GEN-2021-GR1

GENERATING FACILITY REPLACEMENT

By SPP and Aneden Consulting

Published on March 10, 2023

Revision History

Date or version number	Author	Change Description	Comments
03/10/2023	SPP	Original Version	

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EXECUTIVE SUMMARY

Pursuant to Southwest Power Pool (SPP) Open Access Transmission Tariff (SPP tariff) Attachment V Section 3.9 and SPP Business Practice 7800, Interconnection Customers can request a Generating Facility Replacement for its Existing Generating Facility (EGF). The Interconnection Customer of an EGF has requested an SPP Generating Facility Replacement evaluation for GEN-2021-GR1, henceforth referred to as the Replacement Generating Facility (RGF). The EGF and RGF both have a Point of Interconnection (POI) at the Blue Valley Station 69 kV substation.

On June 29, 2021, the Interconnection Customer submitted a request for waiver of sections 3.9.1, 5.3, and 8.2 of Attachment V of the SPP tariff. This waiver was granted by FERC on October 7, 2021, granting the Interconnection Customer the ability to bypass the requirement that generator replacement requests must be made at least one year prior to the planned retirement date of the EGF.

The EGF interconnects in the Independence Power & Light (INDN) control area with 98 MW of available replacement capacity. This study has been requested to evaluate the replacement synchronous gas-fired facility consisting of 2 x GE LM6000 60.5 MW gas turbines for a total capacity of 121 MW. This generating capability for the RGF, also known as GEN-2021-GR1 (121 MW), exceeds its requested Interconnection Service amount of a summer capacity of 88 MW and winter capacity of 98 MW. As a result, the customer must install monitoring and control equipment as needed to ensure that the amount of power injected at the POI does not exceed the Interconnection Service amount. In order to operate above these amounts, a new Interconnection Request would need to be submitted.

The Generating Facility Replacement evaluation consists of two studies: a Reliability Assessment Study and a Replacement Impact Study. The Reliability Assessment Study determines any system reliability impacts between the removal of the EGF from service and the Commercial Operation date of the RGF and system adjustments to mitigate those issues. The Replacement Impact Study determines whether or not the RGF has a material adverse impact on the Transmission System when compared to the EGF (Material Modification).

Because the EGF was considered retired prior to the Generating Facility Replacement, the performance of the Transmission System with the EGF ceasing commercial operations is the status quo. SPP determined that for the Reliability Assessment Study, no further analysis for the time between removing from service of the EGF and the commission of the RGF is necessary, and **no mitigations are applicable**.

The RGF does not include a collector system, so a charging current compensation analysis was not performed. However, SPP determined that short circuit and dynamic stability analyses were required as the dynamic model and associate parameters for the EGF and RGF are different (GENROU and GENTPJU1, respectively).

The requested Generating Facility Replacement does not have a material adverse impact. The requested generator replacement of the EGF with GEN-2021-GR1 was determined to be **not a Material Modification**.

It is likely that the customer may be required to reduce its generation output in real-time, also known as curtailment, under certain system conditions to allow system operators to maintain the reliability of the transmission network.

Nothing in this study should be construed as a guarantee of transmission service or delivery rights. Transfer of an existing resource designation from the EGF to the RGF can be achieved by submitting a transfer of designation request pursuant to Section 30.2.1 of the SPP tariff. If the customer would like to obtain new deliverability to final customers, a separate request for transmission service must be requested on Southwest Power Pool's OASIS by the customer.

SCOPE OF STUDY

Pursuant to SPP tariff Attachment V section 3.9 and SPP Business Practice 7800, Interconnection Customers can request a Generating Facility Replacement for its EGF. A Generating Facility Replacement evaluation is an interconnection study performed to evaluate the impacts of replacing existing generation with new generation, henceforth referred to as the RGF. Two analyses covering different time frames are evaluated:

- Reliability Assessment Study – The time between removing from service the EGF and commission of the RGF
- Replacement Impact Study – The time after the commission of the RGF

If the Replacement Impact Study identifies any materially adverse impact from operating the RGF when compared to the EGF, such impacts shall be deemed a Material Modification.

For any impacts to the system identified in the Reliability Assessment Study, non-transmission solutions, such as redispatch, remedial action schemes, or reactive setting adjustments, will be identified to mitigate issues in the time between removing the EGF from service and RGF commission.

On June 29, 2021, the Interconnection Customer submitted a request for waiver of sections 3.9.1, 5.3, and 8.2 of Attachment V of the SPP tariff. This waiver was granted by FERC on October 7, 2021, granting the Interconnection Customer the ability to bypass the requirement that generator replacement requests must be made at least one year prior to the planned retirement date of the EGF.

RELIABILITY ASSESSMENT STUDY

The Reliability Assessment Study, for the time period between the date that the EGF ceases commercial operations and the Commercial Operation Date of the RGF, evaluates the performance of the Transmission System.

This study compares the conditions on the Transmission System that would exist if the EGF is taken offline to the conditions on the Transmission System as they exist when the EGF is online. The EGF would be responsible for mitigating any reliability violation identified in the study and may not cease operations until all mitigations are implemented or are in service.

Because the EGF was considered retired prior to the Generating Facility Replacement and was out-of-service in the latest planning assessment models, the performance of the Transmission System with the EGF ceasing commercial operations is the status quo. SPP determined that For the

Reliability Assessment Study, no further analysis for the time between removing from service of the EGF and the commission of the RGF is necessary, and **no mitigations are applicable**.

REPLACEMENT IMPACT STUDY

Aneden Consulting (Aneden) was retained by SPP to complete the Replacement Impact Study (Impact Study) for GEN-2021-GR1. All analyses were performed using Siemens PTI PSS/E version 33 software.

STABILITY AND SHORT CIRCUIT ANALYSES

To determine whether stability and short circuit analyses are required, Aneden evaluates the difference between the stability model, stability model parameters, and, if needed, the collector system impedance between the existing configuration and the requested modification. SPP would require dynamic stability analysis and short circuit analysis if the differences listed above may result in a significant impact on the most recently performed DISIS stability analysis.

CHARGING CURRENT COMPENSATION ANALYSIS

A charging current compensation analysis was performed on the requested replacement configuration if it includes a collector system. The charging current compensation analysis determines the capacitive effect at the POI caused by the project's collector system and transmission line's capacitance. A shunt reactor size is determined in order to offset the capacitive effect and maintain no reactive power injection into the POI while the project's generators and capacitors are offline. Since the RGF does not include a collector system, a charging current compensation analysis was not performed.

STUDY LIMITATIONS

The assessments and conclusions provided in this report are based on assumptions and information provided to SPP and Aneden by others. While the assumptions and information provided may be appropriate for the purposes of this report, SPP and Aneden do not guarantee that those conditions assumed will occur. In addition, SPP and Aneden did not independently verify the accuracy or completeness of the information provided. As such, the conclusions and results presented in this report may vary depending on the extent to which actual future conditions differ from the assumptions made or information used herein.

PROJECT AND REPLACEMENT REQUEST

The GEN-2021-GR1 Interconnection Customer has requested a Generating Facility Replacement for its EGF, a synchronous gas-fired generation facility with a POI at the Blue Valley Station 69 kV substation, with a retirement date of June 1, 2020.

The EGF capacity available for replacement is 98 MW based on a provided attestation of capacity. Of the capacity available, the Interconnection Customer has requested a maximum summer capacity of 88 MW and winter capacity of 98 MW with Energy Resource Interconnection Service (ERIS).

The requested RGF is a synchronous gas-fired facility consisting of 2 x GE LM6000 60.5 MW gas turbines for a total capacity of 121 MW. The installed capacity exceeds the requested interconnection service, and the customer must ensure that the amount of power injected at the POI does not exceed the Interconnection Service amount. The RGF has a planned commercial operation date of June 1, 2024. The EGF predated the SPP Generation Interconnection (GI) queue and does not have an SPP Generation Interconnection Agreement (GIA).

The POI of the EGF and RGF is the Blue Valley Station 69 kV substation in the Independence Power & Light (INDN) control area. Since the EGF has been retired, the EGF and RGF will not be operated simultaneously. Figure 1 and Figure 2 show the power flow model single line diagram for the EGF and RGF configurations respectively using the 2019 Winter Peak DISIS-2017-001 model. Table 1 further details the EGF and RGF configurations and parameters.

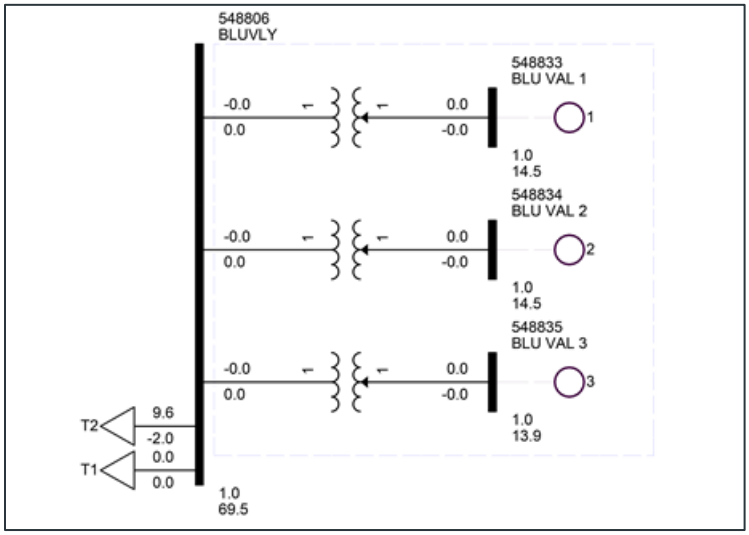

Figure 1: EGF Single Line Diagram (Existing Configuration)

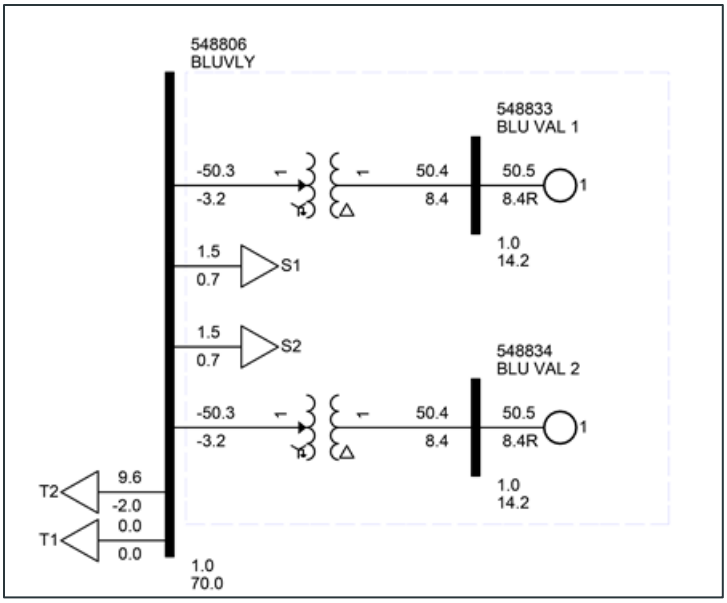

Figure 2: RGF Single Line Diagram (19WP Configuration)

Facility	Existing Generator Facility Configuration			Replacement Generator Facility Configuration	
Point of Interconnection	Blue Valley Station 69 kV (548806)			Blue Valley Station 69 kV (548806)	
Configuration/ Capacity	3 Synchronous Gas-Fired Units totaling 98 MW			2 x GE LM6000 60.5 MW Gas Turbines = 121 MW POI limited to 88/98 MW (Summer/Winter*)	
Generator Step Up Transformer[1]	X = 10.4%, R = 0.3%, Voltage = 14.4/69 kV, Winding MVA = 28 MVA, Rating MVA = 28 MVA	X = 10.4%, R = 0.3%, Voltage = 14.4/69 kV, Winding MVA = 28 MVA, Rating MVA = 28 MVA	X = 6.4%, R = 0.15%, Voltage = 13.8/69 kV, Winding MVA = 37.2 MVA, Rating MVA = 69 MVA	X = 9.496%, R = 0.294%, Voltage = 13.8/69 kV (Delta/Wye), Fixed Taps Available = 5 Taps, ±5% Winding MVA = 45 MVA, Rating MVA = 75 MVA	X = 9.496%, R = 0.294%, Voltage = 13.8/69 kV (Delta/Wye), Fixed Taps Available = 5 Taps, ±5% Winding MVA = 45 MVA, Rating MVA = 75 MVA
Auxiliary Load	N/A			1.4521 MW + 0.7033 MVAr on 69 kV bus	1.4521 MW + 0.7033 MVAr on 69 kV bus
Generator Dynamic Model[2] & Power Factor	GENROU[2] Leading: 0.85 Lagging: 0.92	GENROU[2] Leading: 0.85 Lagging: 0.92	GENROU[2] Leading: 0.90 Lagging: 0.97	1 x GE LM6000 Gas Turbine 71.176 MVA (GENTPJU1)[2] Leading: 0.85 Lagging: 0.85	1 x GE LM6000 Gas Turbine 71.176 MVA (GENTPJU1)[2] Leading: 0.85 Lagging: 0.85
1) X and R based on Winding MVA, 2) DYR stability model name *The Winter capacity of 98 MW was used for Light Load cases					

Table 1: EGF & RGF Interconnection Configuration Details

RELIABILITY ASSESSMENT STUDY

The Reliability Assessment Study, for the time period between the date that the EGF ceases commercial operations and the Commercial Operation Date of the RGF, evaluates the performance of the Transmission System.

This study compares the conditions on the Transmission System that would exist if the EGF is taken offline to the conditions on the Transmission System as they exist when the EGF is online. The EGF would be responsible for mitigating any reliability violation identified in the study and may not cease operations until all mitigations are implemented or are in service.

Because the EGF was considered retired prior to the Generating Facility Replacement, the performance of the Transmission System with the EGF ceasing commercial operations is the status quo. SPP determined that For the Reliability Assessment Study, no further analysis for the time between removing from service of the EGF and the commission of the RGF is necessary, and **no mitigations are applicable**.

REPLACEMENT IMPACT STUDY

Aneden was retained by SPP to complete the Replacement Impact Study for GEN-2021-GR1.

EXISTING VS. REPLACEMENT COMPARISON

To determine which analyses are required for the study, the differences between the existing configuration and the requested replacement were evaluated. Aneden performed this comparison and the resulting analyses using a set of modified study models developed based on the RGF data and the DISIS-2017-001 study models.

Because the dynamic model for the EGF and RGF are different (GENROU and GENTPJU1, respectively), SPP determined that short-circuit and dynamic stability analyses were required. This is because the short-circuit contribution and stability responses of the existing configuration and the requested modification's configuration may differ. The generator dynamic model for the RGF can be found in Appendix A.

SHORT-CIRCUIT ANALYSIS

Aneden performed a short circuit analysis using the 21SP and 28SP stability models for GEN-2021-GR1. The detailed results of the short-circuit analysis are provided in Appendix B.

METHODOLOGY

The short circuit analysis included applying a three-phase fault on buses up to 5 levels away from the 69 kV POI bus. The PSS/E "Automatic Sequence Fault Calculation (ASCC)" fault analysis module was used to calculate the fault current levels in the transmission system with and without the RGF online.

Aneden created two short circuit models using the 21SP and 28SP DISIS-2017-001 stability study models by adjusting the RGF short circuit parameters consistent with the submitted data. The adjusted parameters used in the short circuit analysis are shown in Table 2 below.

Parameter	Value by Generator Bus#	
	548833	**548834**
Machine MVA Base	71.18	71.18
R (pu*)	0.0053	0.0053
X'' (pu*)	0.1440	0.1440

**pu values based on machine MVA Base*

Table 2: GEN-2021-GR1 Short-Circuit Parameters

RESULTS

The results of the short circuit analysis for the 21SP and 28SP models are summarized in Table 3 through Table 5. The RGF POI bus (BLUVLY 69 kV - 548806) fault current magnitudes are provided in Table 3 showing a maximum fault current of 27.6 kA with the RGF project online. Table 4 and Table 5 show the maximum fault current magnitudes and fault current increases with the RGF project online for the 21SP and 28SP models respectively.

The maximum fault current calculated within five buses of the RGF POI (including the POI bus) was less than 50 kA for the 25SP model. There were several buses with a maximum three-phase fault current over 40 kA. These buses are highlighted in Appendix B. The maximum RGF contribution to three-phase fault current was about 17.5% and 4.04 kA.

Case	GEN-OFF Current (kA)	GEN-ON Current (kA)	Max kA Change	Max %Change
21SP	23.56	27.60	4.04	17.1%
28SP	23.05	27.09	4.04	17.5%

Table 3: POI Short-Circuit Results

Voltage (kV)	Max. Current (kA)	Max kA Change	Max %Change
69	27.6	4.04	17.1%
161	49.5	0.86	3.5%
345	20.8	0.17	0.8%
Max	**49.5**	**4.04**	**17.1%**

Table 4: 21SP Short-Circuit Results

Voltage (kV)	Max. Current (kA)	Max kA Change	Max %Change
69	27.1	4.04	17.5%
161	49.3	0.91	3.6%
345	20.6	0.18	0.9%
Max	**49.3**	**4.04**	**17.5%**

Table 5: 28SP Short Circuit Results

DYNAMIC STABILITY ANALYSIS

Aneden performed a dynamic stability analysis to identify the impact of the GEN-2021-GR1 project. The analysis was performed according to SPP's Disturbance Performance Requirements[1]. The project dynamic modeling data is provided in Appendix A. The simulation plots can be found in Appendix C.

METHODOLOGY AND CRITERIA

The dynamic stability analysis was performed using models developed with the requested RGF configuration of 2 x GE LM6000 60.5 MW gas turbines (GENTPJU1). This stability analysis was performed using PTI's PSS/E version 33.10 software.

The RGF project details were used to create modified stability models for this impact study based on the DISIS-2017-001 stability study models:

1. 2019 Winter Peak (19WP),
2. 2021 Light Load (21LL),
3. 2021 Summer Peak (21SP), and
4. 2028 Summer Peak (28SP).

The dynamic model data for the GEN-2021-GR1 project is provided in Appendix A. The power flow models and associated dynamic database were initialized (no-fault test) to confirm that there were no errors in the initial conditions of the system and the dynamic data.

During the fault simulations, the active power (PELEC), reactive power (QELEC), and terminal voltage (ETERM) were monitored for the RGF and other current and prior queued projects in their cluster group[2]. In addition, voltages of five buses away from the POI of the RGF were monitored and plotted. The machine rotor angle for synchronous machines and speed for asynchronous machines within the study areas including 330 (AECI), 356 (AMMO), 536 (WERE), 540 (GMO), 541 (KCPL), 542 (KACY), 545 (INDN), 635 (MEC), 640 (NPPD), 645 (OPPD), 650 (LES), and 652 (WAPA) were monitored. In addition, the voltages of all 100 kV and above buses within the study area were monitored.

[1] SPP Disturbance Performance Requirements:
https://www.spp.org/documents/28859/spp%20disturbance%20performance%20requirements%20(twg%20approved).pdf
[2] Based on the DISIS-2017-001 Cluster Groups

FAULT DEFINITIONS

Aneden developed fault events as required in order to study the RGF. The new set of faults were simulated using the modified study models. The fault events included three-phase faults, three-phase faults on prior outage cases, and single-line-to-ground stuck breaker faults. Single-line-to-ground faults are approximated by applying a fault impedance to bring the faulted bus positive sequence voltage to 0.6 pu. The simulated faults are listed and described in Table 6. These contingencies were applied to the modified 19WP, 21LL, 21SP, and 28SP models.

Fault ID	Planning Event	Fault Descriptions
FLT9001-3PH	P1	3 phase fault on the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9002-3PH	P1	3 phase fault on the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9003-3PH	P1	3 phase fault on the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-3PH	P1	3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9005-3PH	P1	3 phase fault on the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9006-3PH	P1	3 phase fault on the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-3PH	P1	3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9008-3PH	P1	3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9009-3PH	P1	3 phase fault on the BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1, near BLUVLY-161. a. Apply fault at the BLUVLY-161 161kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.

Fault ID	Planning Event	Fault Descriptions
FLT9010-3PH	P1	3 phase fault on the BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1, near BLUVLY-161. a. Apply fault at the BLUVLY-161 161kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9011-3PH	P1	3 phase fault on the BLUMILS5 (543004) to ECKLES-161 (548808) 161kV line CKT 1, near BLUMILS5. a. Apply fault at the BLUMILS5 161kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9012-3PH	P1	3 phase fault on the BLUE MILLS3 161 kV (543004) / 69 kV (543116)/ 12.5 kV (543117) XFMR CKT 3, near BLUMILS5 (543004) 161kV. a. Apply fault at the BLUMILS5 161kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9013-3PH	P1	3 phase fault on the SUB B (548810) to SUB J (548811) 69kV line CKT 1, near SUB B. a. Apply fault at the SUB B 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9014-3PH	P1	3 phase fault on the SUB J (548811) to SUB M (548815) 69kV line CKT 1, near SUB B. a. Apply fault at the SUB B 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9015-3PH	P1	3 phase fault on the SUB H (548802) to SUB M (548815) 69kV line CKT 1, near SUB H. a. Apply fault at the SUB H 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9016-3PH	P1	3 phase fault on the SUB H (548802) to SUGRCRK2 (543089) 69kV line CKT 1, near SUB H. a. Apply fault at the SUB H 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9017-3PH	P1	3 phase fault on the SUB H (548802) to COURTNY2 (543085) 69kV line CKT 1, near SUB H. a. Apply fault at the SUB H 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9018-3PH	P1	3 phase fault on the SUGRCRK2 (543089) to SUB F (548803) 69kV line CKT 1, near SUGRCRK2. a. Apply fault at the SUGRCRK2 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9019-3PH	P1	3 phase fault on the SUB P (548827) to SUB I (548800) 69kV line CKT 1, near SUB P. a. Apply fault at the SUB P 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9020-3PH	P1	3 phase fault on the SUB C (548825) to SUB I (548800) 69kV line CKT 1, near SUB C. a. Apply fault at the SUB C 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.

Fault ID	Planning Event	Fault Descriptions
FLT9021-3PH	P1	3 phase fault on the SUB C (548825) to STRLNGRD (548826) 69kV line CKT 1, near SUB C. a. Apply fault at the SUB C 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9022-3PH	P1	3 phase fault on the SUB K (548801) to SUB R (548830) 69kV line CKT 1, near SUB K. a. Apply fault at the SUB K 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9023-3PH	P1	3 phase fault on the SUB R (548830) to SHRNKRD (548809) 69kV line CKT 1, near SUB R. a. Apply fault at the SUB R 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9024-3PH	P1	3 phase fault on the SUB R 69kV (548830) /161kV (548831) XFMR CKT 1, near SUB R (548830) 69kV. a. Apply fault at the SUB R 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9025-3PH	P1	3 phase fault on the SUB I (548800) to SHRNKRD (548809) 69kV line CKT 1, near SUB I. a. Apply fault at the SUB I 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9026-3PH	P1	3 phase fault on the SUB M (548815) to SHRNKRD (548809) 69kV line CKT 1, near SUB M. a. Apply fault at the SUB M 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9027-3PH	P1	3 phase fault on the SUB M 69kV (548815) /161kV (548814) XFMR CKT 1, near SUB M (548815) 69kV. a. Apply fault at the SUB M 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9028-3PH	P1	3 phase fault on the SUB M-161 (548814) to HAWTHS5 (542973) 161kV line CKT 1, near SUB M-161. a. Apply fault at the SUB M-161 161kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9001-PO1	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB K (548801) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9003-PO1	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB K (548801) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-PO1	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB K (548801) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.

Fault ID	Planning Event	Fault Descriptions
FLT9005-PO1	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB K (548801) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9006-PO1	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB K (548801) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-PO1	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB K (548801) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9008-PO1	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB K (548801) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9001-PO2	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB P (548827) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9002-PO2	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB P (548827) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-PO2	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB P (548827) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9005-PO2	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB P (548827) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9006-PO2	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB P (548827) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-PO2	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB P (548827) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.

Fault ID	Planning Event	Fault Descriptions
FLT9008-PO2	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB P (548827) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9001-PO3	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB H (548802) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9002-PO3	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB H (548802) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9003-PO3	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB H (548802) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-PO3	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB H (548802) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9005-PO3	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB H (548802) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9006-PO3	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB H (548802) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-PO3	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB H (548802) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9008-PO3	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB H (548802) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9001-PO4	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB B (548810) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.

Fault ID	Planning Event	Fault Descriptions
FLT9002-PO4	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB B (548810) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9003-PO4	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB B (548810) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-PO4	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB B (548810) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9006-PO4	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB B (548810) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-PO4	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB B (548810) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9008-PO4	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB B (548810) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9001-PO5	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB J (548811) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9002-PO5	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB J (548811) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9003-PO5	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB J (548811) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-PO5	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB J (548811) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.

Fault ID	Planning Event	Fault Descriptions
FLT9005-PO5	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB J (548811) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-PO5	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB J (548811) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9008-PO5	P6	PRIOR OUTAGE of BLUVLY (548806) to SUB J (548811) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9001-PO6	P6	PRIOR OUTAGE of BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 2; 3 phase fault on the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9002-PO6	P6	PRIOR OUTAGE of BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 2; 3 phase fault on the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9003-PO6	P6	PRIOR OUTAGE of BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 2; 3 phase fault on the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-PO6	P6	PRIOR OUTAGE of BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 2; 3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9005-PO6	P6	PRIOR OUTAGE of BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 2; 3 phase fault on the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9006-PO6	P6	PRIOR OUTAGE of BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 2; 3 phase fault on the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-PO6	P6	PRIOR OUTAGE of BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 2; 3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.

Fault ID	Planning Event	Fault Descriptions
FLT9008-PO6	P6	PRIOR OUTAGE of BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 2; 3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9002-PO7	P6	PRIOR OUTAGE of BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9003-PO7	P6	PRIOR OUTAGE of BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-PO7	P6	PRIOR OUTAGE of BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9005-PO7	P6	PRIOR OUTAGE of BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9006-PO7	P6	PRIOR OUTAGE of BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-PO7	P6	PRIOR OUTAGE of BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9008-PO7	P6	PRIOR OUTAGE of BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9001-PO8	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9002-PO8	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.

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FLT9003-PO8	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-PO8	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9005-PO8	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9006-PO8	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-PO8	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9008-PO8	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9009-PO8	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1; 3 phase fault on the BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1, near BLUVLY-161. a. Apply fault at the BLUVLY-161 161kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9001-PO9	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9002-PO9	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.

Fault ID	Planning Event	Fault Descriptions
FLT9003-PO9	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9004-PO9	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9005-PO9	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9006-PO9	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1; 3 phase fault on the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1, near BLUVLY. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT9007-PO9	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /161kV (548807) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9008-PO9	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1; 3 phase fault on the BLUVLY1 69kV (548806) /13.8kV (548805) XFMR CKT 1, near BLUVLY (548806) 69kV. a. Apply fault at the BLUVLY 69kV bus. b. Clear fault after 7 cycles and trip the faulted transformer.
FLT9010-PO9	P6	PRIOR OUTAGE of BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1; 3 phase fault on the BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1, near BLUVLY-161. a. Apply fault at the BLUVLY-161 161kV bus. b. Clear fault after 7 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 7 cycles, then trip the line in (b) and remove fault.
FLT1001-SB	P4	Stuck Breaker on BLUMILS5 (543004) 161kV bus. a. Apply single-phase fault at BLUMILS5 (543004) on the 161kV bus. b. Wait 16 cycles and remove fault. c. Trip the whole bus BLUMILS5 (543004).
FLT1002-SB	P4	Stuck Breaker on SUB M-161 (548814) 161kV bus. a. Apply single-phase fault at SUB M-161 (548814) on the 161kV bus. b. Wait 16 cycles and remove fault. c. Trip the whole bus SUB M-161 (548814).
FLT1003-SB	P4	Stuck Breaker on BLUVLY-161 (548807) 161kV bus. a. Apply single-phase fault at BLUVLY-161 (548807) on the 161kV bus. b. Wait 16 cycles and remove fault. c. Trip the BLUVLY1 161kV (548807)/69kV (548806) XFMR CKT 1. d. Trip the BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1.

Fault ID	Planning Event	Fault Descriptions
FLT1004-SB	P4	Stuck Breaker on BLUVLY-161 (548807) 161kV bus. a. Apply single-phase fault at BLUVLY-161 (548807) on the 161kV bus. b. Wait 16 cycles and remove fault. c. Trip the BLUVLY1 161kV (548807)/69kV (548806) XFMR CKT 1. d. Trip the BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1.
FLT1005-SB	P4	Stuck Breaker on BLUVLY-161 (548807) 161kV bus. a. Apply single-phase fault at BLUVLY-161 (548807) on the 161kV bus. b. Wait 16 cycles and remove fault. c. Trip the BLUVLY1 161kV (548807)/69kV (548806) XFMR CKT 2. d. Trip the BLUVLY-161 (548807) to SUB M-161 (548814) 161kV line CKT 1.
FLT1006-SB	P4	Stuck Breaker on BLUVLY-161 (548807) 161kV bus. a. Apply single-phase fault at BLUVLY-161 (548807) on the 161kV bus. b. Wait 16 cycles and remove fault. c. Trip the BLUVLY1 161kV (548807)/69kV (548806) XFMR CKT 2. d. Trip the BLUVLY-161 (548807) to BLUMILS5 (543004) 161kV line CKT 1.
FLT1007-SB	P4	Stuck Breaker on BLUVLY (548806) 69kV bus. a. Apply single-phase fault at BLUVLY (548806) on the 69kV bus. b. Wait 16 cycles and remove fault. c. Trip the whole bus BLUVLY (548806).
FLT1008-SB	P4	Stuck Breaker on BLUVLY (548806) 69kV bus. a. Apply single-phase fault at BLUVLY (548806) on the 69kV bus. b. Wait 16 cycles and remove fault. c. Trip the BLUVLY (548806) to SUB H (548802) 69kV line CKT 1. d. Trip the BLUVLY (548806) to SUB B (548810) 69kV line CKT 1. e. Trip the BLUVLY (548806) to SUB J (548811) 69kV line CKT 1.
FLT1009-SB	P4	Stuck Breaker on BLUVLY (548806) 69kV bus. a. Apply single-phase fault at BLUVLY (548806) on the 69kV bus. b. Wait 16 cycles and remove fault. c. Trip the BLUVLY (548806) to SUB K (548801) 69kV line CKT 1. d. Trip the BLUVLY (548806) to SUB P (548827) 69kV line CKT 1. e. Trip the BLUVLY (548806) to LAKCTYJ2 (543087) 69kV line CKT 1.

Table 6: Fault Definitions

RESULTS

Table 7 shows the relevant results of the fault events simulated for each of the modified cases. The associated stability plots are also provided in Appendix C.

Fault ID	19WP			21SP			21LL			28SP		
	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable
FLT9001-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Fault ID	19WP			21SP			21LL			28SP		
	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable
FLT9007-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9009-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9010-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9011-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9012-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9013-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9014-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9015-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9016-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9017-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9018-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9019-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9020-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9021-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9022-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9023-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9024-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9025-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9026-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9027-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9028-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT1001-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT1002-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT1003-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT1004-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Fault ID	19WP			21SP			21LL			28SP		
	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable
FLT1005-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT1006-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT1007-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT1008-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT1009-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Fault ID	19WP			21SP			21LL			28SP		
	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable
FLT9008-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Fault ID	19WP			21SP			21LL			28SP		
	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable	Voltage Violation	Voltage Recovery	Stable
FLT9005-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9009-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9010-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 7: GEN-2021-GR1 Dynamic Stability Results

There were no damping or voltage recovery violations attributed to the GEN-2021-GR1 replacement request observed during the simulated faults.

INSTALLED CAPACITY EXCEEDS GIA CAPACITY

Under FERC Order 845, Interconnection Customers are allowed to request Interconnection Service that is lower than the full generating capacity of their planned generating facilities. The Interconnection Customers must install acceptable control and protection devices that prevent the injection above their requested Interconnection Service amount measured at the POI.

NECESSARY INTERCONNECTION FACILITIES

This study identified necessary Interconnection Facilities to accommodate GEN-2021-GR1 as shown in Table 8.

Upgrade Name	Upgrade Description
Blue Valley Station 69 kV GEN-2021-GR1 Transmission Owner Interconnection Facilities (TOIF) (INDN)	Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2021-GR1, into the POI at Blue Valley Station 69 kV.
Blue Valley Station 69 kV GEN-2021-GR1 Interconnection (Non-Shared NU) (INDN)	Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2021-GR1, into the POI at Blue Valley Station 69 kV.

Table 8: Necessary Interconnection Facilities

Should the Interconnection Customer choose to move forward with this request, an Interconnection Facilities Study will be necessary to determine the full scope, cost, and time required to interconnect these upgrades. SPP will work with the Transmission Owner(s) indicated for the Interconnection Facilities Study.

RESULTS

RELIABILITY ASSESSMENT STUDY

Because the EGF was considered retired prior to the Generating Facility Replacement, the performance of the Transmission System with the EGF ceasing commercial operations is the status quo. SPP determined that For the Reliability Assessment Study, no further analysis for the time between removing from service of the EGF and the commission of the RGF is necessary, and **no mitigations are applicable**.

REPLACEMENT IMPACT STUDY

In accordance with SPP tariff Attachment V, any material adverse impact from operating the RGF when compared to the EGF would be identified as a Material Modification. In the case that the Interconnection Customer chooses to move forward with the RGF after being identified as a Material Modification, it must submit the RGF as a new Interconnection Request.

Because no material adverse impacts to the SPP Transmission System were identified, SPP determined the requested Generating Facility Replacement is **not a Material Modification**. SPP determined that the requested replacement did not cause a materially adverse impact to the dynamic stability and short-circuit characteristics of the SPP system.

This determination implies that no new upgrades beyond those required for interconnection of the RGF are required, thus not resulting in a material adverse impact on the cost or timing of any other Interconnection Request with a later Queue priority date.

NEXT STEPS

As the requested replacement is determined to not be a Material Modification, pursuant to SPP tariff Attachment V section 3.9.3, the Interconnection Customer shall inform SPP within 30 Calendar Days after having received these study results of its election to proceed.

If the Interconnection Customer chooses to proceed with the studied replacement, SPP will initiate an Interconnection Facilities Study and subsequently tender a draft GIA. The Interconnection Customer shall withdraw any associated Attachment AB retirement requests of the EGF, if applicable, and complete the Attachment AE requirements for de-registration of the EGF and registration of the RGF, including transfer or termination of applicable existing transmission service. If the Interconnection Customer would like to obtain new deliverability to final customers, a separate request for transmission service must be requested on Southwest Power Pool's OASIS.

Failure by the Interconnection Customer to provide an election to proceed within 30 Calendar Days will result in withdrawal of the Interconnection Request pursuant to section 3.7 of SPP tariff Attachment V.