# Standard Disturbance Cases

Staff simulate a group of standard disturbances on each base case before distribution to ensure that the power flow and stability data are compatible. The standard disturbances supply a dynamic and power flow data check to verify that the data responds well to several disturbances and, if there are any potential data discrepancies, they are noted for further investigation. The tables below show any issues staff saw during the simulations. Such issues should be further investigated by the appropriate data submitter.

## 22HS3Sa

| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 22HS3S | ST-IMW-1 | 24 |  | 740 | Dynamic | Models Electric Field Density (EFD) unstable post disturbance at bus 24861, 24862 and 24863 | Model |
| 2 | 22HS3S | ST-UCN-1, ST-DSW-1 | 21 |  | 16 | Dynamic | Growing oscillations for EFD during disturbance at buses 21658 and 21659 | Model |
| 3 | 22HS3S | ST-DSW-1 | 40 |  | 987 | Dynamic | Unstable EFD behavior post disturbance at bus 40346 | Model |
| 4 | 22HS3S | ST-DSW-1 | 54 |  | 76 | Dynamic | Unstable EFD behavior post disturbance at bus 55444 | Model |
| 5 | 22HS3S | ST-DSW-1 | 65 |  | 7 | Dynamic | Unstable EFD behavior post disturbance at bus 65021 (units 1-3) | Model |
| 6 | 22HS3S | ST-NWC-1 | 40 |  | 989 | Dynamic | Oscillations for EFD at 44211 and 44212, 44231 and 44232, and 44251 and 44252 were not dampening fast enough | Model |
| 7 | 22HS3S | ST-0 | 30 |  | 390 | Dynamic | SVSMO model moving at bus 31080 and 33210 during a no disturbance run and EFD model at 31153 | Model |
| 8 | 22HS3S | ST-0 | 30 |  | 3001 | Dynamic | Unstable EFD behavior for a no disturbance run at bus 32166 and 37307 | Model |
| 9 | 22HS3S | ST-0 | 65 |  | 7 | Dynamic | Unstable EFD behavior for a no disturbance run at bus 65542, 65543, and 65544 | Model |
| 10 | 22HS3S | ST-CAL-S | 65 |  | 7 | Dynamic | Unstable EFD behavior for a disturbance run at bus 69790, 69773, 69723, and 66238 | Model |
| 11 | 22HS3S | ST-0 | 70 |  | 65 | Dynamic | Unstable EFD behavior for a no disturbance run at bus 71013 and 78528 and governor behavior at 70119 | Model |
| 12 | 22HS3S | ST-CAL-S | 26 |  | 119 | Dynamic | Unstable EFD behavior at bus 27359, 27356, and 27346 | Model |
| 13 | 22HS3S | ST-CAL-N | 50 |  | 10 | Dynamic | Unstable EFD at 50445 | Model |
| 14 | 22HS3S | ST-CAL-N | 19 |  | 4 | Dynamic | PG decreases to zero at 19890 | Model |
| 15 | 22HS3S | ST-0 | 18 |  | 18 | Dynamic | Unstable QG movement at 181006 | Model |
| 16 | 22HS3S | ST-0 | 40 |  | 29 | Dynamic | Unstable EFD at 46732 and 44009 and PG at 48189 | Model |
| 17 | 22HS3S | ST-0 | 50 |  | 202 | Dynamic | Unstable EFD at 51499 and 80434 | Model |
| 18 | 22HS3S | ST-CAL-N | 50 |  | 10 | Dynamic | Unstable EFD at 50177 and 50641 | Model |
| 19 | 22HS3S | ST-0 | 65 |  | 7 | Dynamic | Unstable EFD at 69013 and 69017 | Model |
| 20 | 22HS3S | ST-0 | 54 |  | 76 | Dynamic | unstable EFD at 554986 | Model |
| 21 | 22HS3S | ST-0 | 30 |  | 360 | Dynamic | unstable model at 38134 | Model |
| 22 | 22HS3S | ST-CAL-S | 24 |  | 740 | Dynamic | Unstable model at 29415 and 25735 | Model |

## 33LSP1Sa

| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 33LSP1Sa | ST-0 | 18 |  | 18 | Dynamic | Pg spread at 181006 was above allowable spread | Model |
| 2 | 33LSP1Sa | ST-NWC-1 | 21 |  | 211 | Dynamic | Pg oscillates above allowable spread at 21016 | Model |
| 3 | 33LSP1Sa | ST-0 | 30 |  | 390 | Dynamic | nuisance pickup at t=0 for locti 34738 | Model |
| 4 | 33LSP1Sa | ST-0 | 30 |  | 390 | Dynamic | svsmo1 30330 switches in and out during no disturbance run | Model |
| 5 | 33LSP1Sa | ST-0 | 30 |  | 360 | Dynamic | unit at 36212 trips on voltage at t=1 | Model |
| 6 | 33LSP1Sa | ST-0 | 30 |  | 360 | Dynamic | Pg spread at 365938 was above allowable threshold | Model |
| 7 | 33LSP1Sa | ST-0 | 30 |  | 390 | Dynamic | svsmo1 31080 was causing efd spreads throughout area 30 to be large | Model |
| 8 | 33LSP1Sa | ST-NWC-1 | 30 |  | 363 | Dynamic | pg at 37307 had growing instability | Model |
| 9 | 33LSP1Sa | ST-NWC-1 | 40 |  | 989 | Dynamic | pg was oscillating massively at 44211 44212 44231 44232 | Model |
| 10 | 33LSP1Sa | ST-NWC-1 | 40 |  | 30 | Dynamic | pg had periodic spikes post disturbance at 42997 | Model |
| 11 | 33LSP1Sa | ST-0 | 50 |  | 202 | Dynamic | efd spread was above allowable threshold at 80752 | Model |
| 12 | 33LSP1Sa | ST-0 | 50 |  | 10 | Dynamic | unit at 51273 had speed instability | Model |
| 13 | 33LSP1Sa | ST-NWC-1 | 50 |  | 202 | Dynamic | unit at 81089 trips on voltage at t=30 | Model |
| 14 | 33LSP1Sa | ST-0 | 54 |  | 76 | Dynamic | unit at 557120 had large spreads above allowable thresholds | Model |
| 15 | 33LSP1Sa | ST-0 | 54 |  | 76 | Dynamic | Unit at 554986 had pg instability | Model |
| 16 | 33LSP1Sa | ST-0 | 54 |  | 76 | Dynamic | Unit at 59011 had speed spread above allowable threshold after adding composite load models | Model |
| 17 | 33LSP1Sa | ST-0 | 65 |  | 7 | Dynamic | units at 65542 65543 65544 had undamped efd oscillations | Model |
| 18 | 33LSP1Sa | PDCI | 65 |  | 7 | Dynamic | efd at 65021 was diving down undamped | Model |
| 19 | 33LSP1Sa | ST-0 | 70 |  | 95 | Dynamic | pg spread at 78528 was above allowable threshold | Model |
| 20 | 33LSP1Sa | ST-UCN-1 | 70 |  | 66 | Dynamic | Unit at 71013 trips offline at 32.5 seconds on voltage | Model |
| 21 | 33LSP1Sa | ST-0 | 73 |  | 60 | Dynamic | units at 74042 74043 had speed spreads above allowable thresholds | Model |

## 23HW3a

| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 23HW3a | ST-0 | 20 |  | 111 | Dynamic | Large pgen movement above allowable threshold at 20188 20190, not enough room on swing machine to adjust generation | Model |
| 2 | 23HW3a | ST-0 | 30 |  | 390 | Dynamic | nuisance pickup for locti 34738 at t=0 | Model |
| 3 | 23HW3a | ST-0 | 30 |  | 390 | Dynamic | svsmo 31080 causing large efd spreads throughout area 30 | Model |
| 4 | 23HW3a | ST-0 | 30 |  | 360 | Dynamic | large efd oscillations at 365540 | Model |
| 5 | 23HW3a | ST-0 | 40 |  | 29 | Dynamic | large pg oscillation at 48189 | Model |
| 6 | 23HW3a | ST-0 | 40 |  | 987 | Dynamic | oscillatory spreads at 44007 44008 44009 | Model |
| 7 | 23HW3a | ST-0 | 40 |  | 38 | Dynamic | large efd movement at 46732 | Model |
| 8 | 23HW3a | ST-0 | 40 |  | 32 | Dynamic | extremely large speed spread at 47602 | Model |
| 9 | 23HW3a | ST-NWC-1 | 40 |  | 989 | Dynamic | growing pg oscillations at 44211 44212 | Model |
| 10 | 23HW3a | ST-CAL-N | 40 |  | 987 | Dynamic | extremely large pg oscillation at 40346 | Model |
| 11 | 23HW3a | ST-0 | 50 |  | 10 | Dynamic | pg oscillations at 50177 | Model |
| 12 | 23HW3a | ST-0 | 50 |  | 202 | Dynamic | large efd spread after adding composite load models at 80752 | Model |
| 13 | 23HW3a | ST-0 | 50 |  | 202 | Dynamic | speed instability at 51273 | Model |
| 14 | 23HW3a | ST-0 | 54 |  | 76 | Dynamic | large pg movement at 54154 during first second of simulation | Model |
| 15 | 23HW3a | ST-0 | 54 |  | 76 | Dynamic | large pg spread at 57274 | Model |
| 16 | 23HW3a | ST-0 | 54 |  | 76 | Dynamic | large pg spread at 54773 | Model |
| 17 | 23HW3a | ST-0 | 54 |  | 76 | Dynamic | large pg and spd spreads at 59746 59757 | Model |
| 18 | 23HW3a | ST-0 | 54 |  | 76 | Dynamic | growing efd oscillation at 58334 | Model |
| 19 | 23HW3a | ST-DSW-1 | 60 |  | 11 | Dynamic | speed spreads at 60367 begin to decrease largely around 25 seconds | Model |
| 20 | 23HW3a | ST-0 | 65 |  | 7 | Dynamic | growing efd oscillations at 65542 65543 65544 | Model |
| 21 | 23HW3a | ST-DSW-1 | 65 |  | 7 | Dynamic | undamped efd increase/decrease at 65021 | Model |
| 22 | 23HW3a | ST-DSW-1 | 70 |  | 66 | Dynamic | unit at bus 71013 was causing simulation to diverge at 4.75 seconds | Performance |
| 23 | 23HW3a | ST-NWC-1 | 73 |  | 60 | Dynamic | growing spd oscillations at 74042 74043 | Model |

## 23LW1a

| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 23LW1a | ST-DSW-1 | 40 |  |  | Dynamics | Generator at bus 47995 trips on requency violation of -0.06 at .8 seconds post fault. | Model |
| 2 | 23LW1a | ST-DSW-1 | 50 |  |  | Dynamics | Qgen of generators at buses 80604 and 50445 oscillates then continuously increases post fault. | Performance |
| 3 | 23LW1a | ST-CAL-S, ST-CAL-S2 | 21 |  |  | Dynamics | QG of generators at buses 21655, 21658 and 21659 oscillate post fault | Model |
| 4 | 23LW1a | ST-CAL-S,ST-CAL-S2 | 16 |  |  | Dynamics | QG of generator at bus 160932 oscillates post fault for most disturbances. REEC\_A model will be commented. | Model |
| 5 | 23LW1a | ST-CAL-S2 | 22 |  |  | Dynamics | LHVRT relay tripped the generators at bus 22942 and 22949 approximately 0.2 seconds post fault in PowerWorld | Performance |
| 6 | 23LW1a | ST-DSW-1 | 19 |  |  | Dynamic | Pgen at Generator 1 at bus 19985 and Generator 2 at bus 19986 decreases suddenly around 19 seconds post fault | Model |
| 7 | 23LW1a | ST-UCN-1 | 65 |  |  | Dynamic | Qgen of generators at buses 67565, 67566, nd 67567 oscillates post fault. WT3E, WT3T and WT3P models were commented. | Model |
| 8 | 23LW1a | ST-IMW-1 | 50 |  |  | Dynamics | Qgen of generator at bus 51593 oscillates then continuously increases post fault. | Performance |

## 23HSP1a

| Item # | Base  Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 23HSP1a | All disturbances | 65 |  |  | Dynamic | QG of various IBR generators oscillates post fault for most disturbances. REEC\_A models for the generators at the following buses were commented: 65815, 66006, 66328, 66394, 69707, 69723, 69773, 69778, 69782, 69790, 69786, 69790, 69794, 69798, 69816 | Model |
| 2 | 23HSP1a | All disturbances | 16 |  |  | Dynamic | QG of generator at bus 160932 oscillates post fault for most disturbances. REEC\_A model will be commented. | Model |
| 3 | 23HSP1a | ST-DSW-1 | 40 |  |  | Dynamic | Generator Z1 at bus 47995 trips on low frequency during the disturbance | Performance |
| 4 | 23HSP1a | ST-DSW-1 | 19 |  |  | Dynamic | Pgen at Generator 1 at bus 19985 and at Generator 2 at bus 19986 decrease suddenly around 19 seconds post fault | Model |
| 5 | 23HSP1a | ST-DSW-1 | 60 |  |  | Dynamic | Pgen for generator at bus 60367 begins to oscillate approximately 30 second post fault. | Model |
| 6 | 23HSP1a | ST-DSW-1 | 24 |  |  | Dynamic | QG for generator at bus 29415 increases continuously post fault | Model |
| 7 | 23HSP1a | ST-CAL-N | 40 |  |  | Dynamic | Generator Z1 at bus 47995 trips on low frequency during the disturbance | Performance |
| 8 | 23HSP1a | ST-CAL-N | 24 |  |  | Dynamic | Ooslen on branch FROM 24015 TO 24011 attempts to trip, but fails to find far end of branch | Model |
| 9 | 23HSP1a | ST-CAL-N | 24 |  |  | Dynamic | OEL1 limit exceed for unit 7 at bus 29902 | Performance |
| 10 | 23HSP1a | ST-CAL-N | 30 |  |  | Dynamic | OEL1 limit exceeded for unit 1 and 2 at bus 31406 | Performance |
| 11 | 23HSP1a | ST-CAL-S | 24 |  |  | Dynamic | OEL1 limit exceeded for unit 7 at bus 29902 | Performance |
| 12 | 23HSP1a | ST-UCN-1 | 70 |  |  | Dynamic | OEL1 limit exceeded for generator at bus 70777 post fault | Performance |
| 13 | 23HSP1a | ST-UCN-1 | 70 |  |  | Dynamic | QG for generator at bus 70721 increases continuously post fault | Performance |
| 14 | 23HSP1a | ST-CAL-S, ST-DSW-1, ST-CAL-S2 | 21 |  |  | Dynamic | Exciters for generators at the following buses exhibit slow undamped oscillations post fault. Bus 21655, 21658, 21659, and 21876. The effect was most pronounced in PowerWorld, but is still present in PSLF | Model |
| 15 | 23HSP1a | All Disturbances | 65 |  |  | Dynamic | Qg of generator at bus 69748 continuously increases post fault in PowerWorld | Model |
| 16 | 23HSP1a | ST-NWC-1 | 19 |  |  | Dynamic | Pgen at Generator 1 at bus 19985 and at Generator 2 at bus 19986 decrease suddenly around 19 seconds post fault in PowerWorld |  |

## 28HW2a

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| 1 | 28HW2 | ST-CAL-N | 40 | 987 |  | Dynamic | The generator at bus 40346 becomes unstable around 30 seconds | Model |
| 2 | 28HW2 | ST-CAL-S | 70 | 65 | PW | Dynamic | The generator at bus 70631 becomes unstable around 23 seconds | Model |

## 28HS2a

| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 28HS2a | ST-0 | 18 |  | 18 | Dynamic | qg spread > 60 MVAR at 181006 | Model |
| 2 | 28HS2a | ST-0 | 22 |  | 1001 | Dynamic | units at 22977 22978 causing solution to diverge | Model |
| 3 | 28HS2a | ST-CAL-N | 24 |  | 740 | Dynamic | unit at 29724 reduces output to 0 at 27 seconds | Performance |
| 4 | 28HS2a | ST-CAL-S | 24 |  | 740 | Dynamic | units at 25846 25872 reduce output to 0 at 27 seconds | Performance |
| 5 | 28HS2a | ST-NWC-1 | 30 |  | 363 | Dynamic | unit at 37307 has growing pg instability | Model |
| 6 | 28HS2a | ST-0 | 30 |  | 390 | Dynamic | nuisance pickup for locti 34738 | Model |
| 7 | 28HS2a | ST-0 | 30 |  | 390 | Dynamic | svsmo model 31080 causing large spreads throughout area 30 | Model |
| 8 | 28HS2a | ST-0 | 30 |  | 360 | Dynamic | unit at 365540 had large efd oscillations | Model |
| 9 | 28HS2a | ST-CAL-S | 30 |  | 360 | Dynamic | pg instability in unit at 36413 | Model |
| 10 | 28HS2a | ST-CAL-S | 30 |  | 360 | Dynamic | solution failing to converge due to unit at 365936 | Model |
| 11 | 28HS2a | ST-0 | 40 |  | 29 | Dynamic | large pg movement for unit at 48189 | Model |
| 12 | 28HS2a | ST-0 | 40 |  | 987 | Dynamic | efd spread too large at 44006 44007 440008 44009 | Model |
| 13 | 28HS2a | ST-0 | 40 |  | 38 | Dynamic | efd spread too large at 46732 | Model |
| 14 | 28HS2a | ST-0 | 40 |  | 987 | Dynamic | efd spread extremely large at 40346 after adding composite load models | Model |
| 15 | 28HS2a | ST-CAL-S | 40 |  | 47 | Dynamic | strange periodic efd spikes at 474414 | Model |
| 16 | 28HS2a | ST-0 | 50 |  | 10 | Dynamic | growing pg oscillations at 50177 | Model |
| 17 | 28HS2a | ST-0 | 50 |  | 202 | Dynamic | large efd movement at 51216 51145 | Model |
| 18 | 28HS2a | ST-0 | 50 |  | 10 | Dynamic | svsmo model at 51027 moving and causing large spreads throughout area 50 | Model |
| 19 | 28HS2a | ST-0 | 50 |  | 202 | Dynamic | large qg spreads at 80543 80544 causing efd issues | Model |
| 20 | 28HS2a | ST-0 | 50 |  | 202 | Dynamic | efd spread at 80752 was too large | Model |
| 21 | 28HS2a | ST-0 | 50 |  | 10 | Dynamic | unit at 51273 had speed instability | Model |
| 22 | 28HS2a | ST-CAL-S | 50 |  | 203 | Dynamic | unit at 51140 had large, undamped oscillations | Model |
| 23 | 28HS2a | ST-0 | 54 |  | 76 | Dynamic | extremely large qg spreads at 59757 59746 | Model |
| 24 | 28HS2a | ST-0 | 54 |  | 76 | Dynamic | unit at 58334 had large pg and efd oscillations | Model |
| 25 | 28HS2a | ST-0 | 54 |  | 76 | Dynamic | spd spread at 59011 was over allowable threshold after adding composite load models | Model |
| 26 | 28HS2a | ST-0 | 60 |  | 11 | Dynamic | pg at 610681 was moving around 10 MW during first second | Model |
| 27 | 28HS2a | ST-NWC-1 | 60 |  | 50 | Dynamic | instability at 61811 making solution diverge | Model |
| 28 | 28HS2a | ST-DSW-1 | 60 |  | 11 | Dynamic | speed spread at 60367 starts decreasing around 27 seconds | Performance |
| 29 | 28HS2a | ST-0 | 65 |  | 7 | Dynamic | units at 69013 69017 causing solution to diverge | Model |
| 30 | 28HS2a | ST-0 | 65 |  | 7 | Dynamic | pg moving large amount at 69805 | Model |
| 31 | 28HS2a | ST-0 | 65 |  | 7 | Dynamic | undamped efd oscillations at 65542 65543 65544 | Model |
| 32 | 28HS2a | ST-NWC-1 | 65 |  | 7 | Dynamic | growing pg oscillations at 69773 69723 | Model |
| 33 | 28HS2a | ST-DSW-1 | 65 |  | 7 | Dynamic | undamped efd decrease at 65021 | Model |
| 34 | 28HS2a | ST-0 | 70 |  | 65 | Dynamic | units at 70950 70951 70406 70485 dispatched above mwcap and moving | Performance |
| 35 | 28HS2a | ST-NWC-1 | 70 |  | 95 | Dynamic | undamped pg oscillations at 78528 | Model |
| 36 | 28HS2a | ST-0 | 73 |  | 50 | Dynamic | pg and efd oscillations at 73332 73438 | Model |
| 37 | 28HS2a | ST-DSW-1 | 73 |  | 60 | Dynamic | extremely large pg spike around 14 seconds at 74042 74043 causing simulation to diverge | Model |

## 23HS4a

| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 23HS4a | ST-0 | 18 |  | 18 | Dynamic | extremely large qg movement at 181006 | Model |
| 2 | 23HS4a | ST-0 | 20 |  | 111 | Dynamic | large pg movement 20188 20190 | Model |
| 3 | 23HS4a | ST-CAL-N | 24 |  | 740 | Dynamic | unit 24861 trips on voltage around 30 seconds | Model |
| 4 | 23HS4a | ST-CAL-N | 24 |  | 740 | Dynamic | unit 24862 trips around 34.8 seconds on voltage | Model |
| 5 | 23HS4a | ST-0 | 30 |  | 390 | Dynamic | nuisance pickup 34738 locti at t=0 | Model |
| 6 | 23HS4a | ST-0 | 30 |  | 390 | Dynamic | svsmo 31080 causing large spreads throughout area 30 | Model |
| 7 | 23HS4a | ST-0 | 30 |  | 360 | Dynamic | efd oscillations at 365540 | Model |
| 8 | 23HS4a | ST-NWC-1 | 30 |  | 363 | Dynamic | growing pg instability 37307 | Model |
| 9 | 23HS4a | ST-CAL-N | 30 |  | 360 | Dynamic | pg instability 36413 | Model |
| 10 | 23HS4a | ST-0 | 40 |  | 29 | Dynamic | pg moving upwards at 48189 | Model |
| 11 | 23HS4a | ST-0 | 40 |  | 987 | Dynamic | efd spread too large 44006 44007 44008 44009 | Model |
| 12 | 23HS4a | ST-0 | 40 |  | 38 | Dynamic | efd spread too large at 46732 | Model |
| 13 | 23HS4a | ST-0 | 40 |  | 987 | Dynamic | efd spread too large 40346 after adding composite load models | Model |
| 14 | 23HS4a | ST-CAL-N | 40 |  | 47 | Dynamic | strange periodic efd spikes 474414 | Model |
| 15 | 23HS4a | ST-0 | 52 |  | 75 | Dynamic | large pg and efd spreads 52154 | Model |
| 16 | 23HS4a | ST-0 | 50 |  | 10 | Dynamic | growing pg oscillations 50177 | Model |
| 17 | 23HS4a | ST-0 | 50 |  | 202 | Dynamic | large efd movement 51216 51145 | Model |
| 18 | 23HS4a | ST-0 | 50 |  | 202 | Dynamic | large qg spreads causing efd issues 80543 80544 | Model |
| 19 | 23HS4a | ST-0 | 50 |  | 202 | Dynamic | efd oscillations 51054 | Model |
| 20 | 23HS4a | ST-0 | 50 |  | 10 | Dynamic | svd switching 51027 | Model |
| 21 | 23HS4a | ST-NWC-1 | 50 |  | 202 | Dynamic | 51145 spd spread over allowable threshold | Model |
| 22 | 23HS4a | ST-0 | 54 |  | 76 | Dynamic | pg moving 557120 | Model |
| 23 | 23HS4a | ST-0 | 54 |  | 76 | Dynamic | extremely large qg movement at 59746 59757 | Model |
| 24 | 23HS4a | ST-0 | 54 |  | 76 | Dynamic | growing efd oscillations 58334 | Model |
| 25 | 23HS4a | ST-0 | 54 |  | 76 | Dynamic | spd spread over allowable threshold 59011 after adding composite load models | Model |
| 26 | 23HS4a | ST-0 | 60 |  | 11 | Dynamic | pg moving largely 610681 | Model |
| 27 | 23HS4a | ST-0 | 65 |  | 7 | Dynamic | 69013 69017 causing solution to diverge | Model |
| 28 | 23HS4a | ST-0 | 65 |  | 7 | Dynamic | undamped efd oscillations 65542 65543 65544 | Model |
| 29 | 23HS4a | ST-0 | 65 |  | 7 | Dynamic | extremely large qg movement after adding composite load models 69748 | Model |
| 30 | 23HS4a | ST-NWC-1 | 65 |  | 7 | Dynamic | growing pg oscillations 69773 69723 | Model |
| 31 | 23HS4a | ST-DSW-1 | 65 |  | 7 | Dynamic | undamped efd decrease 65021 | Model |
| 32 | 23HS4a | ST-0 | 70 |  | 95 | Dynamic | pg moving 78518 70448 | Performance |
| 33 | 23HS4a | ST-0 | 70 |  | 95 | Dynamic | growing qg, efd oscillations 78528 | Model |
| 34 | 23HS4a | ST-0 | 70 |  | 65 | Dynamic | large spd spreads after adding composite load models at 70739 70742 70733 70775 70736 | Model |
| 35 | 23HS4a | ST-NWC-1 | 70 |  | 65 | Dynamic | very large spd spreads 70739 70742 70736 70775 70733 | Model |
| 36 | 23HS4a | ST-UCN-1 | 70 |  | 66 | Dynamic | massive pg instability 71013 | Model |

## 23LS1a

| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 23LS1a | ST-DSW-1, ST-CAL-N | 40 |  |  | Dynamics | Generator at bus 47995 trips on frequency 1 second after fault | Model |
| 2 | 23LS1a | ST-CAL-N | 24 |  |  | Dynamic | Ooslen on branch FROM 24015 TO 24011 attempts to trip, but fails to find far end of branch | Model |
| 3 | 23LS1a | ST-CAL-N | 40 |  |  | Dynamic | Qg for generator at bus 40346 decreases continuously post fault, then increases significantly just before 35 seconds. This model exhibits similar behavior on all disturbances. The unit will be netted going forward due to the consistently bad behavior. | Model |
| 4 | 23LS1a | ST-CAL-N | 30 |  |  | Dynamic | OEL1 limit exceeded for unit 1 at bus 35078 ELKHIL3G | Performance |
| 5 | 23LS1a | ST-UCN-1 | 70 |  |  | Dynamic | OEL1 limit exceeded for unit C3 at bus 70777 COMAN\_3 | Performance |
| 6 | 23LS1a | ST-NWC-1 | 40 |  |  | Dynamic | QG of generator at 47489 continuously increases post fault. REEC\_A model was commented in final case. | model |
| 7 | 23LS1a | ST-CAL-S, ST-DSW-1, ST-CAL-S2 | 21 |  |  | Dynamic | Exciters for generators at the following buses exhibit slow undamped oscillations post fault. Bus 21655, 21658, 21659, and 21876. The effect was most pronounced in PowerWorld, but is still present in PSLF | Model |
| 8 | 23LS1a | ST-DSW-1 | 70 |  |  | Dynamic | QG for generator at bus 70721 increases continuously post fault | Performance |
| 9 | 23LS1a | ST-CAL-S2 | 40 |  |  | Dynamic | Qg for generator at bus 40346 decreases continuously post fault. This model exhibits similar behavior on all disturbances | Model |
| 10 | 23LS1a | ST-DSW-1 | 65 |  |  | Dynamic | Generator at bus 69707 trips on LHVRT (over voltage) 12 seconds into the disturbance in PowerWorld | Performance |
| 11 | 23LS1a | ST-DSW-1 | 50 |  |  | Dynamic | Exciter of generator at bus 80604 exhibits slow large undamped oscillation starting approximately 16 seconds in the disturbance in PowerWorld | Model |
| 12 | 23LS1a | ST-DSW-1 | 19 |  |  | Dynamic | Output of generator at bus 19985 decreases suddenly around 12 seconds in the disturbance in PowerWorld | Model |
| 13 | 23LS1a | ST-DSW-1 | 62 |  |  | Dynamic | Holter Generators (bus 627511, 627512, 627513) exhibit undamped oscillations through the disturbance in PowerWorld. Units will be netted in the PowerWorld case. | Model |
| 14 | 23LS1a | ST-NWC-1 | 30 |  |  | Dynamic | Generator at bus 31780 exhibited poorly damped oscillations post disturbance in PowerWorld. Unit will be netted in the PowerWorld case. | Model |
| 15 | 23LS1a | ST-UCN-1 | 70 |  |  | Dynamic | QG for generator at bus 70721 oscillates then decreases continuously post fault | Model |

## 33HW1a

| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 33HW1a | ST-DSW-1 | 19 |  |  | Dynamics | Generator at bus 19981 and Generator at bus 19985 show a drop in Pg approximately 15 seconds post fault | Model |
| 2 | 33HW1a | ST-DSW-1, ST-CAL-N | 40 |  |  | Dynamics | Generator at bus 47995 trips on frequency 1 second after fault | Model |
| 3 | 33HW1a | ST-CAL-N | 24 |  |  | Dynamics | OEL1 limit exceeded for generator 5 at bus 29904 and for generator 6 at bus 29903 | Performance |
| 4 | 33HW1a | ST-CAL-N | 30 |  |  | Dynamics | OEL1 limit exceeded for generator 1 at bus 35078 and for generator 2 at bus 31406 | Performance |
| 5 | 33HW1a | ST-CAL-N | 30 |  |  | Dynamics | LHVRT for generator 1 at bus 365659 reported a voltage violation of dv = 0.2 | Performance |
| 6 | 33HW1a | ST-CAL-N | 30 |  |  | Dynamics | Generator 1 at bus 365157 tripped due to voltage violation of dv = 0.1 | Performance |
| 7 | 33HW1a | All disturbances | 40 |  |  | Dynamic | Qg of generator 1 and 2 at bus 48061 exhibit poorly damped oscillations. In Power World these were nearly undamped. | Model |
| 8 | 33HW1a | ST-CAL-S, ST-DSW-1, ST-CAL-S2 | 21 |  |  | Dynamic | Exciters for generators at the following buses exhibit slow undamped oscillations post fault. Bus 21655, 21658, 21659, and 21876. The effect was most pronounced in Power World, but is still present in PSLF | Model |
| 9 | 33HW1a | All disturbances | 16 |  |  | Dynamic | QG of generator at bus 160932 oscillates post fault for most disturbances. REEC\_A model will be commented. | Model |
| 10 | 33HW1a | ST-CAL-N | 30 |  |  | Dynamic | Pgen of generators at buses 365694, 365524, 365609, and 365523 suddenly decreases approximately 22 seconds post fault | Model |
| 11 | 33HW1a | ST-CAL-N | 30 |  |  | Dynamic | Qgen of generators at buses 365698 and 365694 continuously increase post fault while Qg of generators at buses 365523 and 365524 decrease, possibly in reaction to the other generators behavior. | Model |
| 12 | 33HW1a | ST-CAL-S | 19 |  |  | Dynamic | Qg of generator at bus 19890 continuously increases post fault | Model |
| 13 | 33HW1a | ST-CAL-S2 | 22 |  |  | Dynamic | Generators at buses 22949 and 22942 tripped on high voltage post fault in PowerWorld | Performance |
| 14 | 33HW1a | ST-NWC-1 | 30 |  |  | Dynamic | Generator at bus 31780 exhibited undamped oscillations post fault in Power World. Unit was netted in Power World. | Model |
| 15 | 33HW1a | ST-NWC-1 | 30 |  |  | Dynamic | Generator at bus 31896 exhibited undamped oscillations post fault in Power World. Unit was netted in Power World. | Model |
| 16 | 33HW1a | ST-CAL-N | 19 |  |  | Dynamics | Generator at bus 19981 and Generator at bus 19985 show a drop in Pg approximately 15 seconds post fault | Model |

## 33HS1a

| Item # | Base Case | Standard Disturbance | Base Case Area | Owner of Disturbance | Owner of System Deficiency | Steady State or Dynamic | Issue Description | Model or Performance |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 33HS1a | ST-NWC-1 | 15 |  | 80 | Dynamic | growing efd oscillations at 150227 150228 | Model |
| 2 | 33HS1a | ST-0 | 16 |  | 79 | Dynamic | battery at 160931 immediately discharges at t=0 | Model |
| 3 | 33HS1a | ST-0 | 18 |  | 18 | Dynamic | extremely large qg movement 181006 | Model |
| 4 | 33HS1a | ST-NWC-1 | 21 |  | 211 | Dynamic | pg, qg oscillations at 21016 | Model |
| 5 | 33HS1a | ST-0 | 30 |  | 390 | Dynamic | nuisance pickup locti 34738 | Model |
| 6 | 33HS1a | ST-0 | 30 |  | 390 | Dynamic | svsmo 31080 causing large area 30 efd spreads | Model |
| 7 | 33HS1a | ST-0 | 30 |  | 360 | Dynamic | efd oscillations 365540 | Model |
| 8 | 33HS1a | ST-NWC-1 | 30 |  | 363 | Dynamic | pg instability 37307 | Model |
| 9 | 33HS1a | ST-NWC-1 | 30 |  | 360 | Dynamic | growing qg oscillations 39555 39550 | Model |
| 10 | 33HS1a | ST-CAL-N | 30 |  | 360 | Dynamic | pg instability 36413 | Model |
| 11 | 33HS1a | ST-0 | 40 |  | 38 | Dynamic | large efd spread 46732 | Model |
| 12 | 33HS1a | ST-0 | 40 |  | 987 | Dynamic | efd spread too large at 44006 44007 44008 44009 | Model |
| 13 | 33HS1a | ST-0 | 40 |  | 987 | Dynamic | efd spread large after adding composite load models at 40346 | Model |
| 14 | 33HS1a | ST-0 | 52 |  | 75 | Dynamic | large pg and efd spreads 52154 | Model |
| 15 | 33HS1a | ST-0 | 50 |  | 10 | Dynamic | growing pg oscillations 50177 | Model |
| 16 | 33HS1a | ST-0 | 50 |  | 202 | Dynamic | efd spread over allowable threshold 51145 | Model |
| 17 | 33HS1a | ST-0 | 50 |  | 202 | Dynamic | large efd movement 51216 | Model |
| 18 | 33HS1a | ST-0 | 50 |  | 202 | Dynamic | large qg spreads causing efd issues at 80543 80544 | Model |
| 19 | 33HS1a | ST-NWC-1 | 50 |  | 202 | Dynamic | growing efd oscillations at 51054 | Model |
| 20 | 33HS1a | ST-0 | 54 |  | 76 | Dynamic | extremely large qg spreads 59746 59757 | Model |
| 21 | 33HS1a | ST-0 | 54 |  | 76 | Dynamic | spd spread over allowable threshold 59011 after adding composite load models | Model |
| 22 | 33HS1a | ST-0 | 60 |  | 11 | Dynamic | pg moving largely at 610681 | Model |
| 23 | 33HS1a | ST-DSW-1 | 60 |  | 11 | Dynamic | extremely large pg oscillations 60202 | Model |
| 24 | 33HS1a | ST-0 | 64 |  | 59 | Dynamic | units at 641041 moving during no disturbance | Performance |
| 25 | 33HS1a | ST-0 | 65 |  | 7 | Dynamic | units 69013 69017 causing solution to diverge | Model |
| 26 | 33HS1a | ST-0 | 65 |  | 7 | Dynamic | undamped efd oscillations 65542 65543 65544 | Model |
| 27 | 33HS1a | ST-0 | 65 |  | 7 | Dynamic | large pg movement 69805 | Model |
| 28 | 33HS1a | ST-NWC-1 | 65 |  | 7 | Dynamic | growing pg oscillations 69773 69723 | Model |
| 29 | 33HS1a | ST-NWC-1 | 65 |  | 7 | Dynamic | large qg movement 69748 | Model |
| 30 | 33HS1a | ST-NWC-1 | 65 |  | 7 | Dynamic | large qg oscillations 69790 69794 | Model |
| 31 | 33HS1a | ST-DSW-1 | 65 |  | 7 | Dynamic | undamped efd decrease 65021 | Model |
| 32 | 33HS1a | ST-0 | 70 |  | 65 | Dynamic | unit at 70406 moving with pg | Performance |
| 33 | 33HS1a | ST-NWC-1 | 70 |  | 95 | Dynamic | pg oscillations 78528 | Model |
| 34 | 33HS1a | ST-NWC-1 | 70 |  | 65 | Dynamic | large spd spreads 70739 70742 70736 70775 70733 | Model |
| 35 | 33HS1a | ST-UCN-1 | 70 |  | 66 | Dynamic | massive pg instability 71013 | Model |
| 36 | 33HS1a | ST-0 | 73 |  | 60 | Dynamic | pg oscillations 74042 74043 | Model |