

## GEN-2015-065 & GEN-2016-067

Impact Restudy for Generator Modification (Turbine Change)

Published January 2019

By Generator Interconnection

## **REVISION HISTORY**

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION	COMMENTS
1/18/2019	Generator Interconnection		Initial Posting

## **EXECUTIVE SUMMARY**

The GEN-2015-065 & GEN-2016-067 Interconnection Customer has requested a modification to its Interconnection Request. This system impact restudy was performed to determine the effects of changing wind turbine generators from the previously studied 120 Siemens 2.3 MW wind turbine generators (for a total capacity of 276 MW) to 105 Siemens/Gamesa 2.625 MW wind turbine generators (for a total capacity of 275.625 MW). The Point of Interconnection (POI) for these requests remain unchanged at the Sunflower Electric Power Corporation (SUNC) Mingo 345kV substation.

This study was performed by Aneden Consulting to determine whether the request for modification is considered Material. The study report follows this executive summary.

While performing the stability analysis, the consultant noted that after the prior outage of the Red Willow to the Point of Interconnection substation 345 kV line, a three-phase fault on the Mingo 345kV to Setab 345kV line caused an undervoltage trip of GEN-2015-065 & GEN-2016-067. The output of the project may have to be curtailed to about 200 MW after the prior outage to prevent the undervoltage trip of the project.

The restudy showed that no other stability problems were found during the summer and the winter peak conditions as a result of changing to the Siemens/Gamesa 2.625 MW wind turbine generators. Additionally, the project wind farm was found to stay connected during the contingencies that were studied and, therefore, will meet the Low Voltage Ride Through (LVRT) requirements of FERC Order #661A.

With the assumptions outlined in this report and with all the required network upgrades in place, GEN-2015-065 & GEN-2016-067 with 105 Siemens/Gamesa 2.625 MW wind turbine generators should be able to interconnect reliably to the SPP transmission grid. This restudy confirms that the requested modification in wind turbine generators is not considered Material.

A low-wind/no-wind condition analysis was performed for this modification request. To prevent reactive power injection into the transmission system during low/no wind operation, the Interconnection Customer will be required to install approximately 24.4 MVAr of shunt reactors to be located on the 345 kV bus or install and utilize an equivalent means of compensating for the injection of reactive power into the transmission system at the Point of Interconnection.

It should be noted that this study analyzed the requested modification to change generator technology, manufacturer, and layout. This study analyzed many of the most probable contingencies, but it is not an all-inclusive list and cannot account for every operational situation. It is likely that the customer may be required to reduce its generation output to 0 MW, 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. If the customer wishes to obtain deliverability to final customers, a separate request for transmission service must be requested on Southwest Power Pool's OASIS by the customer.

### Aneden Consulting report follows.



# Submitted to Southwest Power Pool



Report On

GEN-2015-065 & GEN-2016-067 Modification Request Impact Study

**Revision R1** 

Date of Submittal January 16, 2019

anedenconsulting.com

### TABLE OF CONTENTS

Exe	cutive	Summary ES-	1
1.0	Intr	oduction	1
	1.1	Scope	1
	1.2	Study Limitations	1
2.0	Pro	ject and Modification Request	2
3.0		ctive Power Analysis	
	3.1	Methodology and Criteria	
	3.2	Results	4
4.0	Sho	rt Circuit Analysis	5
	4.1	Methodology	
	4.2	Results	5
5.0	Dyr	namic Stability Analysis	б
	5.1	Methodology and Criteria	
	5.2	Fault Definitions	б
	5.3	Results	2
6.0	Cor	nclusions1	5

#### LIST OF TABLES

able ES-1: Existing GEN-2015-065 & GEN-2016-067 Configuration ES-1	
able ES-2: GEN-2015-065 & GEN-2016-067 Modification Request 1	
able 1-1: Existing GEN-2015-065 & GEN-2016-067 Configuration 1	
able 2-1: GEN-2015-065 & GEN-2016-067 Modification Request	;
able 3-1: Shunt Reactor Size for Low Wind Study 4	ŀ
able 4-1: 2017SP Short Circuit Results	, )
able 4-2: 2025SP Short Circuit Results5	j
able 5-1: Fault Definitions	!
able 5-2: GEN-2015-065 & GEN-2016-067 Output Limits for FLT04-PO2 (MW) 12	)
able 5-3: GEN-2015-065 & GEN-2016-067 Dynamic Stability Results	;
able 6-1: Modification Request	í

#### **LIST OF FIGURES**

#### APPENDICES

APPENDIX A: Short Circuit Results APPENDIX B: SPP Disturbance Performance Requirements APPENDIX C: GEN-2015-065 & GEN-2016-067 Generator Dynamic Model APPENDIX D: Dynamic Stability Simulation Plots

## **Executive Summary**

Aneden Consulting (Aneden) was retained by the Southwest Power Pool (SPP) to perform a Modification Request Impact Study (Study) for GEN-2015-065 & GEN-2016-067, an active generation interconnection request with point of interconnection (POI) on the Mingo 345 kV substation.

The GEN-2015-065 and GEN-2016-067 projects were proposed to interconnect in the Sunflower Corp. (SUNC) control area with a combined capacity of 276 MW as shown in Table ES-1 below. This Study has been requested to evaluate the modification of GEN-2015-065 and GEN-2016-067 to change turbine configuration change to a total of 105 x Siemens/Gamesa 2.625 MW for a total capacity of 275.625 MW. Both projects were modeled as a single equivalent generator. In addition, the modification request included changes to the generation interconnection line, collection system and the main substation transformer. The modification request changes are shown in Table ES-2 below.

Request	Capacity (MW)	Existing Generator Configuration	Point of Interconnection
GEN-2015-065	202.4	88 x Siemens 2.3MW	Mingo 345kV Substation (531451)
GEN-2016-067	73.6	32 x Siemens 2.3 MW	Mingo 345kV Substation (531451)

#### Table ES-1: Existing GEN-2015-065 & GEN-2016-067 Configuration

Table ES-2: GEN-2015-065 & GEN-2016-067 Modification Request					
Facility	Existing	Modification Request			
Point of Interconnection	Mingo 345kV Substation (531451)	Mingo 345kV Substation (531451)			
Configuration/Capacity	88 x Siemens 2.3MW = 202.4 MW 32 x Siemens 2.3MW = 73.6 MW	105 x Siemens/Gamesa 2.625 MW turbines (275.625 MW)			
Generation Interconnection Line(s)	Length = 7.5 miles R = $0.000400$ pu X = $0.003100$ pu B = $0.004200$ pu *Zero impedance line is included in original case	Length = 9.196 miles R = 0.000505 pu X = 0.004634 pu B = 0.077858 pu			
Main Substation Transformer	T1: Z = 8.0%, Rating 225 MVA T2: Z = 8.0%, Rating 180 MVA	T1: Z = 11.0%, Rating 225 MVA T2: Z = 11.0%, Rating 225 MVA			
Equivalent Collector Line 1	R = 0.002283 pu X = 0.003118 pu B = 0.029680 pu	R = 0.009178 pu X = 0.012510 pu B = 0.099339 pu			
Equivalent Collector Line 2	R = 0.006142 pu X = 0.008520 pu B = 0.055290 pu	R = 0.006510 pu X = 0.008433 pu B = 0.066016 pu			
Capacitor (C1)	N/A	2 x 15 MVAr			
Capacitor (C2)	N/A	2 x 15 MVAr			

GEN-2015-065 and GEN-2016-067 were originally studied as part of Group 4 in the DISIS-2015-002 and DISIS-2016-001 in April 2016 and January 2017 respectively. Aneden performed reactive power analysis, short circuit analysis and dynamic stability analysis using the modification request data based on the DISIS-2016-001 ReStudy #1 Group 4 study models:

- 1. 2016 Winter Peak (2016WP),
- 2. 2017 Summer Peak (2017SP) and
- 3. 2025 Summer Peak (2025SP).

All analyses were performed using the PTI PSS/E version 32 software and the results are summarized below.

A power factor analysis was not performed as there was no change in the point of interconnection for GEN-2015-065 and GEN-2016-067.

The results of the reactive power analysis, also known as the low-wind/no-wind condition analysis, performed using all three models showed that the combined GEN-2015-065 & GEN-2016-067 project may require a 24.4 MVAr shunt reactor on the 345 kV bus of the project substation. The shunt reactor is needed to reduce the reactive power transfer at the POI to approximately zero during low/no wind conditions while the generation interconnection project remains connected to the grid.

The results from short circuit analysis showed that the maximum change in the fault currents in the immediate systems at or near GEN-2015-065 & GEN-2016-067 was .4139 kA. All three-phase current levels with the GEN-2015-065 & GEN-2016-067 generator online were below 23 kA in the 2017SP and 2025SP models.

The dynamic stability analysis was performed using the three loading scenarios 2016 Winter Peak, 2017 Summer Peak and 2025 Summer Peak simulating up to 52 contingencies that included three-phase faults, three phase faults on prior outage cases, and single-line-to-ground faults stuck breakers faults.

After the prior outage of the Red Willow to the Point of Interconnection substation 345 kV line, a three-phase fault on the Mingo 345kV to Setab 345kV line caused a undervoltage trip of GEN-2015-065 & GEN-2016-067. The output of the project may have to be curtailed to about 200 MW after the prior outage to prevent the undervoltage trip of the project.

There were no other machine rotor angle damping or transient voltage recovery violations observed in the simulated fault events. Additionally, the project wind farm was found to stay connected during the contingencies that were studied and, therefore, will meet the Low Voltage Ride Through (LVRT) requirements of FERC Order #661A.

The results of this Study show that the GEN-2015-065 & GEN-2016-067 Modification Request sdoes not constitute a material modification.

## 1.0 Introduction

Aneden Consulting (Aneden) was retained by the Southwest Power Pool (SPP) to perform a Modification Request Impact Study (Study) for GEN-2015-065 & GEN-2016-067, an active generation interconnection request with point of interconnection (POI) on the Mingo 345 kV substation.

The GEN-2015-065 and GEN-2016-067 projects were proposed to interconnect in the Sunflower Corp. (SUNC) control area with a combined capacity of 276 MW as shown in Table 1-1 below. Details of the modification request as provided in Section 2.0 below.

Request	Capacity (MW)	Existing Generator Configuration	Point of Interconnection
GEN-2015-065	202.4	88 x Siemens 2.3MW	Mingo 345kV Substation (531451)
GEN-2016-067	73.6	32 x Siemens 2.3 MW	Mingo 345kV Substation (531451)

#### Table 1-1: Existing GEN-2015-065 & GEN-2016-067 Configuration

#### 1.1 Scope

The Study included short circuit, power factor, reactive power and dynamic stabilities. The methodology, assumptions and results of the analyses are presented in the following five main sections:

- 1. Project and Modification Request
- 2. Reactive Power Analysis
- 3. Short Circuit Analysis
- 4. Dynamic Stability Analysis
- 5. Conclusions

Aneden performed a reactive power analysis, short circuit analysis and dynamic stability analysis using a set of modified study models developed using the modification request data and the three DISIS-2016-001 ReStudy #4 study models:

- 1. 2016 Winter Peak (2016WP),
- 2. 2017 Summer Peak (2017SP), and
- 3. 2025 Summer Peak (2025SP).

All analyses were performed using the PTI PSS/E version 32 software. The results of each analysis are presented in the following sections.

#### **1.2 Study Limitations**

The assessments and conclusions provided in this report are based on assumptions and information provided to Aneden by others. While the assumptions and information provided may be appropriate for the purposes of this report, Aneden does not guarantee that those conditions assumed will occur. In addition, 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.

## 2.0 Project and Modification Request

Figure 2-1 shows the power flow model single line diagram for the existing GEN-2015-065 & GEN-2016-067 configuration. GEN-2015-065 and GEN-2016-067 were originally studied as part of Group 4 in the DISIS-2015-002 and DISIS-2016-001 in April 2016 and January 2017 respectively.

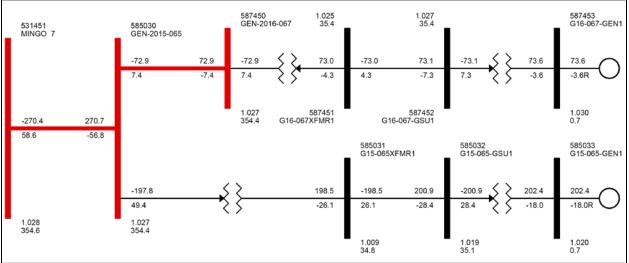


Figure 2-1: GEN-2015-065 & GEN-2016-067 Single Line Diagram (Existing Configuration)

The GEN-2015-065 & GEN-2016-067 Modification Request included a turbine change to 105 x Siemens/Gamesa 2.625 MW for a total capacity of 275.625 MW. In addition, the modification request also included changes to the collection system, the main substation transformer and the generation interconnection line. The major modification request changes are shown in Figure 2-2 and Table 2-1 below.

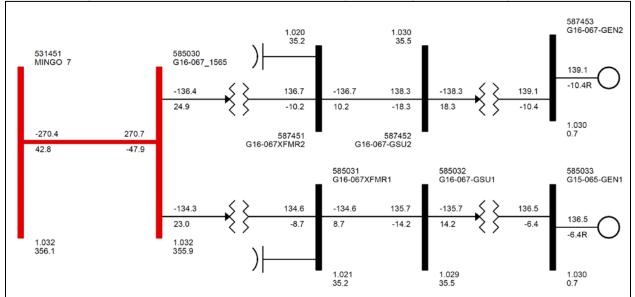


Figure 2-2: GEN-2015-065 & GEN-2016-067 Single Line Diagram (New Configuration)

Table 2-1: GEN-2015-065 & GEN-2016-067 Modification Request					
Facility	Existing	Modification Request			
Point of Interconnection	Mingo 345kV Substation (531451)	Mingo 345kV Substation (531451)			
Configuration/Capacity	88 x Siemens 2.3MW = 202.4 MW 32 x Siemens 2.3MW = 73.6 MW	105 x Siemens/Gamesa 2.625 MW turbines (275.625 MW)			
Generation Interconnection Line(s)	Length = 7.5 miles R = 0.000400  pu X = 0.003100  pu B = 0.004200  pu *Zero impedance line is included in original case	Length = 9.196 miles R = 0.000505 pu X = 0.004634 pu B = 0.077858 pu			
Main Substation Transformer	T1: Z = 8.0%, Rating 225 MVA T2: Z = 8.0%, Rating 180 MVA	T1: Z = 11.0%, Rating 225 MVA T2: Z = 11.0%, Rating 225 MVA			
Equivalent Collector Line 1	R = 0.002283 pu X = 0.003118 pu B = 0.029680 pu	R = 0.009178 pu X = 0.012510 pu B = 0.099339 pu			
Equivalent Collector Line 2	R = 0.006142 pu X = 0.008520 pu B = 0.055290 pu	R = 0.006510 pu X = 0.008433 pu B = 0.066016 pu			
Capacitor (C1)	N/A	2 x 15 MVAr			
Capacitor (C2)	N/A	2 x 15 MVAr			

### 3.0 Reactive Power Analysis

The reactive power analysis, also known as the low-wind/no-wind condition analysis, was performed for GEN-2015-065 & GEN-2016-067 to determine the reactive power contribution from the project's interconnection line and collector transformer and cables during low/no wind conditions while the project is still connected to the grid and to size shunt reactors that would reduce the project reactive power contribution to the POI to approximately zero.

#### 3.1 Methodology and Criteria

For the GEN-2015-065 & GEN-2016-067 project, the generator was switched out of service while other collector system elements remained in-service. A shunt reactor was tested at the study project substation high side bus to bring the MVAr flow into the POI down to approximately zero.

#### 3.2 Results

The results from the reactive power analysis showed that the GEN-2015-065 & GEN-2016-067 project required approximately 24.4 MVAr shunt reactance at the high side of the project substation, to reduce the POI MVAr to zero. This represents the contributions from the project collector systems. Figure 3-1 illustrates the shunt reactor size required to reduce the POI voltage to approximately zero. Reactive compensation can be provided either by discrete reactive devices or by the generator itself if it possesses that capability.

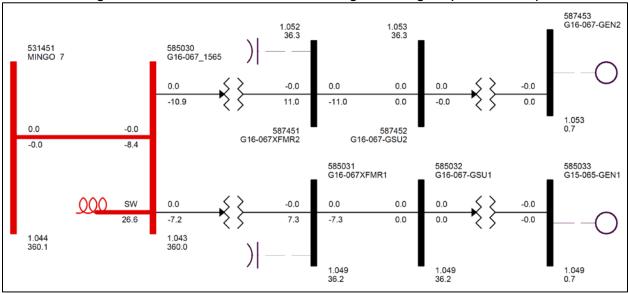


Figure 3-1: GEN-2015-065 & GEN-2016-067 Single Line Diagram (Shunt Reactor)

Table 3-1 shows the shunt reactor size determined for the three study models used in the assessment.

Table 5-1. Shufit Reactor Size for Low Wind Study						
Machine	POI Bus	POI Bus Number POI Bus Name	Reactor Size (MVAr)			
Machine	Number		16WP	17SP	25SP	
GEN-2015-065 & GEN- 2016-067	531451	MINGO 7	24.4	24.4	24.4	

Table 3	6-1: Shunt	Reactor	Size for	Low	Wind	Study

## 4.0 Short Circuit Analysis

A short-circuit study was performed on the power flow models for the 2017SP and 2025SP models for GEN-2015-065 & GEN-2016-067 using the modified Cluster Scenario models. The detail results of the short-circuit analysis are provided in Appendix A.

#### 4.1 Methodology

The short-circuit analysis included applying a 3-phase fault on buses up to 5 levels away from the 345 kV POI bus. The PSS/E "Automatic Sequence Fault Calculation (ASCC)" fault analysis module was used to calculate the fault current levels with and without the project online.

#### 4.2 Results

The results of the short circuit analysis are summarized in Table 4-1 and Table 4-2 for the 2017SP and 2025SP models, respectively. The maximum increase in fault current was about .4139 kA. The maximum fault current calculated within 5 buses with GEN-2015-065 & GEN-2016-067 was less than 23 kA for the 2017SP and 2025SP models.

Bus Distance	Max. Change (kA)	Max %Change		
0	0.3923	6.97%		
1	0.1898	2.09%		
2	0.1205	1.54%		
3	0.0664	0.62%		
4	0.0245	0.25%		
5	-0.0007	-0.02%		

#### Table 4-1: 2017SP Short Circuit Results

Table 4-2: 20255P Short Circuit Results				
Bus Distance	Max. Change (kA)	Max %Change		
0	0.4028	7.04%		
1	0.4139	3.49%		
2	0.2381	2.54%		
3	0.0687	0.64%		
4	0.0474	0.48%		
5	0.0055	0.13%		

#### Table 4-2: 2025SP Short Circuit Results

## 5.0 Dynamic Stability Analysis

Aneden performed a dynamic stability analysis to identify the impact of the turbine change and other modifications to the GEN-2015-065 & GEN-2016-067 project. The analysis was performed according to SPP's Disturbance Performance Requirements shown in Appendix B. The modification details are described in Section 2.0 above and the dynamic modeling data is provided in Appendix C. The simulation plots can be found in Appendix D.

#### 5.1 Methodology and Criteria

The dynamic stability analysis was performed using models developed with the requested 105 x Siemens/Gamesa 2.625 MW turbine configuration for the GEN-2015-065 & GEN-2016-067 generating facility. This stability analysis was performed using PTI's PSS/E version 32 software.

The stability models were developed using the models from the DISIS-2016-001 ReStudy #1 (DISIS-2016-001-1) for Group 4 including network upgrades identified in that restudy. The modifications requested to project GEN-2015-065 & GEN-2016-067 were used to create modified stability models for this impact study.

The modified power flow models and associated dynamics database were initialized (no-fault test) to confirm that there were no errors in the initial conditions of the system and the dynamic data. The modified dynamics model data for the DISIS-2016-001-1 (Group 4) request, GEN-2015-065 & GEN-2016-067 is provided in Appendix C.

During the fault simulations, the active power (PELEC), reactive power (QELEC) and terminal voltage (ETERM) were monitored for GEN-2015-065 & GEN-2016-067 and other equally and prior queued projects in Group 4. In addition, voltages of five (5) buses away from the POI of GEN-2015-065 & GEN-2016-067 were monitored and plotted. The machine rotor angle for synchronous machines and speed for asynchronous machines within this study area including 520 (AEPW), 524 (OKGE), 525 (WFEC), 526 (SPS), 531 (MIDW), 534 (SUNC), 536 (WERE) and 640 (NPPD) were monitored. In addition, the voltages of all 100 kV and above buses within the study area were monitored.

#### 5.2 Fault Definitions

Aneden selected the fault events simulated specifically for GEN-2015-065 & GEN-2016-067 in the DISIS-2016-001 Group 4 study and included additional faults based on the location of the point of interconnection. The new set of faults were simulated using the modified study models. The fault events include three phase faults with reclosing, stuck breaker, and prior outage events. Single-line-to-ground (SLG) fault impedance values were determined by applying a fault on the base case large enough to produce a 0.6 pu voltage value on the faulted bus. This SLG value was then used for the SLG faults.

The simulated faults are listed and described in Table 5-1 below. These contingencies were applied to the modified 2016 Winter Peak, 2017 Summer Peak, and the 2025 Summer Peak models.

3 phase fault on the Post Rock 345kV (530583) to Axtell 345kV (640065) CKT 1, near Post Rock.           a. Apply fault at the Post Rock 345kV bus.           b. Clear fault after 5 cycles by tripping the faulted line.           c. Wait 20 cycles, and then re-close the line in (b) back into the fault.           3 phase fault on the Axtell 345kV bus.           b. Clear fault after 5 cycles by tripping the faulted line.           c. Wait 20 cycles, and then re-close the line in (b) back into the fault.           a. Apply fault at the Axtell 345kV bus.           b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on for 5 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 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           3 phase fault on the Setab 345kV (531451) to Setab 345kV (531450) CKT 1, near Setab.           a. Apply fault at the Mingo 34	Fault ID	Table 5-1: Fault Definitions           Fault Descriptions
FLT01- 3PH       a. Apply fault afthe Post Rock 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.       b. Clear fault after 5 cycles by tripping the faulted line.         FLT02- 5PH       a. Apply fault at the Axtell 346kV (40065) to Sweetwater 345 kV (640374) CKT 1, near Axtell.         a. Apply fault at the Axtell 346kV (40065) to Sweetwater 345 kV (640374) CKT 1, near Axtell.         a. Apply fault at the Axtell 346kV (40065) to Sweetwater 345 kV (640374) CKT 1, near Axtell.         a. Apply fault at the Axtell 346kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531451) to Red Willow 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531465) to Mingo 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Setab 345kV (531465) to Mingo 345kV (531465) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Mingo 345kV (531465) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Mingo 345kV (531510) CKT 1, near Setab.         a. Apply fault at the Holcomb 345kV (S31465) to Mincore fault.         d. Leave fault	- Taun ID	
FLT01- 3PH         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.           3 phase fault on the Axtell 345KV (640055) to Sweetwater 345 kV (640374) CKT 1, near Axtell.           a. Apply fault at the Axtell 345KV (640055) to Sweetwater 345 kV (640325) CKT 1, near Axtell.           b. Clear fault fater 5 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 the Mingo 345KV (531451) to Red Willow 345KV (640325) CKT 1, near Mingo.           a. Apply fault at the Mingo 345KV (531451) to Red Willow 345KV (540325) CKT 1, near Mingo.           a. Apply fault at the Mingo 345KV (531451) to Red Willow 345KV (531465) CKT 1, near Mingo.           a. Apply fault at the Mingo 345KV bus.           b. Clear fault fater 5 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 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           3 phase fault on the Setab 345KV (531454) to Buckmar 345KV (531449) CKT 1, near Setab.           a. Apply fault at the Setab 345KV (531454) to Buckmar 345KV (531450) CKT 1, near Hallocan.           c. Uwait 20 cycles, and then re-close the line in (b) and remove fault. </td <td rowspan="2">FLT01-</td> <td></td>	FLT01-	
<ul> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.</li> <li>a. Apply fault at the Axtell 345kV bus.</li> <li>b. Clear fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.</li> <li>3 phase fault on the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.</li> <li>a. Apply fault at the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.</li> <li>a. Apply fault at the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.</li> <li>b. Clear fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) and remove fault.</li> <li>d. Leave fault on the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.</li> <li>a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.</li> <li>a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.</li> <li>a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531463) CKT 1, near Setab.</li> <li>a. Apply fault at the Mingo 345kV (531451) to Molcomb 345kV (531449) to KT 1, near Setab.</li> <li>a. Apply fault at the Setab 345kV (531462) to Holcomb 345kV (531501) CKT 1, near Setab.</li> <li>a. Apply fault at the Setab 345kV (531462) to Buckner 345kV (531501) CKT 1, near Holcomb.</li> <li>a. Apply fault at the Setab 345kV (531463) to Buckner 345kV (531501) CKT 1, near Holcomb.</li> <li>a. Apply fault at the Roleomb 345kV (531463) to Buckner 345kV (531501) CKT 1, near Holcomb.</li> <li>b. Clear fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault o</li></ul>		
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           3 phase fault on the Axtell 345kV (64005b) to Sweetwater 345 kV (640374) CKT 1, near Axtell.           a. Apply fault at the Axtell 345kV bus.           b. Clear fault after 5 cycles by tripping the faulted line.           c. Wait 20 cycles, and then re-close the line in (b) and remove fault.           3 phase fault on the Mingo 345kV bus.           b. Clear fault after 5 cycles, then trip the line in (b) and remove fault.           a. Apply fault at the Mingo 345kV bus.           b. Clear fault after 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           3 phase fault on the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.           a. Apply fault at the Mingo 345kV bus.           b. Clear fault fare 5 cycles by tripping the faulted line.           c. Wait 20 cycles, and then re-close the line in (b) and remove fault.           3Phase fault on the Setab 345kV bus.           b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.	3PH	
3 phase fault on the Axtell 345kV (640065) to Sweetwater 345 kV (640374) CKT 1, near Axtell.         a. Apply fault at the Axtell 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Mingo 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Mingo 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on the Setab 345kV bus.         b. Clear fault after 5 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 the Setab 345kV (531459) to Buckner 345kV (531449) CKT 1, near Holcomb.         a. Apply fault at the Setab 345kV bus.         b. Clear fault fater 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b)		
a. Apply fault at the Axtell 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         3 phase fault on the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.         b. Clear fault after 5 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 the S cycles, then trip the line in (b) back into the fault.         d. Leave fault on the Mingo 345kV (531451) to Setab 345kV (531455) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (5314451) to Setab 345kV (531455) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531459) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531459) to Mingo.         a. Apply fault at the Mingo 345kV (531455) to Setab 345kV (531459) to Setab 345kV (531459) to Setab 345kV (531459) to Setab 345kV (531459) CKT 1, near Setab.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 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 the Setab 345kV (S31449) to Buckner 345kV (S31501) CKT 1, near Holcomb. <td< td=""><td></td><td></td></td<>		
FLT02- 3PH         b. Clear fault after 5 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 tor 5 cycles, then trip the line in (b) and remove fault.           3 phase fault and the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.           a. Apply fault at the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.           a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.           a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.           a. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault after 5 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 after 5 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 after 5 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 5 cycles, then trip the line in (b) back into the fault.           d. Leave fault on the Setab 345kV (S31446) to Buckner 345kV (S314501) CKT 1, near Holcomb.           a. Apply fault at the Botcomb 345kV (S31449) to Buckner 345kV (S31501) CKT 1, near Holcomb.           a. Apply fault at the Botcomb 345kV (S31464) to Buckner 345kV (S31501) CKT 1		
3PH       c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         4. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3. Apply fault at the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3. Phase fault on the Mingo 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         c. Wait 20 cycles,	FLT02-	
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on for 5 cycles, then trip the line in (b) and remove fault.         a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV (531455) to Setab 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531501) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Folcomb 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         d. Leave fa	3PH	
3 phase fault on the Mingo 345kV (531451) to Red Willow 345kV (640325) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Mingo 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531409) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531464) to Buckner 345kV (531409) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531451) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV (531455) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV (511449) to Setab 13.8kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Setab 345kV bus.       b. Clear fault after 5 cycles then trip the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip		
a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on for 5 cycles, then trip the line in (b) and remove fault.         a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on the Setab 345kV bus.         b. Clear fault after 5 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 the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531464) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on		
FLT03- 3PH       b. Clear fault after 5 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 the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on the Setab 345kV (531465) to Setab 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (31465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Setab 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         FLT06- 3PH       a. Apply fault at the Setab 345kV (531465) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Setab 345kV (531465) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV (640325) to Gent		
3PH       b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         4. Leave fault on tor 5 cycles, then trip the line in (b) back into the fault.         3. Apply fault at the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 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 the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault after 5 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 after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         d. Le	FI T03-	
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 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 the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531409) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531401) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531445) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         b. Clear fault fare 5 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 the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         FLTOF-       3 phase fault on the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transfo		
3 phase fault on the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.         a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 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 the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Centleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line. <tr< td=""><td></td><td>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</td></tr<>		c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT04- 3PH       a. Apply fault at the Mingo 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.       3 phase fault on the Setab 345kV (531445) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531445) to Holcomb 345kV (531449) CKT 1, near Setab.       a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.       3 phase fault on the Holcomb 345kV (S31449) to Buckner 345kV (S31501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (S31449) to Buckner 345kV (S31501) CKT 1, near Holcomb.       a. Apply fault at the Holcomb 345kV (S31449) to Buckner 345kV (S31501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (S31449) to Buckner 345kV (S31501) CKT 1, near Holcomb.       a. Apply fault at the Holcomb 345kV (S31449) to Buckner 345kV (S31501) CKT 1, near Holcomb.         g. ThT07- 3PH       3 phase fault on the Setab 345kV bus.       b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.       3 phase fault on the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted tine.       c. Wait 20 cycles, and then re-close the line in (b) and remove fa		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT04- 3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3         FLT05- 3PH         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         d. Leave fault after 5 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 after 5 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 5 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 after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 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 after 5 cycles by tripping the faulted transformer.         3 phase fault on the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault. <tr< td=""><td></td><td>3 phase fault on the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.</td></tr<>		3 phase fault on the Mingo 345kV (531451) to Setab 345kV (531465) CKT 1, near Mingo.
3PH       b. Clear raut after 5 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 the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Holcomb 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on tor 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on tor 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         FLTOF-       3 phase fault on the Setab 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Setab 345kV bus.       b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.		a. Apply fault at the Mingo 345kV bus.
c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3         FLT05- 3PH         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         a. Apply fault at the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a Apply fault at the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 Phase fault on the Red Willow 345kV bus. </td <td></td> <td>b. Clear fault after 5 cycles by tripping the faulted line.</td>		b. Clear fault after 5 cycles by tripping the faulted line.
3 phase fault on the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 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 the Holcomb 345kV (53149) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (53149) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (53149) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault and for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault at the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         d. Leave fault on the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line. <td></td> <td>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</td>		c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT05- 3PH       a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.       3 phase fault on the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.       a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.       c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.       3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         FLT07- 3PH       a. Apply fault at the Setab 345kV bus.       b. Clear fault after 5 cycles by tripping the faulted transformer.         a. Apply fault at the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.       a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.       d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         g. Diase fault on the Red Willow 345kV bus.       b. Clear fault after 5 cycles by tripping the faulted transformer.		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT05- 3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR		3 phase fault on the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.
3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted tine.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT08-       3 phase fault on the Red Willow 345kV		a. Apply fault at the Setab 345kV bus.
c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR		b. Clear fault after 5 cycles by tripping the faulted line.
FLT06- 3PH       3 phase fault on the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.         a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT09- 3PH       a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on	3611	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT06- 3PH       a. Apply fault at the Holcomb 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.       3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a. Apply fault at the Setab 345kV bus.       b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.       a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.       d. Leave fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         fLT09- 3PH       3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.       b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT06- 3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a. Apply fault at the Setab 345kV (531465) to Setab 115kV (640183) CKT 1, near Red Willow.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         g phase fault on for 5 cycles, then trip the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         d. Leave fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transfor		3 phase fault on the Holcomb 345kV (531449) to Buckner 345kV (531501) CKT 1, near Holcomb.
3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         d. Leave fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         b. Clear fault af		a. Apply fault at the Holcomb 345kV bus.
c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT08- 3PH         FLT09- 3PH         FLT09- 3PH         Apply fault at the Red Willow 345kV bus.         b. Clear fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus. <t< td=""><td></td><td>b. Clear fault after 5 cycles by tripping the faulted line.</td></t<>		b. Clear fault after 5 cycles by tripping the faulted line.
FLT07- 3PH       3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a. Apply fault at the Setab 345kV bus.       b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT09- 3PH         FLT09- 3PH         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line         c. Car fault after 5 cycles by tripping the faulted line <td>SFI</td> <td>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</td>	SFI	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT07- 3PH       3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.         a. Apply fault at the Setab 345kV bus.       b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT09- 3PH         FLT09- 3PH         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line         c. Car fault after 5 cycles by tripping the faulted line <td></td> <td></td>		
BPL 107- 3PH       a. Apply fault at the Setab 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT09- 3PH         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV bus.         b. CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         a. Apply fault at the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         a. Apply fault at the Gentleman 345kV bus.		
b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Apply fault at the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.	FLT07-	
FLT08- 3PH       3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT09- 3PH       a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line         a. Apply fault at the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line         a. Apply fault at the Gentleman 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted line	3PH	a. Apply fault at the Setab 345kV bus.
FLT08- 3PH       a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT09- 3PH         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         FLT10-         b. Clear fault after 5 cycles by tripping the faulted line.		b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT08- 3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         FLT10-         b. Clear fault after 5 cycles by tripping the faulted line.		3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.
3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT09- 3PH         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         FLT10-         b. Clear fault after 5 cycles by tripping the faulted line.		a. Apply fault at the Red Willow 345kV bus.
c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR         FLT09- 3PH         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         FLT10-         b. Clear fault after 5 cycles by tripping the faulted line.		b. Clear fault after 5 cycles by tripping the faulted line.
FLT09- 3PH       3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         FLT10-         b. Clear fault after 5 cycles by tripping the faulted line	0111	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT09- 3PH       3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR CKT 1, near Red Willow.         a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         FLT10-         b. Clear fault after 5 cycles by tripping the faulted line		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
B       a. Apply fault at the Red Willow 345kV bus.         b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         FL109         b. Clear fault after 5 cycles by tripping the faulted line.		3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR
b. Clear fault after 5 cycles by tripping the faulted transformer.         3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman.         a. Apply fault at the Gentleman 345kV bus.         FLT10-         b. Clear fault after 5 cycles by tripping the faulted line.		
3 phase fault on the Gentleman 345kV (640183) to Sweetwater 345kV (640374) CKT 1, near Gentleman. a. Apply fault at the Gentleman 345kV bus. FLT10- b. Clear fault after 5 cycles by tripping the faulted line	3PH	
a. Apply fault at the Gentleman 345kV bus. FLT10-		
FLT10- b Clear fault after 5 cycles by tripping the faulted line		
D Clear fault after 5 cVcles bV tribbing the faulted line	FI T10-	
	3PH	
c. Wait 20 cycles, and then re-close the line in (b) back into the fault.		c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

#### Table 5-1: Fault Definitions

	Table 5-1 continued
Fault ID	Fault Descriptions
	3 phase fault on the Holcomb 345kV (531449) to Finney 345kV (523853) CKT 1, near Holcomb.
	a. Apply fault at the Holcomb 345kV bus.
FLT11- 3PH	b. Clear fault after 5 cycles by tripping the faulted line.
0	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Holcomb 345kV (531449) to Holcomb 115kV (531448) to Holcomb 13.8kV (531450) XFMR CKT
FLT12-	1, near Holcomb 345kV.
3PH	a. Apply fault at the Holcomb 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
	3 phase fault on the Gentleman 345kV (640183) to Keystone 345kV (640252) CKT 1, near Gentleman.
FLT13-	a. Apply fault at the Gentleman 345kV bus.
3PH	b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Beach 115kV (530557) to Hoxie 115kV (530556) CKT 1, near Beach.
FLT14-	a. Apply fault at the Beach 115kV bus.
3PH	b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Colby 115kV (530555) to Atwood 115kV (530554) CKT 1, near Colby.
FLT15-	a. Apply fault at the Colby 115kV bus.
3PH	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Colby 115kV (530555) to Seguin Tap 115kV (530682) CKT 1, near Colby.
FLT16-	a. Apply fault at the Colby 115kV bus.
3PH	b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Colby 115kV (530555) to Mingo 115kV (531429) CKT 1, near Colby.
FLT17-	a. Apply fault at the Colby 115kV bus.
3PH	b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Mingo 115kV (531429) to Pheasant Run 115kV (530559) CKT 1, near Mingo. a. Apply fault at the Mingo 115kV bus.
FLT18-	b. Clear fault after 5 cycles by tripping the faulted line.
3PH	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Mingo 115kV (531429) to Brewster 115kV (531351) CKT 1, near Mingo. a. Apply fault at the Mingo 115kV bus.
FLT19-	
3PH	<ul> <li>b. Clear fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> </ul>
	<ul> <li>d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.</li> <li>3 phase fault on the Mingo 115kV (531429) to Mingo 345kV (531451) to Mingo 13.8kV (531452) XFMR CKT 1, near</li> </ul>
FLT20-	Mingo 115kV.
3PH	a. Apply fault at the Mingo 115kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
r	

Fault D         Full Descriptions           3 phase fault on the Pheasant Run 115kV (53058) to Sguin 115kV (530683) CKT 1, near Pheasant Run.         a. Apply fault at the Pheasant Run 115kV bus.           b. Clear fault atter 5 cycles by tripping the faulted line.         b. Clear fault atter 5 cycles, then trip the line in (b) back into the fault.           d. Lawe fault on the Pheasant Run 115kV bus.         b. Clear fault atter 5 cycles, then trip the line in (b) and remove fault.           g. Lawe fault on the Pheasant Run 115kV bus.         b. Clear fault atter 5 cycles, then trip the line in (b) back into the fault.           d. Lawe fault on the Sovel 15kV bus.         b. Clear fault atter 5 cycles by tripping the faulted line.           c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.           d. Leave fault on the Gove 115kV bus.         b. Clear fault atter 5 cycles by tripping the faulted line.           c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         c. Leave fault on the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.           a. Apply fault at the Arnold 115kV (S3054) to Akwood SW 115kV (S31364) CKT 1, near Atwood.         a. Apply fault at the Arnold 115kV (S3054) to Akwood SW 115kV (S31468) CKT 1, near Atwood.           ftT274         b. Clear fault after 5 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 5 cycles. Item trip t		Table 5-1 continued
FLT21- 3PH       a. Apply fault at the Pheasant Run 115kV bus.         b. Clear fault atter 5 cycles by tripping the faulted line.       b. base fault on the Pheasant Run 115kV (bask into the fault.         FLT22- 3PH       3. phase fault on the Pheasant Run 115kV (bask into the fault.       3. phase fault on the Pheasant Run 115kV (bask into the fault.         FLT22- 3PH       3. Clear fault after 5 cycles by tripping the faulted line.       b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.       3. phase fault on the Gove 115kV (531411) to Arnold 115kV (531409) CKT 1, near Gove.         a. Apply fault at the Gove 115kV bus.       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3. Delar fault after 5 cycles by tripping the faulted line.       c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         c. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.       d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.       d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         e. Leave fa	Fault ID	
FLT21- 3PH       b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         Japhse fault on the Pheasant Run 115kV (530559) to Grinnell 115kV (531412) CKT 1, near Pheasant Run.         a. Apply fault at the Pheasant Run 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3. Apply fault at the Gove 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line (b) band remove fault. <t< td=""><td></td><td></td></t<>		
BH       b. Clear fault after 5 cycles by tripping the faulted line.         FLT22       3 phase fault on the 75 cycles, then trip the line in (b) back into the fault.         A. Apply fault at the Phesasant Run 116kV (530559) to Grinnell 115kV (531412) CKT 1, near Pheasant Run.         a. Apply fault at the Phesasant Run 116kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Grow 115kV (531411) to Arnold 115kV (531409) CKT 1, near Grove.         a. Apply fault at the Grow 115kV tos.         b. Clear fault after 5 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 the Grow 115kV (S31411) to Arnold 115kV (S31414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (S31409) to Ranson 115kV (S31414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (S30564) to Atwood SW 115kV (S31364) CKT 1, near Atwood.         a. Apply fault at the Arnold 115kV bus.         c. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.	FI T21-	a. Apply fault at the Pheasant Run 115kV bus.
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           3 phase fault on the Phessant Run 115kV (530559) to Ginnell 115kV (531412) CKT 1, near Phessant Run.           a. Apply fault at the Phessant Run 115kV (s00559) to Ginnell 115kV (531412) CKT 1, near Phessant Run.           a. Apply fault at the Phessant Run trip the line in (b) back into the fault.           c. Wait 20 cycles, and then re-close the line in (b) and remove fault.           3 phase fault on the Gove 115kV (531411) to Amold 115kV (531409) CKT 1, near Gove.           a. Apply fault at the Gove 115kV (531411) to Amold 115kV (531409) CKT 1, near Gove.           a. Apply fault at the Gove 115kV (531411) to Amold 115kV (531409) CKT 1, near Amold.           a. Apply fault at the Gove 115kV (531409) to Ransom 115kV (531414) CKT 1, near Amold.           a. Apply fault at the Amold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Amold.           a. Apply fault at the Amold 115kV (531409) to Ransom 115kV (531463) CKT 1, near Amold.           a. Apply fault at the Amold 115kV (53054) to Atwood SW 115kV (531364) CKT 1, near Atwood.           a. Apply fault at the Atwood 115kV (530554) to Atwood SW 115kV (531488) CKT 1, near Atwood.           a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.           a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.           a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.           b. Clear fault after 5 cycles by tripp		b. Clear fault after 5 cycles by tripping the faulted line.
3 phase fault on the Pheasant Run 115kV (530559) to Grinnell 115kV (531412) CKT 1, near Pheasant Run.         a. Apply fault at the Pheasant Run 115kV (530559) to Grinnell 115kV (531412) CKT 1, near Pheasant Run.         a. Apply fault at the Pheasant Run 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Gove 115kV (531411) to Amold 115kV (531409) CKT 1, near Gove.         a. Apply fault at the Gove 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Amold 115kV (31409) to Ransom 115kV (531414) CKT 1, near Amold.         a. Apply fault at the Amold 115kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Amodd 115kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) ack into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Amood 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Atwood 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the li		c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT22- 3PH       a. Apply fault at the Pheasant Run 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.       wait 20 cycles, and then re-close the line in (b) back into the fault.         fLT23- 3PH       a. Apply fault at the Gove 115kV (531411) to Amold 115kV (531409) CKT 1, near Gove.         a. Apply fault at the Gove 115kV (531411) to Amold 115kV (531409) CKT 1, near Gove.         a. Apply fault at the Gove 115kV (531411) to Amold 115kV (531414) CKT 1, near Amold.         b. Clear fault after 5 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 the Amold 115kV (531409) to Ansomon 115kV (531414) CKT 1, near Amold.         a. Apply fault at the Amold 115kV (531409) to Ansomon 115kV (531404) CKT 1, near Atwood.         a. Apply fault at the Amold 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 pha		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FL122- 3PH       b. Clear fault after 5 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 the Gove 115kV (531411) to Arnold 115kV (531409) CKT 1, near Gove.         a. Apply fault at the Gove 115kV (531411) to Arnold 115kV (531409) CKT 1, near Gove.         a. Apply fault at the Gove 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault after 5 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 the Arnold 115kV (53054) to Ransom 115kV (531414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (bis.         b. Clear fault after 5 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 tor 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then		3 phase fault on the Pheasant Run 115kV (530559) to Grinnell 115kV (531412) CKT 1, near Pheasant Run.
3PH       c. Clear fault after 5 cycles by tripping the faulted line.         4       Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         4       Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3       phase fault on the Gove 115kV (531411) to Arnold 115kV (531409) CKT 1, near Gove.         a. Apply fault at the Gove 115kV bus.       b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.       d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3       Apply fault at the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (530554) to Atwood SW 115kV (531464) CKT 1, near Atwood.         a. Apply fault at the Arnold 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.		a. Apply fault at the Pheasant Run 115kV bus.
c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         a. Apply fault at the Gove 115kV (531411) to Arnold 115kV (531409) CKT 1, near Gove.         a. Apply fault at the Gove 115kV (501411) to Arnold 115kV (531409) to CKT 1, near Gove.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         3 phase fault on the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (53054) to Ransom 115kV (531414) CKT 1, near Arnold.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         d. Leave fault on the Atwood 115kV (53054) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (53054) to Atwood SW 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault after 5 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 5 cycles, then trip the fa		b. Clear fault after 5 cycles by tripping the faulted line.
Sphase fault on the Gove 115kV (531411) to Arnold 115kV (531409) CKT 1, near Gove.           a. Apply fault at the Gove 115kV bus.           b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.           3 phase fault on the Arnold 115kV bus.           b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.           b. Clear fault after 5 cycles by tripping the faulted line.           c. Wait 20 cycles, and then re-close the line in (b) and remove fault.           d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           a. Apply fault at the Atwood 115kV bus.           b. Clear fault after 5 cycles by tripping the faulted line.           c. Wait 20 cycles, and then re-close the line in (b) and remove fault.           d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.           d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault. </td <td></td> <td>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</td>		c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT23- 3PH       a. Apply fault at the Gove 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.       c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         cleave fault on tor 5 cycles, then trip the line in (b) and remove fault.       3 phase fault on the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.       a. Apply fault at the Arnold 115kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) and remove fault.       d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         fLT25- 3PH       3 phase fault on the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Bave fault.       3 phase fault on the Atwood 115kV (530554) to Bave fault.         glass fault on the Atwood 115kV (530554) to Bave Valley 115kV (531488) CKT 1, near Atwood.       a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.       3 phase fault on the Atwood 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.       c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         fLT26- 3PH       D. Clear fault after 5 cycles by tripping the faulted line.       c. Wait 20 cycles, a		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT23- 3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         a. Apply fault at the Arnold 115kV (50109) to Ransom 115kV (531414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (500554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.		3 phase fault on the Gove 115kV (531411) to Arnold 115kV (531409) CKT 1, near Gove.
3PH       b. Clear fault after 5 cycles by imping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Baver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV Vs30554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV Vs30554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV Vs30554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault		a. Apply fault at the Gove 115kV bus.
<ul> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.</li> <li>3 phase fault on the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.</li> <li>a. Apply fault at the Arnold 115kV bus.</li> <li>b. Clear fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.</li> <li>d. Leave fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.</li> <li>d. Leave fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault after 5 cycles, then trip the line in (b) and remove fault.</li> </ul> FLT26. Prior Outage of Mingo to Brewster 115kV to Prewster (53151) 115kV (solve network for steady state solution). b. 3 phase fault on the Mingo (531429) 115kV to Red Willow (640325) 345kV, near Mingo 115kV. Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap - Setab 345kV line. a. Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap - Setab 345kV. b. 3 phase fault on for 5 cycles, then trip the faulted line in (b). Prior Outage of Mingo 1531451) 345kV to Red Willow (640325) 345kV, near Mingo 115kV. c. L		b. Clear fault after 5 cycles by tripping the faulted line.
Big Phase fault on the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.         a. Apply fault at the Arnold 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Atwood SW 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531458) The Atwood 1	0	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT24-3PH       a. Apply fault at the Arnold 115kV bus.         b. Clear fault after 5 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 the Xtwood 115kV (530564) to Atwood SW 115kV (531364) CKT 1, near Atwood.       a. Apply fault at the Atwood 115kV bus.         FLT25-3PH       3 phase fault on the Atwood 115kV (530564) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.       b. Clear fault after 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.       d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.       a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.       a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.       b. Clear fault after 5 cycles, then trip the line in (b) back into the fault.         fLT27-7       Prior Outage of Mingo to Brewster 115kV.       Sphase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV.         FLT28-7       Prior Outage of Mingo to Ref Willow 345kV.       Sphase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, solve network for steady state		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT24- 3PH       b. Clear fault after 5 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 to 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 the Atwood 115kV (530554) to Beaver Valley 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault fare 5 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 5 cycles, then trip the line in (b) and remove fault.         PO         FLT27- PO         a. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).         b. 3 phase fault on the S cycles, then trip the faulted line in (b).         FLT28- PO       Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line.         a. Prior outage Mingo		3 phase fault on the Arnold 115kV (531409) to Ransom 115kV (531414) CKT 1, near Arnold.
3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         Prior Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo – Pheasant Run 115kV line.         a. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).         FLT2F       Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line.         a. Prior outage Mingo (531429) 345kV to Red Willow (640325) 345kV, near G15-051-Tap 345kV.		a. Apply fault at the Arnold 115kV bus.
c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         3         FLT25- 3PH         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 cycles by tripping the faulted line.         c. Wait 20 cycles, and then re-close the line in (b) and remove fault.         3 phase fault on for 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) and remove fault.         c. Wait 20 cycles, and then re-close the line in (b) back into the fault.         c. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         FLT27- PO         Rift Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo - Pheasant Run 115kV line.         a. Prior Outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).         FLT28- PO       Prior Outage of Mingo to Red Willow (640325) 345kV, solve network for steady state solution). <td></td> <td>b. Clear fault after 5 cycles by tripping the faulted line.</td>		b. Clear fault after 5 cycles by tripping the faulted line.
3 phase fault on the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 the Atwood 115kV bus.         prove fault on the Atwood 115kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Atwood 115kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) and remove fault.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 cycles, then trip the line in (b) and remove fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         FLT27-PO         RFLT27-PO         PO         c. Leave fault on the Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Setab (530559) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         PTir20-PO         c. Eave fault on for 5 cycles, then trip the faulted line in (b).         FLT28-PO         PO         c. Leave fault on for 5 cycles, then trip the faulted	0111	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT25- 3PH       a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.       3 phase fault on the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.       a. Apply fault at the Atwood 115kV bus.         FLT26- 3PH       b. Clear fault after 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         FLT27- PO       Pior Outage of Mingo to Brewster 115kV.       3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV.         PO       c. Leave fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV.         PO       c. Leave fault on the Mingo (531451) 345kV to Setab (531465) 345kV (solve network for steady state solution).         FLT28- PO       Prior Outage of Mingo to Red Willow 445kV. 3 phase fault on the G15-061-Tap – Setab 345kV.         PO       c. Leave fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV.         PO       c. Leave fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         PO       c.		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT25- 3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.         d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.         Prior Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo – Pheasant Run 115kV line.         a. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT28- PO       Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line.         a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV, near G15-051-Tap 345kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT29- PO       Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo - Colby 115kV line.         a. Prior outage Ningo (5		3 phase fault on the Atwood 115kV (530554) to Atwood SW 115kV (531364) CKT 1, near Atwood.
3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         3 phase fault on the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         FLT27- PO         a. Prior Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo – Pheasant Run 115kV line.         a. Prior outage of Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT28- PO       Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line.         a. Prior outage Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV.         c. Leave fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV.         c. Leave fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV. <td></td> <td>a. Apply fault at the Atwood 115kV bus.</td>		a. Apply fault at the Atwood 115kV bus.
c. Wait 20 cycles, and then re-close the line in (b) back into the fault.d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.3 phase fault on the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.a. Apply fault at the Atwood 115kV bus.b. Clear fault after 5 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 5 cycles, then trip the line in (b) back into the fault.d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.FLT27- PO PO POPO PO POFLT88- PO PO POFLT84- PO PO POFLT84- PO PO POFLT84- PO PO POFLT84- PO PO PO POFLT84- PO PO PO POFLT84- PO PO PO POFLT84- PO PO PO FLT4- POFLT84- PO PO PO POFLT84- PO PO PO POFLT84- PO PO POFLT84- PO PO POFLT84- PO PO POFLT84- PO PO POFLT84- PO PO POFLT84- PO PO POFLT84- PO PO POFLT84- PO POFLT85- PO PO POFLT84- PO PO POFLT84- PO POFLT84- PO PO POFLT84- PO PO 		b. Clear fault after 5 cycles by tripping the faulted line.
Big Pase fault on the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.         a. Apply fault at the Atwood 115kV bus.         b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         FLT27- PO         PO         FLT18- PO1         PO1         FLT28- PO1         PO1         FLT28- PO1         PIor Outage of Mingo to Brewster 115kV to Brewster (531351) 115kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).         b. 3 phase fault on the Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line.         a. Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-051-Tap – Setab 345kV line.         a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         PIT29- PO       Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line.         a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).	0111	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT26- 3PHa. Apply fault at the Atwood 115kV bus. b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.FLT27- PO FLT27- POPrior Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo – Pheasant Run 115kV line. a. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution). b. 3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT28- PO FLT4- POPrior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line. a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution). b. 3 phase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV. 		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT26- 3PH       b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.         Prior Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo – Pheasant Run 115kV line.         a. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).         FLT27- PO         PO         FLT28- PO1         FLT28- PO         PO         FLT28- PO         PO         FLT28- PO         PO         FLT28- PO          PO         FLT28- PO         PO         FLT28- PO         PO         c. Leave fault on the Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).         FLT29- PO         R         FLT29- PO         PO         PI rior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line.         a. Prior outage Setab (531465) 345kV to Solate fault on the Mingo – Colby 115kV line.         a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).         FLT29- PO       a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve net		3 phase fault on the Atwood 115kV (530554) to Beaver Valley 115kV (531488) CKT 1, near Atwood.
3PH       b. Clear rault after 5 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 5 cycles, then trip the line in (b) and remove fault.         FLT27- PO       Prior Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo – Pheasant Run 115kV line.         a. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT28- PO       Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line.         a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT29- PO       Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line.         a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         Mingo 1		a. Apply fault at the Atwood 115kV bus.
c. Wait 20 cycles, and then re-close the line in (b) back into the fault.d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.FLT27- PO POPrior Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo – Pheasant Run 115kV line. a. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).FLT18- PO1Po1b. 3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT28- PO POPrior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line. a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).FLT44- PO2 PO POPrior Outage of Setab to Mingo 345kV. 3 phase fault on the G15-051-Tap 345kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT29- PO PO PO PO FLT17- PO3Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line. a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution). b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT30- SBMingo 115kV Stuck Breaker a. Apply single phase fault at the Mingo (531429) 115kV bus on the Mingo – Brewster (531351) 115kV.		b. Clear fault after 5 cycles by tripping the faulted line.
FLT27- POPrior Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo – Pheasant Run 115kV line.a. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).b. 3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV.c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT28- POPOFLT4- PO2POFLT4- PO2POFLT29- POFLT29- POPLT17- PO3FLT29- POFLT717- PO3FLT30- SBFLT30- SB		c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT2- POa. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).b. 3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT28- POPrior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line. a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).FLT4- PO2b. 3 phase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT29- PO POPrior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line. a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).FLT29- PO PO PO POPrior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line. a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).FLT17- PO3 PO3b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT30- SBMingo 115kV Stuck Breaker a. Apply single phase fault at the Mingo (531429) 115kV bus on the Mingo – Brewster (531351) 115kV line. b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.		d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT18- PO1b. 3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT28- PO POPrior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line. a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution). b. 3 phase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT29- PO PO PO FLT17- PO3Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line. a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution). b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT17- PO3Prior Outage Setab (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT30- SBMingo 115kV Stuck Breaker a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line. b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.	FLT27-	Prior Outage of Mingo to Brewster 115kV. 3 phase fault on the Mingo – Pheasant Run 115kV line.
PO1       b. o phase fault on the faulty (b01425) frokt to the data the faulted line in (b).         FLT28- PO       Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line.         a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).         FLT4- PO2       b. 3 phase fault on the Mingo (531451) 345kV to Red Willow (640325) 345kV, near G15-051-Tap 345kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT29- PO       Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line.         a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).         FLT29- PO       Prior Outage Setab to Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT17- PO3       b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         Mingo 115kV Stuck Breaker       a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.         b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.		a. Prior outage Mingo (531429) 115kV to Brewster (531351) 115kV (solve network for steady state solution).
c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT28- PO       Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line.         a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).         FLT4- PO2       b. 3 phase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT29- PO       Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line.         a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT7- PO3       b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         Mingo 115kV Stuck Breaker       a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.         b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.		b. 3 phase fault on the Mingo (531429) 115kV to Pheasant Run (530559) 115kV, near Mingo 115kV.
FL128- POa. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).b. 3 phase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT29- POPrior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line. a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).FLT29- POPrior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line. a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV. c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT30- SBMingo 115kV Stuck Breaker a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line. b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.	FUI	c. Leave fault on for 5 cycles, then trip the faulted line in (b).
PO POa. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).FLT4- PO2b. 3 phase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV.c. Leave fault on for 5 cycles, then trip the faulted line in (b).FLT29- PO POa. Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line.a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.c. Leave fault on for 5 cycles, then trip the faulted line in (b).Mingo 115kV Stuck Breaker a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.	FLT28-	Prior Outage of Mingo to Red Willow 345kV. 3 phase fault on the G15-061-Tap – Setab 345kV line.
PO2       c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT29- PO       Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line.         a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         Mingo 115kV Stuck Breaker         a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.         b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.	PO FLT4-	a. Prior outage Mingo (531451) 345kV to Red Willow (640325) 345kV (solve network for steady state solution).
c. Leave fault on for 5 cycles, then trip the faulted line in (b).         FLT29- PO       Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line.         a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         Mingo 115kV Stuck Breaker         a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.         b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.		b. 3 phase fault on the Mingo (531451) 345kV to Setab (531465) 345kV, near G15-051-Tap 345kV.
FLT29- PO       a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).         b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         Mingo 115kV Stuck Breaker         a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.         b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.	FUZ	c. Leave fault on for 5 cycles, then trip the faulted line in (b).
PO       a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).         FLT17- PO3       b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.         c. Leave fault on for 5 cycles, then trip the faulted line in (b).         Mingo 115kV Stuck Breaker         a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.         b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.	FLT29-	Prior Outage of Setab to Mingo 345kV. 3 phase fault on the Mingo – Colby 115kV line.
PO3       c. Leave fault on for 5 cycles, then trip the faulted line in (b).         Mingo 115kV Stuck Breaker         a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.         b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.	FLT17-	a. Prior outage Setab (531465) 345kV to Mingo (531451) 345kV (solve network for steady state solution).
c. Leave fault on for 5 cycles, then trip the faulted line in (b).         Mingo 115kV Stuck Breaker         FLT30-         a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.         b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.		b. 3 phase fault on the Mingo (531429) 115kV to Colby (530555) 115kV, near Mingo 115kV.
FLT30-a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.SBb. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.		c. Leave fault on for 5 cycles, then trip the faulted line in (b).
SB b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.		Mingo 115kV Stuck Breaker
		a. Apply single phase fault at the Mingo (531429)115kV bus on the Mingo – Brewster (531351) 115kV line.
c. Trip Mingo (531429) to Colby (530555) 115kV and remove the fault.	SB	b. Wait 16 cycles, and then trip Mingo (531429) to Brewster (531351) 115kV.
		c. Trip Mingo (531429) to Colby (530555) 115kV and remove the fault.

Table 5-1 continued						
Fault ID	Fault Descriptions					
FLT31- SB	Mingo 345kV Stuck Breaker a. Apply single phase fault at the Mingo (531451) 345kV bus on the Mingo – Red Willow (640325) 345kV line. b. Wait 16 cycles, and then trip Mingo (531451) to Red Willow (640325) 345kV. c. Trip Mingo (531451) 345kV to Mingo (531429) 115kV to Mingo (531452) 13.8kV transformer and remove the fault.					
FLT32- SB	<ul> <li>Holcomb 345kV Stuck Breaker</li> <li>a. Apply single phase fault at the Holcomb (531449) 345kV bus on the Holcomb – Buckner (531501) 345kV line.</li> <li>b. Wait 16 cycles, and then trip Holcomb (531449) to Buckner (531501) 345kV.</li> <li>c. Trip Holcomb (531449) 345kV to Holcomb (531448) 115kV to Holcomb (531450) 13.8kV transformer and remove the fault.</li> </ul>					
FLT9001- 3PH	<ul> <li>3 phase fault on the GENTLMN3 345kV (640183) to THEDFRD3 345kV (640500), near GENTLMN3.</li> <li>a. Apply fault at the GENTLMN3 345kV bus.</li> <li>b. Clear fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.</li> </ul>					
FLT9002- 3PH	<ul> <li>3 phase fault on the GENTLMN3 345kV (640183) to GENTLMN4 230kV (640184) to GENTLEMANT29 13.8kV (643066), near GENTLMN3 345kV.</li> <li>a. Apply fault at the GENTLMN3 345kV bus.</li> <li>b. Clear fault after 5 cycles by tripping the faulted transformer.</li> </ul>					
FLT9003- 3PH	<ul> <li>3 phase fault on the GENTLMN3 345kV (640183) to GENTLM2G 24kV (640011), near GENTLMN3 345kV.</li> <li>a. Apply fault at the GENTLMN3 345kV bus.</li> <li>b. Clear fault after 5 cycles by tripping the faulted transformer. Trip generator at GENTLM2G</li> </ul>					
FLT9004- 3PH	3 phase fault on the MINGO 345kV (531451) to MINGO 115kV (531429) to MINGTER1 13.8kV (531452), near MINGO 345kV. a. Apply fault at the MINGO 345kV bus.					
FLT05- PO2	<ul> <li>b. Clear fault after 5 cycles by tripping the faulted transformer.</li> <li>Prior Outage of the MINGO (531451) 345kV to REDWILO3 (640325) 345kV</li> <li>3 phase fault on the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.</li> <li>a. Apply fault at the Setab 345kV bus.</li> <li>b. Clear fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.</li> </ul>					
FLT07- PO2	<ul> <li>Prior Outage of the MINGO (531451) 345kV to REDWILO3 (640325) 345kV</li> <li>3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.</li> <li>a. Apply fault at the Setab 345kV bus.</li> <li>b. Clear fault after 5 cycles by tripping the faulted transformer.</li> </ul>					
FLT17- PO2	Prior Outage of the MINGO (531451) 345kV to REDWILO3 (640325) 345kV. 3 phase fault on the Colby 115kV (530555) to Mingo 115kV (531429) CKT 1, near Colby. a. Apply fault at the Colby 115kV bus. b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.					
FLT18- PO2	<ul> <li>Prior Outage of the MINGO (531451) 345kV to REDWILO3 (640325) 345kV.</li> <li>3 phase fault on the Mingo 115kV (531429) to Pheasant Run 115kV (530559) CKT 1, near Mingo.</li> <li>a. Apply fault at the Mingo 115kV bus.</li> <li>b. Clear fault after 5 cycles by tripping the faulted line.</li> <li>c. Wait 20 cycles, and then re-close the line in (b) back into the fault.</li> <li>d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.</li> </ul>					

	Table 5-1 continued
Fault ID	Fault Descriptions
	Prior Outage of the MINGO (531451) 345kV to REDWILO3 (640325) 345kV.
	3 phase fault on the Mingo 115kV (531429) to Brewster 115kV (531351) CKT 1, near Mingo.
FLT19-	a. Apply fault at the Mingo 115kV bus.
PO2	b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.
	Prior Outage of the MINGO (531451) 345kV to SETAB (531465) 345kV.
	3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow. a. Apply fault at the Red Willow 345kV bus.
FLT08-	b. Clear fault after 5 cycles by tripping the faulted line.
PO3	
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT09-	Prior Outage of the MINGO (531451) 345kV to SETAB (531465) 345kV. 3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327) XFMR CKT 1, near Red Willow.
PO3	a. Apply fault at the Red Willow 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
	Prior Outage of the MINGO (531451) 345kV to SETAB (531465) 345kV.
	3 phase fault on the Colby 115kV (530555) to Mingo 115kV (531429) CKT 1, near Colby.
FLT17-	a. Apply fault at the Colby 115kV bus.
PO3	b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.
	Prior Outage of the MINGO (531451) 345kV to SETAB (531465) 345kV.
	3 phase fault on the Mingo 115kV (531429) to Pheasant Run 115kV (530559) CKT 1, near Mingo.
FLT18-	a. Apply fault at the Mingo 115kV bus.
PO3	b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.
	Prior Outage of the MINGO (531451) 345kV to SETAB (531465) 345kV. 3 phase fault on the Mingo 115kV (531429) to Brewster 115kV (531351) CKT 1, near Mingo.
	a. Apply fault at the Mingo 115kV bus.
FLT19- PO3	b. Clear fault after 5 cycles by tripping the faulted line.
100	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault. Prior Outage of the MINGO (531451) 345kV to MINGO (531429) 115kV to MINGTER1 (531452) 13.8kV
	transformer.
	3 phase fault on the Setab 345kV (531465) to Holcomb 345kV (531449) CKT 1, near Setab.
FLT05-	a. Apply fault at the Setab 345kV bus.
PO4	b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.
	Prior Outage of the MINGO (531451) 345kV to MINGO (531429) 115kV to MINGTER1 (531452) 13.8kV transformer.
FLT07- PO4	3 phase fault on the Setab 345kV (531465) to Setab 115kV (531464) to Setab 13.8kV (531259) XFMR CKT 1, near Setab 345kV.
. 04	a. Apply fault at the Setab 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
	Prior Outage of the MINGO (531451) 345kV to MINGO (531429) 115kV to MINGTER1 (531452) 13.8kV
	transformer. 3 phase fault on the Red Willow 345kV/ (640325) to Contieman 345kV/ (640183) CKT 1, pear Red Willow
FLT08-	3 phase fault on the Red Willow 345kV (640325) to Gentleman 345kV (640183) CKT 1, near Red Willow.
PO4	a. Apply fault at the Red Willow 345kV bus.
104	b. Clear fault after 5 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 5 cycles, then trip the line in (b) and remove fault.

Table 5-1 Continued					
Fault ID	Fault Descriptions				
	Prior Outage of the MINGO (531451) 345kV to MINGO (531429) 115kV to MINGTER1 (531452) 13.8kV transformer. 3 phase fault on the Red Willow 345kV (640325) to Red Willow 115kV (640326) to Red Willow 13.8kV (640327)				
FLT09- PO4	XFMR CKT 1, near Red Willow.				
	a. Apply fault at the Red Willow 345kV bus.				
	b. Clear fault after 5 cycles by tripping the faulted transformer.				
	Setab 345kV Stuck Breaker				
FLT9100-	a. Apply single phase fault at the SETAB 7 (531465) 345kV bus on the SETAB 7 (531465) - Mingo 7 (531451) 345kV line.				
SB	b. Wait 16 cycles, and then trip SETAB 7 (531465) - Mingo 7 (531451) 345kV line.				
	c. Trip SETAB 7 (531465) - HOLCOMB7 (531449) 345kV line and remove the fault.				
	REDWILO3 345kV Stuck Breaker				
FLT9200-	a. Apply single phase fault at the REDWILO3 (640325) 345kV bus on the REDWILO3 (640325) - Mingo 7 (531451) 345kV line.				
SB	b. Wait 16 cycles, and then trip REDWILO3 (640325) - Mingo 7 (531451) 345kV line.				
	c. Trip REDWILO3 (640325) - GENTLMN3 (640183) 345kV line and remove the fault.				

#### Table 5-1 continued

#### 5.3 Results

There were no damping or voltage recovery violations observed during the simulations and the system returned to stable conditions except for one fault condition described below.

FLT04-PO2, prior outage on the GEN-2015-065 & GEN-2016-067 POI to Red Willow 345kV line followed by the three phase fault on the Mingo 345kV to Setab 345kV line caused the system to become unstable where GEN-2015-065 & GEN-2016-067 is connected radially only through Mingo 345 kV/115 kV transformer. To prevent this issue, GEN-2015-065 & GEN-2016-067 may have to be curtailed to 200 MW after the loss of either the GEN-2015-065 & GEN-2016-067 POI to Red Willow 345kV line or the Mingo to Setab 345 kV line.

Table 5-2 shows the curtailment requires for FLT04-PO2 described above. GEN-2015-065 & GEN-2016-067 output may have to be limited to the amounts listed in Table 5-2.

N-	-2015-005 & GEN-2010-007 Output Limits for F					
	Fault	2016WP	2017SP	2025SP		
	FLT04-PO2	200	215	225		

Table 5-2: GEN-	2015-065 &	GEN-2016-	067 Output	Limits for F	LT04-PO2 (MW)

Table 5-3 shows the results of the fault events simulated for each of the models. The associated stability plots are provided in Appendix D. Additionally, the project wind farm was found to stay connected during the contingencies that were studied and, therefore, will meet the Low Voltage Ride Through (LVRT) requirements of FERC Order #661A.

Table 5-3: GEN-2015-065 & GEN-2016-067 Dynamic Stability Results				
Fault ID	2016WP	2017SP	2025SP	
FLT01-3PH	Stable	Stable	Stable	
FLT02-3PH	Stable	Stable	Stable	
FLT03-3PH	Stable	Stable	Stable	
FLT04-3PH	Stable	Stable	Stable	
FLT05-3PH	Stable	Stable	Stable	
FLT06-3PH	Stable	Stable	Stable	
FLT07-3PH	Stable	Stable	Stable	
FLT08-3PH	Stable	Stable	Stable	
FLT09-3PH	Stable	Stable	Stable	
FLT10-3PH	Stable	Stable	Stable	
FLT11-3PH	Stable	Stable	Stable	
FLT12-3PH	Stable	Stable	Stable	
FLT13-3PH	Stable	Stable	Stable	
FLT14-3PH	Stable	Stable	Stable	
FLT15-3PH	Stable	Stable	Stable	
FLT16-3PH	Stable	Stable	Stable	
FLT17-3PH	Stable	Stable	Stable	
FLT18-3PH	Stable	Stable	Stable	
FLT19-3PH	Stable	Stable	Stable	
FLT20-3PH	Stable	Stable	Stable	
FLT21-3PH	Stable	Stable	Stable	
FLT22-3PH	Stable	Stable	Stable	
FLT23-3PH	Stable	Stable	Stable	
FLT24-3PH	Stable	Stable	Stable	
FLT25-3PH	Stable	Stable	Stable	
FLT26-3PH	Stable	Stable	Stable	
FLT30-SB	Stable	Stable	Stable	
FLT31-SB	Stable	Stable	Stable	
FLT32-SB	Stable	Stable	Stable	
FLT9001-3PH	N/A	N/A	Stable	
FLT9002-3PH	Stable	Stable	Stable	
FLT9003-3PH	Stable	Stable	Stable	
FLT9004-3PH	Stable	Stable	Stable	
FLT9100-SB	Stable	Stable	Stable	
FLT9200-SB	Stable	Stable	Stable	
FLT18-PO1	Stable	Stable	Stable	

Table 5-3 continued				
Fault ID	2016WP	2017SP	2025SP	
FLT04-PO2	Unstable GEN-2015-065 & GEN-2016-067 Tripped on Undervoltage. Project Output Curtailed to 200 MW to prevent trip	GEN-2015-065 & GEN-2016-067 Tripped on Undervoltage. Project Output Curtailed to 215 MW to prevent trip	GEN-2015-065 & GEN-2016-067 Tripped on Undervoltage. Project Output Curtailed to 225 MW to prevent trip	
FLT05-PO2	Stable	Stable	Stable	
FLT07-PO2	Stable	Stable	Stable	
FLT17-PO2	Stable	Stable	Stable	
FLT18-PO2	Stable	Stable	Stable	
FLT19-PO2	Stable	Stable	Stable	
FLT08-PO3	Stable	Stable	Stable	
FLT09-PO3	Stable	Stable	Stable	
FLT17-PO3	Stable	Stable	Stable	
FLT18-PO3	Stable	Stable	Stable	
FLT19-PO3	Stable	Stable	Stable	
FLT05-PO4	Stable	Stable	Stable	
FLT07-PO4	Stable	Stable	Stable	
FLT08-PO4	Stable	Stable	Stable	
FLT09-PO4	Stable	Stable	Stable	

## 6.0 Conclusions

The Interconnection Customer for GEN-2015-065 & GEN-2016-067 requested a Modification Request Impact Study to assess the impact of the turbine and facility changes presented in Table 6-1 below.

Facility	Existing	Modification Request
Point of Interconnection	Mingo 345kV Substation (531451)	Mingo 345kV Substation (531451)
Configuration/Capacity	88 x Siemens 2.3MW = 202.4 MW 32 x Siemens 2.3MW = 73.6 MW	105 x Siemens/Gamesa 2.625 MW turbines (275.625 MW)
Generation Interconnection Line(s)	Length = 7.5 miles R = 0.000400  pu X = 0.003100  pu B = 0.004200  pu *Zero impedance line is included in original case	Length = 9.196 miles R = 0.000505 pu X = 0.004634 pu B = 0.077858 pu
Main Substation Transformer	T1: Z = 8.0%, Rating 225 MVA T2: Z = 8.0%, Rating 180 MVA	T1: Z = 11.0%, Rating 225 MVA T2: Z = 11.0%, Rating 225 MVA
Equivalent Collector Line 1	R = 0.002283 pu X = 0.003118 pu B = 0.029680 pu	R = 0.009178 pu X = 0.012510 pu B = 0.099339 pu
Equivalent Collector Line 2	R = 0.006142 pu X = 0.008520 pu B = 0.055290 pu	R = 0.006510 pu X = 0.008433 pu B = 0.066016 pu
Capacitor (C1)	N/A	2 x 15 MVAr
Capacitor (C2)	N/A	2 x 15 MVAr

#### Table 6-1: Modification Request

A power factor analysis was not performed as there was no change in the point of interconnection for GEN-2015-065 & GEN-2016-067.

The results of the reactive power analysis, also known as the low-wind/no-wind condition analysis, performed using all three models showed that the combined GEN-2015-065 & GEN-2016-067 project may require a 24.4 MVAr shunt reactor on the 345 kV bus of the project substation. The shunt reactor is needed to reduce the reactive power transfer at the POI to approximately zero during low/no wind conditions while the generation interconnection project remains connected to the grid.

The results from short circuit analysis showed that the maximum change in the fault currents in the immediate systems at or near GEN-2015-065 & GEN-2016-067 was .4139 kA. The largest fault current calculated was below 23 kA in the 2017SP and 2025SP models.

The results of the dynamic stability analysis showed that after the prior outage of the Red Willow to the Point of Interconnection substation 345 kV line, a three-phase fault on the Mingo 345kV to Setab 345kV line caused a undervoltage trip of GEN-2015-065 & GEN-2016-067. The output of the project may have to be curtailed to about 200 MW after the prior outage to prevent the undervoltage trip of the project.

There were no other machine rotor angle damping or transient voltage recovery violations observed in the simulated fault events. Additionally, the project wind farm was found to stay connected during the contingencies that were studied and, therefore, will meet the Low Voltage Ride Through (LVRT) requirements of FERC Order #661A.

In conclusion, the results of this Study showed that the Modification Request shown in Table 6-1 do not constitute a material modification.