32% | New Bridgeville - Garberville 115kVline will mitigate the overload. Adjust generation at Humboldt bay in the interim |
| | | GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP115KV) | B | L-1 | 99% | 100% | 32% | |
| | | BUS FAULT AT Eagle Rock 115.0kV | C | Bus | 102% | 96% | 33% | |
| | | BUS FAULT AT Mendocino with 115kV breaker # CB102 stuck | C | Breaker | 107% | 109% | 32% | |
| | | GEYSER # 3 - CLOVERDALE 115K line & Cortina - Mendocino No.1 115 kV Line | C | L-1-1 | 117% | 118% | 35% | |

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| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-T-4 | GARBERVILLE - LAYTONVILLE 60KV Line between Garberville - Kekawaka | BUS FAULT AT Mendocino with 115kV breaker # CB102 stuck | C | Breaker | 60% | 59% | 106% | Redispatch generation at Humboldt bay |
| | | Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines | C | L-2 | 58% | 58% | 108% | |
| | | GEYSER # 3 - CLOVERDALE 115K line & Cortina - Mendocino No.1 115 kV Line | C | L-1-1 | 68% | 66% | 126% | |
| NCNB-S-T-5 | GARBERVILLE - LAYTONVILLE 60KV Line between Kekawaka - Laytonville | BUS FAULT AT Mendocino with 115kV breaker # CB102 stuck | C | Breaker | 60% | 59% | 106% | Redispatch generation at Humboldt bay |
| | | Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines | C | L-2 | 58% | 58% | 108% | |
| | | GEYSER # 3 - CLOVERDALE 115K line & Cortina - Mendocino No.1 115 kV Line | C | L-1-1 | 68% | 66% | 126% | |
| NCNB-S-T-6 | Geysers 3 - Cloverdale 115 kV Line #1 Between CLOVRDLE - MPE TAP | Eagle Rock-Redbud & Cortina-Mendocino 115kV Lines | C | L-2 | 99% | 98% | 103% | Geyser No. 3 - Cloverdale 115 kV switch replacement, in interim, trip Geyser 5-6 generation, and load at Ukiah for Category C |
| | | Cortina - Mendocino No.1 115 kV Line & Eagle Rock- Cortina 115 kV Line | C | L-1-1 | 99% | 98% | 103% | |
| NCNB-S-T-7 | Mendocino - Redbud 115 kV #1 Between LUCERNJ2 - REDBUDJ1 | Geyser # 3-Cloverdale 115kV (Cloverdale-MPE Tap) & Cortina-Mendocino #1 115 kV (Mendocino Sub 1- Lucern) | C | L-1-1 | 98% | 97% | 115% | Disable the flip flop scheme at Lucerne. Drop load at Cloverdale, Ukiah and City of Ukiah as necessary if overload persists. |
| NCNB-S-T-8 | Mendocino - Redbud 115 kV #1 Between REDBUD - REDBUDJ1 | Geyser # 3-Cloverdale 115kV (Cloverdale-MPE Tap) & Cortina-Mendocino #1 115 kV (Mendocino Sub 1- Lucern) | C | L-1-1 | 108% | 106% | 126% | Disable the flip flop scheme at |
| NCNB-S-T-9 | Eagle Rock - Redbud 115 kV #1 Between REDBUD - REDBUDJ2 | Geyser # 3-Cloverdale 115kV (Cloverdale-MPE Tap) & Cortina-Mendocino #1 115 kV (Mendocino Sub 1- Lucern) | C | L-1-1 | 119% | 118% | 141% | |

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| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-T-10 | Eagle Rock - Redbud 115 kV #1 Between REDBUDJ2 - CACHE J2 | Geyser # 3-Cloverdale 115kV (Cloverdale-MPE Tap) & Cortina-Mendocino #1 115 kV (Mendocino Sub 1- Lucern) | C | L-1-1 | 109% | 108% | 129% | Lucerne. Trip load at Redbud & Lucerne for second contingency. If overload persists drop load at Ukiah, City of Ukiah and cloverdale as necessary. |
| NCNB-S-T-11 | Eagle Rock - Redbud 115 kV #1 Between HGHLNDJ1 - LWRLAKEJ | Geyser # 3-Cloverdale 115kV (Cloverdale-MPE Tap) & Cortina-Mendocino #1 115 kV (Mendocino Sub 1- Lucern) | C | L-1-1 | 120% | 119% | 141% | |
| NCNB-S-T-12 | Eagle Rock - Redbud 115 kV #1 Between HGHLNDJ1 - CACHE J2 | Geyser # 3-Cloverdale 115kV (Cloverdale-MPE Tap) & Cortina-Mendocino #1 115 kV (Mendocino Sub 1- Lucern) | C | L-1-1 | 102% | 101% | 120% | |
| NCNB-S-T-13 | Fulton - Santa Rosa 115 kV Line #1 Between FULTON - MONROE1 | Fulton-Santa Rosa 115 kV #2 & Corona-Lakeville 115 kV #1 | C | L-1-1 | 112% | 119% | 131% | trip load at Monroe 2 115 kV |
| NCNB-S-T-14 | Fulton - Santa Rosa 115 kV Line #2 Between FULTON - MONROE2 | | C | L-1-1 | 112% | 119% | 131% | |
| NCNB-S-T-15 | Mendocino - Clear Lake 60 kV Line #1 between Mendocino - Upper Lake | Eagle Rock 115/60 kV & Clear Lake-Hopland Jct 60 kV #1 | C | L-1/T-1 | 161% | 59% | 66% | Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake and Calistoga 60 kV with second contingency if overload persists |
| NCNB-S-T-16 | Mendocino - Clear Lake 60 kV Line #1 Between Upper Lake-Hartley | | C | L-1/T-1 | 149% | 50% | 55% | |
| NCNB-S-T-17 | Mendocino - Clear Lake 60 kV Between Hartley-Clear Lake | | C | L-1/T-1 | 110% | 15% | 16% | |
| NCNB-S-T-18 | Clear Lake-Hopland between Clear Lake-Granite 60 kV | Eagle Rock - Konocti Jct 60kV line | B | L-1 | 109% | 109% | 44% | Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists |
| | | Bus Fault at Eagle Rock 115.0 kV | C | Bus | 113% | 45% | 48% | |
| | | Mendocino - Clearlake 60 kV Line & Eagle Rock - Konocti Jct 60kV line | C | L-1-1 | 154% | 35% | 38% | |
| NCNB-S-T-19 | Clear Lake-Hopland between Granite-Hopland 60 kV | Eagle Rock - Konocti Jct 60kV line | B | L-1 | 118% | 47% | 52% | |
| | | Bus Fault at Eagle Rock 115.0 kV | C | Bus | 122% | 53% | 56% | |
| | | Mendocino - Clearlake 60 kV Line & Eagle Rock - Konocti Jct 60kV line | C | L-1-1 | 162% | 43% | 46% | |

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| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-T-20 | Clear Lake - Eagle Rock 60 kV Line #1 Between CLER LKE - KONOCTI6 | GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP115KV) | B | L-1 | 75% | 94% | 101% | PG&E Action Plan. Open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists |
| | | BUS FAULT AT MENDOCNO 115kV breaker # CB102 stuck | C | Breaker | 84% | 106% | 116% | |
| | | Eagle Rock-Redbud & Cortina-Mendocino 115kV Lines | C | L-2 | 82% | 105% | 112% | |
| | | GEYSER # 3 - CLOVERDALE 115K Line & Cortina - Mendocino #1 115 kV Line | C | L-1-1 | 118% | 145% | 193% | |
| NCNB-S-T-21 | Clear Lake - Eagle Rock 60 kV Line #1 Between KONOCTI6 - EGLE RCK | Geyser # 3-Cloverdale 115kV (Cloverdale-MPE Tap) & Eagle Rock- Cortina (Lower Lake) 115 kV | C | L-1-1 | 126% | 96% | 101% | |
| NCNB-S-T-22 | KONOCTI-LOWER LAKE 60 kV | Eagle Rock - Cortina (Homestake) 115 kV and Fulton - Calistoga 60 kV | C | L-1-1 | <95% | 96% | 105% | trip load at Calistoga |
| NCNB-S-T-23 | Monte Rio- Fulton 60 KV between TRNTN JT - FULTON | Fulton- Molino- Cotati 60 kV(Molino sub 60 kV to Molino Jct 60 kV) | B | L-1 | 84% | 89% | 100% | Existing scheme to close the Molino - Trenton Jct section for the loss of Fulton-Molino-Cotati line. Line will not overload if load is not transferred |
| NCNB-S-T-24 | Fulton - Pueblo 115 kV Line #1 Between PUEBLO - PUEBLOJT | Lakeville 115 kV CB102 stuck | C | Breaker | 93% | 99% | 110% | trip load at Pueblo 115 kV (existing Sonoma-Pueblo SPS) |
| | | Lakeville- Sonoma No.1 115 KV & Lakeville-Sonoma No.2 115 KV | C | L-1-1 | 93% | 99% | 109% | |
| | | Lakeville-Sonoma #1 & #2 115kV Lines | C | L-2 | 93% | 99% | 109% | |
| NCNB-S-T-25 | Ignacio - San Rafael #.3 115 kV (between Ignacio and Las Gallinas) | Ignacio-San Rafael #2 & Ignacio-San Rafael #1 115kV | C | L-1-1 | N/A | 109% | 115% | Ignacio-Alto Voltage Conversion project |

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| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-T-26 | Ignacio-San Rafael 115 kV # 1 | Ignacio - San Rafael No.3 115 kV (Ignacio - Las Gallinas) & Ignacio-San Rafael #2 115kV line | C | L-1-1 | N/A | 113% | 119% | Disconnect switch limitation? / Ignacio-Alto Voltage Conversion project |
| NCNB-S-T-27 | Ignacio-San Rafael 115 kV # 2 | Ignacio - San Rafael No.3 115 kV (Ignacio 115 kv to Las Gallinas sub 115 kv) & Ignacio - San Rafael No. 3 115 kV | C | L-1-1 | N/A | N/A | 130% | Ignacio-Alto Voltage Conversion project |
| NCNB-S-T-28 | Ignacio - Alto 60 kV Line #1 Between IG JCT - SAN RFLJ - GREENBRE 60 kV | Ignacio - Alto - Saulsalito # 2 60 kV & Ignacio - Alto - Saulsalito # 1 60 kV | C | L-1-1 | 125% | N/A | N/A | Ignacio-Alto Voltage Conversion project. In the interim, drop load at Alto |
| NCNB-S-T-29 | Ignacio - Alto 60 kV Line #1 Between IG JCT - SAN RFLJ - GREENBRE 60 kV | | C | L-1-1 | 125% | N/A | N/A | Ignacio-Alto Voltage Conversion project. In the interim, drop load at Alto |
| NCNB-S-T-30 | San Rafael - Greenbrae 115kV line | Ignacio A 115/60kV bank & Ignacio B 115/60.00 kV Bank | C | T-1-1 | N/A | 121% | 125% | Ignacio - Alto Voltage conversion project. |
| NCNB-S-T-31 | Bridgeville - Garberville 60kV between Bridgeville - Fruitland jct | | D | Loss of Substation | 102% | 105% | 33% | Under Review |
| NCNB-S-T-32 | Bridgeville - Garberville 60kV between Fruitland Jct - Fort Seward Jct | | D | Loss of Substation | 104% | 106% | 26% | Under Review |
| NCNB-S-T-33 | Bridgeville - Garberville 60kV between Fort Seward Jct - Garberville | | D | Loss of Substation | 102% | 104% | 24% | Under Review |
| NCNB-S-T-34 | Garberville - Laytonville 60kV between Garberville - Kekawaka | | D | Loss of Substation | 52% | 52% | 102% | Under Review |
| NCNB-S-T-35 | Garberville - Laytonville 60kV between kekawaka - Lytonville | | D | Loss of Substation | 52% | 52% | 102% | Under Review |

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| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-T-36 | Eagle Rock - Fulton - Silverado 115kV Between Eagle Rock - ERFT5_25 | Loss of Fulton 230kV station + Xfmrs | D | Loss of Substation | 102% | 94% | 104% | Under Review |
| NCNB-S-T-37 | Lakeville - Santa Rosa 115kV line Between SNTA RSA - STNY PTP | | D | Loss of Substation | 85% | 86% | 106% | Under Review |
| NCNB-S-T-38 | Lakeville - Santa Rosa 115kV line Between STNY PTP - BELLVUE | | D | Loss of Substation | 85% | 87% | 107% | Under Review |
| NCNB-S-T-39 | Lakeville - Santa Rosa 115kV line Between BELLVUE - PENNGRVE | | D | Loss of Substation | 109% | 113% | 137% | Under Review |
| NCNB-S-T-40 | Lakeville - Santa Rosa 115kV line Between PENNGRVE - CORONA | | D | Loss of Substation | 114% | 118% | 143% | Under Review |
| NCNB-S-T-41 | Lakeville - Santa Rosa 115kV line Between CORONA - Lakeville | | D | Loss of Substation | 108% | 112% | 135% | Under Review |
| NCNB-S-T-42 | Sonoma - Pueblo 115kV line | | D | Loss of Substation | 103% | 107% | 127% | Under Review |
| NCNB-S-T-43 | Monte Rio - Fulton 60kV between WHLR JCT - MONTE RO | | D | Loss of Substation | 75% | 81% | 106% | Under Review |
| NCNB-S-T-44 | Fulton - Molino - Cotati 60kV between MLNO JCT - Fulton | | D | Loss of Substation | 81% | 86% | 104% | Under Review |
| NCNB-S-T-45 | Lakeville - Sobrante 230kV between Crockett - Ignacio | | D | Loss of Substation | 107% | 114% | 124% | Under Review |
| NCNB-S-T-46 | Bridgeville - Garberville 60kV between Bridgeville - Fruitland jct | | D | Loss of Substation | 104% | 109% | 33% | Under Review |
| NCNB-S-T-47 | Bridgeville - Garberville 60kV between Fruitland Jct - Fort Seward Jct | | D | Loss of Substation | 56% | 55% | 103% | Under Review |

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| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-T-48 | Bridgeville - Garberville 60kV between Fort Seward Jct - Garberville | Loss of Lakeville 230kV station + Xfmrs | D | Loss of Substation | 55% | 55% | 103% | Under Review |
| NCNB-S-T-49 | Garberville - Laytonville 60kV between Garberville - Kekawaka | | D | Loss of Substation | 106% | 110% | 26% | Under Review |
| NCNB-S-T-50 | Garberville - Laytonville 60kV between kekawaka - Lytonville | | D | Loss of Substation | 105% | 108% | 24% | Under Review |
| NCNB-S-T-51 | Eagle Rock - Fulton - Silverado 115kV Between Eagle Rock - ERFT5_25 | | D | Loss of Substation | 103% | 96% | 94% | Under Review |
| NCNB-S-T-52 | Eagle Rock - Cortina 115kV line between CACHE J1 - TAPP1015 | | D | Loss of Substation | 76% | 97% | 104% | Under Review |

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Thermal Overloads

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|-------------|---|---|----------|----------------------|------------------|------------------|------------------|--|
| | | | | | 2014 Winter Peak | 2017 Winter Peak | 2022 Winter Peak | |
| NCNB-W-T-1 | Mendocino - Clear Lake 60 kV Line #1 between Mendocino - Upper Lake | Clear Lake- Hopland 60 Kv & Eagle Rock 60kV - Konocti6 60kV | C | L-1-1 | 188% | 37% | 42% | Middletown 115 kV Project. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake and Calistoga 60 kV with second contingency if overload persists |
| NCNB-W-T-2 | Mendocino - Clear Lake 60 kV Line #1 Between Upper Lake-Hartley | | C | L-1-1 | 180% | 32% | 36% | |
| NCNB-W-T-3 | Mendocino - Clear Lake 60 kV Between Hartley-Clear Lake | | C | L-1-1 | 133% | 7% | 9% | |
| NCNB-W-T-4 | Elk 60kV - Philo 60kV | Mendocino- Willits- Fort Bragg 60 kV & Monte Rio- Fulton 60 KV | C | L-1-1 | 88% | 94% | Diverged | Drop Load at Gaulala |
| NCNB-W-T-5 | Clear Lake - Eagle Rock 60 kV Line #1 Between CLER LKE - KONOCTI6 | GEYSER # 3 - CLOVERDALE 115K & Eagle Rock- Cortina 115 kV | C | L-1-1 | 106% | 118% | 121% | PG&E Action Plan. Open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if overload persists |
| NCNB-W-T-6 | Clear Lake - Eagle Rock 60 kV Line #1 Between KONOCTI6 - EGLE RCK | | C | L-1-1 | 105% | 86% | 89% | |
| NCNB-W-T-7 | Lakeville #2 60kV Line #1 between Lakevl_JCT - PETLMA A | Fulton- Molino- Cotati 60 kV & Lakeville - Petaluma 60kV | C | L-1-1 | 103% | 107% | 117% | trip load at Petaluma A or C 60 kV (Existing SPS) |
| NCNB-W-T-8 | Ignacio - San Rafael #.3 115 kV (between Ignacio and Las Gallinas) | Ignacio-San Rafael #2 & Ignacio-San Rafael #1 115kV Lines | C | L-1-1 | N/A | 106% | 109% | Ignacio-Alto Voltage Conversion project? |
| NCNB-W-T-9 | Ignacio - San Rafael #.3 115 kV (between Las Gallinas and San Rafael) | | C | L-1-1 | N/A | 104% | 106% | Ignacio-Alto Voltage Conversion project? |
| NCNB-W-T-10 | Ignacio-San Rafael 115 kV #1 | Ignacio - San Rafael No.3 115 kV (Ignacio - Las Gallinas) & Ignacio-San Rafael #2 115kV line | C | L-1-1 | N/A | 120% | 124% | Disconnect switch limitation? / Ignacio-Alto Voltage Conversion project |

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| NCNB-W-T-11 | Ignacio - Alto 60 kV Line #1 Between IG JCT - SAN RFLJ - GREENBRE 60 kV | Ignacio-Alto-Sausalito 60kV #2 & Ignacio-Alto-Sausalito 60kV #1 | C | L-1-1 | 143% | N/A | N/A | Ignacio-Alto 60 kV Voltage Conversion Project. In interim, trip load at Alto 60 kV |
| NCNB-W-T-12 | Ignacio - Alto -Sausalito 60 kV # 2 Between HMLTN FD - ALTO JT2 | San Rafael - Green Brae 115kV & Ignacio - Alto - Sausalito # 1 60 kV | C | L-1-1 | N/A | 107% | 108% | Ignacio-Alto 60 kV Voltage Conversion Project. In interim, trip load at Alto 60 kV for Category C contingencies |
| NCNB-W-T-13 | Ignacio - Alto -Sausalito 60 kV # 1 Between ALTO JT1- HMLTN FDB | Ignacio _Alto 60 kV & Ignacio - Alto - Saulsalito # 2 60 kV | C | L-1-1 | 115% | N/A | N/A | |
| NCNB-W-T-14 | Ignacio-San Rafael 115 kV # 2 | Ignacio - San Rafael No.3 115 kV (Ignacio 115 kv to Las Gallinas sub 115 kv) & Ignacio - San Rafael No. 3 115 kV | C | L-1-1 | N/A | 102% | 104% | Ignacio - Alto Voltage conversion project |
| NCNB-W-T-15 | Hopland Jct 115 kV / 60kV Transformer | Ukiah-Hopland-Cloverdale 115 kV & Geyser #3 - Eagle Rock 115 kV | C | L-1-1 | 214% | 212% | 206% | Xfmr upgrade? trip Geo Energy and P0706 generation and load at Elk if overload persists |
| NCNB-W-T-16 | San Rafael - Greenbrae 115kV line | Ignacio A 115/60kV bank & Ignacio B 115/60.00 kV Bank | C | T-1-1 | N/A | 112% | 113% | Ignacio - Alto Voltage conversion project |
| NCNB-W-T-17 | Greenbrae 60kV - Alto 60kV | | C | T-1-1 | N/A | 114% | 115% | Ignacio - Alto Voltage conversion project |
| NCNB-W-T-18 | Ignacio A 60kV - Ignacio B 60kV | Ignacio _Bolas No. 2 60 kV & Ignacio A 115kV / 60kV transformer | C | L-1/T-1 | 104% | 54% | 55% | Ignacio - Alto Voltage conversion project |

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| | | | | | 2014 Summer Light Load | 2017 Summer Off-Peak | N/A | |
| NCNB-OP-T-1 | Eagle Rock Cortina 115kV line between Eagle Rock 115kV - Homstk Tap 115kV | Eagle Rock- Fulton- Silverado 115 kV | B | L-1 | 102% | 81% | N/A | Adjust Generation at Geysers |
| | | Fulton-Hopland 60kv & Geysers #17-Fulton 230kv & Eagle Rock-Fulton-Silverado 115kV | C | L-2 | 114% | 88% | N/A | |
| | | Cortina - Mendocino No.1 115 kV & Eagle Rock-Fulton- Silverado 115 kV | C | L-1-1 | 128% | 90% | N/A | |
| NCNB-OP-T-2 | Eagle Rock Cortina 115kV line between Homestk Tap 115kV - Highland Jct2 115kV | Eagle Rock- Fulton- Silverado 115 kV | B | L-1 | 101% | 60% | N/A | |
| | | Fulton-Hopland 60kv & Geysers #17-Fulton 230kv & Eagle Rock-Fulton-Silverado 115kV | C | L-2 | 114% | 65% | N/A | |
| | | Cortina - Mendocino No.1 115 kV & Eagle Rock-Fulton- Silverado 115 kV | C | L-1-1 | 127% | 69% | N/A | |
| NCNB-OP-T-3 | Eagle Rock Cortina 115kV line between Cache J1 115kV - TAPP1015 115kV | Cortina - Mendocino No.1 115 kV & Eagle Rock-Fulton- Silverado 115 kV | C | L-1-1 | 111% | 59% | N/A | Adjust generation at RSP 1015 |
| NCNB-OP-T-4 | Eagle Rock Cortina 115kV line between TAPP1015 115kV - Cortina 115kV | Eagle Rock- Fulton- Silverado 115 kV | B | L-1 | 112% | 61% | N/A | Adjust generation at RSP 1015 / Geysers |
| | | Fulton 115 kV Bus Section 2D | C | Bus | 105% | 52% | N/A | |
| | | Fulton 115 kV CB342 stuck | C | Breaker | 104% | 51% | N/A | |
| | | Fulton-Hopland 60kv & Geysers #17-Fulton 230kv & Eagle Rock-Fulton-Silverado 115 kV | C | L-2 | 123% | 65% | N/A | |
| | | Cortina - Mendocino No.1 115 kV & Eagle Rock-Fulton- Silverado 115 kV | C | L-1-1 | 135% | 69% | N/A | |
| NCNB-OP-T-5 | Mendocino - Hopland 60kV between Philo Jct 60kV - Hopland JCT 60kV | Ukiah-Hopland-Cloverdale 115 kV (between Ukiah - City of Ukiah 115kv) & Geyser #3 - Eagle Rock 115 kV | C | L-1-1 | 109% | 75% | N/A | Adjust generation at Geysers |

Thermal Overloads

| ID | Overloaded Facility | Worst Contingency | Category | Category Description | Loading (%) | | | Potential Mitigation Solutions |
|--------------|--|---|----------|----------------------------|------------------------|----------------------|-----|--|
| | | | | | 2014 Summer Light Load | 2017 Summer Off-Peak | N/A | |
| NCNB-OP-T-6 | Hopland JCT 60kV - Cloverdale Jct 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | 159% | N/A | Close the tie line between Petaluma C jct and Cotati sub. Drop load at Cotati. |
| NCNB-OP-T-7 | Cloverdale Jct 60kV - Geyser Jct1 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | 150% | N/A | |
| NCNB-OP-T-8 | Geyser Jct1 60kV - Fitch Mntn 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | 151% | N/A | |
| NCNB-OP-T-9 | Fulton 60kV - St.Helna 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | 135% | N/A | |
| NCNB-OP-T-10 | St.Helna 60kV - Calistga 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | 165% | N/A | |
| NCNB-OP-T-11 | Calistga 60kV - Middltn 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | N/A | 183% | N/A | |
| NCNB-OP-T-12 | Hopland Jct 115 kV / 60kV Transformer | Ukiah-Hopland-Cloverdale 115 kV (between Ukiah - City of Ukiah 115kv) & Geyser #3 - Eagle Rock 115 kV | C | L-1-1 | 247% | 172% | N/A | Adjust generation at Geysers |
| NCNB-OP-T-13 | Eagle Rock - Cortina 115kV between Eagle rock and Homestk tap | Common Corridor between Eagle Rock - Fulton | D | Loss of all lines in a ROW | 110% | 85% | N/A | Under Review |
| NCNB-OP-T-14 | Eagle Rock - Cortina 115kV line between Homestk tap - Highland Jct | Common Corridor between Eagle Rock - Fulton | D | Loss of all lines in a ROW | 109% | 81% | N/A | Under Review |

Thermal Overloads

| ID | Overloaded Facility | Worst Contingency | Category | Category Description | Loading (%) | | | Potential Mitigation Solutions |
|--------------|--|---|----------|----------------------------|------------------------|----------------------|-----|--------------------------------|
| | | | | | 2014 Summer Light Load | 2017 Summer Off-Peak | N/A | |
| NCNB-OP-T-15 | Eagle Rock - Cortina 115kV line between Tap 1015 - Cortina | Common Corridor between Eagle Rock - Fulton | D | Loss of all lines in a ROW | 119% | 80% | N/A | Under Review |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: PG&E North Coast and Bay - Summer Peak



Voltage Deviations

| ID | Substation | Worst Contingency | Category | Category Description | Post Cont. Voltage Deviation % | | | Potential Mitigation Solutions |
|--------------|----------------|---|----------|----------------------|--------------------------------|------------------|------------------|---|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-DV-1 | ALTO 60kV | Ignacio-Alto-Sausalito #2 & #1 60kV Lines | C | L-2 | -11.07% | -1.13% | -1.23% | Ignacio - Alto voltage conversion project |
| NCNB-S-DV-2 | CALISTGA 60kV | LAKEVILLE #1 60 kV(Lakeville sub 60 kV to Dunbar Sub 60 kV) | B | L-1 | -5.91% | -2.24% | -2.56% | Middle town 115kV project |
| | | Homestk Tp - Middletown 115kV | B | L-1 | N/A | -4.96% | -5.82% | |
| | | Middletown 115/60kV transformer | B | T-1 | N/A | -4.95% | -5.81% | |
| NCNB-S-DV-3 | CLER LKE 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | -11.13% | -2.44% | -2.84% | |
| | | BUS FAULT AT EGLE RCK 115kV | C | Bus | -11.55% | -3.55% | -2.64% | |
| | | BUS FAULT AT EGLE RCK 60kV | C | Bus | -11.13% | -2.43% | -2.84% | |
| NCNB-S-DV-4 | CLOVRDLE 115kV | GEYSER # 3 - CLOVERDALE 115K (CLOVERDALE 115KV to MPE TAP115KV) | B | L-1 | -3.61% | -3.70% | -5.23% | Adjust generation at geysers |
| NCNB-S-DV-5 | COVELO6 60kV | LYTNVILLE - COVELO6 60kV | B | L-1 | 1.73% | 2.47% | 5.97% | Garberville reactive support project |
| | | BUS FAULT AT MENDOCNO with 115kV breaker CB102 stuck | C | Breaker | -7.62% | -7.32% | -10.41% | |
| NCNB-S-DV-6 | DUNBAR 60kV | LAKEVILLE #1 60 kV(Lakeville sub 60 kV to Dunbar Sub 60 kV) | B | L-1 | -6.81% | -2.62% | -3.31% | Middle town 115kV project |
| NCNB-S-DV-7 | EGLE RCK 60kV | EAGLE ROCK 115/60 KV BANK NO.1 | B | T-1 | -11.83% | -6.34% | -7.18% | open Eagle Rock-Konocti 60 kV line for Eagle Rock bank outage |
| | | BUS FAULT AT EGLE RCK 115kV | C | Bus | -22.64% | -7.36% | -7.37% | |
| NCNB-S-DV-8 | GRANITE 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | -9.28% | -1.98% | -2.33% | Middle town 115kV project |
| NCNB-S-DV-9 | HARTLEY 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | -9.70% | -2.11% | -2.47% | |
| | | BUS FAULT AT EGLE RCK 115kV | C | Bus | -10.07% | -3.37% | -2.22% | |
| NCNB-S-DV-10 | HOMSTKTP 115kV | BUS FAULT AT HOMSTKTP 115kV | C | Bus | -1.69% | -13.75% | -14.49% | Adjust generation near Eagle Rock / Homestk Tap |
| | | Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines | C | L-2 | -1.69% | -13.81% | -14.61% | |
| | | Eagle Rock-Redbud & Eagle Rock-Cortina 115kV Lines | C | L-2 | -1.69% | -14.01% | -14.14% | |
| NCNB-S-DV-11 | KONOCTI6 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | -18.85% | -4.53% | -5.19% | |
| | | BUS FAULT AT EGLE RCK 115kV | C | Bus | -19.27% | -5.30% | -5.02% | |

Voltage Deviations

| ID | Substation | Worst Contingency | Category | Category Description | Post Cont. Voltage Deviation % | | | Potential Mitigation Solutions |
|--------------|-----------------|--|----------|----------------------|--------------------------------|------------------|------------------|--|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| 11 | KONOCTI 60kV | BUS FAULT AT EGLE RCK 60kV | C | Bus | -18.85% | -4.52% | -5.19% | Middle town 115kV project |
| | | EAGLE ROCK 115/60 KV BANK NO.1 | B | T-1 | -8.46% | -4.28% | -4.83% | |
| NCNB-S-DV-12 | LOWR LKE 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | -19.46% | -2.93% | -3.44% | |
| | | BUS FAULT AT EGLE RCK 115kV | C | Bus | -19.91% | -3.47% | -3.32% | |
| | | BUS FAULT AT EGLE RCK 60kV | C | Bus | -19.46% | -2.92% | -3.44% | |
| | | EAGLE ROCK 115/60 KV BANK NO.1 | B | T-1 | -6.50% | -2.64% | -3.02% | |
| NCNB-S-DV-13 | MIDDLTWN 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | -20.35% | -0.18% | -0.41% | |
| | | BUS FAULT AT EGLE RCK 115kV | C | Bus | -20.82% | -0.35% | -0.38% | |
| | | BUS FAULT AT EGLE RCK 60kV | C | Bus | -20.35% | -0.18% | -0.41% | |
| | | Homestk Tp - Middletown 115kV | B | L-1 | N/A | -6.90% | -8.05% | |
| | | Middletown 115/60kV transformer | B | T-1 | N/A | -6.89% | -8.03% | |
| NCNB-S-DV-14 | MIDDLTWN 115kV | BUS FAULT AT HOMSTKTP 115kV | C | Bus | N/A | -12.31% | -12.82% | |
| | | Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines | C | L-2 | N/A | -12.37% | -12.94% | |
| | | Eagle Rock-Redbud & Eagle Rock-Cortina 115kV Lines | C | L-2 | N/A | -12.57% | -12.47% | |
| | | Homestk Tp - Middletown 115kV | B | L-1 | N/A | -12.54% | -13.03% | |
| NCNB-S-DV-15 | MNDCCNO M 115kV | BUS FAULT AT MENDOCNO with 115kV breaker CB102 stuck | C | Breaker | -6.91% | -6.87% | -11.92% | Install a series breaker to 115kV CB102 at Mendocino |
| NCNB-S-DV-16 | PTTR VLY 60kV | BUS FAULT AT MENDOCNO with 115kV breaker CB102 stuck | C | Breaker | -6.26% | -6.17% | -11.32% | |
| NCNB-S-DV-17 | PUEBLO 115kV | Lakeville 115 kV CB102 stuck | C | Breaker | -9.15% | -8.90% | -11.80% | Trip load at Pueblo by existing SPS |
| | | Lakeville-Sonoma #1 & #2 115kV Lines | C | L-2 | -8.38% | -9.41% | -10.72% | |
| NCNB-S-DV-18 | RPSP1015 115kV | Eagle rock – Cortina 115kV line (Between Highland Jct - Cortina) | B | L-1 | -5.66% | -5.59% | -5.47% | Adjust generation near Eagle Rock / Homestk Tap |
| NCNB-S-DV-19 | SONOMA 115kV | Lakeville 115 kV CB102 stuck | C | Breaker | -12.15% | -12.16% | -15.39% | Trip load at Pueblo by existing SPS |
| | | Lakeville-Sonoma #1 & #2 115kV Lines | C | L-2 | -11.36% | -12.68% | -14.28% | |
| NCNB-S-DV-21 | UPPR LKE 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | -8.13% | -1.75% | -2.06% | Middle town 115kV project |
| | | BUS FAULT AT MENDOCNO with 115kV breaker CB102 stuck | C | Breaker | -6.39% | -6.21% | -11.62% | Install a series breaker to 115kV CB102 at Mendocino |

Voltage Deviations

| ID | Substation | Worst Contingency | Category | Category Description | Post Cont. Voltage Deviation % | | | Potential Mitigation Solutions |
|--------------|--------------|---|----------|----------------------|--------------------------------|------------------|------------------|--------------------------------------|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-DV-22 | WILLITS 60kV | Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV to Willits Jct 60 kV) | B | L-1 | 4.04% | 4.25% | 6.22% | Garberville reactive support project |
| NCNB-S-DV-23 | FULTON | | D | Loss of Substation | -20.30% | -20.04% | -26.16% | Under Review |
| NCNB-S-DV-24 | MONROE1 | | D | Loss of Substation | -19.06% | -18.81% | -24.76% | Under Review |
| NCNB-S-DV-25 | MONROE2 | | D | Loss of Substation | -19.08% | -18.83% | -24.78% | Under Review |
| NCNB-S-DV-26 | SNTA RSA | | D | Loss of Substation | -18.48% | -18.24% | -24.09% | Under Review |
| NCNB-S-DV-27 | STONY PT | | D | Loss of Substation | -16.86% | -16.61% | -22.07% | Under Review |
| NCNB-S-DV-28 | BELLVUE | | D | Loss of Substation | -16.04% | -15.79% | -21.05% | Under Review |
| NCNB-S-DV-29 | PENNGRVE | | D | Loss of Substation | -13.47% | -13.19% | -17.70% | Under Review |
| NCNB-S-DV-30 | RINCON | | D | Loss of Substation | -18.04% | -17.80% | -23.21% | Under Review |
| NCNB-S-DV-31 | GUALALA | | D | Loss of Substation | -19.91% | -20.51% | -30.88% | Under Review |
| NCNB-S-DV-32 | ANNAPOLS | | D | Loss of Substation | -19.30% | -19.84% | -29.33% | Under Review |
| NCNB-S-DV-33 | FORT RSS | | D | Loss of Substation | -18.92% | -19.42% | -28.34% | Under Review |
| NCNB-S-DV-34 | SLMN CRK | | D | Loss of Substation | -18.79% | -19.27% | -27.92% | Under Review |
| NCNB-S-DV-35 | MONTE RO | | D | Loss of Substation | -18.25% | -18.67% | -26.67% | Under Review |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and Bay - Summer Peak**



Voltage Deviations

| ID | Substation | Worst Contingency | Category | Category Description | Post Cont. Voltage Deviation % | | | Potential Mitigation Solutions |
|--------------|------------|--------------------------------------|----------|----------------------|--------------------------------|------------------|------------------|--------------------------------|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-DV-36 | WOHLER | Loss of Fulton 230kV station + Xfmrs | D | Loss of Substation | -17.15% | -17.43% | -24.15% | Under Review |
| NCNB-S-DV-37 | MIRABEL | | D | Loss of Substation | -17.35% | -17.66% | -24.62% | Under Review |
| NCNB-S-DV-38 | MOLINO | | D | Loss of Substation | -17.51% | -17.82% | -24.65% | Under Review |
| NCNB-S-DV-39 | GYSRVILLE | | D | Loss of Substation | -18.01% | -18.43% | -25.76% | Under Review |
| NCNB-S-DV-40 | GYSR 1-2 | | D | Loss of Substation | -17.91% | -18.32% | -25.56% | Under Review |
| NCNB-S-DV-41 | FULTON | | D | Loss of Substation | -16.69% | -16.92% | -23.10% | Under Review |
| NCNB-S-DV-42 | FTCH MTN | | D | Loss of Substation | -17.85% | -18.25% | -25.45% | Under Review |
| NCNB-S-DV-43 | LAGUNA | | D | Loss of Substation | -17.69% | -18.01% | -24.99% | Under Review |
| NCNB-S-DV-44 | COTATI | | D | Loss of Substation | -17.86% | -18.21% | -25.34% | Under Review |
| NCNB-S-DV-45 | SNMALDFL | | D | Loss of Substation | -17.83% | -18.17% | -25.29% | Under Review |
| NCNB-S-DV-46 | SILVERDO | | D | Loss of Substation | -16.67% | -16.45% | -21.46% | Under Review |
| NCNB-S-DV-47 | MONTCLLO | | D | Loss of Substation | -16.65% | -16.43% | -21.44% | Under Review |
| NCNB-S-DV-48 | MNTCLOPH | | D | Loss of Substation | -16.63% | -16.41% | -21.41% | Under Review |
| NCNB-S-DV-49 | PUEBLO | | D | Loss of Substation | -13.12% | -12.83% | -17.16% | Under Review |
| NCNB-S-DV-50 | ST.HELNA | | D | Loss of Substation | -17.55% | -11.67% | -16.45% | Under Review |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and North Bay- Winter Peak**



Voltage Deviations

| ID | Substation | Worst Contingency | Category | Category Description | Post Cont. Voltage Deviation % | | | Potential Mitigation Solutions |
|--------------|----------------|--|----------|----------------------|--------------------------------|------------------|------------------|---|
| | | | | | 2014 Winter Peak | 2017 Winter Peak | 2022 Winter Peak | |
| NCNB-W-DV-1 | ALTO 60kV | Ignacio-Alto-Sausalito #2 & #1 60kV Lines | C | L-2 | -17.19% | -1.33% | -1.36% | Ignacio - Alto Voltage conversion project |
| NCNB-W-DV-2 | EGLE RCK 60kV | EAGLE ROCK 115/60 KV BANK NO.1 | B | T-1 | -10.11% | -5.32% | -6.01% | Open Eagle Rock-Konocti 60 kV line for Eagle Rock bank outage |
| | | BUS FAULT AT EGLE RCK 115.00 | C | Bus | -13.06% | -4.91% | -5.83% | |
| NCNB-W-DV-3 | GREENBRE 60kV | Ignacio-Alto-Sausalito #2 & #1 60kV Lines | C | L-2 | -15.17% | -0.15% | -0.18% | Ignacio - Alto Voltage conversion project |
| NCNB-W-DV-4 | HOMSTKTP 115kV | BUS FAULT AT HOMSTKTP 115.00 | C | Bus | -1.61% | -10.59% | -11.01% | Adjust generation near Eagle Rock / Homestk Tap |
| | | Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines | C | L-2 | -1.61% | -10.65% | -10.92% | |
| | | Eagle Rock-Redbud & Eagle Rock-Cortina 115kV Lines | C | L-2 | -1.61% | -10.81% | -10.67% | |
| NCNB-W-DV-5 | KONOCTI6 60kV | EAGLE ROCK 115/60 KV BANK NO.1 | B | T-1 | -7.75% | -3.69% | -4.13% | Middletown 115kV project |
| | | BUS FAULT AT EGLE RCK 115.00 | C | Bus | -10.70% | -3.28% | -3.95% | |
| | | BUS FAULT AT EGLE RCK 60.00 | C | Bus | -11.68% | -4.13% | -4.63% | |
| NCNB-W-DV-6 | LOWR LKE 60kV | BUS FAULT AT EGLE RCK 115.00 | C | Bus | -10.82% | -2.24% | -2.68% | |
| | | BUS FAULT AT EGLE RCK 60.00 | C | Bus | -11.82% | -2.93% | -3.30% | |
| NCNB-W-DV-7 | MIDDLTWN 60kV | BUS FAULT AT EGLE RCK 115.00 | C | Bus | -11.01% | -0.50% | -0.54% | |
| | | BUS FAULT AT EGLE RCK 60.00 | C | Bus | -12.03% | -0.91% | -1.05% | |
| NCNB-W-DV-8 | MIDDLTWN 115kV | BUS FAULT AT HOMSTKTP 115.00 | C | Bus | N/A | -9.71% | -10.05% | |
| | | HomeStk Tp - Middletown 115kV | B | L-1 | N/A | -9.97% | -10.33% | |
| NCNB-W-DV-9 | FULTON | | D | Loss of Substation | -13.46% | -13.63% | -17.08% | Under Review |
| NCNB-W-DV-10 | MONROE1 | | D | Loss of Substation | -12.54% | -12.67% | -15.96% | Under Review |
| NCNB-W-DV-11 | MONROE2 | | D | Loss of Substation | -12.54% | -12.68% | -15.98% | Under Review |
| NCNB-W-DV-12 | SNTA RSA | | D | Loss of Substation | -12.12% | -12.23% | -15.45% | Under Review |
| NCNB-W-DV-13 | STONY PT | | D | Loss of Substation | -11.01% | -11.06% | -14.05% | Under Review |

Voltage Deviations

| ID | Substation | Worst Contingency | Category | Category Description | Post Cont. Voltage Deviation % | | | Potential Mitigation Solutions |
|--------------|------------|--------------------------------------|----------|----------------------|--------------------------------|------------------|------------------|--------------------------------|
| | | | | | 2014 Winter Peak | 2017 Winter Peak | 2022 Winter Peak | |
| NCNB-W-DV-14 | BELLVUE | Loss of Fulton 230kV station + Xfmrs | D | Loss of Substation | -10.45% | -10.48% | -13.35% | Under Review |
| NCNB-W-DV-15 | PENNGRVE | | D | Loss of Substation | -8.77% | -8.73% | -11.18% | Under Review |
| NCNB-W-DV-16 | RINCON | | D | Loss of Substation | -11.88% | -12.02% | -15.09% | Under Review |
| NCNB-W-DV-17 | GUALALA | | D | Loss of Substation | -10.64% | -11.80% | -16.66% | Under Review |
| NCNB-W-DV-18 | ANNAPOLS | | D | Loss of Substation | -10.35% | -11.42% | -15.86% | Under Review |
| NCNB-W-DV-19 | FORT RSS | | D | Loss of Substation | -10.17% | -11.18% | -15.36% | Under Review |
| NCNB-W-DV-20 | SLMN CRK | | D | Loss of Substation | -10.07% | -11.05% | -15.06% | Under Review |
| NCNB-W-DV-21 | MONTE RO | | D | Loss of Substation | -9.87% | -10.79% | -14.58% | Under Review |
| NCNB-W-DV-22 | WOHLER | | D | Loss of Substation | -9.43% | -10.25% | -13.57% | Under Review |
| NCNB-W-DV-23 | MIRABEL | | D | Loss of Substation | -9.52% | -10.35% | -13.75% | Under Review |
| NCNB-W-DV-24 | MOLINO | | D | Loss of Substation | -9.68% | -10.52% | -13.87% | Under Review |
| NCNB-W-DV-25 | GYSRVILLE | | D | Loss of Substation | -9.76% | -10.64% | -14.10% | Under Review |
| NCNB-W-DV-26 | GYSR 1-2 | | D | Loss of Substation | -9.73% | -10.59% | -14.03% | Under Review |
| NCNB-W-DV-27 | FULTON | | D | Loss of Substation | -9.25% | -10.02% | -13.15% | Under Review |
| NCNB-W-DV-28 | FTCH MTN | | D | Loss of Substation | -9.71% | -10.56% | -13.99% | Under Review |

Voltage Deviations

| ID | Substation | Worst Contingency | Category | Category Description | Post Cont. Voltage Deviation % | | | Potential Mitigation Solutions |
|--------------|------------|-------------------|----------|----------------------|--------------------------------|------------------|------------------|--------------------------------|
| | | | | | 2014 Winter Peak | 2017 Winter Peak | 2022 Winter Peak | |
| NCNB-W-DV-29 | LAGUNA | | D | Loss of Substation | -9.79% | -10.65% | -14.07% | Under Review |
| NCNB-W-DV-30 | COTATI | | D | Loss of Substation | -9.85% | -10.72% | -14.19% | Under Review |
| NCNB-W-DV-31 | SNMALDFL | | D | Loss of Substation | -9.84% | -10.70% | -14.16% | Under Review |
| NCNB-W-DV-32 | SILVERDO | | D | Loss of Substation | -10.88% | -11.02% | -13.86% | Under Review |
| NCNB-W-DV-33 | MONTCLLO | | D | Loss of Substation | -10.87% | -11.01% | -13.86% | Under Review |
| NCNB-W-DV-34 | MNTCLOPH | | D | Loss of Substation | -10.86% | -10.99% | -13.84% | Under Review |
| NCNB-W-DV-35 | PUEBLO | | D | Loss of Substation | -8.60% | -8.52% | -10.90% | Under Review |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: PG&E North Coast and North Bay- Summer Light Load & Summer Off-Peak



Voltage Deviations

| ID | Substation | Worst Contingency | Category | Category Description | Post Cont. Voltage Deviation % | | | Potential Mitigation Solutions |
|---------------|-----------------|---|----------|----------------------|--------------------------------|----------------------|-----|---|
| | | | | | 2014 Summer Light Load | 2017 Summer Off-Peak | N/A | |
| NCNB-OP-DV-1 | ANNAPOLS 60kV | Gualala- Monte Rio 60 kV (Gualala sub 60 kV to Annapolis Sub 60 kV) | B | L-1 | -7.81% | -7.25% | | Install reactive support at Annapolis / Fort Ross |
| | | Monte Rio- Fulton 60 KV(Wohler Jct 60 Kv to Monte Rio Sub 60 KV) | B | L-1 | -7.81% | -7.25% | | |
| NCNB-OP-DV-2 | BIG RIVR 60kV | Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV to Willits Jct 60 kV) | B | L-1 | 3.60% | 5.22% | | Garberville reactive support project |
| NCNB-OP-DV-3 | CALISTGA 60kV | Fulton -Calistoga 60 kV (Fulton Sub 60 kV to St. Helena Jct 60 kV) | B | L-1 | -6.83% | -1.29% | | Middletown 115kV project |
| NCNB-OP-DV-4 | FORT RSS 60kV | Gualala- Monte Rio 60 kV (Gualala sub 60 kV to Annapolis Sub 60 kV) | B | L-1 | -7.63% | -7.07% | | Install reactive support at Annapolis / Fort Ross |
| | | Monte Rio- Fulton 60 KV(Wohler Jct 60 Kv to Monte Rio Sub 60 KV) | B | L-1 | -7.63% | -7.07% | | |
| NCNB-OP-DV-5 | FRT BRGG 60kV | Mendocino- Willits- Fort Bragg 60 kV(Mendocino sub 60kV to Willits Jct 60 kV) | B | L-1 | 4.31% | 6.19% | | Garberville reactive support project |
| NCNB-OP-DV-6 | GYSR 1-2 60kV | Fulton #1 60kV (Geyserville sub 60 kV to Geyserville Jct 60 KV) | B | L-1 | -6.28% | -5.83% | | Adjust generation at Geysers |
| NCNB-OP-DV-7 | GYSRVLL 60kV | Fulton #1 60kV (Geyserville sub 60 kV to Geyserville Jct 60 KV) | B | L-1 | -6.29% | -5.80% | | |
| NCNB-OP-DV-8 | MIDDLTWN 115kV | Homestk TP - Middletown 115kV | B | L-1 | N/A | -8.37% | | Middletown 115kV project |
| NCNB-OP-DV-9 | MIRABEL 60kV | Monte Rio- Fulton 60 KV(Wohler Jct 60 Kv to Monte Rio Sub 60 KV) | B | L-1 | -6.26% | -6.04% | | Adjust generation at Geysers |
| NCNB-OP-DV-10 | MNDCCNO M 115kV | MENDOCINO 115/60 KV BANK NO.1 | B | T-1 | -5.72% | -5.42% | | Big river and Garberville reactive support projects |
| NCNB-OP-DV-11 | MONTE RO 60kV | Monte Rio- Fulton 60 KV(Wohler Jct 60 Kv to Monte Rio Sub 60 KV) | B | L-1 | -7.09% | -6.63% | | Install reactive support at Annapolis / Fort Ross |
| NCNB-OP-DV-12 | RPSP1015 115kV | Eagle rock – Cortina 115kV line (Between Highland Jct - Cortina) | B | L-1 | -5.33% | -5.55% | | Adjust generation near Eagle Rock / Homestk Tap |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and North Bay- Summer Light Load & Summer Off-Peak**



Voltage Deviations

| ID | Substation | Worst Contingency | Category | Category Description | Post Cont. Voltage Deviation % | | | Potential Mitigation Solutions |
|---------------|---------------|---|----------|----------------------|--------------------------------|----------------------|-----|---|
| | | | | | 2014 Summer Light Load | 2017 Summer Off-Peak | N/A | |
| NCNB-OP-DV-13 | SLMN CRK 60kV | Gualala- Monte Rio 60 kV (Gualala sub 60 kV to Annapolis Sub 60 kV) | B | L-1 | -7.78% | -7.12% | | Install reactive support at Annapolis / Fort Ross |
| | | Monte Rio- Fulton 60 KV(Wohler Jct 60 Kv to Monte Rio Sub 60 KV) | B | L-1 | -7.78% | -7.12% | | |
| NCNB-OP-DV-14 | ST.HELNA 60kV | Fulton -Calistoga 60 kV (Fulton Sub 60 kV to St. Helena Jct 60 kV) | B | L-1 | -5.28% | -5.51% | | Middletown 115kV project |
| NCNB-OP-DV-15 | WOHLER 60kV | Monte Rio- Fulton 60 KV(Wohler Jct 60 Kv to Monte Rio Sub 60 KV) | B | L-1 | -5.48% | -5.29% | | |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: PG&E North Coast and Bay - Summer Peak



High/Low Voltage

| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|-------------|---------------|---|----------|----------------------|------------------|------------------|------------------|---|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-V-1 | ALTO 60kV | Ignacio - Alto - Sausalito # 2 60 kV & Ignacio - Alto - Sausalito # 1 60 kV | C | L-1-1 | 0.8714 | 0.9981 | 0.9978 | trip load at Alto 60 kV for Category C contingencies. Long term-Ignacio-Alto 60 kV voltage conversion |
| | | Ignacio-Alto-Sausalito #2 & #1 60kV Lines | C | L-2 | 0.8714 | 0.9981 | 0.9978 | |
| NCNB-S-V-2 | CALISTGA 60kV | Fulton -Calistoga 60 kV & Middletown 115kV / 60kV transformer | C | L-1/T-1 | N/A | 0.8231 | 0.7992 | Trip load at Calistoga |
| NCNB-S-V-3 | CLER LKE 60kV | Eagle Rock 60kV - KONOCTI6 60kV | B | L-1 | 0.8814 | 0.9756 | 0.9605 | Middletown 115kV project. In the interim Open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists |
| | | BUS FAULT AT EGLE RCK 115kV | C | Bus | 0.8772 | 0.9645 | 0.9625 | |
| | | BUS FAULT AT EGLE RCK 60kV | C | Bus | 0.8814 | 0.9757 | 0.9605 | |
| | | Mendocino -Clearlake 60 kV & Eagle Rock - KONOCTI6 60kV | C | L-1-1 | 0.6691 | 0.9551 | 0.9411 | |
| NCNB-S-V-4 | COVELO6 60kV | BUS FAULT AT MENDOCNO with 115kV breaker CB102 stuck | C | Breaker | 0.9166 | 0.9122 | 0.8463 | Garberville reactive support project |
| NCNB-S-V-5 | EGLE RCK 60kV | BUS FAULT AT EGLE RCK 115kV | C | Bus | 0.8171 | 0.9749 | 0.9717 | Middletown 115 kV Project |
| | | Clear Lake- Hopland 60 Kv & EAGLE ROCK 115/60 KV BANK NO.1 | C | L-1/T-1 | 0.6974 | 0.9518 | 0.9338 | |
| NCNB-S-V-6 | FRT BRGG 60kV | BUS FAULT AT MENDOCNO with 115kV breaker CB102 stuck | C | Breaker | 0.9774 | 0.9838 | 0.8918 | Garberville reactive support project |
| NCNB-S-V-7 | GARCIA 60kV | BUS FAULT AT MENDOCNO with 115kV breaker CB102 stuck | C | Breaker | 0.9758 | 0.9815 | 0.8966 | Drop load at Garcia. Long term install reactive support at Annapolis / Fort Ross. |
| NCNB-S-V-8 | GRANITE 60kV | Mendocino -Clearlake 60 kV & Eagle Rock - KONOCTI6 60kV | C | L-1-1 | 0.7302 | 0.968 | 0.9548 | Middletown 115 kV Project |
| NCNB-S-V-9 | GREENBRE 60kV | Ignacio - Alto - Sausalito # 2 60 kV & Ignacio - Alto - Sausalito # 1 60 kV | C | L-1-1 | 0.887 | 1.0121 | 1.0121 | Trip load at Alto 60 kV for Category C contingencies. Long Term: Ignacio - Alto 60 kV Voltage Conversion |
| | | Ignacio-Alto-Sausalito #2 & #1 60kV Lines | C | L-2 | 0.887 | 1.0121 | 1.0121 | |
| NCNB-S-V-10 | HARTLEY 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | 0.8922 | 0.9735 | 0.9571 | Middletown 115 kV Project |
| | | Bus Fault at Eagle Rck 115kV | C | Bus | 0.8885 | 0.9609 | 0.9596 | |
| | | Bus Fault at Eagle Rck 60kV | C | Bus | 0.8922 | 0.9736 | 0.9571 | |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: PG&E North Coast and Bay - Summer Peak

High/Low Voltage



| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|-------------|----------------|---|----------|----------------------|------------------|------------------|------------------|---|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| | | Mendocino -Clearlake 60 kV & Eagle Rock - KONOCTI6 60kV | C | L-1-1 | 0.6527 | 0.9433 | 0.9278 | Drop load at Hartley / Upper lake |
| NCNB-S-V-11 | HOMEGRND 115kV | Eagle Rock- Cortina 115 kV (between Eagle Rock - Homestake Sub) & Eagle Rock - Cortina 115kV (between Highland Jct - Cortina) | C | L-1-1 | 1.0111 | 0.9035 | 0.8923 | Drop load at Homestake. |
| NCNB-S-V-12 | HOMEPROC 115kV | | C | L-1-1 | 1.0132 | 0.9034 | 0.8923 | |
| NCNB-S-V-13 | KONOCTI6 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | 0.8212 | 0.9824 | 0.9698 | Middletown 115 kV Project |
| | | Bus Fault at Eagle Rck 115kV | C | Bus | 0.817 | 0.9747 | 0.9715 | |
| | | Bus Fault at Eagle Rck 60kV | C | Bus | 0.8212 | 0.9825 | 0.9698 | |
| | | Mendocino -Clearlake 60 kV & Eagle Rock - KONOCTI6 60kV | C | L-1-1 | 0.5621 | 0.9668 | 0.9564 | |
| NCNB-S-V-14 | LOWR LKE 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | 0.796 | 1.0033 | 0.9945 | Middletown 115 kV Project |
| | | Bus Fault at Eagle Rck 115kV | C | Bus | 0.7915 | 0.9979 | 0.9957 | |
| | | Bus Fault at Eagle Rck 60kV | C | Bus | 0.796 | 1.0034 | 0.9945 | |
| | | Mendocino -Clearlake 60 kV & Eagle Rock - KONOCTI6 60kV | C | L-1-1 | 0.5141 | 0.9919 | 0.9861 | |
| NCNB-S-V-15 | LYTNVLE 60kV | BUS FAULT AT MENDOCNO with 115kV CB102 stuck | C | Breaker | 0.926 | 0.9219 | 0.8595 | Garberville reactive support project |
| NCNB-S-V-16 | MENDOCNO 60kV | BUS FAULT AT MENDOCNO with 115kV CB102 stuck | C | Breaker | 0.9572 | 0.9572 | 0.8931 | |
| NCNB-S-V-17 | MIDDLTWN 60kV | Eagle Rock - KONOCTI6 60kV | B | L-1 | 0.7563 | 1.0383 | 1.0361 | Middle town 115 kV Project will mitigate the low voltage. In interim, open CB22 at Clear Lake and close NO CB at Middletown, trip load at Clear Lake 60 kV with second contingency if low voltage persists. |
| | | Bus Fault at Eagle Rck 115kV | C | Bus | 0.7516 | 1.0366 | 1.0364 | |
| | | Bus Fault at Eagle Rck 60kV | C | Bus | 0.7563 | 1.0383 | 1.0361 | |
| | | Mendocino -Clearlake 60 kV & Eagle Rock - KONOCTI6 60kV | C | L-1-1 | 0.4428 | 1.0342 | 1.0367 | |
| NCNB-S-V-18 | MIDDLTWN 115kV | Eagle Rock-Cortina & Cortina-Mendocino 115kV Lines | C | L-1-1 | N/A | 0.8995 | 0.8881 | Middletown 115 kV Project |
| | | Eagle Rock-Redbud & Eagle Rock-Cortina 115kV Lines | C | L-1-1 | N/A | 0.8975 | 0.8928 | |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and Bay - Summer Peak**
High/Low Voltage

| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|-------------|-----------------|--|----------|----------------------------|------------------|------------------|------------------|--|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-V-19 | MNDCCNO M 115kV | BUS FAULT AT MENDOCNO with 115kV CB102 stuck | C | Breaker | 0.9556 | 0.9556 | 0.8917 | Install a series breaker to CB#102 |
| NCNB-S-V-20 | OLEMA 60kV | IGNACO A 115/60.00 kV BANK & IGNACO B 115/60.00 kV BANK | C | T-1-1 | 1.0136 | 0.9054 | 0.897 | Close the NO tie line between Lakeville Jct - Novato Jct 60kV. Drop load at Novato / Stafford sub as needed. |
| NCNB-S-V-21 | PNT ARNA 60kV | BUS FAULT AT MENDOCNO with 115kV CB102 stuck | C | Breaker | 0.9758 | 0.9815 | 0.8966 | Drop load at Point Arena. Long term, install reactive support at Annapolis / Fort Ross. |
| NCNB-S-V-22 | PTTR VLY 60kV | BUS FAULT AT MENDOCNO with 115kV CB102 stuck | C | Breaker | 0.9641 | 0.9641 | 0.896 | Adjust generation near Eagle Rock / Homstk Tap |
| NCNB-S-V-23 | SAUSALTO 60kV | Ignacio _Alto 60 kV & Ignacio - Alto - Saulsalito # 2 60 kV | C | L-1-1 | 0.8277 | N/A | N/A | Ignacio - Alto voltage conversion project. PG&E action plan in the interim. |
| NCNB-S-V-24 | SONOMA 115kV | Lakeville 115 kV CB102 stuck | C | Breaker | 0.9173 | 0.916 | 0.8857 | Trip load at Pueblo by existing SPS |
| | | Lakeville- Sonoma No.1 115 KV & Lakeville-Sonoma No.2 115 KV | C | L-1-1 | 0.9252 | 0.9108 | 0.8968 | |
| | | Lakeville-Sonoma #1 & #2 115kV Lines | C | Breaker | 0.9252 | 0.9108 | 0.8968 | |
| NCNB-S-V-25 | WILLITS 60kV | BUS FAULT AT MENDOCNO with 115kV CB102 stuck | C | Breaker | 0.9404 | 0.9399 | 0.8651 | Big river SVC (Mendocino coast reactive support project). |
| NCNB-S-V-26 | GUALALA | Common Corridor between Eagle Rock - Fulton | D | Loss of all lines in a ROW | 0.93 | 0.95 | 0.89 | Under review |
| NCNB-S-V-27 | GUALALA | Common corridor south of Lakeville | D | Loss of all lines in a ROW | 0.94 | 0.95 | 0.89 | Under review |
| NCNB-S-V-28 | FULTON | | D | Loss of Station | 0.8367 | 0.8372 | 0.7815 | Under review |
| NCNB-S-V-29 | MONROE1 | | D | Loss of Station | 0.8374 | 0.8372 | 0.7815 | Under review |
| NCNB-S-V-30 | MONROE2 | | D | Loss of Station | 0.8365 | 0.8363 | 0.7805 | Under review |

High/Low Voltage

| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|-------------|------------|--------------------------------------|----------|----------------------|------------------|------------------|------------------|--------------------------------|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-V-31 | SNTA RSA | Loss of Fulton 230kV station + Xfmrs | D | Loss of Station | 0.8396 | 0.8391 | 0.7839 | Under review |
| NCNB-S-V-32 | BELLVUE | | D | Loss of Station | 0.8639 | 0.8636 | 0.8135 | Under review |
| NCNB-S-V-33 | PENNGRVE | | D | Loss of Station | 0.8943 | 0.8948 | 0.8520 | Under review |
| NCNB-S-V-34 | RINCON | | D | Loss of Station | 0.8555 | 0.8559 | 0.8057 | Under review |
| NCNB-S-V-35 | GUALALA | | D | Loss of Station | 0.7539 | 0.7420 | 0.6134 | Under review |
| NCNB-S-V-36 | ANNAPOLS | | D | Loss of Station | 0.7803 | 0.7703 | 0.6563 | Under review |
| NCNB-S-V-37 | FORT RSS | | D | Loss of Station | 0.7949 | 0.7862 | 0.6812 | Under review |
| NCNB-S-V-38 | SLMN CRK | | D | Loss of Station | 0.7986 | 0.7902 | 0.6896 | Under review |
| NCNB-S-V-39 | MONTE RO | | D | Loss of Station | 0.8206 | 0.8142 | 0.7237 | Under review |
| NCNB-S-V-40 | WHLR TAP | | D | Loss of Station | 0.8686 | 0.8666 | 0.7960 | Under review |
| NCNB-S-V-41 | MIRABEL | | D | Loss of Station | 0.8606 | 0.8577 | 0.7834 | Under review |
| NCNB-S-V-42 | MOLINO | | D | Loss of Station | 0.8456 | 0.8425 | 0.7696 | Under review |
| NCNB-S-V-43 | GYSRVLE | | D | Loss of Station | 0.8228 | 0.8162 | 0.7363 | Under review |
| NCNB-S-V-44 | GYSR 1-2 | | D | Loss of Station | 0.8290 | 0.8228 | 0.7443 | Under review |
| NCNB-S-V-45 | FULTON | | D | Loss of Station | 0.8851 | 0.8847 | 0.8220 | Under review |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and Bay - Summer Peak**

High/Low Voltage



| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|-------------|------------|-------------------|----------|----------------------|------------------|------------------|------------------|--------------------------------|
| | | | | | 2014 Summer Peak | 2017 Summer Peak | 2022 Summer Peak | |
| NCNB-S-V-46 | FTCH MTN | | D | Loss of Station | 0.8317 | 0.8257 | 0.7479 | Under review |
| NCNB-S-V-47 | COTATI | | D | Loss of Station | 0.8264 | 0.8217 | 0.7438 | Under review |
| NCNB-S-V-48 | SNMALDFL | | D | Loss of Station | 0.8283 | 0.8238 | 0.7462 | Under review |
| NCNB-S-V-49 | ST.HELNA | | D | Loss of Station | 0.8426 | 0.9285 | 0.8794 | Under review |
| NCNB-S-V-50 | SILVERDO | | D | Loss of Station | 0.8597 | 0.8595 | 0.8122 | Under review |
| NCNB-S-V-51 | MONTCLLO | | D | Loss of Station | 0.8624 | 0.8622 | 0.8148 | Under review |
| NCNB-S-V-52 | MNTCLOPH | | D | Loss of Station | 0.8643 | 0.8641 | 0.8168 | Under review |
| NCNB-S-V-53 | PUEBLO | | D | Loss of Station | 0.8957 | 0.8959 | 0.8542 | Under review |
| NCNB-S-V-54 | CALISTGA | | D | Loss of Station | 0.8082 | 0.9601 | 0.9243 | Under review |
| NCNB-S-V-55 | STONY PT | | D | Loss of Station | 0.8557 | 0.8554 | 0.8035 | Under review |
| NCNB-S-V-56 | WOHLER | | D | Loss of Station | 0.8683 | 0.8663 | 0.7956 | Under review |
| NCNB-S-V-57 | LAGUNA | | D | Loss of Station | 0.8359 | 0.8323 | 0.7573 | Under review |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: PG&E North Coast and North Bay- Winter Peak

High/Low Voltage

| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|-------------|----------------|--|----------|----------------------|------------------|------------------|------------------|--|
| | | | | | 2014 Winter Peak | 2017 Winter Peak | 2022 Winter Peak | |
| NCNB-W-V-1 | ALTO 60kV | Ignacio _Alto 60 kV & Ignacio - Alto - Sausalito # 2 60 kV | C | L-1-1 | 0.70 | N/A | N/A | Ignacio - Alto voltage conversion project |
| | | Ignacio-Alto-Sausalito #2 & #1 60kV Lines | C | L-2 | 0.80 | 0.99 | 0.99 | |
| NCNB-W-V-2 | BOLINAS 60kV | IGNACO A 115/60.00 kV BANK & IGNACO B 115/60.00 kV BANK | C | T-1-1 | 1.03 | 0.88 | 0.88 | Close the NO tie line between Lakeville Jct - Novato Jct 60kV. Drop load at Novato / Stafford sub as needed. |
| NCNB-W-V-3 | CLOVRDLE 115kV | Mendocno- Ukiah 115 kV & GEYSER # 3 - CLOVERDALE 115K | C | L-1-1 | 0.86 | 0.85 | 0.83 | Drop load at Ukiah and City of Ukiah |
| NCNB-W-V-4 | EGLE RCK 60kV | Clear Lake- Hopland 60 Kv & EAGLE ROCK 115/60 KV BANK NO.1 | C | L-1 / T-1 | 0.81 | 0.97 | 0.96 | Middletown 115kV project. |
| NCNB-W-V-5 | GREENBRE 60kV | Ignacio _Alto 60 kV & Ignacio - Alto - Sausalito # 2 60 kV | C | L-1-1 | 0.69 | N/A | N/A | Ignacio - Alto voltage conversion project |
| | | Ignacio-Alto-Sausalito #2 & #1 60kV Lines | C | L-2 | 0.82 | 1.01 | 1.01 | |
| NCNB-W-V-6 | GUALALA 60kV | Fulton - Ignacio No.1 230 kV & Fulton - Lakeville - Igancio 230 kV | C | L-1-1 | 0.95 | 0.96 | 0.89 | Install reactive support at Annapolis / Fort Ross in 2022 |
| | | Fulton-Lakeville & Fulton-Ignacio 230kV Lines | C | L-1-1 | 0.95 | 0.96 | 0.89 | |
| NCNB-W-V-7 | HARTLEY 60kV | Clear Lake- Hopland 60 Kv & KONOCTI6 - Eagle Rck 60kV | C | L-1-1 | 0.59 | 0.96 | 0.94 | Drop load at Hartley |
| NCNB-W-V-8 | HPLND JT 115kV | Mendocno- Ukiah 115 kV & GEYSER # 3 - CLOVERDALE 115K | C | L-1-1 | 0.86 | 0.86 | 0.83 | Drop load at Ukiah and City of Ukiah |
| NCNB-W-V-9 | KONOCTI6 60kV | Clear Lake- Hopland 60 Kv & KONOCTI6 - Eagle Rck 60kV | C | L-1-1 | 0.45 | 0.97 | 0.96 | Middletown 115kV project |
| NCNB-W-V-10 | LOWR LKE 60kV | KONOCTI6 - Eagle Rck 60kV | B | L-1 | 0.90 | 1.01 | 1.00 | |
| | | BUS FAULT AT EGLE RCK 60kV | C | Bus | 0.90 | 1.01 | 1.00 | |
| | | Clear Lake- Hopland 60 Kv & KONOCTI6 - Eagle Rck 60kV | C | L-1-1 | 0.43 | 0.99 | 0.99 | |
| NCNB-W-V-11 | MIDDLTWN 60kV | KONOCTI6 - Eagle Rck 60kV | B | L-1 | 0.88 | 1.04 | 1.03 | |
| | | BUS FAULT AT EGLE RCK 115kV | C | Bus | 0.89 | 1.04 | 1.04 | |
| | | BUS FAULT AT EGLE RCK 60kV | C | Bus | 0.88 | 1.04 | 1.03 | |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and North Bay- Winter Peak**

High/Low Voltage

| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|-------------|---------------|---|----------|----------------------------|------------------|------------------|------------------|--|
| | | | | | 2014 Winter Peak | 2017 Winter Peak | 2022 Winter Peak | |
| | | Clear Lake- Hopland 60 Kv & KONOCTI6 - Eagle Rck 60kV | C | L-1-1 | 0.39 | 1.04 | 1.04 | |
| NCNB-W-V-12 | OLEMA 60kV | IGNACO A 115/60.00 kV BANK & IGNACO B 115/60.00 kV BANK | C | T-1-1 | 1.01 | 0.87 | 0.87 | Close the NO tie line between Lakeville Jct - Novato Jct 60kV. Drop load at Novato / Stafford sub as needed. |
| NCNB-W-V-13 | SAUSALTO 60kV | Ignacio _Alto 60 kV & Ignacio - Alto - Saulsalito # 2 60 kV | C | L-1-1 | 0.68 | N/A | N/A | |
| NCNB-W-V-14 | STAFFORD 60kV | IGNACO A 115/60.00 kV BANK & IGNACO B 115/60.00 kV BANK | C | T-1-1 | 1.02 | 0.88 | 0.88 | Close the NO tie line between Lakeville Jct - Novato Jct 60kV. Drop load at Novato / Stafford sub as needed. |
| NCNB-W-V-15 | TOCALOMA 60kV | | C | T-1-1 | 1.02 | 0.88 | 0.87 | |
| NCNB-W-V-16 | UKIAH 115kV | Mendocno- Ukiah 115 kV & GEYSER # 3 - CLOVERDALE 115K | C | L-1-1 | 0.84 | 0.83 | 0.81 | Drop load at Ukiah and City of Ukiah |
| NCNB-W-V-17 | UPPR LKE 60kV | Clear Lake- Hopland 60 Kv & KONOCTI6 - Eagle Rck 60kV | C | L-1-1 | 0.67 | 0.97 | 0.96 | Drop load at Upper lake / Hartley |
| NCNB-W-V-18 | WOODACRE 60kV | IGNACO A 115/60.00 kV BANK & IGNACO B 115/60.00 kV BANK | C | T-1-1 | 1.03 | 0.89 | 0.89 | Close the NO tie line between Lakeville Jct - Novato Jct 60kV. Drop load at Novato / Stafford sub as needed. |
| NCNB-W-V-19 | GUALALA | Common Corridor between Eagle Rock - Fulton | D | Loss of all lines in a ROW | 0.96 | 0.93 | 0.89 | Under review |
| NCNB-W-V-20 | GUALALA | Common corridor south of Lakeville | D | Loss of all lines in a ROW | 0.95 | 0.94 | 0.90 | Under review |
| NCNB-W-V-21 | FULTON | | D | Loss of Station | 0.90 | 0.90 | 0.87 | Under review |
| NCNB-W-V-22 | MONROE1 | | D | Loss of Station | 0.91 | 0.90 | 0.87 | Under review |
| NCNB-W-V-23 | MONROE2 | | D | Loss of Station | 0.91 | 0.90 | 0.87 | Under review |

High/Low Voltage

| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|-------------|------------|--------------------------------------|----------|----------------------|------------------|------------------|------------------|--------------------------------|
| | | | | | 2014 Winter Peak | 2017 Winter Peak | 2022 Winter Peak | |
| NCNB-W-V-24 | SNTA RSA | Loss of Fulton 230kV station + Xfmrs | D | Loss of Station | 0.91 | 0.91 | 0.88 | Under review |
| NCNB-W-V-25 | RINCON | | D | Loss of Station | 0.92 | 0.92 | 0.89 | Under review |
| NCNB-W-V-26 | GUALALA | | D | Loss of Station | 0.86 | 0.84 | 0.76 | Under review |
| NCNB-W-V-27 | ANNAPOLS | | D | Loss of Station | 0.88 | 0.87 | 0.80 | Under review |
| NCNB-W-V-28 | FORT RSS | | D | Loss of Station | 0.90 | 0.88 | 0.82 | Under review |
| NCNB-W-V-29 | SLMN CRK | | D | Loss of Station | 0.90 | 0.89 | 0.83 | Under review |
| NCNB-W-V-30 | MONTE RO | | D | Loss of Station | 0.92 | 0.90 | 0.85 | Under review |
| NCNB-W-V-31 | MOLINO | | D | Loss of Station | 0.92 | 0.92 | 0.88 | Under review |
| NCNB-W-V-32 | GYSRVLE | | D | Loss of Station | 0.92 | 0.91 | 0.87 | Under review |
| NCNB-W-V-33 | GYSR 1-2 | | D | Loss of Station | 0.92 | 0.91 | 0.87 | Under review |
| NCNB-W-V-34 | FTCH MTN | | D | Loss of Station | 0.92 | 0.91 | 0.87 | Under review |
| NCNB-W-V-35 | COTATI | | D | Loss of Station | 0.91 | 0.90 | 0.86 | Under review |
| NCNB-W-V-36 | SNMALDFL | | D | Loss of Station | 0.91 | 0.90 | 0.86 | Under review |
| NCNB-W-V-37 | SILVERDO | | D | Loss of Station | 0.92 | 0.92 | 0.89 | Under review |
| NCNB-W-V-38 | MONTCLLO | | D | Loss of Station | 0.92 | 0.92 | 0.89 | Under review |
| NCNB-W-V-39 | MNTCLOPH | | D | Loss of Station | 0.92 | 0.92 | 0.90 | Under review |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and North Bay- Winter Peak**



High/Low Voltage

| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|-------------|------------|-------------------|----------|----------------------|------------------|------------------|------------------|--------------------------------|
| | | | | | 2014 Winter Peak | 2017 Winter Peak | 2022 Winter Peak | |
| NCNB-W-V-40 | LAGUNA | | D | Loss of Station | 0.91 | 0.91 | 0.87 | Under review |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: PG&E North Coast and North Bay- Summer Light Load & Summer Off-Peak

High/Low Voltage

| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|--------------|---------------|---|----------|----------------------|------------------------|----------------------|-----|---|
| | | | | | 2014 Summer Light Load | 2017 Summer Off-Peak | N/A | |
| NCNB-OP-V-1 | ANNAPOLS 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | Diverged | N/A | Close the tie line between Petaluma C jct and Cotati sub (under off-peak conditions). Drop load at Cotati if overloads exist. |
| NCNB-OP-V-2 | BIG RIVR 60kV | Mendocno- Ukiah 115 kV & Mendocino-Willits- Fort Bragg 60 kV | C | L-1-1 | 1.30 | 1.05 | N/A | Big river SVC. Adjust generation in the interim |
| NCNB-OP-V-3 | CALISTGA 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | Diverged | N/A | Close the tie line between Petaluma C jct and Cotati sub (under off-peak conditions). Drop load at Cotati if overloads exist. |
| NCNB-OP-V-4 | CLVRDLJT 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-5 | COTATI 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-6 | ELK 60kV | Mendocno- Ukiah 115 kV & Mendocino-Willits- Fort Bragg 60 kV | C | L-1-1 | 1.23 | 1.05 | N/A | Big river SVC. Adjust generation in the interim |
| NCNB-OP-V-7 | FCHMNT2P 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | Diverged | N/A | Close the tie line between Petaluma C jct and Cotati sub (under off-peak conditions). Drop load at Cotati if overloads exist. |
| NCNB-OP-V-8 | FORT RSS 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-9 | FRT BRGG 60kV | Mendocno- Ukiah 115 kV & Mendocino-Willits- Fort Bragg 60 kV | C | L-1-1 | 1.30 | 1.06 | N/A | Big river SVC. Adjust generation in the interim |
| | | Ukiah-Hopland-Cloverdale 115 kV & Cortina - Mendocino No.1 115 kV | C | L-1-1 | 0.99 | 1.11 | N/A | |
| NCNB-OP-V-10 | FTCH MTN 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | Diverged | N/A | Close the tie line between Petaluma C jct and Cotati sub (under off-peak conditions). Drop load at Cotati if overloads exist. |
| NCNB-OP-V-11 | FTCHMTNP 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-12 | FULTON 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V- | GARCIA 60kV | Mendocno- Ukiah 115 kV & Mendocino-Willits- Fort Bragg 60 kV | C | L-1-1 | 1.23 | 1.05 | N/A | Big river SVC. Adjust generation in the |

High/Low Voltage

| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|--------------|---------------|---|----------|----------------------|------------------------|----------------------|-----|---|
| | | | | | 2014 Summer Light Load | 2017 Summer Off-Peak | N/A | |
| 13 | BARROSA 60kV | Ukiah-Hopland-Cloverdale 115 kV & Cortina - Mendocino No.1 115 kV | C | L-1-1 | 1.00 | 1.11 | N/A | interim |
| NCNB-OP-V-15 | GUALALA 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | T-1-1 | Diverged | Diverged | N/A | Close the tie line between Petaluma C jct and Cotati sub (under off-peak conditions). Drop load at Cotati if overloads exist. |
| NCNB-OP-V-16 | GYSR 1-2 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-17 | GYSRJCT1 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-18 | GYSRJCT2 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-19 | GYSRVLE 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-20 | HDSBGTP1 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-21 | HDSBGTP2 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-22 | LAGUNA 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-23 | LAGUNATP 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-24 | MIRABEL 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-25 | MIRBELTP 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-26 | MLNO JCT 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-27 | MOLINO 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-28 | MONTE RO 60kV | | C | T-1-1 | Diverged | Diverged | N/A | |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and North Bay- Summer Light Load & Summer Off-Peak**

High/Low Voltage



| ID | Substation | Worst Contingency | Category | Category Description | Voltage (PU) | | | Potential Mitigation Solutions |
|--------------|---------------|---|----------|----------------------|------------------------|----------------------|-----|--|
| | | | | | 2014 Summer Light Load | 2017 Summer Off-Peak | N/A | |
| NCNB-OP-V-29 | PHILO 60kV | Mendocno- Ukiah 115 kV & Mendocino-Willits- Fort Bragg 60 kV | C | L-1-1 | 1.16 | 1.04 | N/A | Big River SVC. Adjust Generation to mitigate the high voltage |
| NCNB-OP-V-30 | PNT ARNA 60kV | Mendocno- Ukiah 115 kV & Mendocino-Willits- Fort Bragg 60 kV | C | L-1-1 | 1.23 | 1.05 | N/A | |
| | | Ukiah-Hopland-Cloverdale 115 kV & Cortina - Mendocino No.1 115 kV | C | L-1-1 | 1.00 | 1.11 | N/A | |
| NCNB-OP-V-31 | SLMN CRK 60kV | FULTON 115/60.00 KV BANK NO.1 & FULTON 115/60.00 KV BANK NO.2 | C | L-1-1 | Diverged | Diverged | N/A | Add a new Fulton 115 / 60kV transformer. In the interim drop load at Molino, Mirabel, Heldsberg, Gyserville & Fitch mountain |
| NCNB-OP-V-32 | SLMN JCT 60kV | | C | L-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-33 | SNMA TAP 60kV | | C | L-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-34 | SNMALDFL 60kV | | C | L-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-35 | ST.HELNA 60kV | | C | L-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-36 | TRNTN JT 60kV | | C | L-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-37 | TRNTN_JC 60kV | | C | L-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-38 | WHLR JCT 60kV | | C | L-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-39 | WHLR TAP 60kV | | C | L-1-1 | Diverged | Diverged | N/A | |
| NCNB-OP-V-40 | WOHLER 60kV | | C | L-1-1 | Diverged | Diverged | N/A | |

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and North Bay**



Single Contingency Load Drop

| ID | Worst Contingency | Category | Category Description | Amount of Load Drop (MW) | | | Potential Mitigation Solutions |
|----|-------------------|----------|----------------------|--------------------------|------|------|--------------------------------|
| | | | | 2014 | 2017 | 2022 | |
| | | | | | | | |

No single contingency resulted in total load drop of more than 250 MW.

2012/2013 ISO Reliability Assessment - Preliminary Study Results

Study Area: **PG&E North Coast and North Bay**



Single Source Substation with more than 100 MW Load

| ID | Substation | Load Served (MW) | | | Potential Mitigation Solutions |
|----|------------|------------------|------|------|--------------------------------|
| | | 2014 | 2017 | 2022 | |
| | | | | | |

No single source substation with more than 100 MW Load