

APPENDIX A CONNECTION ASSESSMENT

Engineering Connection Assessment Wheatland Wind Project Connection

Whearland Wind Project L.P.

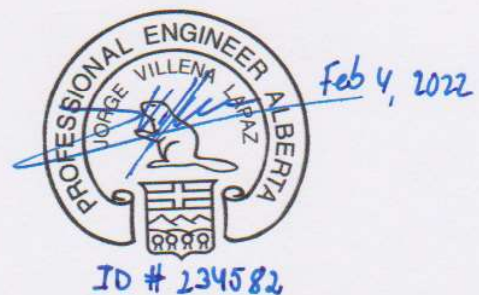
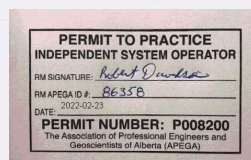
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Attachment A1 Engineering Connection Assessment: Study Scope

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Attachment A3 Post-Project Power Flow Diagrams

Attachment A4 Post-Project Transient Stability Diagrams

Attachment A5 Dynamic Data and Assumption

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1 Introduction

This AESO Engineering Connection Assessment describes the engineering studies that were completed to assess the impact of the Project (as defined below) on the performance of the Alberta interconnected electric system (AIES). This report also provides the AESO's conclusions and recommendations based on the results of the engineering studies.

Attached to this Engineering Connection Assessment is the scope and methodology used to perform the studies (see Attachment A1). This attachment provides details regarding the technical criteria, assumptions, and methods for performing these engineering studies.

1.1 Project Overview

Wheatland Wind Project L.P., by its General Partner Wheatland Wind Project Ltd. (Market Participant) has submitted a request for system access service to the Alberta Electric System Operator (AESO) to connect its approved Wheatland Wind Project (Facility) to the AIES. The Facility includes an approved collector station, to be designated the Badlands 981S substation.

The Market Participant's request includes: a request for a new system access service in the area, with a Rate STS, *Supply Transmission Service*, contract capacity of 120 MW and a Rate DTS, *Demand Transmission Service*, contract capacity of 1 MW; and a request for transmission development (collectively, the Project).

The scheduled in-service date (ISD) for the Project is June 30, 2022.

2 Assessment Scope

2.1 Objectives

The objectives of the AESO Engineering Connection Assessment are as follows:

- Assess the impact of the Project on the performance of the AIES.
- Evaluate Project connection alternatives and identify the AESO's preferred alternative.
- Recommend mitigation measures, if required, to reliably connect the Project to the AIES.
- Identify Project dependencies, including any TFO projects or AESO plans to expand or enhance the transmission system that must be completed prior to connection.

2.2 Existing System

Geographically, the Project is located in the AESO planning area of Sheerness (Area 43), which is part of the South Planning Region. Sheerness (Area 43) is surrounded by the AESO planning areas of Hanna (Area 42), Strathmore/Blackie (Area 45), Brooks (Area 43) and Empress (Area 48).

From a transmission system perspective, Sheerness (Area 43) consists primarily of 240 kV and 144 kV transmission systems. Sheerness (Area 43) is connected to Hanna (Area 42) through the 240 kV transmission lines 9L59 and 9L24, and the 144 kV transmission lines 7L171 and 7L128; Sheerness (Area 43) is connected to Brooks (Area 48) through a 240 kV path made up of 240 kV transmission line 933L, 934L and 950L.

Although Sheerness (Area 43) is part of the South Planning Region, generation in Sheerness (Area 43) has a direct impact on existing constraints in Central East Sub-region¹. These constraints are managed in accordance with the procedures set out in Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (TCM Rule).

2.3 Study Area

The Study Area for the Project consists of the AESO Planning areas of Sheerness (Area 43), Hanna (Area 42), Wainwright (Area 32), Alliance / Battle River (Area 36), Provost (Area 37), Lloydminster (Area 13), Vegreville (Area 56) and the tie lines that connect these planning areas to the rest of the AIES. All transmission facilities within the Study Area will be studied and monitored for violations of the Reliability Criteria (defined in Section 3.1 of Attachment A1).

¹ The Central East Sub-region comprises the following AESO planning areas: Lloydminster (Area 13), Wainwright (Area 32), Alliance/Battle River (Area 36), Provost (Area 37), Hanna (Area 42), and Vegreville (Area 56).

3 Connection Alternatives

3.1 Overview

The AESO, in consultation with ATCO Electric (ATCO), as the legal owner of transmission facilities (TFO) for the area immediately surrounding the Facility, and the Market Participant, identified two transmission alternatives to meet the Market Participant's request for system access service., as detailed in Section 3.2.

3.2 Connection Alternatives Examined

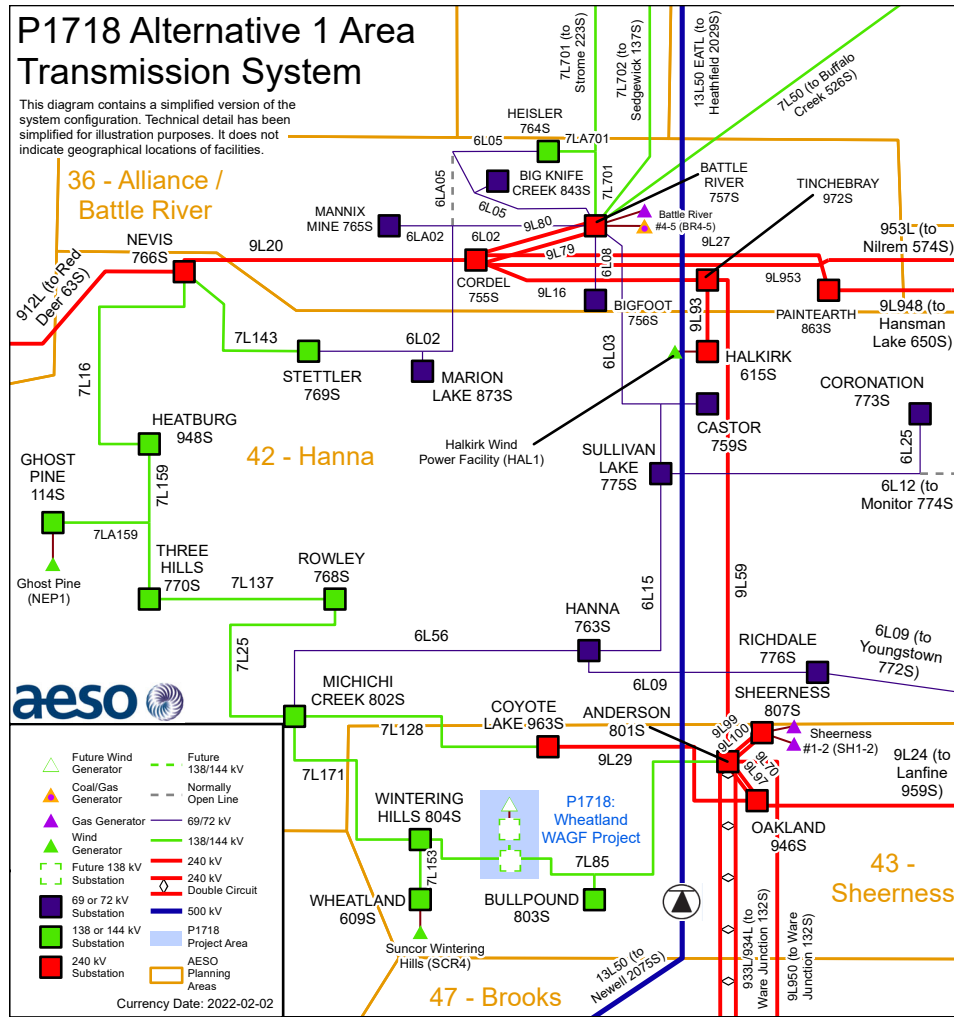
Below is a description of the developments associated with the transmission alternatives that were examined for the Project.

Alternative 1 - In-and-out connection to the 144 kV transmission line 7L85

This alternative includes the following development:

- Add a switching station, to be called Parker 2072S, with three 144 kV circuit breakers;
- Add two 144 kV circuits, each approximately 200 metres (m) in length, to connect the Parker 2072S substation to the 144 kV transmission line 7L85 (between the Wintering Hills 804S substation and the Bullpound 803S tap point) using an in-and-out configuration;
- Add a 144 kV circuit to connect the Facility to the Parker 2072S substation; and
- Add or modify associated equipment as required for the above transmission developments.

Figure 3-1: Connection alternative 1

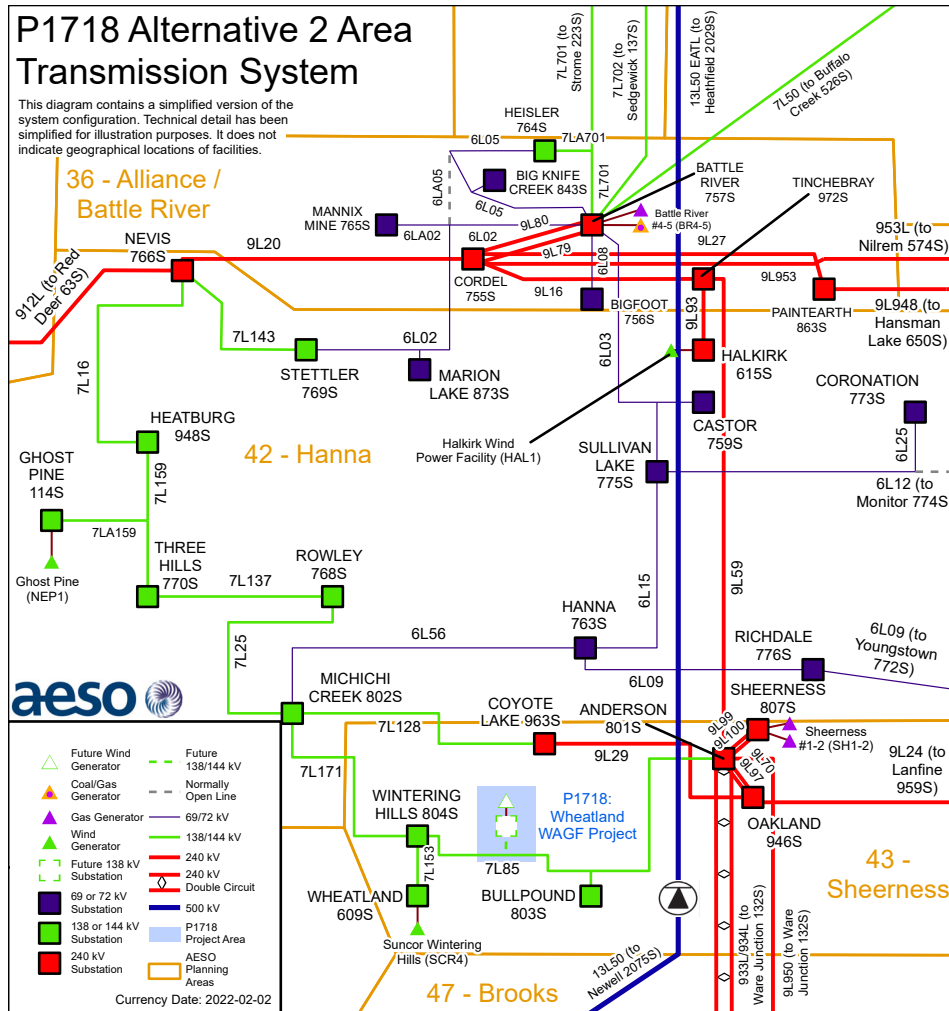


Alternative 2 - T-tap connection to the 144 kV transmission line 7L85

This alternative includes the following development:

- Add a 144 kV circuit, approximately 200 m in length, to connect the Facility to the 144 kV transmission line 7L85 (between the Wintering Hills 804S substation and the Bullpound 803S tap point) using a T-tap connection; and
- Add or modify associated equipment as required for the above transmission developments.

Figure 3-2: Connection alternative 2



3.3 Connection Alternatives Selected for Further Study

Alternative 2 is considered technically feasible and was selected for further study.

3.4 Connection Alternatives Not Selected for Further Study

In May 2020, the AESO revised its *Guidelines for T-Tap Connections*² and, in consultation with the Market Participant and ATCO, the AESO re-examined Alternative 1 and determined a new T-tap connection would be the preferred technical solution. Alternative 1 was ruled out as it would involve increased transmission development and hence, overall increased cost compared to Alternative 2.

² Available on the AESO website.

4 Assessment Approach

4.1 Criteria, Standards and Requirements

A detailed description of the standards, criteria, and assumptions that were used for the connection assessment is provided in Attachment A1.

4.2 Studies Performed

At the time of study, the scheduled ISD for the Project was June 30, 2022. Therefore, studies were performed using scenarios for 2022.

Short-circuit studies were performed using the 2022 and 2031 winter peak scenarios.

Table 4-1 lists the study scenarios. Post-project scenarios reflect the Market Participant's requested Rate STS contract capacity of 120 MW at its approved Facility.

Table 4-1: Connection Study Scenarios

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Project Load (MW)	Project Generation (MW)
Pre-Project					
1	2022 Summer Light (SL)	High Wind	2022 SL Pre-Project	0	0
2	2022 Summer Peak (SP)		2022 SP Pre-Project	0	0
3	2022 Winter Peak (WP)		2022 WP Pre-Project	0	0
Post-Project					
4	2022 SL	High Wind	2022 SL Post-Project	0	120
5	2022 SP		2022 SP Post-Project	0	120
6	2022 WP		2022 WP Post-Project	0	120
7	2031 WP	All Study Area generation online	2031 WP Post-Project	0	120

The AESO Planning Region load forecasts used for the connection studies were based on the AESO 2021 Long Term Outlook (2021 LTO).

4.2.1 Power Flow Studies

The purpose of the power flow studies is to identify and quantify any thermal and voltage criteria violations in the Study Area.

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In addition, power flow studies are also used to identify point of delivery (POD) low voltage bus voltage deviations beyond the limits listed in Table 3-1 of Attachment A1.³

Power flow studies were performed for 2022 SL, 2022 SP, and 2022 WP pre-Project and post-Project scenarios.

4.2.2 Transient Stability Studies

The purpose of the transient stability studies is to assess the post-Project stability of the transmission system after three-phase to ground faults are applied on select transmission lines in the Study Area.

Transient stability studies were performed for 2022 SL, 2022 SP, and 2022 WP post-Project scenarios.

4.2.3 Short-Circuit Current Level Studies

The purpose of short-circuit current level studies is to determine the expected system short-circuit current levels in the vicinity of the Project.

Short circuit studies were performed for the 2022 WP pre-Project scenario and for the 2022 WP and 2031 WP post-Project scenarios.

4.3 Mitigation Measure Development and Evaluation

As explained in Section 6 of Attachment A1, mitigation measures were developed to address system performance issues that were identified in the post-Project scenarios. Studies performed to assess the effectiveness of mitigation measures are briefly outlined below.

4.3.1 Post-Mitigation Studies

Power flow and transient stability studies were performed to assess the impact of the Project on the performance of the AIES following implementation of the AESO's proposed mitigation measures.

4.3.2 Constraint Effective Factor Studies

Constraint effective factor studies were used to determine the generator and load constraint effective factors and to identify the most effective generators or loads to manage thermal criteria violations that were observed under Category A and Category B condition Pre-Project Study Results

This section describes the results of the pre-Project power flow studies.

³ The AESO's desired post-contingency voltage deviations for low voltage busses represent guidelines rather than criteria. A POD bus voltage deviation that exceeds the desired limits shown in Table 3-1 of Attachment A1 does not represent a Reliability Criteria violation. Mitigation measures would not be developed to specifically address POD bus voltage deviations that exceed the desired values in Table 3-1 of Attachment A1.

5 Pre-Project Study Results

5.1 Power Flow Studies

Power flow diagrams illustrating the pre-Project power flow studies results for Category A and Category B conditions are provided in Attachment A2.

5.1.1 Scenario 1: 2022 Summer Light High Wind Pre-Project

Category A Conditions

No Reliability Criteria (as defined in Section 3.1 of Attachment A1) violations were observed under Category A conditions.

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 5-1.

Table 5-1: Thermal Criteria Violations under Category B Conditions for Scenario 1

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow (MVA)	% Loading ^a
959S901T (Lanfine)	7L132 (Oyen 767S to Lanfine 959S)	112.13	138.00	121.83	100.48

Notes:

^a Reported as a percentage of the power flow (in MVA, i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$) relative to the transmission line's Normal Rating (also in MVA), as shown in Attachment A1.

Voltage Criteria Violations

No Voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No voltage deviations beyond the limits listed in Table 3-1 of Attachment A1 (hereafter referred to as point of delivery (POD) bus voltage deviations) were observed.

5.1.2 Scenario 2: 2022 Summer Peak High Wind Pre-Project

Category A Conditions

No Reliability Criteria (as defined in Section 3.1 of Attachment A1) violations were observed under Category A conditions.

Category B Conditions

Thermal Criteria Violations

Thermal criteria violations were observed under certain Category B conditions as shown in Table 5-1.

Table 5-2: Thermal Criteria Violations under Category B Conditions for Scenario 2

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow (MVA)	% Loading ^a
EATL (Newell 2075S to Heathfield 2029S)	701L (North Holden 395S to Strome 223S)	119.00	131.00	136.85	116.16
	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	157.89	121.48
	704L (Wainwright 51S to Tucuman 478S)	75.00	83.00	78.89	102.30
	749L-2 (Edgerton 899S to Killarney Lake 267S)	96.00	134.00	104.39	105.38
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	129.29	107.75
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	131.30	119.93
	7L701-2 (Heisler 764S to Battle River 757S)	141.80	159.10	153.99	104.25
912L/9L912 (Nevis 766S to Red Deer 63S)	701L (North Holden 395S to Strome 223S)	119.00	131.00	124.31	102.54
	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	144.38	108.45

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	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	120.85	107.21
766S901T (Nevis)	701L (North Holden 395S to Strome 223S)	119.00	131.00	124.34	102.55
	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	144.42	108.46
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	120.87	107.21
899ST3 (Edgerton)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	114.64	103.38
7L749/749L (Lloydminster 716S to Edgerton 899S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	112.53	101.09
749L (Metiskow 648S to Edgerton 899S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	116.79	105.88
267ST1 (Killarney Lake)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	117.65	106.75

Notes:

^a Reported as a percentage of the power flow (in MVA, i.e., $S = \sqrt{3} \times V_{\text{base}} \times I_{\text{actual}}$) relative to the transmission line's Normal Rating (also in MVA), as shown in Attachment A1.

Voltage Criteria Violations

No Voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No voltage deviations beyond the limits listed in Table 3-1 of Attachment A1 (hereafter referred to as point of delivery (POD) bus voltage deviations) were observed.

5.1.3 Scenario 3: 2022 Winter Peak High Wind Pre-Project

Category A Conditions

No Reliability Criteria (as defined in Section 3.1 of Attachment A1) violations were observed under Category A conditions.

Category B Conditions

No Thermal Reliability Criteria (as defined in Section 3.1 of Attachment A1) violations were observed under Category B conditions.

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Voltage Criteria Violations

POD Bus Voltage Deviations

No voltage deviations beyond the limits listed in Table 3-1 of Attachment A1 (hereafter referred to as point of delivery (POD) bus voltage deviations) were observed.

6 Post-Project Study Results

This section describes the results of the post-Project power flow studies and transient stability studies.

As described in Section 2 of Attachment A1, the post-Project studies were performed using Alternative 2 (T-tap connection to the 144 kV transmission line 7L85).

6.1 Power Flow Studies

Power flow diagrams illustrating the post-Project power flow studies results for Category A and Category B conditions are included in Attachment A3.

6.1.1 Scenario 4: 2022 Summer Light High Wind Post-Project

Category A Conditions

One thermal criteria violation was observed under Category A conditions. Following this, Wintering Hills was dispatched down to remove the Category A violation prior to performing Category B powerflow analysis.

Table 6-1: Thermal Criteria Violations under Category A Conditions for Scenario 4

Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
			Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	59.68	55.60	115.89	108.00	52.40

Category B Conditions

Thermal criteria violations were observed under certain Category B conditions as shown in Table 6-1.

Table 6-1: Thermal Criteria Violations under Category B Conditions for Scenario 4

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
EATL (Newell 2075S to Heathfield 2029S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	77.90	67.16	126.35	108.49	41.32
	9L16 (Cordel 755S to Tinchebray 972S)	499.00	499.00	520.73	99.76	539.55	103.75	3.99
9L59 (Anderson 801S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	69.13	59.37	118.20	101.19	41.82
9L20 (Cordel 755S to Nevis 766S)	766S901T (Nevis)	100.00	100.00	83.84	83.84	100.76	100.76	16.92
	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	70.19	60.35	119.12	102.07	41.72
9L16 (Cordel 755S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	75.68	65.20	124.75	107.04	41.84
959S901T (Lanfine)	7L132 (Oyen 767S to Lanfine 959S)	112.13	138.00	121.83	100.48	121.79	100.49	0.01
801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	71.47	61.60	165.37	142.16	80.56
7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-2A (P1718 Tap to Bullpond 803S)	139.00	165.80	77.17	52.60	171.10	115.21	62.61
	7L85-3 (Bullpond 803S to Anderson 801S)	139.00	165.80	71.70	48.89	161.53	111.07	62.18
	801S901T (Anderson)	125.00	125.00	69.64	55.71	163.64	130.92	75.20
114ST1 (Ghost Pine)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	72.63	62.54	120.95	103.76	41.22

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed.

6.1.2 Scenario 5: 2022 Summer Peak High Wind Post-Project

Category A Conditions

One thermal criteria violation was observed under Category A conditions. Following this, Wintering Hills was dispatched down to remove the Category A violation prior to performing Category B powerflow analysis.

Table 6-1: Thermal Criteria Violations under Category A Conditions for Scenario 5

Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
			Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	52.48	48.90	108.08	100.71	51.81

Category B Conditions

Thermal criteria violations were observed under certain Category B conditions as shown in Table 6-2.

Table 6-2: Thermal Criteria Violations under Category B Conditions for Scenario 5

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Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
EATL (Newell 2075S to Heathfield 2029S)	701L (North Holden 395S to Strome 223S)	119.00	131.00	136.85	116.16	143.00	122.58	6.42
	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	157.89	121.48	164.76	127.64	6.15
	704L (Wainwright 51S to Tucuman 478S)	75.00	83.00	78.89	102.30	82.46	107.19	4.89
	749L-2 (Edgerton 899S to Killarney Lake 267S)	96.00	134.00	104.39	105.38	107.61	108.97	3.59
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	129.29	107.75	133.74	112.55	4.80
	7L129-2 (Vermilion 710S to Bauer 918S Tap)	120.00	132.00	118.51	98.01	122.59	102.54	4.54
	7L159-1 (Ghost Pine 114S to Heatburg 948S)	107.33	118.83	102.48	89.84	116.37	103.26	13.41
	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	69.63	60.03	126.19	108.44	48.41
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	131.30	119.93	136.71	125.91	5.98
	7L701-2 (Heisler 764S to Battle River 757S)	141.80	159.10	153.99	104.25	160.71	109.28	5.03
	9L16 (Cordel 755S to Tinchebray 972S)	499.00	499.00	515.52	99.25	536.16	103.54	4.29
9L59 (Anderson 801S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	61.64	52.82	118.78	101.64	48.83
9L20 (Cordel 755S to Nevis 766S)	701L (North Holden 395S to Strome 223S)	119.00	131.00	111.37	91.81	120.77	100.07	8.26
	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	131.22	98.57	141.00	106.29	7.73
	766S901T (Nevis)	100.00	100.00	91.90	91.90	110.25	110.25	18.35
	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	64.52	55.43	121.56	104.23	48.80
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	108.32	97.01	117.29	105.19	8.18
9L16 (Cordel 755S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	67.58	58.08	124.81	107.05	48.97
912L/9L912 (Nevis 766S to Red Deer 63S)	701L (North Holden 395S to Strome 223S)	119.00	131.00	124.31	102.54	135.88	113.65	11.11

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Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	144.38	108.45	157.29	119.12	10.67
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	118.74	95.69	123.39	102.07	6.38
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	120.85	107.21	125.76	113.71	6.50
	7L701-2 (Heisler 764S to Battle River 757S)	141.80	159.10	138.80	92.13	150.60	100.41	8.28
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	112.30	92.65	124.90	101.97	9.32
899ST3 (Edgerton)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	114.64	103.38	126.96	113.87	10.50
801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	63.13	54.25	170.98	147.02	92.76
7L749/749L (Lloydminster 716S to Edgerton 899S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	112.53	101.09	125.01	111.71	10.62
7L50 (Buffalo Creek 526S to Battle River 757S)	749L-2 (Edgerton 899S to Killarney Lake 267S)	96.00	134.00	93.75	94.98	103.84	104.77	9.79
7L42 (Lloydminster 716S to Hill 751S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	108.20	95.85	115.02	102.60	6.75
7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-2A (P1718 Tap to Bullpond 803S)	139.00	165.80	70.71	48.16	179.45	121.19	73.03
	7L85-3 (Bullpond 803S to Anderson 801S)	139	165.80	63.04	42.96	166.70	115.24	72.28
	801S901T (Anderson)	125.00	125.00	59.94	47.96	168.94	135.16	87.20
7L129 (Buffalo Creek 526S to Vermilion 710S)	749L-2 (Edgerton 899S to Killarney Lake 267S)	96.00	134.00	90.37	91.29	100.73	101.34	10.05
766S901T (Nevis)	701L (North Holden 395S to Strome 223S)	119.00	131.00	124.34	102.55	135.62	113.59	11.04
	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	144.42	108.46	156.93	119.06	10.60
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	118.76	95.70	123.19	101.99	6.29
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	120.87	107.21	125.55	113.61	6.40
	7L701-2 (Heisler 764S to Battle River 757S)	141.80	159.10	138.86	92.16	149.85	100.06	7.91
749L (Metiskow 648S to Edgerton 899S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	114.34	95.04	126.68	104.15	9.12

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Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	116.79	105.88	128.83	116.14	10.26
701L/7L701 (North Holden 395S to Heisler 764S to Battle River 757S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	108.57	97.34	117.75	105.46	8.11
701L (Strome 223S to North Holden 395S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	105.23	93.87	114.52	102.14	8.27
526ST1 or 526ST2 (Buffalo Creek)	749L-2 (Edgerton 899S to Killarney Lake 267S)	96.00	134.00	93.64	94.89	103.52	104.47	9.59
395ST1 (North Holden)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	107.68	95.87	117.09	104.19	8.32
267ST1 (Killarney Lake)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	115.19	95.85	127.51	104.96	9.11
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	117.65	106.75	129.67	117.01	10.25
114ST1 (Ghost Pine)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	63.70	54.79	120.05	103.02	48.23

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed.

6.1.3 Scenario 6: 2022 Winter Peak High Wind Post-Project

Category A Conditions

No Reliability Criteria violations were observed under Category A conditions.

Category B Conditions

Thermal criteria violations were observed under certain Category B conditions as shown in Table 6-3.

Table 6-3: Thermal Criteria Violations under Category B Conditions for Scenario 6

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Normal Rating (MVA)	Emergency Rating (MVA)	Pre-Project Results		Post-Project Results		% Loading Difference (Post-Pre)
				Observed Power Flow (MVA)	% Loading	Observed Power Flow (MVA)	% Loading	
EATL (Newell 2075S to Heathfield 2029S) 801S901T (Anderson)	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	128.24	97.36	136.13	104.23	6.87
	9L16 (Cordel 755S to Tinchebray 972S)	499.00	499.00	497.45	95.27	520.97	100.17	4.90
7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	140.90	143.75	71.89	47.05	187.81	123.29	76.24
EATL (Newell 2075S to Heathfield 2029S)	801S901T (Anderson)	125.00	125.00	69.44	55.55	186.64	149.31	93.76

Voltage Criteria Violations

No Voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed.

6.2 Transient Stability Studies

Transient stability studies were complete for Scenario 4, 5, and 6.

The results did not indicate any transient stability concerns, and the system showed acceptable dynamic response to all Category B conditions studied, as shown in Table 6-4. The post-Project transient stability plots are provided in Attachment A4. The dynamic data and assumptions of all equipment proposed for the Facility are provided in Attachment A5.

Table 6-4: Transient Stability Study Results under Category B Conditions for Scenario 4, 5, and 6

Studied Contingency	Fault Description and Location	Results
9L24 (Oakland 946S – Lanfine 959S)	3-phase fault at Oakland 946S	Stable
	3-phase fault at Lanfine 959S	Stable
9L29 (Oakland 946S – Coyote Lake 963S)	3-phase fault at Oakland 946S	Stable
	3-phase fault at Coyote Lake 963S	Stable
9L20 (Cordel 755S – Nevis 766S)	3-phase fault at Cordel 755S	Stable
	3-phase fault at Nevis 766S	Stable
912L-9L912 (Nevis 766S – Red Deer 63S)	3-phase fault at Nevis 766S	Stable
	3-phase fault at Red Deer 63S	Stable
7L171 (Wintering Hill 804S – Michichi Creek 802S)	3-phase fault at Wintering Hill 804S	Stable
	3-phase fault at Michichi Creek 802S	Stable
7L25 (Rowley 768S – Michichi Creek 802S)	3-phase fault at Rowley 768S	Stable
	3-phase fault at Michichi Creek 802S	Stable
7L137 (Rowley 768S – Three Hills 770S)	3-phase fault at Rowley 768S	Stable
	3-phase fault at Three Hills 770S	Stable
7L16 (Heatburg 948S – Nevis 766S)	3-phase fault at Heatburg 948S	Stable
	3-phase fault at Nevis 766S	Stable
7L159 (Three Hills 770S – Ghost Pine 114S – Heatburg 948S)	3-phase fault at Three Hills 770S	Stable
	3-phase fault at Ghost Pine 114S	Stable
	3-phase fault at Heatburg 948S	Stable
9L59 (Anderson 801S – Tinchebray 972S)	3-phase fault at Anderson 801S	Stable
	3-phase fault at Tinchebray 972S	Stable
7L128 (Michichi Creek 802S – Coyote Lake 963S)	3-phase fault at Michichi Creek 802S	Stable
	3-phase fault at Coyote Lake 963S	Stable
7L85 (Wintering Hills 804S – Anderson 801S)	3-phase fault at Wintering Hills 804S	Stable
	3-phase fault at Anderson 801S	Stable
EATL (Heathfield 2029S – Newell 2075S)	3-phase fault at Heathfield 2029S	Stable

7 Short Circuit Studies

7.1 Pre-Project Results

7.1.1 Scenario 3: 2022 Winter Peak Pre-Project

Pre-Project short-circuit current levels are provided in Table 7-1⁴.

Table 7-1: Pre-Project Short-Circuit Current Levels for Scenario 3

Substation Name and Number	Base Voltage (kV)	Pre-Fault Voltage (kV)	3- Φ Fault (kA)	Positive Sequence Thevenin Source Impedance (R1+jX1) (pu)	1- Φ Fault (kA)	Zero Sequence Thevenin Source Impedance (R0+jX0) (pu)
Coyote Lake 963S	240	258.98	6.5	0.007+0.043j	6.3	0.007+0.049j
Coyote Lake 963S	138	149.87	6.6	0.010+0.075j	7.7	0.005+0.045j
Oakland 946S	240	257.62	11.5	0.004+0.024j	11.8	0.004+0.024j
Michichi Creek 802S	138	150.11	4.4	0.033+0.107j	3.1	0.124+0.228j
Michichi Creek 802S	69	72.96	3	0.067+0.309j	3.2	0.070+0.269j
Wintering Hills 804S	138	149.75	3.5	0.038+0.134j	3.6	0.033+0.131j
Bullpound 803S	138	149.85	3.4	0.034+0.140j	3.4	0.026+0.145j
Sheerness 807S	240	257.5	12.3	0.004+0.023j	13.7	0.002+0.017j
Anderson 801S	240	257.34	12.6	0.004+0.022j	14.4	0.002+0.015j
Anderson 801S	138	149.85	4.9	0.011+0.101j	5.3	0.004+0.078j
Wheatland 609S	138	149.52	3.3	0.040+0.145j	3.1	0.046+0.169j

7.2 Post-Project Results

7.2.1 Scenario 6: 2022 Winter Peak Post-Project

Post-Project short-circuit current levels for Scenario 6 are provided in Table 7-2.

⁴ Short-circuit current studies were based on modeling information provided to the AESO by third parties. The authenticity of the modeling information has not been validated. Fault levels could change as a result of system developments, new customer connections, or additional generation in the area. It is recommended that these changes be monitored and fault levels reviewed to ensure that the fault levels are within equipment operating limits. The information provided in this study should not be used as the sole source of information for electrical equipment specifications or for the design of safety-grounding systems.

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Table 7-2: Post-Project Short-Circuit Current Levels for Scenario 6

Substation Name and Number	Base Voltage (kV)	Pre-Fault Voltage (kV)	3- Φ Fault (kA)	Positive Sequence Thevenin Source Impedance (R1+jX1) (pu)	1- Φ Fault (kA)	Zero Sequence Thevenin Source Impedance (R0+jX0) (pu)
Coyote Lake 963S	240	258.06	6.5	0.007+0.043j	6.3	0.007+0.049j
Coyote Lake 963S	138	148.76	6.6	0.010+0.075j	7.6	0.005+0.045j
Oakland 946S	240	257.07	11.5	0.004+0.024j	11.8	0.004+0.024j
Michichi Creek 802S	138	148.66	4.4	0.033+0.107j	3.1	0.120+0.227j
Michichi Creek 802S	69	72.55	3	0.067+0.309j	3.2	0.068+0.268j
Wintering Hills 804S	138	149.92	3.6	0.038+0.134j	3.6	0.033+0.131j
Bullpound 803S	138	149.49	3.5	0.034+0.140j	3.4	0.026+0.145j
Sheerness 807S	240	256.98	12.2	0.004+0.023j	13.7	0.002+0.017j
Anderson 801S	240	256.81	12.6	0.004+0.022j	14.4	0.002+0.015j
Anderson 801S	138	148.13	4.9	0.011+0.101j	5.3	0.004+0.078j
Wheatland 609S	138	149.68	3.3	0.040+0.145j	3.1	0.046+0.169j
Badlands 961S	138	150.47	3.4	0.039+0.141j	4.4	0.004+0.047j

7.2.2 Scenario 7: 2031 Winter Peak High Wind Post-Project

Post-Project short-circuit current levels for Scenario 7 are provided in Table 7-3.

Table 7-3: Post-Project Short-Circuit Current Levels for Scenario 7

Substation Name and Number	Base Voltage (kV)	Pre-Fault Voltage (kV)	3- Φ Fault (kA)	Positive Sequence Thevenin Source Impedance (R1+jX1) (pu)	1- Φ Fault (kA)	Zero Sequence Thevenin Source Impedance (R0+jX0) (pu)
Coyote Lake 963S	240	259.17	6.5	0.006+0.040j	6.2	0.007+0.048j
Coyote Lake 963S	138	149.27	6.5	0.009+0.071j	7.4	0.005+0.044j
Oakland 946S	240	258.52	12.3	0.003+0.021j	12.4	0.004+0.022j
Michichi Creek 802S	138	149.77	4.3	0.032+0.104j	3	0.120+0.227j
Michichi Creek 802S	69	72.74	2.9	0.066+0.306j	3	0.068+0.268j
Wintering Hills 804S	138	150.42	3.4	0.037+0.131j	3.4	0.033+0.131j
Bullpound 803S	138	150.37	3.3	0.034+0.137j	3.3	0.026+0.145j
Sheerness 807S	240	258.54	13.2	0.003+0.020j	14.7	0.002+0.015j
Anderson 801S	240	258.39	13.7	0.003+0.019j	15.7	0.001+0.013j
Anderson 801S	138	149.59	4.7	0.010+0.098j	5.1	0.004+0.076j

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Substation Name and Number	Base Voltage (kV)	Pre-Fault Voltage (kV)	3- Φ Fault (kA)	Positive Sequence Thevenin Source Impedance ($R1+jX1$) (pu)	1- Φ Fault (kA)	Zero Sequence Thevenin Source Impedance ($R0+jX0$) (pu)
Wheatland 609S	138	150.27	3.1	0.040+0.143j	3	0.046+0.169j
Badlands 961S	138	150.75	3.3	0.038+0.138j	4.2	0.004+0.047j

8 Mitigation Measure Development and Evaluation

The AESO developed mitigation measures to address the system performance issues that were identified in the post-Project scenarios. Existing remedial action schemes (RASs) are described in Section 1.2.2 of Attachment A1.

8.1 Pre-Project

Pre-Project mitigation measures are summarized in Table 8-1.

Table 8-1: Pre-Project Mitigation Measures

Mitigation Measure	Location of Observed Violation	Contingency
Real time operational practices	7L132 (Oyen 767S to Lanfine 959S)	959S901T (Lanfine)
Planned RAS 134 ^a	701L (North Holden 395S to Strome 223S)	766S901T (Nevis)
	701L/7L701 (Strome 223S to Heisler 764S)	766S901T (Nevis)
	701L (North Holden 395S to Strome 223S)	912L/9L912 (Nevis 766S to Red Deer 63S)
	701L/7L701 (Strome 223S to Heisler 764S)	912L/9L912 (Nevis 766S to Red Deer 63S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	912L/9L912 (Nevis 766S to Red Deer 63S)
Planned RAS 138 ^b	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	267ST1 (Killarney Lake)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	749L (Metiskow 648S to Edgerton 899S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	766S901T (Nevis)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	7L749/749L (Lloydminster 716S to Edgerton 899S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	899ST3 (Edgerton)
Planned RAS 134/138	701L (North Holden 395S to Strome 223S)	EATL (Newell 2075S to Heathfield 2029S)

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	701L/7L701 (Strome 223S to Heisler 764S)	EATL (Newell 2075S to Heathfield 2029S)
	704L (Wainwright 51S to Tucuman 478S)	EATL (Newell 2075S to Heathfield 2029S)
	749L-2 (Edgerton 899S to Killarney Lake 267S)	EATL (Newell 2075S to Heathfield 2029S)
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	EATL (Newell 2075S to Heathfield 2029S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	EATL (Newell 2075S to Heathfield 2029S)
	7L701-2 (Heisler 764S to Battle River 757S)	EATL (Newell 2075S to Heathfield 2029S)

Notes:

^a RAS 134 is an existing RAS (see Section 1.2.2 of Attachment A1). Modifications to RAS 134 are proposed for projects 1898 and 1909. This modified version of RAS 134 is referred to hereafter as “planned RAS 134”.

^b RAS 138 is an existing RAS (see Section 1.2.2 of Attachment A1). Modifications to RAS 138 are proposed for projects 1898 and 1909. This modified version of RAS 138 is referred to hereafter as “planned RAS 138”

8.2 Post-Project

Post-Project mitigation measures are summarized in Table 8-2.

Table 8-2: Post-Project Mitigation Measures

Mitigation Measure	Location of Observed Violation	Contingency
TCM Rule 302.1	7L171 (Michichi Creek 802S to Wintering Hills 804S)	None
Real time operational practices	749L-2 (Edgerton 899S to Killarney Lake 267S)	526ST1 or 526ST2 (Buffalo Creek)
	749L-2 (Edgerton 899S to Killarney Lake 267S)	7L129 (Buffalo Creek 526S to Vermilion 710S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	7L42 (Lloydminster 716S to Hill 751S)
	749L-2 (Edgerton 899S to Killarney Lake 267S)	7L50 (Buffalo Creek 526S to Battle River 757S)
	7L132 (Oyen 767S to Lanfine 959S)	959S901T (Lanfine)

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Planned RAS 138	7L129-1 (Buffalo Creek 526S to Bauer 918S)	267ST1 (Killarney Lake)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	267ST1 (Killarney Lake)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	395ST1 (North Holden)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	701L (Strome 223S to North Holden 395S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	701L/7L701 (North Holden 395S to Heisler 764S to Battle River 757S)
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	749L (Metiskow 648S to Edgerton 899S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	749L (Metiskow 648S to Edgerton 899S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	7L749/749L (Lloydminster 716S to Edgerton 899S)
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	899ST3 (Edgerton)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	899ST3 (Edgerton)
New 7L171 RAS	7L171 (Michichi Creek 802S to Wintering Hills 804S)	114ST1 (Ghost Pine)
	7L171 (Michichi Creek 802S to Wintering Hills 804S)	801S901T (Anderson)
	7L171 (Michichi Creek 802S to Wintering Hills 804S)	9L16 (Cordel 755S to Tinchebray 972S)
	7L171 (Michichi Creek 802S to Wintering Hills 804S)	9L59 (Anderson 801S to Tinchebray 972S)
New Anderson RAS	7L85-2A (P1718 Tap to Bullpond 803S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)
	7L85-3 (Bullpond 803S to Anderson 801S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)
	801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)

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Modified ^a planned RAS 134/Planned RAS 138	701L (North Holden 395S to Strome 223S)	766S901T (Nevis)
	701L/7L701 (Strome 223S to Heisler 764S)	766S901T (Nevis)
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	766S901T (Nevis)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	766S901T (Nevis)
	7L701-2 (Heisler 764S to Battle River 757S)	766S901T (Nevis)
	701L (North Holden 395S to Strome 223S)	912L/9L912 (Nevis 766S to Red Deer 63S)
	701L/7L701 (Strome 223S to Heisler 764S)	912L/9L912 (Nevis 766S to Red Deer 63S)
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	912L/9L912 (Nevis 766S to Red Deer 63S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	912L/9L912 (Nevis 766S to Red Deer 63S)
	7L701-2 (Heisler 764S to Battle River 757S)	912L/9L912 (Nevis 766S to Red Deer 63S)
Modified planned RAS 134/139, Planned RAS 138	701L (North Holden 395S to Strome 223S)	9L20 (Cordel 755S to Nevis 766S)
	701L/7L701 (Strome 223S to Heisler 764S)	9L20 (Cordel 755S to Nevis 766S)
	766S901T (Nevis)	9L20 (Cordel 755S to Nevis 766S)
	7L171 (Michichi Creek 802S to Wintering Hills 804S)	9L20 (Cordel 755S to Nevis 766S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	9L20 (Cordel 755S to Nevis 766S)
New 7L171 RAS, Modified planned RAS 134/139, Planned RAS 138	701L (North Holden 395S to Strome 223S)	EATL (Newell 2075S to Heathfield 2029S)
	701L/7L701 (Strome 223S to Heisler 764S)	EATL (Newell 2075S to Heathfield 2029S)

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	704L (Wainwright 51S to Tucuman 478S)	EATL (Newell 2075S to Heathfield 2029S)
	749L-2 (Edgerton 899S to Killarney Lake 267S)	EATL (Newell 2075S to Heathfield 2029S)
	7L129-1 (Buffalo Creek 526S to Bauer 918S)	EATL (Newell 2075S to Heathfield 2029S)
	7L129-2 (Vermilion 710S to Bauer 918S Tap)	EATL (Newell 2075S to Heathfield 2029S)
	7L159-1 (Ghost Pine 114S to Heatburg 948S)	EATL (Newell 2075S to Heathfield 2029S)
	7L171 (Michichi Creek 802S to Wintering Hills 804S)	EATL (Newell 2075S to Heathfield 2029S)
	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	EATL (Newell 2075S to Heathfield 2029S)
	7L701-2 (Heisler 764S to Battle River 757S)	EATL (Newell 2075S to Heathfield 2029S)
	9L16 (Cordel 755S to Tinchebray 972S)	EATL (Newell 2075S to Heathfield 2029S)

Notes:

^a “Modified” in the context of Table 5-2 refers to adding the Project to the logic of the given RAS.

8.3 Evaluation of Mitigation Measures

This section describes the results of the power flow studies that were performed to assess the impact of the Project on the performance of the AIES following the implementation of proposed mitigation measures.

The post-mitigation measures studies were performed under Category B conditions for scenarios 4, 5 and 6 using Alternative 2 and the RASs described in the previous section. For Scenario 4 and Scenario 5, Wintering Hills was dispatched down to remove the Category A violation on 7L171 prior to running these studies.

The post-mitigation power flow diagrams for selected Category B conditions are provided in Attachment A6. Post-mitigation power flow diagrams present only those post-Project contingencies that result in thermal criteria violations that require RAS mitigation. Post-Project contingencies that result in thermal criteria violations that can be mitigated by real-time operational practices or TFO capital maintenance projects were not studied.

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8.3.1 Scenario 4: 2022 Summer Light High Wind Post-Project

Category B Conditions

Thermal and voltage criteria violations observed under certain Category B conditions in the post-Project studies were mitigated by RASs as shown in Table 8-3.

Table 8-3: Post-RAS Power Flow Study Results for Scenario 4

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Seasonal Continuous Rating (MVA)	Short-term (Emergency) Rating (MVA)	Post-Project Results		Post-RAS Action Results	
				Power Flow (MVA)	% Loading	Power Flow (MVA)	% Loading
EATL (Newell 2075S to Heathfield 2029S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	126.35	108.49	107.33	56.21
EATL (Newell 2075S to Heathfield 2029S)	9L16 (Cordel 755S to Tinchebray 972S)	499.00	499.00	539.55	103.75	524.53	100.56
9L20 (Cordel 755S to Nevis 766S)	766S901T (Nevis)	100.00	100.00	100.76	100.76	44.59	44.59
9L20 (Cordel 755S to Nevis 766S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	119.12	102.07	52.67	45.16
9L16 (Cordel 755S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	124.75	107.04	63.17	54.37
801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	165.37	142.16	42.21	42.21
7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-2A (P1718 Tap to Bullpond 803S)	139.00	165.80	171.10	115.21	55.10	37.27
7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-3 (Bullpond 803S to Anderson 801S)	139.00	165.80	161.53	111.07	49.84	33.69
7L171 (Michichi Creek 802S to Wintering Hills 804S)	801S901T (Anderson)	125.00	125.00	163.64	130.92	46.58	37.26

8.3.2 Scenario 5: 2022 Summer Peak High Wind Post-Project

Category B Conditions

The thermal and voltage criteria violations observed under certain Category B conditions in the post-Project studies were mitigated by RASs as shown in Table 8-4.

After RAS actions were complete, real-time operational practices are required to fully alleviate certain thermal criteria violations observed on 138 kV transmission line 749L-2.

Table 8-4: Post-RAS Power Flow Study Results for Scenario 5

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Seasonal Continuous Rating (MVA)	Short-term (Emergency) Rating (MVA)	Post-Project Results		Post-RAS Action Results	
				Power Flow (MVA)	% Loading	Power Flow (MVA)	% Loading
EATL (Newell 2075S to Heathfield 2029S)	701L (North Holden 395S to Strome 223S)	119.00	131.00	143.00	122.58	98.46	81.36
EATL (Newell 2075S to Heathfield 2029S)	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	164.76	127.64	117.34	88.70
EATL (Newell 2075S to Heathfield 2029S)	704L (Wainwright 51S to Tucuman 478S)	75.00	83.00	82.46	107.19	28.06	36.90
EATL (Newell 2075S to Heathfield 2029S)	749L-2 (Edgerton 899S to Killarney Lake 267S)	96.00	134.00	107.61	108.97	102.74	103.27 ^a
EATL (Newell 2075S to Heathfield 2029S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	133.74	112.55	101.60	82.05
EATL (Newell 2075S to Heathfield 2029S)	7L129-2 (Vermilion 710S to Bauer 918S Tap)	120.00	132.00	122.59	102.54	90.07	72.62
EATL (Newell 2075S to Heathfield 2029S)	7L159-1 (Ghost Pine 114S to Heatburg 948S)	107.33	118.83	116.37	103.26	98.68	86.03
EATL (Newell 2075S to Heathfield 2029S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	126.19	108.44	65.14	56.12
EATL (Newell 2075S to Heathfield 2029S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	136.71	125.91	103.80	92.13
EATL (Newell 2075S to Heathfield 2029S)	7L701-2 (Heisler 764S to Battle River 757S)	141.80	159.10	160.71	109.28	114.36	76.66
EATL (Newell 2075S to Heathfield 2029S)	9L16 (Cordel 755S to Tinchebray 972S)	499.00	499.00	536.16	103.54	373.13	71.36
9L20 (Cordel 755S to Nevis 766S)	701L (North Holden 395S to Strome 223S)	119.00	131.00	120.77	100.07	72.94	58.73
9L20 (Cordel 755S to Nevis 766S)	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	141.00	106.29	90.51	67.11
9L20 (Cordel 755S to Nevis 766S)	766S901T (Nevis)	100.00	100.00	110.25	110.25	78.29	62.22

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9L20 (Cordel 755S to Nevis 766S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	121.56	104.23	62.22	48.65
9L20 (Cordel 755S to Nevis 766S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	117.29	105.19	56.81	68.56
9L16 (Cordel 755S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	124.81	107.05	63.87	54.87
912L/9L912 (Nevis 766S to Red Deer 63S)	701L (North Holden 395S to Strome 223S)	119.00	131.00	135.88	113.65	78.90	63.46
912L/9L912 (Nevis 766S to Red Deer 63S)	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	157.29	119.12	96.42	71.43
912L/9L912 (Nevis 766S to Red Deer 63S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	123.39	102.07	84.35	66.33
912L/9L912 (Nevis 766S to Red Deer 63S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	125.76	113.71	86.98	75.18
912L/9L912 (Nevis 766S to Red Deer 63S)	7L701-2 (Heisler 764S to Battle River 757S)	141.80	159.10	150.60	100.41	93.67	61.79
899ST3 (Edgerton)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	124.90	101.97	99.01	78.15
899ST3 (Edgerton)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	126.96	113.87	101.51	88.21
801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	107.33	121.71	170.98	147.02	55.78	47.91
7L749/749L (Lloydminster 716S to Edgerton 899S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	125.01	111.71	99.91	86.43
7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-2A (P1718 Tap to Bullpond 803S)	139.00	165.80	179.45	121.19	63.34	43.03
7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-3 (Bullpond 803S to Anderson 801S)	139	165.80	166.70	115.24	55.77	37.90
7L171 (Michichi Creek 802S to Wintering Hills 804S)	801S901T (Anderson)	125.00	125.00	168.94	135.16	52.27	41.82
766S901T (Nevis)	701L (North Holden 395S to Strome 223S)	119.00	131.00	135.62	113.59	78.90	63.45
766S901T (Nevis)	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	156.93	119.06	96.42	71.42
766S901T (Nevis)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	123.19	101.99	84.31	66.28
766S901T (Nevis)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	125.55	113.61	86.94	75.12
766S901T (Nevis)	7L701-2 (Heisler 764S to Battle River 757S)	141.80	159.10	149.85	100.06	93.01	61.33
749L (Metiskow 648S to Edgerton 899S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	126.68	104.15	100.65	80.07

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749L (Metiskow 648S to Edgerton 899S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	128.83	116.14	103.07	90.15
701L/7L701 (North Holden 395S to Heisler 764S to Battle River 757S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	117.75	105.46	93.83	81.97
395ST1 (North Holden)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	117.09	104.19	95.26	82.43
267ST1 (Killarney Lake)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	120.00	132.00	127.51	104.96	101.23	80.60
267ST1 (Killarney Lake)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	109.25	116.92	129.67	117.01	103.65	90.72

Notes:

^a The remaining overload on this transmission line can be mitigated through the use of real time operational practices

8.3.3 Scenario 6: 2022 Winter Peak High Wind Post-Project

Category B Conditions

The thermal and voltage criteria violations observed under certain Category B conditions in the post-Project studies were mitigated by RASs as shown in Table 8-5.

Table 8-5: Post-RAS Power Flow Study Results for Scenario 6

Contingency (System Element Lost)	Details of Violation (Violation Observed On)	Seasonal Continuous Rating (MVA)	Short-term (Emergency) Rating (MVA)	Post-Project Results		Post-RAS Action Results	
				Power Flow (MVA)	% Loading	Power Flow (MVA)	% Loading
EATL (Newell 2075S to Heathfield 2029S)	701L/7L701 (Strome 223S to Heisler 764S)	127.46	127.46	136.13	104.23	89.20	66.68
EATL (Newell 2075S to Heathfield 2029S)	9L16 (Cordel 755S to Tinchebray 972S)	499.00	499.00	520.97	100.17	348.78	66.25

8.4 Constraint Effective Factor Studies

Constraint effective factor studies were conducted for all post-Project scenarios. The constraint effective factors were calculated for all Category B conditions when the loadings of the monitored transmission elements in the Study Area exceeded 100% (i.e., for all of the contingencies that resulted in thermal criteria violations). The results of the constraint effective factor studies are provided in Attachment A5.

9 Interpretation of Results

9.1 Results Overview

This section provides an assessment of the impact of the Project on the performance of the AIES. The Reliability Criteria violations observed during the connection assessment studies, and the proposed mitigation measures are summarized in Table 9-1.

- Section 8.2 includes an overview of the pre-Project studies results.
- Section 8.3 includes an overview of the post-Project studies results.
- Section 8.4 includes a description of the proposed mitigation measures to address observed Reliability Criteria violations.
- Section 8.5 includes an overview of the post-mitigation studies results.

Detailed study results are provided in Attachment A.

Table 9-1: Summary of Reliability Criteria Violations, Project Impact and Mitigation Measures

Scenario	Type of Reliability Criteria Violation		Contingency (System Element Lost)	Details of Violation	Project Impact	Pre-Project Mitigation Measures	Post-Project Mitigation Measures
	Pre-Project	Post-Project					
Scn #4 SL Post-Project	None	Thermal - above normal rating	None	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	TCM Rule 302.1
Scn #4 SL Post-Project	None	Thermal - above normal rating	114ST1 (Ghost Pine)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #4 SL Post-Project	None	Thermal - above normal rating	7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-2A (P1718 Tap to Bullpond 803S)	New violation	None	New Anderson RAS
Scn #4 SL Post-Project	None	Thermal - above normal rating	7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-3 (Bullpond 803S to Anderson 801S)	New violation	None	New Anderson RAS
Scn #4 SL Post-Project	None	Thermal - above emergency rating	7L171 (Michichi Creek 802S to Wintering Hills 804S)	801S901T (Anderson)	New violation	None	New Anderson RAS
Scn #4 SL Post-Project	None	Thermal - above emergency rating	801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #4 SL Post-Project	Thermal - above normal rating	Thermal - above normal rating	959S901T (Lanfine)	7L132 (Oyen 767S to Lanfine 959S)	Marginally increased violation	Real time operational practices	Real time operational practices
Scn #4 SL Post-Project	None	Thermal - above normal rating	9L16 (Cordel 755S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #4 SL Post-Project	None	Thermal - above emergency rating	9L20 (Cordel 755S to Nevis 766S)	766S901T (Nevis)	New violation	None	Planned modified RAS 139 and new 7L171 RAS
Scn #4 SL Post-Project	None	Thermal - above normal rating	9L20 (Cordel 755S to Nevis 766S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	Planned modified RAS 139 and new 7L171 RAS
Scn #4 SL Post-Project	None	Thermal - above normal rating	9L59 (Anderson 801S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #4 SL Post-Project	None	Thermal - above normal rating	EATL (Newell 2075S to Heathfield 2029S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #4 SL Post-Project	None	Thermal - above emergency rating	EATL (Newell 2075S to Heathfield 2029S)	9L16 (Cordel 755S to Tinchebray 972S)	New violation	None	New 7L171 RAS
Scn #5 SP Post-Project	None	Thermal - above normal rating	None	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	TCM Rule 302.1
Scn #5 SP Post-Project	None	Thermal - above normal rating	114ST1 (Ghost Pine)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #5 SP Post-Project	None	Thermal - above normal rating	267ST1 (Killarney Lake)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	New violation	None	Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above emergency rating	267ST1 (Killarney Lake)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	Materially increased violation	Planned RAS 138	Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	395ST1 (North Holden)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	New violation	None	Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	526ST1 or 526ST2 (Buffalo Creek)	749L-2 (Edgerton 899S to Killarney Lake 267S)	New violation	None	RTOP
Scn #5 SP Post-Project	None	Thermal - above normal rating	701L (Strome 223S to North Holden 395S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	New violation	None	Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	701L/7L701 (North Holden 395S to Heisler 764S to Battle River 757S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	New violation	None	Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	749L (Metiskow 648S to Edgerton 899S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	New violation	None	Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above emergency rating	749L (Metiskow 648S to Edgerton 899S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	Materially increased violation	Planned RAS 138	Planned RAS 138

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Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above emergency rating	766S901T (Nevis)	701L (North Holden 395S to Strome 223S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above emergency rating	766S901T (Nevis)	701L/7L701 (Strome 223S to Heisler 764S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	766S901T (Nevis)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	New violation	None	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above emergency rating	Thermal - above emergency rating	766S901T (Nevis)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	Materially increased violation	Planned RAS 134 and Planned RAS 138	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	766S901T (Nevis)	7L701-2 (Heisler 764S to Battle River 757S)	New violation	None	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	7L129 (Buffalo Creek 526S to Vermilion 710S)	749L-2 (Edgerton 899S to Killarney Lake 267S)	New violation	None	RTOP
Scn #5 SP Post-Project	None	Thermal - above emergency rating	7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-2A (P1718 Tap to Bullpond 803S)	New violation	None	New Anderson RAS
Scn #5 SP Post-Project	None	Thermal - above normal rating	7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-3 (Bullpond 803S to Anderson 801S)	New violation	None	New Anderson RAS
Scn #5 SP Post-Project	None	Thermal - above emergency rating	7L171 (Michichi Creek 802S to Wintering Hills 804S)	801S901T (Anderson)	New violation	None	New Anderson RAS
Scn #5 SP Post-Project	None	Thermal - above normal rating	7L42 (Lloydminster 716S to Hill 751S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	New violation	None	RTOP
Scn #5 SP Post-Project	None	Thermal - above normal rating	7L50 (Buffalo Creek 526S to Battle River 757S)	749L-2 (Edgerton 899S to Killarney Lake 267S)	New violation	None	RTOP
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above emergency rating	7L749/749L (Lloydminster 716S to Edgerton 899S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	Materially increased violation	Planned RAS 138	Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above emergency rating	801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #5 SP Post-Project	None	Thermal - above normal rating	899ST3 (Edgerton)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	New violation	None	Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above emergency rating	899ST3 (Edgerton)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	Materially increased violation	Planned RAS 138	Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above emergency rating	912L/9L912 (Nevis 766S to Red Deer 63S)	701L (North Holden 395S to Strome 223S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above emergency rating	912L/9L912 (Nevis 766S to Red Deer 63S)	701L/7L701 (Strome 223S to Heisler 764S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	912L/9L912 (Nevis 766S to Red Deer 63S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	New violation	None	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above emergency rating	Thermal - above emergency rating	912L/9L912 (Nevis 766S to Red Deer 63S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	Materially increased violation	Planned RAS 134 and Planned RAS 138	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	912L/9L912 (Nevis 766S to Red Deer 63S)	7L701-2 (Heisler 764S to Battle River 757S)	New violation	None	Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	9L16 (Cordel 755S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #5 SP Post-Project	None	Thermal - above normal rating	9L20 (Cordel 755S to Nevis 766S)	701L (North Holden 395S to Strome 223S)	New violation	None	Planned modified RAS 134, Planned RAS 138 and Planned modified RAS 139
Scn #5 SP Post-Project	None	Thermal - above normal rating	9L20 (Cordel 755S to Nevis 766S)	701L/7L701 (Strome 223S to Heisler 764S)	New violation	None	Planned modified RAS 134, Planned RAS 138 and Planned modified RAS 139
Scn #5 SP Post-Project	None	Thermal - above emergency rating	9L20 (Cordel 755S to Nevis 766S)	766S901T (Nevis)	New violation	None	Planned modified RAS 134, Planned RAS 138 and Planned modified RAS 139

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Scn #5 SP Post-Project	None	Thermal - above normal rating	9L20 (Cordel 755S to Nevis 766S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	Planned modified RAS 134, Planned RAS 138 and Planned modified RAS 139
Scn #5 SP Post-Project	None	Thermal - above normal rating	9L20 (Cordel 755S to Nevis 766S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	New violation	None	Planned modified RAS 134, Planned RAS 138 and Planned modified RAS 139
Scn #5 SP Post-Project	None	Thermal - above normal rating	9L59 (Anderson 801S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #5 SP Post-Project	Thermal - above emergency rating	Thermal - above emergency rating	EATL (Newell 2075S to Heathfield 2029S)	701L (North Holden 395S to Strome 223S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above emergency rating	Thermal - above emergency rating	EATL (Newell 2075S to Heathfield 2029S)	701L/7L701 (Strome 223S to Heisler 764S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above normal rating	EATL (Newell 2075S to Heathfield 2029S)	704L (Wainwright 51S to Tucuman 478S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above normal rating	EATL (Newell 2075S to Heathfield 2029S)	749L-2 (Edgerton 899S to Killarney Lake 267S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above emergency rating	EATL (Newell 2075S to Heathfield 2029S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	EATL (Newell 2075S to Heathfield 2029S)	7L129-2 (Vermilion 710S to Bauer 918S Tap)	New violation	None	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	EATL (Newell 2075S to Heathfield 2029S)	7L159-1 (Ghost Pine 114S to Heatburg 948S)	New violation	None	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above normal rating	EATL (Newell 2075S to Heathfield 2029S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above emergency rating	Thermal - above emergency rating	EATL (Newell 2075S to Heathfield 2029S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	Materially increased violation	Planned RAS 134 and Planned RAS 138	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	Thermal - above normal rating	Thermal - above normal rating	EATL (Newell 2075S to Heathfield 2029S)	7L701-2 (Heisler 764S to Battle River 757S)	Materially increased violation	Planned RAS 134 and Planned RAS 138	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #5 SP Post-Project	None	Thermal - above emergency rating	EATL (Newell 2075S to Heathfield 2029S)	9L16 (Cordel 755S to Tinchebray 972S)	New violation	None	New 7L171 RAS, Planned modified RAS 134 and Planned RAS 138
Scn #6 WP Post-Project	None	Thermal - above emergency rating	7L171 (Michichi Creek 802S to Wintering Hills 804S)	801S901T (Anderson)	New violation	None	New Anderson RAS
Scn #6 WP Post-Project	None	Thermal - above emergency rating	801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	New violation	None	New 7L171 RAS
Scn #6 WP Post-Project	None	Thermal - above normal rating	EATL (Newell 2075S to Heathfield 2029S)	701L/7L701 (Strome 223S to Heisler 764S)	New violation	None	Planned modified RAS 134
Scn #6 WP Post-Project	None	Thermal - above emergency rating	EATL (Newell 2075S to Heathfield 2029S)	9L16 (Cordel 755S to Tinchebray 972S)	New violation	None	Planned modified RAS 134

Notes:

- Marginally increased (or marginally decreased) refers to a percent loading difference (post-Project percent loading minus pre-Project percent loading) between 0% and 3% (or -3%).
- Materially increased (or materially decreased) refers to a percent loading difference (post-Project percent loading minus pre-Project percent loading) above or equal to 3% (or below or equal to -3%).

9.2 Pre-Project Study Results

9.2.1 Category A Conditions

No Reliability Criteria violations were observed under the Category A conditions (i.e., all elements in service) for any of the pre-Project scenarios.

The short-circuit fault levels were found to be within the typical capabilities of the nearby facilities.

9.2.2 Category B Conditions

The pre-Project power flow studies identified a number of thermal violations under Category B conditions (i.e., loss of a single system element).

9.3 Post-Project Study Results

9.3.1 Category A Conditions

A Reliability Criteria violation was observed under Category A conditions for some post-Project scenarios. The probability of Category A thermal criteria violations materializing is highly dependent upon the production profile of the Facility and other generating facilities in the area. The connection assessment uses credible worst-case conditions to assess the impact of the Facility connection on the Alberta interconnected electric system.

Post-Project short-circuit fault levels were not significantly higher than pre-Project levels. The long-term short circuit levels were found to be within the designed capabilities of the nearby facilities.

9.3.2 Category B Conditions

Post-Project power flow studies identified a number of system performance issues under Category B conditions, namely: thermal criteria violations, both above the normal rating and the emergency rating.

Results did not indicate any transient stability concerns, and the system showed acceptable dynamic response to all Category B conditions studied.

9.4 Mitigation Measures

This section discusses the AESO's proposed mitigation measures to address the system performance issues that were identified in the pre-Project and post-Project scenarios. As part of this Project, mitigation measures will not be specifically developed for the POD bus voltage deviations observed under certain Category B conditions during pre-Project and post-Project scenarios.

9.4.1 Pre-Project

Prior to connection of the Project, some of the observed Category B thermal criteria violations can be managed by using real-time operational practices. The remaining thermal criteria violations can be mitigated by the following RAS:

- planned RAS 134 (referred to as "planned RAS 134"). This RAS monitors the flow on the 138 kV transmission lines 174L and 701L;

- planned RAS 138 (referred to as “planned RAS 138”). This RAS monitors the flow on the 144 kV transmission line 7L50; and
- planned RAS 139 (referred to as “planned RAS 139”). This RAS monitors the flow on Nevis 766S transformer 901T.

The modifications to the planned RAS 134, RAS 138, and RAS 139, were proposed for the approved Garden Plain Wind Power Project Connection NID⁵ and the approved Pattern Lanfine North Wind Power Project Connection.⁶

In these studies, the above planned RASs sequentially trip generation from Garden Plain Wind Farm project, Pattern Lanfine North Wind Power project and Halkirk Wind Farm until the thermal violation is mitigated.

9.4.2 Post-Project

The Wintering Hills (SCR4) Facility was dispatched down on the 2022 SL and 2022 SP to remove the observed thermal overload on the 144 kV transmission line 7L171 under Category A conditions.

After the connection of the Project, some of the thermal criteria violations observed can be mitigated by using real-time operational practices. Some of the remaining thermal criteria violations can be mitigated by:

- modification to planned RAS 134, by including the Project in the RAS logic (referred to as “modified RAS 134”);
- modification to planned RAS 139, by including the Project in the RAS logic (referred to as “modified RAS 139”);
- planned RAS 138; and

The thermal criteria violations observed on the 144 kV transmission line 7L171 can be mitigated by a new RAS, referred to as the “new 7L171 RAS”. The thermal criteria violations observed on the 240/144 kV transformer at Anderson 801S substation and on the 144 kV transmission line 7L85 can be mitigated by a new RAS, referred to as the “new Anderson 801S RAS”.

With the proposed logic, modified RAS 134 and modified RAS 139 have approximately 520 MW of generation tied to them. With the addition of the Project, the total amount of generation tied to RAS 134 and 139 exceeds the Most Severe Single Contingency (MSSC) limit of 466 MW. The post-Project studies indicate that in order to mitigate the thermal violations following EATL contingency, the combined actions of RAS 134 and 139 may result in generation curtailment in excess of the MSSC limit. Pre-contingency generation curtailment under normal conditions may be required using real-time operational practices to prevent generation curtailment by RAS action above the MSSC level. The probability of pre-curtailment being required would be dependent on generation profiles and operating conditions.

9.4.3 Post-Project Mitigation Study Results

As described above, in the post-Project studies all thermal criteria violations observed under Category B conditions can be mitigated by the new 7L171 RAS, the new Anderson 801S RAS, the modified RAS 134, the modified RAS 139, the planned RAS 138, and real-time operational practices, alone or in combination.

⁵ Approved in Decision 26439-D01-2021 on July 9, 2021

⁶ Approved in Decision 26832-D01-2021 on December 14, 2021

To mitigate the observed thermal criteria violations following the contingency of the 500 kV DC Eastern Alberta Transmission Line (EATL) under certain system conditions, curtailment above the current MSSC level may be required. This may require pre-contingency generation curtailment under normal conditions. Under Category B conditions, most of the observed Reliability Criteria violations requiring RAS were mitigated. The remaining Reliability Criteria violations observed were mitigated by a combination of RAS and real-time operational practices.

10 Project Dependencies

The Project does not require the completion of any other AESO plans to expand or enhance the transmission system prior to connection

11 Conclusions and Recommendations

Based on the study results, Alternative 2 is technically viable. The connection assessment identified a number of pre-Project and post-Project system performance issues.

The connection assessment uses credible worst-case conditions to assess the impact of the Facility connection on the Alberta interconnected electric system. Category A thermal criteria violations were observed under these credible worst-case load and generation forecast conditions. The probability of Category A thermal criteria violations materializing is highly dependent upon the production profile of the Facility and other generation facilities in the area. Closer to the ISD, if the AESO determines that congestion will arise under Category A conditions, the AESO will make an application to the AUC to obtain approval for an “exception” under Section 15(2) of the *Transmission Regulation*.

The identified issues can be mitigated through the use of modified planned RAS 134, planned RAS 138, modified planned RAS 139, the new 7L171 RAS, the new Anderson 801S RAS, and real-time operational practices.

With implementation of these mitigation measures, connecting the project with the preferred alternative does not adversely affect the performance of the AIES.

The AESO recommends proceeding with the Project using Alternative 2 as the preferred alternative to respond to the Market Participant’s request for system access service. Real-time operational practices and the RASs mentioned above, alone or in combination, are recommended to mitigate the identified system performance issues. Alternative 2 involves adding a 144 kV circuit, approximately 200 m in length, to connect the Facility to the 144 kV transmission line 7L85 (between the Wintering Hills 804S substation and the Bullpound 803S tap point) using a T-tap connection configuration. The normal rating of the new 144 kV circuit shall be no less than the normal rating of the existing 144 kV transmission line 7L85. This will meet the Market Participant’s total requested Rate STS contract capacity of 120 MW.

Attachment A1

Engineering Connection Assessment: Study Scope



Engineering Connection Assessment: Study Scope

P1718 Wheatland Wind Project Connection

Wheatland Wind Project L.P.

Date: February 15, 2022

Version: V4 FINAL

Classification: Public

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Attachment A: Transmission Planning Criteria – Basis and Assumptions

1 Introduction

This Study Scope provides an overview of the engineering studies to be completed by AESO to assess the impact of the Project (as defined in section 1.1) on the performance of the Alberta interconnected electric system (AIES). Technical criteria, assumptions and methods for performing these engineering studies are provided in this document.

1.1 Project Overview

Wheatland Wind Project L.P., by its General Partner Wheatland Wind Project Ltd. (the Market Participant) has submitted a request for system access service to the Alberta Electric System Operator (AESO) to connect its approved Wheatland Wind Project (the Facility) to the AIES. The Facility includes an approved collector substation, to be designated the Badlands 981S substation.

The Market Participant’s request includes: a request for a new system access service in the AESO planning area of Sheerness (Area 43), with a Rate STS, *Supply Transmission Service*, contract capacity of 120 MW and a Rate DTS, *Demand Transmission Service*, contract capacity of 1 MW; and a request for transmission development (collectively, the Project).

The Project in-service date (ISD) used for the purpose of the studies is June 30, 2022.

Load and generation components of the Project are listed in Table 1-1.

Table 1-1: Project Load and Generation Details

Project Component		Description
Load	Existing Rate DTS, <i>Demand Transmission Service</i> , contract capacity	No existing contract
	Requested Rate DTS	1 MW
	Type	industrial
	Motors (number and size)	Not applicable
	Power factor	0.9
	Future load expansion plans	No
Generation	Generation type	Wind
	Existing Rate STS, <i>Supply Transmission Service</i> , contract capacity	No existing contract
	Requested Rate STS	120 MW
	Number and size of generating units	24 wind turbines (6 x 5.0 MW, 18 x 5.2 MW)
	Maximum authorized real power (MARP)	120 MW
	Maximum capability (MC)	120 MW
	Reactive power capability	58.1 MVar (0.9 pf lagging)
		39.4 MVar (0.95 pf leading)

Project Component		Description
	Future generation expansion plans	No

Note:

MARP and MC are defined in the AESO's *Consolidated Authoritative Document Glossary*, which can be found on the AESO's website.

1.2 Existing System Overview

1.2.1 Study Area

Geographically, the Project is located in the AESO planning area of Sheerness (Area 43).

Although Sheerness (Area 43) is part of the South Planning Region, generation in Sheerness (Area 43) has a direct impact on existing constraints in Central East Sub-region¹. These constraints are managed in accordance with the procedures set out in Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (TCM Rule).

The Study Area consists of the AESO planning areas of Sheerness (Area 43), Hanna (Area 42), Wainwright (Area 32), Alliance/Battle River (Area 36), Provost (Area 37), Lloydminster (Area 13), and Vegreville (Area 56), including the tie lines connecting these planning areas to the rest of the AIES.

The existing transmission system in the Study Area is shown in Figure 1-1.

1.2.2 Existing Constraints

Existing constraints in the Study Area are managed in accordance with the procedures set out in Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (TCM Rule).

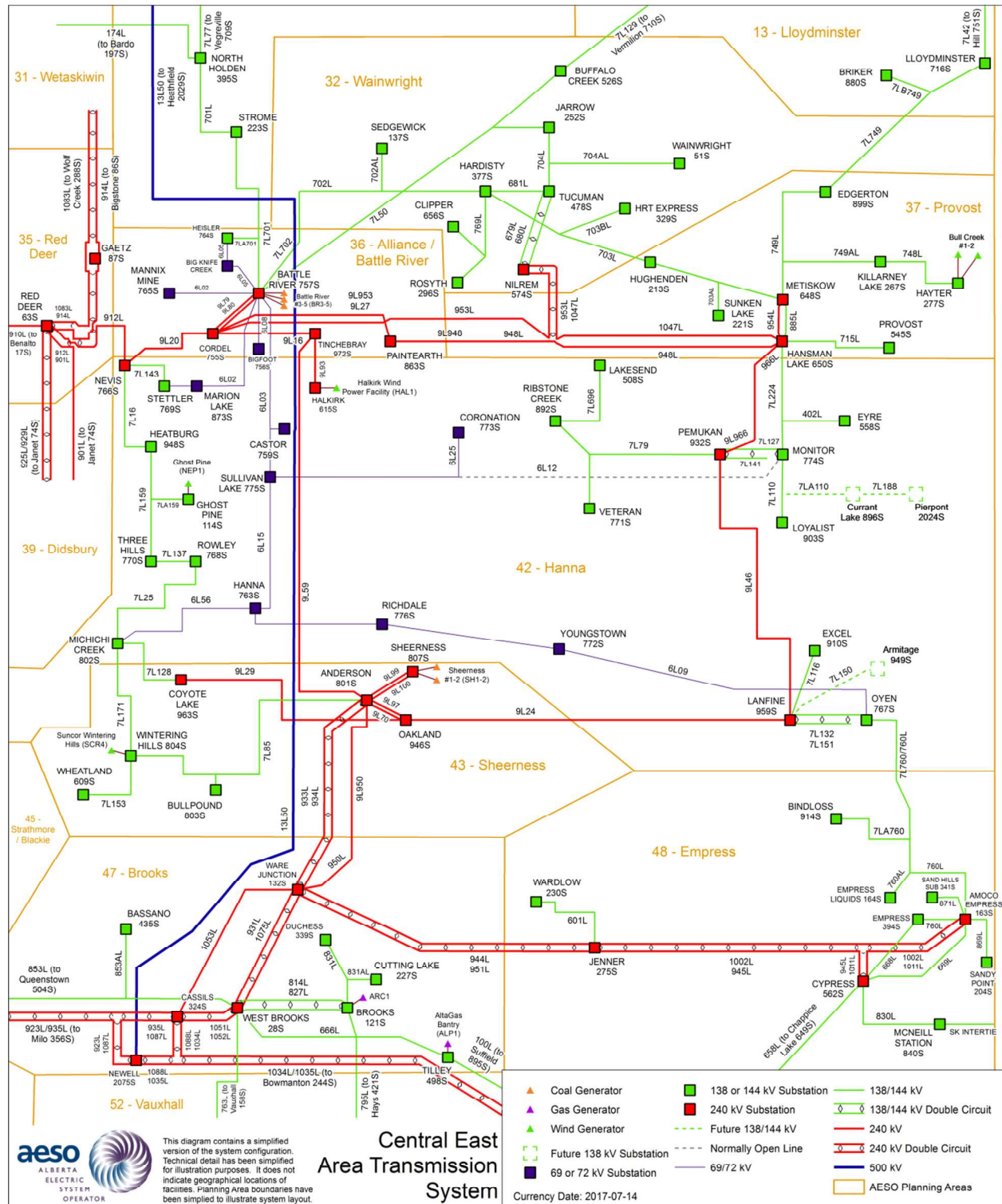
There are a number of constraints in the Study Area that are mitigated by existing remedial action schemes (RASs) and/or other protection schemes.

The following existing RASs and/or other protection schemes are used to manage constraints in the area:

- RAS 20: Anderson 801s 240 kV Line 9L933, 9L934 and 9L950 Thermal Protection Scheme to Sheerness Plant
- RAS 134: 174L-395S North Holden overload mitigation scheme
- RAS 138: 7L50 -526S Buffalo Creek Overload Mitigation Scheme
- RAS 139: 901T-766S Nevis Overload Mitigation Scheme
- RAS 151: 223S Strome Low Voltage Mitigation
- RAS 159: 936S Norberg Under Voltage Mitigation

¹ The Central East Sub-region comprises the following AESO planning areas: Lloydminster (Area 13), Wainwright (Area 32), Alliance/Battle River (Area 36), Provost (Area 37), Hanna (Area 42), and Vegreville (Area 56).

Figure 1-1: Transmission System in the Study Area



2 Connection Alternative(s) to be Studied

The following alternative will be studied:

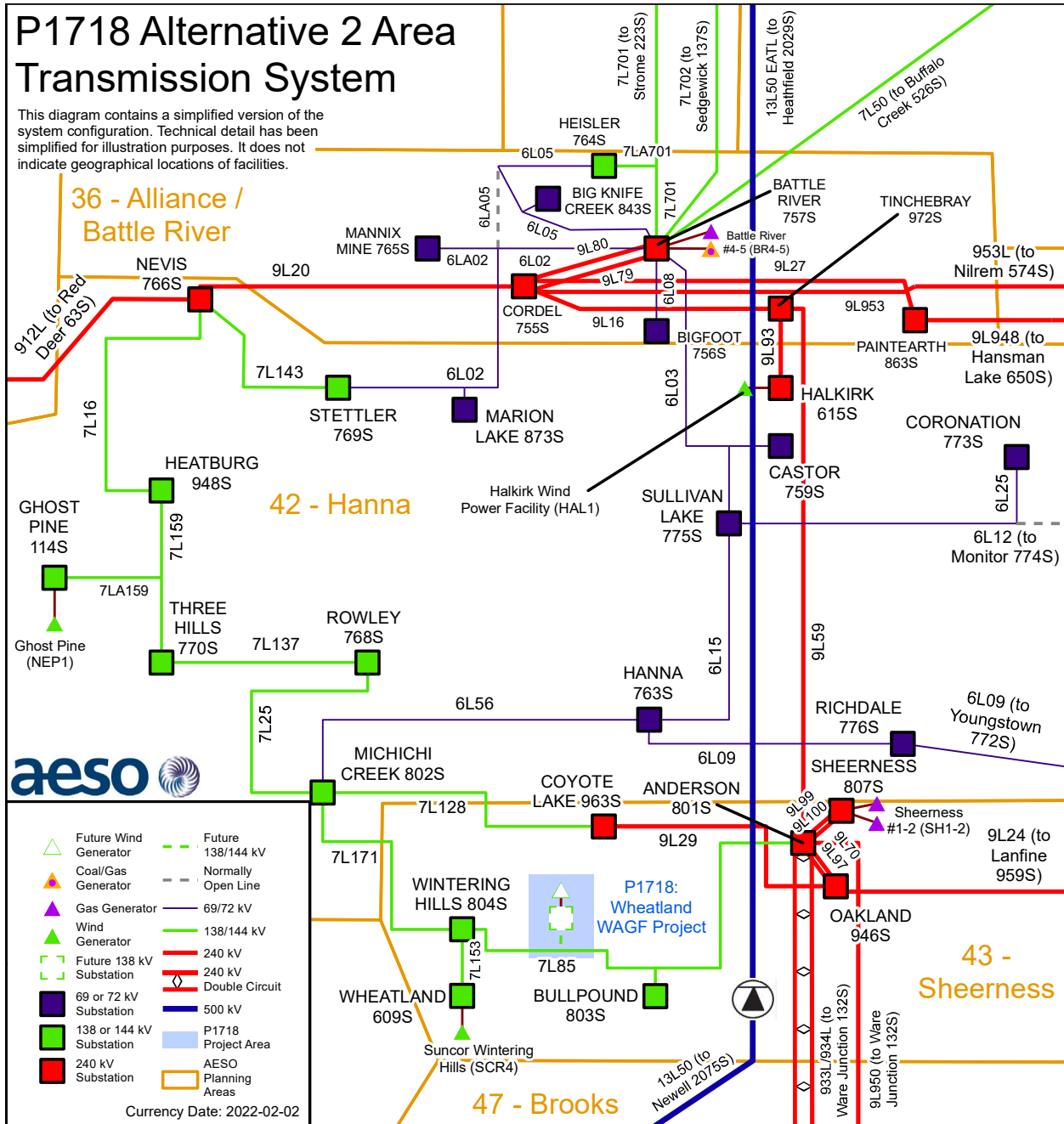
2.1 Alternative 2 – T-tap connection to the 144 kV transmission line 7L85

This alternative includes the following developments:

- Add a 144 kV circuit to connect the Facility to the existing 144 kV transmission line 7L85 (Wintering Hills 804S – 7LA85 tap point) using a T-tap connection configuration.
- Add or modify associated equipment as required for the above developments. Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 2-1.

Figure 2-1: Connection Alternative 2



3 Criteria, Standards and Requirements

3.1 AESO Reliability Criteria

The Transmission Planning (TPL) Standards, which are included in the Alberta Reliability Standards, and *Transmission Planning Criteria – Basis and Assumptions* (see Attachment A), (collectively, the Reliability Criteria) will be applied to evaluate system performance under Category A system conditions (i.e., all elements in-service) and following Category B contingencies (i.e., single element outage), prior to and following the studied alternatives. Below is a summary of Category A and Category B system conditions.

Category A, often referred to as the N-0 condition, represents a normal system with no contingencies and all facilities in service. Under this condition, the system must be able to supply all firm load and firm transfers to other areas. All equipment must operate within its applicable rating, voltages must be within their applicable range, and the system must be stable with no cascading outages.

Category B events, often referred to as an N-1 or N-G-1 with the most critical generator out of service, result in the loss of any single specified system element under specified fault conditions with normal clearing. These elements are a generator, a transmission circuit, a transformer, or a single pole of a DC transmission line. The acceptable impact on the system is the same as Category A. Planned or controlled interruptions of electric supply to radial customers or some local network customers, connected to or supplied by the faulted element or by the affected area, may occur in certain areas without impacting the overall reliability of the interconnected transmission systems. To prepare for the next contingency, system adjustments are permitted, including curtailments of contracted firm (non-recallable reserved) transmission service electric power transfers.

The TPL standards, TPL-001-AB-0 and TPL-002-AB1-0, have referenced Applicable Ratings when specifying the required system performance under Category A and Category B events. For the purpose of applying the TPL standards to the studies documented in this report, Applicable Ratings are defined as follows:

- Normal thermal rating of the line's loading limits for each season;
- The highest specified loading limits for transformers;
- For Category A conditions: Voltage range under normal operating condition per AESO Information Document #2010-007RS, *General Operating Practices – Voltage Control* (ID #2010-007RS). For the busses not listed in ID #2010-007RS, Table 2-1 in the *Transmission Planning Criteria – Basis and Assumptions* applies;
- For Category B conditions: The extreme voltage range values per Table 2-1 in the *Transmission Planning Criteria – Basis and Assumptions*; and
- Desired post-contingency voltage deviation limits for three defined post-event timeframes as provided in Table 3-1.

Table 3-1: Post-Contingency Voltage Deviation Guidelines for Low Voltage Busses

Parameter and reference point	Time Period		
	Post Transient (up to 30 sec)	Post Auto Control (30 sec to 5 min)	Post Manual Control (Steady State)
Voltage deviation from steady state at point of delivery (POD) low voltage bus.	±10%	±7%	±5%

3.2 ISO Rules and Information Documents

ID #2010-007RS will be used to establish system normal (i.e., pre-contingency) voltage profiles for the Study Area.

The TCM Rule will be followed to set up the study scenarios and assess the impact of the Project. In addition, due regard will be given to the following:

- The AESO’s *Connection Study Requirements*;
- Section 502.1 of the ISO rules, *Aggregated Generating Facilities Technical Requirements*;
- Section 502.16 of the ISO rules, *Aggregated Generating Facilities Operating Requirements*;

4 Scenarios and Assumptions

4.1 Scenarios

The following section describes the scenarios to be studied and the assumptions to be used in the studies. Connection scenarios must be studied as outlined in Table 4-1.

Table 4-1: Connection Study Scenarios

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Project Generation (MW)
Pre-Project				
1	2022 Summer Light (SL)	High Wind	2022 SL Pre-Project	0
2	2022 Summer Peak (SP)		2022 SP Pre-Project	0
3	2022 Winter Peak (WP)		2022 WP Pre-Project	0
Post-Project				
4	2022 SL	High Wind	2022 SL Post-Project	120
5	2022 SP		2022 SP Post-Project	120
6	2022 WP		2022 WP Post-Project	120
7	2031 WP	All Study Area generation online	2031 WP Post-Project	120

4.2 Assumptions

4.2.1 System Project Assumptions

The pre-Project and post-Project connection assessment will not include any system transmission projects because there are no planned system transmission developments in the Study Area that are expected to be in service before the scheduled Project ISD. Connection Project Assumptions

4.2.2 Connection Project Assumptions

Table 4-2 summarizes the connection projects in the Study Area that should be included in the studies.

Table 4-2: Planned Connection Projects Included in the Studies

AESO Project No.	AESO Project Name	AESO Planning Area No.	Generation (MW)	Load (MW)	Scheduled ISD	AUC NID Decision No.
1250*	Enel Grizzly Bear Wind	13	120	2	Oct 1, 2022	27021-DD01-2021
1567*	EDPR Sharp Hills Wind Farm	42	300	1	Apr 15, 2022	27023-D01-2021
1704*	Paintearth Wind Power	42	150	1	Apr 1, 2023	23206-D01-2021
1898	Pattern Lanfine North Wind	42	145	2	Sep 30, 2022	26832-D01-2021

AESO Project No.	AESO Project Name	AESO Planning Area No.	Generation (MW)	Load (MW)	Scheduled ISD	AUC NID Decision No.
1909	P1909 TransAlta Garden Plain Wind	42	130	4	Jun 1, 2022	26439-D01-2021
1978	ATCO Michichi DER Solar	42	61	0	Nov 1, 2022	N/A
2059*	ATCO Three Hills 770S DER Solar 1	42	14	0	Mar 1, 2022	N/A
2061*	ATCO Michichi Creek 802S DER Solar	42	11	0	Mar 1, 2022	N/A
2248*	ATCO Michichi Creek 802S DER Solar	42	14	0	Jun 1, 2022	N/A
2272	FortisAlberta Buffalo Creek 526S DER Storage	32	16	0	Oct 1, 2021	N/A

*These projects did not meet the AESO's project inclusion criteria at the time of developing this Study Scope.

4.2.3 Load Assumptions

The load forecast to be used for the studies is shown in Table 4-3 and is a forecast for the AESO Central Planning Region peak based on the AESO's *2021 Long-Term Outlook (2021 LTO)*² with modifications to incorporate the latest forecast intelligence. For the post-Project studies, when the Study Area loads are modified to align with the regional load forecast, the active power to reactive power ratio in the base case scenarios shall be maintained.

Table 4-3: Forecast Load at AESO Central Planning Region Peak

AESO Planning Region Name	Forecast Peak Load by Year/Season (MW)		
	2022 SL	2022 SP	2023 WP
Central Planning Region ¹	1518	1937	2183

Note:

¹ The Central Region comprises the following AESO planning areas: Vegreville (56), Lloydminster (13), Wainwright (32), Provost (37), Alliance/Battler River (36), Hanna (42), Red Deer (35), Didsbury (39), Caroline (38), Drayton Valley (30), Hinton/Edson (29), Abraham Lake (34), and Cold Lake (28)

IDEV files contain non-motor loads in zones 34 and 36. These loads are not accounted for in the forecasted peak loads shown above and should not be considered when scaling load. The AESO engineer will provide guidance to load scaling procedures as required.

4.2.4 Generation Assumptions

The generation forecast to be used for the studies is based on the 2021 LTO with modifications to incorporate the latest forecast intelligence. The generation assumptions for the studies will assume high wind generation dispatch condition. Additional studies may be required in the event of changes to the AESO's corporate forecast.

² The 2021 LTO is available on the AESO website.

The existing generation (excluding wind and solar) dispatch conditions for the study scenarios are described in Table 4-4.

Table 4-4: Existing Generation (excluding Wind and Solar) Dispatch Conditions

Facility Name	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation ^a (MW) by Scenario		
				2022 SL	2022 SP	2022 WP
Battle River #4 (BR4)	1496	155	36	0	80	0
Battle River #5 (BR5)	1497	385	36	0	151	180
Sheerness #1 (SH1)	1482	400	43	135	135	135
Sheerness #2 (SH2)	1487	390	43	103	135	135
Bellshill (BHL1)	2088	5	32	0	0	0

Notes:

^a “Unit Net Generation” refers to gross generating unit output (MW) less unit service load.

Pre-Project dispatch levels for the existing, under-construction, and contracted wind and solar generation facilities are shown in Table 4-5 and Table 4-6.

Table 4-5: Dispatch Conditions for Existing and Under Construction Wind Generation Facilities

Facility Name and Code	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation ^s (MW) by Scenario		
				2022 SL	2022 SP	2022 WP
McBride Lake Windfarm (AKE1)	2901, 3901, 4901	73	53	67.2	62.1	67.2
Ardenville Wind (ARD1)	4735, 4740	68	53	62.6	57.8	62.6
Blackspring Ridge (BSR1)	61736, 61737	300	49	276.0	255.0	276.0
Blue Trail Wind (BTR1)	66328, 67328	66	53	60.7	56.1	60.7
Castle River #1 (CR1)	2234, 3234	39	53	35.9	33.2	35.9
Castle Rock Wind Farm (CRR1)	67221	77	53	70.8	65.5	70.8
Castle Rock Ridge 2 (CRR2)	567221	29	53	26.7	24.7	26.7
Cowley Ridge (CRE3)	4264	20	53	18.4	17.0	18.4
Soderglen Wind (GWW1)	12358, 13358	71	53	65.3	60.4	65.3
Summerview 1 (IEW1)	2338, 3338	66	53	60.7	56.1	60.7
Summerview 2 (IEW2)	4339, 5337	66	53	60.7	56.1	60.7
Kettles Hill (KHW1)	2402, 3402	63	53	58.0	53.6	58.0
Oldman 2 Wind Farm 1 (OWF1)	61543	46	53	42.3	39.1	42.3
Riverview (RIV1)	69221	105	53	96.6	89.3	96.6
Suncor Magrath (SCR2)	11002	30	55	27.6	25.5	27.6

Engineering Connection Assessment: Study Scope

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Facility Name and Code	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation ^s (MW) by Scenario		
				2022 SL	2022 SP	2022 WP
Suncor Chin Chute (SCR3)	2389	30	54	27.6	25.5	27.6
Wintering Hills (SCR4)	60789, 60791, 60793, 60846, 60848, 60850	88	43	81.0	74.8	81.0
Enmax Taber (TAB1)	15343, 16343	81	52	74.5	68.9	74.5
Whitla 1 (WHT1)	60990	202	4	185.8	171.7	185.8
Whitla 2 (WHT2)	61990	151	4	89.2	82.5	89.2
AESO South Planning Region Subtotal		1671		1487.6	1374.9	1487.6
BUL1 Bull Creek (BUL1)	550003	13	37	12.0	11.1	12.0
BUL2 Bull Creek (BUL2)	550004	16	37	14.7	13.6	14.7
Halkirk Wind Power Facility (HAL1)	66435, 67435	150	42	138.0	127.5	138.0
Ghost Pine (NEP1)	2621, 2622, 2623, 2624, 2625	82	42	75.4	69.7	75.4
AESO Central Planning Region Subtotal		261		240.1	221.9	240.1
Total		1932		1727.7	1596.8	1727.7

Note:

^a "Unit Net Generation" refers to gross generating unit output (MW) less unit service load.

Table 4-6: Dispatch Conditions for Existing and Under Construction Solar Generation Facilities

Facility Name and Code	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation ^s (MW) by Scenario		
				2022 SL	2022 SP	2022 WP
BRD1 Burdett (BRD1)	2269	11	52	0.0	5.5	0.0
Brooks Solar (BSC1)	553257	15	47	0.0	7.5	0.0
BUR1 Burdett (BUR1)	557269	20	52	0.0	10.0	0.0
Claresholm 1 (CLR1)	60894	58	49	0.0	29.0	0.0
Claresholm 2 (CLR2)	61894	75	49	0.0	37.5	0.0
Hull (HUL1)	2401	25	52	0.0	12.5	0.0
Suffield (SUF1)	3270	23	4	0.0	11.5	0.0
Vauxhall (VXH1)	4274	22	52	0.0	11.0	0.0
Westfield Yellow Lake (WEF1)	557277	19	52	0.0	9.5	0.0
AESO South Planning Region Subtotal		268		0.0	134.0	0.0

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Facility Name and Code	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation ^s (MW) by Scenario		
				2022 SL	2022 SP	2022 WP
Innisfail (INF1)	557120	22	39	0.0	11.0	0.0
AESO Central Planning Region Subtotal		22		0.0	11.0	0.0
Total		290		0.0	145.0	0.0

Table 4-7 and Table 4-8 list the pre-Project dispatch levels for the planned wind and solar generation projects in the AESO South and Central planning regions that are included in the study scenarios.

Table 4-7: Dispatch Conditions for Planned Wind Generation Projects

Project Number	Project Name	Planned ISD	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation Dispatch ^a (MW) by Scenario		
						2022 SL	2022 SP	2022 WP
South Planning Region								
P1533	Joss MPC WAGF (REP #3)	Jun 30, 2022	60798, 60799	122.4	47	112.6	104.0	112.6
P1698	Joss Jenner WAGF - Phase 2 (REP #3)	Jun 30, 2022	61798, 61799	71.4	47	166.0	153.3	166.0
P2234	Joss Jenner WAGF - Phase 3	Jun 30, 2022		109				
P1719	Stirling WAGF Project	Nov 1, 2022	61630	113	54	104.0	96.1	104.0
P1812	Suncor Forty Mile Granlea WAGF	Nov 16, 2021	61994, 62994	200	4	184.0	170.0	184.0
P1853	Fortis Buffalo Atlee Cluster 1 WAGF (REP #2)	Dec 1, 2021	553260	17.3	47	15.9	14.7	15.9
P1892	Fortis Buffalo Atlee Cluster 3 WAGF (REP #2)	Dec 1, 2021	552260	17.3	47	15.9	14.7	15.9
P2041	TransAlta Windrise MPC Wind (REP #3)	Jun 10, 2021	567031	207	53	190.4	176.0	190.4
P2122	EDF Cypress Wind (REP #2)	Nov 1, 2022	560003, 561003	201.6	4	185.5	171.4	185.5
P2199	Buffalo Atlee Wind Farm 2 (REP #2)	Dec 1, 2021	557261	13.8	47	12.7	11.7	12.7
P2212	RESC Rattlesnake Ridge MPC Wind	Jul 30, 2021	60873	114.0	4	104.9	96.9	104.9
P1909	TransAlta Garden Plain Wind	Jun 1, 2022	565002	130.0	42	119.6	110.5	119.6
P1898	Pattern Lanfine North Wind	Sep 30, 2022	60996	145.0	42	133.4	123.3	133.4

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Project Number	Project Name	Planned ISD	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation Dispatch ^a (MW) by Scenario		
						2022 SL	2022 SP	2022 WP
P1718	Wheatland WAGF	Jun 30, 2022	61632, 60632	120	43	120	120	120
Total Planned				1581.8		1464.9	1362.6	1464.9

Table 4-8: Dispatch Conditions for Planned Solar Generation Projects

Project Number	Project Name	Planned ISD	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation Dispatch ^a (MW) by Scenario		
						2022 SL	2022 SP	2022 WP
South Planning Region								
P1831	Fortis 255S Vulcan Faribault Farms DG PV	Sep 1, 2021	4244	22	49	0.0	11.0	0.0
P1837	Fortis 498S Tilley DG PV	Nov 15, 2021	3275	22	47	0.0	0.0	0.0
P1839	Fortis 421S Hays DG PV	Jun 24, 2021	554401	24	52	0.0	12.0	0.0
P1840	Fortis 275S Jenner Solar DER	Jun 23, 2021	554986	23	48	0.0	11.5	0.0
P1850	Fortis Coaldale 254S DER Solar 3	Sep 1, 2021	554691	22	54	0.0	11.0	0.0
P1851	Fortis Monarch 492S DER Solar	Sep 1, 2021	2005	23.6	54	0.0	12.0	0.0
P1862	Fortis Spring Coulee 385S Solar DG	Oct 15, 2021	553246, 554246	29.5	55	0.0	15.0	0.0
P1870	Fortis Stavely 349S DER Solar	Feb 1, 2022	2004	17.0	49	0.0	8.5	0.0
P1918	FortisAlberta Conrad DER Solar 1	Dec 21, 2021	554291	23.0	52	0.0	11.5	0.0
P1932	FortisAlberta Namaka DER Solar	Aug 15, 2021	552340	20.1	45	0.0	10.1	0.0
P1959	FortisAlberta Conrad DER Solar 2	Dec 21, 2021	553291	23.0	52	0.0	11.5	0.0
P2009	Greengate Travers MPC Solar	Dec 10, 2021	560026, 561026, 562026	400	49	0.0	200.0	0.0
P2029	FortisAlberta Strathmore 151S DER Solar 1	Nov 8, 2021	557259	18	45	0.0	9.0	0.0
P2030	FortisAlberta Strathmore 151S DER Solar 2	Nov 8, 2021	558259	23.0	45	0.0	11.5	0.0
P2341	Travers Solar Phase 2	Apr 1, 2022	560026, 561026, 562026	65	49	0.0	32.5	0.0
Subtotal (Southern Alberta)					755.2	0	367.1	0

Project Number	Project Name	Planned ISD	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation Dispatch ^a (MW) by Scenario		
						2022 SL	2022 SP	2022 WP
P2248	ATCO Michichi Creek 802S DER Solar	Jun 1, 2022	557448	13.5	42	0	0	0
P1978	ATCO Michichi DER Solar	Nov 1, 2022	552447, 552448, 553447	61	42	0	37.5	0
Subtotal (Central Alberta)				13.5		0	37.5	0
Total Planned				768.7		0	404.6	0

The post-Project scenario wind and solar generation dispatch levels will be identical to the pre-Project scenario dispatch levels shown in Table 4-7 and Table 4-8.

The Facility was dispatched to 120 MW in all post-Project scenarios.

4.2.5 Intertie Flow Assumptions

The intertie flow assumptions for the Alberta-British Columbia (AB-BC), Alberta-Saskatchewan (AB-SK), and Alberta-Montana (MATL) interties are shown in Table 4-9.

For the 2031 WP scenario, the intertie flow values should be set to the AESO planning base cases.

Table 4-9: Intertie Flows by Scenario

Scenario Number	Scenario Name	Import (-) / Export (+) (MW) by Intertie		
		AB-BC	AB-SK	MATL
1, 4	2022 SL	0	-77	-300
2, 5	2022 SP	-31	-150	-300
3, 6	2022 WP	-261	-150	-300

4.2.6 HVDC Power Order Assumptions

The Western Alberta Transmission Line (WATL) and the Eastern Alberta Transmission Line (EATL) are high-voltage direct current (HVDC) transmission lines. The HVDC power order assumptions for the studies will be set to minimize losses for the pre-Project and post-Project study scenarios.

For the 2031 WP scenario, the HVDC power order should be as per the AESO base cases and will not be adjusted.

Table 4-10: HVDC Power Order by Scenario

Scenario Number	Scenario Name	WATL (MW)*	EATL (MW)*
1, 4	2022 SL	-500	-1000
2, 5	2022 SP	-550	-1000

Scenario Number	Scenario Name	WATL (MW)*	EATL (MW)*
3, 6	2022 WP	-400	-950

Notes:

N → S: HVDC flow direction is North to South

S → N: HVDC flow direction is South to North

The reactive power limits of the MVar exchanges between the HVDC terminals (WATL and EATL) and the connected alternating current (AC) transmission systems are shown in Table 4-11. These limits must be maintained when performing the studies.

Table 4-11: HVDC to Adjacent AC System MVar Exchange Limits

HVDC Facility	North Terminal Reactive Power Limit (MVar)	South Terminal Reactive Power Limit (MVar)
EATL	-85 to 75	-35 to 35
WATL	-75 to 75	-35 to 35

4.2.7 Transmission Facility Ratings

The legal owners of transmission facilities (TFOs) provided the thermal ratings assumptions for the existing transmission lines in the Study Area. Table 4-12 shows the normal ratings and emergency ratings for the key transmission lines in the Study Area, which will be used to perform the engineering studies.

Table 4-12: Thermal Rating Assumptions for Key Transmission Lines in the Study Area

Line ID	Line Description	Voltage Class (kV)	Normal Rating (MVA)		Emergency Rating (MVA)	
			Summer	Winter	Summer	Winter
174L	Bardo 197S - 395S North Holden	138	85	90	94	99
408L ^a	Jarrow 252S - Wainwright 51S	138	75	79	83	87
472L	Metiskow 648S - Sunken Lake 221S Tap	138	121	150	133	153
472L	Sunken Lake 221S Tap - Hughenden 213S	138	121	150	133	165
679L	Nilrem 574S - Tucuman 478S	138	167CT	191	184	218
680L	Nilrem 574S - Tucuman 478S	138	167CT	191	184	218
681L	Tucuman 478S - Hardisty 377S	138	143	172	184	218
701L	North Holden 395S - Strome 223S	138	119	146	131	161
6L02	Battle River 757S - Marion Lake 873S	72	59	74CT	67	74CT
6L02	Marion Lake 873S - Stettler 769S	72	59	66CT	66CT	66CT
6L03	Battle River 757S - Sullivan Lake 775S	72	49CT	49CT	49CT	49CT
6L05	Heisler 764S - Battle River 757S	72	57	72	64	74CT

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Line ID	Line Description	Voltage Class (kV)	Normal Rating (MVA)		Emergency Rating (MVA)	
			Summer	Winter	Summer	Winter
6L09	Oyen 767S - Hanna 763S	72	24CT	24CT	24CT	24CT
6L12	Sullivan Lake 775S - Coronation 773S	72	24CT	24CT	24CT	24CT
6L15	Hanna 763S - Sullivan Lake 775S	72	24CT	24CT	24CT	24CT
6L56	Hanna 763S - Michichi Creek 802S	72	37L	37CT	37CT	37CT
701L	Heisler T-Tap - Strome 223S	138	158	191	174	213
703L	Hughenden 213S - HRT Express 329S Tap	138	121	145	133	160
703L	HRT Express 329S Tap - Hardisty 377S	138	96CT	96CT	133	143
704L	Wainwright 51S - Tucuman 478S	138	75	79	83	87
704L	Jarrow 252S - Jarrow 252S Tap	138	85	90	94	99
748L	Killarney Lake 267S - Hayter 277S	138	119	146	131	161
749L	Metiskow 648S - Killarney T-Tap	138	122	150	134	163
749L	Edgerton 899S - Killarney T-Tap	138	96CT	96CT	134	143
749L/7 L749	Edgerton 899S - Briker Tap	138	96CT	96CT	130	140
760L	Empress Liquid 164S tap - Bindloss 914S Tap	138	120	142	132	156
760L	Empress Liquid 164S tap - Amoco Empress 163S	138	120	148	132	163
760L	Amoco Empress 163S - Empress 394S	138	119	146	131	161
760L/7	Empress Liquid 164S tap - Bindloss Tap	138	109.3	139	123.6	142.8C
769L	Hardisty 377S - Rosyth	138	86	115	95	127
7L110	Monitor 774S - Loyalist 903S	144	99CT	99CT	99CT	99CT
7L116	Excel 910S - Lanfine 959S	144	99CT	99CT	99CT	99CT
7L117	Vermilion 710S - Irish Creek 706S	144	131	166	147	189
7L127	Pemukan 932S - Monitor 774S	144	151 bus cond	190 bus cond	194 bus cond	254 bus cond
7L128	Coyote Lake 963S - Michichi Creek 802S	144	117 bus cond	147 bus cond	144 bus cond	185 bus cond
7L129	Buffalo Creek 526S - Vermilion 710S	144	129	161	138	178
7L130	Vermilion 710S - Kitscoty 705S	144	114	151	125	170
7L132	Lanfine 959S - Oyen 767S	144	117 bus	147 bus	144 bus	179P
7L137	Three Hills 770S - Rowley 768S	144	113	149	126	171
7L139	Whitby Lake 819S - Norberg 936S Tap	144	114	151	127	173
7L139	Norberg 936S Tap - St. Paul 707S	144	114	151	127	173

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Line ID	Line Description	Voltage Class (kV)	Normal Rating (MVA)		Emergency Rating (MVA)	
			Summer	Winter	Summer	Winter
7L14	Kitscoty 705S - Hill 751S	144	114	151	125	170
7L143	Nevis 766S - Stettler 769S	144	100CT	100CT	100CT	100CT
7L153	Wintering Hills 804S - Wheatland 609S	144	185	199CT	199CT	199CT
7L159	Three Hills 770S - Ghostpine Tap	144	112	149	124	150CT
7L159	Heatburg 948S - Ghostpine Tap	144	112	149	124	167CT
7L16	Nevis 766S - Heatburg 948S	144	112	133CT	125	133CT
7L171	Michichi Creek 802S - Wintering Hills 804S	144	112	147	127	150CT
7L224	Hansman Lake 650S - Monitor 774S	144	113	150	125	171
7L25	Michichi Creek 802S - Rowley 768S	144	114	154	128	177
7L42	Hill 751S - Lloydminster 716S	144	130	150CT	142	150CT
7L50	Battle River 757S - Jarrow 252S Tap	144	114	150GS	122	150GS
7L53	Irish Creek 706S - Lindberg 969S Tap	144	130	162	145	185
7L53	Lindberg 969S Tap - Bonnyville 700S	144	130	162	145	185
7L65	Vermilion 710S - Future Vincent 2019S	144	114	146	127	172
7L70	St. Paul 707S - Bonnyville 700S	144	115	152	128	174
7L77	North Holden 395S - Vegreville 709S	138	114	151	125	169
7L701	Battle River 757S - Heisler Tap	144	148	200	166	239
7L702	Battle River 757S - Sedgewick 137S Tap	144	115	155	128	177
702L	Sedgewick 137S tap - Hardisty 377S	138	87	135	96	146
7L749	Lloydminster 716S - Briker Tap	144	114	151	126	170
7L760	Oyen 767S - Bindloss 914S Tap	144	115	153	128	175
7L79	Pemukan 932S - Ribstone Creek 892S	144	114	145	129	157
7L85	Wintering Hills 804S - Bullpound 803S Tap	144	117 bus cond.	147 bus cond.	144 bus cond.	184 bus cond.
7L85	Bullpound 803S Tap - Anderson 801S	144	145	193	173	199CT
7L92	Vegreville 709S - Whitby Lake 819S (All segments)	144	114	133CT	126	133CT
7LA15	Ghost Pine 114S - 7L159 Tap	144	114	145	129	149CT
7LA70	Heisler 764S - Heisler Tap	144	133CT	133CT	133CT	133CT
885L	Metiskow 648S - Hansman Lake 650S	138	287	287	344	373

Line ID	Line Description	Voltage Class (kV)	Normal Rating (MVA)		Emergency Rating (MVA)	
			Summer	Winter	Summer	Winter
912L/ 9L912	Nevis 766S - Red Deer 63S	240	507	624CT (ATCO)	553	624CT (ATCO)
931L	Ware Junction 132S - West Brooks 28S	240	592	665	654	773
953L	Cordel 755S - Nilrem 574S	240	544	663CT	641	663CT
954L	Metiskow 648S - Hansman Lake 650S	240	333CT	333CT	499CT	499CT
9L16	Tinchebray 972S - Cordel 755S	240	499CT	499CT	499CT	499CT
9L20	Nevis 766S - Cordel 755S	240	488	623.5C	558	623.5C
9L24	Oakland 946S - Lanfine 959S	240	740	831GS	831GS	831GS
9L27	Paintearth 863S - Cordel 755S	240	442CT	442CT	442CT	442CT
9L29	Oakland 946S - Coyote Lake 963S	240	740	831GS	831GS	831GS
9L46	Lanfine 959S - Pemukan 932S	240	755	831CT	831CT	831CT
9L59	Tinchebray 972S - Anderson 801S	240	499GS	499GS	499GS	499GS
9L70	Anderson 801S - Oakland 946S	240	499GS	499GS	499GS	499GS
9L79	Battle River 757S - Cordel 755S	240	499CT	499CT	499CT	499CT
9L80	Battle River 757S - Cordel 755S	240	499CT	499CT	499CT	499CT
9L93	Halkirk 615S - Tinchebray 972S	240	378	520	517	733
9L933	Anderson 801S - Ware Junction 132S	240	550	748	651	831GS
9L934	Anderson 801S - Ware Junction 132S	240	499GS	499GS	499GS	499GS
9L948	Paintearth 863S - Hansman Lake 650S	240	442CT	442CT	442CT	442CT
9L950	Anderson 801S - Ware Junction 132S	240	499GS	499GS	499GS	499GS
9L953	Cordel 755S - Nilrem 574S	240	544	663CT	641	663CT
9L966	Pemukan 932S - Hansman Lake 650S	240	442CT	442CT	442CT	442CT
9L97	Anderson 801S - Oakland 946S	240	499GS	499GS	499GS	499GS
9L99	Sheerness 807S - Anderson 801S	240	470	499GS	499GS	499GS
9L100	Sheerness 807S - Anderson 801S	240	470	499GS	499GS	499GS
1047L	Nilrem 574S - Hansman Lake 650S	240	499CT	499CT	680	748CT

Note:

“CT” indicates that the transmission line is limited by current transformer.

“GS” indicates that the transmission line is limited by a gang switch

“bus cond” indicates that the transmission line is limited by bus conductor rating for at least one terminal substation

The TFOs provided the details of the substation transformers in the Study Area. The key transformers in the Study Area are shown in Table 4-13.

Table 4-13: Summary of Key Transformer Ratings in the Study Area

Substation Name and Number	Transformer ID	Transformer Voltages (kV)	Transformer Rating (MVA)
Anderson 801S	901T	240/144	125CT
Battle River 757S	912T	240/144	299CT
	701T	144/72	75
Nevis 766S	901T	240/144	100CT
	701T	144/25	12/16/20
Nilrem 574S	T1	240/138	400
	T2	240/138	400
Metiskow 648S	T3	240/138	200
Hansman Lake 650S	T1	240/138	200
	T3	240/18	200

*ATCO has identified that Nevis 766S901T has an emergency rating of 110MVA

The TFOs provided the details of the shunt elements in the Study Area. The key shunt elements in the Study Area are shown in Table 4-14.

Table 4-14: Summary of Key Shunt Elements in the Study Area

Substation Name and Number	Voltage Class (kV)	Capacitors		Reactors		SVC
		Number of Switched Shunt Blocks	Total at Nominal Voltage (MVar)	Number of Switched Shunt Blocks	Total at Nominal Voltage (MVar)	Total at Nominal Voltage (MVar)
Buffalo Creek 526S	138	1 x 15.06	15.06	-	-	-
Sunken Lake 221S	138	1 x 18.12	18.12	-	-	-
Halkirk 615S	34.5	1 x 5, 3 x 18	60	2 x 14	28	
	0.5	-	-	-	-	± 25
Hansman Lake 650S	18	1 x 176.8	176.8	1 x 88.2	88.2	
Hardisty 377S	138	1 x 27.02, 1 x 44.9	71.92	-	-	-
Hill 751S	138	1 x 18.12, 1 x 22.96	41.08	-	-	-
Stettler 769S	138	1 x 13.78	13.78	-	-	-
Killarney Lake 267S	138	1 x 9.06, 2 x 10.87	30.8	-	-	-
Lloydminster 716S	138	1 x 18.12	18.12	-	-	-
Tucuman 478S	138	1 x 27.17	27.17	-	-	-
Vermilion 710S	138	1 x 22.96	22.96	-	-	-

Substation Name and Number	Voltage Class (kV)	Capacitors		Reactors		SVC
		Number of Switched Shunt Blocks	Total at Nominal Voltage (MVA _r)	Number of Switched Shunt Blocks	Total at Nominal Voltage (MVA _r)	Total at Nominal Voltage (MVA _r)
Lanfine 959S	240	1 x 200	200	1 x 100	100	-
	138	2 x 27.55	55.1	-	-	-
Monitor 774S	138	1 x 18.38, 1 x 27.55	45.93	-	-	-
Pemukan 932S	138	2 x 27.55	55.1	-	-	-

4.2.8 Protection Fault Clearing Times

The transient stability studies will be performed using the actual fault clearing times for the selected contingencies, as provided by the TFOs and as shown in Table 4-15. Only those contingencies shown in Table 4-15 will be studied for transient stability studies. If the TFOs did not specify the fault clearing times (e.g. for new transmission lines) for a selected contingency, then the studies for that contingency will be performed using the standard fault clearing times that are specified in Table 2-3 of the AESO's *Transmission Planning Criteria – Basis and Assumptions*.

Table 4-15: Protection Fault Clearing Times

Contingency (System Element Lost)	Fault Location	Clearing Times (Cycles)	
		Near End	Far End
9L24 (Oakland 946S – Lanfine 959S)	Oakland 946S	5	6
9L24 (Oakland 946S – Lanfine 959S)	Lanfine 959S	5	6
9L29 (Oakland 946S – Coyote Lake 963S)	Oakland 946S	5	6
9L29 (Oakland 946S – Coyote Lake 963S)	Coyote Lake 963S	5	6
9L20 (Cordel 755S – Nevis 766S)	Cordel 755S	5	6
9L20 (Cordel 755S – Nevis 766S)	Nevis 766S	5	6
9L59 (Anderson 801S – Tinchebray 972S)	Anderson 801S	5	6
9L59 (Anderson 801S – Tinchebray 972S)	Tinchebray 972S	5	6
912L/9L912 (Nevis 766S – Red Deer 63S)	Nevis 766S	5.5	6.5
912L/9L912 (Nevis 766S – Red Deer 63S)	Red Deer 63S	5.5	6.5
7L171 (Wintering Hills 804S – Michichi Creek 802S)	Wintering Hills 804S	6	24
7L171 (Wintering Hills 804S – Michichi Creek 802S)	Michichi Creek 802S	6	24
7L25 (Rowley 768S – Michichi Creek 802S)	Rowley 768S	6	24
7L25 (Rowley 768S – Michichi Creek 802S)	Michichi Creek 802S	6	24
7L85 (Wintering Hills 804S - Anderson 801S)	Wintering Hills 804S	6	24
7L85 (Wintering Hills 804S - Anderson 801S)	Anderson 801S	6	42
7L137 (Rowley 768S – Three Hills 770S)	Rowley 768S	6	24
7L137 (Rowley 768S – Three Hills 770S)	Three Hills 770S	6	24
7L159 (Three Hills 770S – Ghost Pine 114S – Heatburg 948S)	Three Hills 770S	6	8
7L159 (Three Hills 770S – Ghost pine 114S – Heatburg 948S)	Ghost Pine 114S	6	8
7L159 (Three Hills 770S – Ghost pine 114S – Heatburg 948S)	Heatburg 948S	6	8
7L16 (Heatburg 948S – Nevis 766S)	Heatburg 948S	6	24
7L16 (Heatburg 948S – Nevis 766S)	Nevis 766S	6	24
7L128 (Michichi Creek 802S – Coyote Lake 963S)	Michichi Creek 802S	6	8
7L128 (Michichi Creek 802S – Coyote Lake 963S)	Coyote Lake 963S	6	8
EATL (Heathfield 2029S - Newell 2075S)	Heathfield 2029S	5	6

4.2.9 Project Dynamic Data

Dynamic data for the Project can be found in Attachment A7.

4.2.10 Voltage Profile Assumption

ID #2010-007RS will be used to establish system normal (i.e., pre-contingency) voltage profiles for key area busses prior to commencing any studies. Table 2-1 of the *Transmission Planning Criteria – Basis and Assumptions* applies for the busses not included in ID #2010-007RS. These voltages will be used to set the voltage profile for the study base cases prior to the power flow studies.

5 Study Methodology

The studies to be performed for this connection assessment are identified in Table 5-1.

Table 5-1: Summary of the Studies to be Performed

Scenario No. and Name		Power Flow		Voltage Stability		Transient Stability		Motor Starting		Short Circuit
		Category		Category		Category		Category		Category A
		A	B	A	B	A	B	A	B	
Pre-Project										
1	2022 SP	X	X							
2	2022 SL	X	X							
3	2022 WP	X	X							X
Post-Project										
4	2022 SP	X	X			X	X			
5	2022 SL	X	X			X	X			
6	2022 WP	X	X			X	X			X
7	2031 WP									X

For the engineering studies, all transmission facilities 69 kV and above, within the Study Area and the transmission lines connecting these planning areas to neighbouring planning areas will be studied and monitored to assess the impact of the Project on the performance of the AIES, including any violations of the Reliability Criteria (as defined in Section 3.1).

5.1 Power Flow Studies

Power flow studies will be performed to identify thermal and voltage criteria violations as per the Reliability Criteria, and any deviations from the limits listed in Table 3-1.

For information purposes, the Studies Consultant must also provide, as a separate file, a list of any transmission elements where the thermal loading exceeds 95% of the element's normal rating under Category A and Category B conditions.

For the Category B power flow studies, the transformer taps and switched shunt reactive compensating devices such as shunt capacitors and reactors will be locked and continuous shunt devices will be enabled.

Voltage deviations at point-of-delivery (POD) low voltage busses will also be assessed for both the pre-Project and post-Project networks by first locking all tap changers and area shunt reactive compensating devices to identify any post-transient voltage deviations above 10%. Second, tap changers will be allowed to move while shunt reactive compensating devices remained locked to determine if any voltage deviations above 7% would occur in the area. Third, all the taps and shunt reactive compensating devices will be allowed to adjust, and voltage deviations above 5% will be reported.

The scenarios to be studied are shown in Table 5-1.

5.1.1 Contingencies to be Studied

Power flow studies will be performed for the Category A and all Category B conditions in the Study Area.

5.2 Transient Stability Studies

The Keephills Unit 3 in AESO planning area Wabamun (Area 40) will be used as the reference for the studies.

The report presenting the results of the transient stability studies must provide response plots for several variables, including rotor angle, and active and reactive power output for the Sheerness (Area 43) and Battle River (Area 36) units. The results report must also provide the 500 kV, 240 kV and 138 kV bus voltage levels for substations near the point of connection. Other busses will be monitored and will be reported as determined by the results. The results report must also provide the key branch active and reactive power flow surrounding the Facility.

Transient stability studies will be performed for the post-Project scenarios as shown in Table 5-1. If any transient stability issues are observed, transient stability analysis will be performed for the corresponding pre-Project scenarios.

5.2.1 Contingencies to be Studied

Transient stability studies will be performed for the contingencies shown in Table 4-15

5.3 Short-Circuit Current Level Studies

A maximum fault level must be provided for the substations in the vicinity of the Project assuming normal system operation with all transmission elements in service and generation dispatched. Three-phase faults and single line-to-ground faults will be simulated. Polar coordinates and per-unit values will be used for reporting the results.

Winter peak scenarios will be used for the short-circuit studies because winter peak scenarios generally produce higher short-circuit current levels than summer peak scenarios.

Estimated maximum three-phase faults and single line-to-ground short-circuit current levels will be reported for the following substations:

- Anderson 801S
- Bullpound 803S
- Coyote Lake 963S
- Michichi Creek 802S
- Oakland 946S
- Sheerness 807S
- Wheatland 609S
- Wintering Hills 804S
- Badlands 981S (post-Project scenarios only)

Engineering Connection Assessment: Study Scope

P1718 Wheatland Wind Project Connection

V4 FINAL



Further sensitivity studies, in consultation with the TFO, may be required if the primary short-circuit analysis indicates a potential to exceed or approach the existing fault rating of the transmission facilities.

The scenarios to be studied are as shown in Table 5-1.

6 Mitigation Measures

6.1 Development

Mitigation measures may be required if the post-Project study results identify system performance issues. Mitigation measures for the Project may involve modifying or adding real-time operational practices and/or remedial action schemes (RASs).

The Studies Consultant must notify the AESO of any system performance issues in a timely manner, following which the AESO Studies Engineer may instruct the Studies Consultant as follows:

- Develop tables showing the constraint effective factors³ for generation or load based on thermal criteria violations that are observed.
- Collaborate with the AESO to propose changes, if any, to the connection alternatives that could remove the requirement for a RAS.
- Collaborate with the AESO to study modifications to existing and/or planned RASs, proposed by the AESO, to ensure the coordination of existing protection schemes with the addition of any proposed protection schemes.
- Collaborate with the AESO to identify and study new RASs, if any, that may be required to ensure system reliability is maintained after connecting the Project to the AES.

The AESO Studies Engineer will work closely with the Studies Consultant and guide the development and/or modifications of the proposed mitigation measures to ensure system reliability, security and compliance with AESO ID #2018-018T, *Provision of System Access Service and the Connection Process*.

6.2 Evaluation

6.2.1 Post-Mitigation Studies

Studies to evaluate the effectiveness of mitigation measures, if required, will be performed in accordance with the technical criteria, assumptions, and methods provided in this Study Scope and in accordance with further instructions from the AESO.

6.2.2 Constraint Effective Factor Studies

Constraint effective factor analysis are used to determine the generator- and load- constraint effective factors and to identify the most effective generators or loads to manage the thermal criteria violations, if any, that are observed under Category B conditions.

³ Constraint effective factor studies are performed to determine the generator- and load- constraint effective factors. Constraint effective factors are used to estimate the ability of generators and loads to manage transmission constraints. A generator's or load's constraint effective factor is defined as the change in power flow over a specific transmission line following a change in the generator's energy production or in the load's energy consumption. The greater the constraint effective factor, the more effective a generator or load can be in managing a thermal criteria violation on the specific transmission line.

7 Changes to Study Assumptions

This study will utilize the AESO's planning base cases, which are based on the AESO's current corporate forecast (2021 LTO) with modifications to incorporate the latest forecast intelligence. Sensitivity studies or restudy may be required in the event of revisions to the AESO's corporate forecast, forecast intelligence, or other study assumptions. Additional engineering studies may also be required to assess new connection alternatives, changes to project ISD, or delays in proposed system developments. Any additional or revised study requirements shall be captured in a signed Study Scope Amendment document.

Attachment A: Transmission Planning Criteria – Basis and Assumptions

Transmission Planning Criteria – Basis and Assumptions

Date: July 9, 2019

Version: V1.2

1. Introduction

This document presents the reliability standards, criteria, and assumptions to be used as the basis for planning the Alberta Transmission System. The criteria, standards and assumptions identified in this document supersede those previously established.

2. Transmission Reliability Standards and Criteria¹

The AESO applies the following Alberta Reliability Standards to ensure that the transmission system is planned to meet applicable performance requirements under a defined set of system conditions and contingencies. A brief description of each of these standards is given below:

1. TPL-001-AB-0: System Performance Under Normal Conditions

Category A represents a normal system condition with all elements in service (N-0). All equipment must be within its applicable rating, voltages must be within their applicable ratings and the system must be stable with no cascading outages. Under Category A, electric supply to load cannot be interrupted and generating units cannot be removed from service.

2. TPL-002-AB1-0: System Performance Following Loss of a Single BES Element

Category B events result in the loss of any single element (N-1) under specified fault conditions with normal clearing. The specified elements are a generating unit, a transmission circuit, a transformer or a single pole of a direct current transmission line. The acceptable impact on the system is the same as Category A with the exception that radial customers or some local network customers, including loads or generating units, are allowed to be disconnected from the system if they are connected through the faulted element. The loss of opportunity load or opportunity interchanges is allowed. No cascading can occur.

3. TPL-003-AB-0: System Performance Following Loss of Two or More BES Elements

Category C events result in the loss of two or more bulk electric system elements (sequential, N-1-1 or concurrent, N-2) under specified fault conditions and include both normal and delayed fault clearing. All of the system limits for Category A and B events apply with the exception that planned and controlled loss of firm load, firm transfers and/or generation is acceptable provided there is no cascading.

4. TPL-004-AB-0: System Performance Following Extreme BES Events

Category D represents a wide variety of extreme, rare and unpredictable events, which may result in the loss of load and generation in widespread areas. The system may not be able to reach a new stable steady state, which means a blackout is a possible outcome. The AESO needs to evaluate these events, at its discretion, for risks and consequences prior to creating mitigation plans.

5. FAC-014-AB1-2: Establishing and Communicating System Operating Limits

The AESO is required to establish system operating limits where a contingency is not mitigated through construction of transmission facilities

¹ A complete description of the *Alberta Reliability Standards* can be found on the AESO's website: <https://www.aeso.ca/rules-standards-and-tariff/alberta-reliability-standards/>

2.1 Thermal Loading Criteria

The AESO Thermal Loading Criteria require that the continuous thermal rating of any transmission element is not exceeded under normal and post-contingency operating conditions. Thermal limits are assumed to be 100% of the respective normal summer and winter ratings. Emergency limits are not considered in the planning evaluations.

2.2 Voltage Range and Voltage Stability Criteria

The normal minimum and maximum voltage limits as specified in the following table are used to identify Category A system voltage violations, while the extreme minimum and maximum limits are used to identify Category B and C system violations. Table 2-1 presents the acceptable steady state and contingency state voltage ranges for the AIES. Table 2-2 provides voltage stability criteria used to test the system performance.

Table 2-1: Acceptable Range of Steady State Voltage (kV)

Nominal Voltage	Extreme Minimum	Normal Minimum	Normal Maximum	Extreme Maximum
500	475	500	525	550
240	216	234	252	264
260 (Northeast & Northwest)*	234	247	266	275
144	130	137	151	155
138	124	135	145	150
72	65	68.5	75.5	79
69	62	65.5	72.5	76

Table 2-2: Voltage Stability Criteria

Performance Level	Disturbance (1)(2)(3)(4) Initiated by: Fault or No Fault DC Disturbance	MW Margin (P-V method) (5)(6)(7)	MVAr Margin (V-Q method) (6)(7)
A	Any element such as: One Generator One Circuit One Transformer One Reactive Power Source One DC Monopole	$\geq 5\%$	Worst Case Scenario(8)
B	Bus Section	$\geq 5\%$	50% of Margin Requirement in Level A
C	Any combination of two elements such as: A Line and a Generator A Line and a Reactive Power Source Two Generators Two Circuits Two Transformers Two Reactive Power Sources DC Bipole	$\geq 2.5\%$	50% of Margin Requirement in Level A
D	Any combination of three or more elements such as: Three or More Circuits on ROW Entire Substation Entire Plant Including Switchyard	> 0	> 0

2.3 Transient Stability Analysis Assumptions

Standard fault clearing times as shown in Table 2-3 are used for the new facilities or when the actual clearing times are not available for the existing facilities. Double line-to-ground faults are applied for the Category C5 events with normal clearing times. Single line-to-ground faults are applied for Category C6 to C9 events with delayed clearing times as depicted in Table 2-4 and Table 2-5.

Table 2-3: Fault Clearing Times

Nominal (kV)	Near End (Cycles)	Far End (Cycles)
500	4	5
240	5	6
144/138 with telecommunications	6	8
144/138 without telecommunications	6	30

Table 2-4: Stuck Breaker Clearing Times for Lines

Voltage (kV)	Fault Clearing Times (Cycles)		
	Near End	Far End	2 nd Ckt (C5 and C7 only)
138/144	15	24	24
240	12	6	14
500	9	5	11

Table 2-5: Stuck Breaker Clearing Times for Transformers

Voltage (kV)	Fault Location	Fault Clearing Times (Cycles)		
		High Side	Low Side	2 nd Ckt (breaker fail)
240/138	240 kV side	12	6	14
	138 kV side	5	15	24
500/240	500 kV side	9	5	11
	240 kV side	4	12	14

Attachment A2

Pre-Project Power Flow Diagrams

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

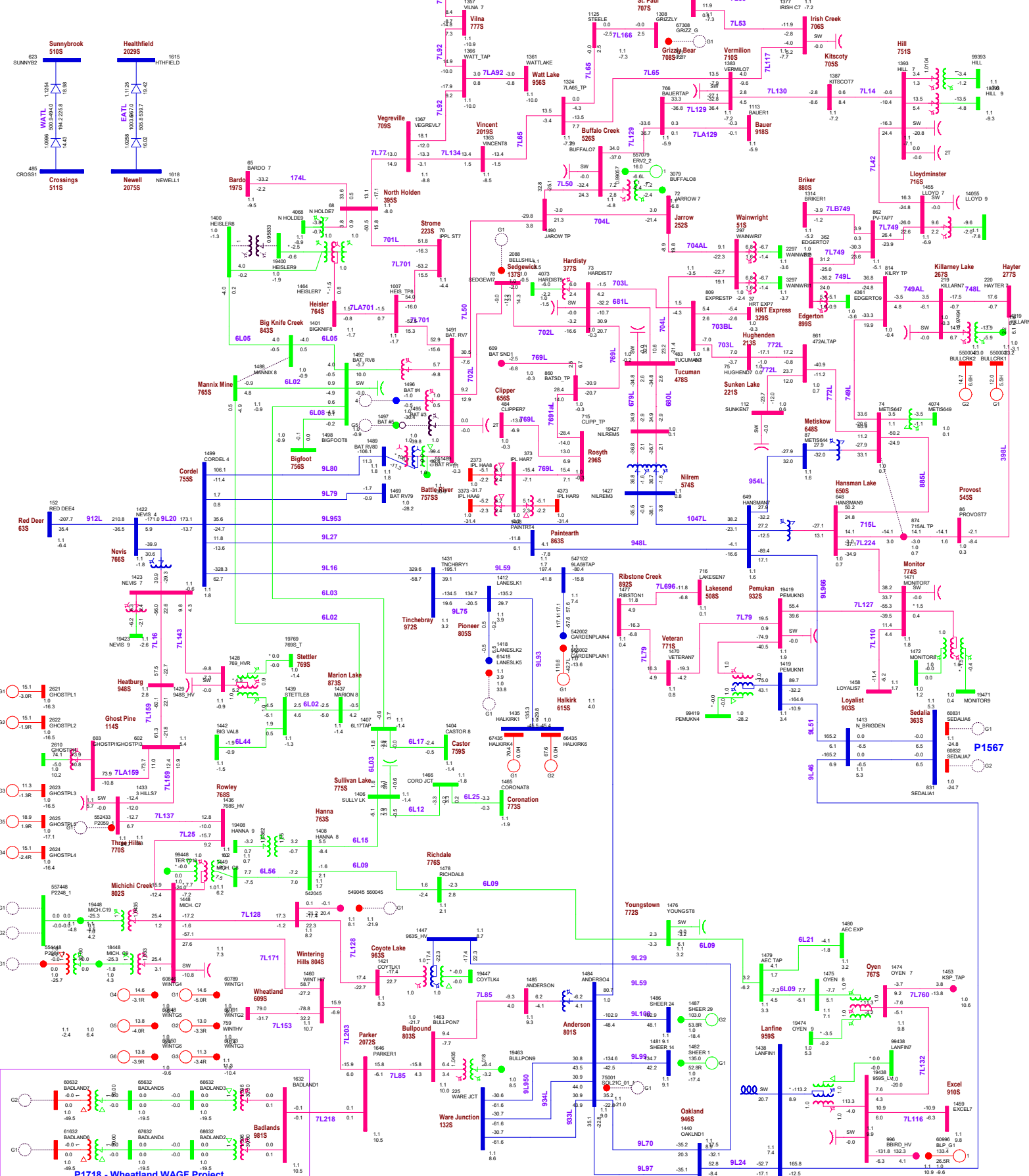


Figure A2-1

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

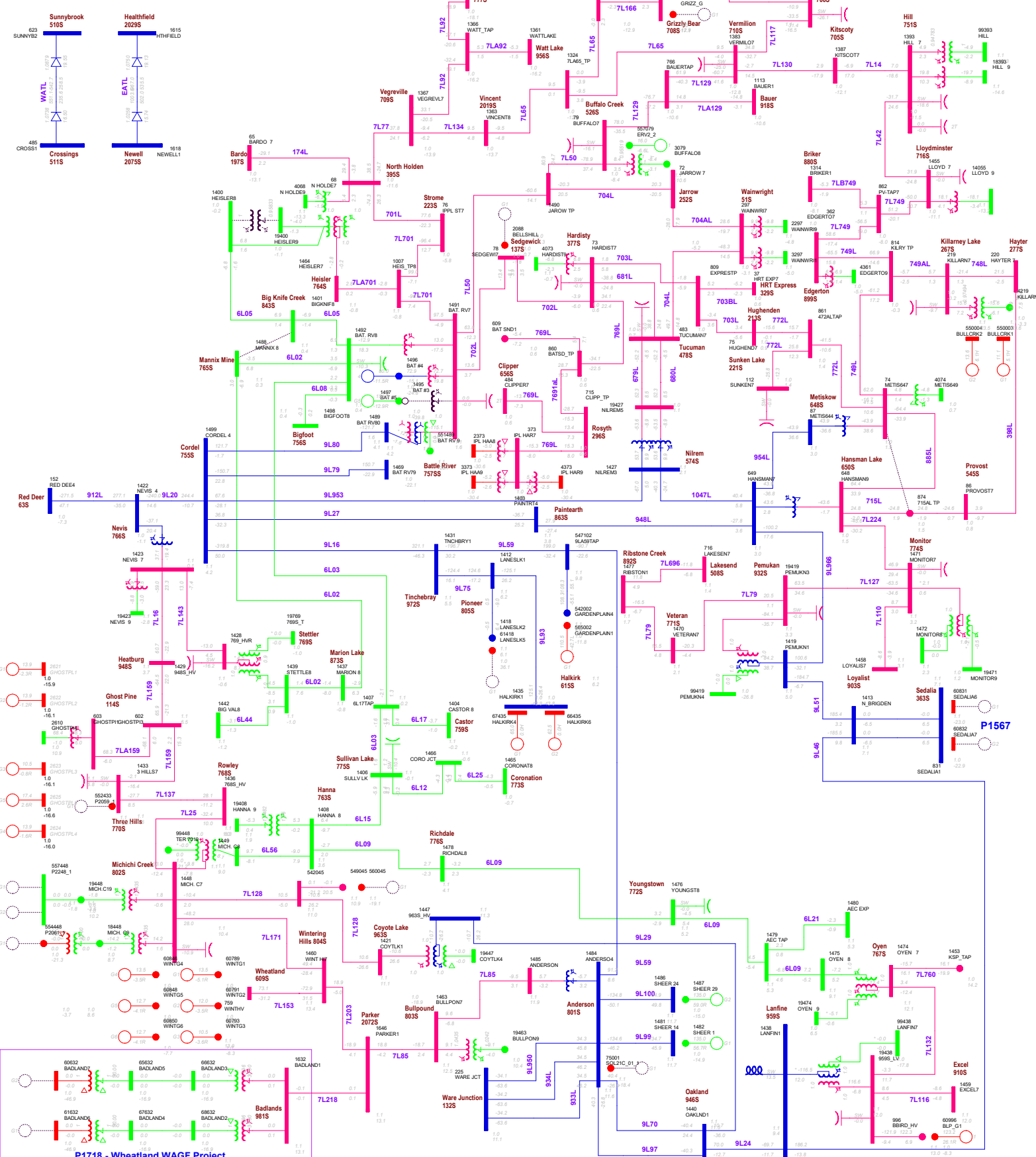


Figure A2-2

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATEZ

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

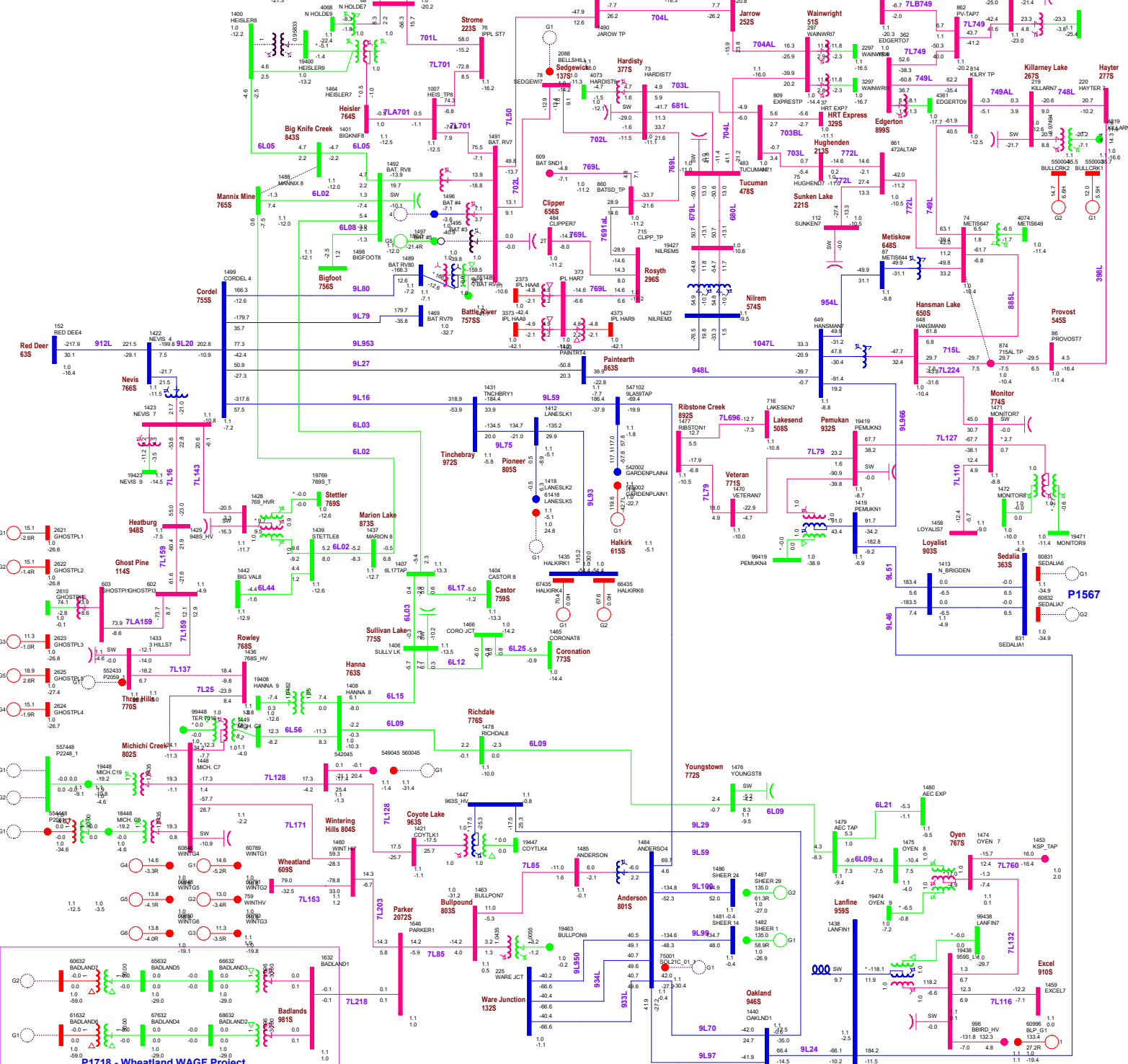
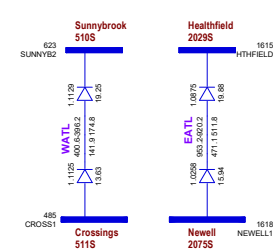


Figure A2-3

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

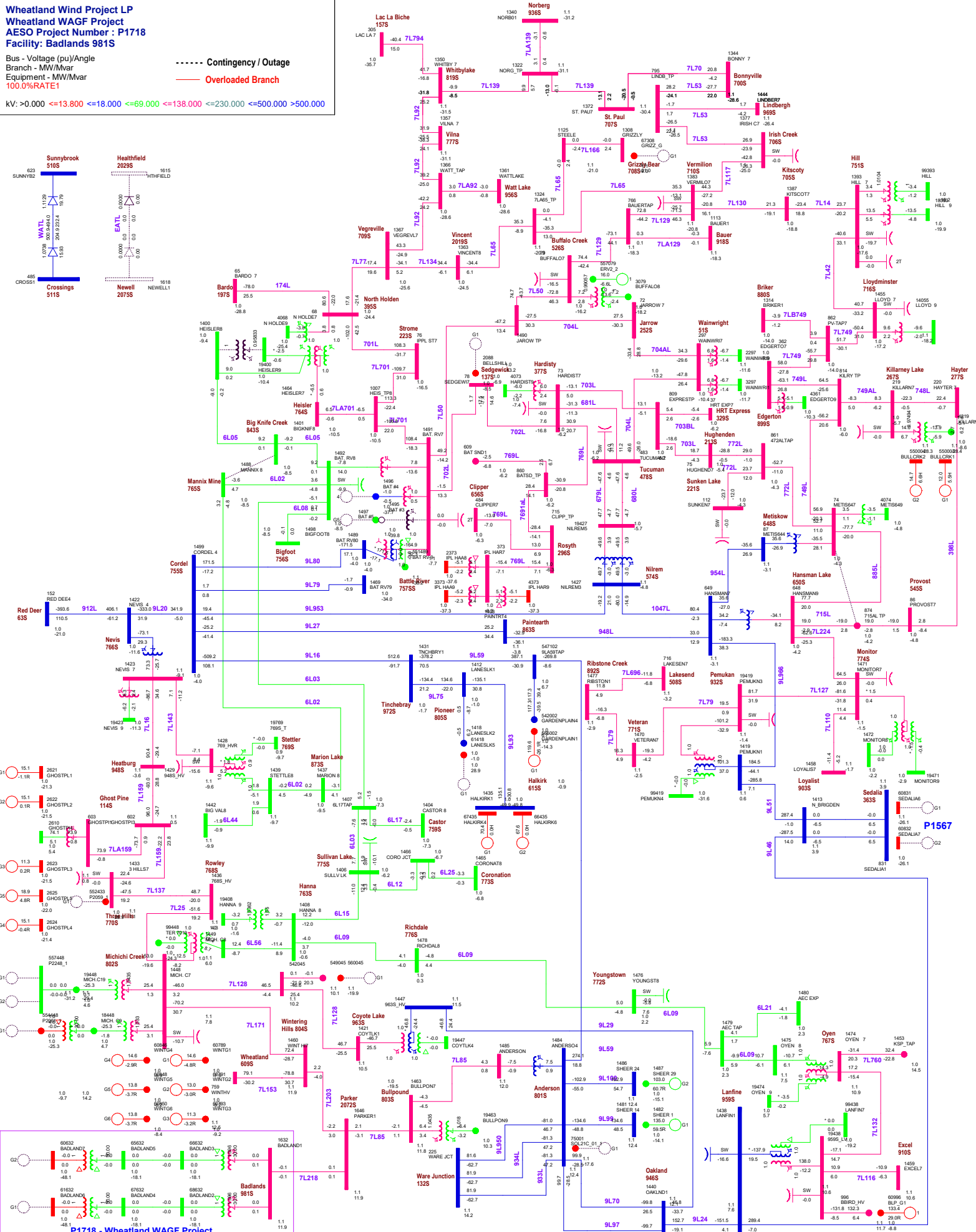


Figure A2-4

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

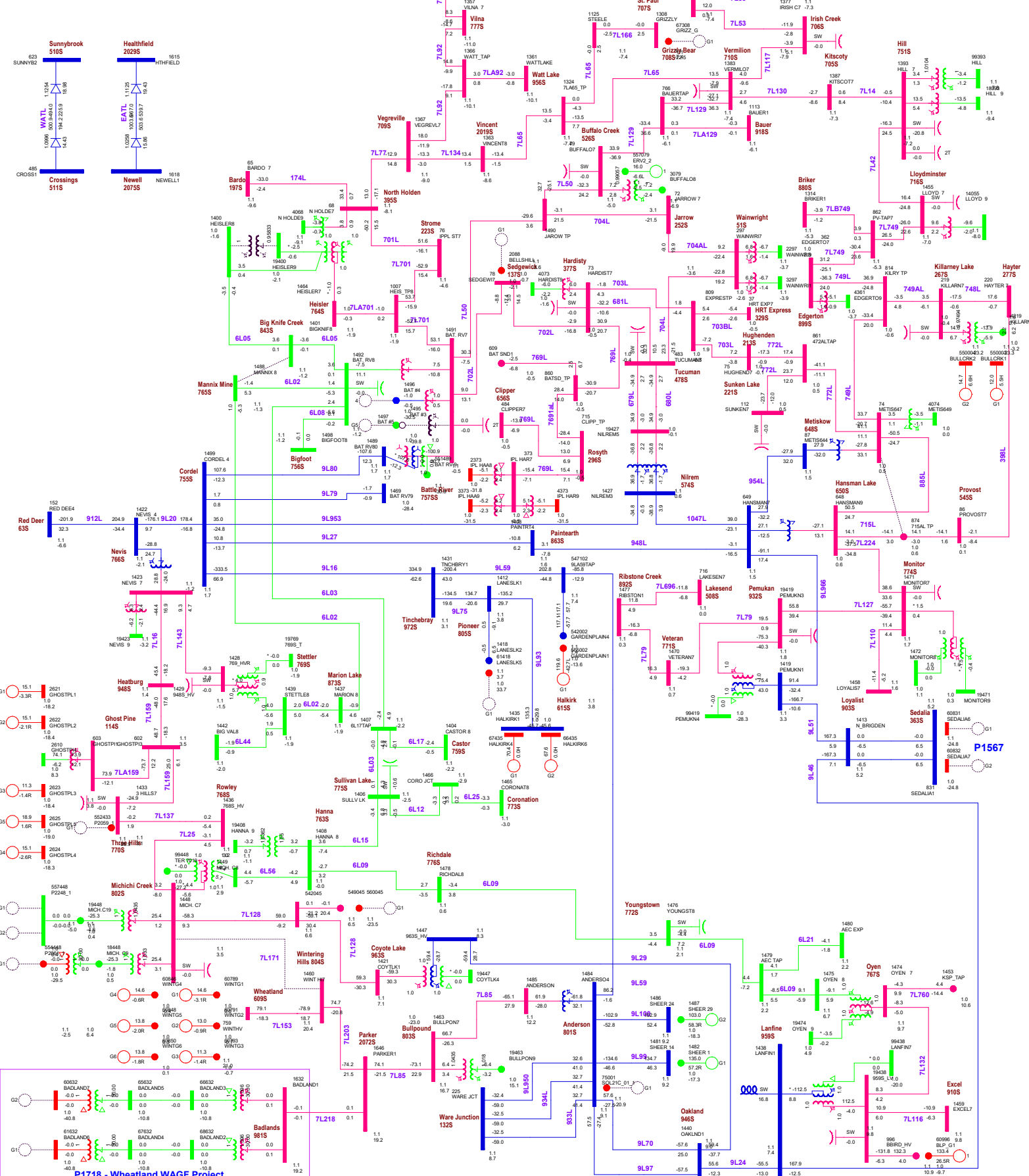


Figure A2-5

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

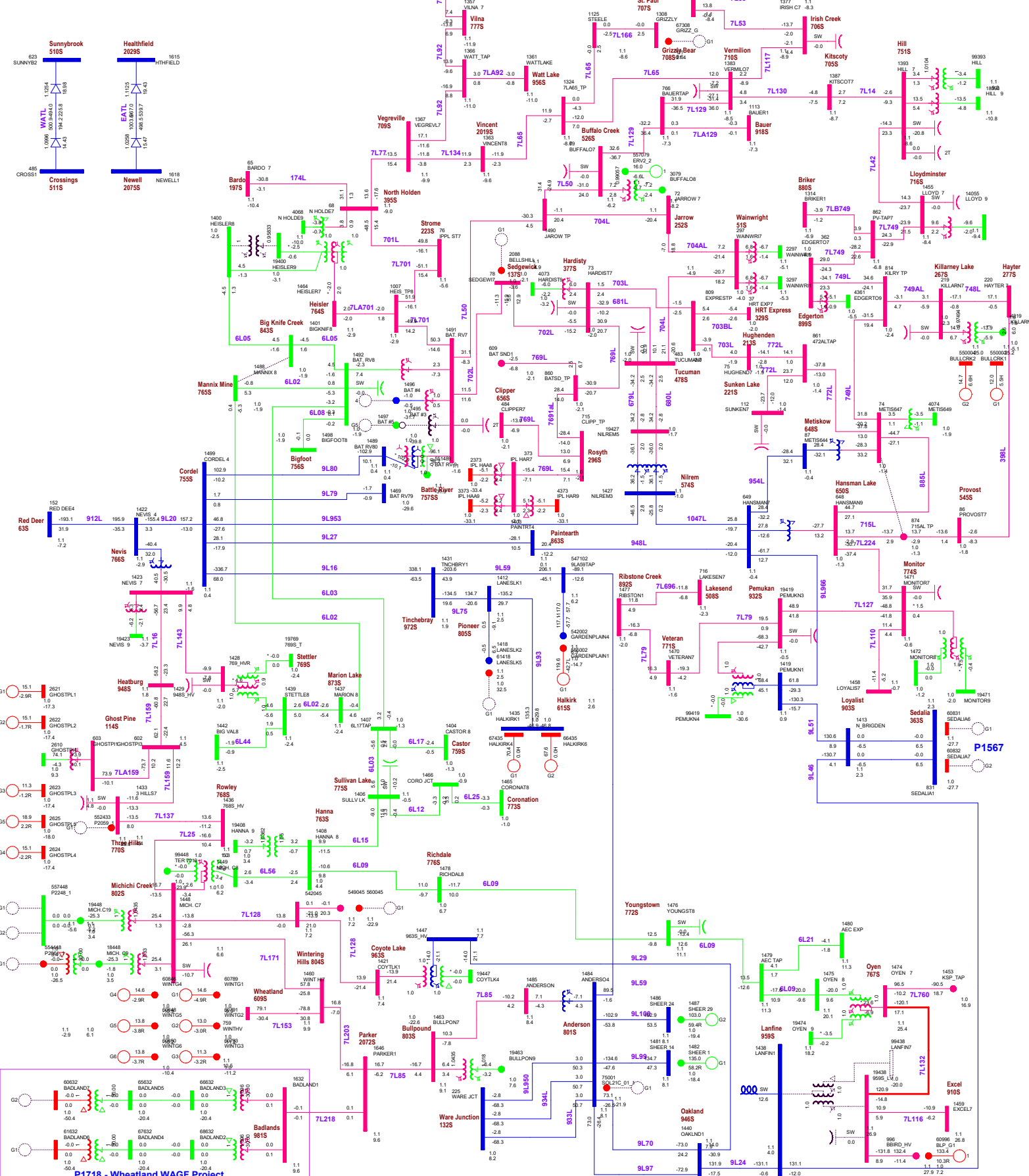


Figure A2-6

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.00 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

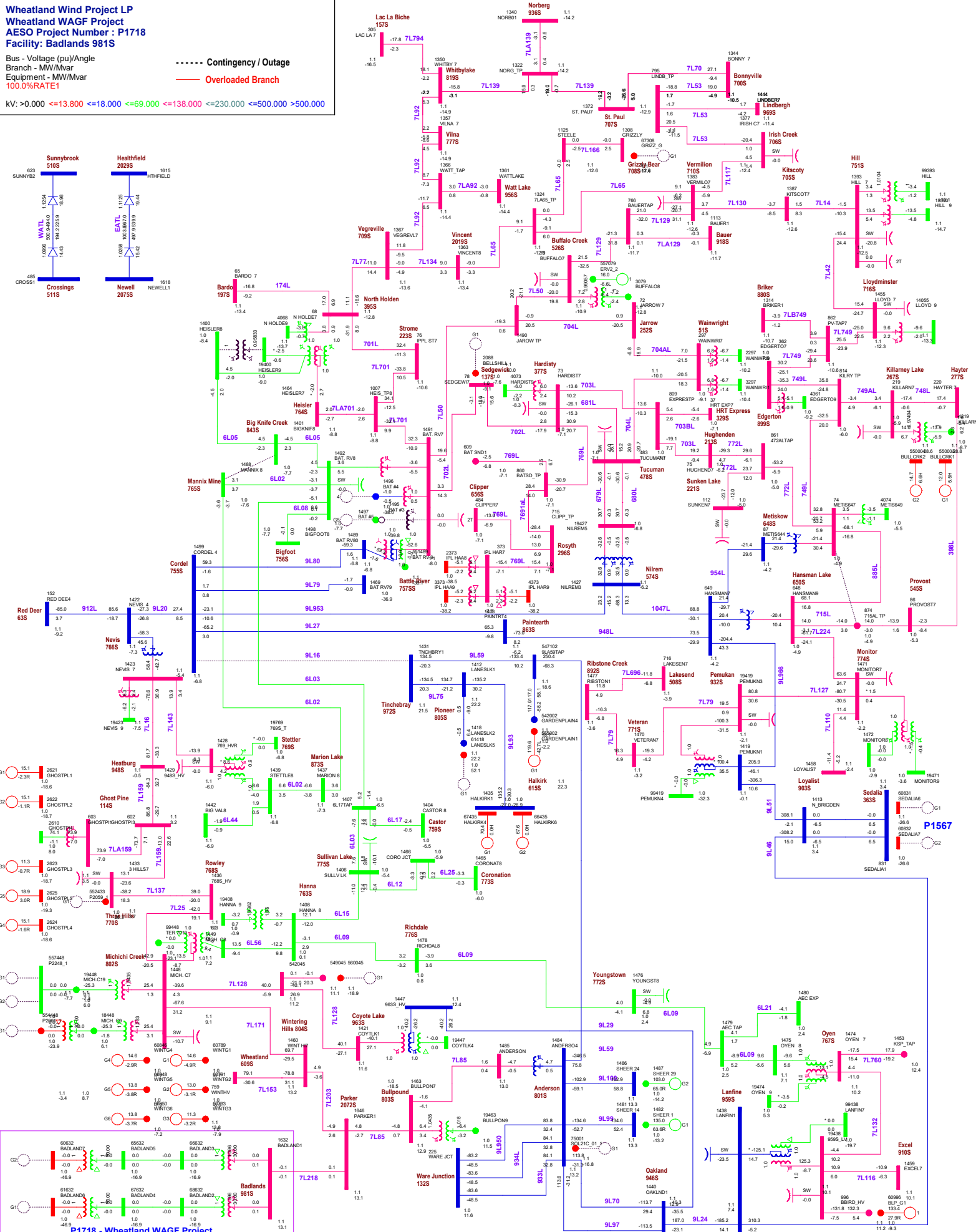


Figure A2-7

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 9815

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

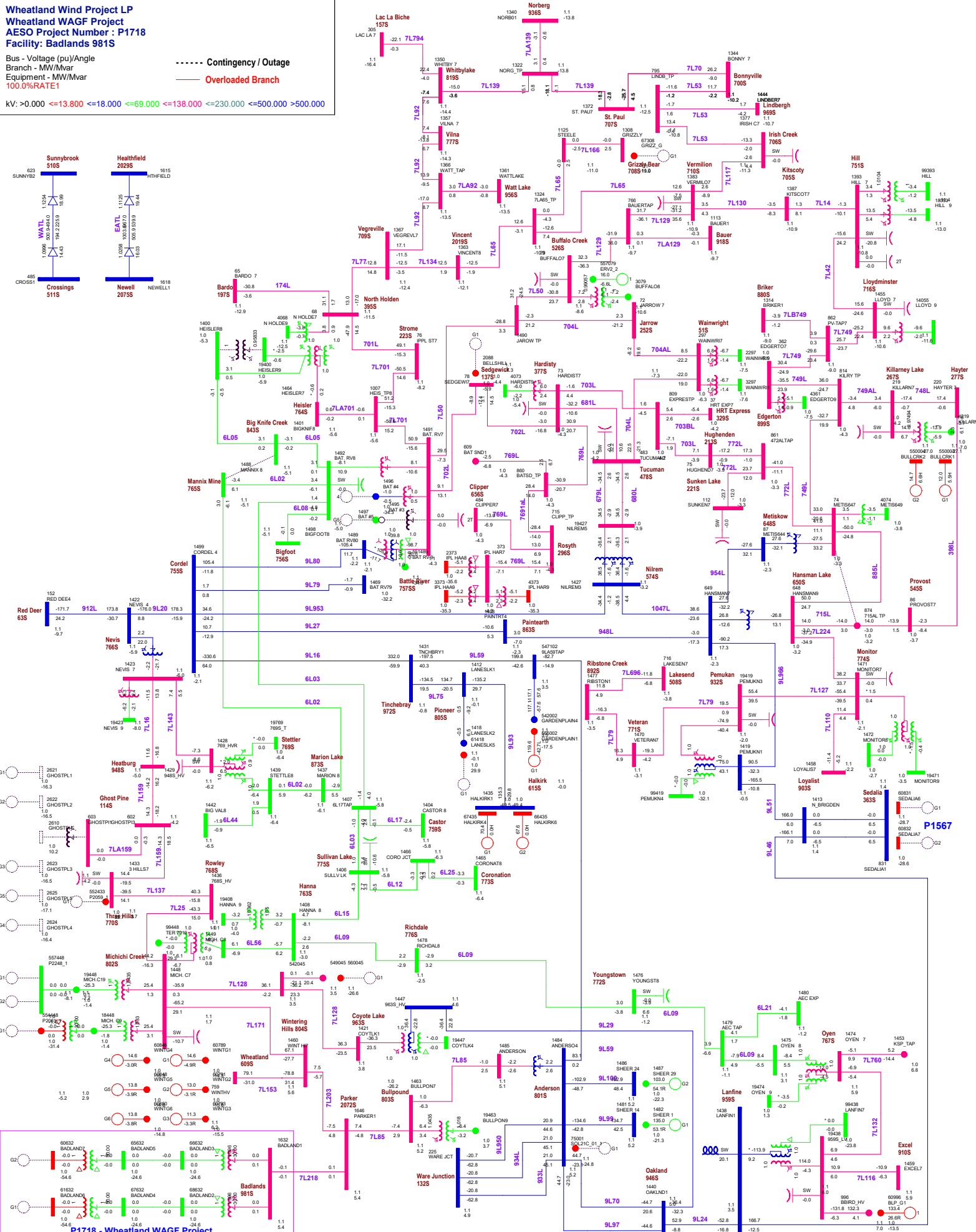


Figure A2-8

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

- - - - - Contingency / Outage
 ——— Overloaded Branch

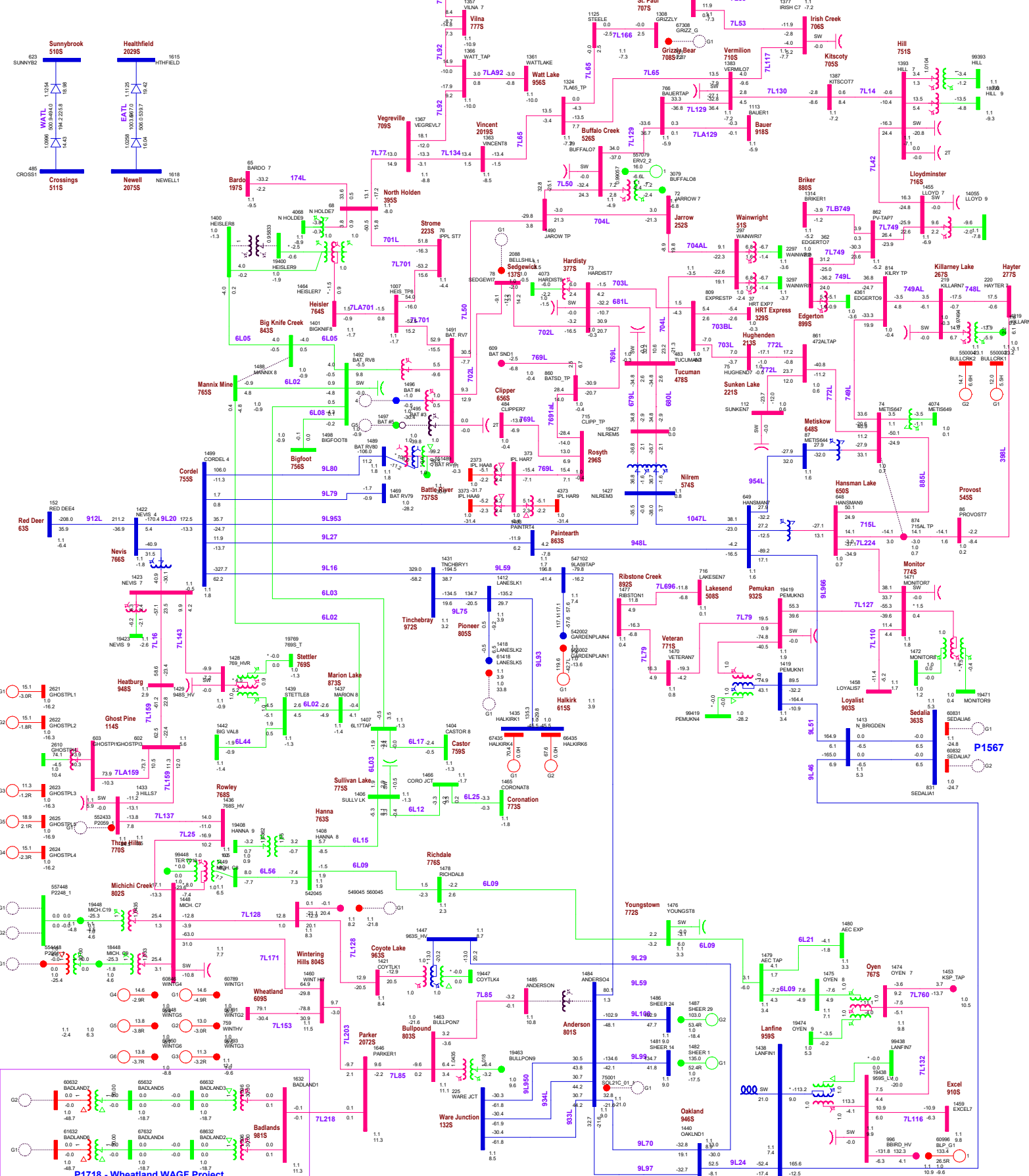


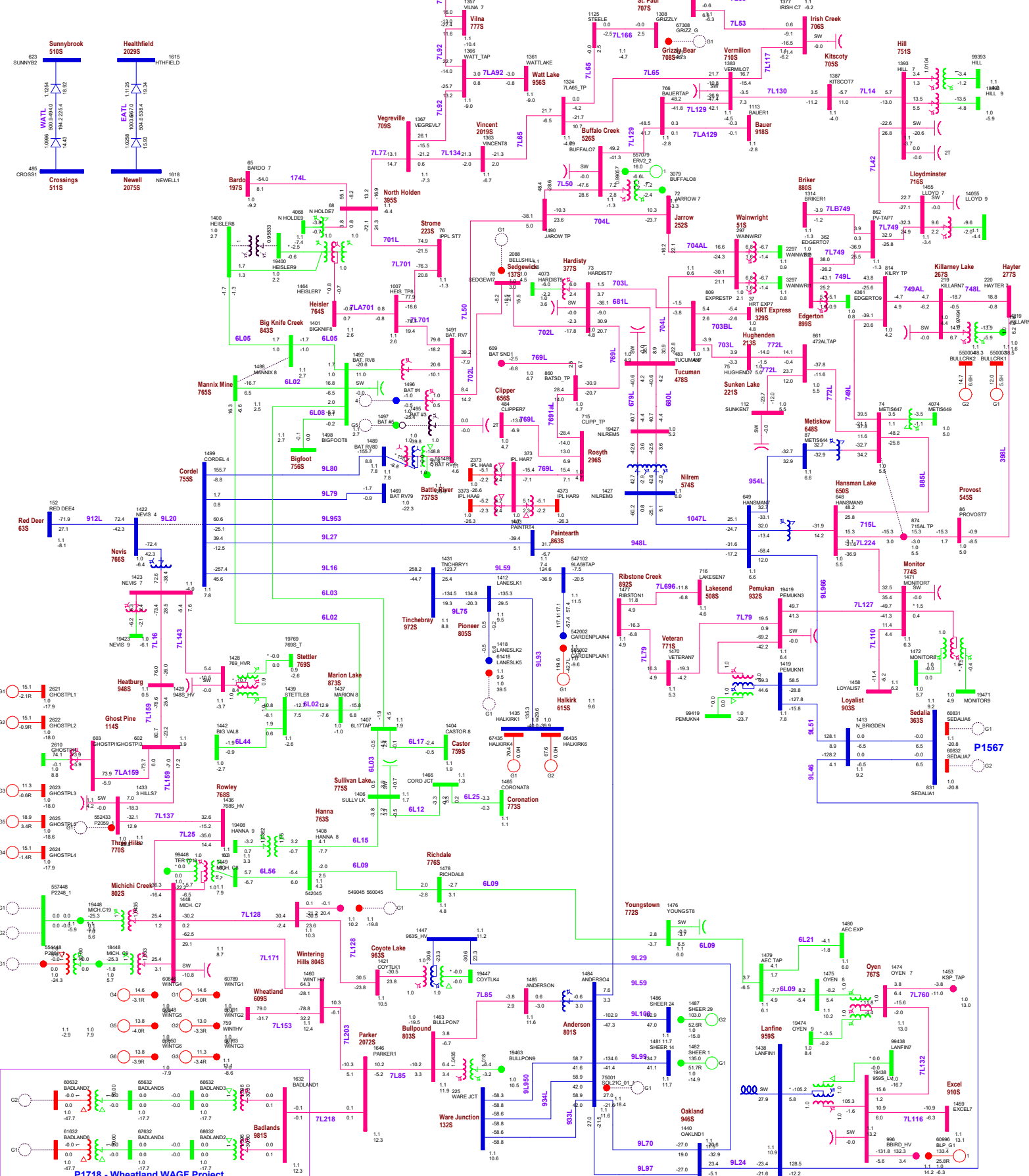
Figure A2-9

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000



Wheatland Wind Project LP
 Wheatland WAGF Project
 AESO Project Number : P1718
 Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 ——— Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

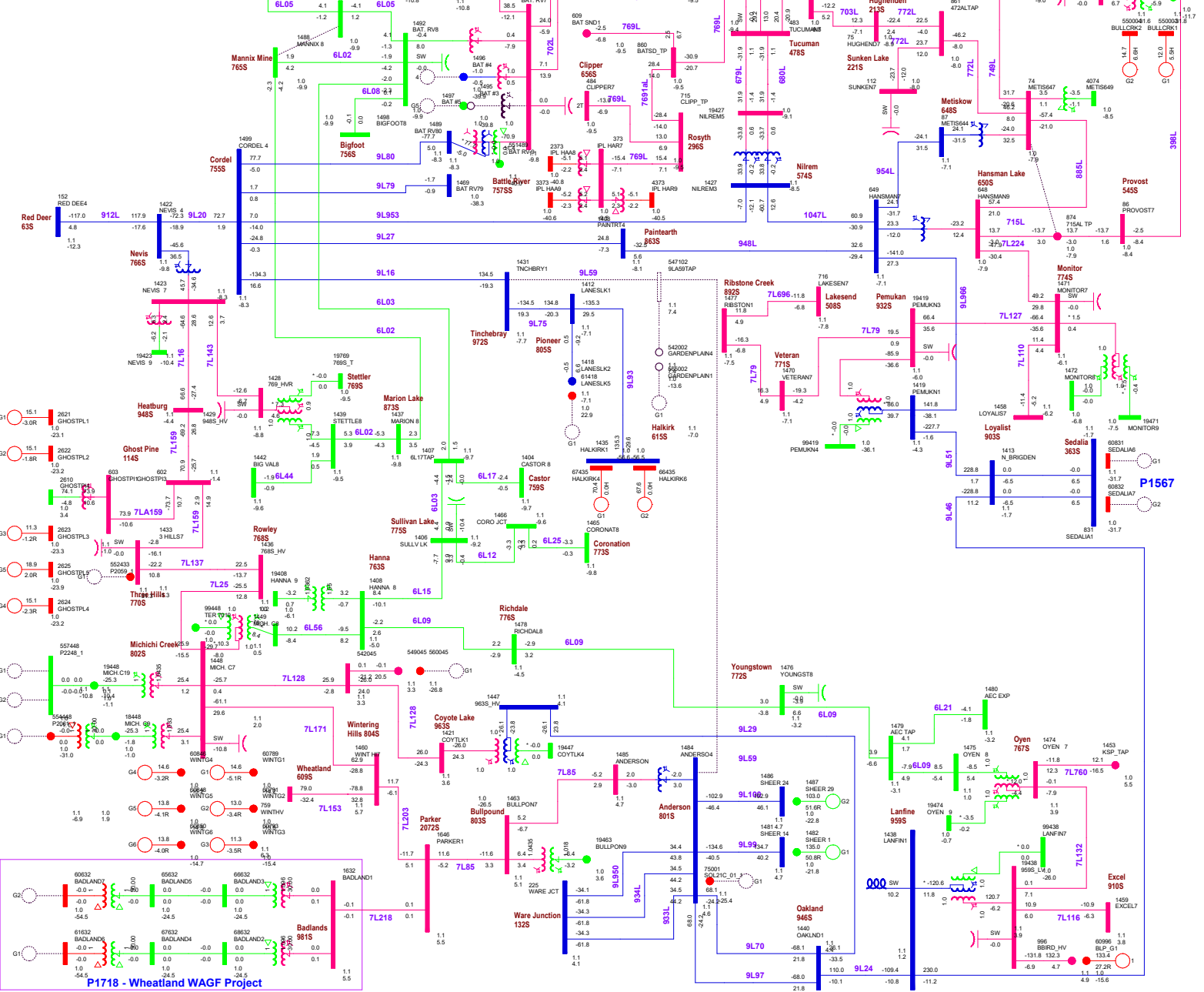
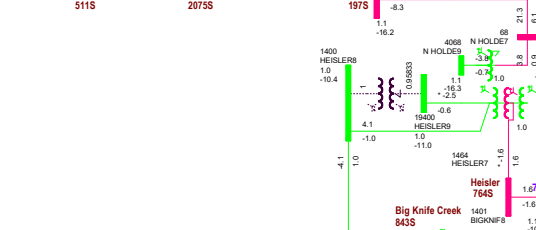
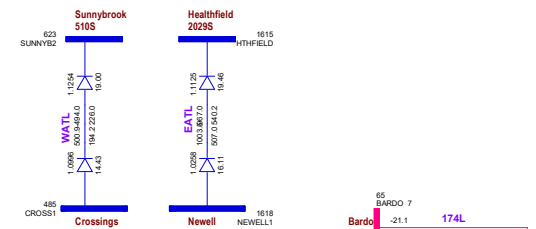


Figure A2-11

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

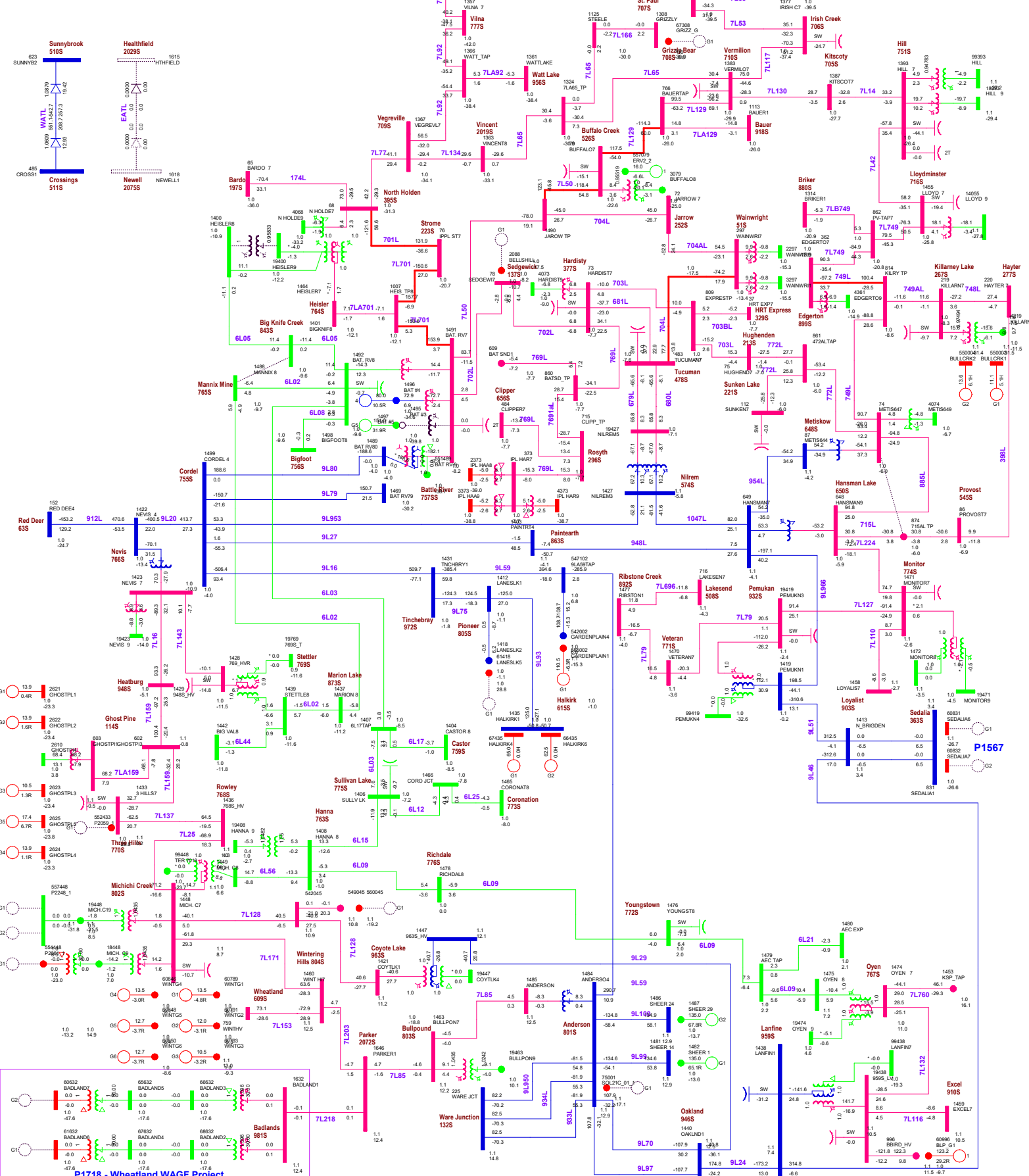


Figure A2-12

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

- - - - - Contingency / Outage
 ——— Overloaded Branch

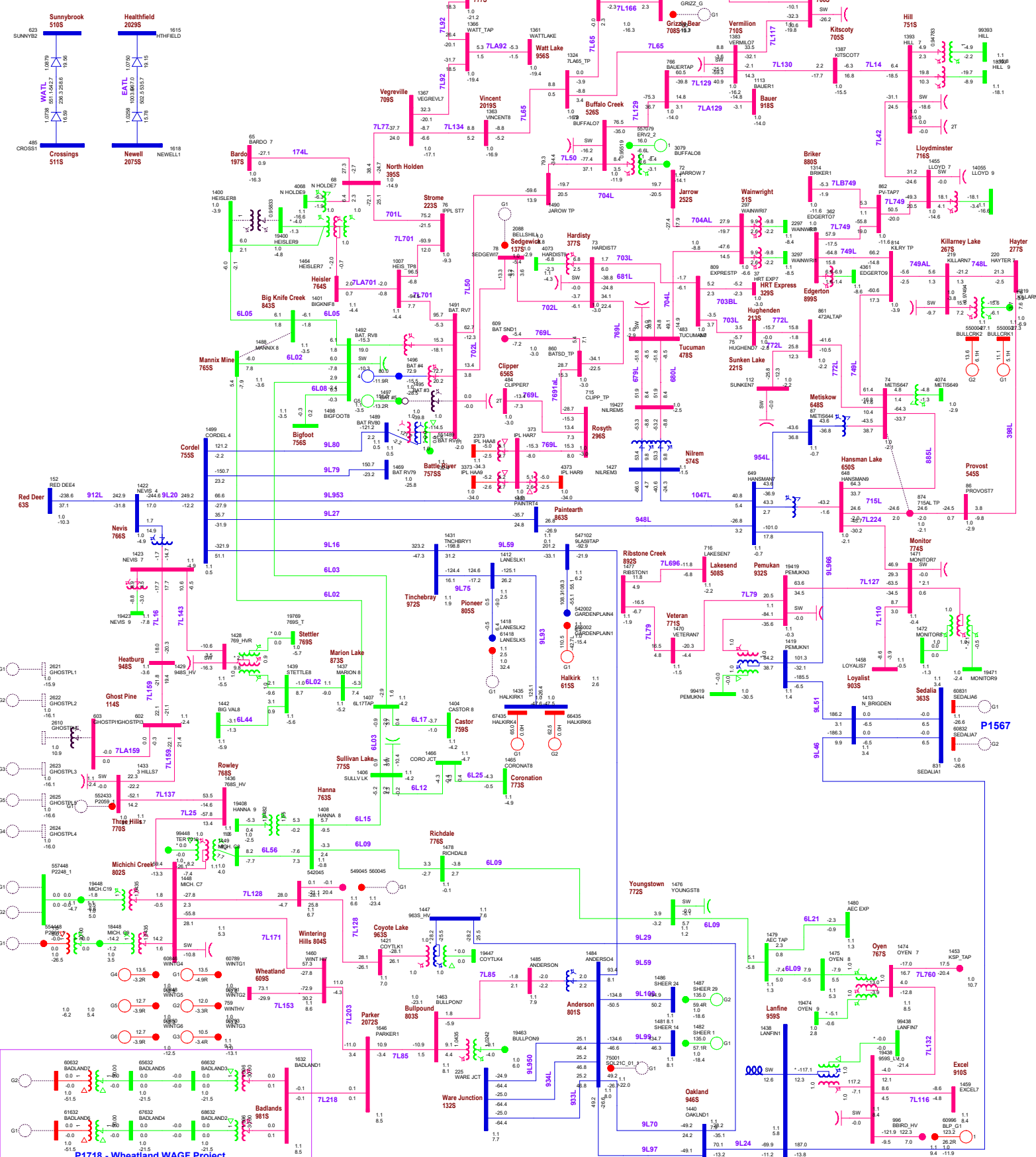


Figure A2-13

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
100.0%RATE1

KV: >0.000 <=18.000 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

- - - - - Contingency / Outage
 ——— Overloaded Branch

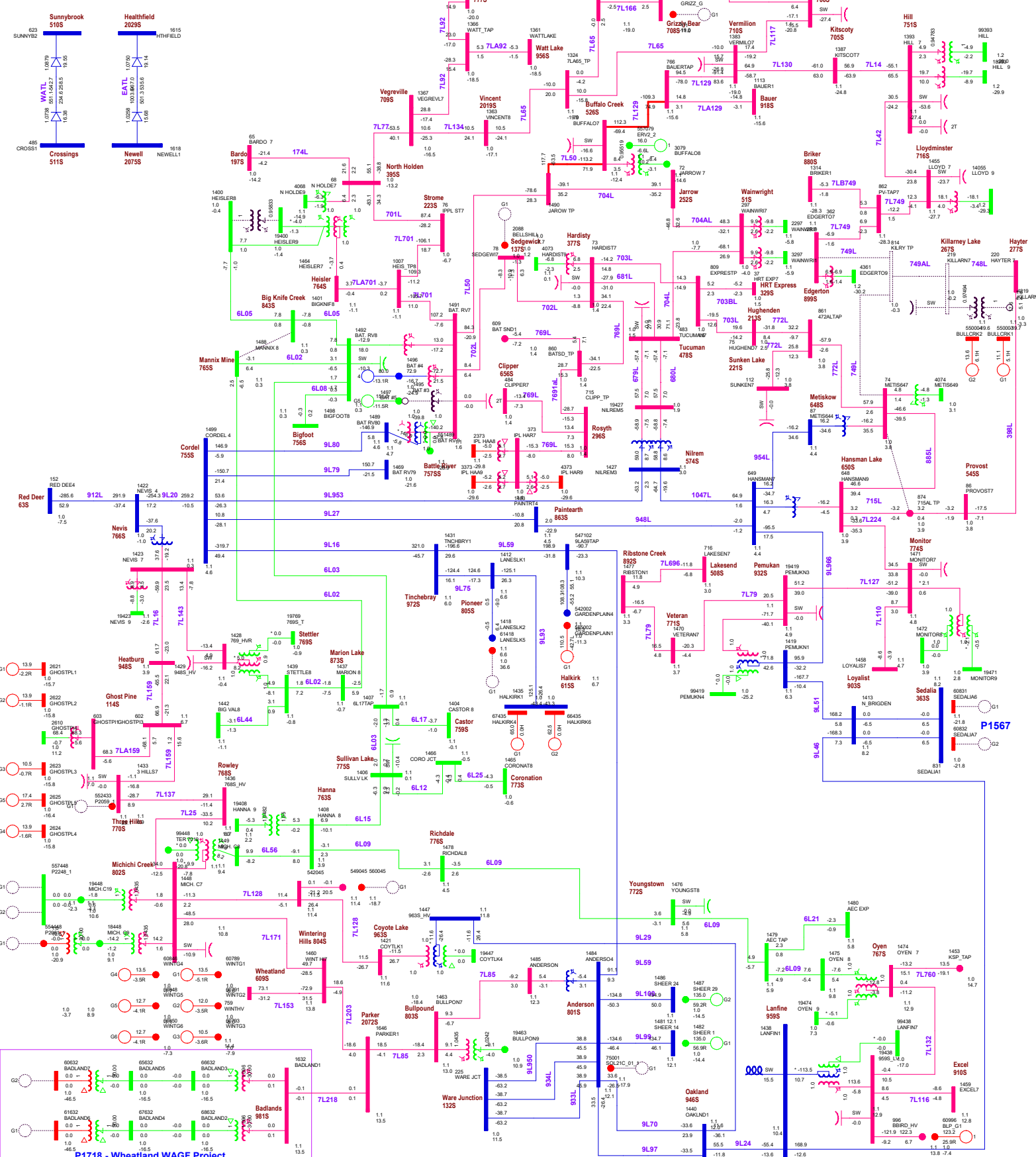


Figure A2-14

P1718 - Wheatland WAGF Project

Wheatland Wind Project LP
Branch - MW/WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=18.000 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

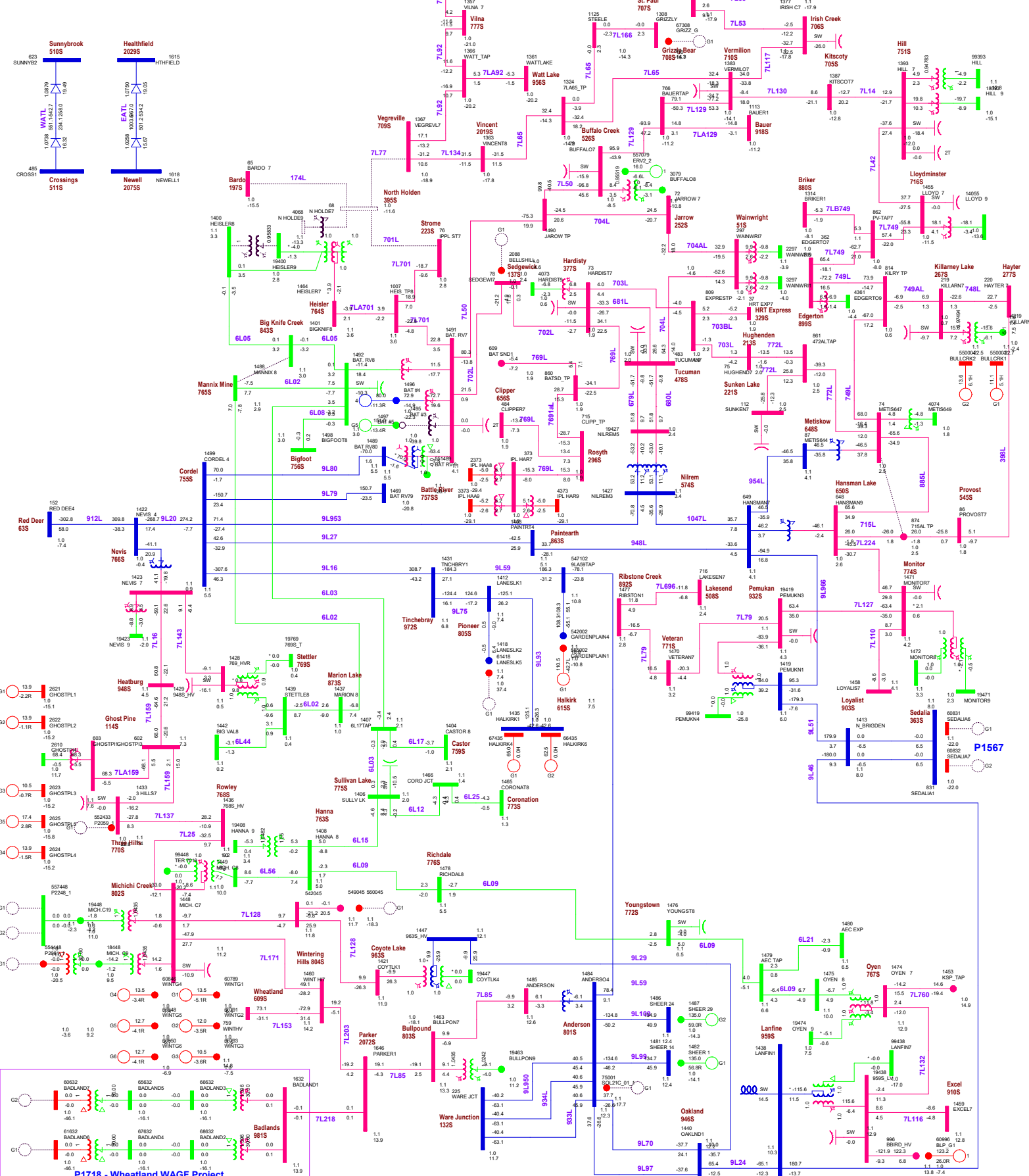


Figure A2-15

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

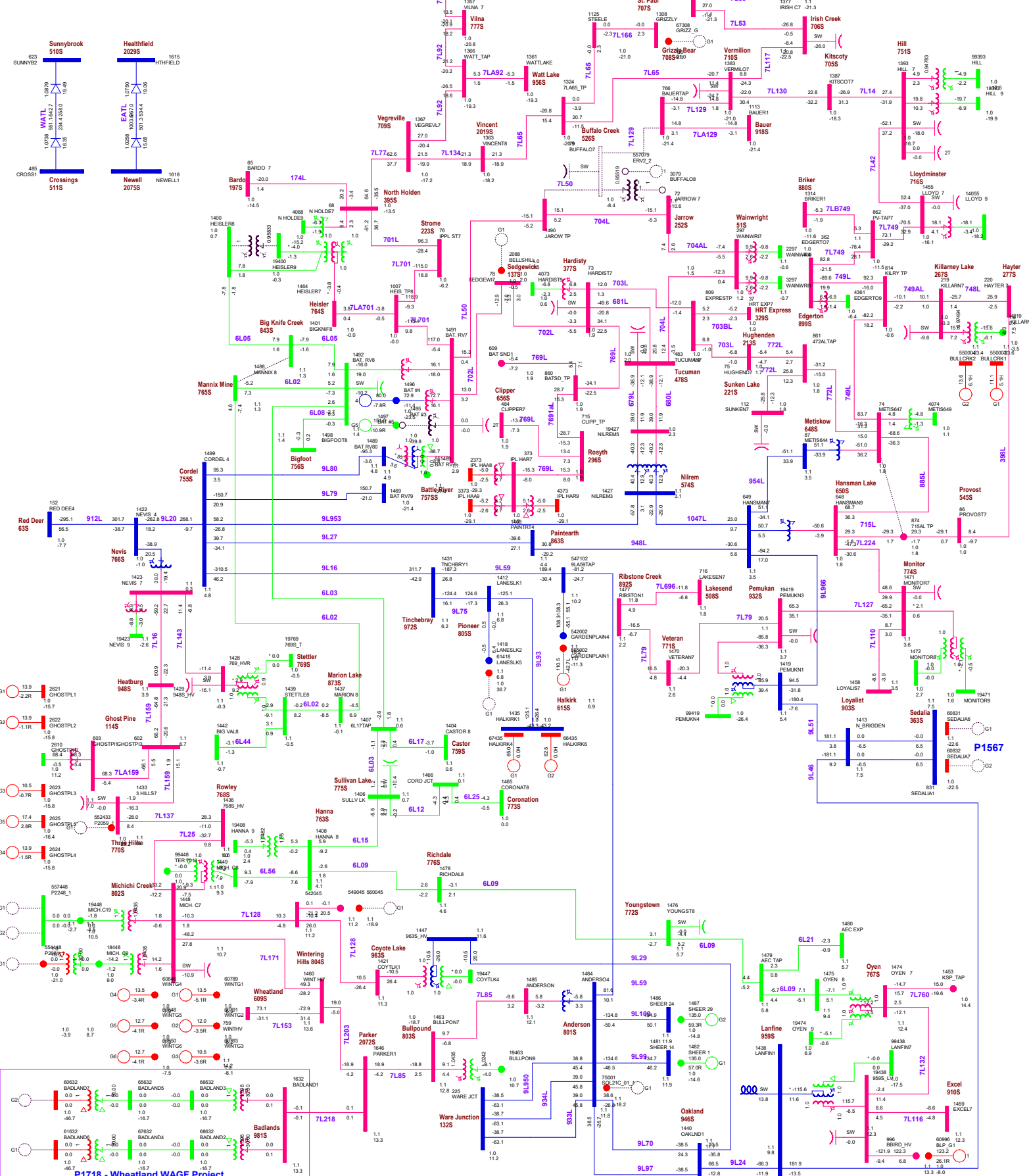


Figure A2-16

Wheatland Wind Project LP Branch - MW/Mvar AESO Project Number : P1718 Facility: Badlands 981S

Bus - Voltage (pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATE1

KV: >0.000 <=18.000 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
----- Overloaded Branch

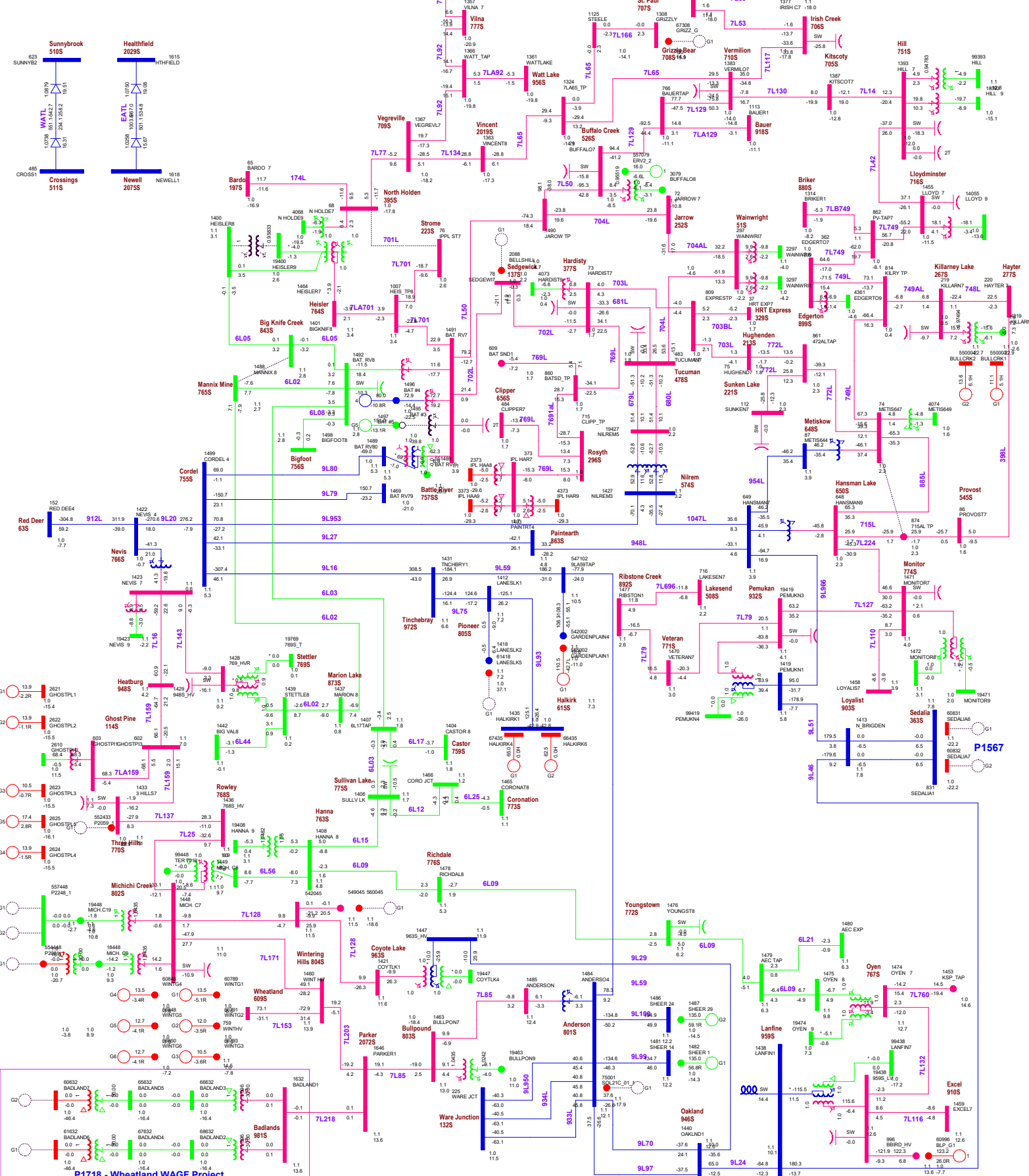


Figure A2-17

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

- - - - - Contingency / Outage
 ——— Overloaded Branch

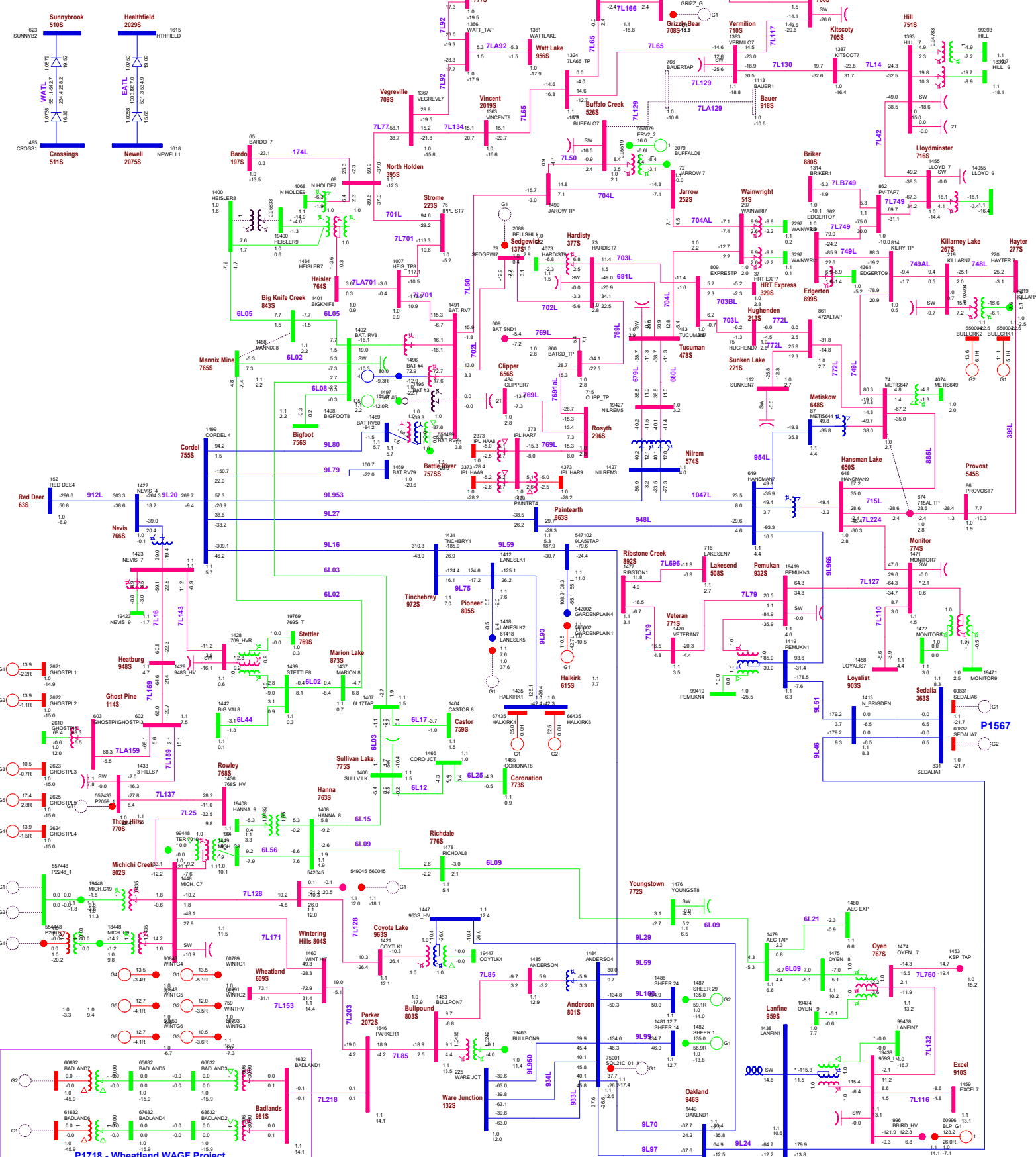


Figure A2-18

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 ——— Overloaded Branch

KV: >0.000 <=18.000 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

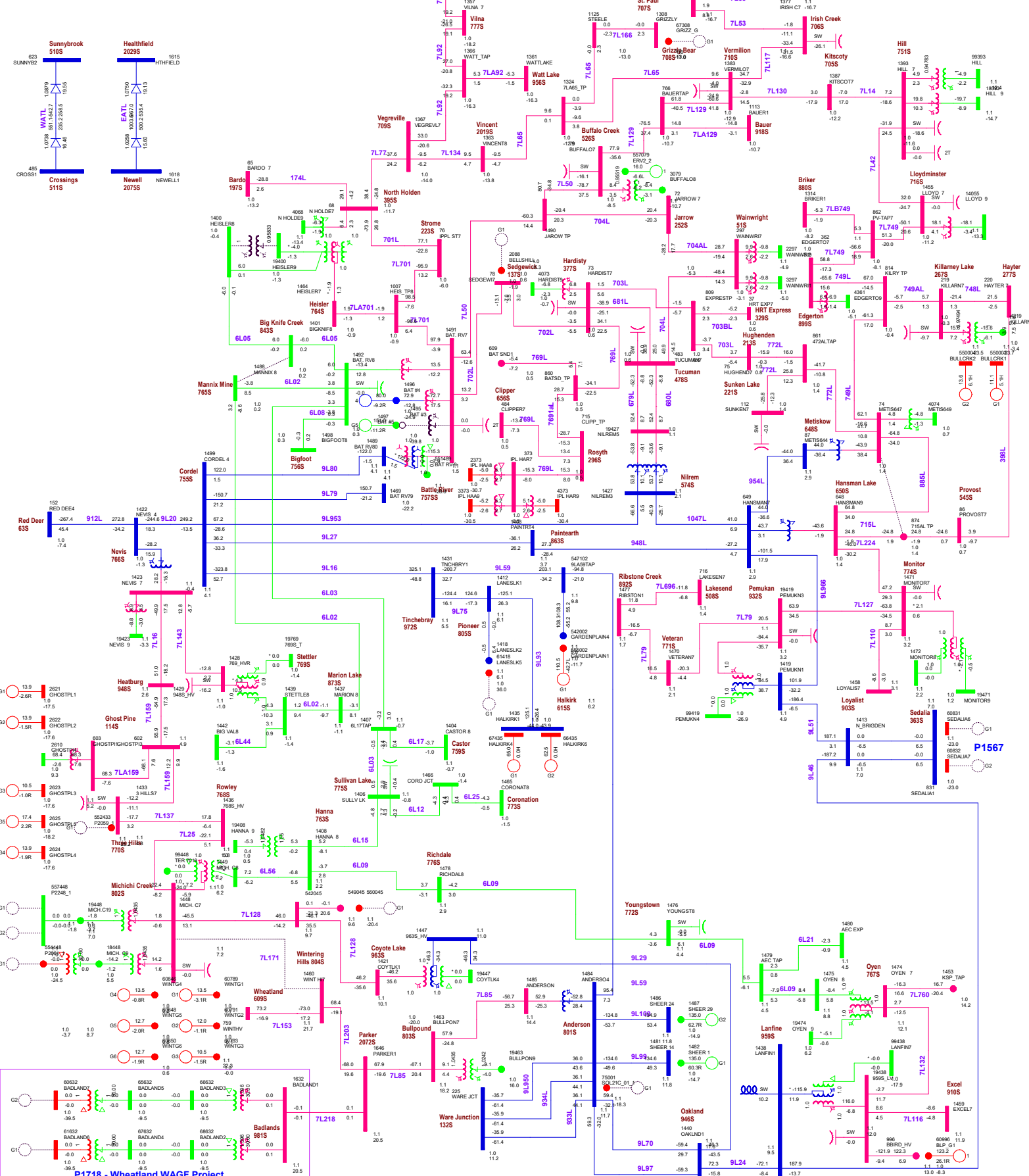


Figure A2-19

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

- - - - - Contingency / Outage
 ——— Overloaded Branch

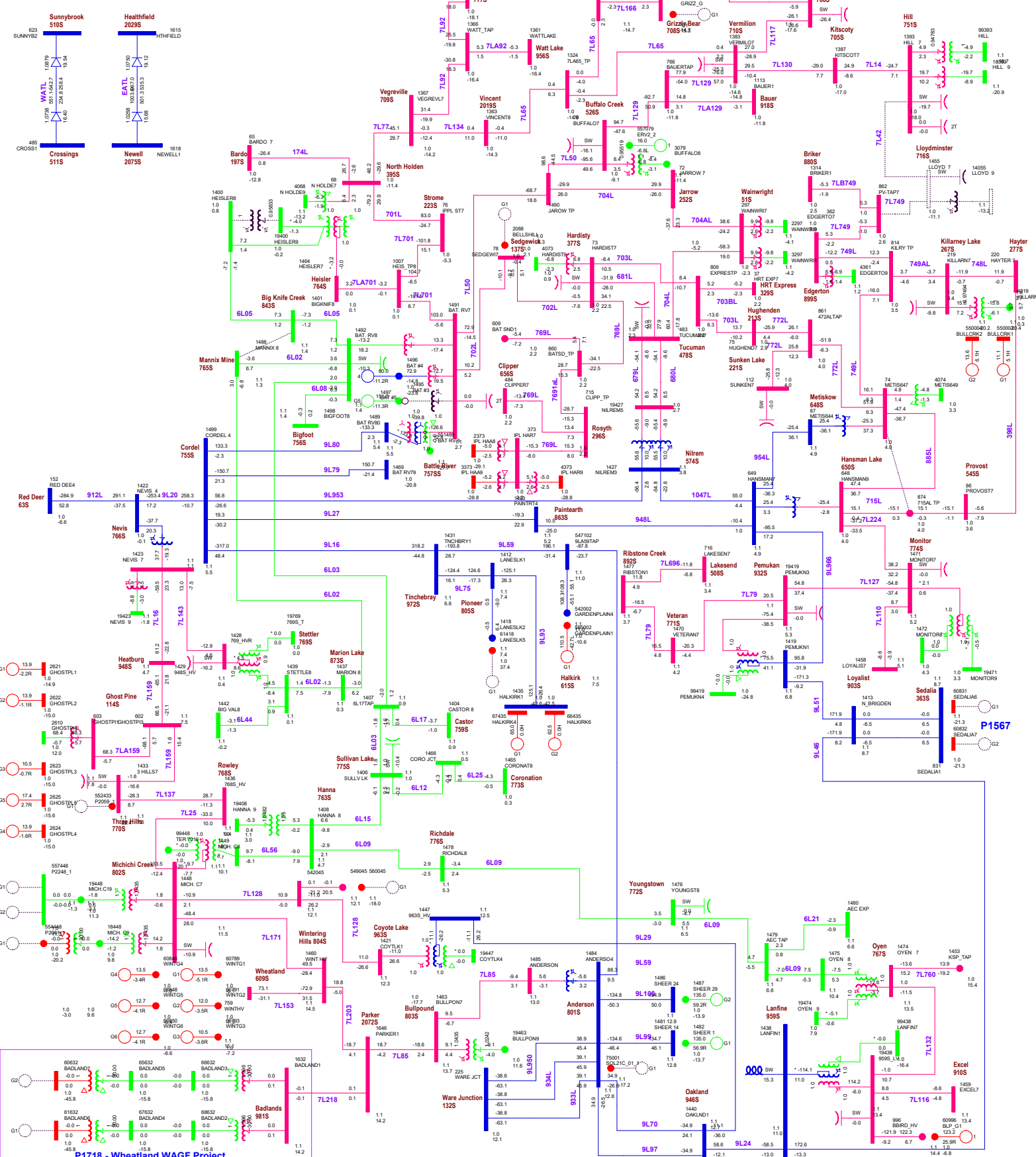


Figure A2-20

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

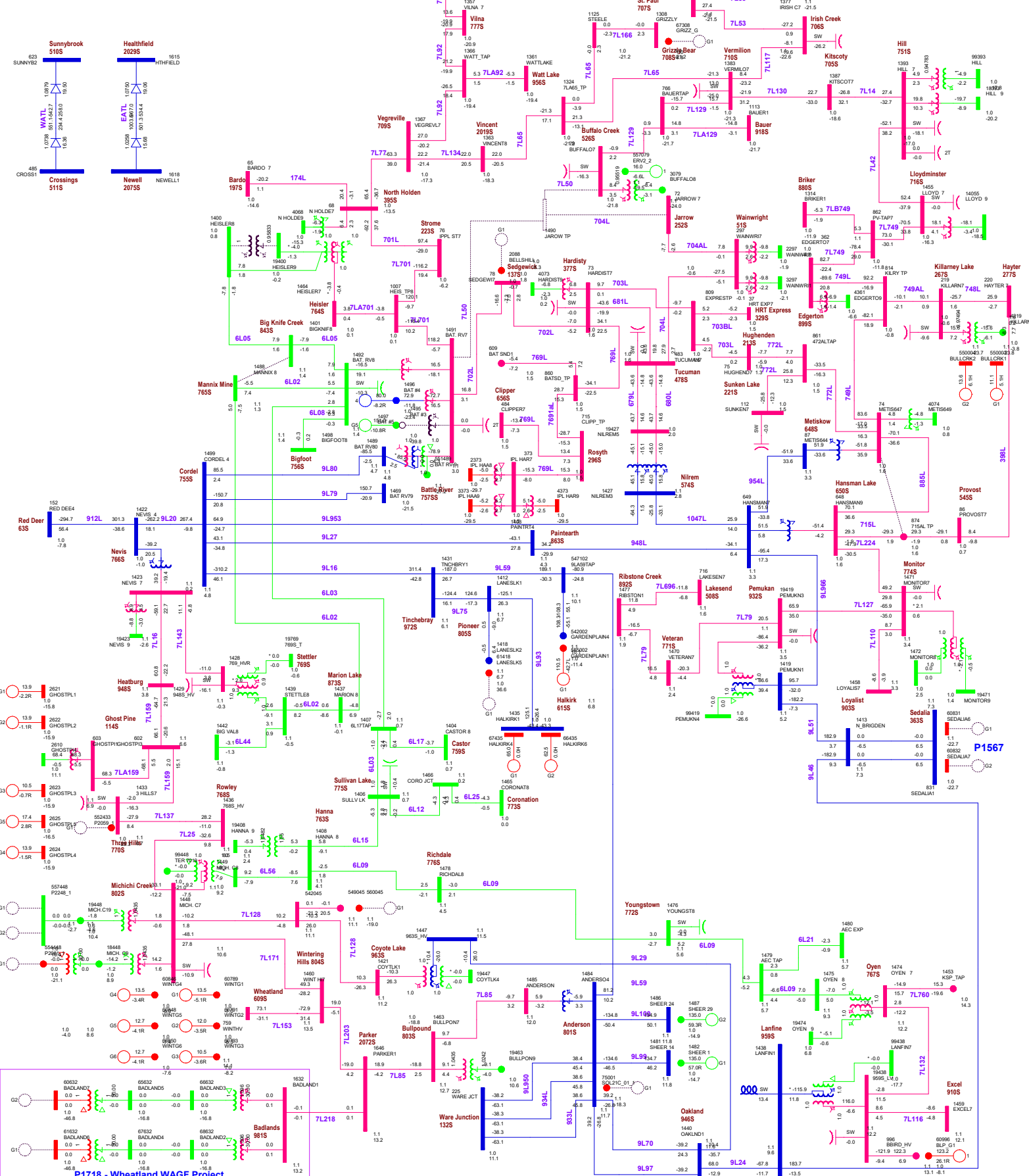


Figure A2-21

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

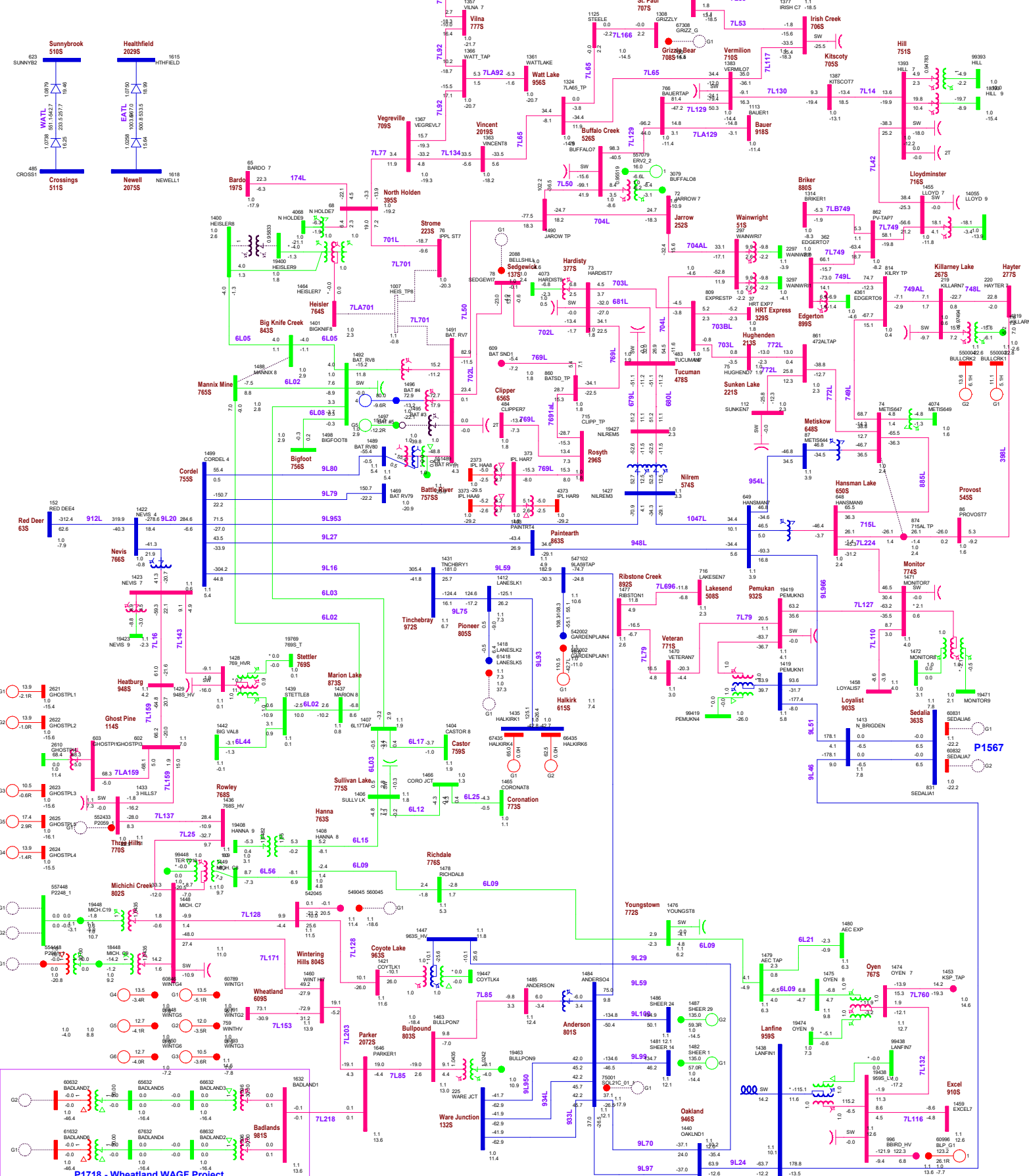


Figure A2-22

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

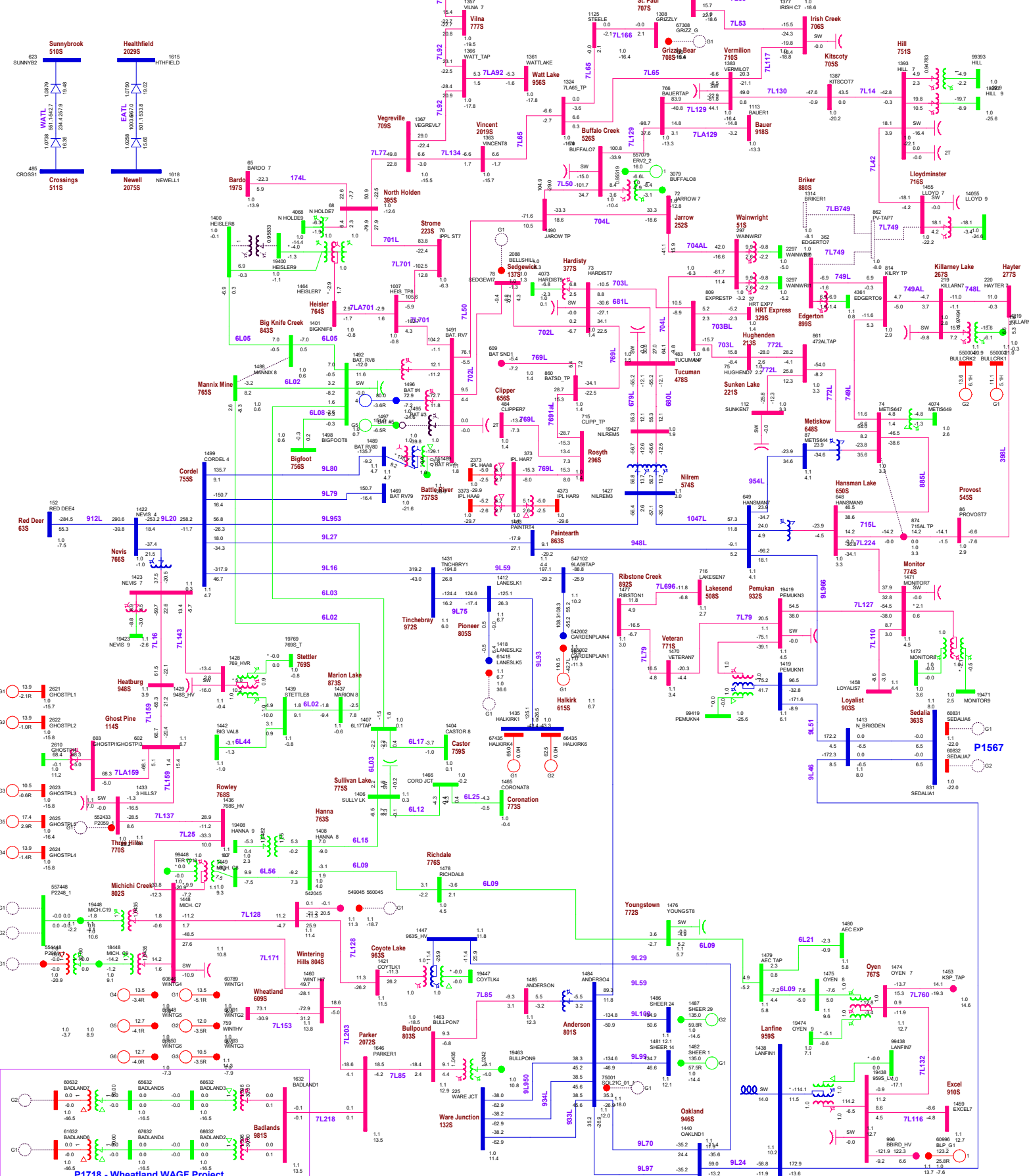


Figure A2-23

Wheatland Wind Project LP
Whitland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=18.000 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

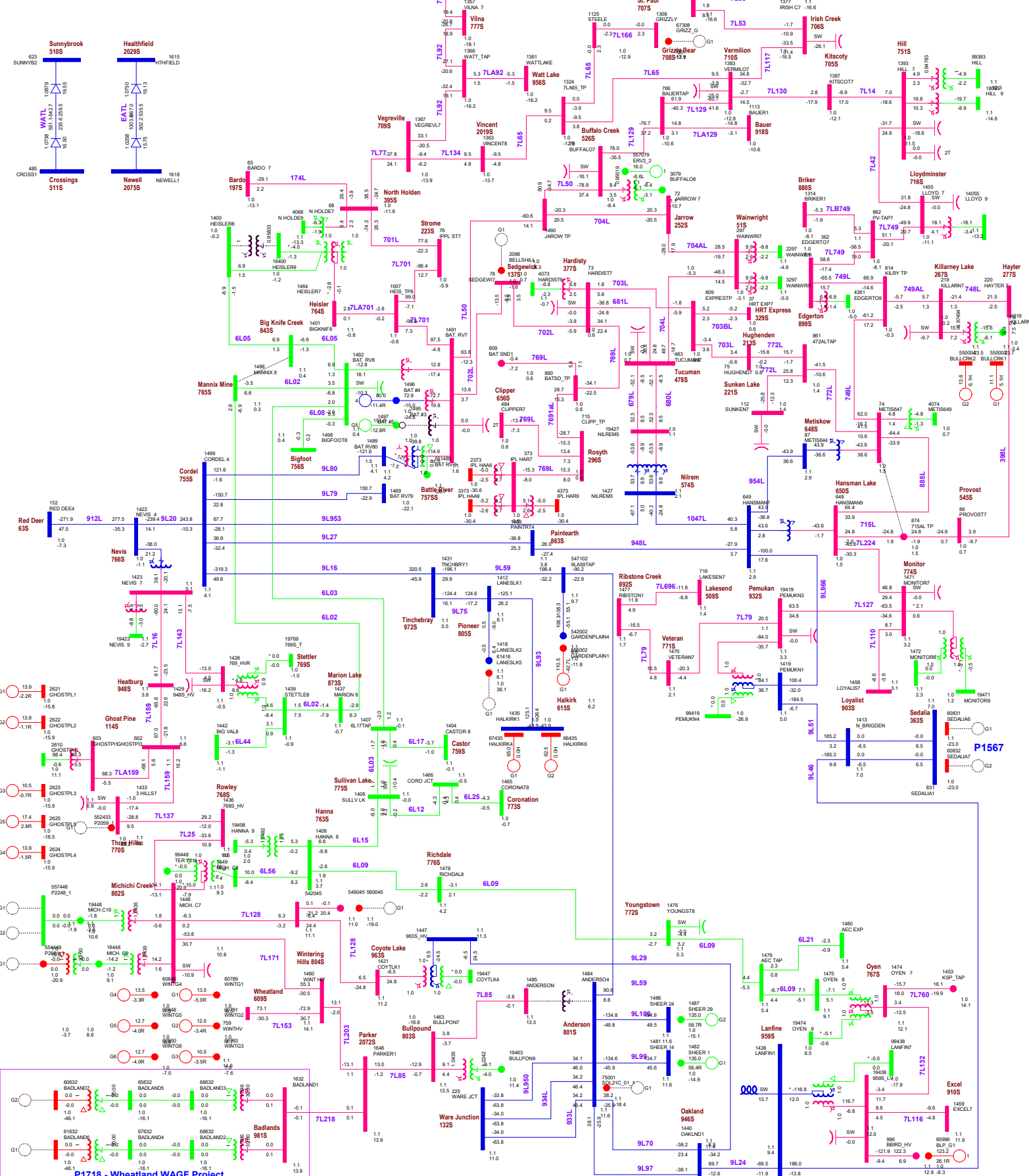


Figure A2-24

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=18.000 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

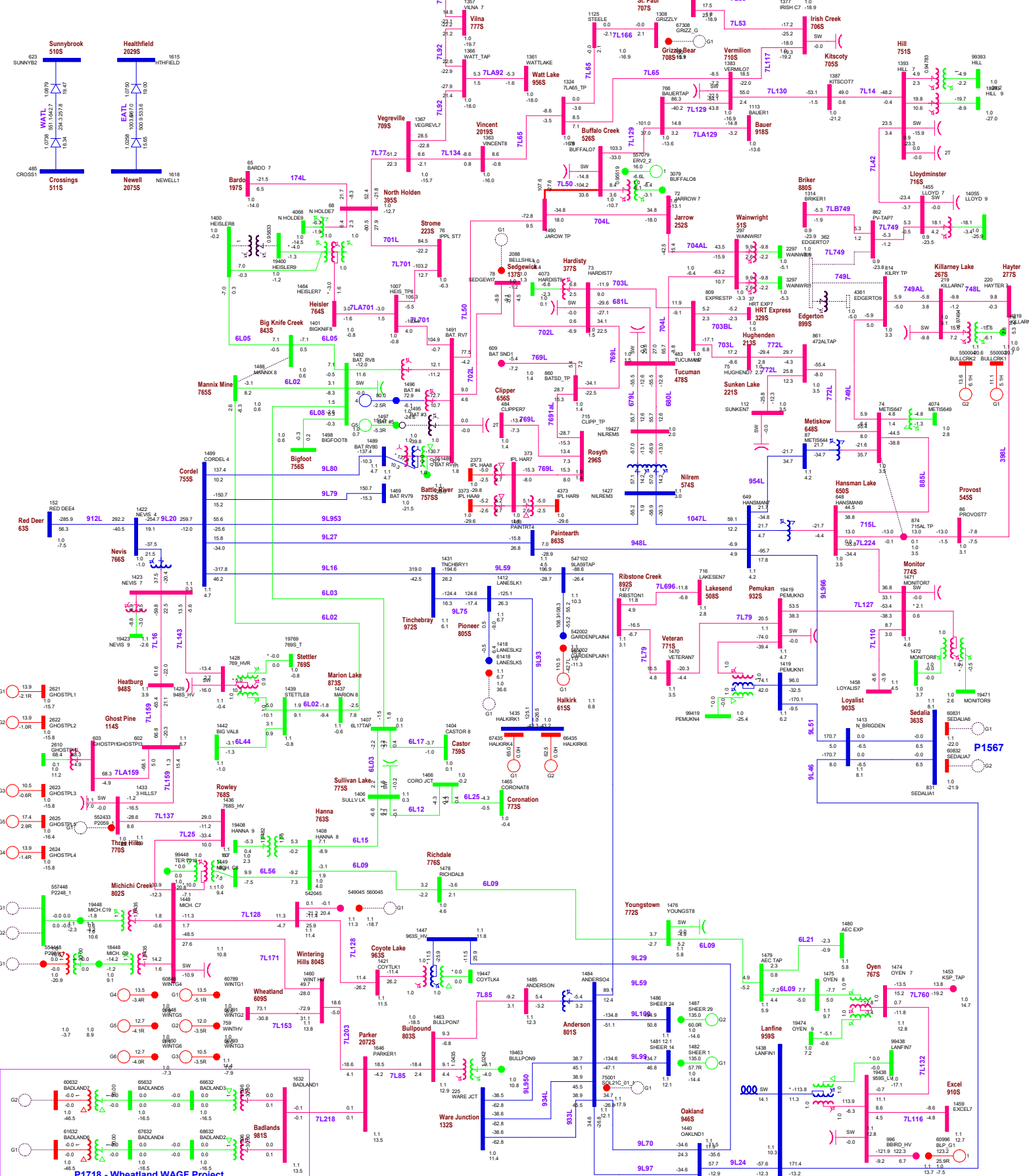


Figure A2-25

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

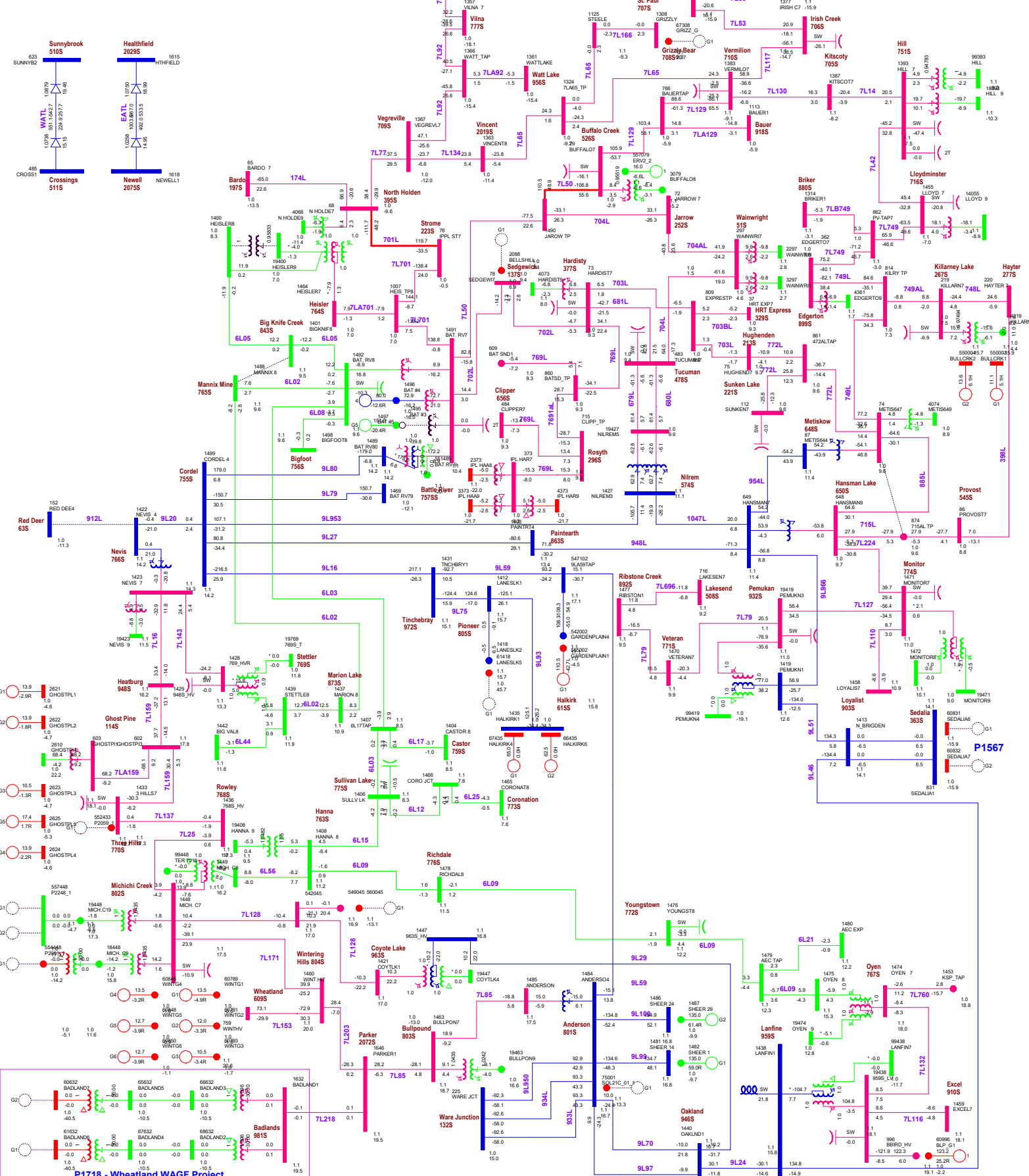


Figure A2-26

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=18.000 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

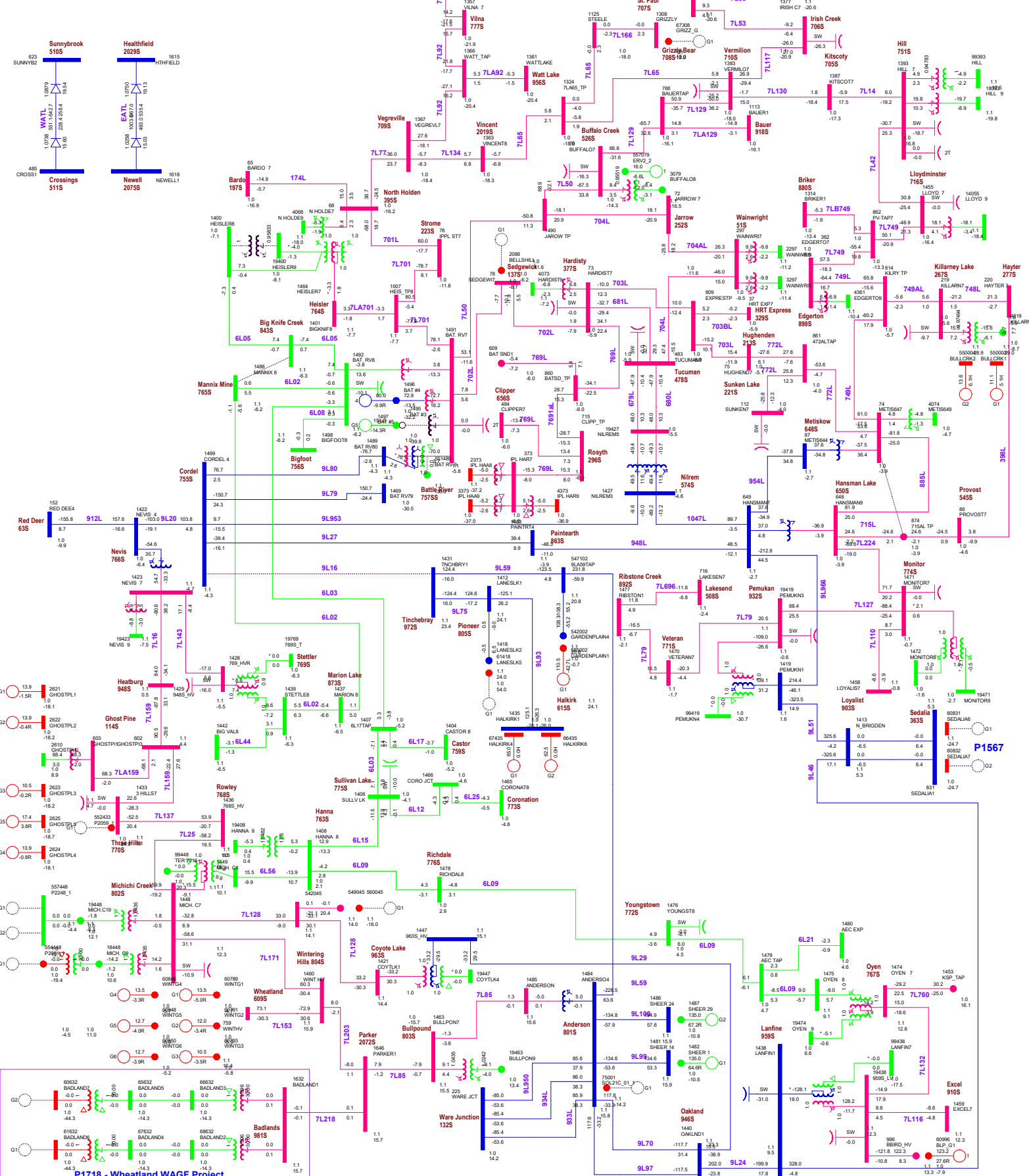


Figure A2-12

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

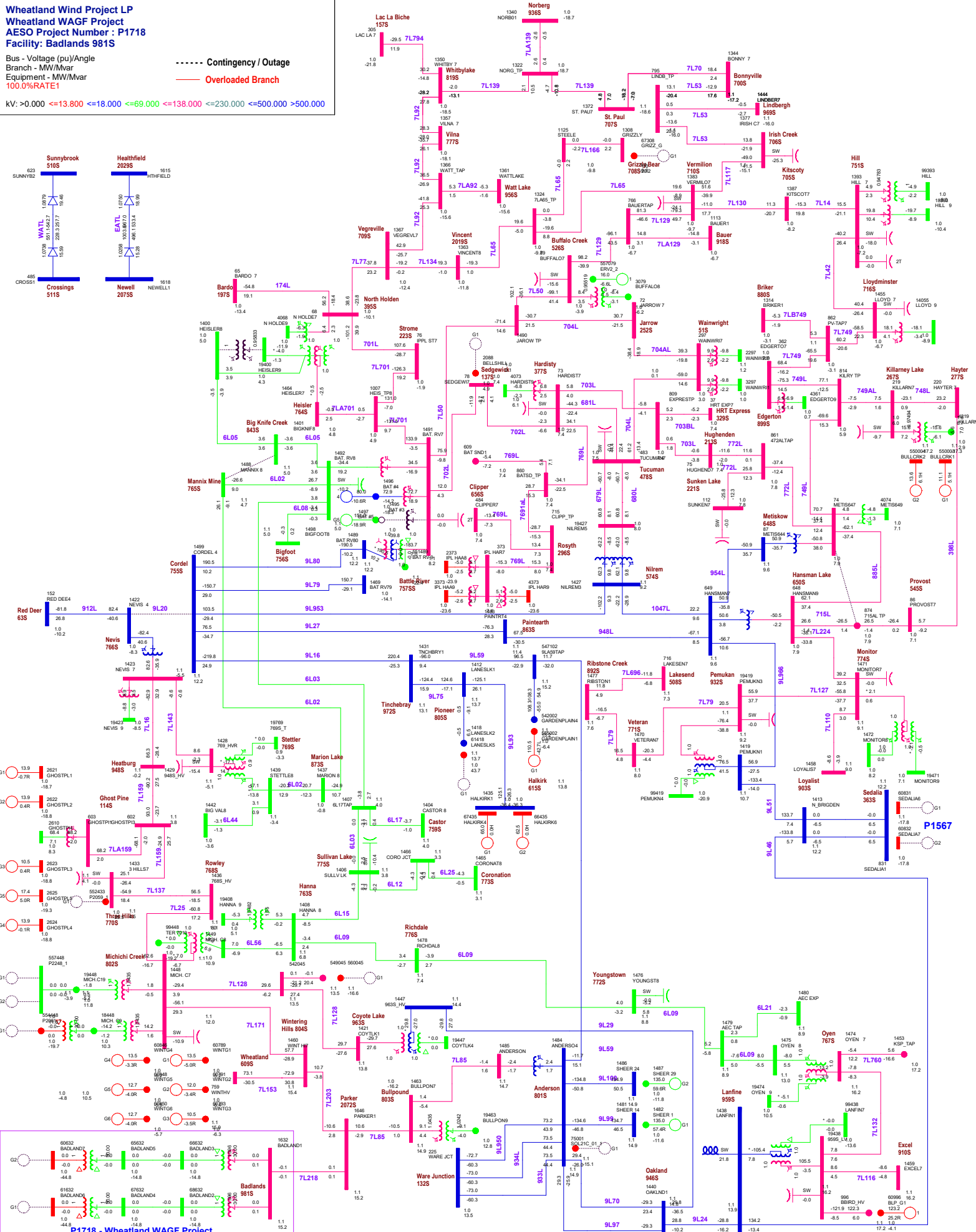


Figure A2-28

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

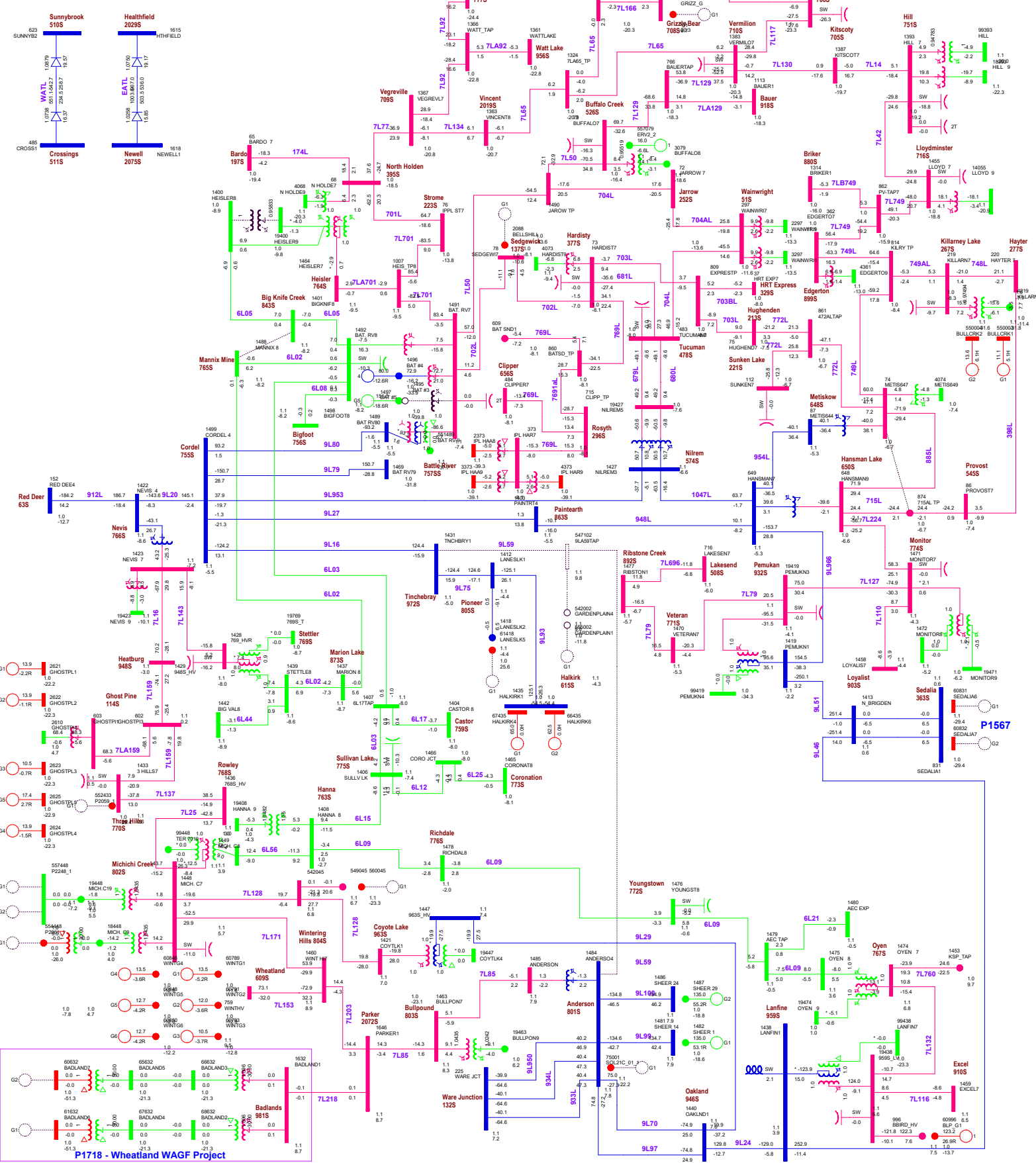


Figure A2-29

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=18.000 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

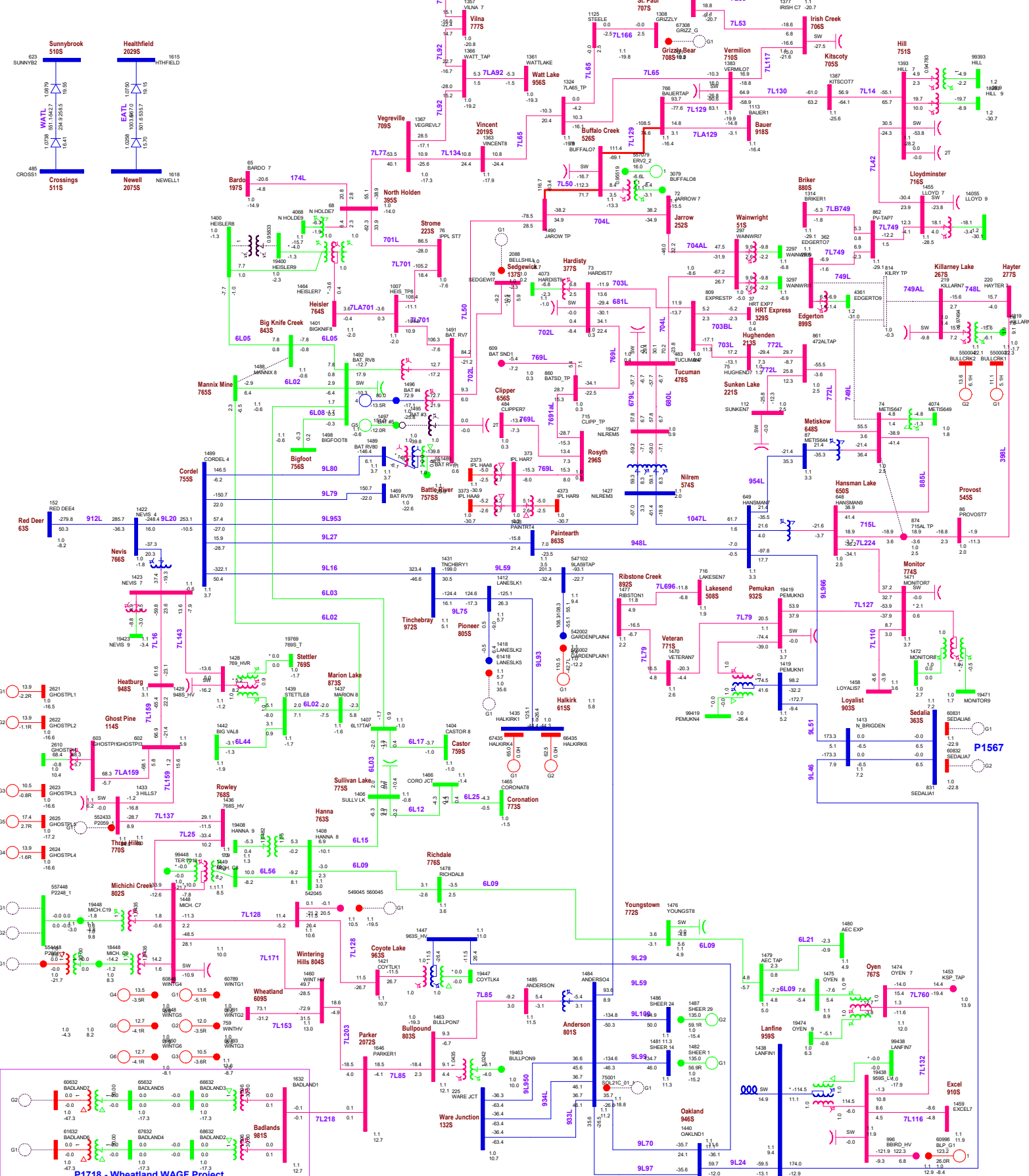


Figure A2-30

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

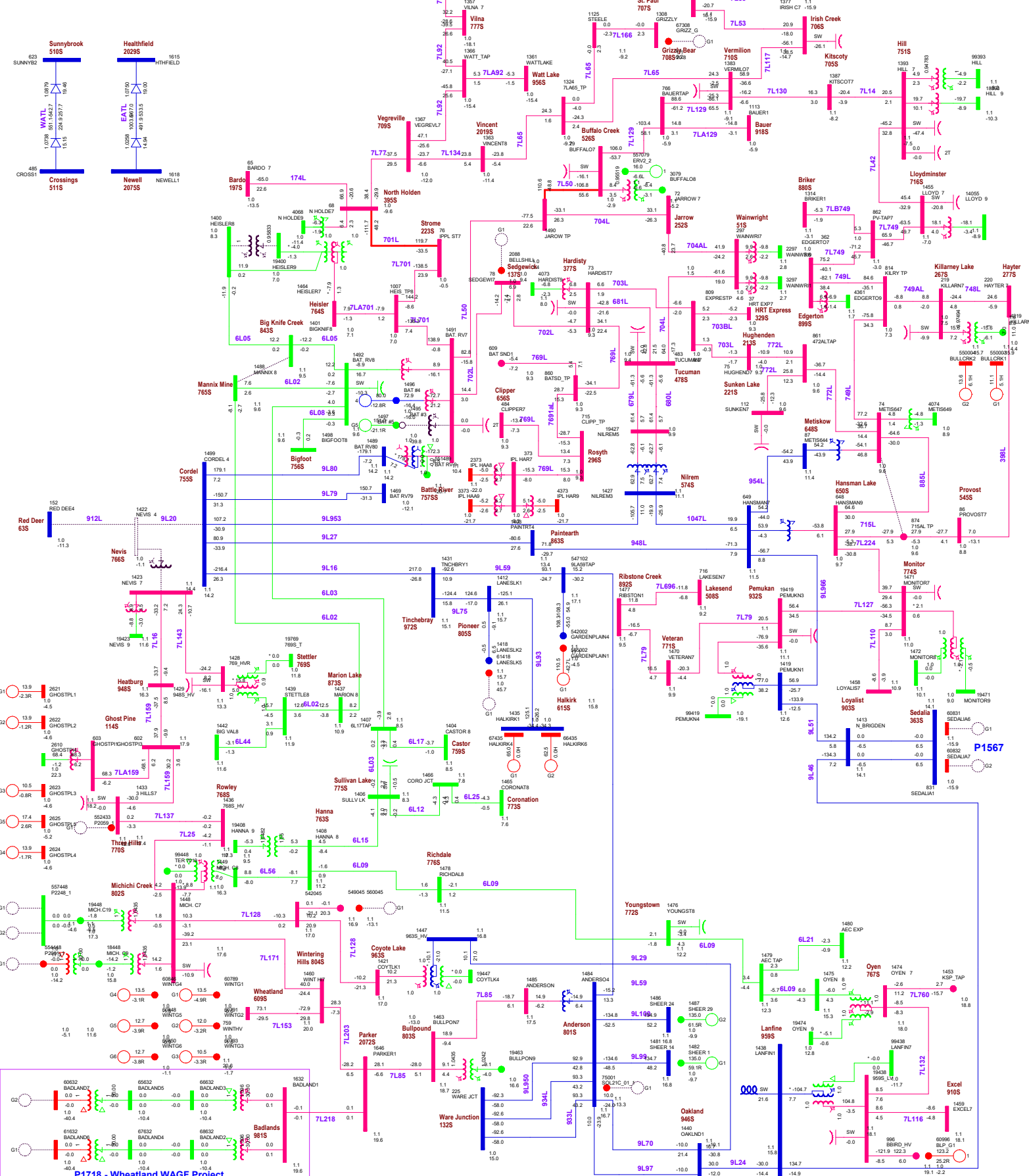


Figure A2-31

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATEZ

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

- - - - - Contingency / Outage
 ——— Overloaded Branch

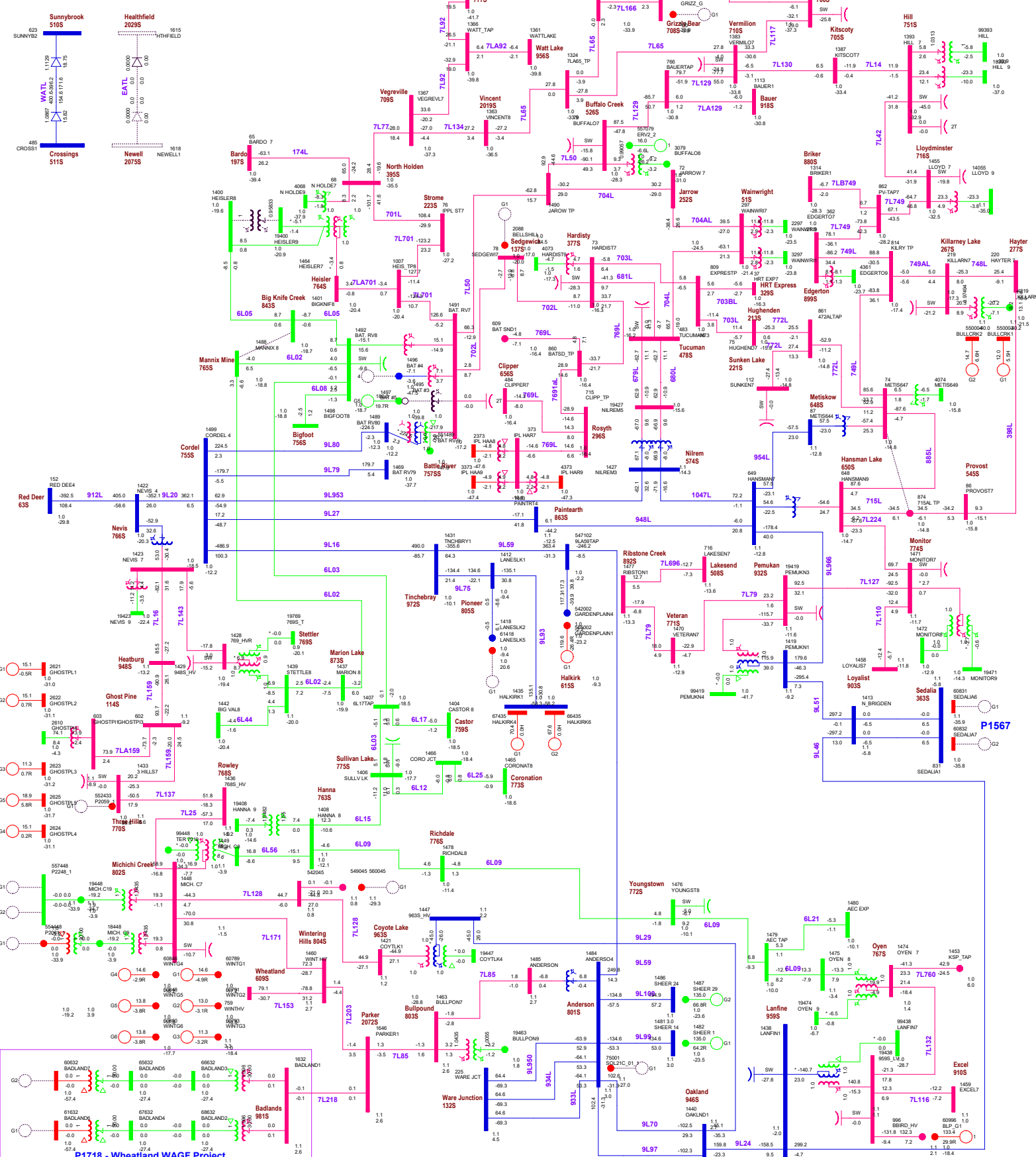


Figure A2-32

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE2

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

- - - - - Contingency / Outage
 ——— Overloaded Branch

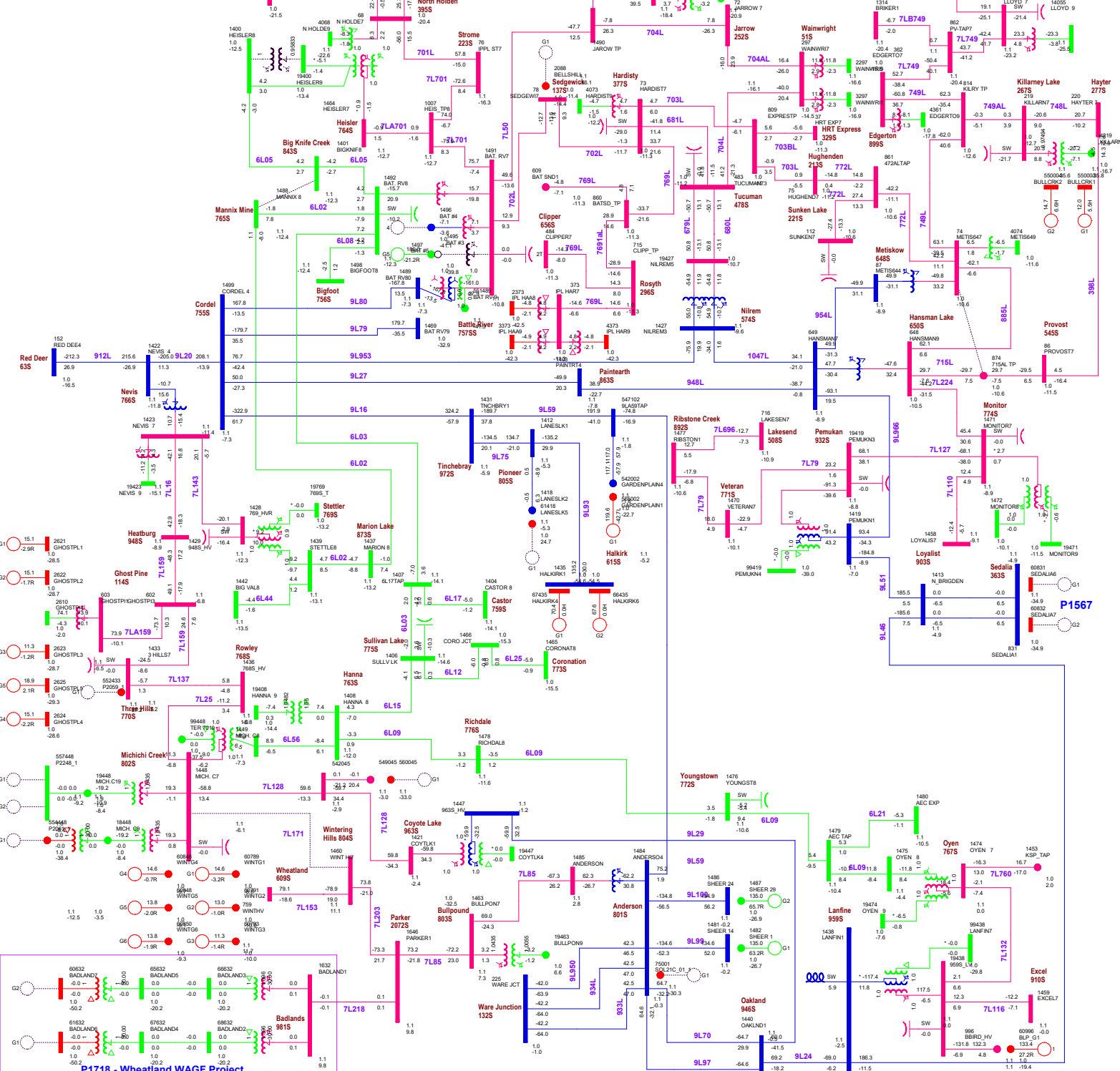
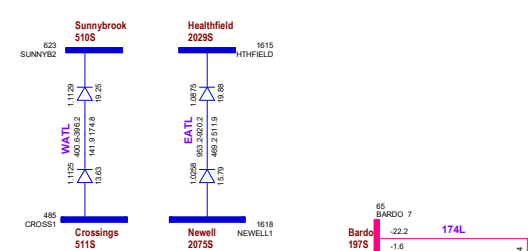


Figure A2-33

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATEZ

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

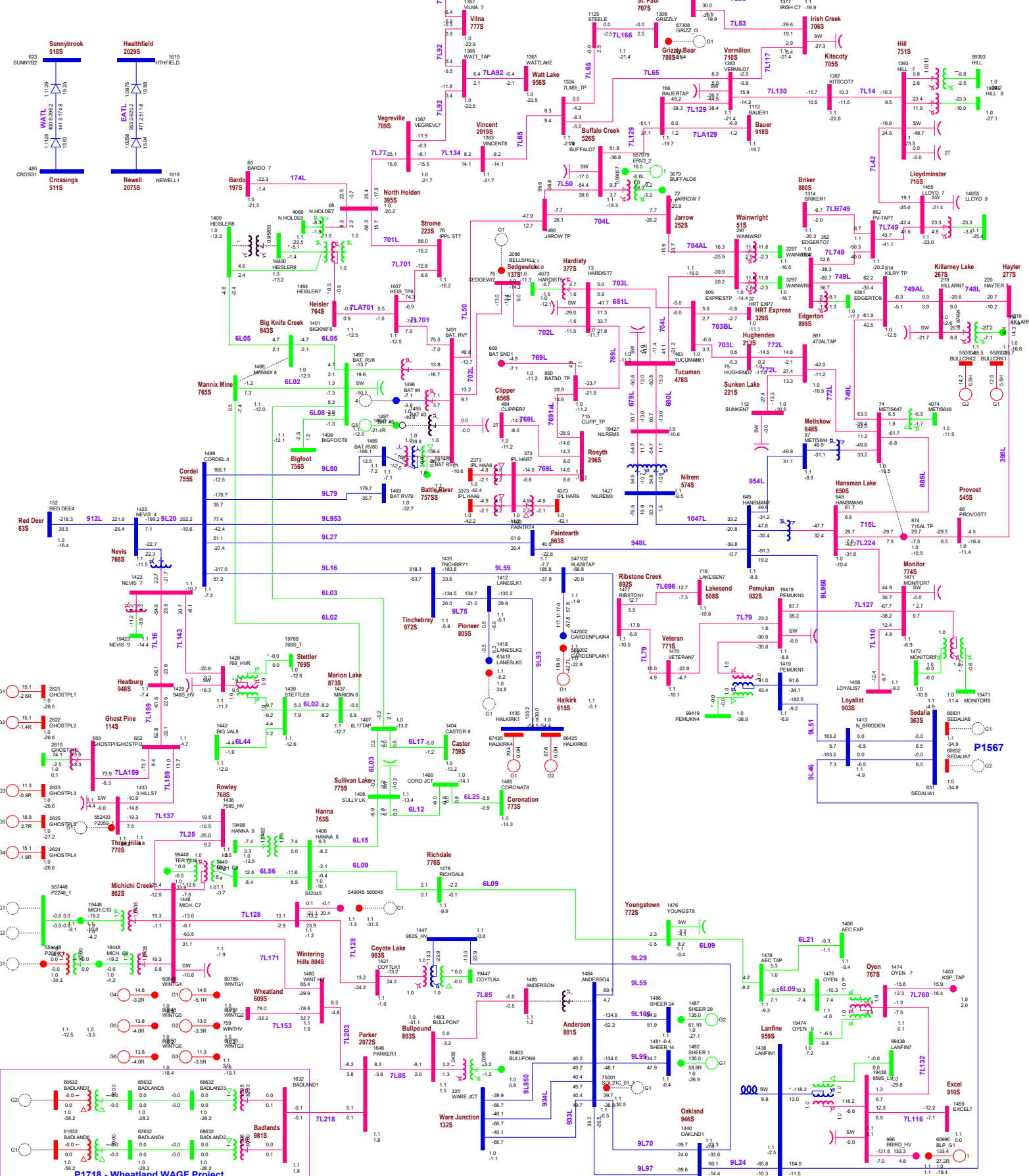


Figure A2-34

Attachment A3

Post-Project Power Flow Diagrams



Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

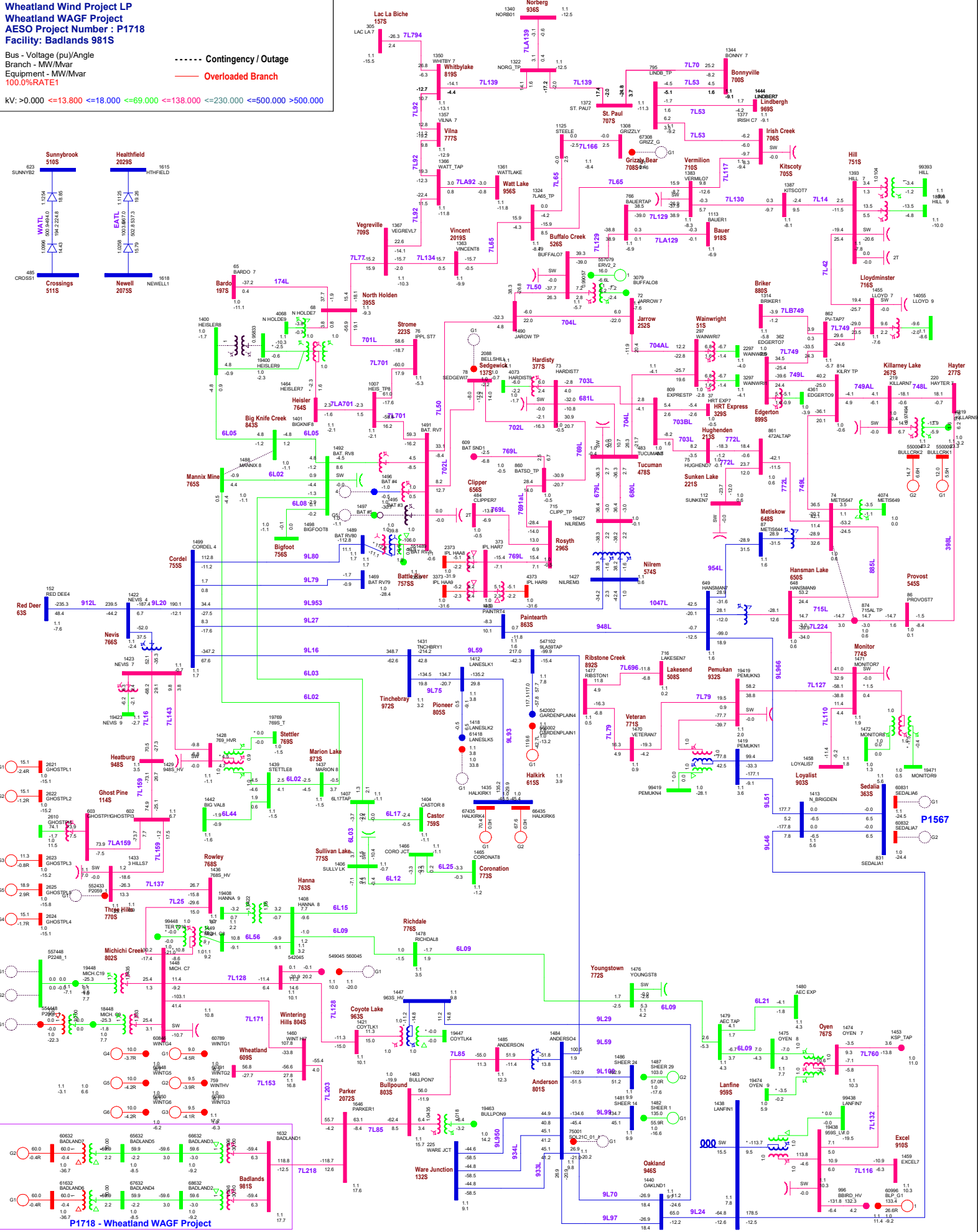


Figure A3-35

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 ——— Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

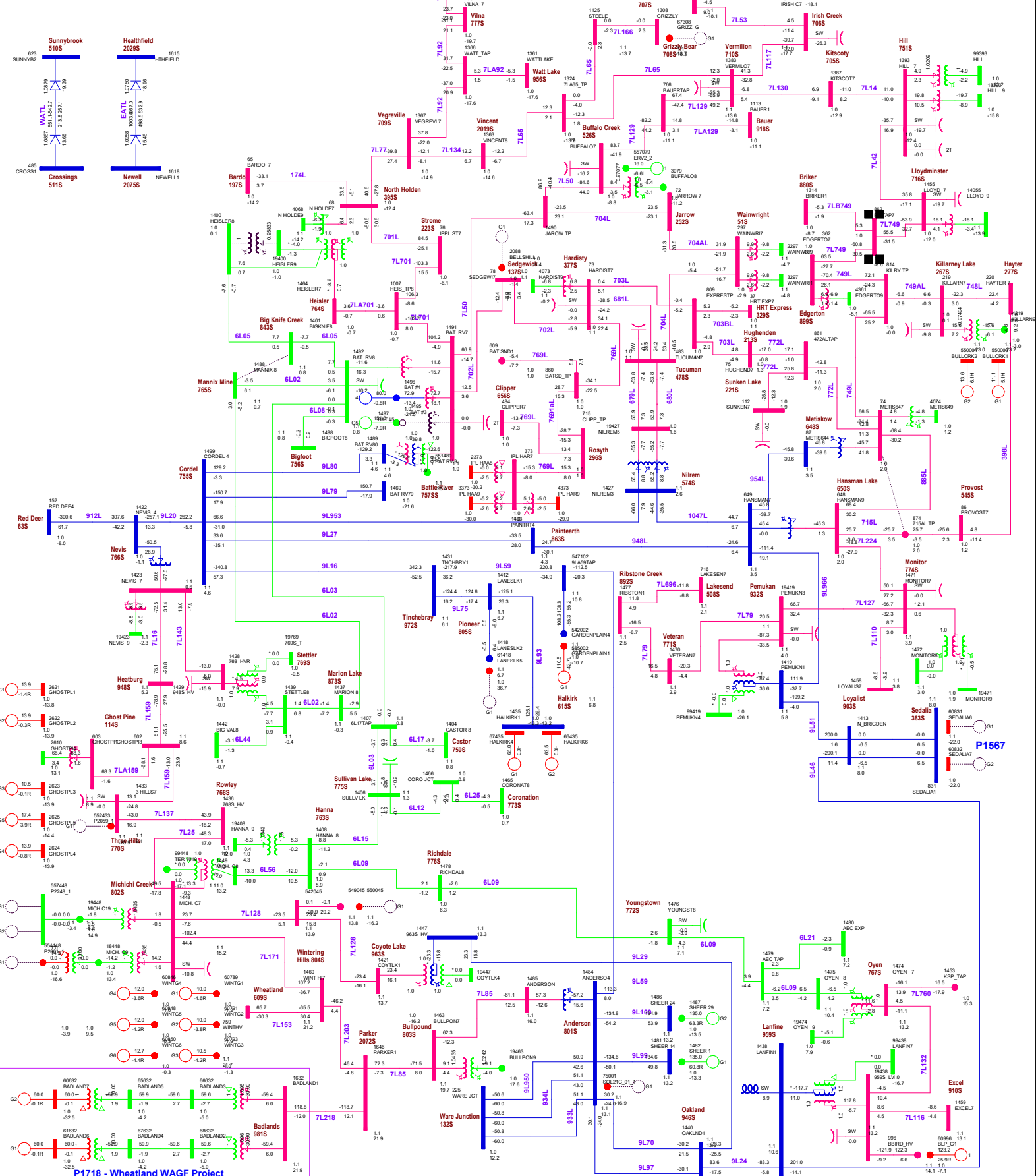


Figure A3-36

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE2

----- Contingency / Outage
 — Overloaded Branch

kV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

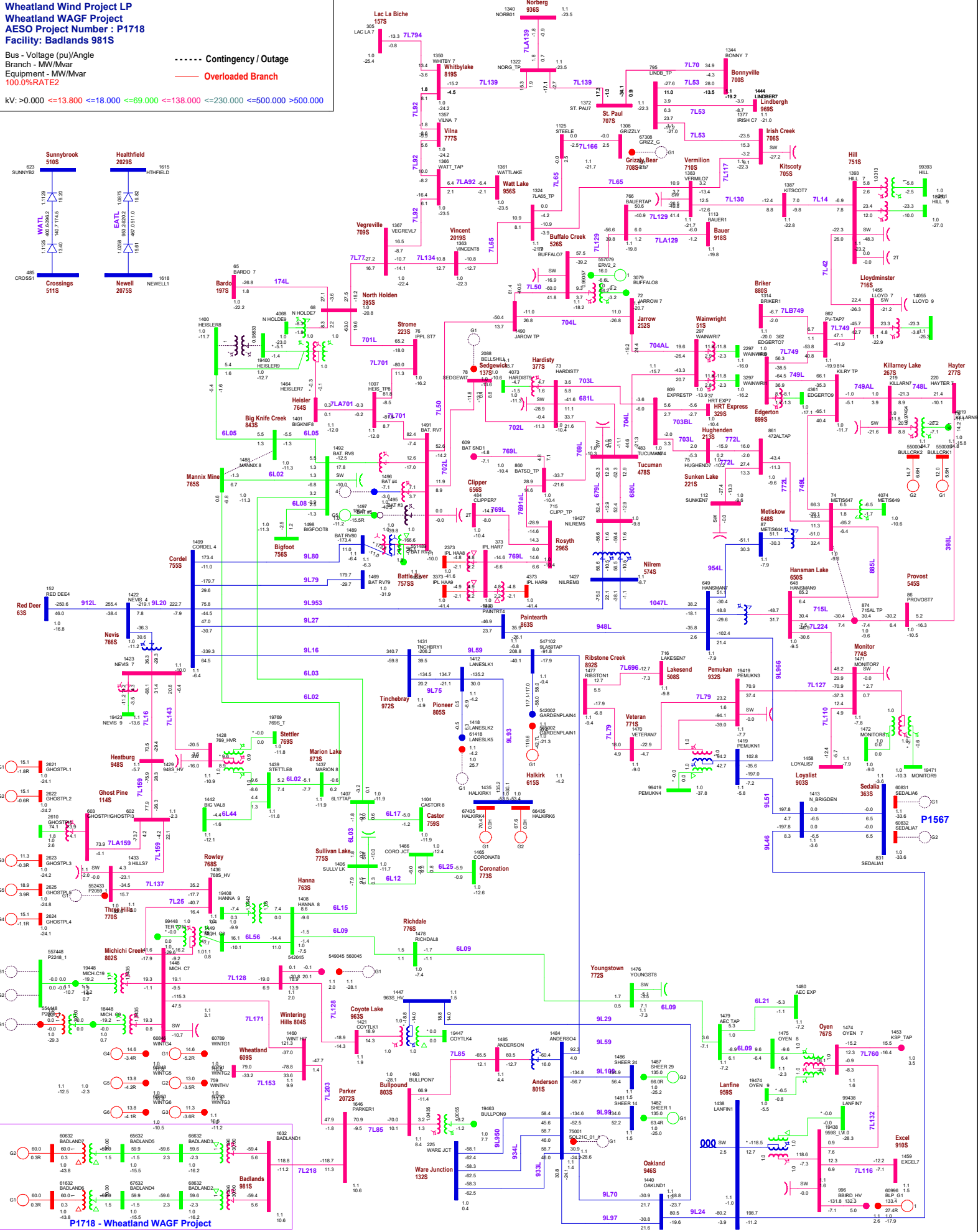


Figure A3-37

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

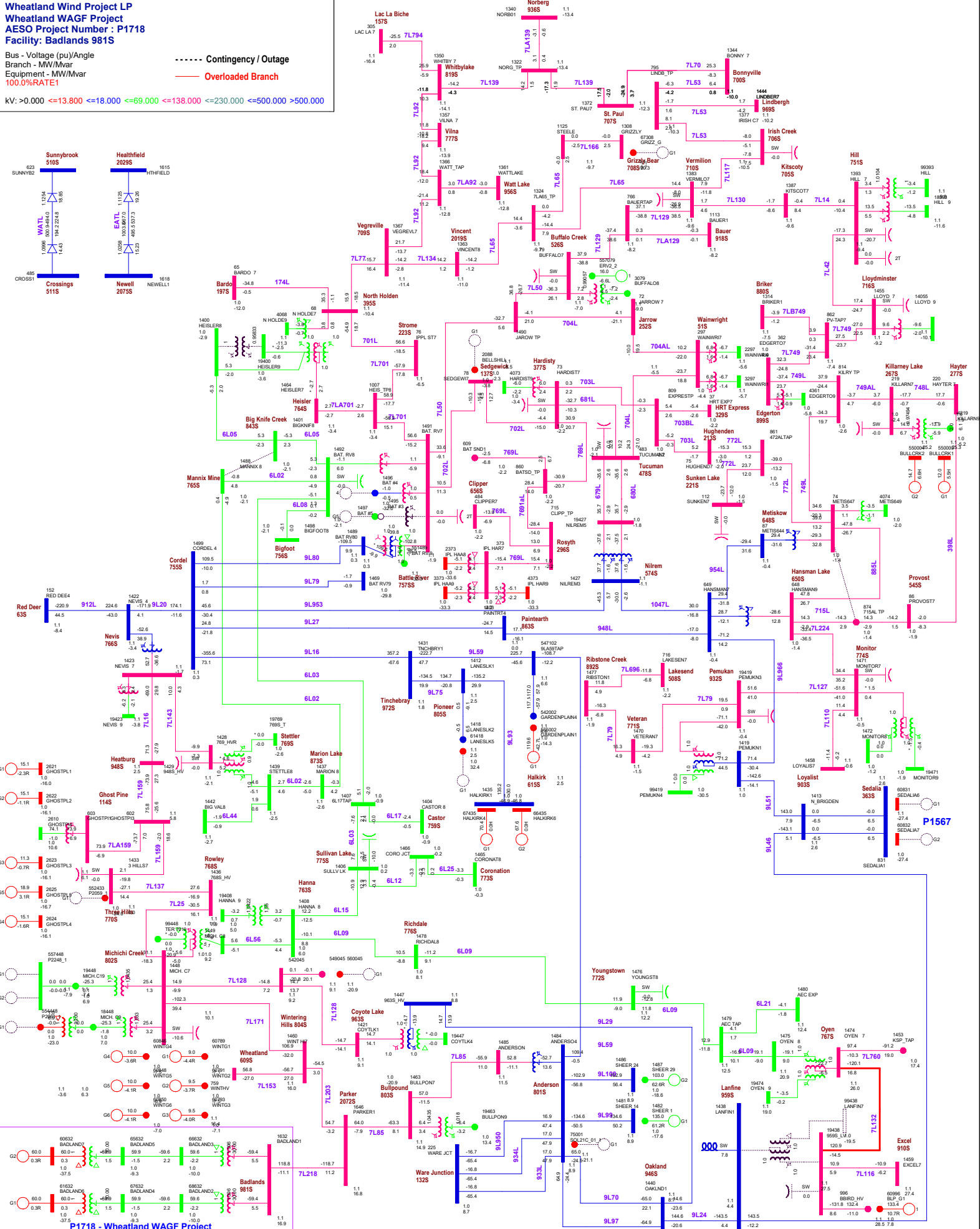


Figure A3-38

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ——— Overloaded Branch

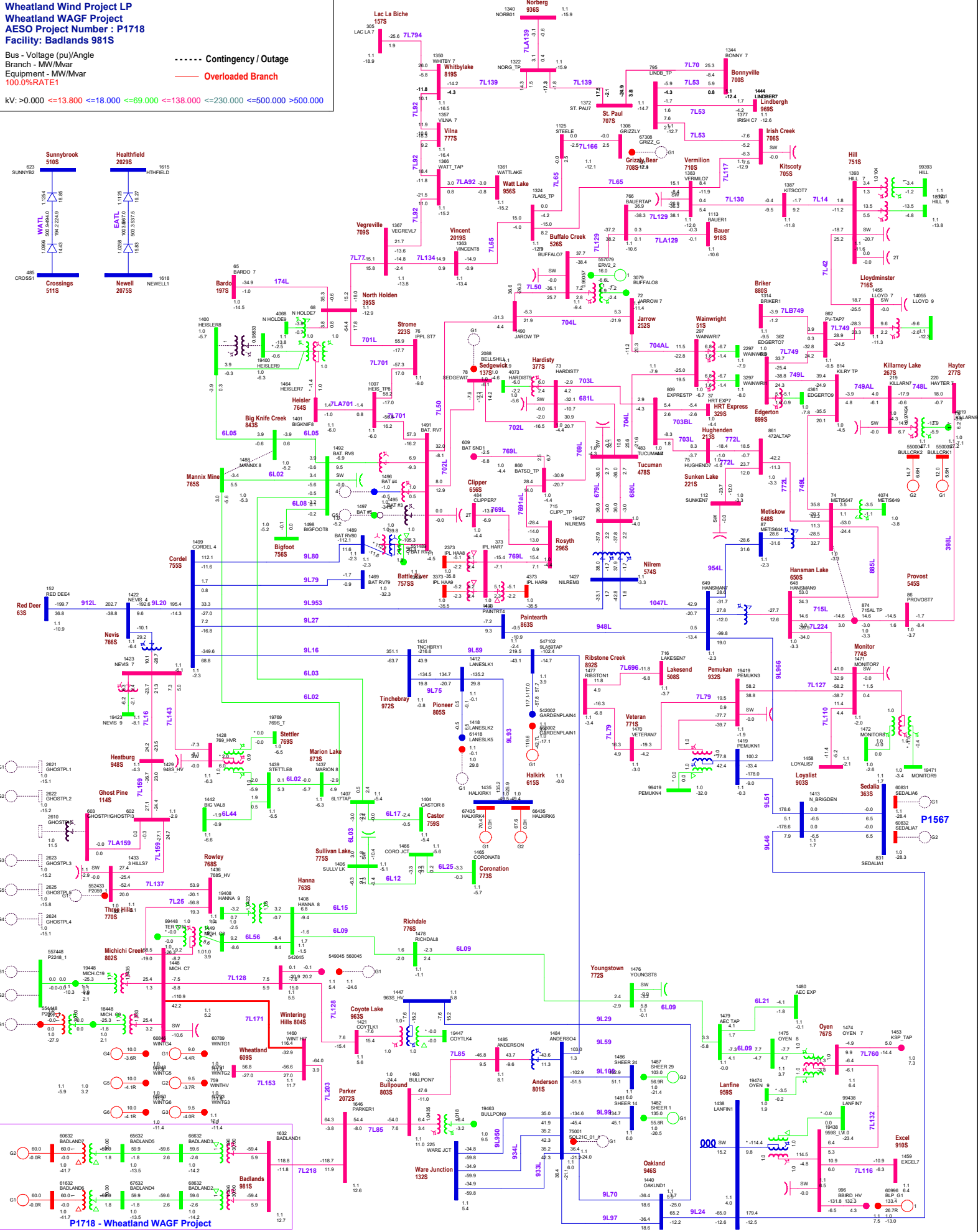


Figure A3-39

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

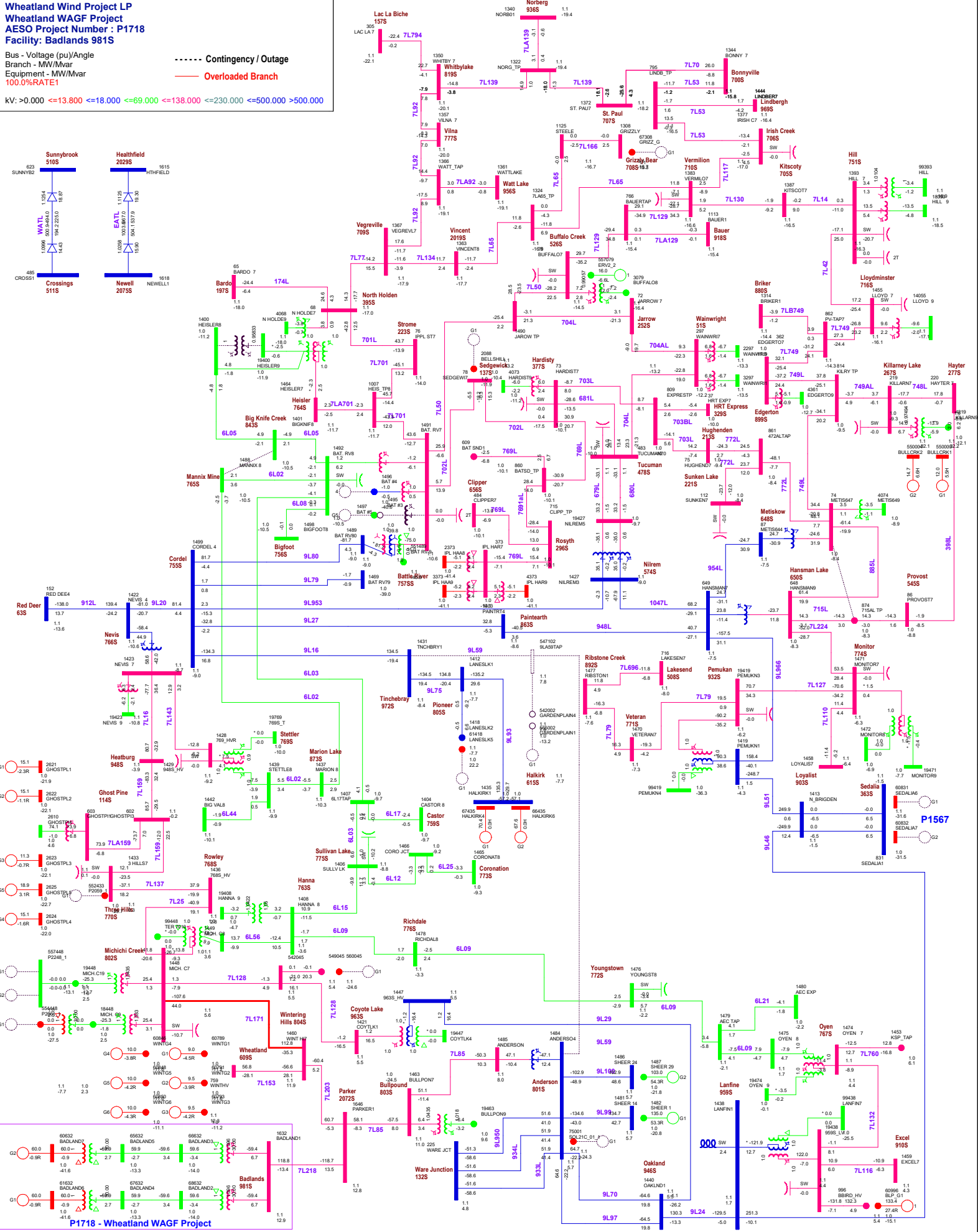


Figure A3-40

Irish Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

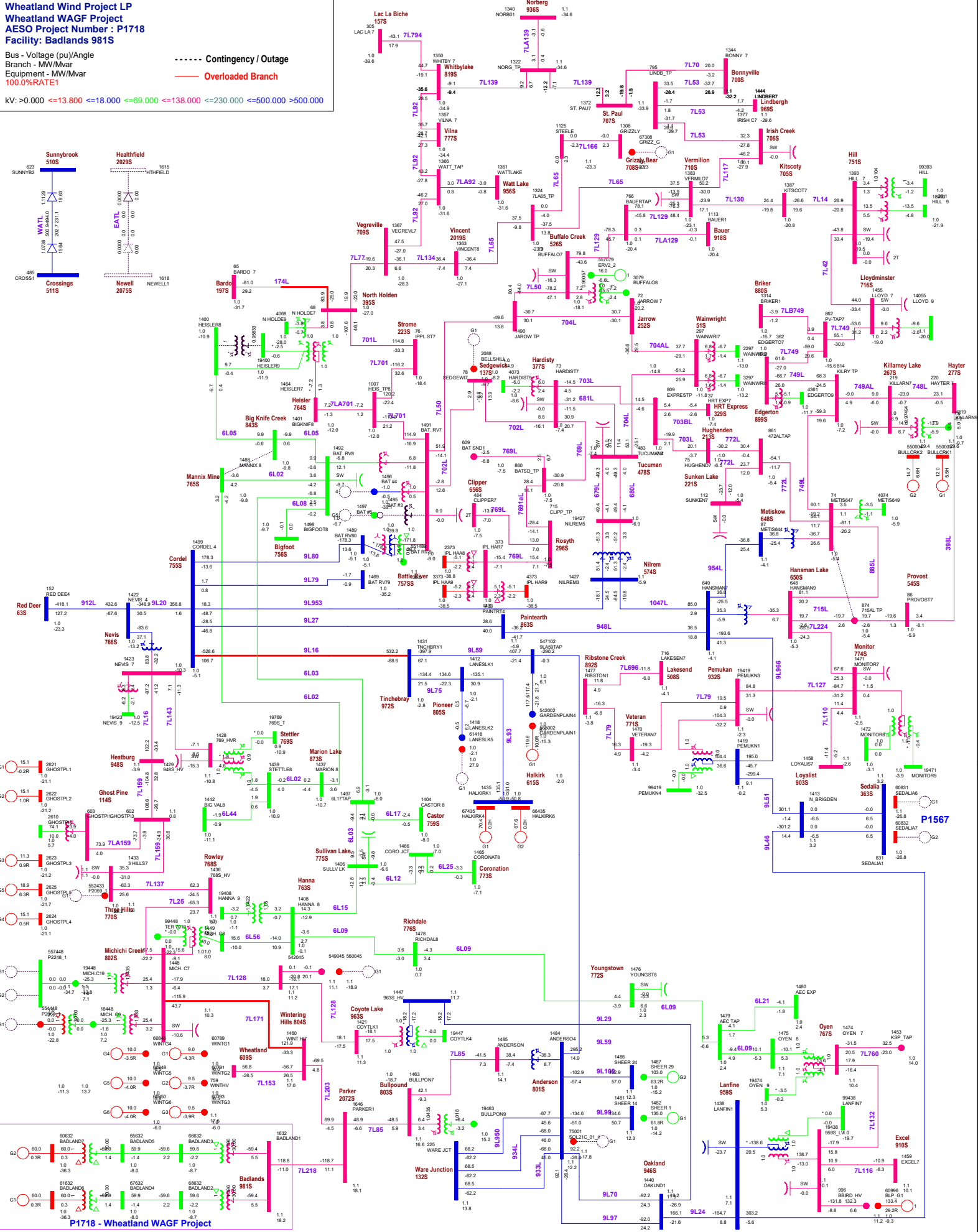


Figure A3-14

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

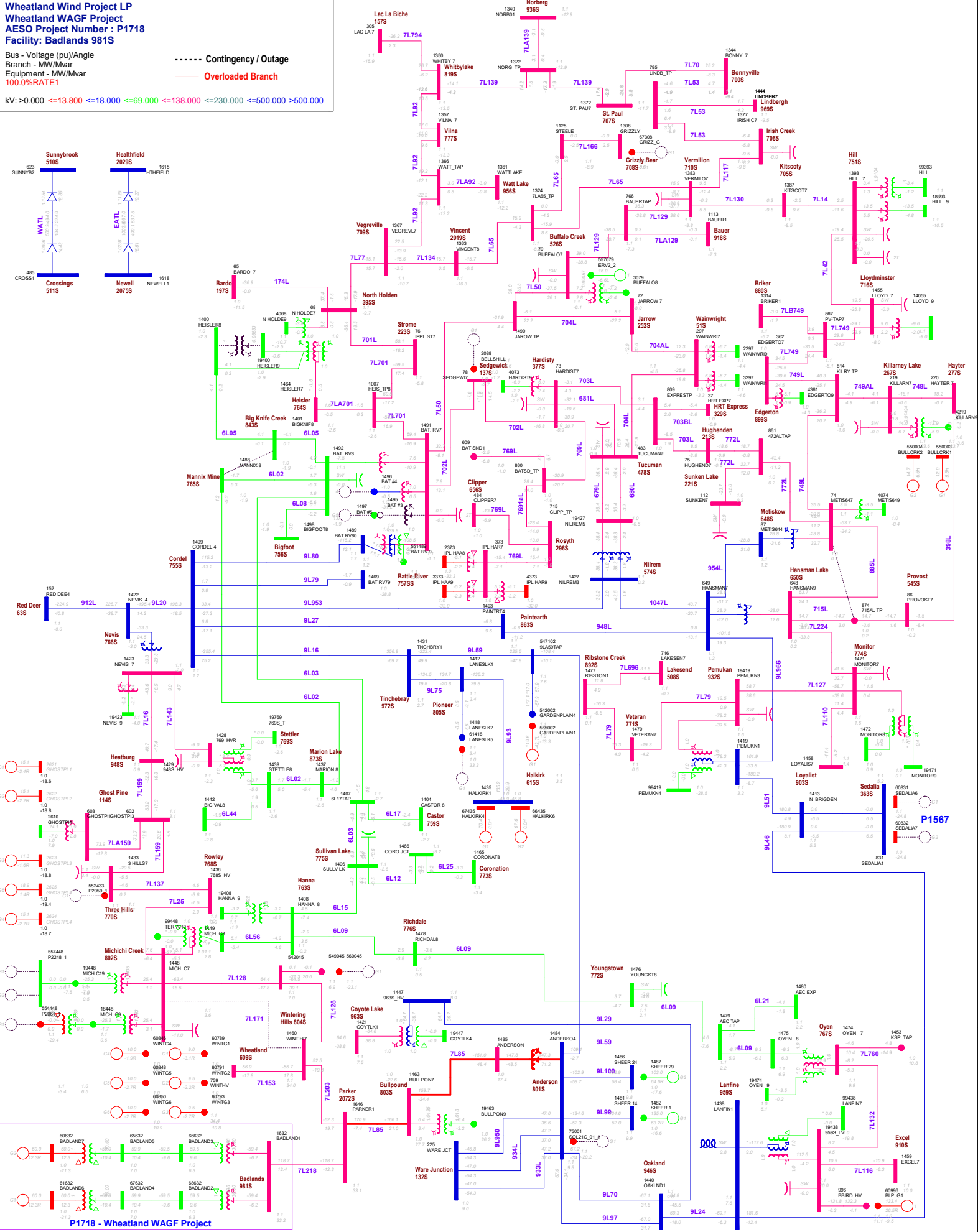


Figure A3-42

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

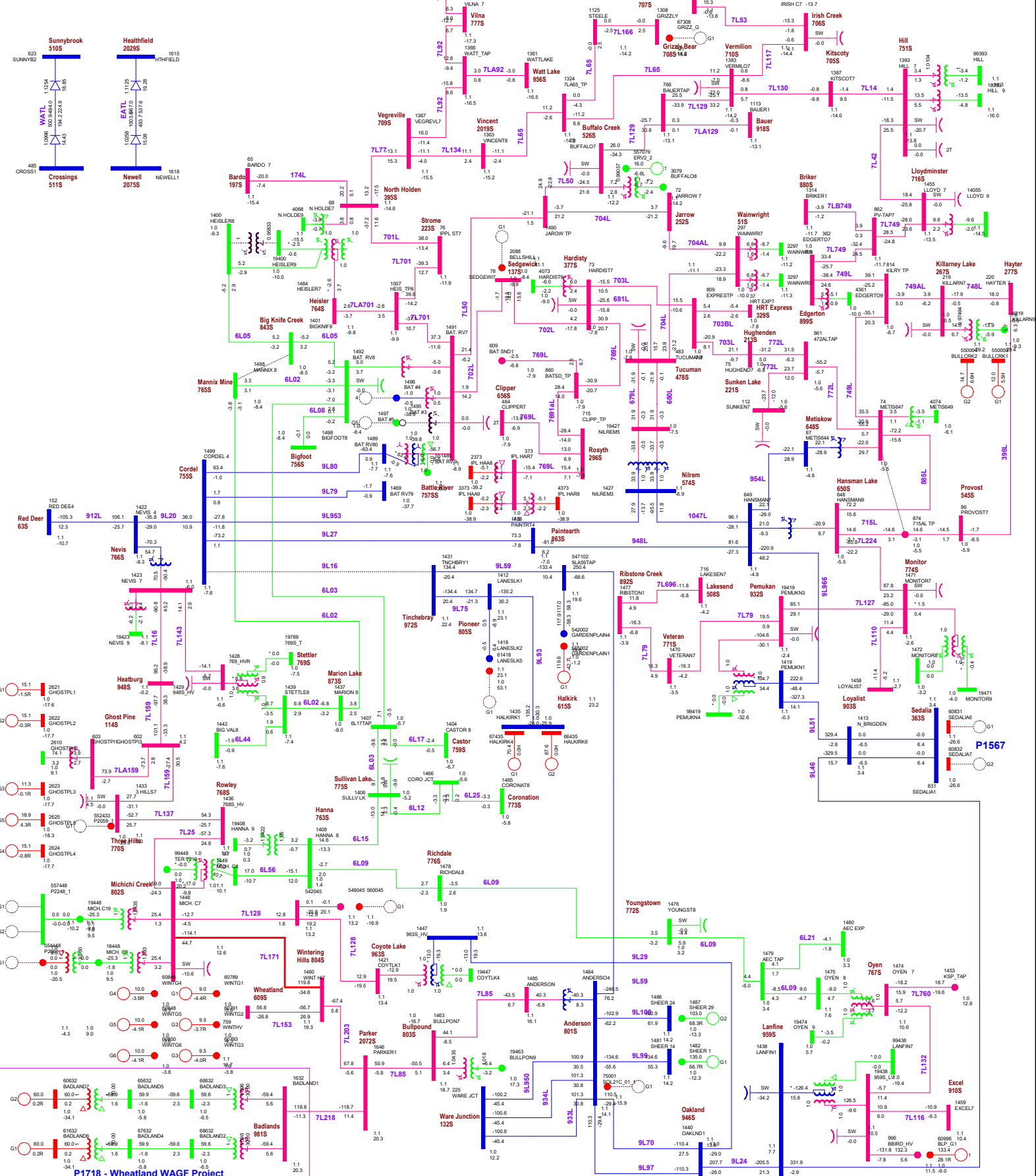


Figure A3-43

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 ——— Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

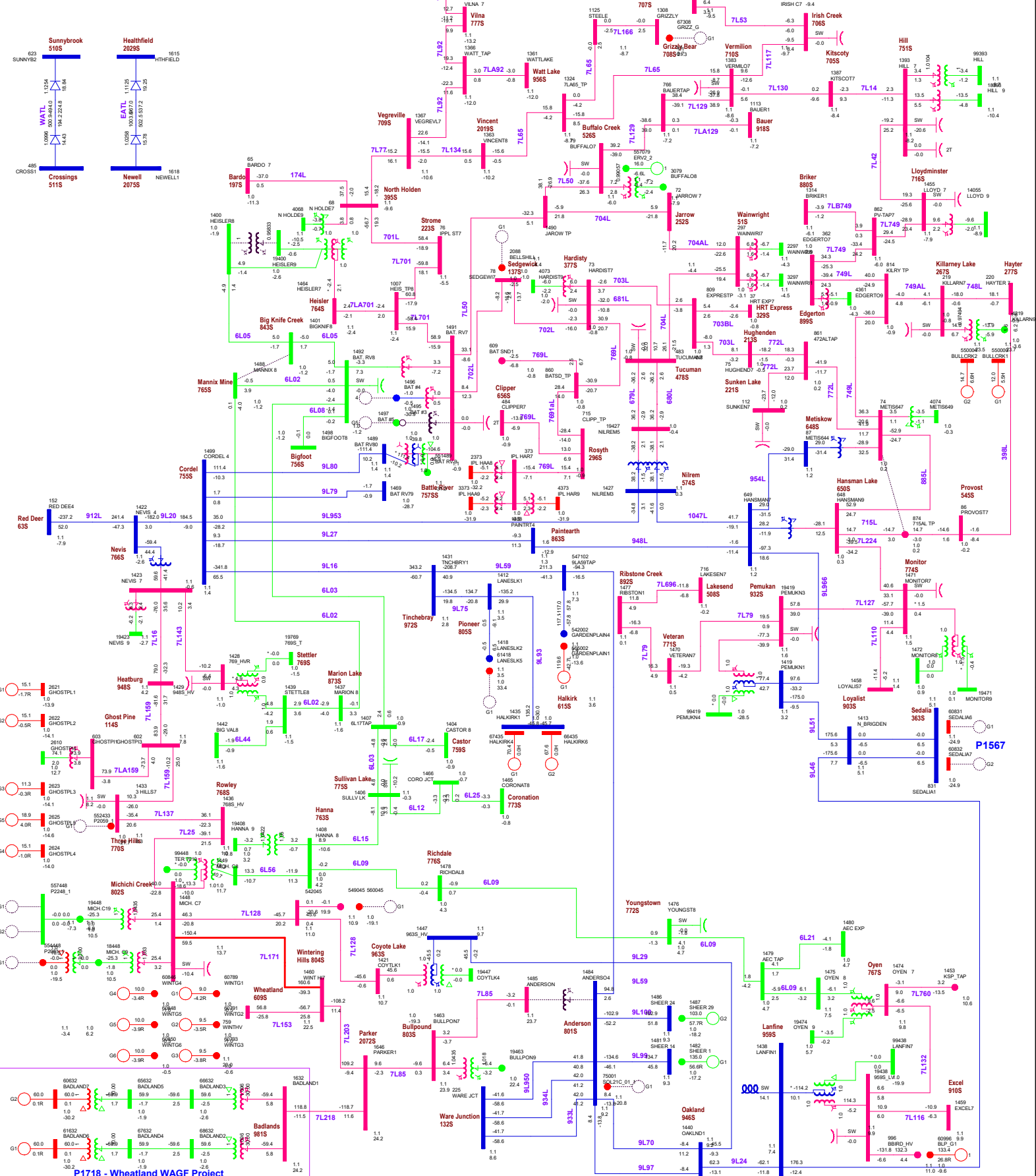


Figure A3-44

Irishland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

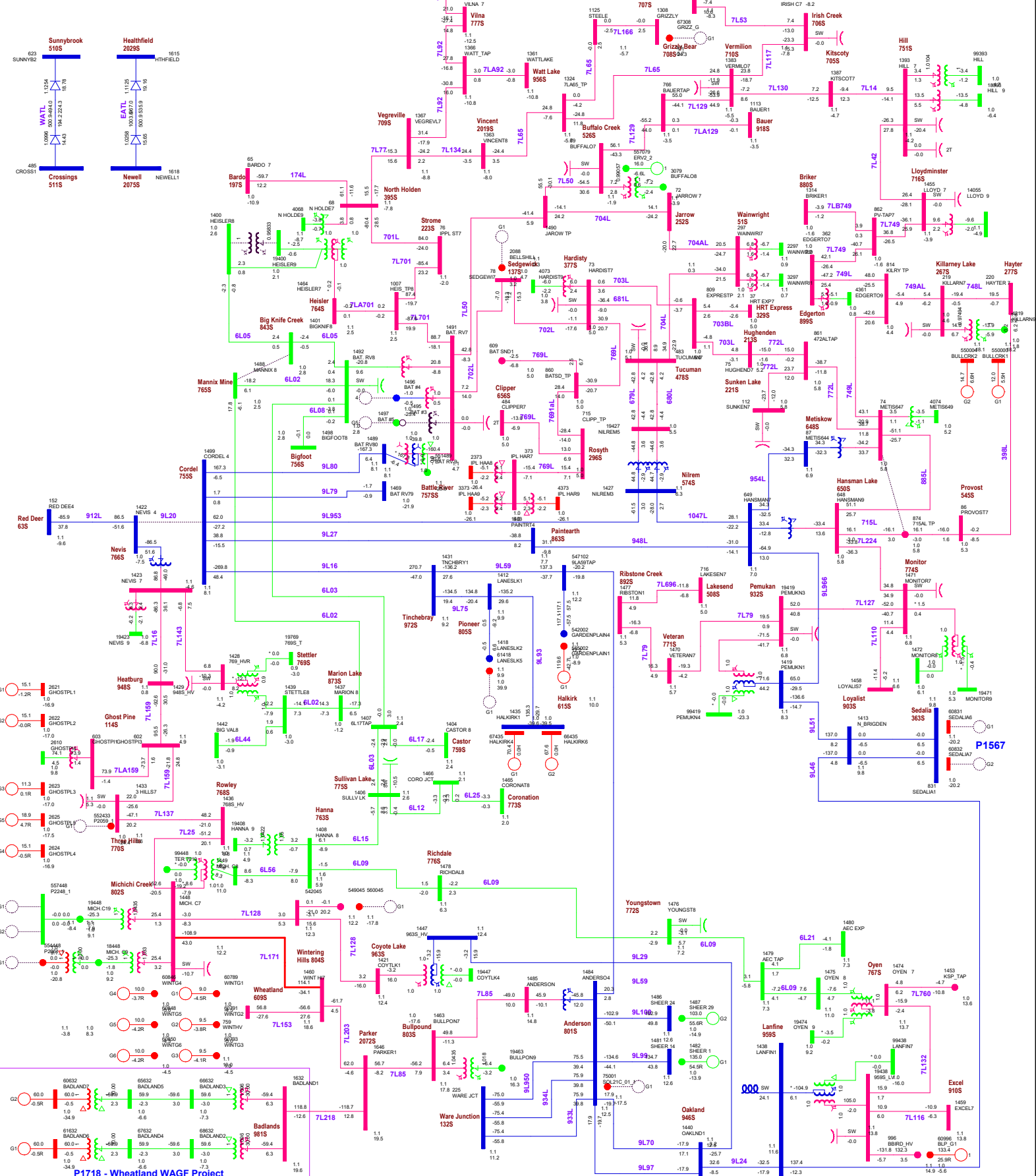


Figure A3-45

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ——— Overloaded Branch

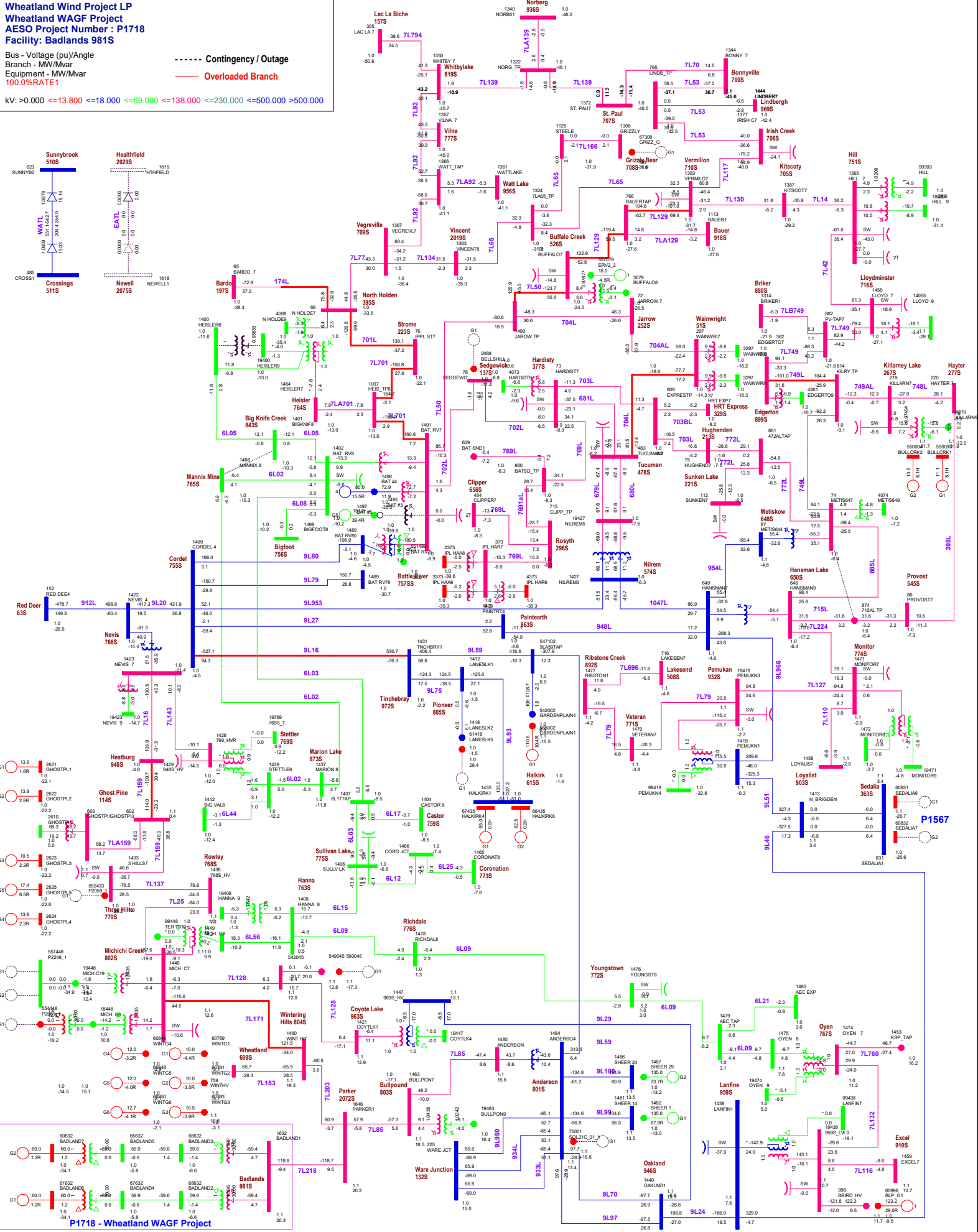


Figure A3-46

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 — Overloaded Branch

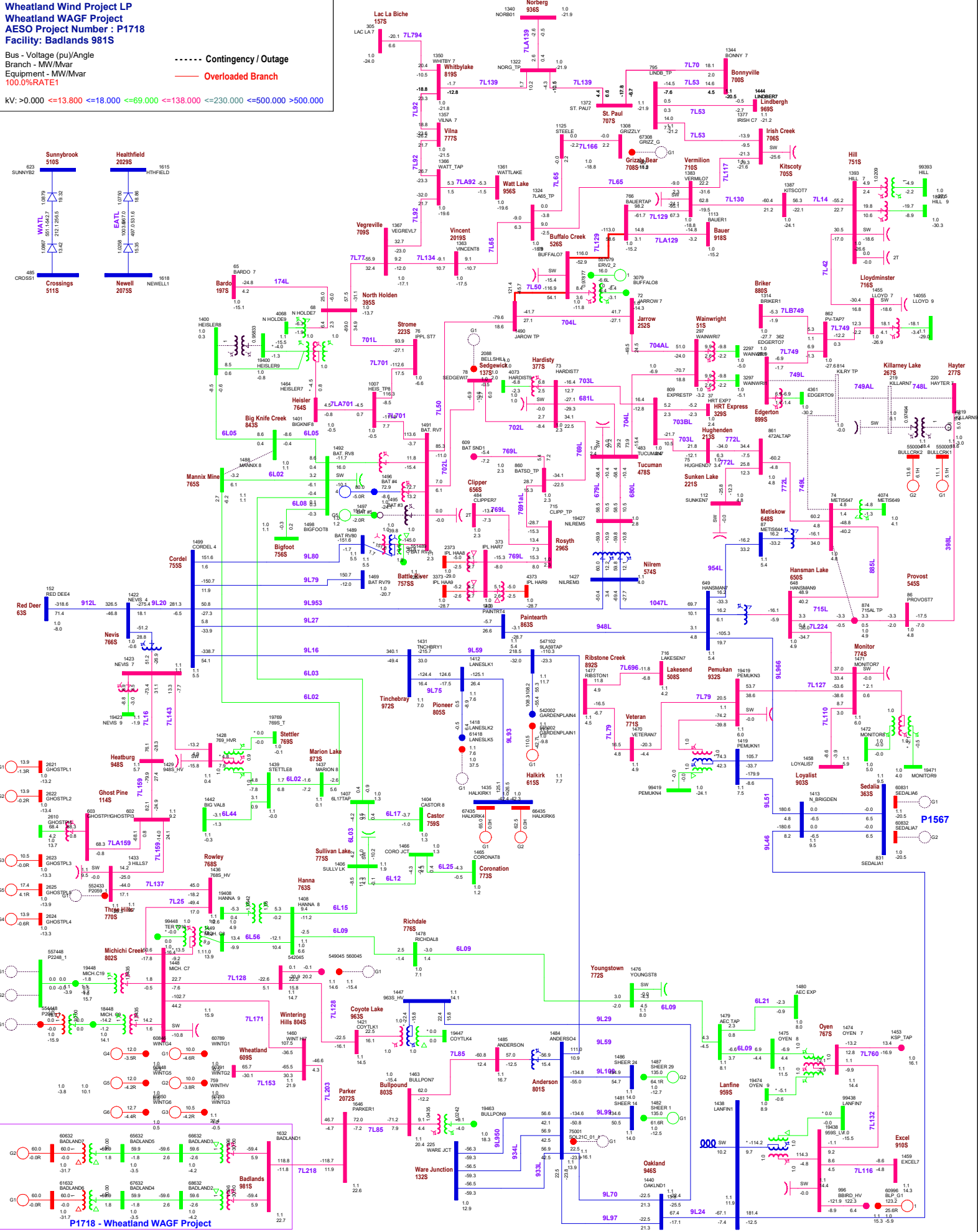


Figure A3-47

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

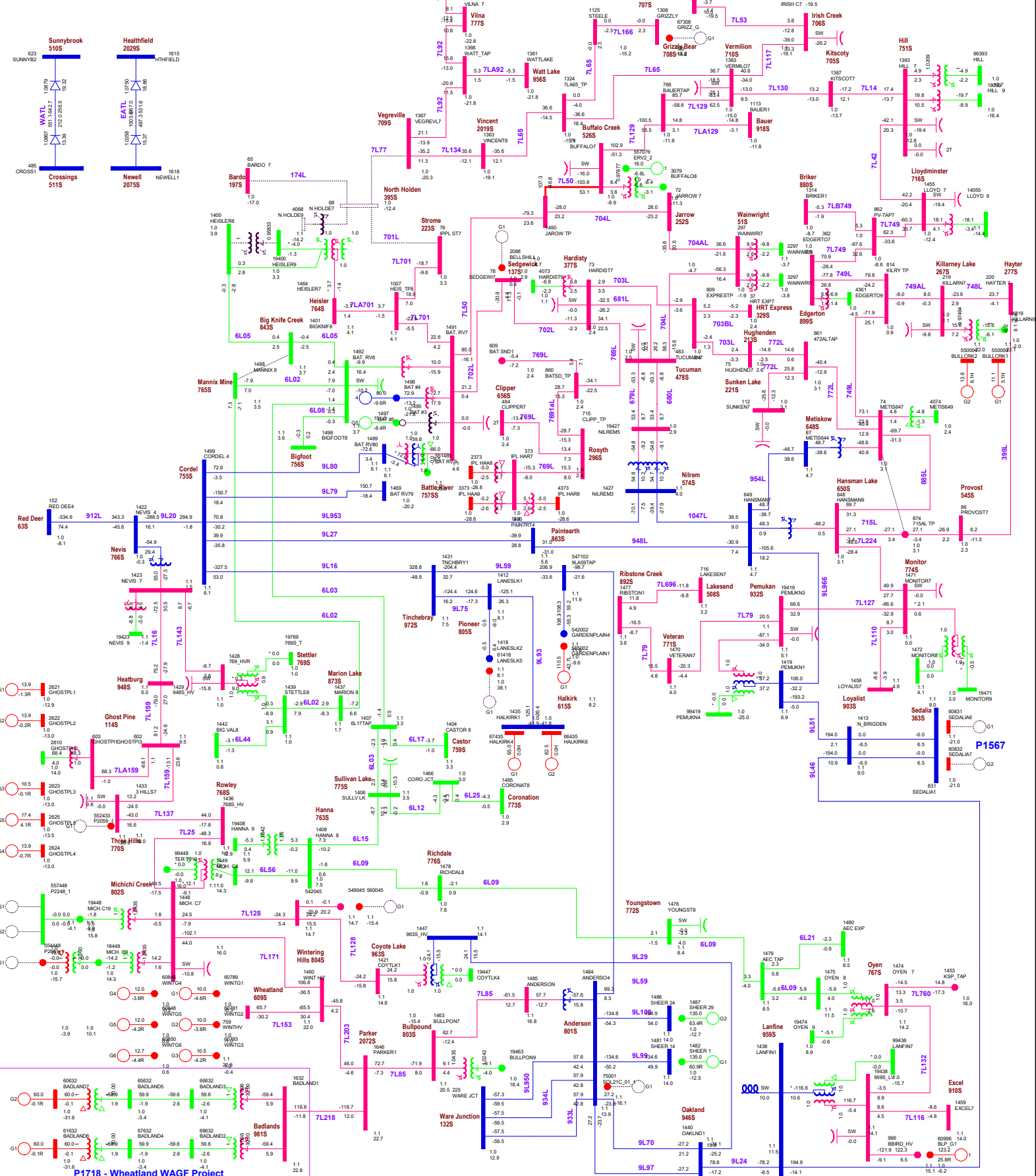


Figure A3-48

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 — Overloaded Branch

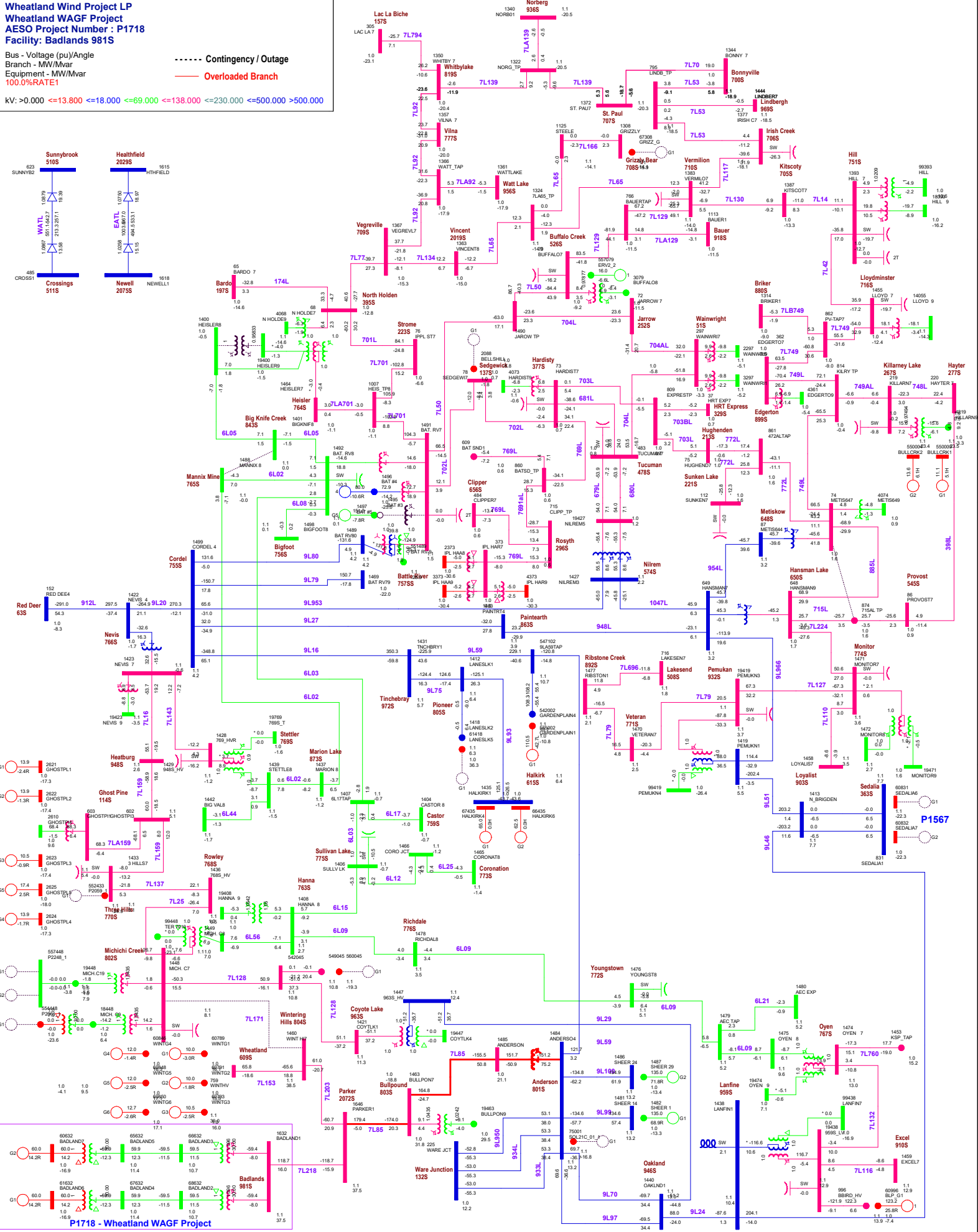


Figure A3-49

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 — Overloaded Branch

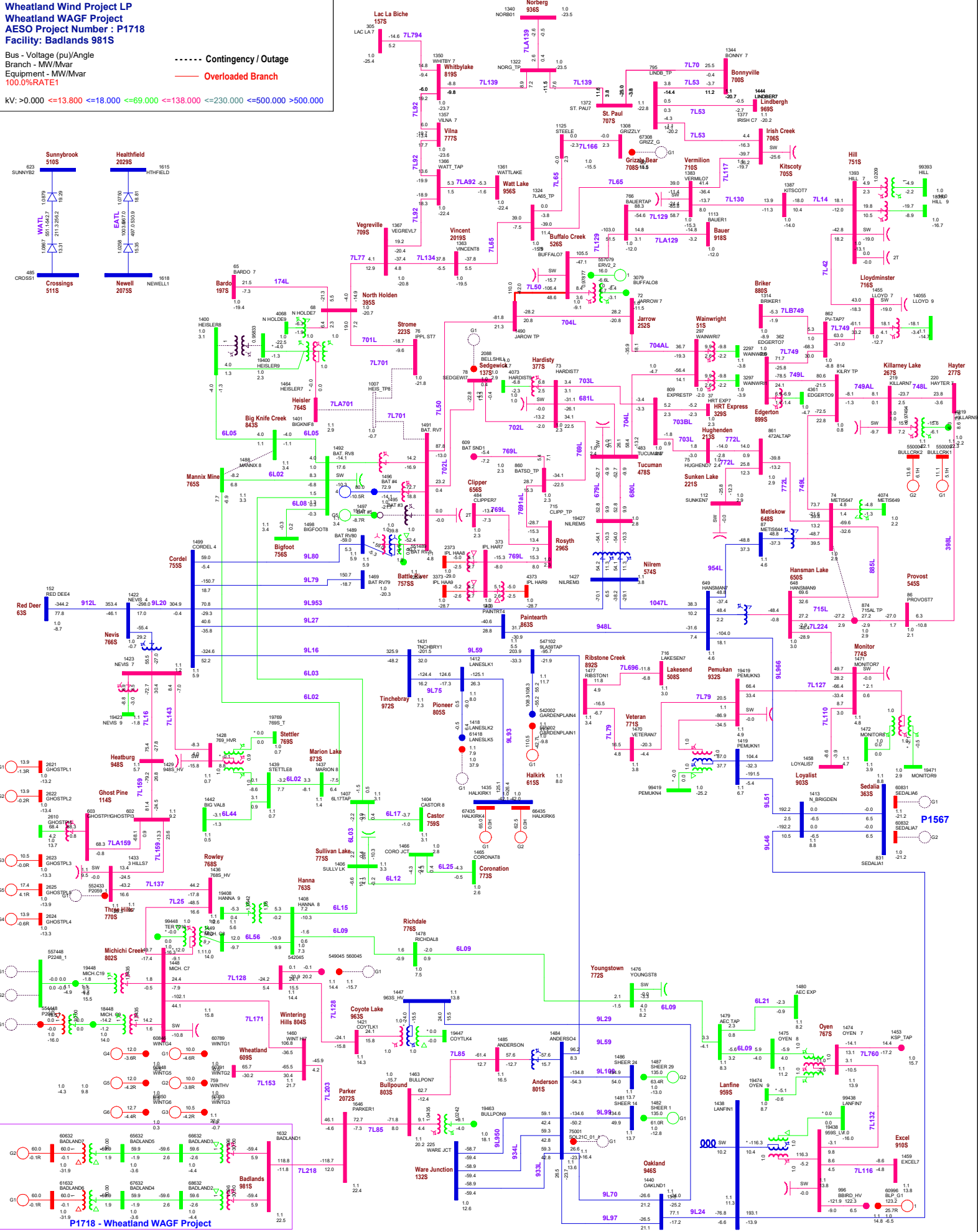


Figure A3-50

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

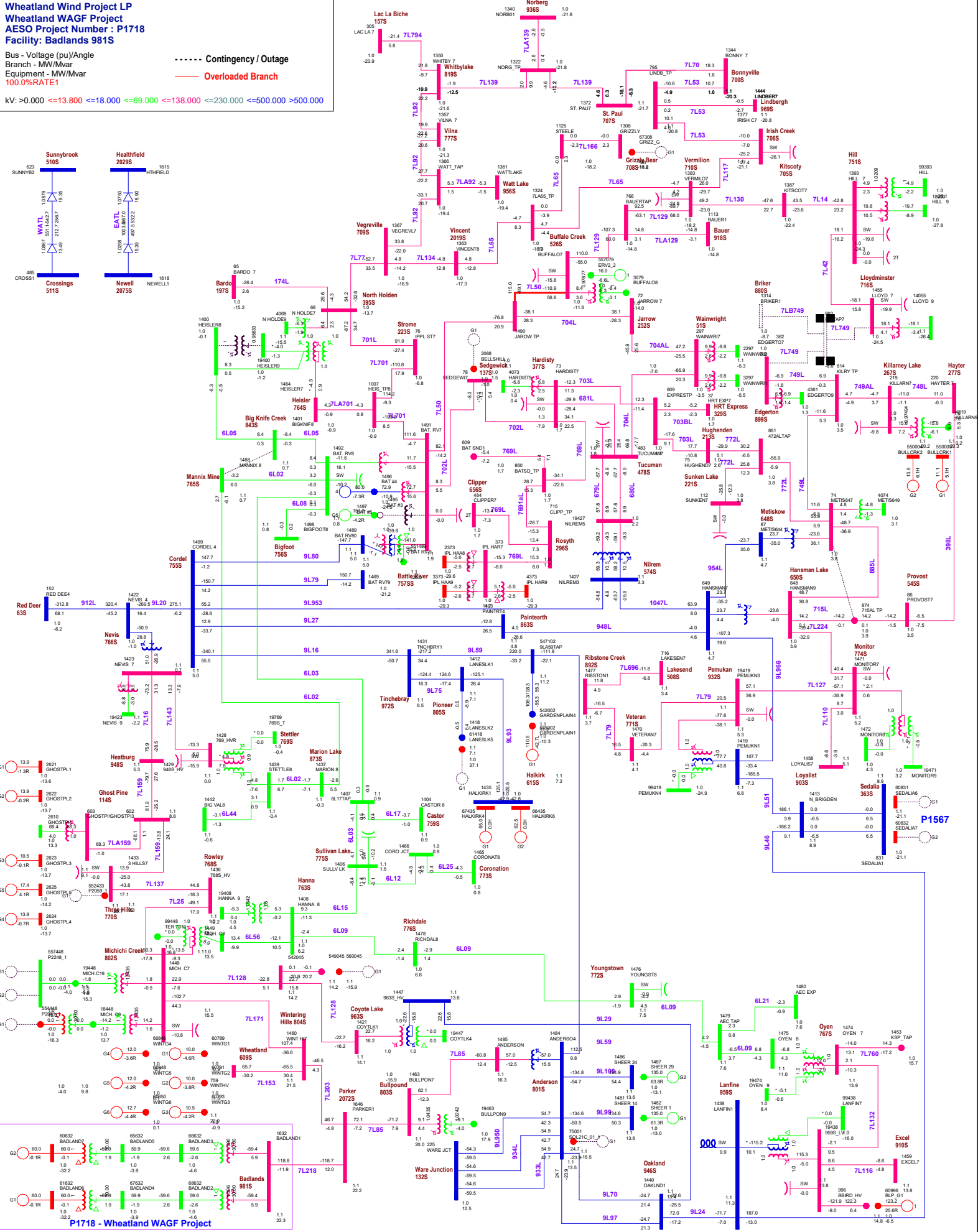


Figure A3-51

Irishland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

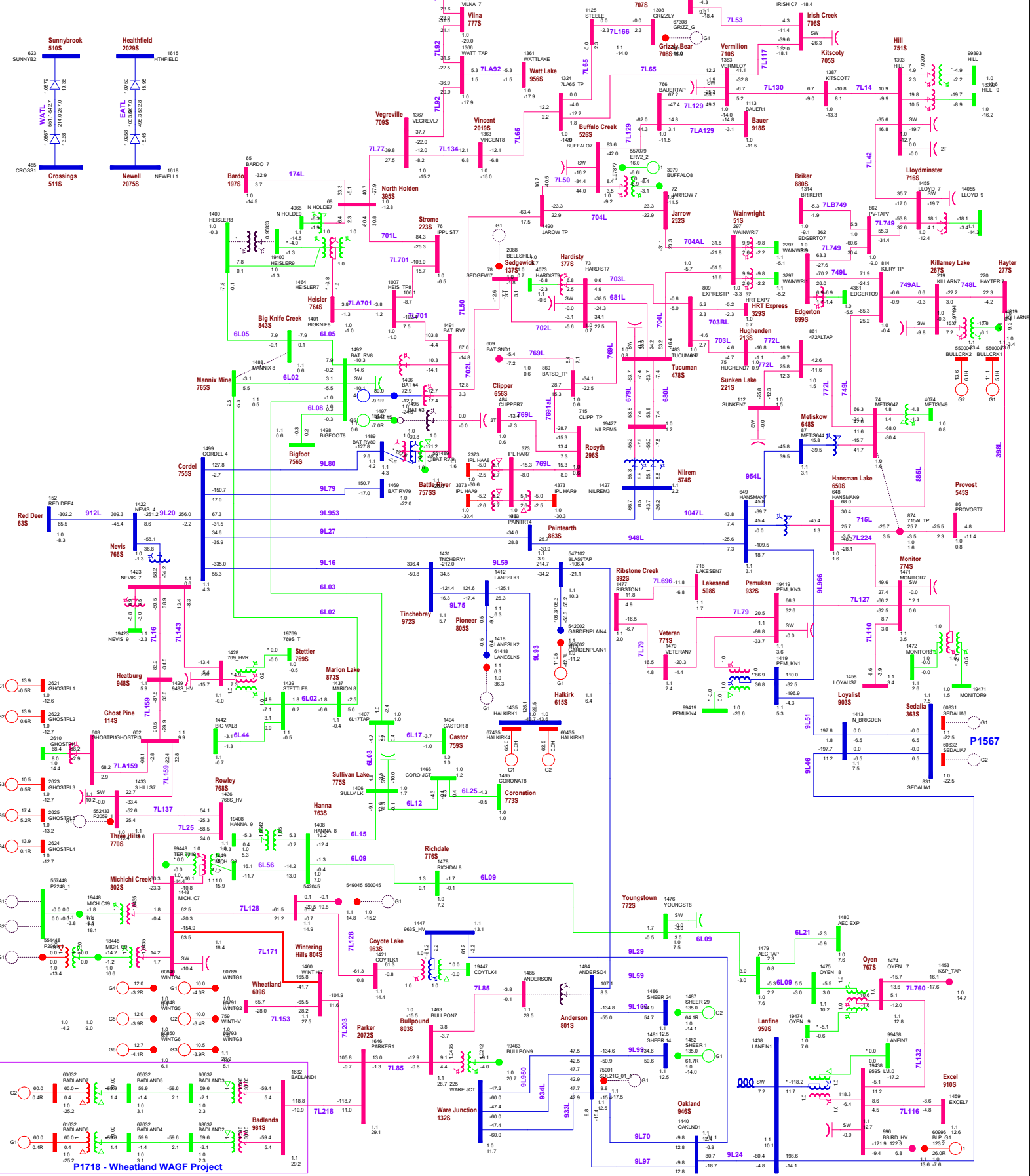


Figure A3-52

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ——— Overloaded Branch

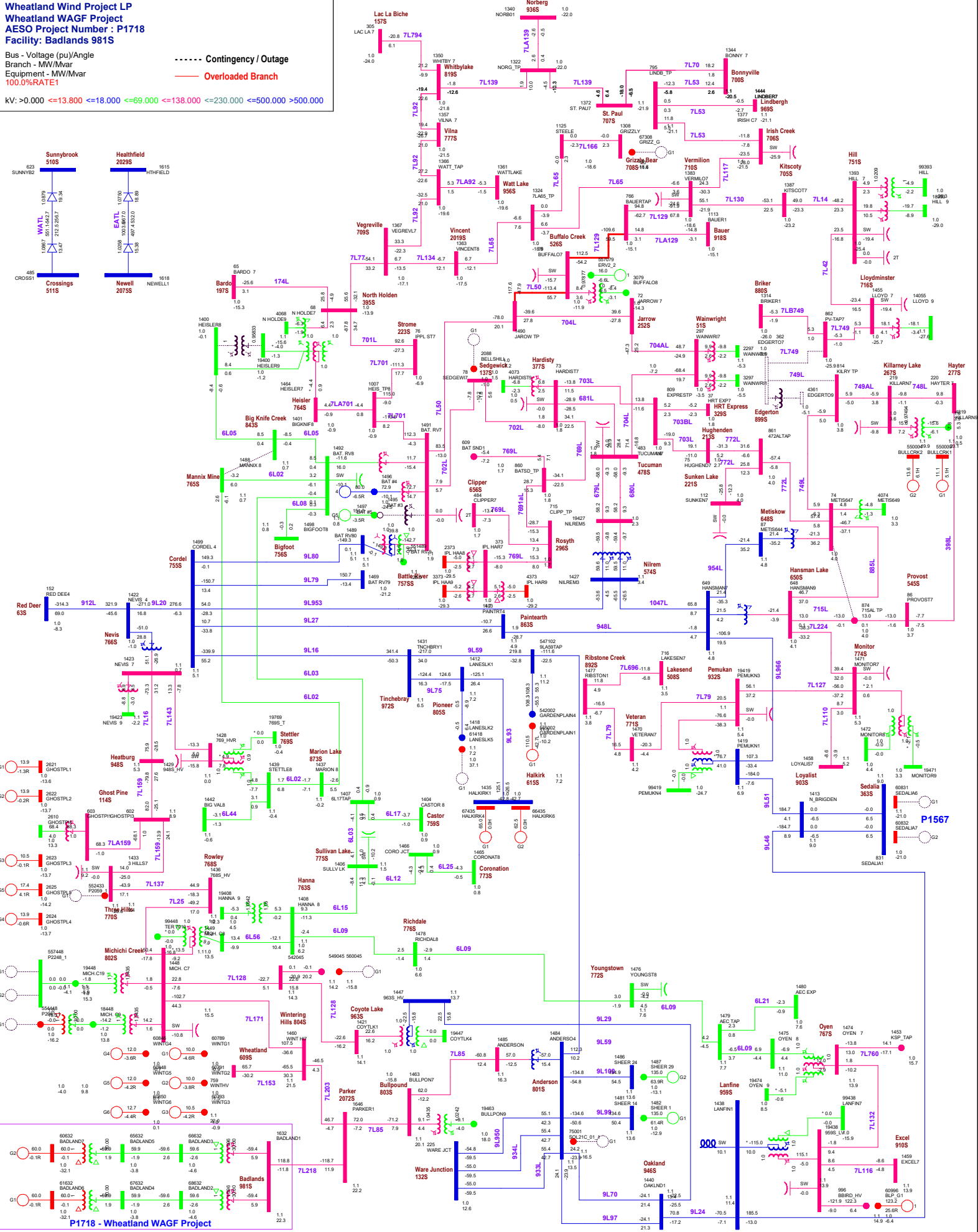


Figure A3-53

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

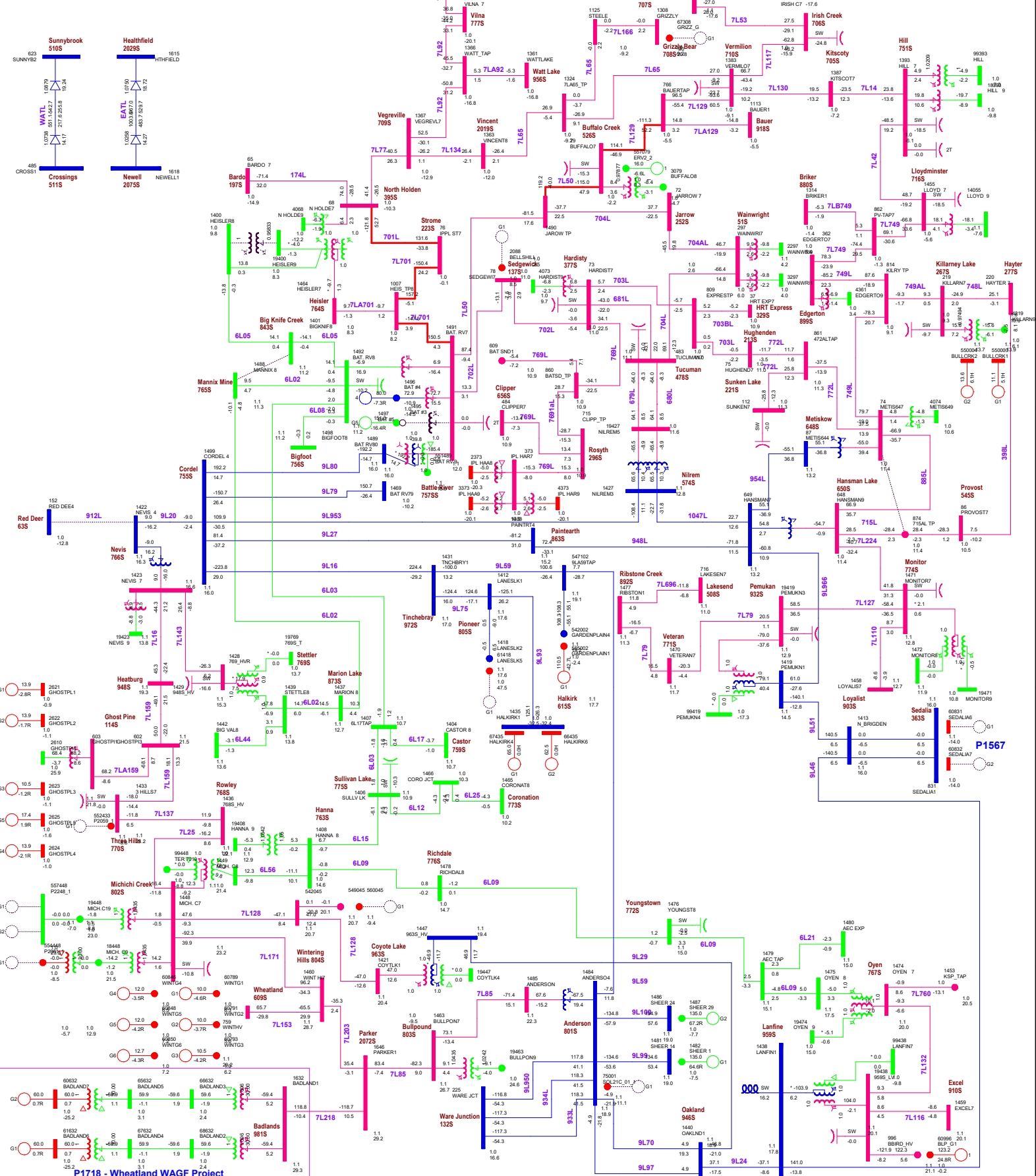


Figure A3-54
002

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

kv: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 — Overloaded Branch

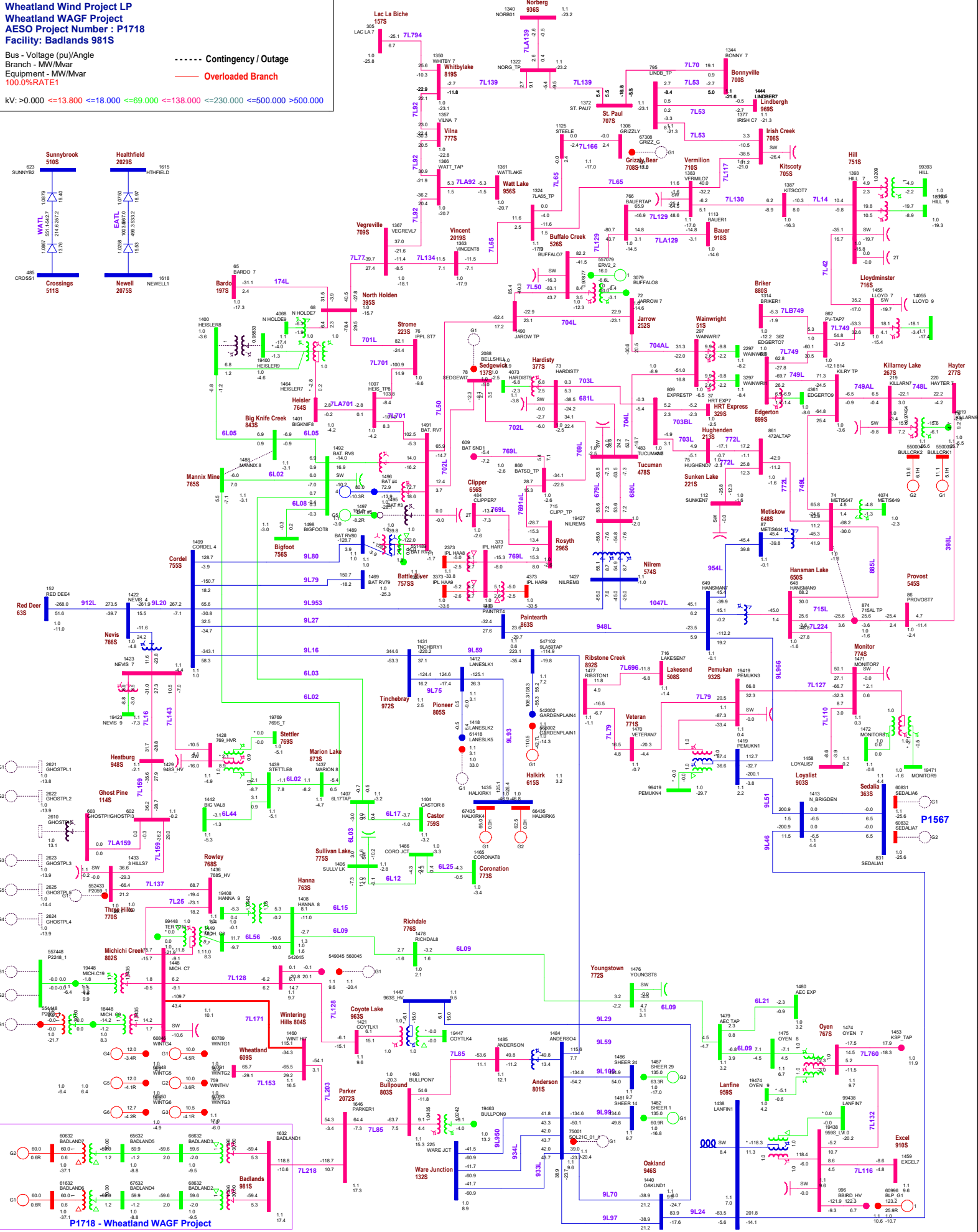


Figure A3-55

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

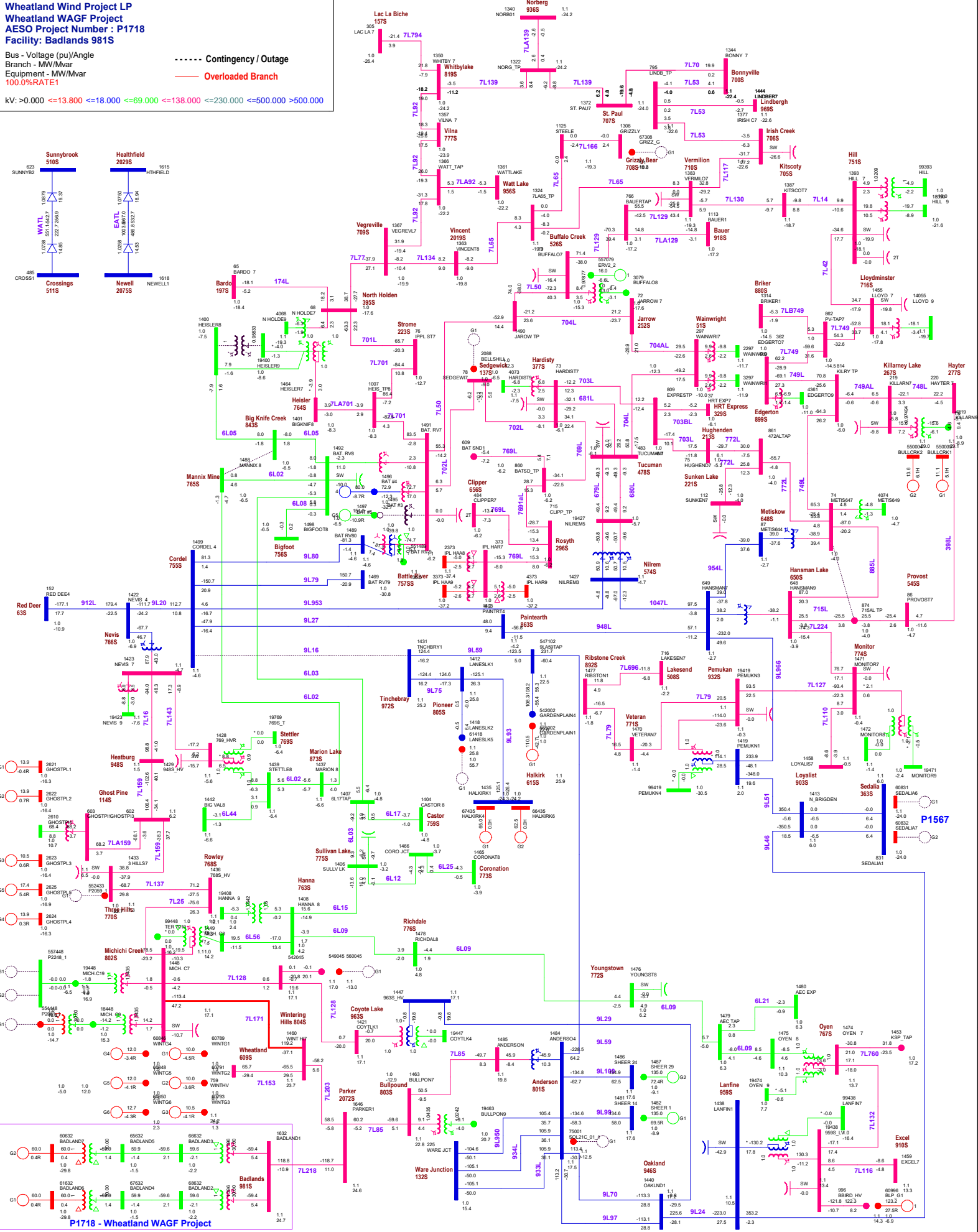


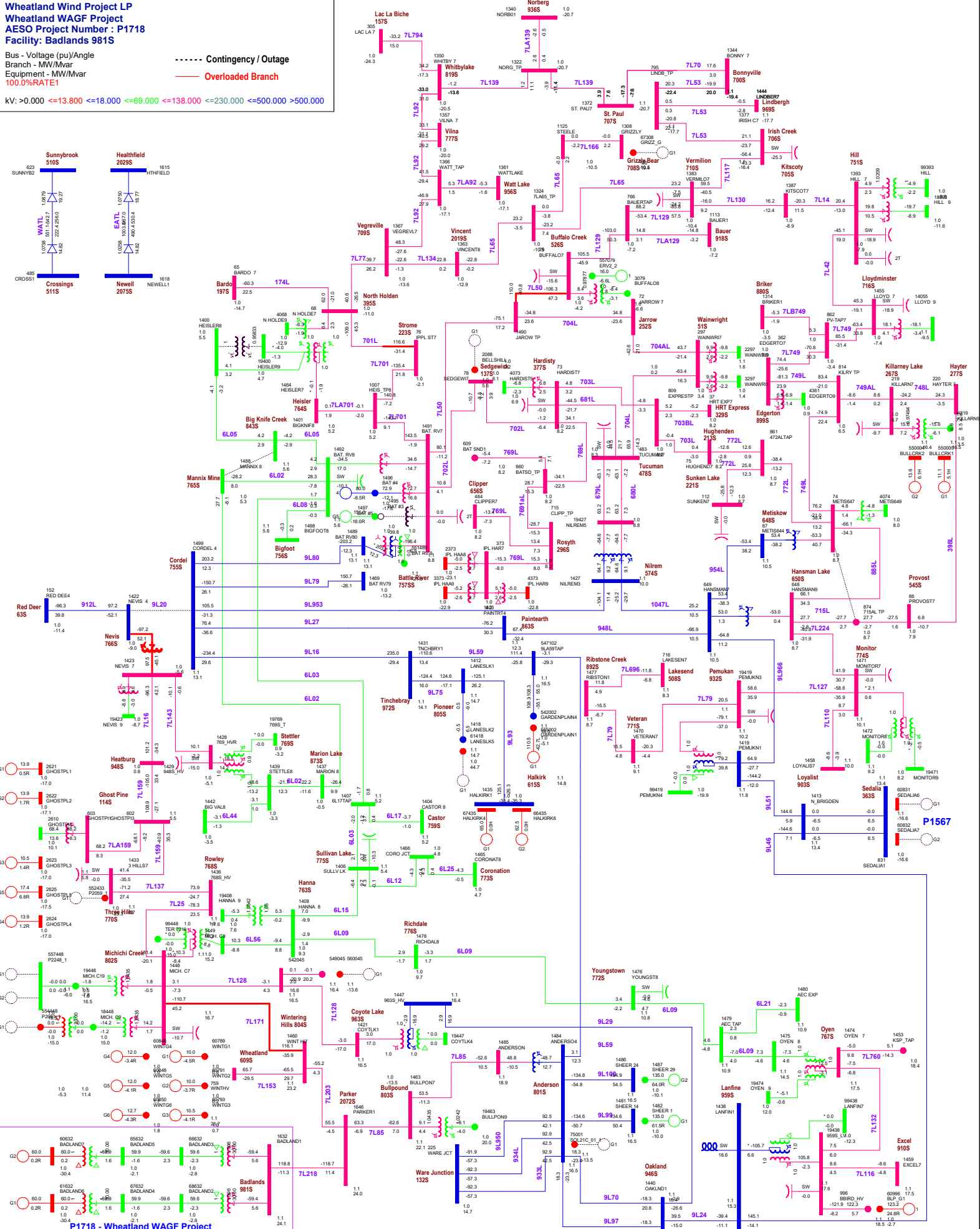
Figure A3-56

**Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S**

Bus - Voltage (pu)/Angle
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%RATE1

----- Contingency / Outage
----- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000



Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

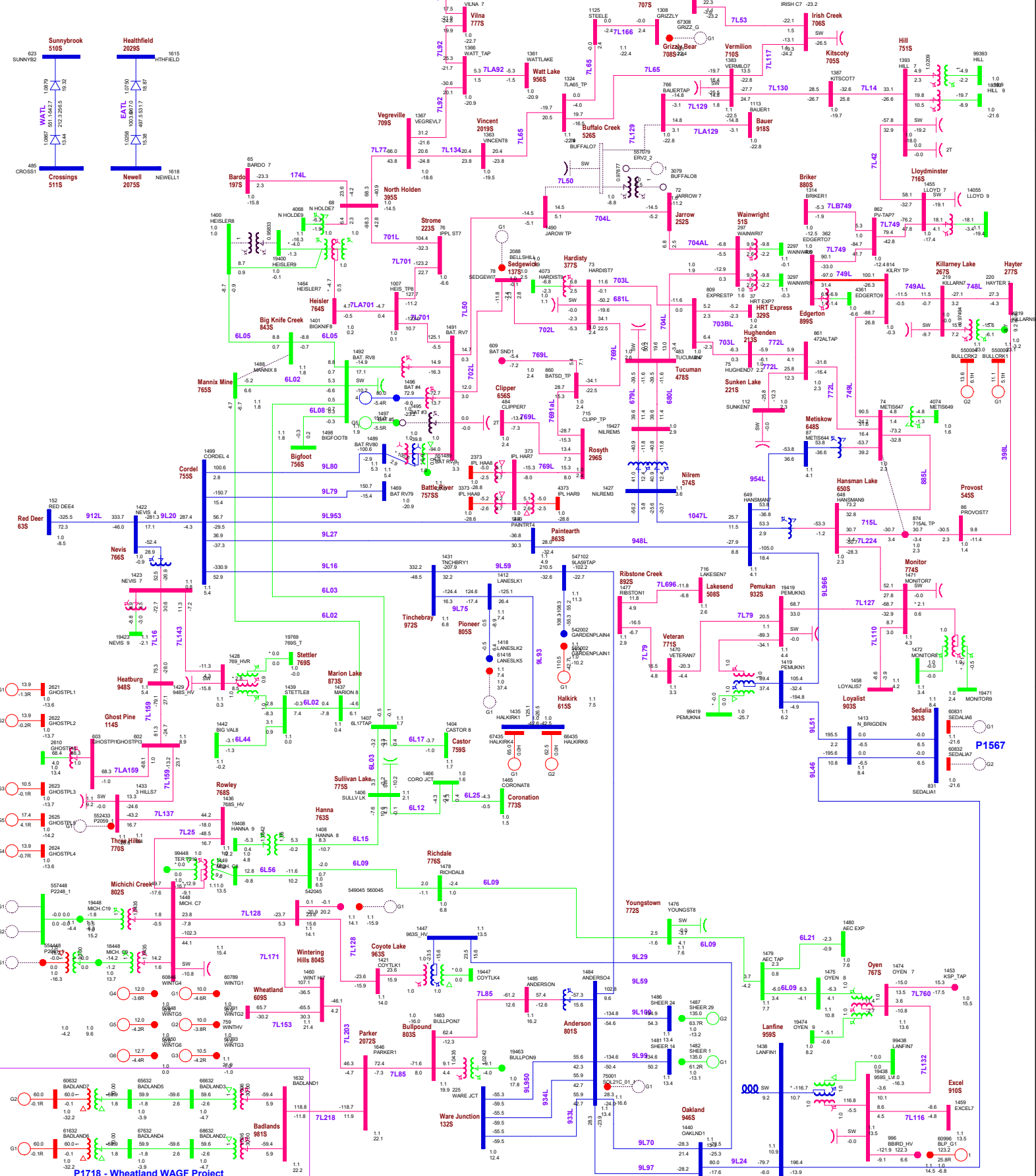


Figure A3-58

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 --- Overloaded Branch

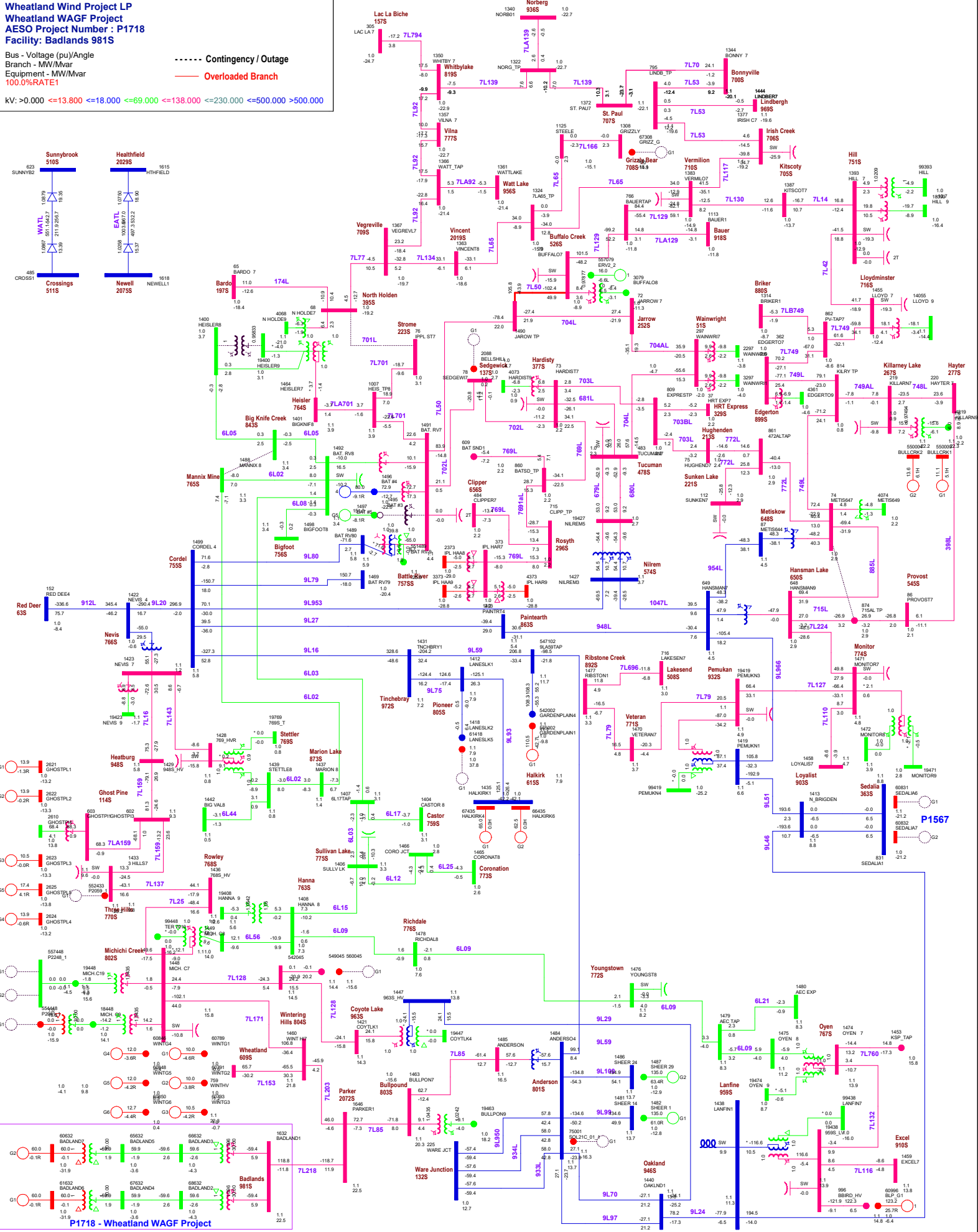


Figure A3-59

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

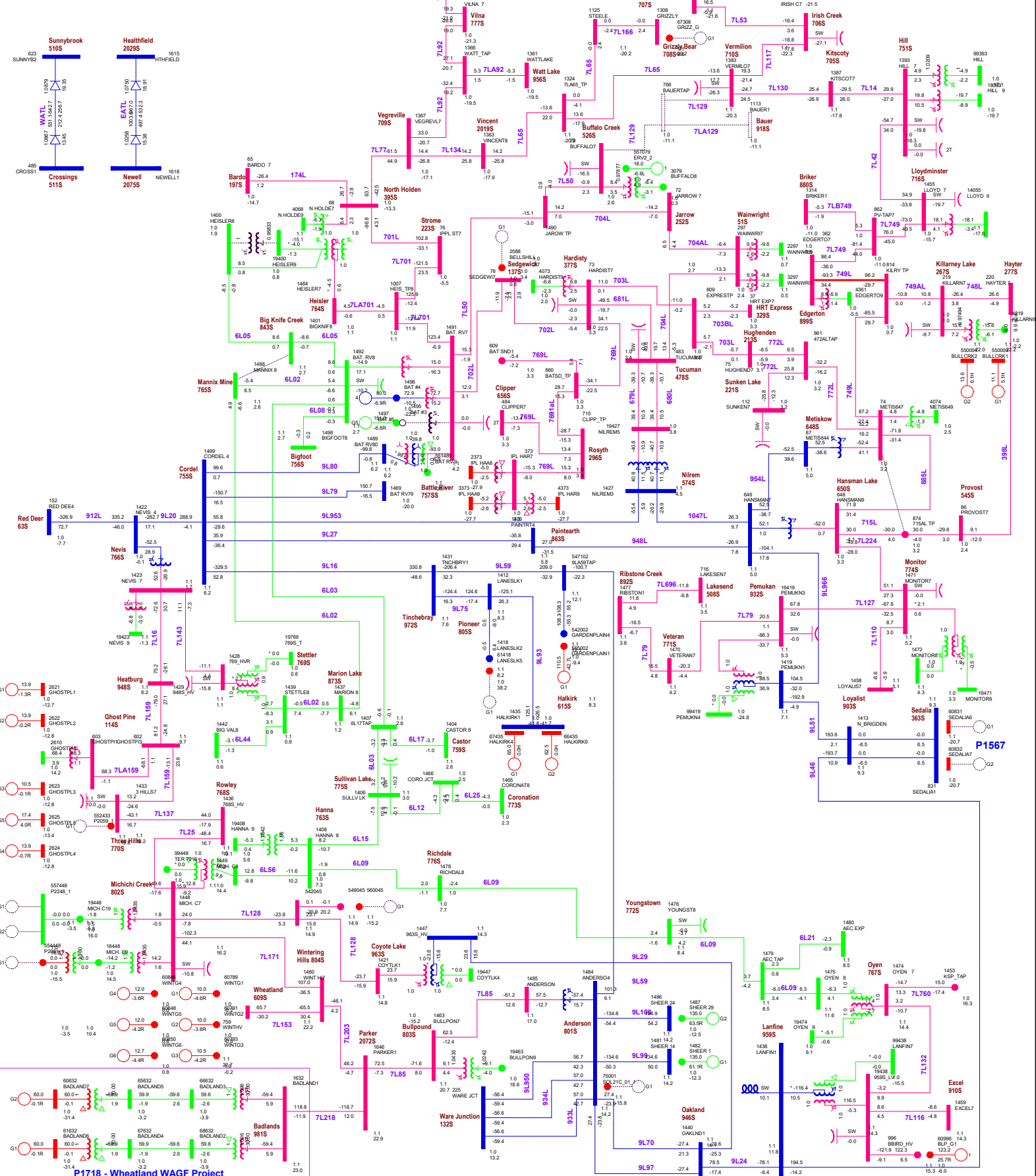


Figure A3-60

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

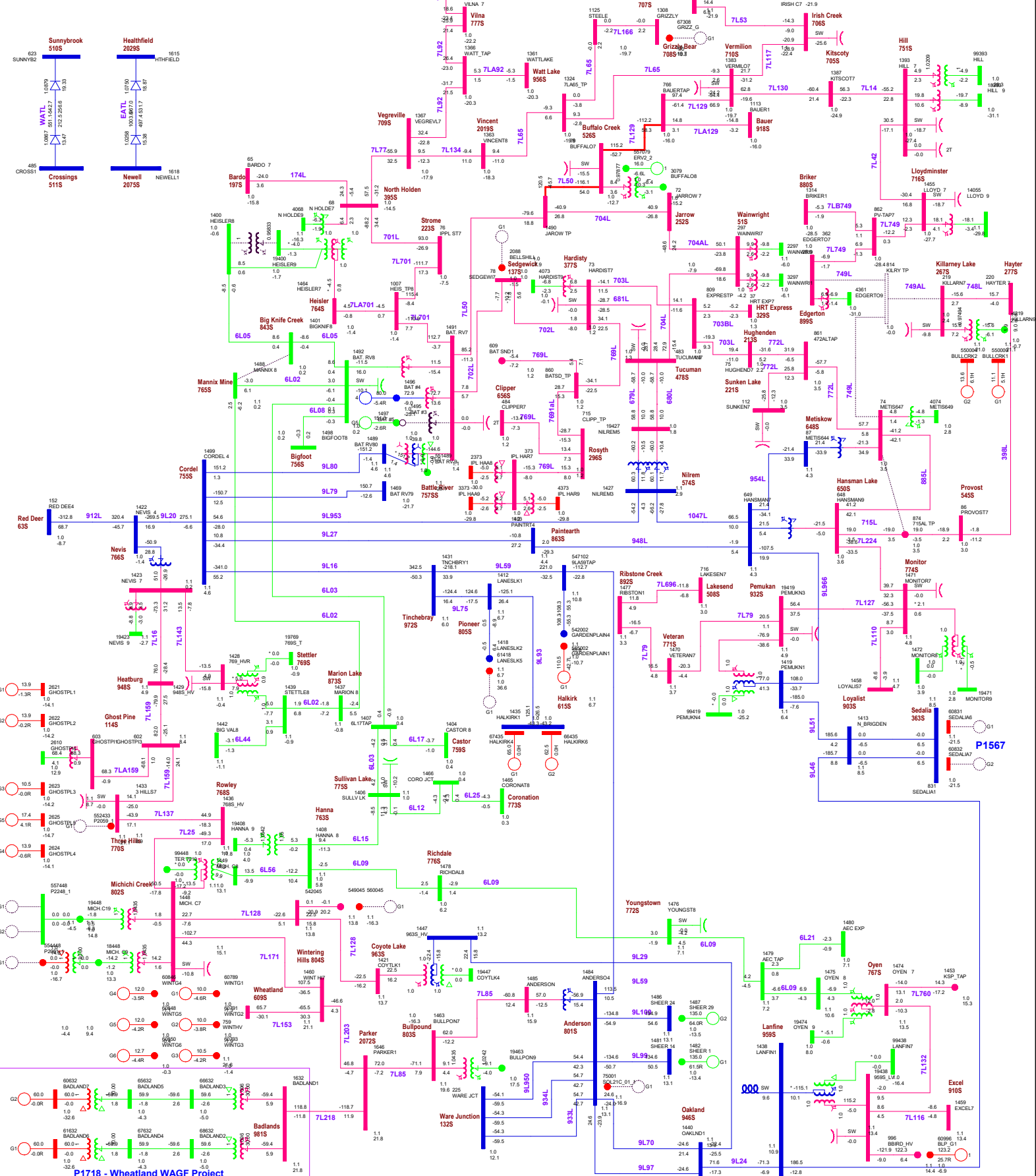


Figure A3-61

Irishland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

Contingency / Outage
 Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

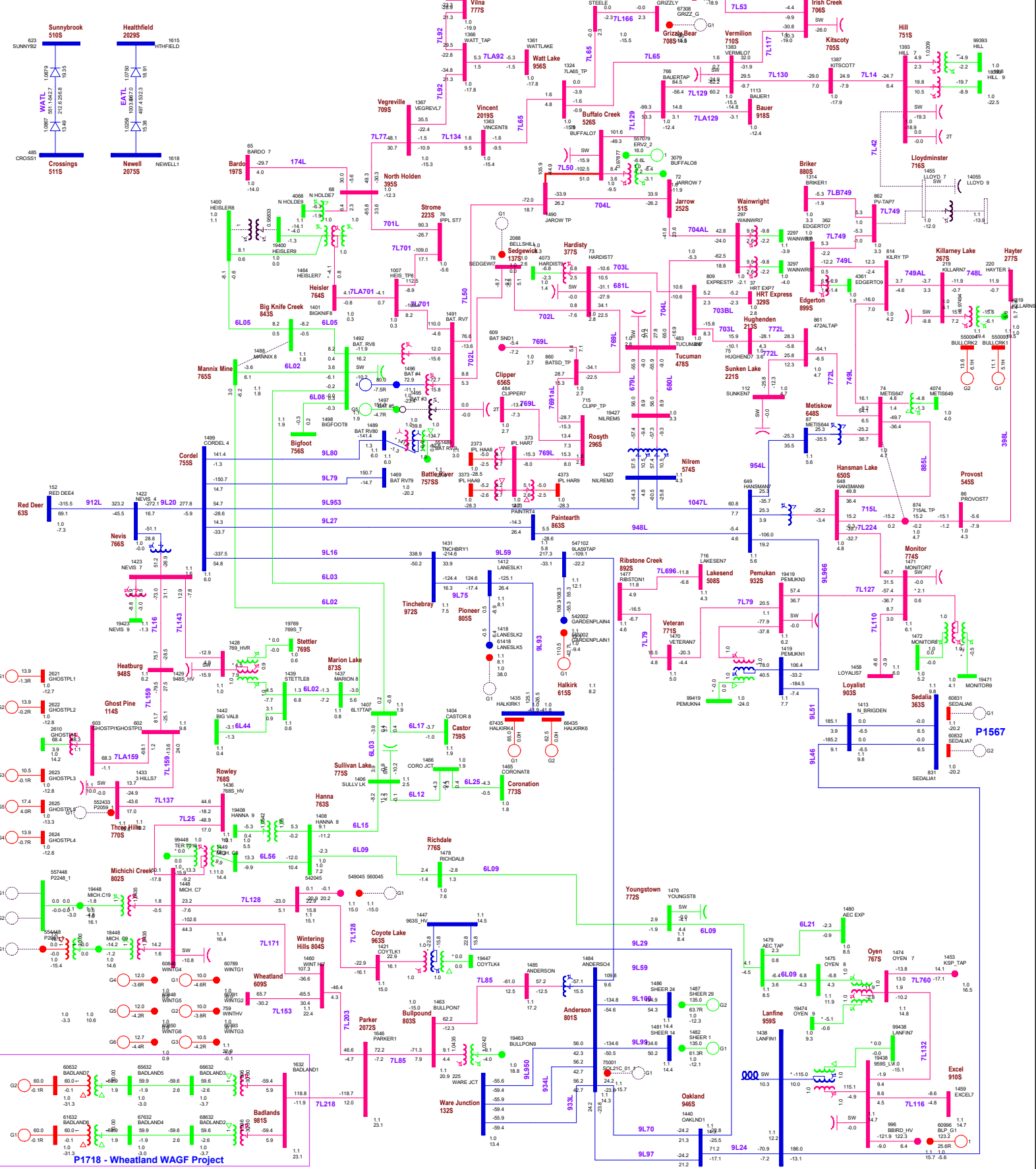


Figure A3-62

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

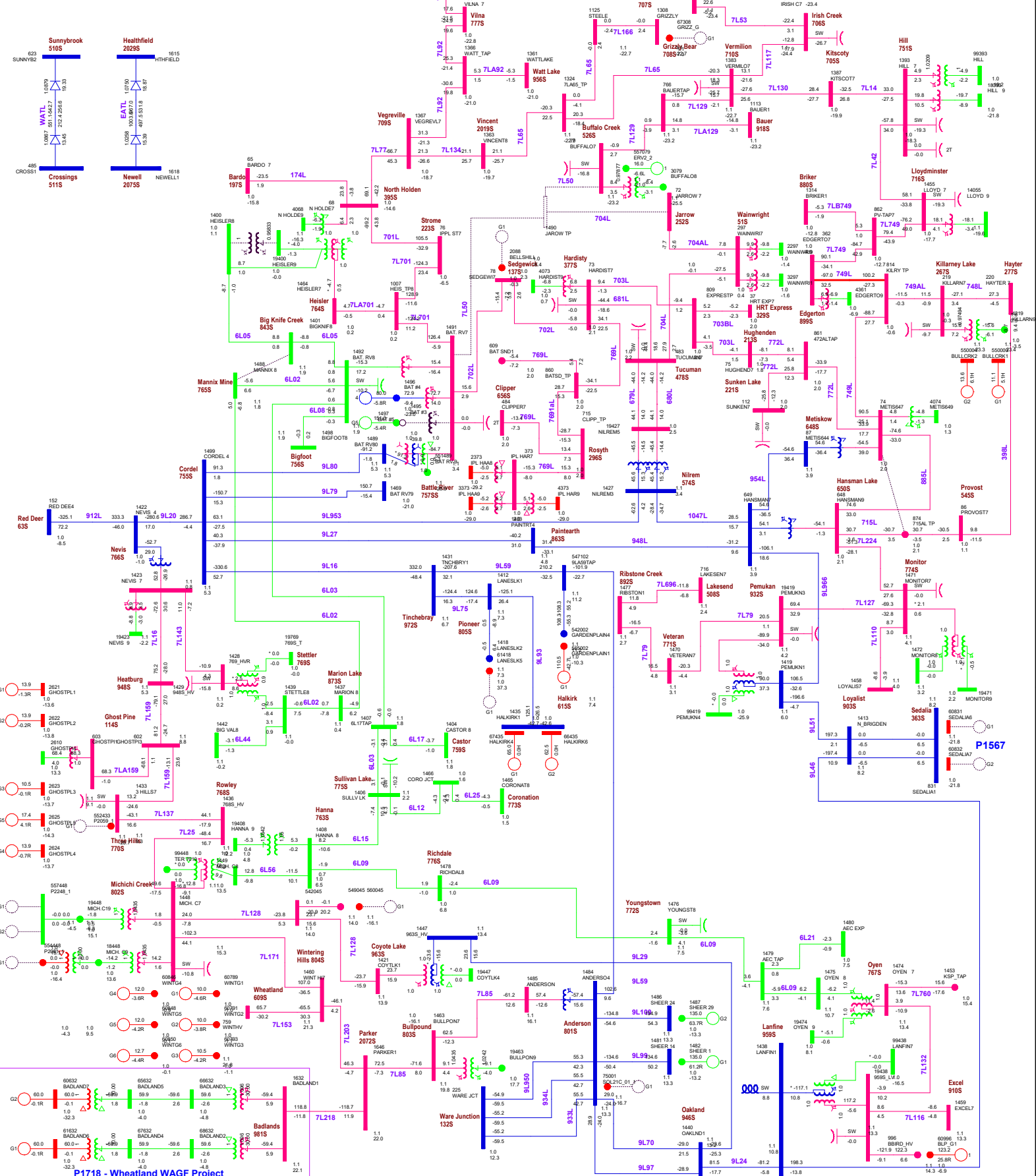


Figure A3-63

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

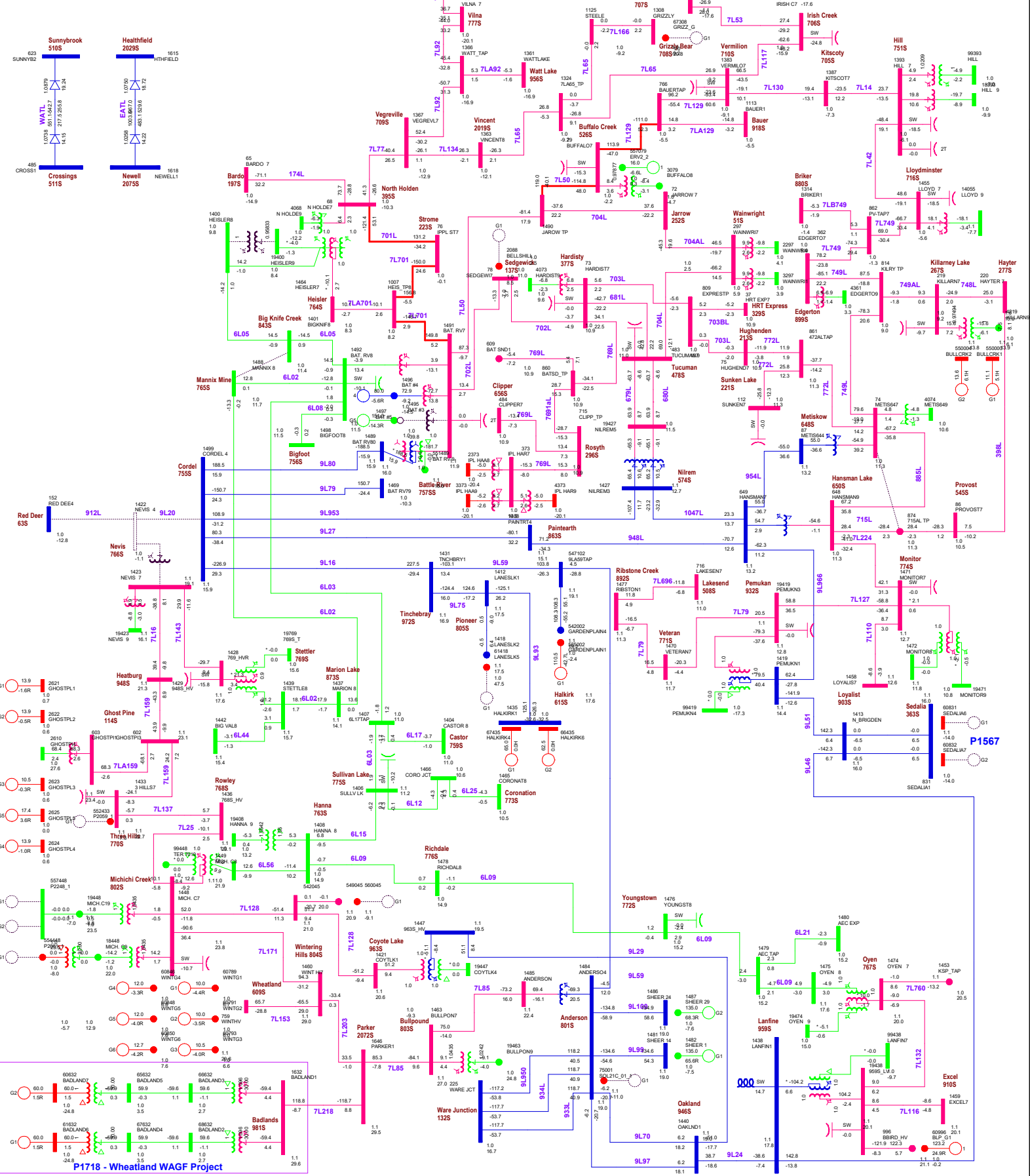


Figure A3-64

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

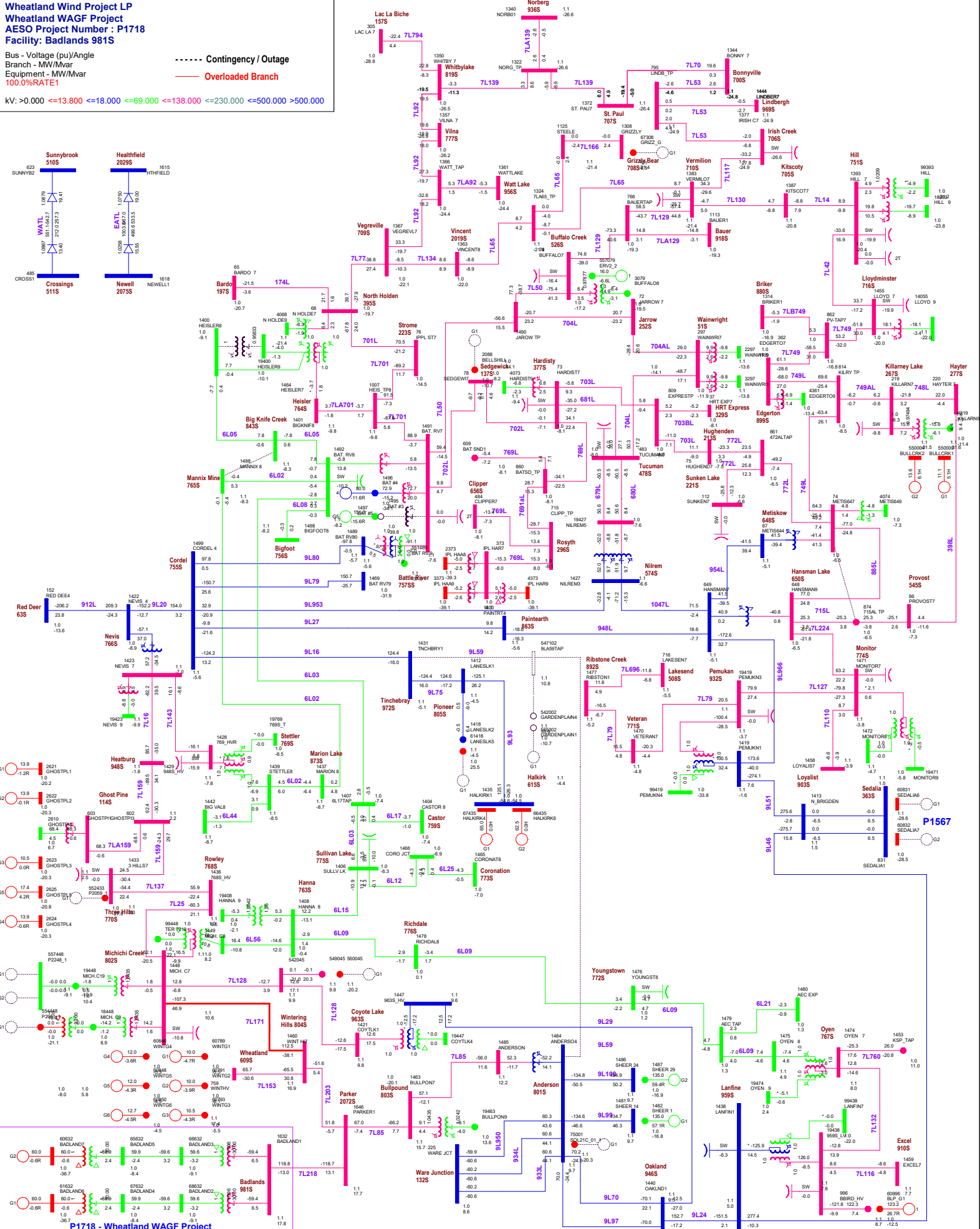


Figure A3-65

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE2

----- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

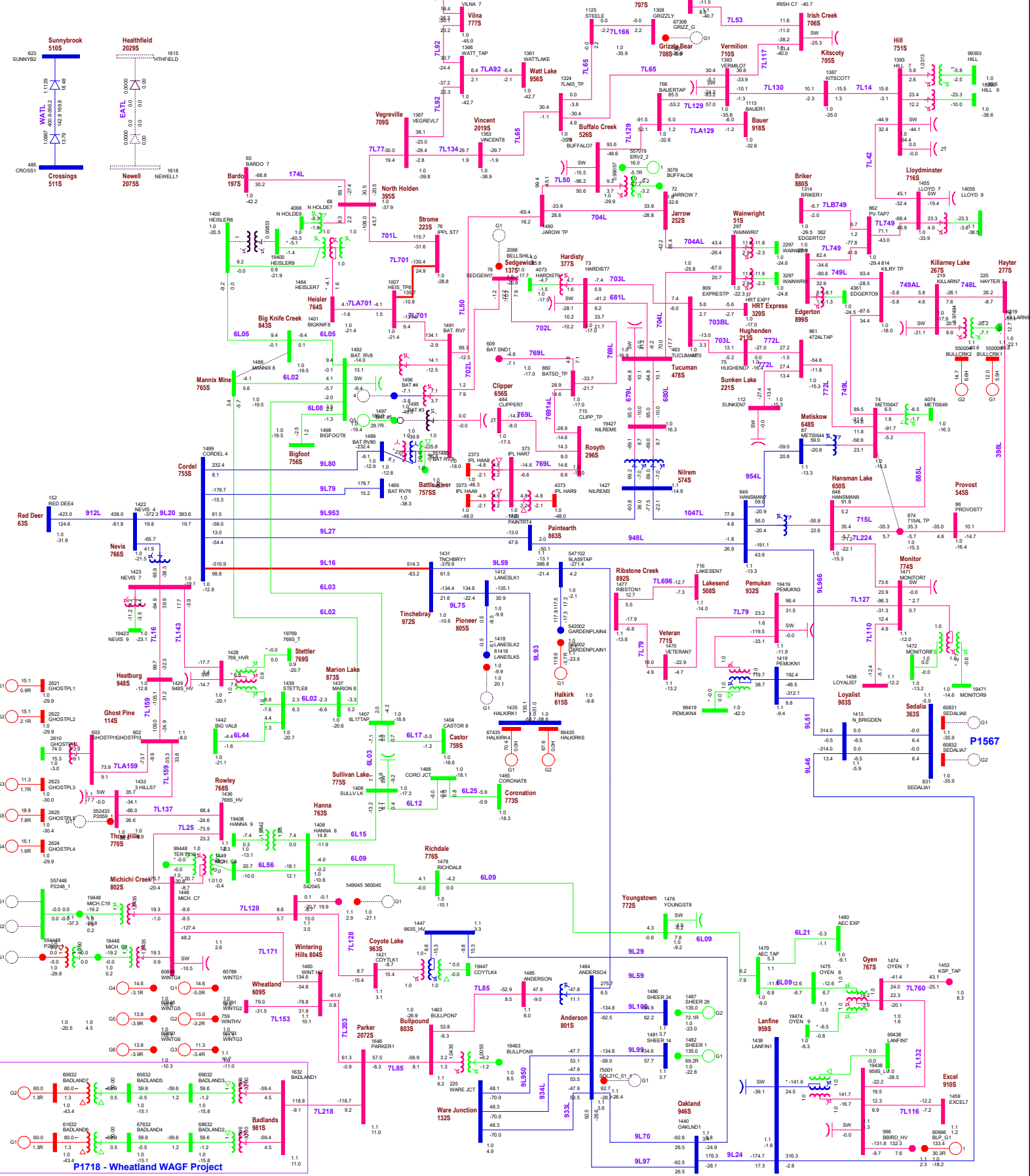


Figure A3-66

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE2

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 — Overloaded Branch

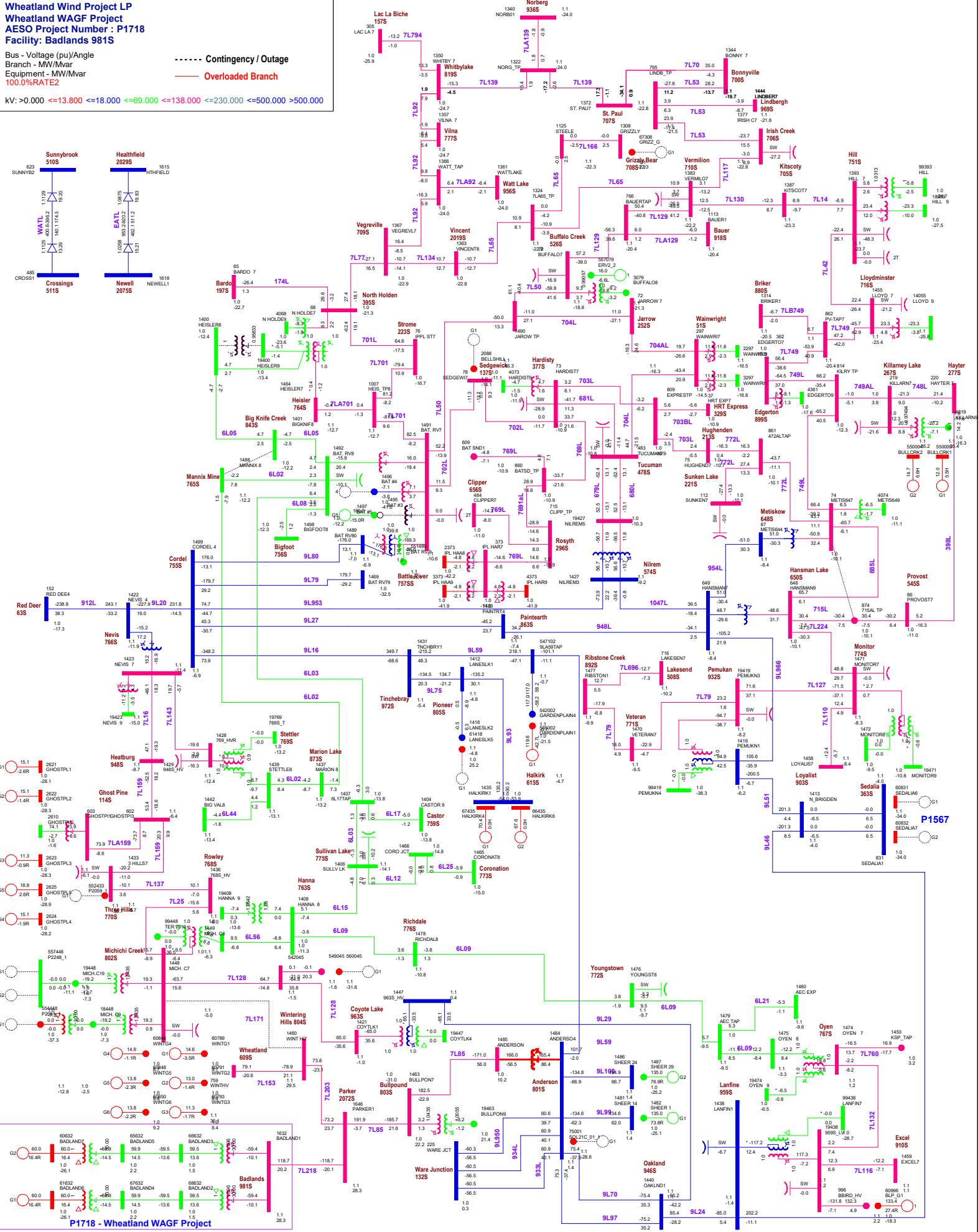


Figure A3-67

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE2

----- Contingency / Outage
 — Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

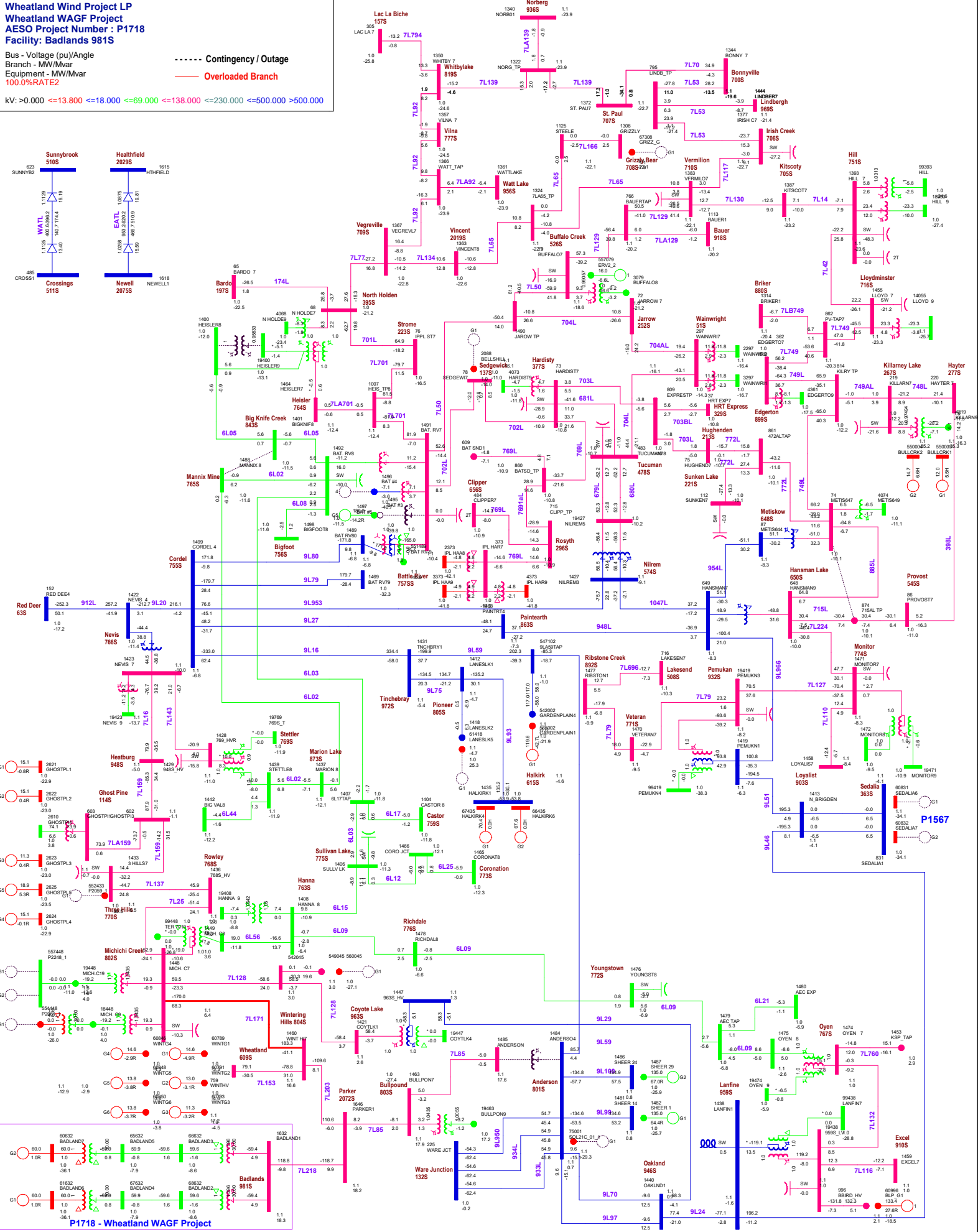


Figure A3-68

Attachment A4

Post-Project Transient Stability Diagrams



Attachment A4: Post-Project Transient Stability Diagrams

Table A4-1: Transient Stability Figures for Contingencies

Category	Contingency	Fault Location	Fault Clearing Time (Cycles)		2022 SL	2022 SP	2022 WP
			Near End	Far End			
Category B	9L24 (Oakland 946S - Lanfine 959S)	Oakland 946S	5	6	A4-1	A4-27	A4-53
Category B	9L24 (Oakland 946S - Lanfine 959S)	Lanfine 959S	5	6	A4-2	A4-28	A4-54
Category B	9L29 (Oakland 946S - Coyote Lake 963S)	Oakland 946S	5	6	A4-3	A4-29	A4-55
Category B	9L29 (Oakland 946S - Coyote Lake 963S)	Coyote Lake 963S	5	6	A4-4	A4-30	A4-56
Category B	9L20 (Cordel 755S - Nevis 766S)	Cordel 755S	5	6	A4-5	A4-31	A4-57
Category B	9L20 (Cordel 755S - Nevis 766S)	Nevis 766S	5	6	A4-6	A4-32	A4-58
Category B	912L-9L912 (Nevis 766S - Red Deer 63S)	Nevis 766S	5.5	6.5	A4-7	A4-33	A4-59
Category B	912L-9L912 (Nevis 766S - Red Deer 63S)	Red Deer 63S	5.5	6.5	A4-8	A4-34	A4-60
Category B	7L171 (Wintering Hill 804S - Michichi Creek 802S)	Wintering Hill 804S	6	24	A4-9	A4-35	A4-61
Category B	7L171 (Wintering Hill 804S - Michichi Creek 802S)	Michichi Creek 802S	6	24	A4-10	A4-36	A4-62
Category B	7L25 (Rowley 768S - Michichi Creek 802S)	Rowley 768S	6	24	A4-11	A4-37	A4-63
Category B	7L25 (Rowley 768S - Michichi Creek 802S)	Michichi Creek 802S	6	24	A4-12	A4-38	A4-64
Category B	7L137 (Rowley 768S - Three Hills 770S)	Rowley 768S	6	24	A4-13	A4-39	A4-65
Category B	7L137 (Rowley 768S - Three Hills 770S)	Three Hills 770S	6	24	A4-14	A4-40	A4-66
Category B	7L16 (Heatburg 948S - Nevis 766S)	Heatburg 948S	6	24	A4-15	A4-41	A4-67
Category B	7L16 (Heatburg 948S - Nevis 766S)	Nevis 766S	6	24	A4-16	A4-42	A4-68
Category B	7L159 (Three Hills 770S - Ghost Pine 114S - Heatburg 948S)	Three Hills 770S	6	8	A4-17	A4-43	A4-69
Category B	7L159 (Three Hills 770S - Ghost Pine 114S - Heatburg 948S)	Ghost Pine 114S	6	8	A4-18	A4-44	A4-70
Category B	7L159 (Three Hills 770S - Ghost Pine 114S - Heatburg 948S)	Heatburg 948S	6	8	A4-19	A4-45	A4-71
Category B	9L59 (Anderson 801S - Tinchebray 972S)	Anderson 801S	5	6	A4-20	A4-46	A4-72
Category B	9L59 (Anderson 801S - Tinchebray 972S)	Tinchebray 972S	5	6	A4-21	A4-47	A4-73
Category B	7L128 (Michichi Creek 802S - Coyote Lake 963S)	Michichi Creek 802S	6	8	A4-22	A4-48	A4-74
Category B	7L128 (Michichi Creek 802S - Coyote Lake 963S)	Coyote Lake 963S	6	8	A4-23	A4-49	A4-75
Category B	7L85 (Wintering Hills 804S - Anderson 801S)	Wintering Hills 804S	6	42	A4-24	A4-50	A4-76
Category B	7L85 (Wintering Hills 804S - Anderson 801S)	Anderson 801S	6	42	A4-25	A4-51	A4-77
Category B	EATL (Heathfield 2029S - Newell 2075S)	Heathfield 2029S	5	6	A4-26	A4-52	A4-78



FIGURE A4-1B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-1_3PH_Fault_9L24@Oakland-946S.out

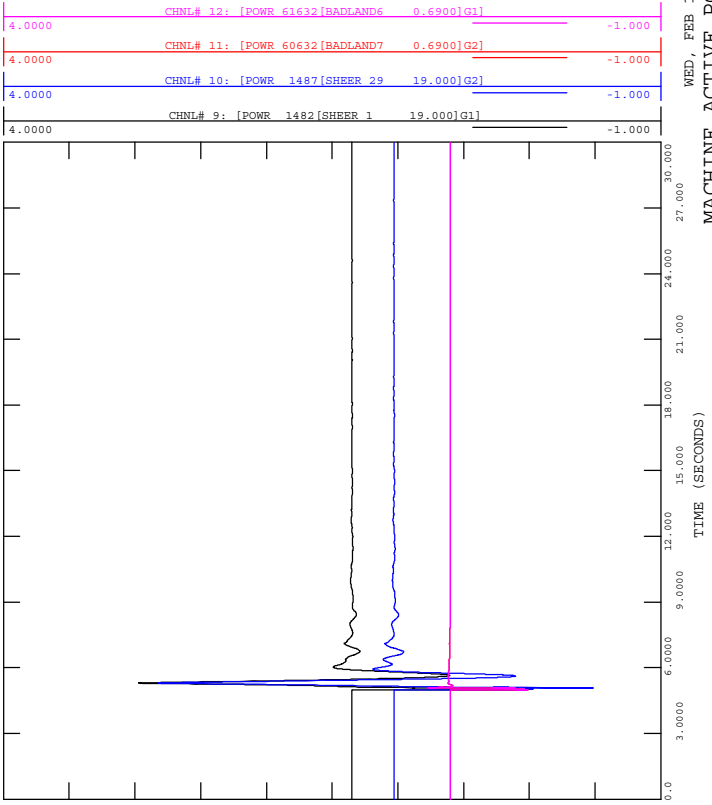


FIGURE A4-1D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-1_3PH_Fault_9L24@Oakland-946S.out

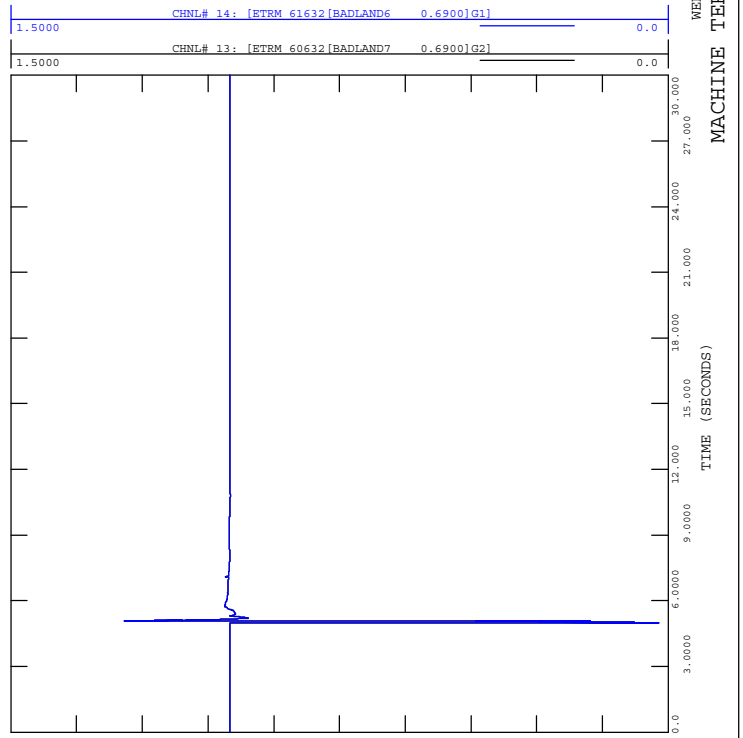


FIGURE A4-1A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-1_3PH_Fault_9L24@Oakland-946S.out

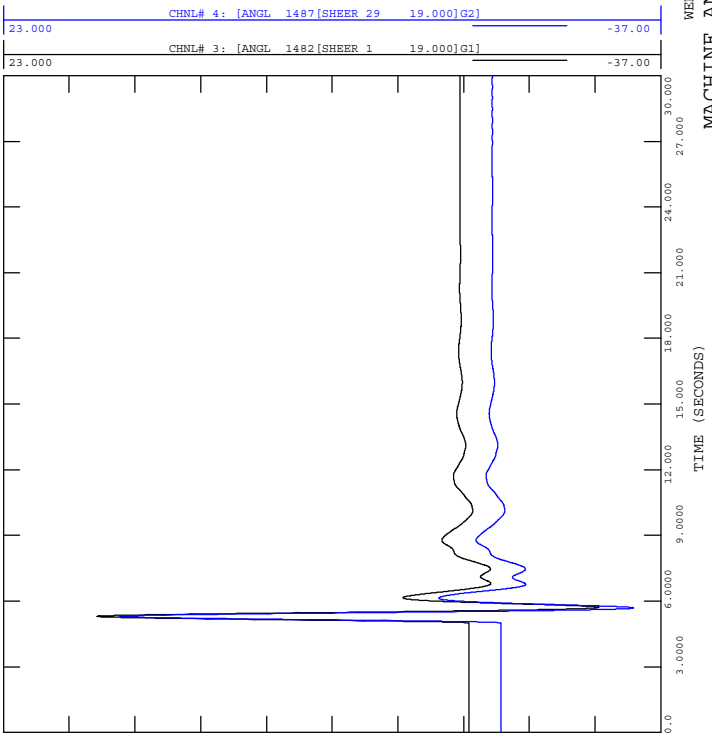


FIGURE A4-1C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-1_3PH_Fault_9L24@Oakland-946S.out

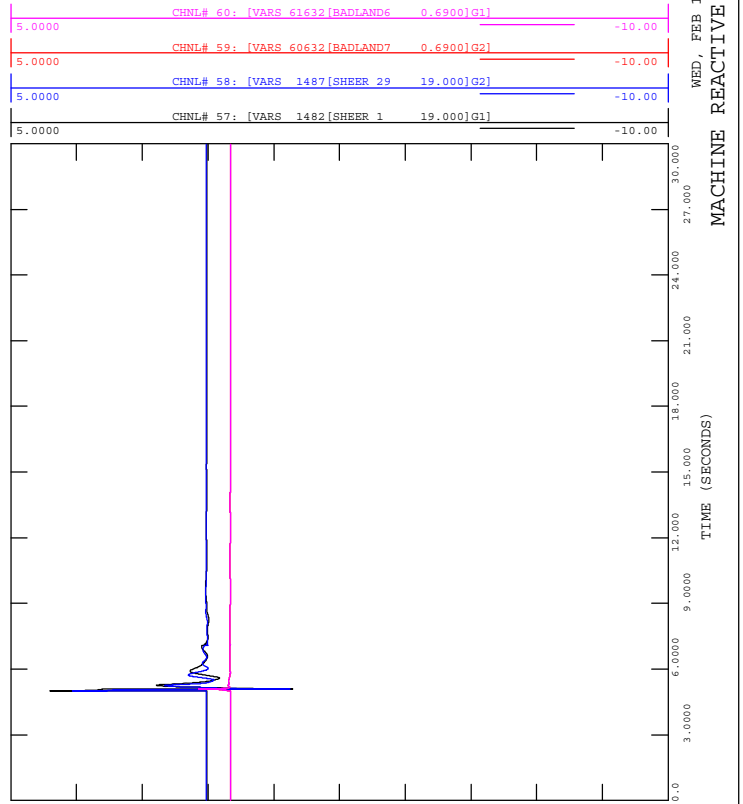




FIGURE A4-1F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-1_3PH_Fault_9L24@Oakland-946S.out

15:27
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

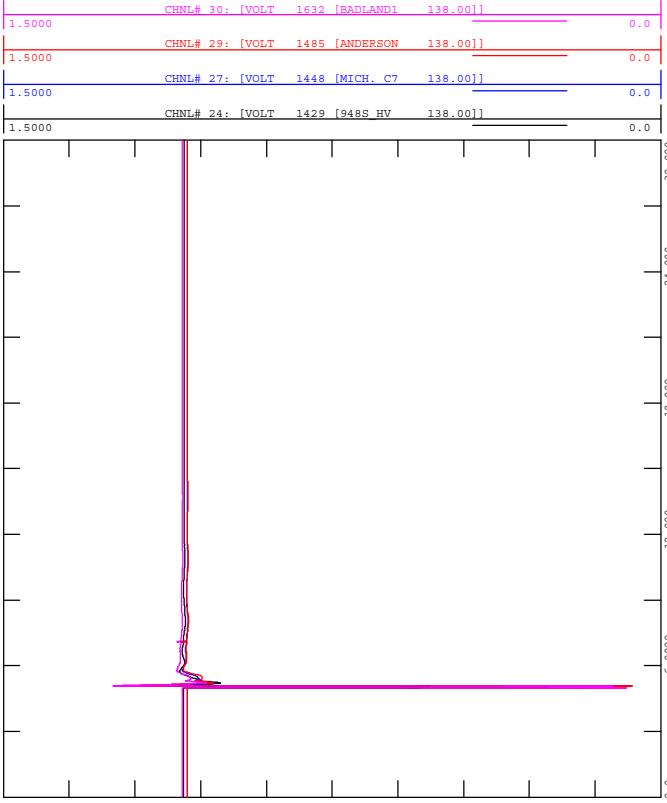


FIGURE A4-1H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-1_3PH_Fault_9L24@Oakland-946S.out

15:27
 WED, FEB 16 2022
 BRANCH FLOW (Q)

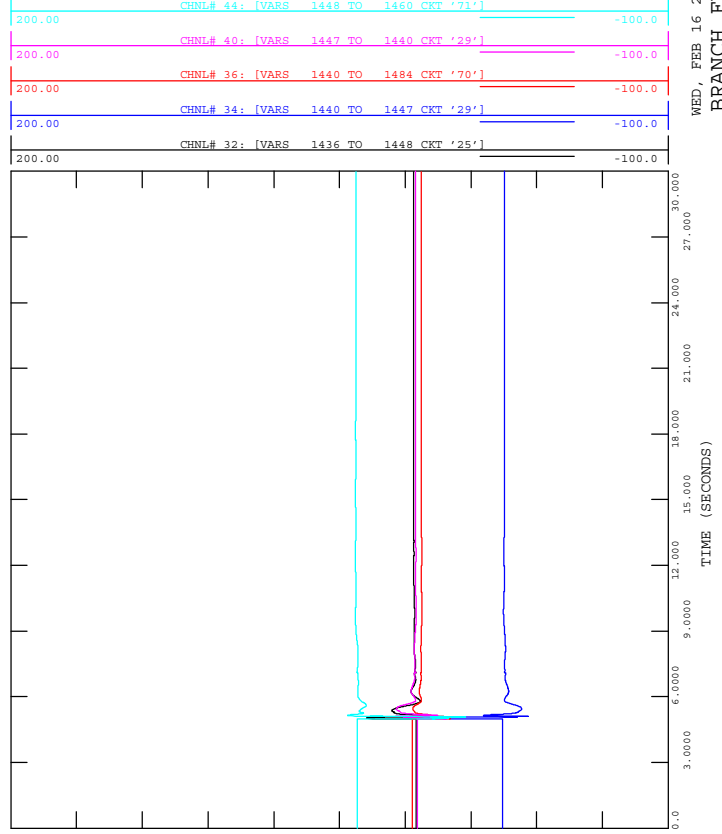


FIGURE A4-1E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-1_3PH_Fault_9L24@Oakland-946S.out

15:27
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

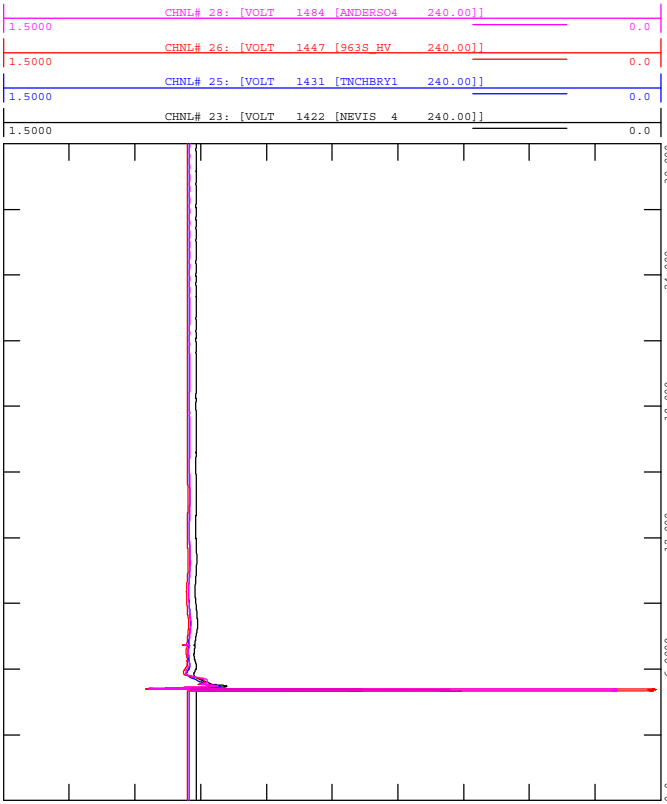


FIGURE A4-1G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-1_3PH_Fault_9L24@Oakland-946S.out

15:27
 WED, FEB 16 2022
 BRANCH FLOW (P)

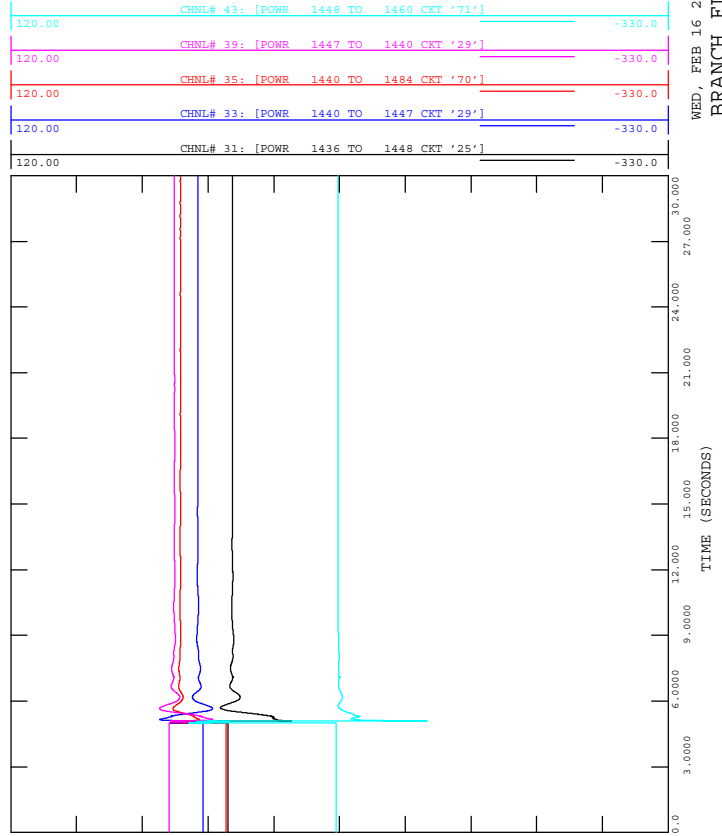




FIGURE A4-2B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-2_3PH_Fault_9L24@Lanfine-959S.out

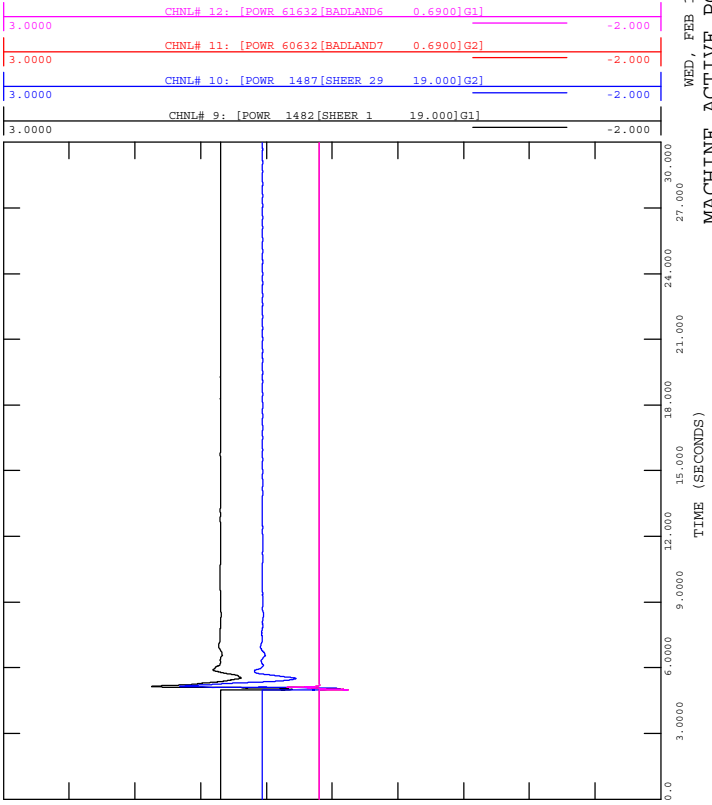


FIGURE A4-2D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-2_3PH_Fault_9L24@Lanfine-959S.out

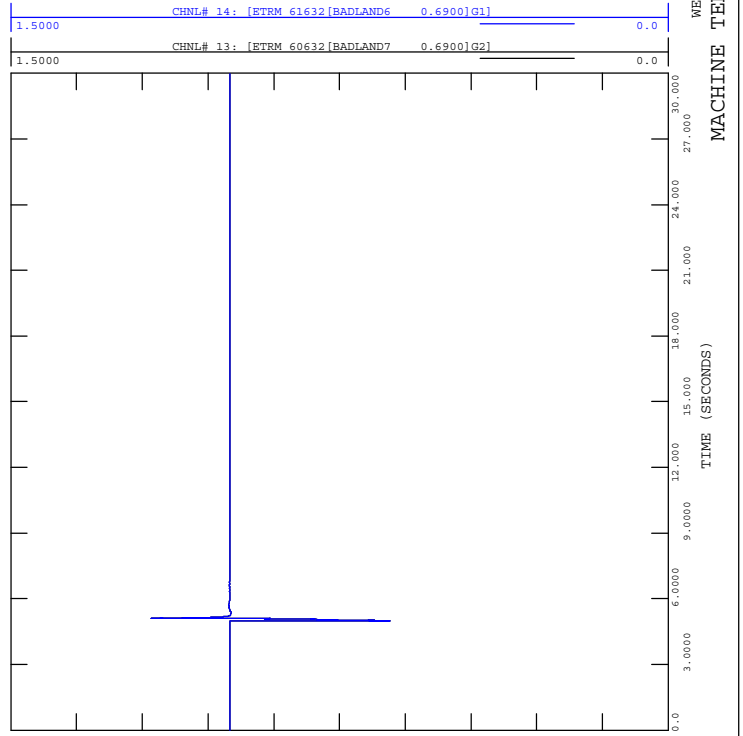


FIGURE A4-2A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-2_3PH_Fault_9L24@Lanfine-959S.out

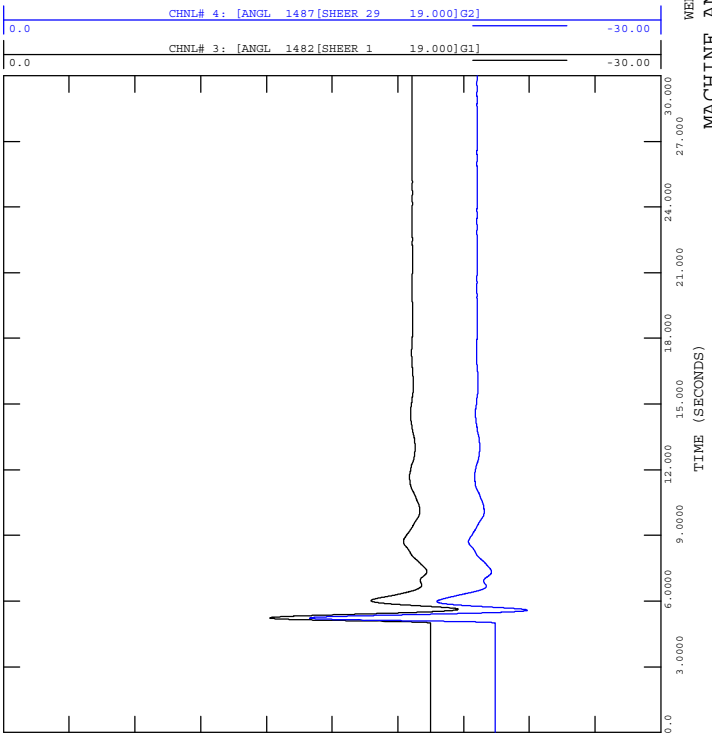


FIGURE A4-2C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-2_3PH_Fault_9L24@Lanfine-959S.out

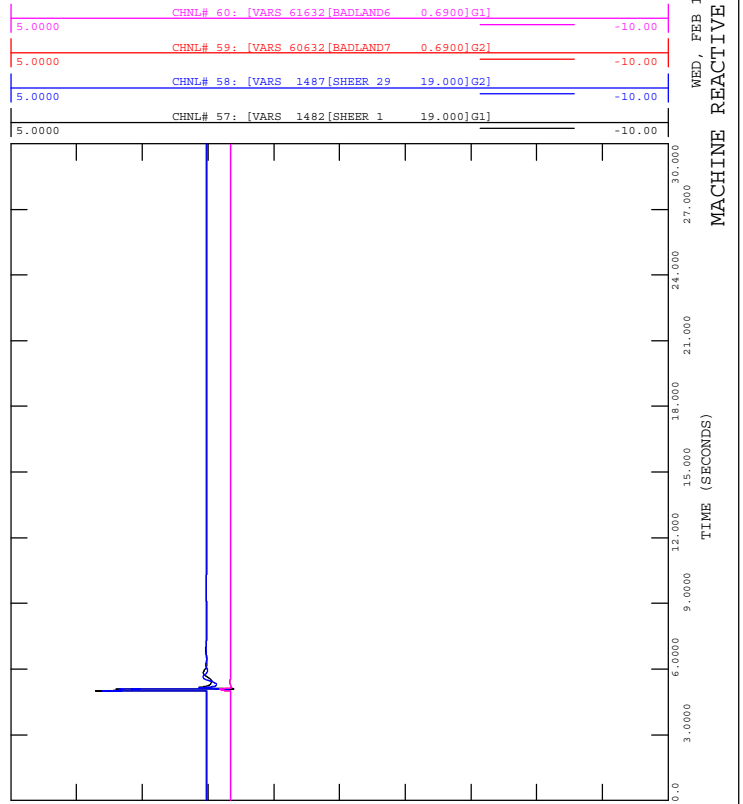




FIGURE A4-2F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-2_3PH_Fault_9L24@Lanpine-959S.out

15:27
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

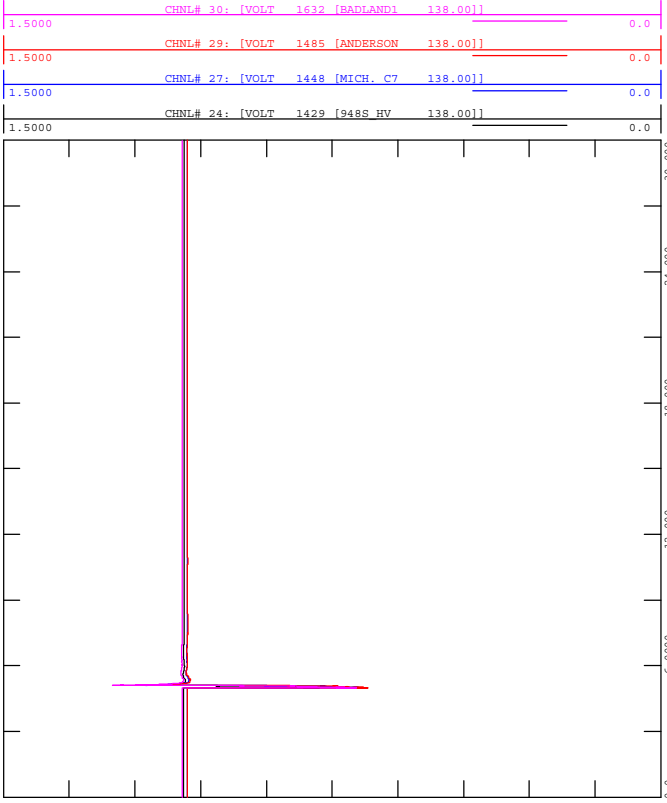


FIGURE A4-2H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-2_3PH_Fault_9L24@Lanpine-959S.out

15:28
 WED, FEB 16 2022
 BRANCH FLOW (Q)

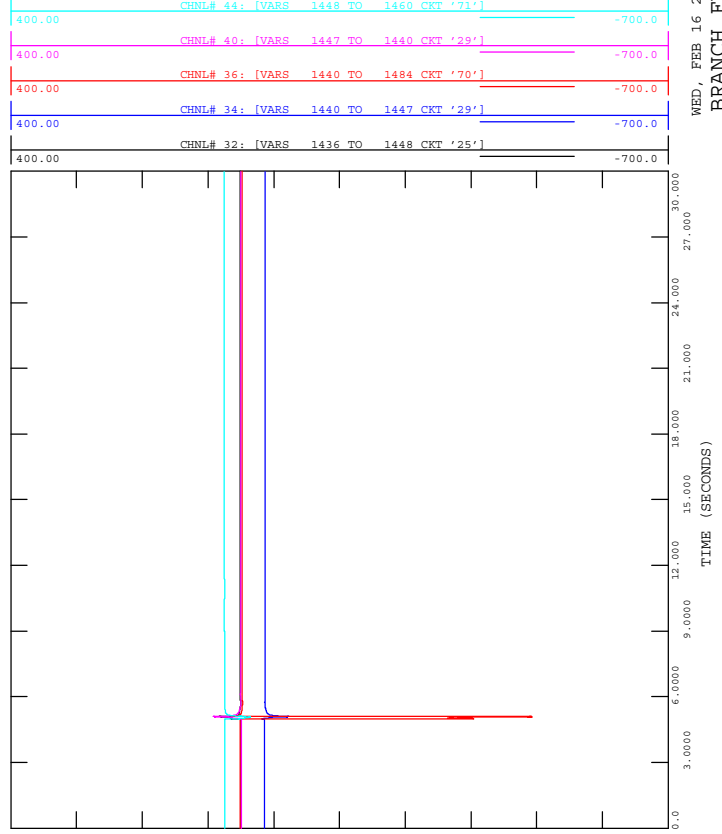


FIGURE A4-2E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-2_3PH_Fault_9L24@Lanpine-959S.out

15:27
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

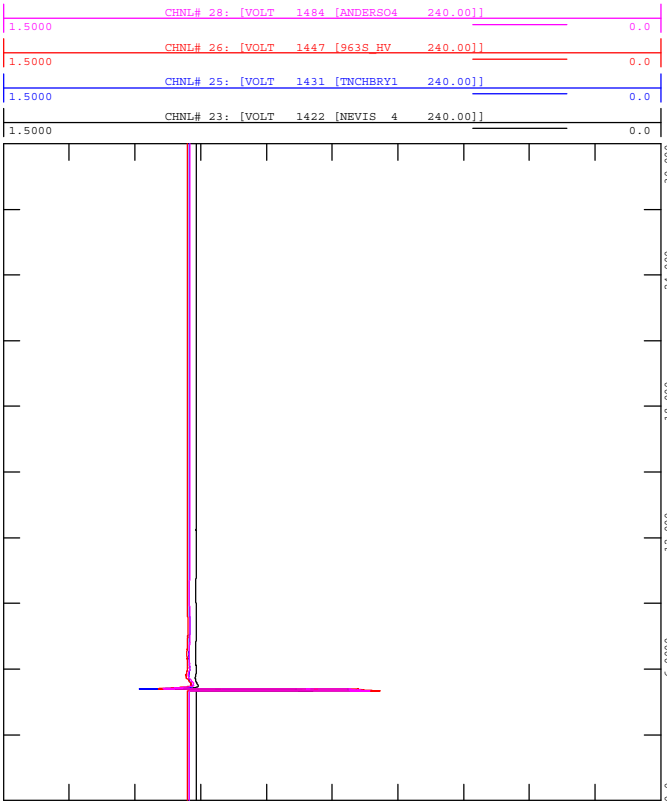


FIGURE A4-2G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-2_3PH_Fault_9L24@Lanpine-959S.out

15:28
 WED, FEB 16 2022
 BRANCH FLOW (P)

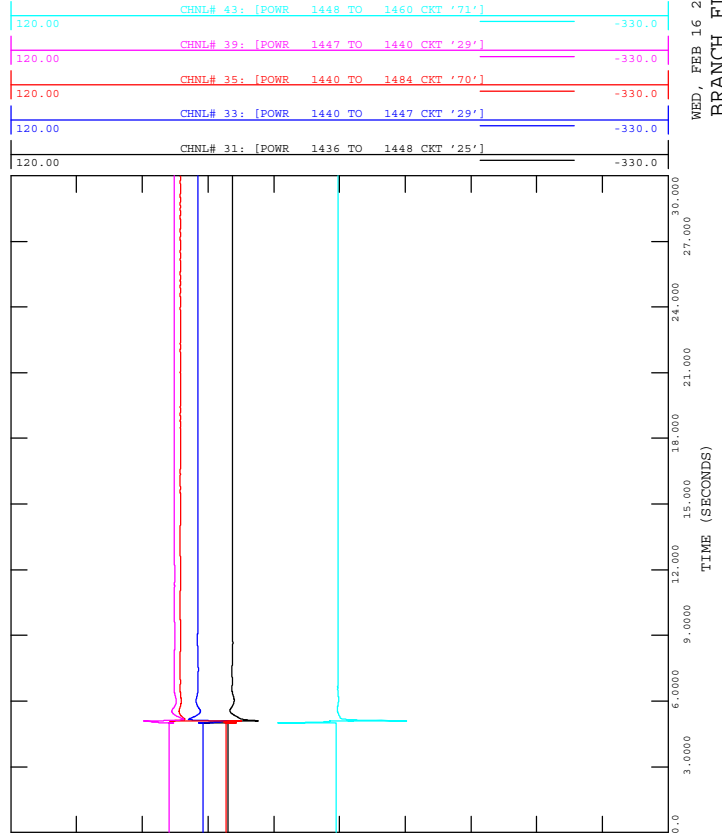




FIGURE A4-3B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-3_3PH_Fault_9L29@Oakland-946S.out

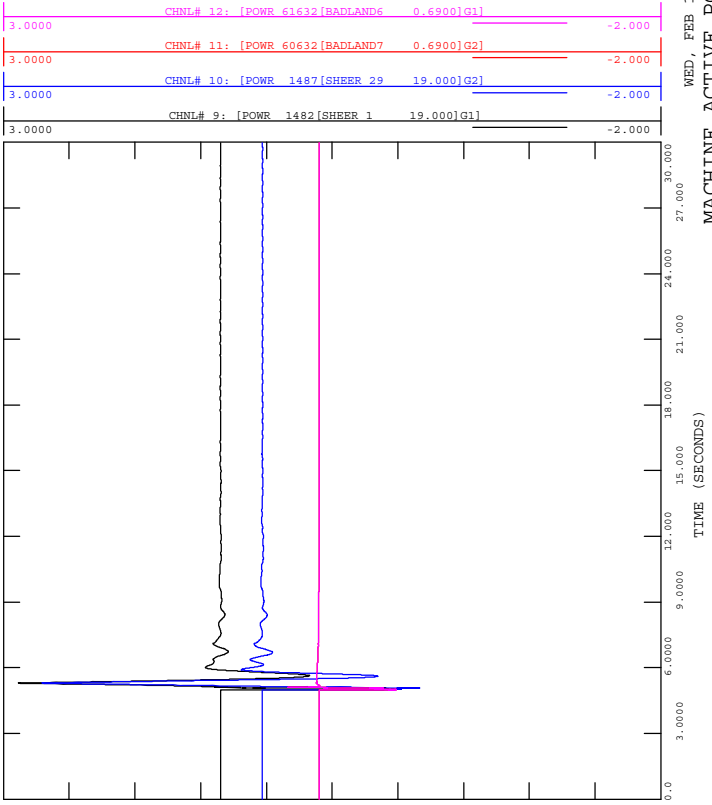


FIGURE A4-3D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-3_3PH_Fault_9L29@Oakland-946S.out

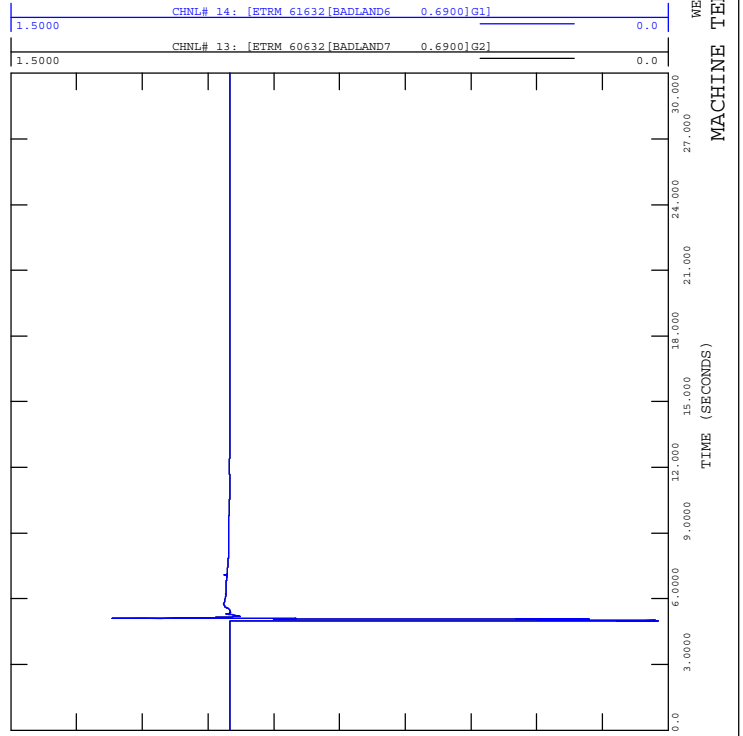


FIGURE A4-3A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-3_3PH_Fault_9L29@Oakland-946S.out

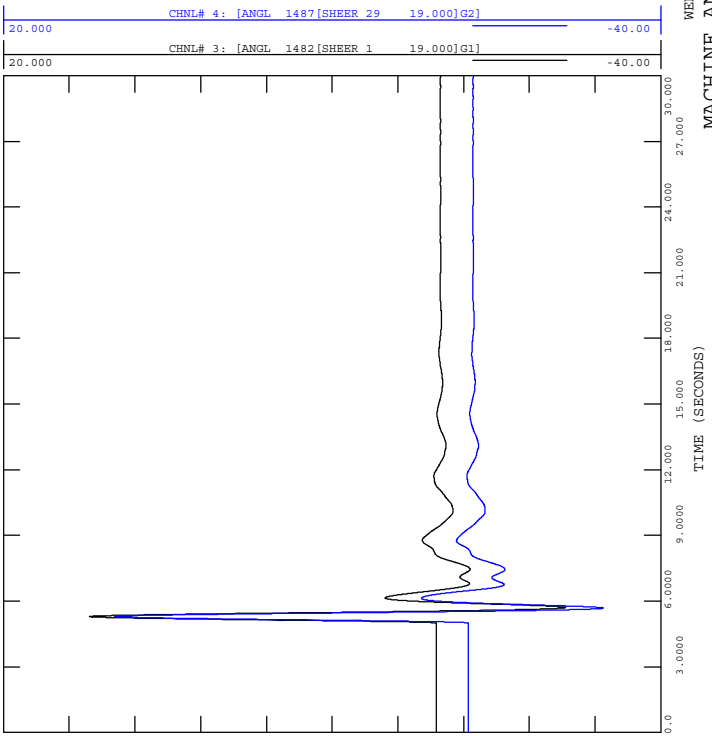


FIGURE A4-3C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-3_3PH_Fault_9L29@Oakland-946S.out

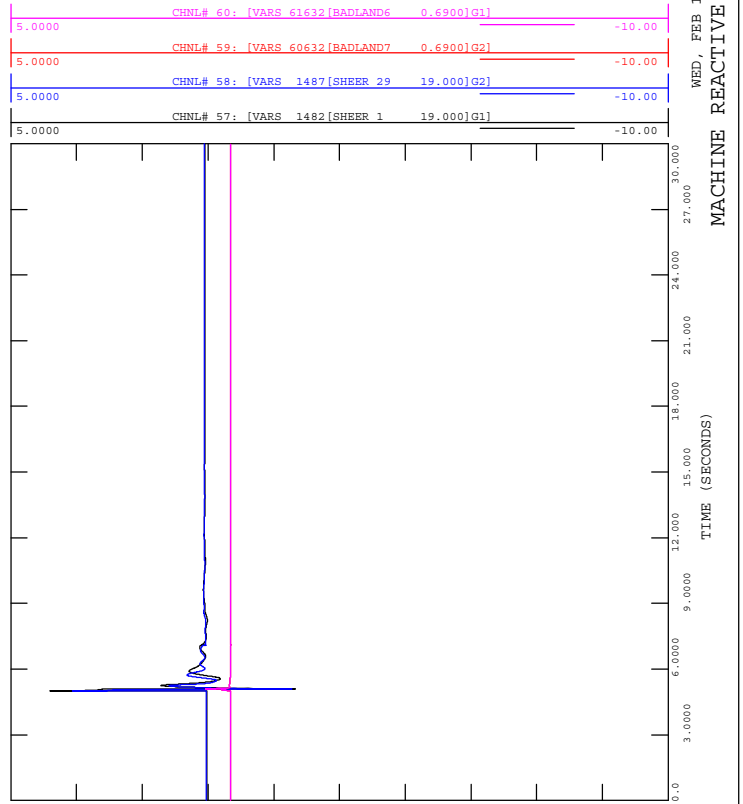




FIGURE A4-3F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-3_PH_Fault_9L29@Oakland-946S.out

WED, FEB 16 2022 15:28
 138 KV BUS VOLTAGE (PU)

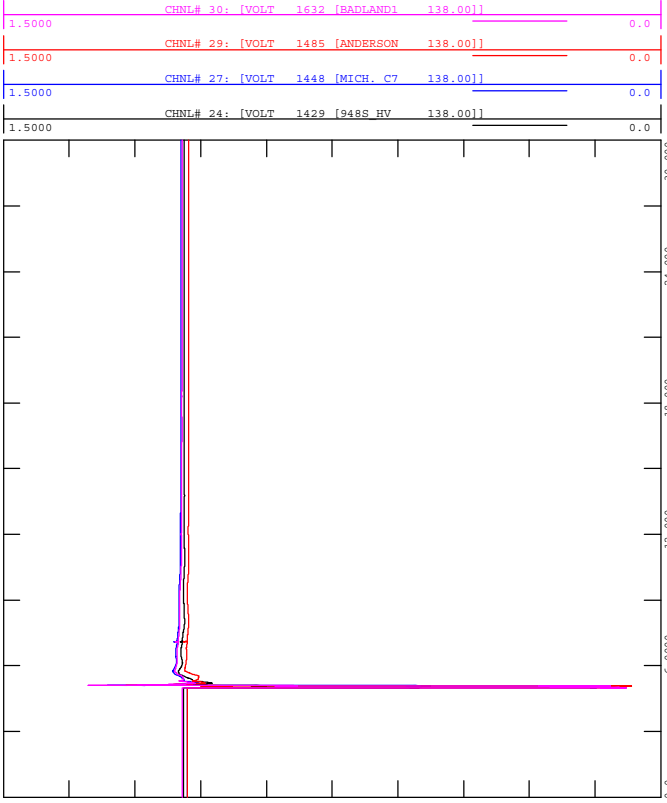


FIGURE A4-3H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-3_PH_Fault_9L29@Oakland-946S.out

WED, FEB 16 2022 15:28
 BRANCH FLOW (Q)

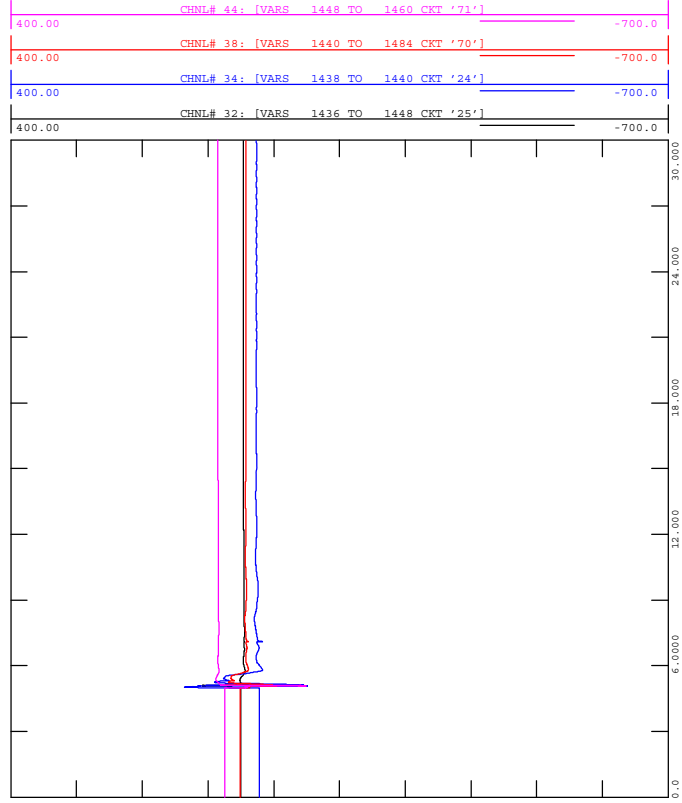


FIGURE A4-3E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-3_PH_Fault_9L29@Oakland-946S.out

WED, FEB 16 2022 15:28
 240 KV BUS VOLTAGE (PU)

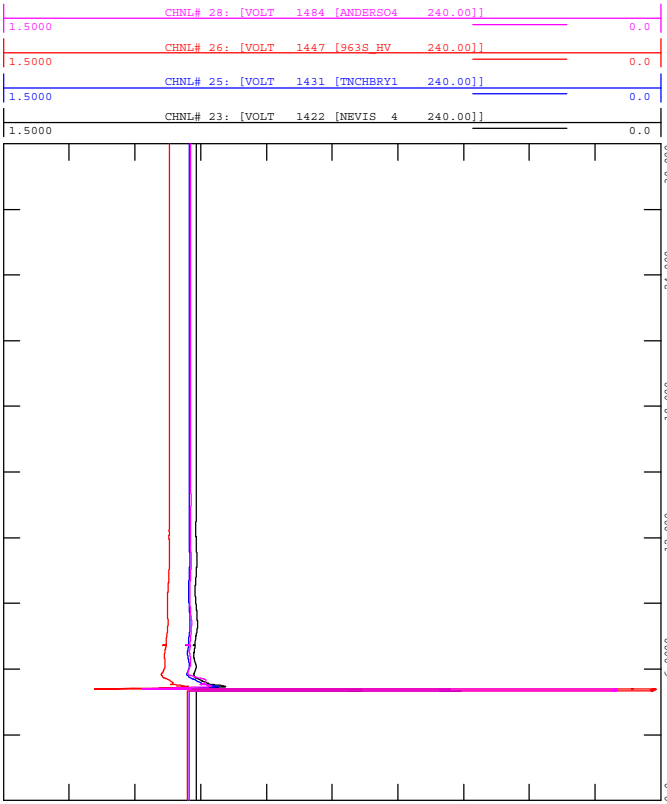


FIGURE A4-3G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-3_PH_Fault_9L29@Oakland-946S.out

WED, FEB 16 2022 15:28
 BRANCH FLOW (P)

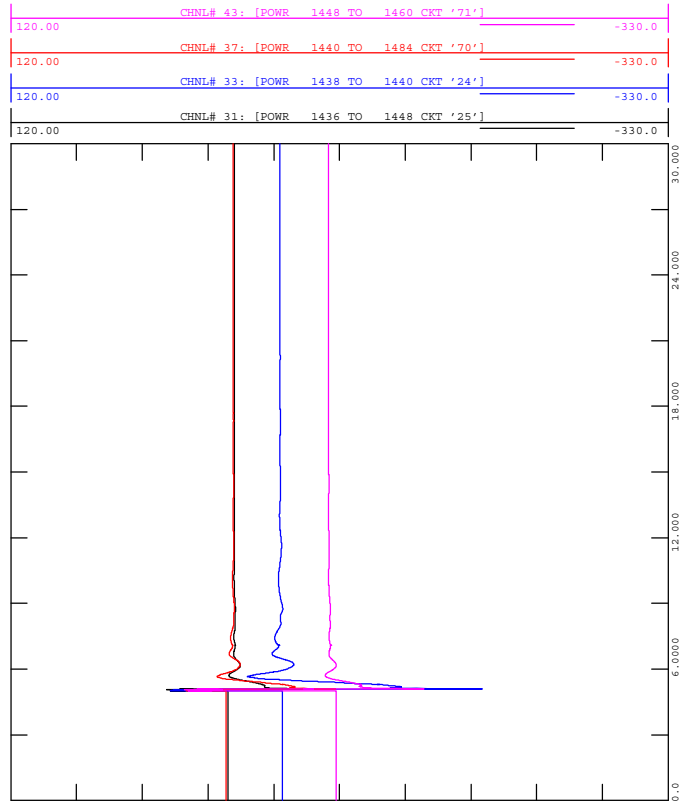




FIGURE A4-4B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-4_3PH_Fault_9L29@Coyote-Lake-963S.out

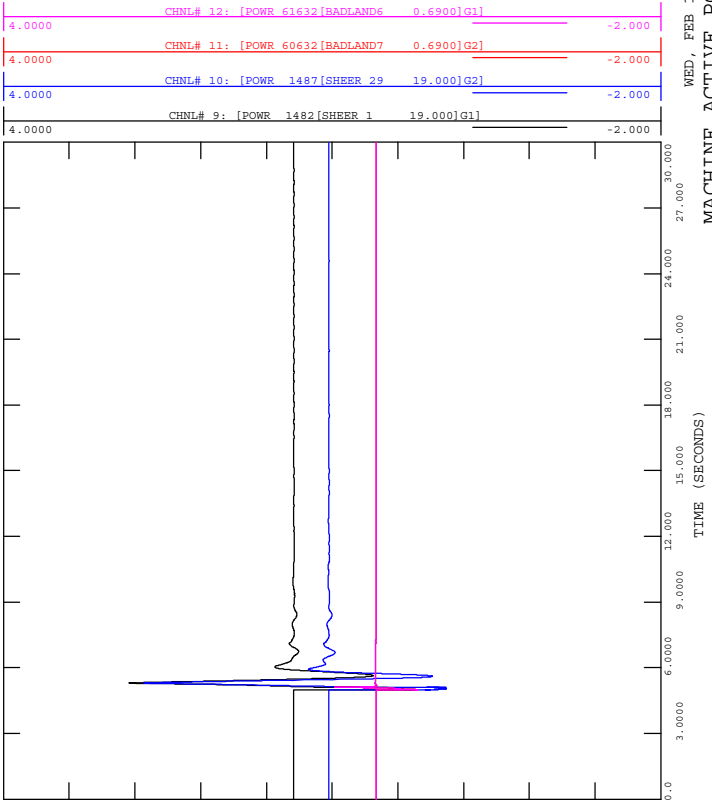


FIGURE A4-4D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-4_3PH_Fault_9L29@Coyote-Lake-963S.out

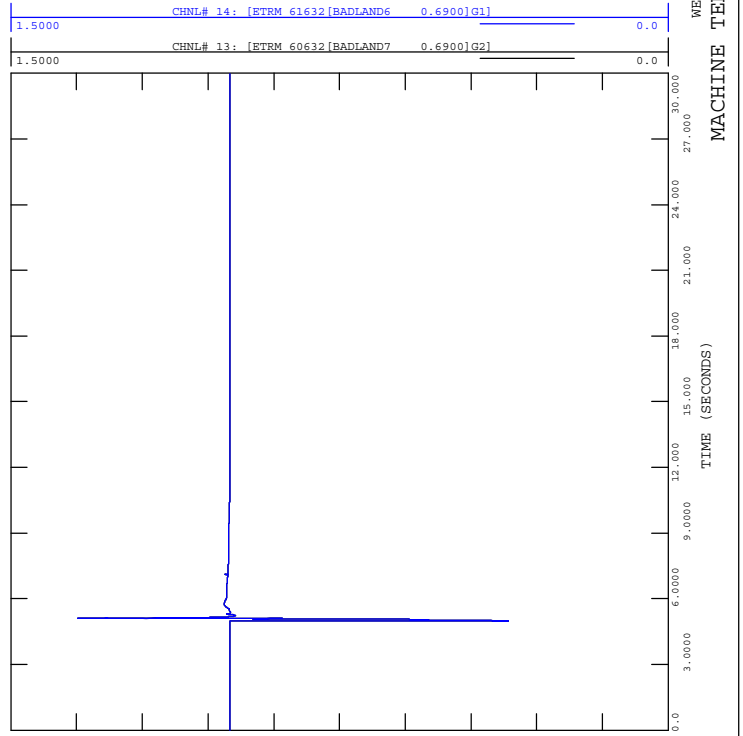


FIGURE A4-4A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-4_3PH_Fault_9L29@Coyote-Lake-963S.out

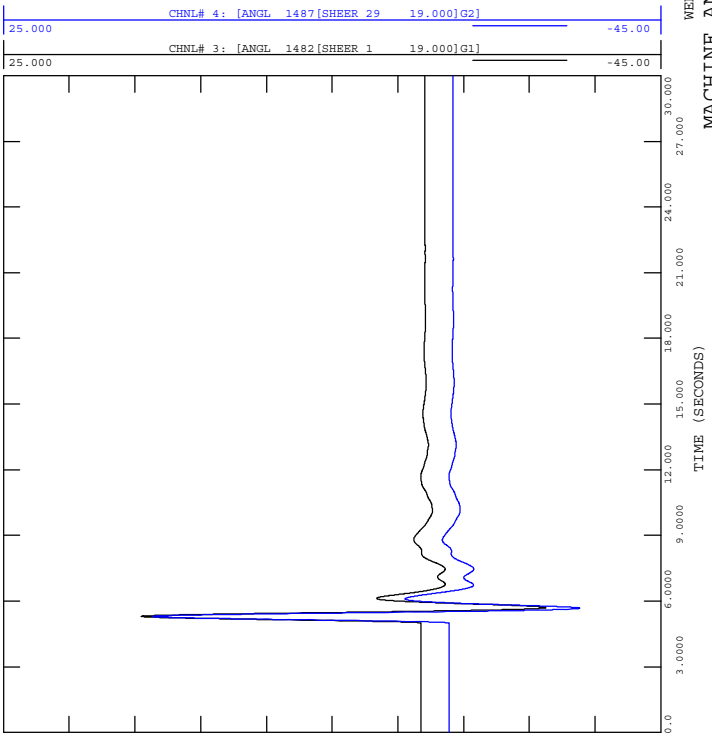


FIGURE A4-4C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-4_3PH_Fault_9L29@Coyote-Lake-963S.out

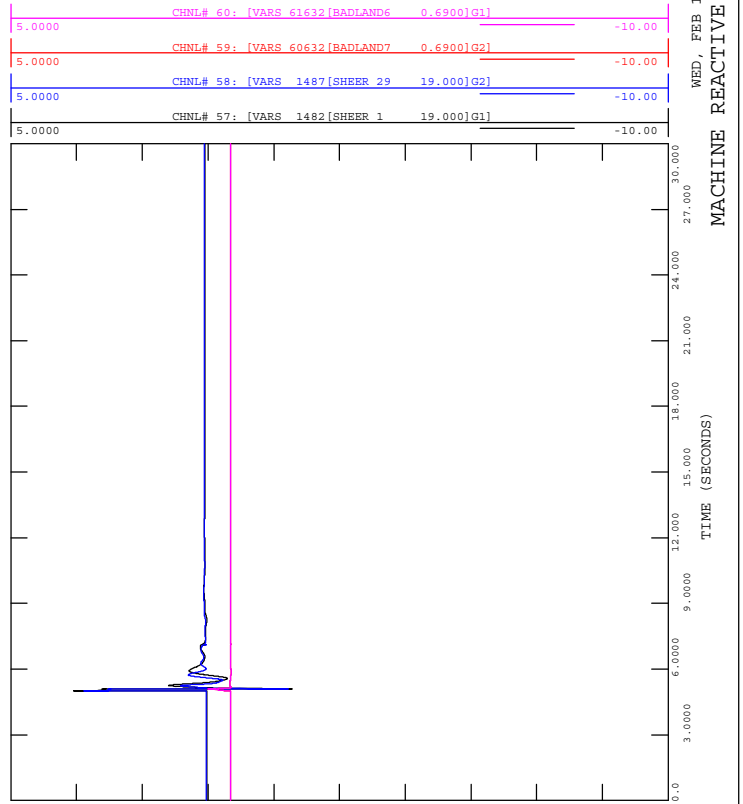




FIGURE A4-4F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-4_3PH_Fault_9L29@Coyote-Lake-963S.out

15:29
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

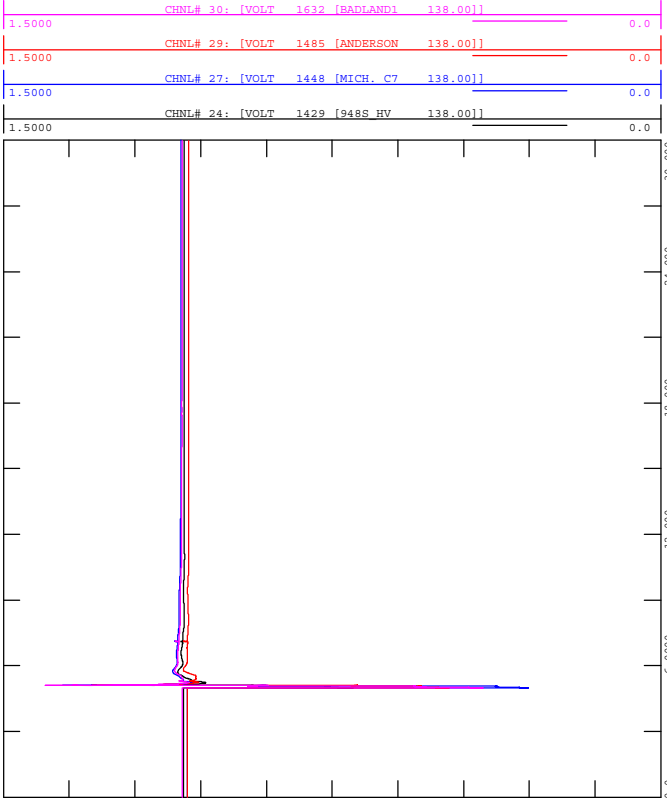


FIGURE A4-4H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-4_3PH_Fault_9L29@Coyote-Lake-963S.out

15:29
 WED, FEB 16 2022
 BRANCH FLOW (Q)

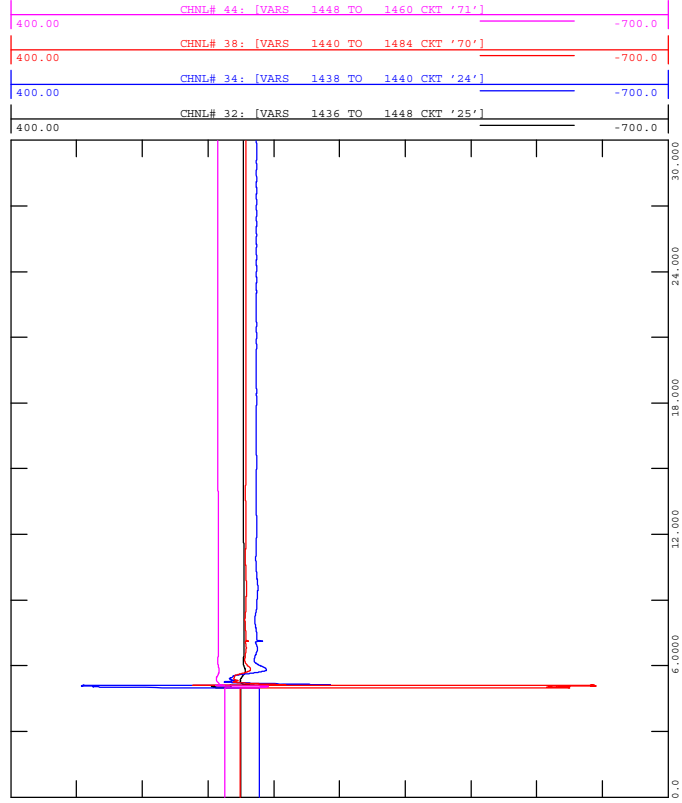


FIGURE A4-4E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-4_3PH_Fault_9L29@Coyote-Lake-963S.out

15:29
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

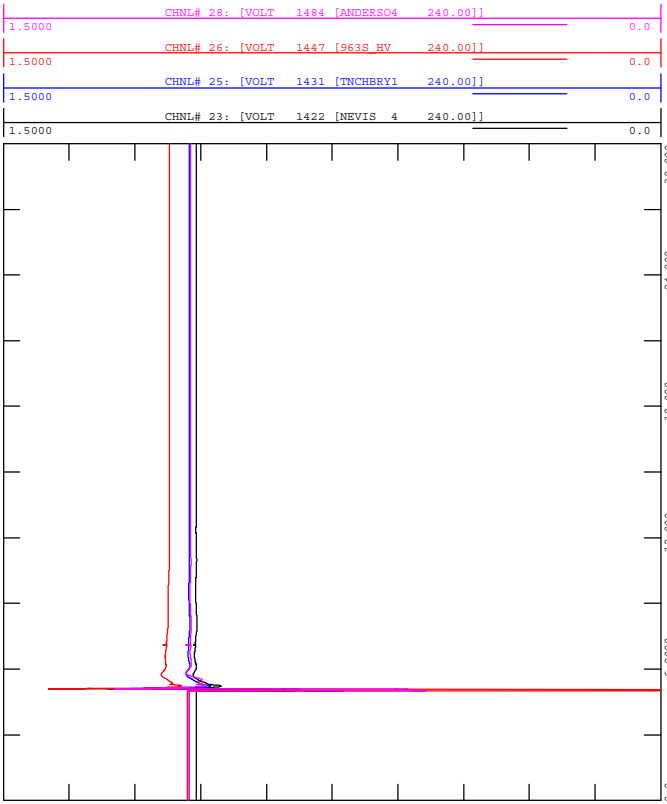


FIGURE A4-4G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-4_3PH_Fault_9L29@Coyote-Lake-963S.out

15:29
 WED, FEB 16 2022
 BRANCH FLOW (P)

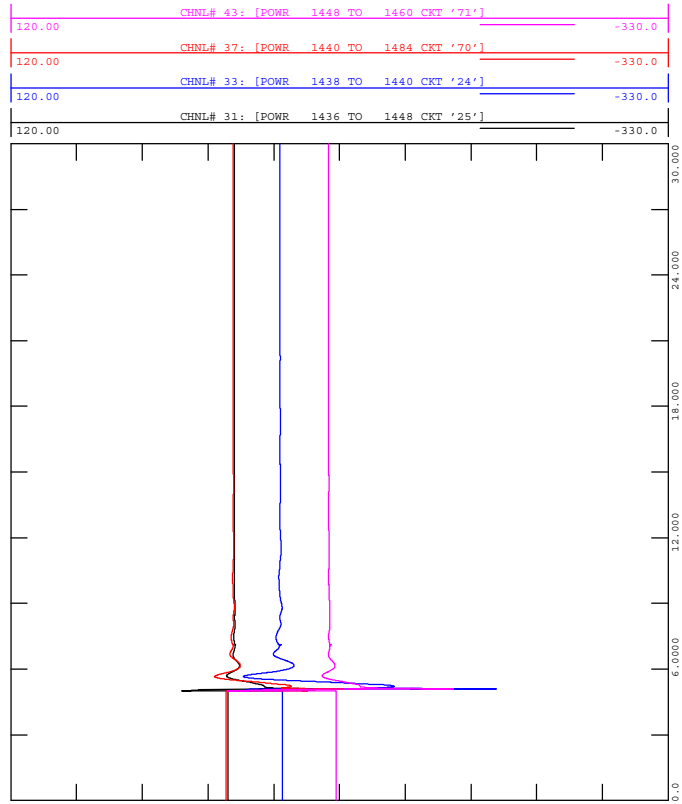




FIGURE A4-5B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-5_3PH_Fault_9L20@Cordel-755S.out

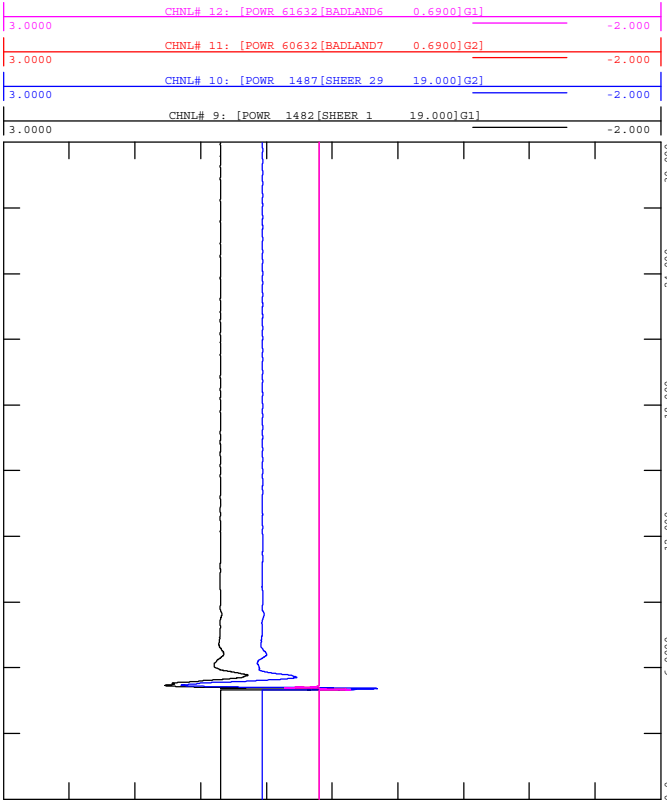


FIGURE A4-5D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-5_3PH_Fault_9L20@Cordel-755S.out

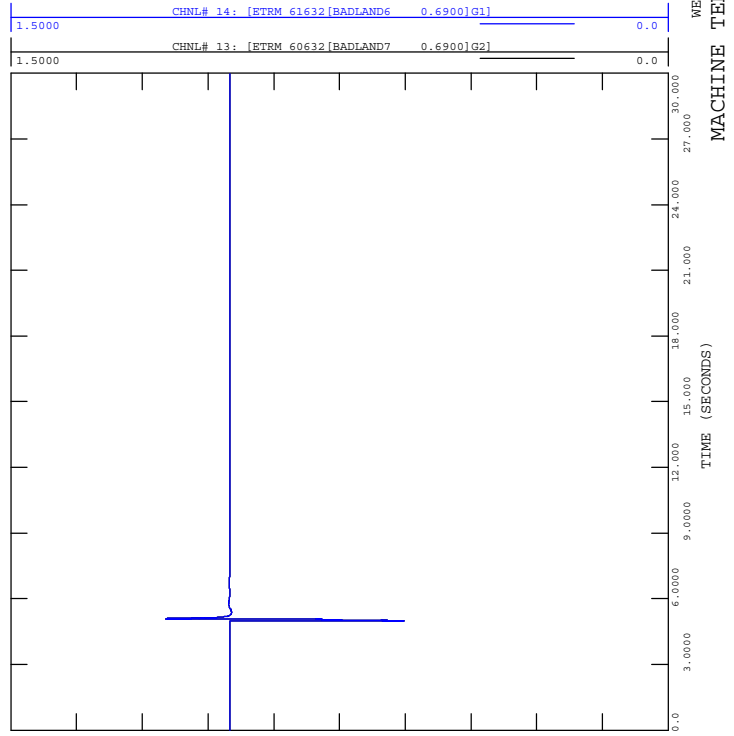


FIGURE A4-5A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-5_3PH_Fault_9L20@Cordel-755S.out

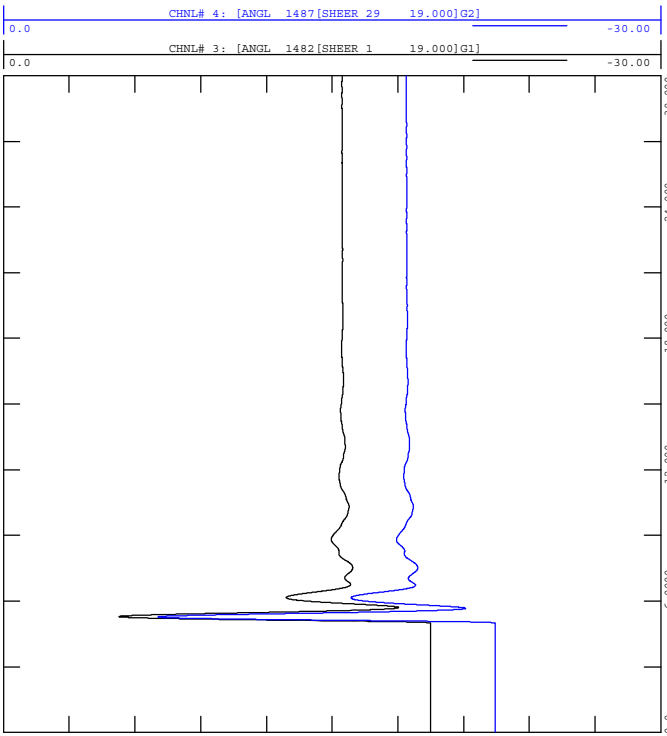


FIGURE A4-5C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-5_3PH_Fault_9L20@Cordel-755S.out

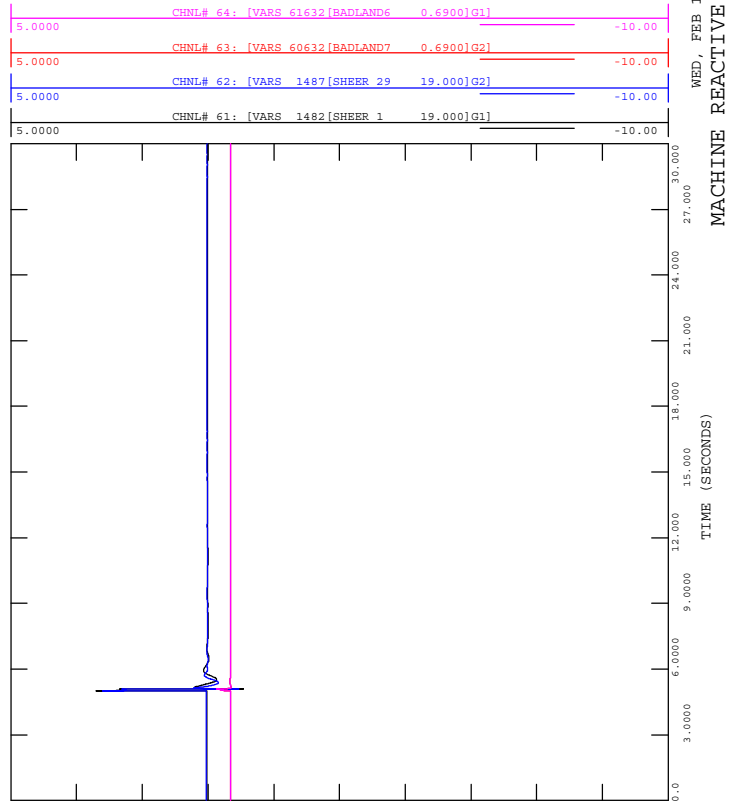




FIGURE A4-5F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-5_3PH_Fault_9L20@Cordel-755S.out

15:29
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

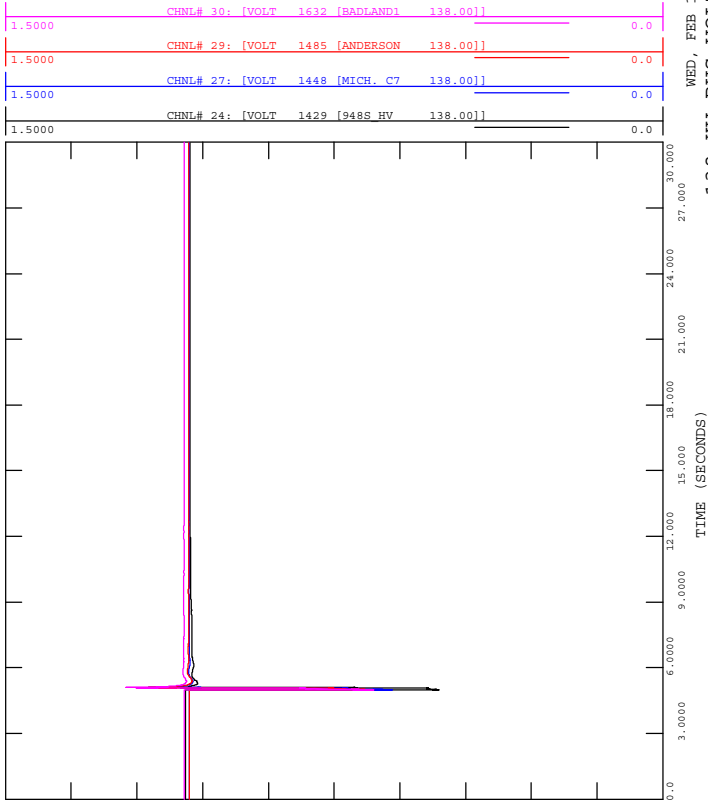


FIGURE A4-5H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-5_3PH_Fault_9L20@Cordel-755S.out

15:29
 WED, FEB 16 2022
 BRANCH FLOW (Q)

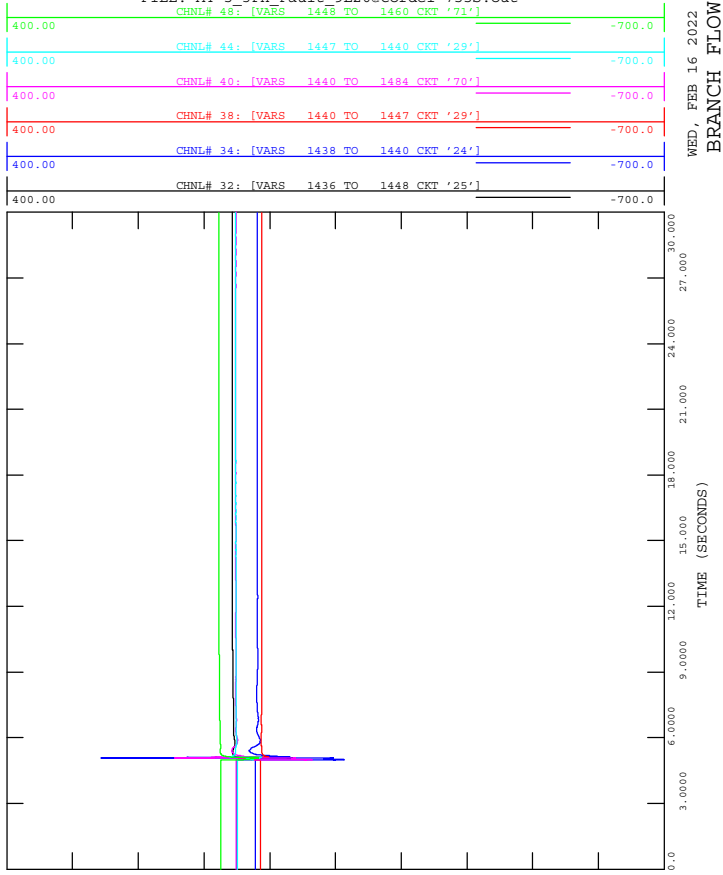


FIGURE A4-5E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-5_3PH_Fault_9L20@Cordel-755S.out

15:29
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

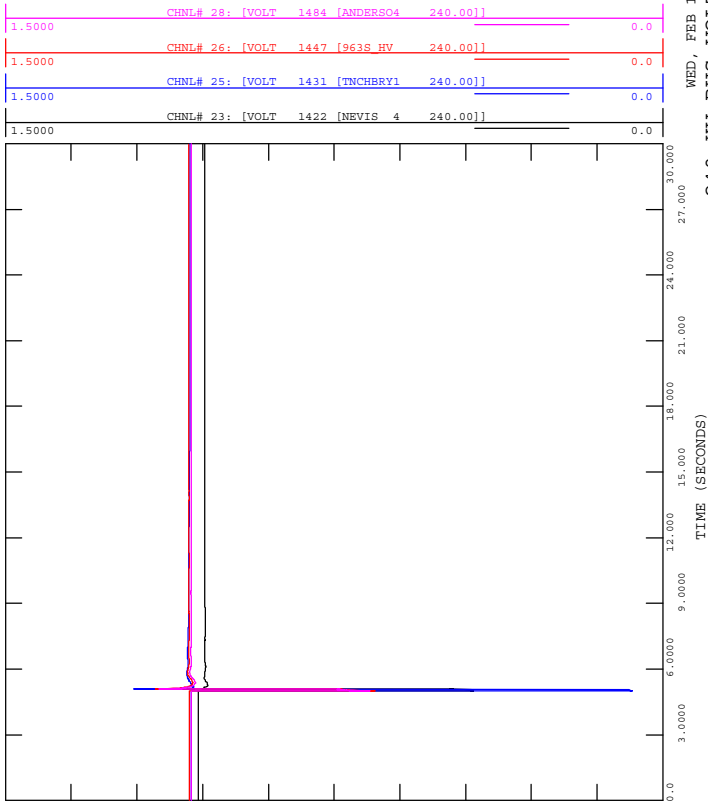


FIGURE A4-5G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-5_3PH_Fault_9L20@Cordel-755S.out

15:29
 WED, FEB 16 2022
 BRANCH FLOW (P)

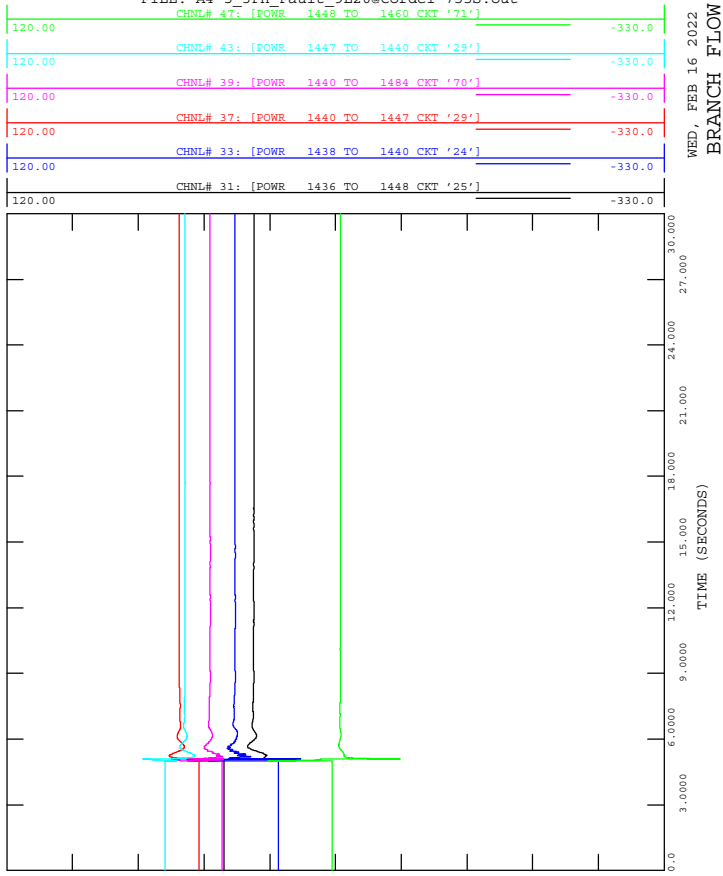




FIGURE A4-6B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-6_3PH_Fault_9L20@Nevis-766S.out

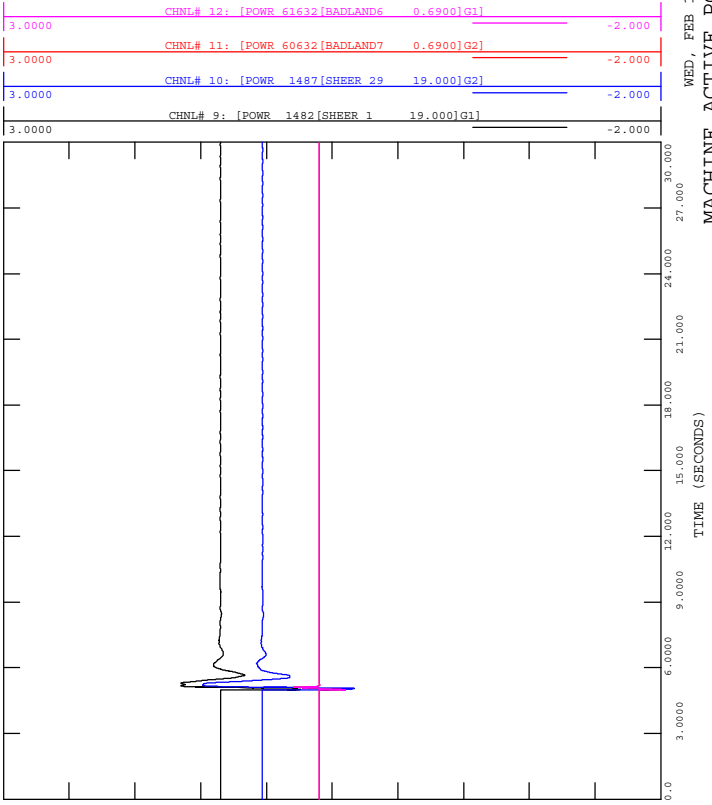


FIGURE A4-6D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-6_3PH_Fault_9L20@Nevis-766S.out

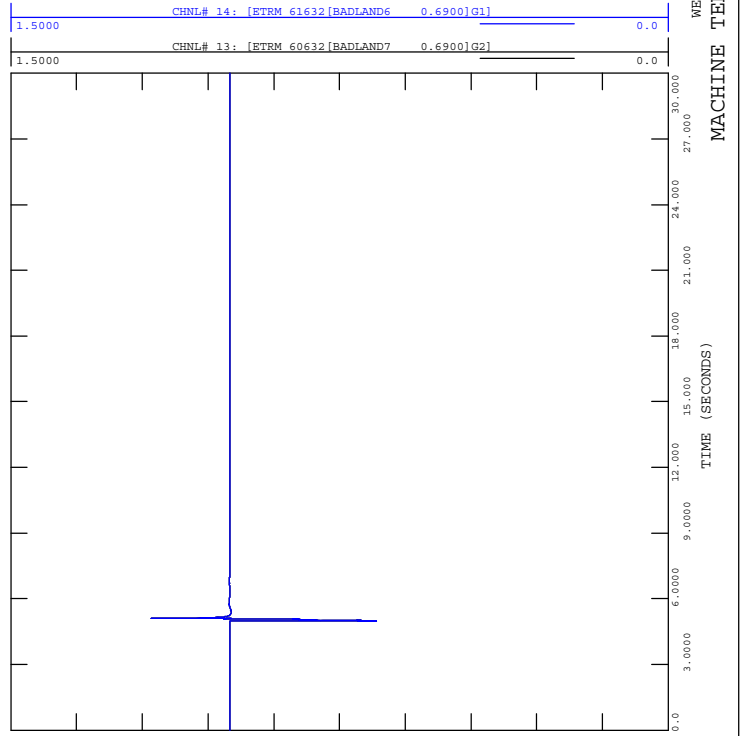


FIGURE A4-6A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-6_3PH_Fault_9L20@Nevis-766S.out

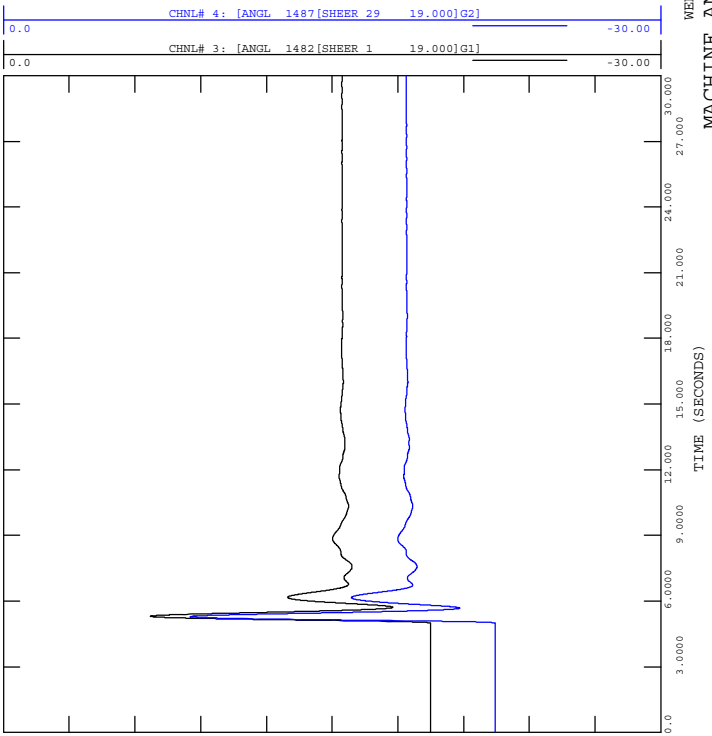


FIGURE A4-6C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-6_3PH_Fault_9L20@Nevis-766S.out

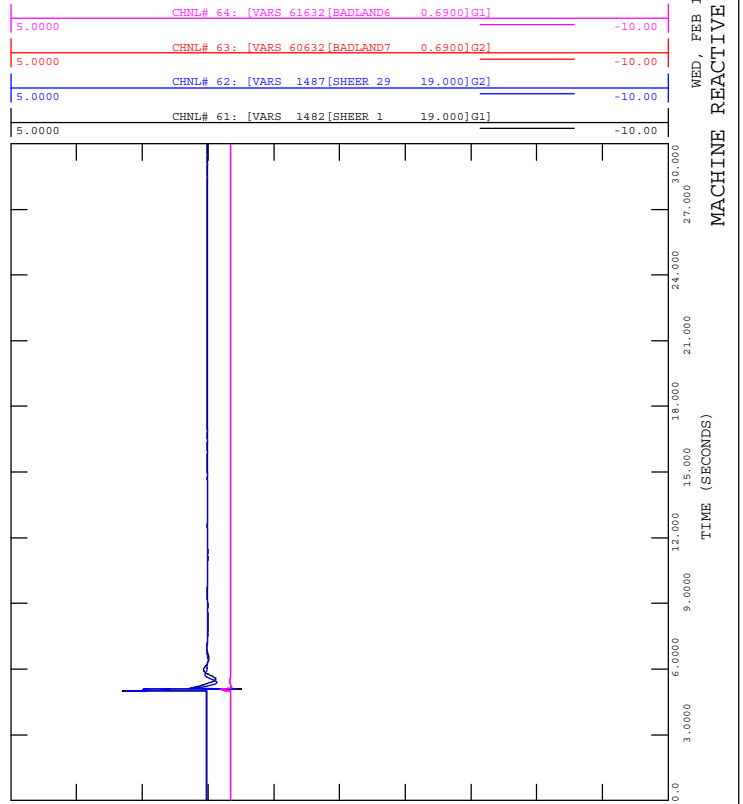




FIGURE A4-6F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-6_3PH_Fault_9L20@Nevis-766S.out

15:30
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

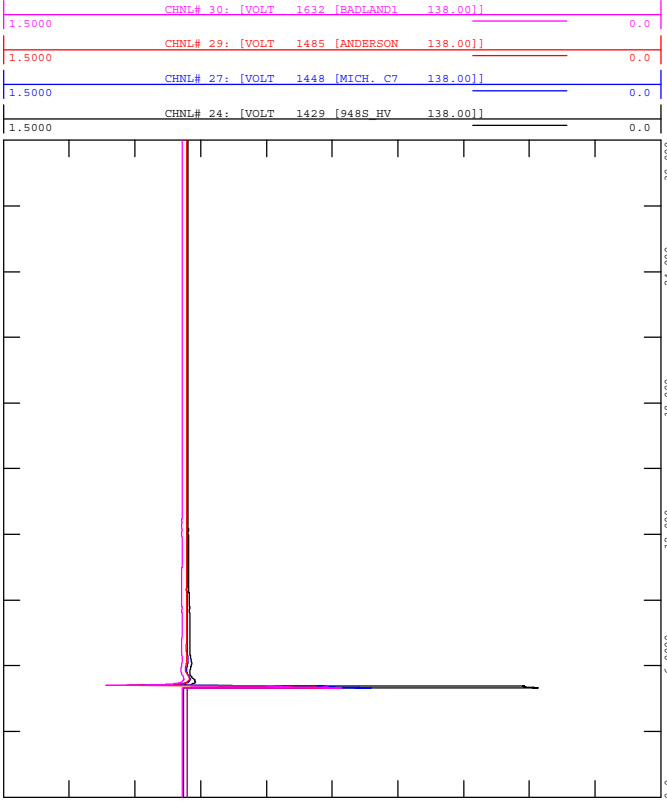


FIGURE A4-6H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-6_3PH_Fault_9L20@Nevis-766S.out

15:30
 WED, FEB 16 2022
 BRANCH FLOW (Q)

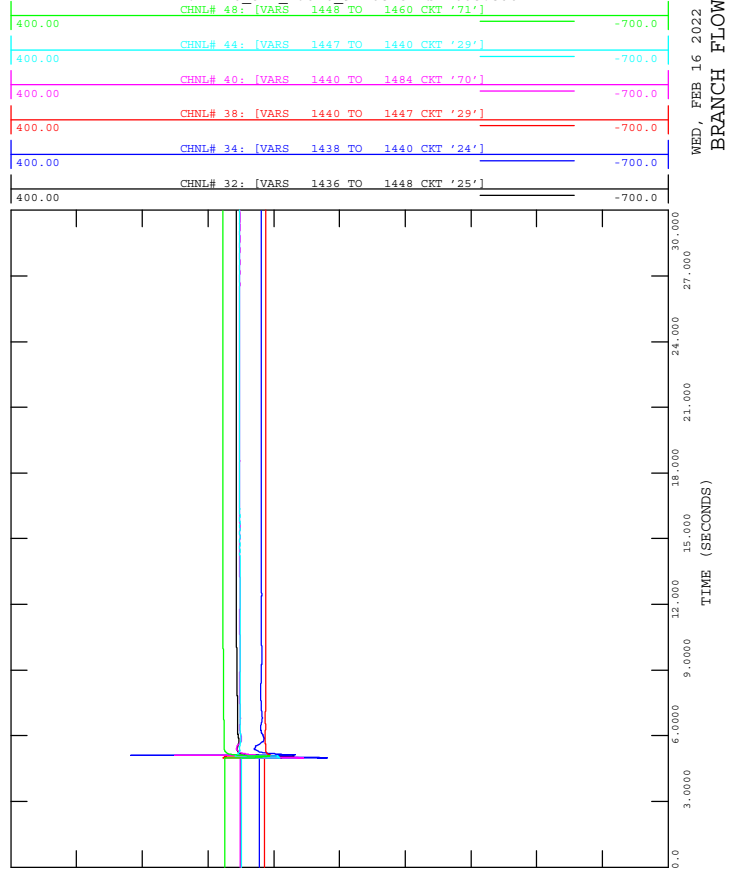


FIGURE A4-6E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-6_3PH_Fault_9L20@Nevis-766S.out

15:30
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

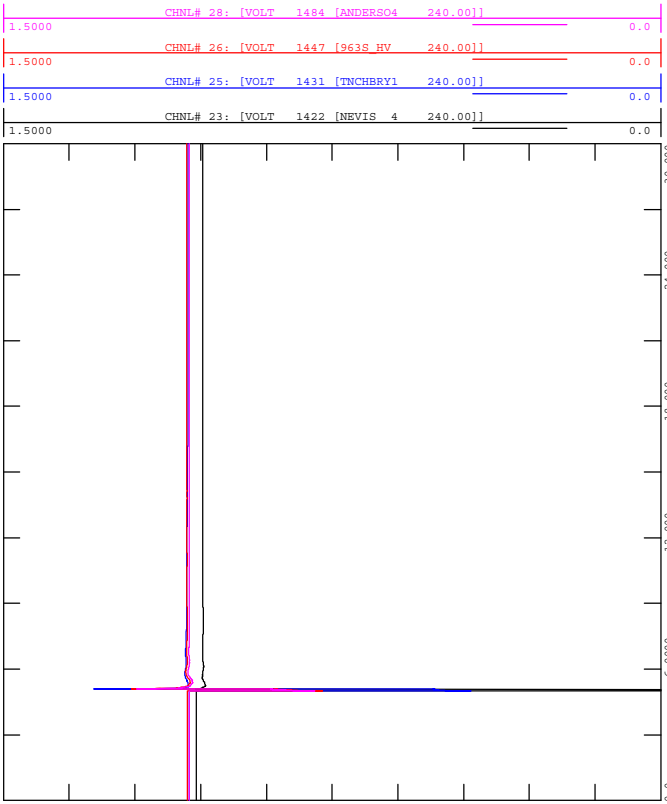


FIGURE A4-6G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-6_3PH_Fault_9L20@Nevis-766S.out

15:30
 WED, FEB 16 2022
 BRANCH FLOW (P)

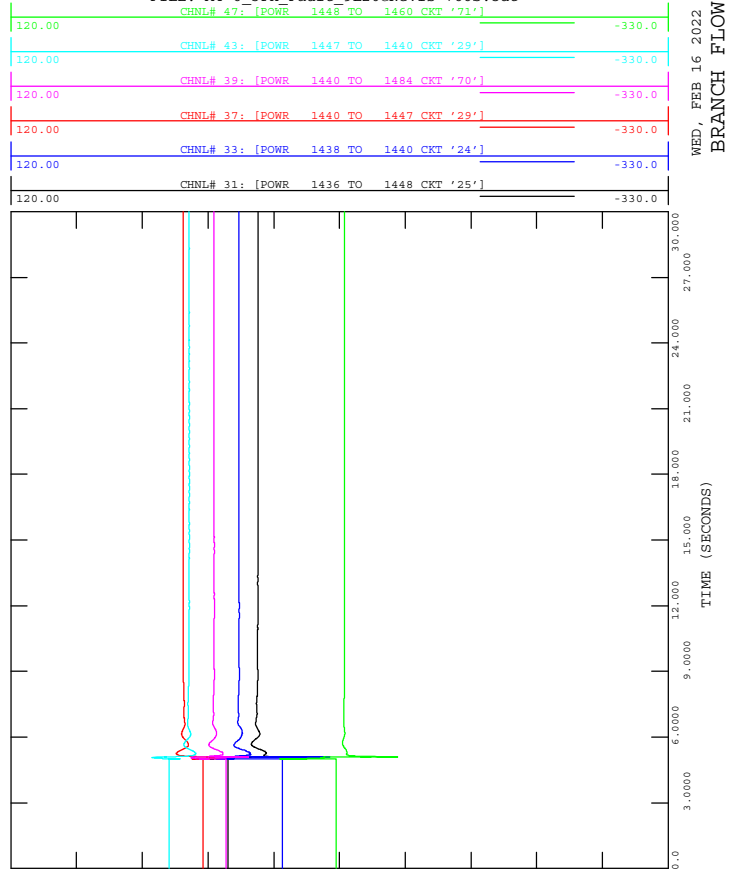




FIGURE A4-7B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-7_3PH_Fault_912L-9L912@Nevis-766S.out

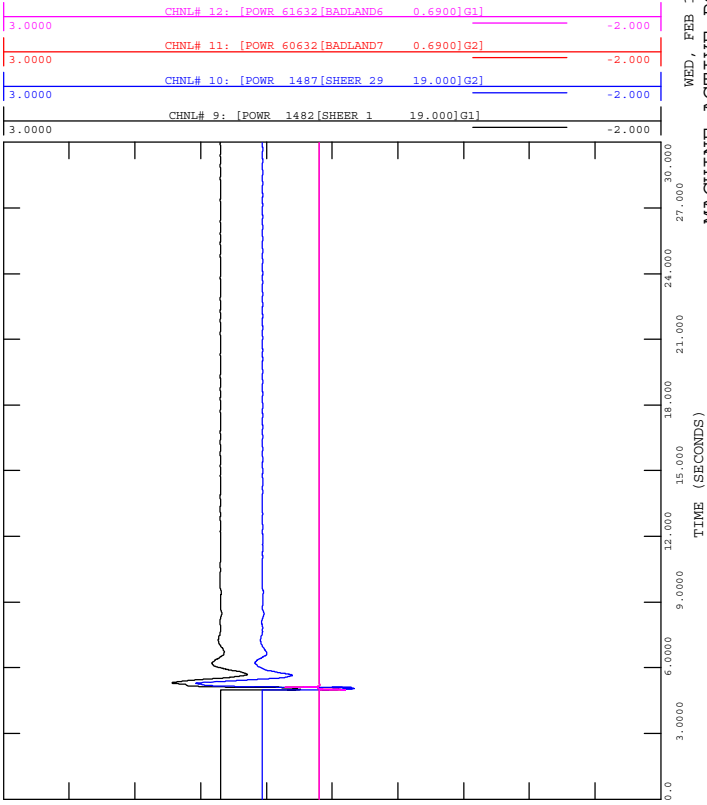


FIGURE A4-7D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-7_3PH_Fault_912L-9L912@Nevis-766S.out

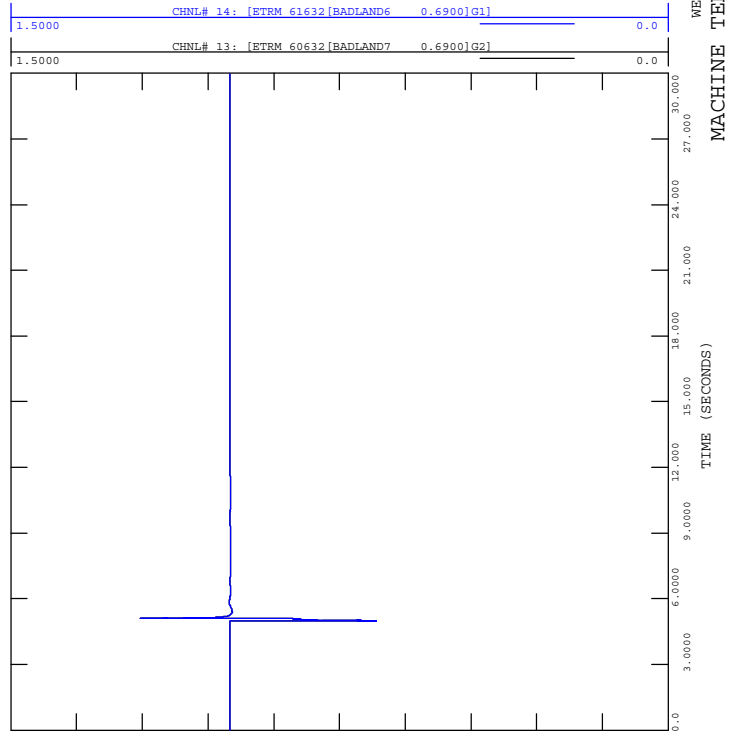


FIGURE A4-7A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-7_3PH_Fault_912L-9L912@Nevis-766S.out

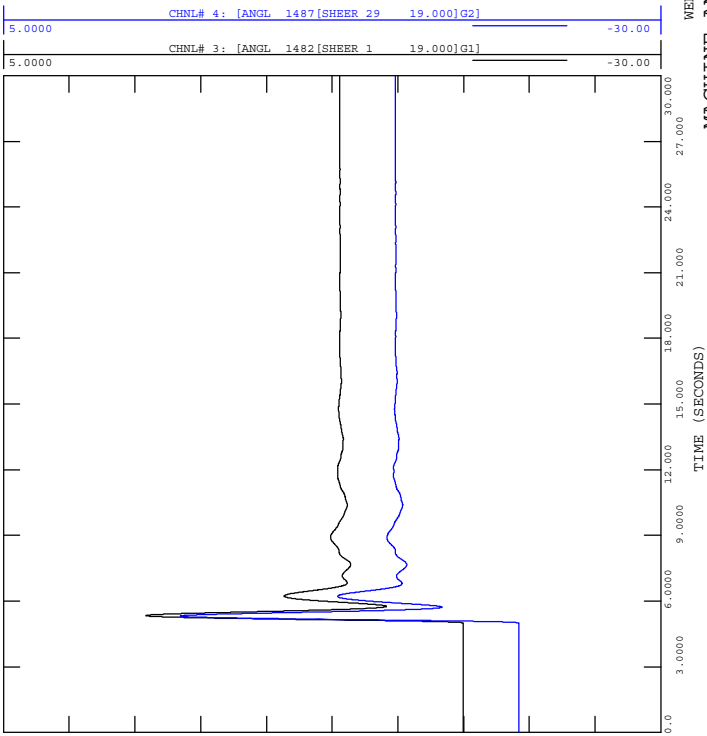


FIGURE A4-7C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-7_3PH_Fault_912L-9L912@Nevis-766S.out

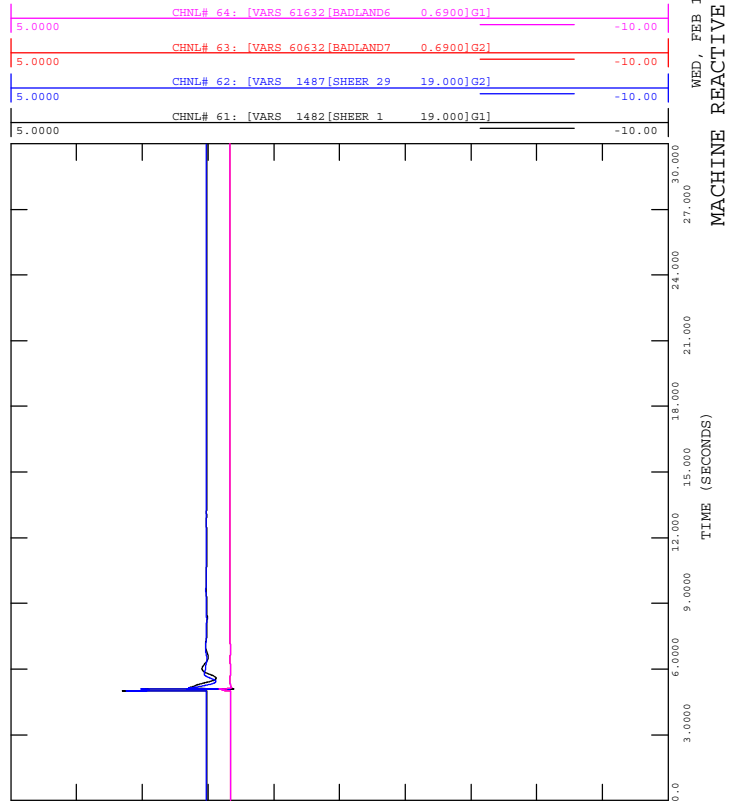




FIGURE A4-7F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-7_3PH_Fault_912L-9L912@Nevis-766S.out

15:31
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

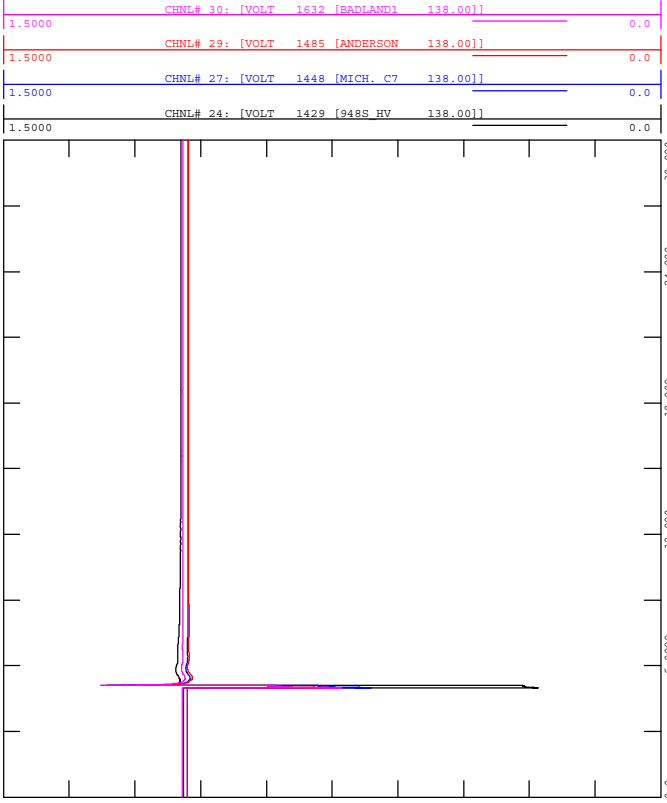


FIGURE A4-7H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-7_3PH_Fault_912L-9L912@Nevis-766S.out
 CHNL# 48: [VARS 1448 TO 1460 CKT '71']

15:31
 WED, FEB 16 2022
 BRANCH FLOW (Q)

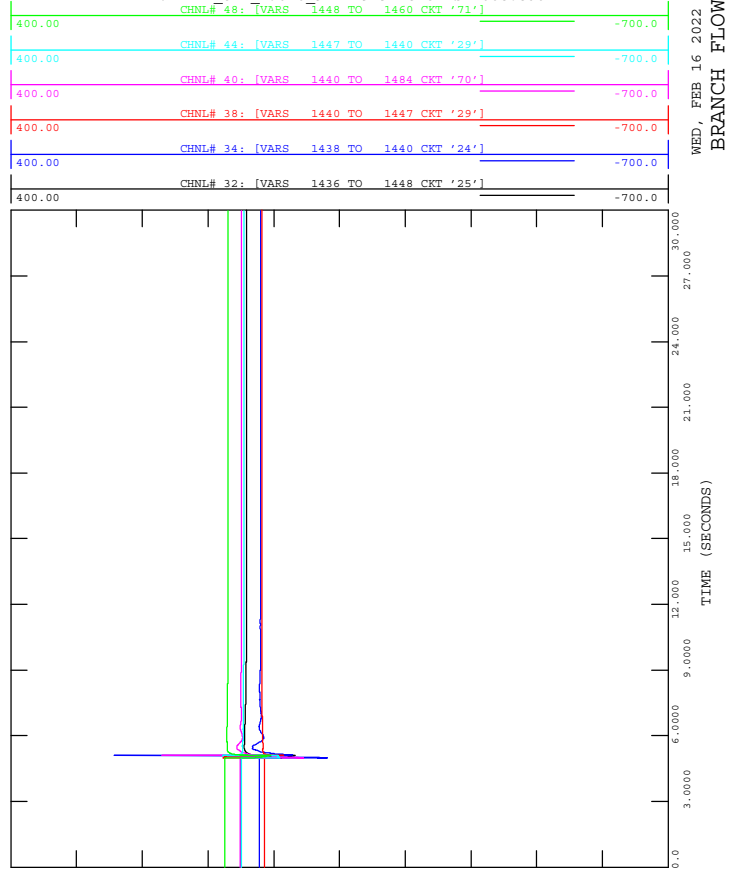


FIGURE A4-7E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-7_3PH_Fault_912L-9L912@Nevis-766S.out

15:30
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

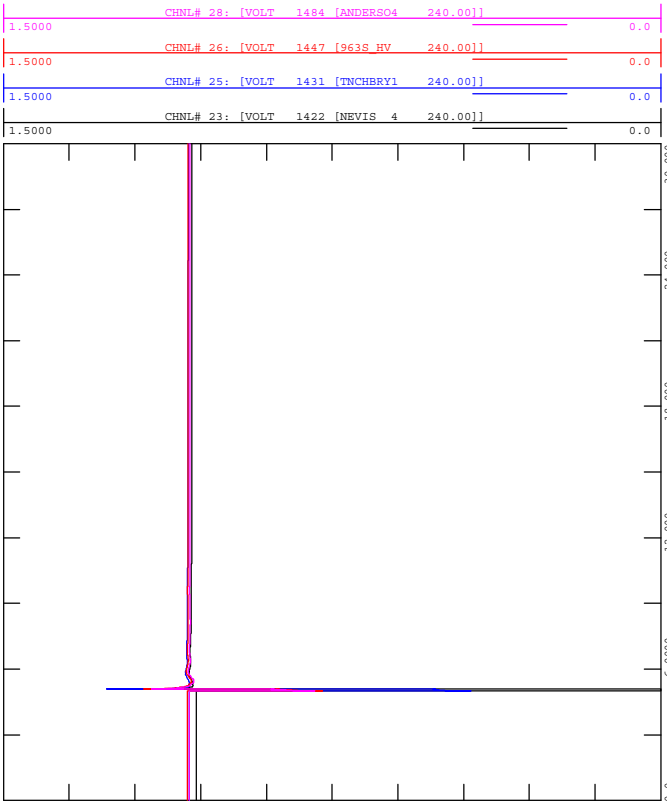


FIGURE A4-7G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-7_3PH_Fault_912L-9L912@Nevis-766S.out
 CHNL# 47: [POWR 1448 TO 1460 CKT '71']

15:31
 WED, FEB 16 2022
 BRANCH FLOW (P)

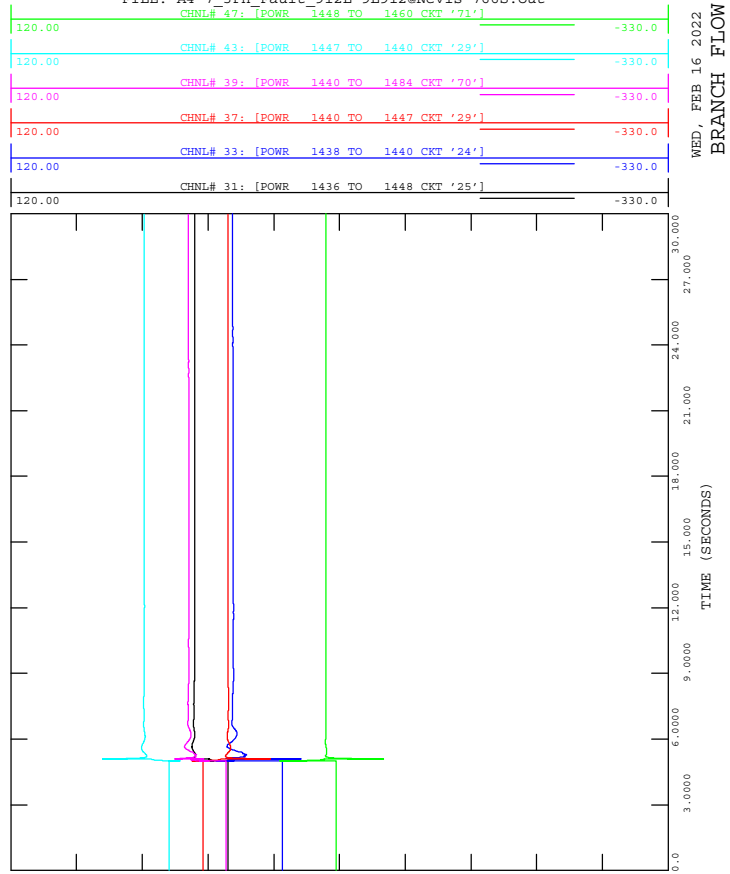




FIGURE A4-8B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-8_3PH_Fault_912L-9L912@Red-Deer-63S.out

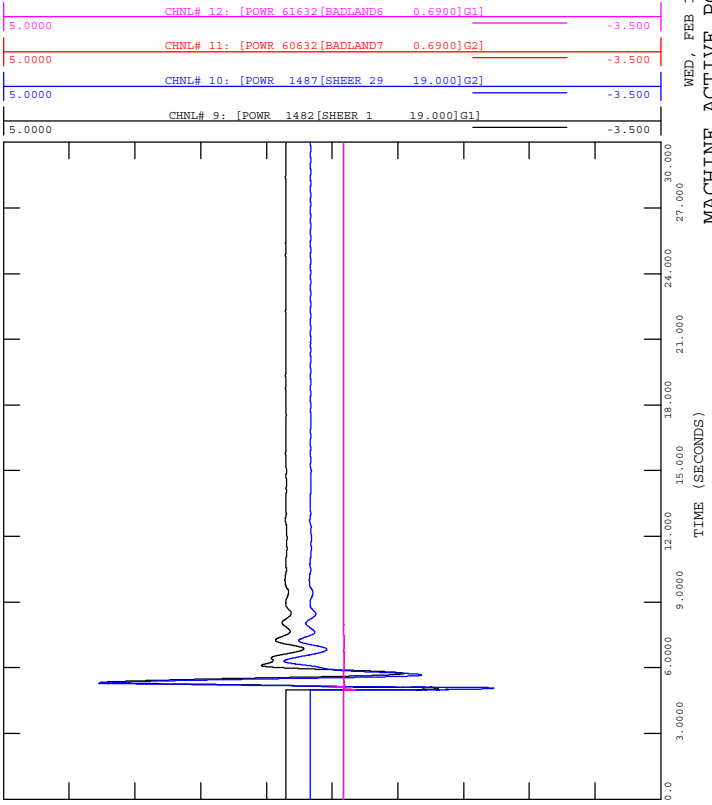


FIGURE A4-8D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-8_3PH_Fault_912L-9L912@Red-Deer-63S.out

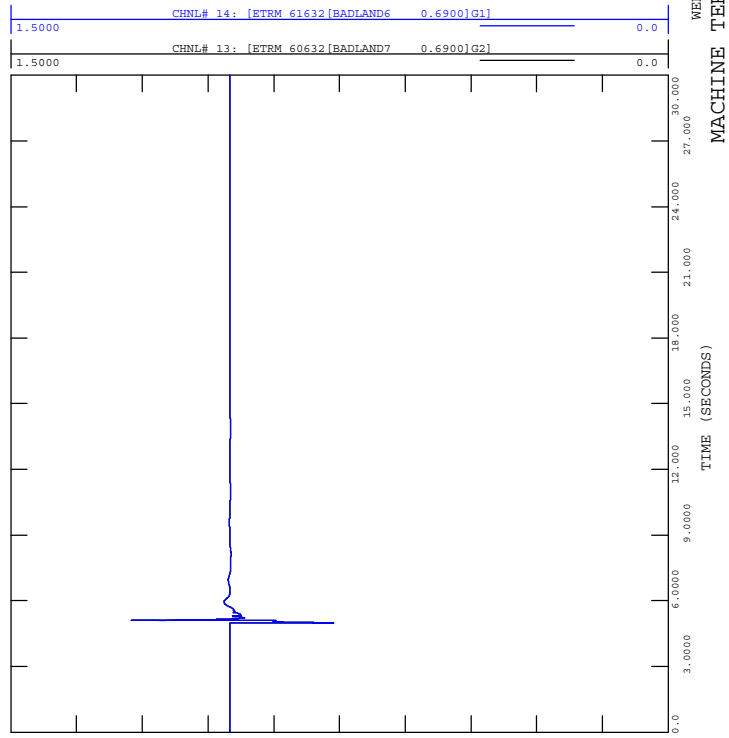


FIGURE A4-8A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-8_3PH_Fault_912L-9L912@Red-Deer-63S.out

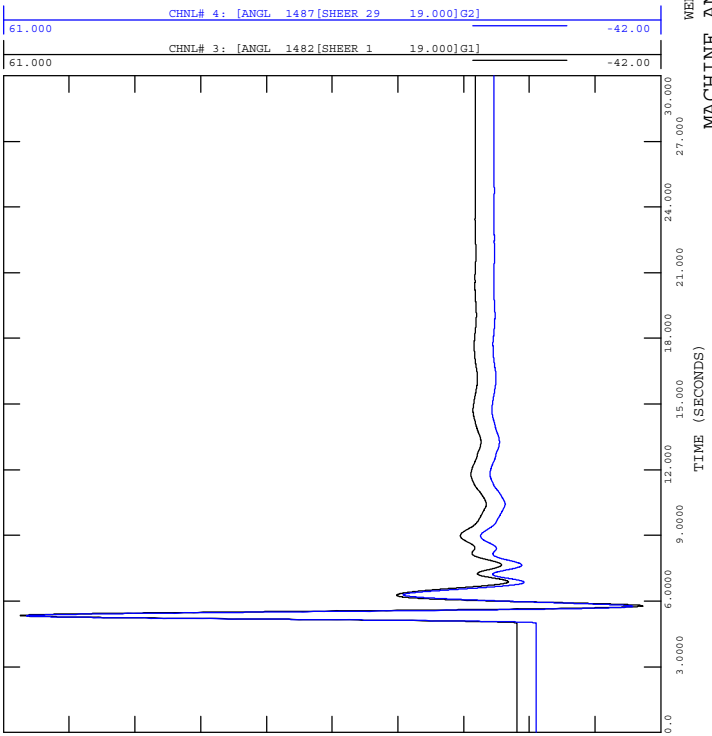


FIGURE A4-8C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-8_3PH_Fault_912L-9L912@Red-Deer-63S.out

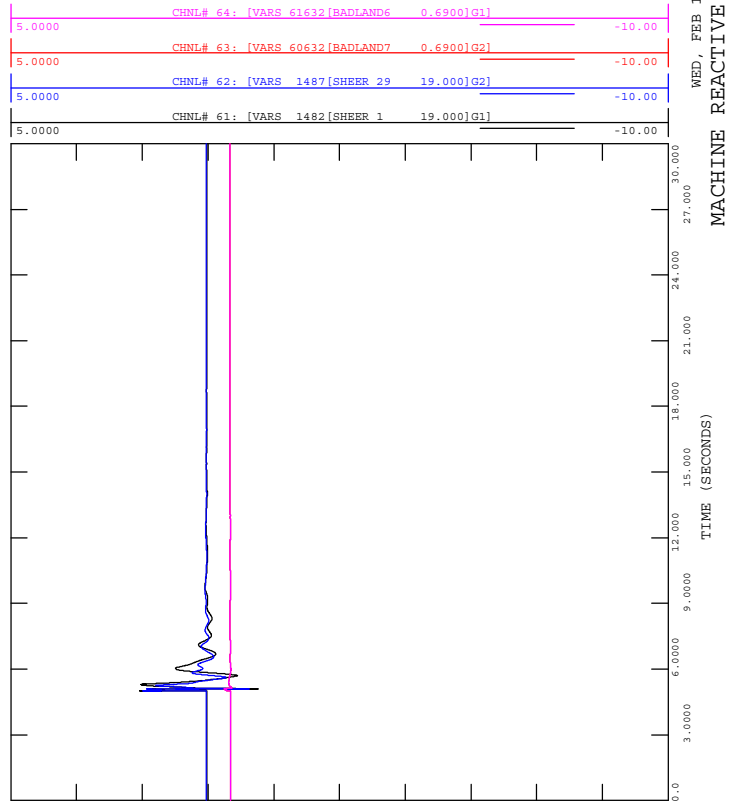
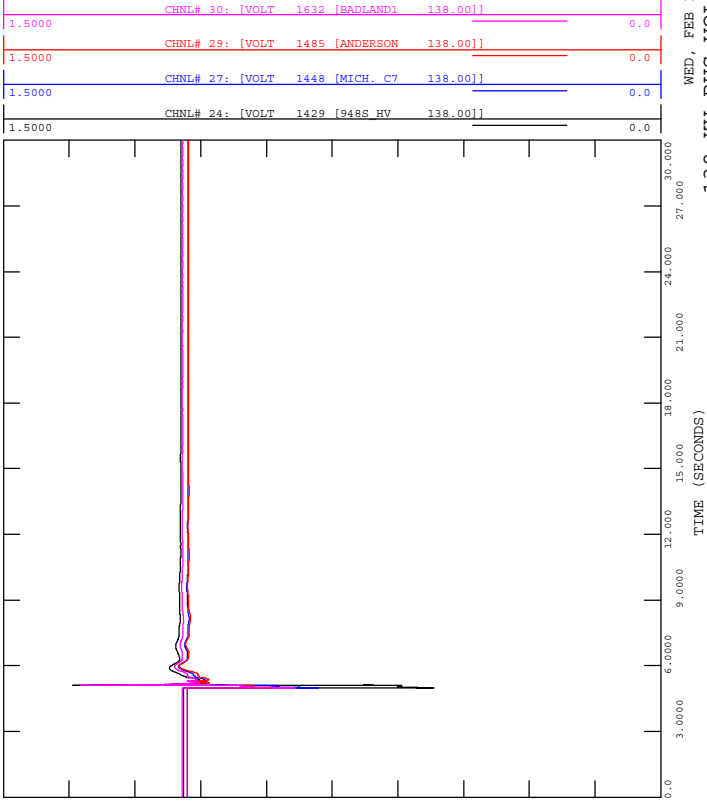




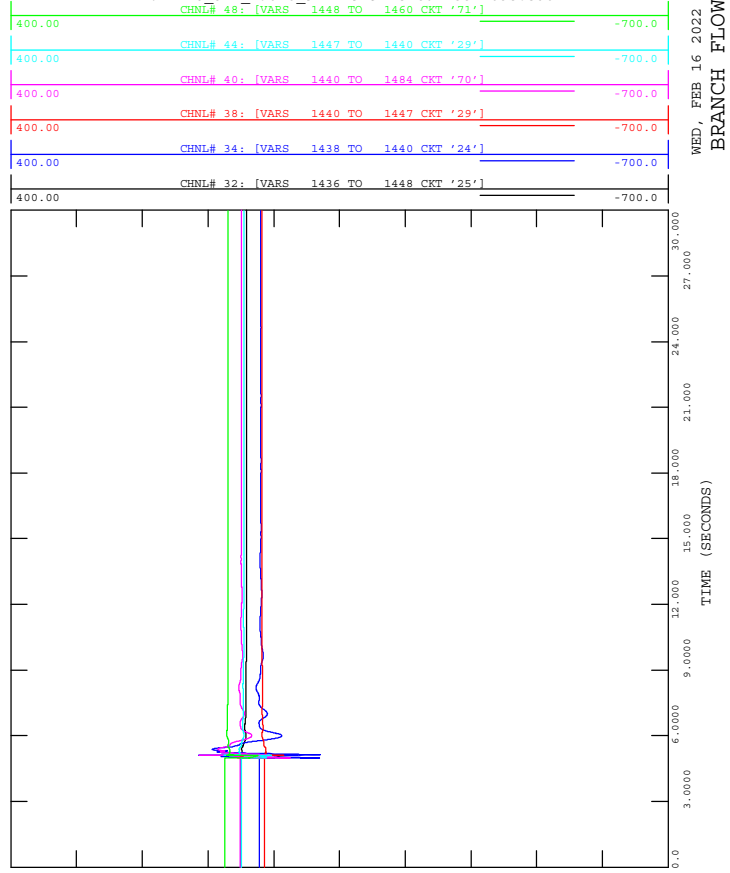
FIGURE A4-8F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-8_3PH_Fault_912L-9L912@Red-Deer-63S.out



138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:31



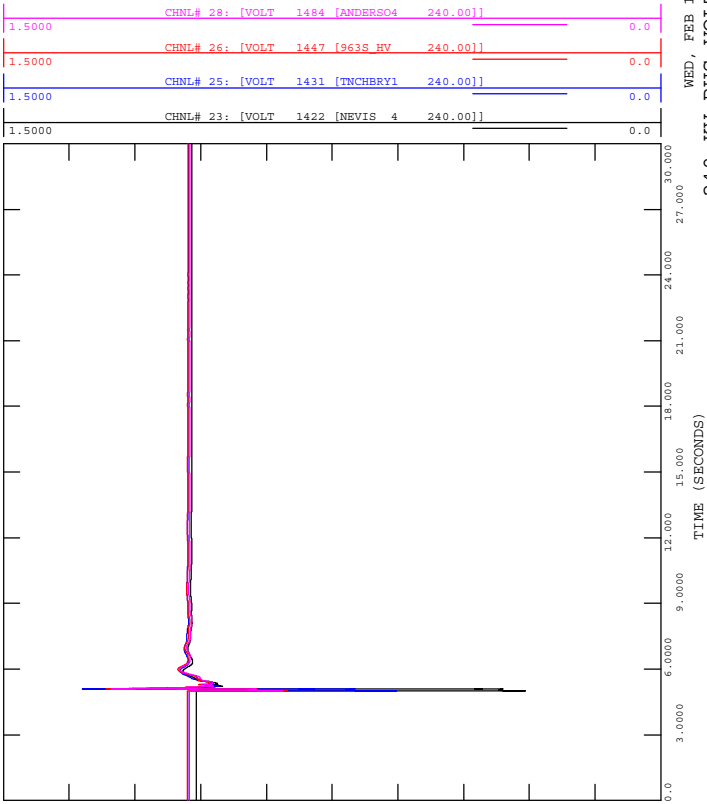
FIGURE A4-8H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-8_3PH_Fault_912L-9L912@Red-Deer-63S.out



BRANCH FLOW (Q)
 WED, FEB 16 2022 15:31



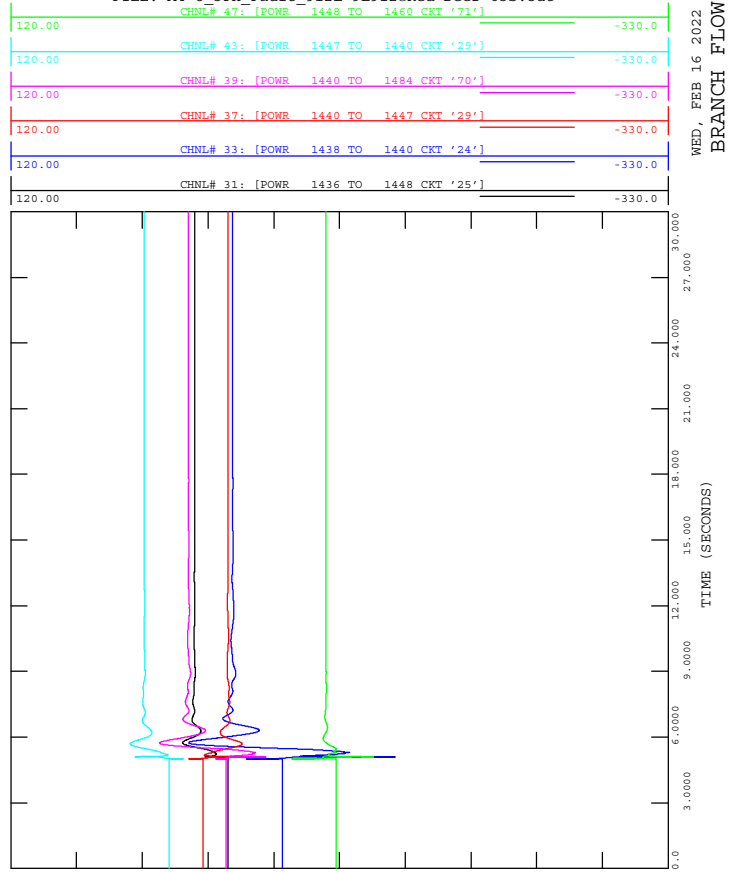
FIGURE A4-8E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-8_3PH_Fault_912L-9L912@Red-Deer-63S.out



240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:31



FIGURE A4-8G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-8_3PH_Fault_912L-9L912@Red-Deer-63S.out



BRANCH FLOW (P)
 WED, FEB 16 2022 15:31



FIGURE A4-9B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-9_3PH_Fault_7L171@Wintering-Hill-804S.out

WED, FEB 16 2022 15:32
 MACHINE ACTIVE POWER (MW)

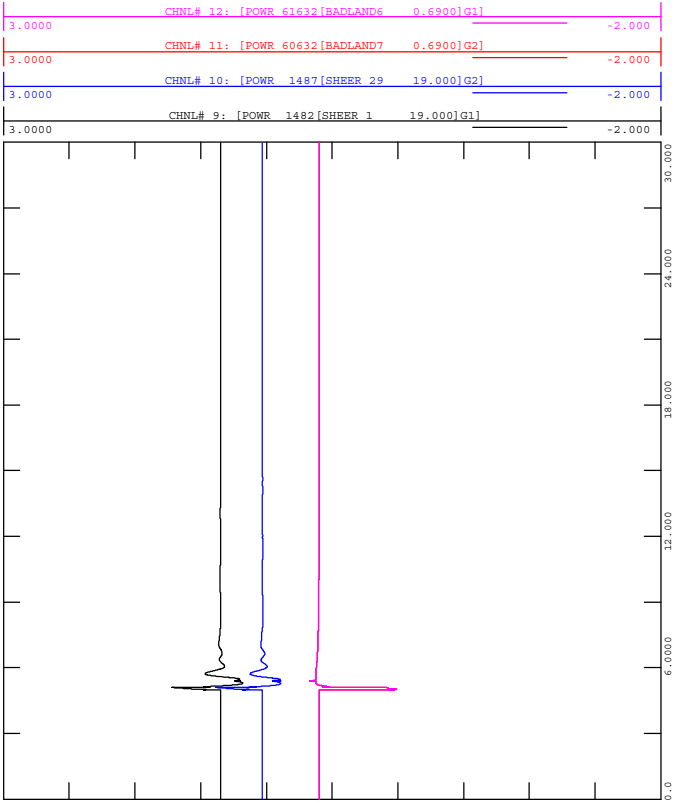


FIGURE A4-9D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-9_3PH_Fault_7L171@Wintering-Hill-804S.out

WED, FEB 16 2022 15:32
 MACHINE TERMINAL VOLTAGE

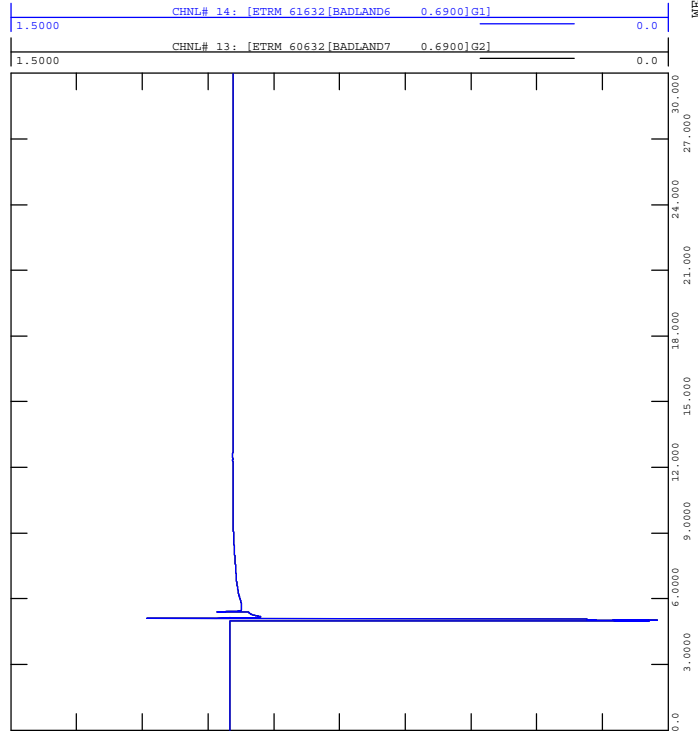


FIGURE A4-9A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-9_3PH_Fault_7L171@Wintering-Hill-804S.out

WED, FEB 16 2022 15:32
 MACHINE ANGLE (DEGREES)

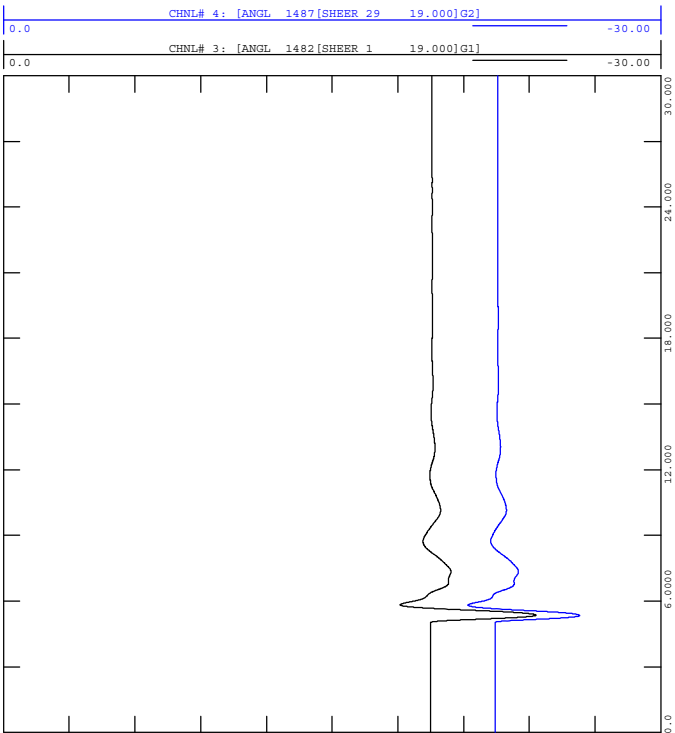


FIGURE A4-9C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-9_3PH_Fault_7L171@Wintering-Hill-804S.out

WED, FEB 16 2022 15:32
 MACHINE REACTIVE POWER (M)

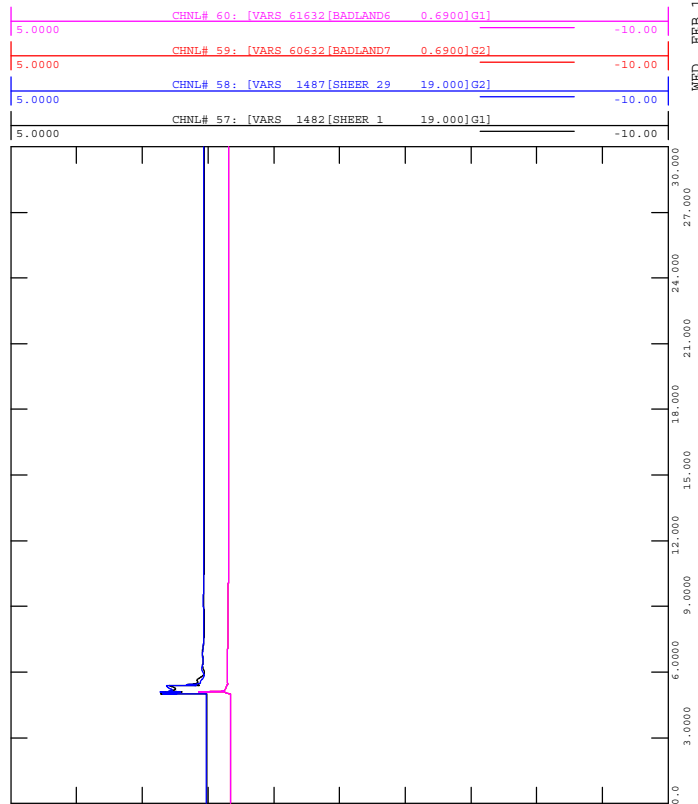




FIGURE A4-9F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-9_3PH_Fault_7L171@Wintering-Hill-804S.out

15:32
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

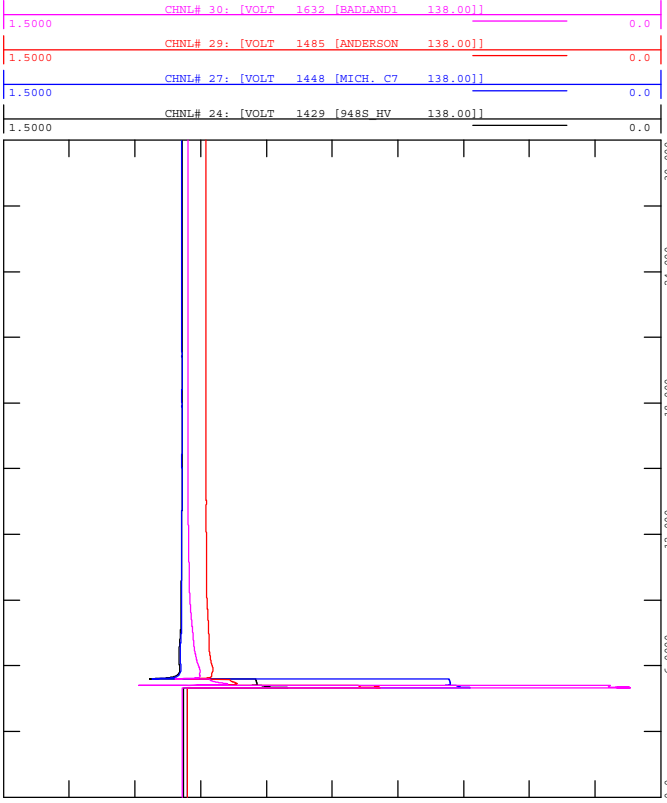


FIGURE A4-9H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-9_3PH_Fault_7L171@Wintering-Hill-804S.out

15:32
 WED, FEB 16 2022
 BRANCH FLOW (Q)

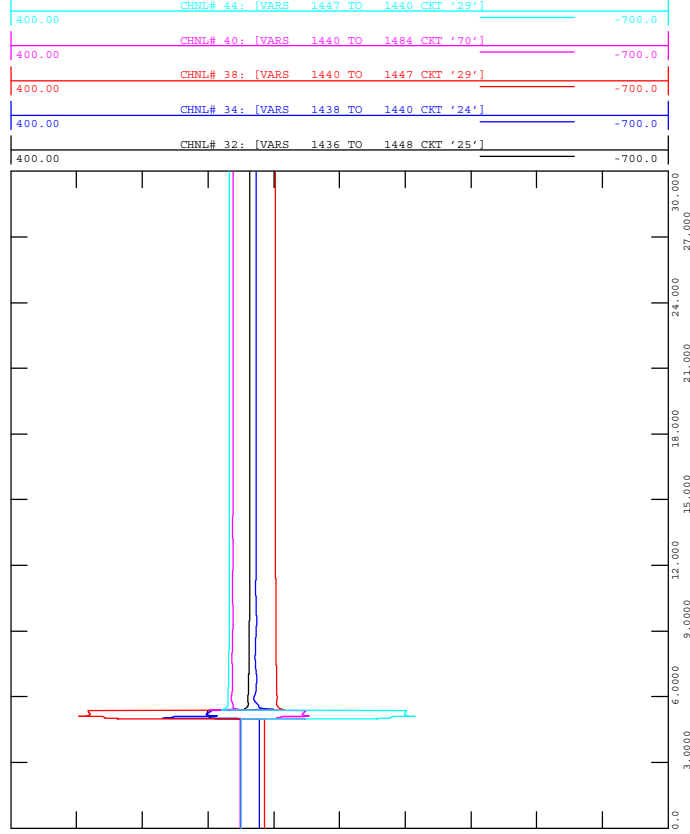


FIGURE A4-9E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-9_3PH_Fault_7L171@Wintering-Hill-804S.out

15:32
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

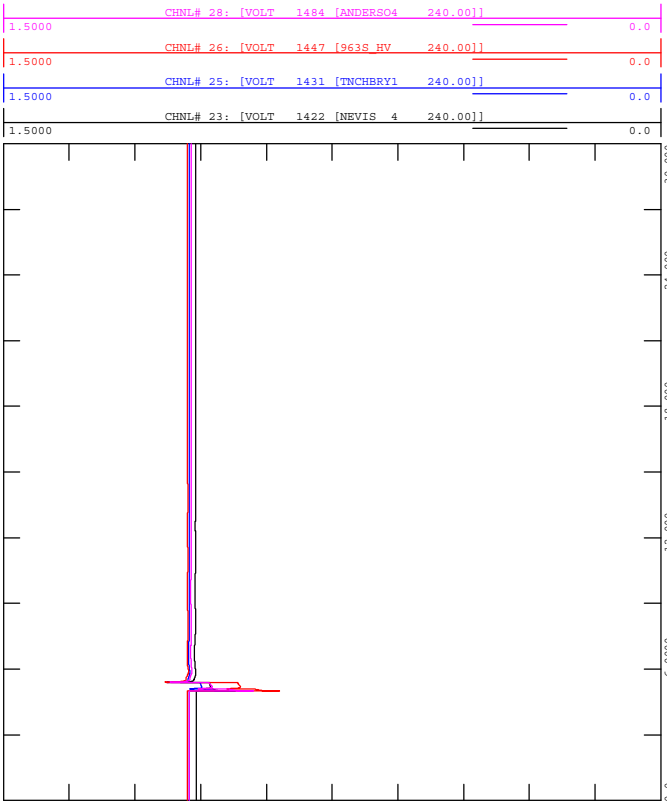


FIGURE A4-9G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-9_3PH_Fault_7L171@Wintering-Hill-804S.out

15:32
 WED, FEB 16 2022
 BRANCH FLOW (P)

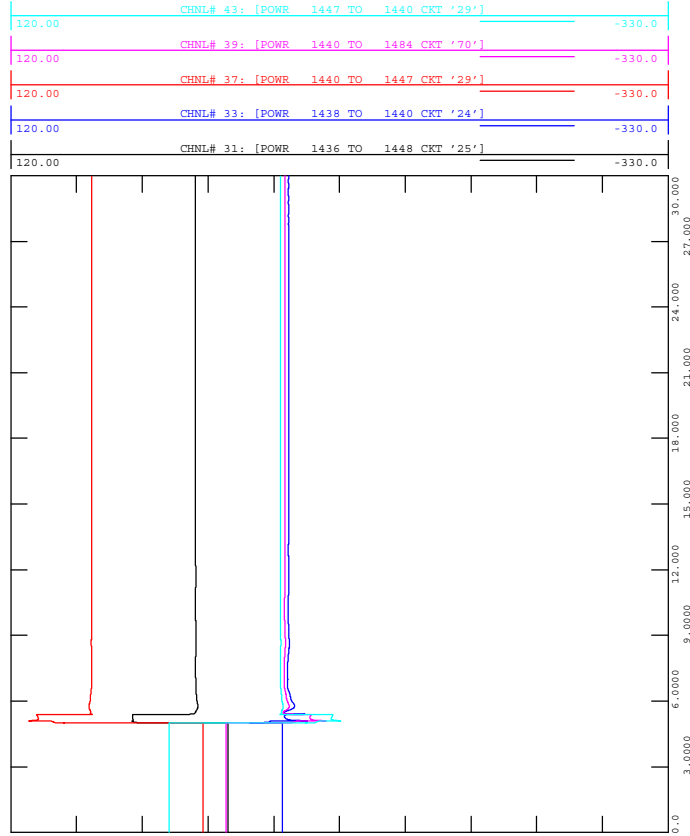




FIGURE A4-10B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-10_3PH_Fault_7L171@Michichi-Creek-802S.out

WED, FEB 16 2022 15:32
 MACHINE ACTIVE POWER (MW)

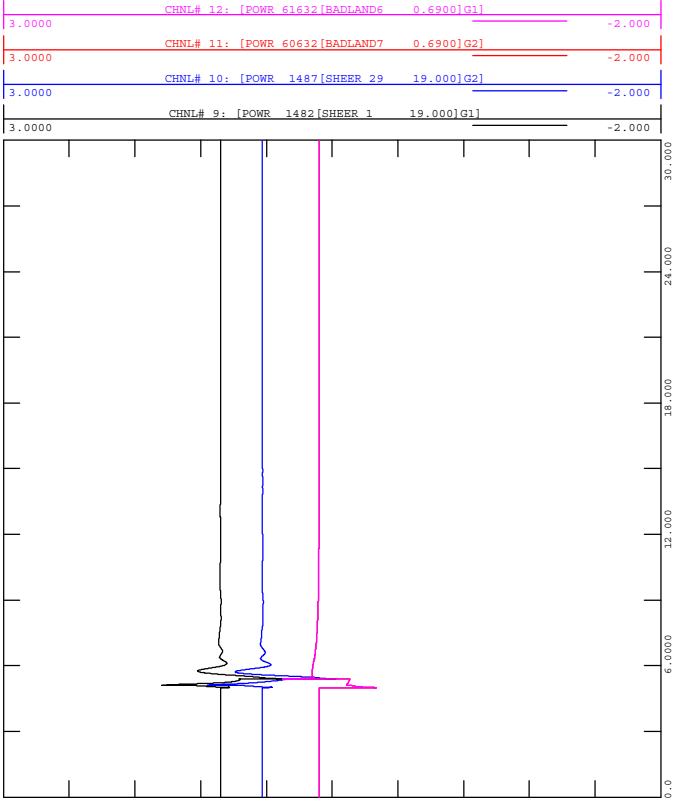


FIGURE A4-10D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-10_3PH_Fault_7L171@Michichi-Creek-802S.out

WED, FEB 16 2022 15:32
 MACHINE TERMINAL VOLTAGE

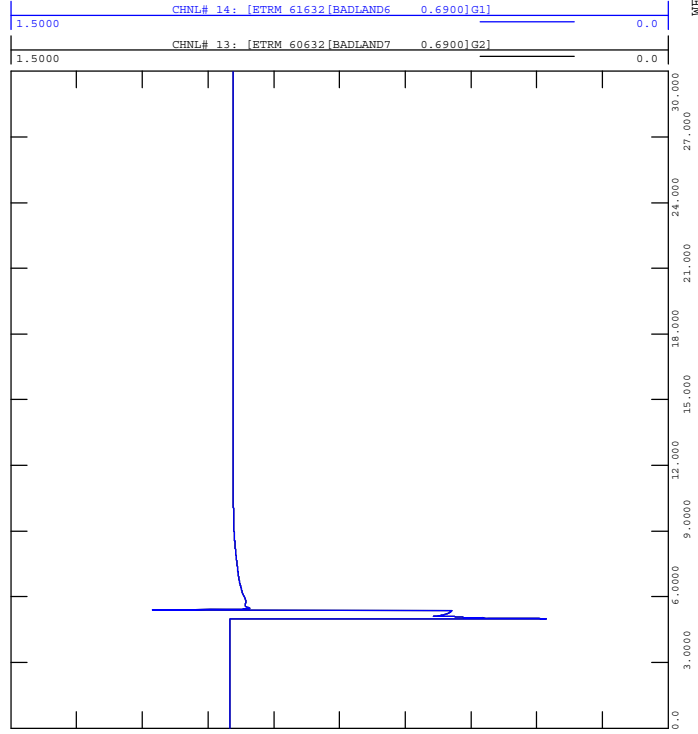


FIGURE A4-10A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-10_3PH_Fault_7L171@Michichi-Creek-802S.out

WED, FEB 16 2022 15:32
 MACHINE ANGLE (DEGREES)

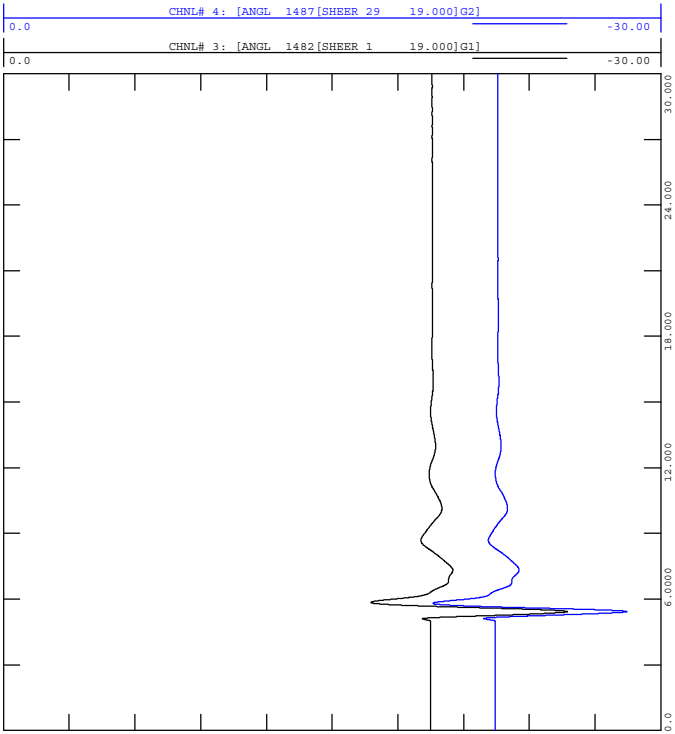


FIGURE A4-10C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-10_3PH_Fault_7L171@Michichi-Creek-802S.out

WED, FEB 16 2022 15:32
 MACHINE REACTIVE POWER (M)

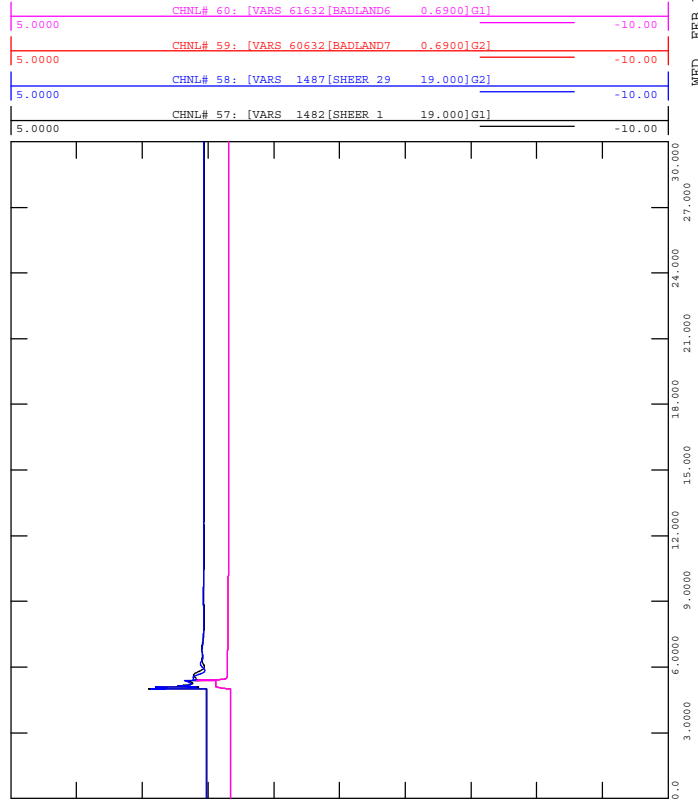




FIGURE A4-10F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-10_3PH_Fault_7L171@Michichi-Creek-802S.out

WED, FEB 16 2022 15:32
 138 KV BUS VOLTAGE (PU)

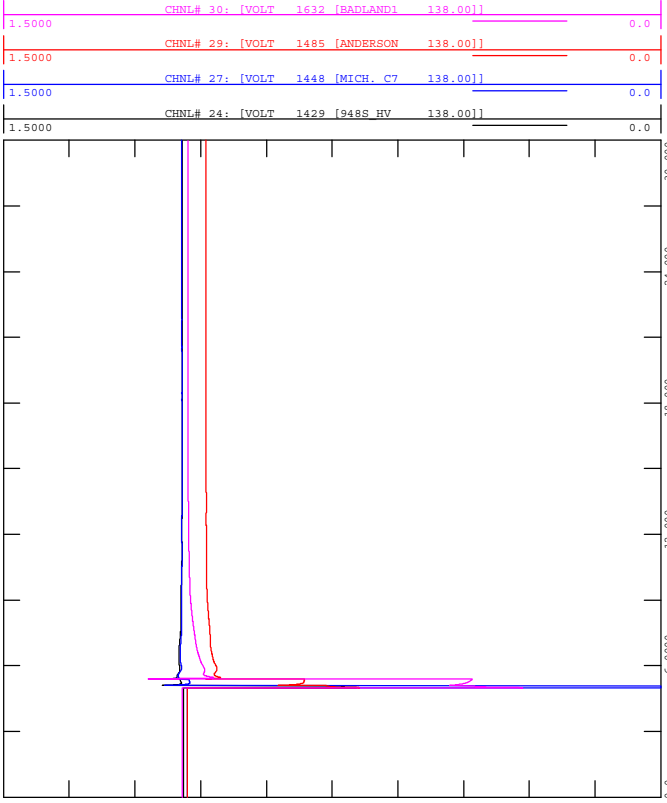


FIGURE A4-10H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CRBEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-10_3PH_Fault_7L171@Michichi-Creek-802S.out

WED, FEB 16 2022 15:33
 BRANCH FLOW (Q)

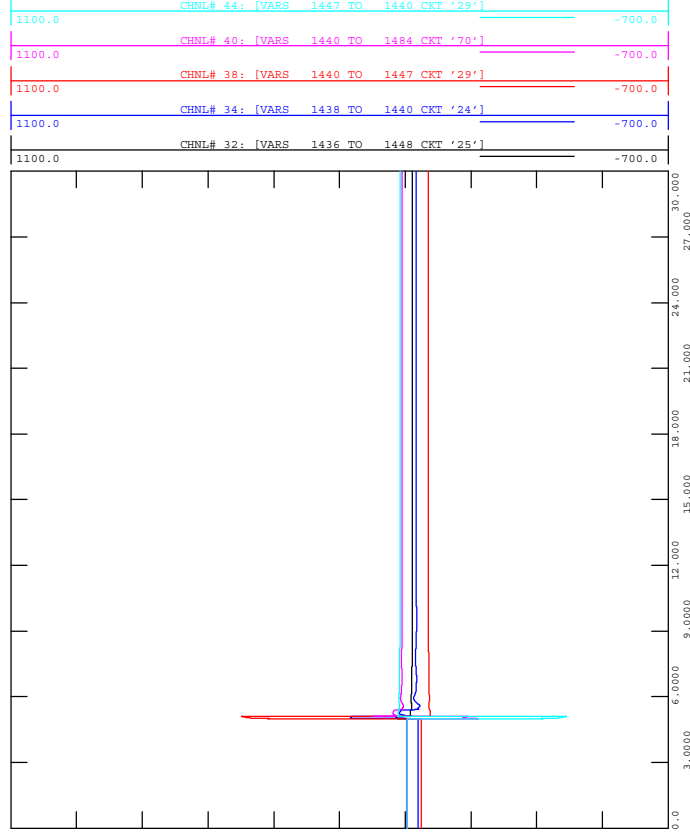


FIGURE A4-10E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-10_3PH_Fault_7L171@Michichi-Creek-802S.out

WED, FEB 16 2022 15:32
 240 KV BUS VOLTAGE (PU)

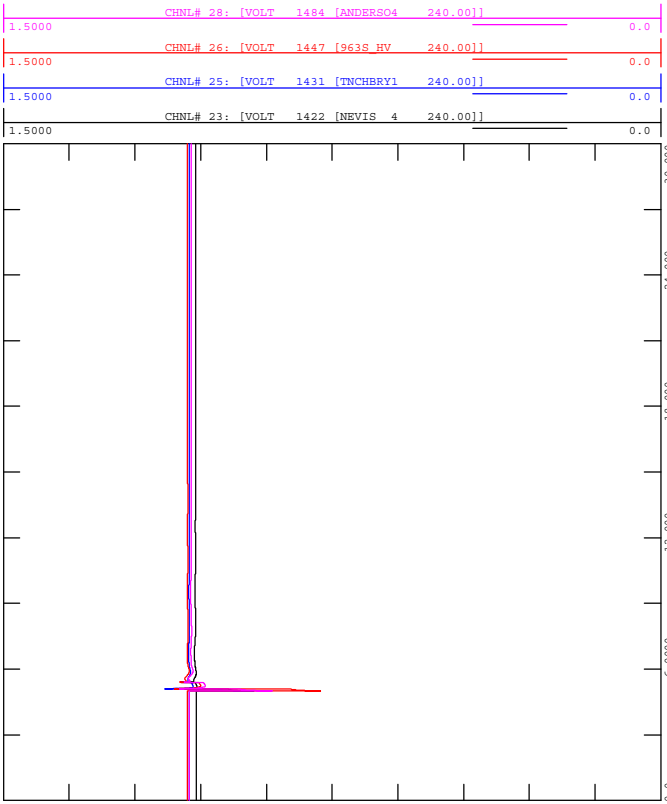


FIGURE A4-10G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-10_3PH_Fault_7L171@Michichi-Creek-802S.out

WED, FEB 16 2022 15:32
 BRANCH FLOW (P)

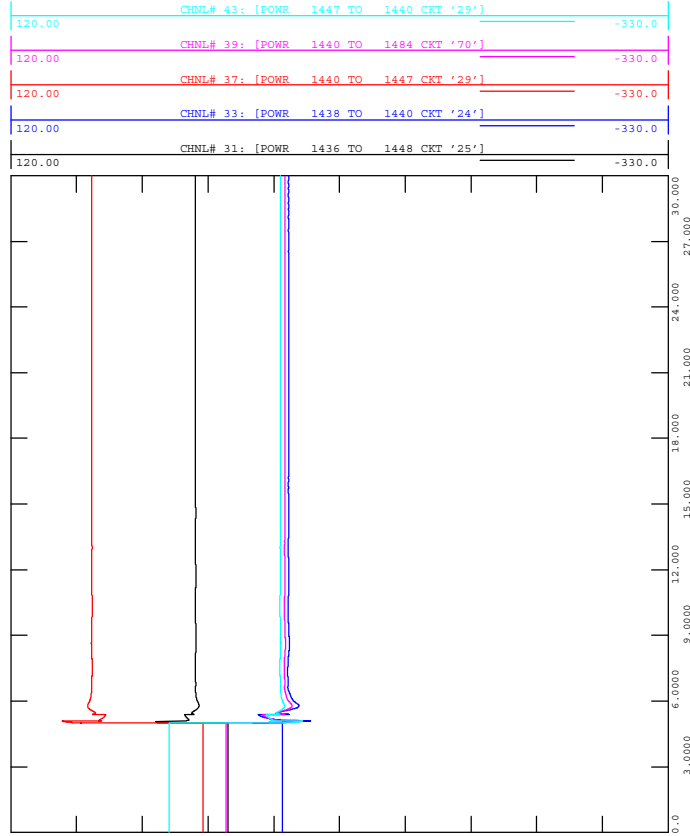




FIGURE A4-11B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-11_3PH_Fault_7L25@Rowley-768S.out

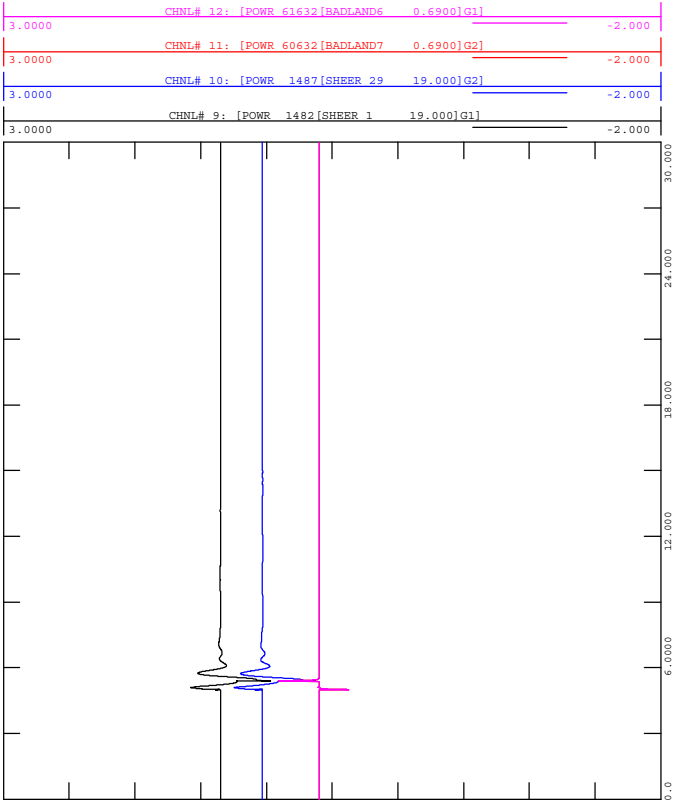


FIGURE A4-11D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-11_3PH_Fault_7L25@Rowley-768S.out

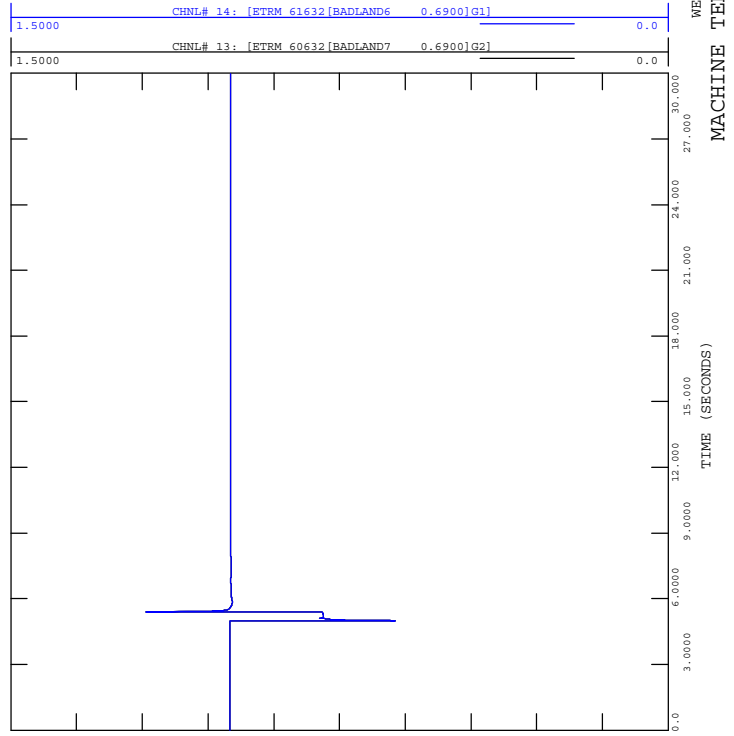


FIGURE A4-11A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-11_3PH_Fault_7L25@Rowley-768S.out

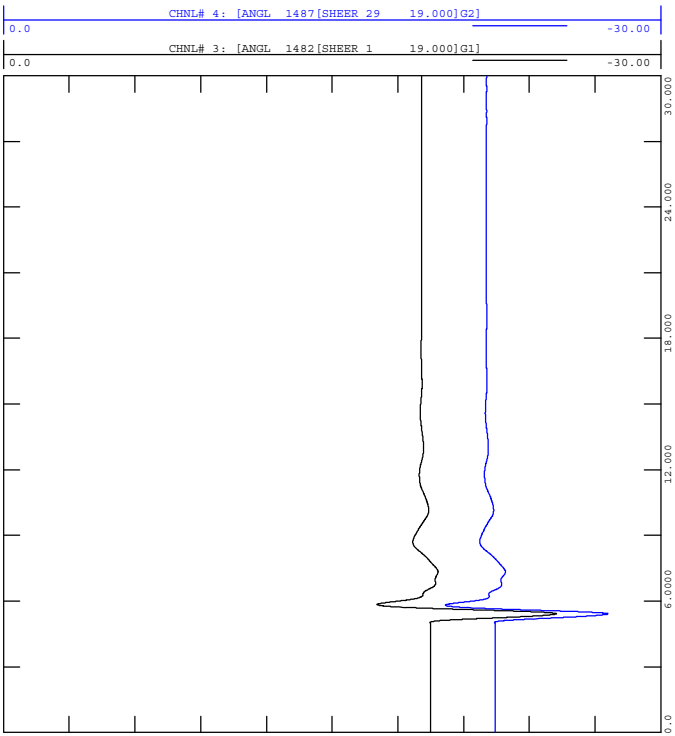


FIGURE A4-11C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-11_3PH_Fault_7L25@Rowley-768S.out

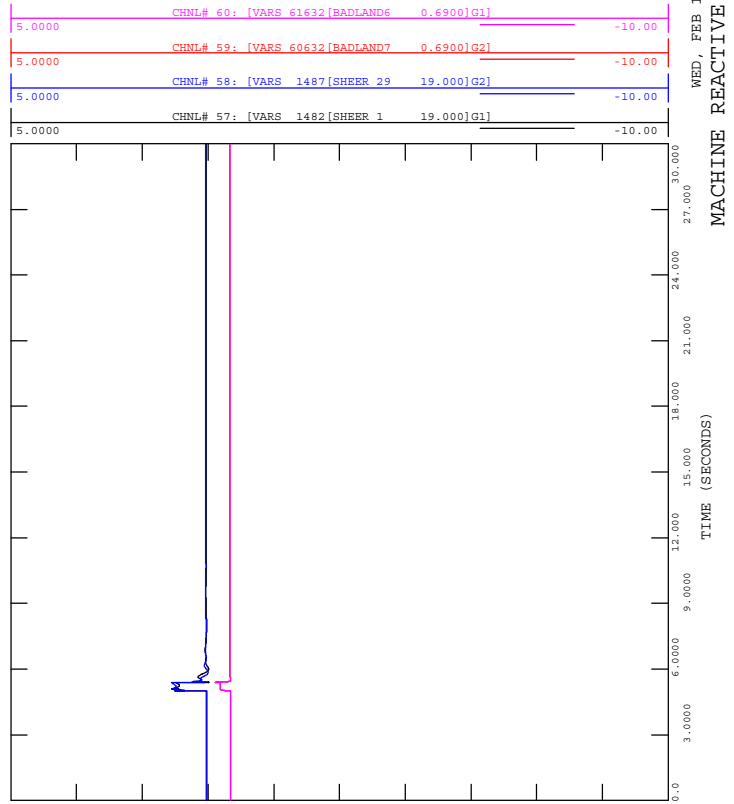




FIGURE A4-11F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-11_3PH_Fault_7L25@Rowley-768S.out

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:33

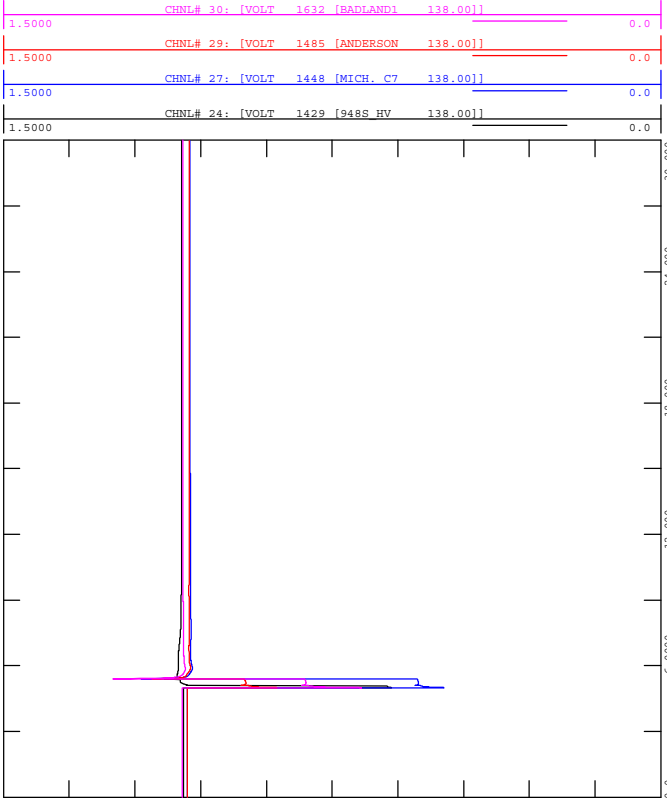


FIGURE A4-11H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-11_3PH_Fault_7L25@Rowley-768S.out

BRANCH FLOW (Q)
 WED, FEB 16 2022 15:33

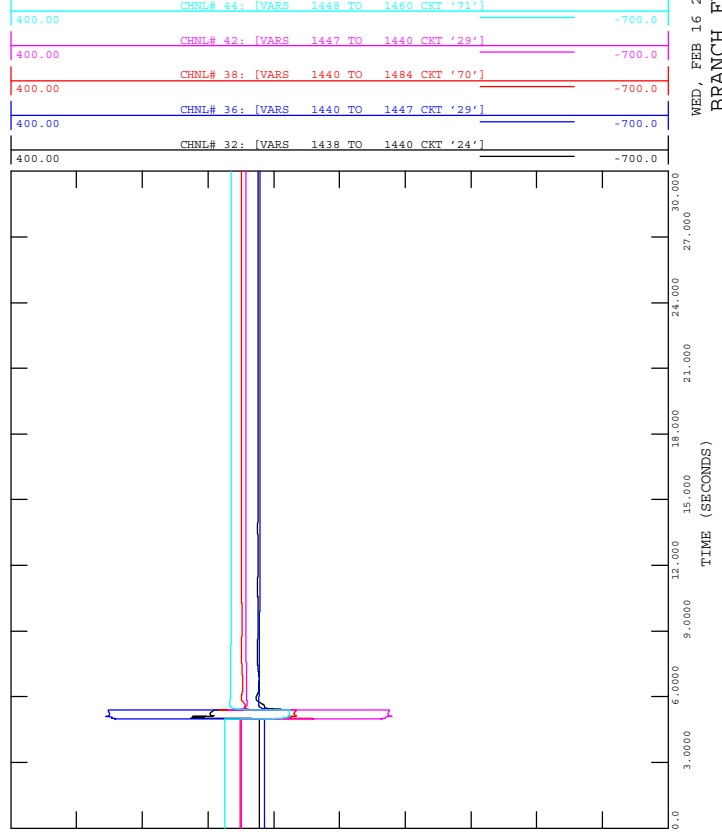


FIGURE A4-11E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-11_3PH_Fault_7L25@Rowley-768S.out

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:33

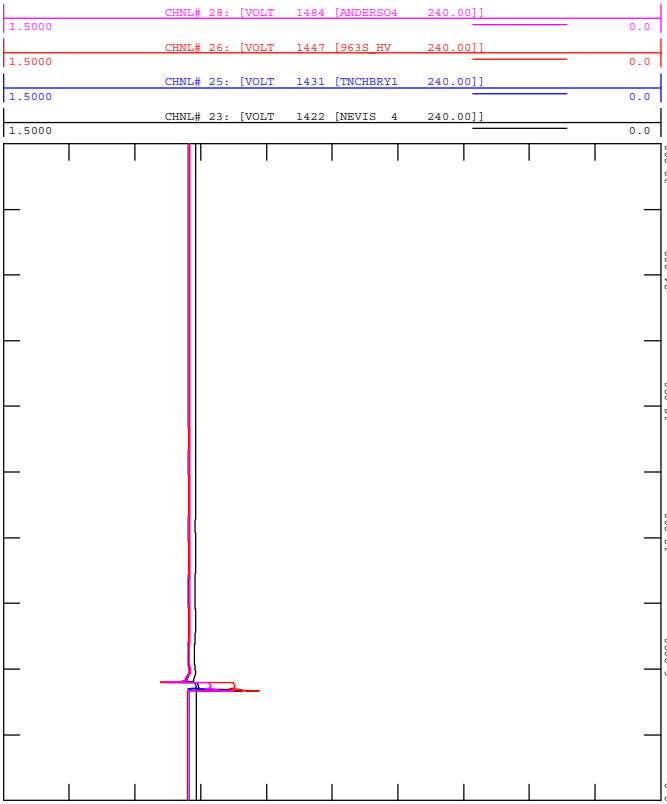


FIGURE A4-11G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-11_3PH_Fault_7L25@Rowley-768S.out

BRANCH FLOW (P)
 WED, FEB 16 2022 15:33

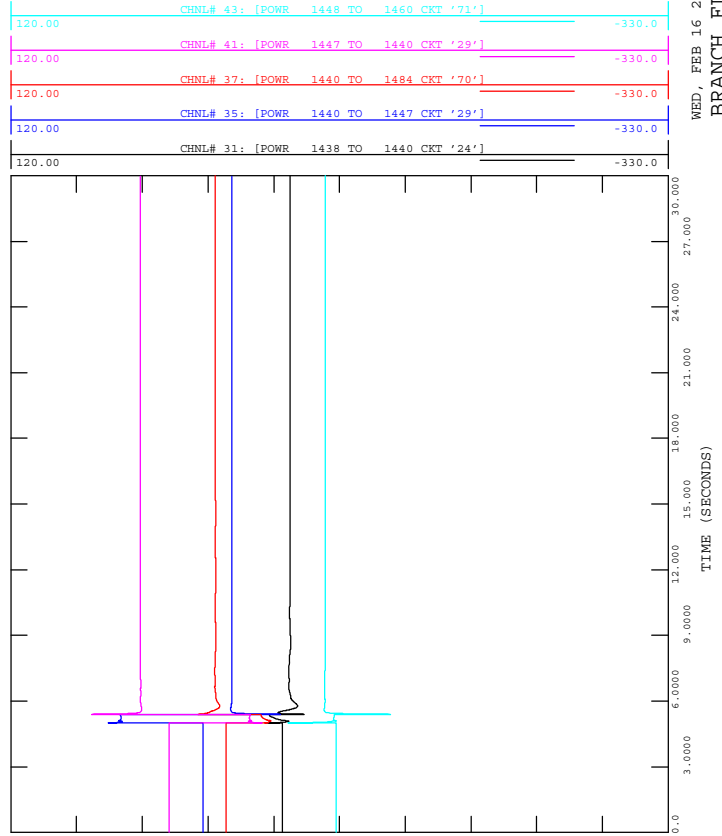




FIGURE A4-12B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-12_3PH_Fault_7L25@Michichi-Creek-802S.out

WED, FEB 16 2022 15:33
 MACHINE ACTIVE POWER (MW)

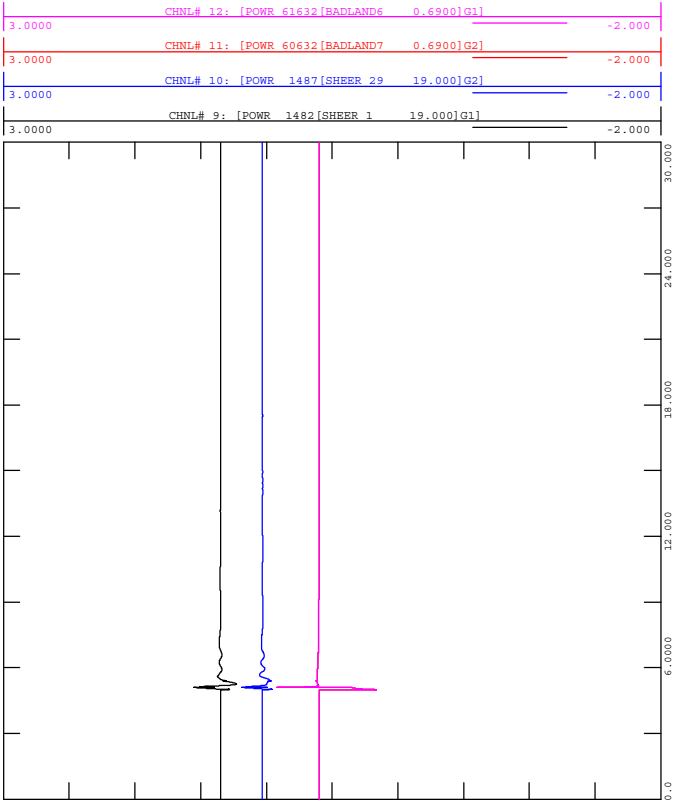


FIGURE A4-12D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-12_3PH_Fault_7L25@Michichi-Creek-802S.out

WED, FEB 16 2022 15:34
 MACHINE TERMINAL VOLTAGE

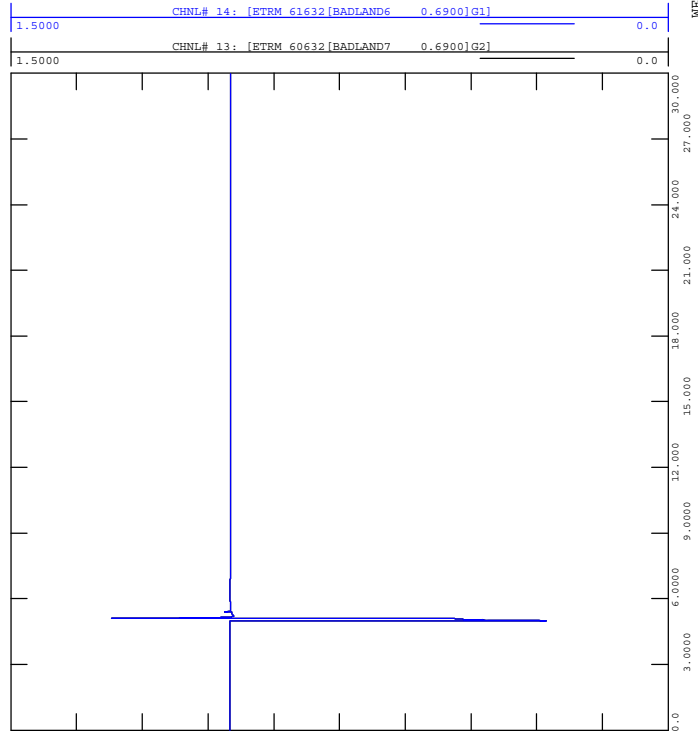


FIGURE A4-12A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-12_3PH_Fault_7L25@Michichi-Creek-802S.out

WED, FEB 16 2022 15:33
 MACHINE ANGLE (DEGREES)

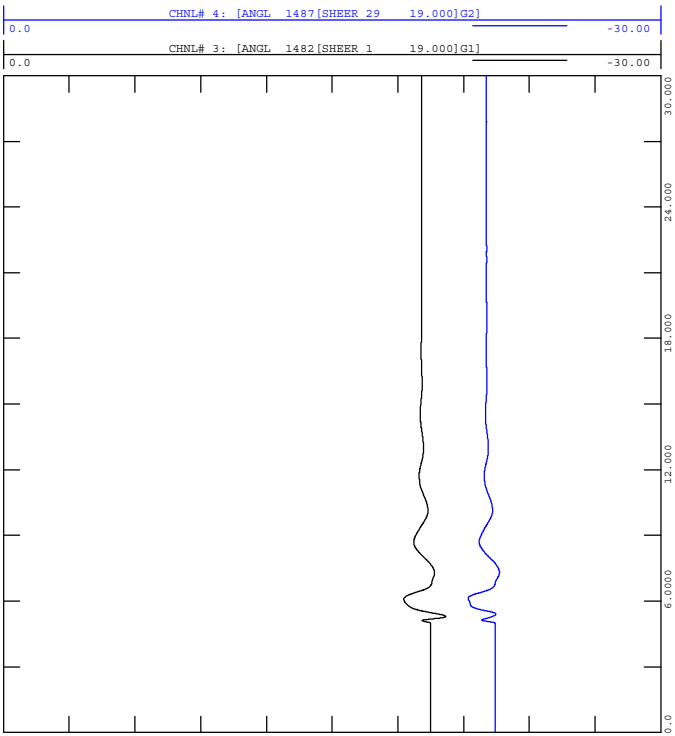


FIGURE A4-12C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-12_3PH_Fault_7L25@Michichi-Creek-802S.out

WED, FEB 16 2022 15:34
 MACHINE REACTIVE POWER (M)

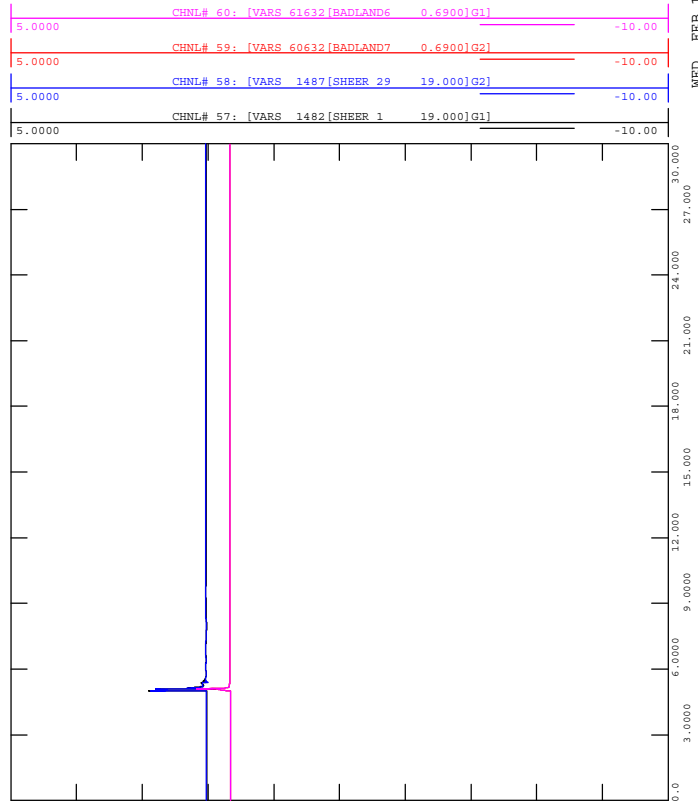




FIGURE A4-12F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-12_3PH_Fault_7L25@Michichi-Creek-802S.out

15:34
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

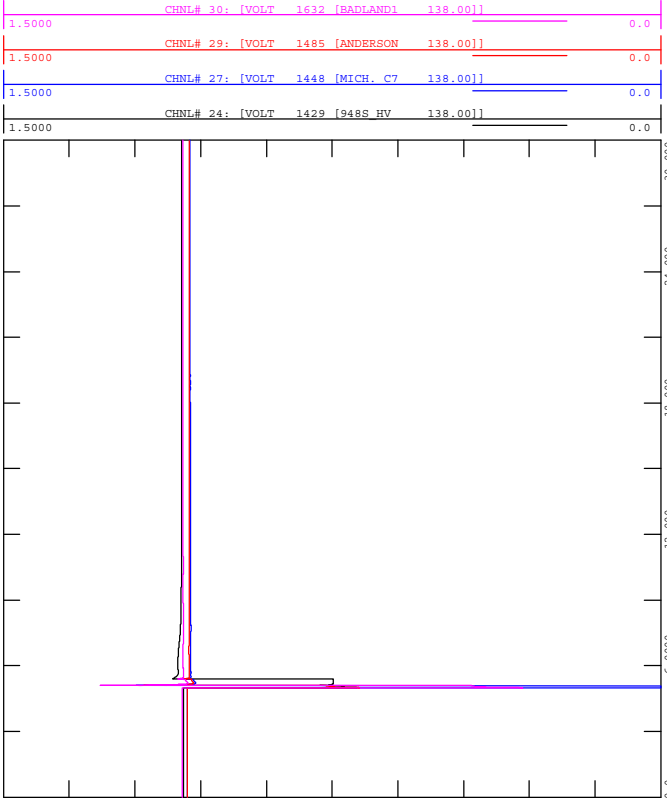


FIGURE A4-12H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-12_3PH_Fault_7L25@Michichi-Creek-802S.out

15:34
 WED, FEB 16 2022
 BRANCH FLOW (Q)

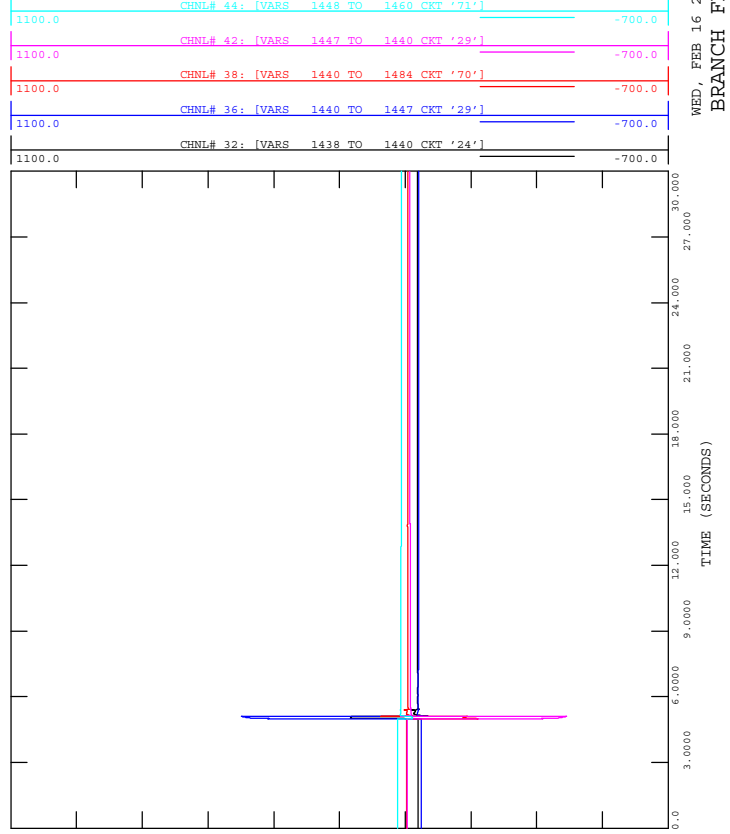


FIGURE A4-12E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-12_3PH_Fault_7L25@Michichi-Creek-802S.out

15:34
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

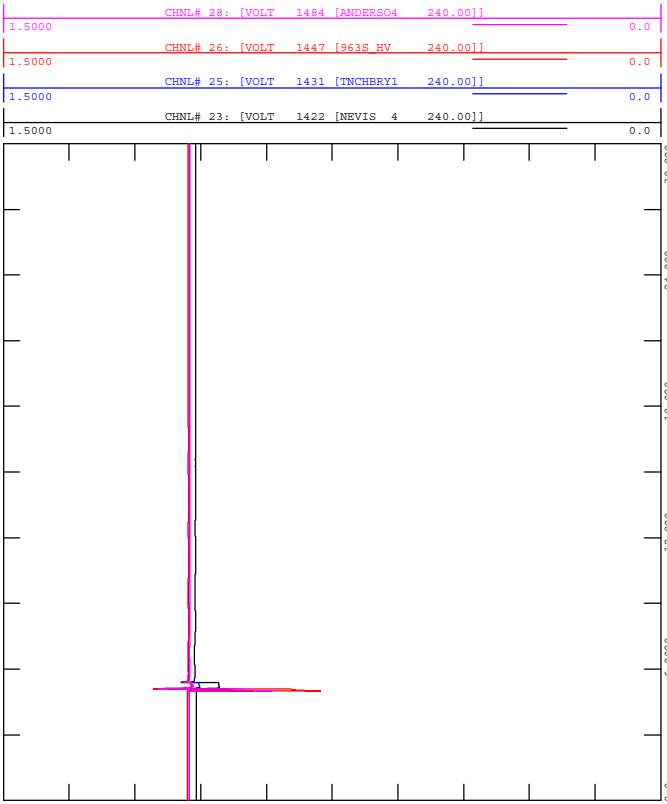


FIGURE A4-12G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-12_3PH_Fault_7L25@Michichi-Creek-802S.out

15:34
 WED, FEB 16 2022
 BRANCH FLOW (P)

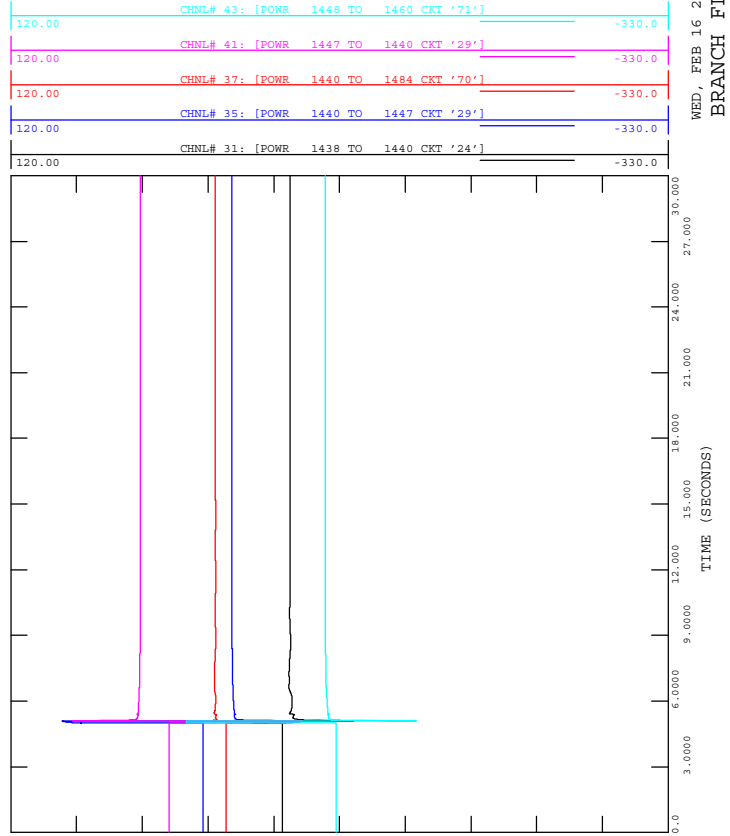
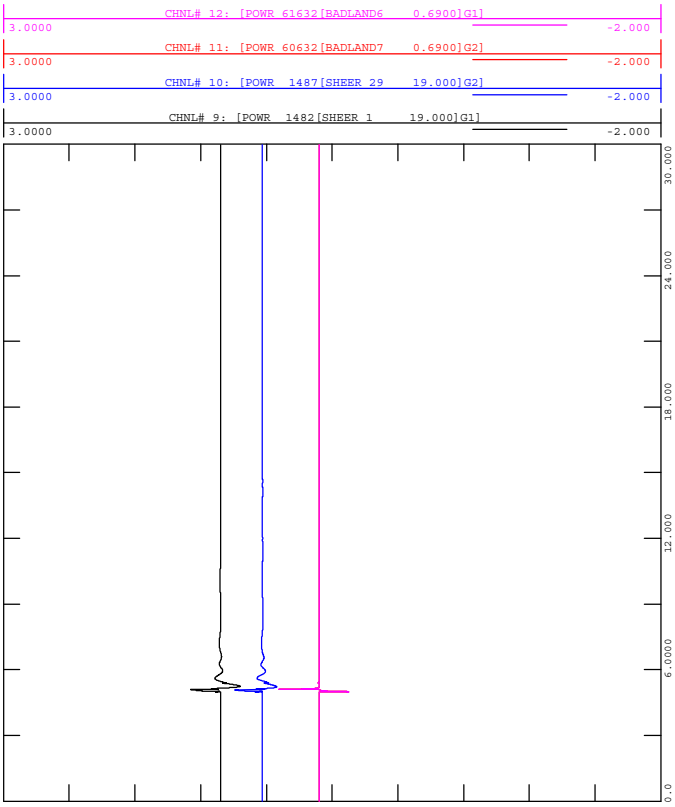




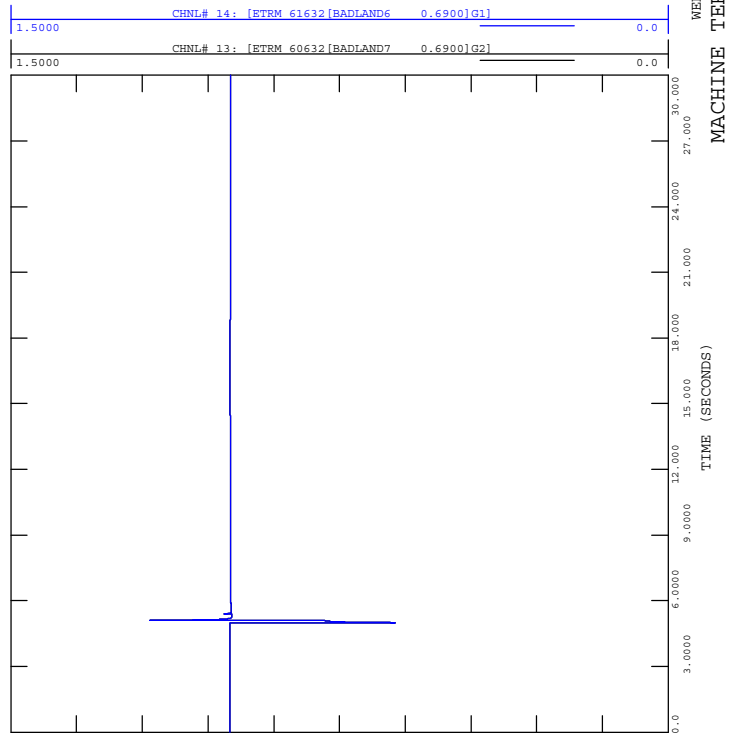
FIGURE A4-13B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-13_3PH_Fault_7L137@Rowley-768S.out



WED, FEB 16 2022 15:34
 MACHINE ACTIVE POWER (MW)



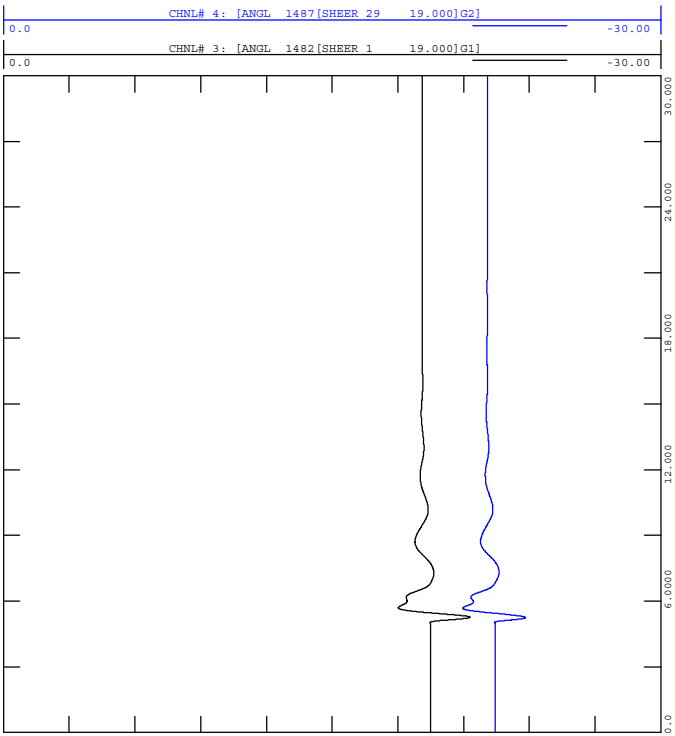
FIGURE A4-13D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-13_3PH_Fault_7L137@Rowley-768S.out



WED, FEB 16 2022 15:34
 MACHINE TERMINAL VOLTAGE



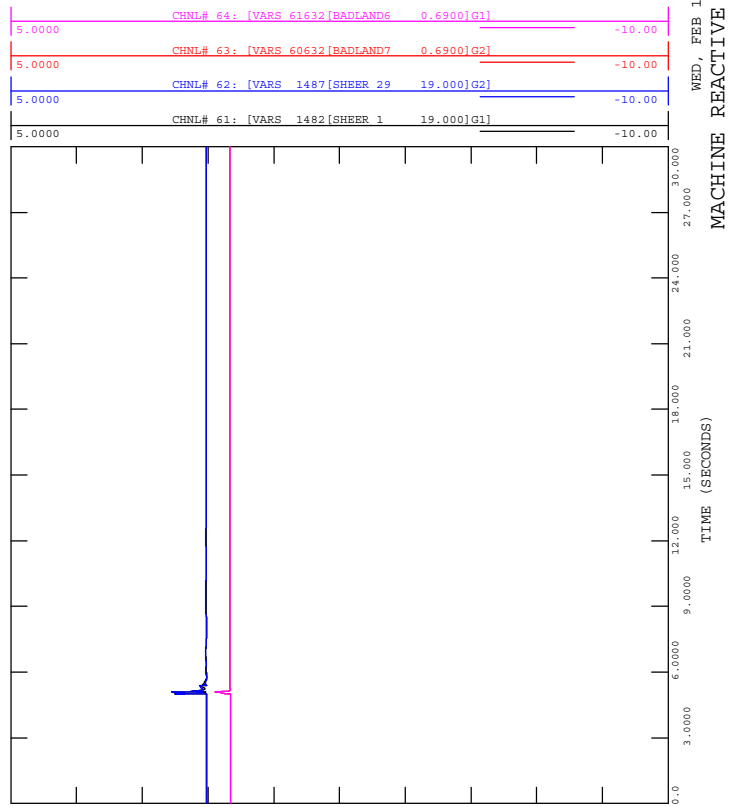
FIGURE A4-13A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-13_3PH_Fault_7L137@Rowley-768S.out



WED, FEB 16 2022 15:34
 MACHINE ANGLE (DEGREES)



FIGURE A4-13C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-13_3PH_Fault_7L137@Rowley-768S.out



WED, FEB 16 2022 15:34
 MACHINE REACTIVE POWER (M)



FIGURE A4-13F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-13_3PH_Fault_7L137@Rowley-768S.out

15:34
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

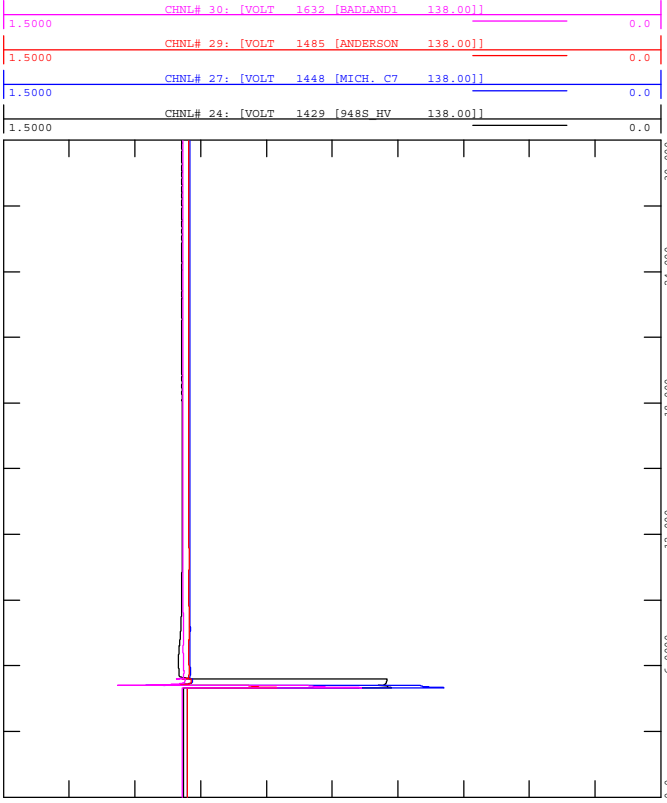


FIGURE A4-13H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-13_3PH_Fault_7L137@Rowley-768S.out

15:34
 WED, FEB 16 2022
 BRANCH FLOW (Q)

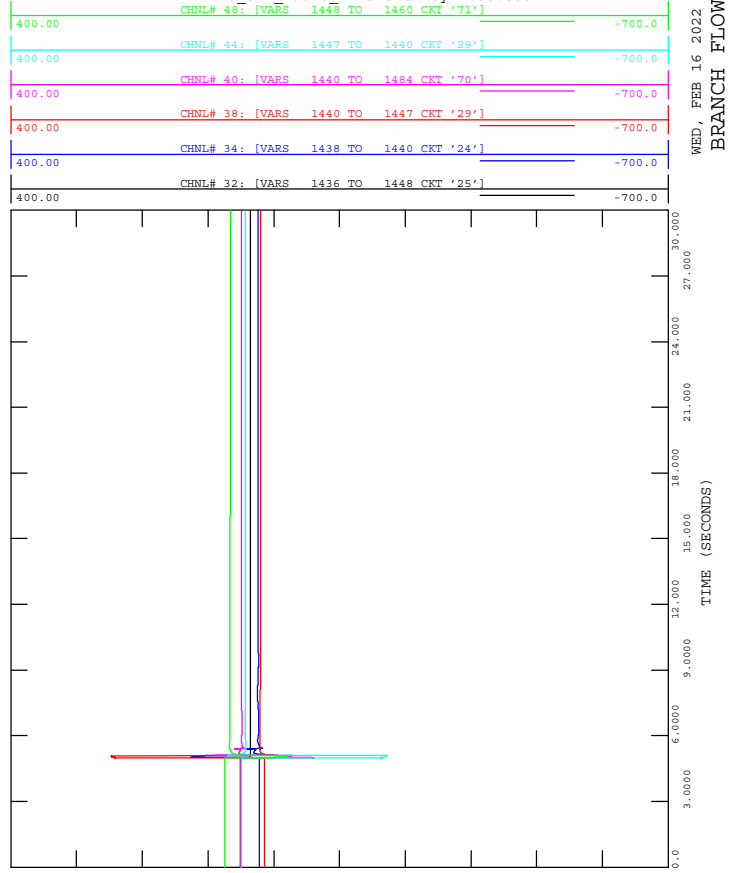


FIGURE A4-13E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-13_3PH_Fault_7L137@Rowley-768S.out

15:34
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

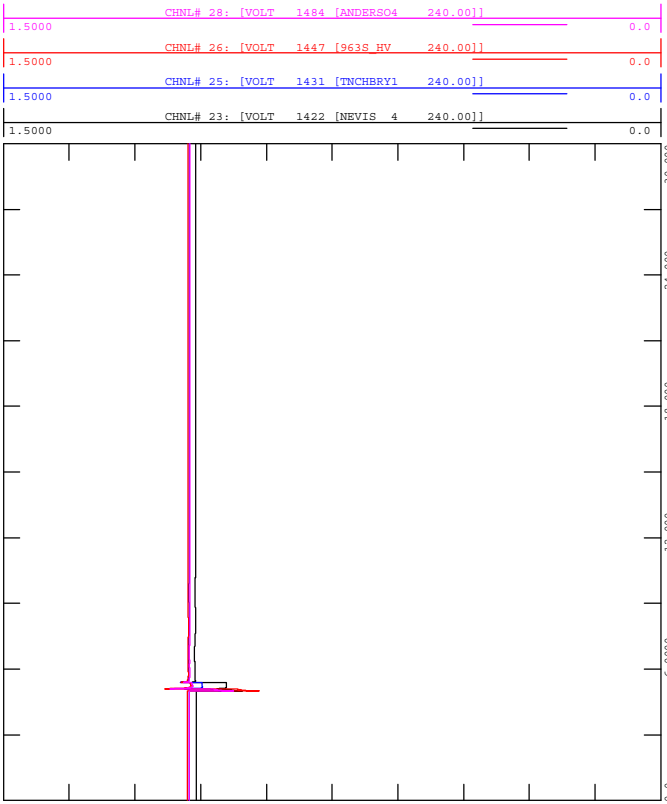


FIGURE A4-13G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-13_3PH_Fault_7L137@Rowley-768S.out

15:34
 WED, FEB 16 2022
 BRANCH FLOW (P)

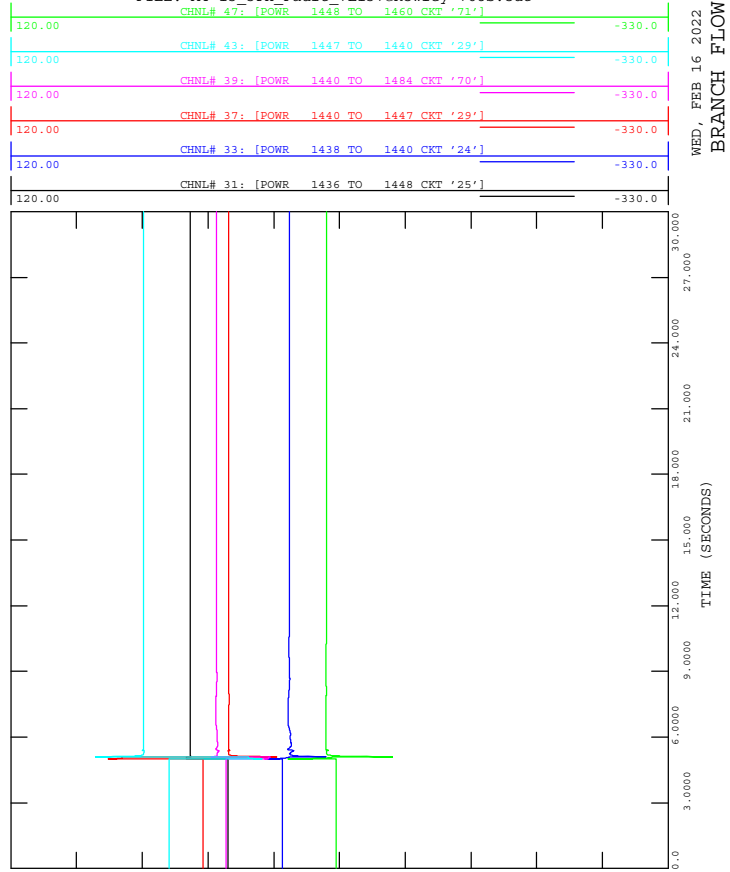




FIGURE A4-14B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-14_3PH_Fault_7L137@Three-Hills-770S.out

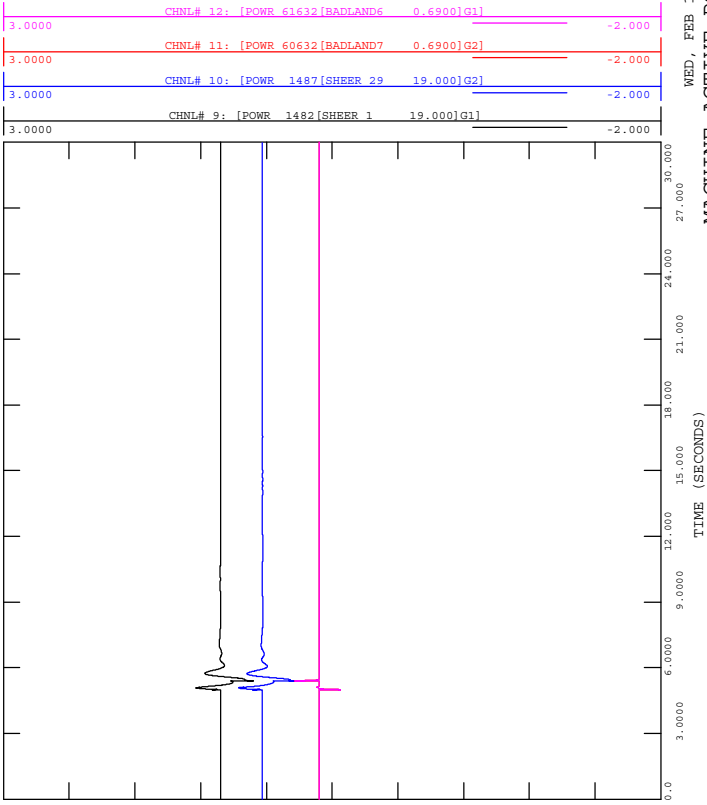


FIGURE A4-14D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-14_3PH_Fault_7L137@Three-Hills-770S.out

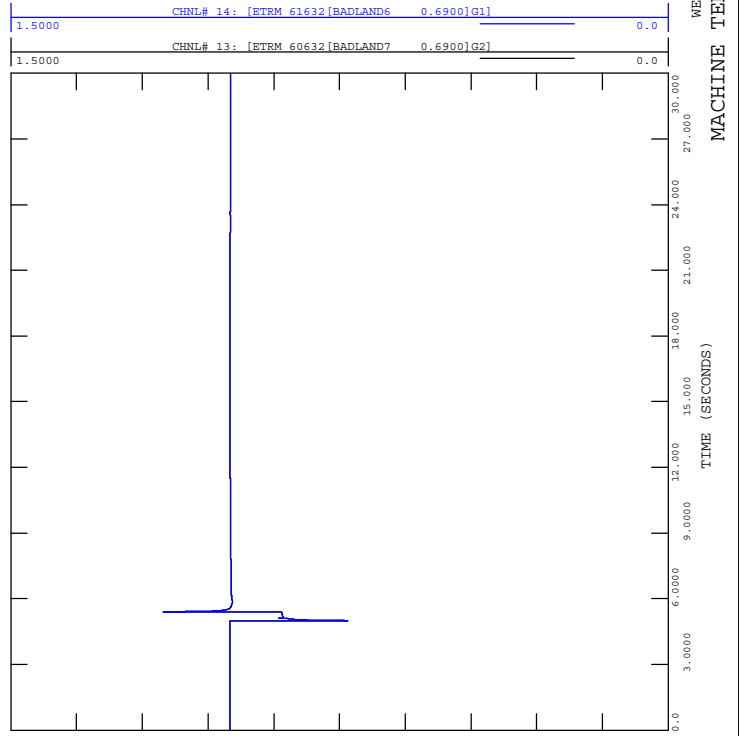


FIGURE A4-14A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-14_3PH_Fault_7L137@Three-Hills-770S.out

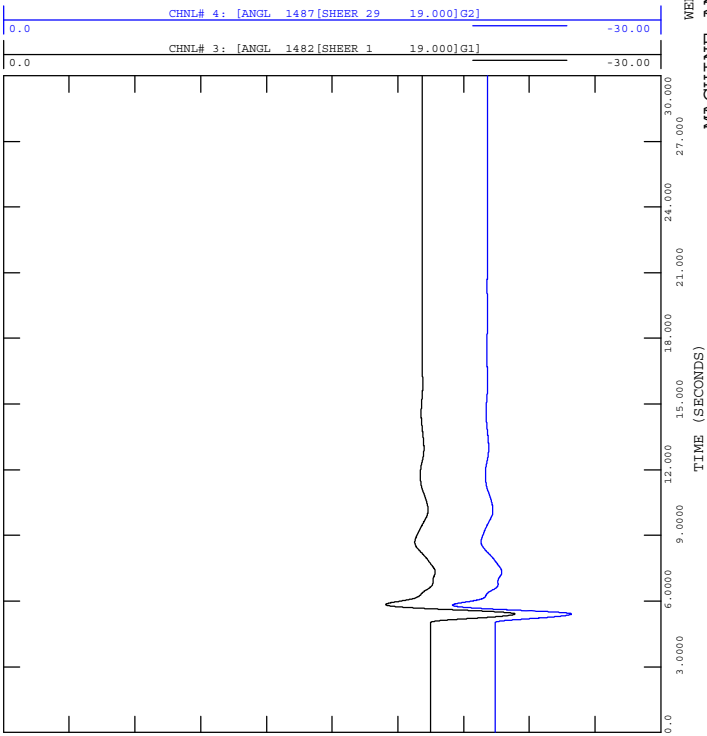


FIGURE A4-14C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-14_3PH_Fault_7L137@Three-Hills-770S.out

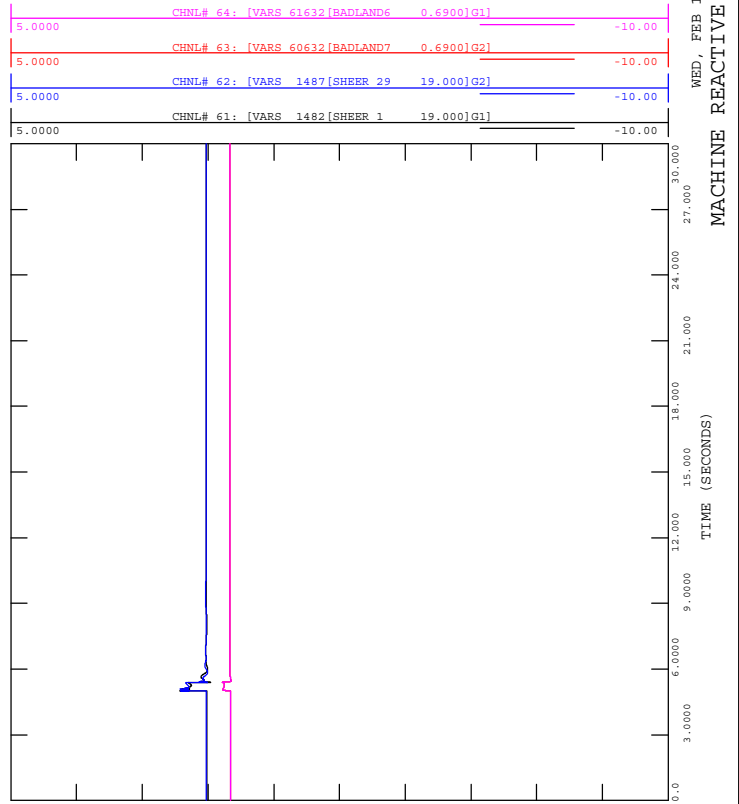




FIGURE A4-14F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-14_3PH_Fault_7L137@Three-Hills-770S.out

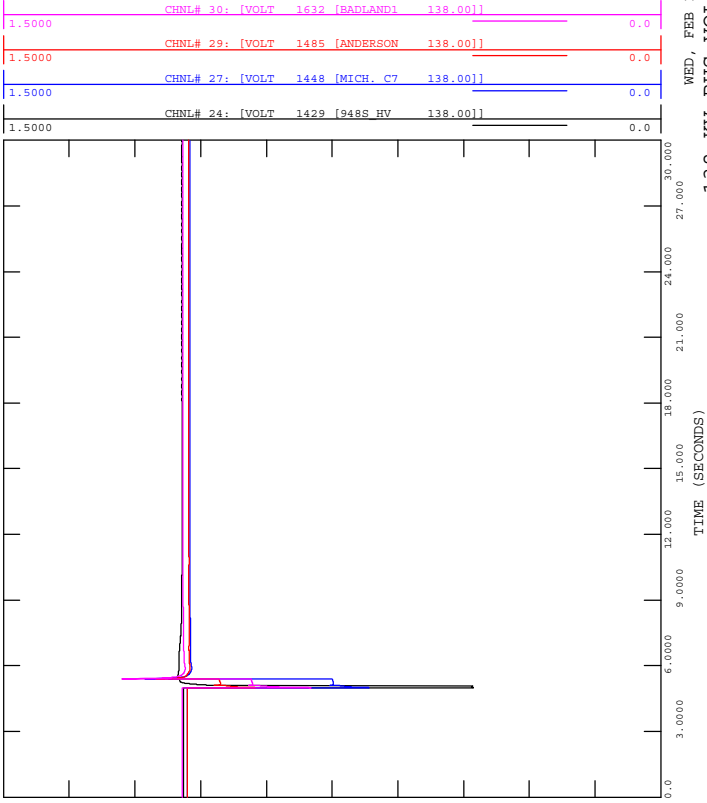


FIGURE A4-14H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-14_3PH_Fault_7L137@Three-Hills-770S.out

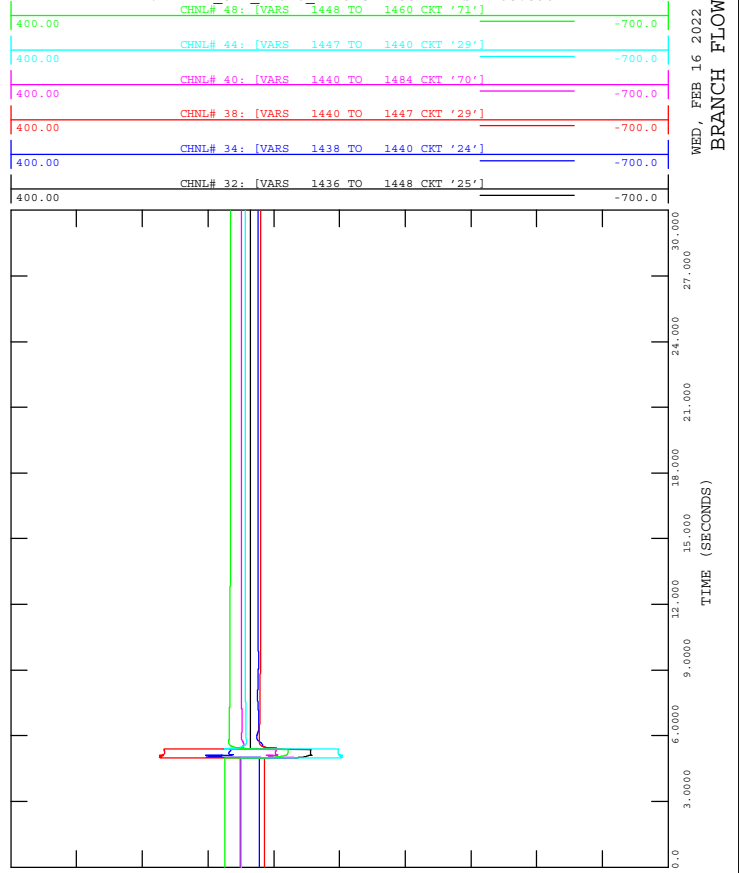


FIGURE A4-14E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-14_3PH_Fault_7L137@Three-Hills-770S.out

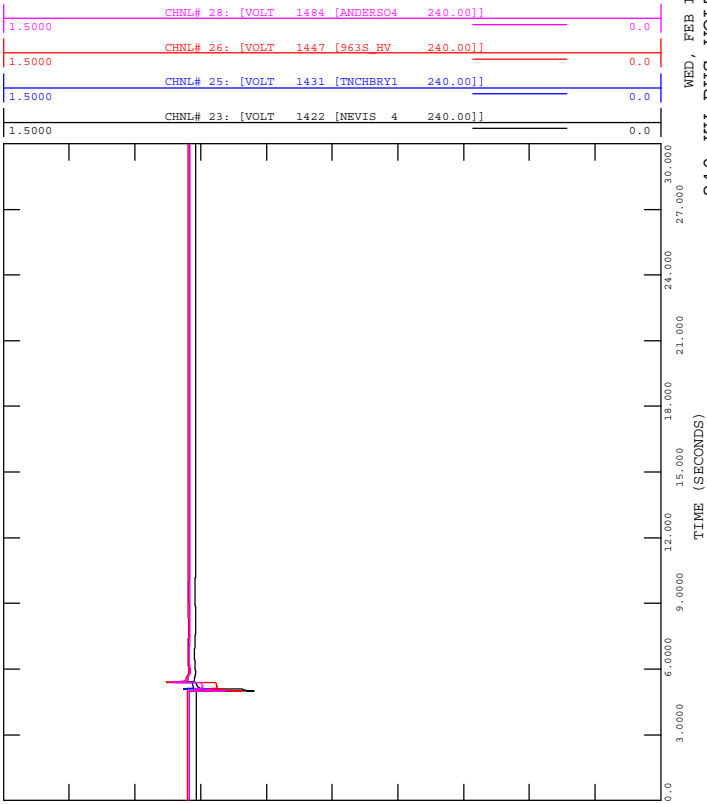


FIGURE A4-14G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-14_3PH_Fault_7L137@Three-Hills-770S.out

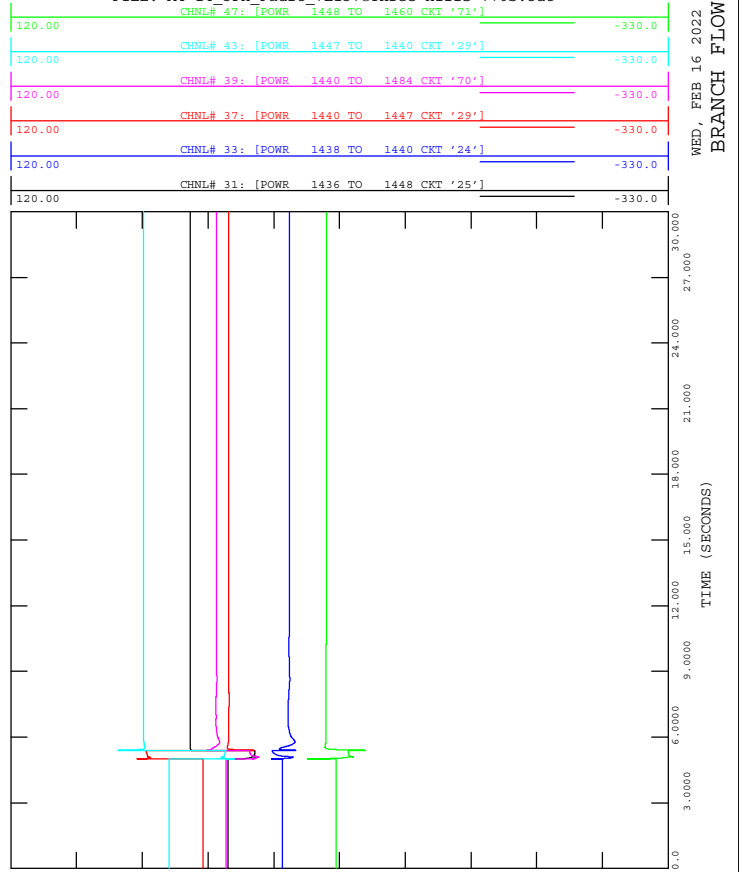




FIGURE A4-15B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-15_3PH_Fault_7L16@Heatburg-948S.out

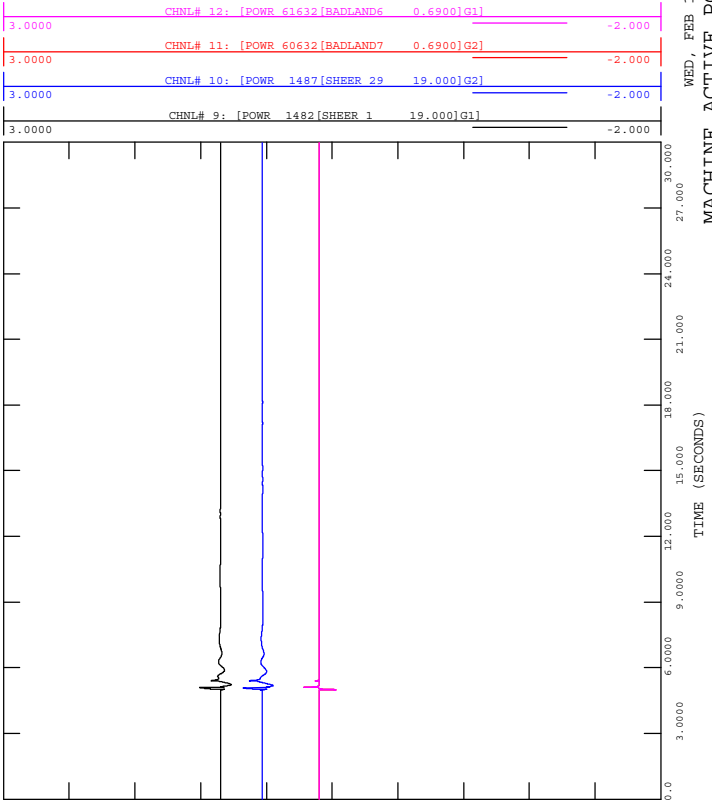


FIGURE A4-15D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-15_3PH_Fault_7L16@Heatburg-948S.out

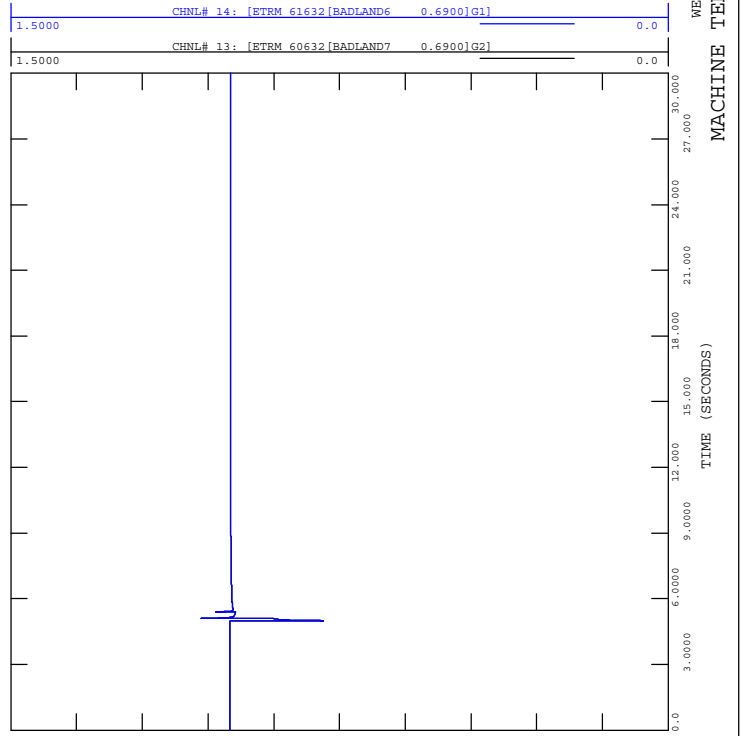


FIGURE A4-15A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-15_3PH_Fault_7L16@Heatburg-948S.out

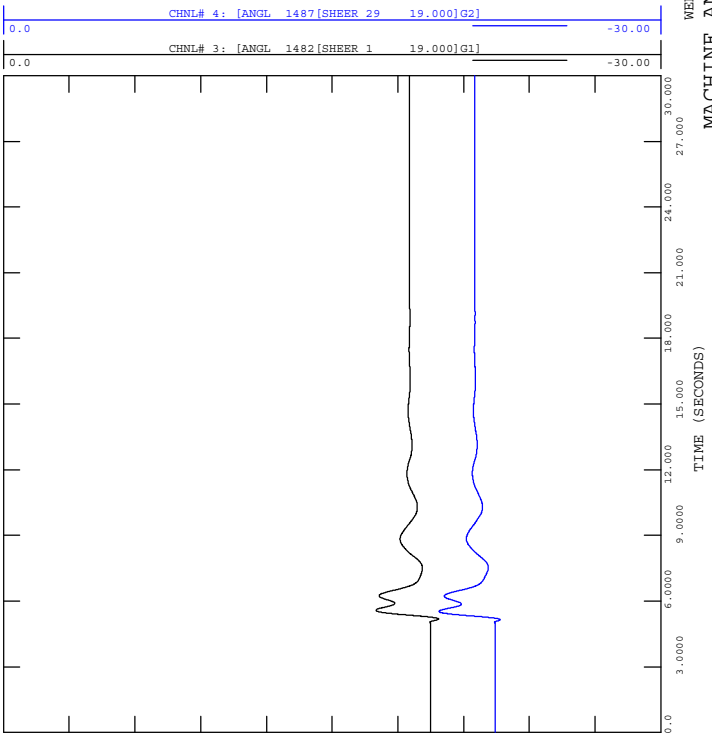


FIGURE A4-15C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-15_3PH_Fault_7L16@Heatburg-948S.out

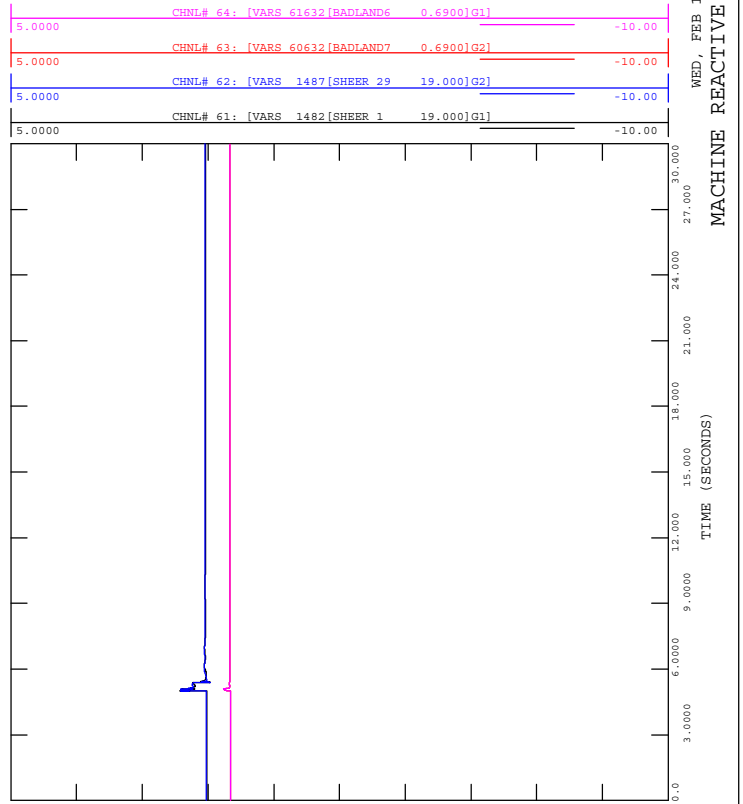




FIGURE A4-15F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-15_3PH_Fault_7L16@Heatburg-948S.out

WED, FEB 16 2022 15:36
 138 KV BUS VOLTAGE (PU)

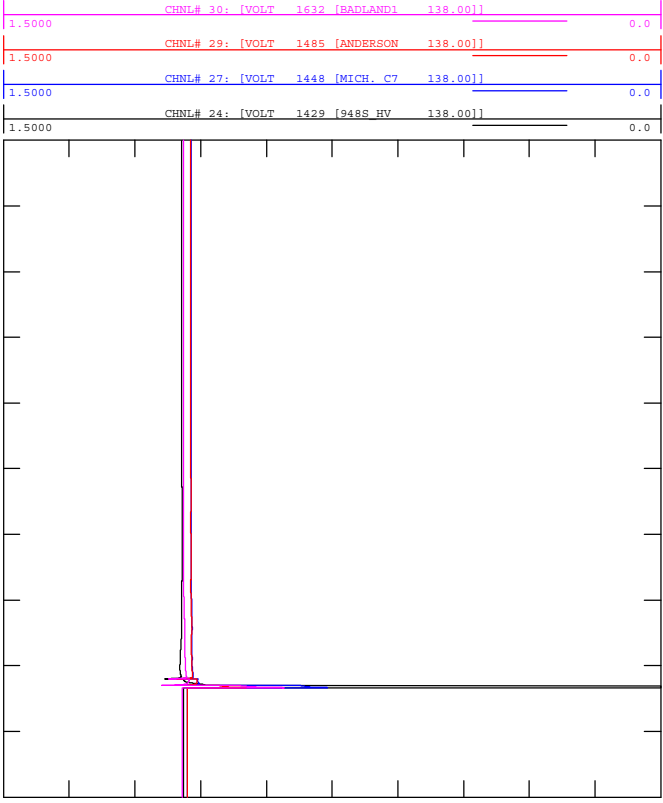


FIGURE A4-15H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-15_3PH_Fault_7L16@Heatburg-948S.out

WED, FEB 16 2022 15:36
 BRANCH FLOW (Q)

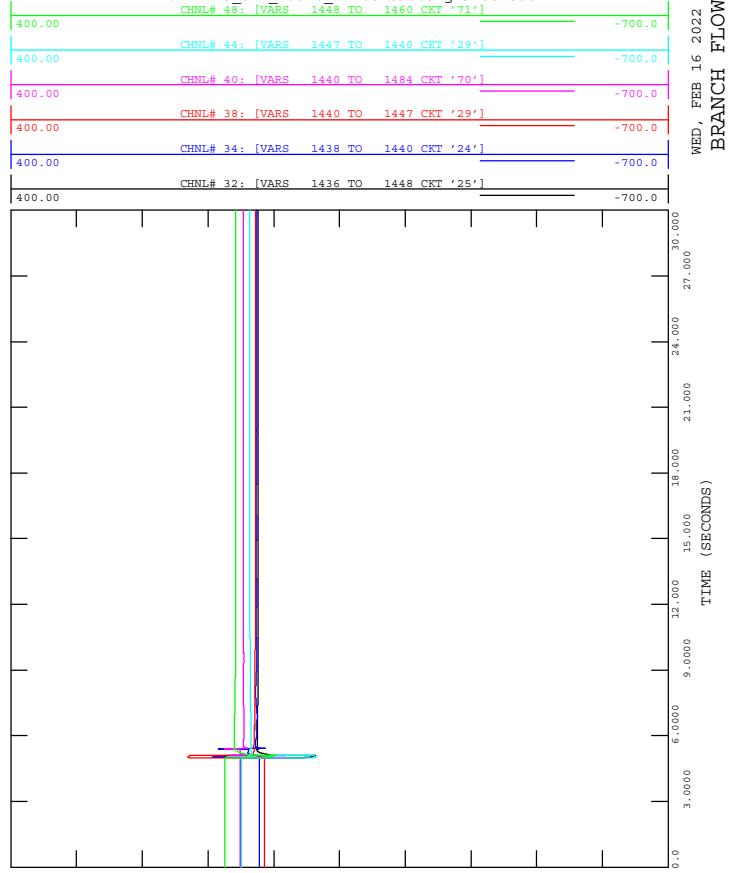


FIGURE A4-15E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-15_3PH_Fault_7L16@Heatburg-948S.out

WED, FEB 16 2022 15:36
 240 KV BUS VOLTAGE (PU)

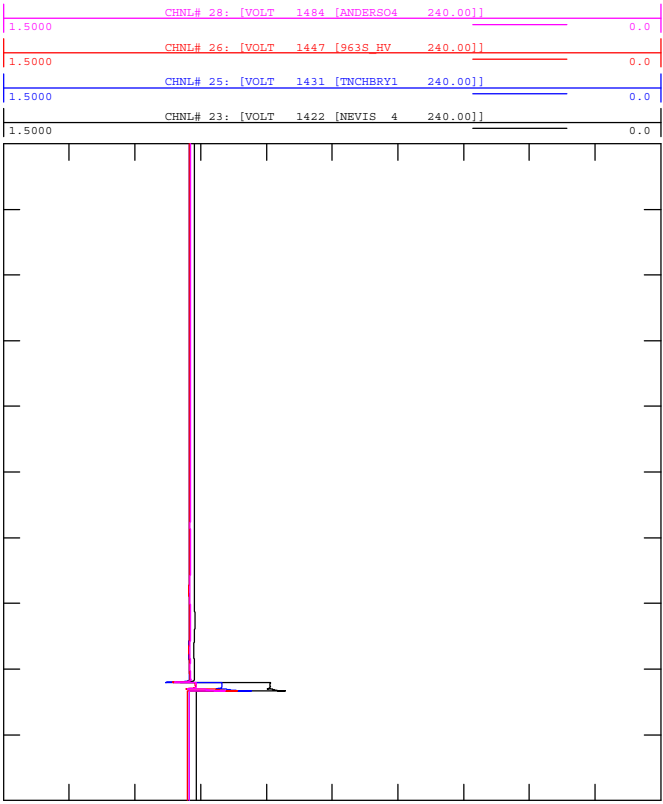


FIGURE A4-15G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-15_3PH_Fault_7L16@Heatburg-948S.out

WED, FEB 16 2022 15:36
 BRANCH FLOW (P)

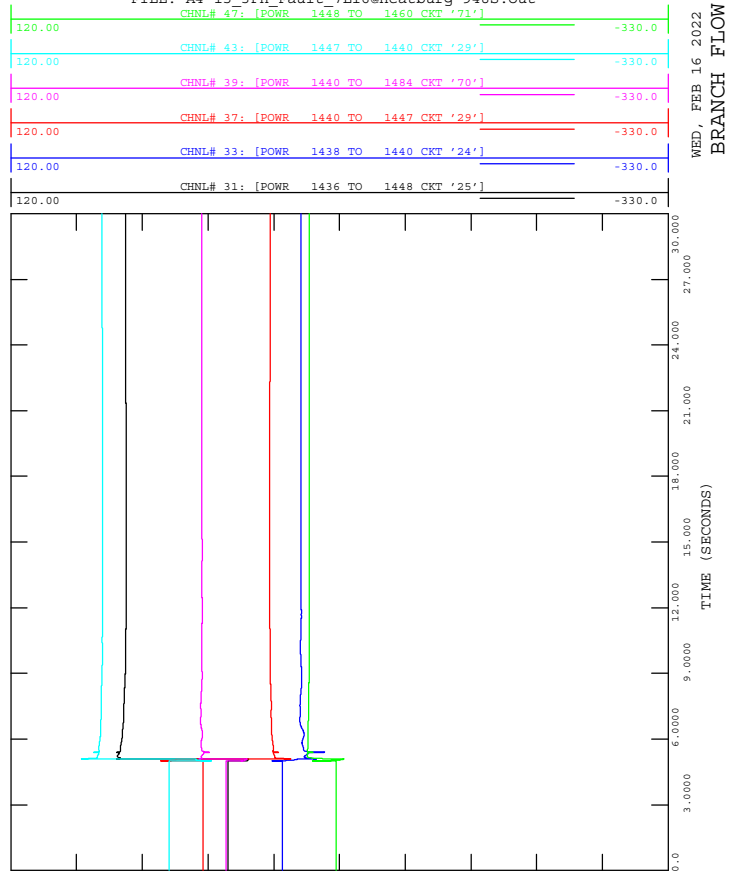
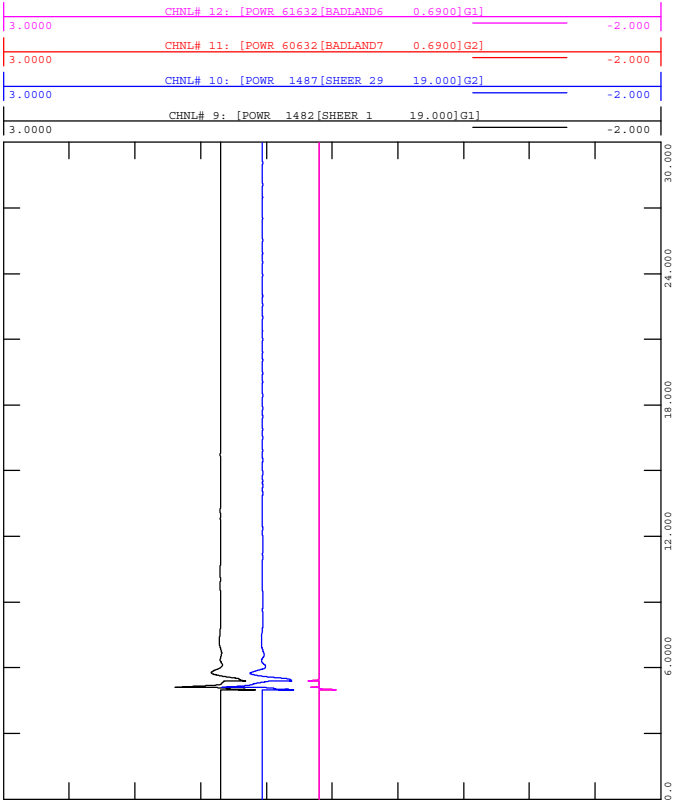




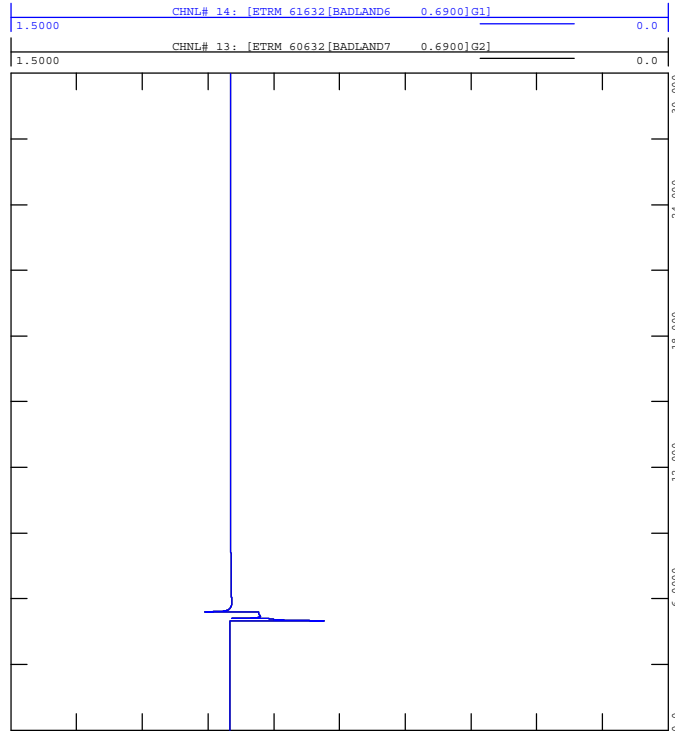
FIGURE A4-16B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-16_3PH_Fault_7L16@Nevis-766S.out



WED, FEB 16 2022 15:36
 MACHINE ACTIVE POWER (MW)



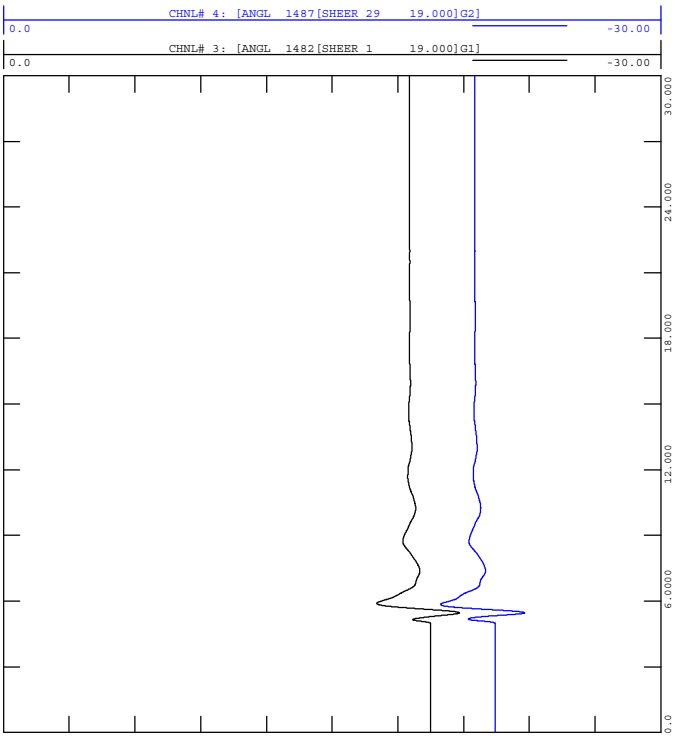
FIGURE A4-16D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-16_3PH_Fault_7L16@Nevis-766S.out



WED, FEB 16 2022 15:36
 MACHINE TERMINAL VOLTAGE



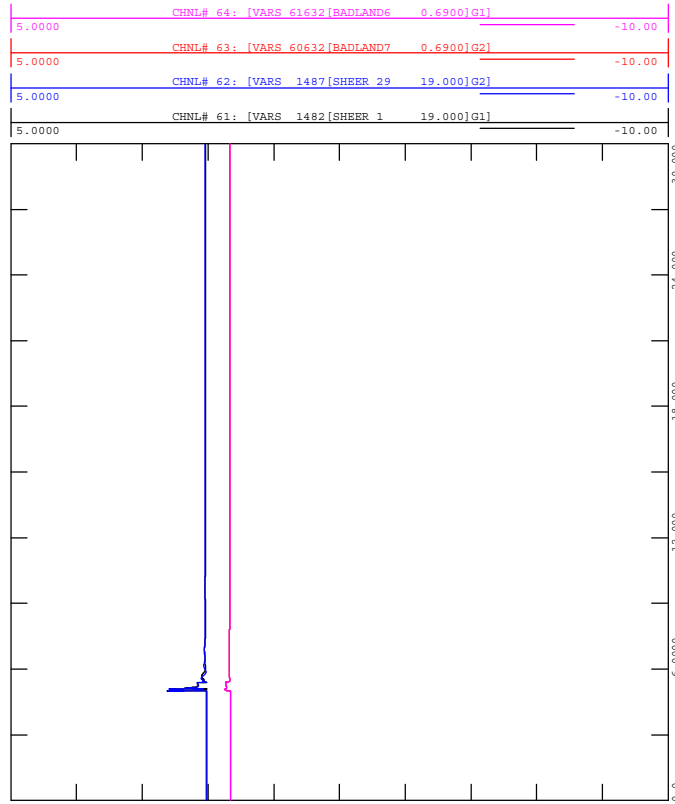
FIGURE A4-16A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-16_3PH_Fault_7L16@Nevis-766S.out



WED, FEB 16 2022 15:36
 MACHINE ANGLE (DEGREES)



FIGURE A4-16C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-16_3PH_Fault_7L16@Nevis-766S.out



WED, FEB 16 2022 15:36
 MACHINE REACTIVE POWER (M)



FIGURE A4-16F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-16_3PH_Fault_7L16@Nevis-766S.out

15:36
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

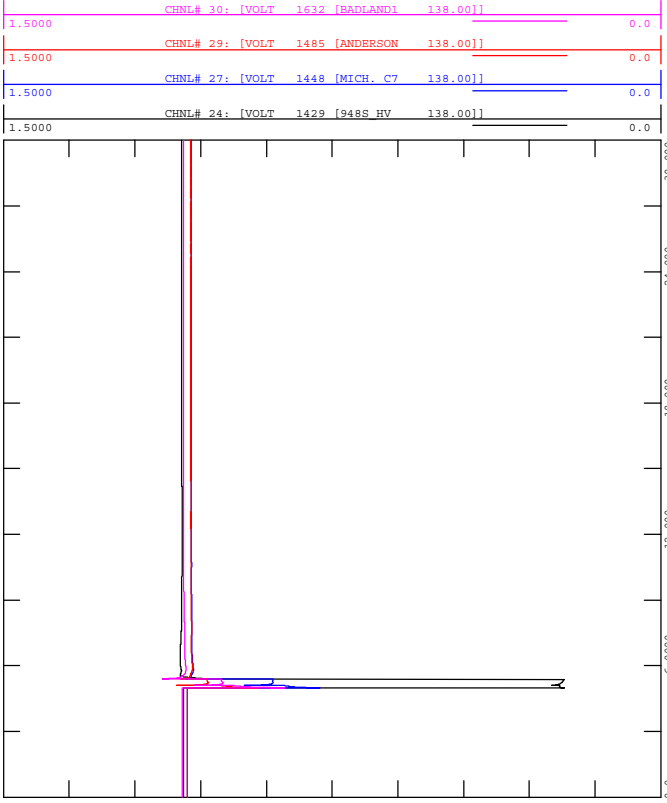


FIGURE A4-16H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-16_3PH_Fault_7L16@Nevis-766S.out

15:36
 WED, FEB 16 2022
 BRANCH FLOW (Q)

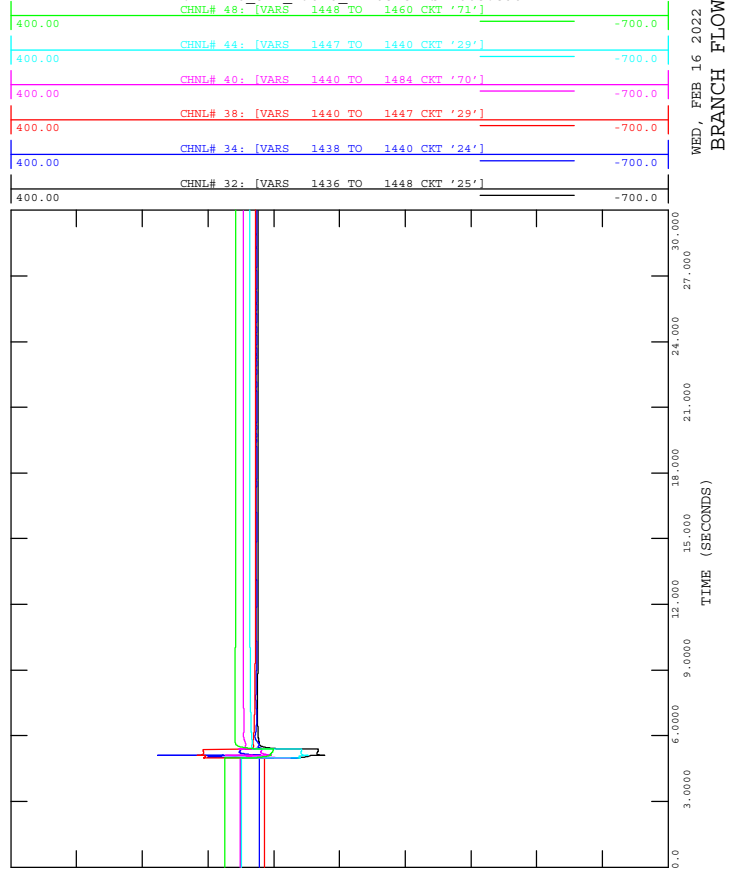


FIGURE A4-16E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-16_3PH_Fault_7L16@Nevis-766S.out

15:36
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

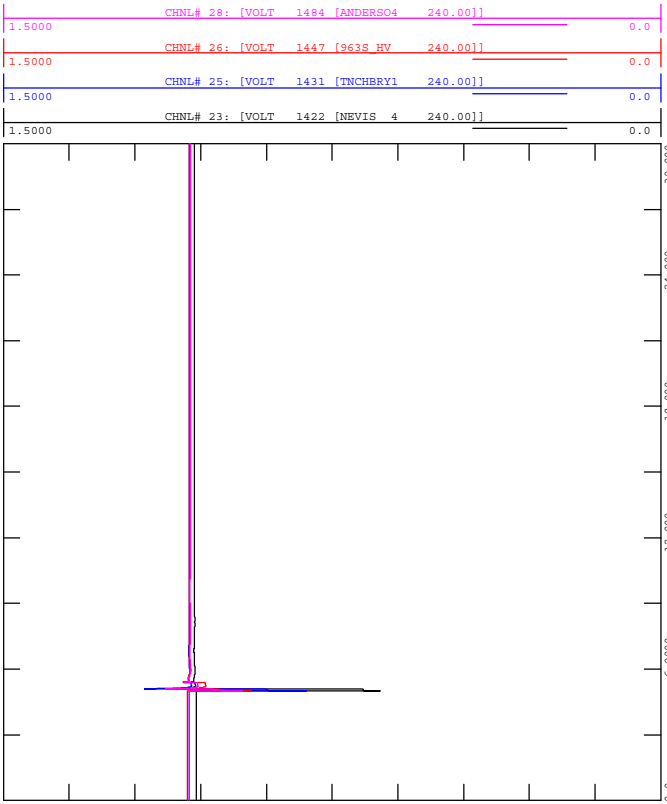


FIGURE A4-16G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-16_3PH_Fault_7L16@Nevis-766S.out

15:36
 WED, FEB 16 2022
 BRANCH FLOW (P)

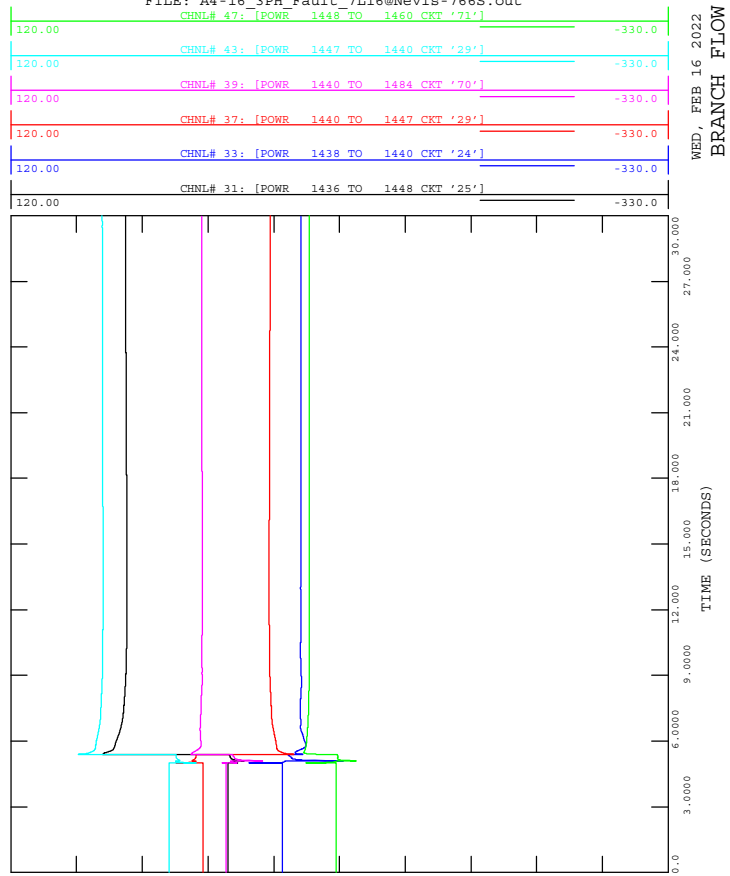




FIGURE A4-17B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-17_3PH_Fault_7L159-2@Three-Hills-770S.out

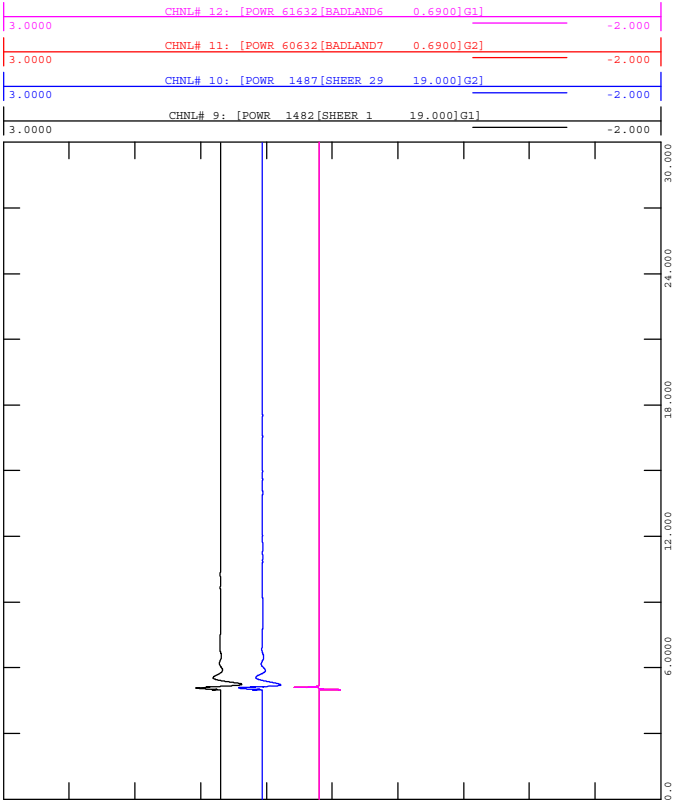


FIGURE A4-17D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-17_3PH_Fault_7L159-2@Three-Hills-770S.out

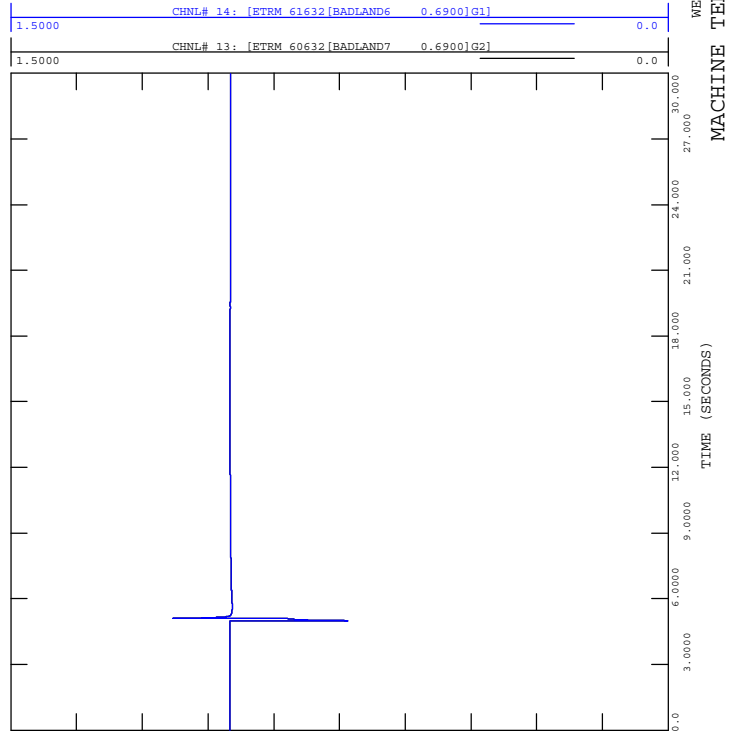


FIGURE A4-17A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-17_3PH_Fault_7L159-2@Three-Hills-770S.out

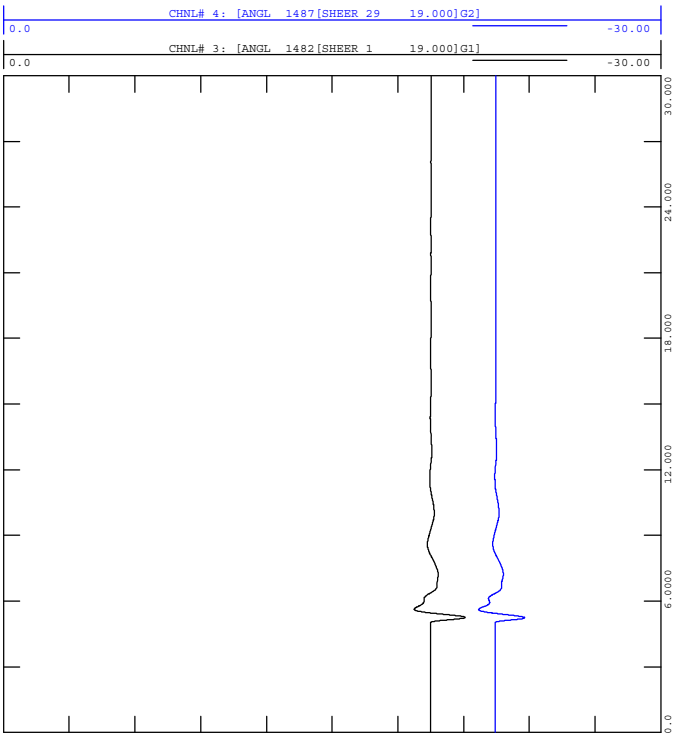


FIGURE A4-17C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-17_3PH_Fault_7L159-2@Three-Hills-770S.out

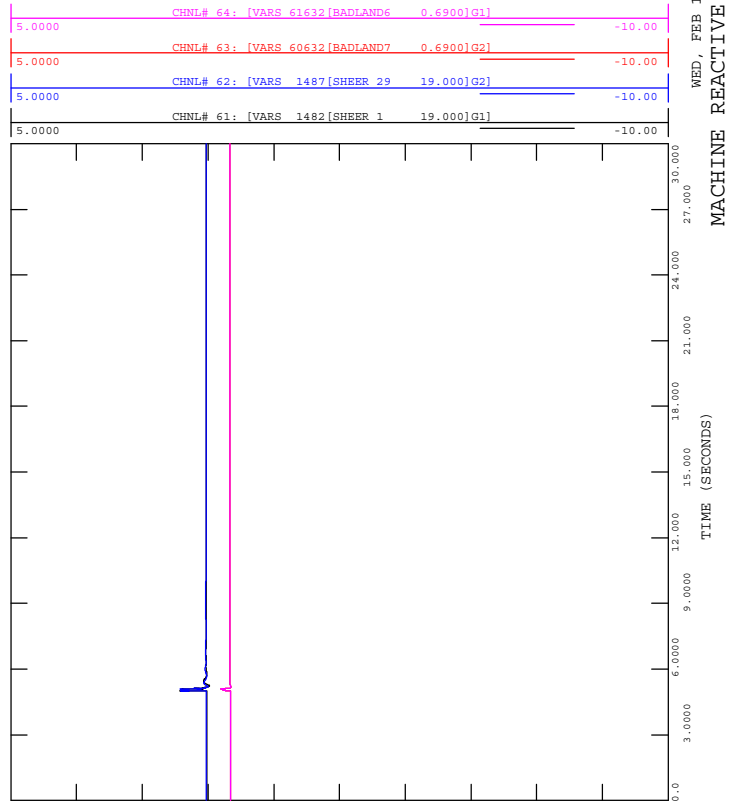
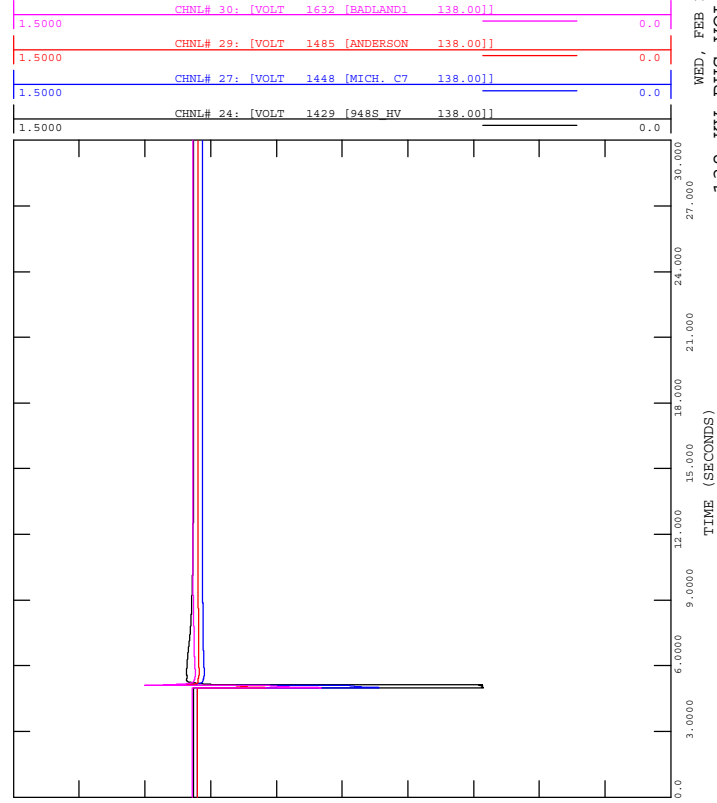




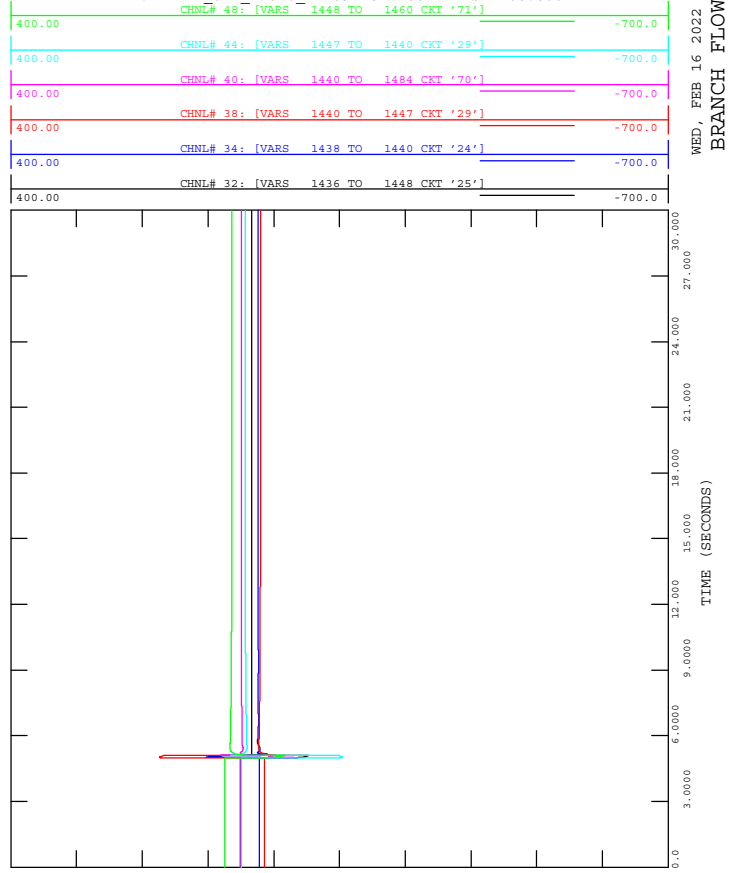
FIGURE A4-17F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-17_3PH_Fault_7L159-2@Three-Hills-770S.out



138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:37



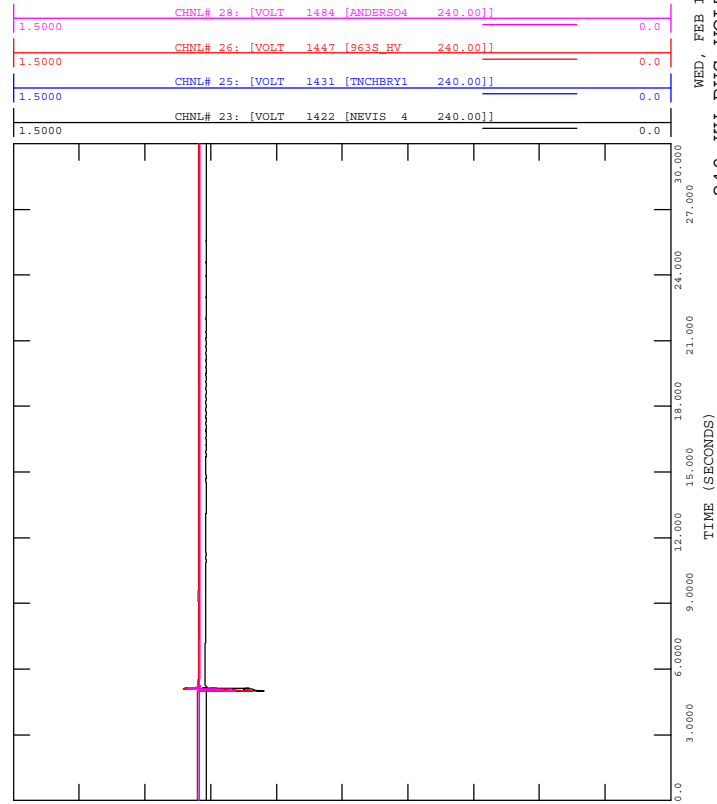
FIGURE A4-17H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-17_3PH_Fault_7L159-2@Three-Hills-770S.out



BRANCH FLOW (Q)
 WED, FEB 16 2022 15:37



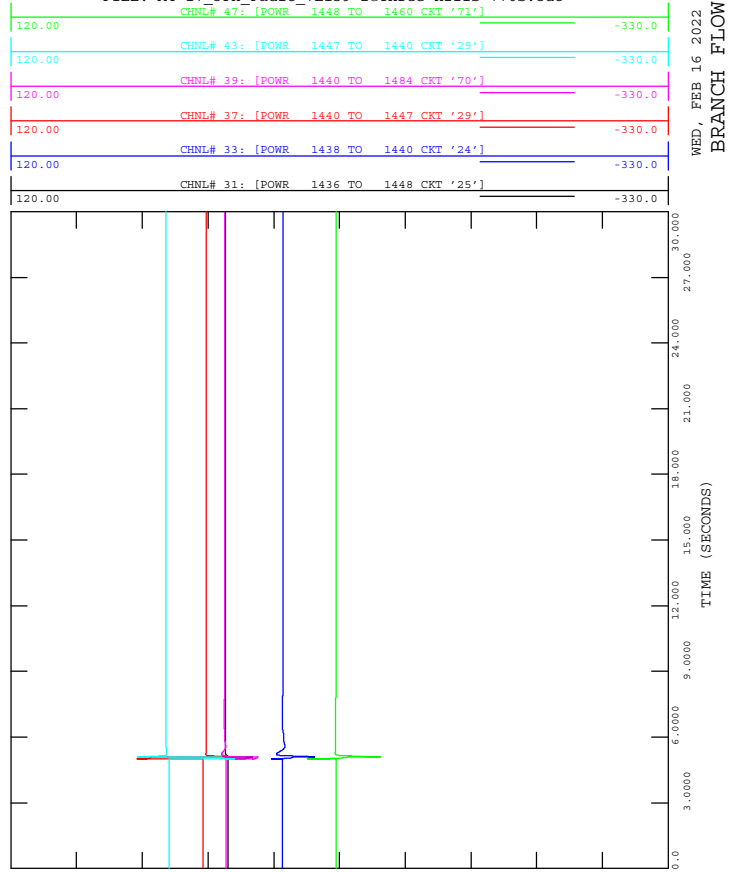
FIGURE A4-17E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-17_3PH_Fault_7L159-2@Three-Hills-770S.out



240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:37



FIGURE A4-17G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-17_3PH_Fault_7L159-2@Three-Hills-770S.out



BRANCH FLOW (P)
 WED, FEB 16 2022 15:37



FIGURE A4-18B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-18_3PH_Fault_7L159-2@Ghost-Pine-114S.out

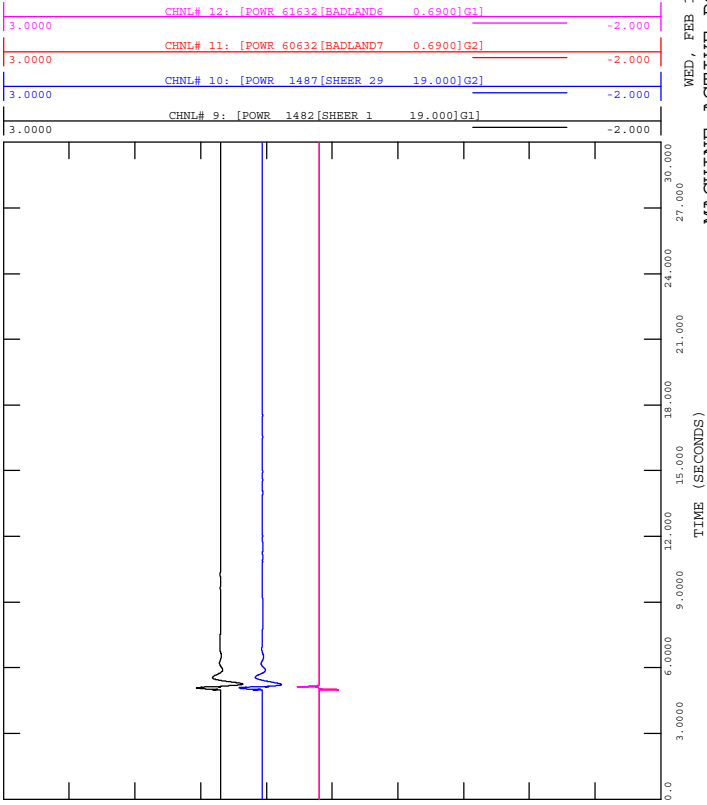


FIGURE A4-18D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-18_3PH_Fault_7L159-2@Ghost-Pine-114S.out

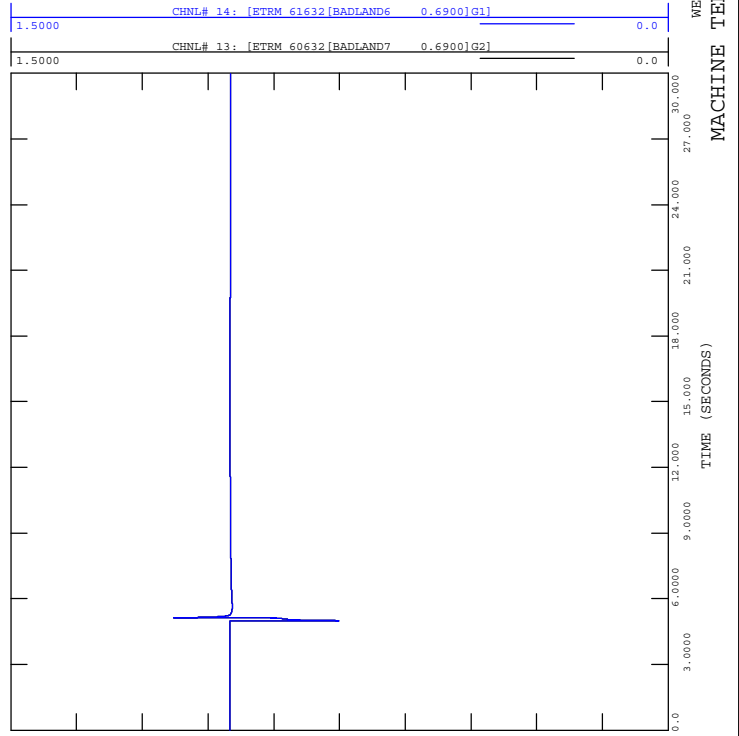


FIGURE A4-18A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-18_3PH_Fault_7L159-2@Ghost-Pine-114S.out

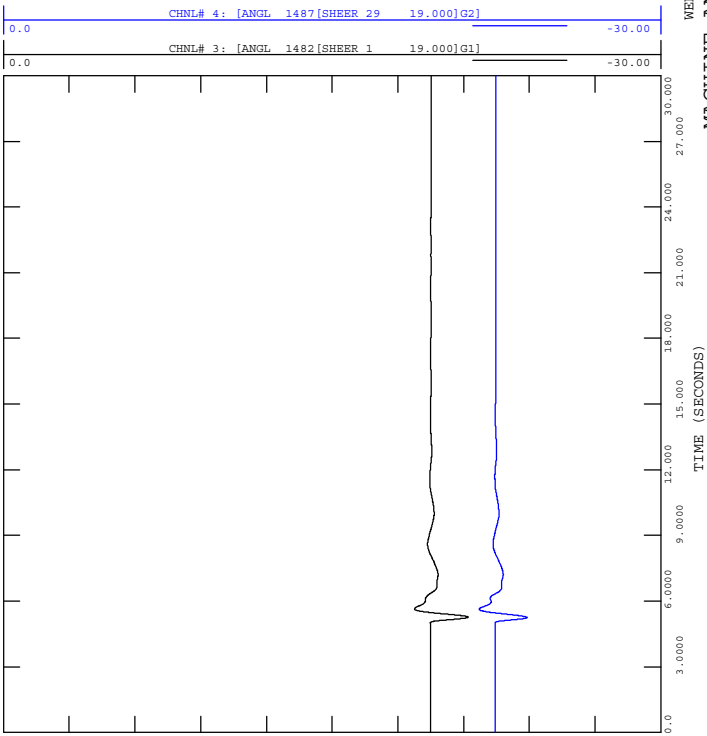


FIGURE A4-18C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-18_3PH_Fault_7L159-2@Ghost-Pine-114S.out

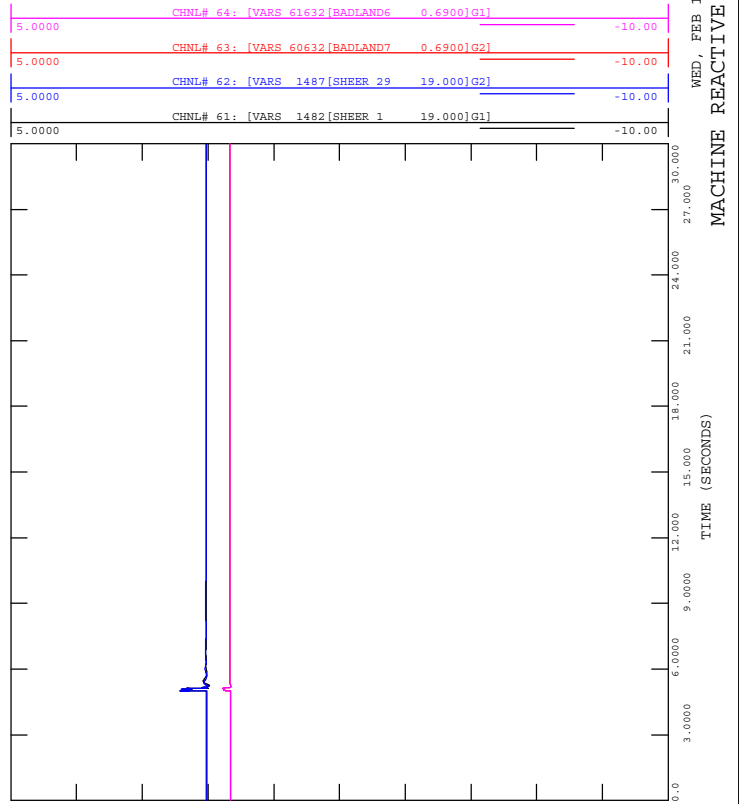




FIGURE A4-18F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-18_3PH_Fault_7L159-2@Ghost-Pine-114S.out

15:38
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

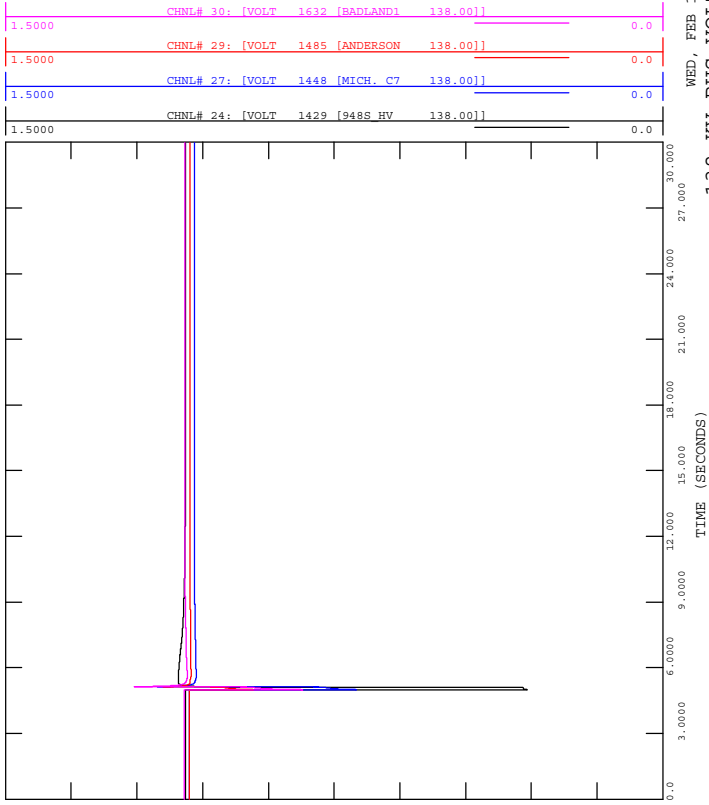


FIGURE A4-18H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-18_3PH_Fault_7L159-2@Ghost-Pine-114S.out

15:38
 WED, FEB 16 2022
 BRANCH FLOW (Q)

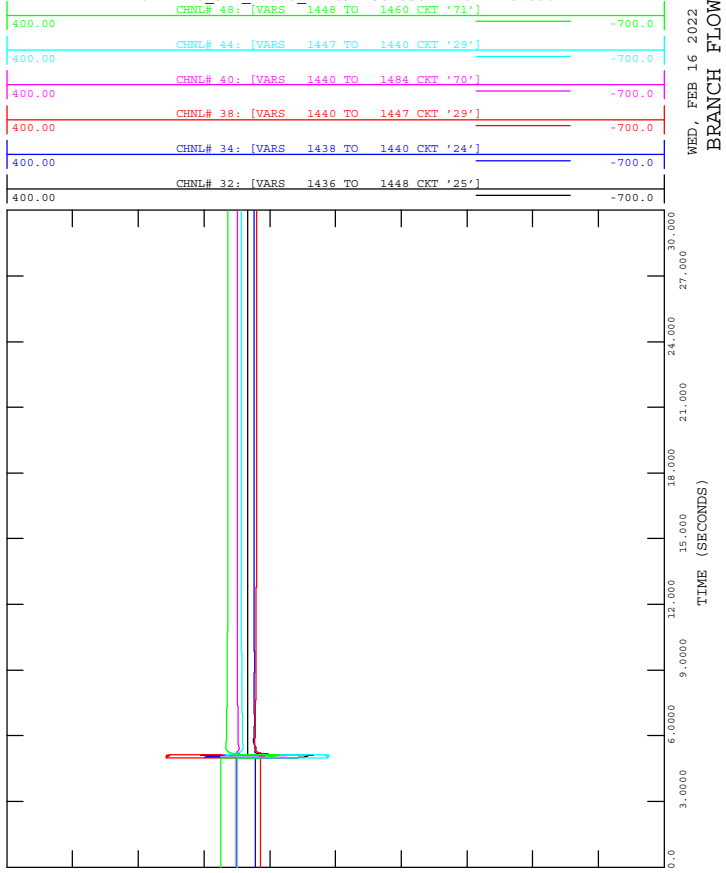


FIGURE A4-18E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-18_3PH_Fault_7L159-2@Ghost-Pine-114S.out

15:38
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

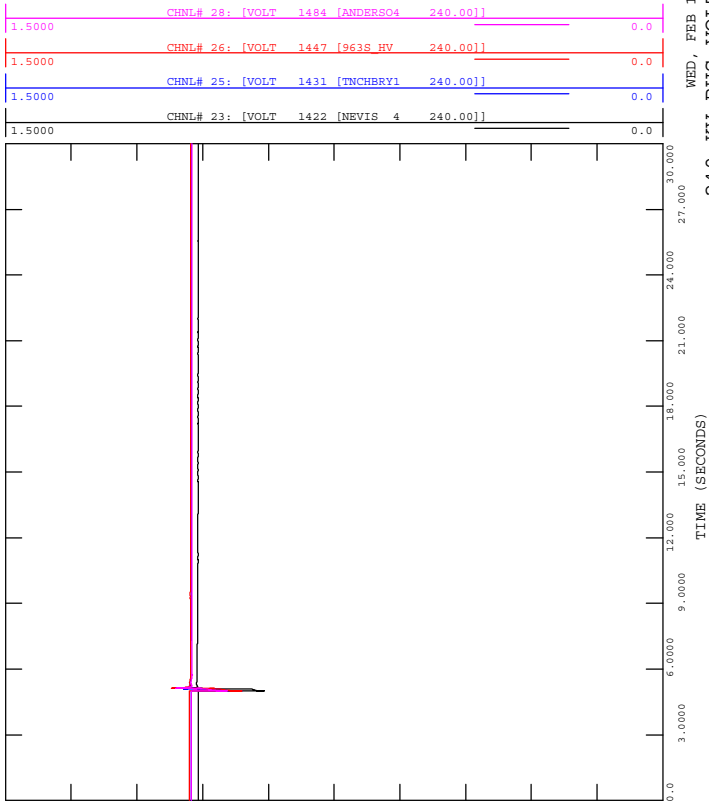


FIGURE A4-18G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-18_3PH_Fault_7L159-2@Ghost-Pine-114S.out

15:38
 WED, FEB 16 2022
 BRANCH FLOW (P)

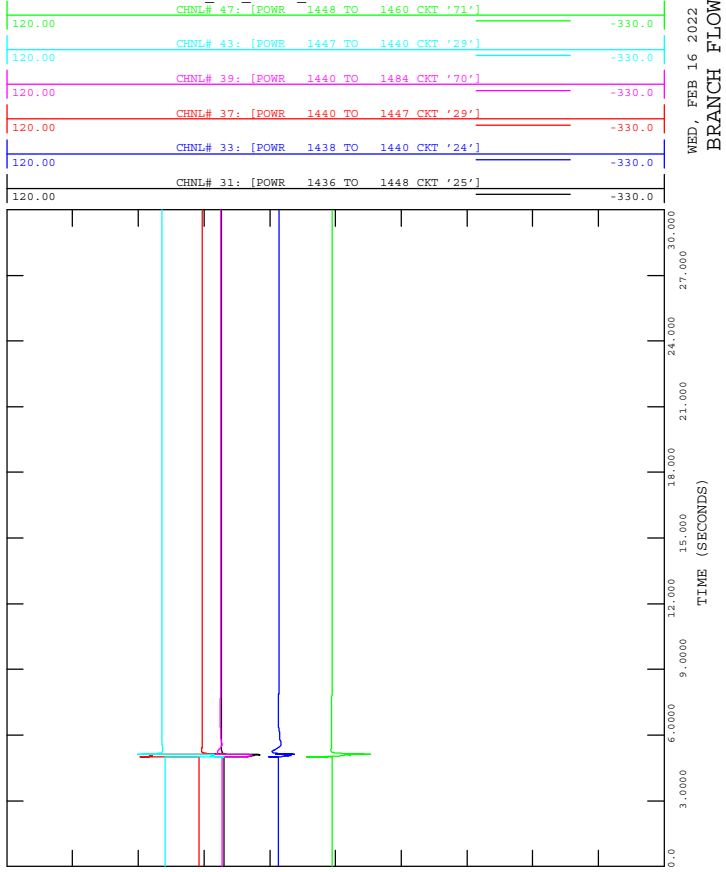
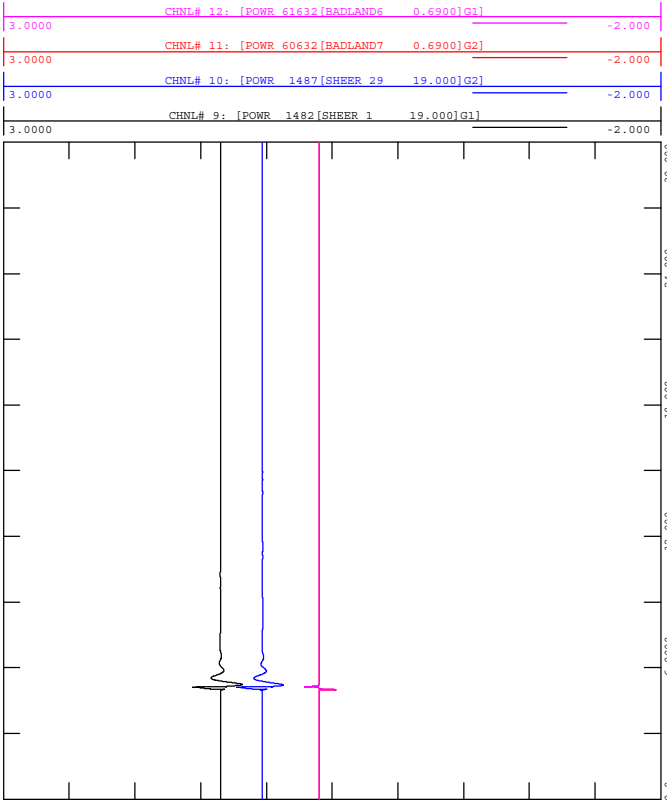




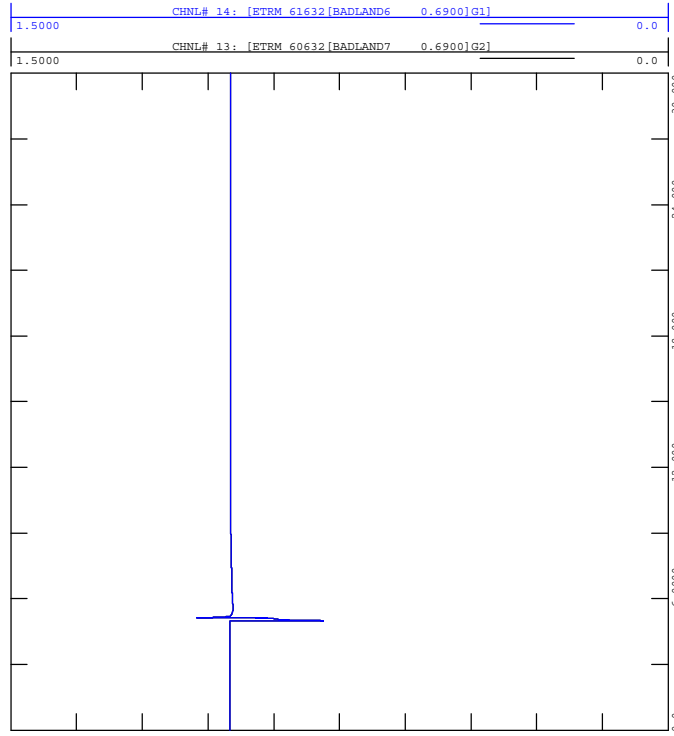
FIGURE A4-19B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-19_3PH_Fault_7L159-1@Heatburg-948S.out



WED, FEB 16 2022 15:38
 MACHINE ACTIVE POWER (MW)



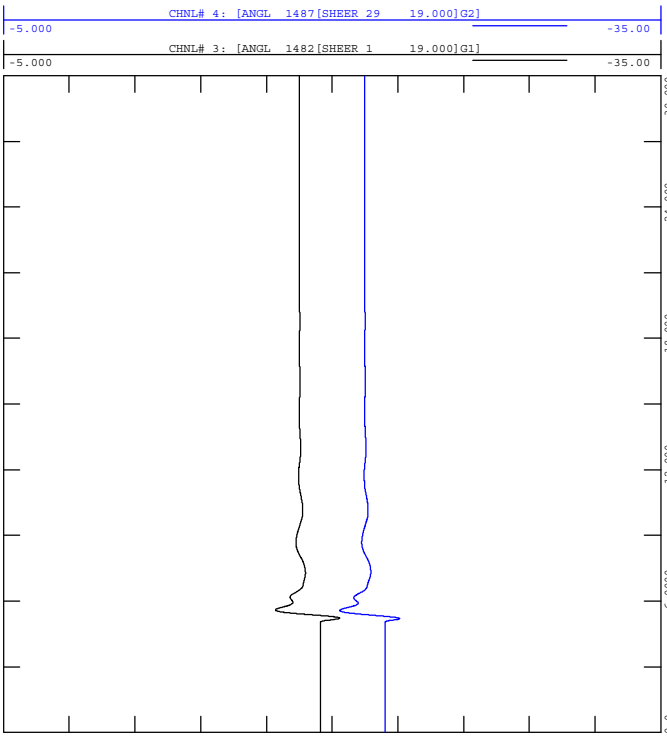
FIGURE A4-19D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-19_3PH_Fault_7L159-1@Heatburg-948S.out



WED, FEB 16 2022 15:38
 TERMINAL VOLTAGE



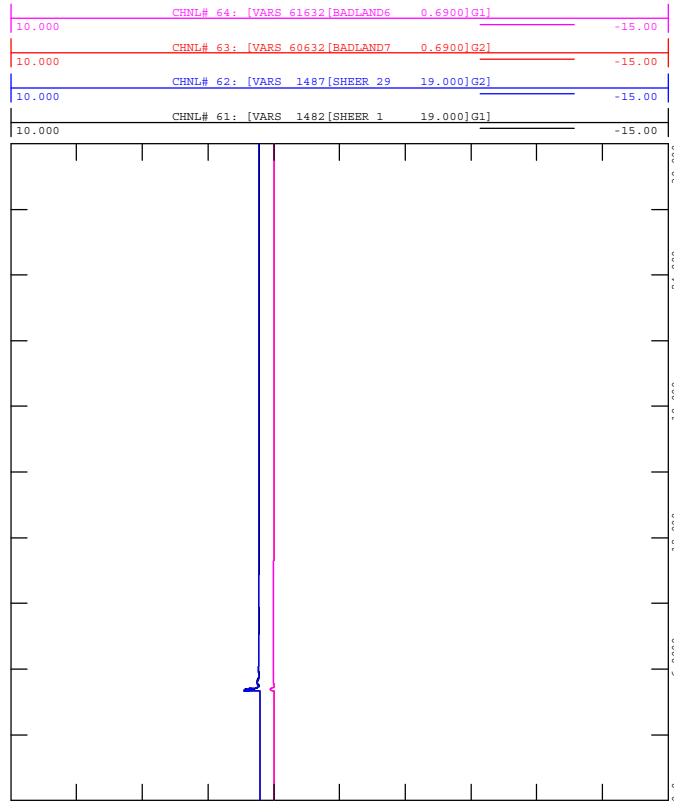
FIGURE A4-19A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-19_3PH_Fault_7L159-1@Heatburg-948S.out



WED, FEB 16 2022 15:38
 MACHINE ANGLE (DEGREES)



FIGURE A4-19C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-19_3PH_Fault_7L159-1@Heatburg-948S.out



WED, FEB 16 2022 15:38
 MACHINE REACTIVE POWER (M)



FIGURE A4-19F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-19_3PH_Fault_7L159-1@Heatburg-948S.out

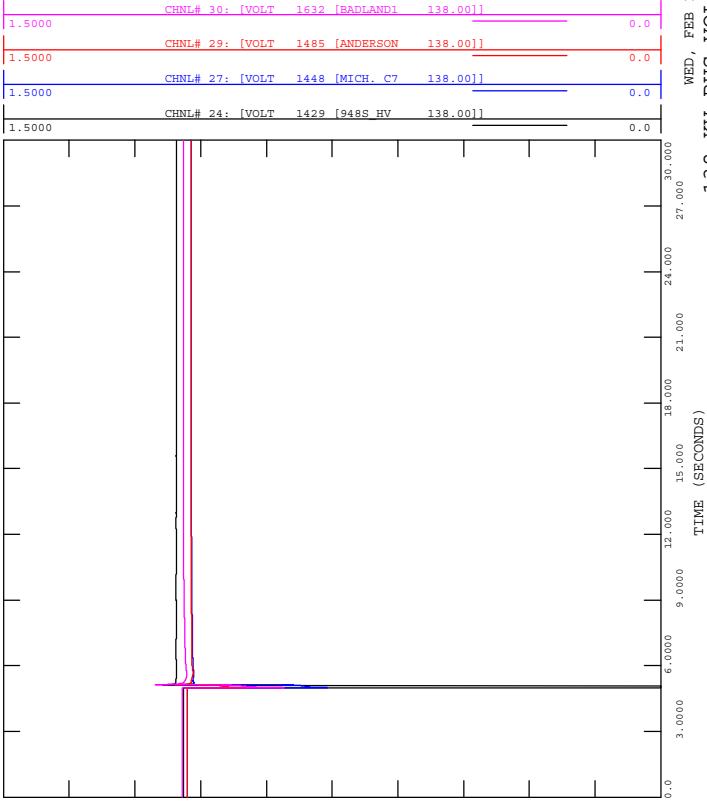


FIGURE A4-19H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-19_3PH_Fault_7L159-1@Heatburg-948S.out

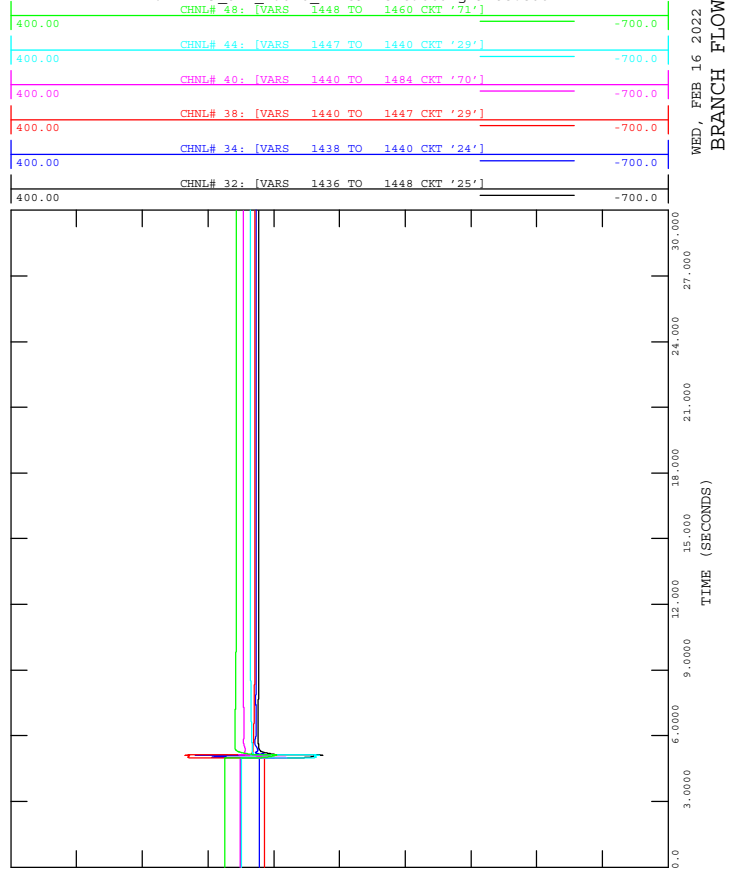


FIGURE A4-19E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-19_3PH_Fault_7L159-1@Heatburg-948S.out

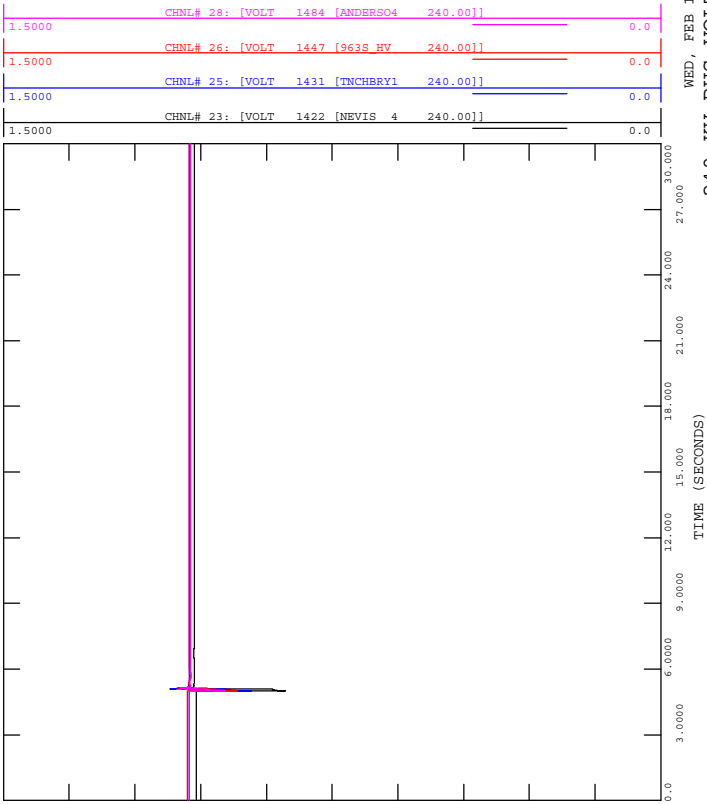


FIGURE A4-19G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-19_3PH_Fault_7L159-1@Heatburg-948S.out

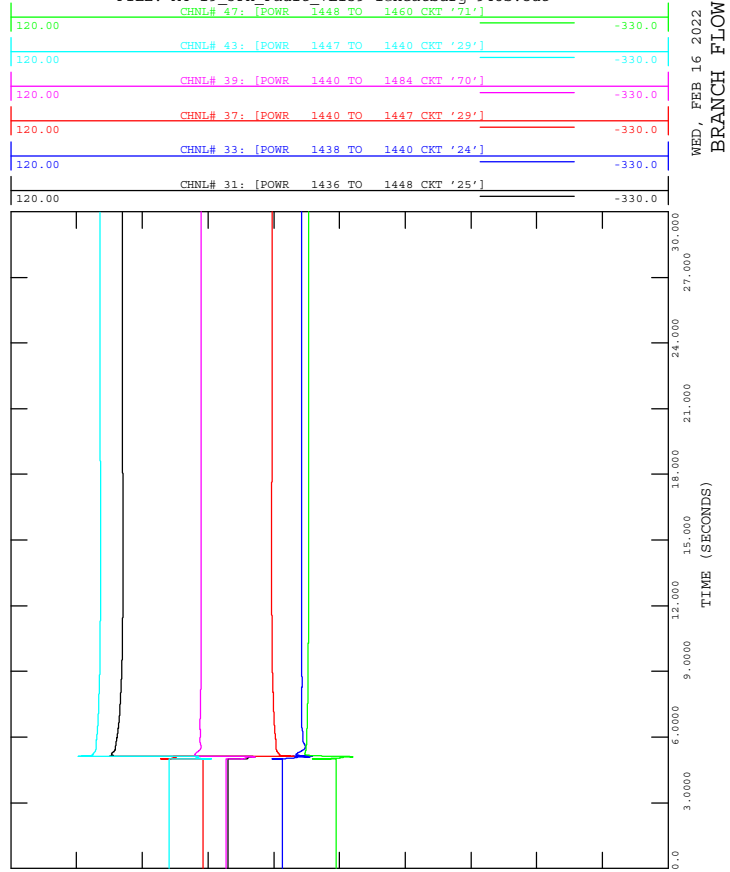




FIGURE A4-20B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-20_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 15:39
 MACHINE ACTIVE POWER (MW)

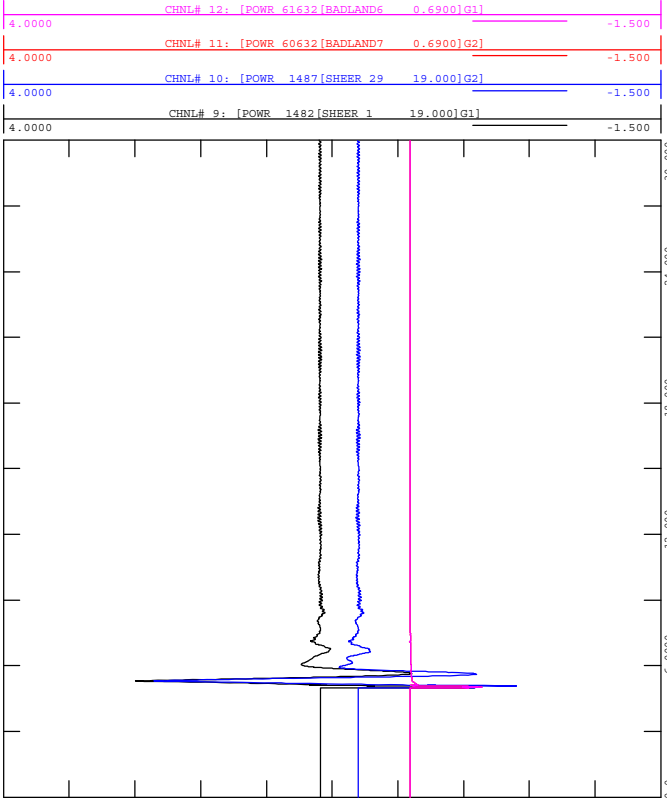


FIGURE A4-20D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-20_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 15:39
 MACHINE TERMINAL VOLTAGE

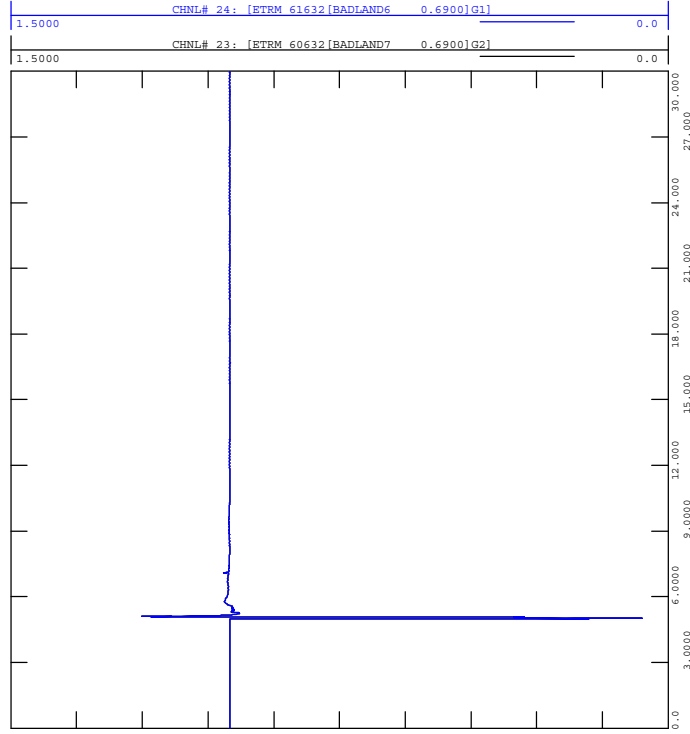


FIGURE A4-20A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-20_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 15:39
 MACHINE ANGLE (DEGREES)

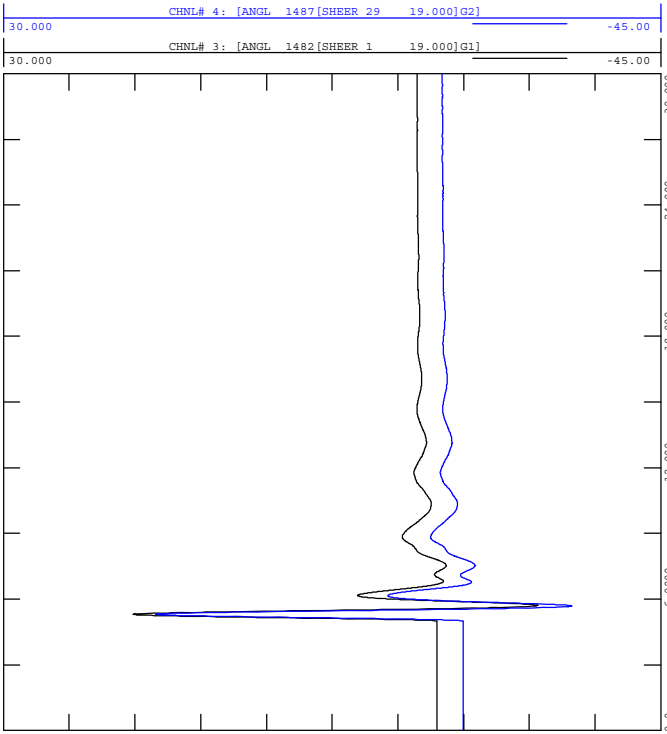


FIGURE A4-20C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-20_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 15:39
 MACHINE REACTIVE POWER (M)

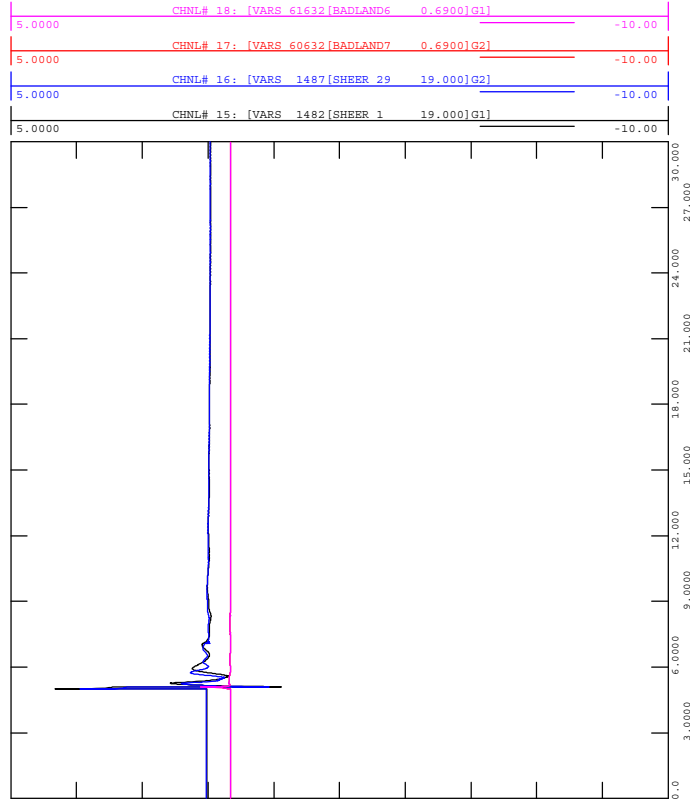




FIGURE A4-20F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-20_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 15:39
 138 KV BUS VOLTAGE (PU)

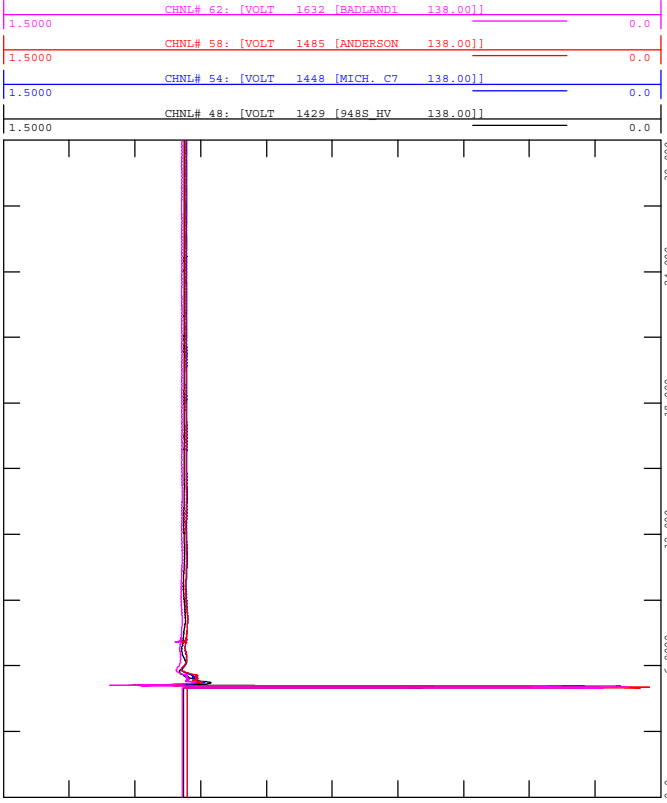


FIGURE A4-20H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-20_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 15:39
 BRANCH FLOW (Q)

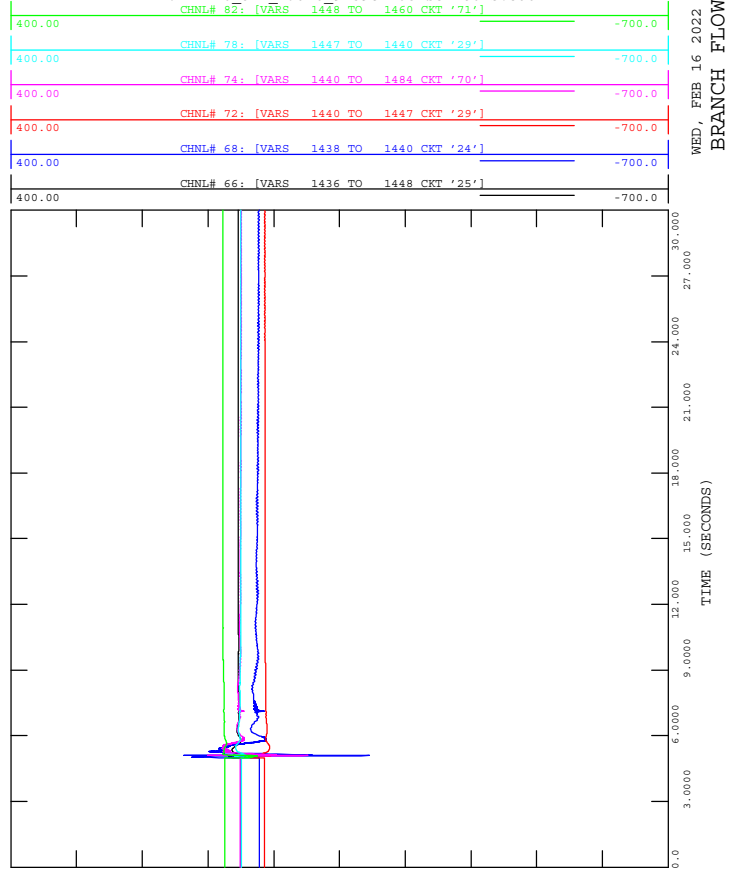


FIGURE A4-20E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-20_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 15:39
 240 KV BUS VOLTAGE (PU)

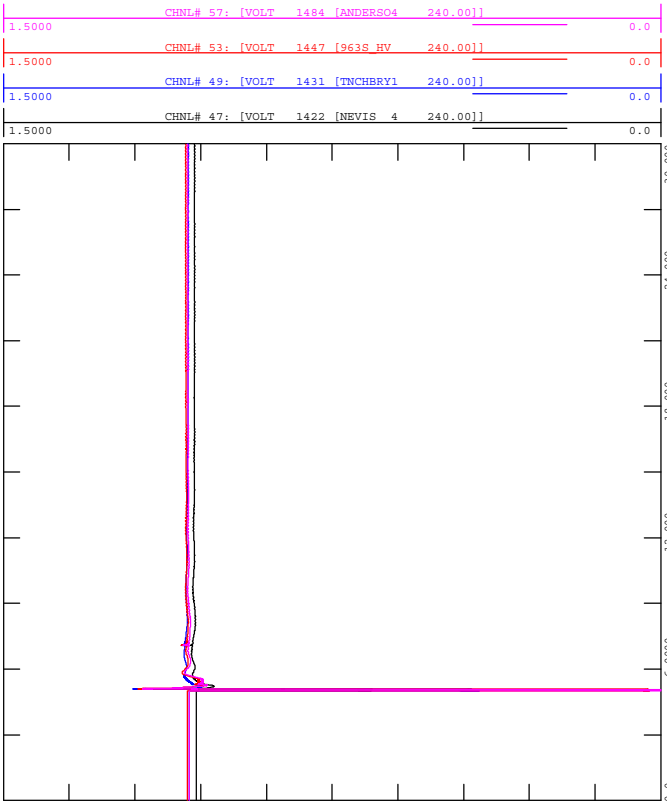


FIGURE A4-20G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-20_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 15:39
 BRANCH FLOW (P)

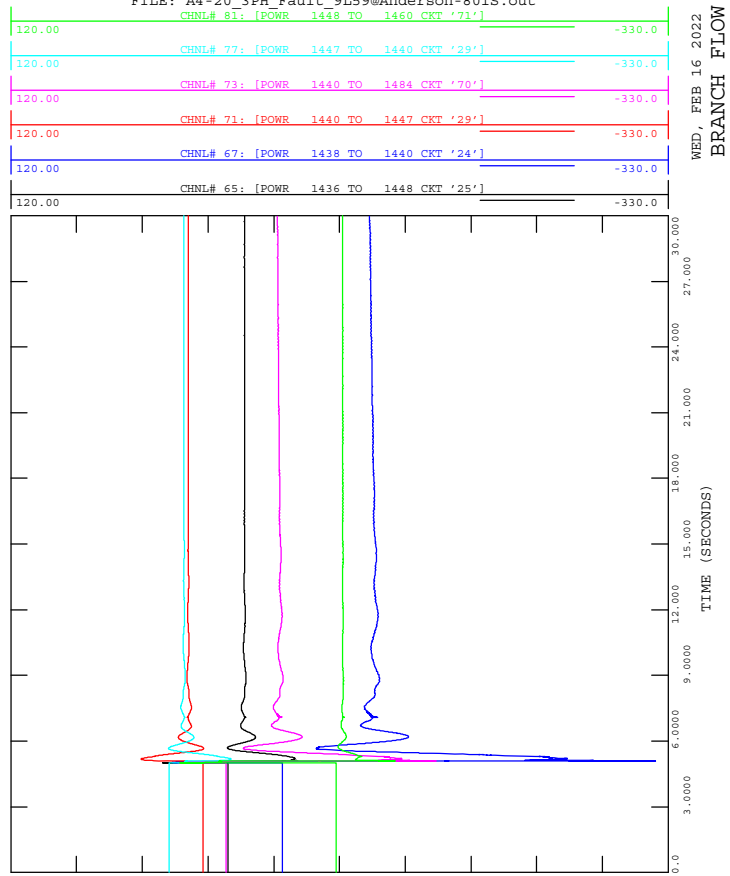




FIGURE A4-21B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-21_3PH_Fault_9L59@Tinchebray-972S.out

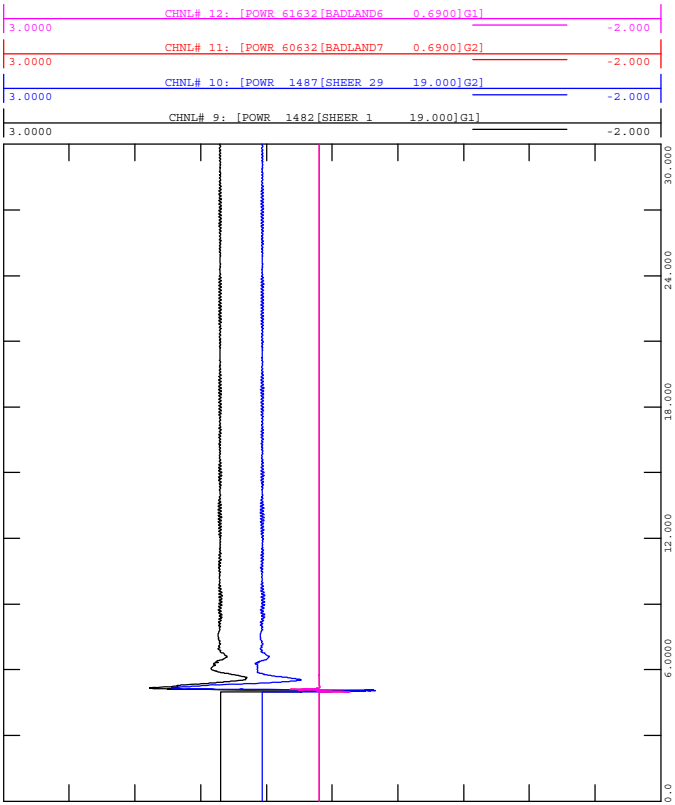


FIGURE A4-21D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-21_3PH_Fault_9L59@Tinchebray-972S.out

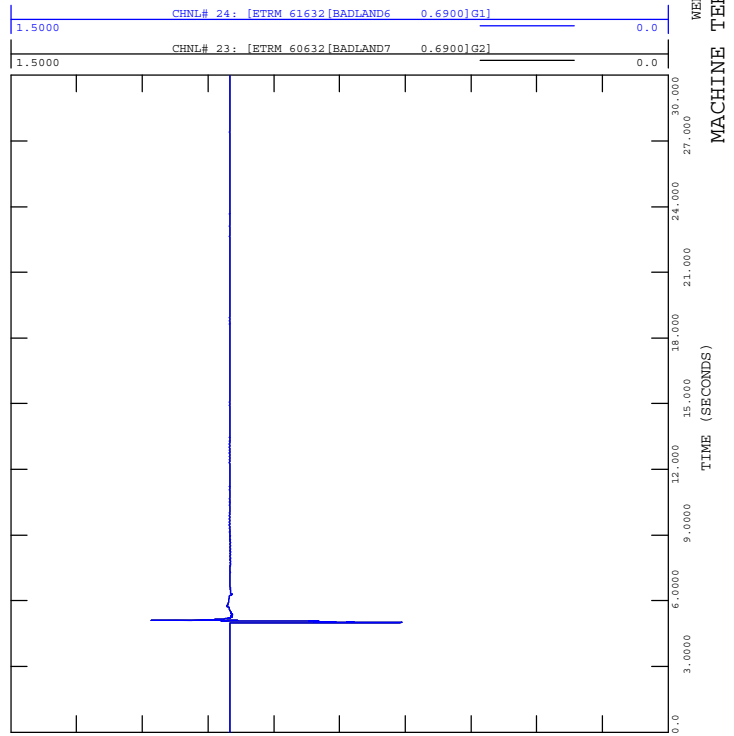


FIGURE A4-21A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-21_3PH_Fault_9L59@Tinchebray-972S.out

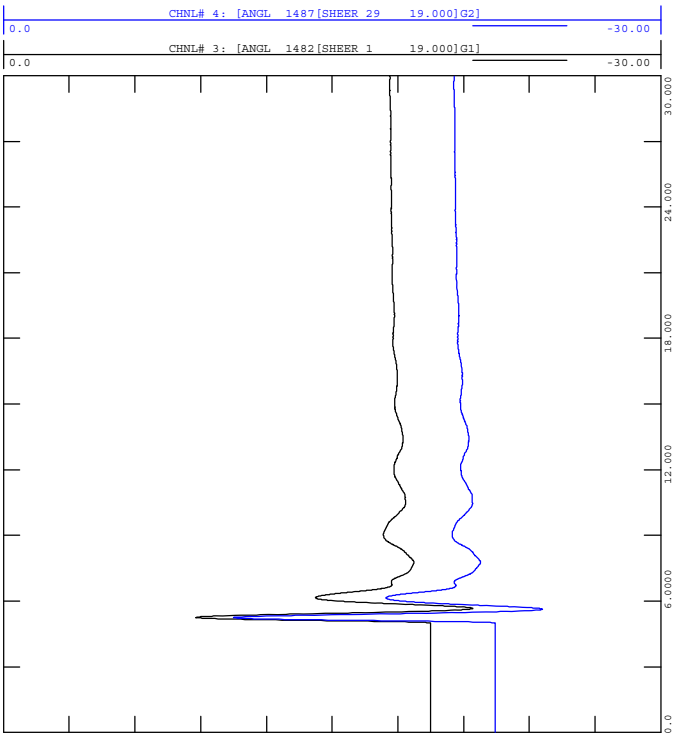


FIGURE A4-21C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-21_3PH_Fault_9L59@Tinchebray-972S.out

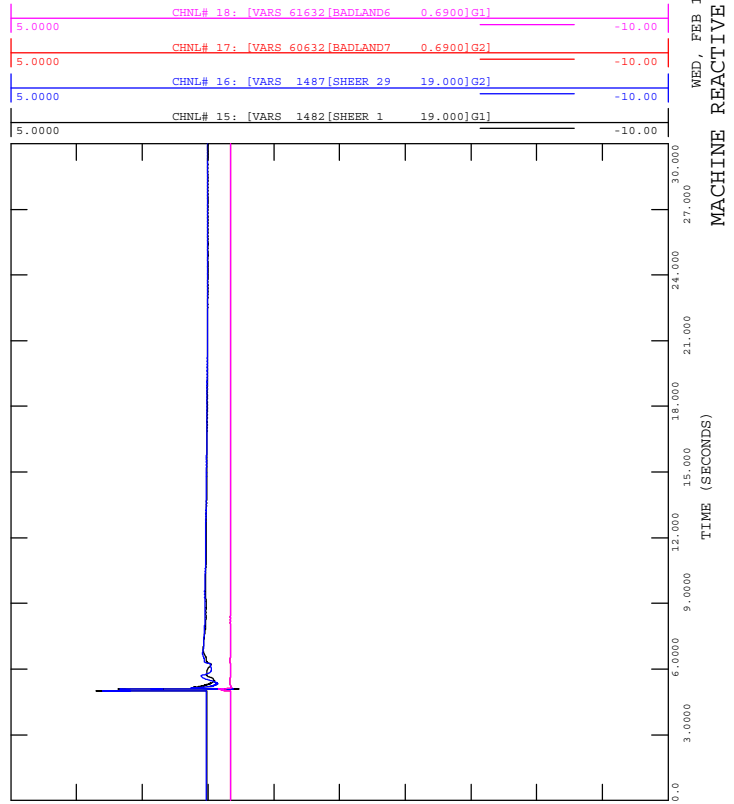




FIGURE A4-21F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-21_3PH_Fault_9L59@Tinchebray-972S.out

15:39
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

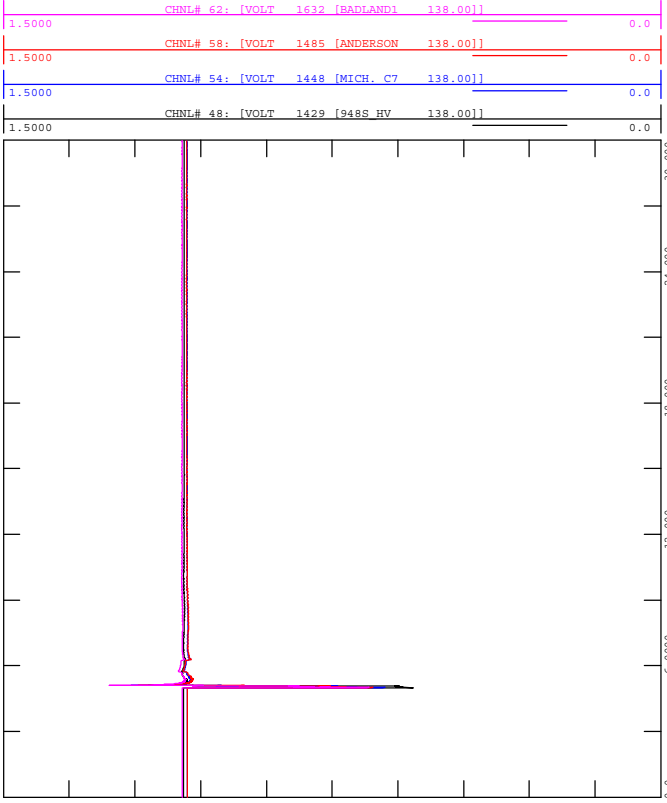


FIGURE A4-21H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-21_3PH_Fault_9L59@Tinchebray-972S.out

15:40
 WED, FEB 16 2022
 BRANCH FLOW (Q)

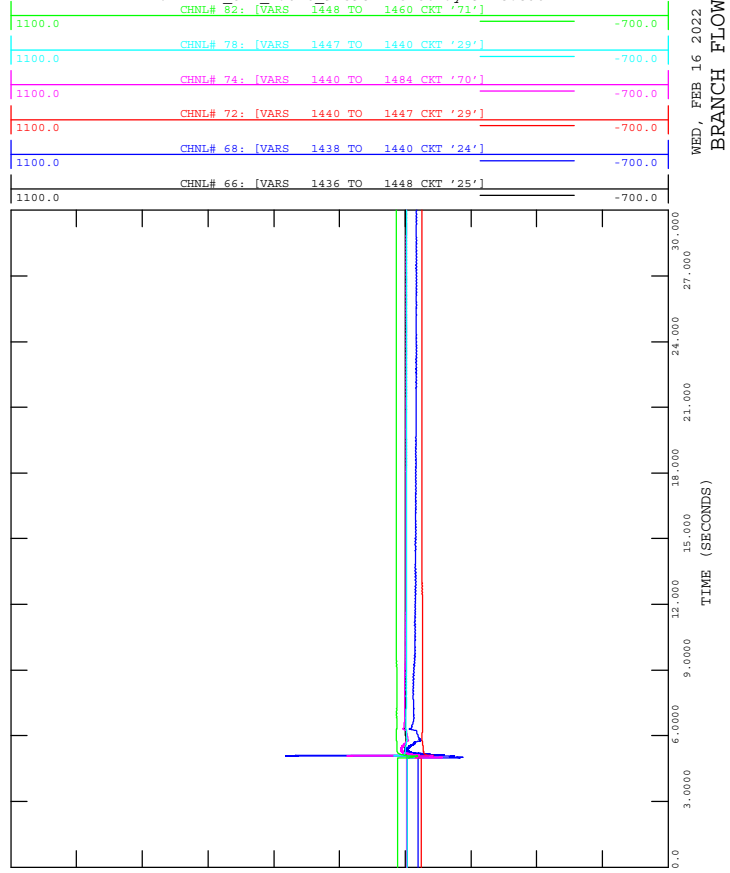


FIGURE A4-21E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-21_3PH_Fault_9L59@Tinchebray-972S.out

15:39
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

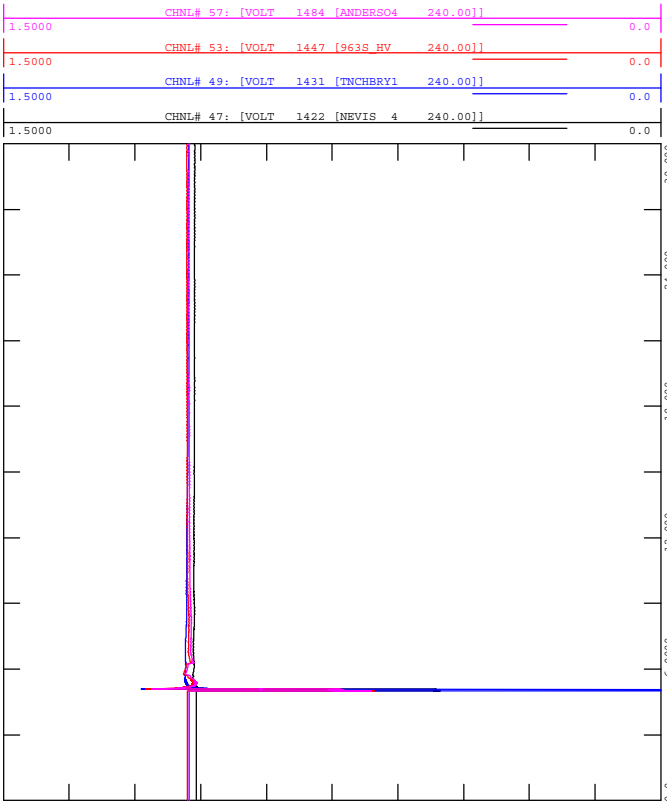


FIGURE A4-21G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-21_3PH_Fault_9L59@Tinchebray-972S.out

15:40
 WED, FEB 16 2022
 BRANCH FLOW (P)

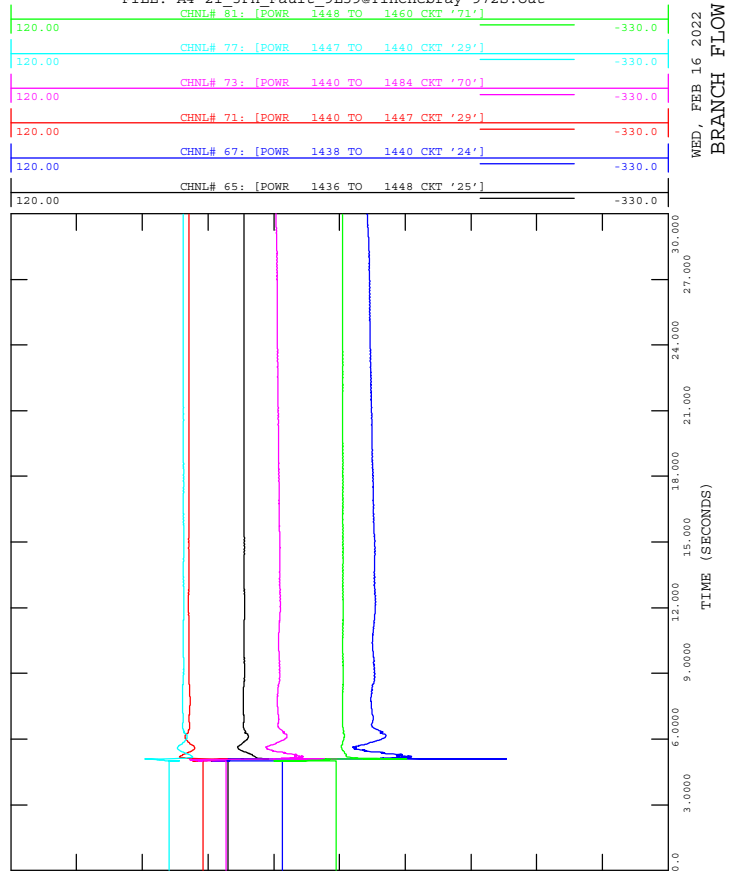




FIGURE A4-22B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-22_3PH_Fault_7L128@Michichi-Creek-802S.out

WED, FEB 16 2022 15:40
 MACHINE ACTIVE POWER (MW)

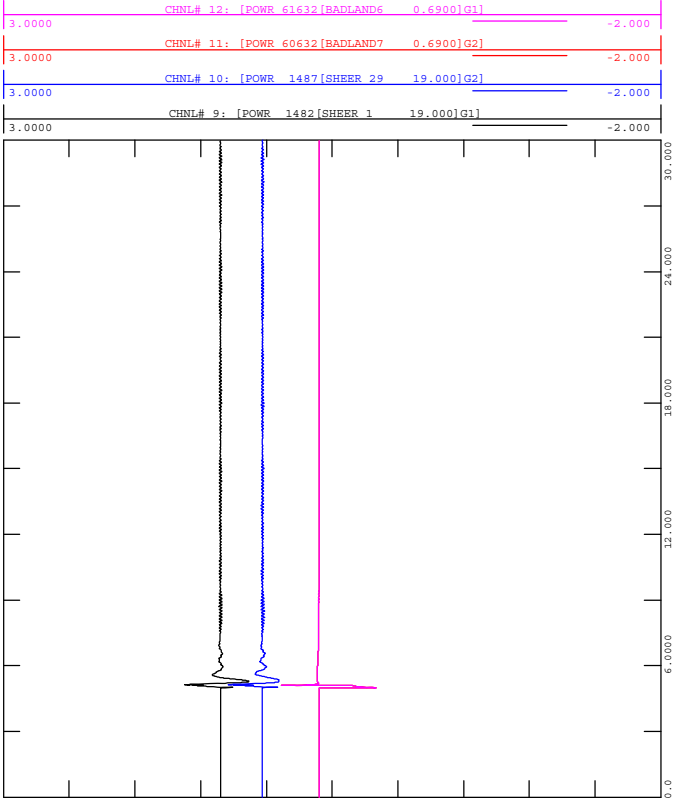


FIGURE A4-22D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-22_3PH_Fault_7L128@Michichi-Creek-802S.out

WED, FEB 16 2022 15:40
 MACHINE TERMINAL VOLTAGE

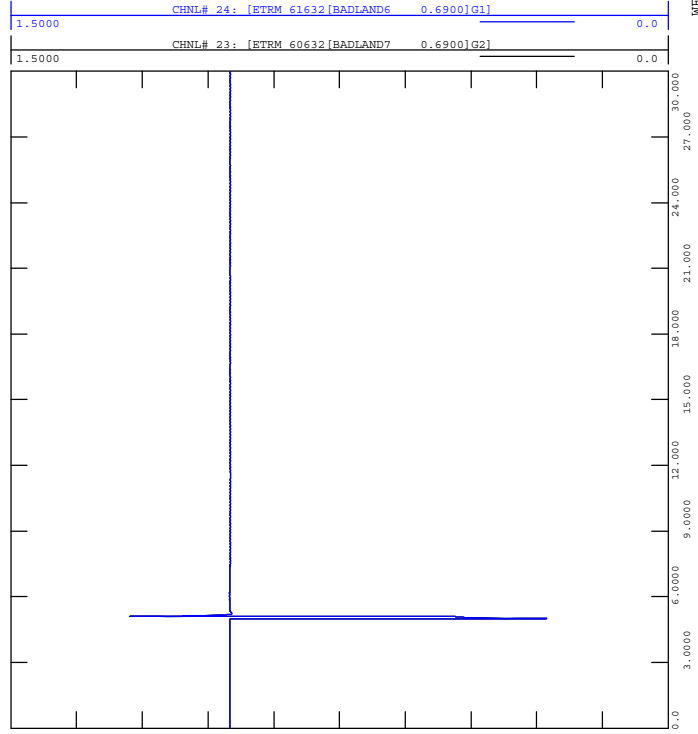


FIGURE A4-22A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-22_3PH_Fault_7L128@Michichi-Creek-802S.out

WED, FEB 16 2022 15:40
 MACHINE ANGLE (DEGREES)

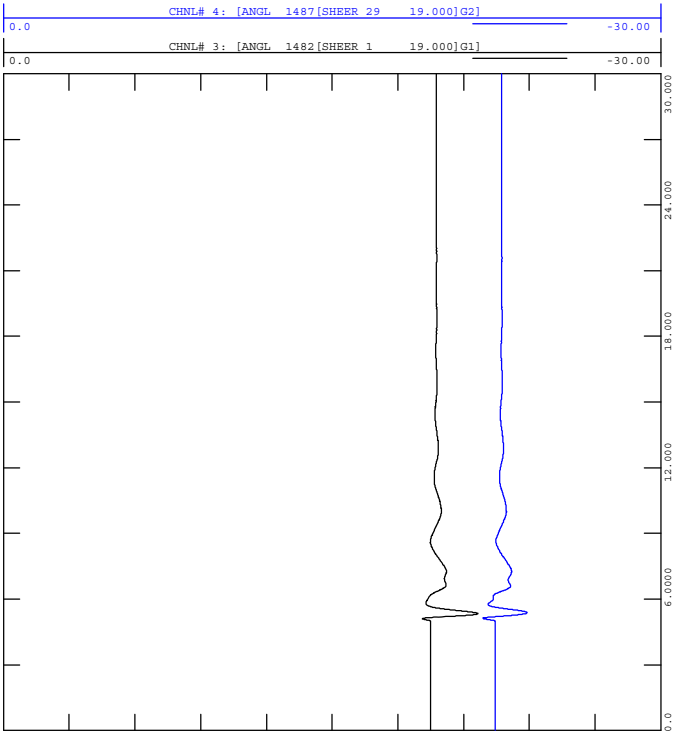


FIGURE A4-22C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-22_3PH_Fault_7L128@Michichi-Creek-802S.out

WED, FEB 16 2022 15:40
 MACHINE REACTIVE POWER (M)

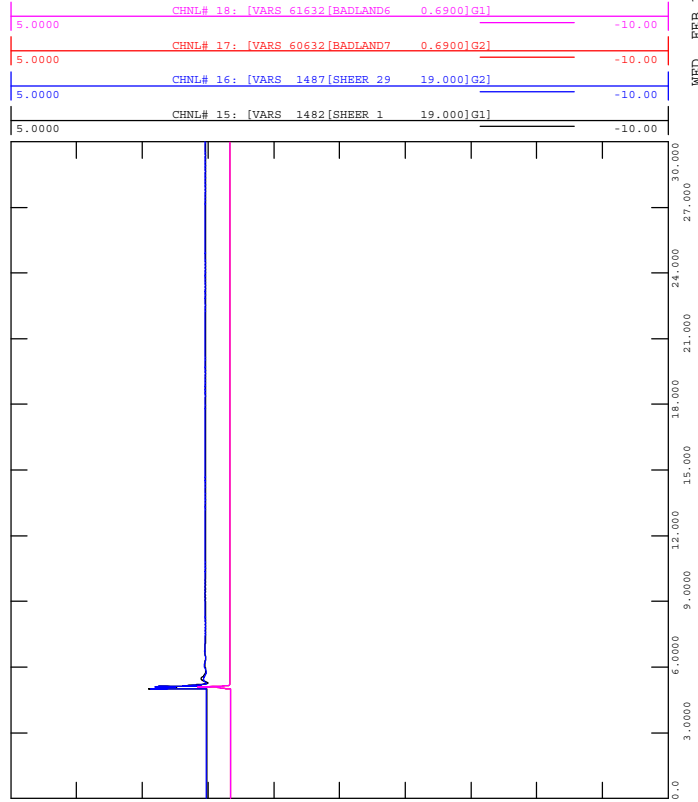




FIGURE A4-22F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-22_3PH_Fault_7L128@Michichi-Creek-802S.out

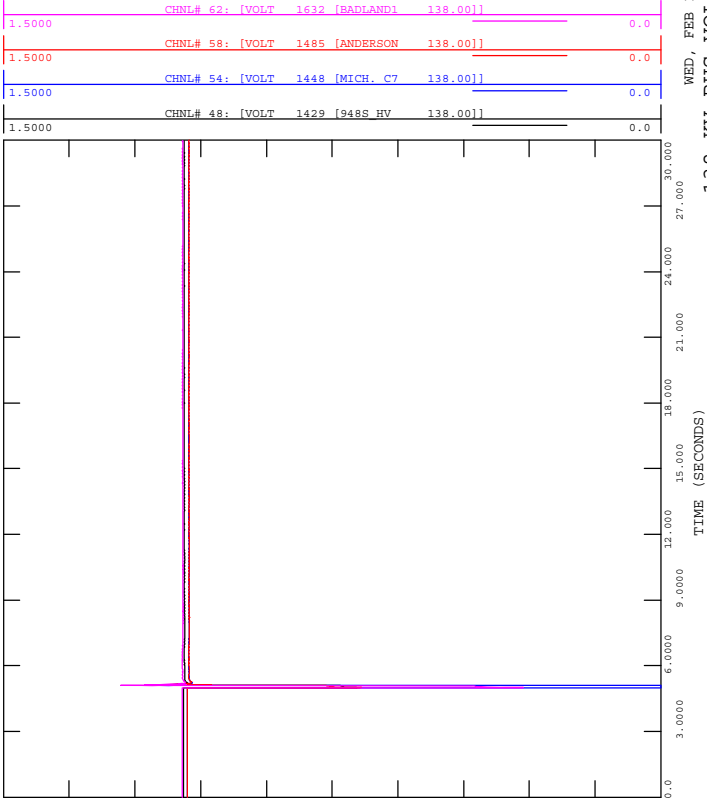


FIGURE A4-22H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-22_3PH_Fault_7L128@Michichi-Creek-802S.out

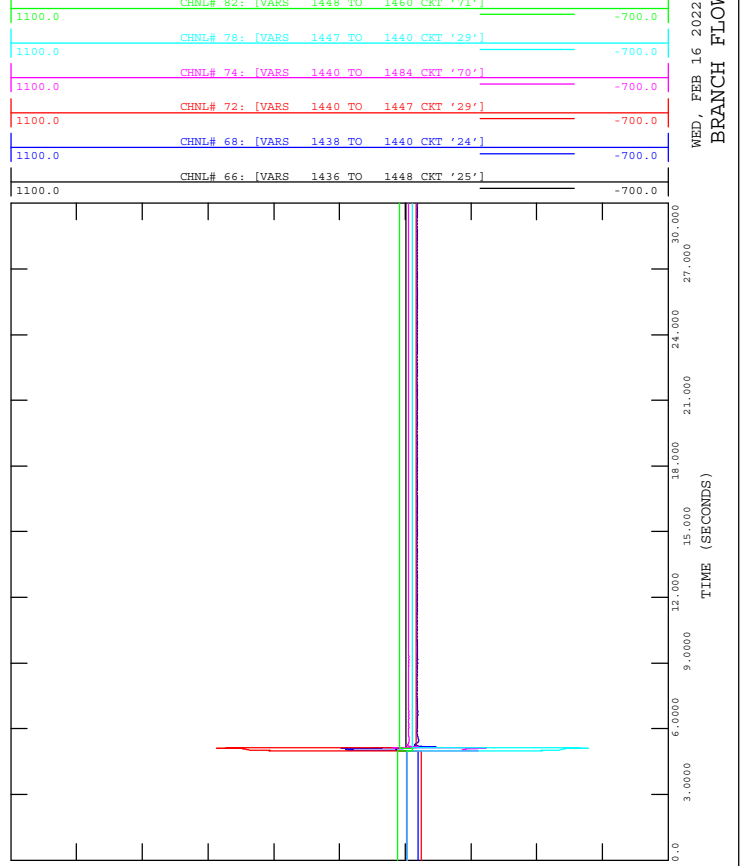


FIGURE A4-22E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-22_3PH_Fault_7L128@Michichi-Creek-802S.out

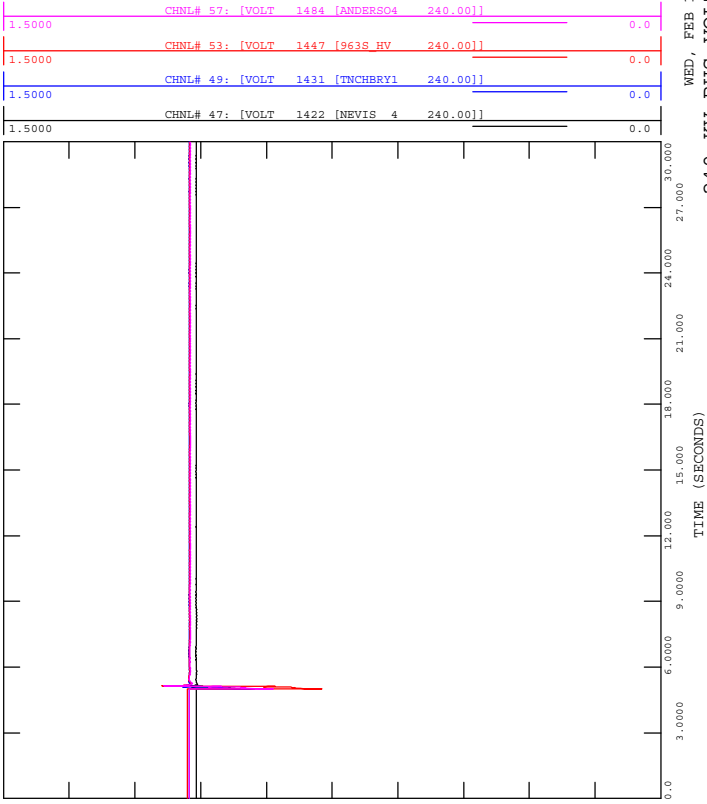


FIGURE A4-22G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-22_3PH_Fault_7L128@Michichi-Creek-802S.out

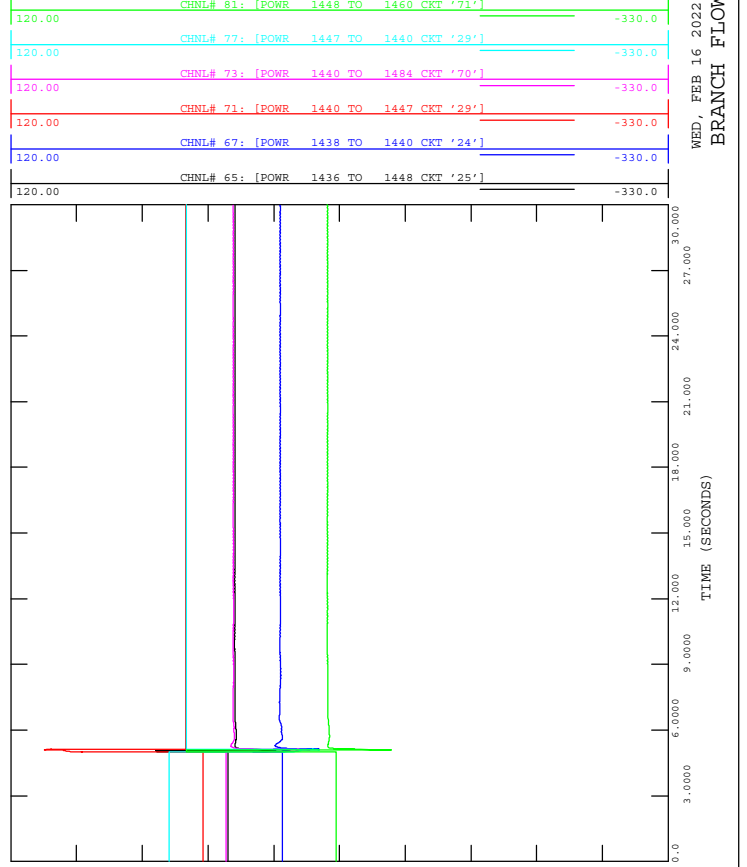




FIGURE A4-23B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-23_3PH_Fault_7L128@Coyote-Lake-963S.out

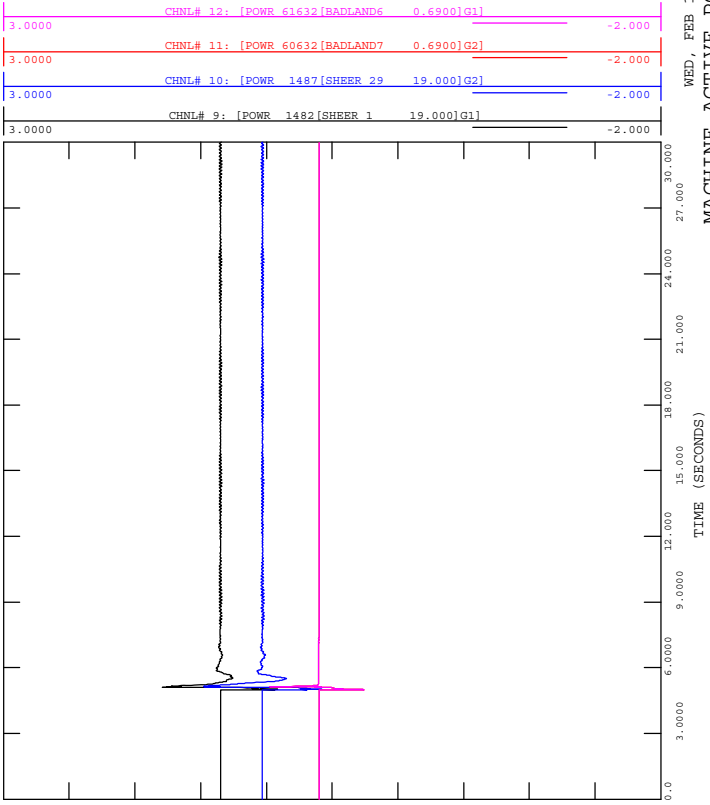


FIGURE A4-23D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-23_3PH_Fault_7L128@Coyote-Lake-963S.out

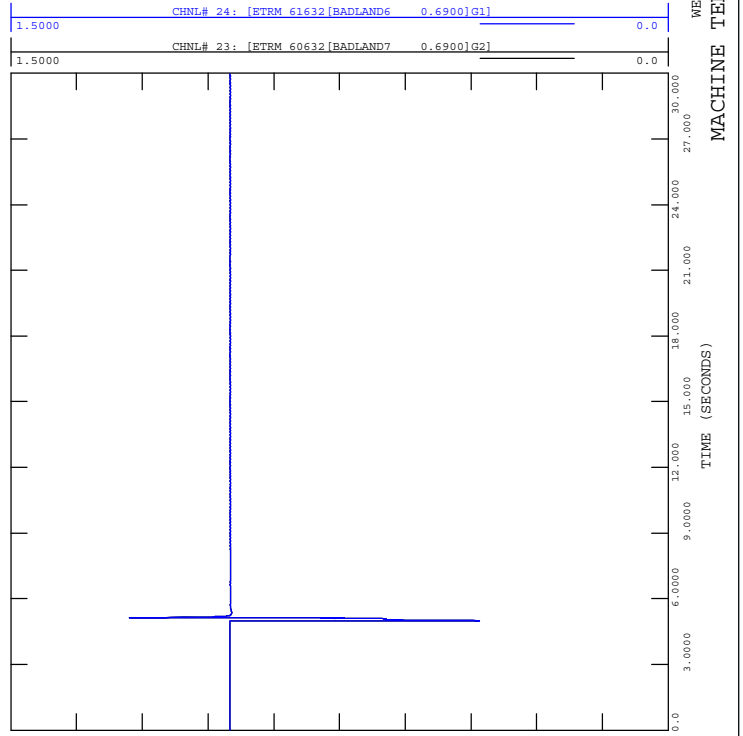


FIGURE A4-23A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-23_3PH_Fault_7L128@Coyote-Lake-963S.out

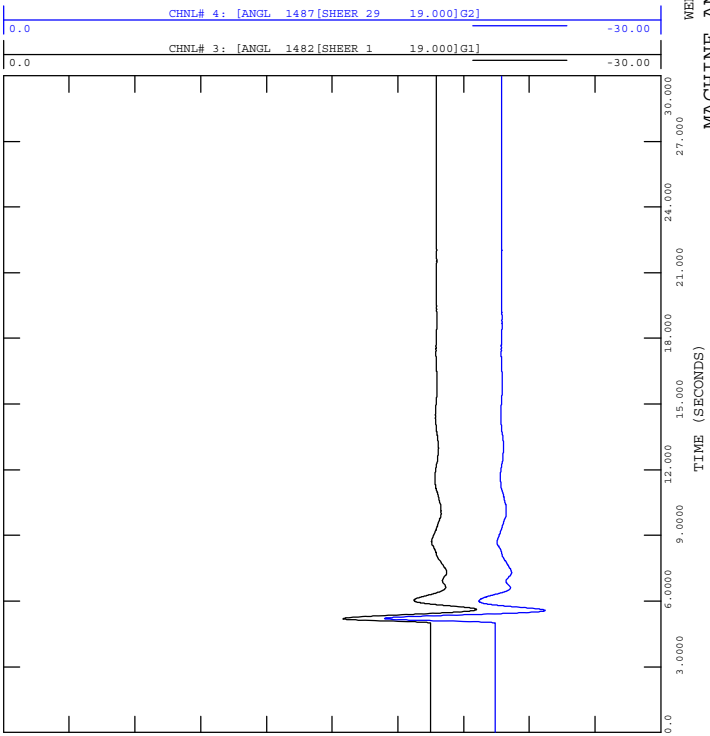


FIGURE A4-23C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-23_3PH_Fault_7L128@Coyote-Lake-963S.out

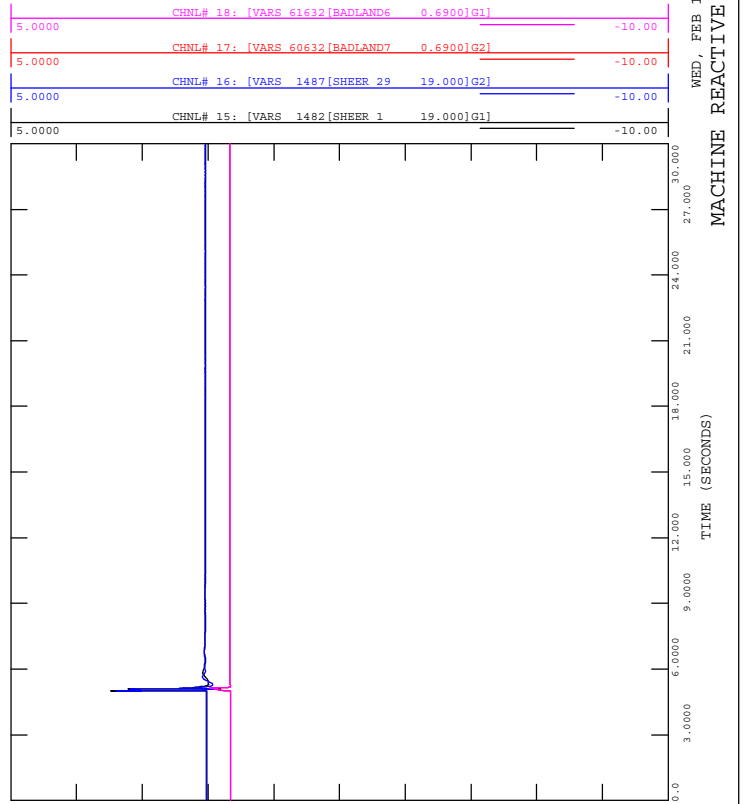
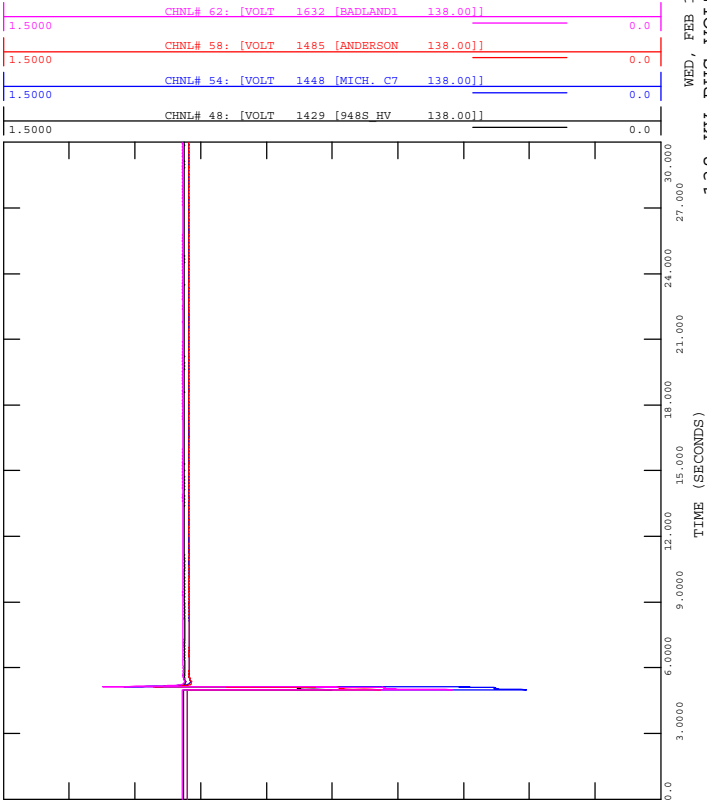




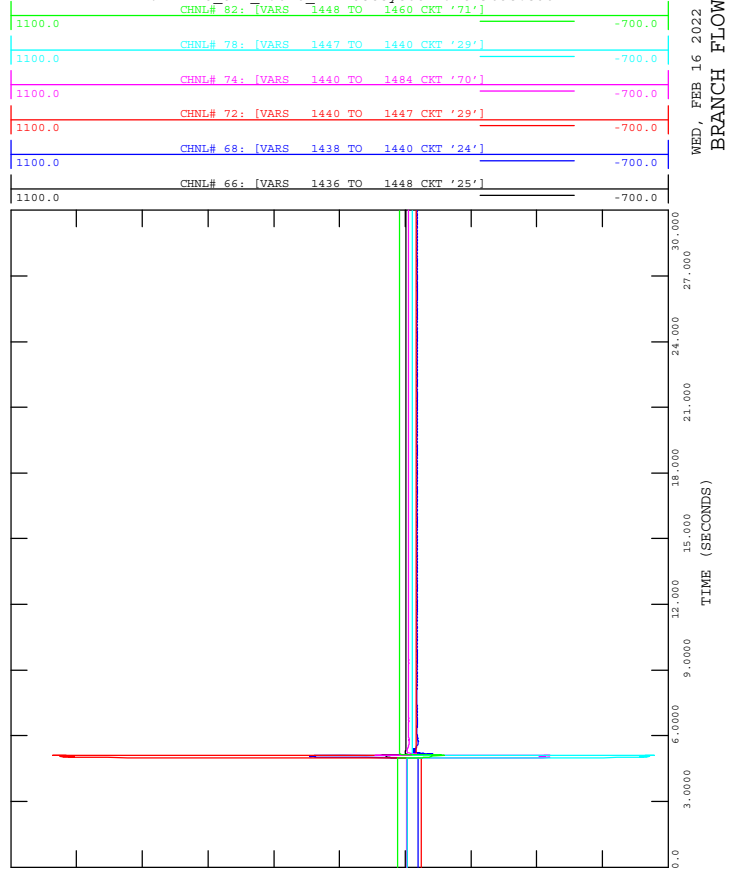
FIGURE A4-23F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-23_3PH_Fault_7L128@Coyote-Lake-963S.out



138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:41



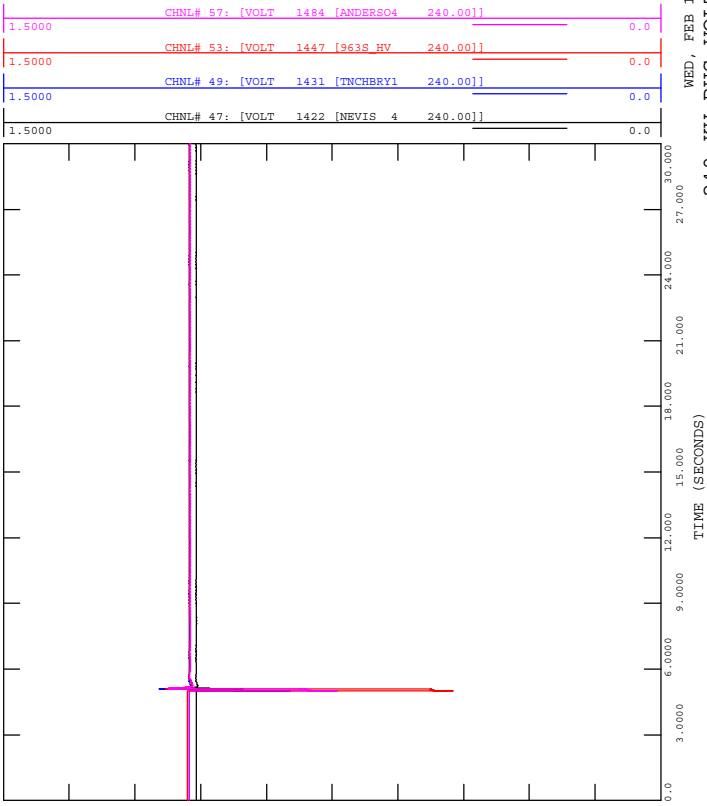
FIGURE A4-23H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-23_3PH_Fault_7L128@Coyote-Lake-963S.out



BRANCH FLOW (Q)
 WED, FEB 16 2022 15:41



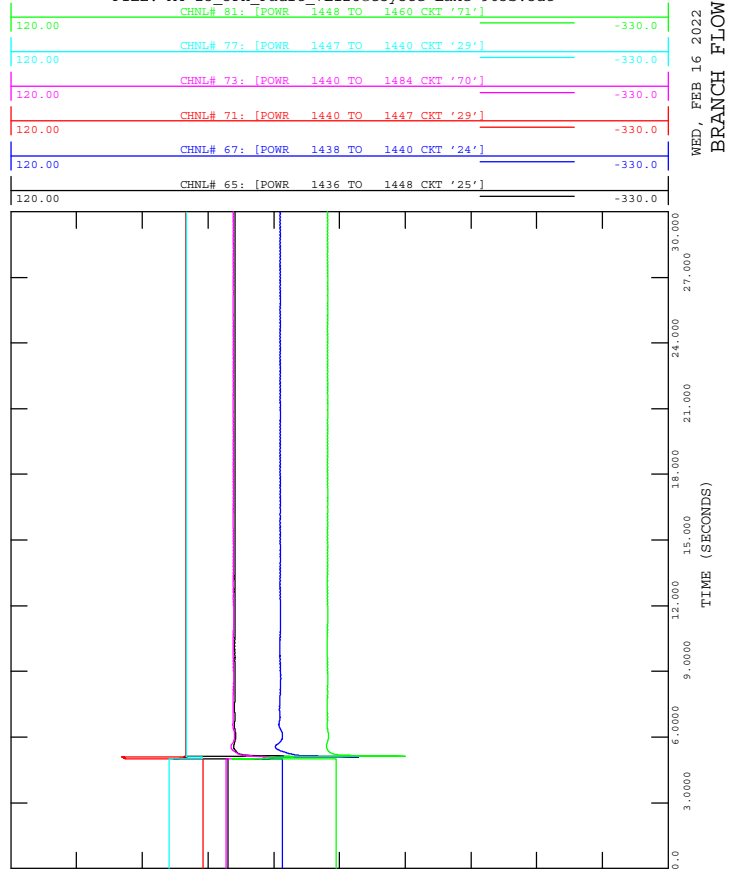
FIGURE A4-23E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-23_3PH_Fault_7L128@Coyote-Lake-963S.out



240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:41



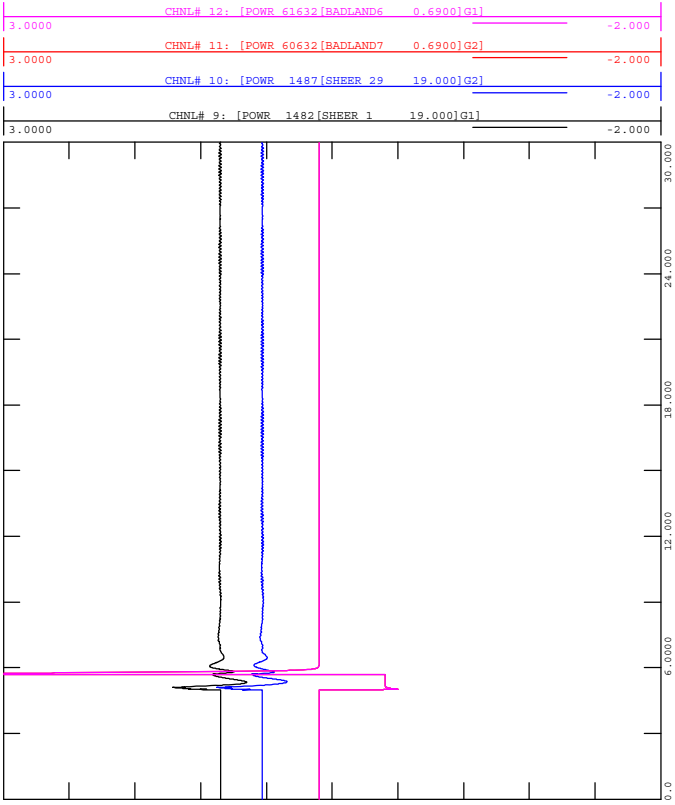
FIGURE A4-23G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-23_3PH_Fault_7L128@Coyote-Lake-963S.out



BRANCH FLOW (P)
 WED, FEB 16 2022 15:41



FIGURE A4-24B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-24_3PH_Fault_7L85@Wintering-Hills-804S.out

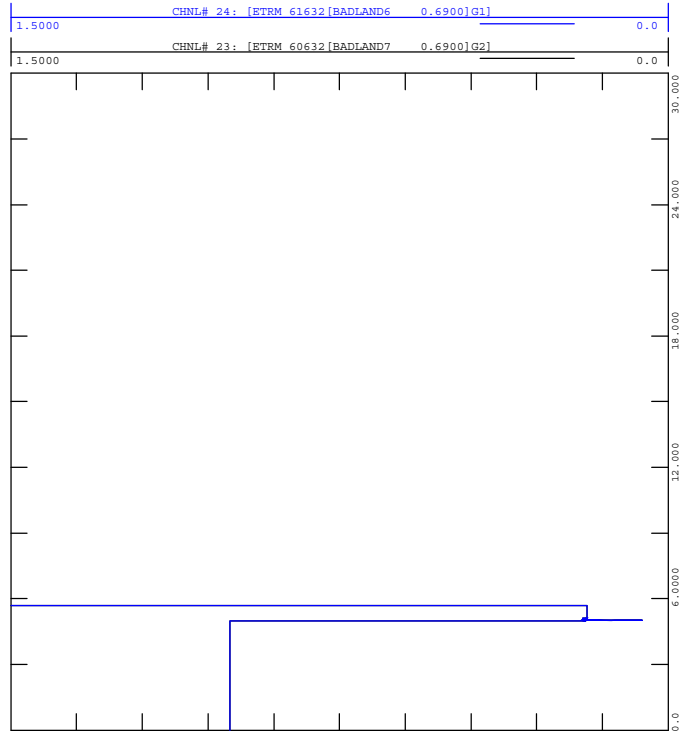


MACHINE ACTIVE POWER (MW)

WED, FEB 16 2022 15:41



FIGURE A4-24D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-24_3PH_Fault_7L85@Wintering-Hills-804S.out

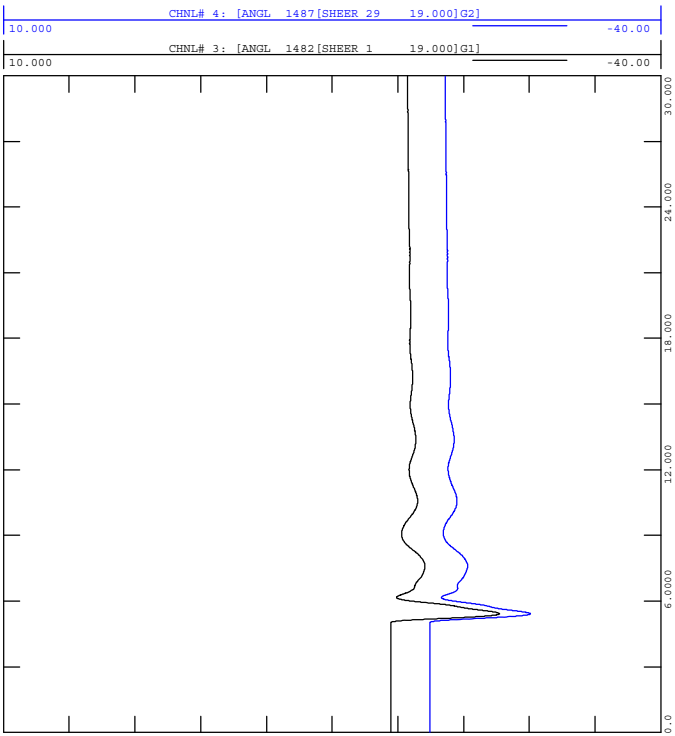


MACHINE TERMINAL VOLTAGE

WED, FEB 16 2022 15:41



FIGURE A4-24A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-24_3PH_Fault_7L85@Wintering-Hills-804S.out

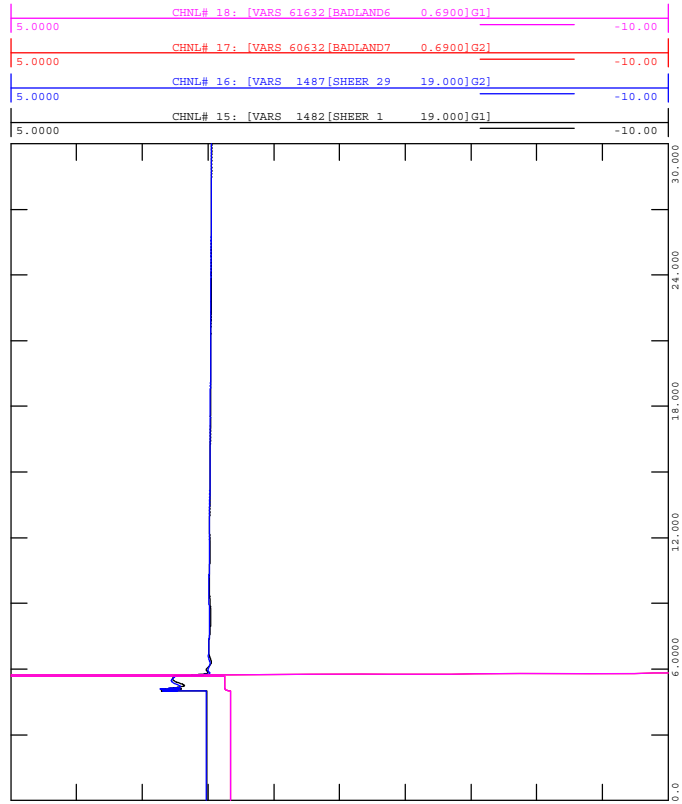


MACHINE ANGLE (DEGREES)

WED, FEB 16 2022 15:41



FIGURE A4-24C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-24_3PH_Fault_7L85@Wintering-Hills-804S.out



MACHINE REACTIVE POWER (M)

WED, FEB 16 2022 15:41



FIGURE A4-24F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-24_3PH_Fault_7L85@Wintering-Hills-804S.out

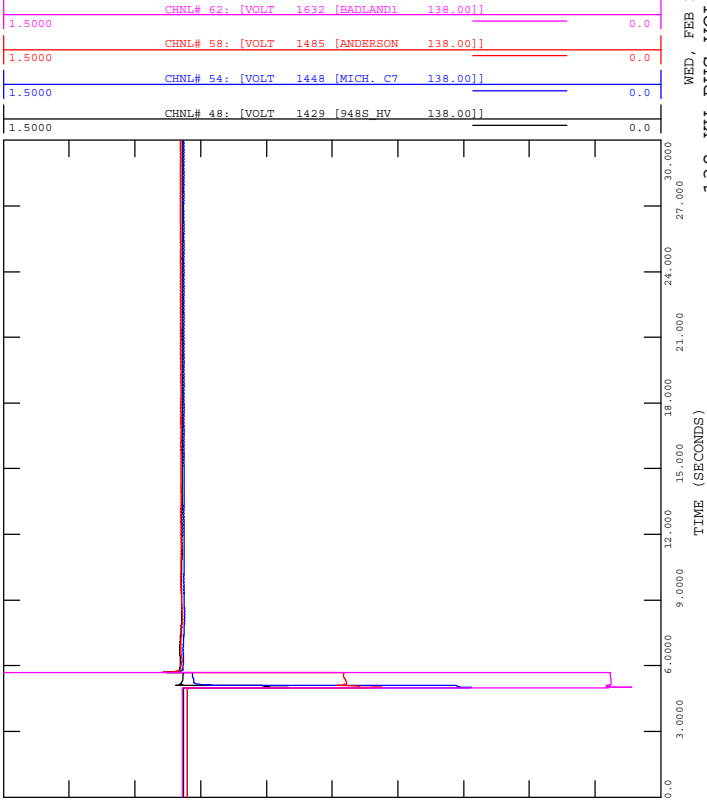


FIGURE A4-24H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-24_3PH_Fault_7L85@Wintering-Hills-804S.out

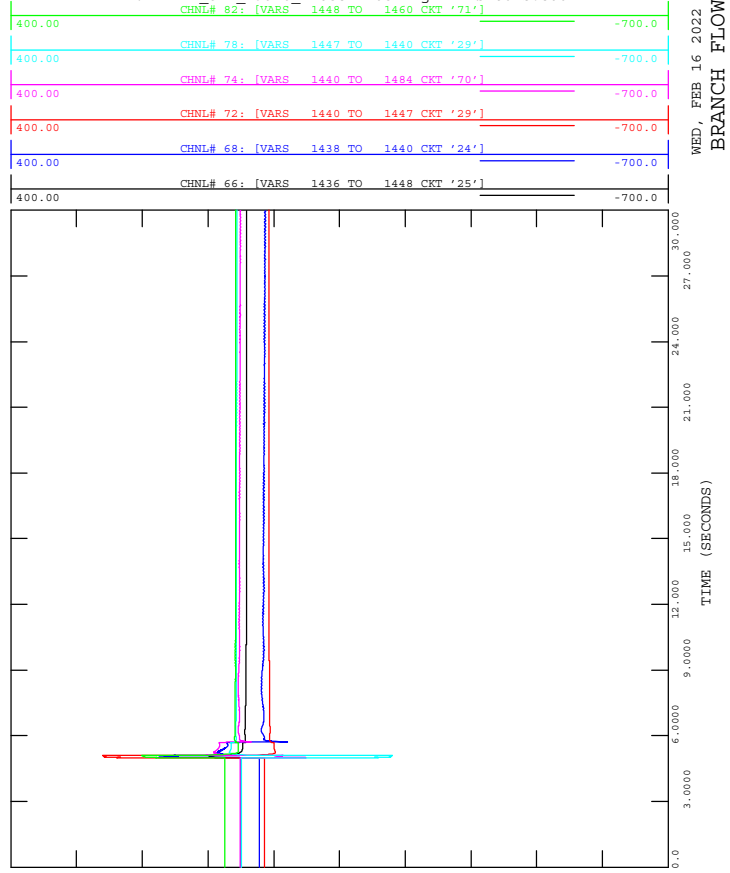


FIGURE A4-24E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-24_3PH_Fault_7L85@Wintering-Hills-804S.out

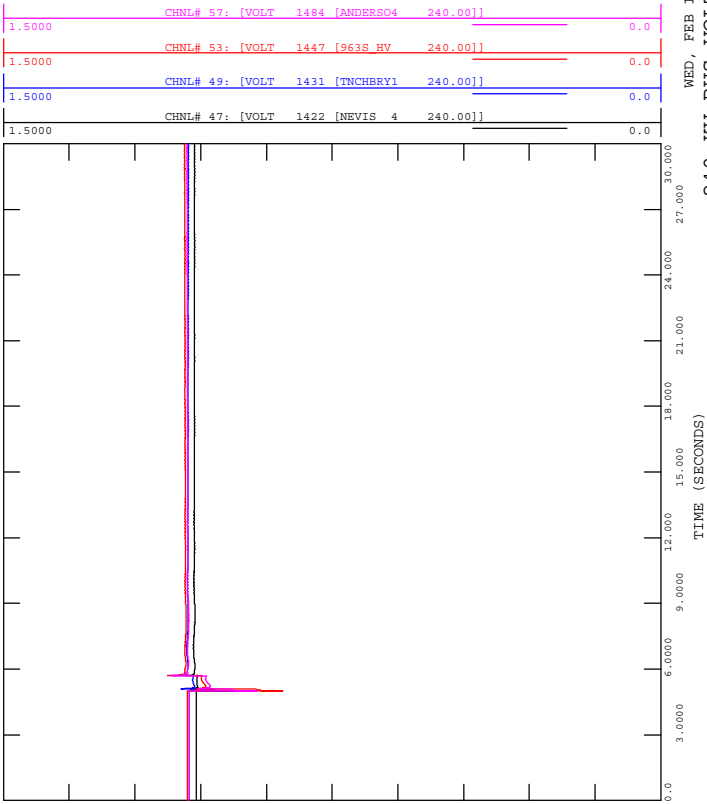


FIGURE A4-24G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-24_3PH_Fault_7L85@Wintering-Hills-804S.out

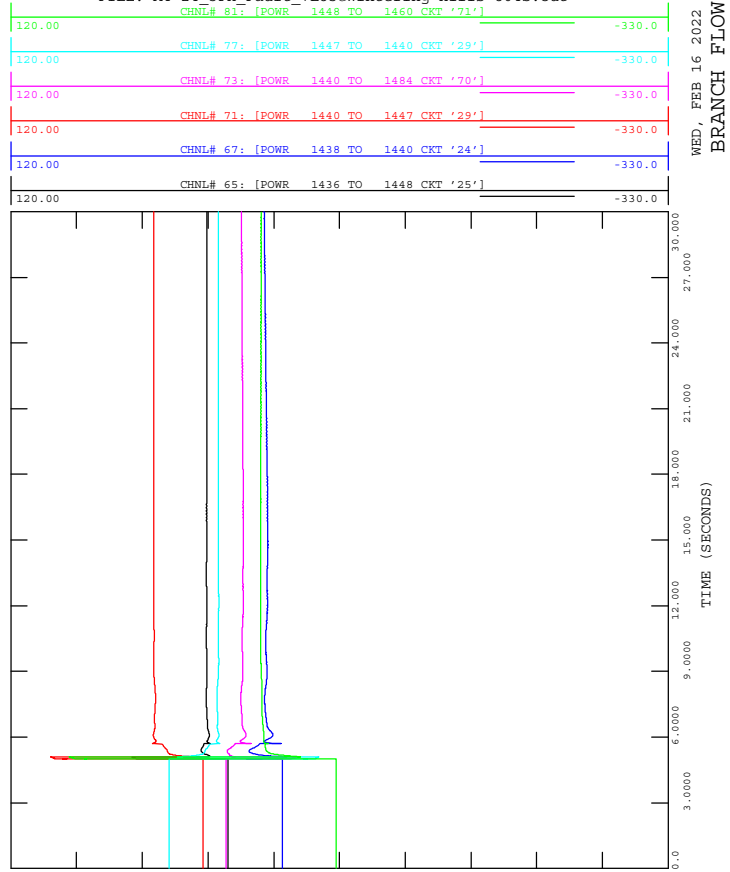




FIGURE A4-25B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-25_3PH_Fault_7L85@Anderson-801S.out

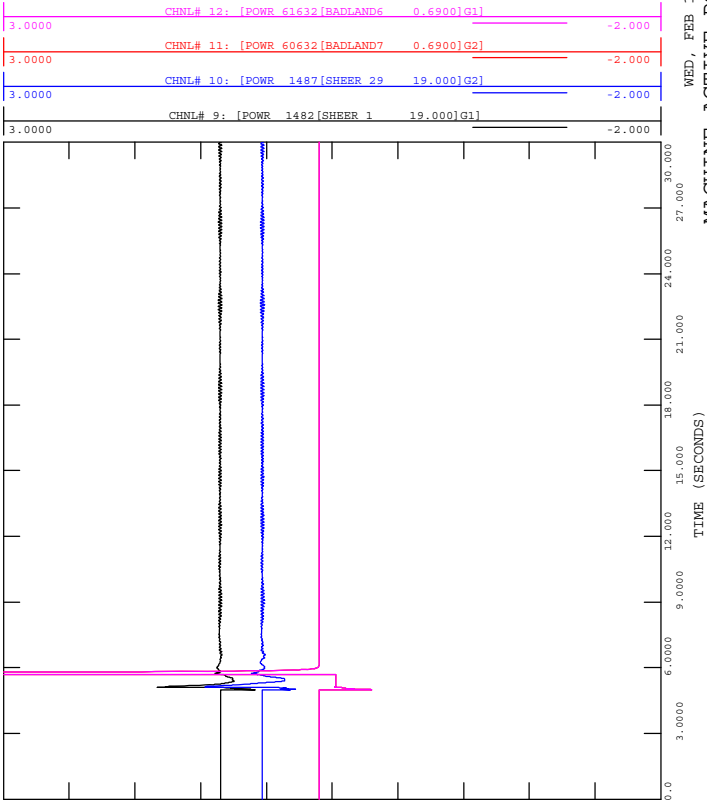


FIGURE A4-25D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-25_3PH_Fault_7L85@Anderson-801S.out

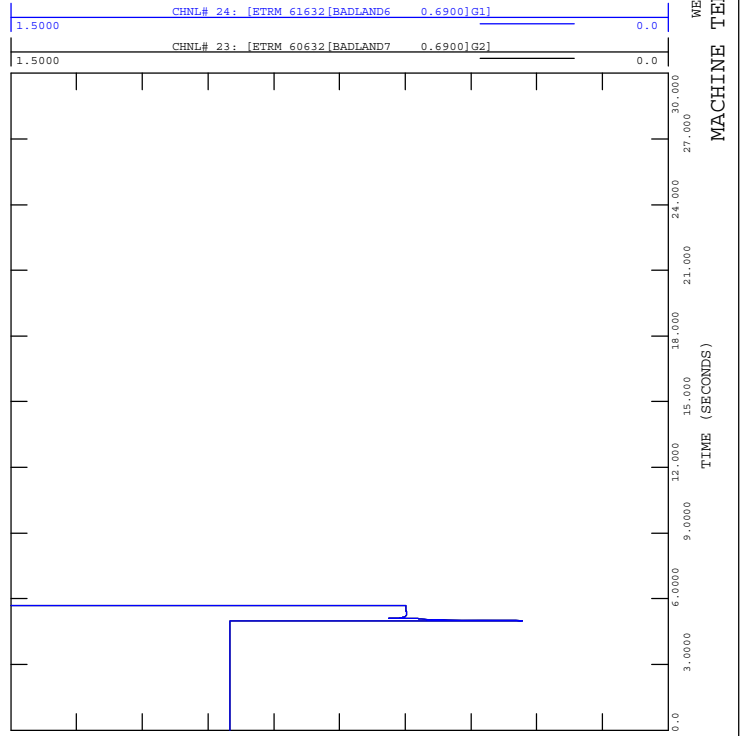


FIGURE A4-25A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-25_3PH_Fault_7L85@Anderson-801S.out

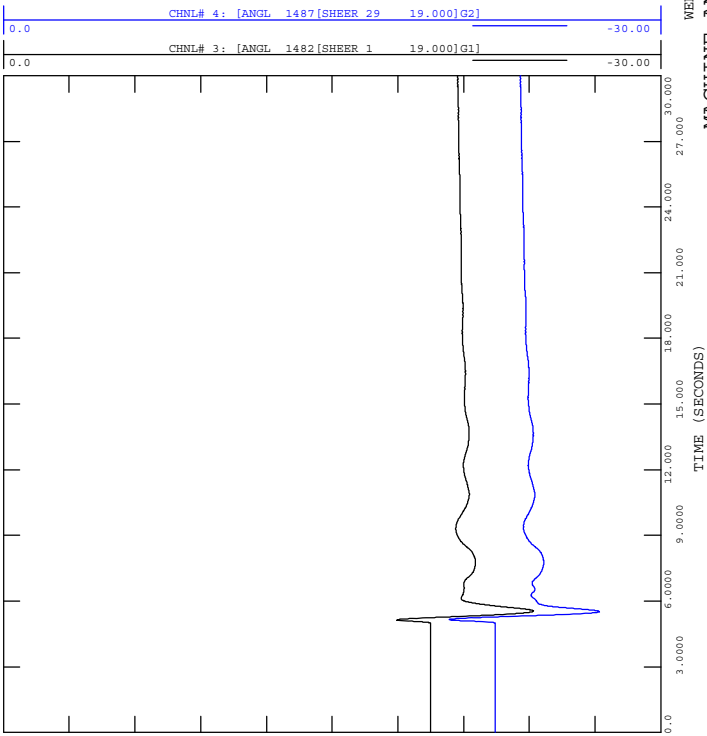


FIGURE A4-25C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-25_3PH_Fault_7L85@Anderson-801S.out

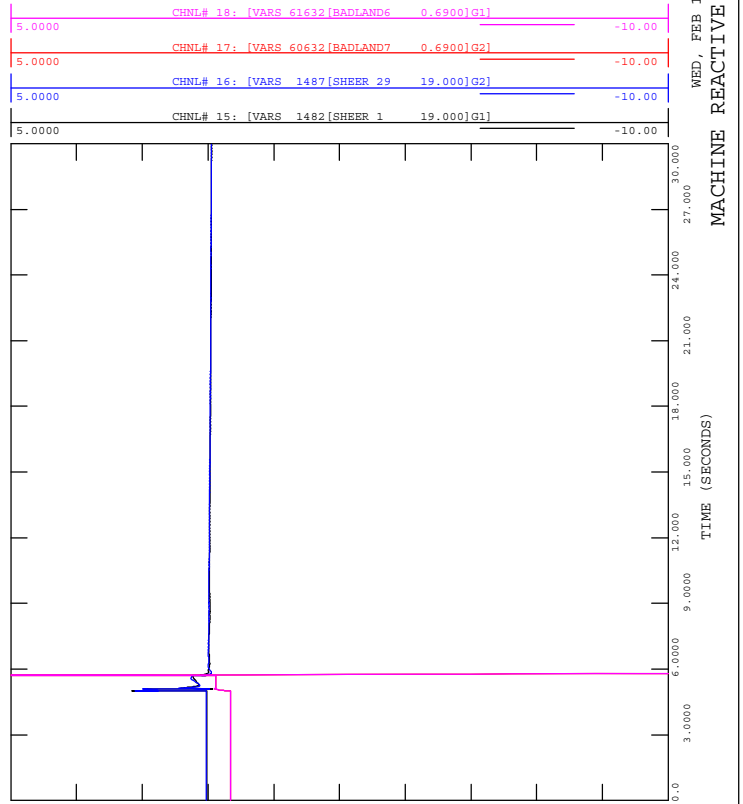




FIGURE A4-25F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-25_3PH_Fault_7L85@Anderson-801S.out

15:42
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

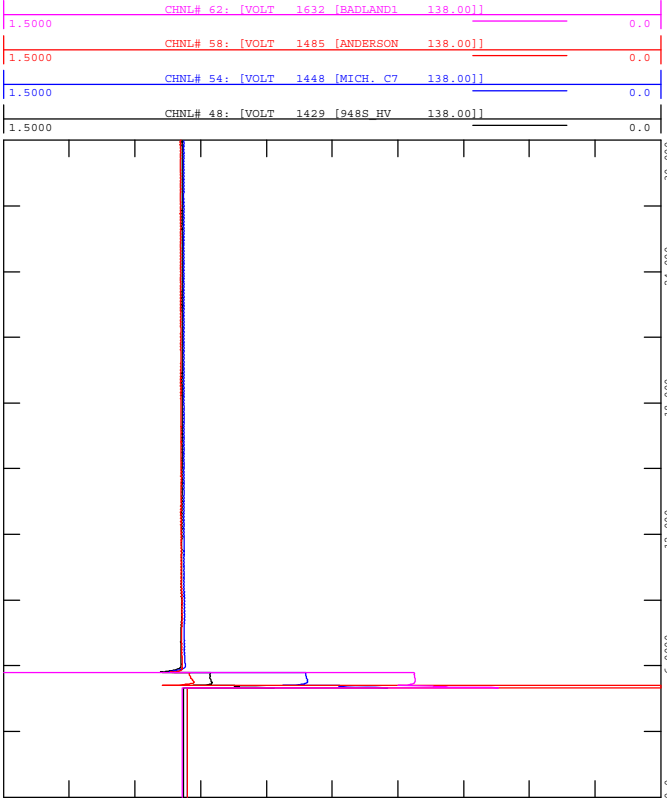


FIGURE A4-25H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-25_3PH_Fault_7L85@Anderson-801S.out

15:42
 WED, FEB 16 2022
 BRANCH FLOW (Q)

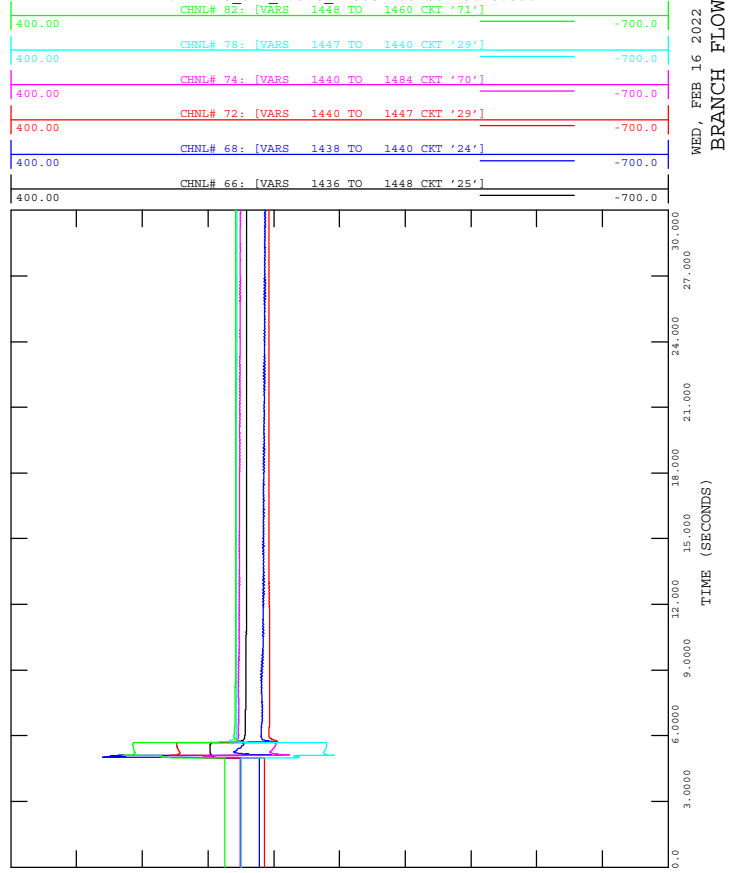


FIGURE A4-25E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-25_3PH_Fault_7L85@Anderson-801S.out

15:42
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

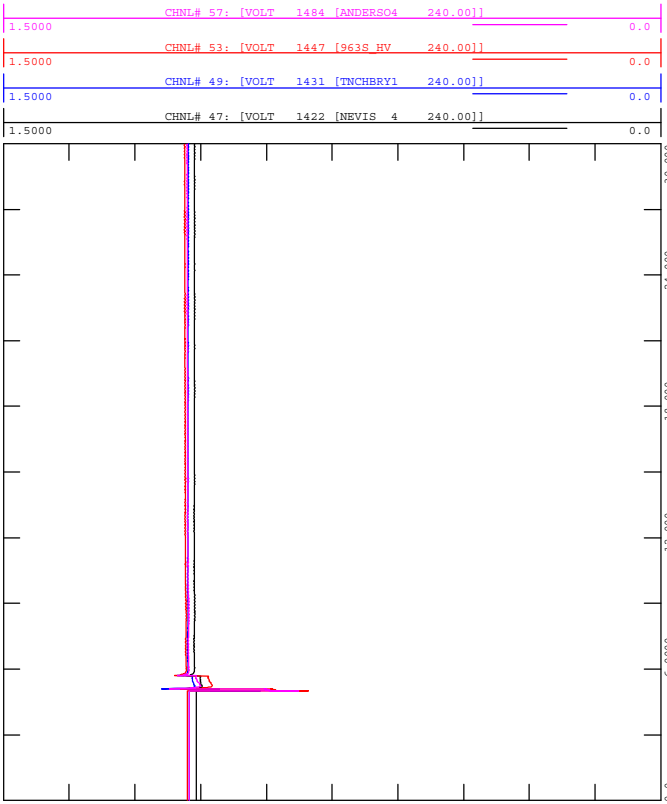


FIGURE A4-25G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-25_3PH_Fault_7L85@Anderson-801S.out

15:42
 WED, FEB 16 2022
 BRANCH FLOW (P)

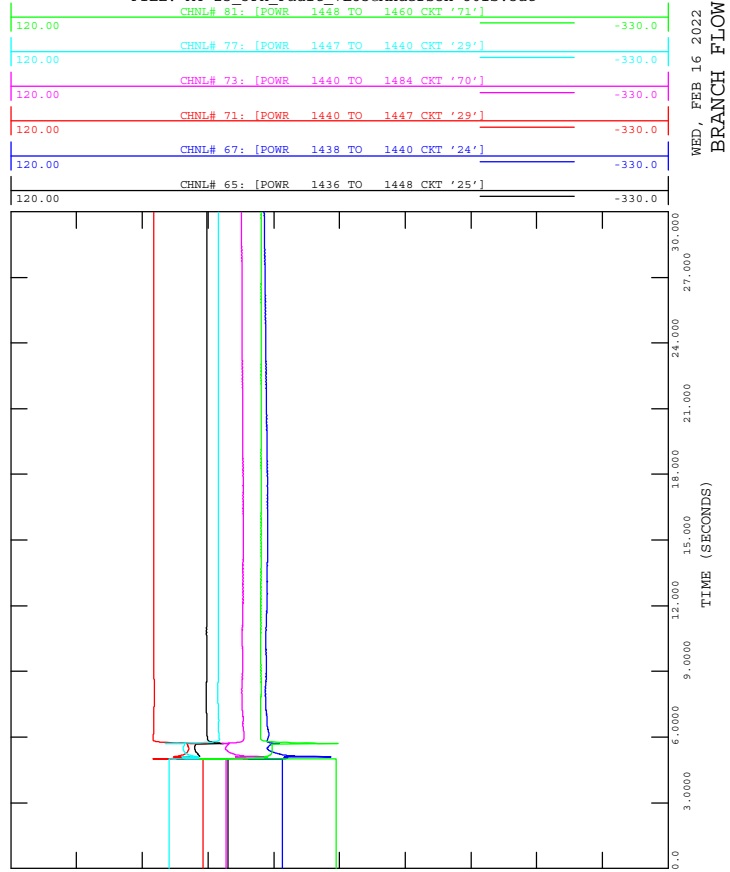




FIGURE A4-26B
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-26_3PH_Fault_EATL@Heathfield-2029S.out

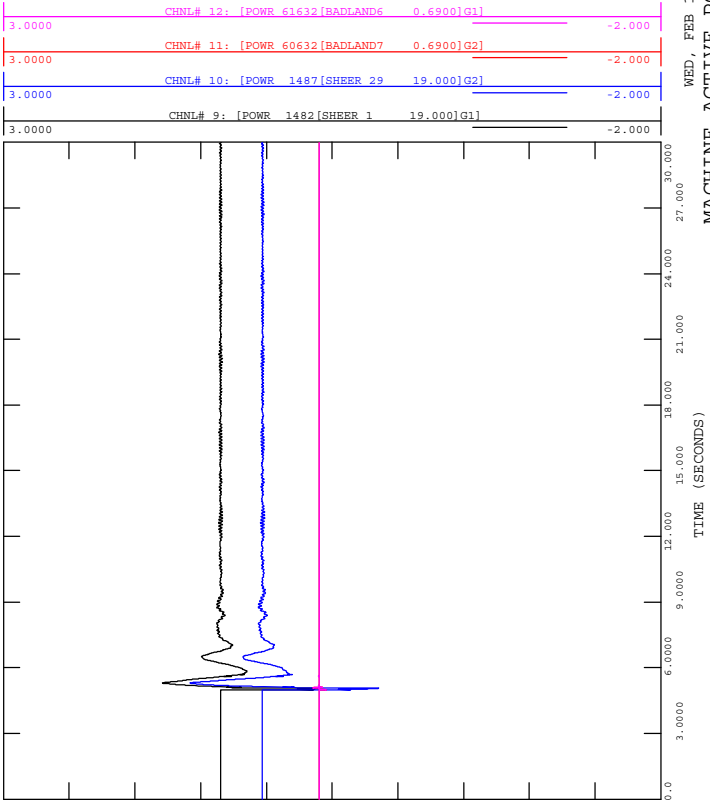


FIGURE A4-26D
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-26_3PH_Fault_EATL@Heathfield-2029S.out

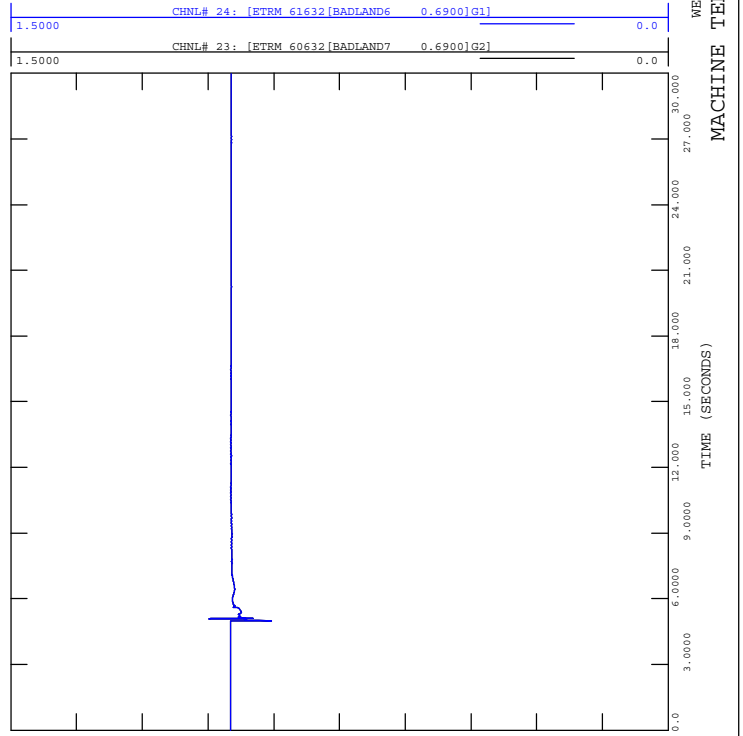


FIGURE A4-26A
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-26_3PH_Fault_EATL@Heathfield-2029S.out

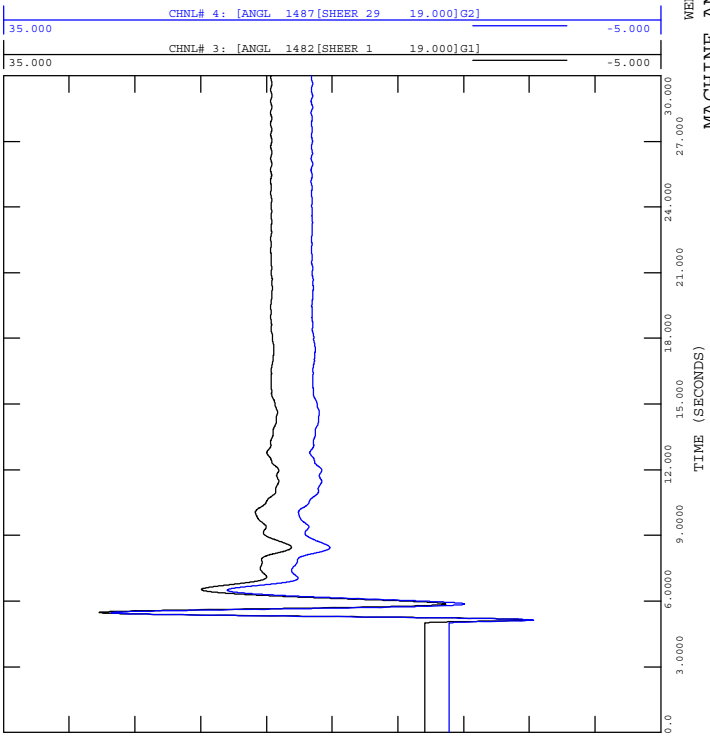


FIGURE A4-26C
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-26_3PH_Fault_EATL@Heathfield-2029S.out

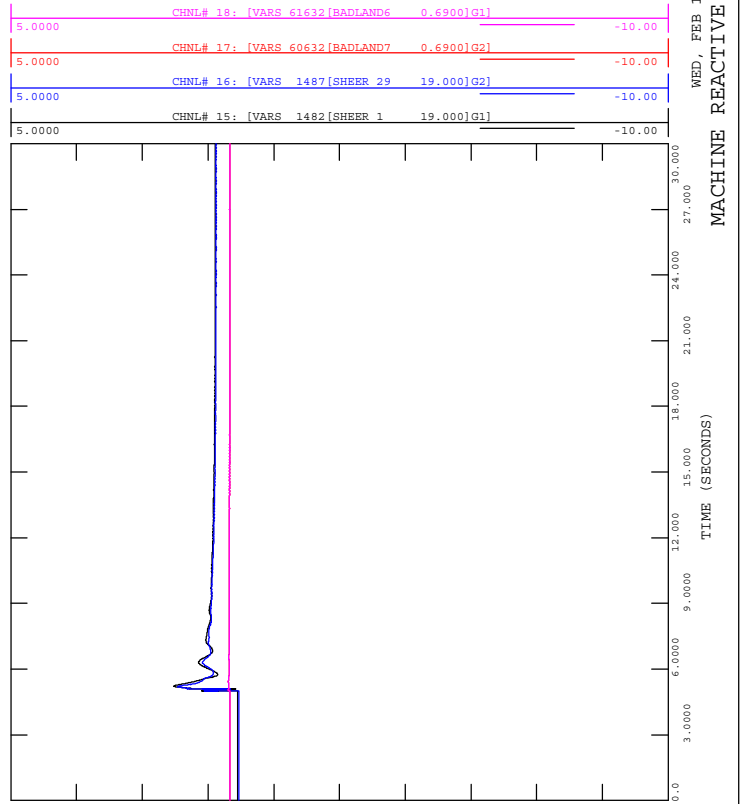




FIGURE A4-26F
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-26_3PH_Fault_EATL@Heathfield-2029S.out

CHNL# 62: [VOLT 1632 [BADLAND] 138.00]
 CHNL# 58: [VOLT 1485 [ANDERSON 138.00]
 CHNL# 54: [VOLT 1448 [MICH. C7 138.00]
 CHNL# 48: [VOLT 1429 [948S_HV 138.00]

15:43
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

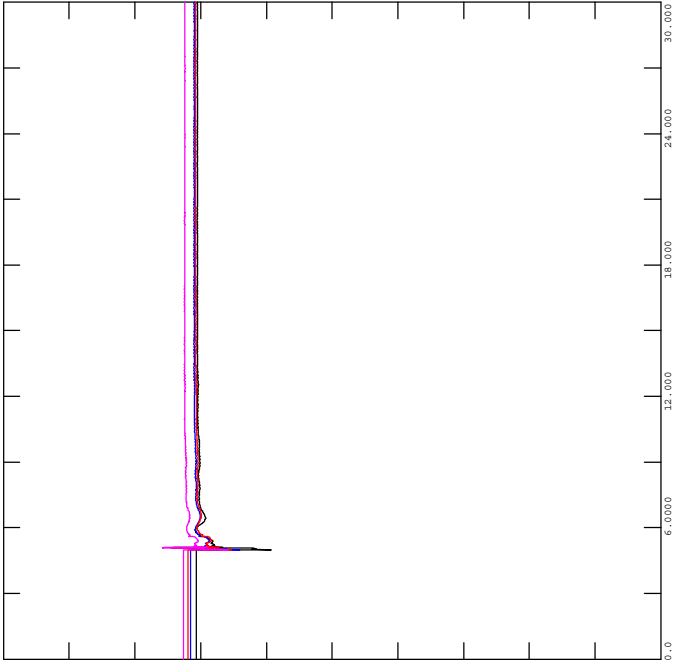


FIGURE A4-26H
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-26_3PH_Fault_EATL@Heathfield-2029S.out

CHNL# 82: [VARS 1448 TO 1460 CKT '71'
 CHNL# 78: [VARS 1447 TO 1440 CKT '29'
 CHNL# 74: [VARS 1440 TO 1484 CKT '70'
 CHNL# 72: [VARS 1440 TO 1447 CKT '29'
 CHNL# 68: [VARS 1438 TO 1440 CKT '24'
 CHNL# 66: [VARS 1436 TO 1448 CKT '25'

15:43
 WED, FEB 16 2022
 BRANCH FLOW (Q)

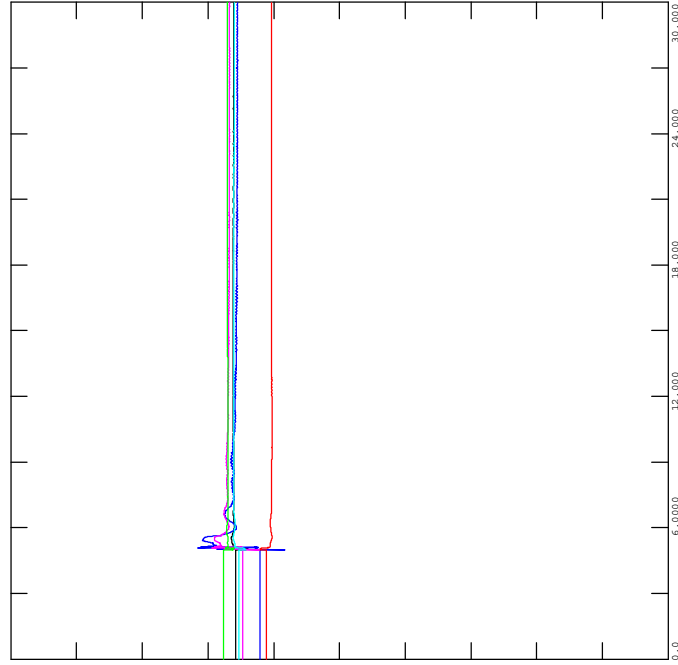


FIGURE A4-26E
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-26_3PH_Fault_EATL@Heathfield-2029S.out

CHNL# 57: [VOLT 1484 [ANDERSO4 240.00]
 CHNL# 53: [VOLT 1447 [963S_HV 240.00]
 CHNL# 49: [VOLT 1431 [TNCHBRY1 240.00]
 CHNL# 47: [VOLT 1422 [NEVIS 4 240.00]

15:42
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

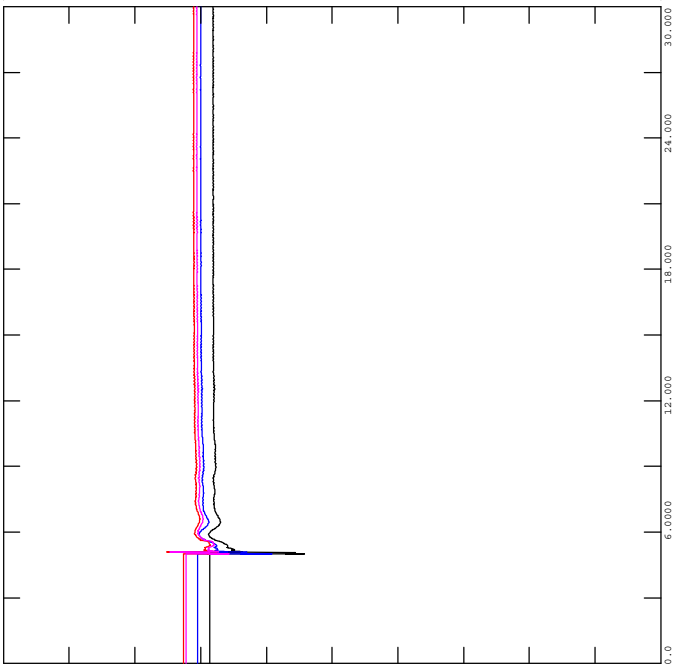


FIGURE A4-26G
 2022SL, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-26_3PH_Fault_EATL@Heathfield-2029S.out

CHNL# 81: [POWR 1448 TO 1460 CKT '71'
 CHNL# 77: [POWR 1447 TO 1440 CKT '29'
 CHNL# 73: [POWR 1440 TO 1484 CKT '70'
 CHNL# 71: [POWR 1440 TO 1447 CKT '29'
 CHNL# 67: [POWR 1438 TO 1440 CKT '24'
 CHNL# 65: [POWR 1436 TO 1448 CKT '25'

15:43
 WED, FEB 16 2022
 BRANCH FLOW (P)

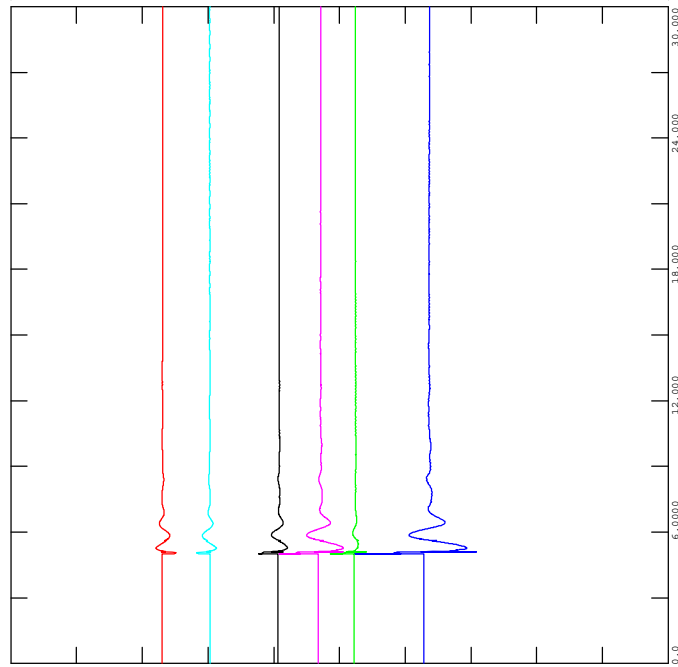
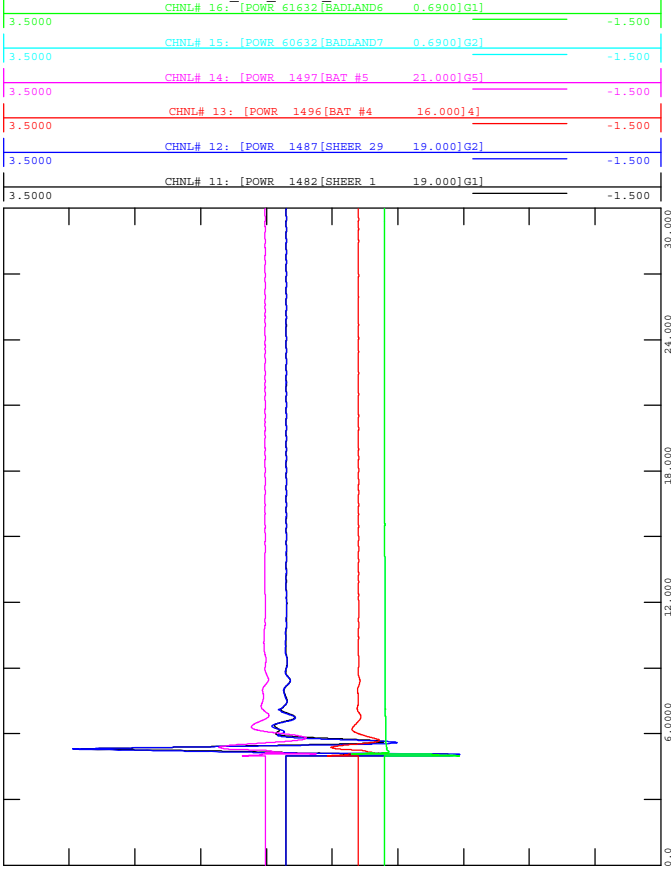




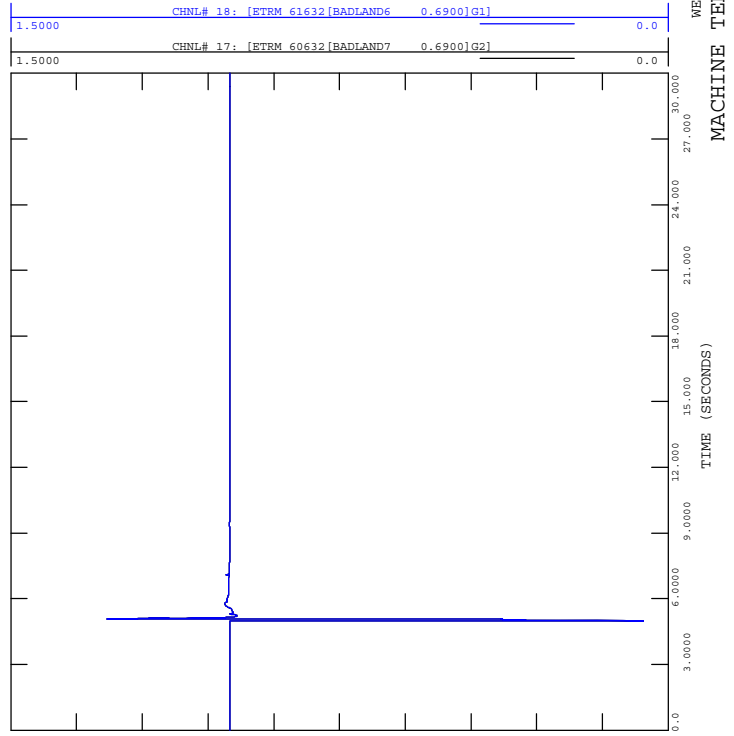
FIGURE A4-27B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-27_3PH_Fault_9L24@Oakland-946S.out



WED, FEB 16 2022 14:24
 MACHINE ACTIVE POWER (MW)



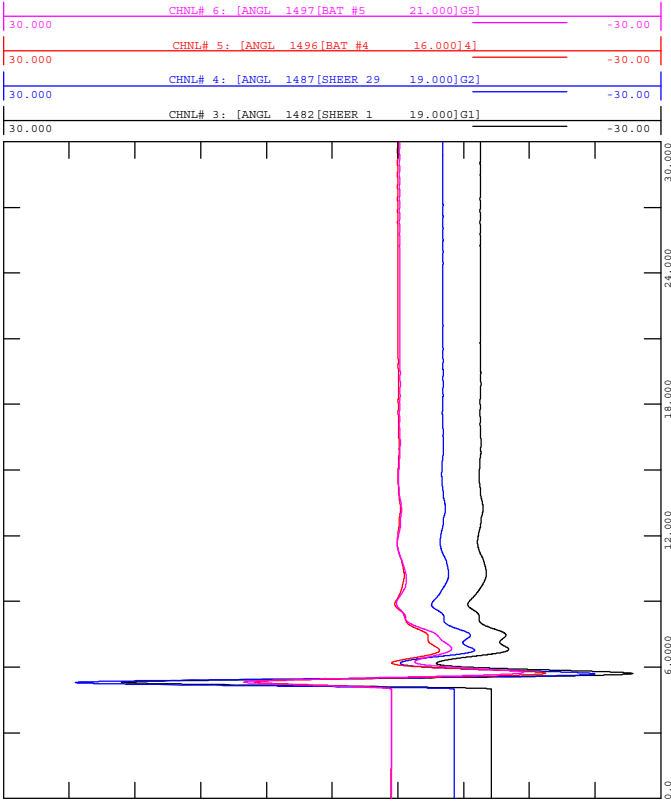
FIGURE A4-27D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-27_3PH_Fault_9L24@Oakland-946S.out



WED, FEB 16 2022 14:24
 MACHINE TERMINAL VOLTAGE



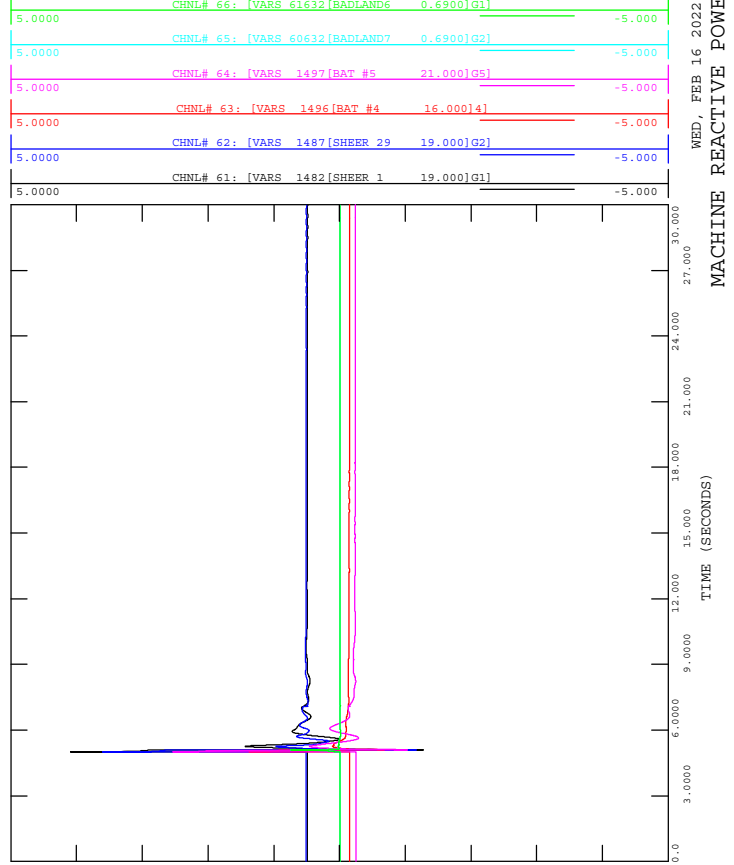
FIGURE A4-27A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-27_3PH_Fault_9L24@Oakland-946S.out



WED, FEB 16 2022 14:23
 MACHINE ANGLE (DEGREES)



FIGURE A4-27C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-27_3PH_Fault_9L24@Oakland-946S.out



WED, FEB 16 2022 14:24
 MACHINE REACTIVE POWER (M)



FIGURE A4-27F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-27_3PH_Fault_9L24@Oakland-946S.out

14:24
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

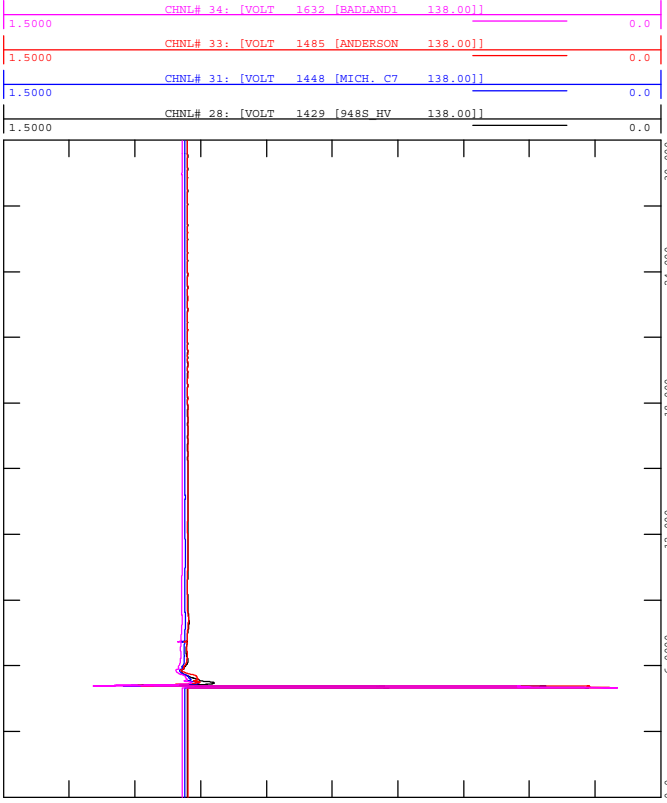


FIGURE A4-27H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-27_3PH_Fault_9L24@Oakland-946S.out

14:24
 WED, FEB 16 2022
 BRANCH FLOW (Q)

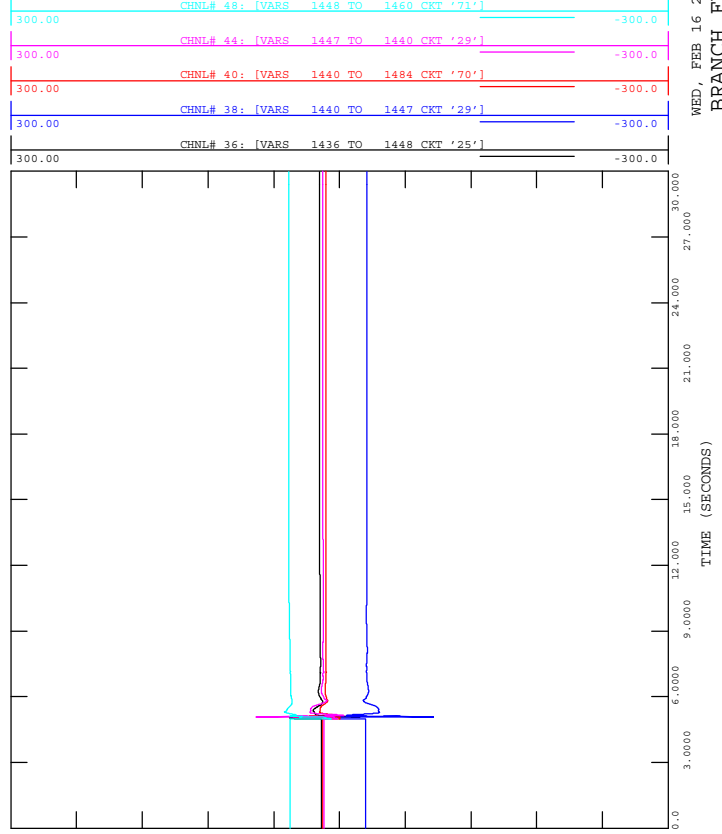


FIGURE A4-27E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-27_3PH_Fault_9L24@Oakland-946S.out

14:24
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

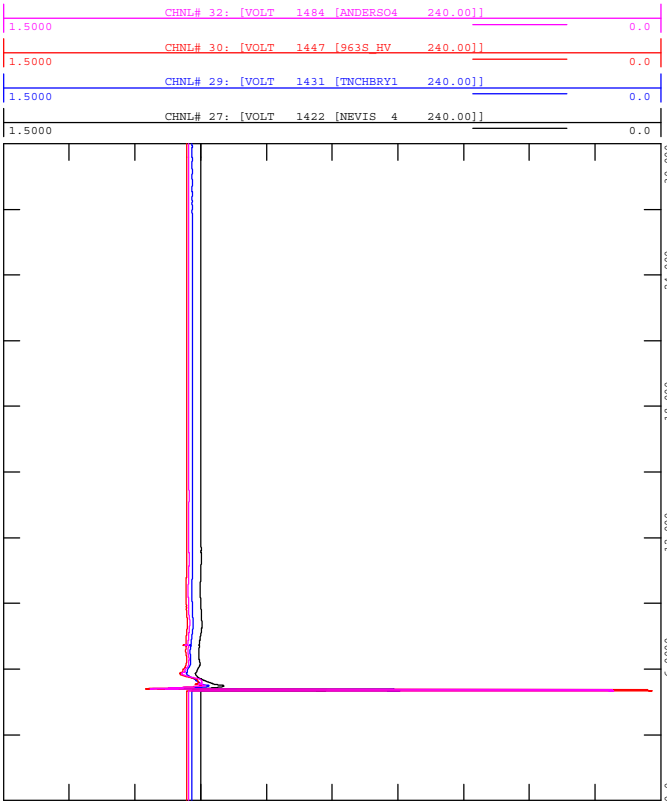


FIGURE A4-27G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-27_3PH_Fault_9L24@Oakland-946S.out

14:24
 WED, FEB 16 2022
 BRANCH FLOW (P)

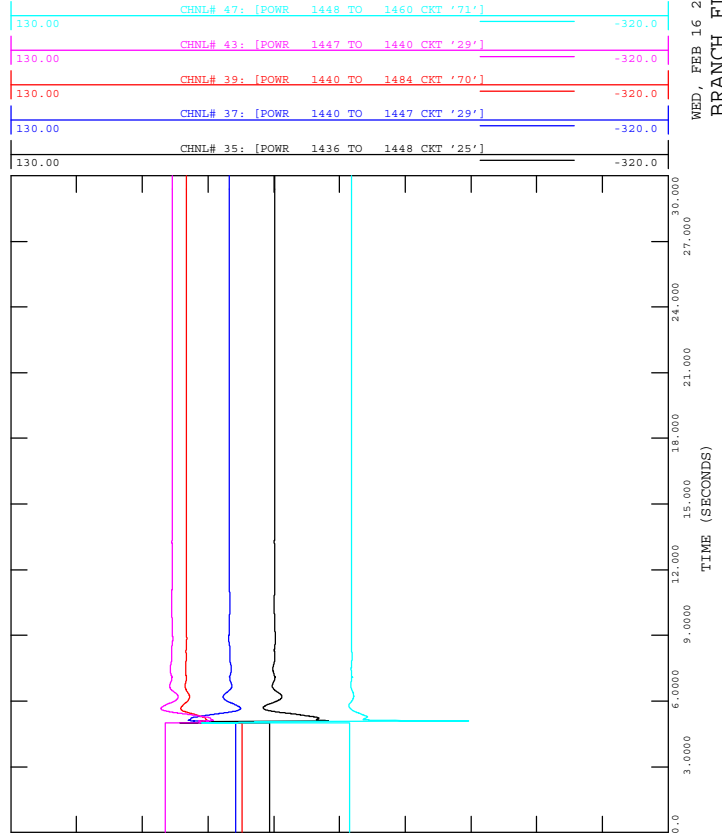
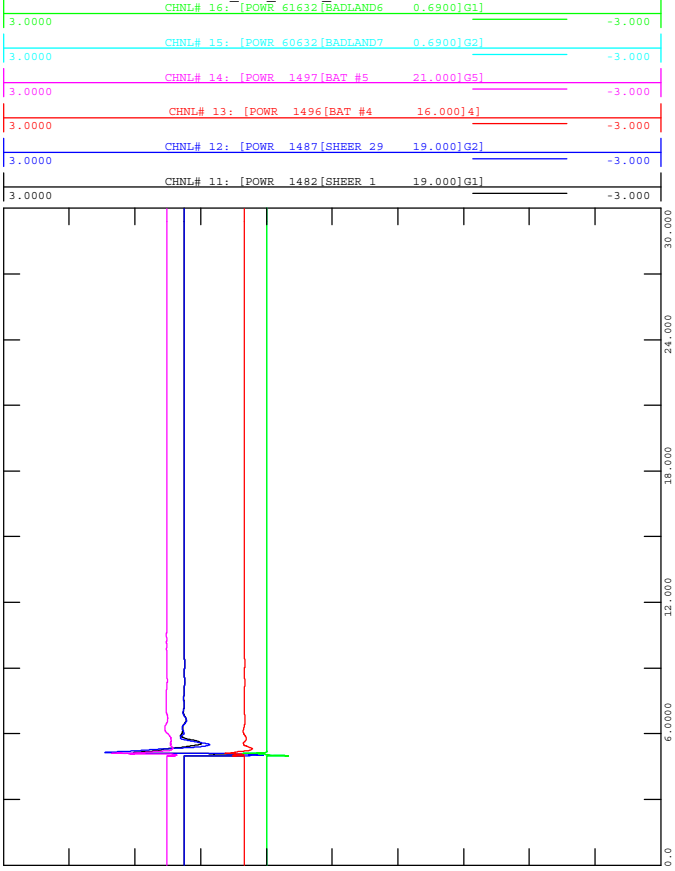




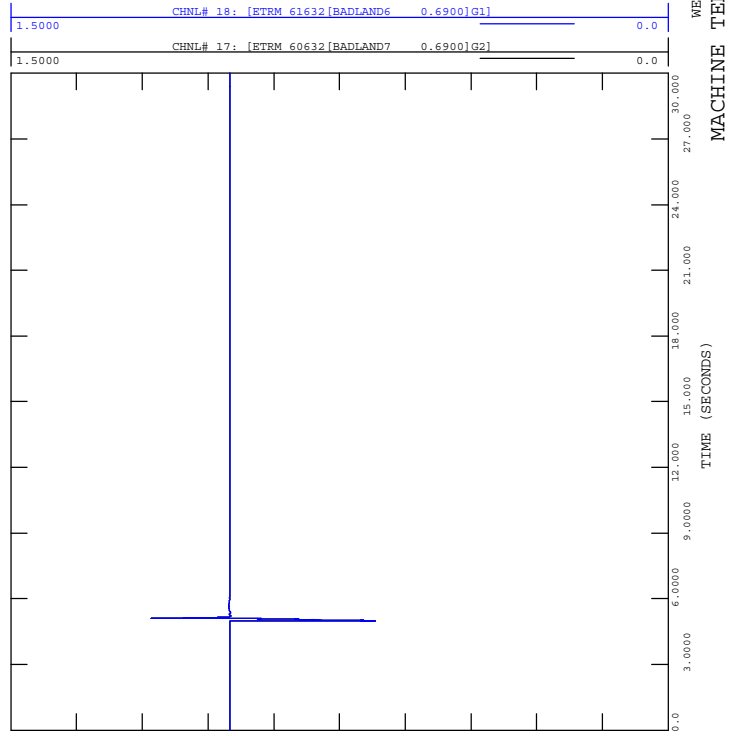
FIGURE A4-28B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT LANFINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-28_3PH_Fault_9L24@Lanfine-959S.out



WED, FEB 16 2022 14:24
 MACHINE ACTIVE POWER (MW)



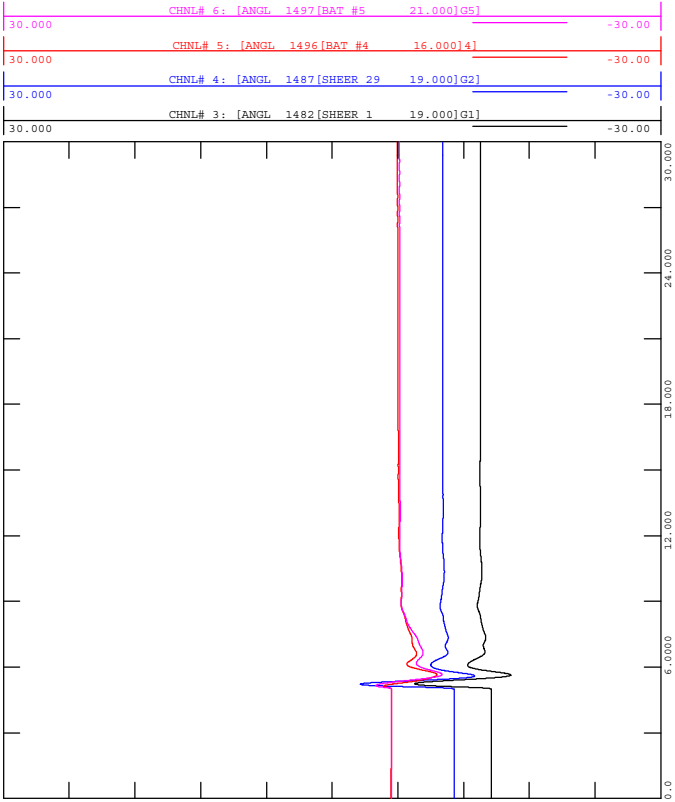
FIGURE A4-28D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT LANFINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-28_3PH_Fault_9L24@Lanfine-959S.out



WED, FEB 16 2022 14:25
 MACHINE TERMINAL VOLTAGE



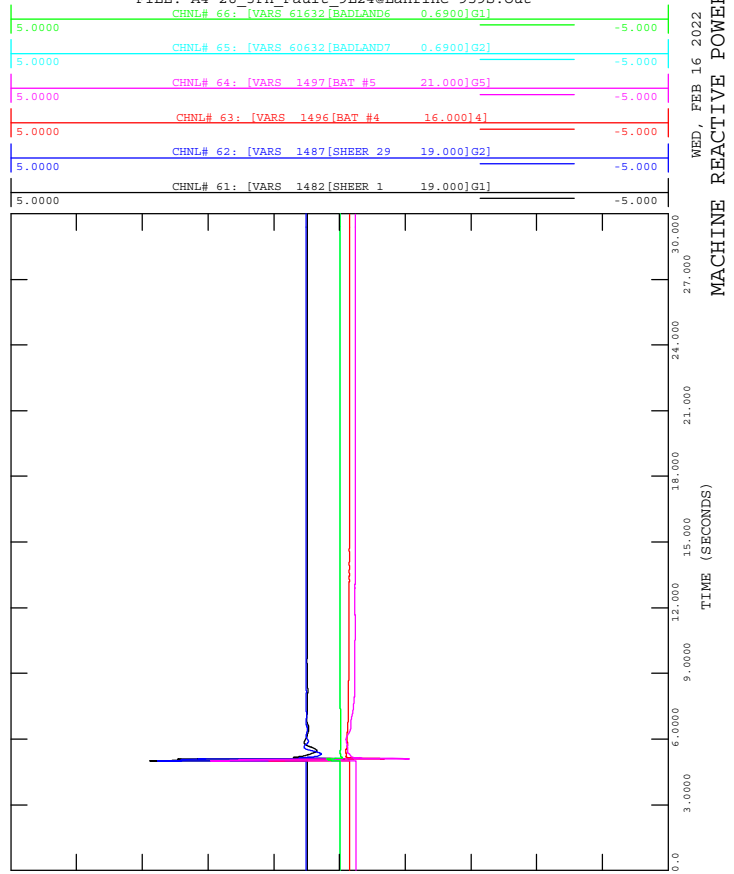
FIGURE A4-28A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT LANFINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-28_3PH_Fault_9L24@Lanfine-959S.out



WED, FEB 16 2022 14:24
 MACHINE ANGLE (DEGREES)



FIGURE A4-28C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT LANFINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-28_3PH_Fault_9L24@Lanfine-959S.out



WED, FEB 16 2022 14:25
 MACHINE REACTIVE POWER (M)



FIGURE A4-28F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-28_3PH_Fault_9L24@Lanfine-959S.out

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:25

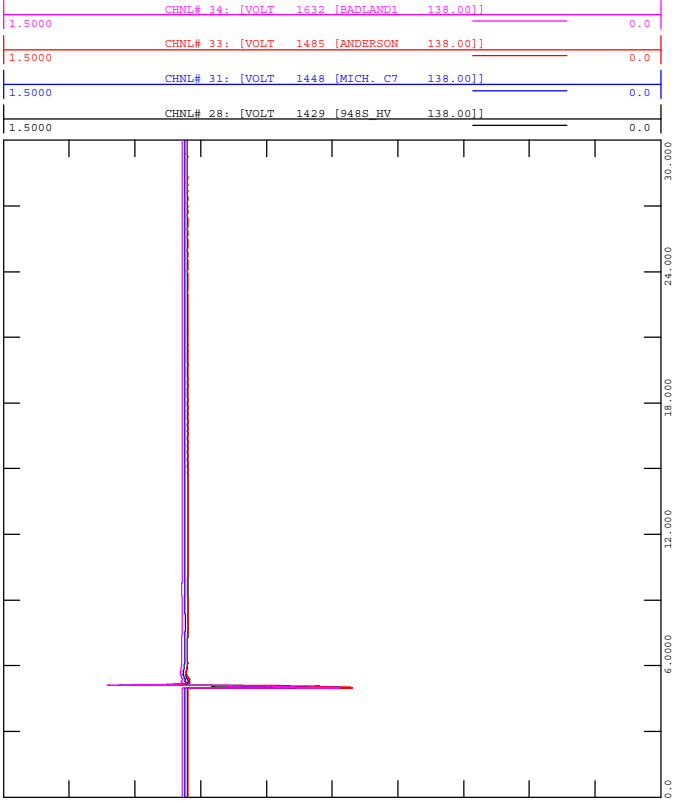


FIGURE A4-28H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-28_3PH_Fault_9L24@Lanfine-959S.out

BRANCH FLOW (Q)
 WED, FEB 16 2022 14:25

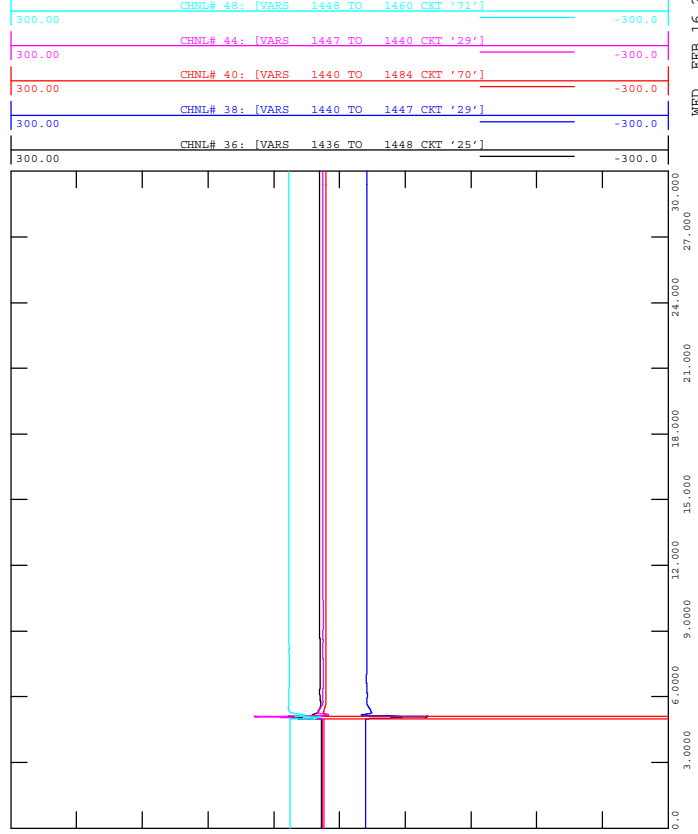


FIGURE A4-28E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-28_3PH_Fault_9L24@Lanfine-959S.out

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:25

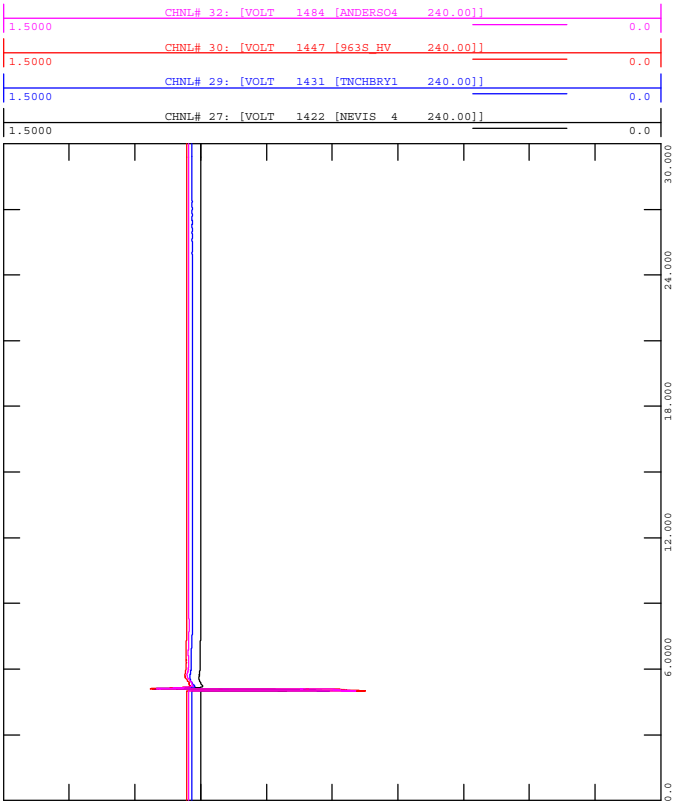


FIGURE A4-28G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-28_3PH_Fault_9L24@Lanfine-959S.out

BRANCH FLOW (P)
 WED, FEB 16 2022 14:25

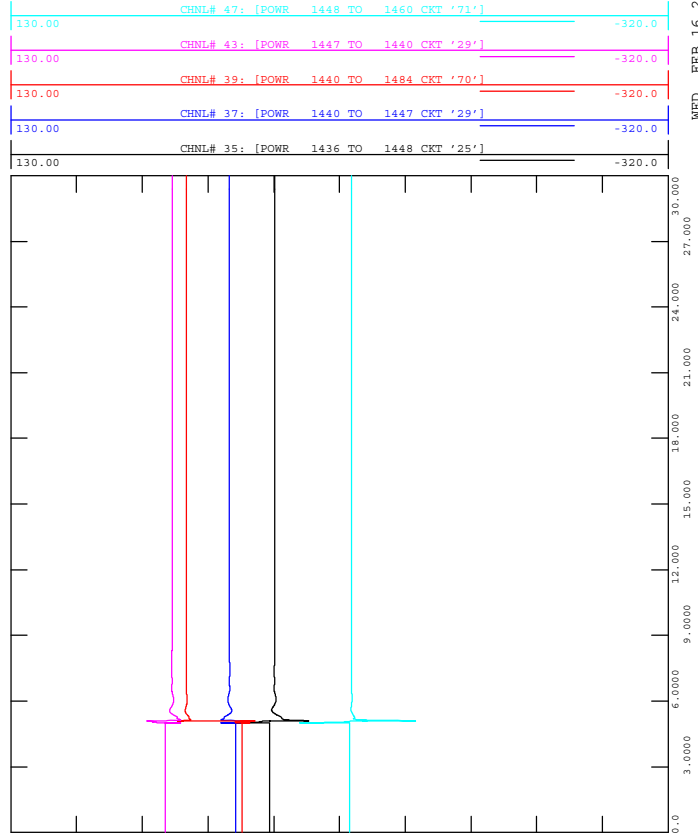
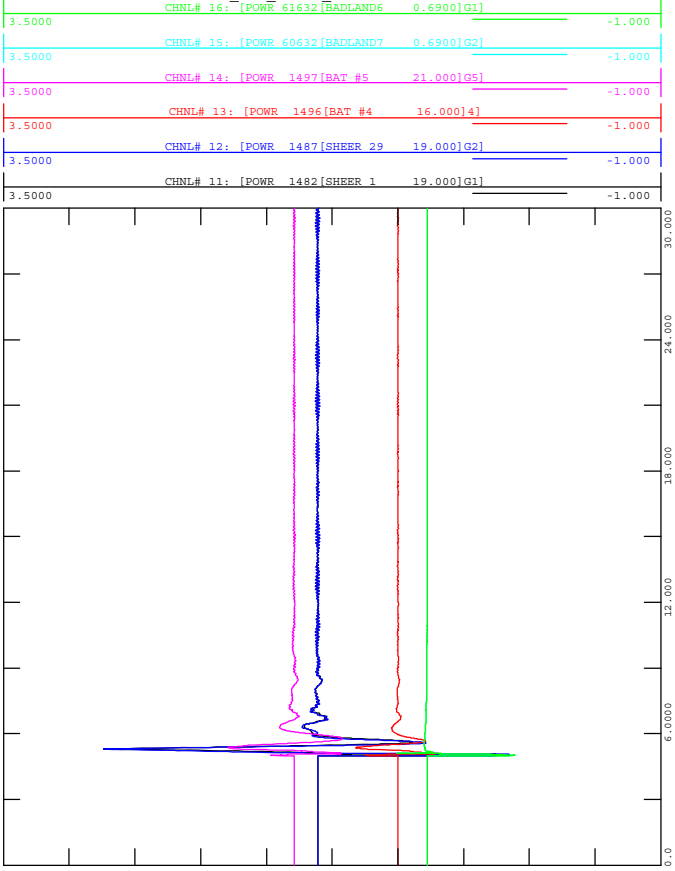




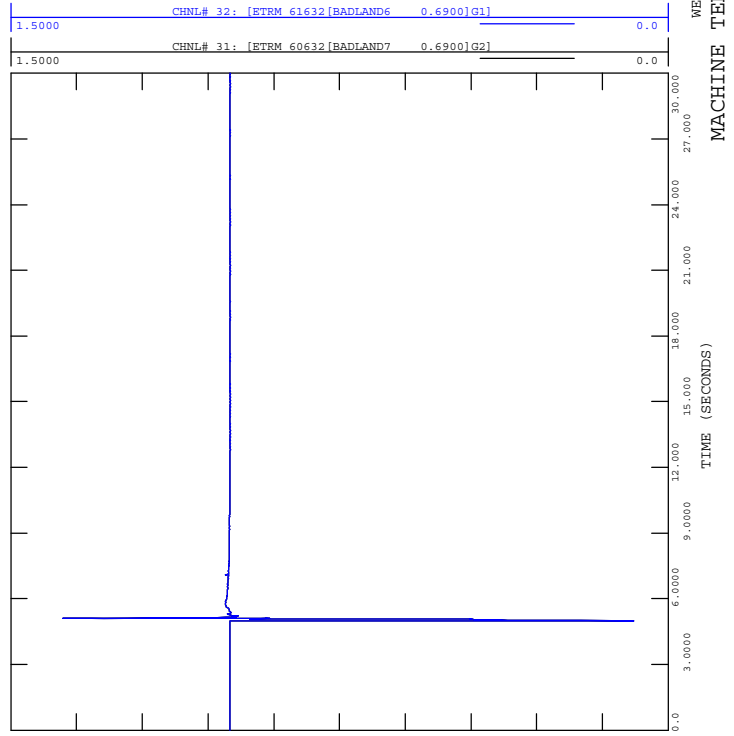
FIGURE A4-29B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-29_3PH_Fault_9L29@Oakland-946S.out
 CHNL# 16: [POWR 61632[BADLAND6 0.6900]G1]



WED, FEB 16 2022 14:25
 MACHINE ACTIVE POWER (MW)



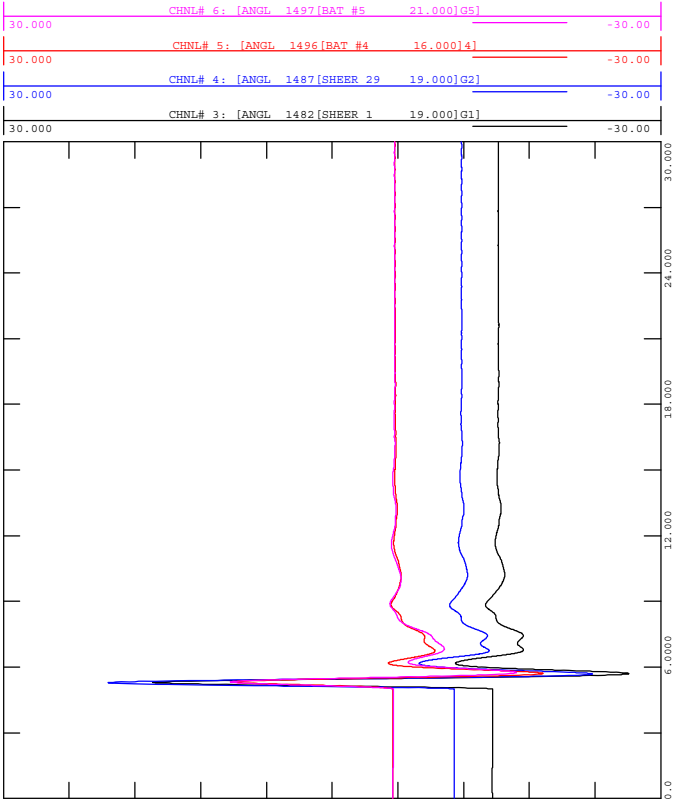
FIGURE A4-29D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-29_3PH_Fault_9L29@Oakland-946S.out



WED, FEB 16 2022 14:25
 MACHINE TERMINAL VOLTAGE



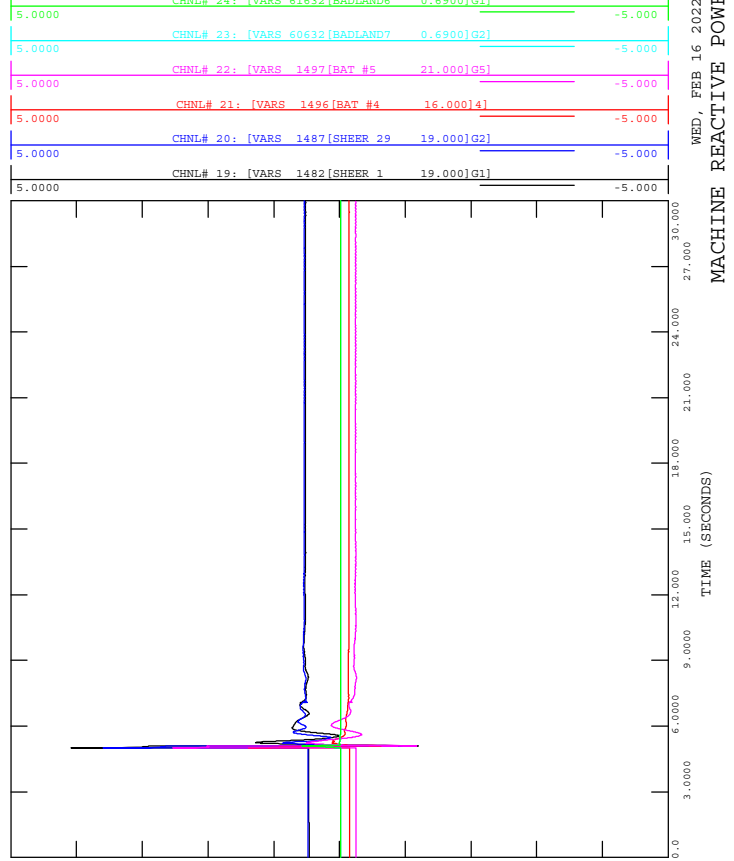
FIGURE A4-29A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-29_3PH_Fault_9L29@Oakland-946S.out



WED, FEB 16 2022 14:25
 MACHINE ANGLE (DEGREES)



FIGURE A4-29C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-29_3PH_Fault_9L29@Oakland-946S.out



WED, FEB 16 2022 14:25
 MACHINE REACTIVE POWER (M)



FIGURE A4-29F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-29_3PH_Fault_9L29@Oakland-946S.out

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:25

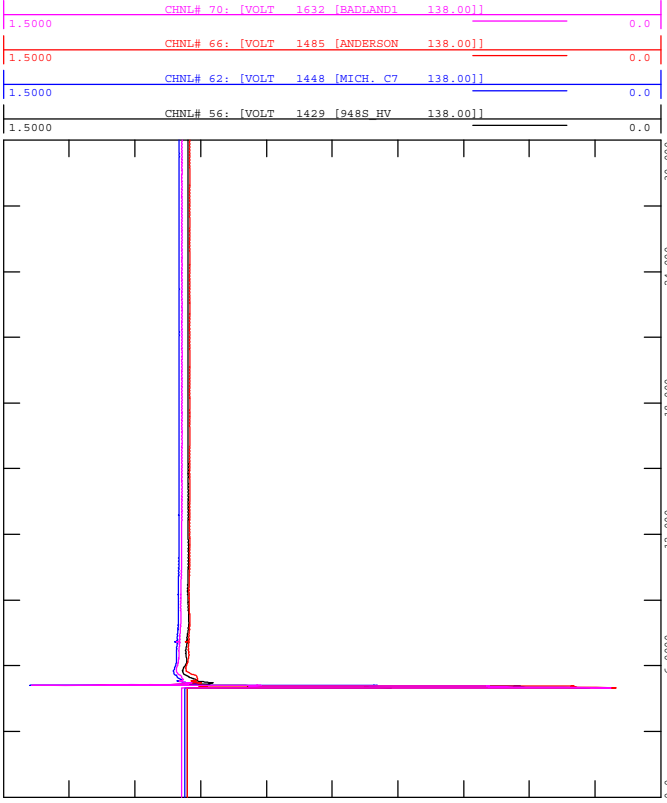


FIGURE A4-29H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-29_3PH_Fault_9L29@Oakland-946S.out

BRANCH FLOW (Q)
 WED, FEB 16 2022 14:25

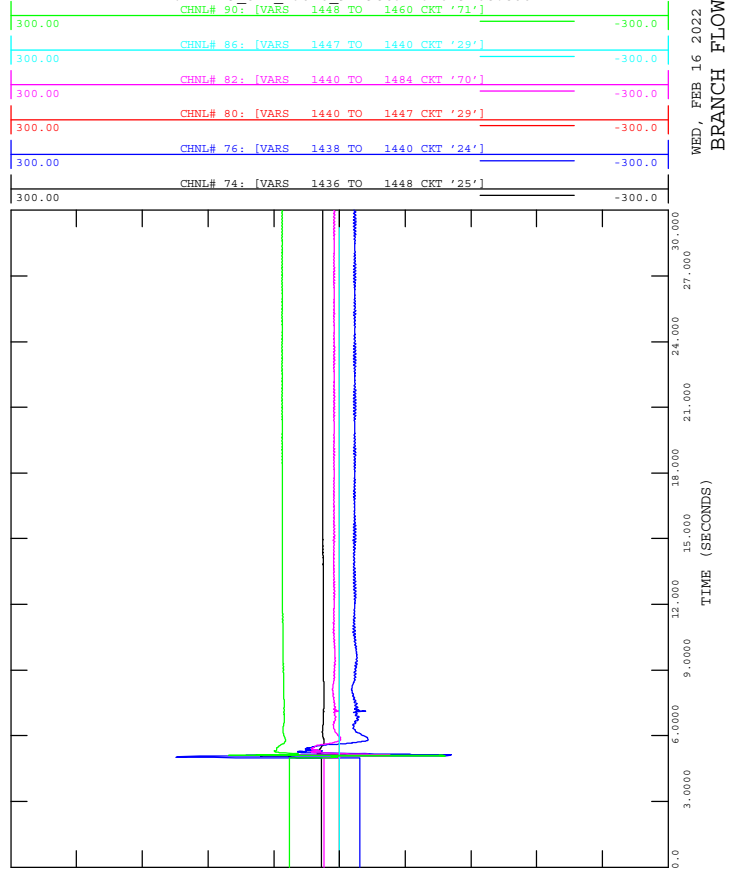


FIGURE A4-29E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-29_3PH_Fault_9L29@Oakland-946S.out

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:25

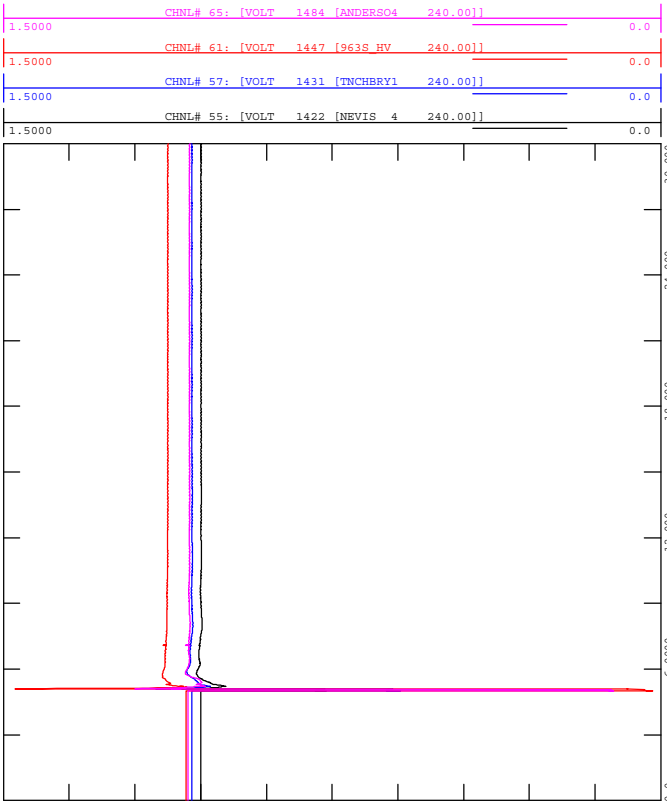


FIGURE A4-29G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-29_3PH_Fault_9L29@Oakland-946S.out

BRANCH FLOW (P)
 WED, FEB 16 2022 14:25

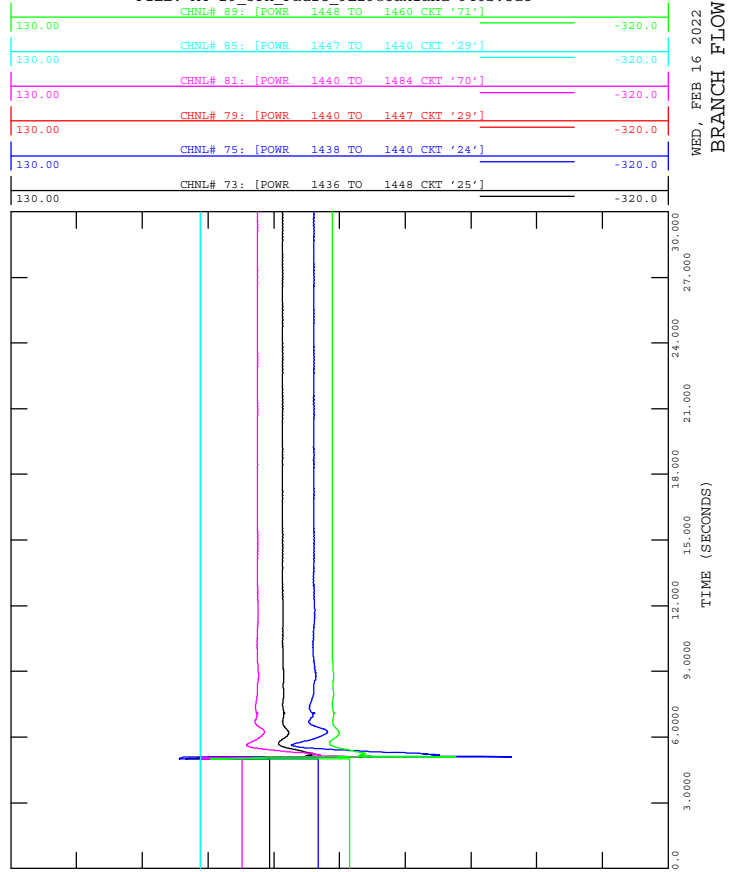
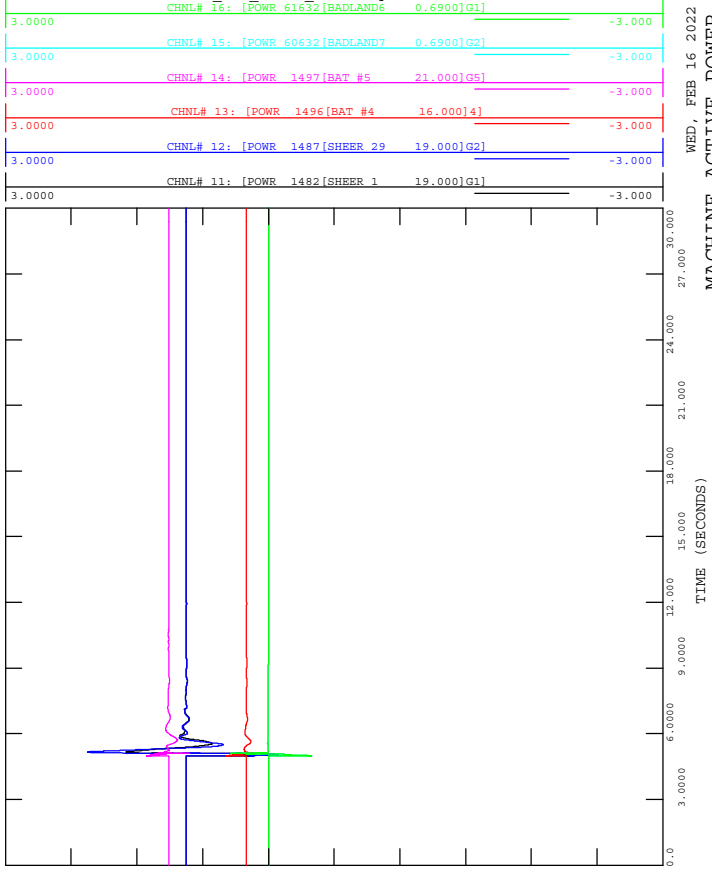




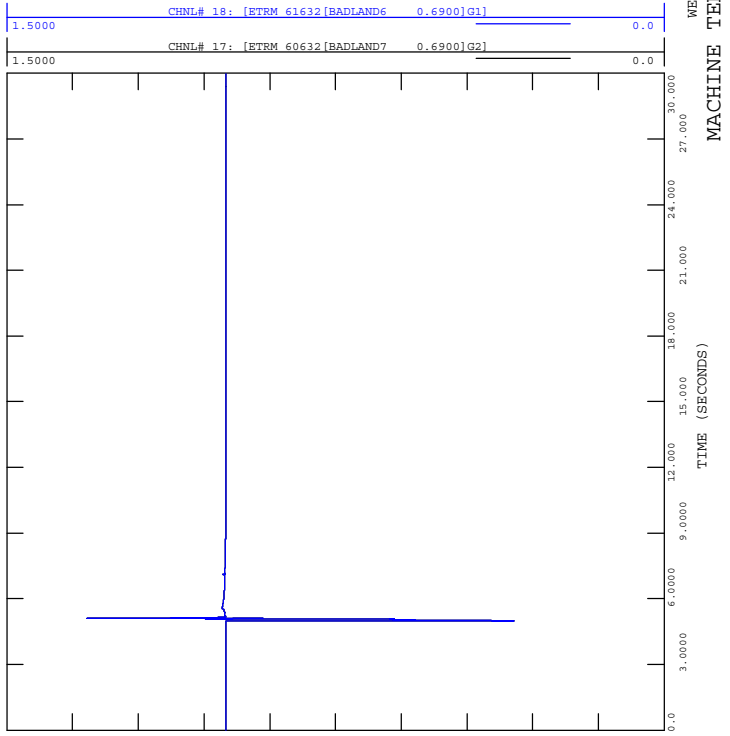
FIGURE A4-30B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-30_3PH_Fault_9L29@Coyote-Lake-963S.out



WED, FEB 16 2022 14:26
 MACHINE ACTIVE POWER (MW)



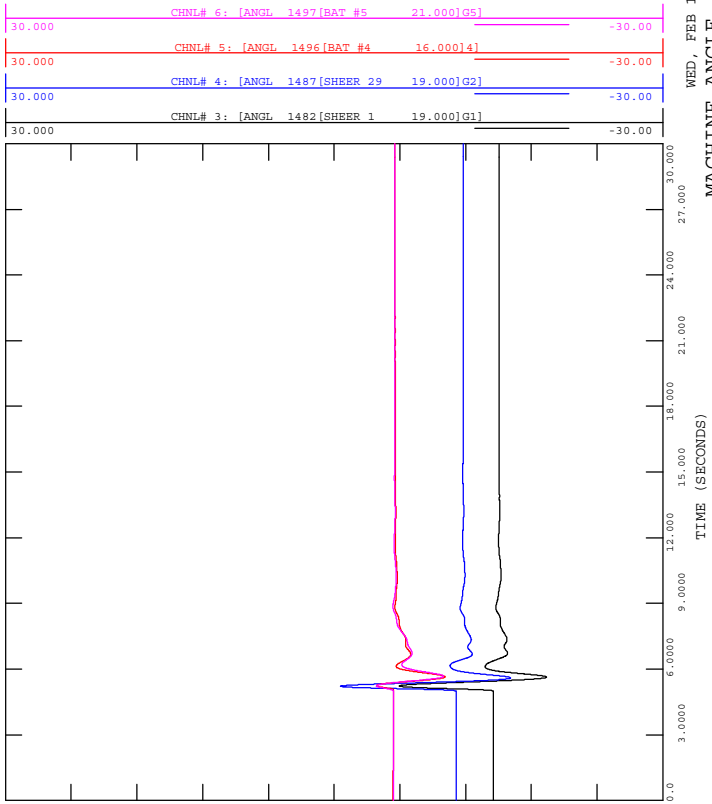
FIGURE A4-30D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-30_3PH_Fault_9L29@Coyote-Lake-963S.out



WED, FEB 16 2022 14:26
 MACHINE TERMINAL VOLTAGE



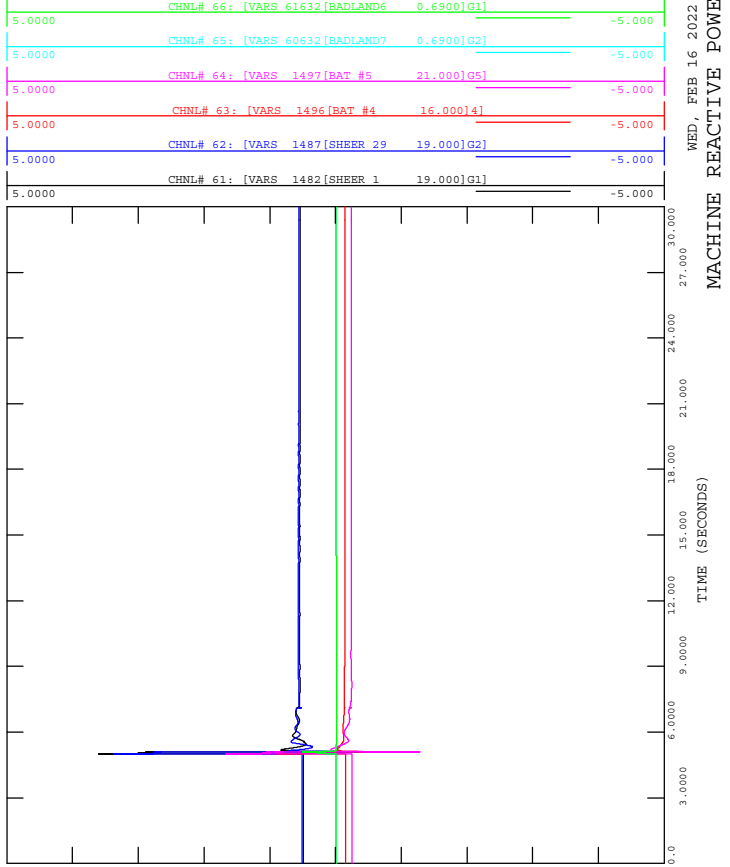
FIGURE A4-30A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-30_3PH_Fault_9L29@Coyote-Lake-963S.out



WED, FEB 16 2022 14:26
 MACHINE ANGLE (DEGREES)



FIGURE A4-30C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-30_3PH_Fault_9L29@Coyote-Lake-963S.out



WED, FEB 16 2022 14:26
 MACHINE REACTIVE POWER (M)



FIGURE A4-30F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-30_3PH_Fault_9L29@Coyote-Lake-963S.out

WED, FEB 16 2022 14:26
 138 KV BUS VOLTAGE (PU)

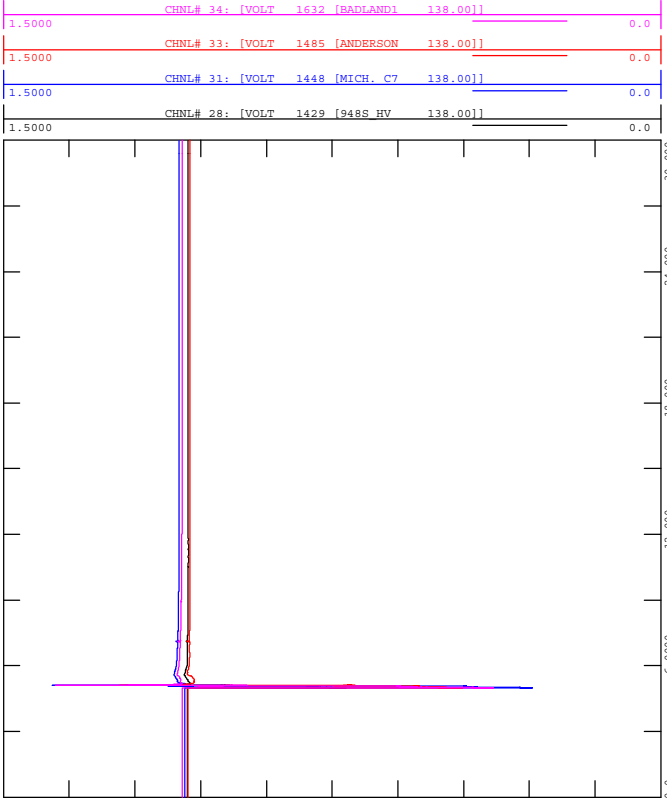


FIGURE A4-30H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-30_3PH_Fault_9L29@Coyote-Lake-963S.out

WED, FEB 16 2022 14:26
 BRANCH FLOW (Q)

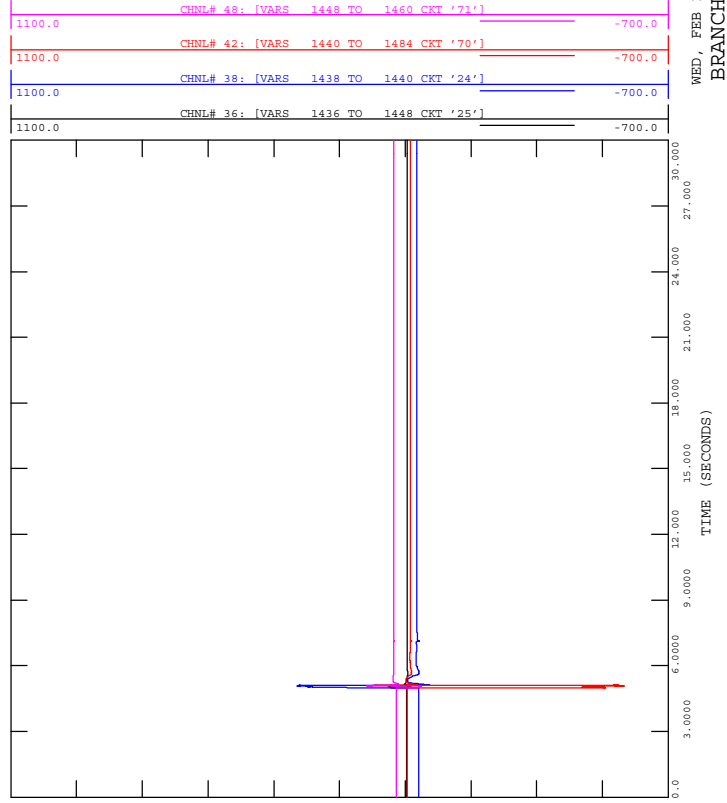


FIGURE A4-30E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-30_3PH_Fault_9L29@Coyote-Lake-963S.out

WED, FEB 16 2022 14:26
 240 KV BUS VOLTAGE (PU)

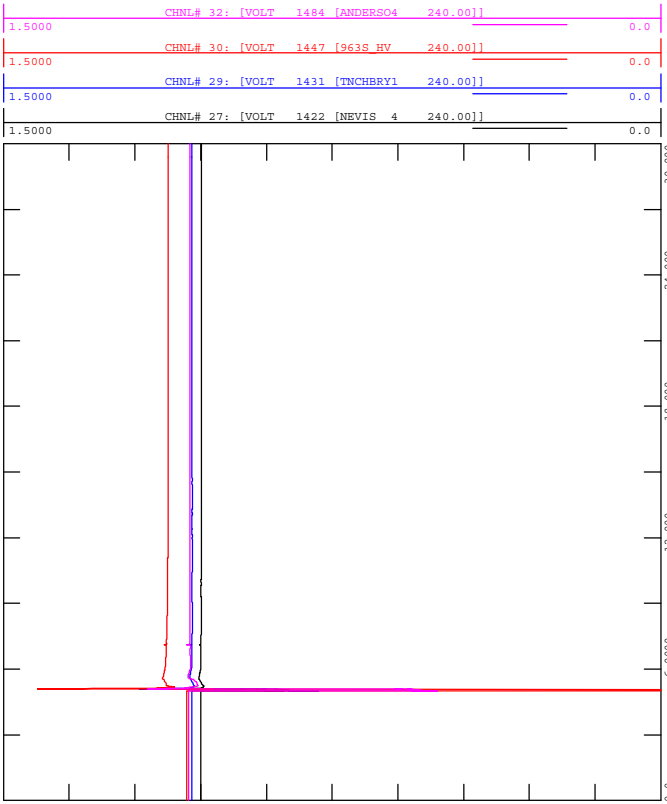


FIGURE A4-30G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-30_3PH_Fault_9L29@Coyote-Lake-963S.out

WED, FEB 16 2022 14:26
 BRANCH FLOW (P)

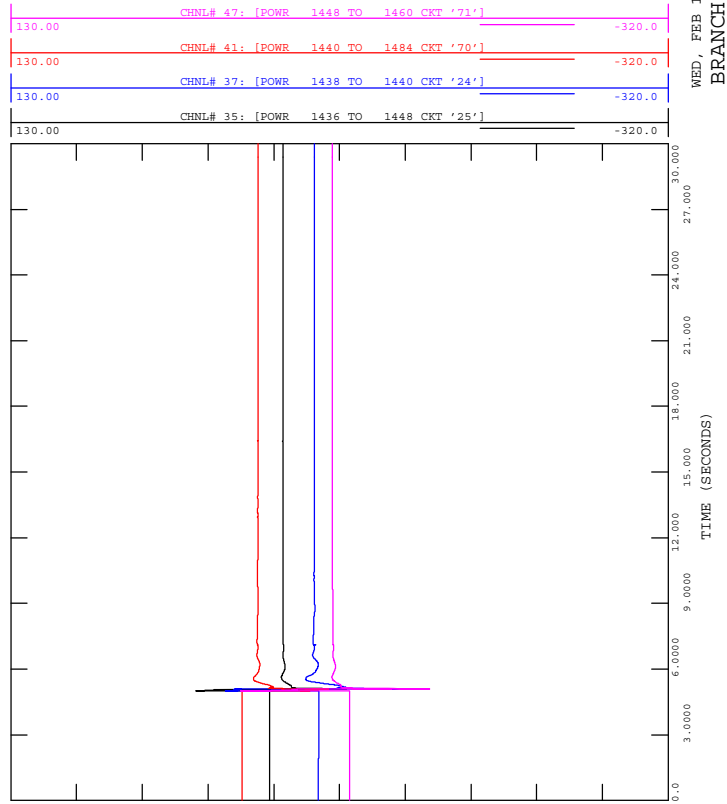




FIGURE A4-31B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-31_3PH_Fault_9L20@Cordel-755S.out

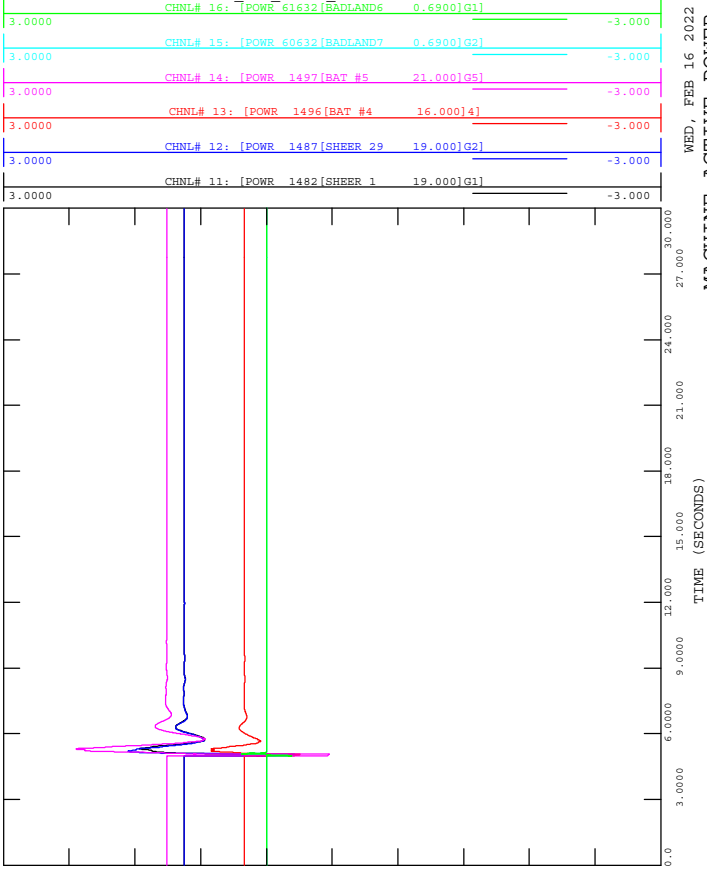


FIGURE A4-31D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-31_3PH_Fault_9L20@Cordel-755S.out

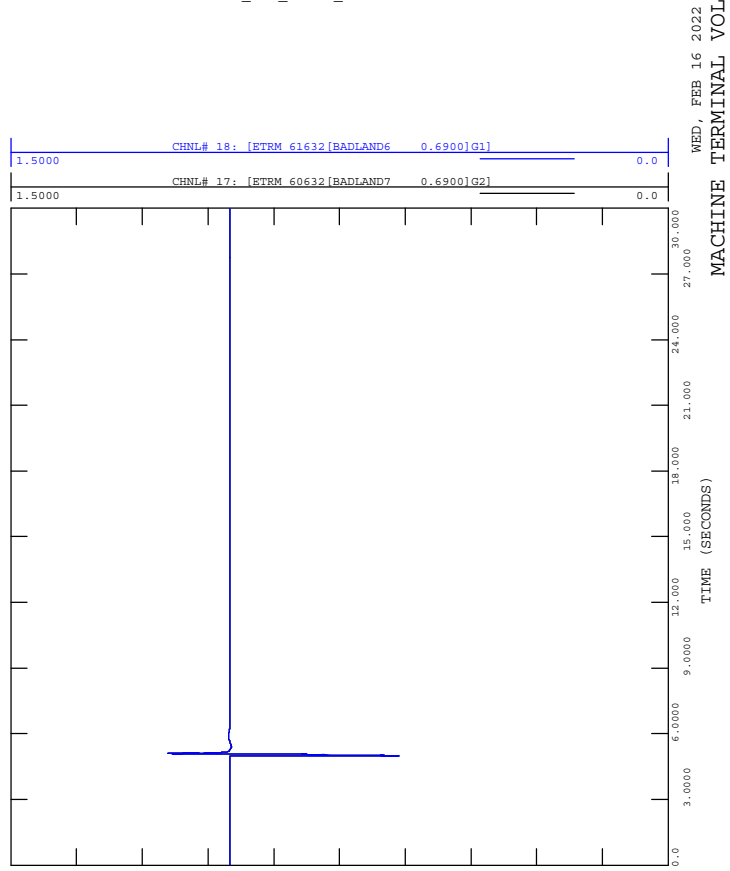


FIGURE A4-31A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-31_3PH_Fault_9L20@Cordel-755S.out

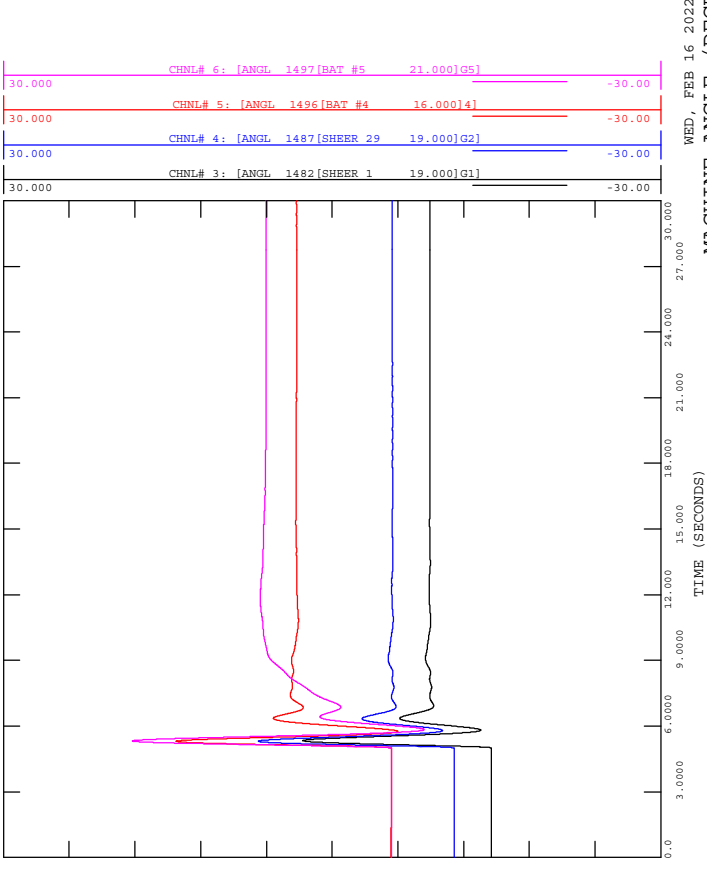


FIGURE A4-31C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-31_3PH_Fault_9L20@Cordel-755S.out

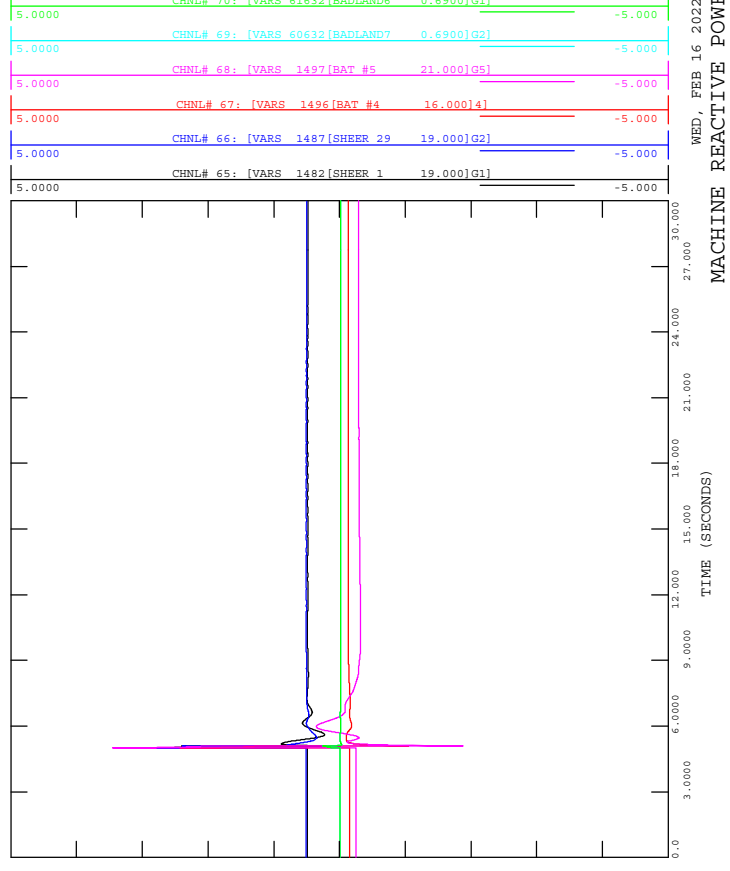




FIGURE A4-31F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-31_3PH_Fault_9L20@Cordel-755S.out

14:27
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

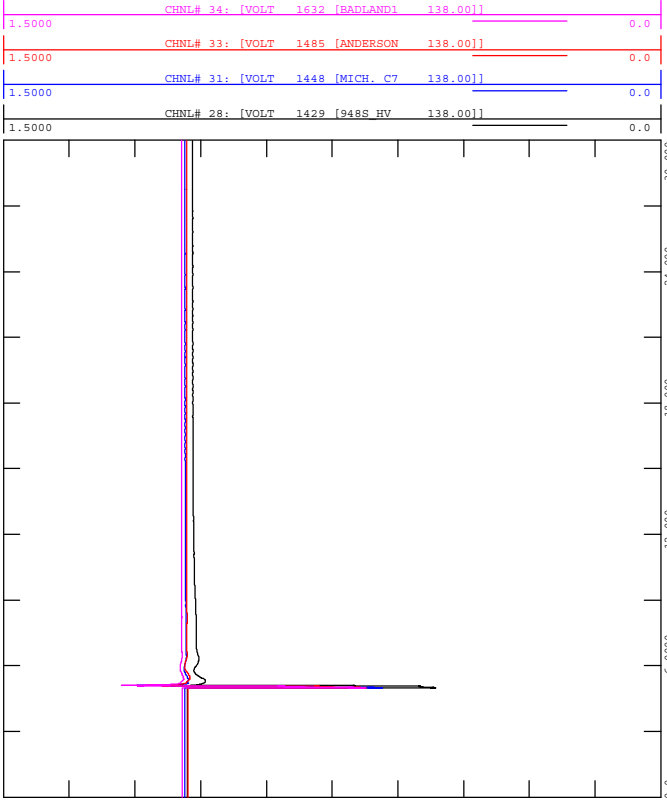


FIGURE A4-31H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-31_3PH_Fault_9L20@Cordel-755S.out

14:27
 WED, FEB 16 2022
 BRANCH FLOW (Q)

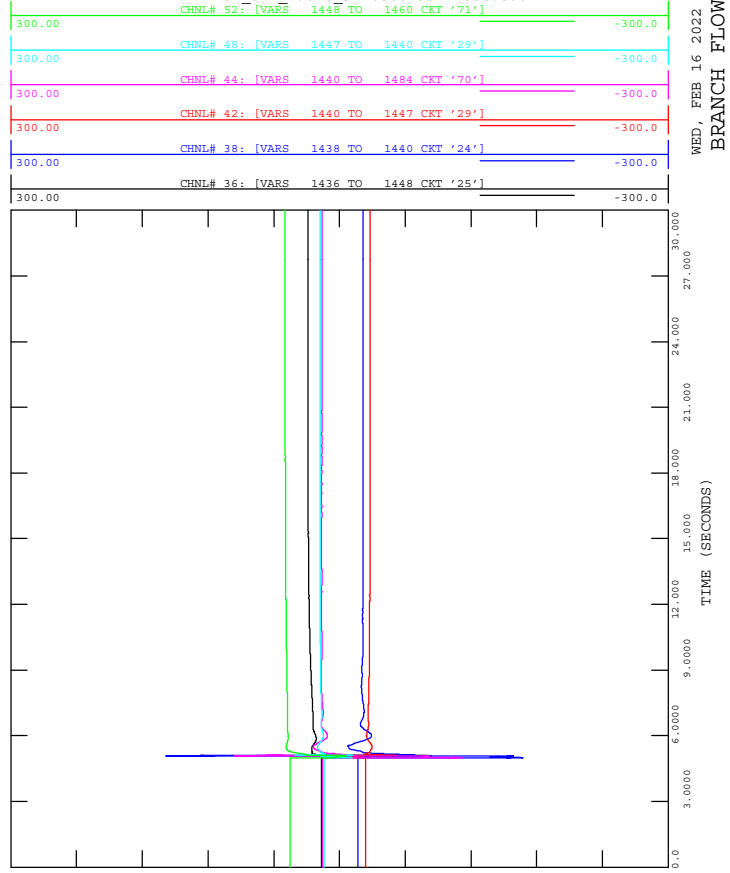


FIGURE A4-31E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-31_3PH_Fault_9L20@Cordel-755S.out

14:27
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

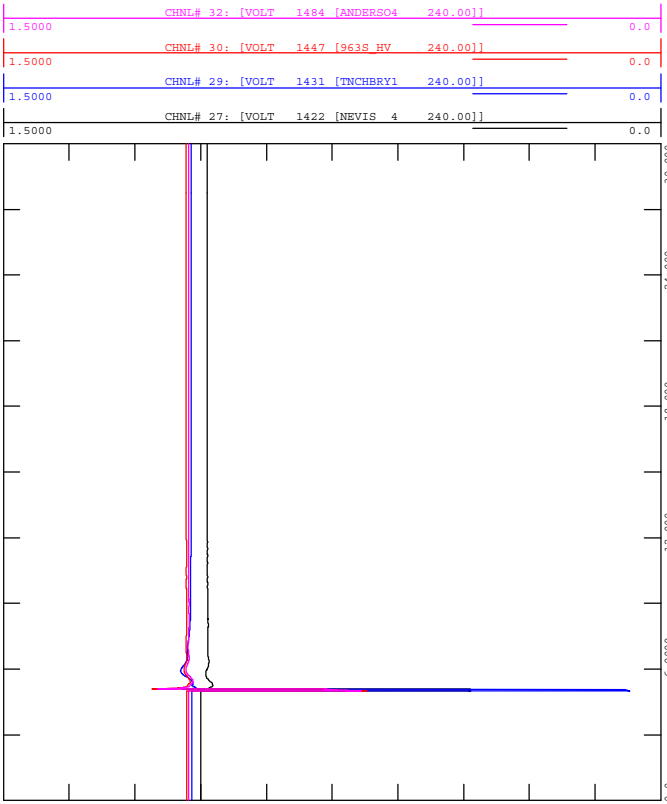


FIGURE A4-31G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-31_3PH_Fault_9L20@Cordel-755S.out

14:27
 WED, FEB 16 2022
 BRANCH FLOW (P)

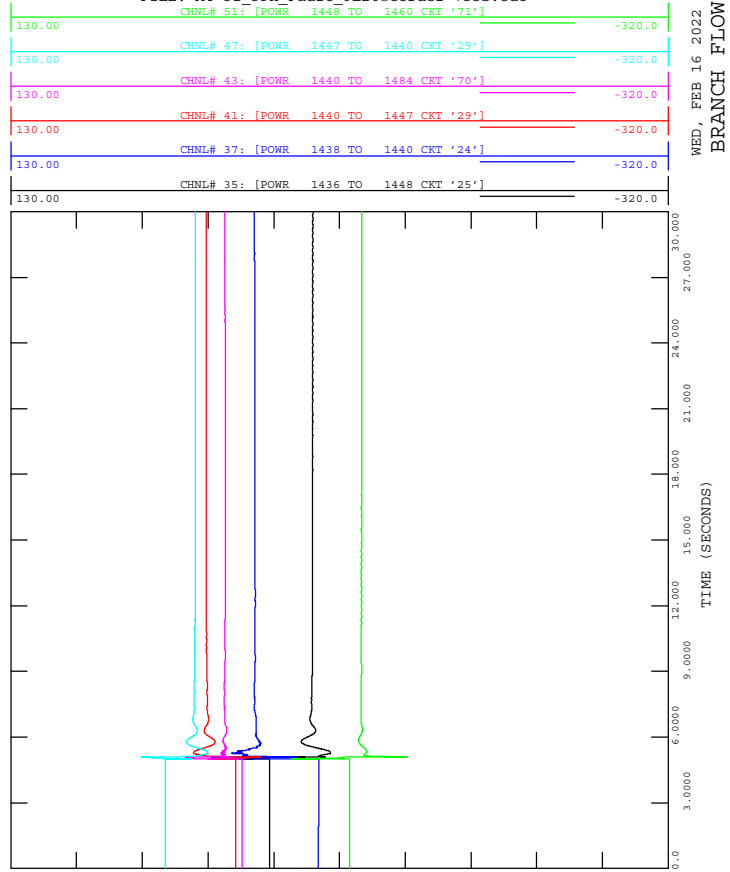
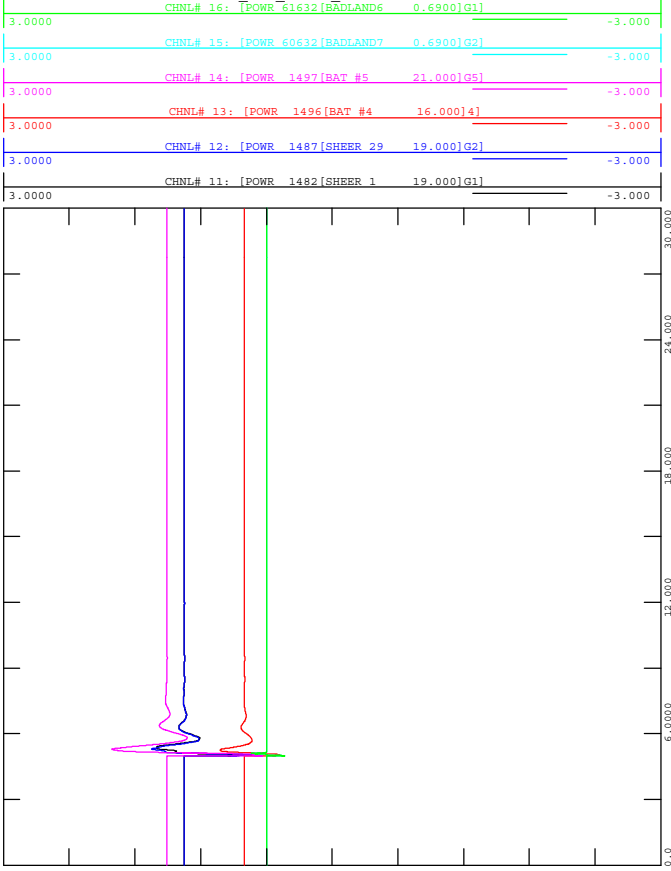




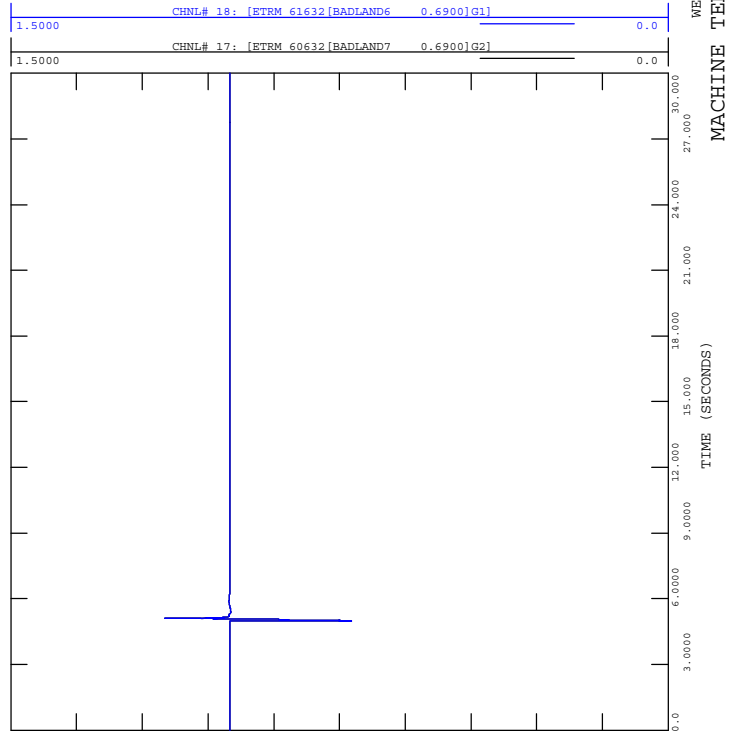
FIGURE A4-32B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-32_3PH_Fault_9L20@Nevis-766S.out



WED, FEB 16 2022 14:27
 MACHINE ACTIVE POWER (MW)



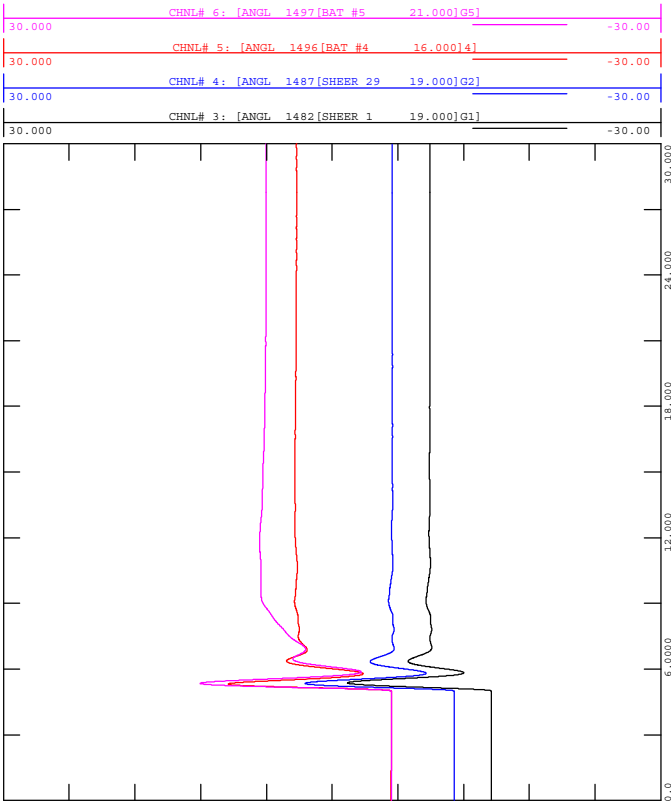
FIGURE A4-32D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-32_3PH_Fault_9L20@Nevis-766S.out



WED, FEB 16 2022 14:27
 MACHINE TERMINAL VOLTAGE



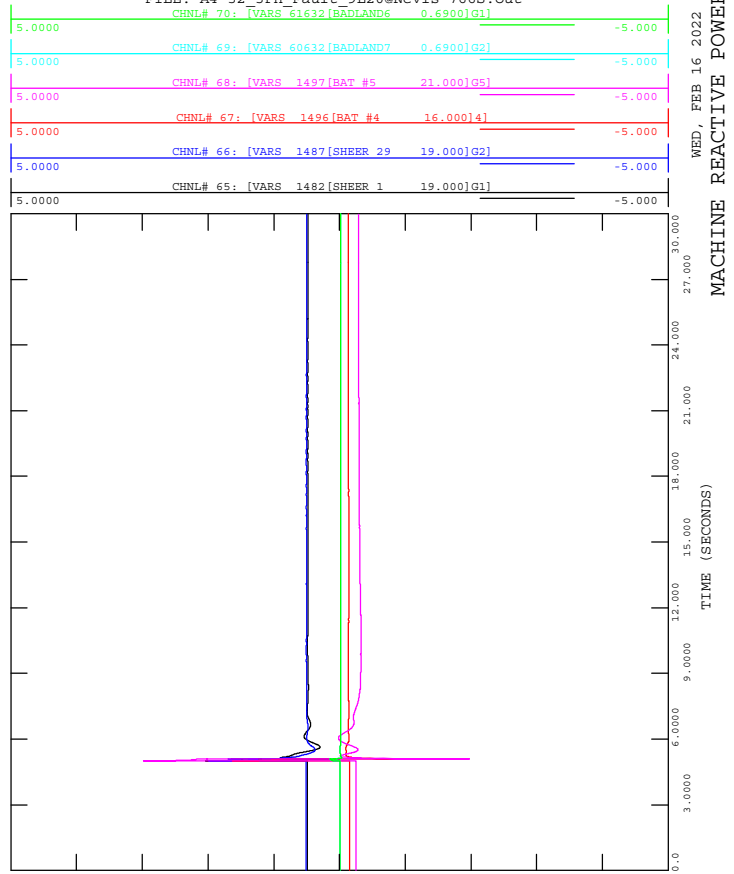
FIGURE A4-32A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-32_3PH_Fault_9L20@Nevis-766S.out



WED, FEB 16 2022 14:27
 MACHINE ANGLE (DEGREES)



FIGURE A4-32C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-32_3PH_Fault_9L20@Nevis-766S.out



WED, FEB 16 2022 14:27
 MACHINE REACTIVE POWER (M)



FIGURE A4-32F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-32_3PH_Fault_9L20@Nevis-766S.out

14:27
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

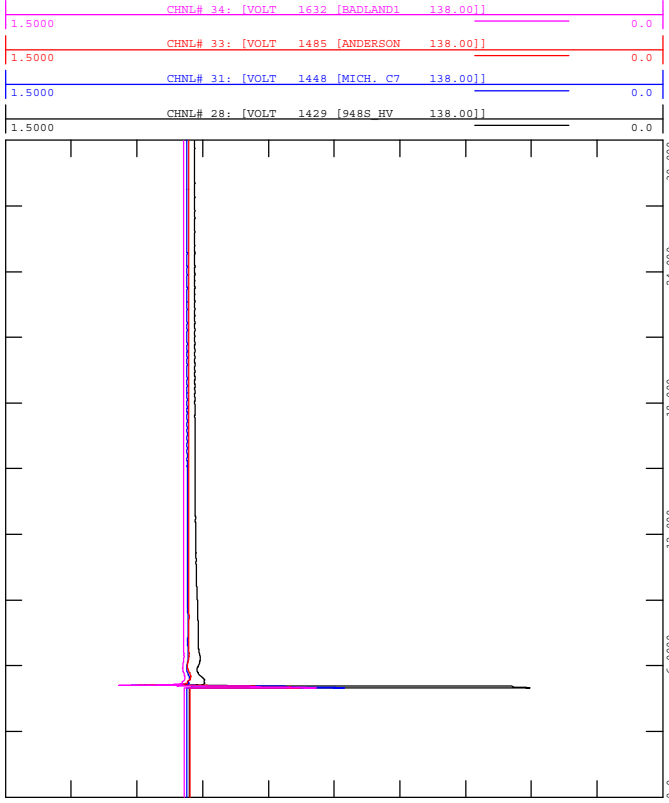


FIGURE A4-32H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-32_3PH_Fault_9L20@Nevis-766S.out

14:27
 WED, FEB 16 2022
 BRANCH FLOW (Q)

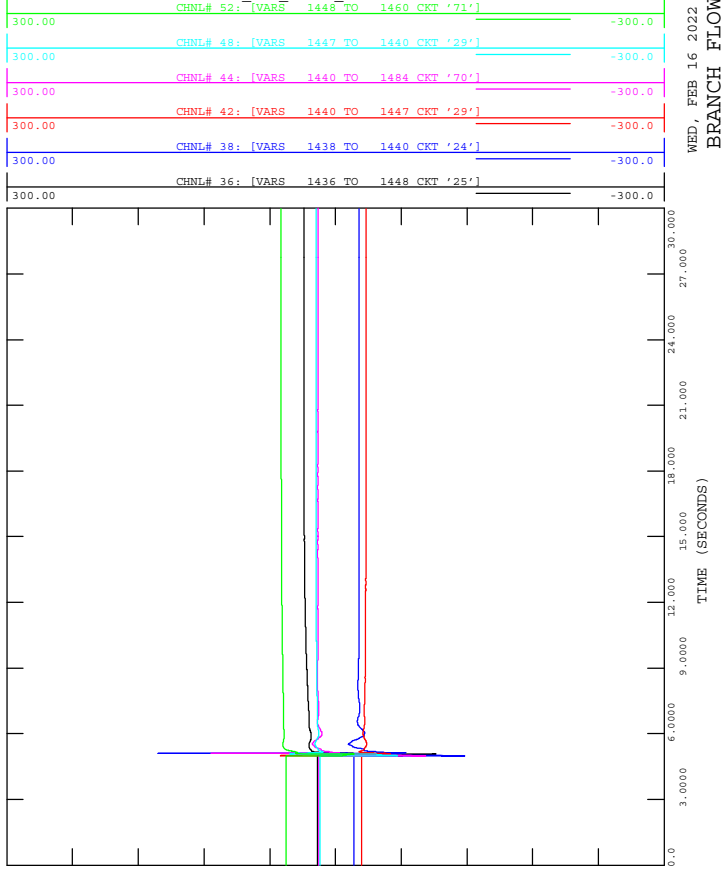


FIGURE A4-32E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-32_3PH_Fault_9L20@Nevis-766S.out

14:27
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

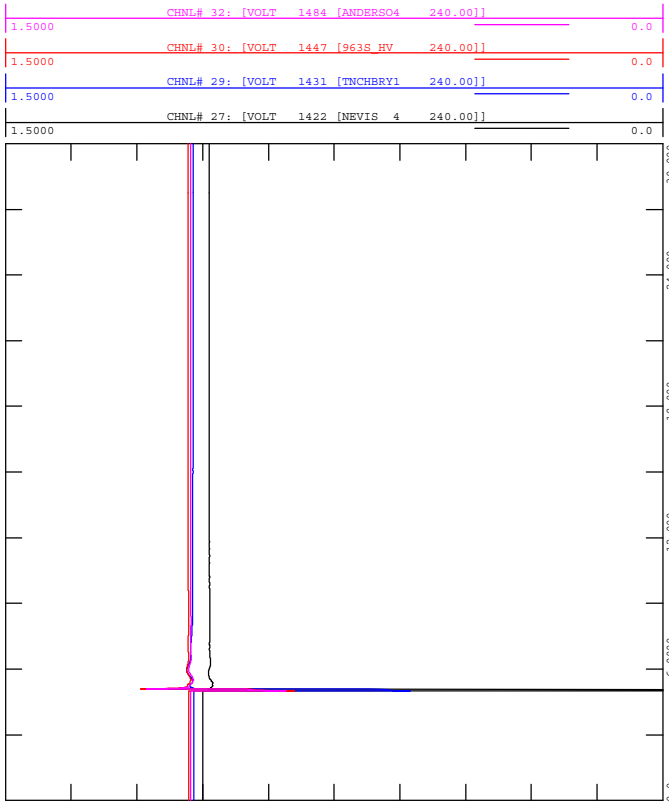


FIGURE A4-32G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-32_3PH_Fault_9L20@Nevis-766S.out

14:27
 WED, FEB 16 2022
 BRANCH FLOW (P)

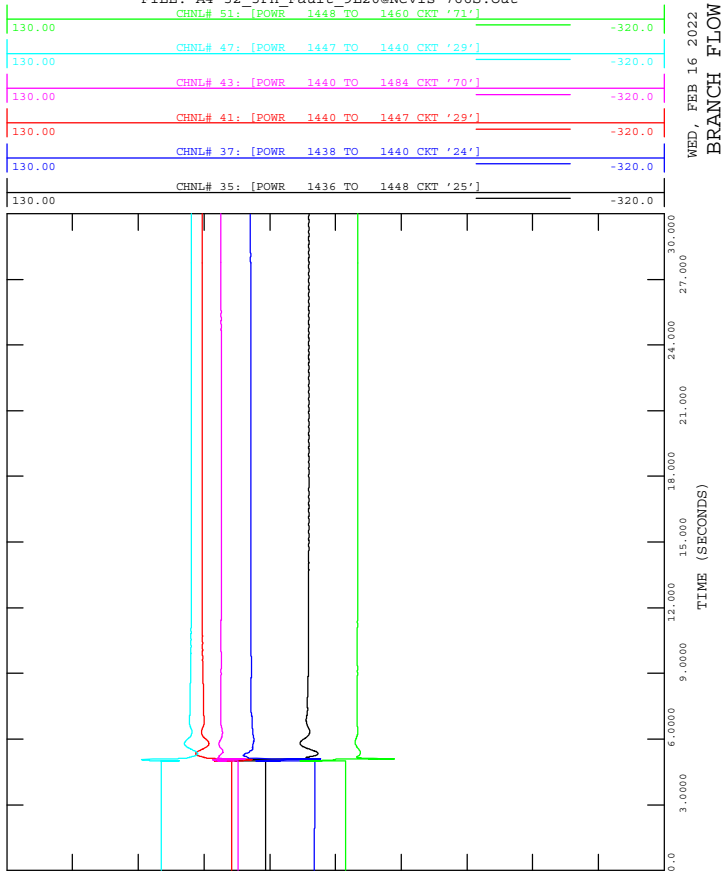
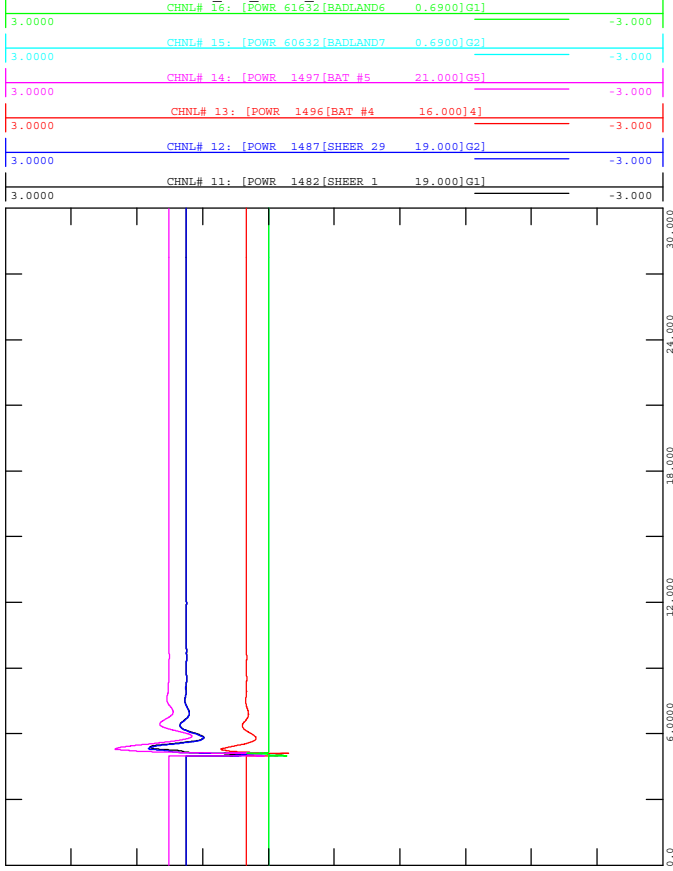




FIGURE A4-33B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-33_3PH_Fault_912L-9L912@Nevis-766S.out



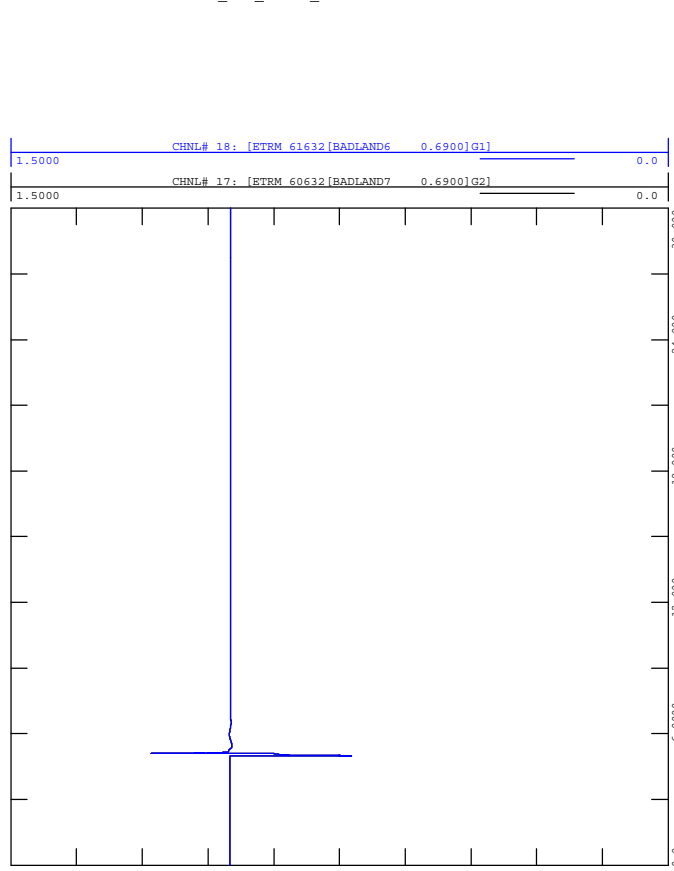
MACHINE ACTIVE POWER (MW)

TIME (SECONDS)

WED, FEB 16 2022 14:28



FIGURE A4-33D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-33_3PH_Fault_912L-9L912@Nevis-766S.out



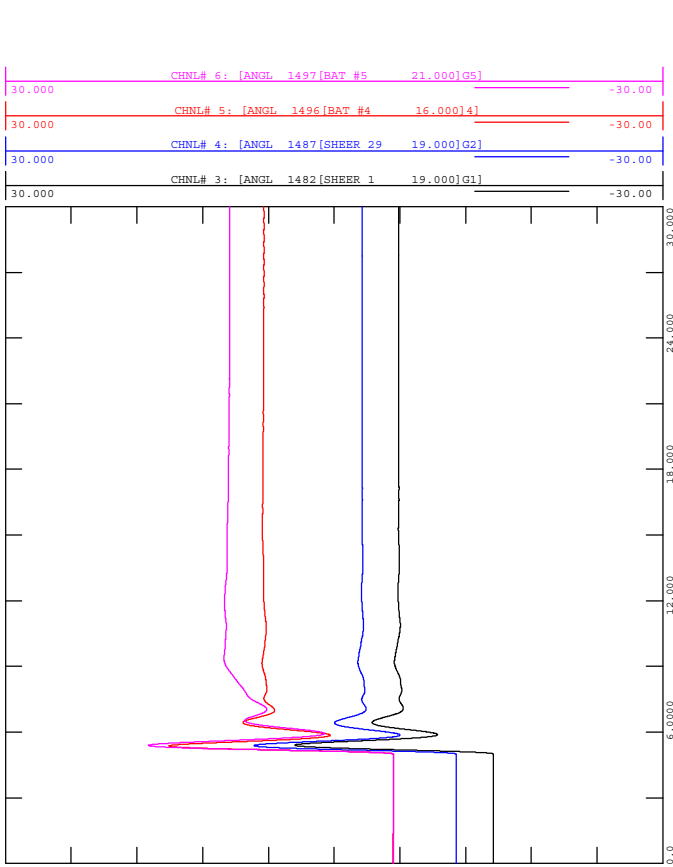
MACHINE TERMINAL VOLTAGE

TIME (SECONDS)

WED, FEB 16 2022 14:28



FIGURE A4-33A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-33_3PH_Fault_912L-9L912@Nevis-766S.out



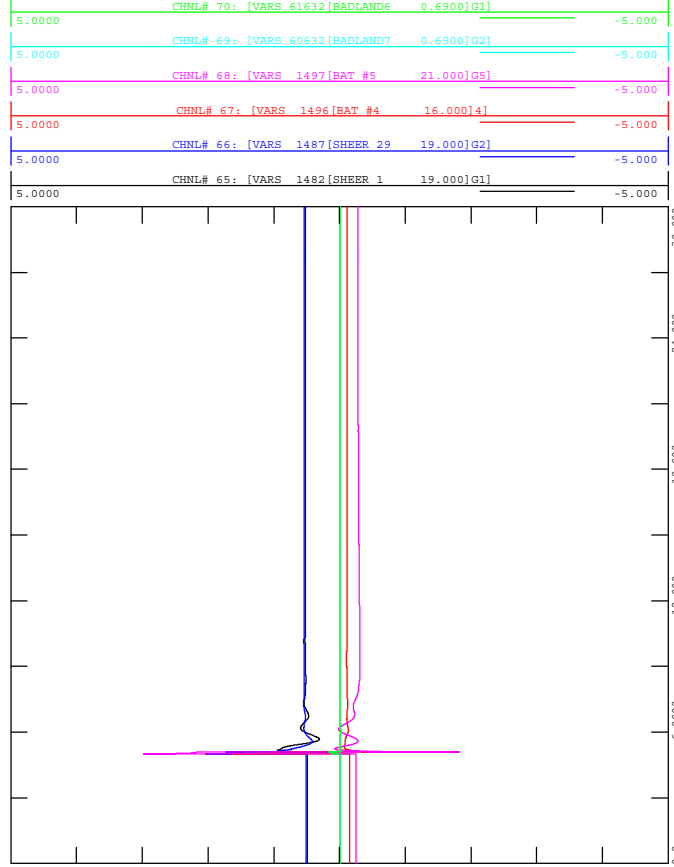
MACHINE ANGLE (DEGREES)

TIME (SECONDS)

WED, FEB 16 2022 14:28



FIGURE A4-33C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-33_3PH_Fault_912L-9L912@Nevis-766S.out



MACHINE REACTIVE POWER (M)

TIME (SECONDS)

WED, FEB 16 2022 14:28



FIGURE A4-33F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-33_3PH_Fault_912L-9L912@Nevis-766S.out

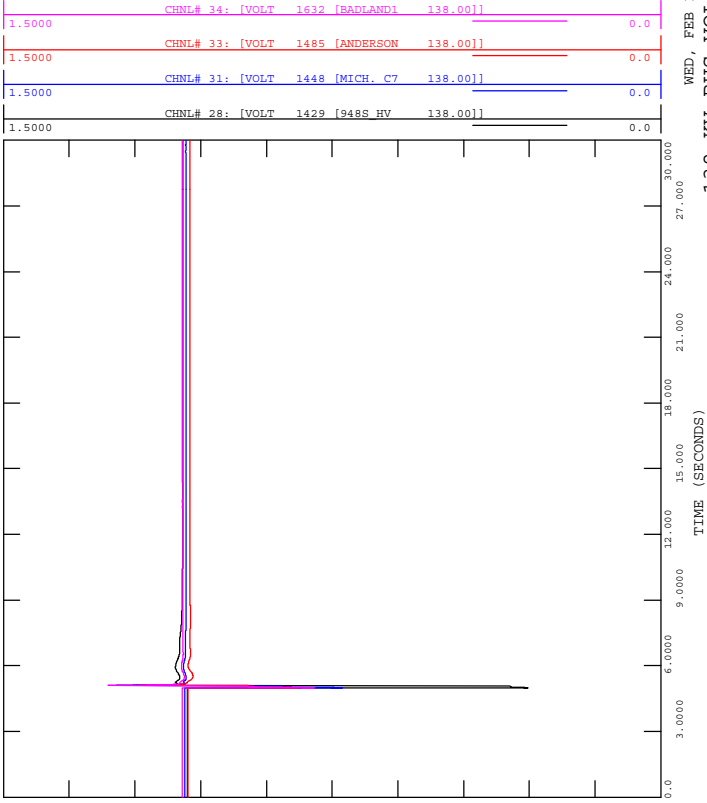


FIGURE A4-33H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-33_3PH_Fault_912L-9L912@Nevis-766S.out

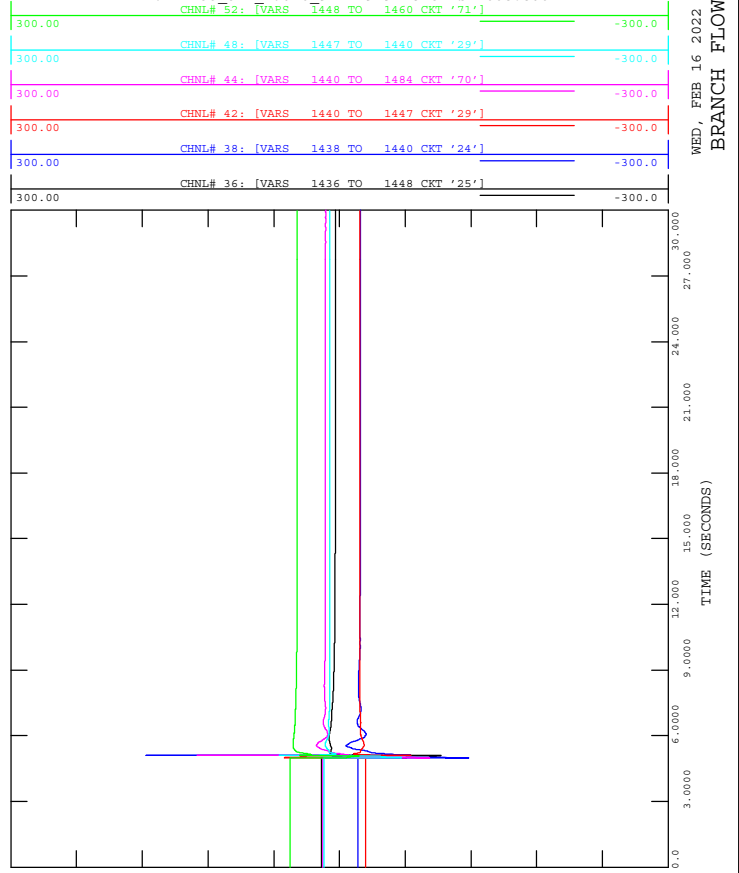


FIGURE A4-33E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-33_3PH_Fault_912L-9L912@Nevis-766S.out

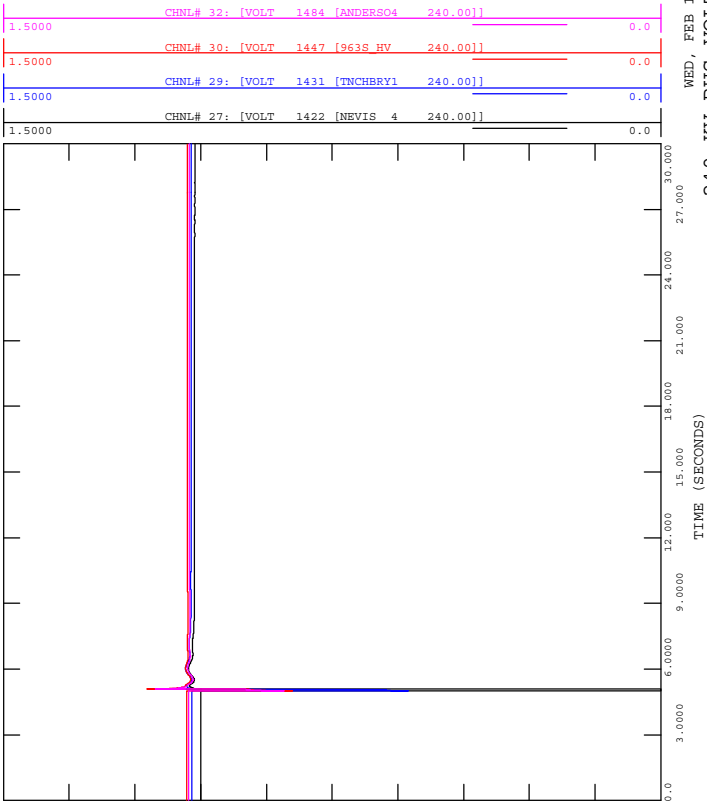


FIGURE A4-33G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-33_3PH_Fault_912L-9L912@Nevis-766S.out

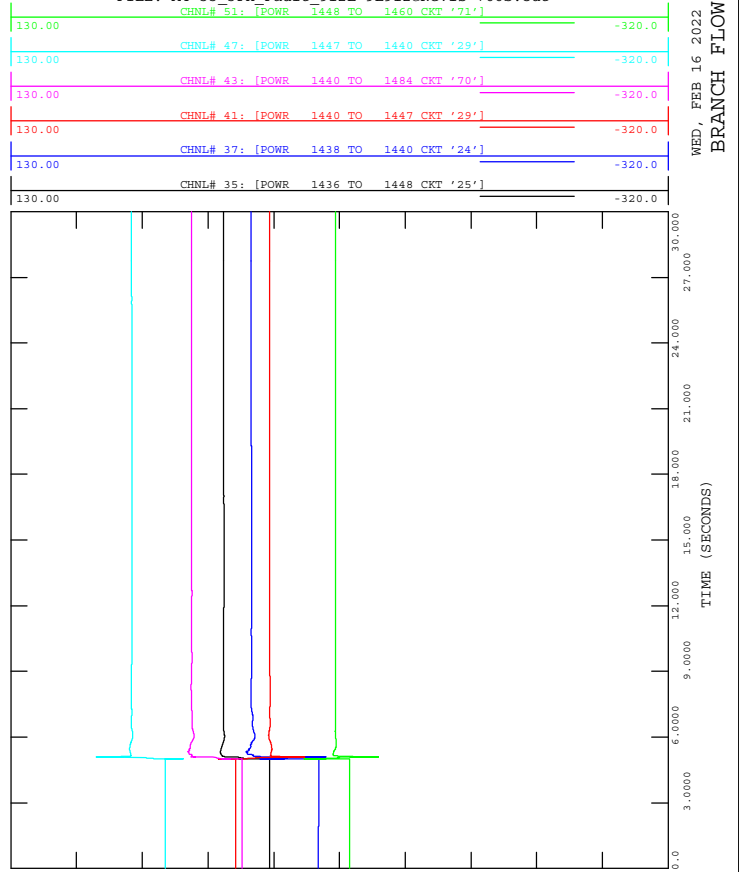
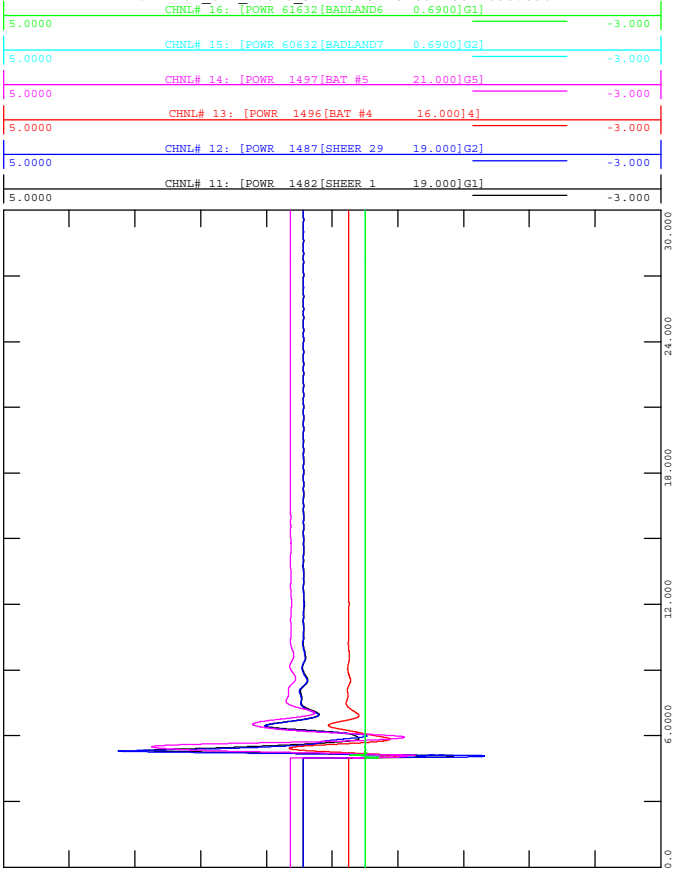




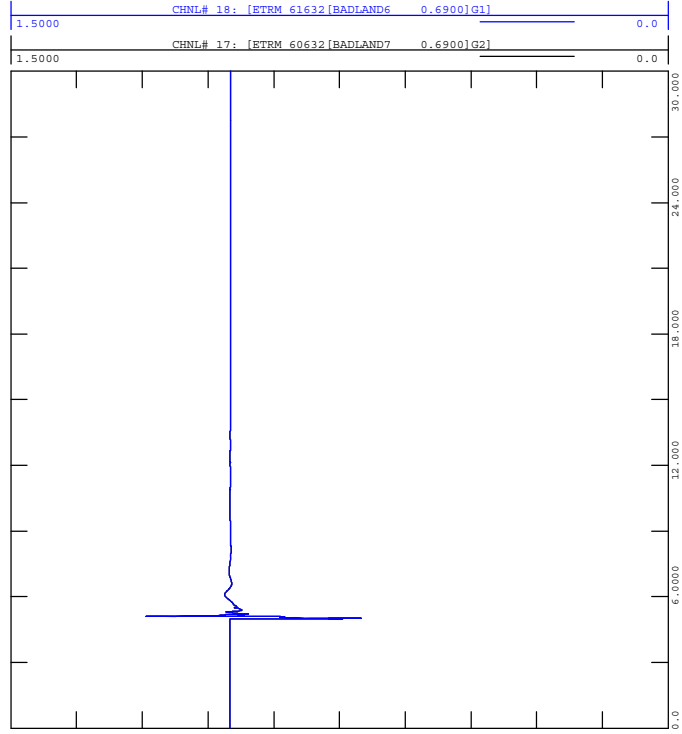
FIGURE A4-34B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-34_3PH_Fault_912L-9L912@Red-Deer-63S.out
 CHNL# 16: [POWR 61632[BADLAND6 0.6900]G1]



WED, FEB 16 2022 14:29
 MACHINE ACTIVE POWER (MW)



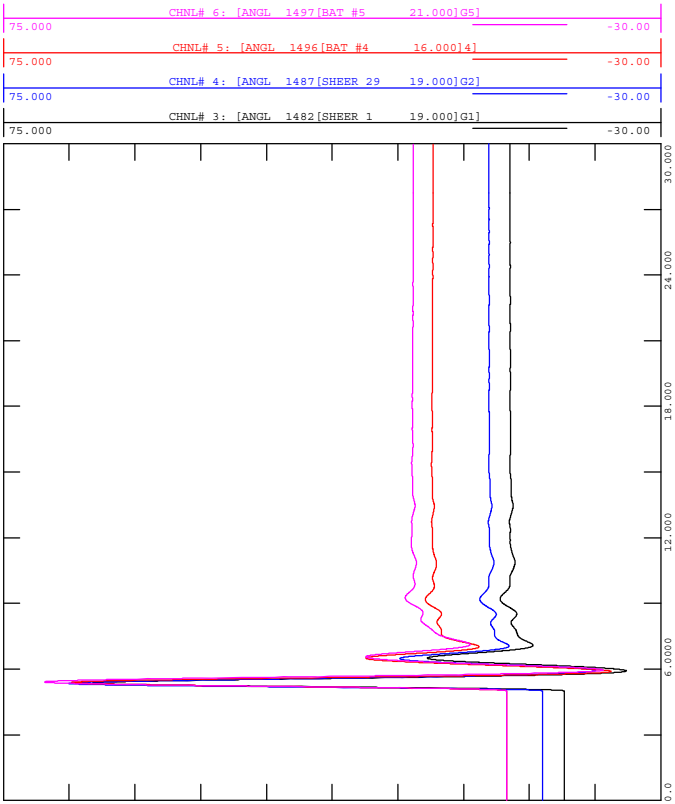
FIGURE A4-34D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-34_3PH_Fault_912L-9L912@Red-Deer-63S.out
 CHNL# 18: [BTRM 61632[BADLAND6 0.6900]G1]



WED, FEB 16 2022 14:29
 MACHINE TERMINAL VOLTAGE



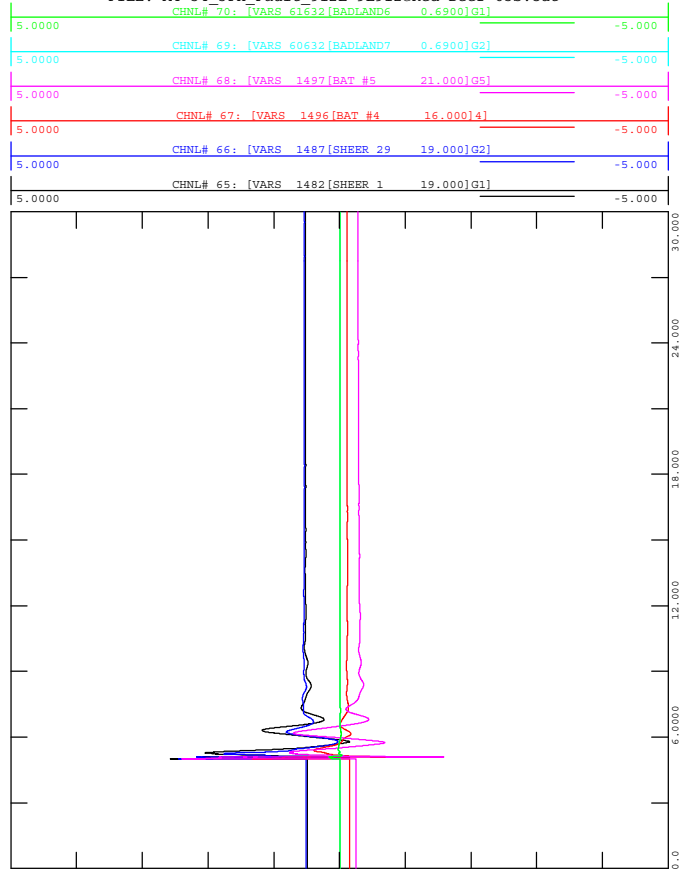
FIGURE A4-34A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-34_3PH_Fault_912L-9L912@Red-Deer-63S.out
 CHNL# 6: [ANGL 1497[BAT #5 21.000]G5]



WED, FEB 16 2022 14:29
 MACHINE ANGLE (DEGREES)



FIGURE A4-34C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-34_3PH_Fault_912L-9L912@Red-Deer-63S.out
 CHNL# 70: [VARS 61632[BADLAND6 0.6900]G1]



WED, FEB 16 2022 14:29
 MACHINE REACTIVE POWER (M)



FIGURE A4-34F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-34_3PH_Fault_912L-9L912@Red-Deer-63S.out

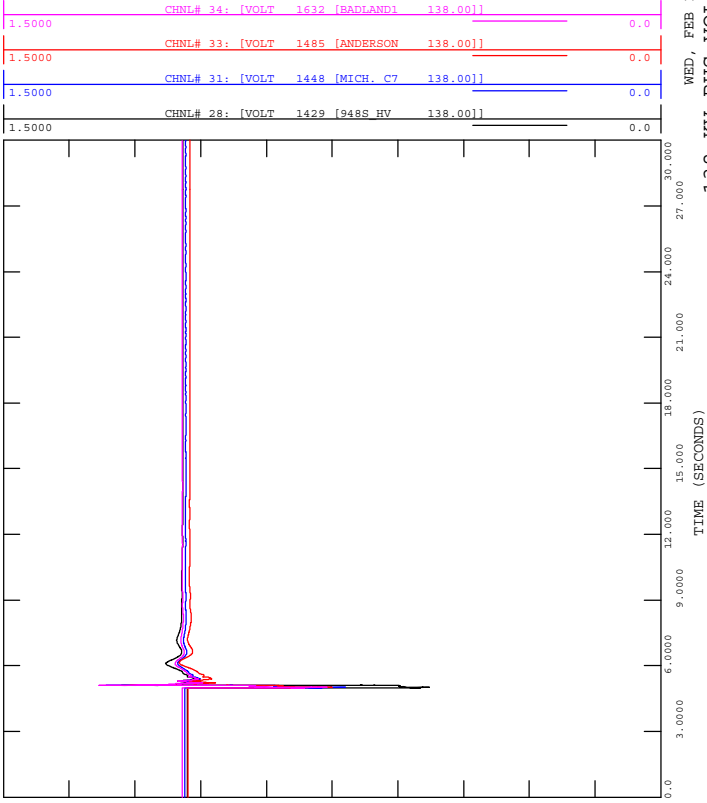


FIGURE A4-34H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-34_3PH_Fault_912L-9L912@Red-Deer-63S.out

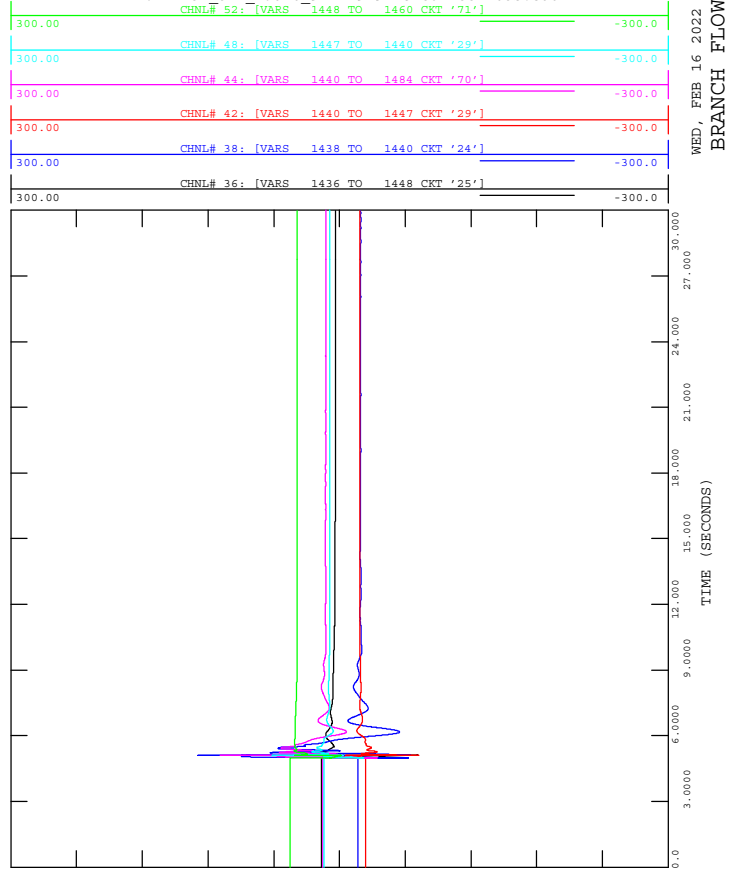


FIGURE A4-34E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-34_3PH_Fault_912L-9L912@Red-Deer-63S.out

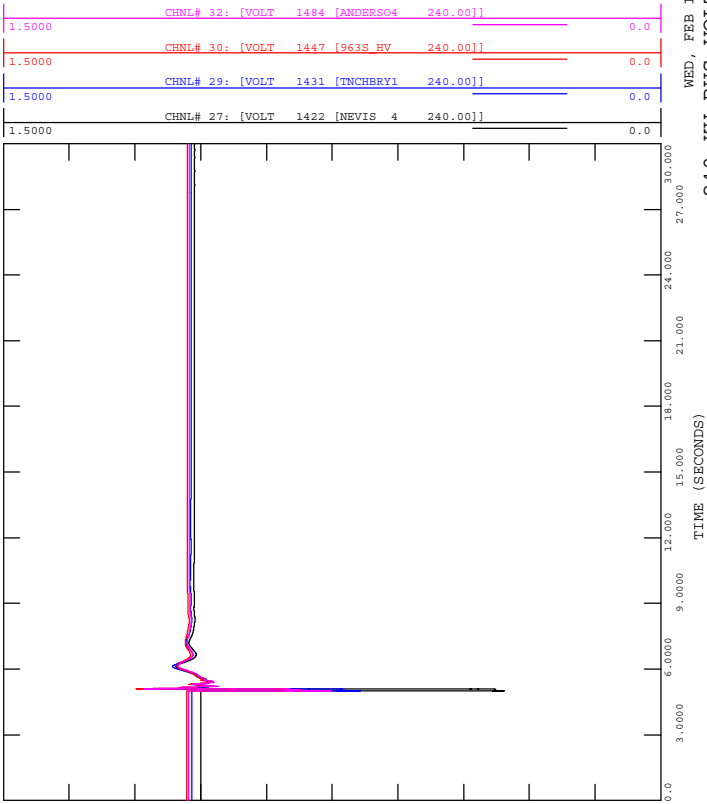
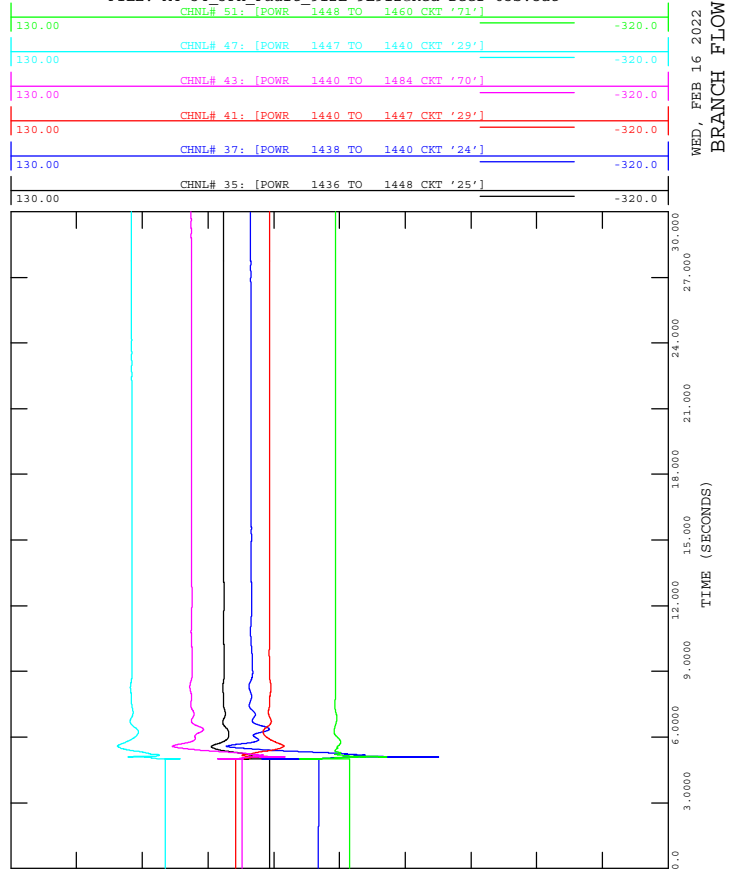


FIGURE A4-34G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-34_3PH_Fault_912L-9L912@Red-Deer-63S.out



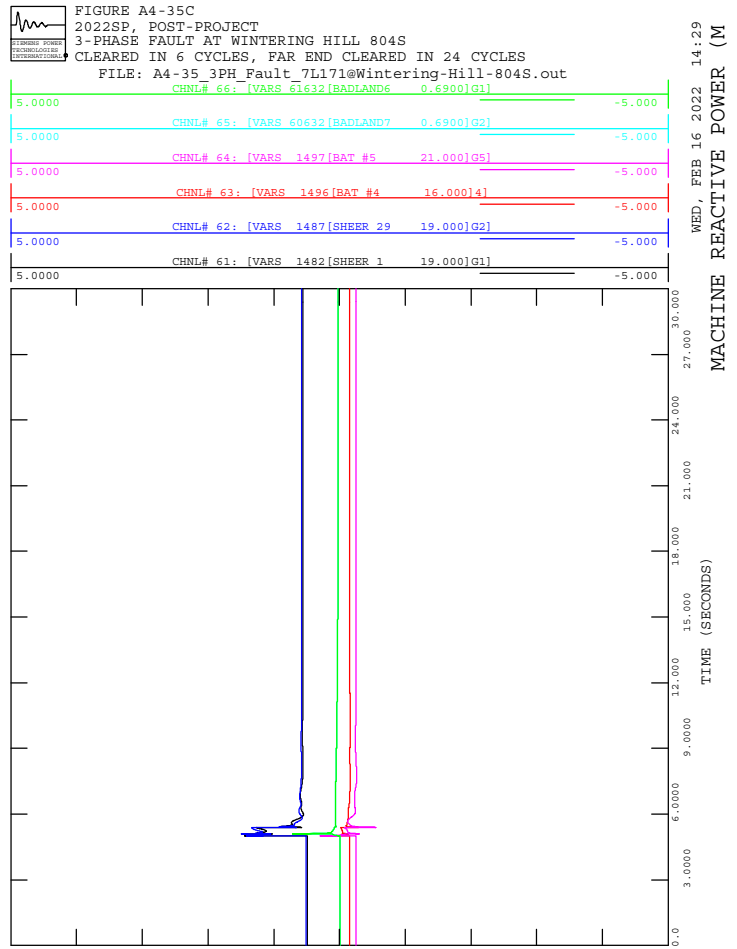
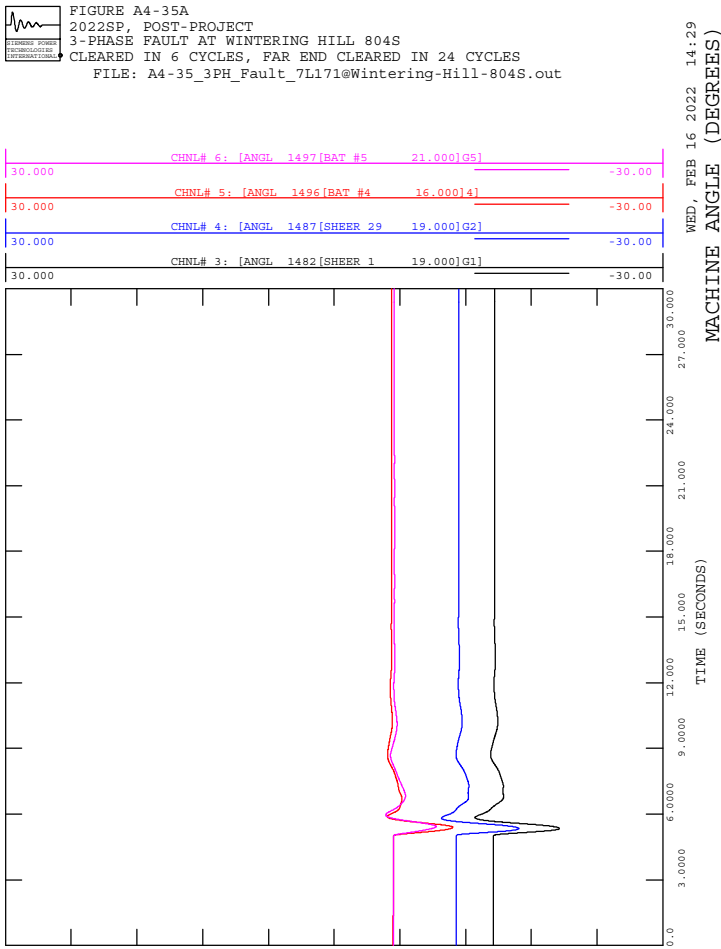
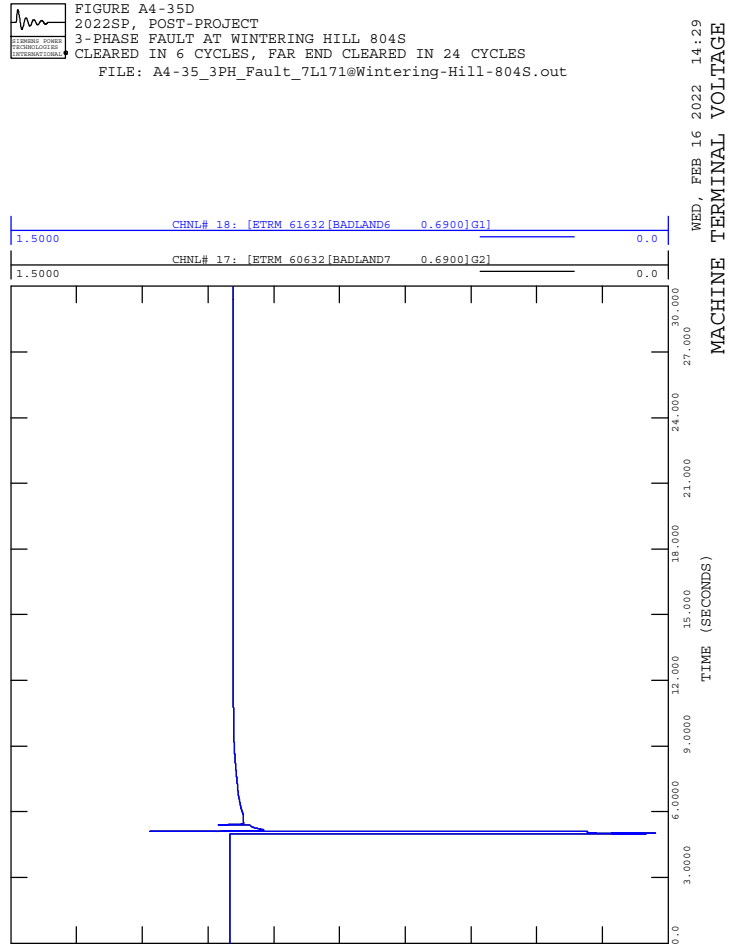
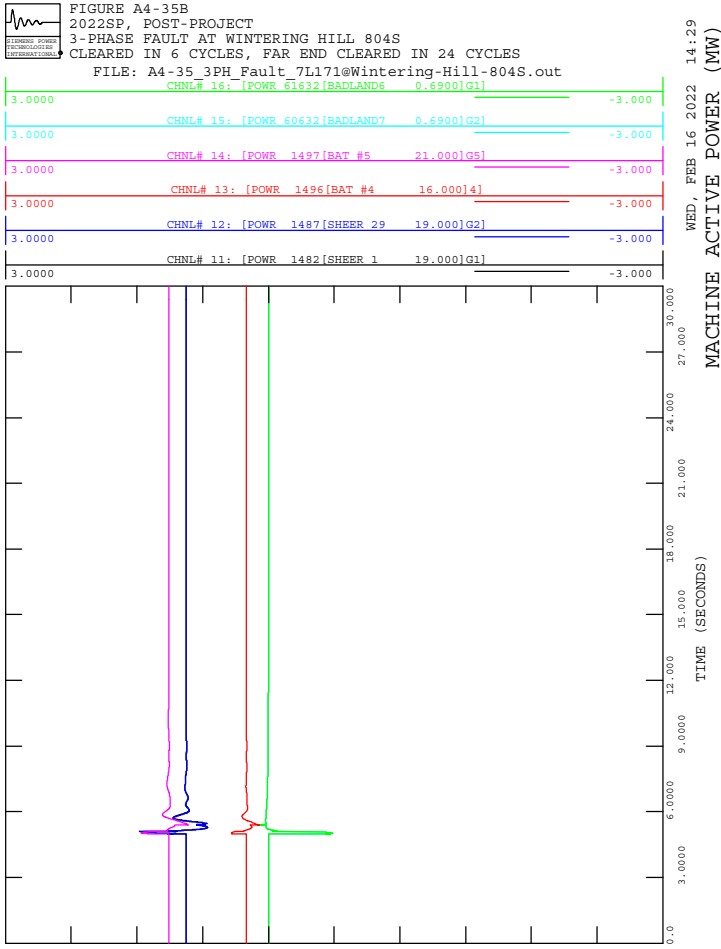




FIGURE A4-35F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-35_3PH_Fault_7L171@Wintering-Hill-804S.out

14:30
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

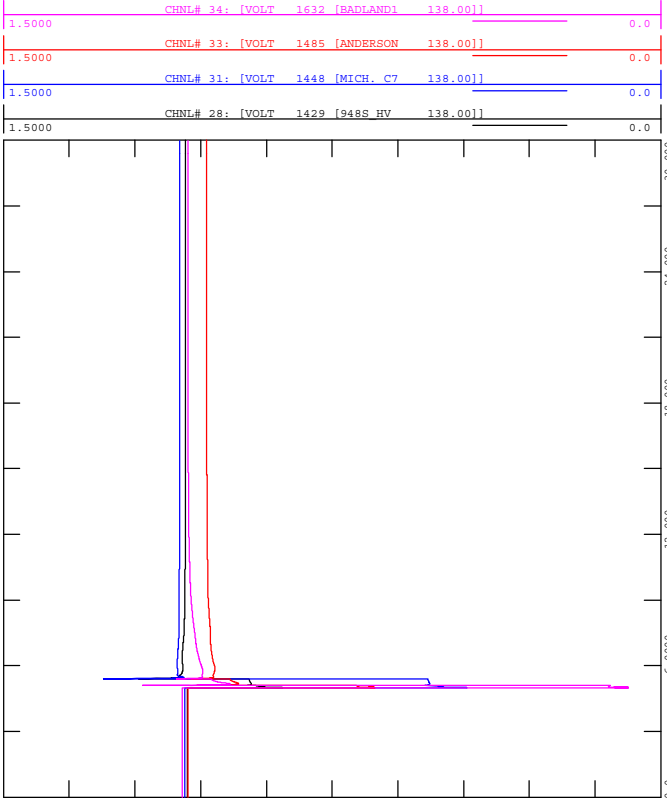


FIGURE A4-35H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-35_3PH_Fault_7L171@Wintering-Hill-804S.out

14:30
 WED, FEB 16 2022
 BRANCH FLOW (Q)

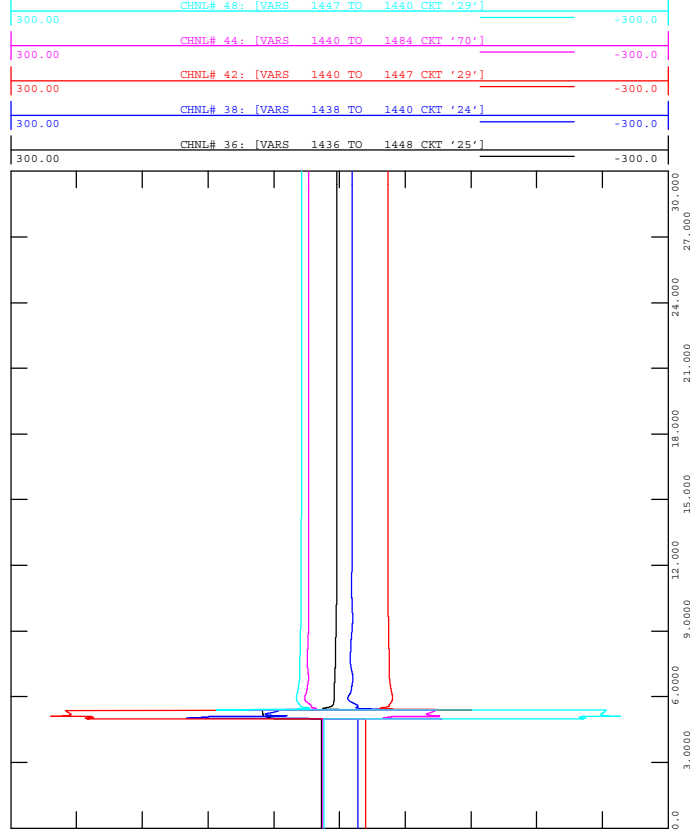


FIGURE A4-35E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-35_3PH_Fault_7L171@Wintering-Hill-804S.out

14:30
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

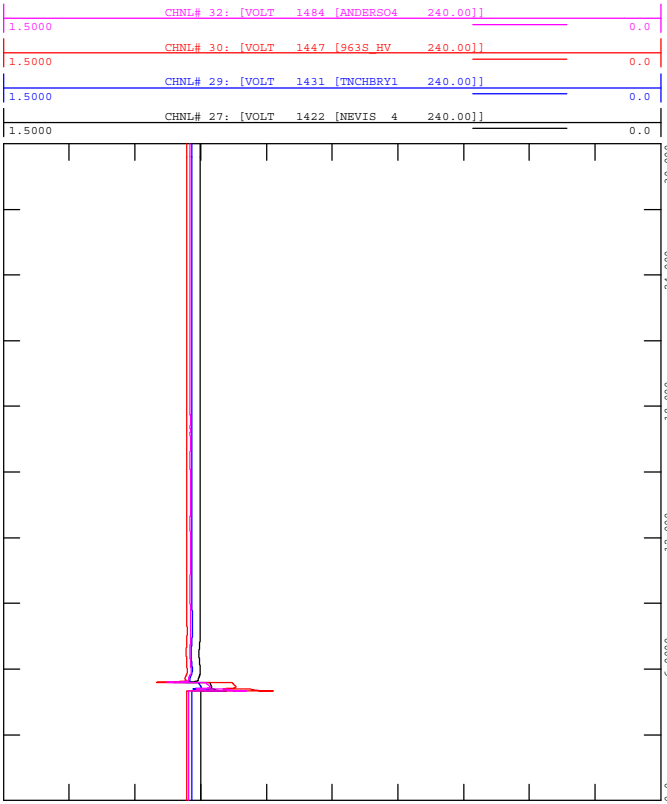


FIGURE A4-35G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-35_3PH_Fault_7L171@Wintering-Hill-804S.out

14:30
 WED, FEB 16 2022
 BRANCH FLOW (P)

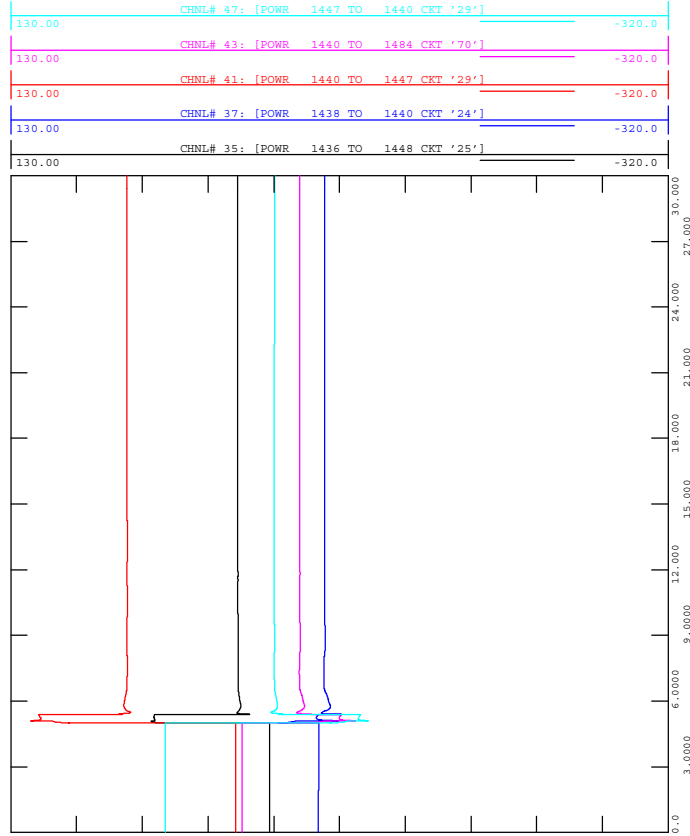
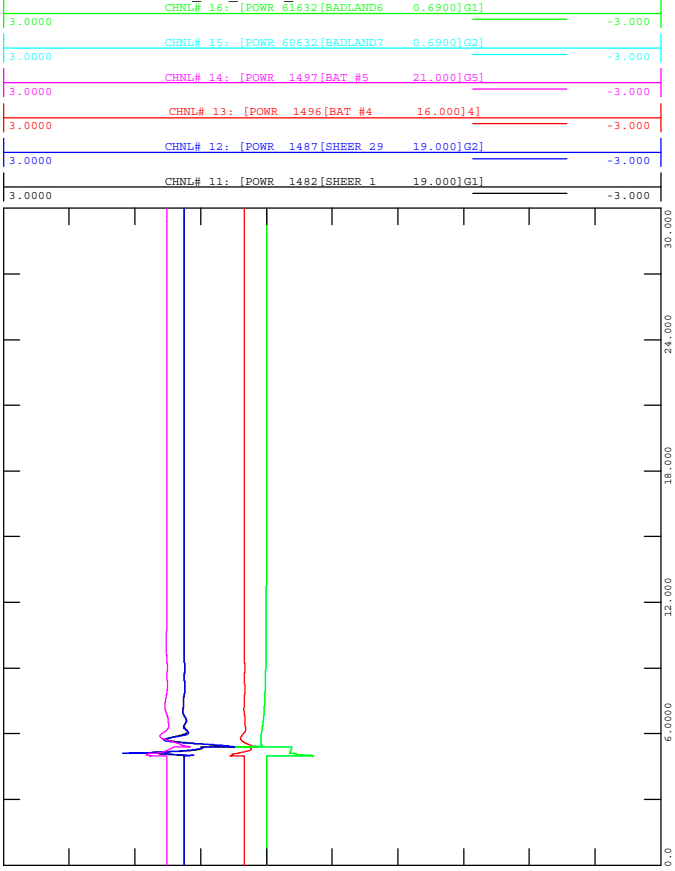




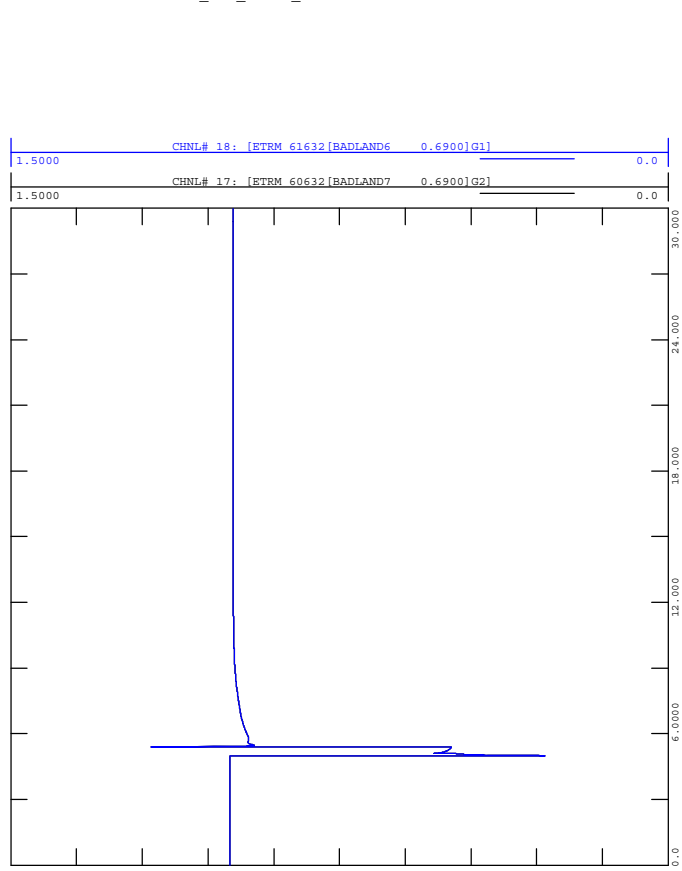
FIGURE A4-36B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-36_3PH_Fault_7L171@Michichi-Creek-802S.out



WED, FEB 16 2022 14:30
 MACHINE ACTIVE POWER (MW)



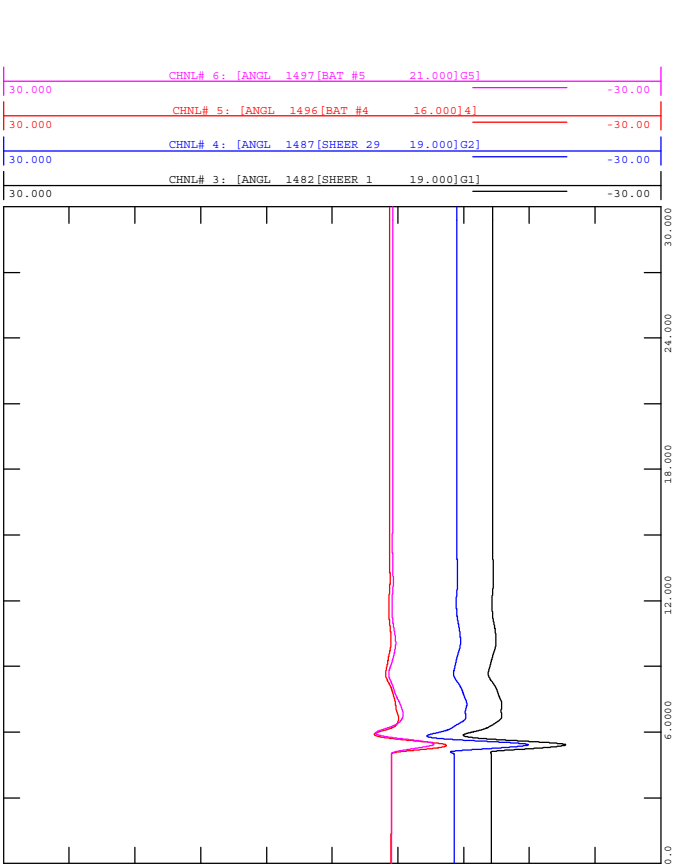
FIGURE A4-36D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-36_3PH_Fault_7L171@Michichi-Creek-802S.out



WED, FEB 16 2022 14:30
 MACHINE TERMINAL VOLTAGE



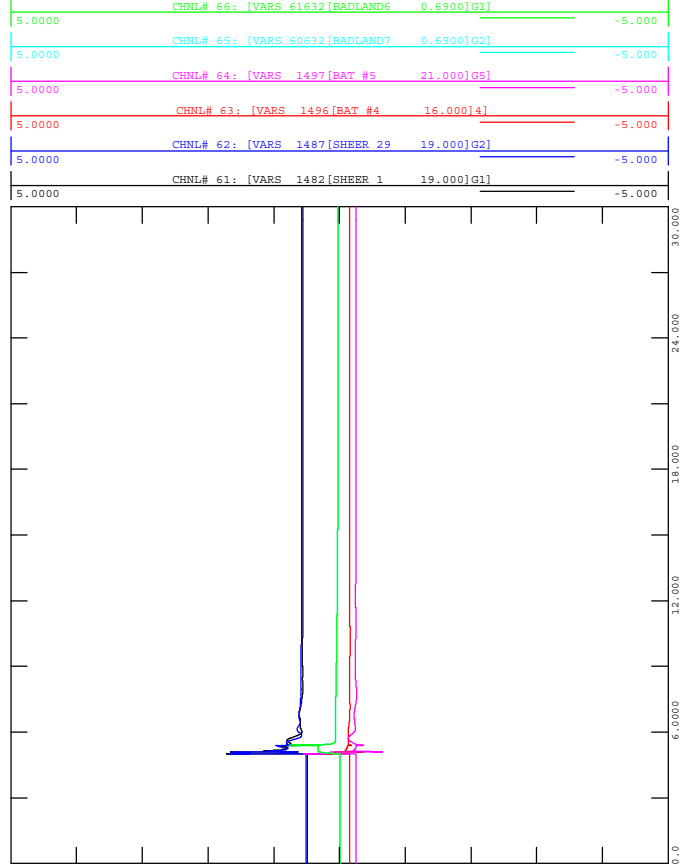
FIGURE A4-36A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-36_3PH_Fault_7L171@Michichi-Creek-802S.out



WED, FEB 16 2022 14:30
 MACHINE ANGLE (DEGREES)



FIGURE A4-36C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-36_3PH_Fault_7L171@Michichi-Creek-802S.out



WED, FEB 16 2022 14:30
 MACHINE REACTIVE POWER (M)



FIGURE A4-36F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-36_3PH_Fault_7L171@Michichi-Creek-802S.out

14:30
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

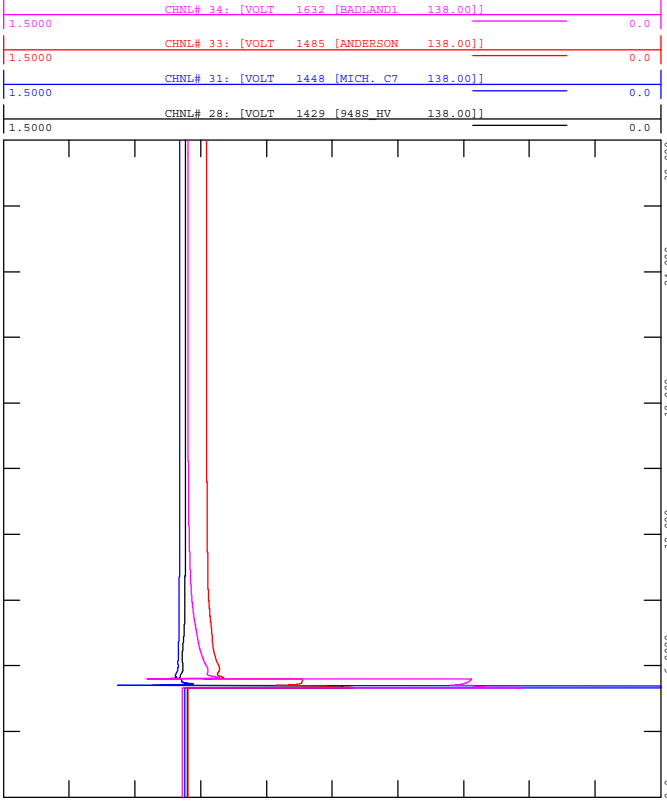


FIGURE A4-36H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-36_3PH_Fault_7L171@Michichi-Creek-802S.out

14:30
 WED, FEB 16 2022
 BRANCH FLOW (Q)

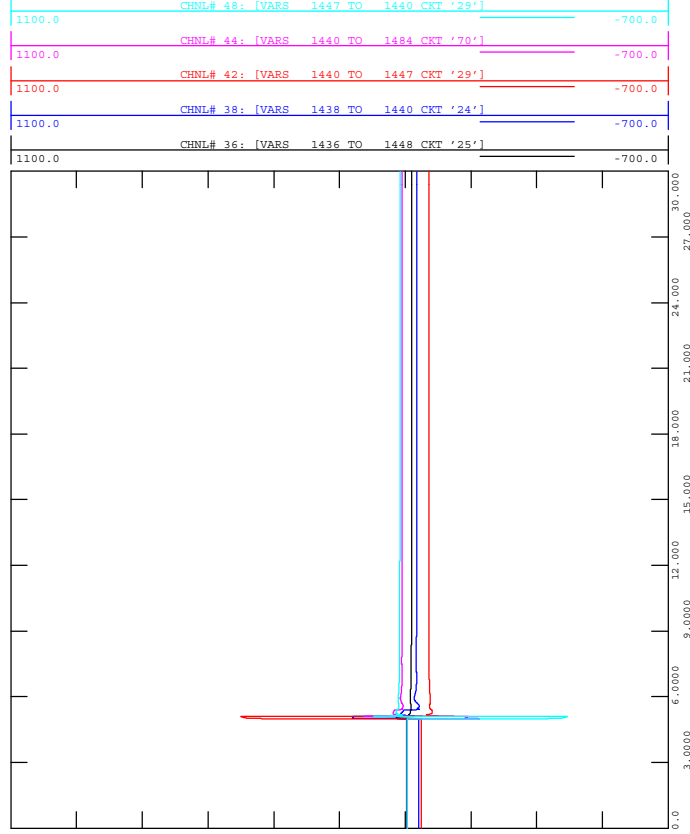


FIGURE A4-36E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-36_3PH_Fault_7L171@Michichi-Creek-802S.out

14:30
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

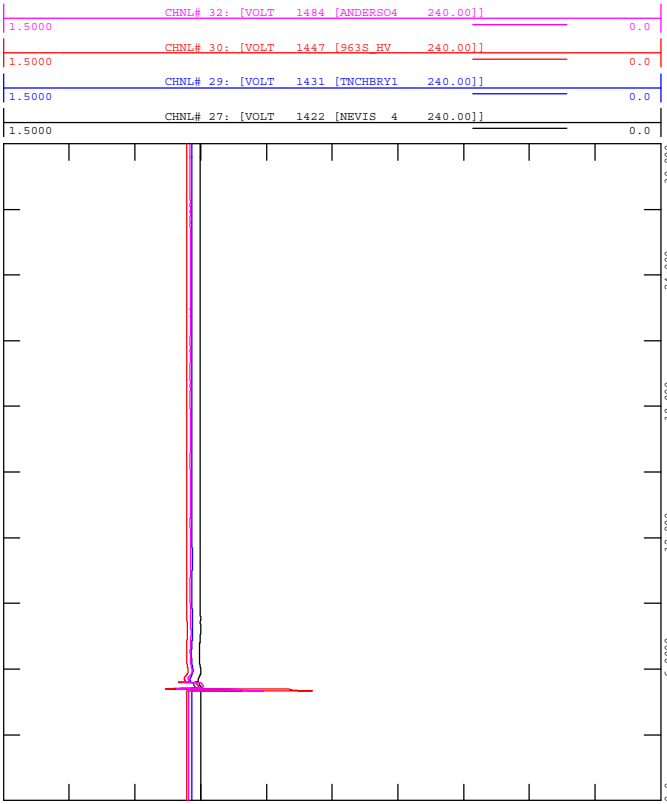


FIGURE A4-36G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-36_3PH_Fault_7L171@Michichi-Creek-802S.out

14:30
 WED, FEB 16 2022
 BRANCH FLOW (P)

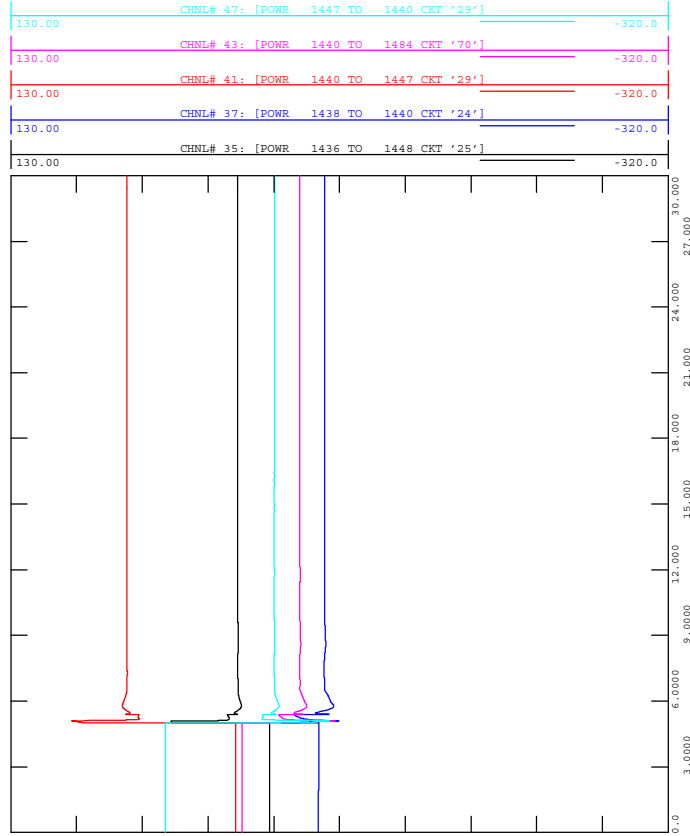
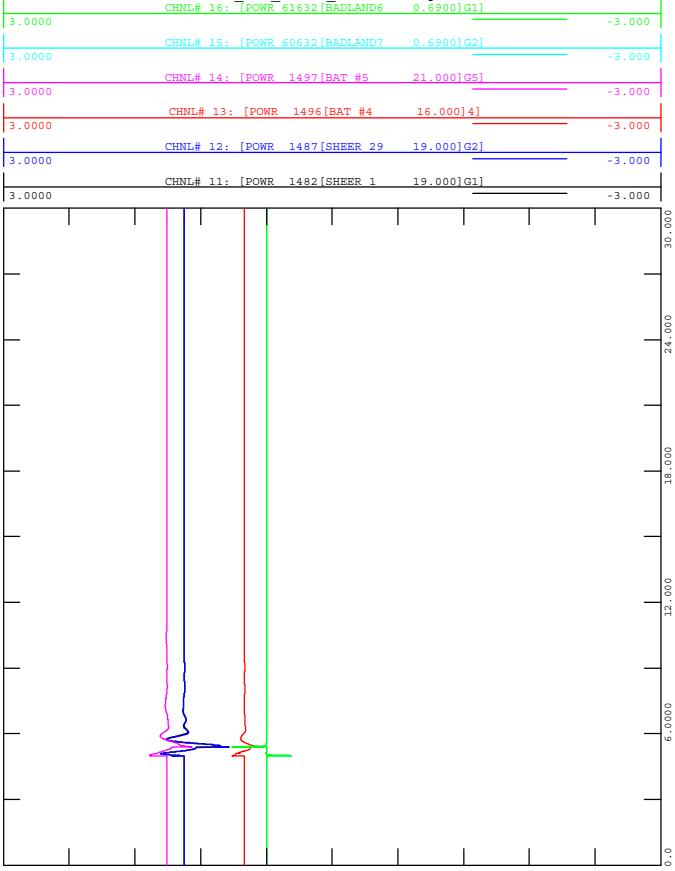




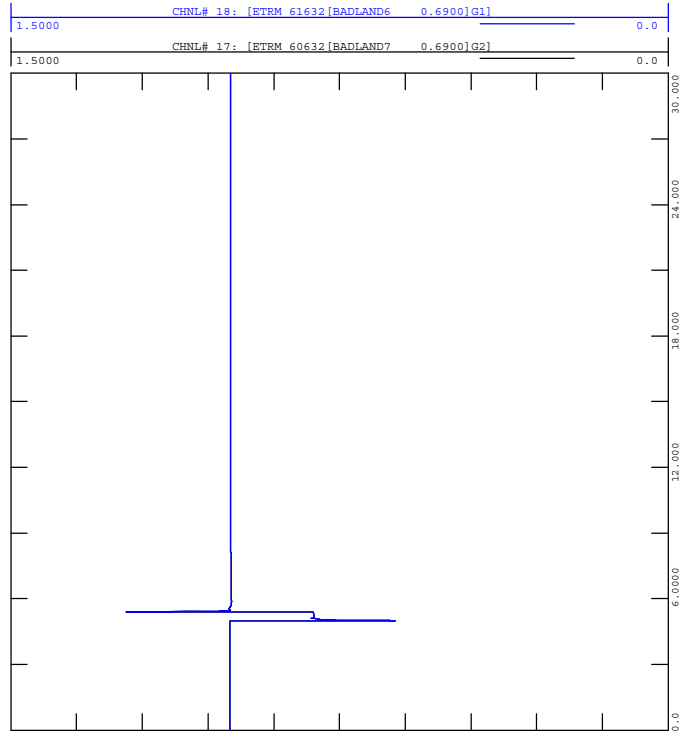
FIGURE A4-37B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-37_3PH_Fault_7L25@Rowley-768S.out



WED, FEB 16 2022 14:31
 MACHINE ACTIVE POWER (MW)



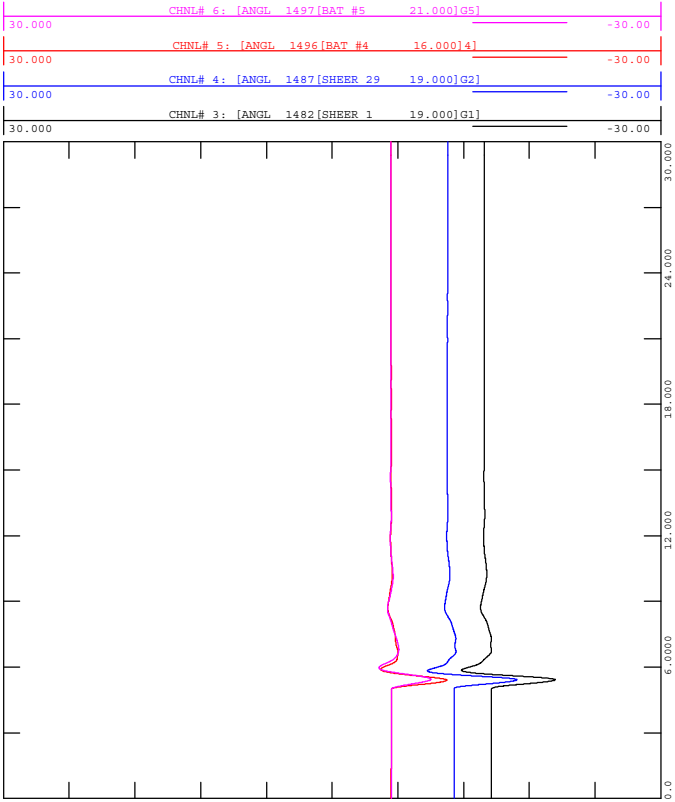
FIGURE A4-37D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-37_3PH_Fault_7L25@Rowley-768S.out



WED, FEB 16 2022 14:31
 MACHINE TERMINAL VOLTAGE



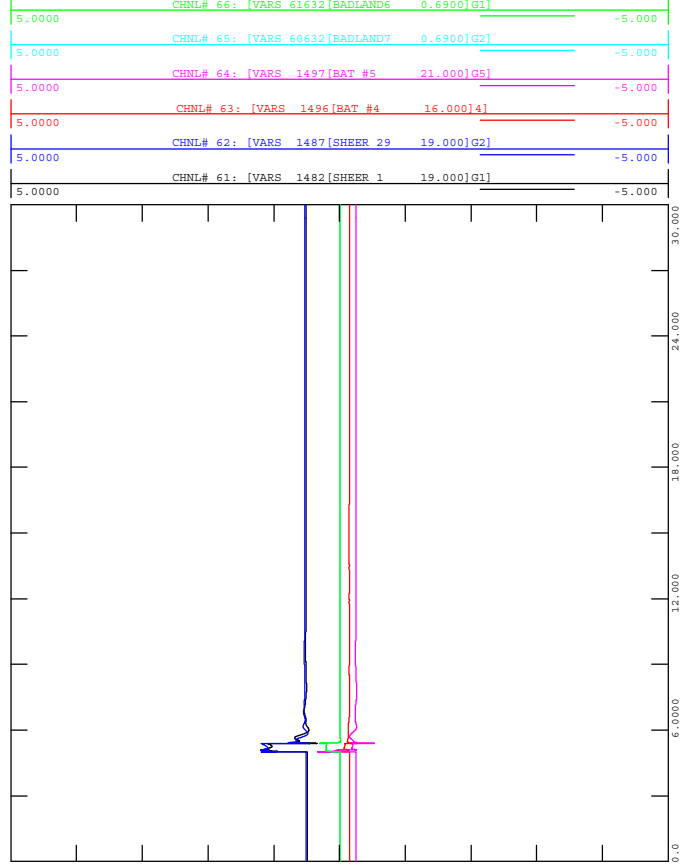
FIGURE A4-37A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-37_3PH_Fault_7L25@Rowley-768S.out



WED, FEB 16 2022 14:31
 MACHINE ANGLE (DEGREES)



FIGURE A4-37C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-37_3PH_Fault_7L25@Rowley-768S.out



WED, FEB 16 2022 14:31
 MACHINE REACTIVE POWER (M)



FIGURE A4-37F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-37_3PH_Fault_7L25@Rowley-768S.out

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:31

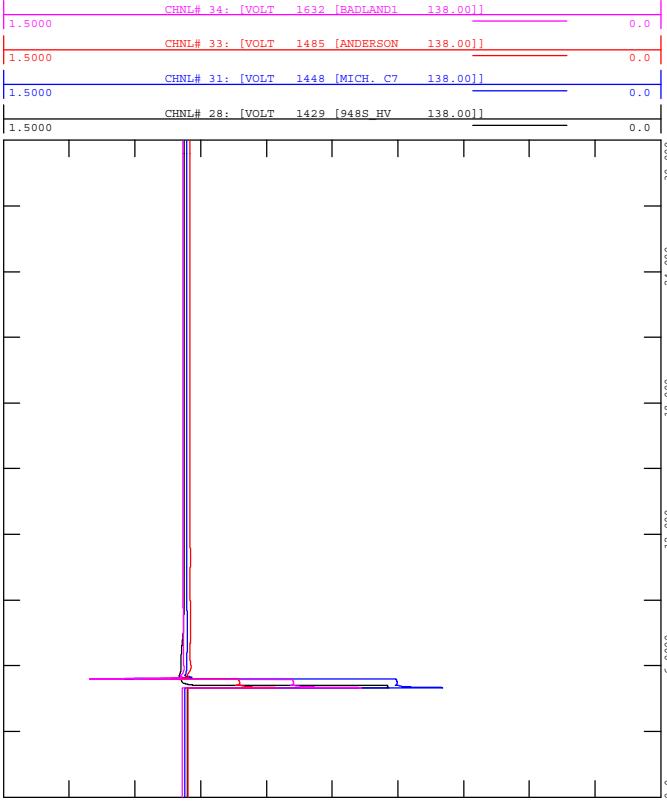


FIGURE A4-37H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-37_3PH_Fault_7L25@Rowley-768S.out

BRANCH FLOW (Q)
 WED, FEB 16 2022 14:31

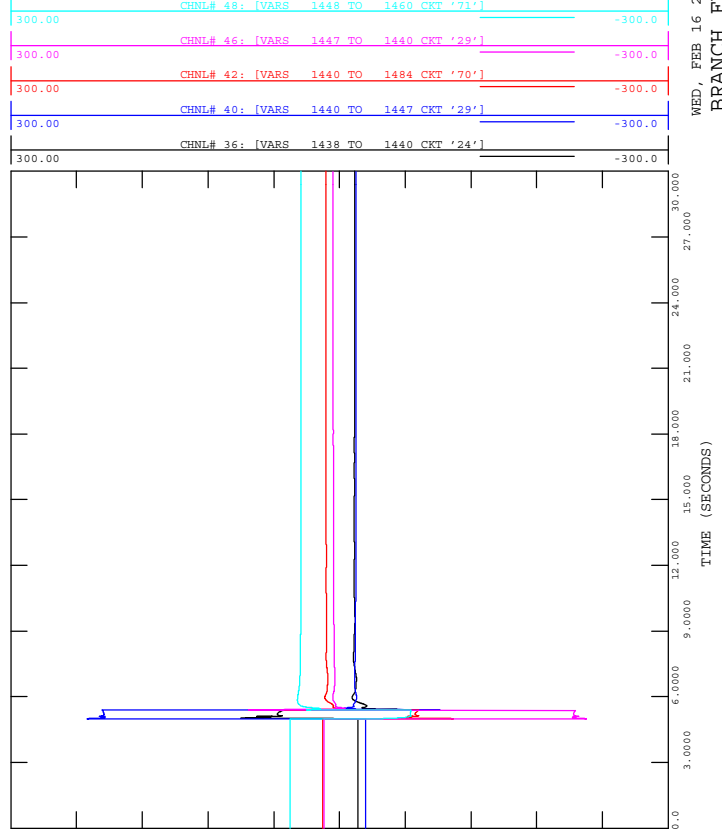


FIGURE A4-37E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-37_3PH_Fault_7L25@Rowley-768S.out

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:31

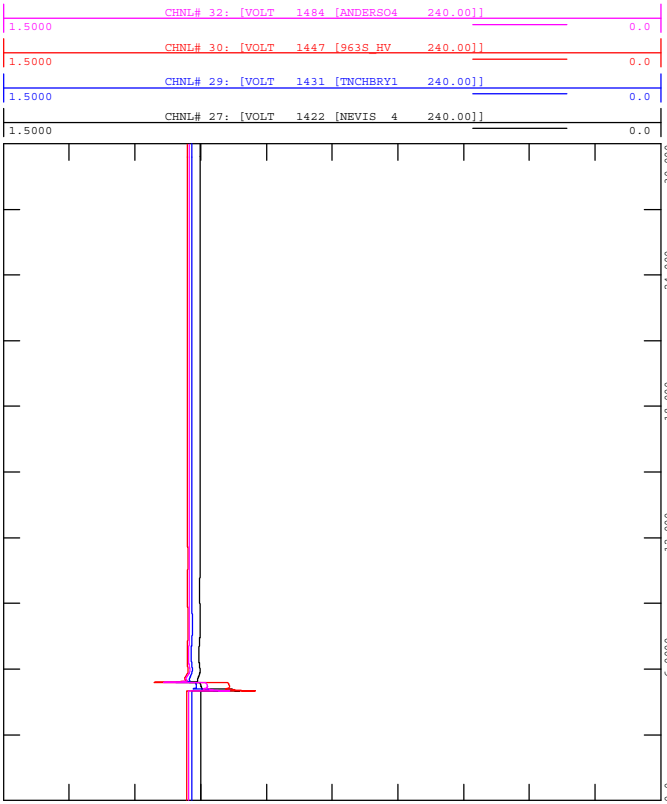


FIGURE A4-37G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-37_3PH_Fault_7L25@Rowley-768S.out

BRANCH FLOW (P)
 WED, FEB 16 2022 14:31

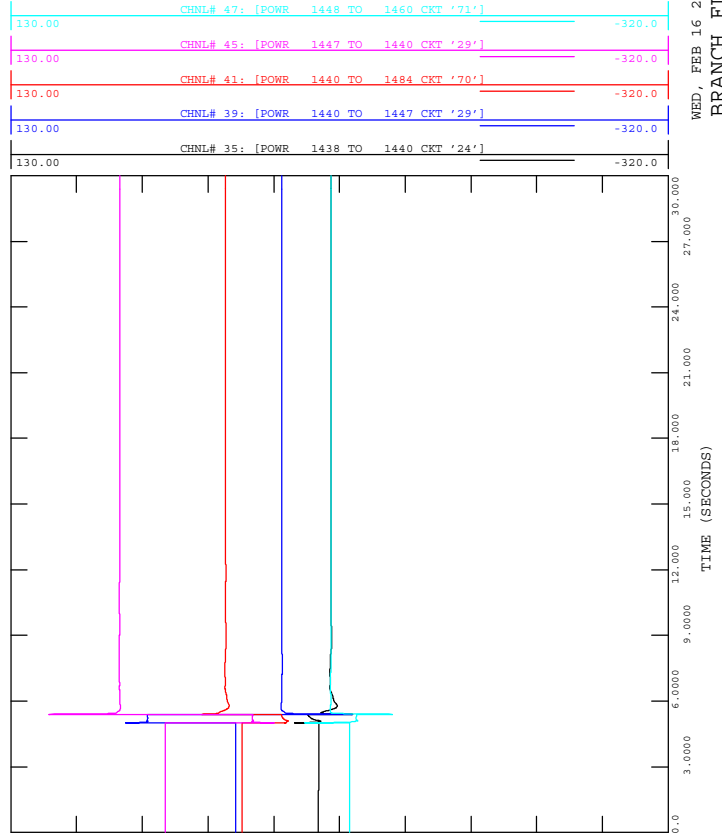
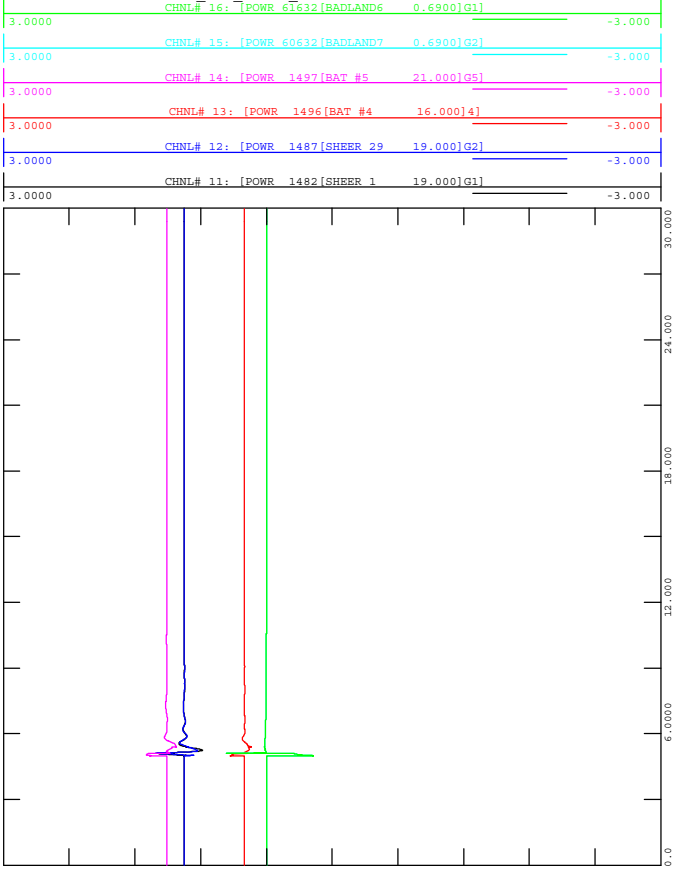




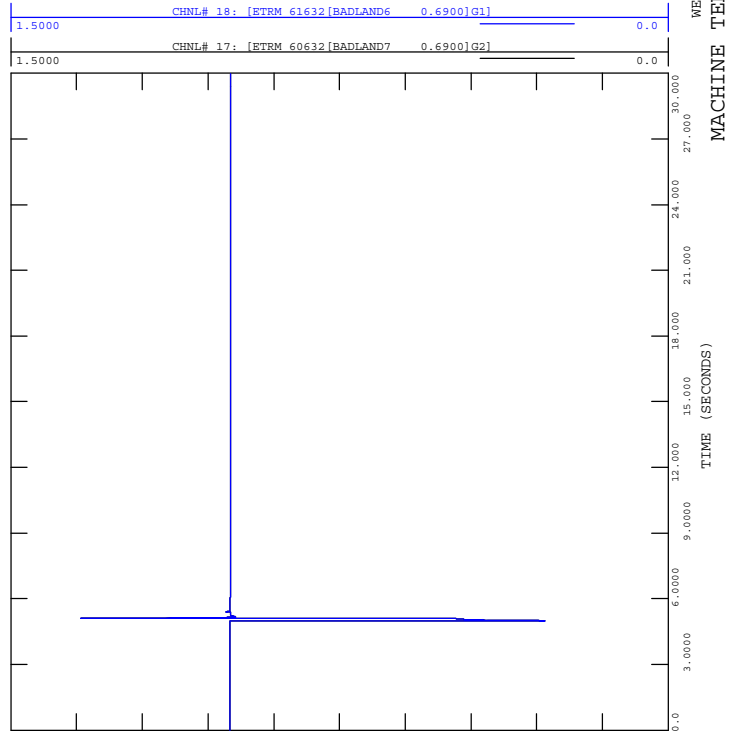
FIGURE A4-38B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-38_3PH_Fault_7L25@Michichi-Creek-802S.out



WED, FEB 16 2022 14:32
 MACHINE ACTIVE POWER (MW)



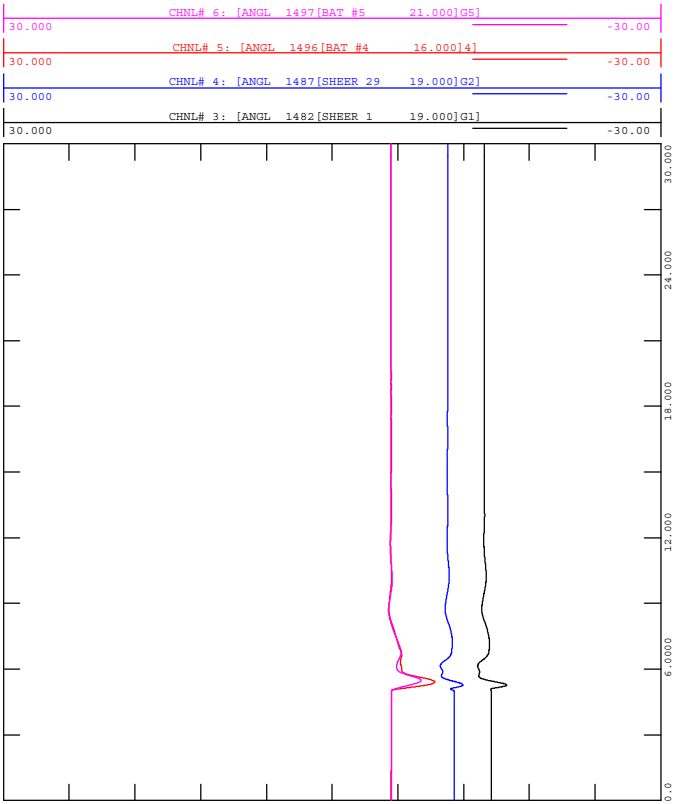
FIGURE A4-38D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-38_3PH_Fault_7L25@Michichi-Creek-802S.out



WED, FEB 16 2022 14:32
 MACHINE TERMINAL VOLTAGE



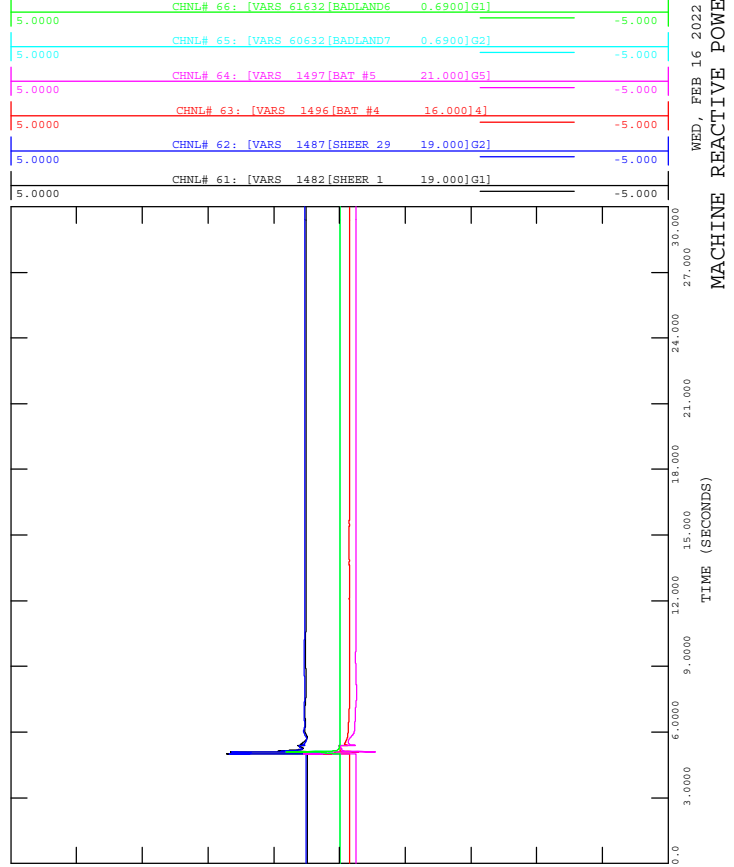
FIGURE A4-38A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-38_3PH_Fault_7L25@Michichi-Creek-802S.out



WED, FEB 16 2022 14:31
 MACHINE ANGLE (DEGREES)



FIGURE A4-38C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-38_3PH_Fault_7L25@Michichi-Creek-802S.out



WED, FEB 16 2022 14:32
 MACHINE REACTIVE POWER (M)



FIGURE A4-38F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-38_3PH_Fault_7L25@Michichi-Creek-802S.out

WED, FEB 16 2022 14:32
 138 KV BUS VOLTAGE (PU)

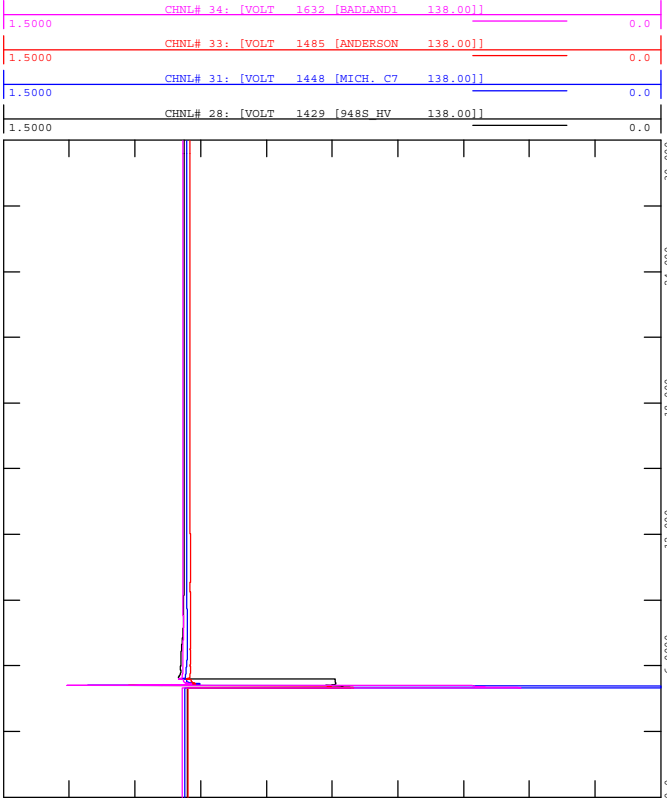


FIGURE A4-38H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-38_3PH_Fault_7L25@Michichi-Creek-802S.out

WED, FEB 16 2022 14:32
 BRANCH FLOW (Q)

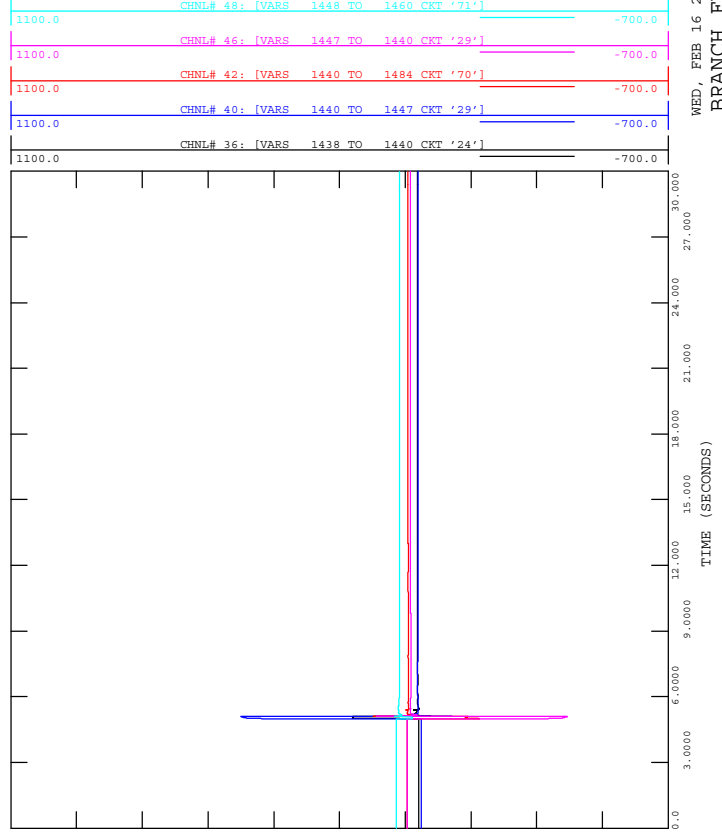


FIGURE A4-38E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-38_3PH_Fault_7L25@Michichi-Creek-802S.out

WED, FEB 16 2022 14:32
 240 KV BUS VOLTAGE (PU)

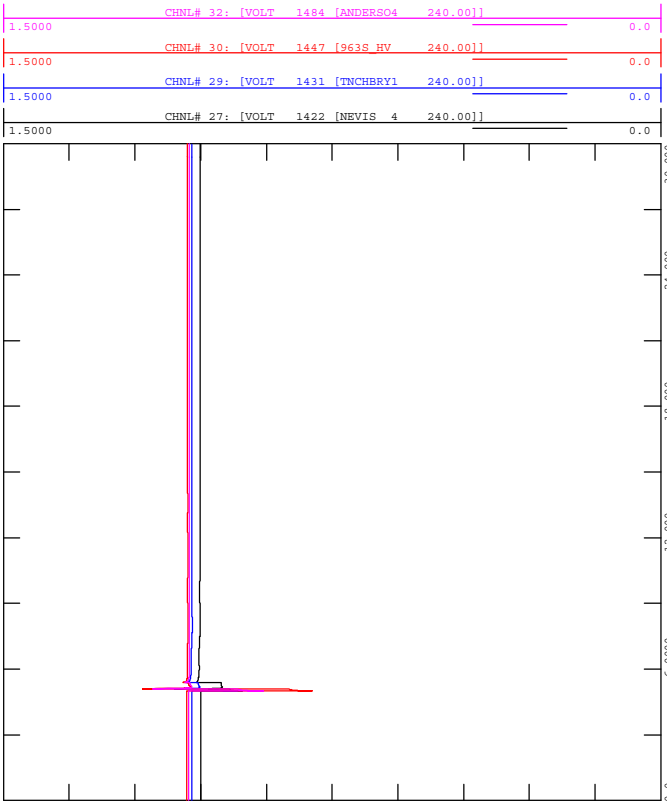
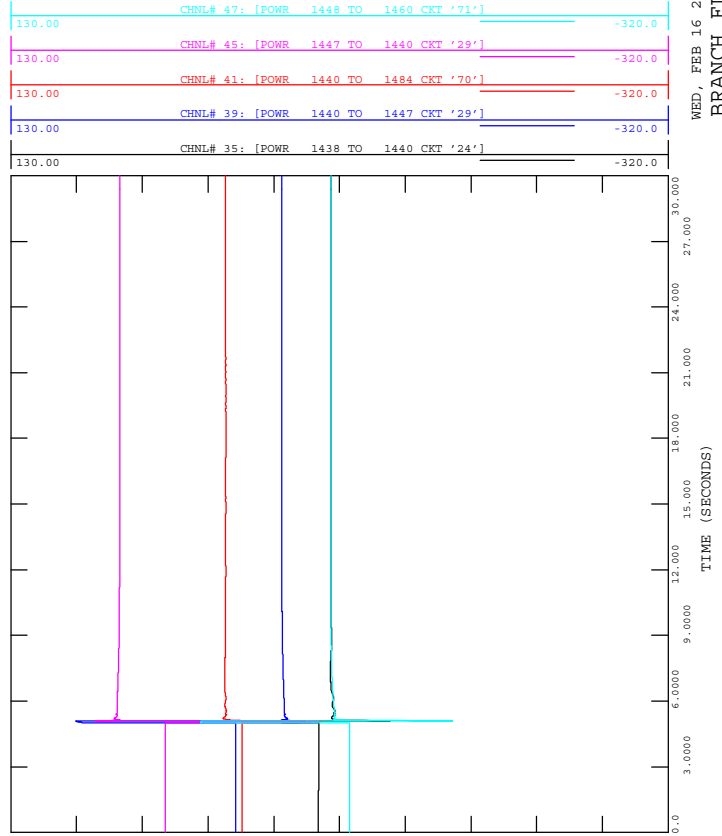


FIGURE A4-38G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-38_3PH_Fault_7L25@Michichi-Creek-802S.out

WED, FEB 16 2022 14:32
 BRANCH FLOW (P)



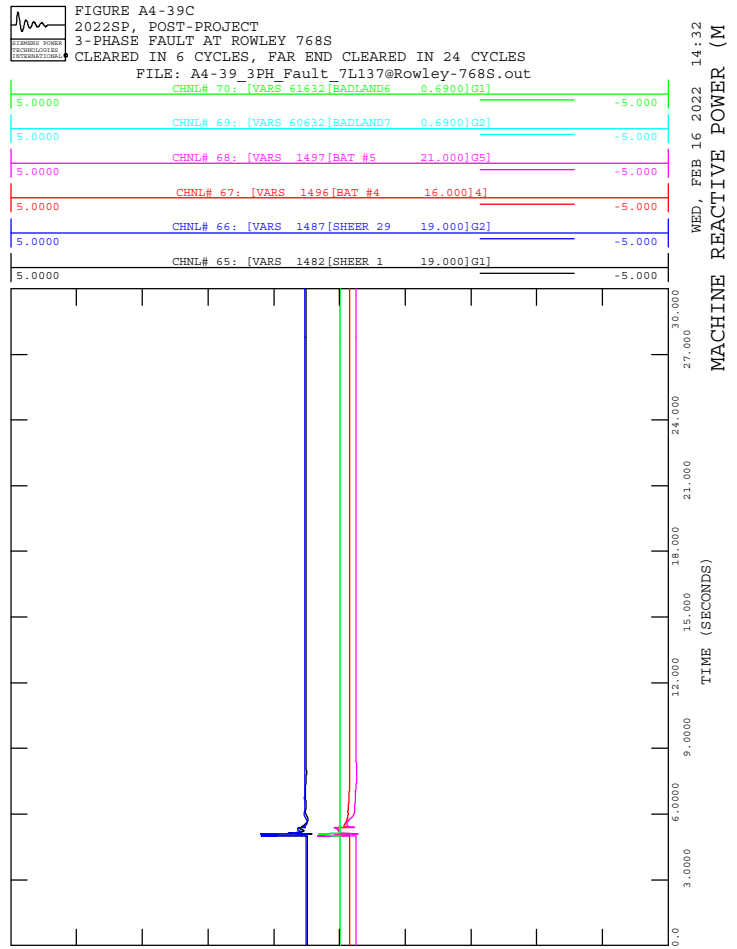
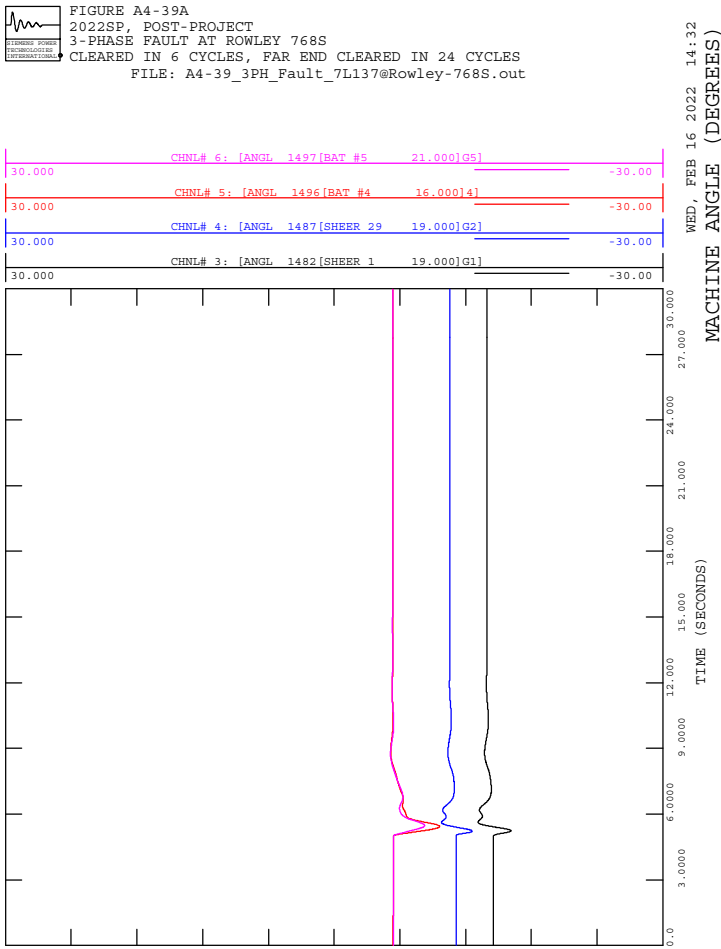
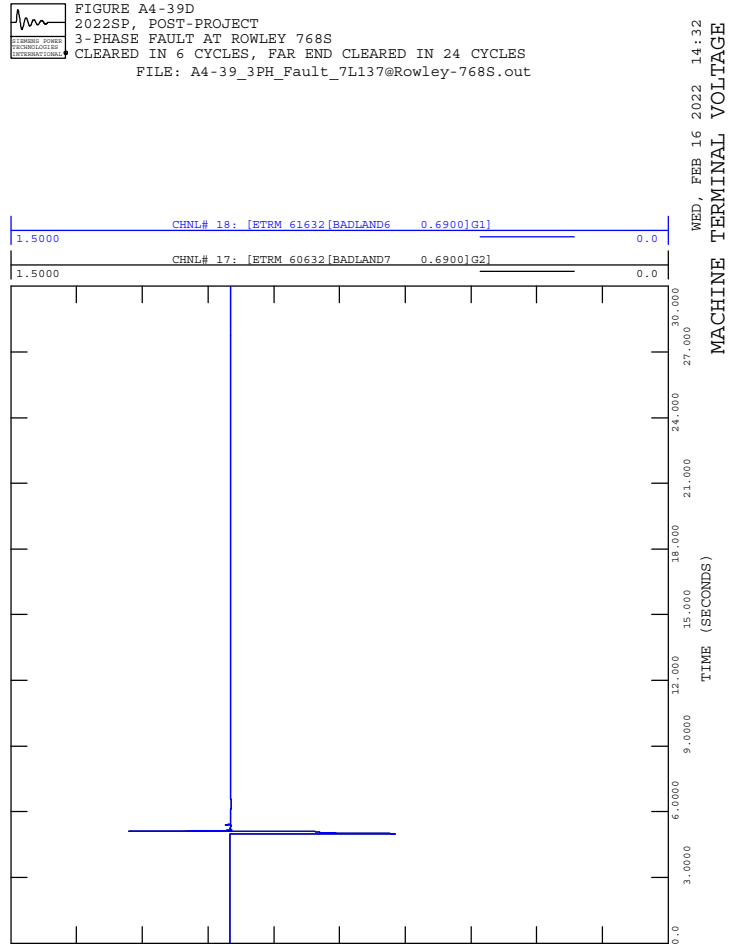
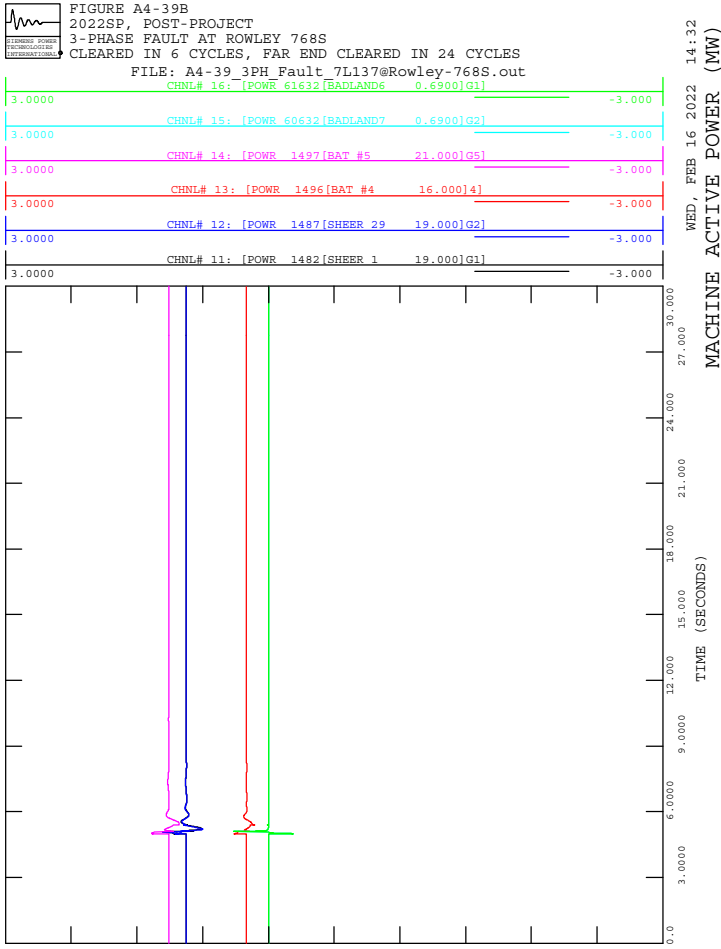
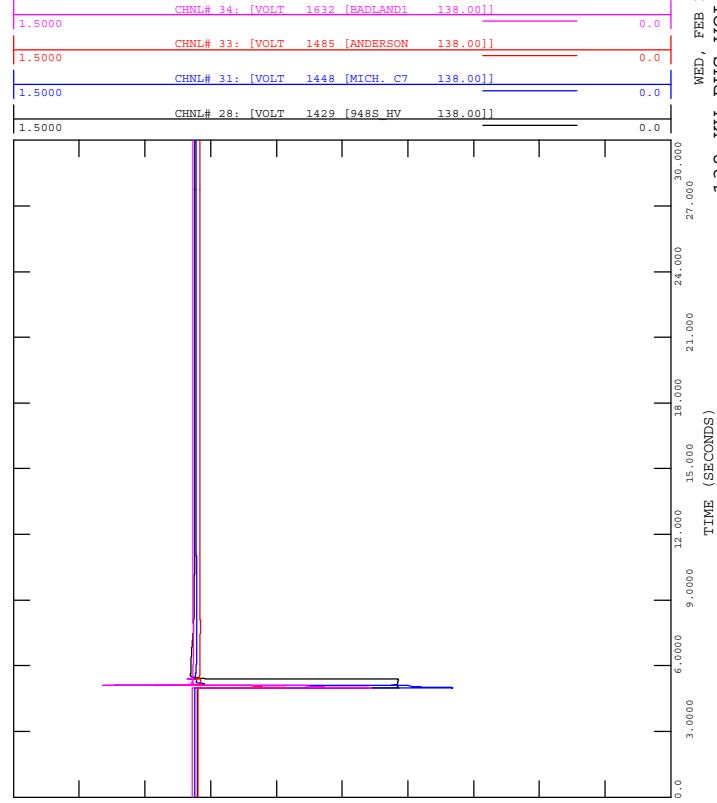




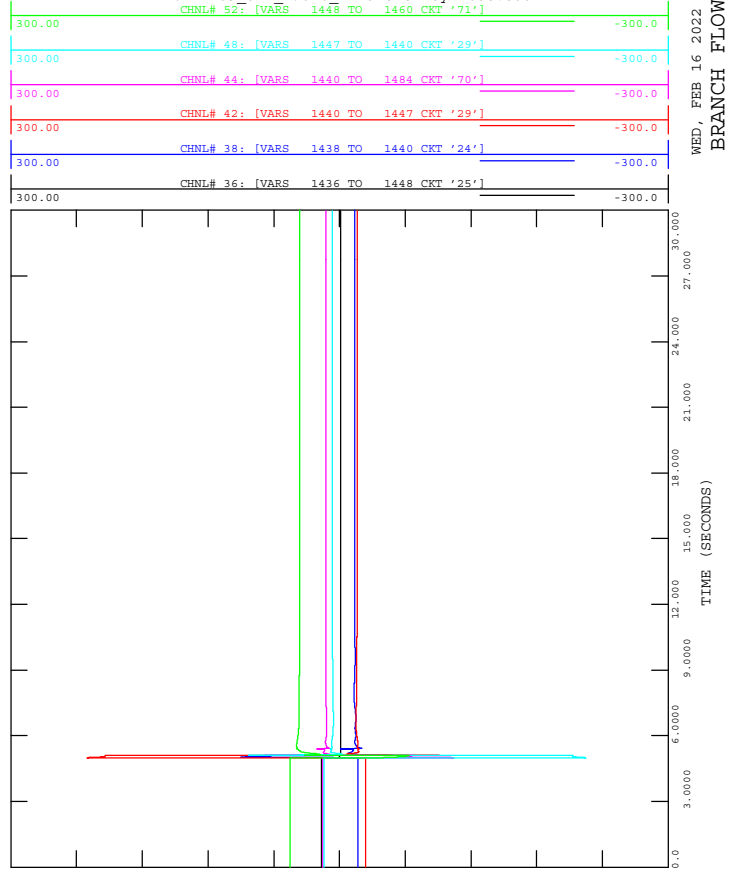
FIGURE A4-39F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-39_3PH_Fault_7L137@Rowley-768S.out



WED, FEB 16 2022 14:33
 138 KV BUS VOLTAGE (PU)



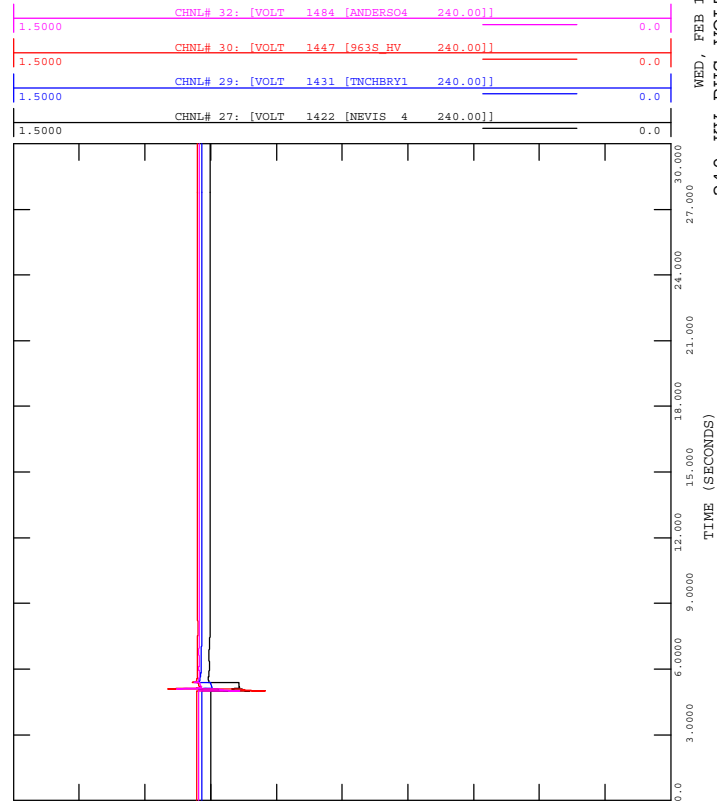
FIGURE A4-39H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-39_3PH_Fault_7L137@Rowley-768S.out



WED, FEB 16 2022 14:33
 BRANCH FLOW (Q)



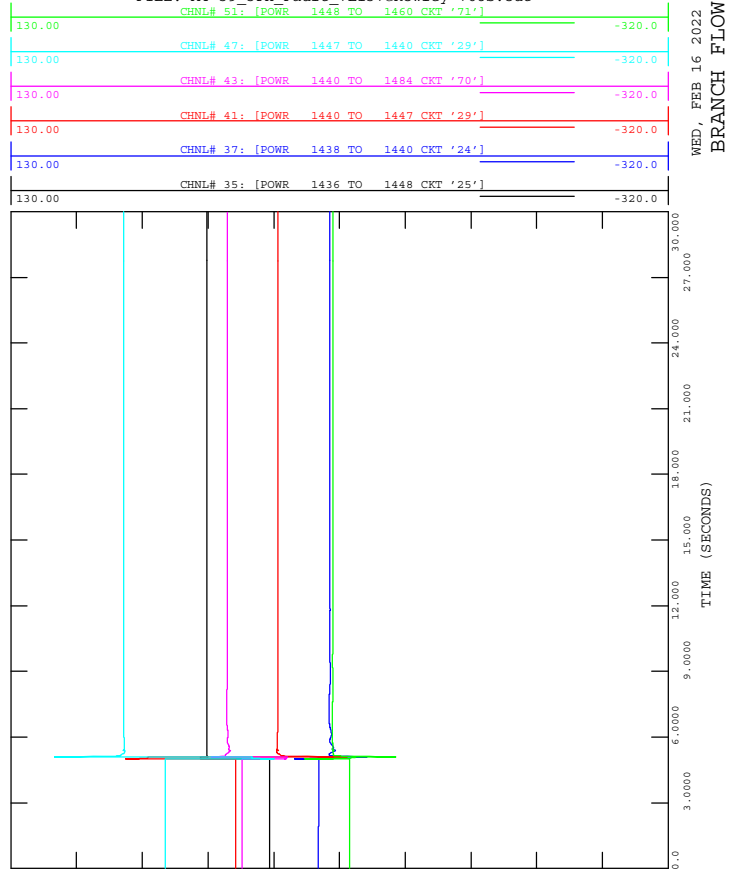
FIGURE A4-39E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-39_3PH_Fault_7L137@Rowley-768S.out



WED, FEB 16 2022 14:32
 240 KV BUS VOLTAGE (PU)



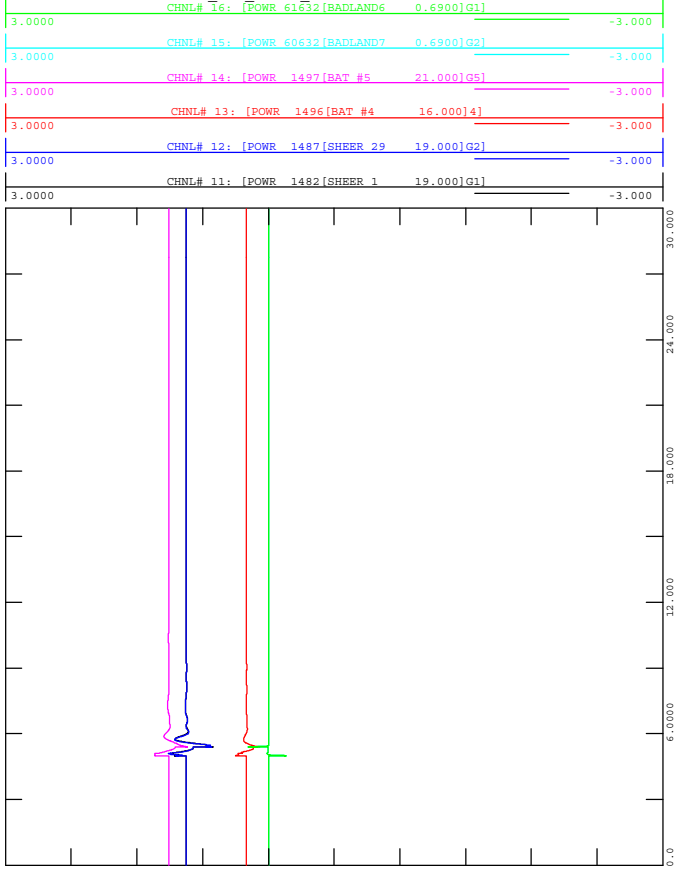
FIGURE A4-39G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-39_3PH_Fault_7L137@Rowley-768S.out



WED, FEB 16 2022 14:33
 BRANCH FLOW (P)



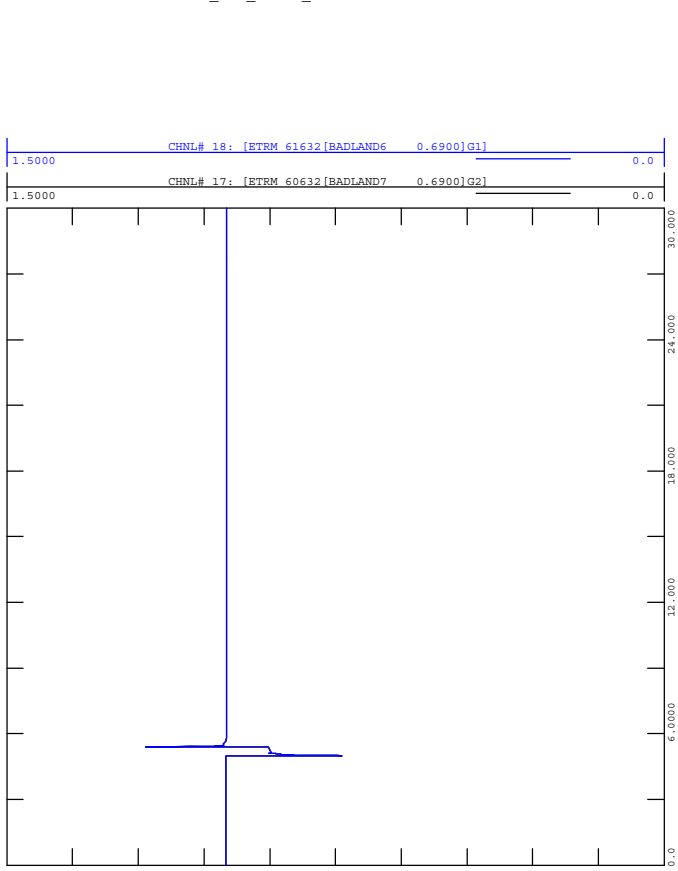
FIGURE A4-40B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-40_3PH_Fault_7L137@Three-Hills-770S.out



WED, FEB 16 2022 14:33
 MACHINE ACTIVE POWER (MW)



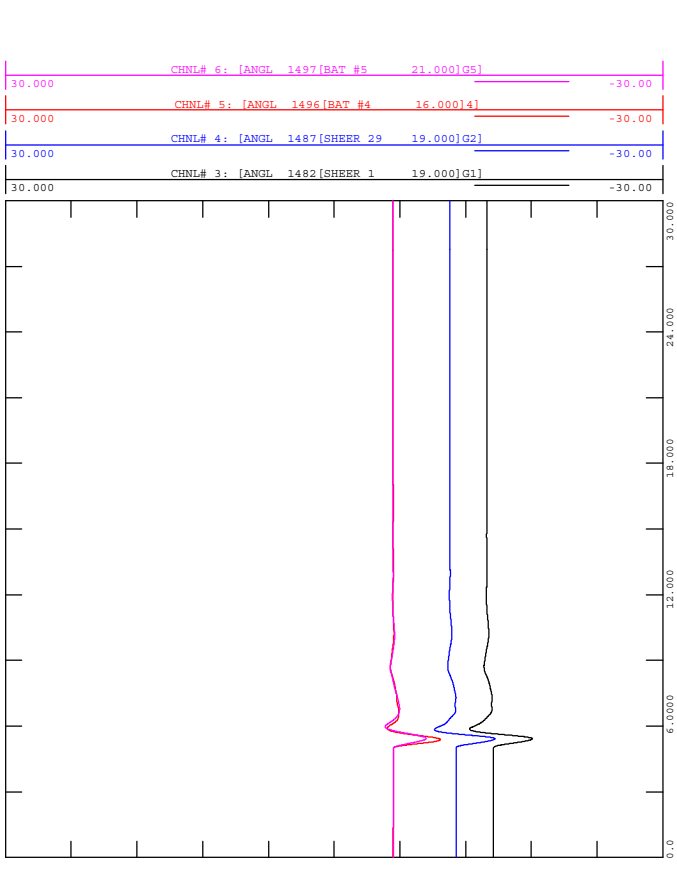
FIGURE A4-40D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-40_3PH_Fault_7L137@Three-Hills-770S.out



WED, FEB 16 2022 14:33
 MACHINE TERMINAL VOLTAGE



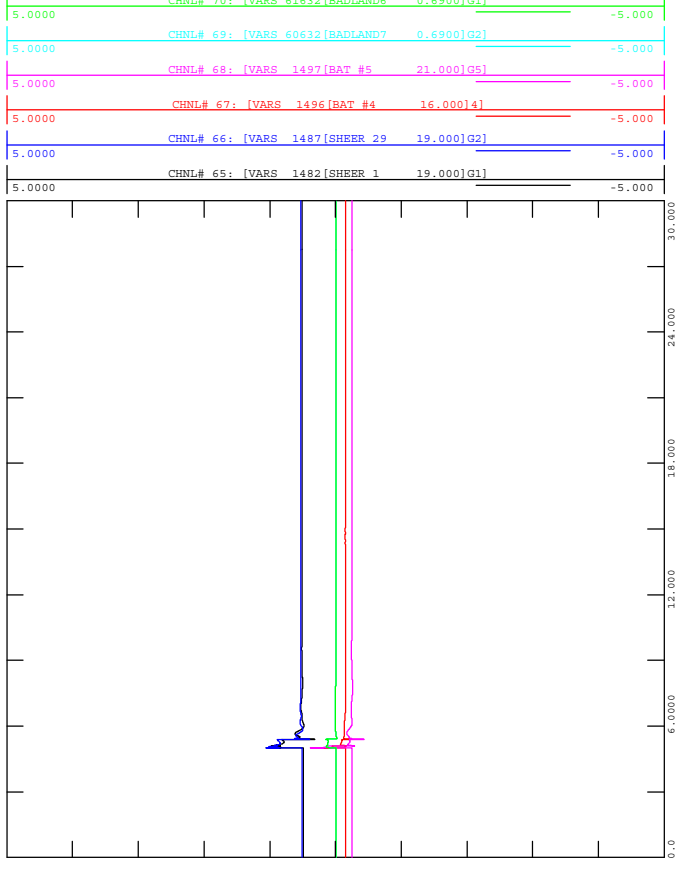
FIGURE A4-40A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-40_3PH_Fault_7L137@Three-Hills-770S.out



WED, FEB 16 2022 14:33
 MACHINE ANGLE (DEGREES)



FIGURE A4-40C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-40_3PH_Fault_7L137@Three-Hills-770S.out



WED, FEB 16 2022 14:33
 MACHINE REACTIVE POWER (M)



FIGURE A4-40F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-40_3PH_Fault_7L137@Three-Hills-770S.out

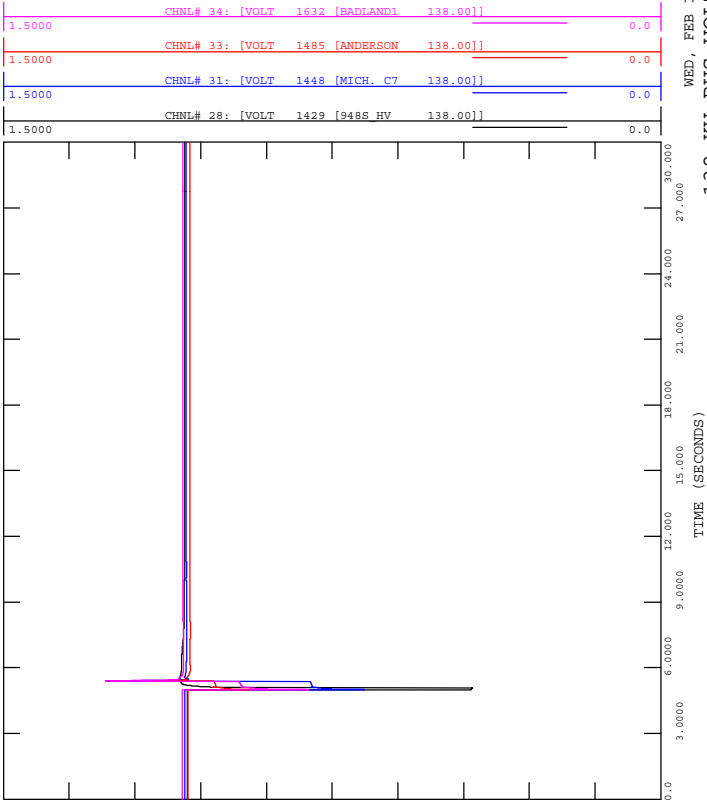


FIGURE A4-40H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-40_3PH_Fault_7L137@Three-Hills-770S.out

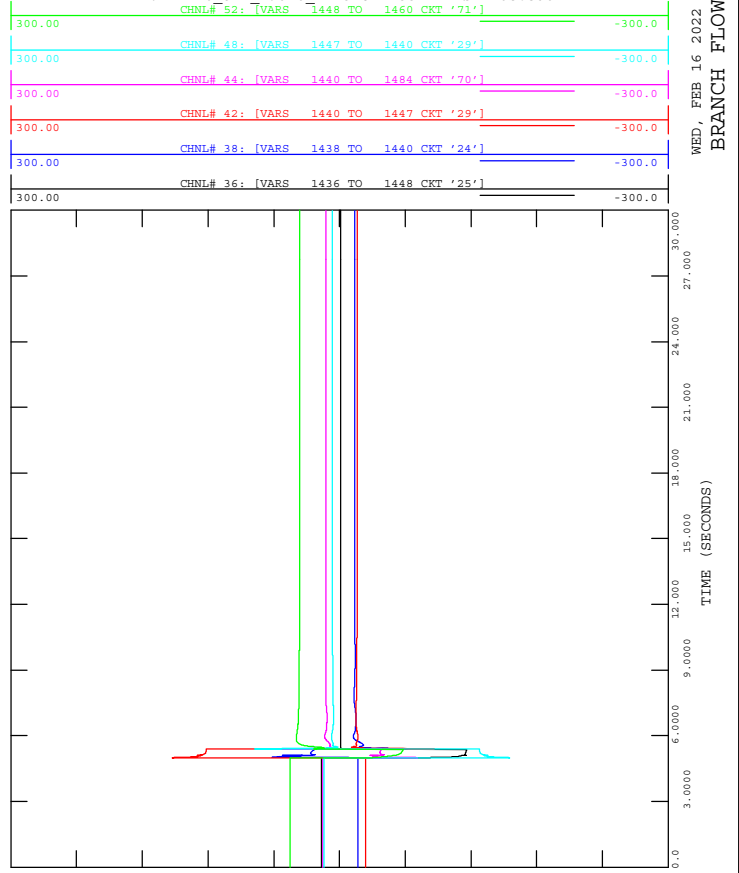


FIGURE A4-40E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-40_3PH_Fault_7L137@Three-Hills-770S.out

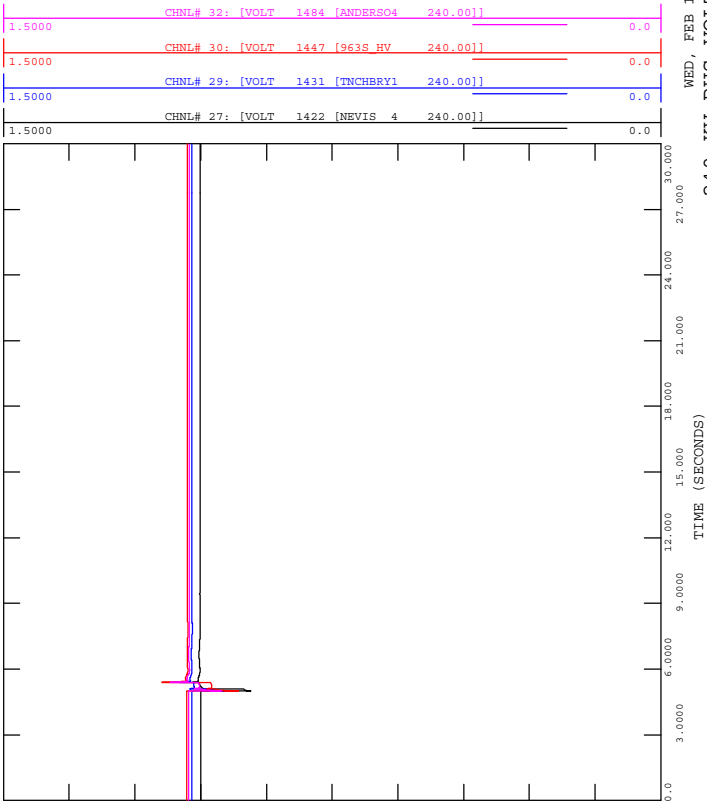


FIGURE A4-40G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-40_3PH_Fault_7L137@Three-Hills-770S.out

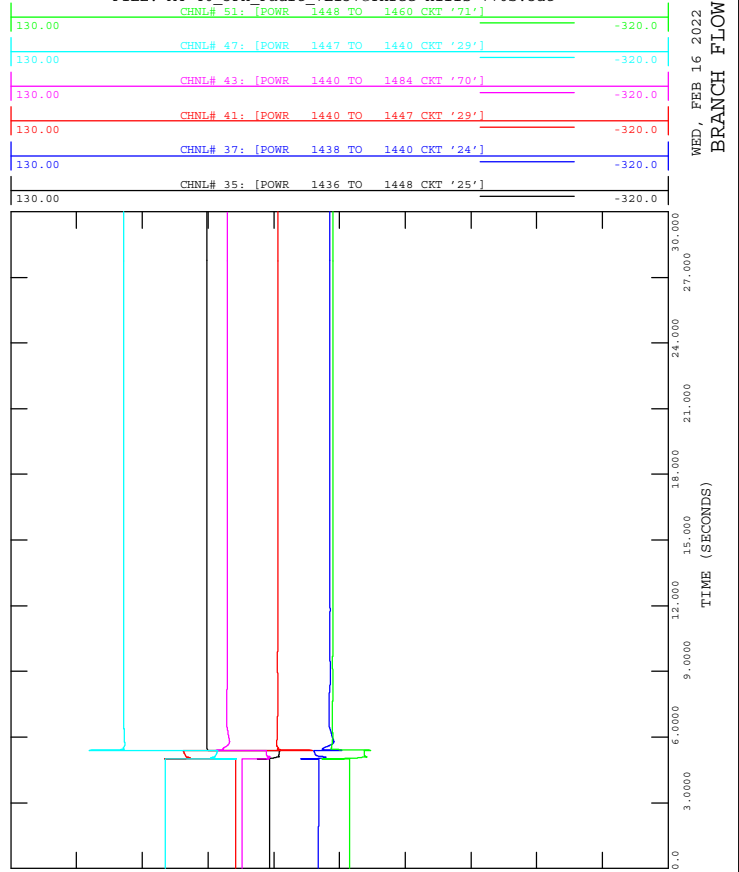
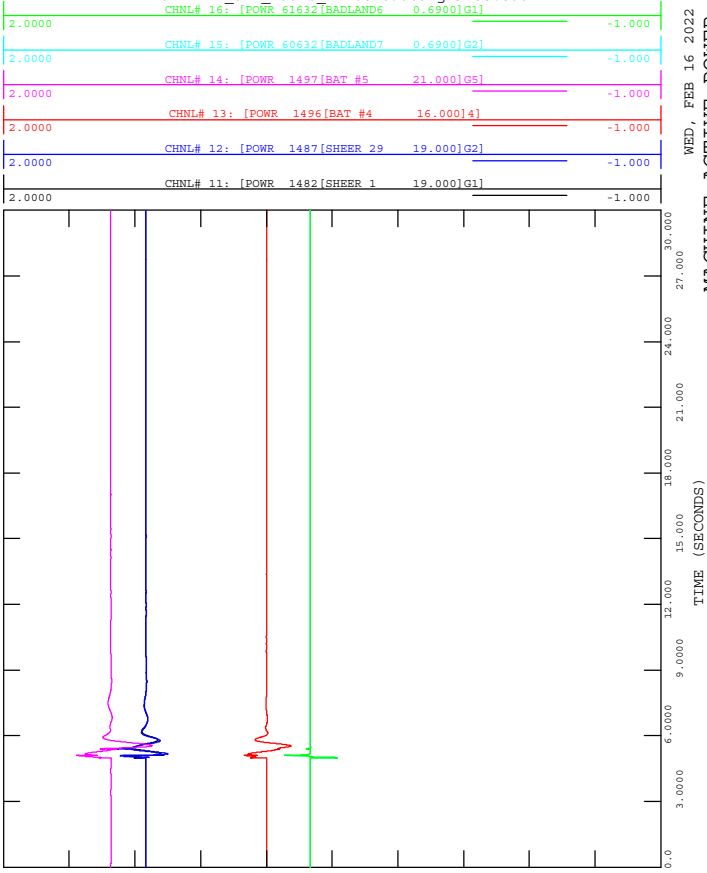




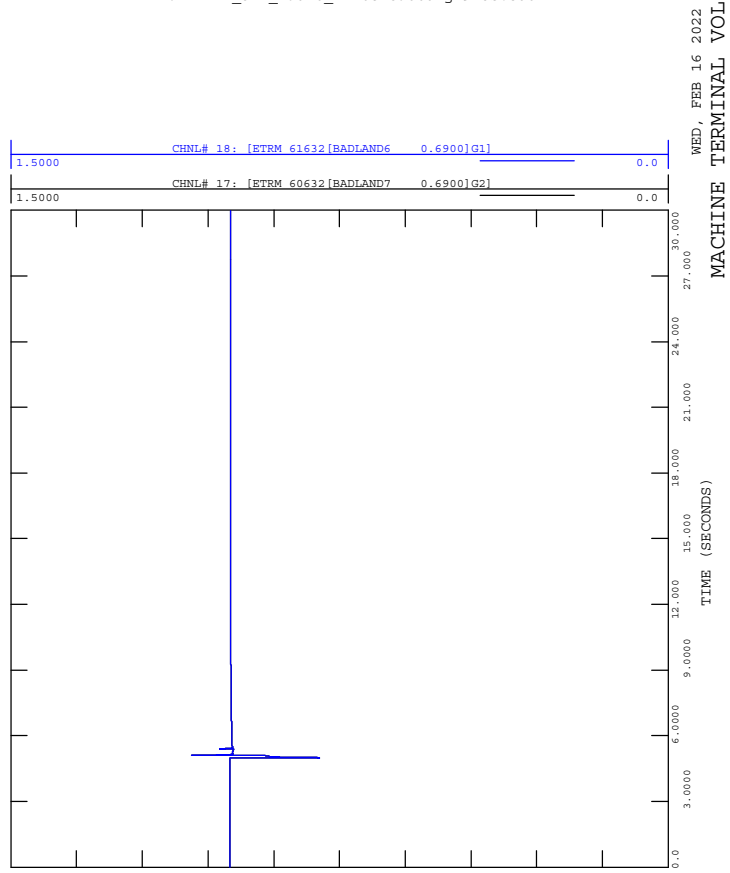
FIGURE A4-41B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-41_3PH_Fault_7L16@Heatburg-948S.out



WED, FEB 16 2022 14:34
 MACHINE ACTIVE POWER (MW)



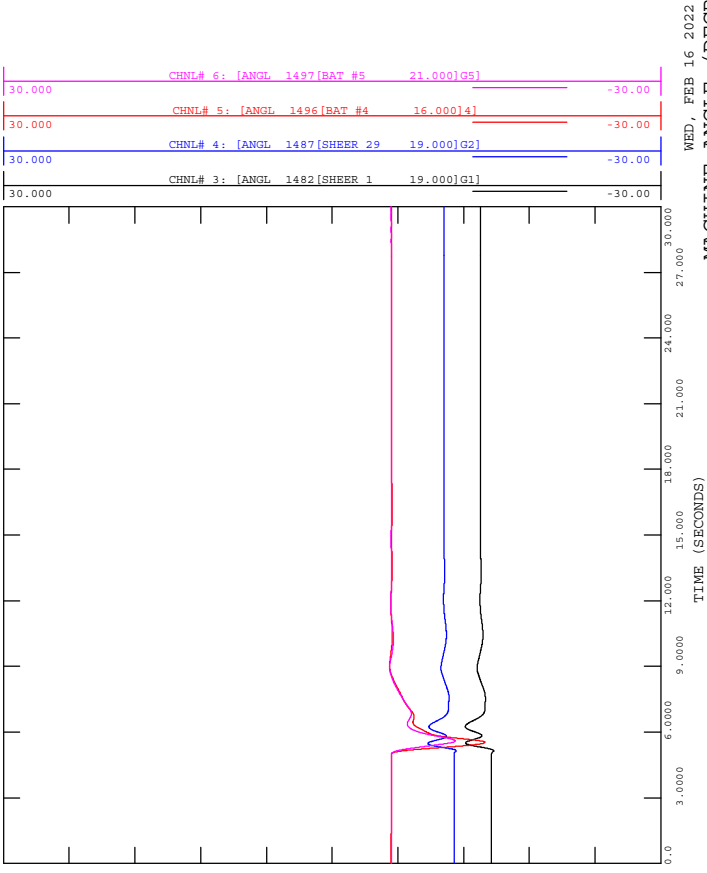
FIGURE A4-41D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-41_3PH_Fault_7L16@Heatburg-948S.out



WED, FEB 16 2022 14:34
 MACHINE TERMINAL VOLTAGE



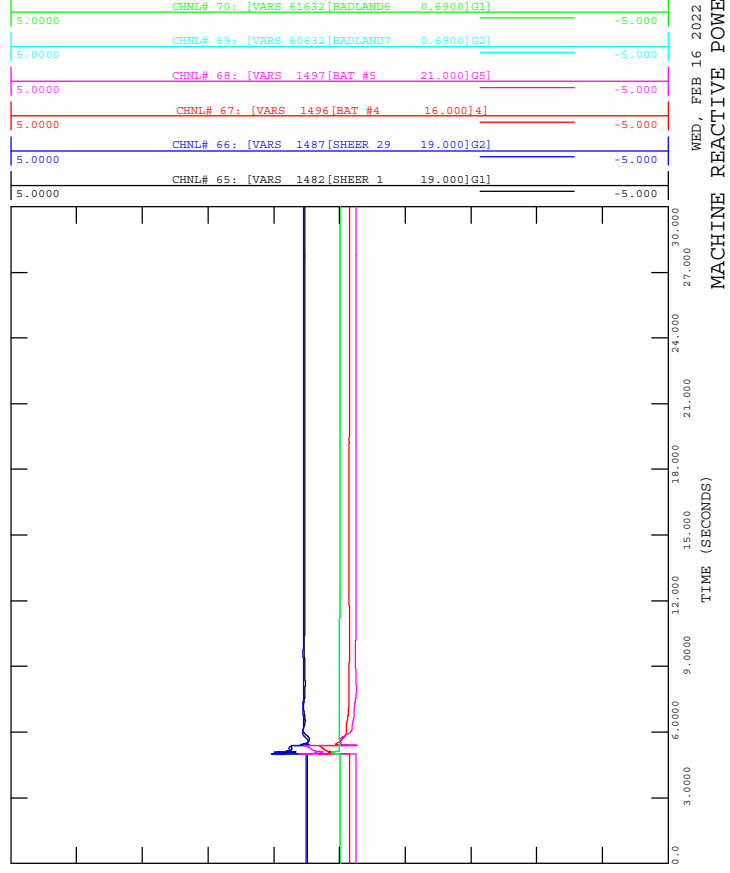
FIGURE A4-41A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-41_3PH_Fault_7L16@Heatburg-948S.out



WED, FEB 16 2022 14:34
 MACHINE ANGLE (DEGREES)



FIGURE A4-41C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-41_3PH_Fault_7L16@Heatburg-948S.out



WED, FEB 16 2022 14:34
 MACHINE REACTIVE POWER (M)



FIGURE A4-41F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-41_3PH_Fault_7L16@Heatburg-948S.out

WED, FEB 16 2022 14:34
 138 KV BUS VOLTAGE (PU)

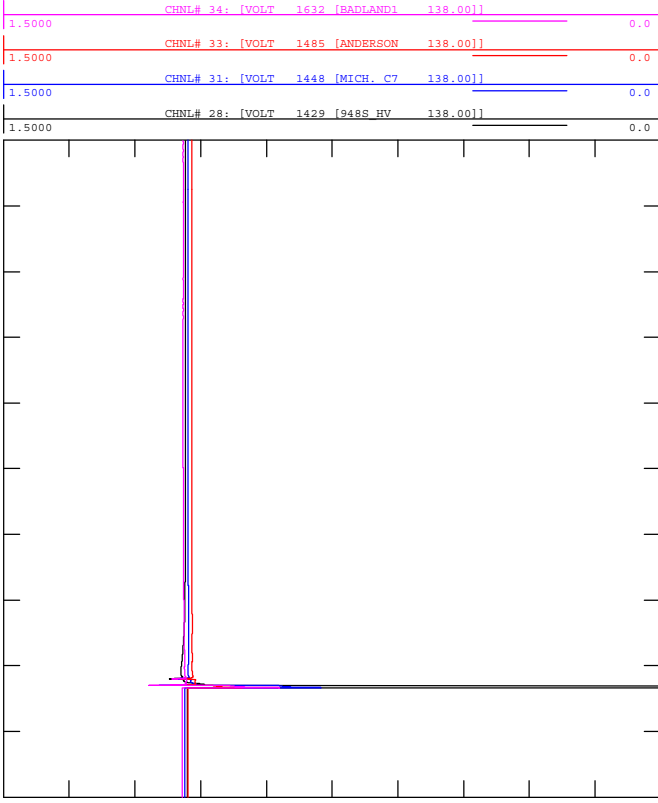


FIGURE A4-41H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-41_3PH_Fault_7L16@Heatburg-948S.out

WED, FEB 16 2022 14:34
 BRANCH FLOW (Q)

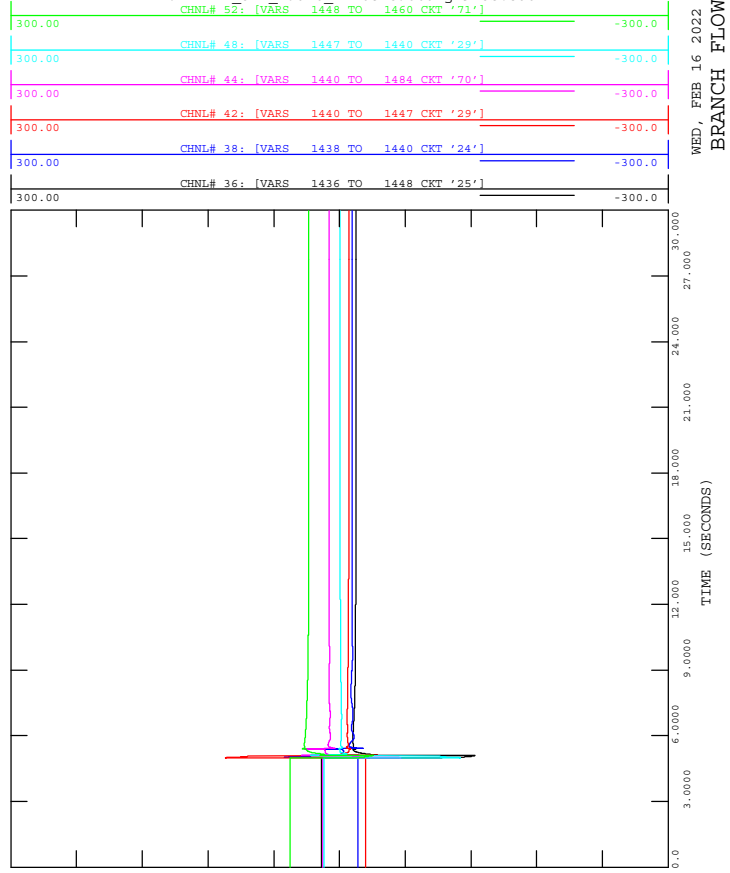


FIGURE A4-41E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-41_3PH_Fault_7L16@Heatburg-948S.out

WED, FEB 16 2022 14:34
 240 KV BUS VOLTAGE (PU)

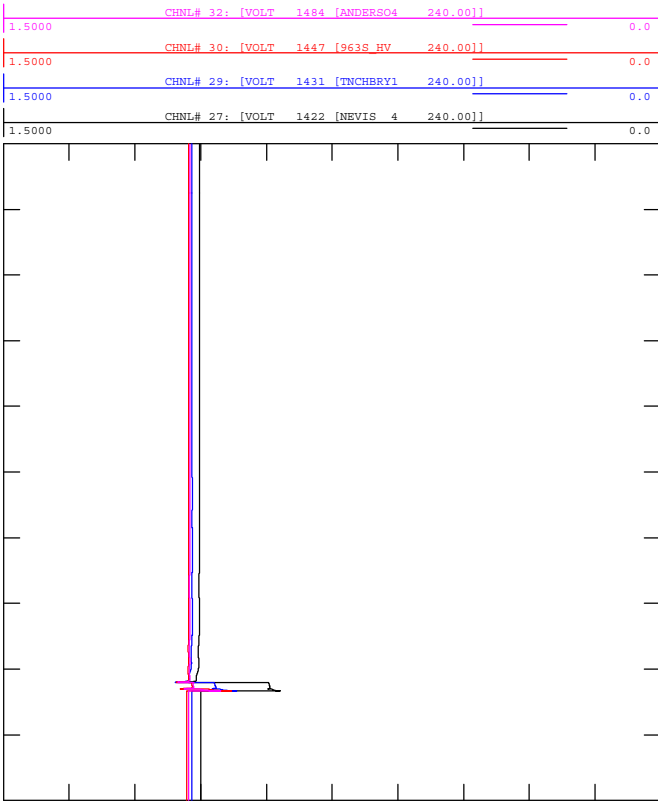


FIGURE A4-41G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-41_3PH_Fault_7L16@Heatburg-948S.out

WED, FEB 16 2022 14:34
 BRANCH FLOW (P)

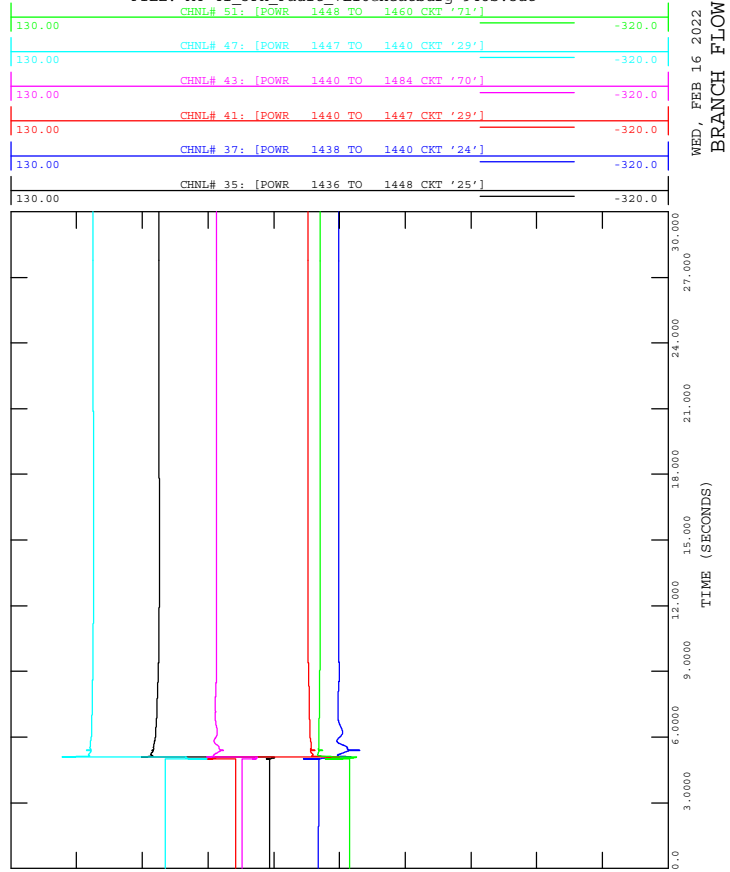
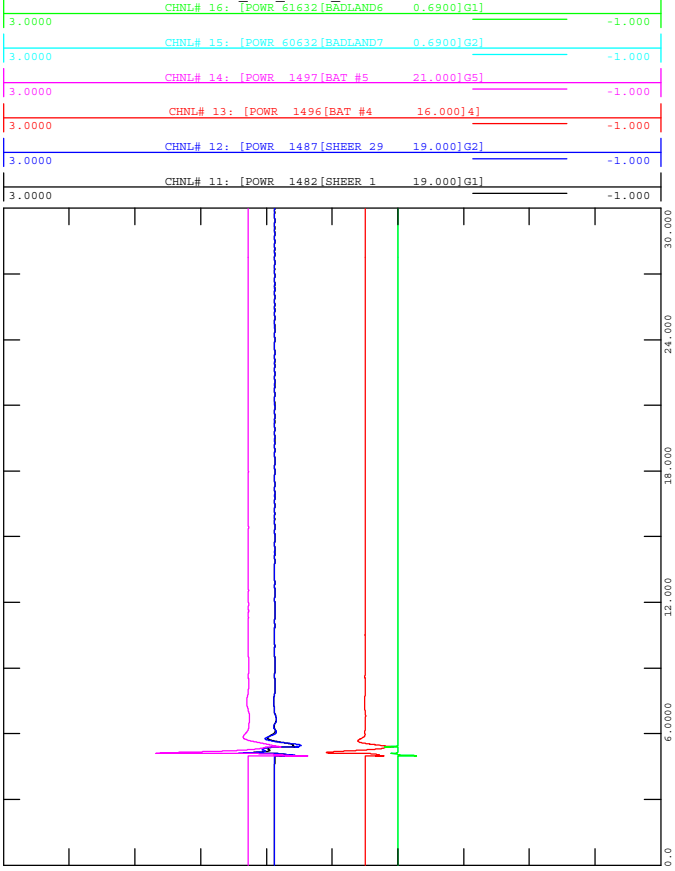




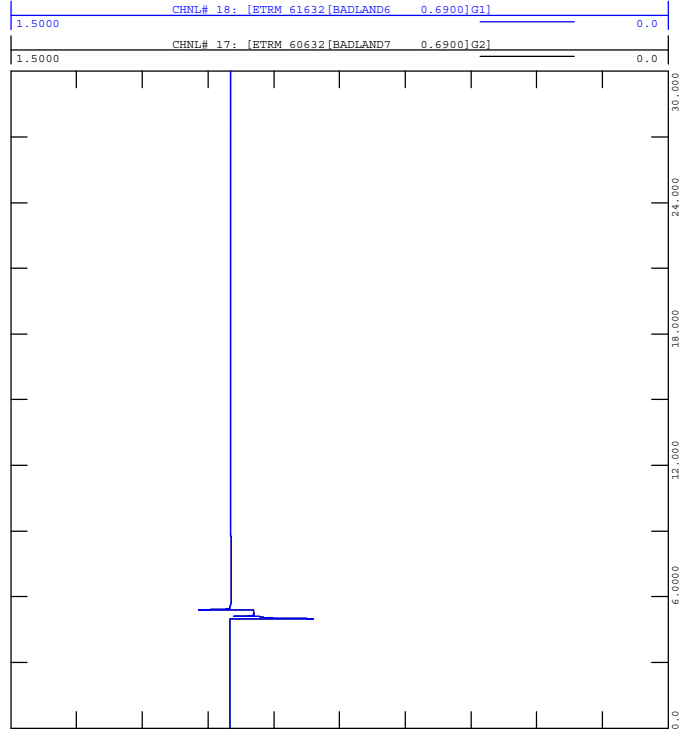
FIGURE A4-42B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-42_3PH_Fault_7L16@Nevis-766S.out
 CHNL# 16: [POWR 61632[BADLAND6 0.6900]G1]



WED, FEB 16 2022 14:35
 MACHINE ACTIVE POWER (MW)



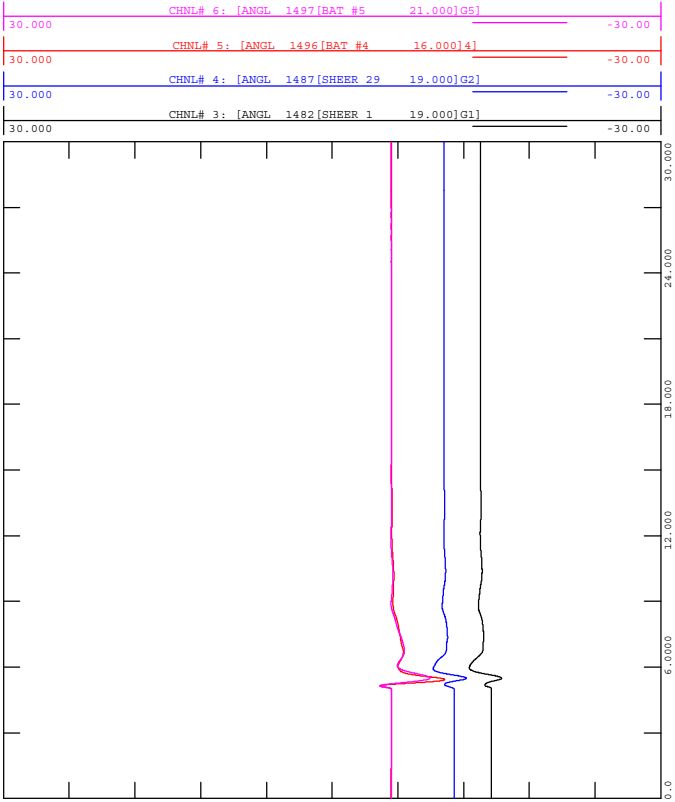
FIGURE A4-42D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-42_3PH_Fault_7L16@Nevis-766S.out



WED, FEB 16 2022 14:35
 TERMINAL VOLTAGE



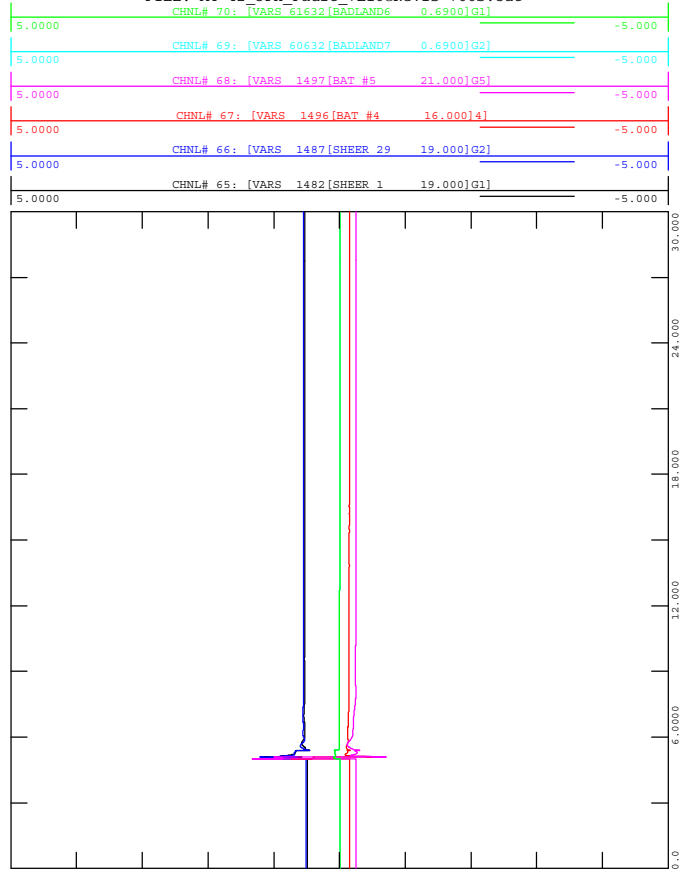
FIGURE A4-42A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-42_3PH_Fault_7L16@Nevis-766S.out



WED, FEB 16 2022 14:34
 MACHINE ANGLE (DEGREES)



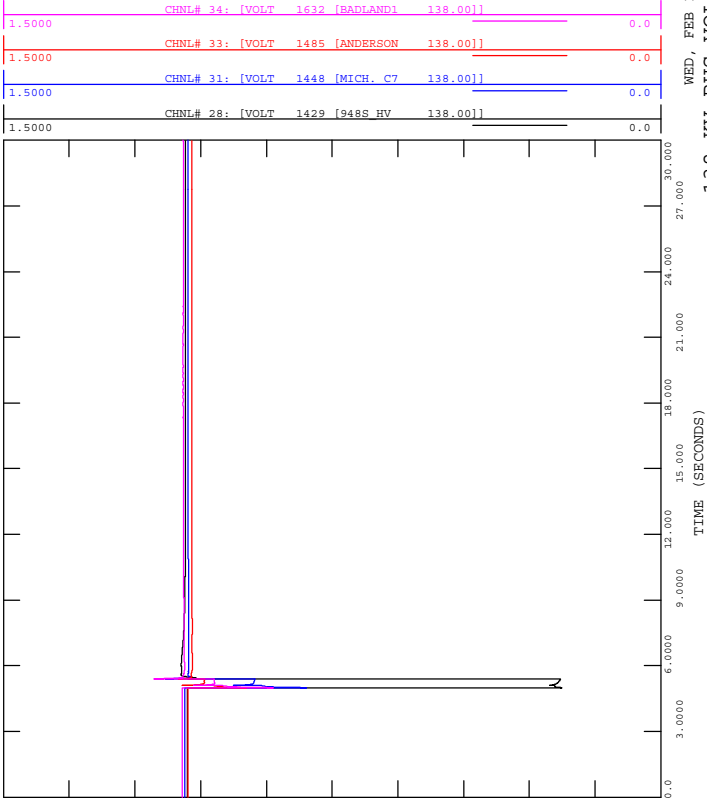
FIGURE A4-42C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-42_3PH_Fault_7L16@Nevis-766S.out



WED, FEB 16 2022 14:35
 MACHINE REACTIVE POWER (M)



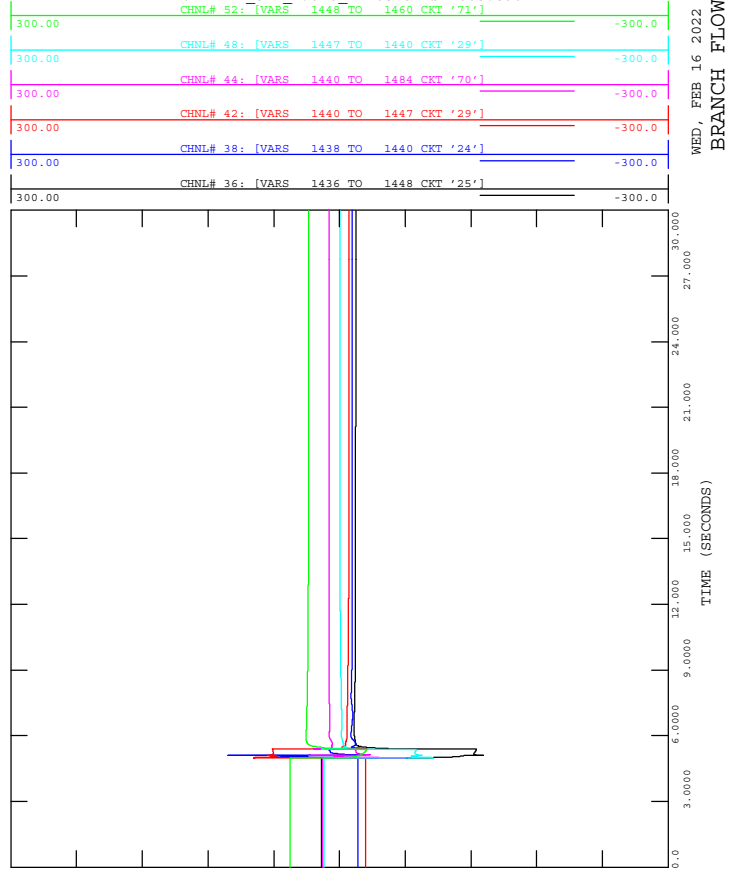
FIGURE A4-42F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-42_3PH_Fault_7L16@Nevis-766S.out



138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:35



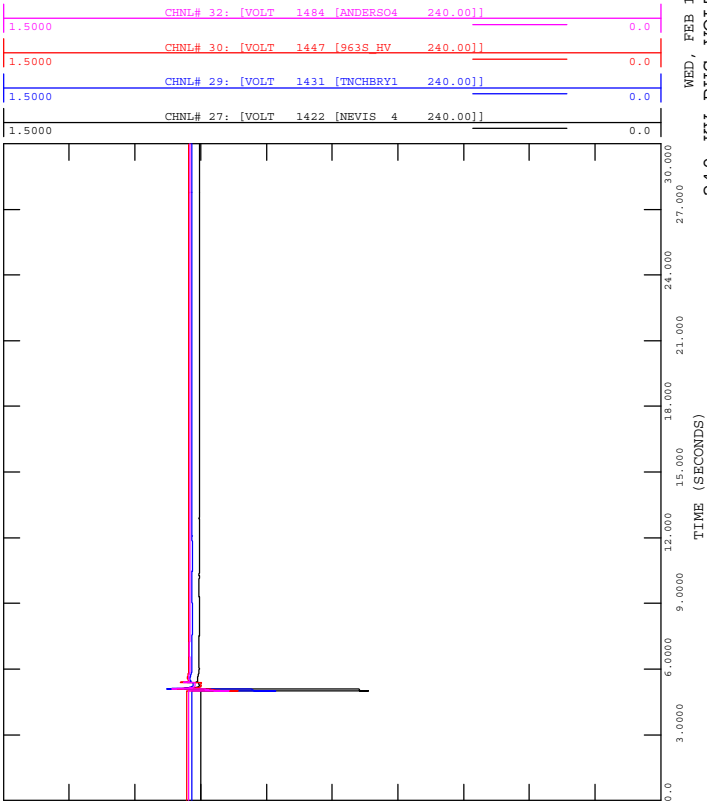
FIGURE A4-42H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-42_3PH_Fault_7L16@Nevis-766S.out



BRANCH FLOW (Q)
 WED, FEB 16 2022 14:35



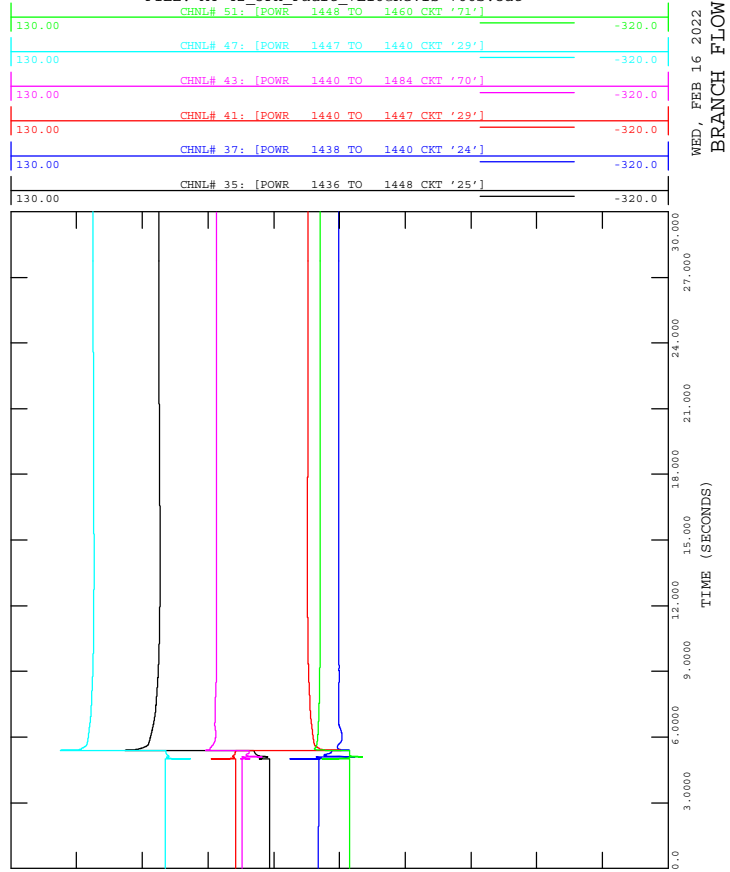
FIGURE A4-42E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-42_3PH_Fault_7L16@Nevis-766S.out



240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:35



FIGURE A4-42G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-42_3PH_Fault_7L16@Nevis-766S.out



BRANCH FLOW (P)
 WED, FEB 16 2022 14:35

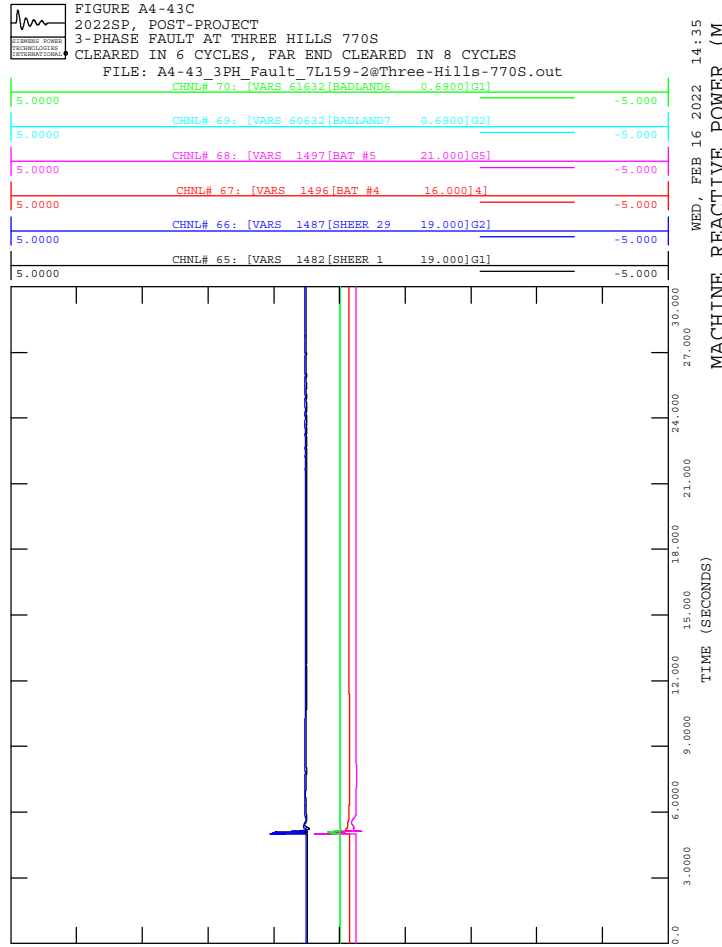
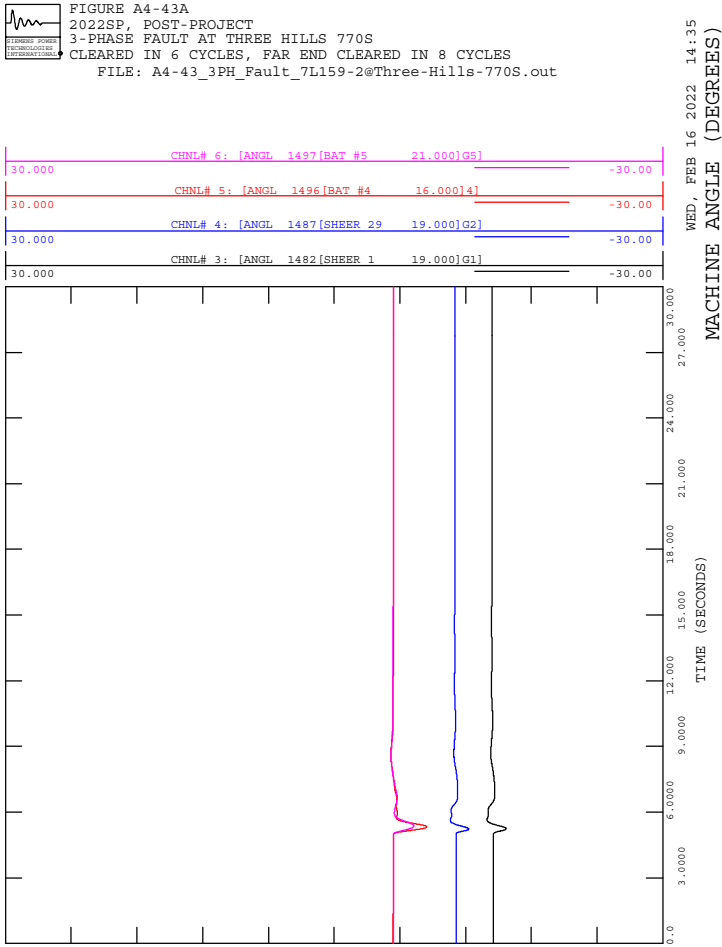
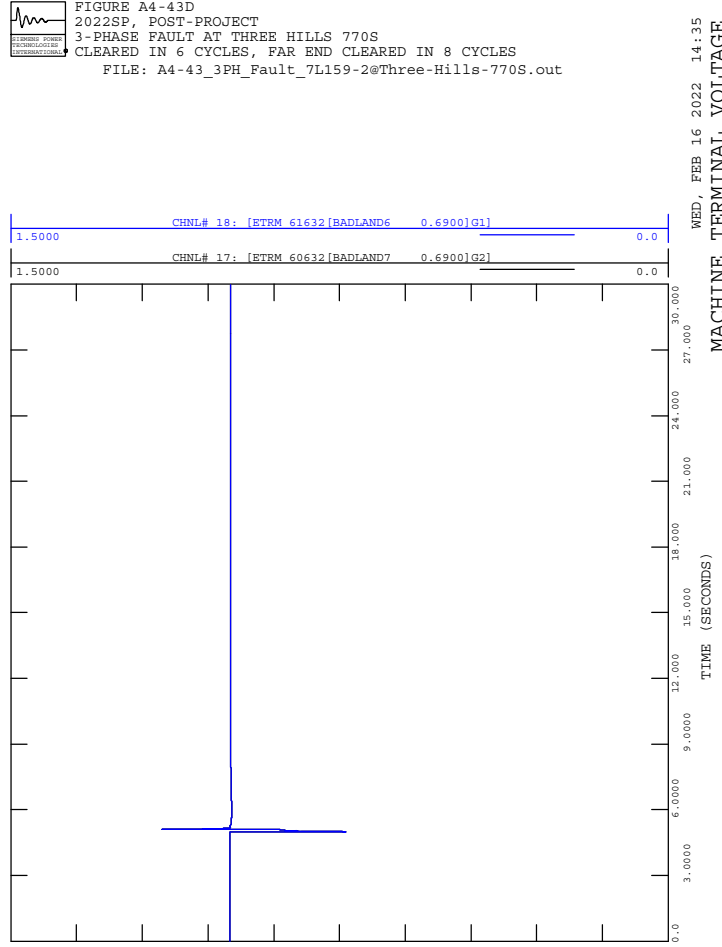
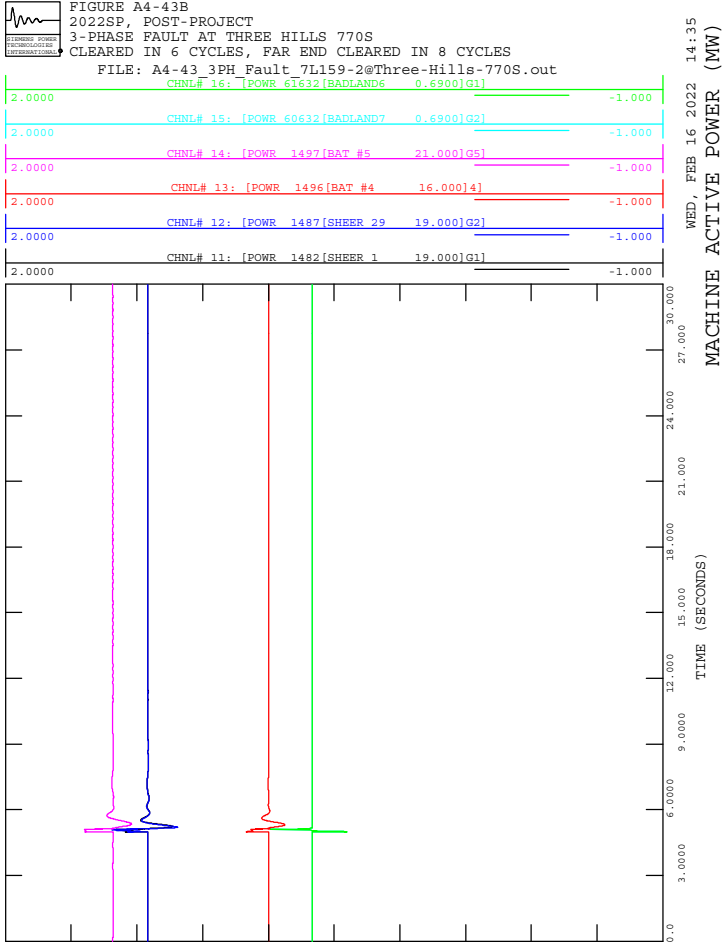




FIGURE A4-43F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-43_3PH_Fault_7L159-2@Three-Hills-770S.out

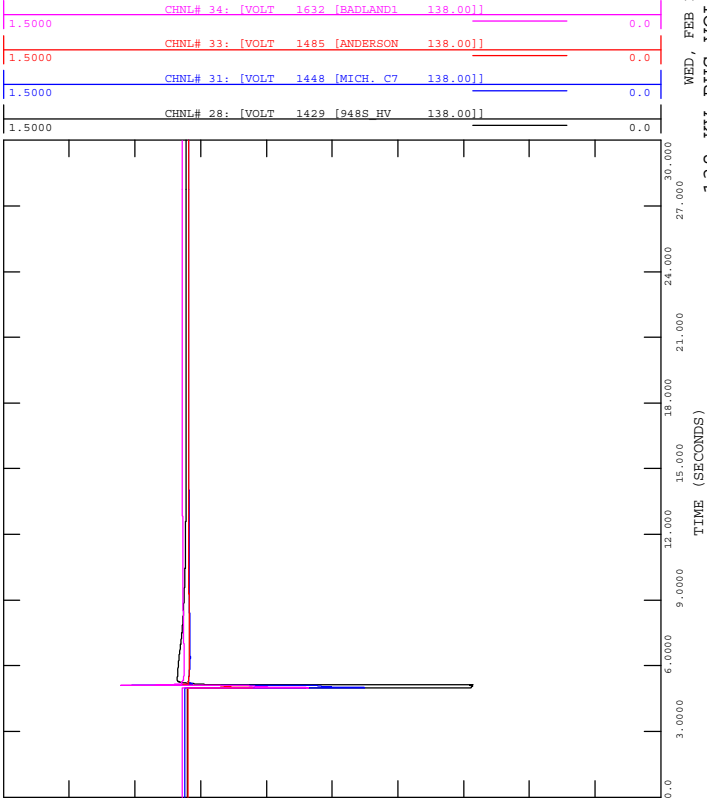


FIGURE A4-43H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-43_3PH_Fault_7L159-2@Three-Hills-770S.out

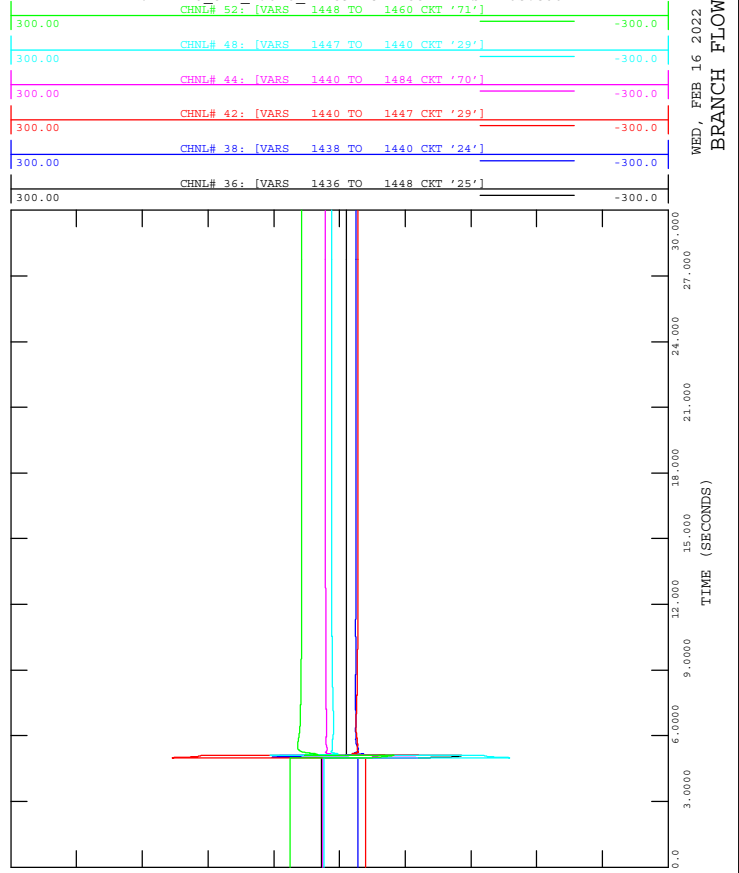


FIGURE A4-43E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-43_3PH_Fault_7L159-2@Three-Hills-770S.out

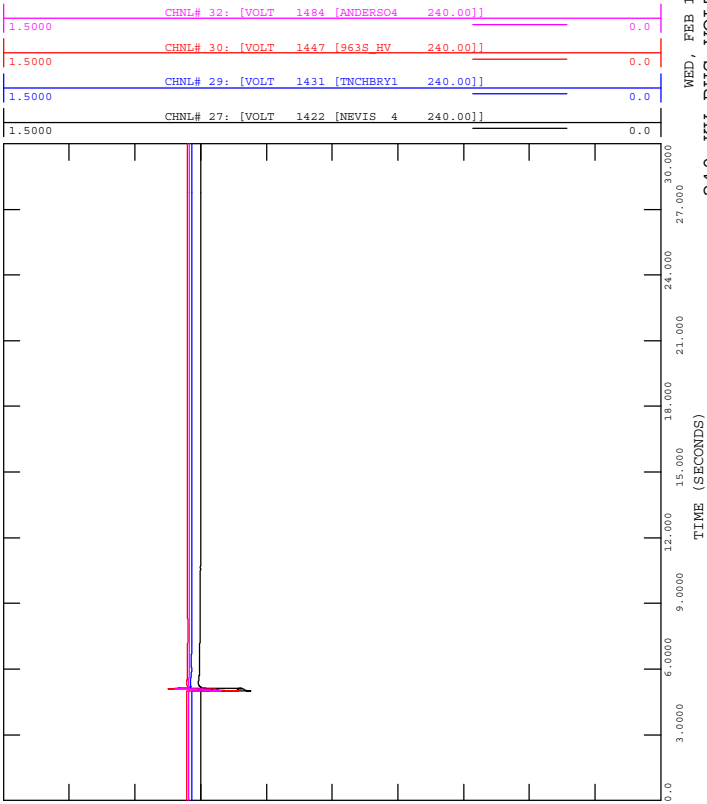


FIGURE A4-43G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-43_3PH_Fault_7L159-2@Three-Hills-770S.out

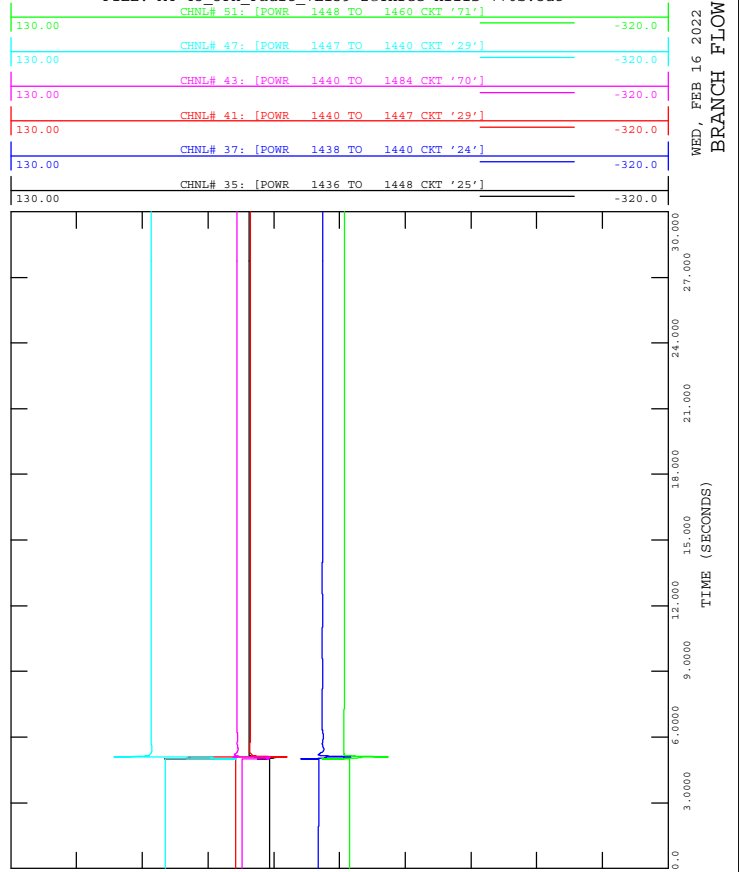
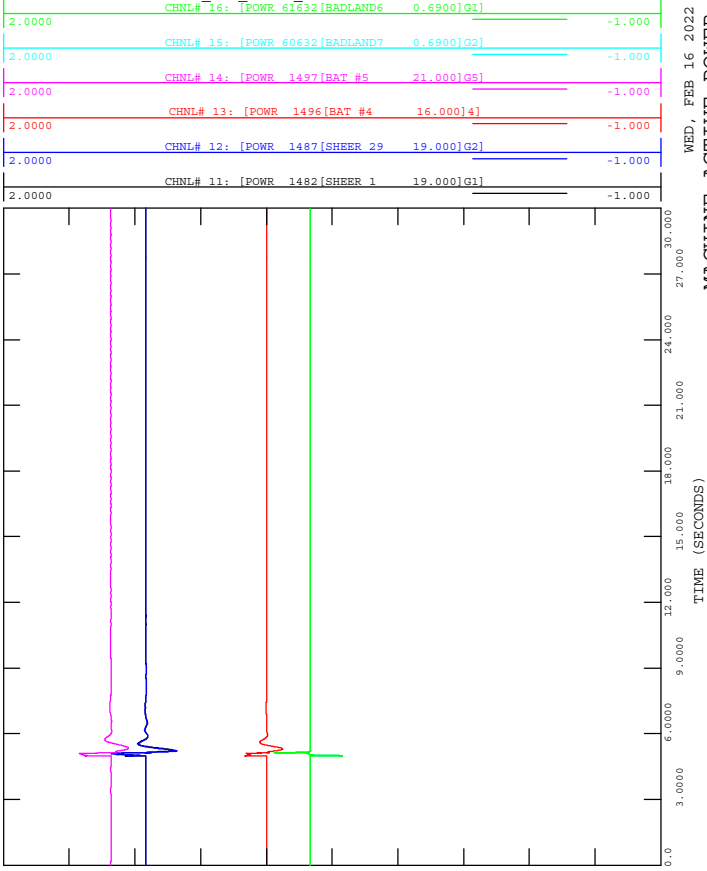




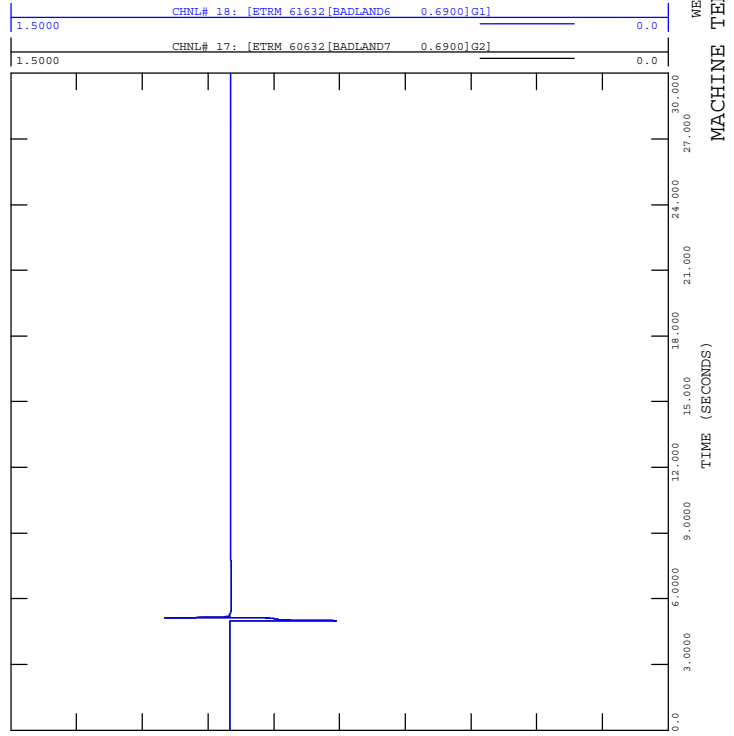
FIGURE A4-44B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-44_3PH_Fault_7L159-2@Ghost-Pine-114S.out



WED, FEB 16 2022 14:36
 MACHINE ACTIVE POWER (MW)



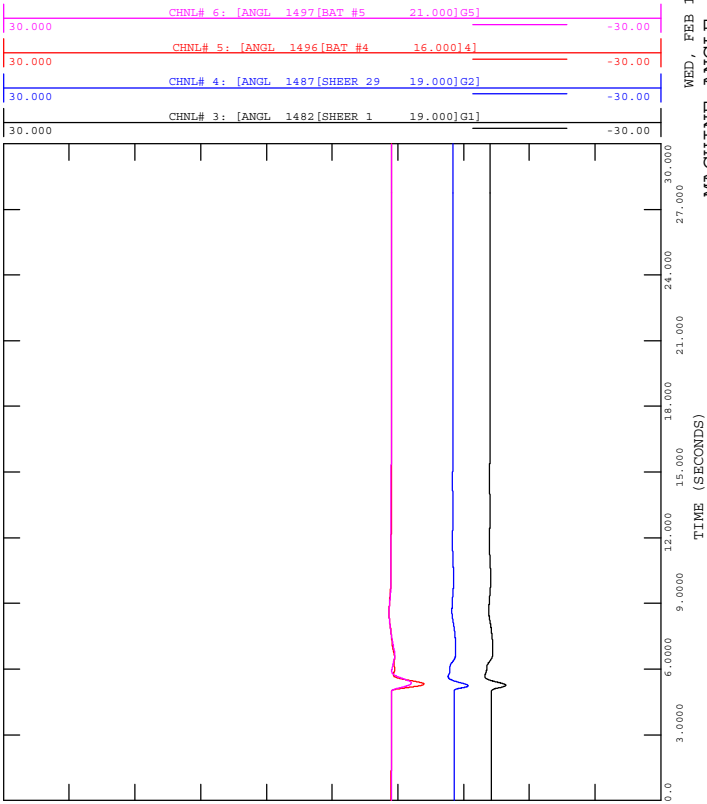
FIGURE A4-44D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-44_3PH_Fault_7L159-2@Ghost-Pine-114S.out



WED, FEB 16 2022 14:36
 MACHINE TERMINAL VOLTAGE



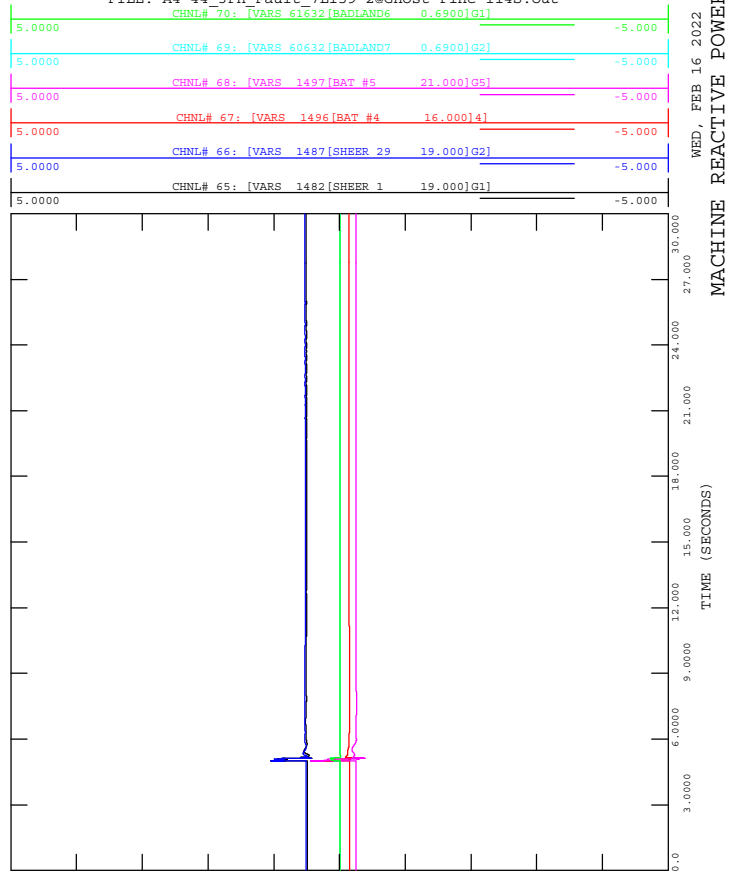
FIGURE A4-44A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-44_3PH_Fault_7L159-2@Ghost-Pine-114S.out



WED, FEB 16 2022 14:36
 MACHINE ANGLE (DEGREES)



FIGURE A4-44C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-44_3PH_Fault_7L159-2@Ghost-Pine-114S.out



WED, FEB 16 2022 14:36
 MACHINE REACTIVE POWER (M)



FIGURE A4-44F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-44_3PH_Fault_7L159-2@Ghost-Pine-114S.out

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:36

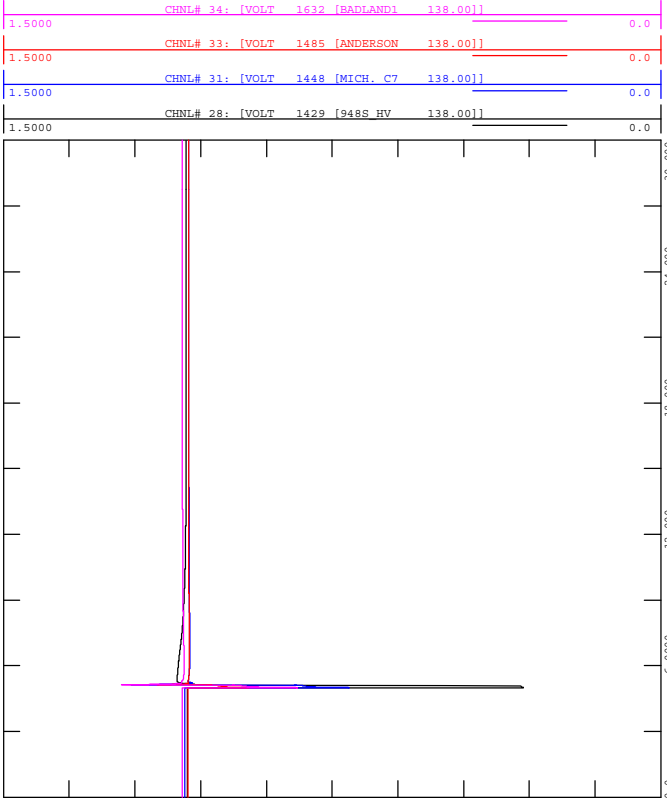


FIGURE A4-44H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-44_3PH_Fault_7L159-2@Ghost-Pine-114S.out

BRANCH FLOW (Q)
 WED, FEB 16 2022 14:36

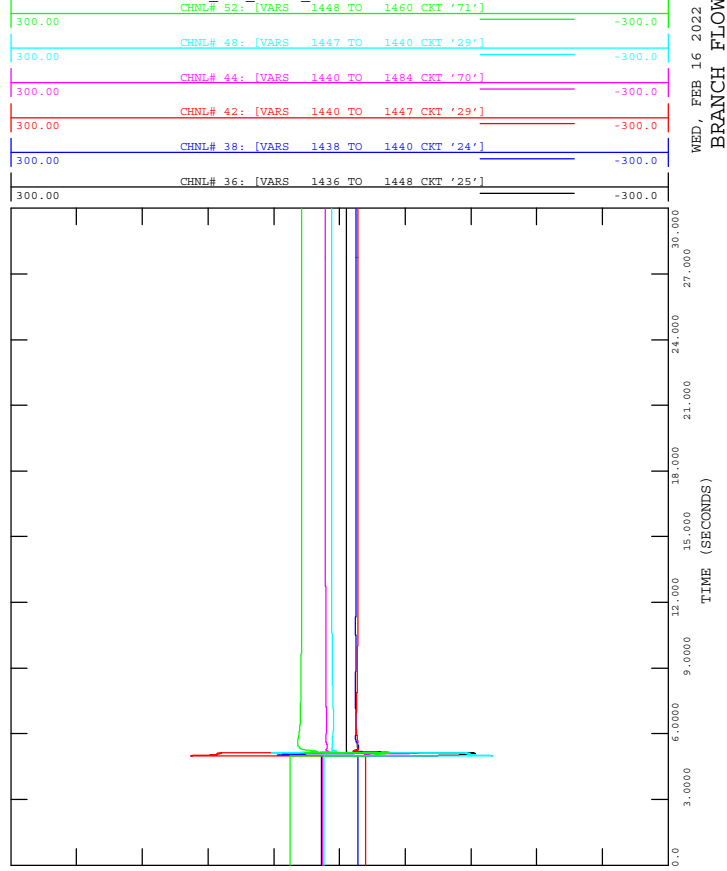


FIGURE A4-44E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-44_3PH_Fault_7L159-2@Ghost-Pine-114S.out

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:36

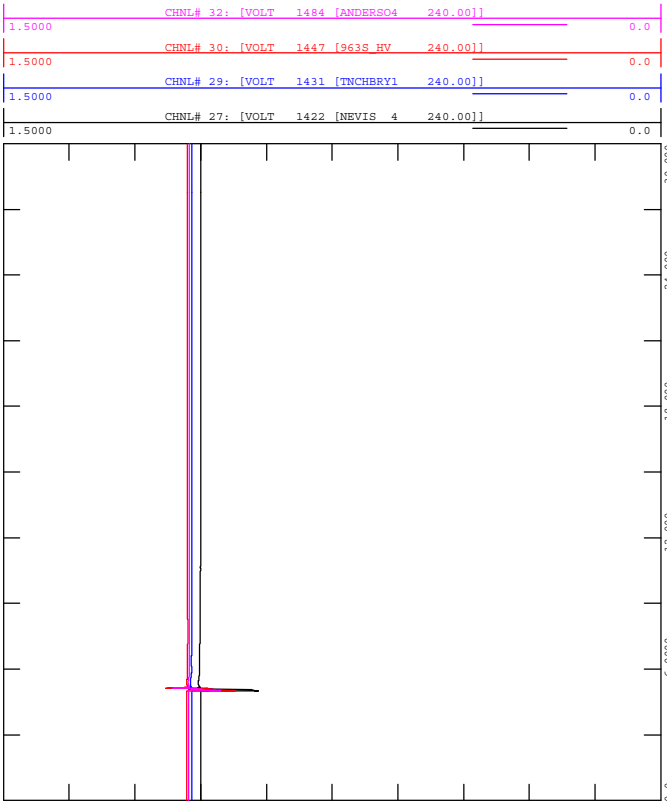
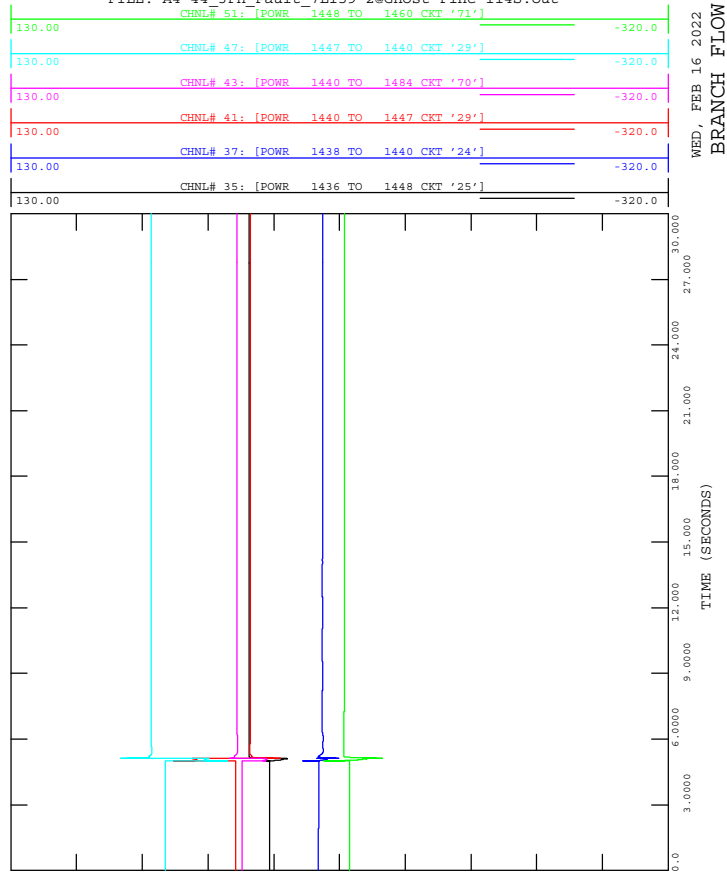


FIGURE A4-44G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-44_3PH_Fault_7L159-2@Ghost-Pine-114S.out

BRANCH FLOW (P)
 WED, FEB 16 2022 14:36



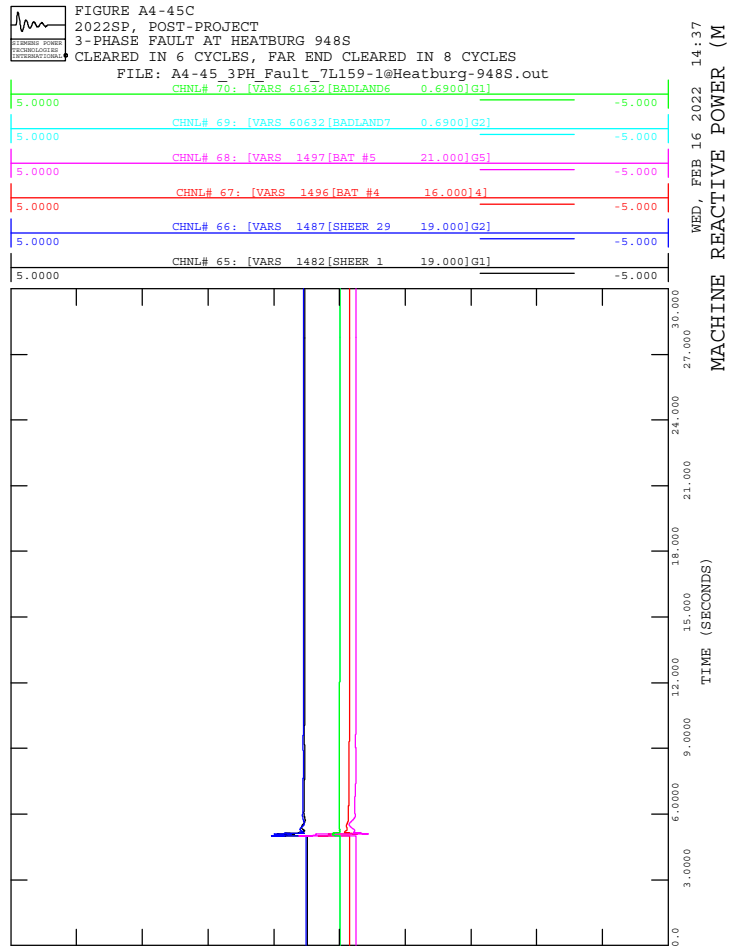
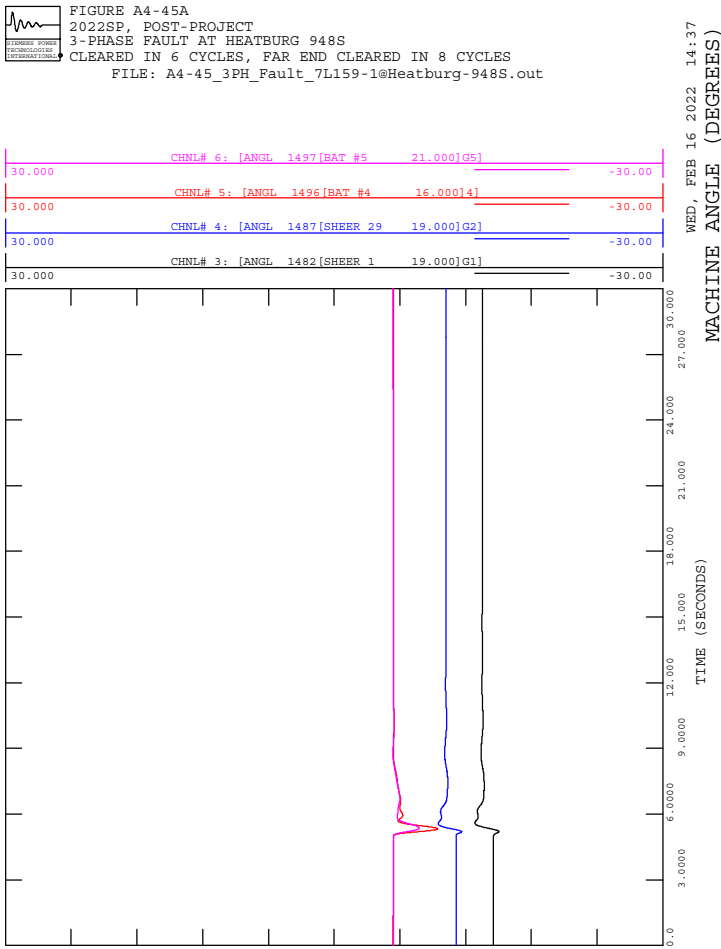
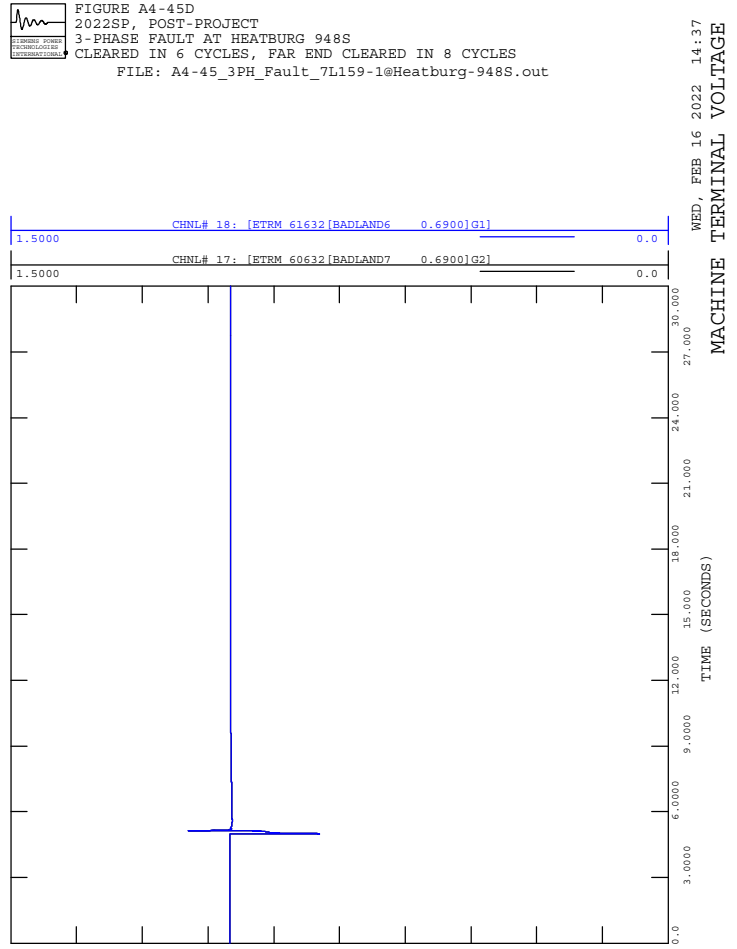
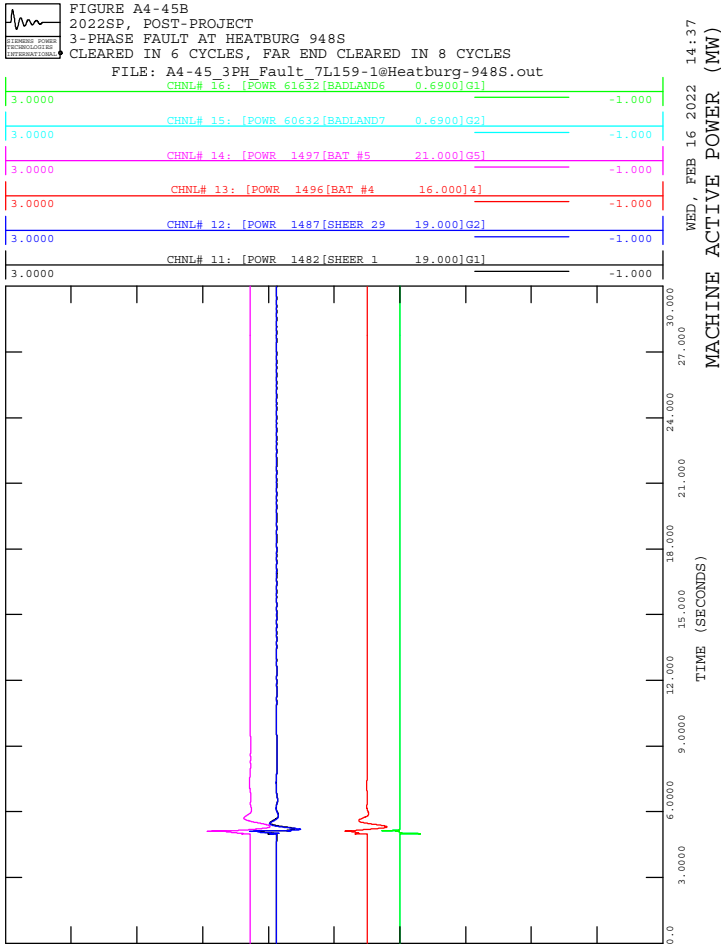




FIGURE A4-45F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-45_3PH_Fault_7L159-1@Heatburg-948S.out

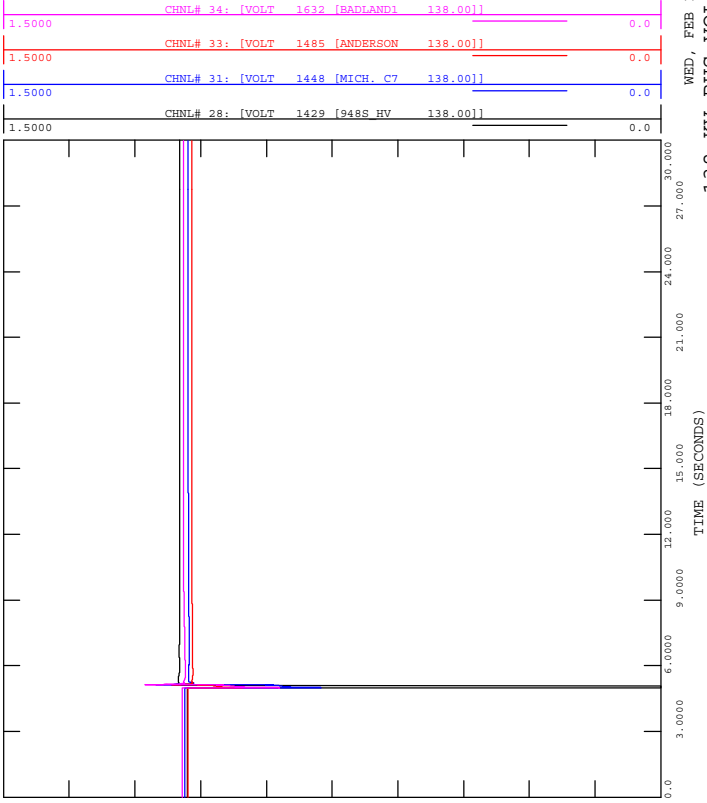


FIGURE A4-45H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-45_3PH_Fault_7L159-1@Heatburg-948S.out

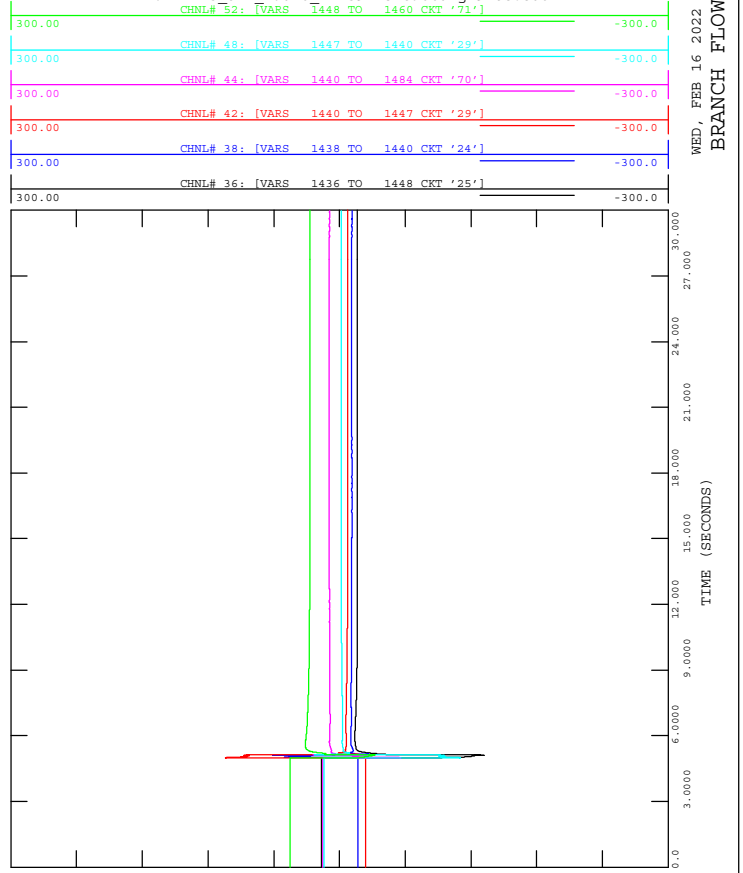


FIGURE A4-45E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-45_3PH_Fault_7L159-1@Heatburg-948S.out

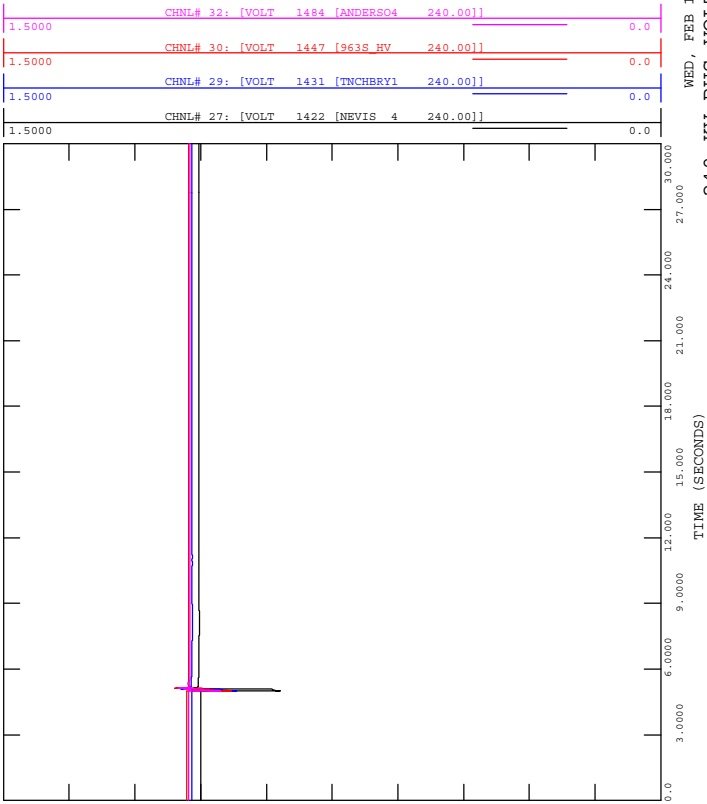


FIGURE A4-45G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-45_3PH_Fault_7L159-1@Heatburg-948S.out

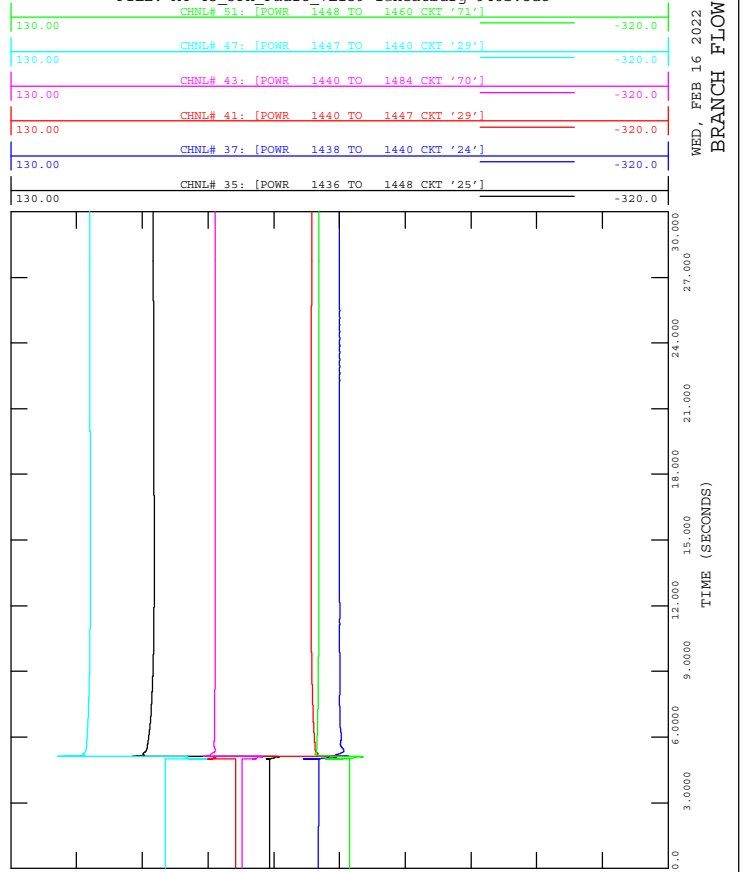
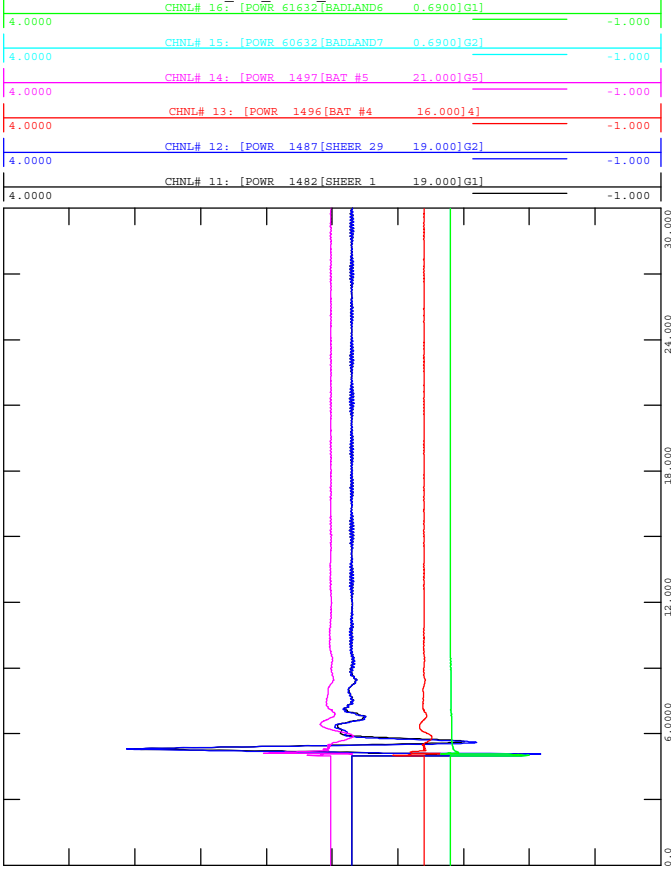




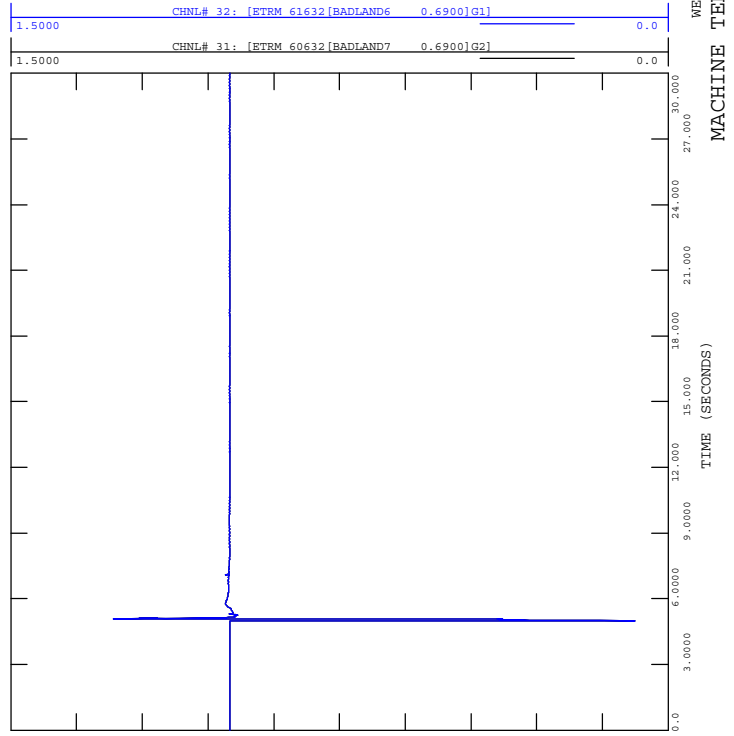
FIGURE A4-46B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-46_3PH_Fault_9L59@Anderson-801S.out



WED, FEB 16 2022 14:38
 MACHINE ACTIVE POWER (MW)



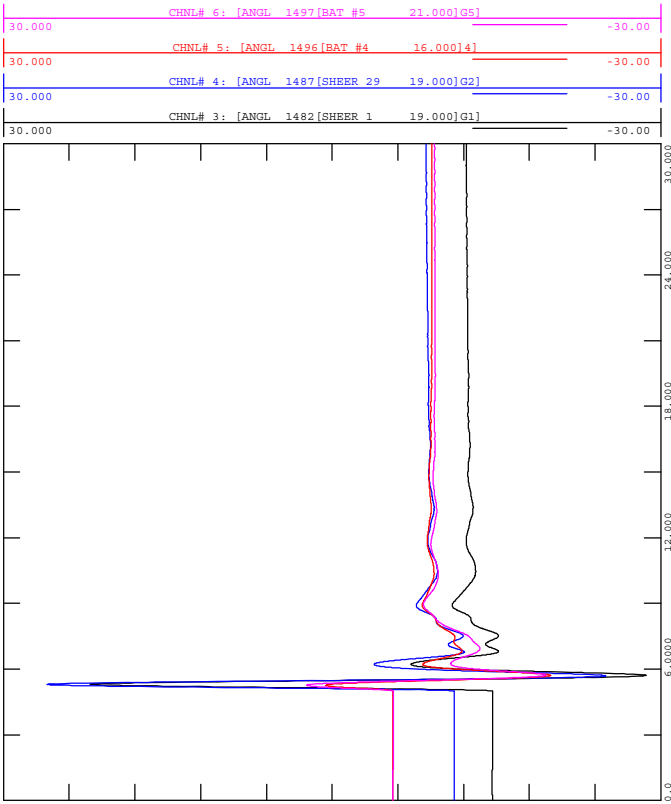
FIGURE A4-46D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-46_3PH_Fault_9L59@Anderson-801S.out



WED, FEB 16 2022 14:38
 MACHINE TERMINAL VOLTAGE



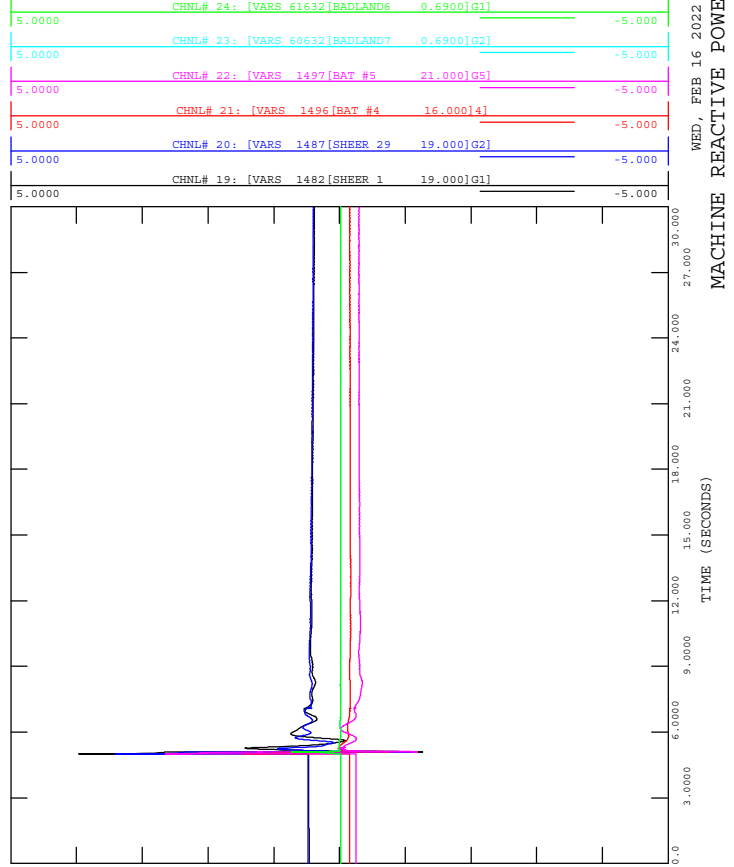
FIGURE A4-46A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-46_3PH_Fault_9L59@Anderson-801S.out



WED, FEB 16 2022 14:37
 MACHINE ANGLE (DEGREES)



FIGURE A4-46C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-46_3PH_Fault_9L59@Anderson-801S.out



WED, FEB 16 2022 14:38
 MACHINE REACTIVE POWER (M)



FIGURE A4-46F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-46_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 14:38
 138 KV BUS VOLTAGE (PU)

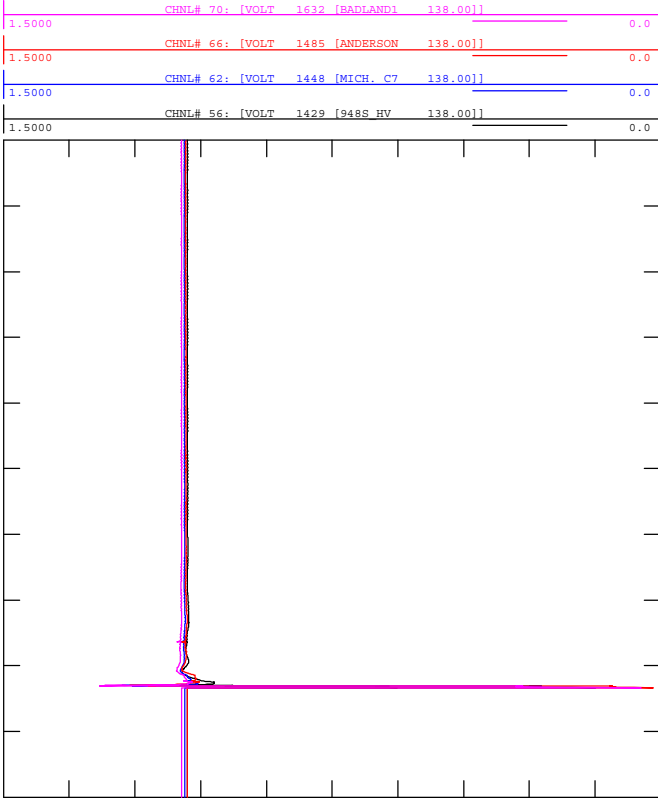


FIGURE A4-46H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-46_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 14:38
 BRANCH FLOW (Q)

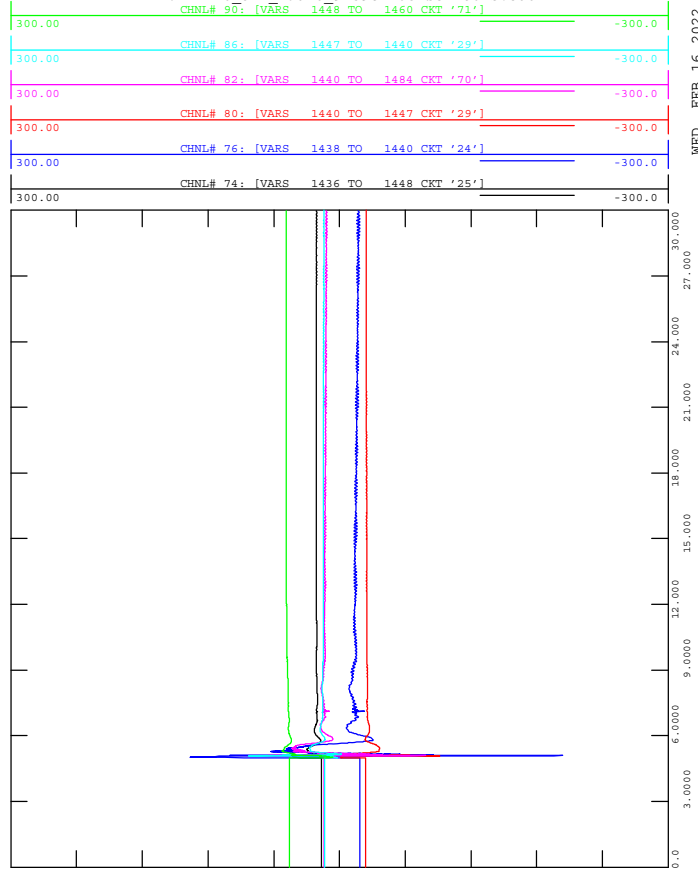


FIGURE A4-46E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-46_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 14:38
 240 KV BUS VOLTAGE (PU)

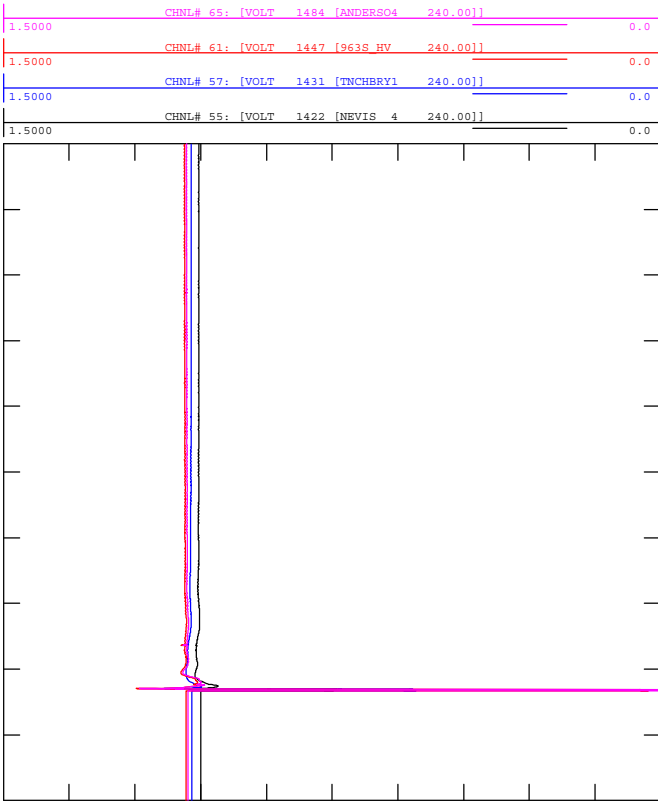


FIGURE A4-46G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-46_3PH_Fault_9L59@Anderson-801S.out

WED, FEB 16 2022 14:38
 BRANCH FLOW (P)

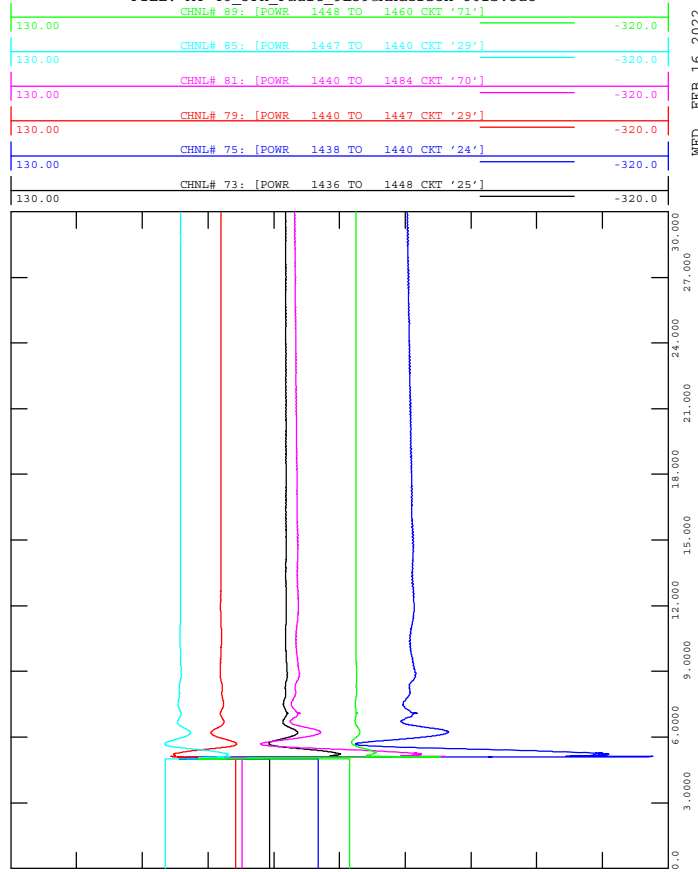
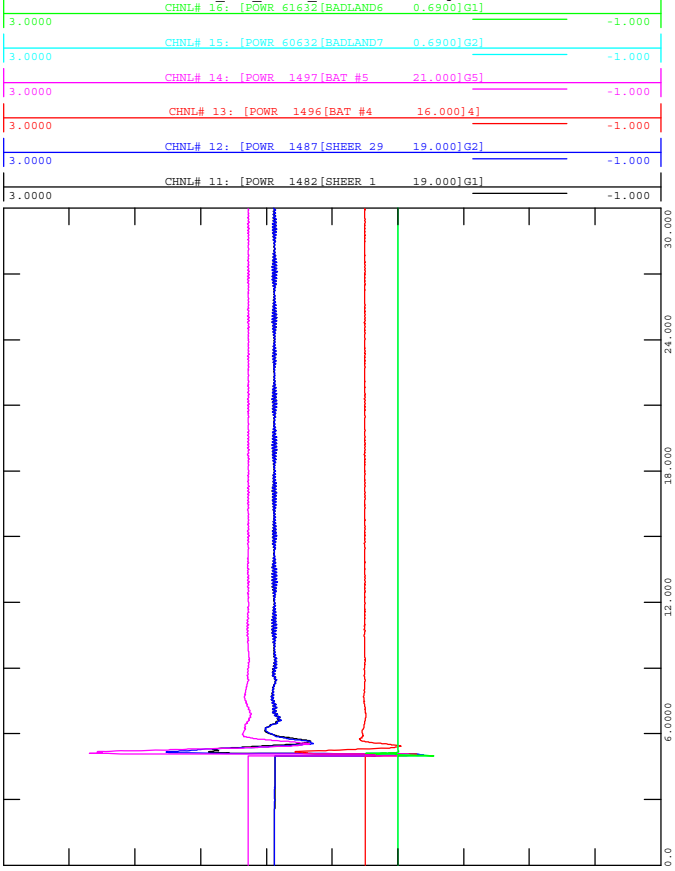




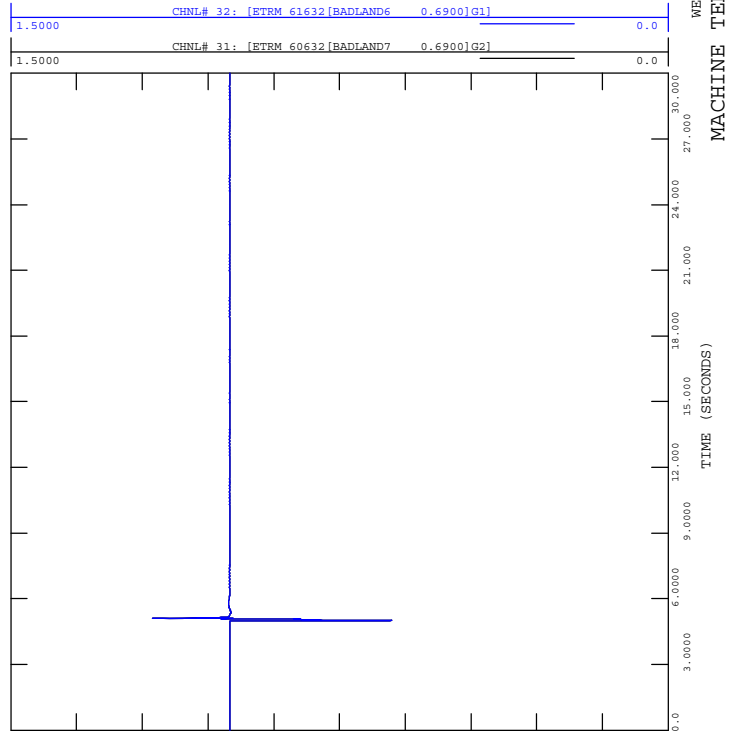
FIGURE A4-47B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-47_3PH_Fault_9L59@Tinccheyray-972S.out



WED, FEB 16 2022 14:38
 MACHINE ACTIVE POWER (MW)



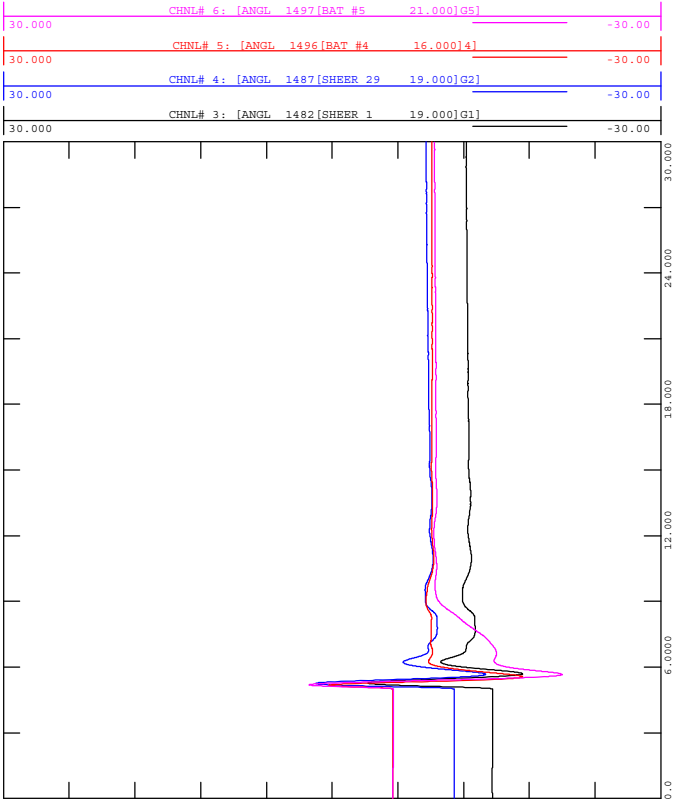
FIGURE A4-47D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-47_3PH_Fault_9L59@Tinccheyray-972S.out



WED, FEB 16 2022 14:38
 MACHINE TERMINAL VOLTAGE



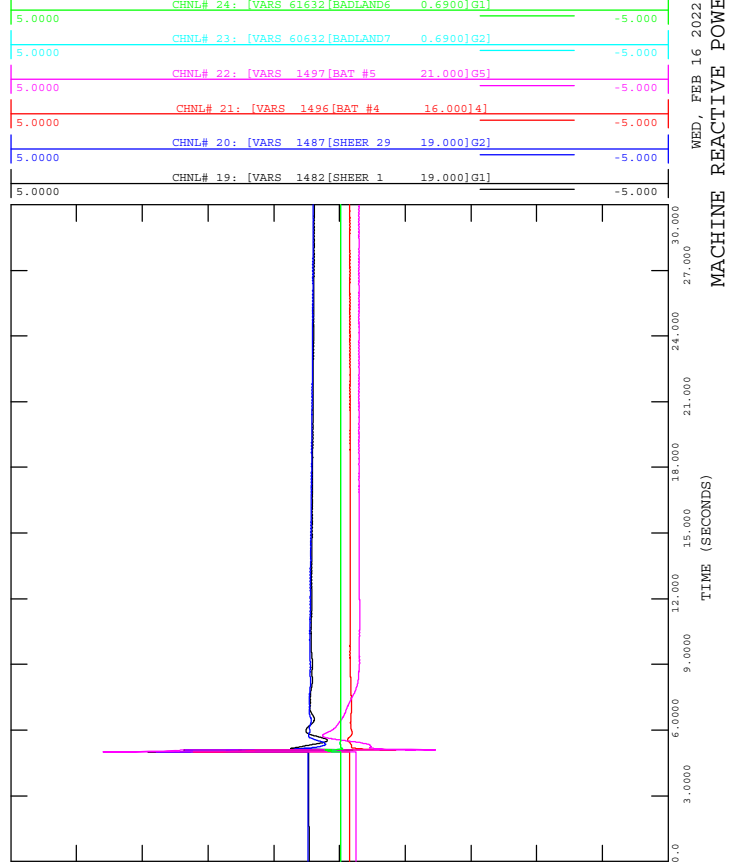
FIGURE A4-47A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-47_3PH_Fault_9L59@Tinccheyray-972S.out



WED, FEB 16 2022 14:38
 MACHINE ANGLE (DEGREES)



FIGURE A4-47C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-47_3PH_Fault_9L59@Tinccheyray-972S.out



WED, FEB 16 2022 14:38
 MACHINE REACTIVE POWER (M)



FIGURE A4-47F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-47_3PH_Fault_9L59@Tincchbray-972S.out

14:38
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

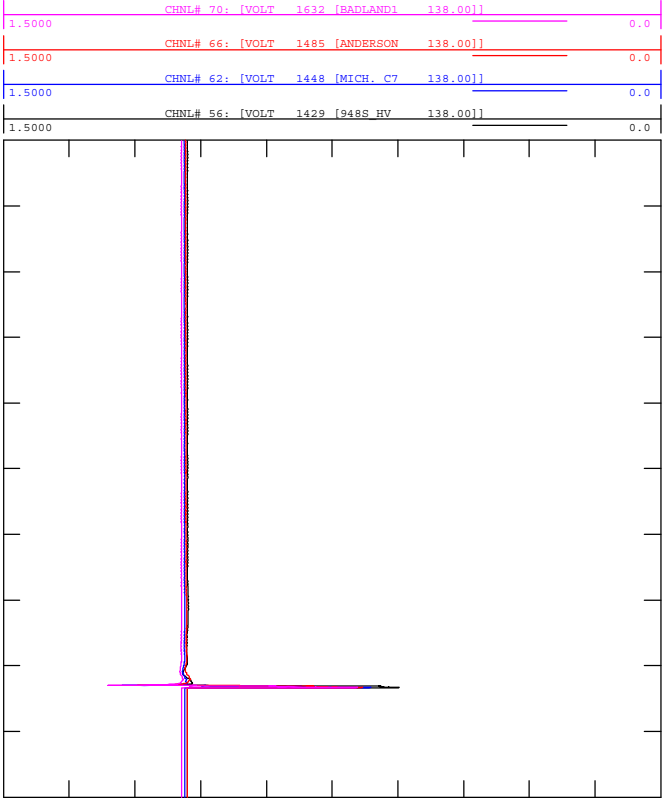


FIGURE A4-47H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-47_3PH_Fault_9L59@Tincchbray-972S.out

14:38
 WED, FEB 16 2022
 BRANCH FLOW (Q)

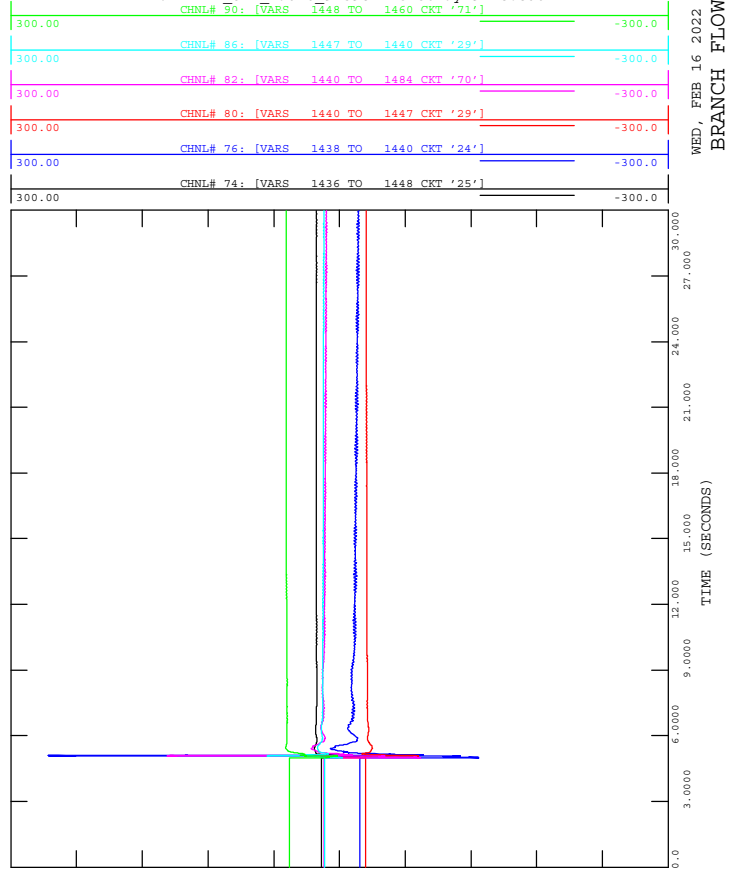


FIGURE A4-47E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-47_3PH_Fault_9L59@Tincchbray-972S.out

14:38
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

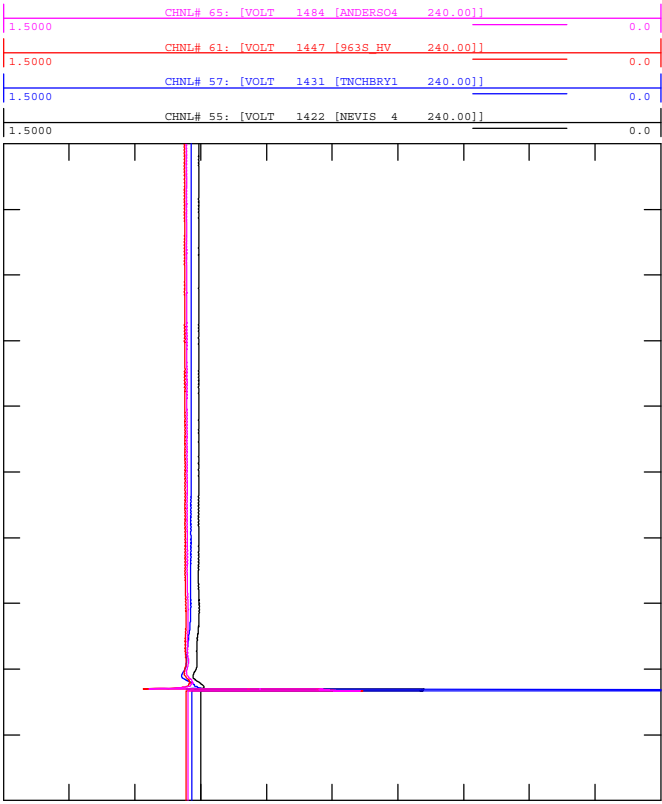


FIGURE A4-47G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-47_3PH_Fault_9L59@Tincchbray-972S.out

14:38
 WED, FEB 16 2022
 BRANCH FLOW (P)

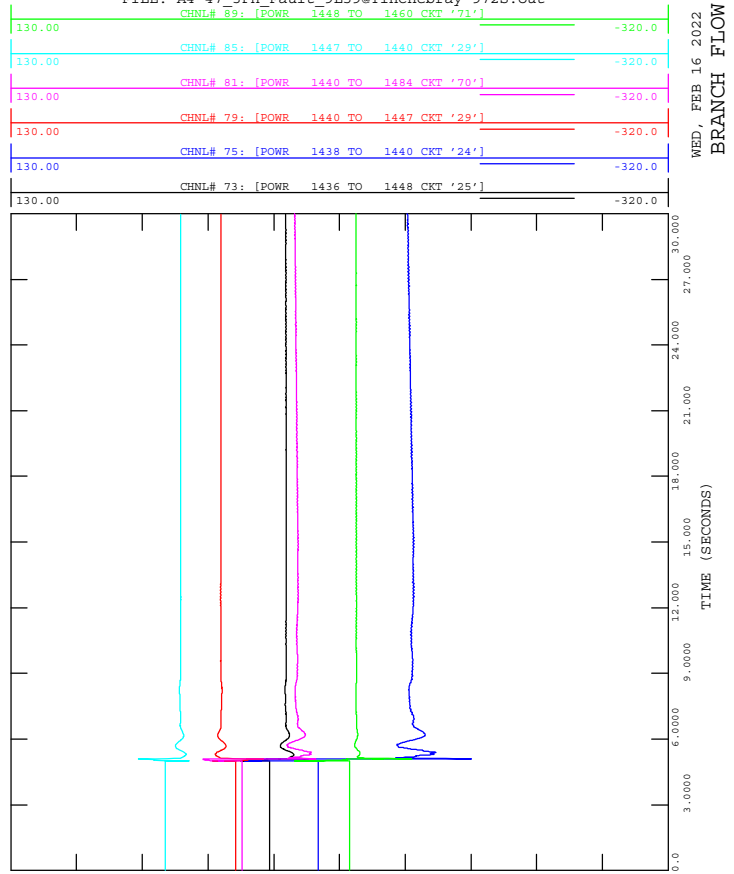
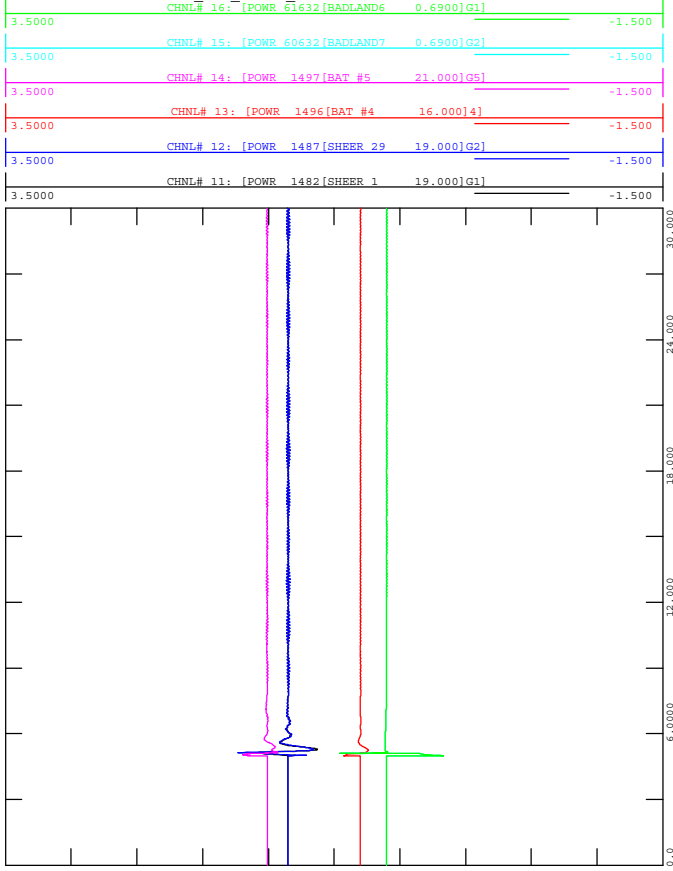




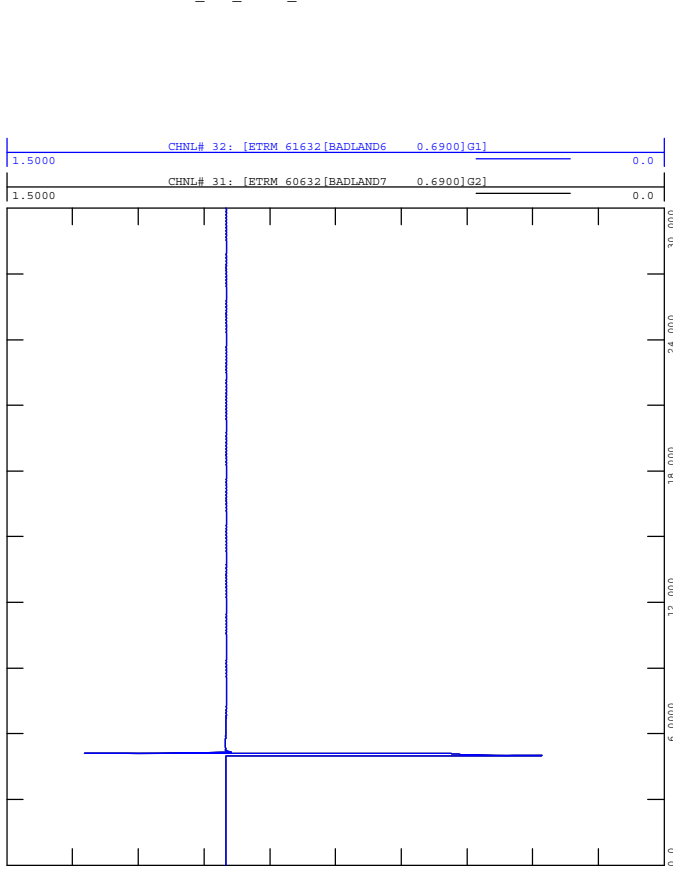
FIGURE A4-48B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-48_3PH_Fault_7L128@Michichi-Creek-802S.out



WED, FEB 16 2022 14:39
 MACHINE ACTIVE POWER (MW)



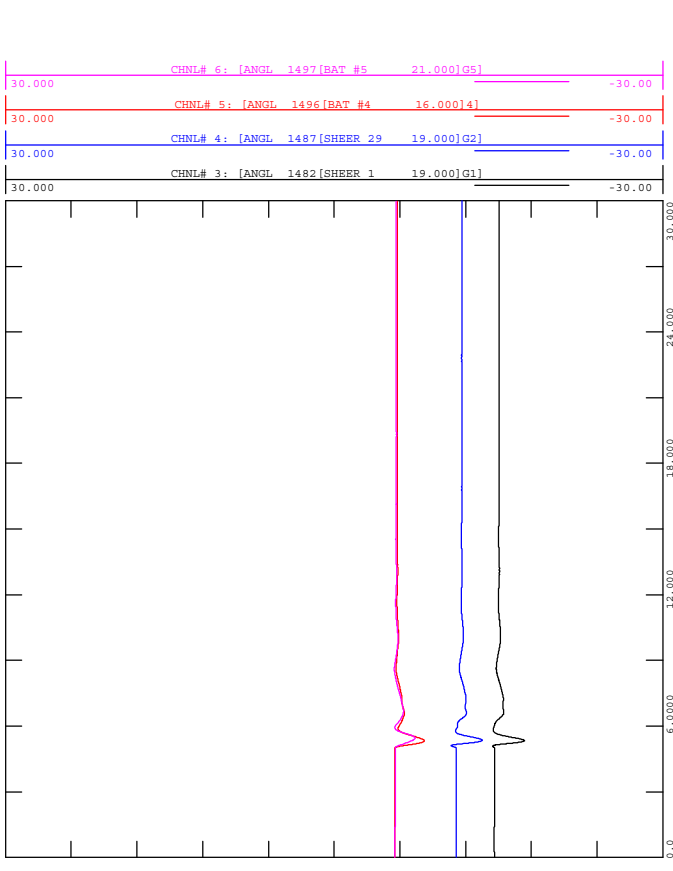
FIGURE A4-48D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-48_3PH_Fault_7L128@Michichi-Creek-802S.out



WED, FEB 16 2022 14:39
 MACHINE TERMINAL VOLTAGE



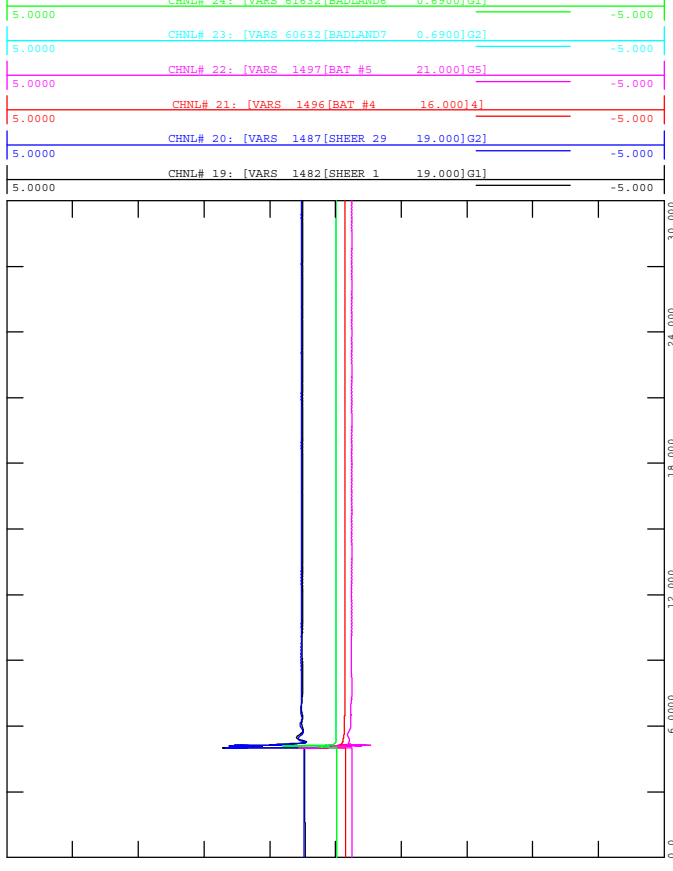
FIGURE A4-48A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-48_3PH_Fault_7L128@Michichi-Creek-802S.out



WED, FEB 16 2022 14:39
 MACHINE ANGLE (DEGREES)



FIGURE A4-48C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-48_3PH_Fault_7L128@Michichi-Creek-802S.out



WED, FEB 16 2022 14:39
 MACHINE REACTIVE POWER (M)



FIGURE A4-48F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-48_3PH_Fault_7L128@Michichi-Creek-802S.out

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:39

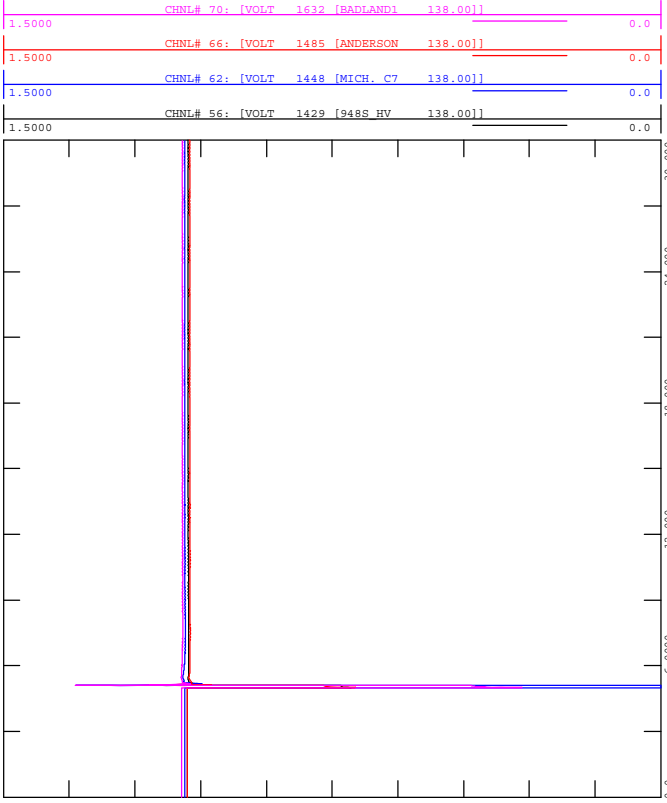


FIGURE A4-48H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-48_3PH_Fault_7L128@Michichi-Creek-802S.out

BRANCH FLOW (Q)
 WED, FEB 16 2022 14:39

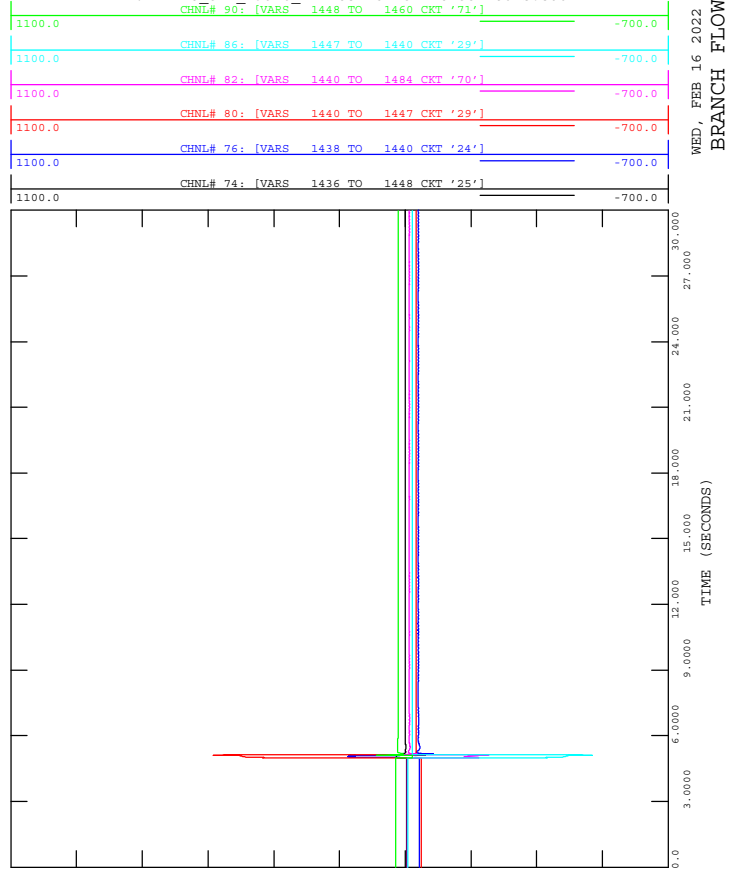


FIGURE A4-48E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-48_3PH_Fault_7L128@Michichi-Creek-802S.out

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:39

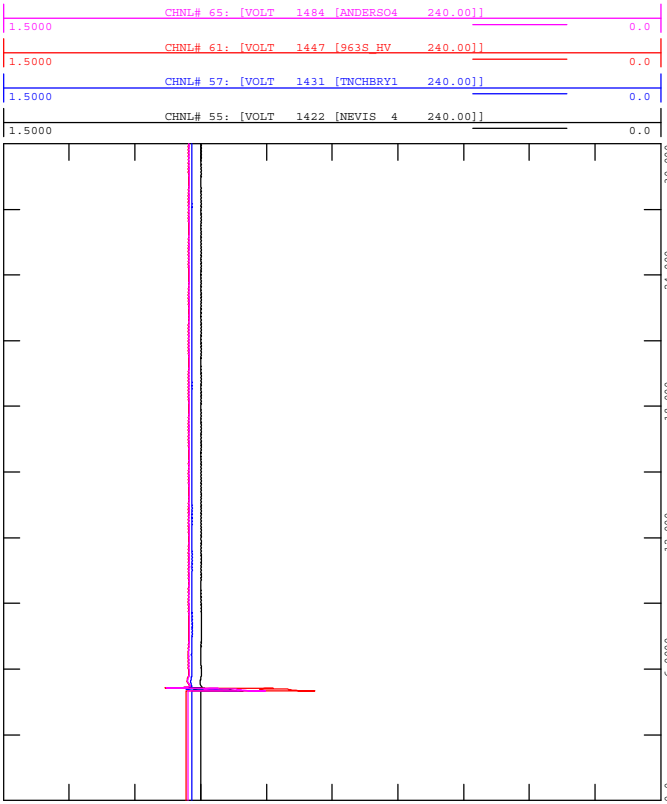


FIGURE A4-48G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-48_3PH_Fault_7L128@Michichi-Creek-802S.out

BRANCH FLOW (P)
 WED, FEB 16 2022 14:39

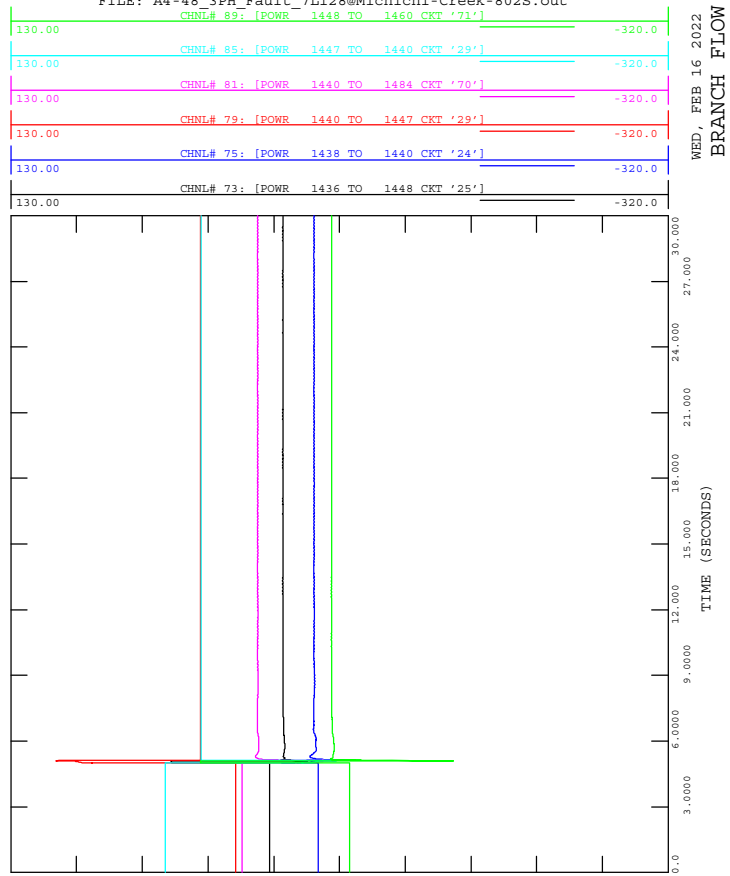
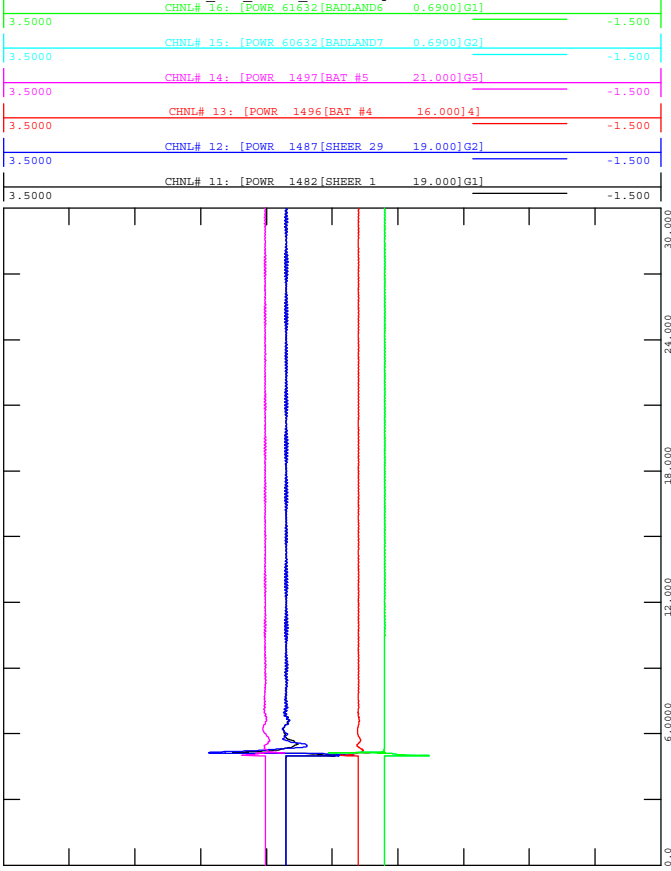




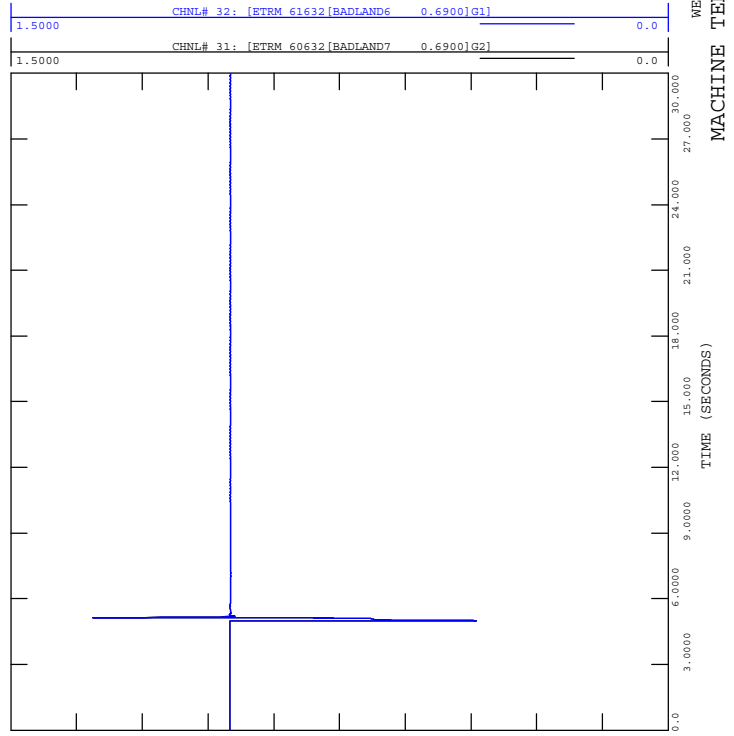
FIGURE A4-49B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-49_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 14:40
 MACHINE ACTIVE POWER (MW)



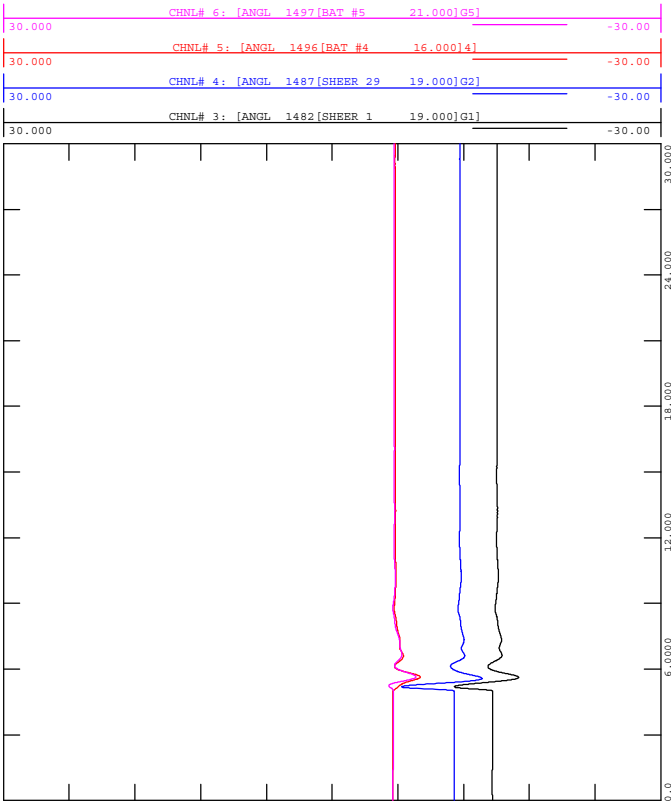
FIGURE A4-49D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-49_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 14:40
 MACHINE TERMINAL VOLTAGE



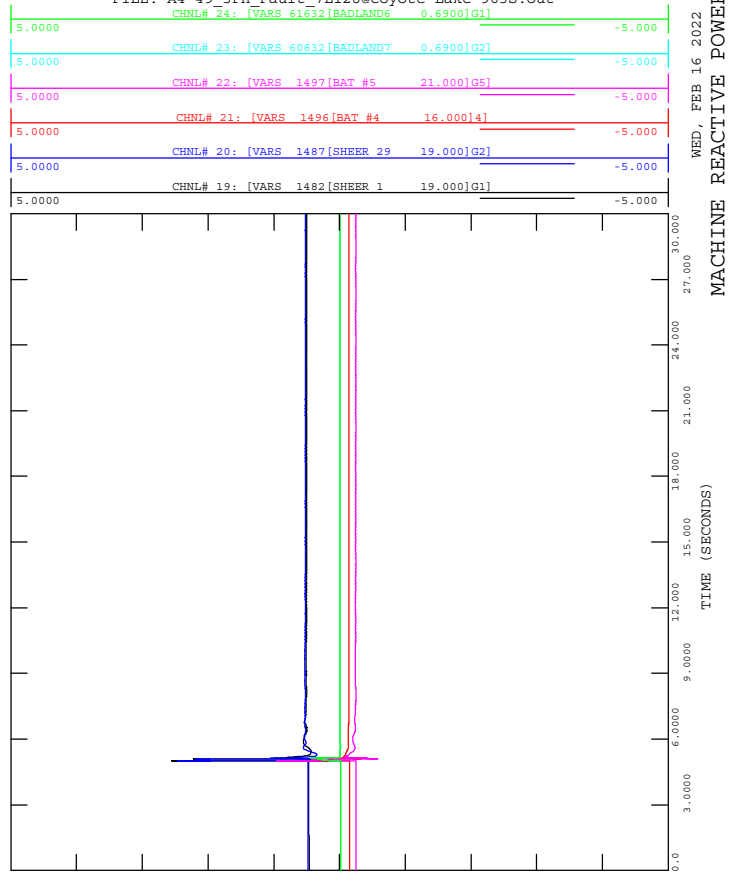
FIGURE A4-49A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-49_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 14:39
 MACHINE ANGLE (DEGREES)



FIGURE A4-49C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-49_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 14:40
 MACHINE REACTIVE POWER (M)



FIGURE A4-49F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-49_3PH_Fault_7L128@Coyote-Lake-963S.out

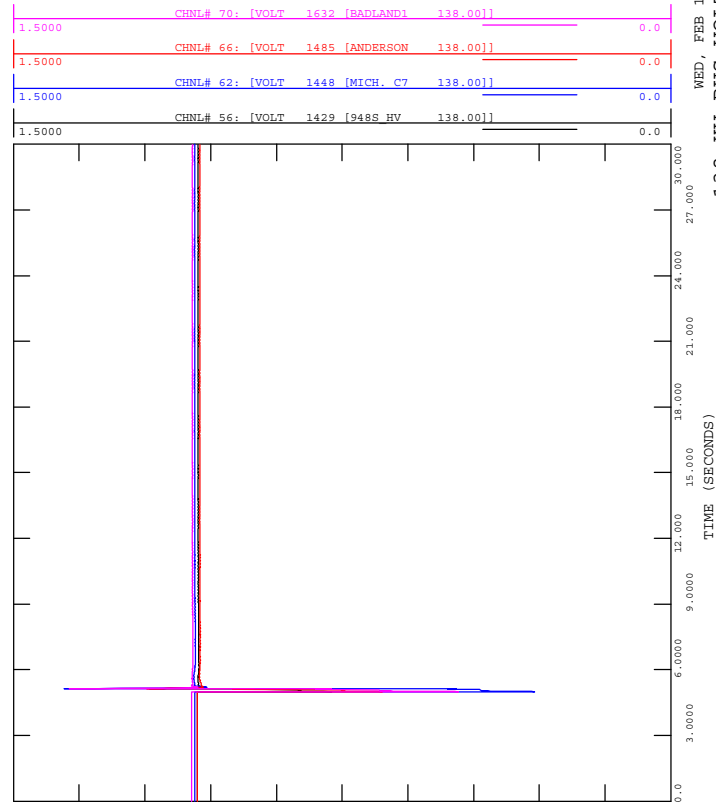


FIGURE A4-49H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-49_3PH_Fault_7L128@Coyote-Lake-963S.out

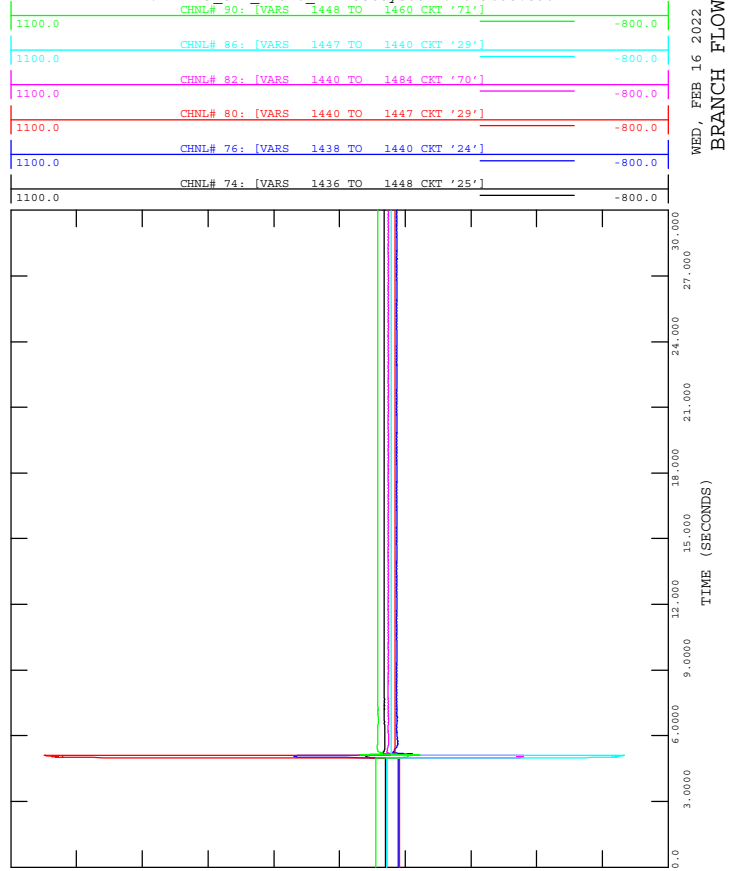


FIGURE A4-49E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-49_3PH_Fault_7L128@Coyote-Lake-963S.out

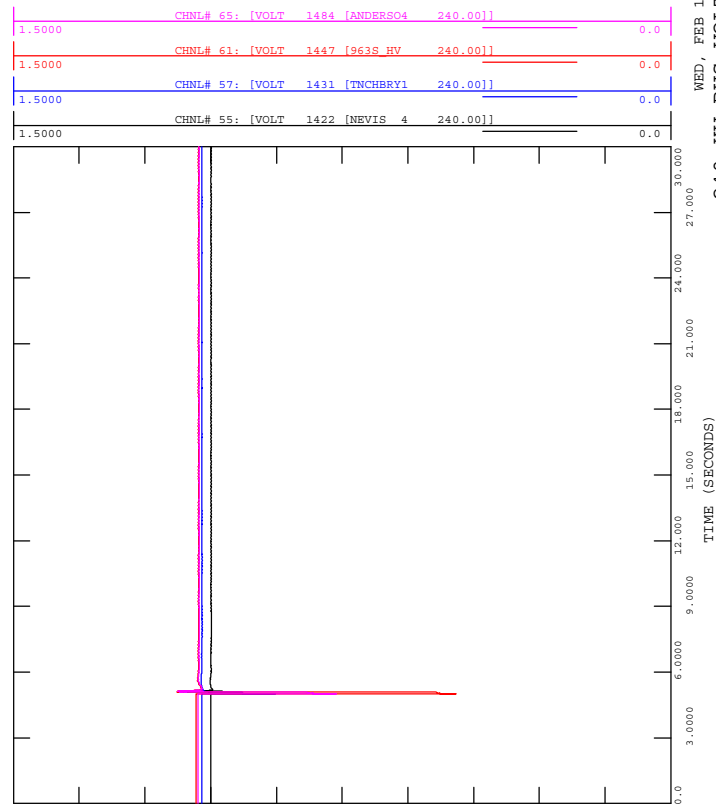


FIGURE A4-49G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-49_3PH_Fault_7L128@Coyote-Lake-963S.out

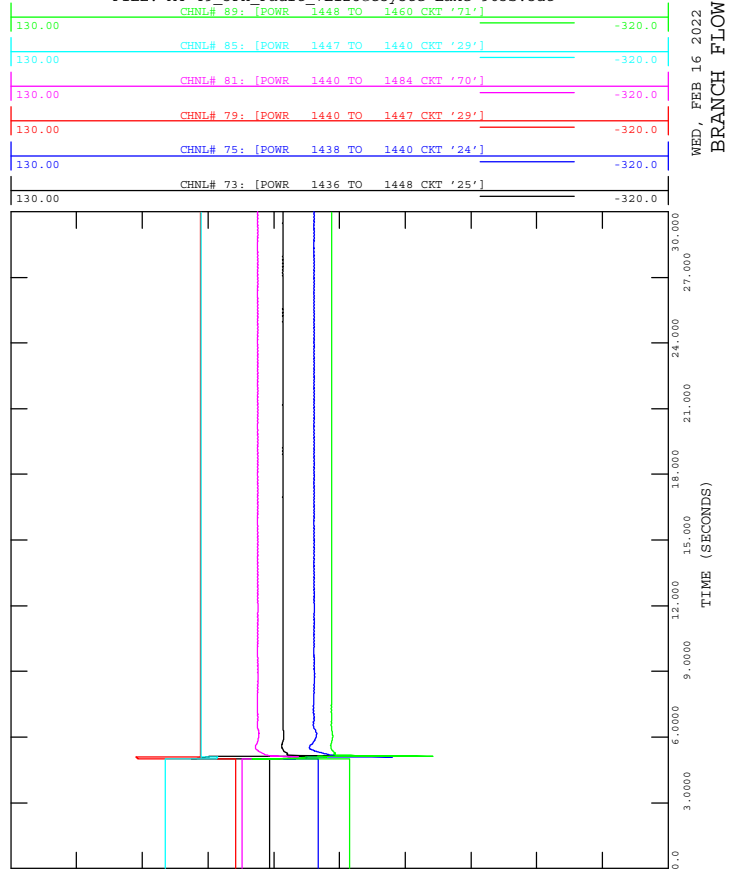
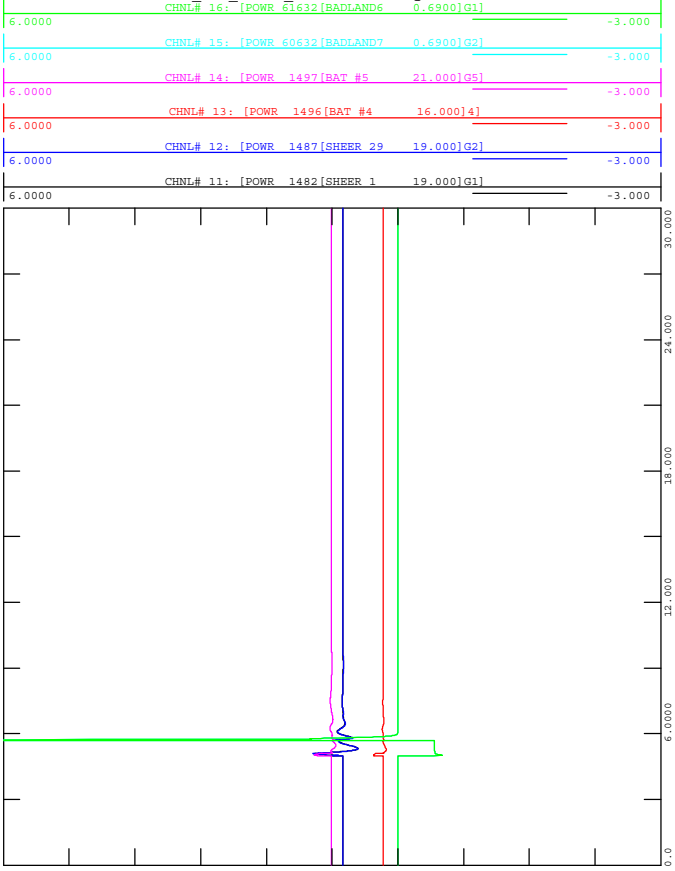




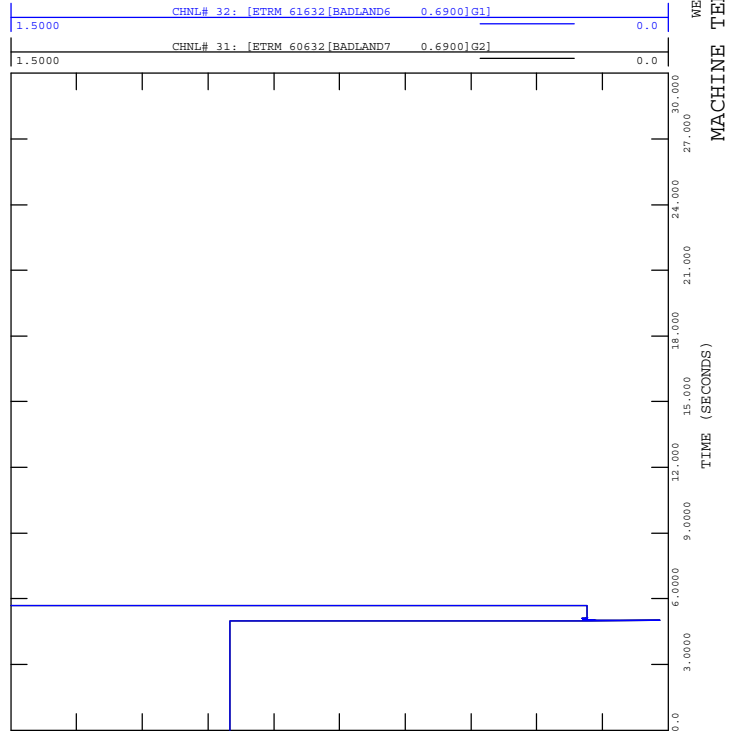
FIGURE A4-50B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-50_3PH_Fault_7L85@Wintering-Hills-804S.out



WED, FEB 16 2022 14:40
 MACHINE ACTIVE POWER (MW)



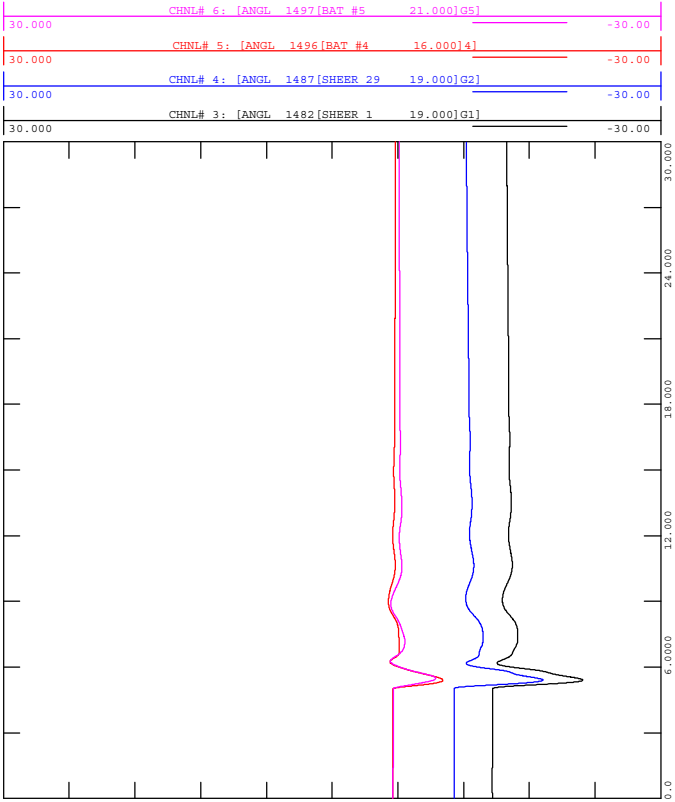
FIGURE A4-50D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-50_3PH_Fault_7L85@Wintering-Hills-804S.out



WED, FEB 16 2022 14:40
 MACHINE TERMINAL VOLTAGE



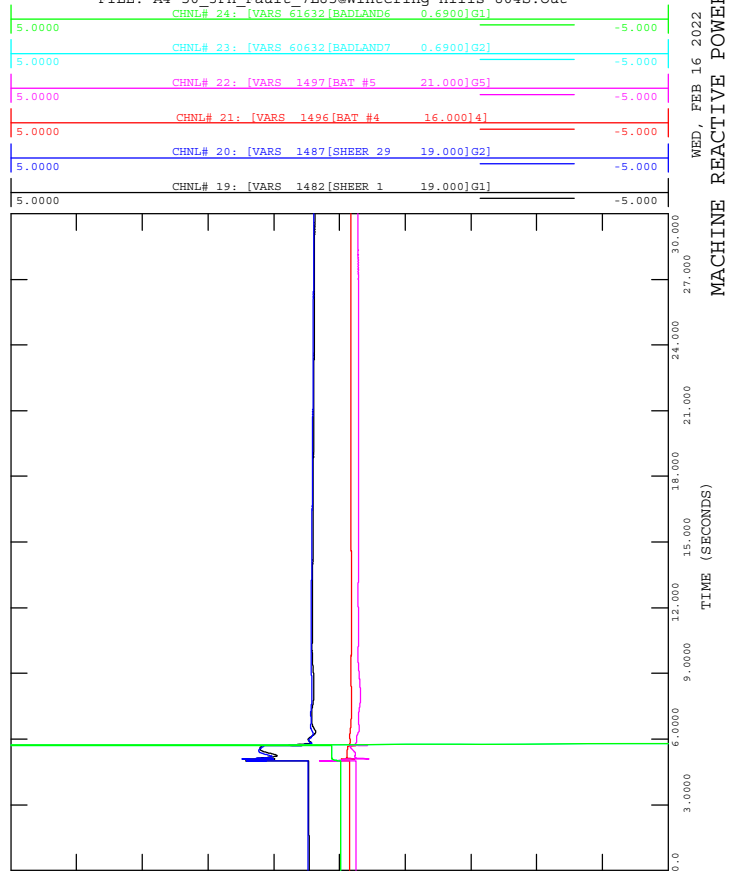
FIGURE A4-50A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-50_3PH_Fault_7L85@Wintering-Hills-804S.out



WED, FEB 16 2022 14:40
 MACHINE ANGLE (DEGREES)



FIGURE A4-50C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-50_3PH_Fault_7L85@Wintering-Hills-804S.out



WED, FEB 16 2022 14:40
 MACHINE REACTIVE POWER (M)



FIGURE A4-50F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-50_3PH_Fault_7L85@Wintering-Hills-804S.out

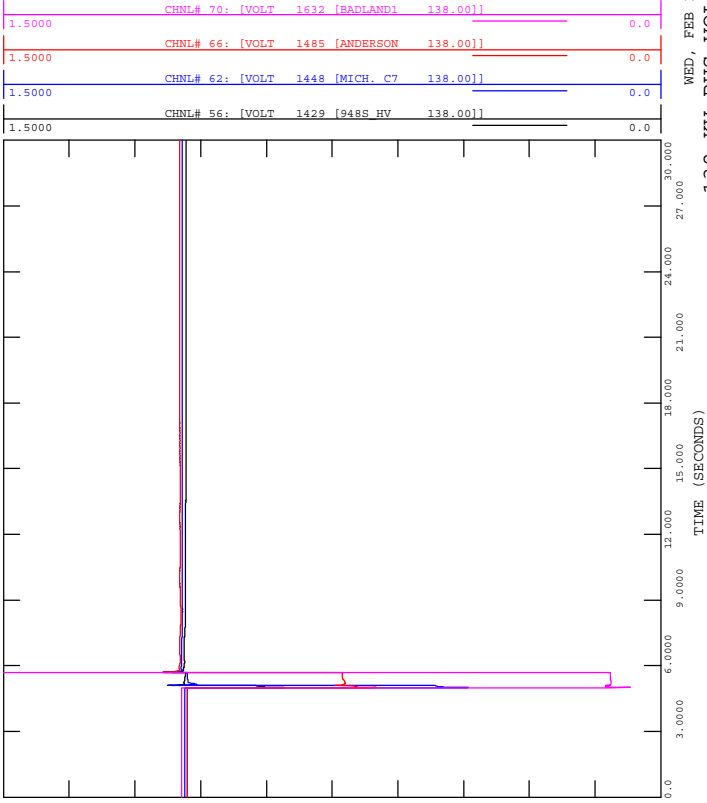


FIGURE A4-50H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-50_3PH_Fault_7L85@Wintering-Hills-804S.out

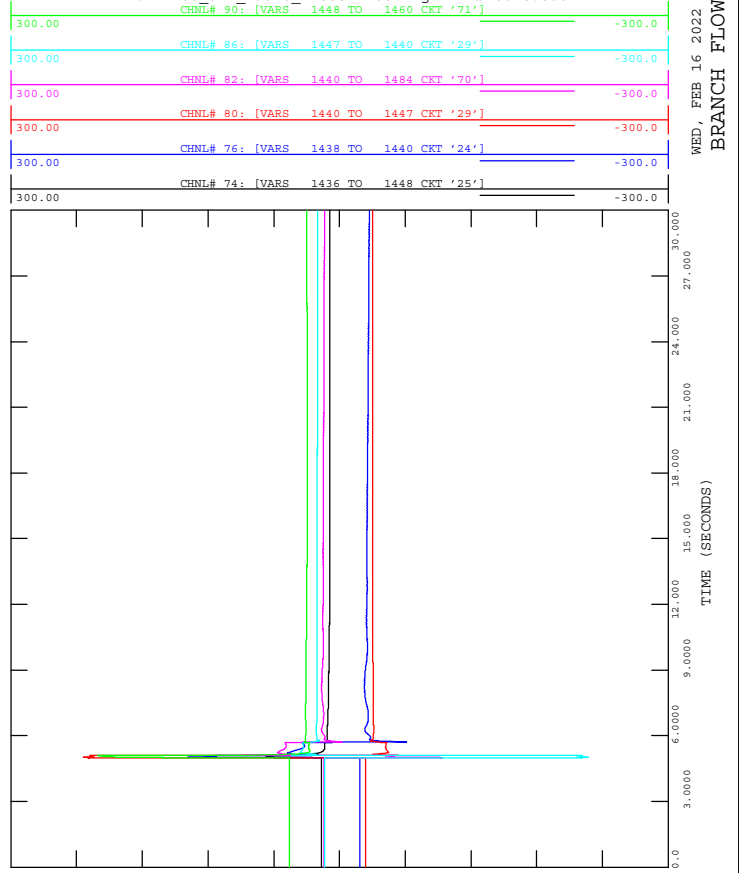


FIGURE A4-50E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-50_3PH_Fault_7L85@Wintering-Hills-804S.out

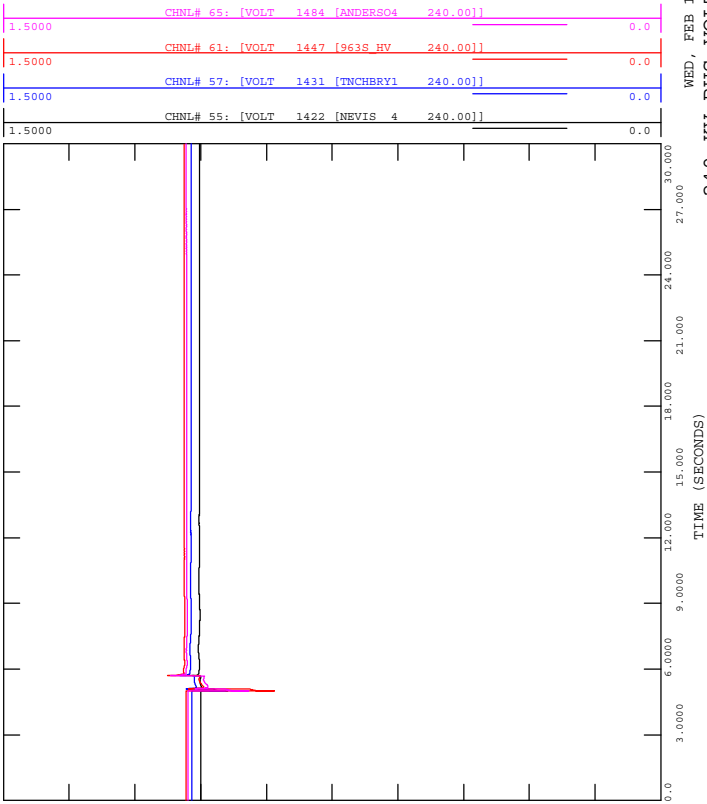


FIGURE A4-50G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-50_3PH_Fault_7L85@Wintering-Hills-804S.out

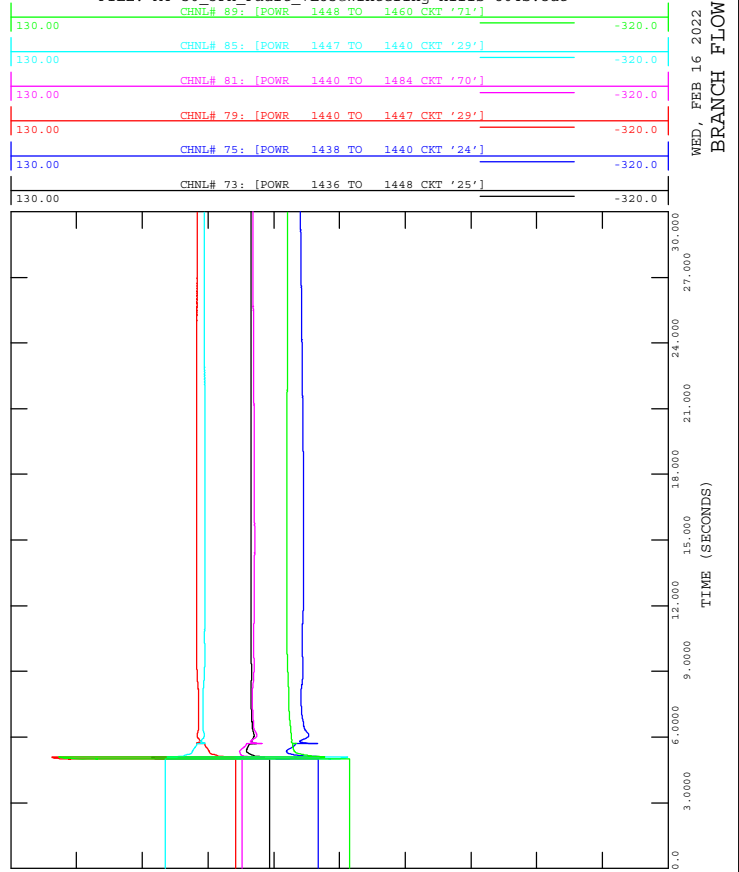
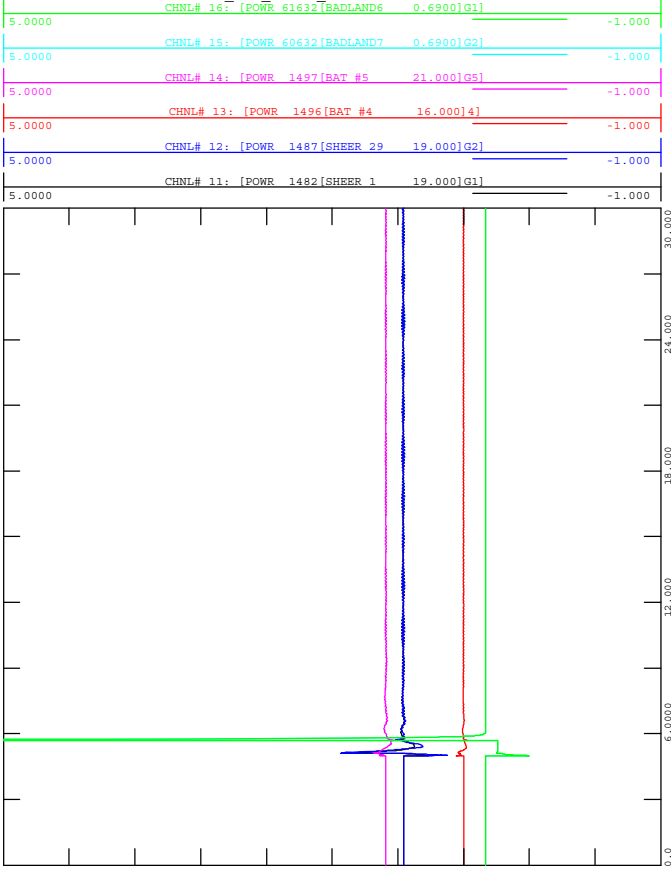




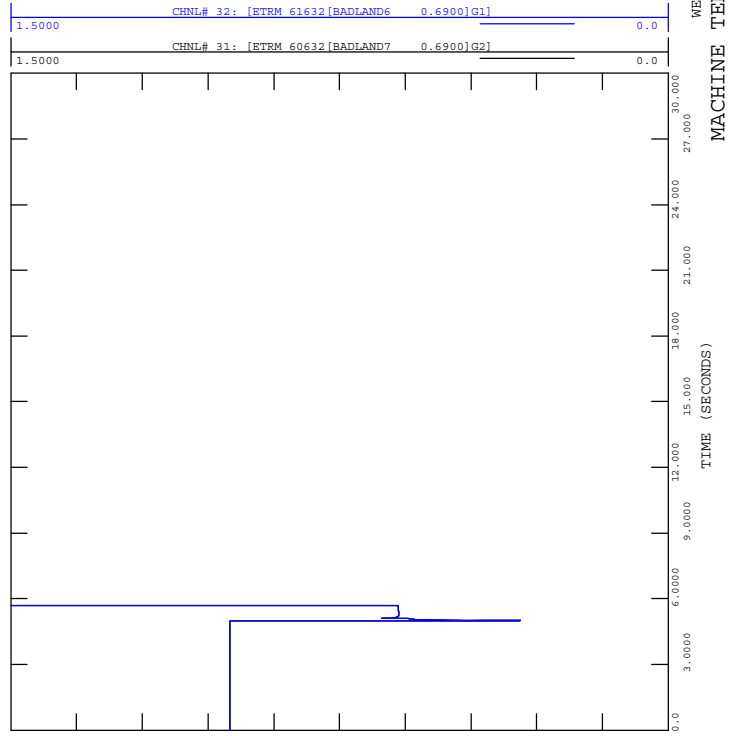
FIGURE A4-51B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-51_3PH_Fault_7L85@Anderson-801S.out



WED, FEB 16 2022 14:41
 MACHINE ACTIVE POWER (MW)



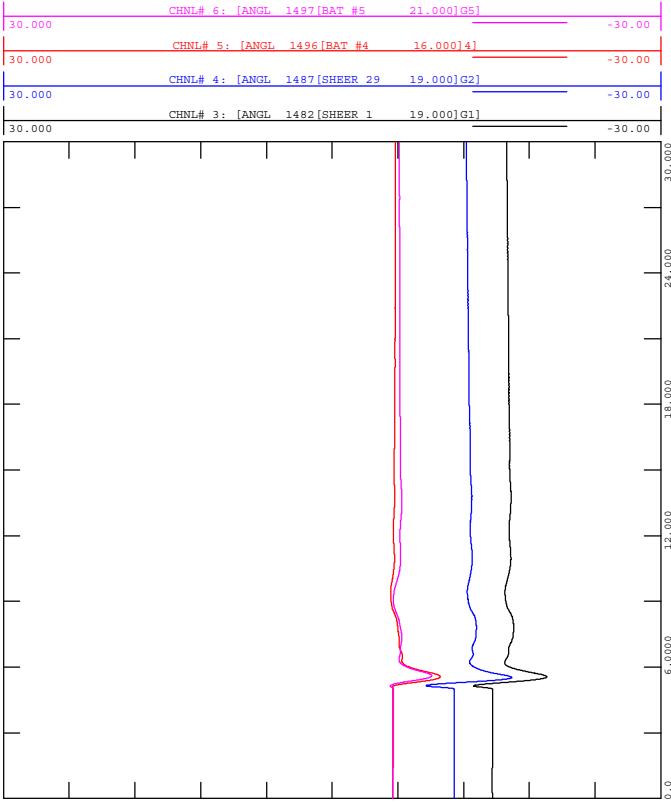
FIGURE A4-51D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-51_3PH_Fault_7L85@Anderson-801S.out



WED, FEB 16 2022 14:41
 MACHINE TERMINAL VOLTAGE



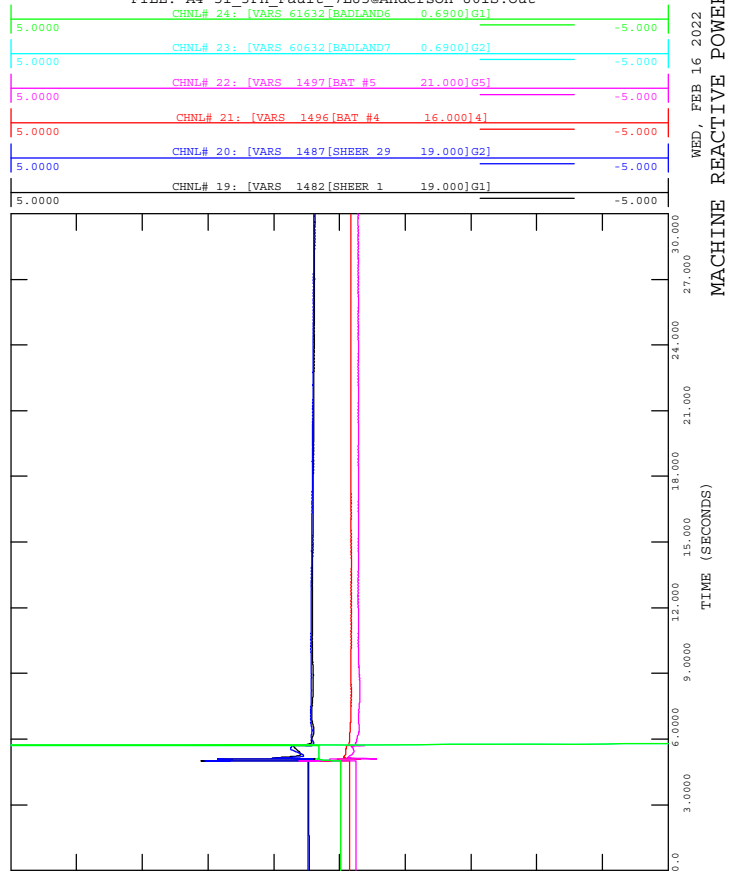
FIGURE A4-51A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-51_3PH_Fault_7L85@Anderson-801S.out



WED, FEB 16 2022 14:41
 MACHINE ANGLE (DEGREES)



FIGURE A4-51C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-51_3PH_Fault_7L85@Anderson-801S.out



WED, FEB 16 2022 14:41
 MACHINE REACTIVE POWER (M)



FIGURE A4-51F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-51_3PH_Fault_7L85@Anderson-801S.out

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:41

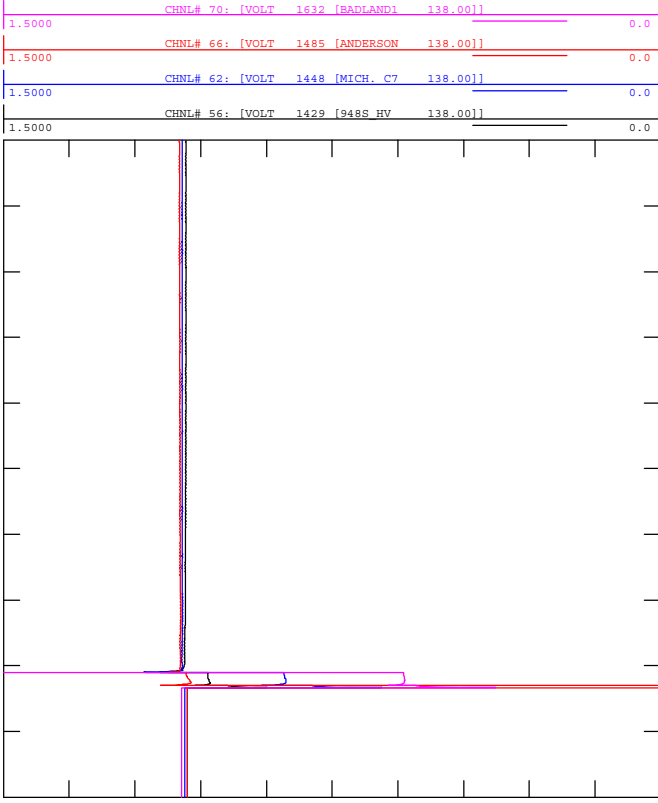


FIGURE A4-51H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-51_3PH_Fault_7L85@Anderson-801S.out

BRANCH FLOW (Q)
 WED, FEB 16 2022 14:41

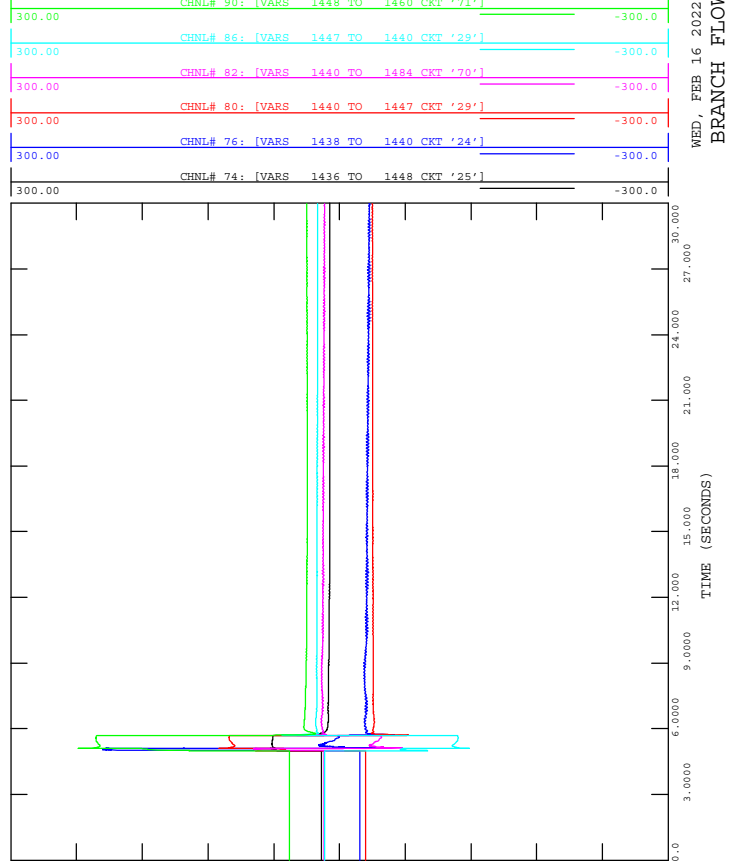


FIGURE A4-51E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-51_3PH_Fault_7L85@Anderson-801S.out

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 14:41

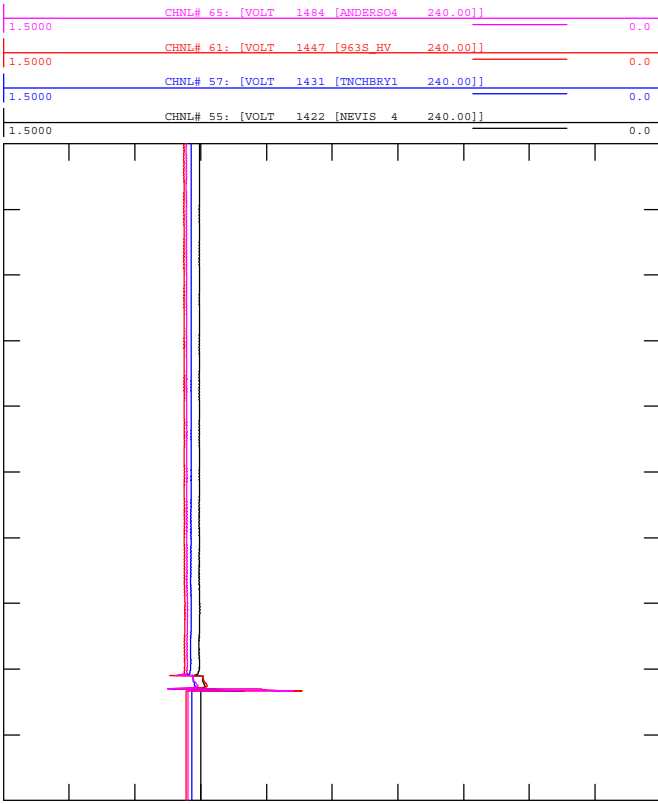


FIGURE A4-51G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-51_3PH_Fault_7L85@Anderson-801S.out

BRANCH FLOW (P)
 WED, FEB 16 2022 14:41

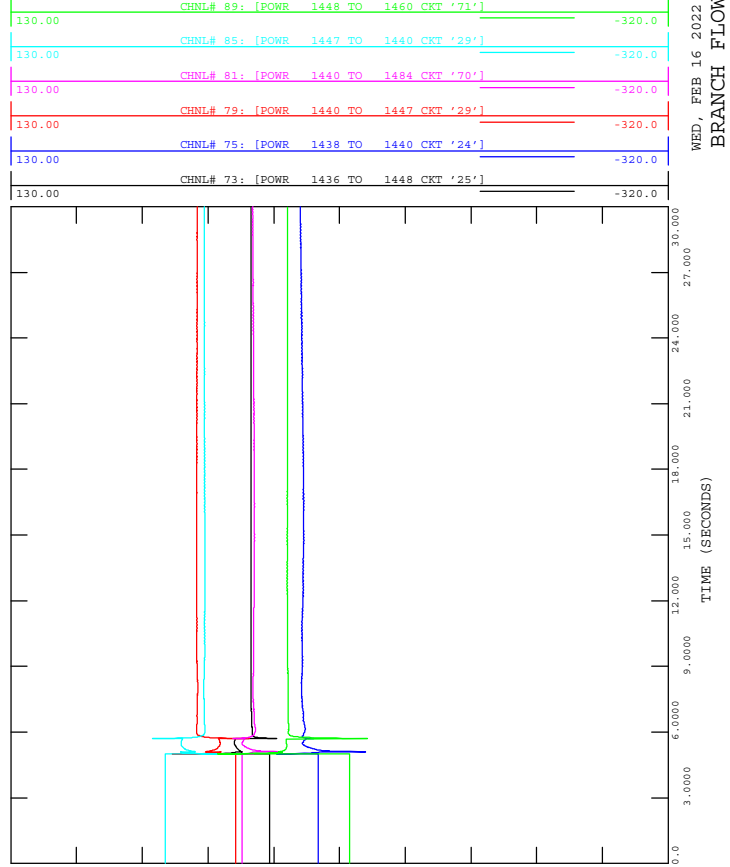
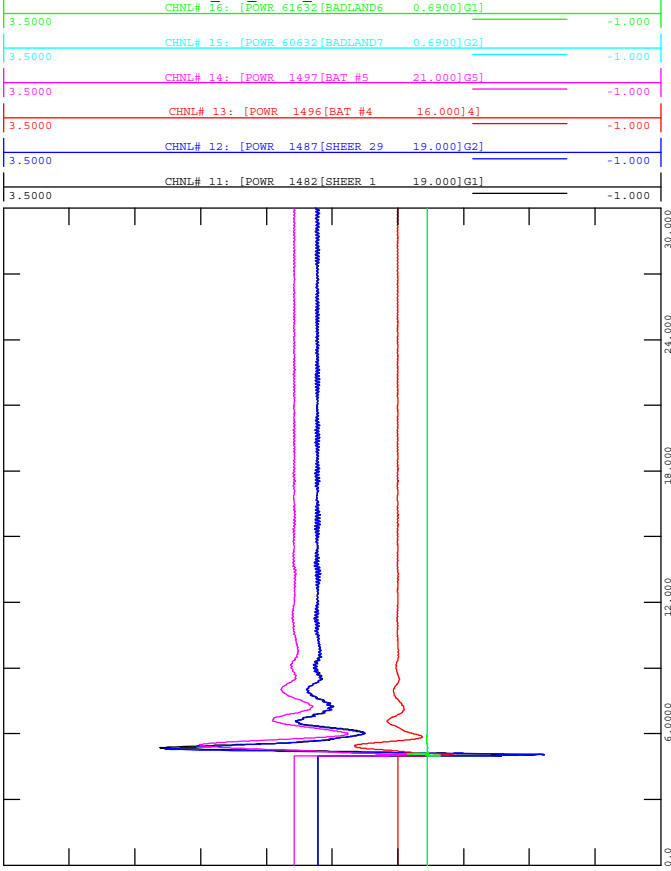




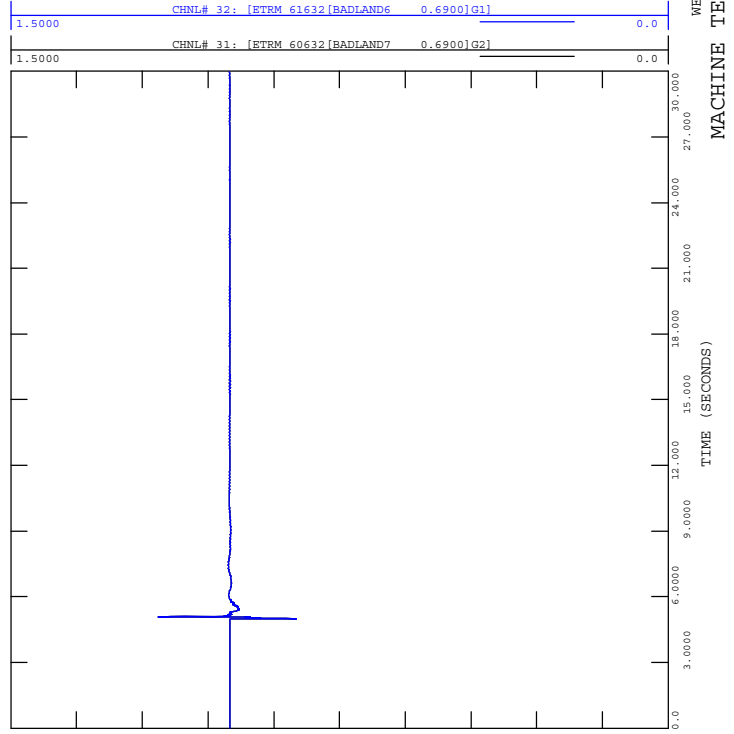
FIGURE A4-52B
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-52_3PH_Fault_EATL@Heathfield-2029S.out
 CHNL# 16: [POWR 61632[BADLAND6 0.6900]G1]



WED, FEB 16 2022 14:42
 MACHINE ACTIVE POWER (MW)



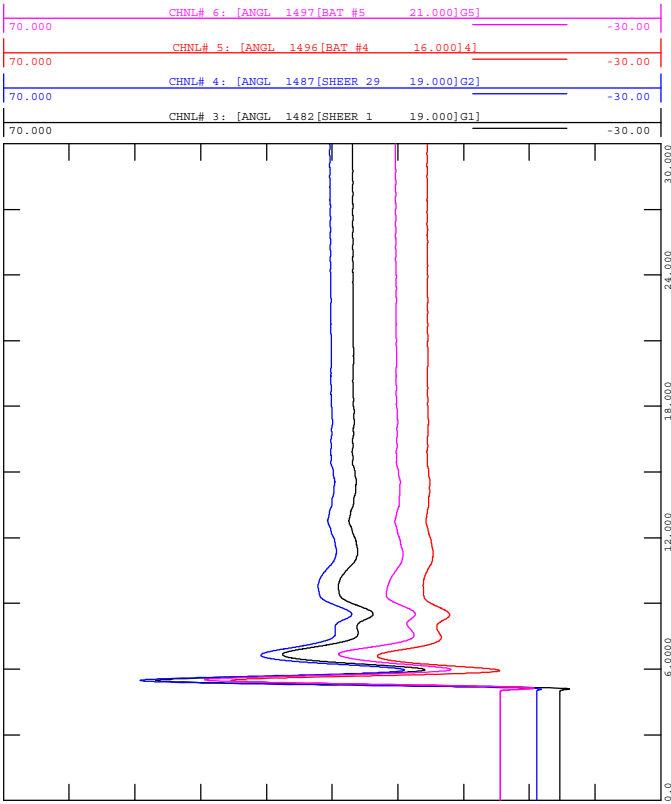
FIGURE A4-52D
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-52_3PH_Fault_EATL@Heathfield-2029S.out



WED, FEB 16 2022 14:42
 MACHINE TERMINAL VOLTAGE



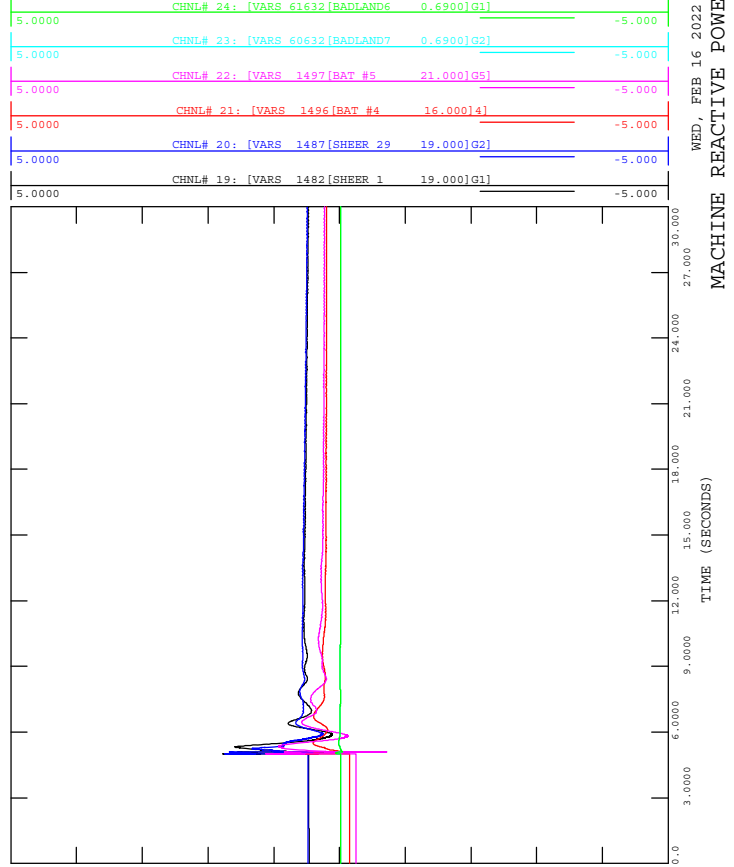
FIGURE A4-52A
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-52_3PH_Fault_EATL@Heathfield-2029S.out



WED, FEB 16 2022 14:41
 MACHINE ANGLE (DEGREES)



FIGURE A4-52C
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-52_3PH_Fault_EATL@Heathfield-2029S.out



WED, FEB 16 2022 14:42
 MACHINE REACTIVE POWER (M)



FIGURE A4-52F
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-52_3PH_Fault_EATL@Heathfield-2029S.out

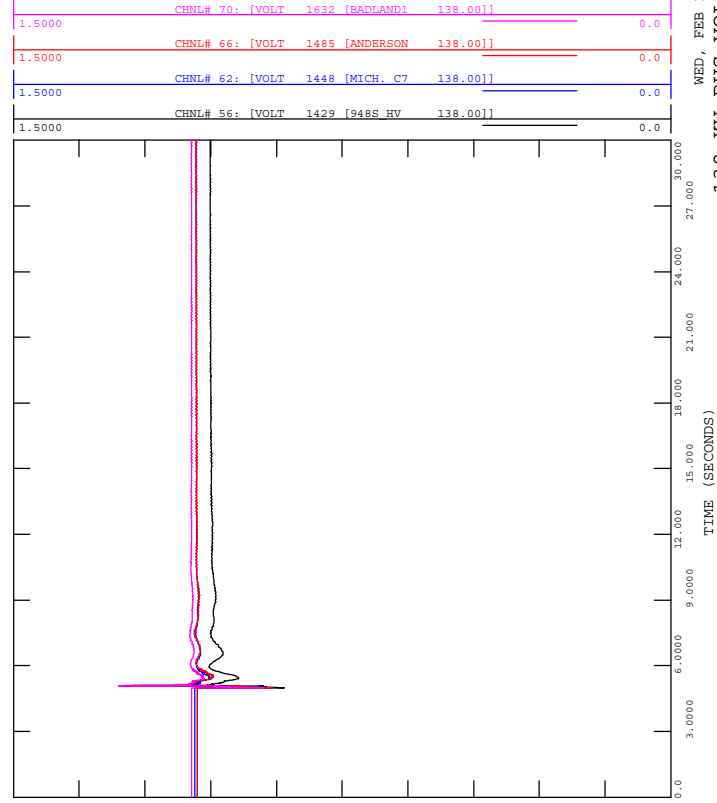


FIGURE A4-52H
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-52_3PH_Fault_EATL@Heathfield-2029S.out

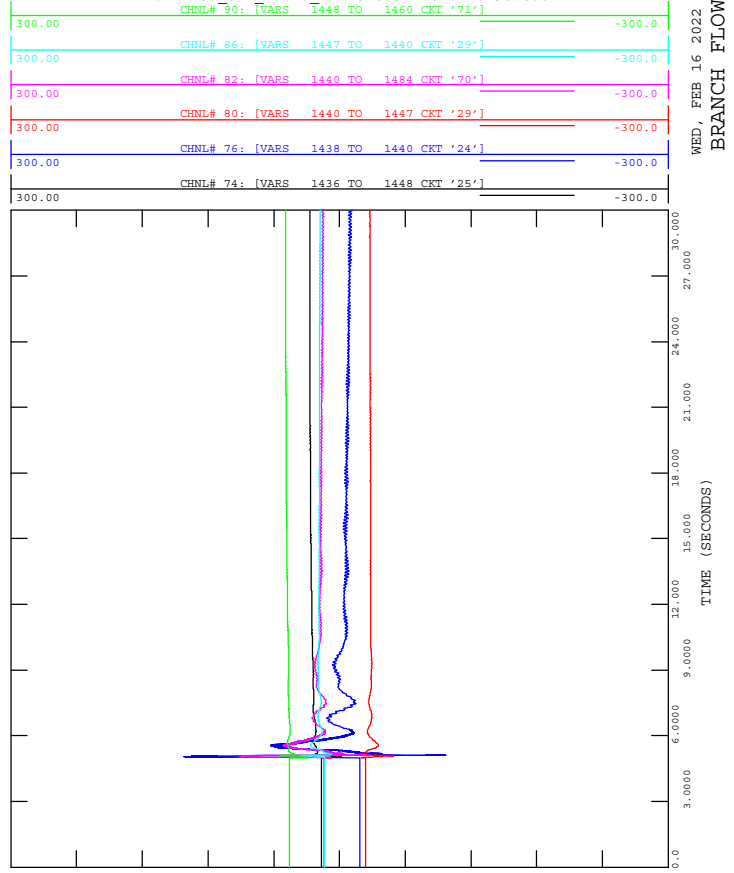


FIGURE A4-52E
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-52_3PH_Fault_EATL@Heathfield-2029S.out

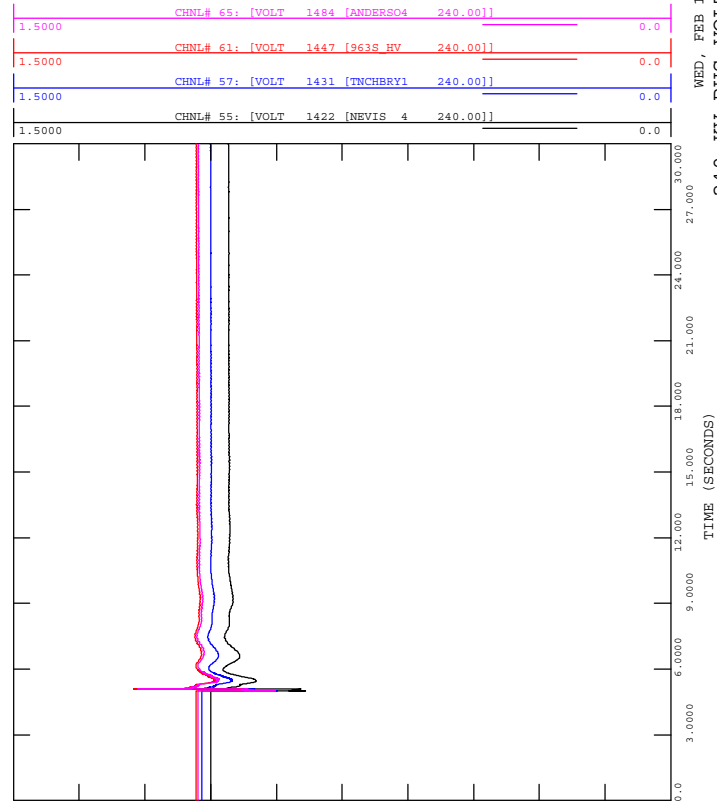


FIGURE A4-52G
 2022SP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-52_3PH_Fault_EATL@Heathfield-2029S.out

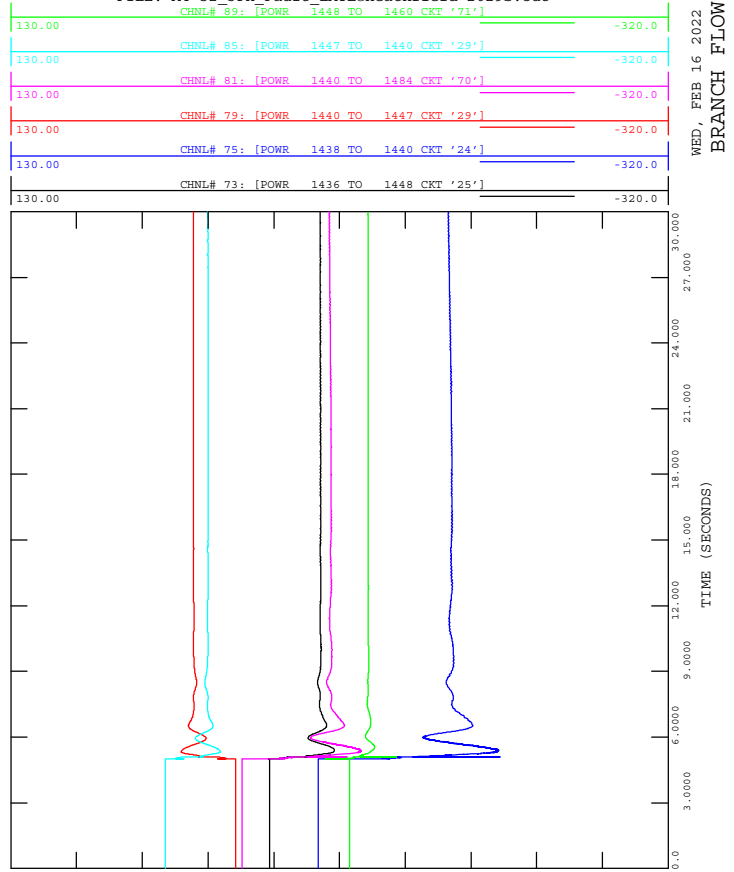




FIGURE A4-53B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-53_3PH_Fault_9L24@Oakland-946S.out

WED, FEB 16 2022 15:34
 MACHINE ACTIVE POWER (MW)

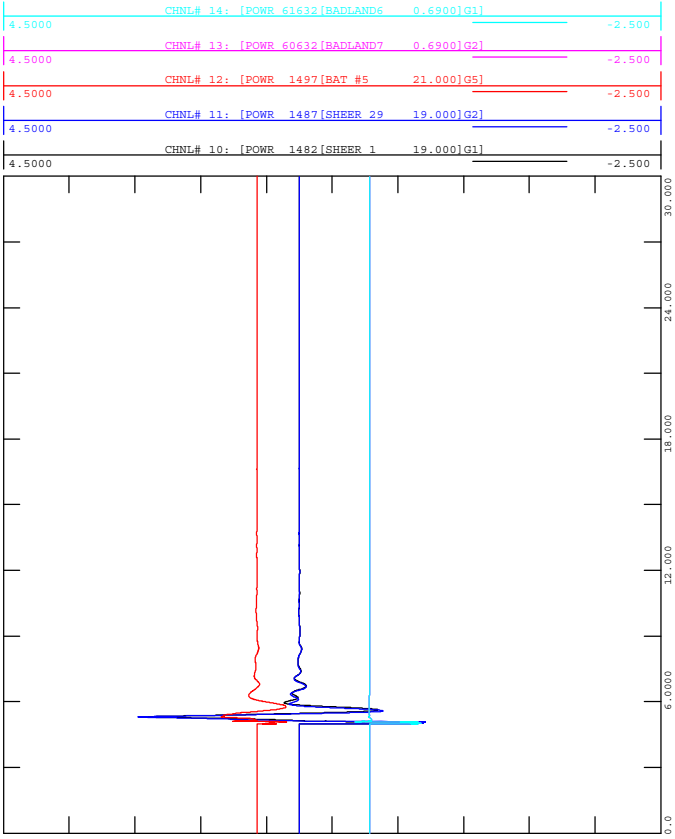


FIGURE A4-53D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-53_3PH_Fault_9L24@Oakland-946S.out

WED, FEB 16 2022 15:34
 MACHINE TERMINAL VOLTAGE

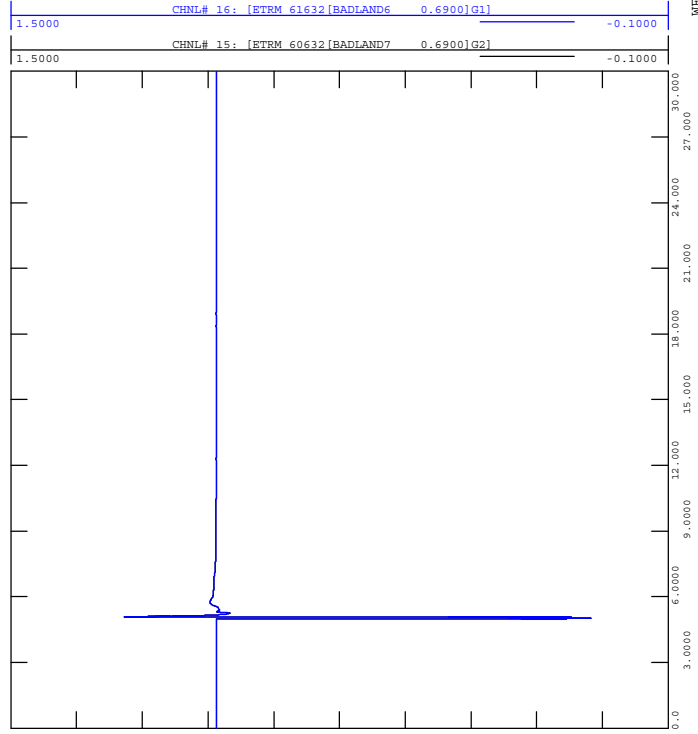


FIGURE A4-53A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-53_3PH_Fault_9L24@Oakland-946S.out

WED, FEB 16 2022 15:34
 MACHINE ANGLE (DEGREES)

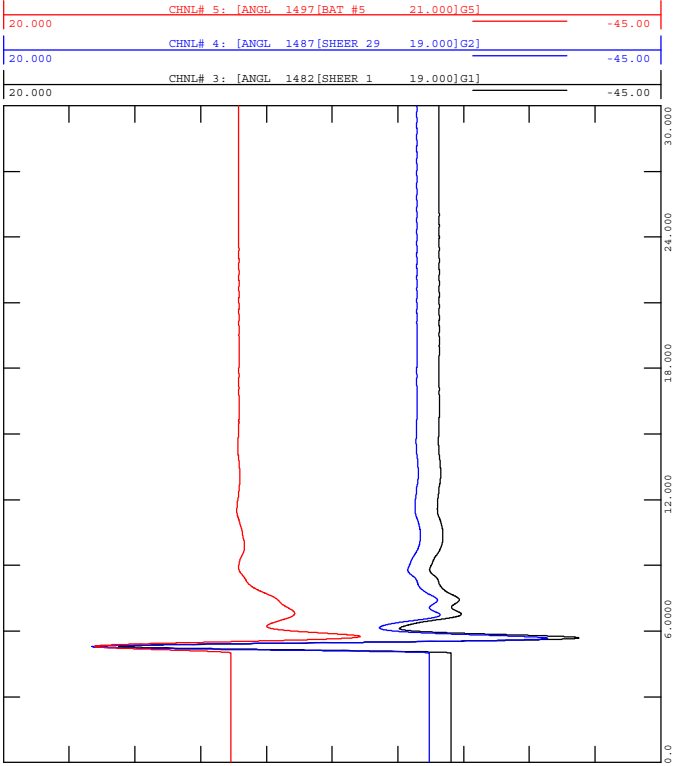


FIGURE A4-53C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-53_3PH_Fault_9L24@Oakland-946S.out

WED, FEB 16 2022 15:34
 MACHINE REACTIVE POWER (M)

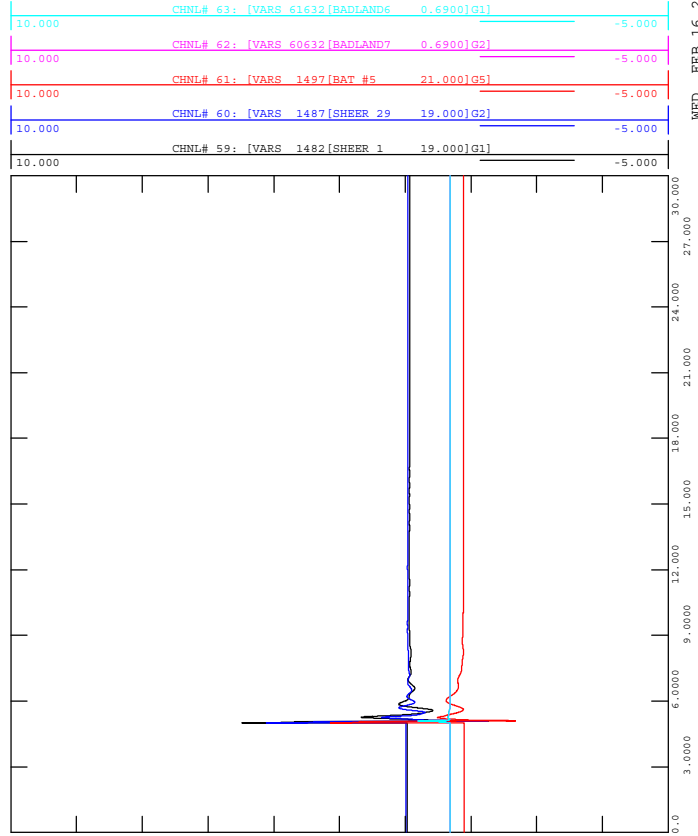




FIGURE A4-53F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-53_3PH_Fault_9L24@Oakland-946S.out

WED, FEB 16 2022 15:35
 138 KV BUS VOLTAGE (PU)

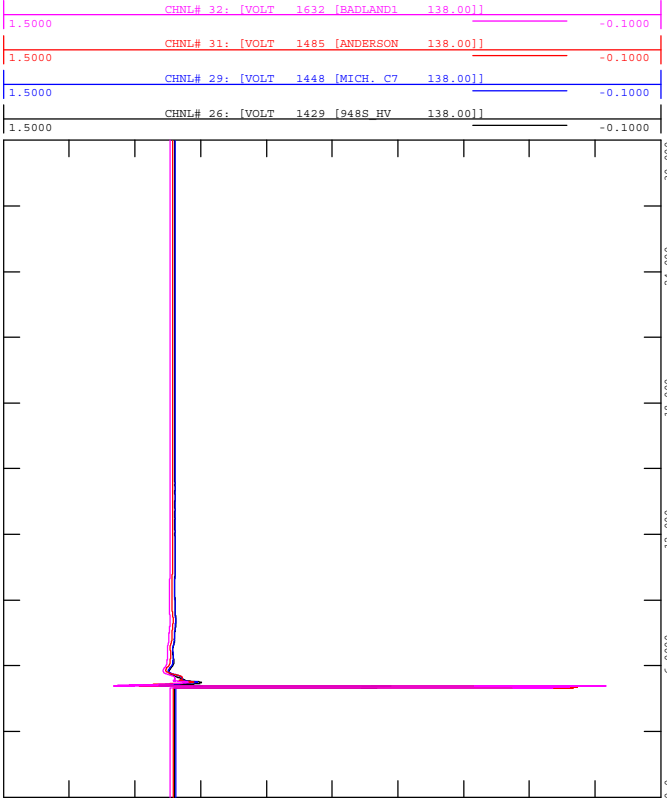


FIGURE A4-53H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-53_3PH_Fault_9L24@Oakland-946S.out

WED, FEB 16 2022 15:35
 BRANCH FLOW (Q)

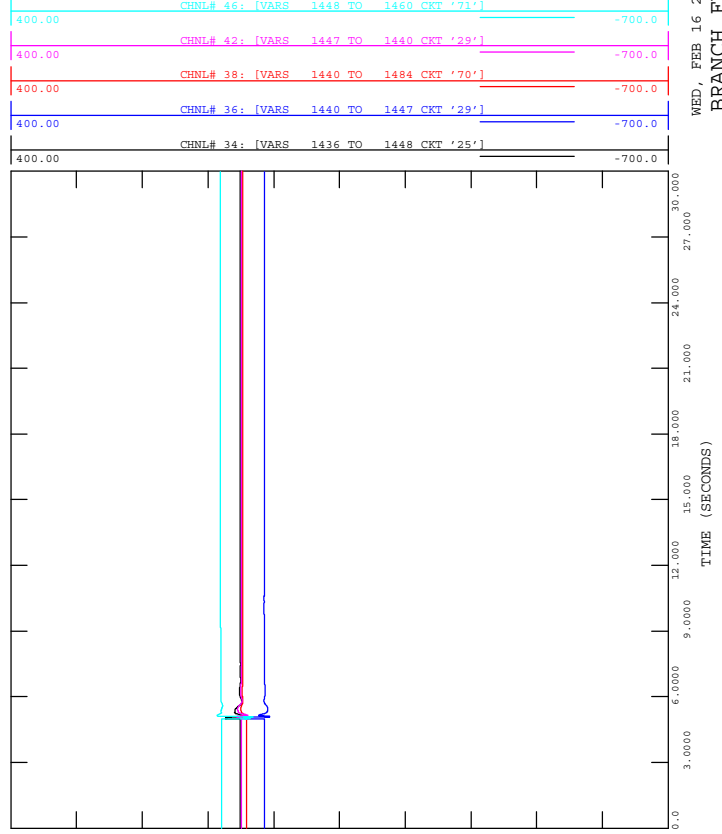


FIGURE A4-53E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-53_3PH_Fault_9L24@Oakland-946S.out

WED, FEB 16 2022 15:34
 240 KV BUS VOLTAGE (PU)

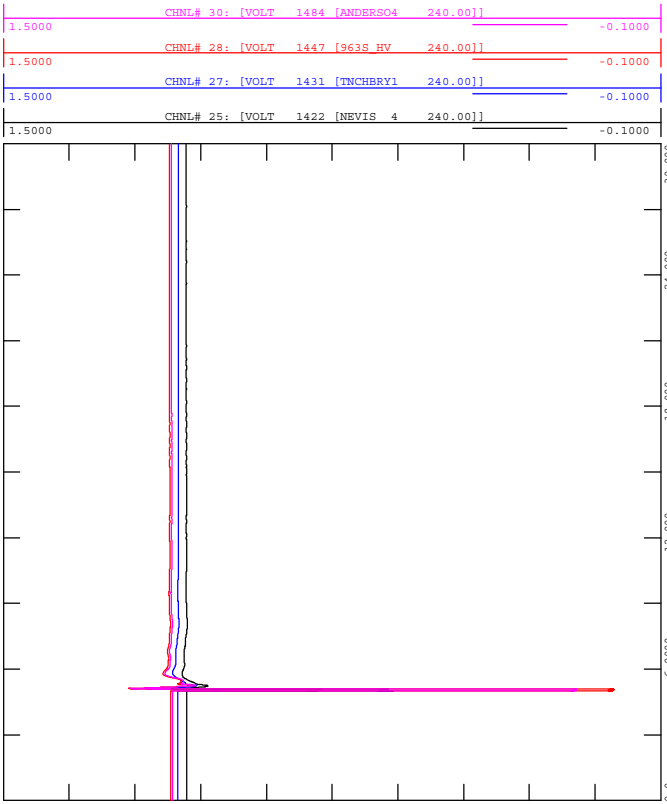


FIGURE A4-53G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-53_3PH_Fault_9L24@Oakland-946S.out

WED, FEB 16 2022 15:35
 BRANCH FLOW (P)

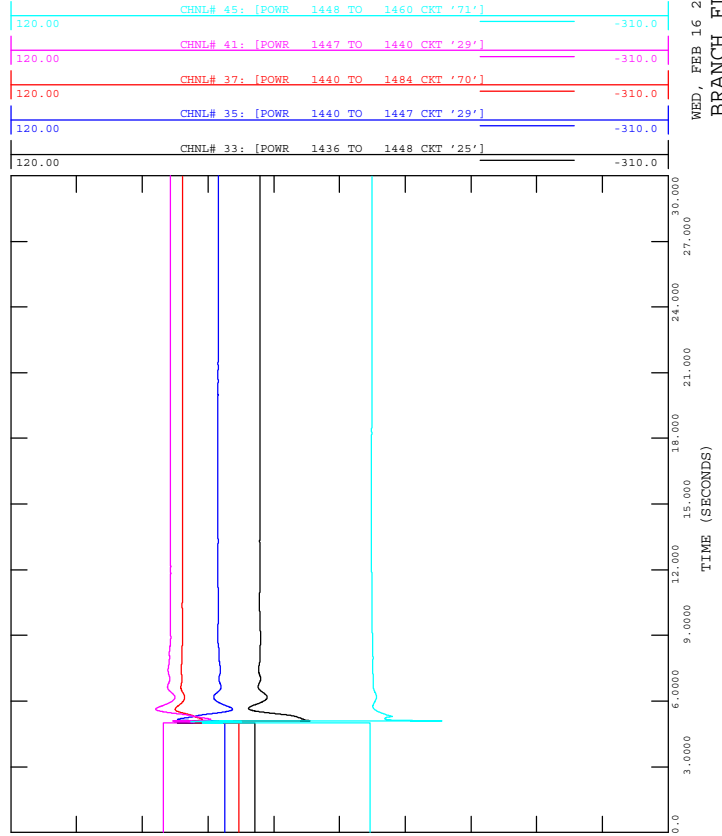
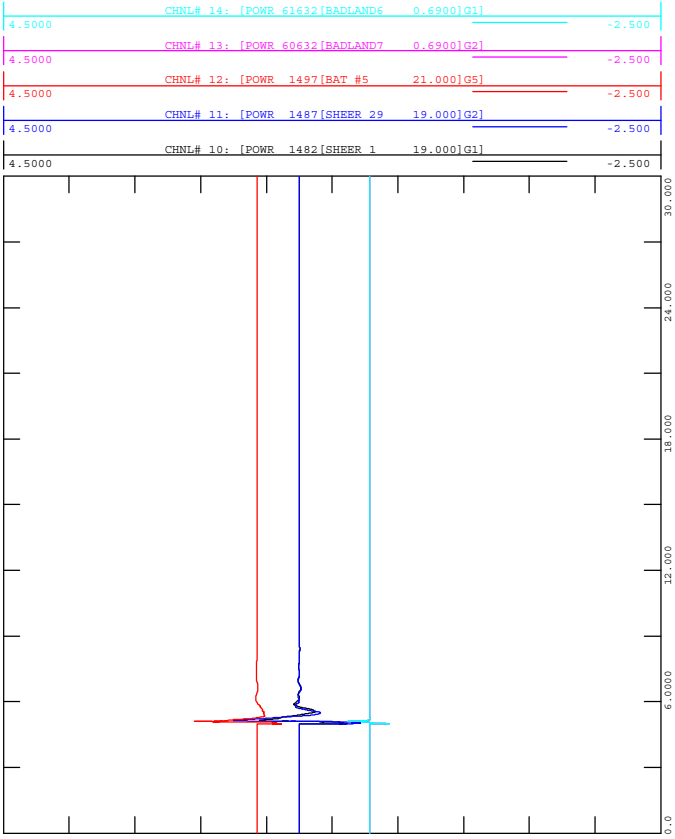




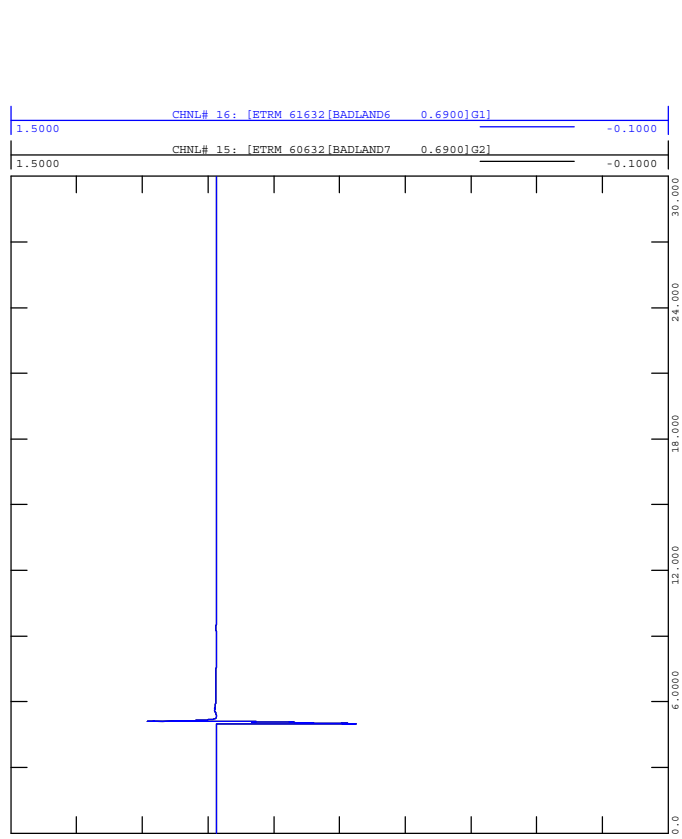
FIGURE A4-54B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-54_3PH_Fault_9L24@Lanfine-959S.out



WED, FEB 16 2022 15:35
 MACHINE ACTIVE POWER (MW)



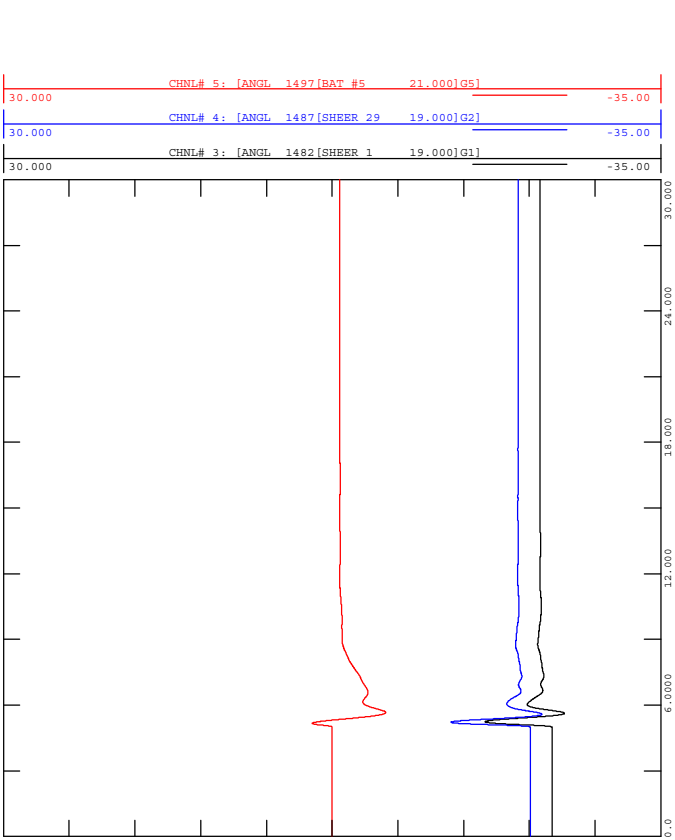
FIGURE A4-54D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-54_3PH_Fault_9L24@Lanfine-959S.out



WED, FEB 16 2022 15:35
 MACHINE TERMINAL VOLTAGE



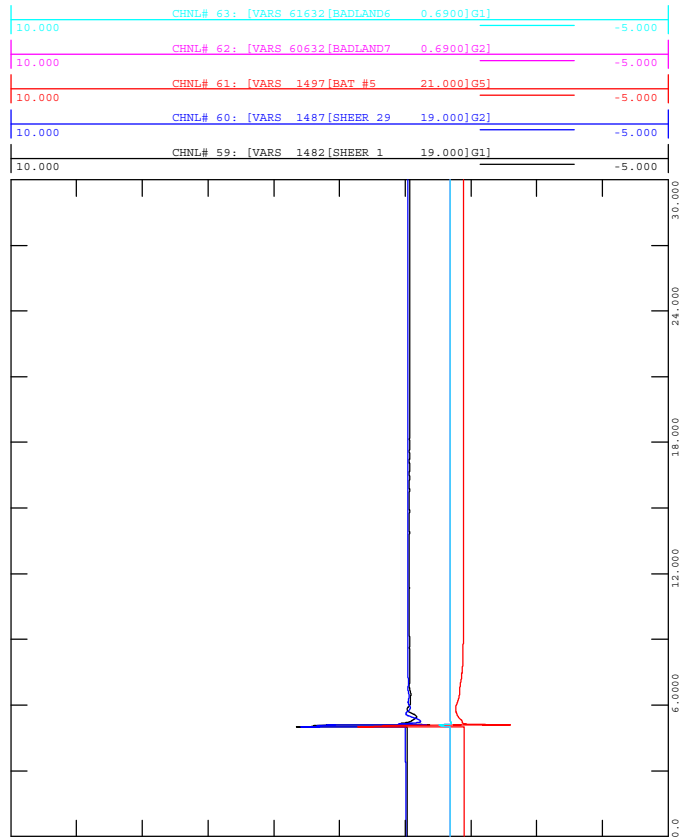
FIGURE A4-54A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-54_3PH_Fault_9L24@Lanfine-959S.out



WED, FEB 16 2022 15:35
 MACHINE ANGLE (DEGREES)



FIGURE A4-54C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-54_3PH_Fault_9L24@Lanfine-959S.out



WED, FEB 16 2022 15:35
 MACHINE REACTIVE POWER (M)



FIGURE A4-54F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-54_3PH_Fault_9L24@Lanfine-959S.out

WED, FEB 16 2022 15:35
 138 KV BUS VOLTAGE (PU)

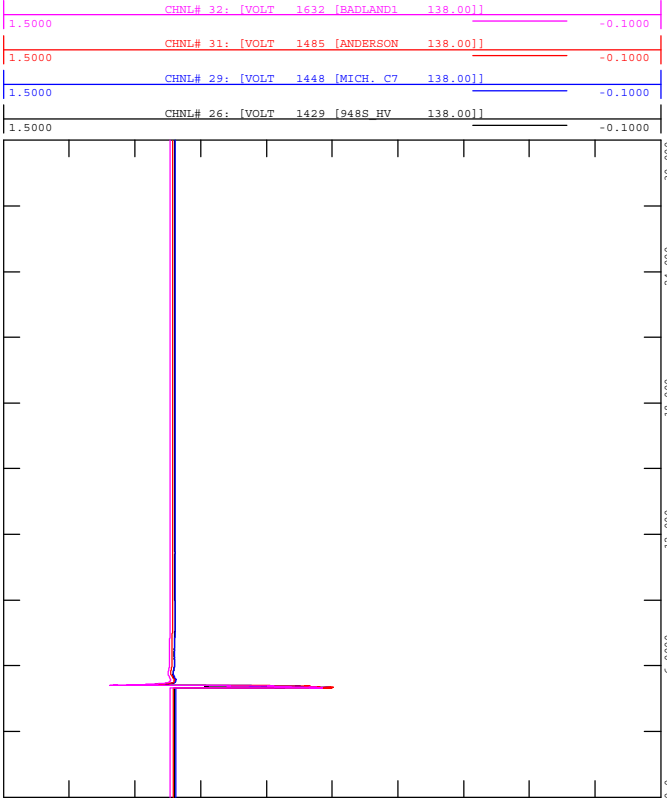


FIGURE A4-54H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-54_3PH_Fault_9L24@Lanfine-959S.out

WED, FEB 16 2022 15:35
 BRANCH FLOW (Q)

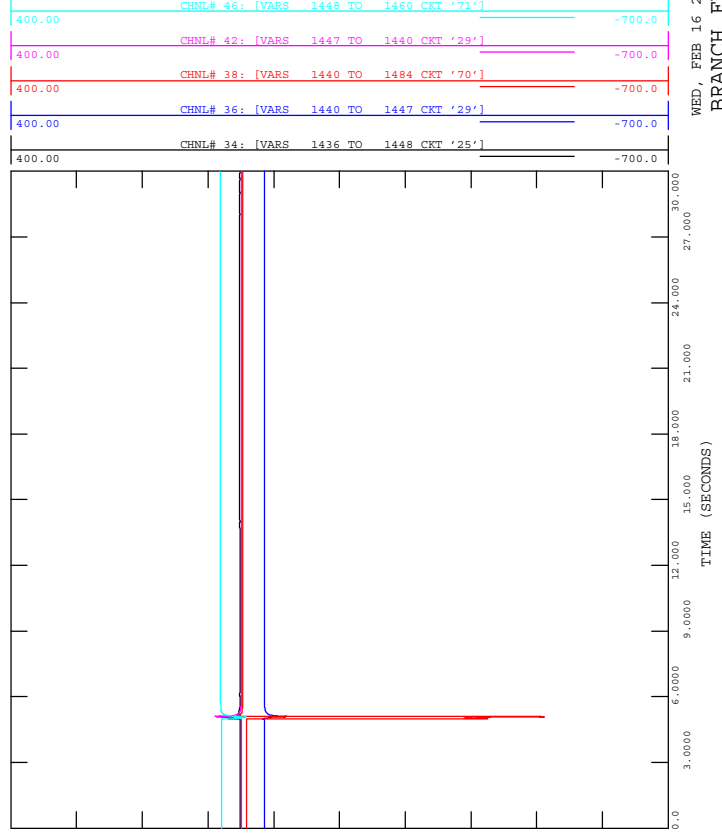


FIGURE A4-54E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-54_3PH_Fault_9L24@Lanfine-959S.out

WED, FEB 16 2022 15:35
 240 KV BUS VOLTAGE (PU)

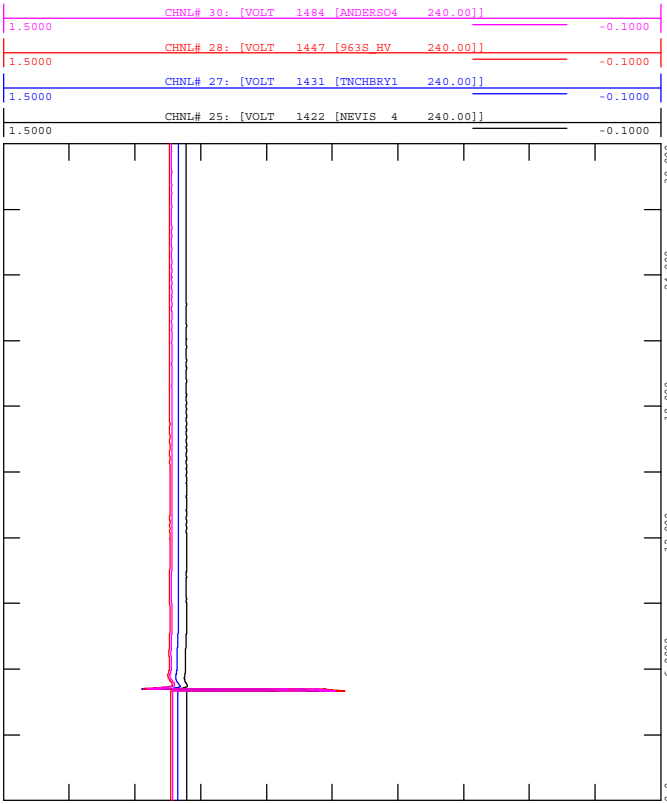


FIGURE A4-54G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT LANPINE 959S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-54_3PH_Fault_9L24@Lanfine-959S.out

WED, FEB 16 2022 15:35
 BRANCH FLOW (P)

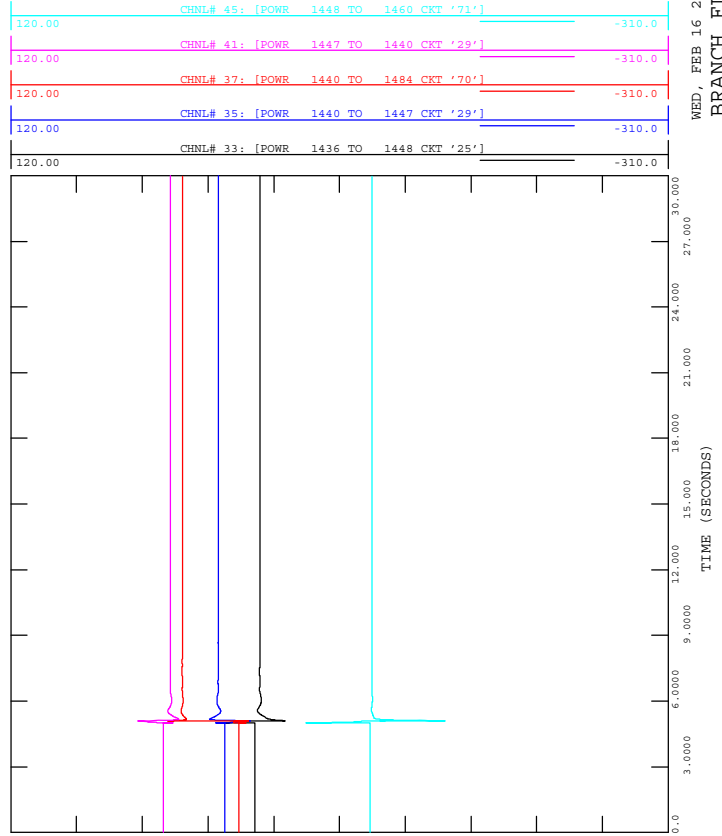




FIGURE A4-55B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-55_3PH_Fault_9L29@Oakland-946S.out

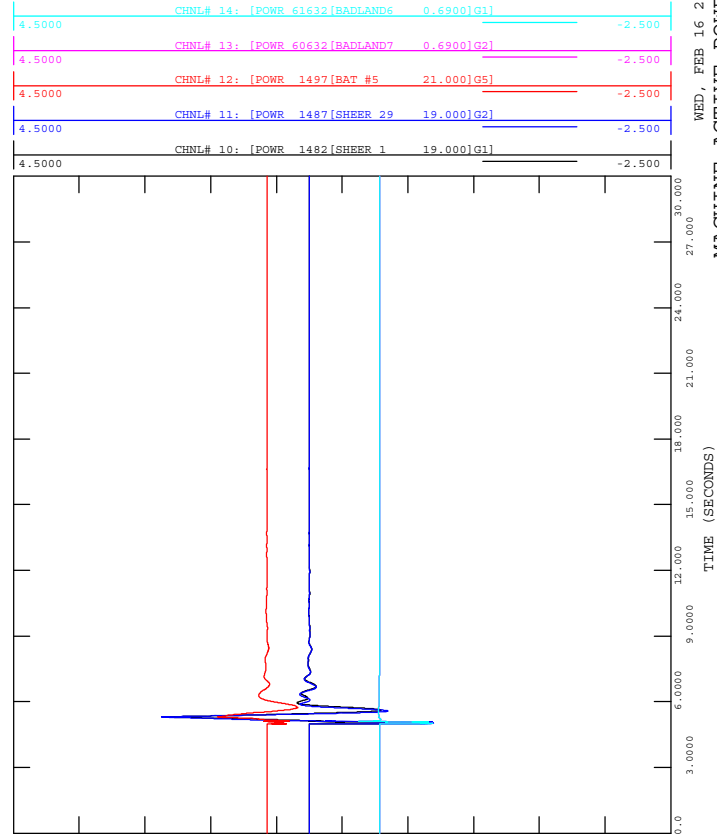


FIGURE A4-55D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-55_3PH_Fault_9L29@Oakland-946S.out

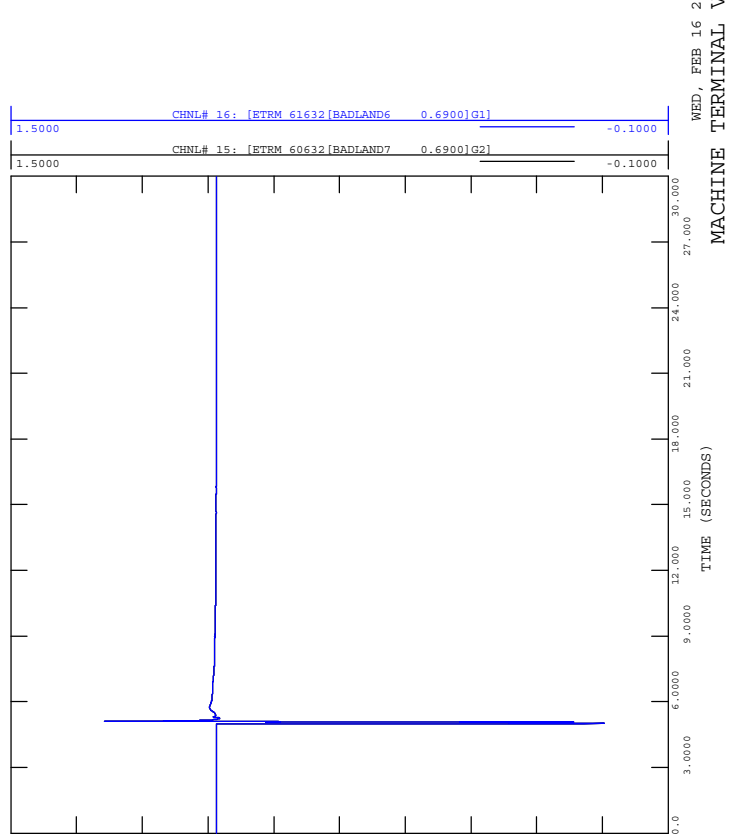


FIGURE A4-55A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-55_3PH_Fault_9L29@Oakland-946S.out

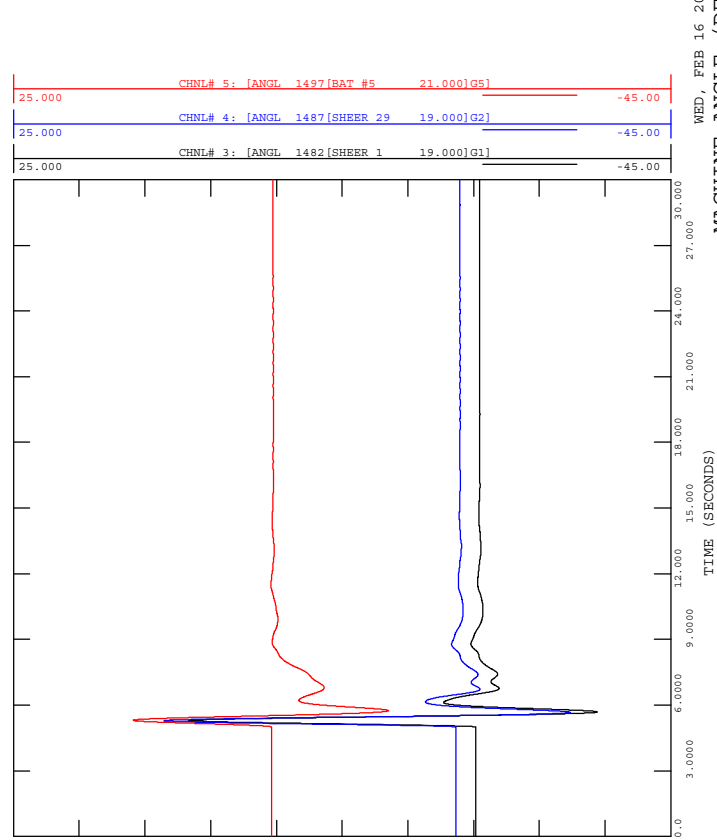


FIGURE A4-55C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-55_3PH_Fault_9L29@Oakland-946S.out

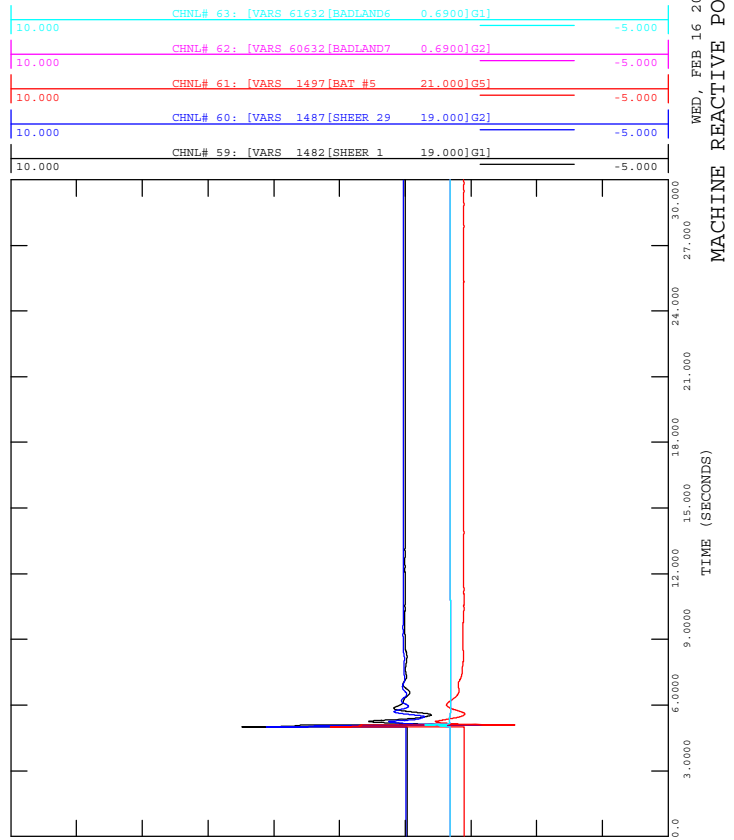




FIGURE A4-55F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-55_3PH_Fault_9L29@Oakland-946S.out

WED, FEB 16 2022 15:36
 138 KV BUS VOLTAGE (PU)

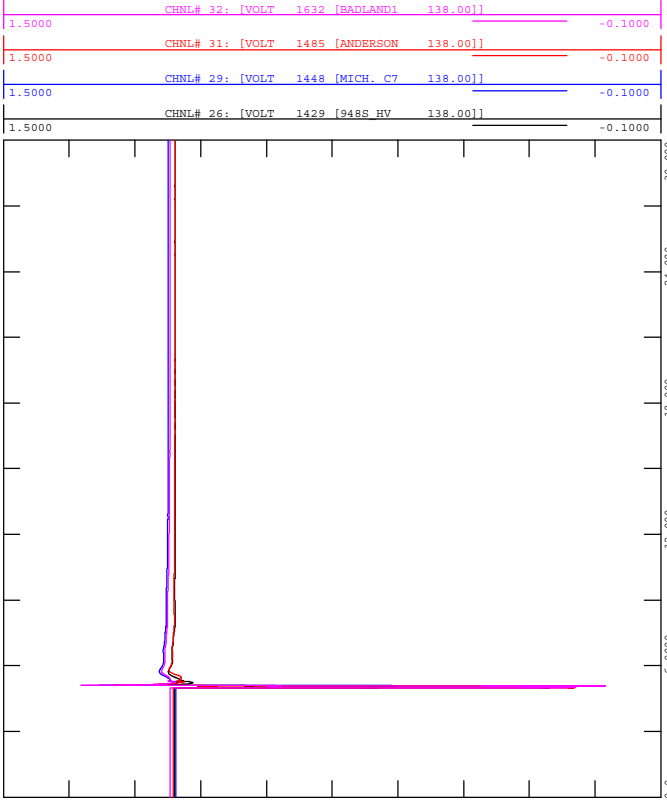


FIGURE A4-55H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-55_3PH_Fault_9L29@Oakland-946S.out

WED, FEB 16 2022 15:36
 BRANCH FLOW (Q)

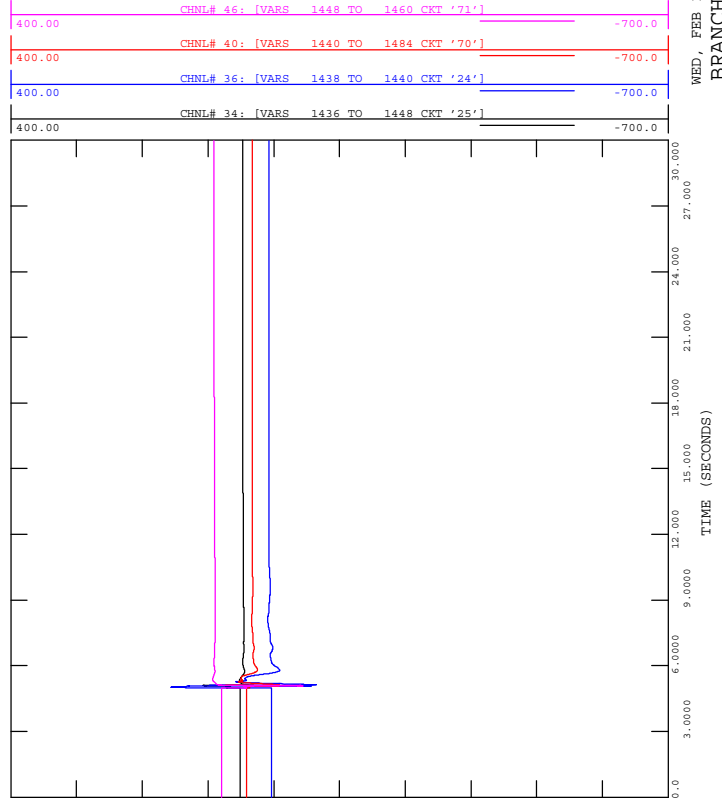


FIGURE A4-55E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-55_3PH_Fault_9L29@Oakland-946S.out

WED, FEB 16 2022 15:36
 240 KV BUS VOLTAGE (PU)

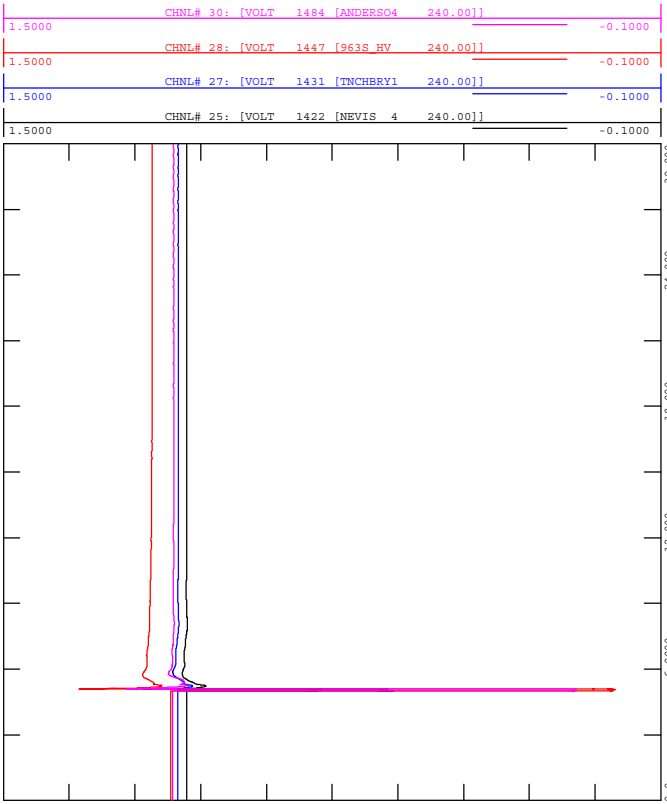


FIGURE A4-55G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT OAKLAND 946S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-55_3PH_Fault_9L29@Oakland-946S.out

WED, FEB 16 2022 15:36
 BRANCH FLOW (P)

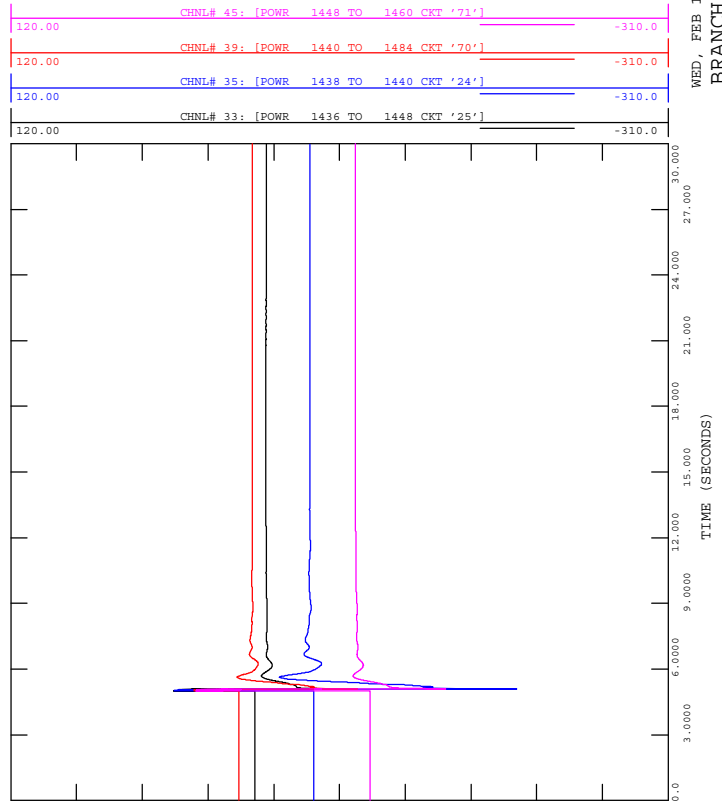
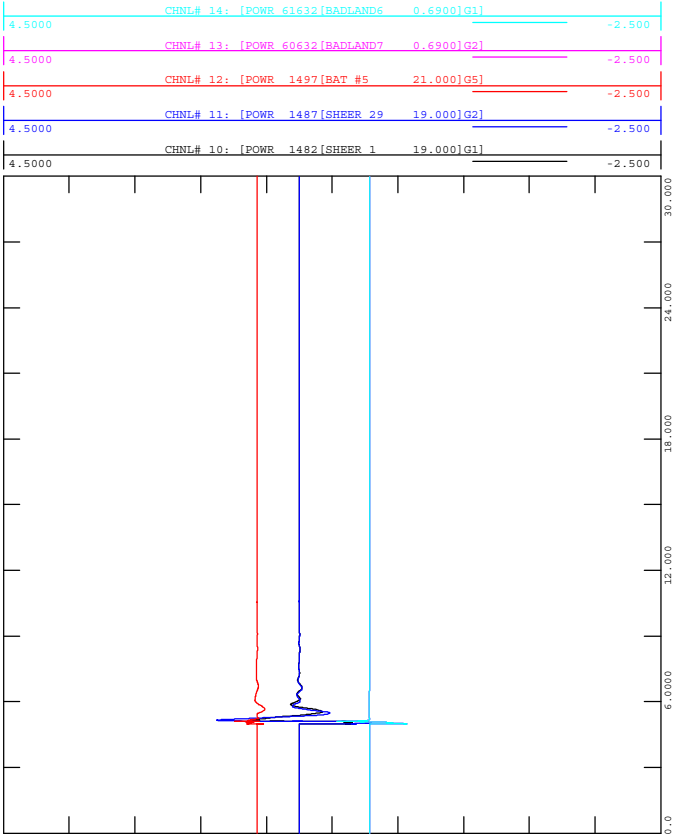




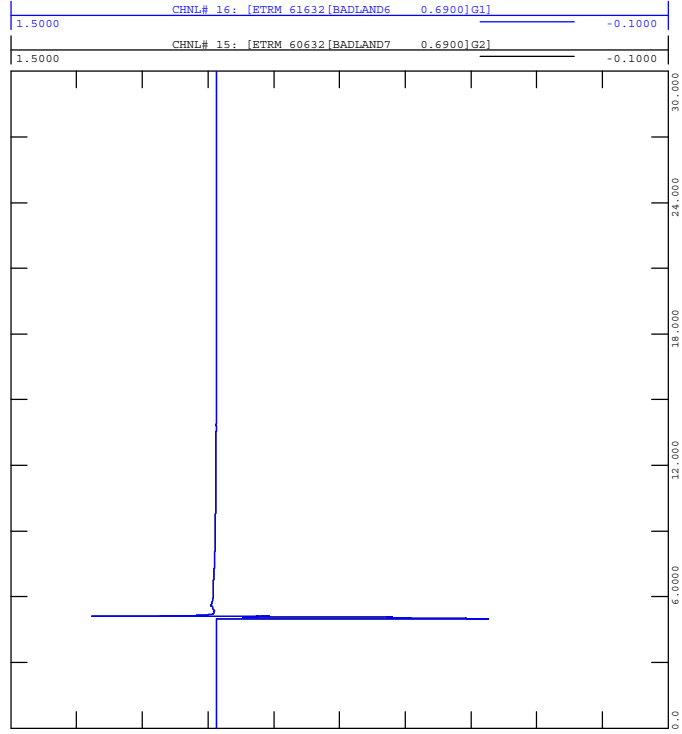
FIGURE A4-56B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-56_3PH_Fault_9L29@Coyote-Lake-963S.out



WED, FEB 16 2022 15:36
 MACHINE ACTIVE POWER (MW)



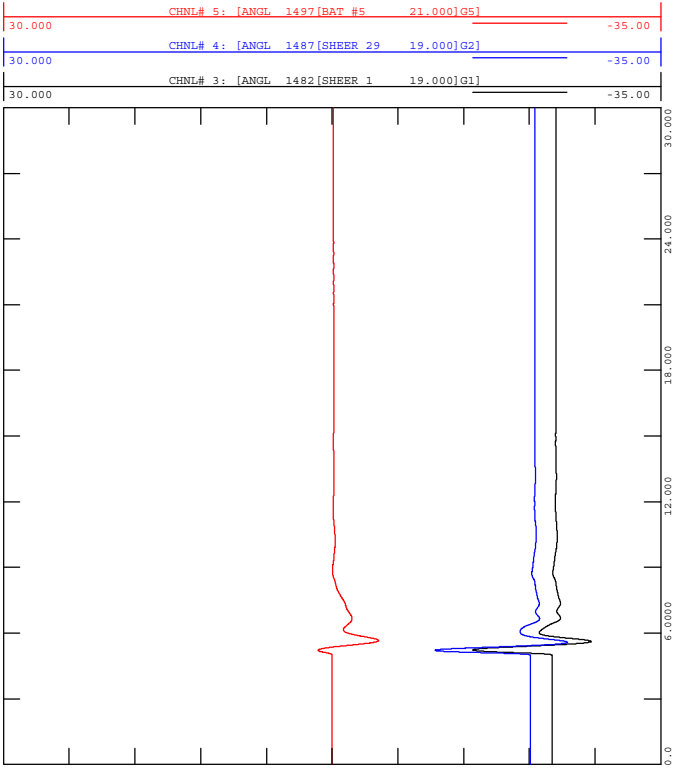
FIGURE A4-56D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-56_3PH_Fault_9L29@Coyote-Lake-963S.out



WED, FEB 16 2022 15:36
 MACHINE TERMINAL VOLTAGE



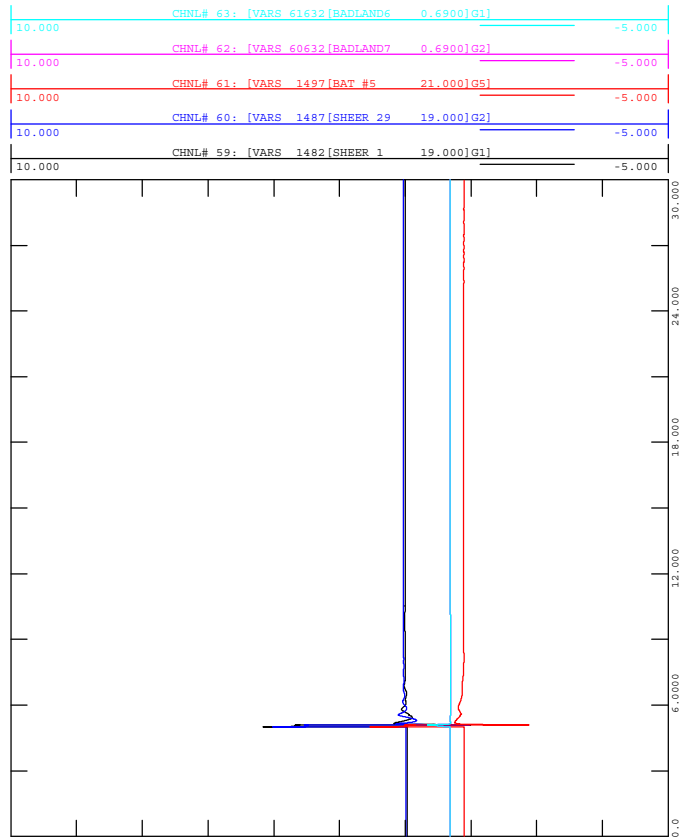
FIGURE A4-56A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-56_3PH_Fault_9L29@Coyote-Lake-963S.out



WED, FEB 16 2022 15:36
 MACHINE ANGLE (DEGREES)



FIGURE A4-56C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-56_3PH_Fault_9L29@Coyote-Lake-963S.out



WED, FEB 16 2022 15:36
 MACHINE REACTIVE POWER (M)



FIGURE A4-56F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-56_3PH_Fault_9L29@Coyote-Lake-963S.out

15:37
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

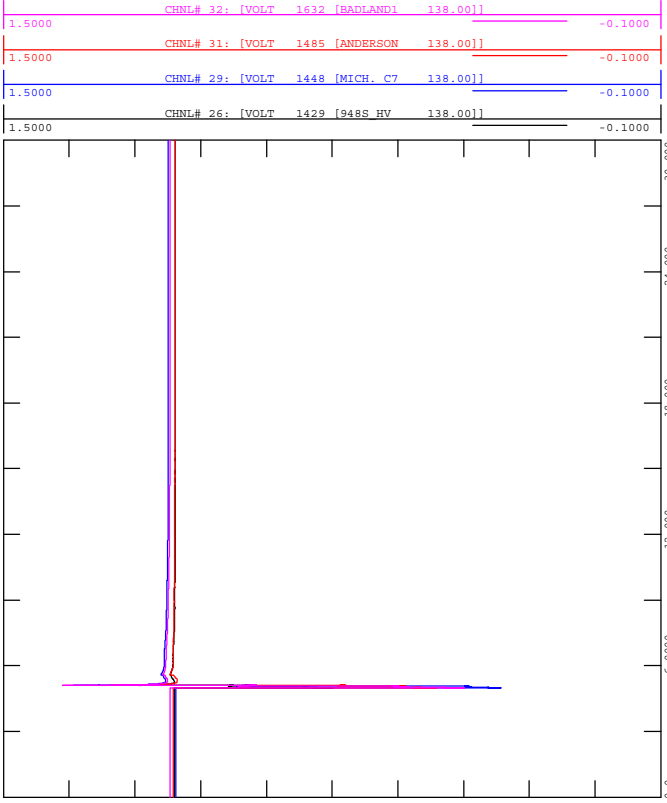


FIGURE A4-56H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-56_3PH_Fault_9L29@Coyote-Lake-963S.out

15:37
 WED, FEB 16 2022
 BRANCH FLOW (Q)

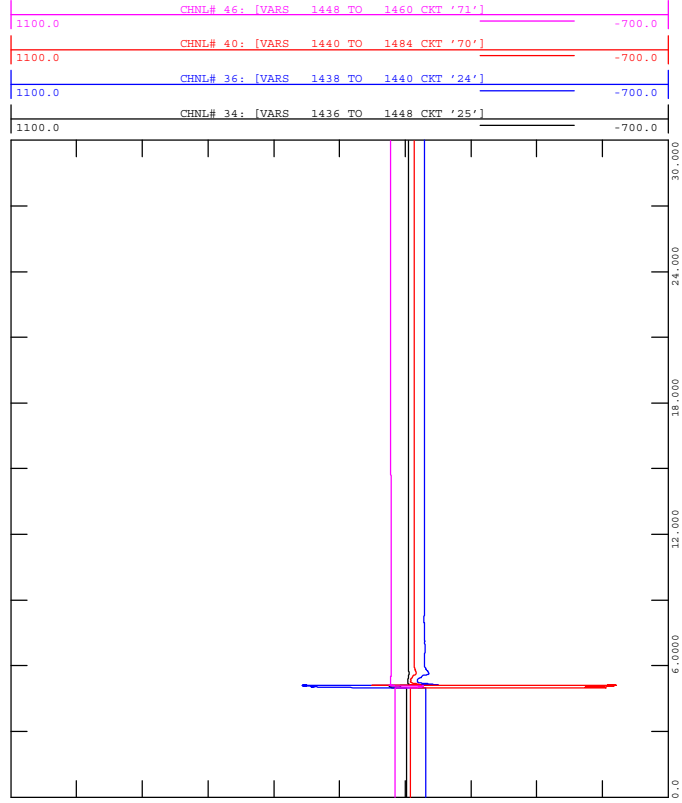


FIGURE A4-56E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-56_3PH_Fault_9L29@Coyote-Lake-963S.out

15:37
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

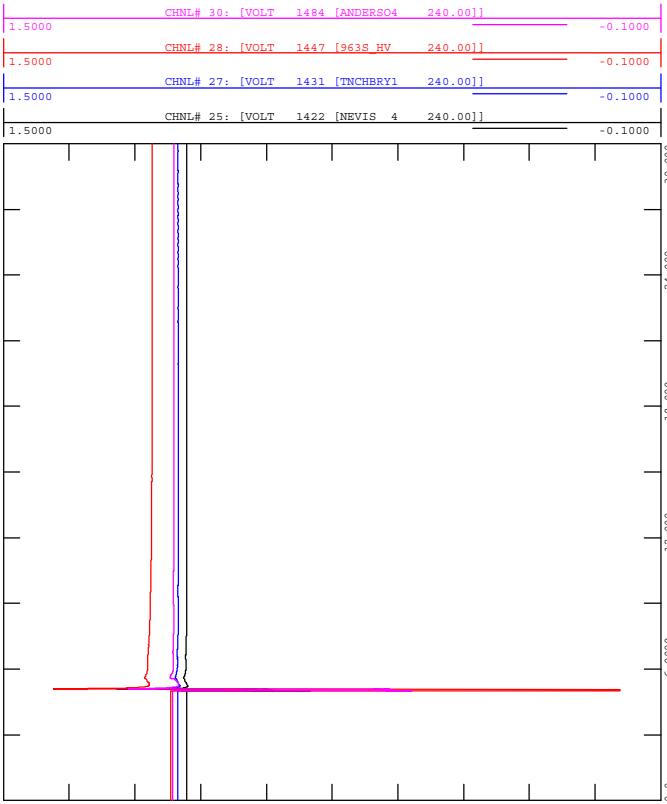


FIGURE A4-56G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-56_3PH_Fault_9L29@Coyote-Lake-963S.out

15:37
 WED, FEB 16 2022
 BRANCH FLOW (P)

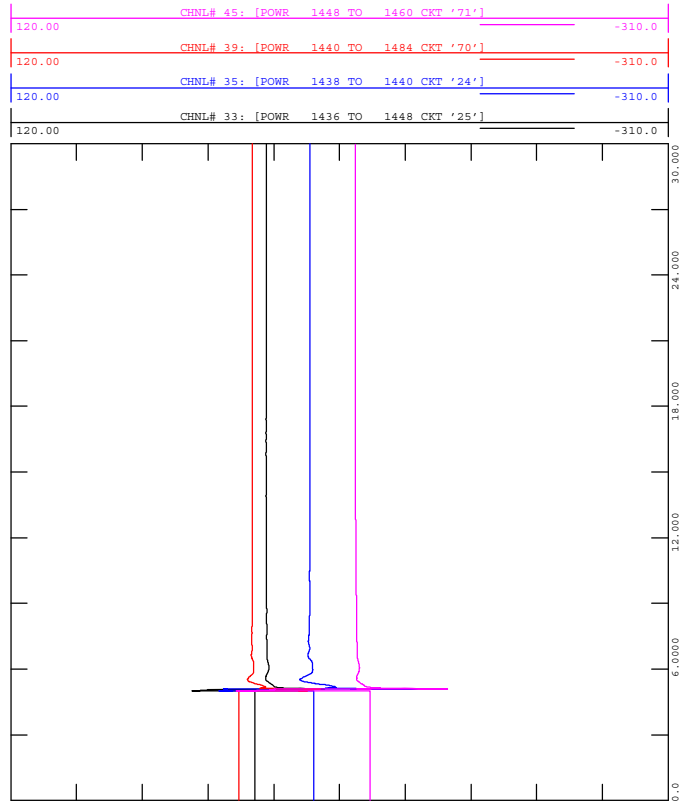




FIGURE A4-57B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-57_3PH_Fault_9L20@Cordel-755S.out

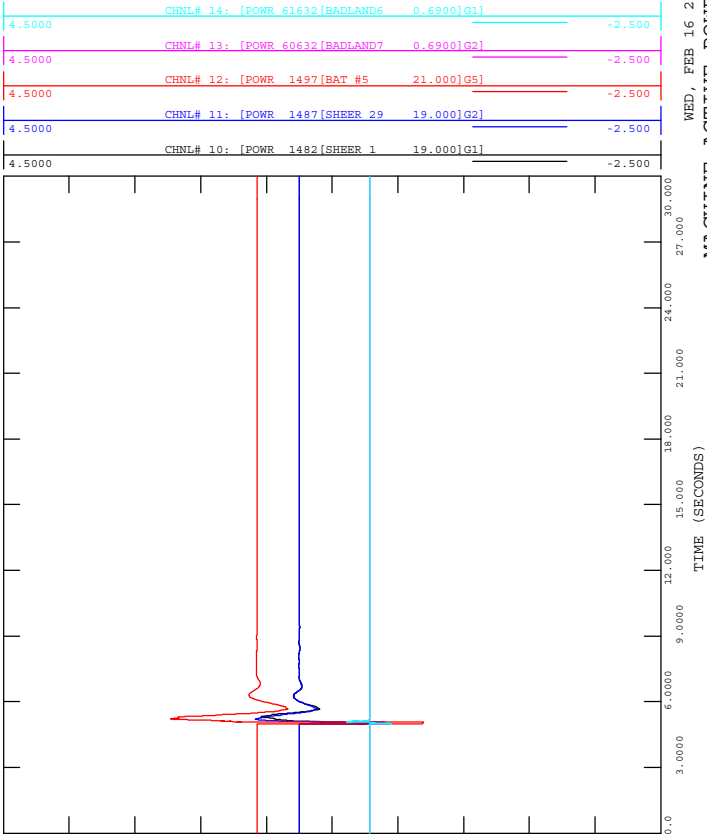


FIGURE A4-57D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-57_3PH_Fault_9L20@Cordel-755S.out

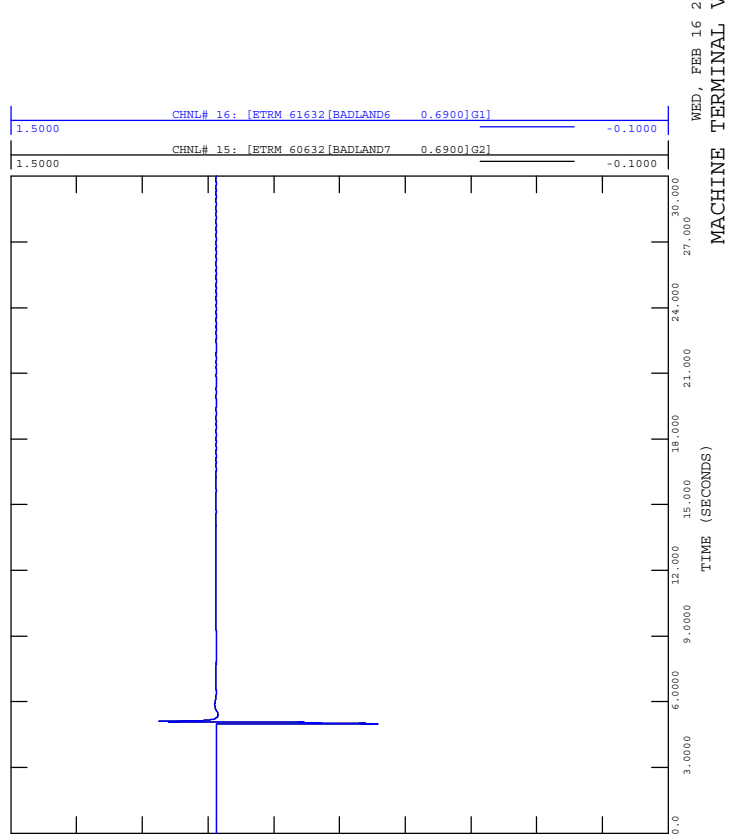


FIGURE A4-57A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-57_3PH_Fault_9L20@Cordel-755S.out

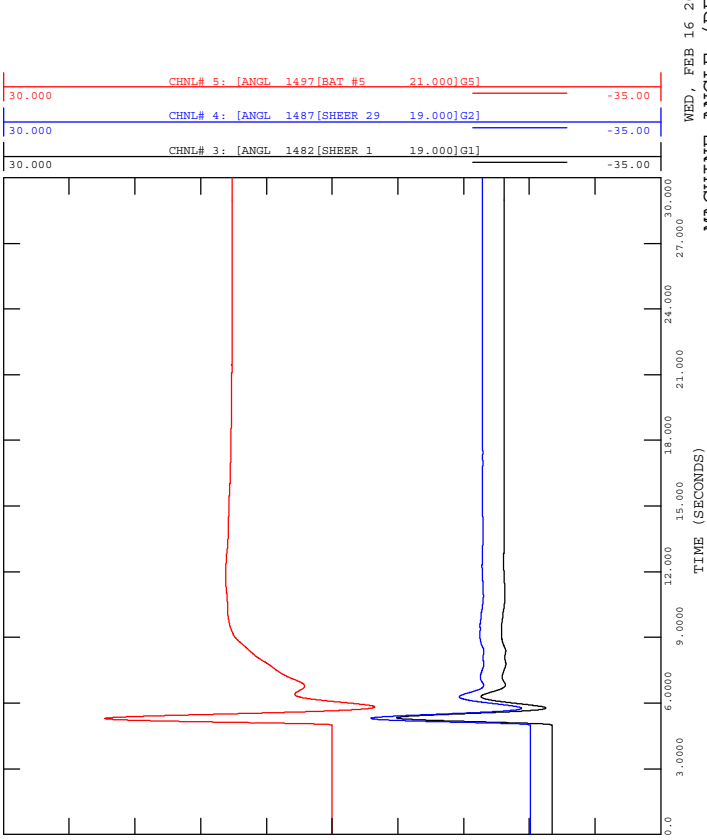


FIGURE A4-57C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-57_3PH_Fault_9L20@Cordel-755S.out

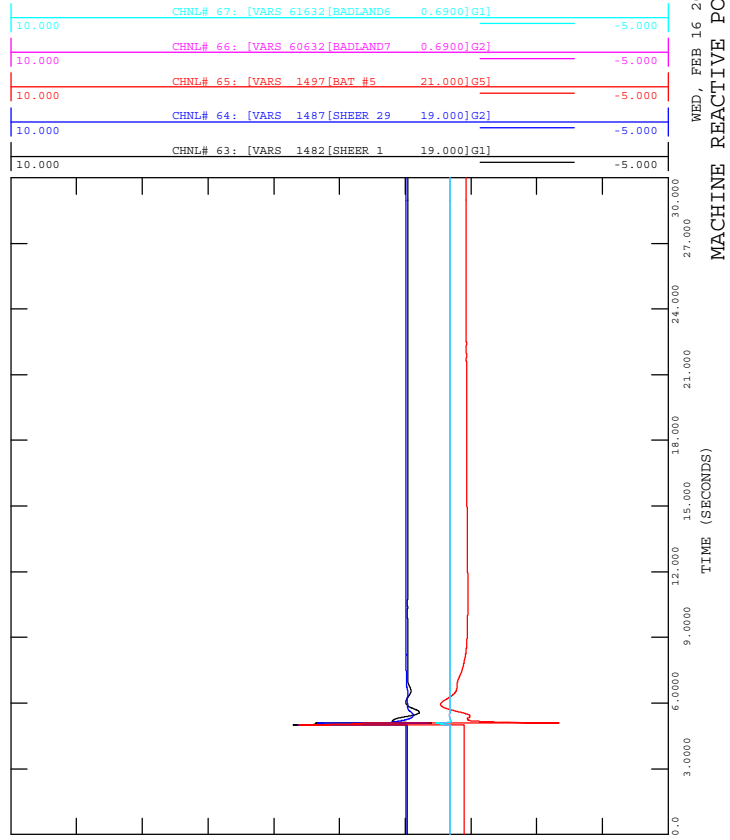




FIGURE A4-57F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-57_3PH_Fault_9L20@Cordel-755S.out

15:37
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

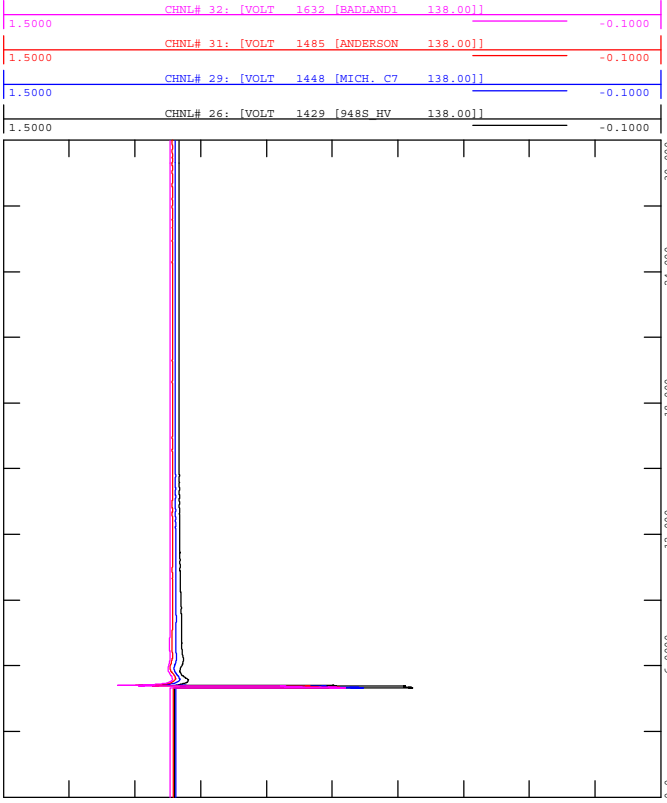


FIGURE A4-57H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-57_3PH_Fault_9L20@Cordel-755S.out

15:37
 WED, FEB 16 2022
 BRANCH FLOW (Q)

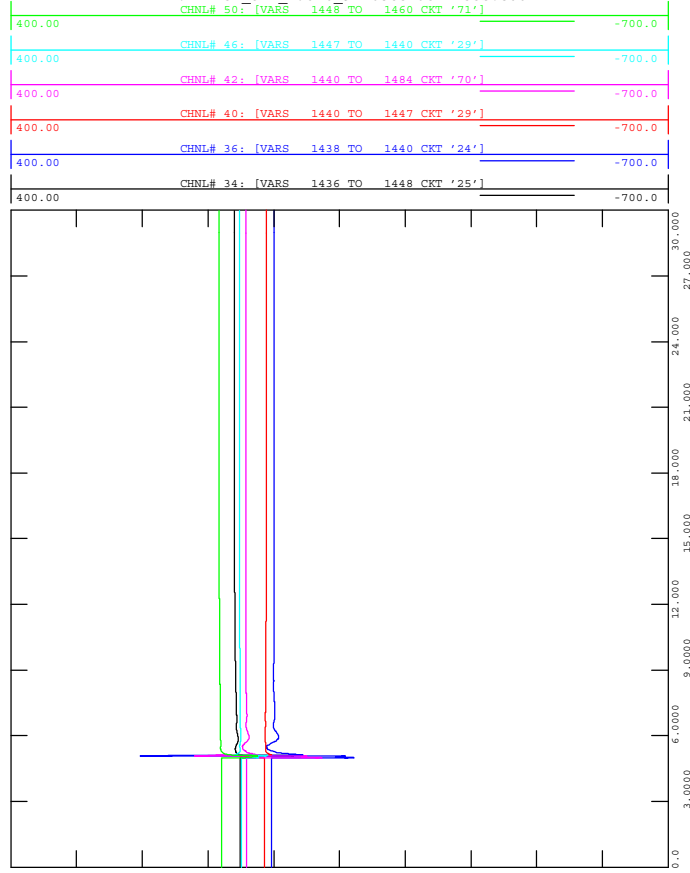


FIGURE A4-57E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-57_3PH_Fault_9L20@Cordel-755S.out

15:37
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

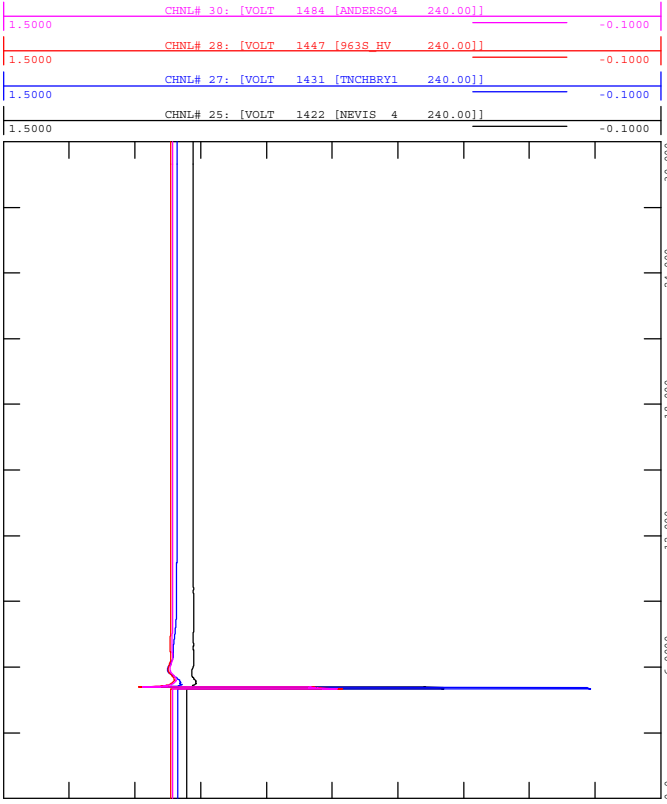


FIGURE A4-57G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT CORDEL 755S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-57_3PH_Fault_9L20@Cordel-755S.out

15:37
 WED, FEB 16 2022
 BRANCH FLOW (P)

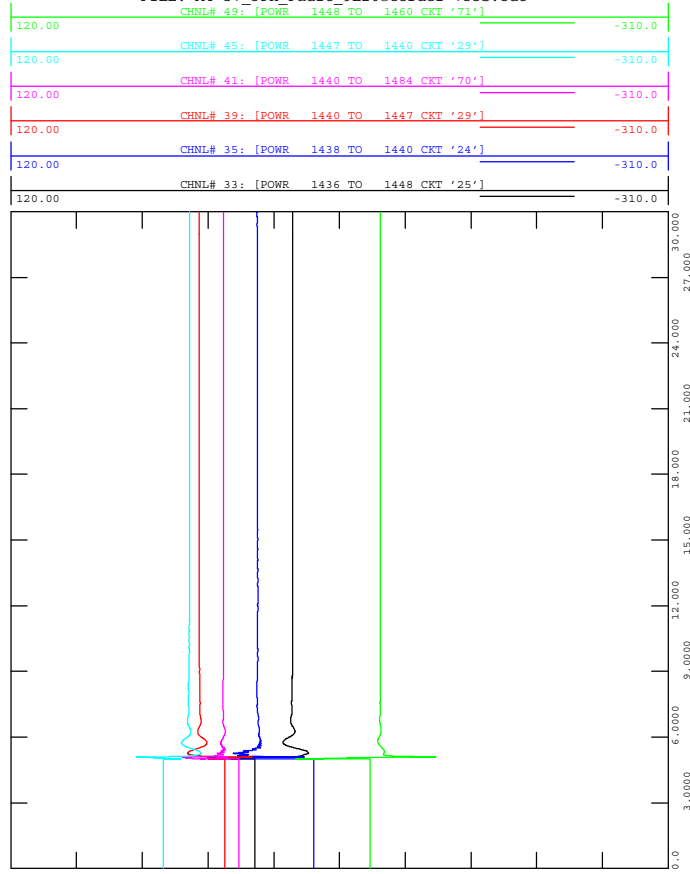
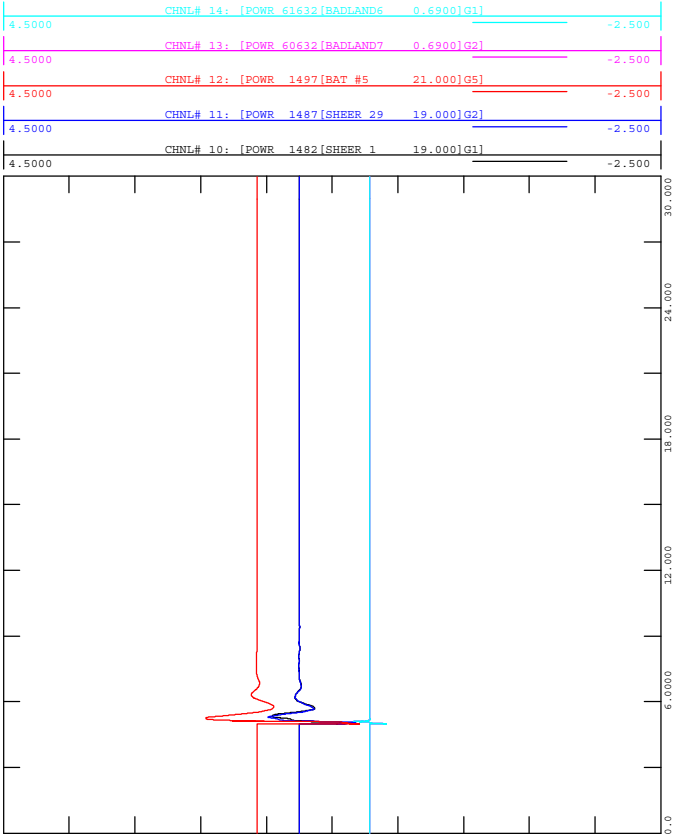




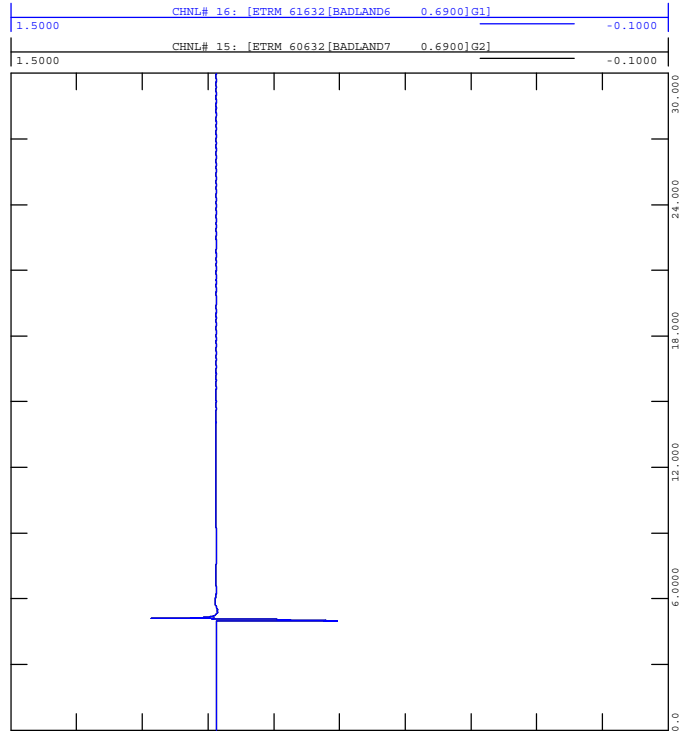
FIGURE A4-58B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-58_3PH_Fault_9L20@Nevis-766S.out



WED, FEB 16 2022 15:38
 MACHINE ACTIVE POWER (MW)



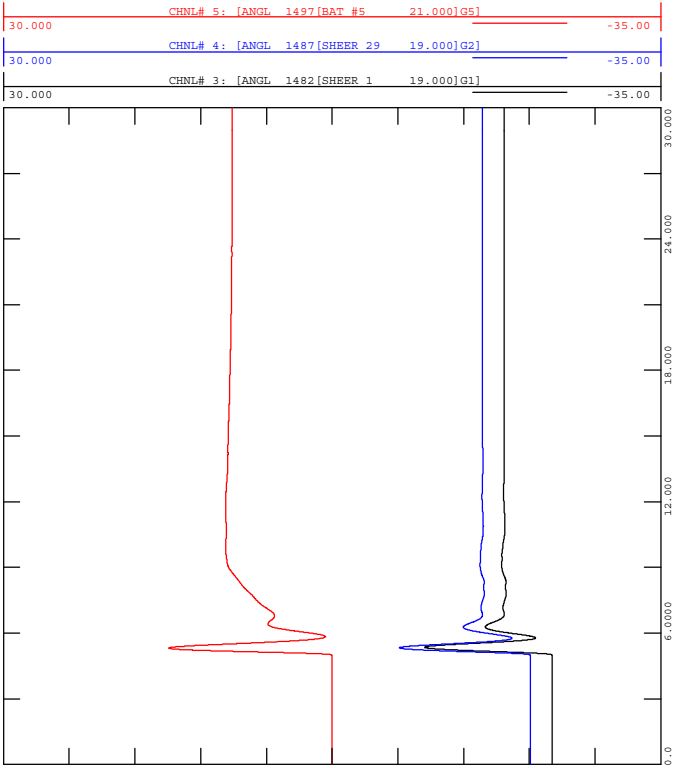
FIGURE A4-58D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-58_3PH_Fault_9L20@Nevis-766S.out



WED, FEB 16 2022 15:38
 MACHINE TERMINAL VOLTAGE



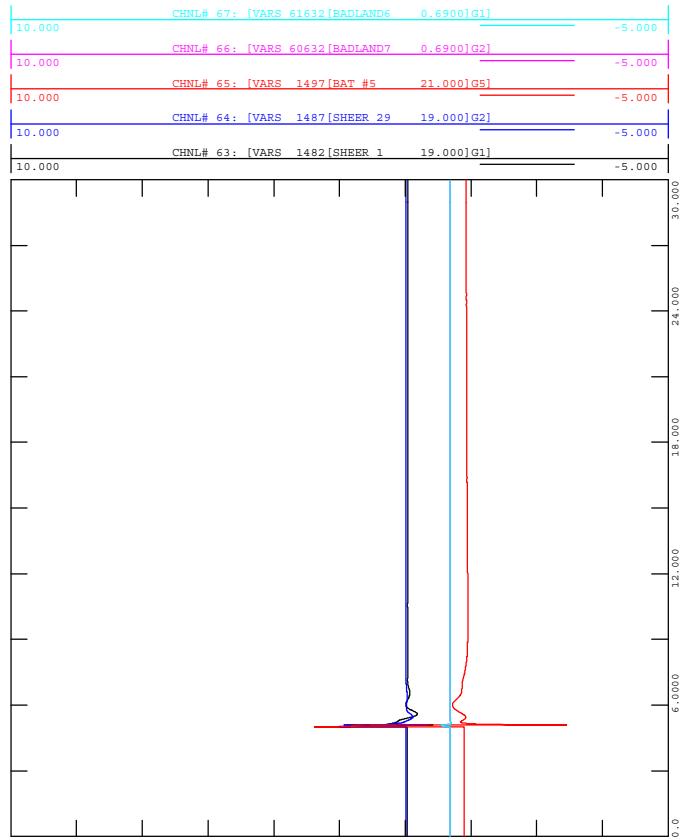
FIGURE A4-58A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-58_3PH_Fault_9L20@Nevis-766S.out



WED, FEB 16 2022 15:38
 MACHINE ANGLE (DEGREES)



FIGURE A4-58C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-58_3PH_Fault_9L20@Nevis-766S.out



WED, FEB 16 2022 15:38
 MACHINE REACTIVE POWER (M)



FIGURE A4-58F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-58_3PH_Fault_9L20@Nevis-766S.out

15:38
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

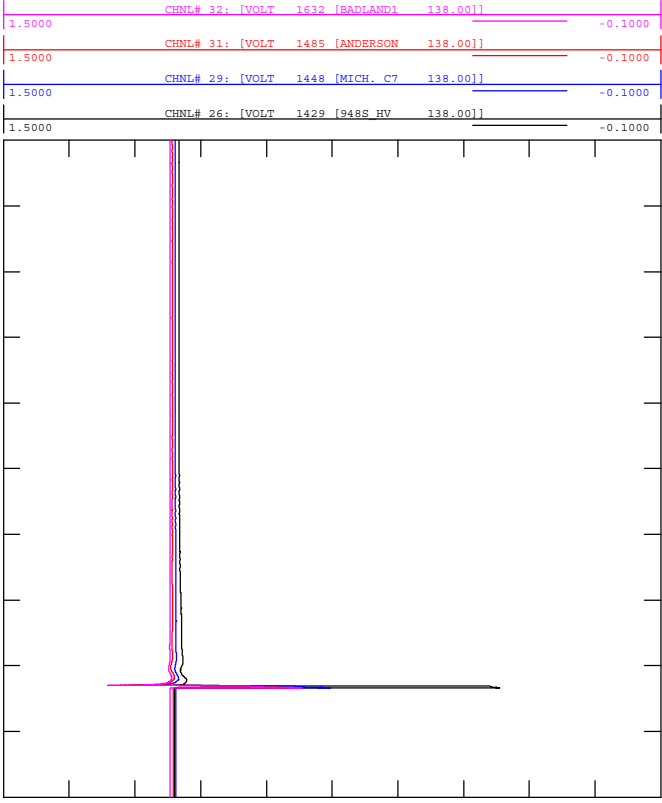


FIGURE A4-58H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-58_3PH_Fault_9L20@Nevis-766S.out

15:38
 WED, FEB 16 2022
 BRANCH FLOW (Q)

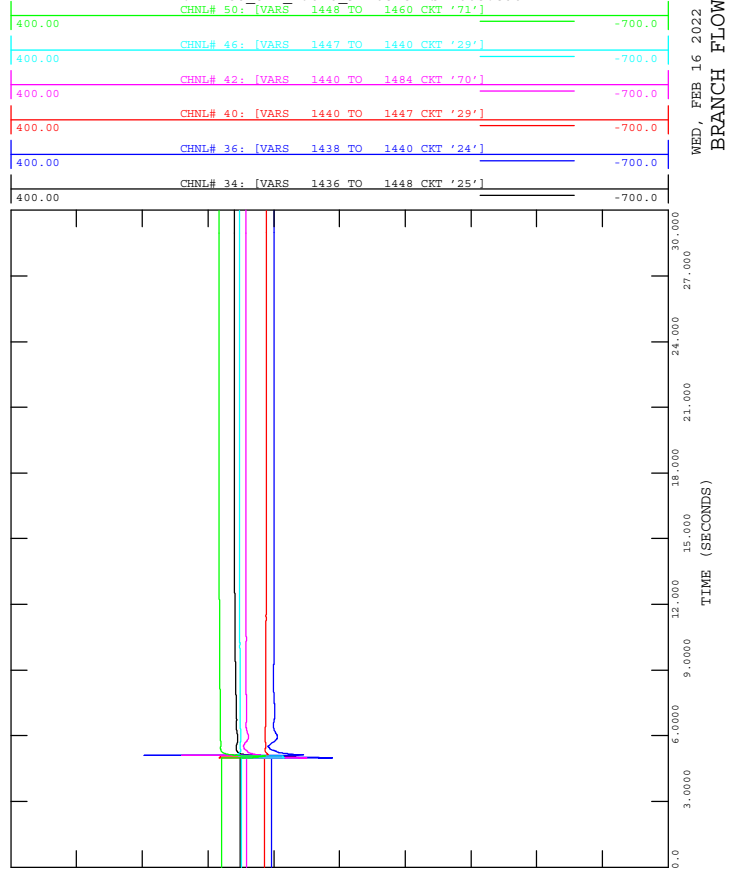


FIGURE A4-58E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-58_3PH_Fault_9L20@Nevis-766S.out

15:38
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

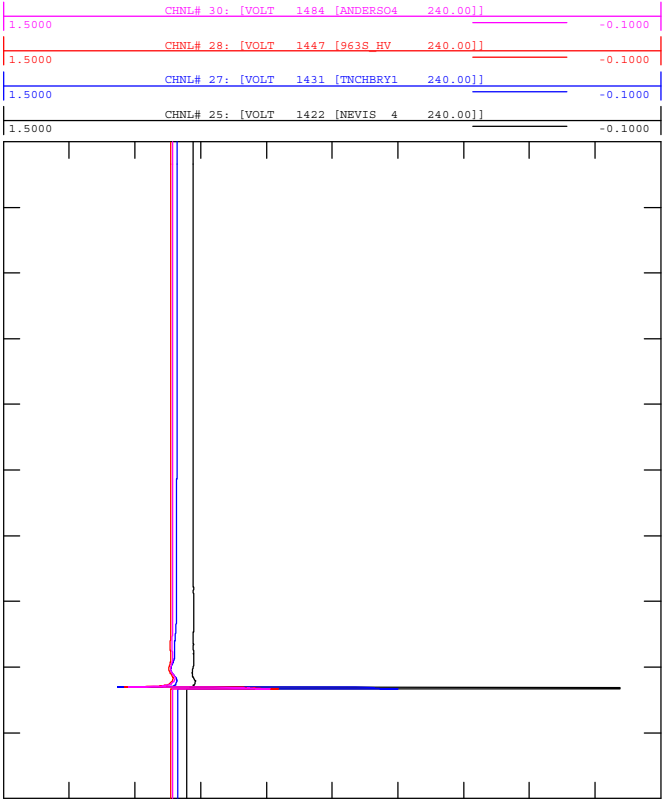


FIGURE A4-58G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-58_3PH_Fault_9L20@Nevis-766S.out

15:38
 WED, FEB 16 2022
 BRANCH FLOW (P)

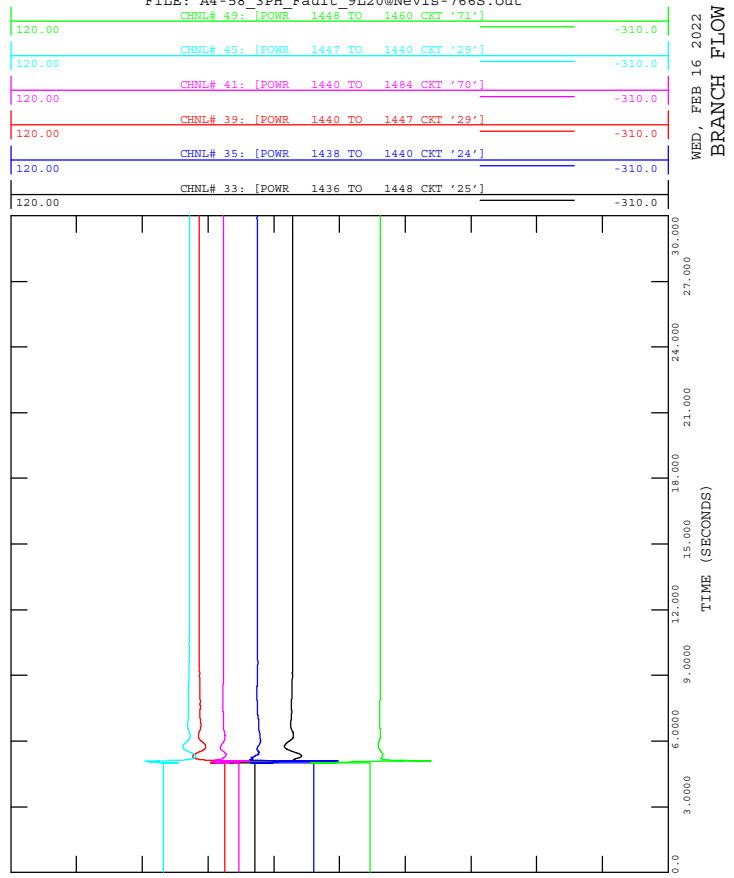




FIGURE A4-59B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-59_3PH_Fault_912L-9L912@Nevis-766S.out

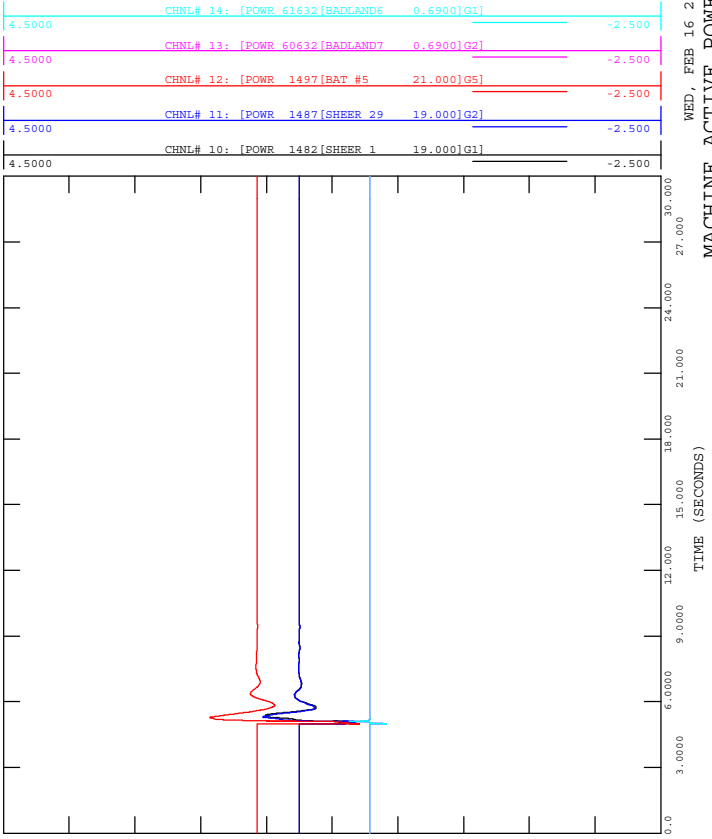


FIGURE A4-59D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-59_3PH_Fault_912L-9L912@Nevis-766S.out

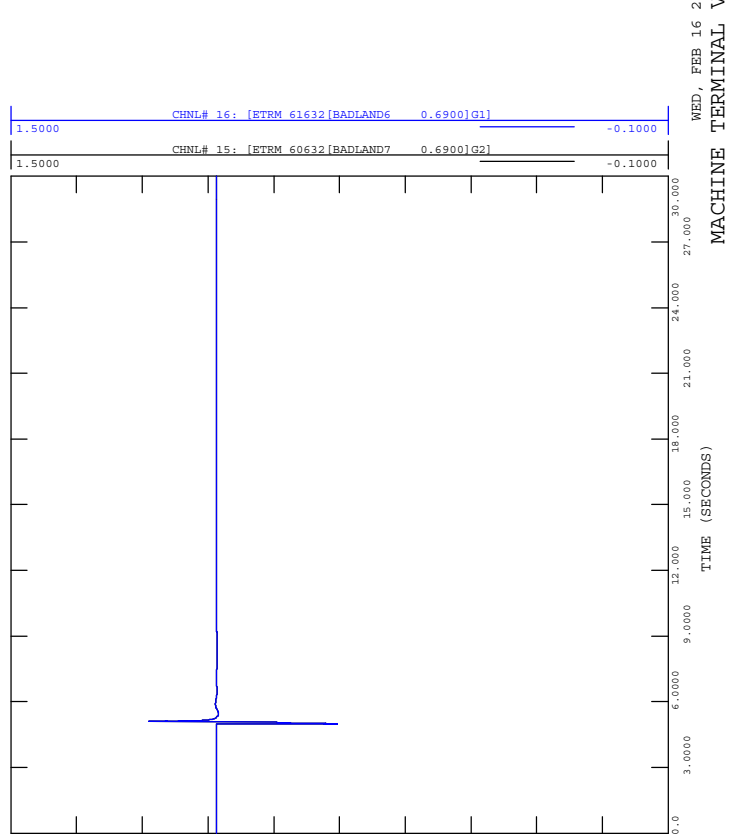


FIGURE A4-59A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-59_3PH_Fault_912L-9L912@Nevis-766S.out

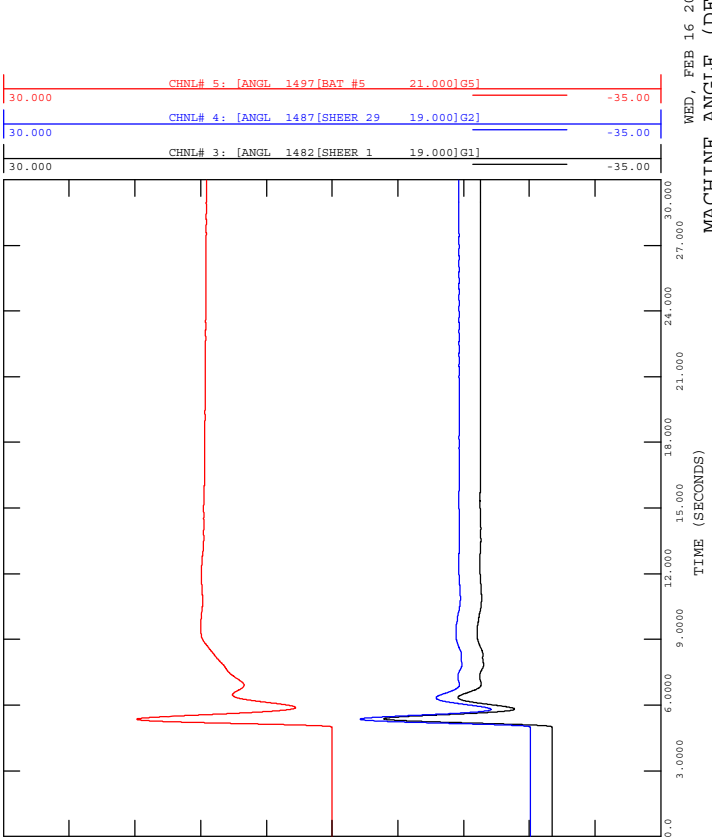


FIGURE A4-59C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-59_3PH_Fault_912L-9L912@Nevis-766S.out

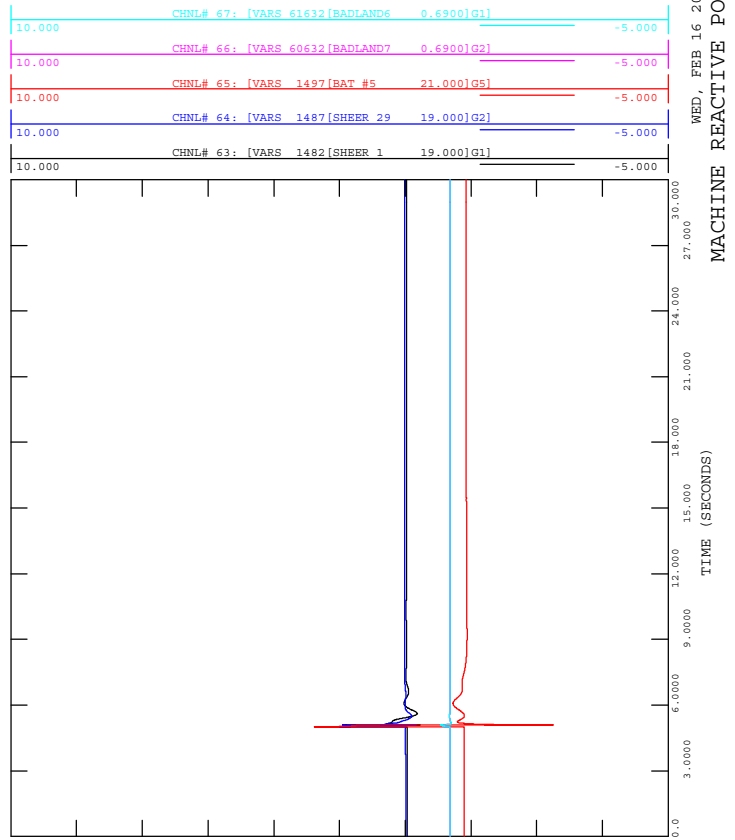




FIGURE A4-59F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-59_3PH_Fault_912L-9L912@Nevis-766S.out

CHNL# 32: [VOLT 1632 [BADLAND] 138.00] -0.1000
 CHNL# 31: [VOLT 1485 [ANDERSON 138.00] -0.1000
 CHNL# 29: [VOLT 1448 [MICH. C7 138.00] -0.1000
 CHNL# 26: [VOLT 1429 [948S_HV 138.00] -0.1000

15:39
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

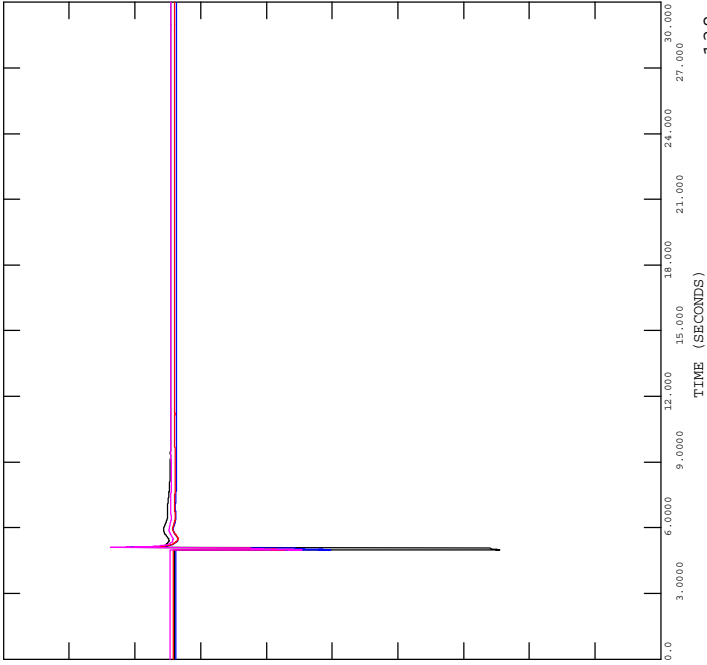


FIGURE A4-59H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-59_3PH_Fault_912L-9L912@Nevis-766S.out

CHNL# 50: [VARS 1448 TO 1460 CKT '71'] -700.0
 CHNL# 46: [VARS 1447 TO 1440 CKT '29'] -700.0
 CHNL# 42: [VARS 1440 TO 1484 CKT '70'] -700.0
 CHNL# 40: [VARS 1440 TO 1447 CKT '29'] -700.0
 CHNL# 36: [VARS 1438 TO 1440 CKT '24'] -700.0
 CHNL# 34: [VARS 1436 TO 1448 CKT '25'] -700.0

15:39
 WED, FEB 16 2022
 BRANCH FLOW (Q)

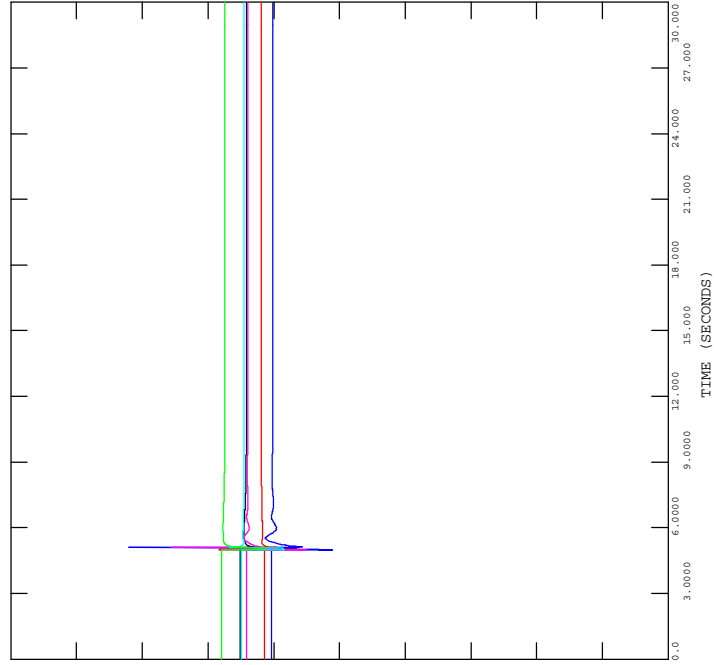


FIGURE A4-59E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-59_3PH_Fault_912L-9L912@Nevis-766S.out

CHNL# 30: [VOLT 1484 [ANDERSO4 240.00] -0.1000
 CHNL# 28: [VOLT 1447 [963S_HV 240.00] -0.1000
 CHNL# 27: [VOLT 1431 [TNCHBRY1 240.00] -0.1000
 CHNL# 25: [VOLT 1422 [NEVIS 4 240.00] -0.1000

15:39
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

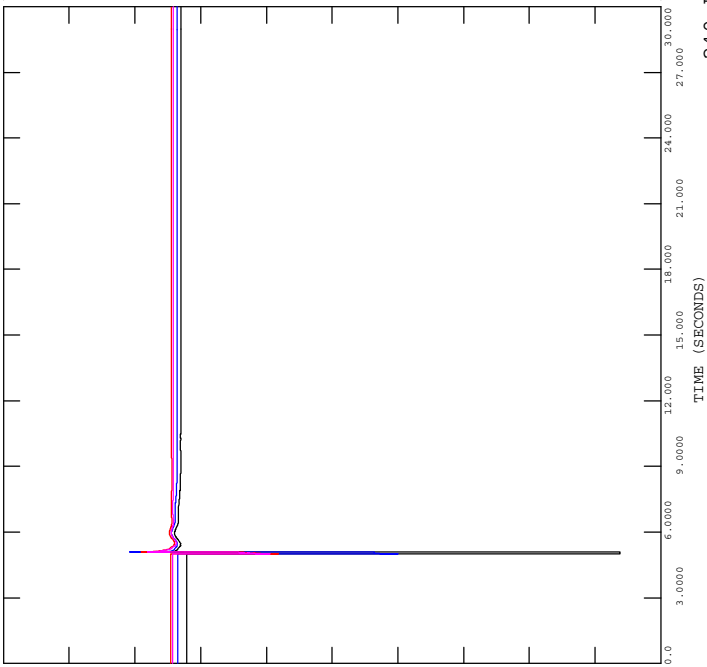


FIGURE A4-59G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-59_3PH_Fault_912L-9L912@Nevis-766S.out

CHNL# 49: [POWR 1448 TO 1460 CKT '71'] -310.0
 CHNL# 45: [POWR 1447 TO 1440 CKT '29'] -310.0
 CHNL# 41: [POWR 1440 TO 1484 CKT '70'] -310.0
 CHNL# 39: [POWR 1440 TO 1447 CKT '29'] -310.0
 CHNL# 35: [POWR 1438 TO 1440 CKT '24'] -310.0
 CHNL# 33: [POWR 1436 TO 1448 CKT '25'] -310.0

15:39
 WED, FEB 16 2022
 BRANCH FLOW (P)

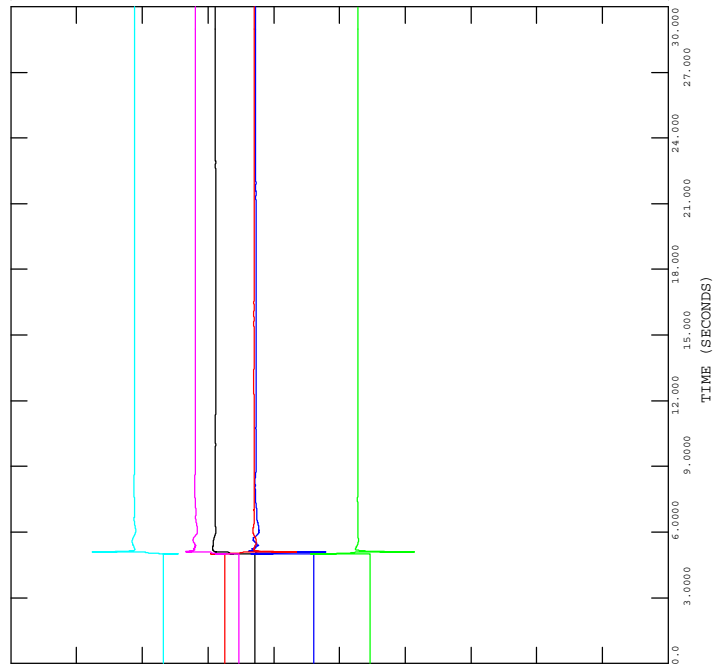




FIGURE A4-60B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-60_3PH_Fault_912L-9L912@Red-Deer-63S.out

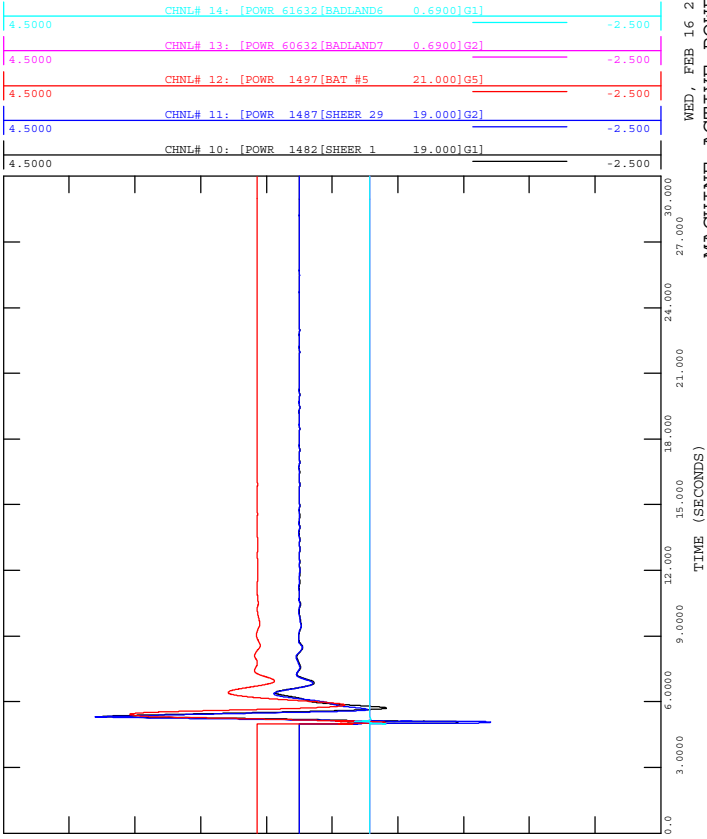


FIGURE A4-60D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-60_3PH_Fault_912L-9L912@Red-Deer-63S.out

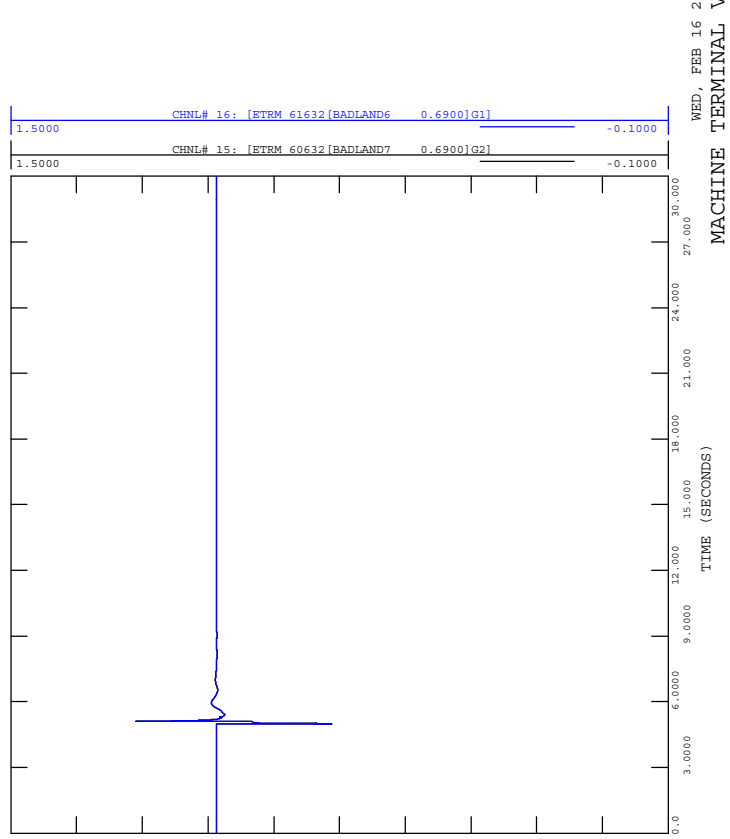


FIGURE A4-60A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-60_3PH_Fault_912L-9L912@Red-Deer-63S.out

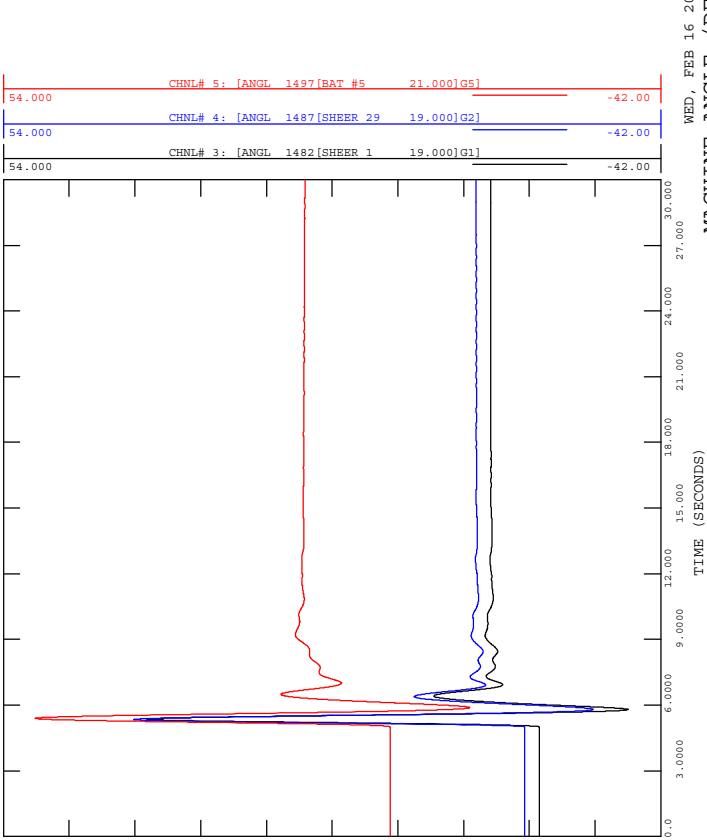


FIGURE A4-60C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-60_3PH_Fault_912L-9L912@Red-Deer-63S.out

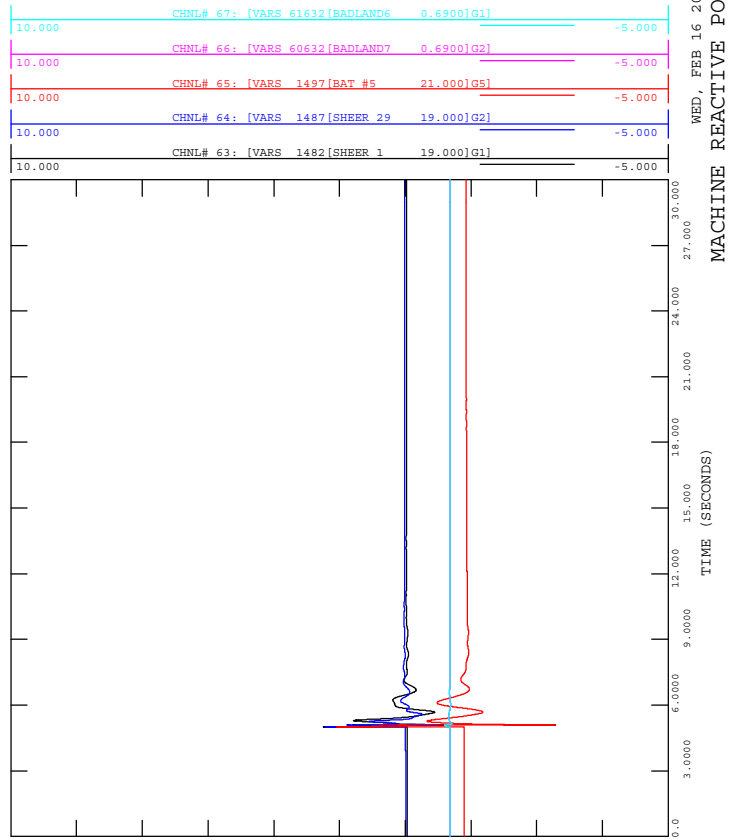




FIGURE A4-60F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-60_3PH_Fault_912L-9L912@Red-Deer-63S.out

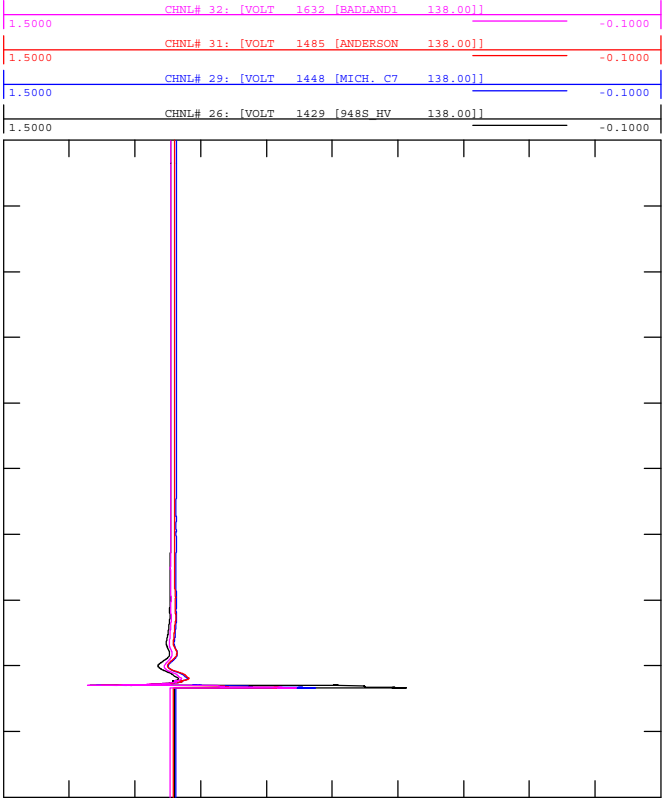


FIGURE A4-60H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-60_3PH_Fault_912L-9L912@Red-Deer-63S.out

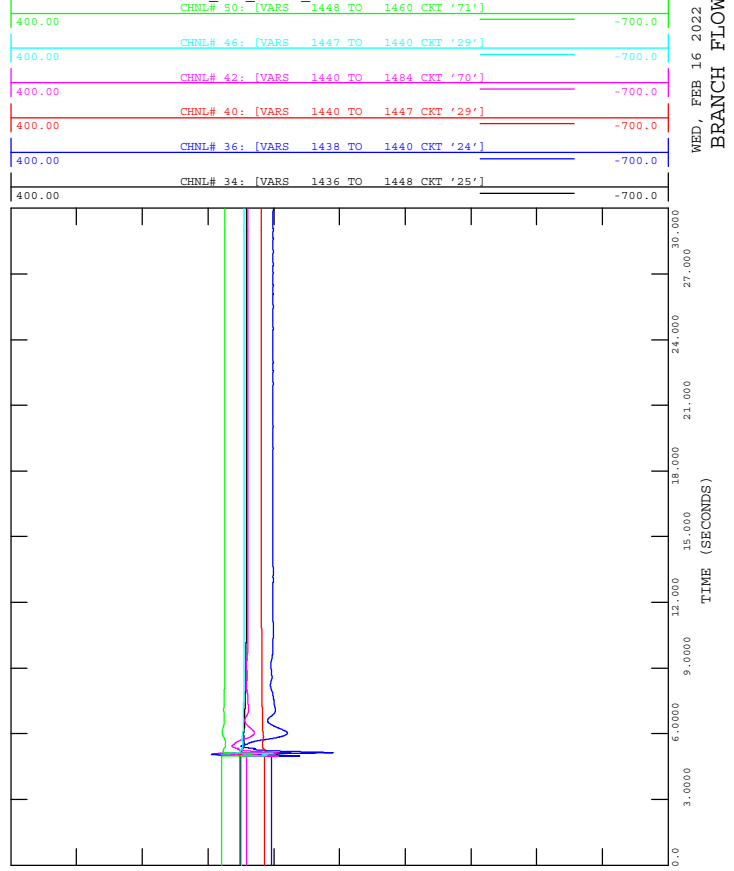


FIGURE A4-60E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-60_3PH_Fault_912L-9L912@Red-Deer-63S.out

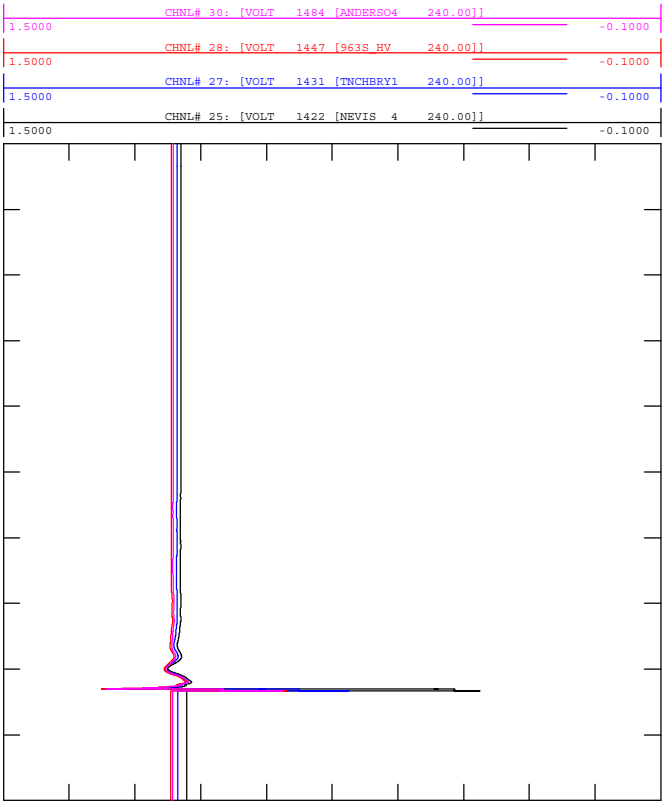


FIGURE A4-60G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT RED DEER 63S
 CLEARED IN 5.5 CYCLES, FAR END CLEARED IN 6.5 CYCLES
 FILE: A4-60_3PH_Fault_912L-9L912@Red-Deer-63S.out

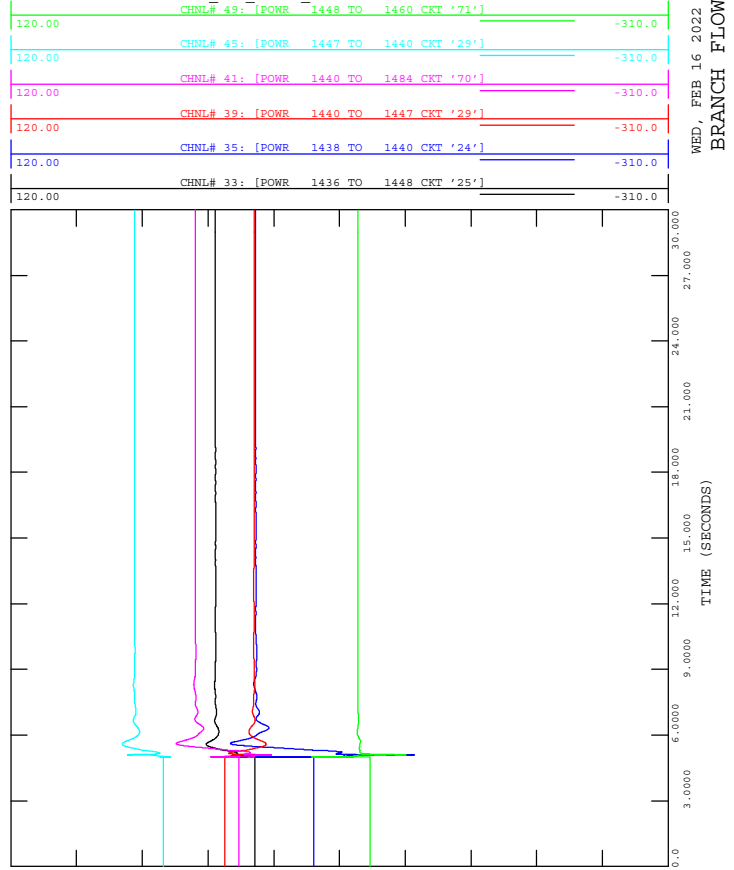




FIGURE A4-61B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-61_3PH_Fault_7L171@Wintering-Hill-804S.out

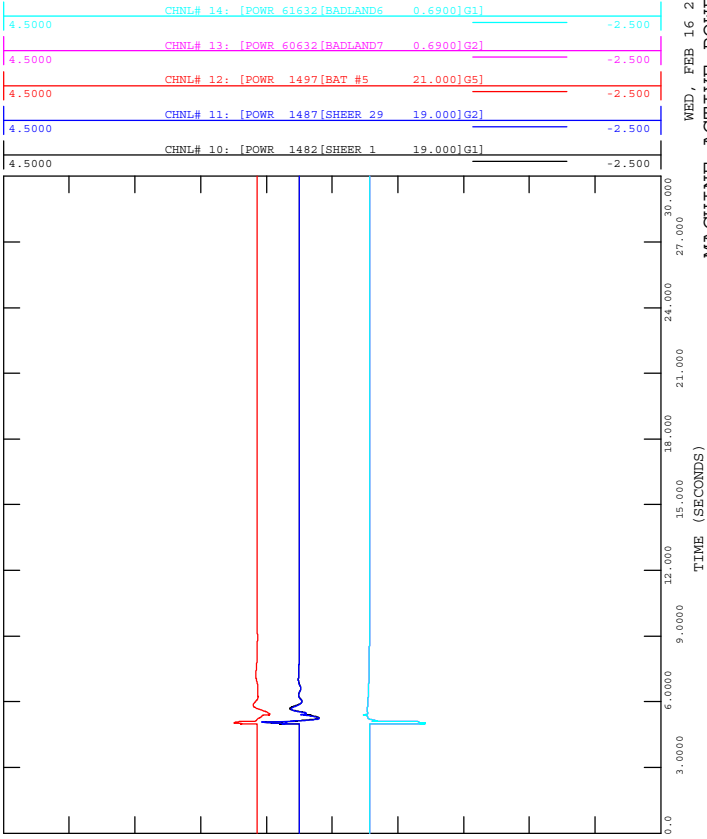


FIGURE A4-61D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-61_3PH_Fault_7L171@Wintering-Hill-804S.out

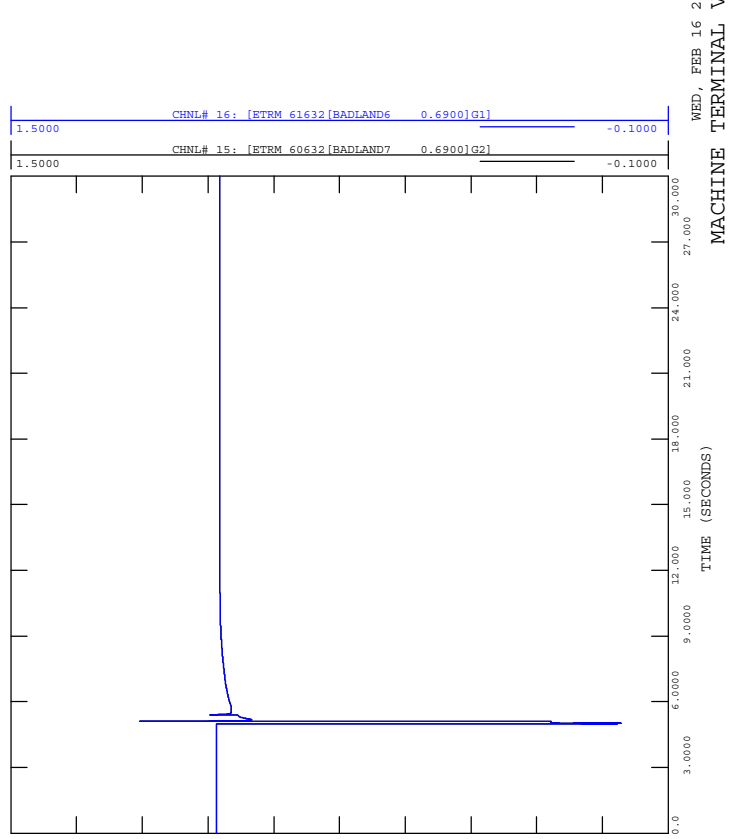


FIGURE A4-61A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-61_3PH_Fault_7L171@Wintering-Hill-804S.out

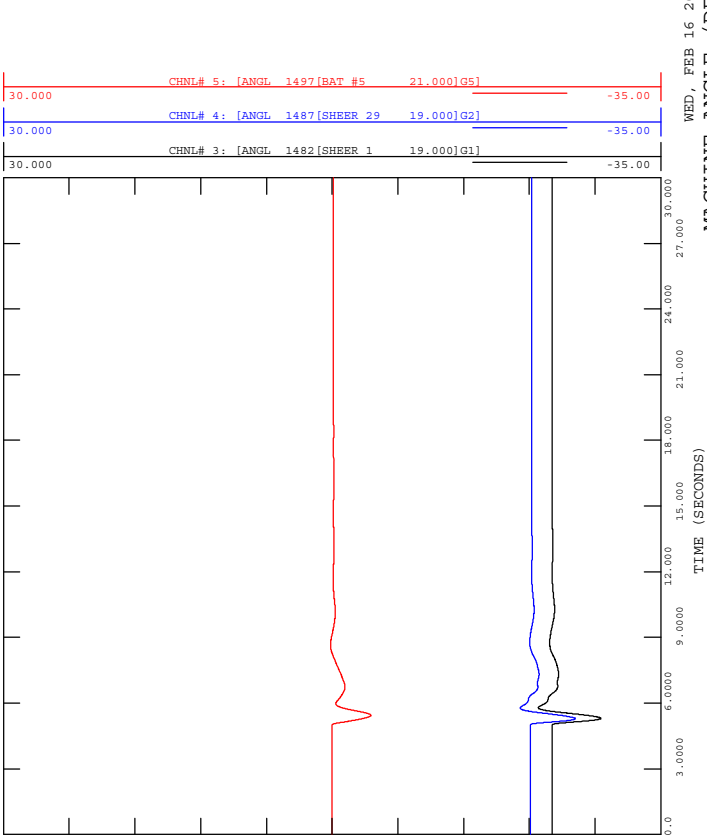


FIGURE A4-61C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-61_3PH_Fault_7L171@Wintering-Hill-804S.out

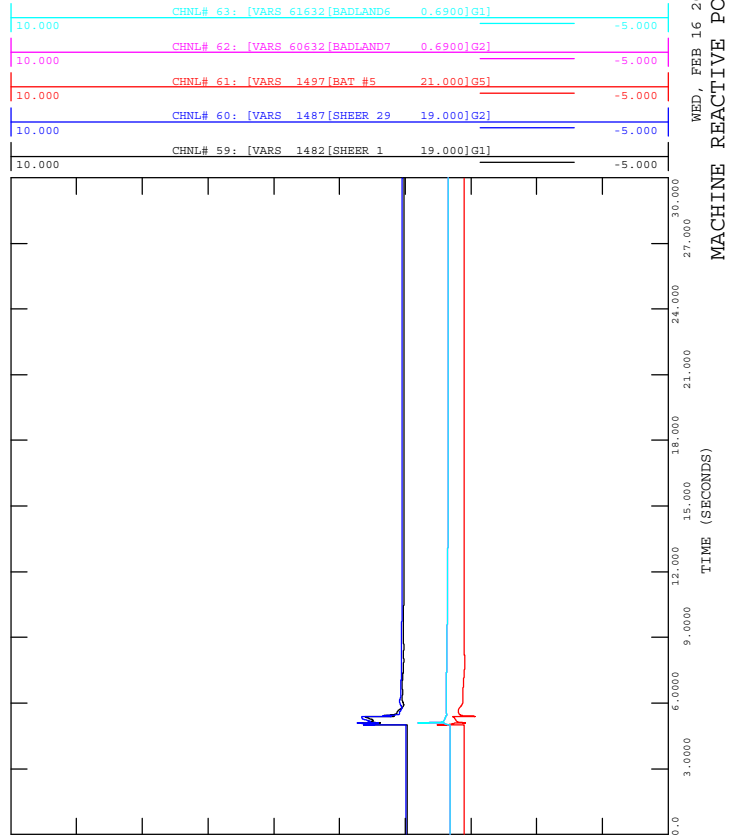




FIGURE A4-61F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-61_3PH_Fault_7L171@Wintering-Hill-804S.out

15:40
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

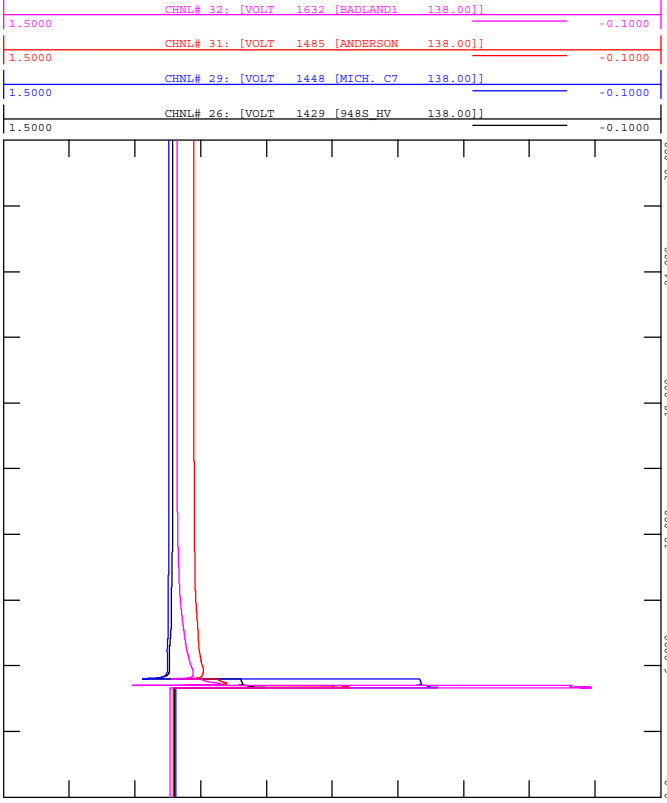


FIGURE A4-61H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-61_3PH_Fault_7L171@Wintering-Hill-804S.out

15:40
 WED, FEB 16 2022
 BRANCH FLOW (Q)

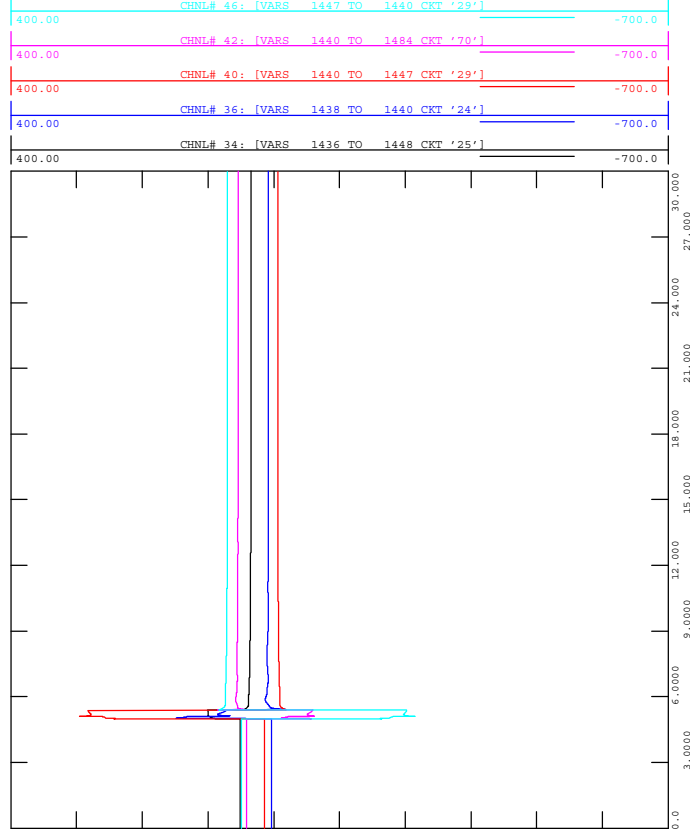


FIGURE A4-61E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-61_3PH_Fault_7L171@Wintering-Hill-804S.out

15:40
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

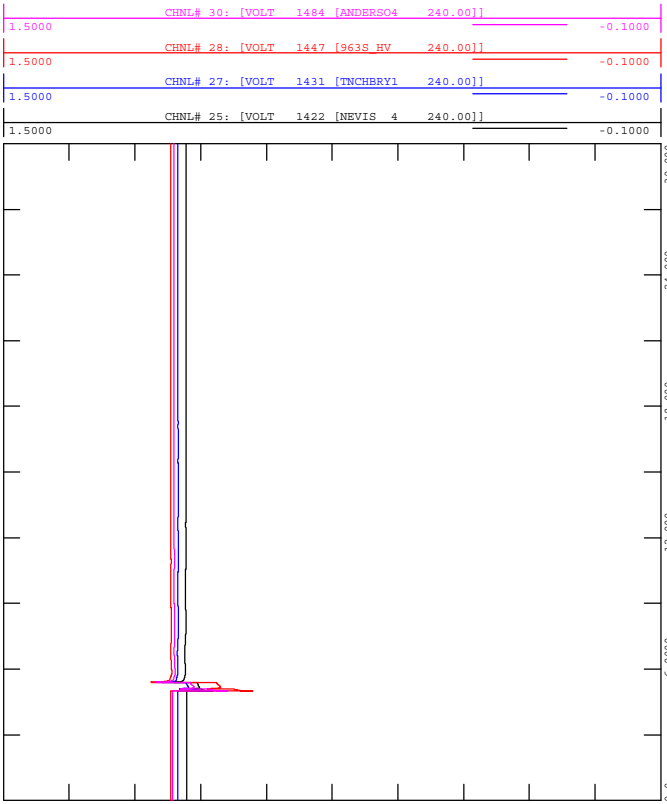


FIGURE A4-61G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILL 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-61_3PH_Fault_7L171@Wintering-Hill-804S.out

15:40
 WED, FEB 16 2022
 BRANCH FLOW (P)

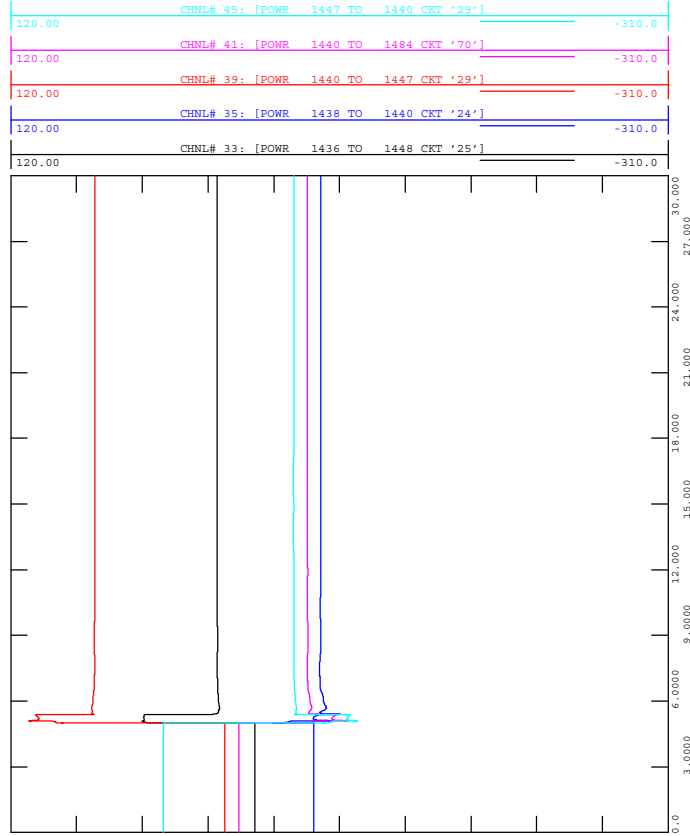




FIGURE A4-62B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-62_3PH_Fault_7L171@Michichi-Creek-802S.out

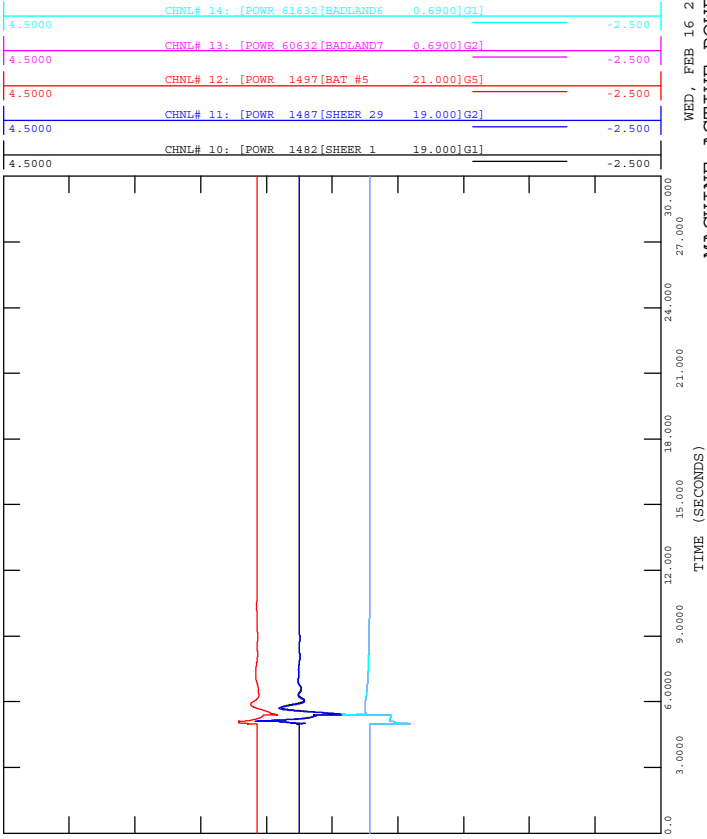


FIGURE A4-62D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-62_3PH_Fault_7L171@Michichi-Creek-802S.out

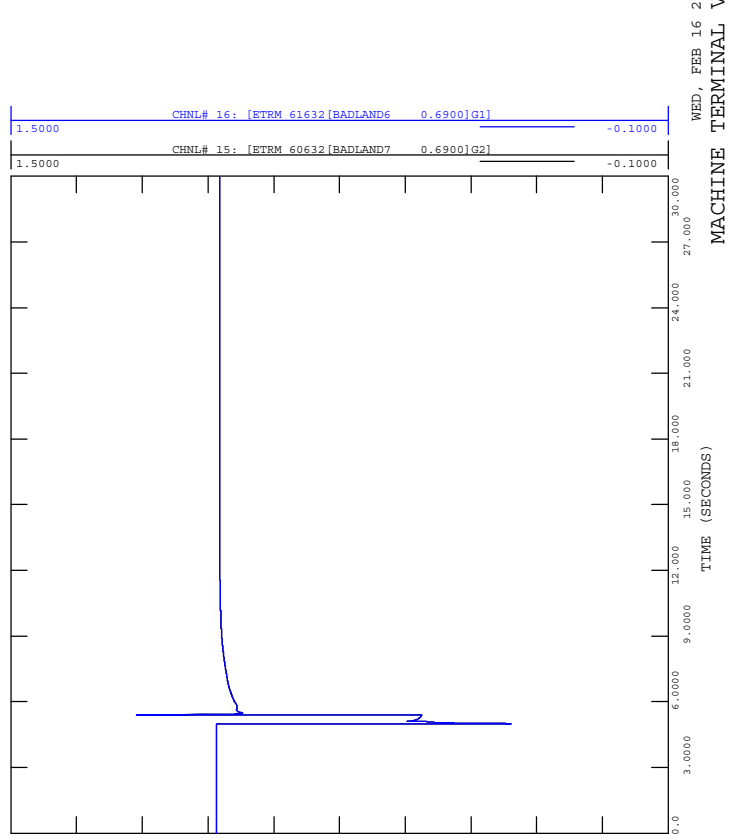


FIGURE A4-62A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-62_3PH_Fault_7L171@Michichi-Creek-802S.out

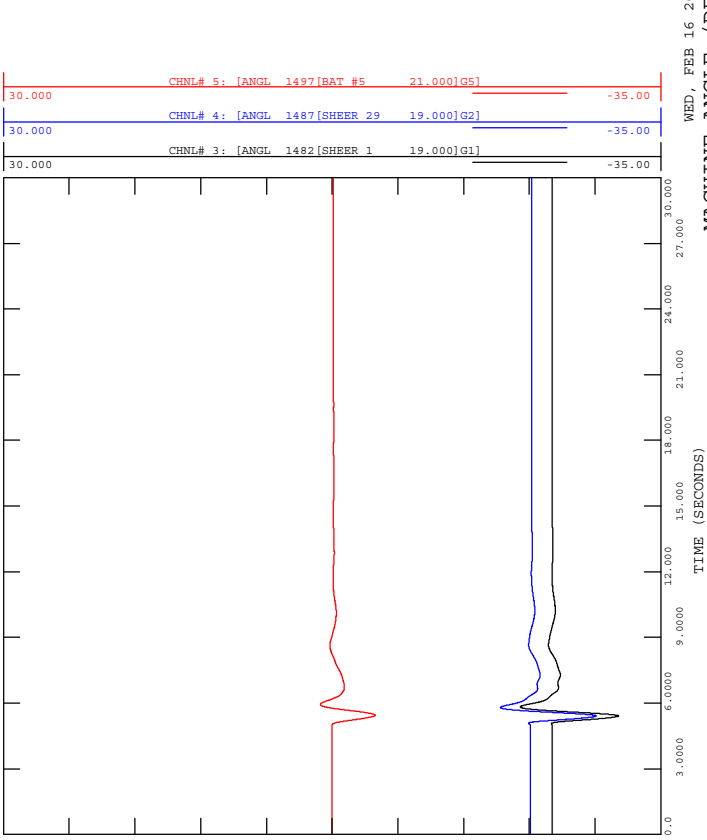


FIGURE A4-62C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-62_3PH_Fault_7L171@Michichi-Creek-802S.out

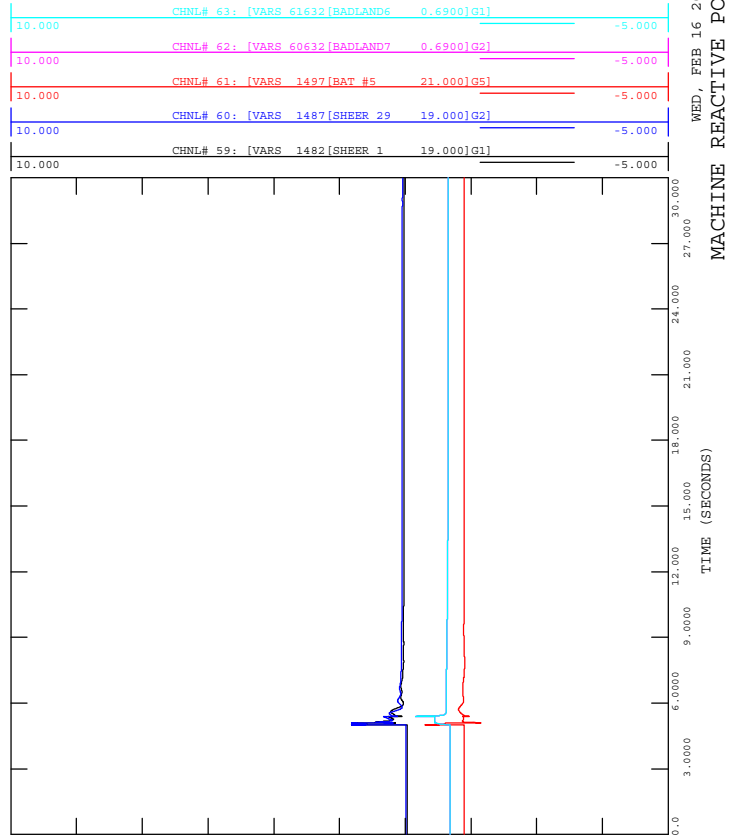




FIGURE A4-62F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-62_3PH_Fault_7L171@Michichi-Creek-802S.out

15:41
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

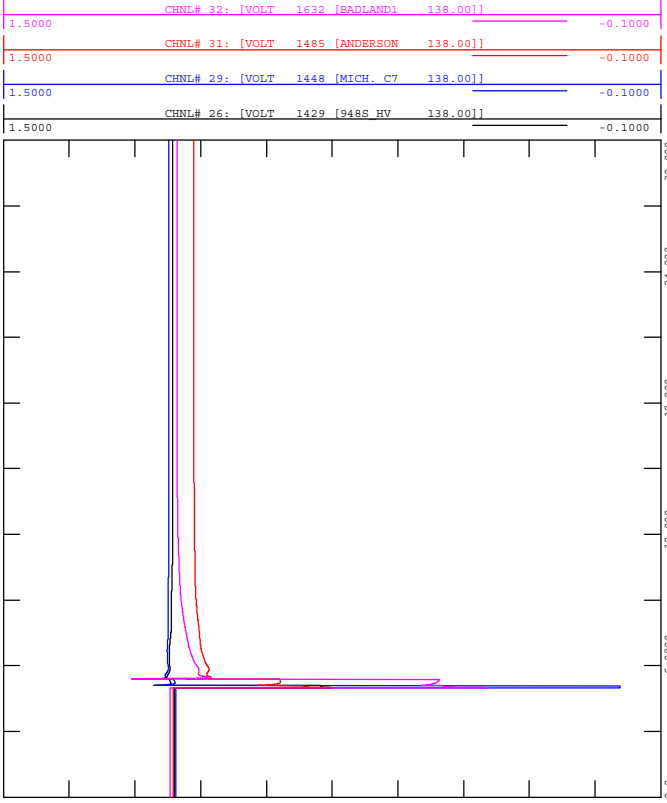


FIGURE A4-62H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-62_3PH_Fault_7L171@Michichi-Creek-802S.out

15:41
 WED, FEB 16 2022
 BRANCH FLOW (Q)

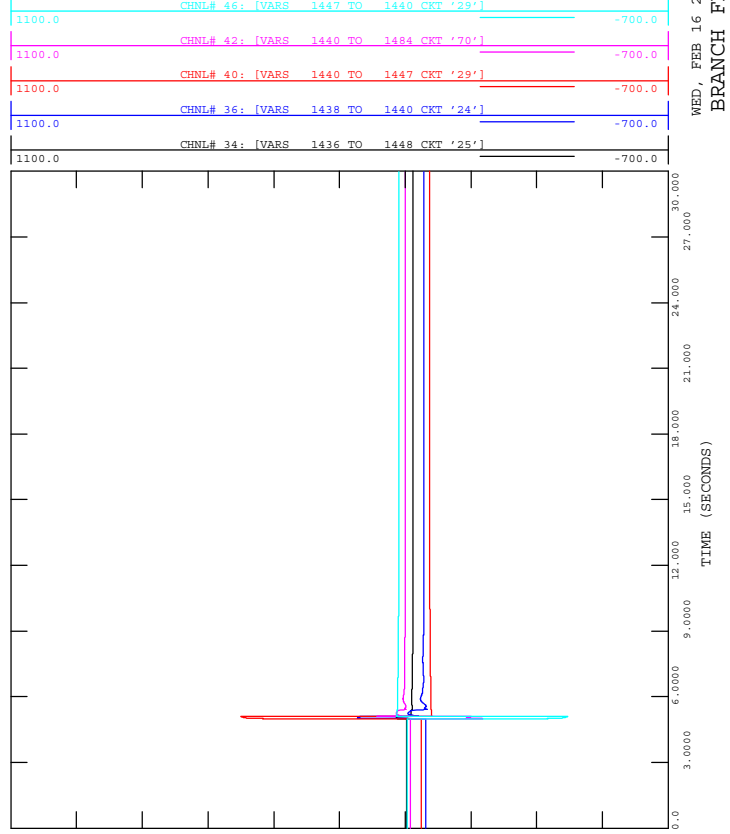


FIGURE A4-62E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-62_3PH_Fault_7L171@Michichi-Creek-802S.out

15:41
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

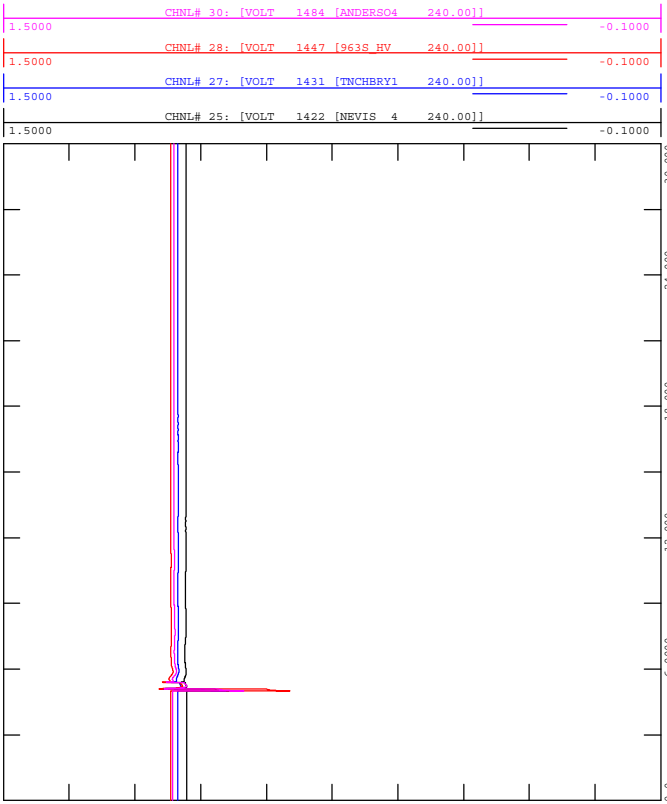


FIGURE A4-62G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-62_3PH_Fault_7L171@Michichi-Creek-802S.out

15:41
 WED, FEB 16 2022
 BRANCH FLOW (P)

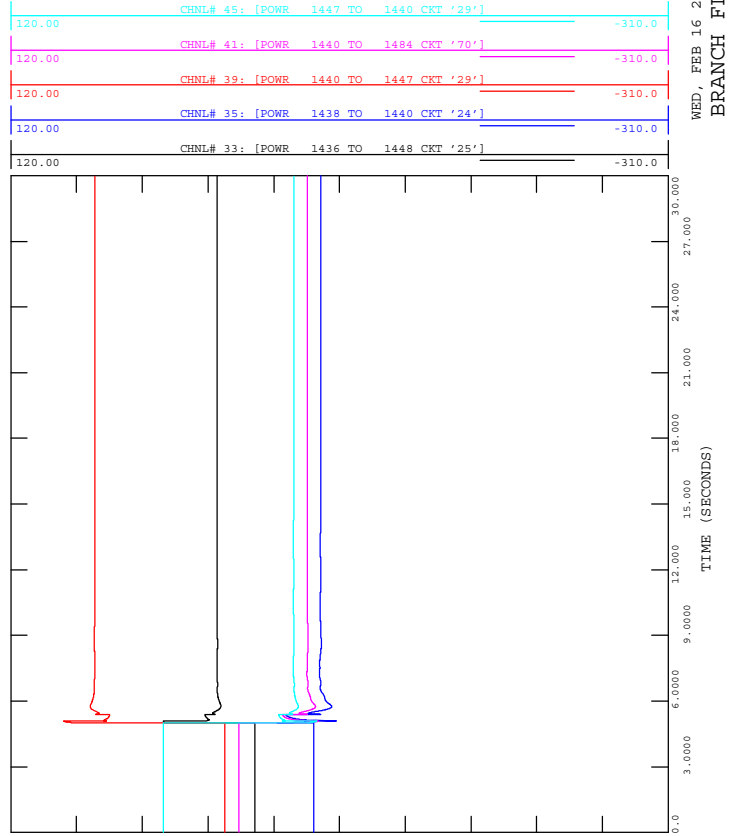




FIGURE A4-63B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-63_3PH_Fault_7L25@Rowley-768S.out

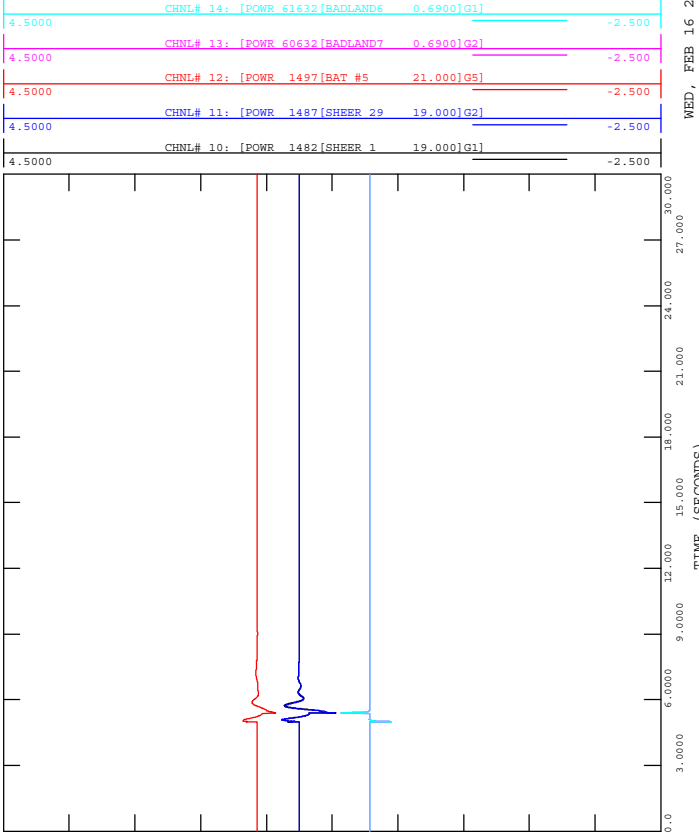


FIGURE A4-63D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-63_3PH_Fault_7L25@Rowley-768S.out

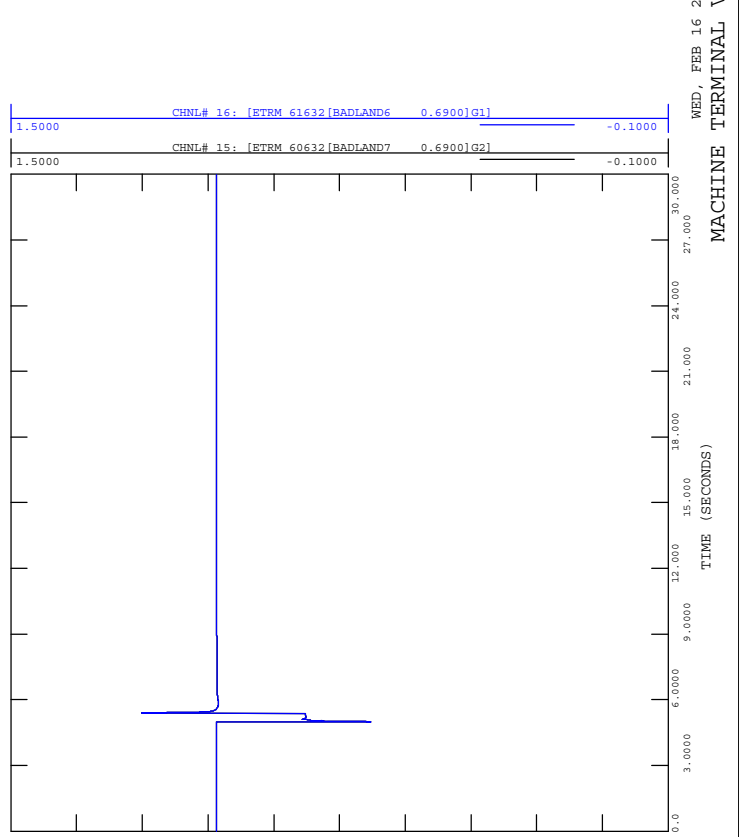


FIGURE A4-63A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-63_3PH_Fault_7L25@Rowley-768S.out

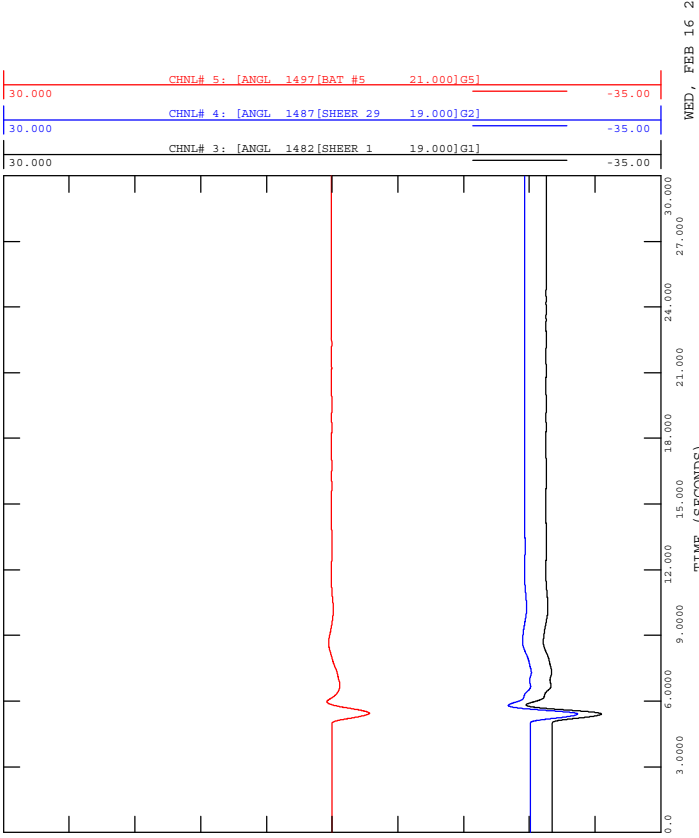


FIGURE A4-63C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-63_3PH_Fault_7L25@Rowley-768S.out

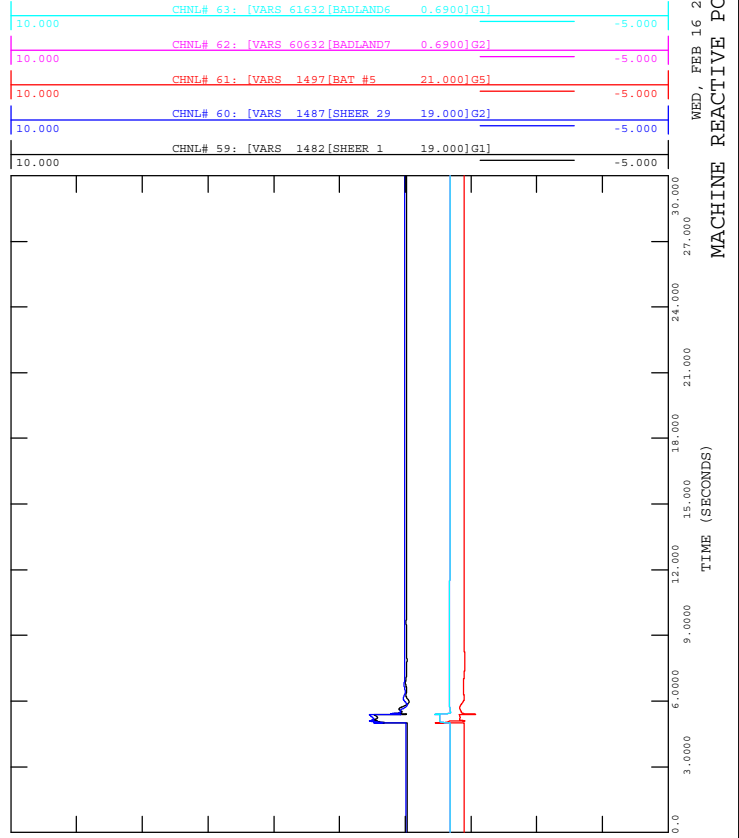




FIGURE A4-63F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-63_3PH_Fault_7L25@Rowley-768S.out

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:42

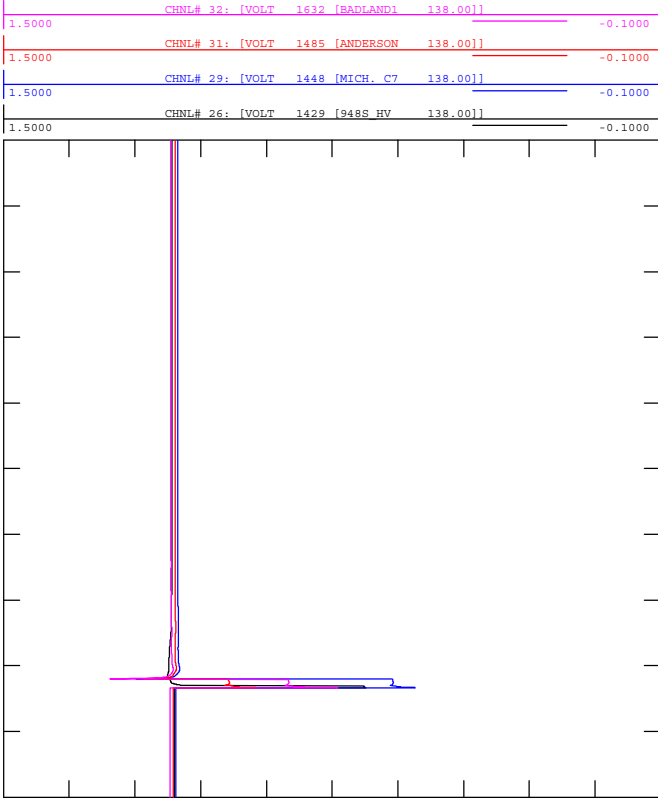


FIGURE A4-63H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-63_3PH_Fault_7L25@Rowley-768S.out

BRANCH FLOW (Q)
 WED, FEB 16 2022 15:42

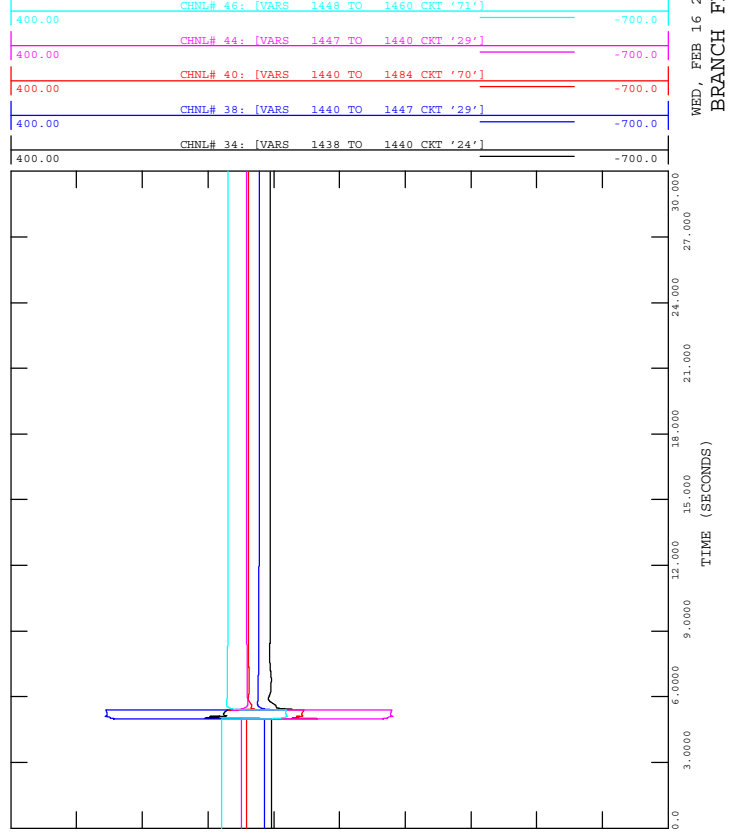


FIGURE A4-63E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-63_3PH_Fault_7L25@Rowley-768S.out

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:42

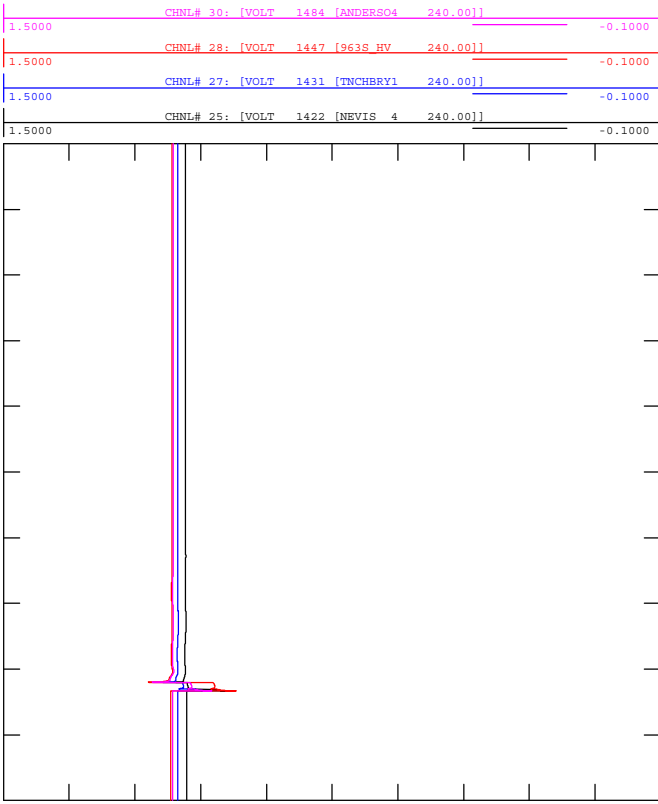


FIGURE A4-63G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-63_3PH_Fault_7L25@Rowley-768S.out

BRANCH FLOW (P)
 WED, FEB 16 2022 15:42

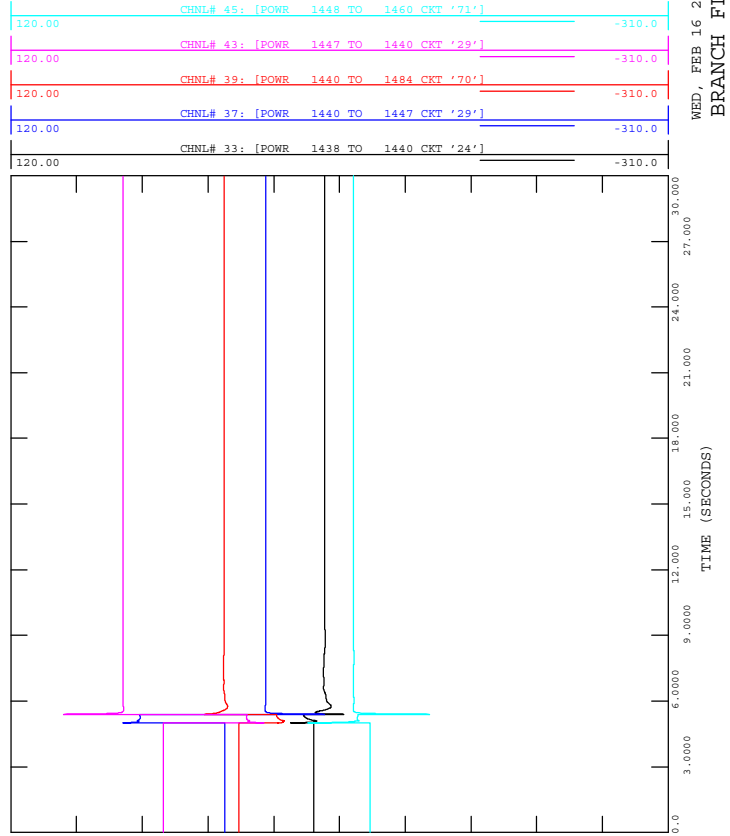
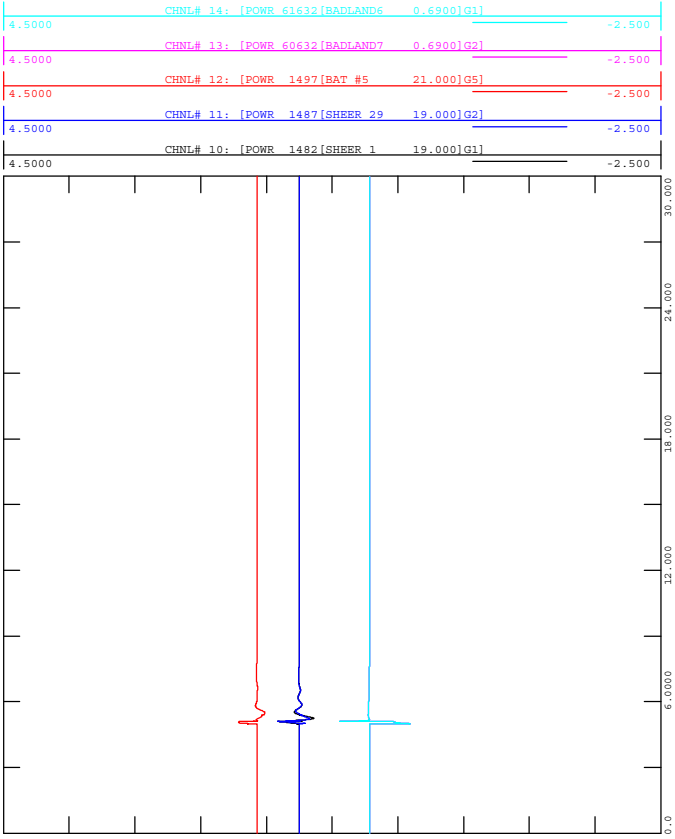




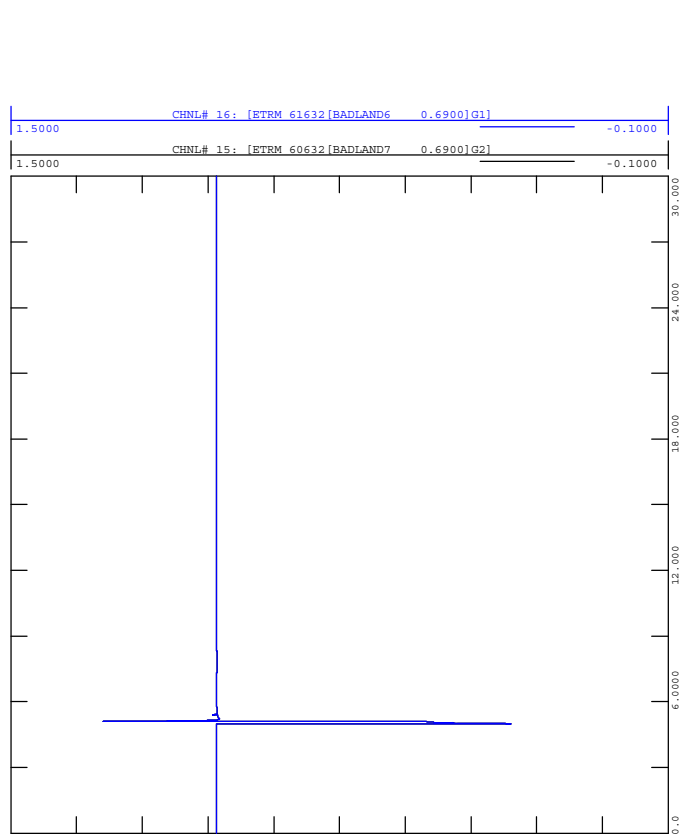
FIGURE A4-64B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-64_3PH_Fault_7L25@Michichi-Creek-802S.out



WED, FEB 16 2022 15:42
 MACHINE ACTIVE POWER (MW)



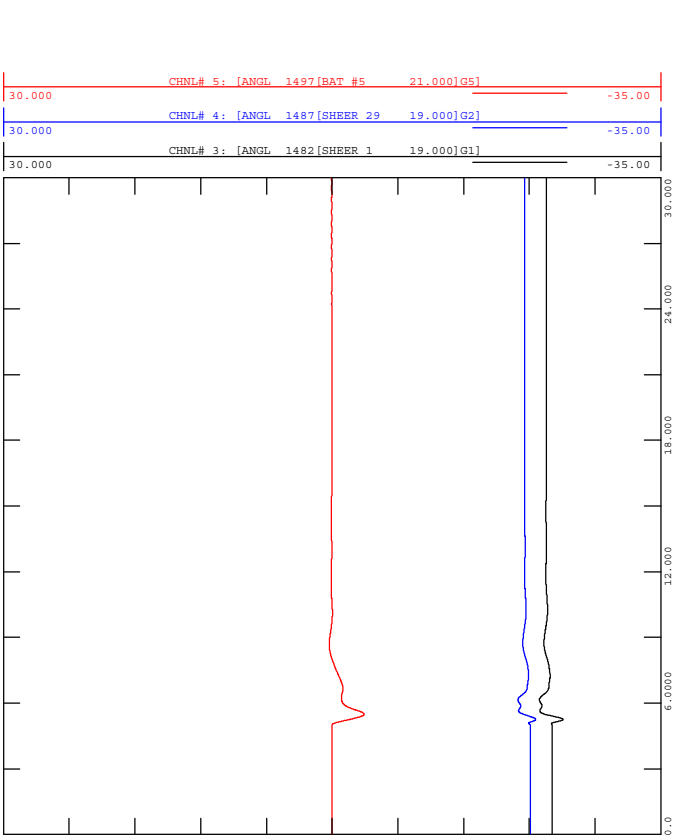
FIGURE A4-64D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-64_3PH_Fault_7L25@Michichi-Creek-802S.out



WED, FEB 16 2022 15:42
 MACHINE TERMINAL VOLTAGE



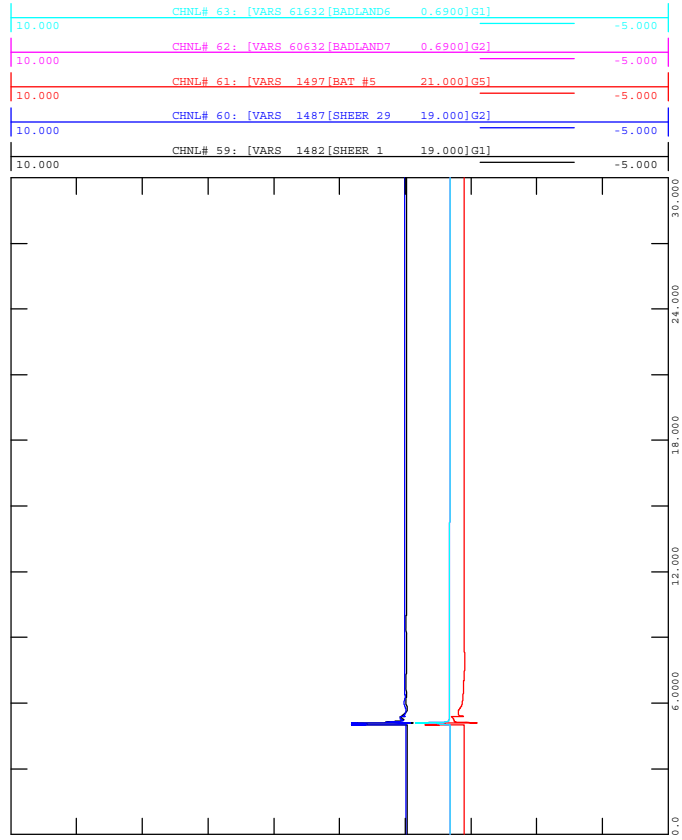
FIGURE A4-64A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-64_3PH_Fault_7L25@Michichi-Creek-802S.out



WED, FEB 16 2022 15:42
 MACHINE ANGLE (DEGREES)



FIGURE A4-64C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-64_3PH_Fault_7L25@Michichi-Creek-802S.out



WED, FEB 16 2022 15:42
 MACHINE REACTIVE POWER (M)



FIGURE A4-64F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-64_3PH_Fault_7L25@Michichi-Creek-802S.out

15:42
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

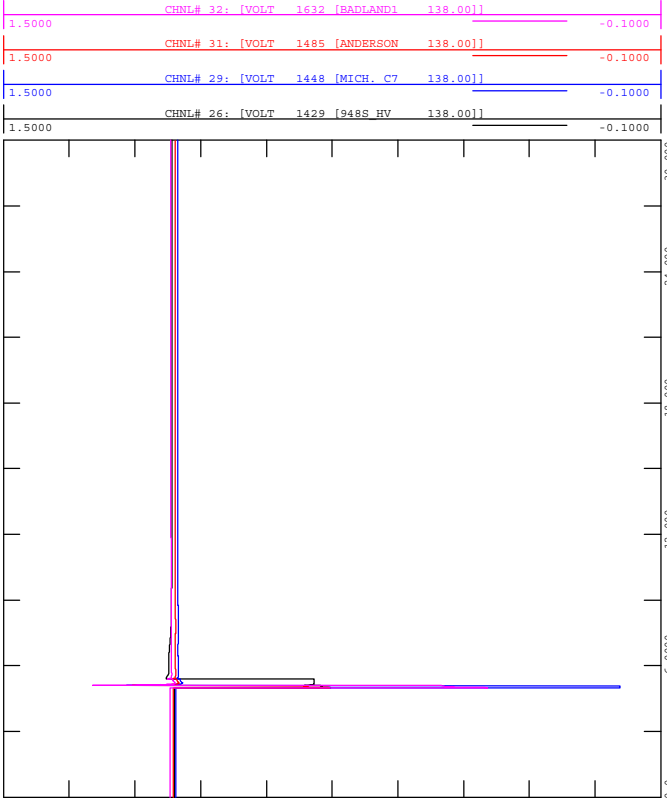


FIGURE A4-64H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-64_3PH_Fault_7L25@Michichi-Creek-802S.out

15:42
 WED, FEB 16 2022
 BRANCH FLOW (Q)

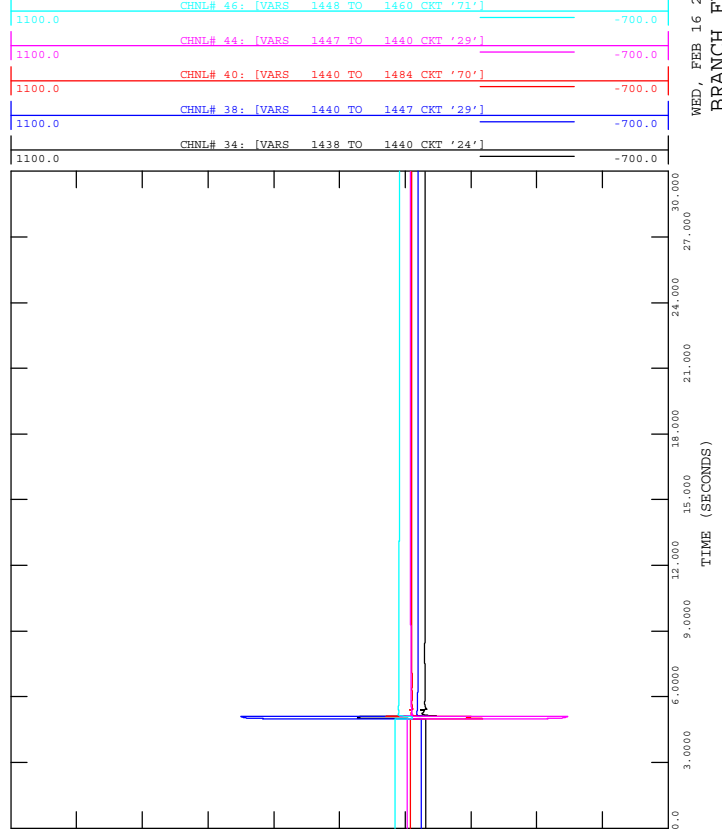


FIGURE A4-64E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-64_3PH_Fault_7L25@Michichi-Creek-802S.out

15:42
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

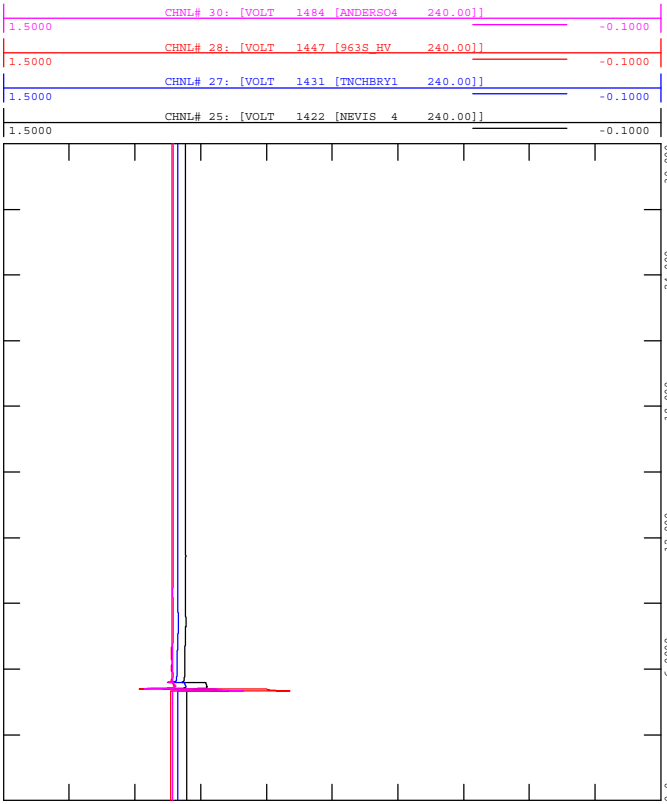


FIGURE A4-64G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-64_3PH_Fault_7L25@Michichi-Creek-802S.out

15:42
 WED, FEB 16 2022
 BRANCH FLOW (P)

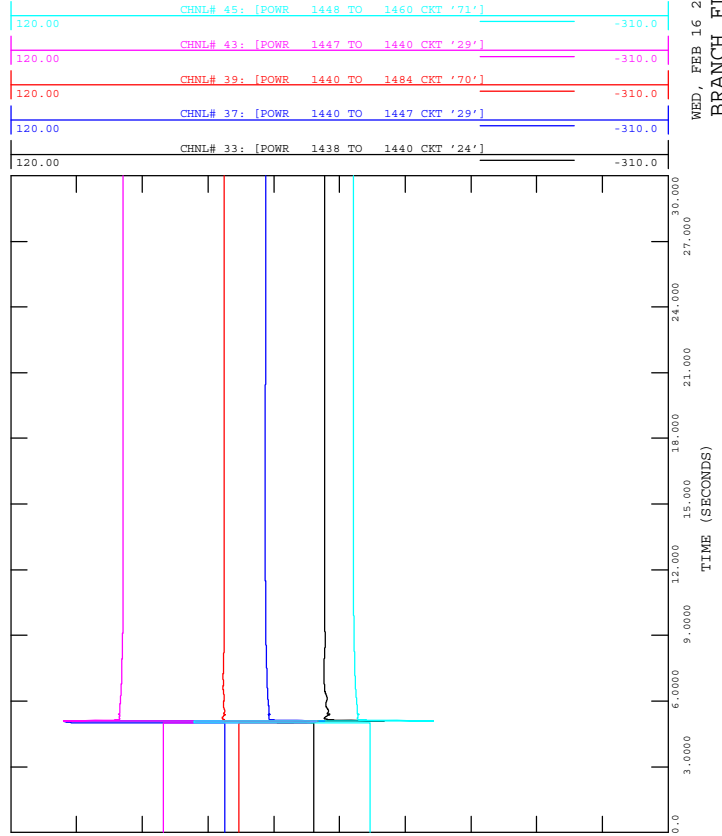




FIGURE A4-65B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-65_3PH_Fault_7L137@Rowley-768S.out

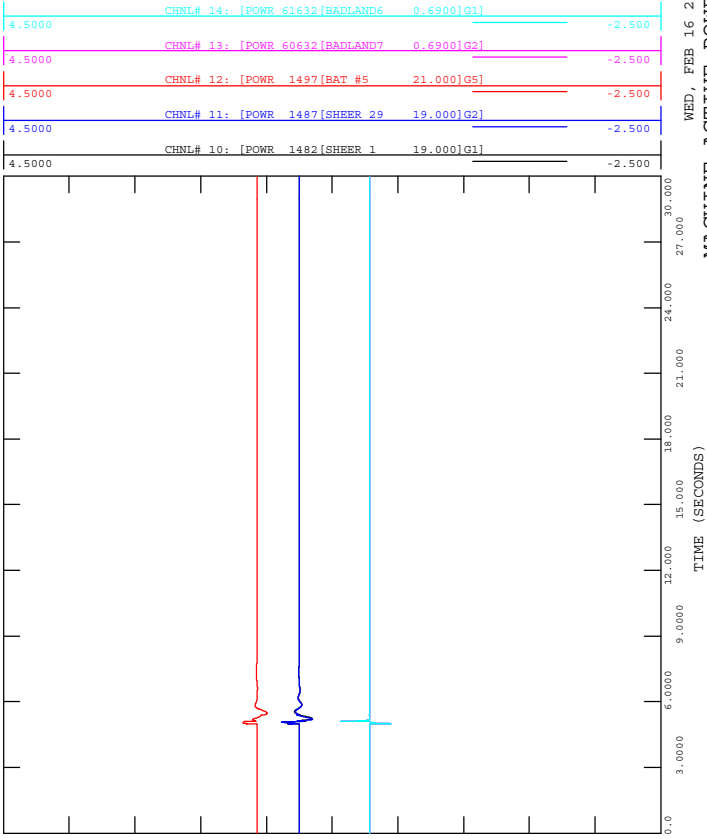


FIGURE A4-65D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-65_3PH_Fault_7L137@Rowley-768S.out

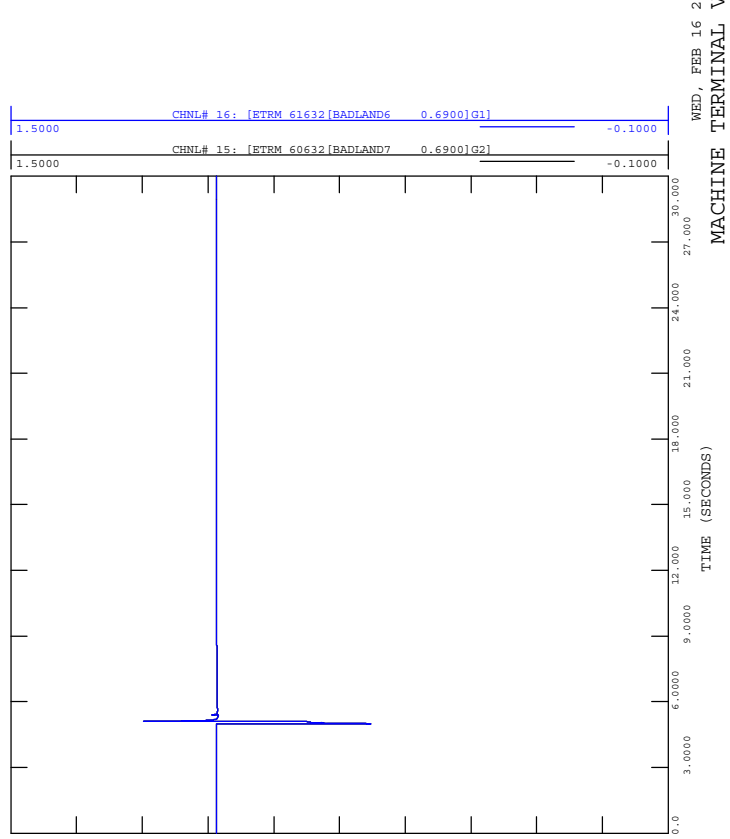


FIGURE A4-65A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-65_3PH_Fault_7L137@Rowley-768S.out

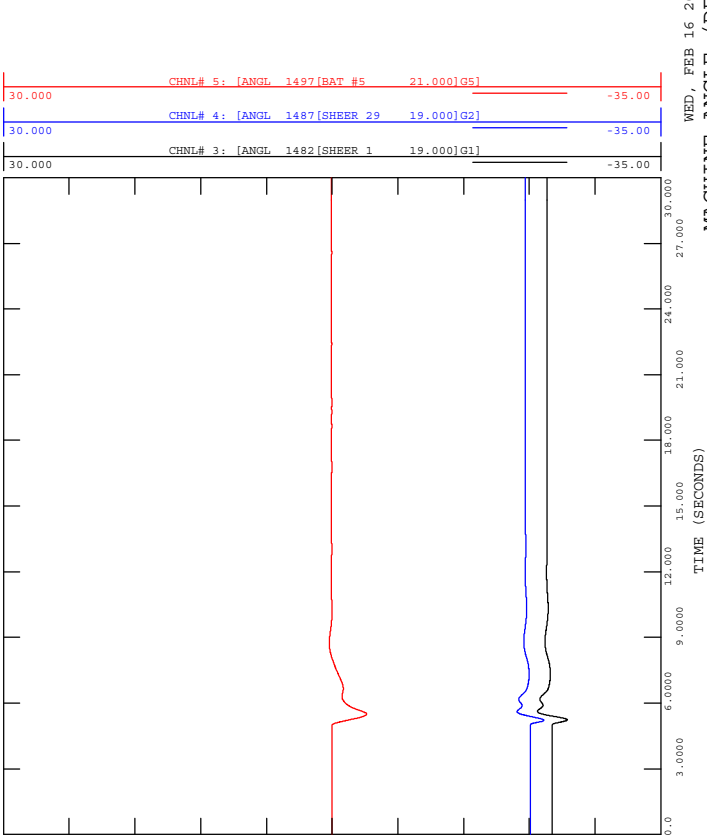


FIGURE A4-65C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-65_3PH_Fault_7L137@Rowley-768S.out

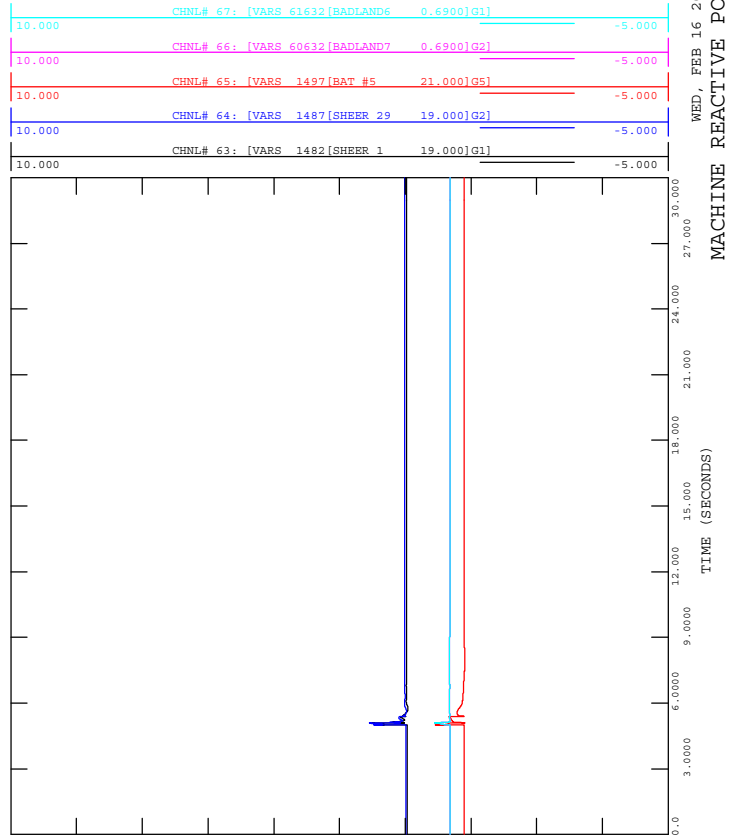




FIGURE A4-65F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-65_3PH_Fault_7L137@Rowley-768S.out

15:43
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

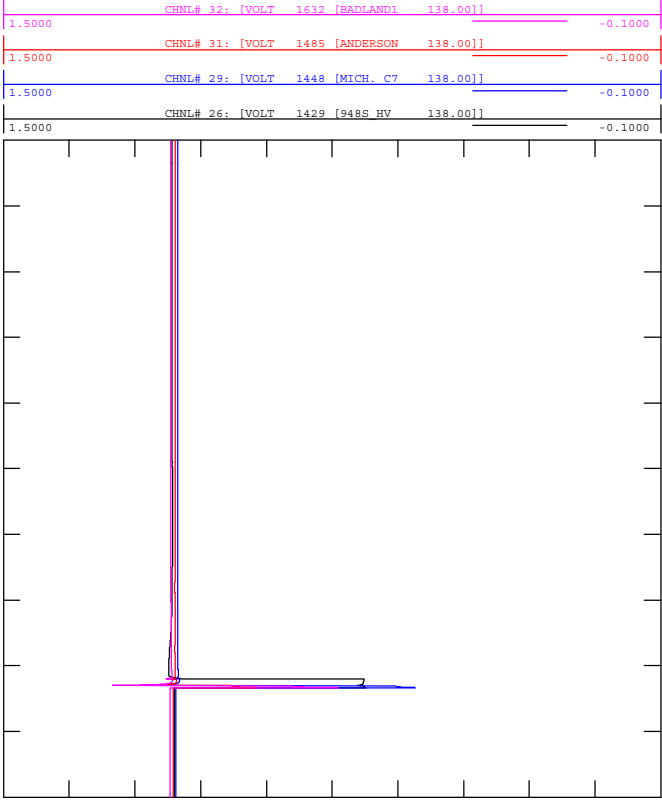


FIGURE A4-65H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-65_3PH_Fault_7L137@Rowley-768S.out

15:43
 WED, FEB 16 2022
 BRANCH FLOW (Q)

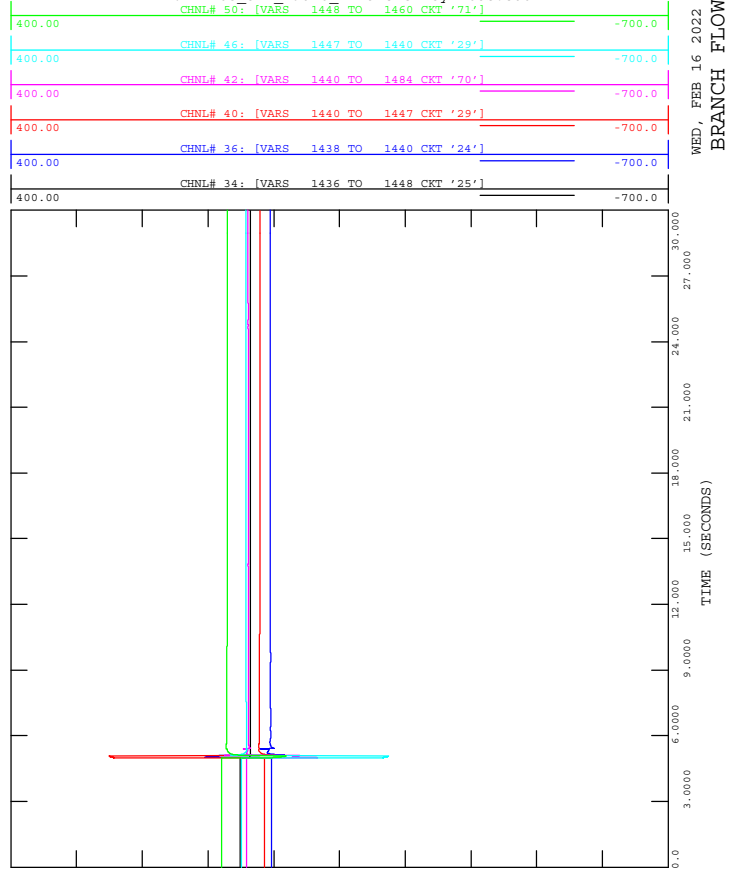


FIGURE A4-65E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-65_3PH_Fault_7L137@Rowley-768S.out

15:43
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

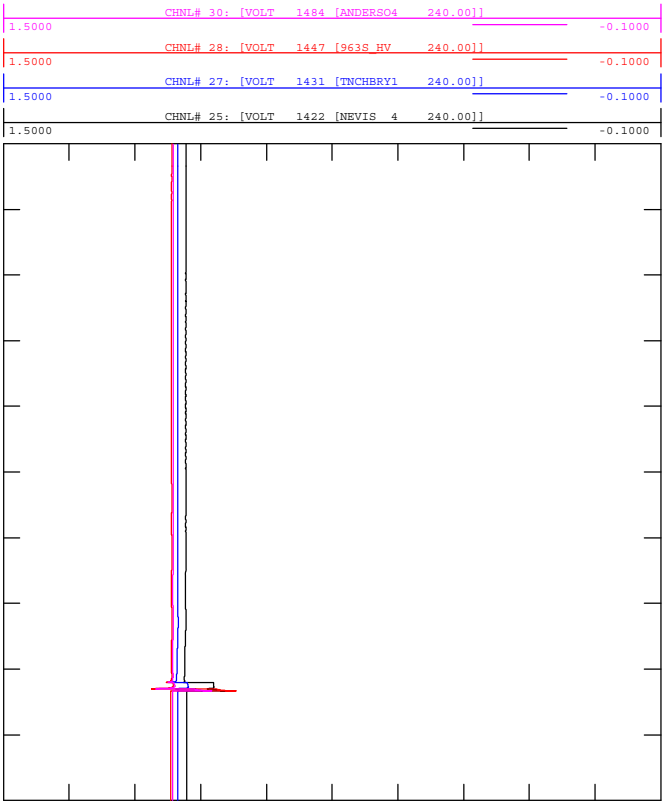


FIGURE A4-65G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ROWLEY 768S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-65_3PH_Fault_7L137@Rowley-768S.out

15:43
 WED, FEB 16 2022
 BRANCH FLOW (P)

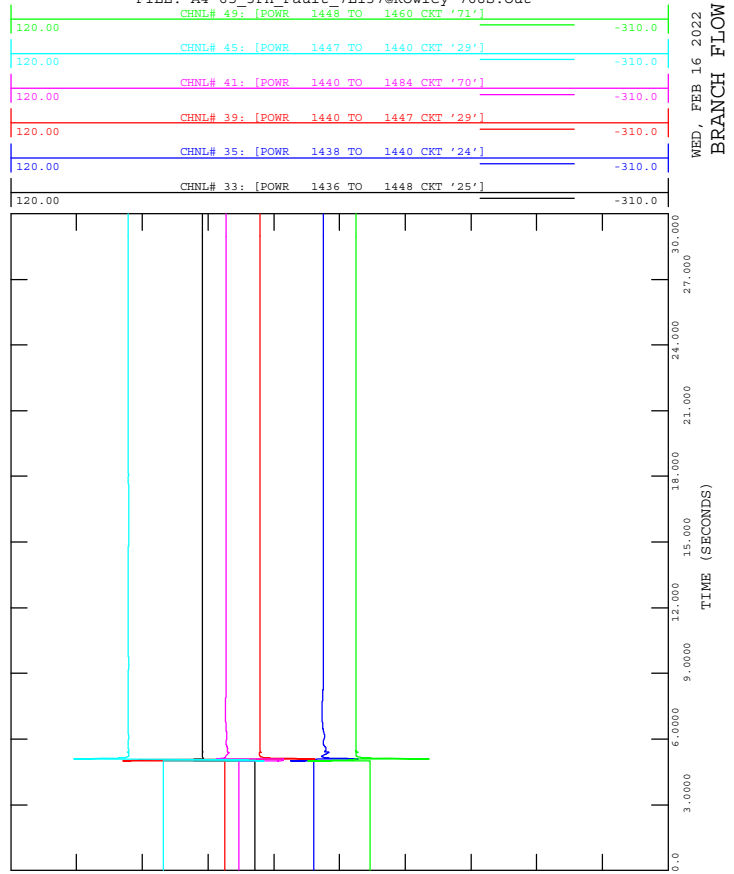




FIGURE A4-66B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-66_3PH_Fault_7L137@Three-Hills-770S.out

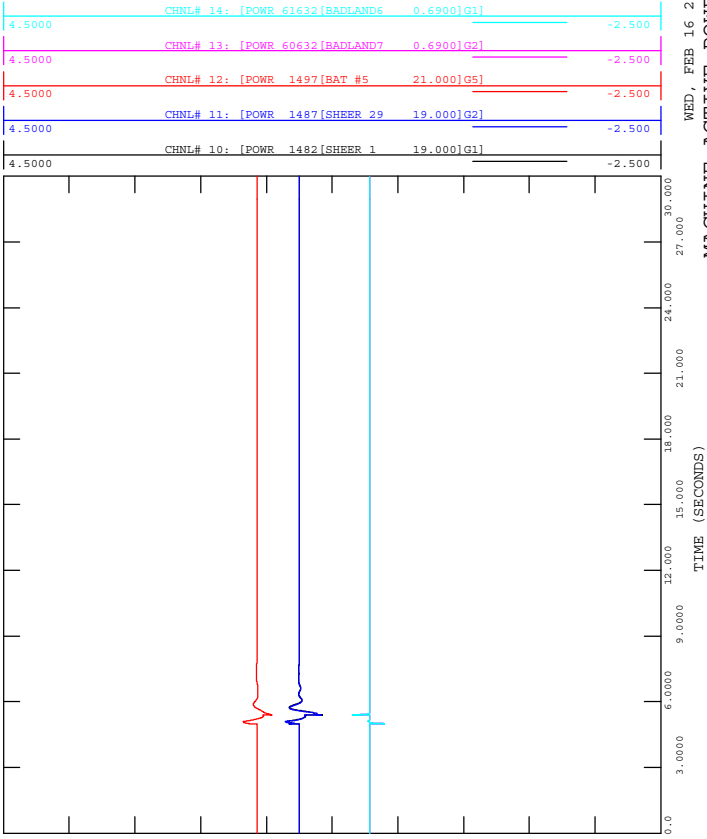


FIGURE A4-66D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-66_3PH_Fault_7L137@Three-Hills-770S.out

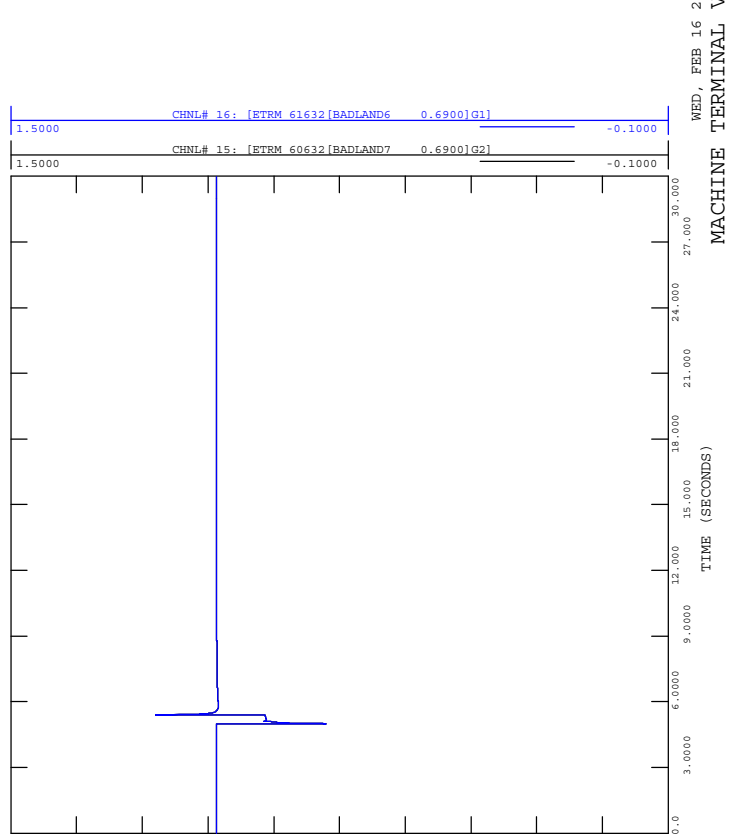


FIGURE A4-66A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-66_3PH_Fault_7L137@Three-Hills-770S.out

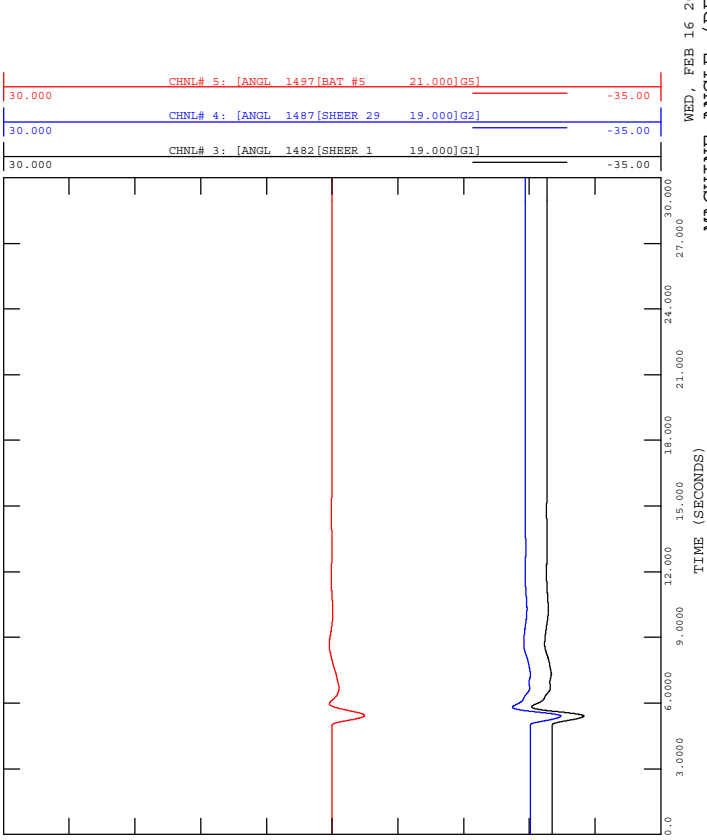


FIGURE A4-66C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-66_3PH_Fault_7L137@Three-Hills-770S.out

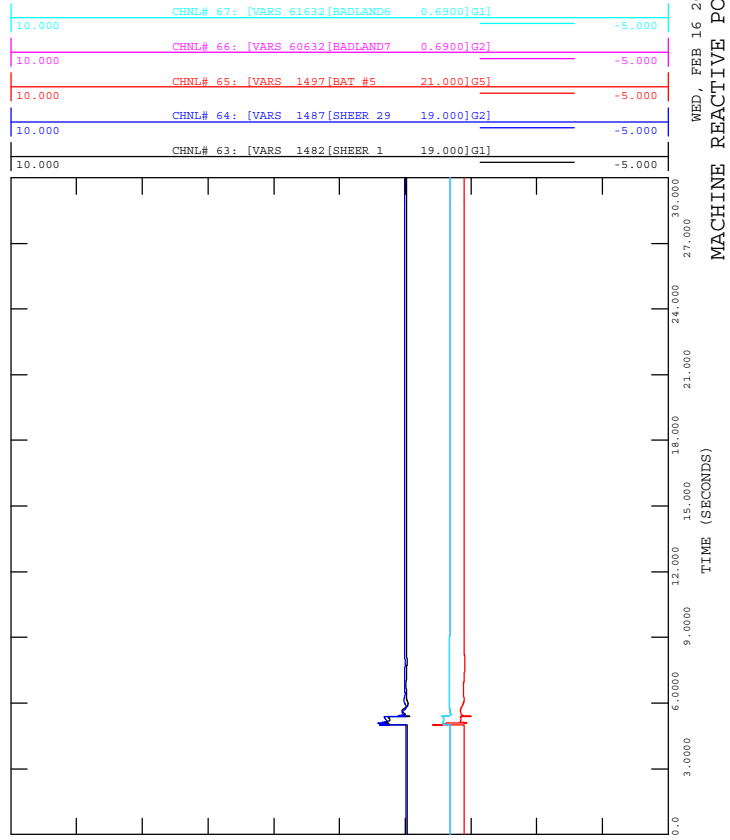




FIGURE A4-66F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-66_3PH_Fault_7L137@Three-Hills-770S.out

15:44
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

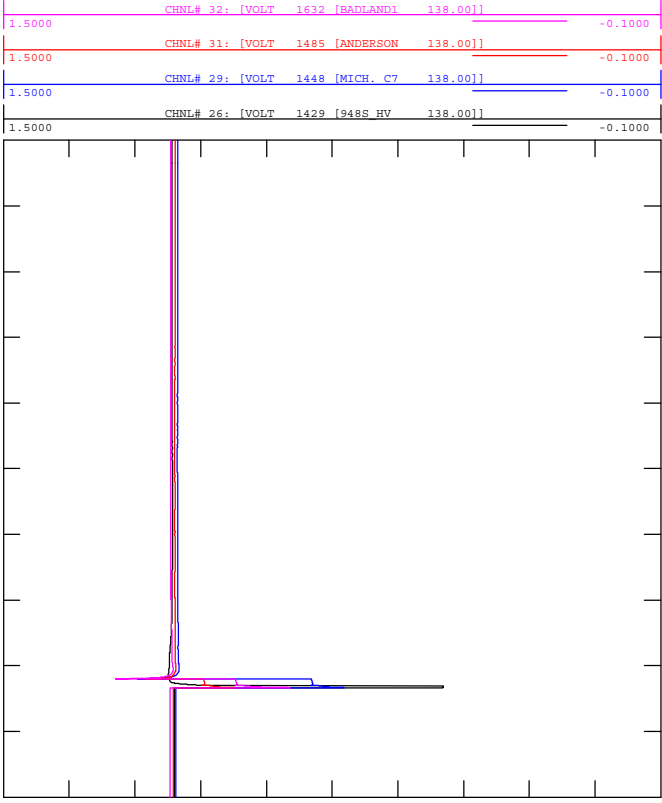


FIGURE A4-66H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-66_3PH_Fault_7L137@Three-Hills-770S.out

15:44
 WED, FEB 16 2022
 BRANCH FLOW (Q)

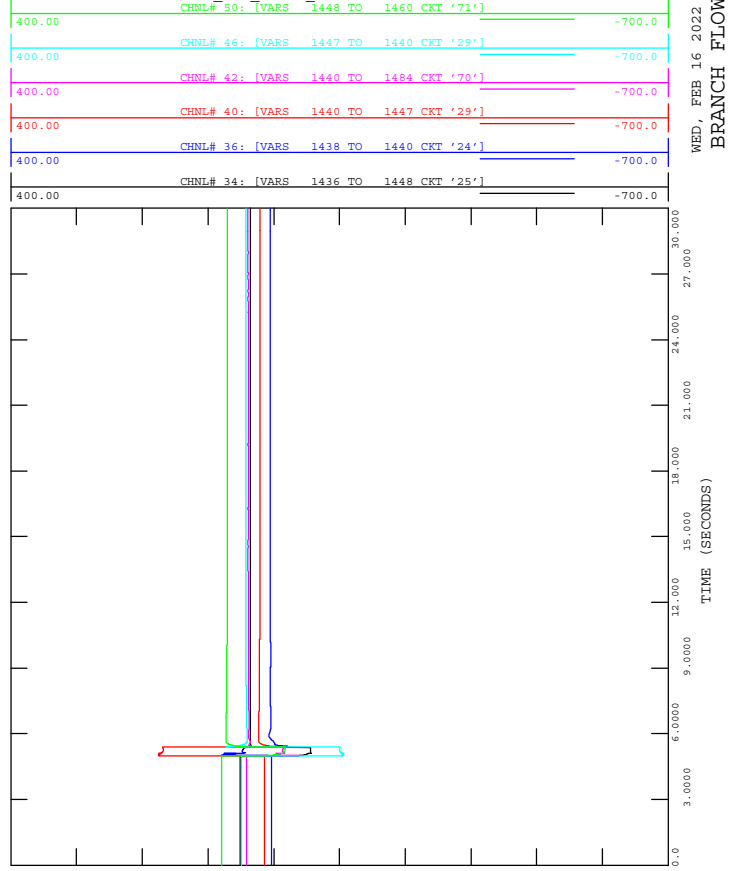


FIGURE A4-66E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-66_3PH_Fault_7L137@Three-Hills-770S.out

15:44
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

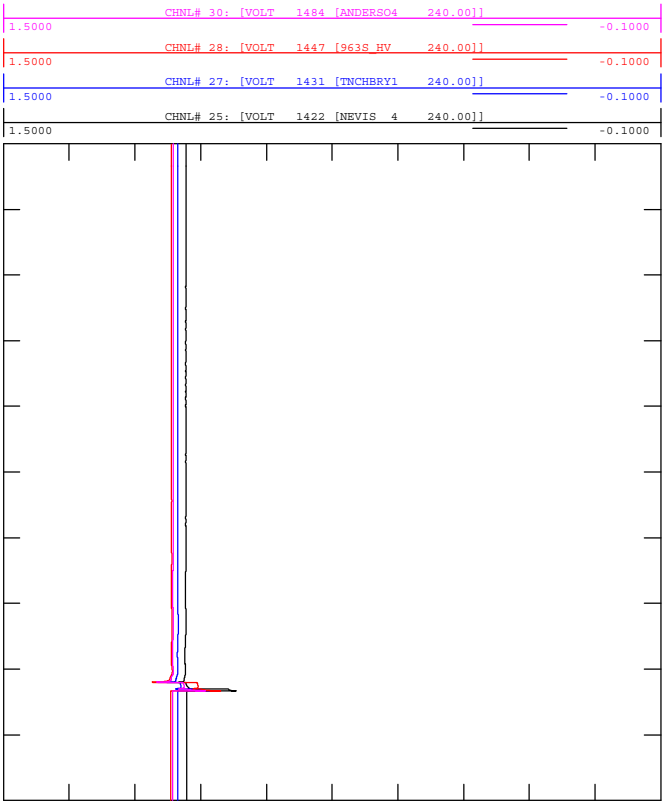


FIGURE A4-66G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-66_3PH_Fault_7L137@Three-Hills-770S.out

15:44
 WED, FEB 16 2022
 BRANCH FLOW (P)

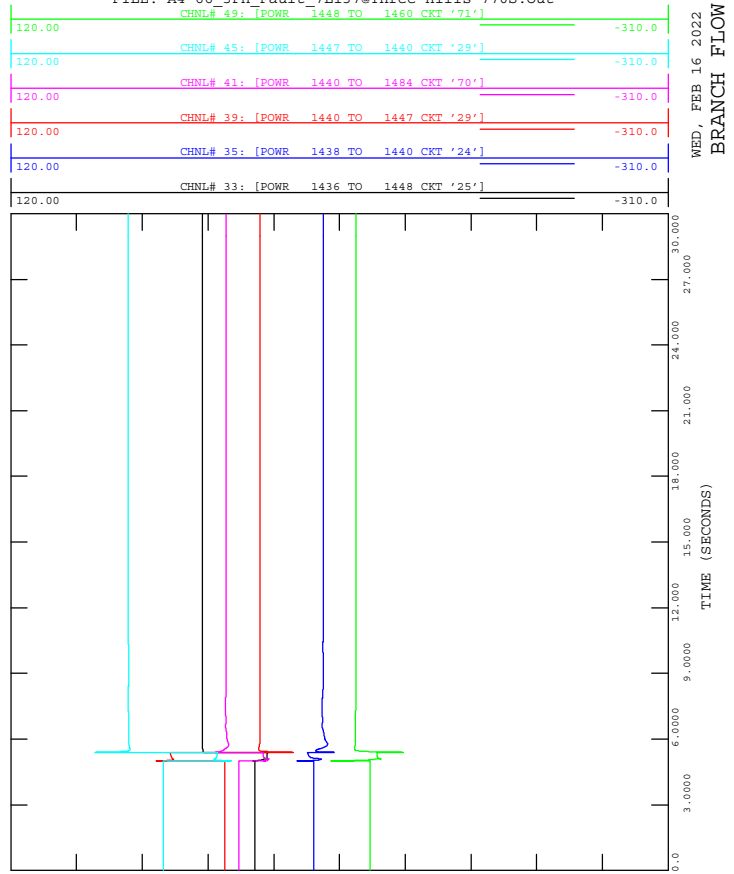
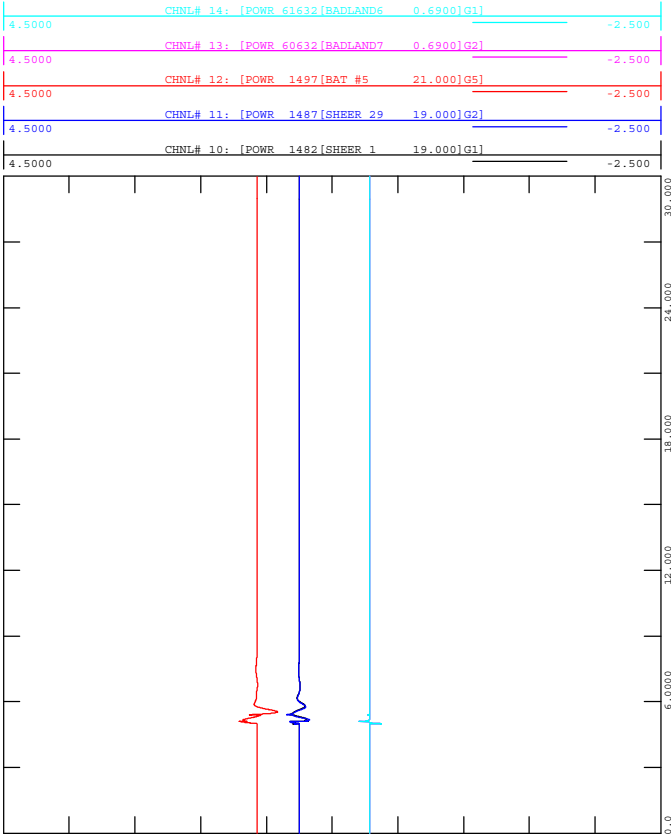




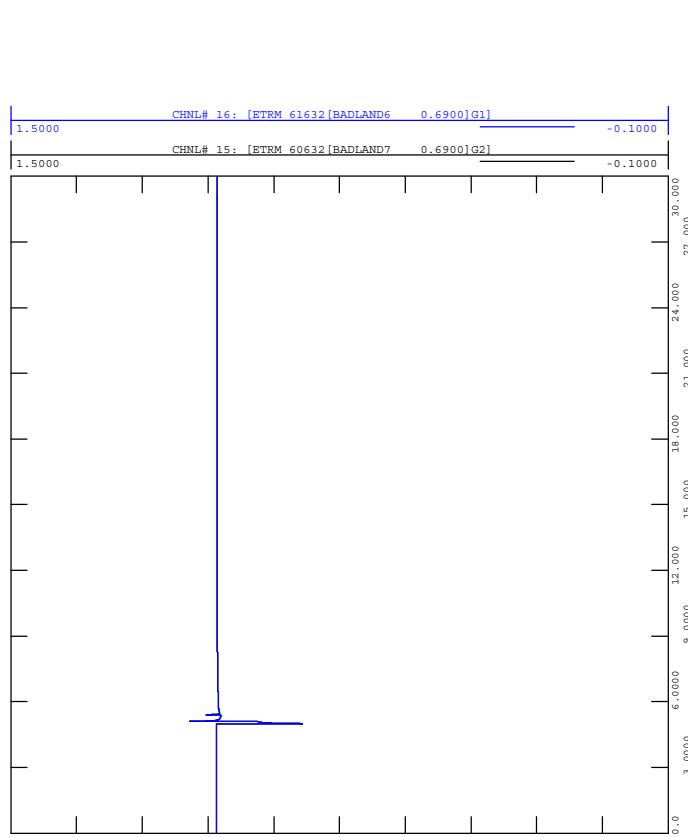
FIGURE A4-67B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-67_3PH_Fault_7L16@Heatburg-948S.out



WED, FEB 16 2022 15:44
 MACHINE ACTIVE POWER (MW)



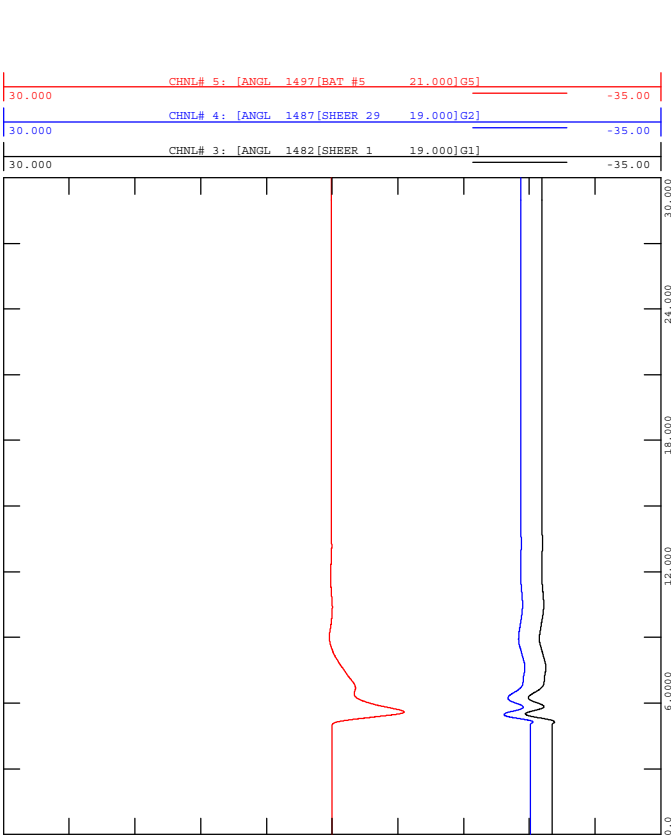
FIGURE A4-67D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-67_3PH_Fault_7L16@Heatburg-948S.out



WED, FEB 16 2022 15:44
 MACHINE TERMINAL VOLTAGE



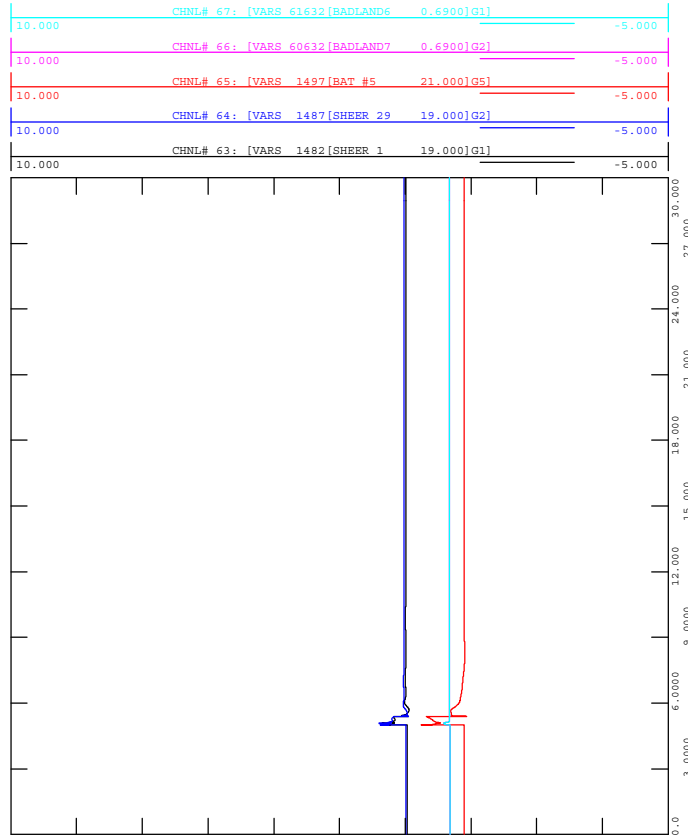
FIGURE A4-67A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-67_3PH_Fault_7L16@Heatburg-948S.out



WED, FEB 16 2022 15:44
 MACHINE ANGLE (DEGREES)



FIGURE A4-67C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-67_3PH_Fault_7L16@Heatburg-948S.out



WED, FEB 16 2022 15:44
 MACHINE REACTIVE POWER (M)



FIGURE A4-67F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-67_3PH_Fault_7L16@Heatburg-948S.out

15:44
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

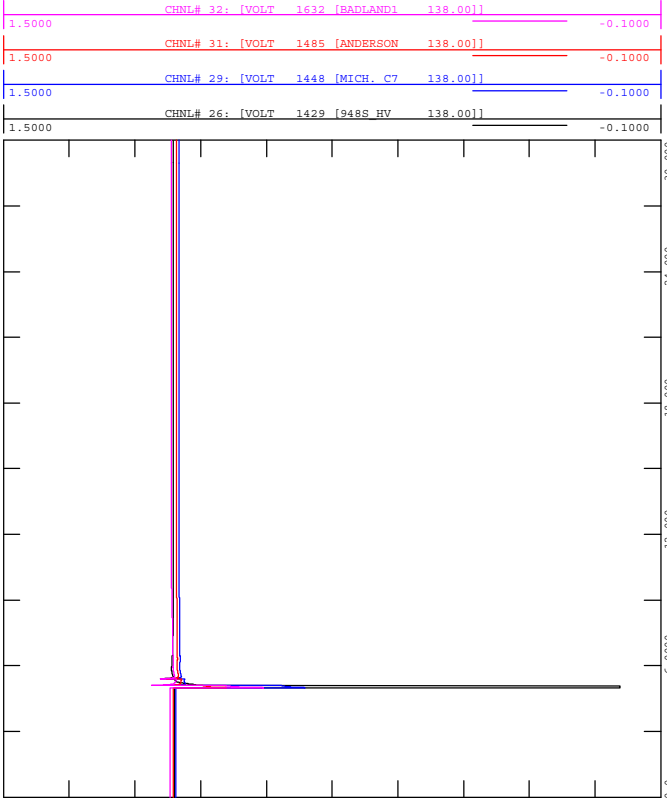


FIGURE A4-67H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-67_3PH_Fault_7L16@Heatburg-948S.out

15:45
 WED, FEB 16 2022
 BRANCH FLOW (Q)

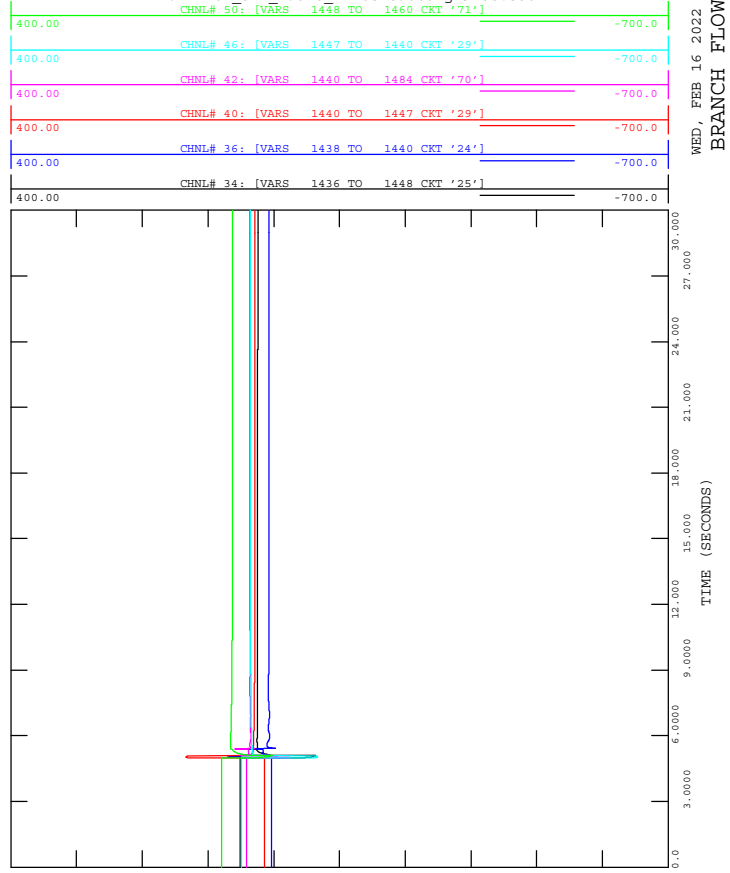


FIGURE A4-67E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-67_3PH_Fault_7L16@Heatburg-948S.out

15:44
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

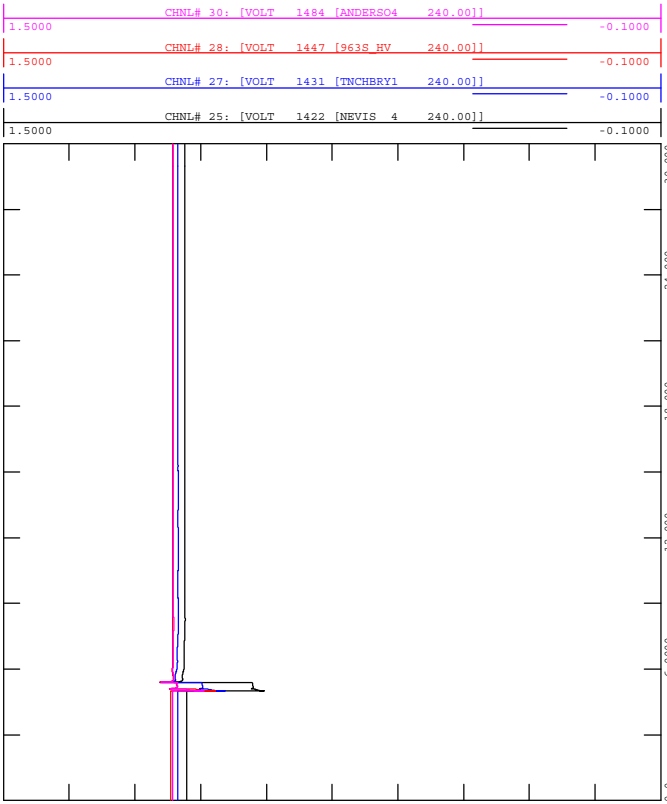


FIGURE A4-67G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-67_3PH_Fault_7L16@Heatburg-948S.out

15:44
 WED, FEB 16 2022
 BRANCH FLOW (P)

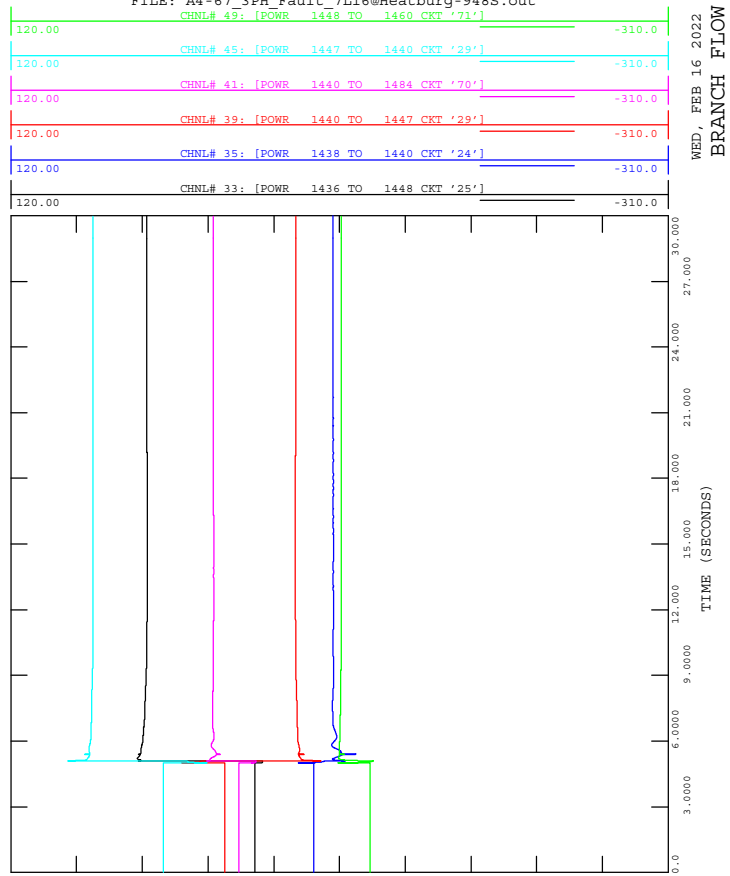




FIGURE A4-68B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-68_3PH_Fault_7L16@Nevis-766S.out

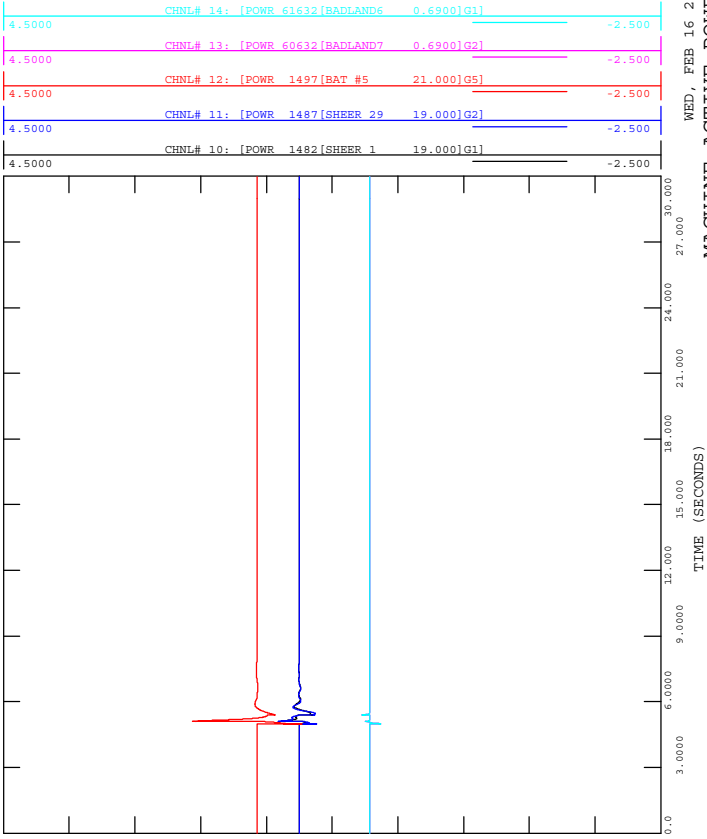


FIGURE A4-68D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-68_3PH_Fault_7L16@Nevis-766S.out

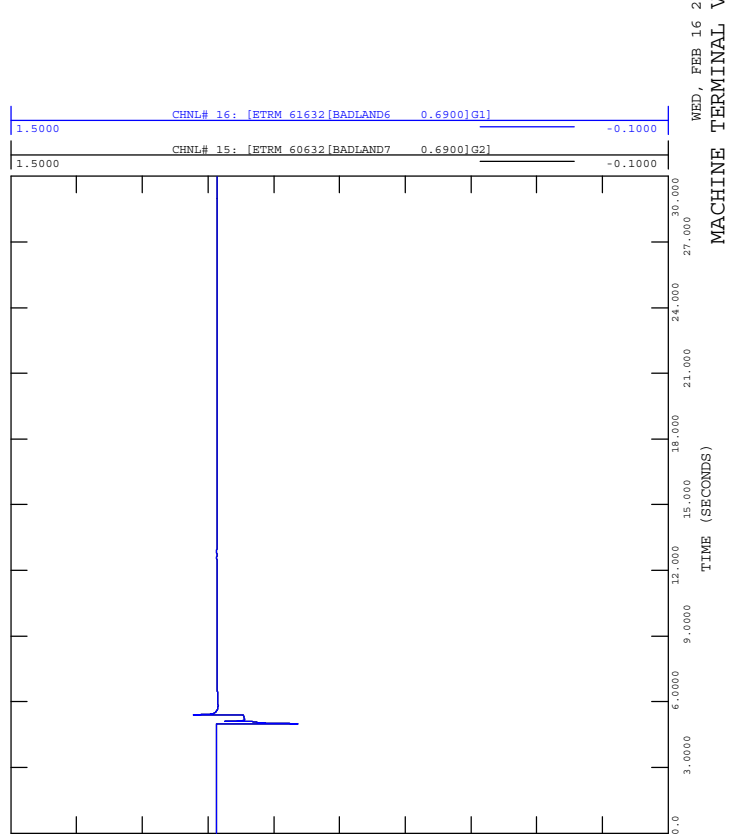


FIGURE A4-68A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-68_3PH_Fault_7L16@Nevis-766S.out

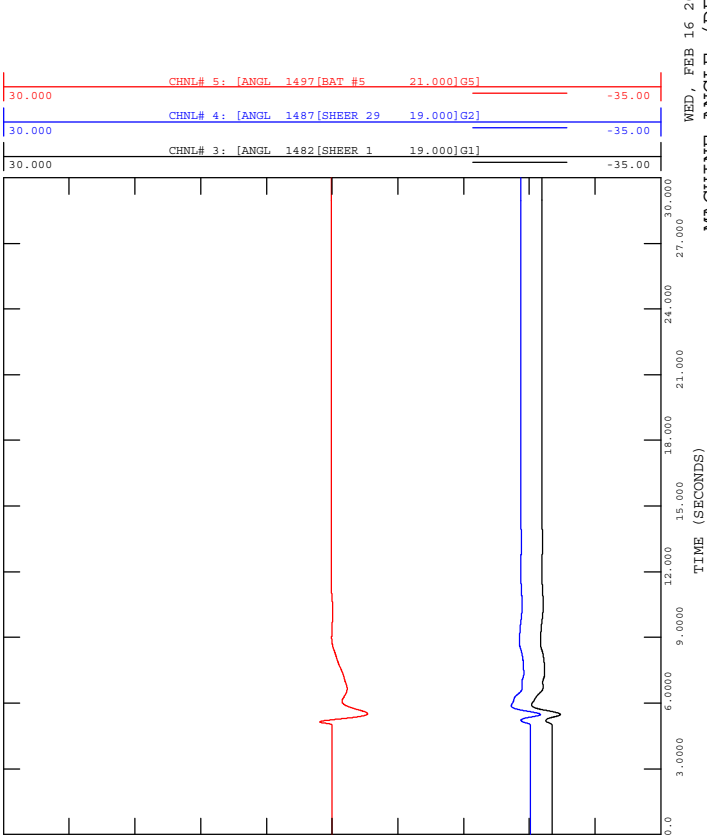


FIGURE A4-68C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-68_3PH_Fault_7L16@Nevis-766S.out

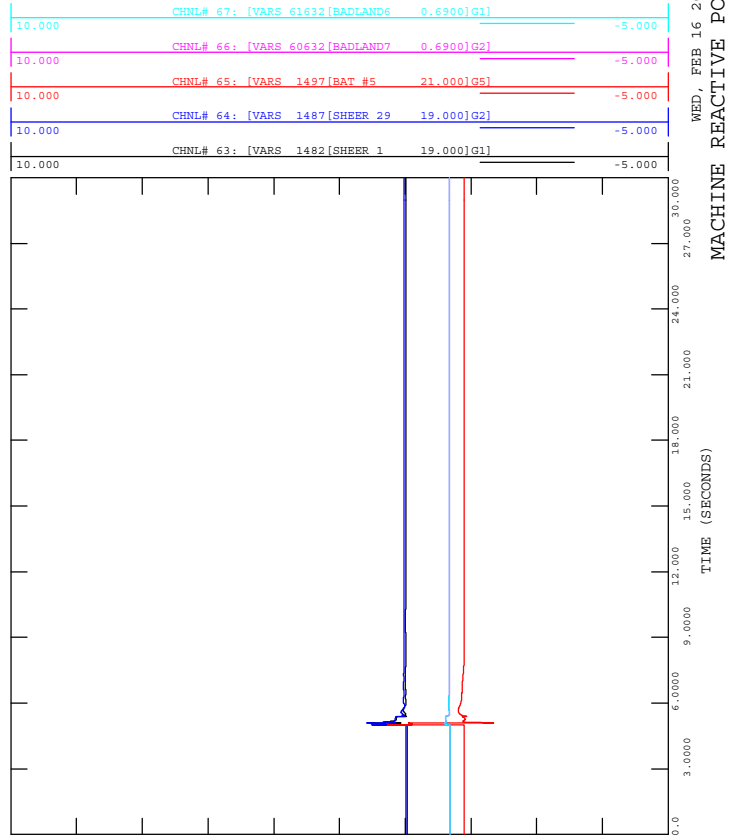




FIGURE A4-68F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-68_3PH_Fault_7L16@Nevis-766S.out

15:45
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

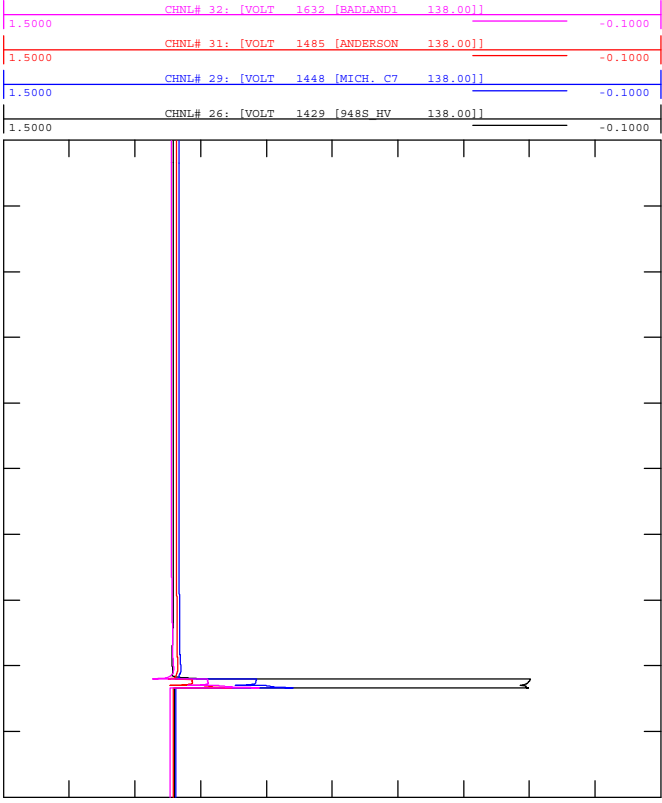


FIGURE A4-68H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-68_3PH_Fault_7L16@Nevis-766S.out

15:45
 WED, FEB 16 2022
 BRANCH FLOW (Q)

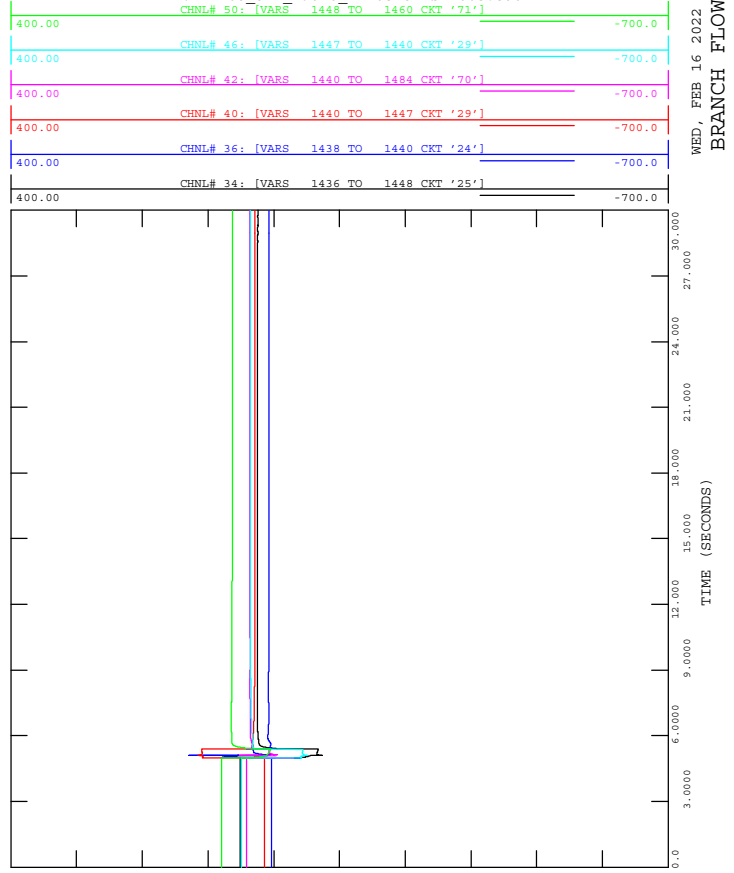


FIGURE A4-68E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-68_3PH_Fault_7L16@Nevis-766S.out

15:45
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

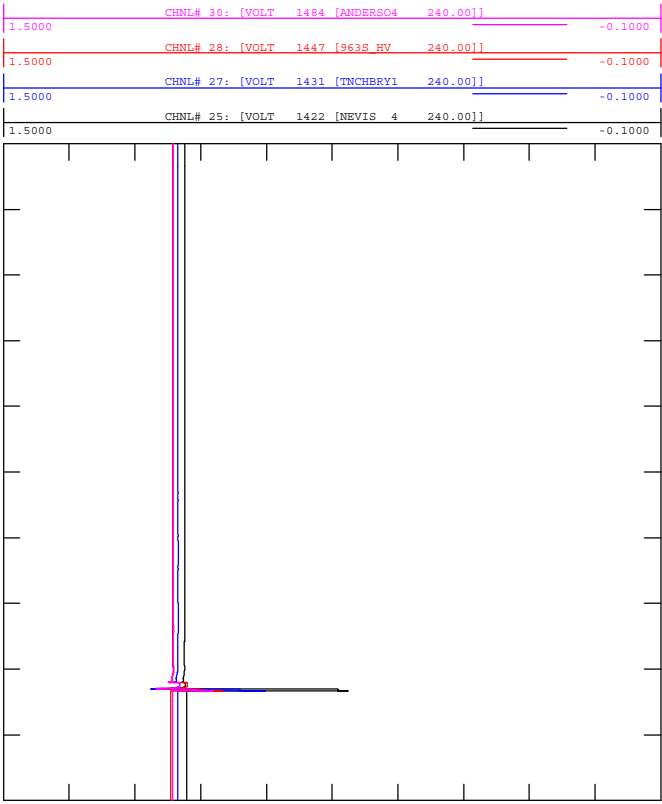


FIGURE A4-68G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT NEVIS 766S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 24 CYCLES
 FILE: A4-68_3PH_Fault_7L16@Nevis-766S.out

15:45
 WED, FEB 16 2022
 BRANCH FLOW (P)

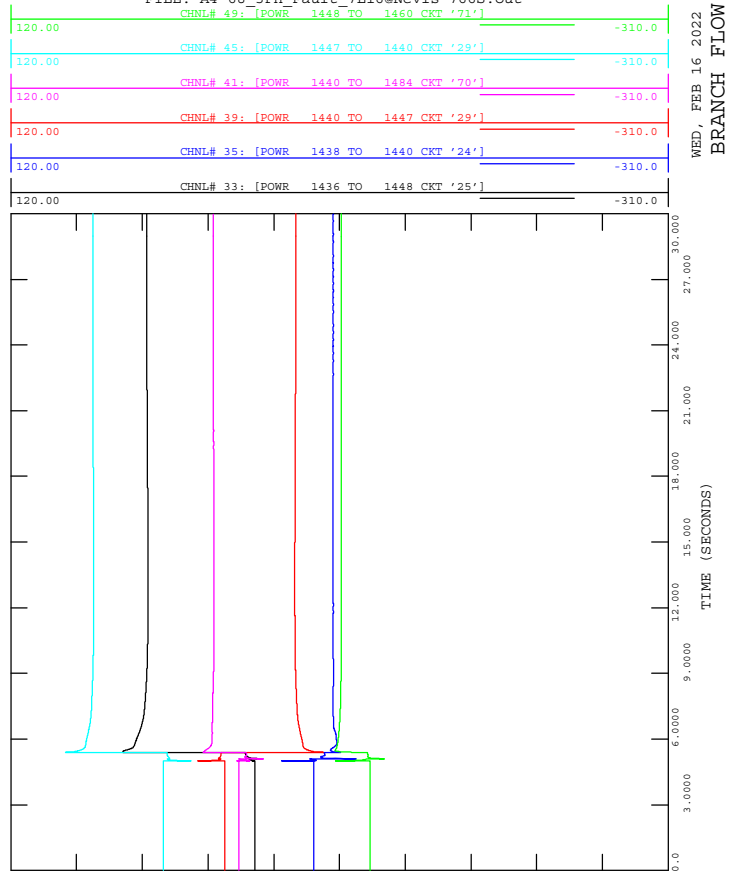




FIGURE A4-69B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-69_3PH_Fault_7L159-2@Three-Hills-770S.out

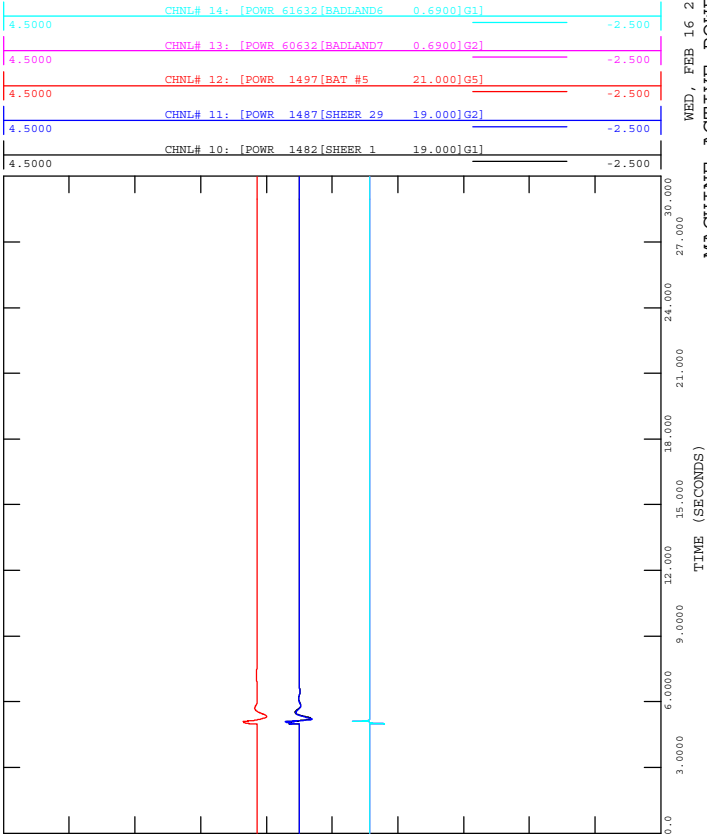


FIGURE A4-69D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-69_3PH_Fault_7L159-2@Three-Hills-770S.out

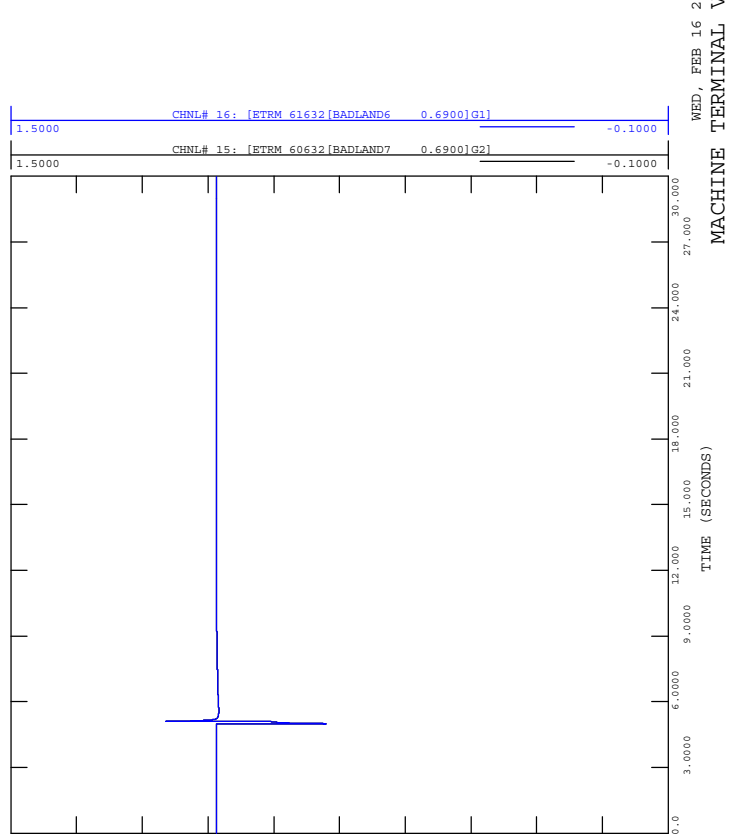


FIGURE A4-69A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-69_3PH_Fault_7L159-2@Three-Hills-770S.out

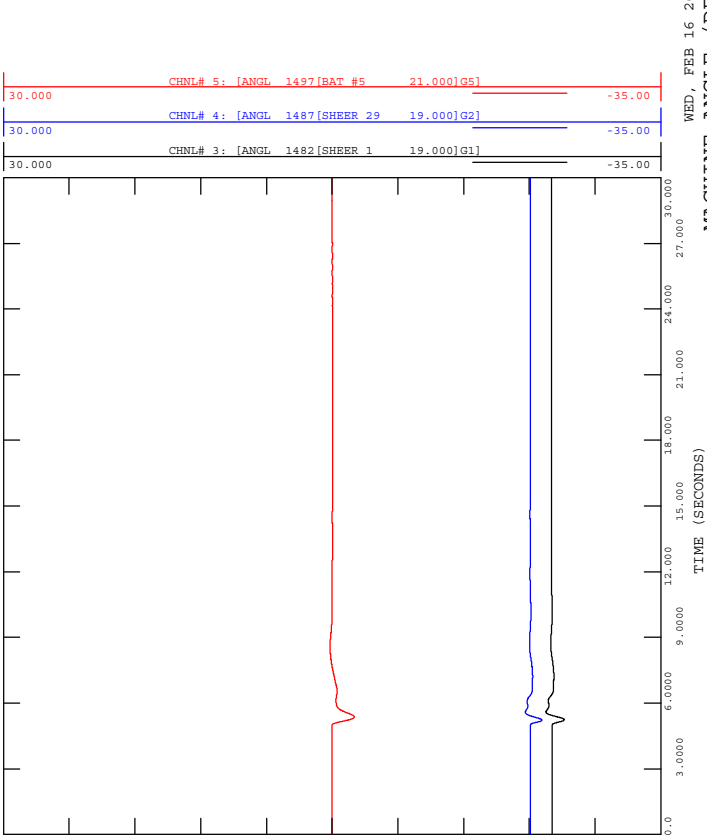


FIGURE A4-69C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-69_3PH_Fault_7L159-2@Three-Hills-770S.out

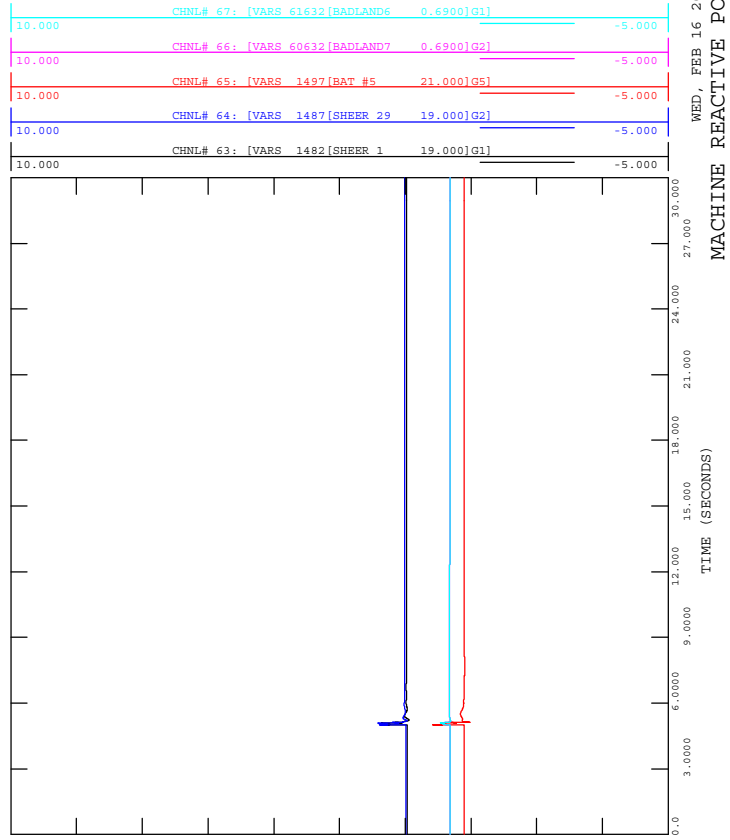




FIGURE A4-69F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-69_3PH_Fault_7L159-2@Three-Hills-770S.out

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:46

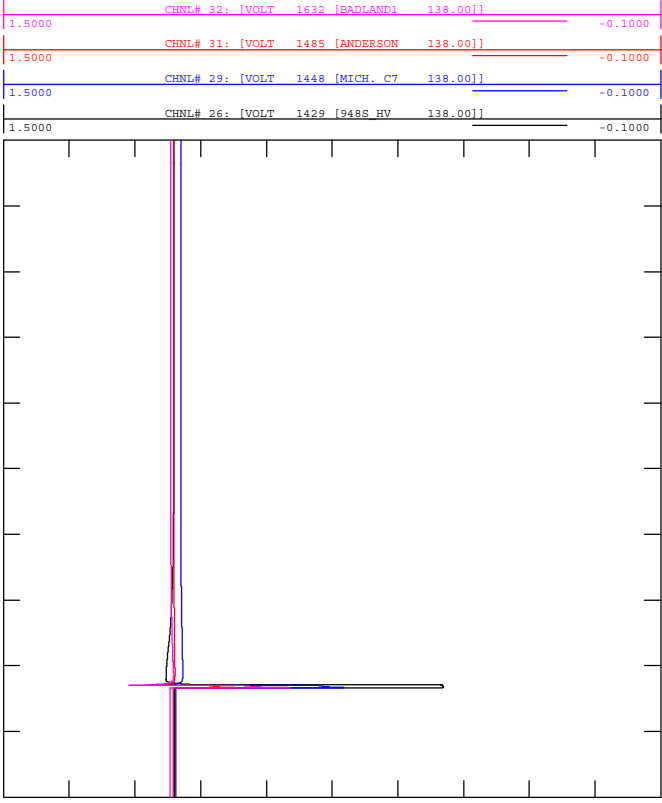


FIGURE A4-69H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-69_3PH_Fault_7L159-2@Three-Hills-770S.out

BRANCH FLOW (Q)
 WED, FEB 16 2022 15:46

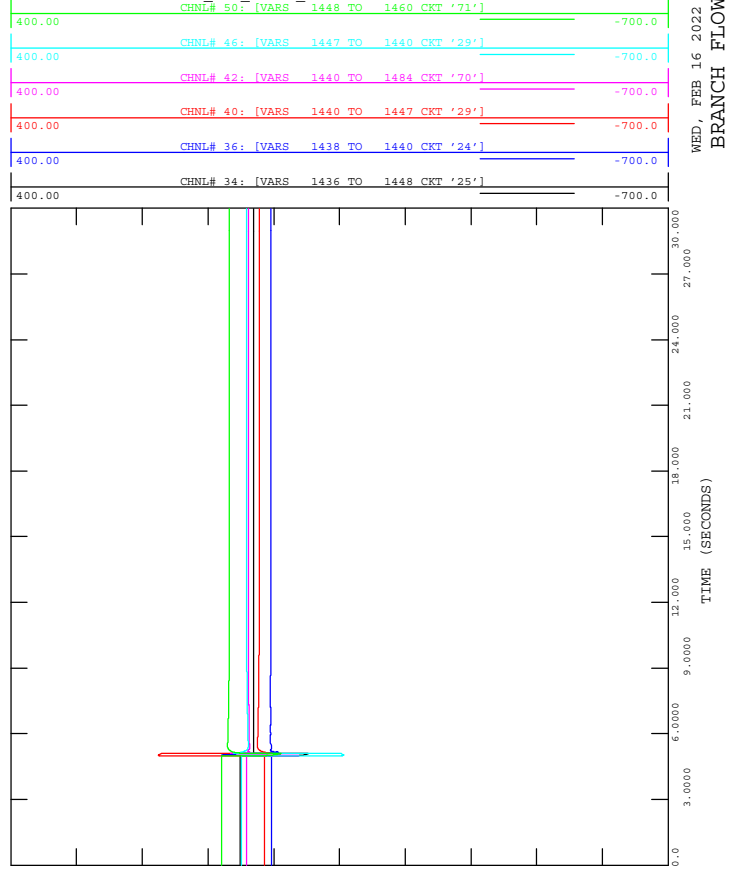


FIGURE A4-69E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-69_3PH_Fault_7L159-2@Three-Hills-770S.out

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:46

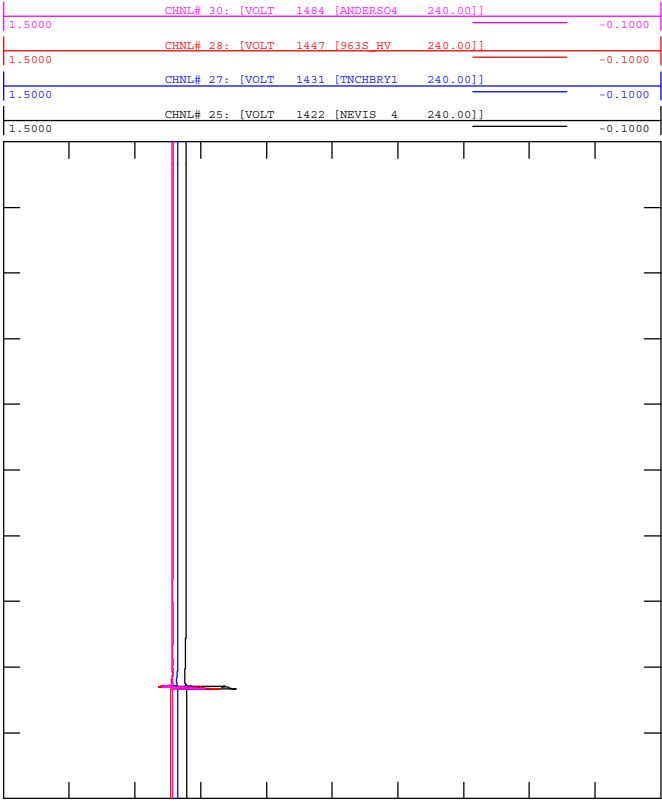


FIGURE A4-69G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT THREE HILLS 770S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-69_3PH_Fault_7L159-2@Three-Hills-770S.out

BRANCH FLOW (P)
 WED, FEB 16 2022 15:46

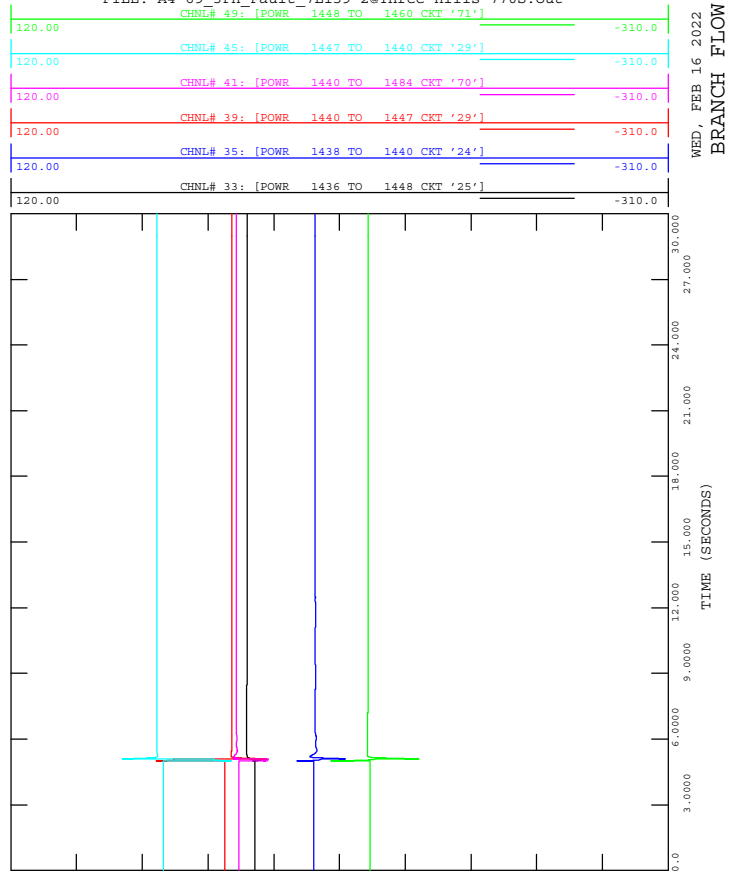
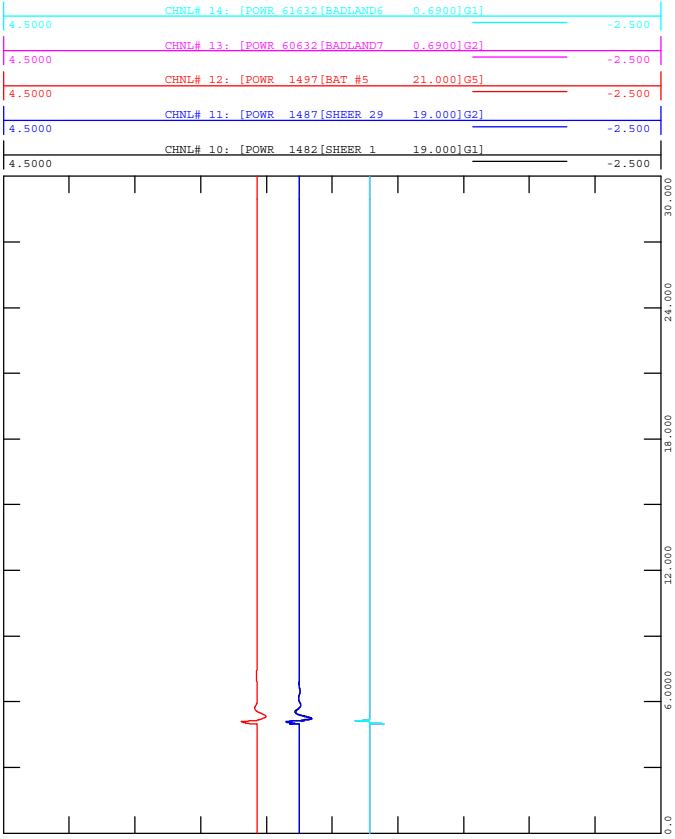




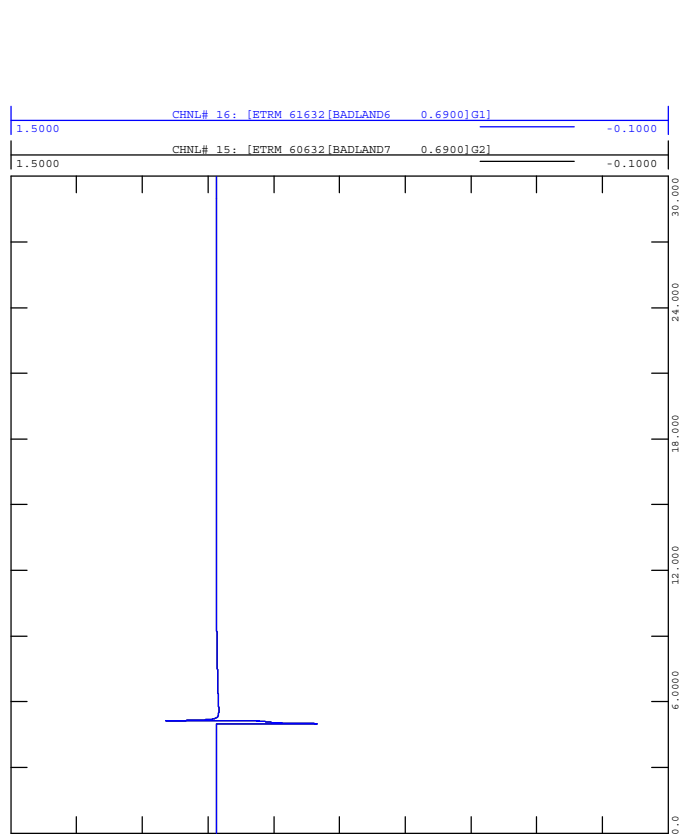
FIGURE A4-70B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-70_3PH_Fault_7L159-2@Ghost-Pine-114S.out



15:46
 WED, FEB 16 2022
 MACHINE ACTIVE POWER (MW)



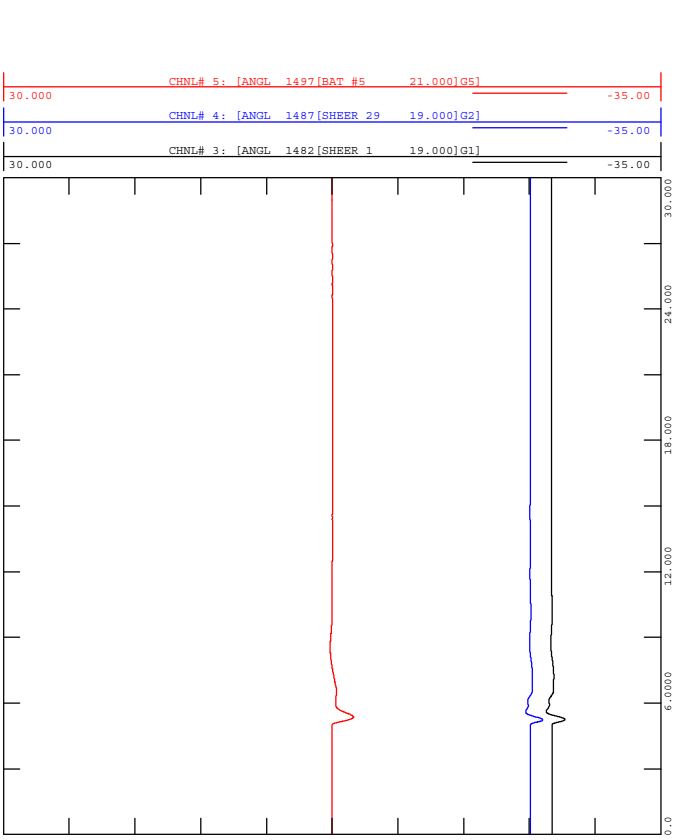
FIGURE A4-70D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-70_3PH_Fault_7L159-2@Ghost-Pine-114S.out



15:46
 WED, FEB 16 2022
 MACHINE TERMINAL VOLTAGE



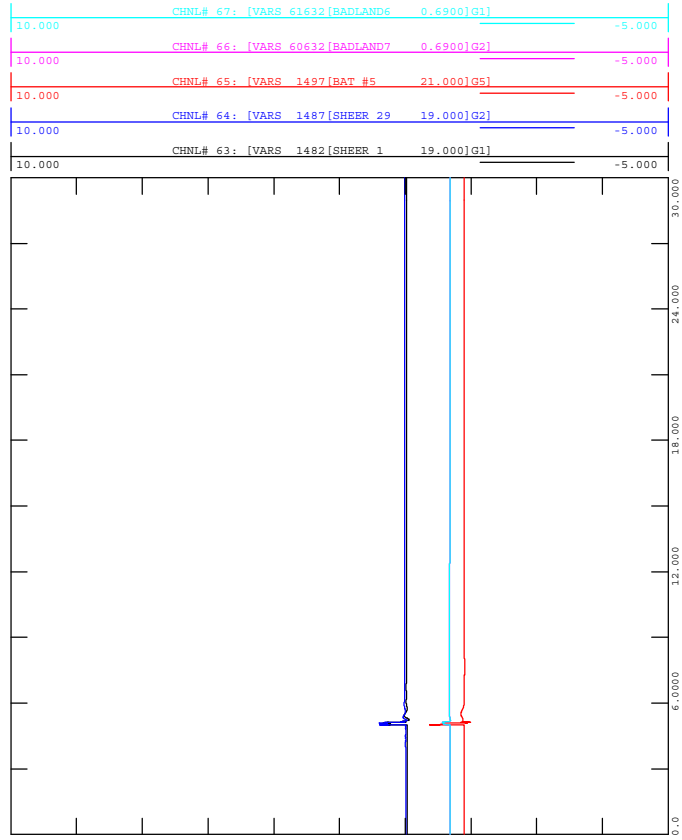
FIGURE A4-70A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-70_3PH_Fault_7L159-2@Ghost-Pine-114S.out



15:46
 WED, FEB 16 2022
 MACHINE ANGLE (DEGREES)



FIGURE A4-70C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-70_3PH_Fault_7L159-2@Ghost-Pine-114S.out



15:46
 WED, FEB 16 2022
 MACHINE REACTIVE POWER (M)



FIGURE A4-70F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-70_3PH_Fault_7L159-2@Ghost-Pine-114S.out

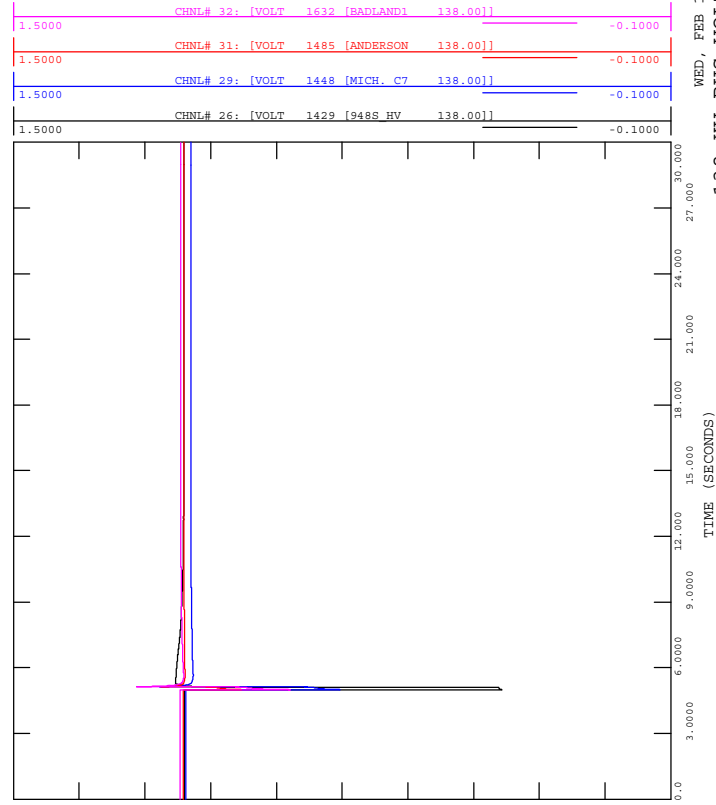


FIGURE A4-70H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-70_3PH_Fault_7L159-2@Ghost-Pine-114S.out

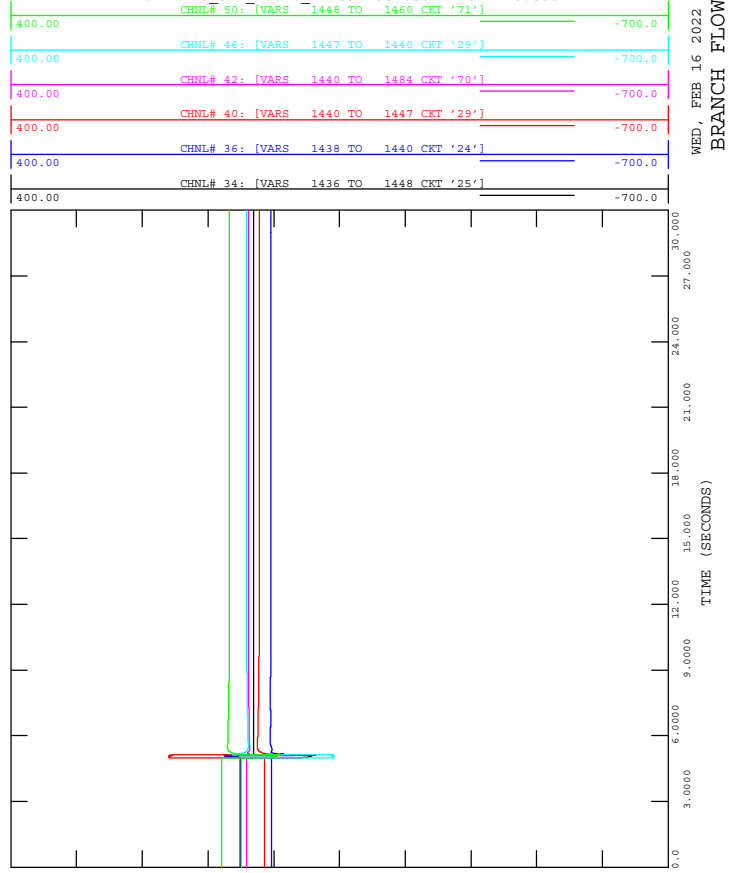


FIGURE A4-70E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-70_3PH_Fault_7L159-2@Ghost-Pine-114S.out

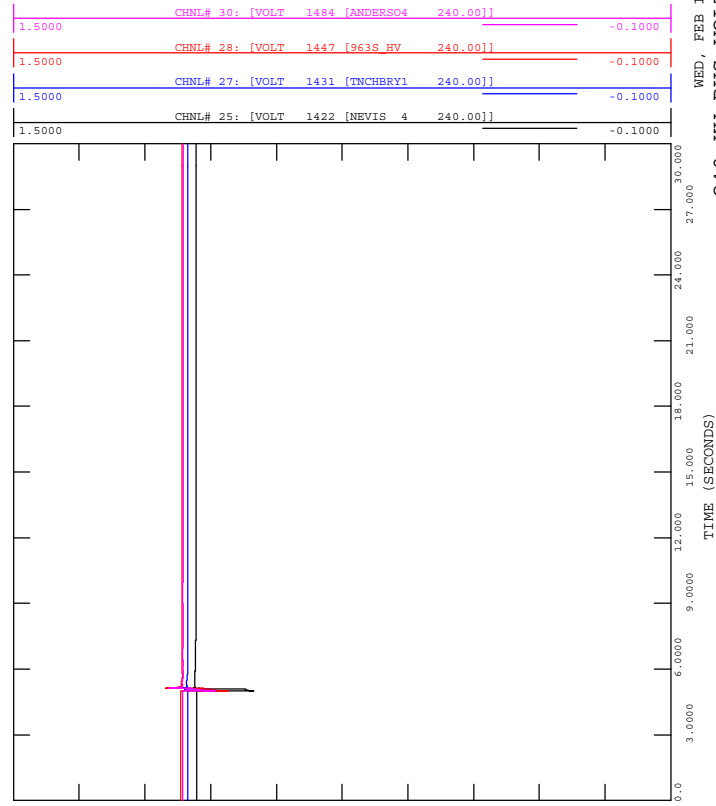


FIGURE A4-70G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT GHOST PINE 114S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-70_3PH_Fault_7L159-2@Ghost-Pine-114S.out

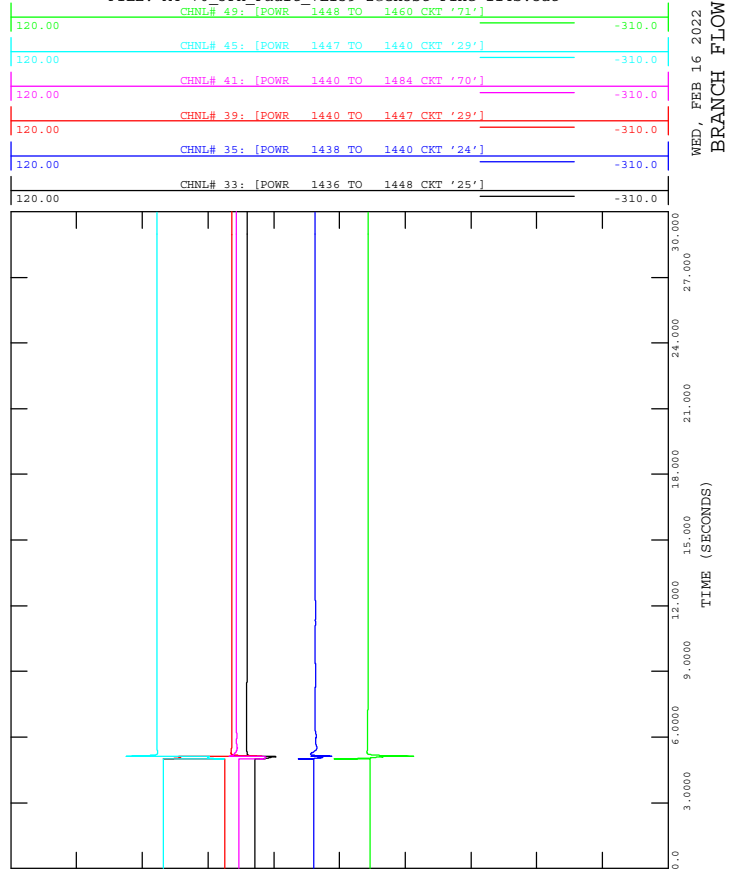




FIGURE A4-71B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-71_3PH_Fault_7L159-1@Heatburg-948S.out

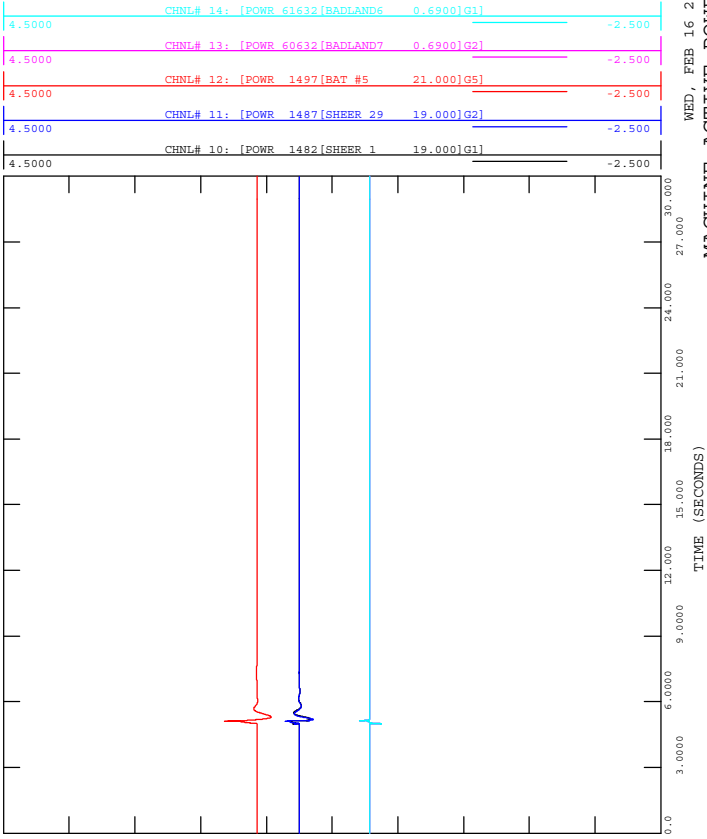


FIGURE A4-71D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-71_3PH_Fault_7L159-1@Heatburg-948S.out

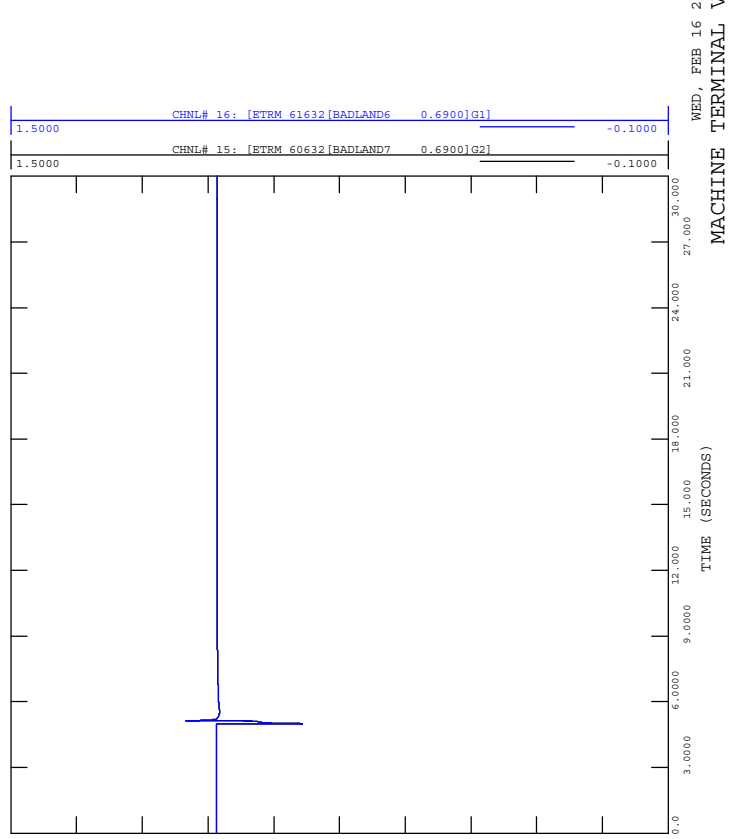


FIGURE A4-71A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-71_3PH_Fault_7L159-1@Heatburg-948S.out

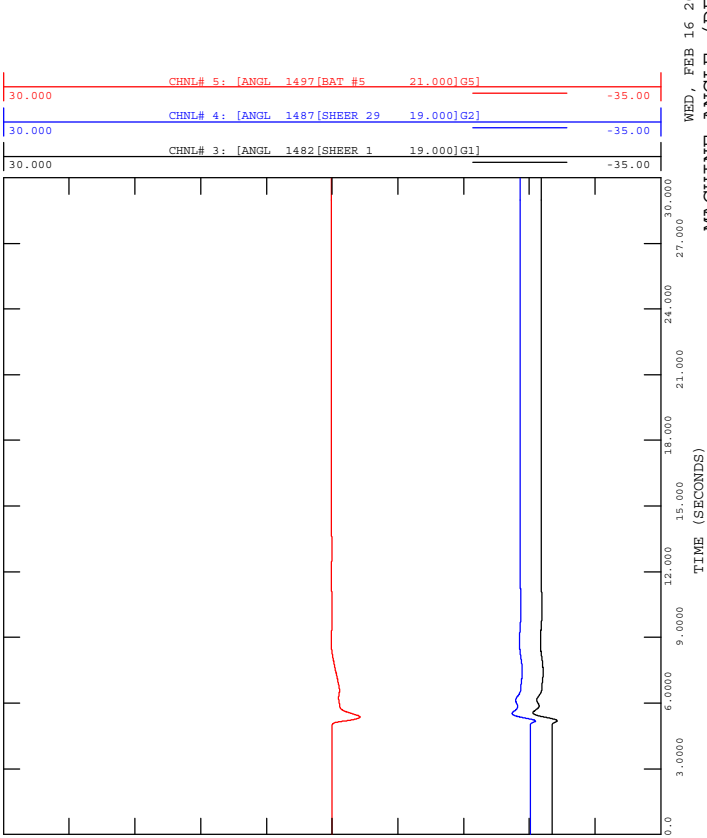


FIGURE A4-71C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-71_3PH_Fault_7L159-1@Heatburg-948S.out

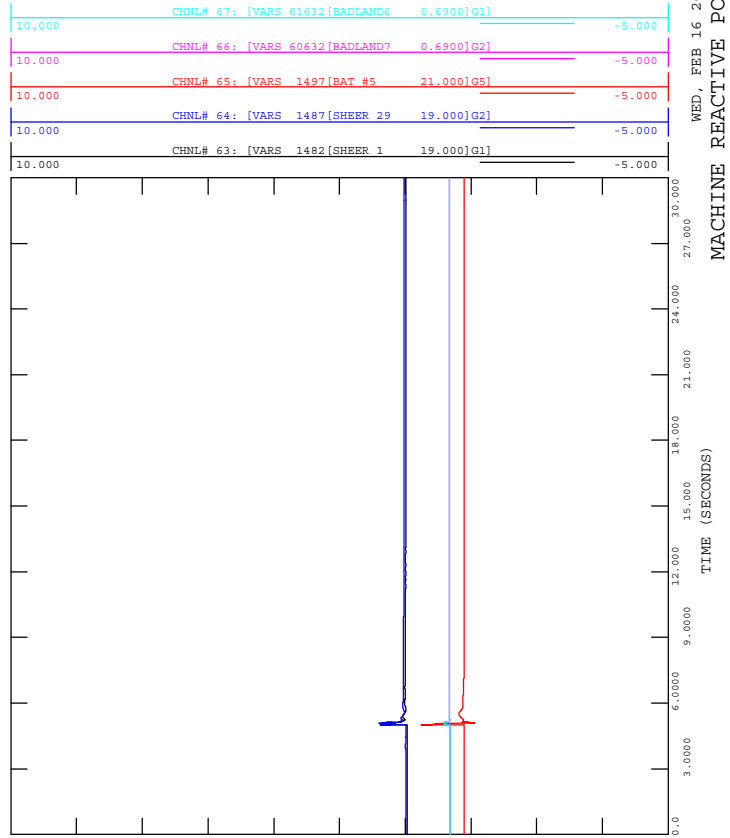




FIGURE A4-71F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-71_3PH_Fault_7L159-1@Heatburg-948S.out

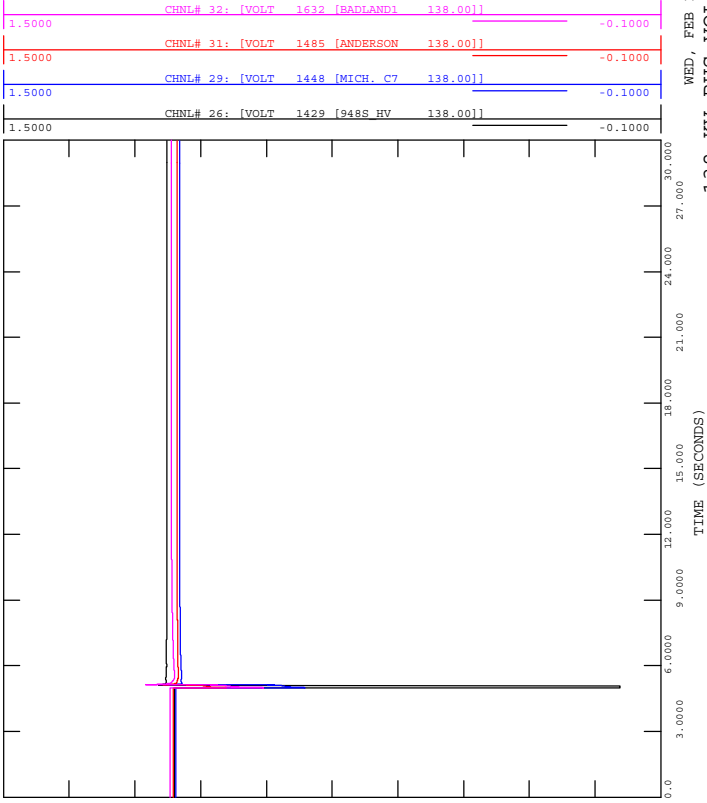


FIGURE A4-71H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-71_3PH_Fault_7L159-1@Heatburg-948S.out

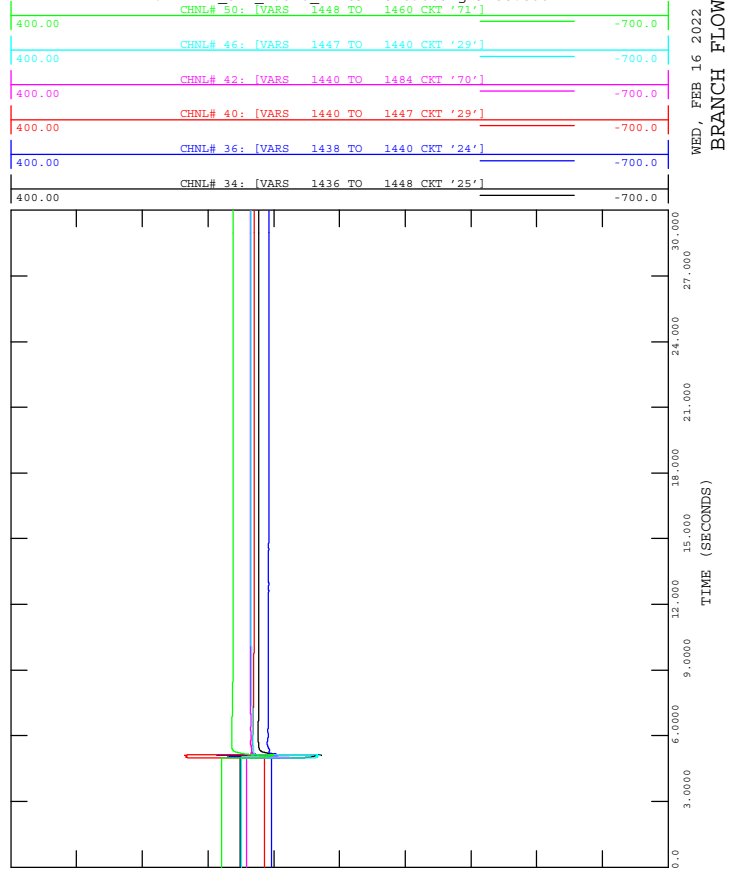


FIGURE A4-71E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-71_3PH_Fault_7L159-1@Heatburg-948S.out

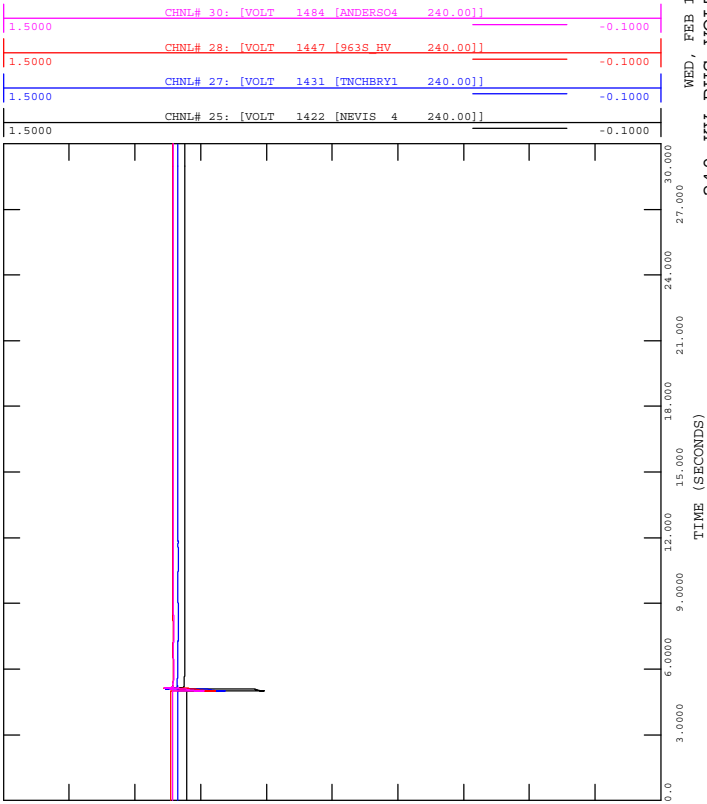


FIGURE A4-71G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATBURG 948S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-71_3PH_Fault_7L159-1@Heatburg-948S.out

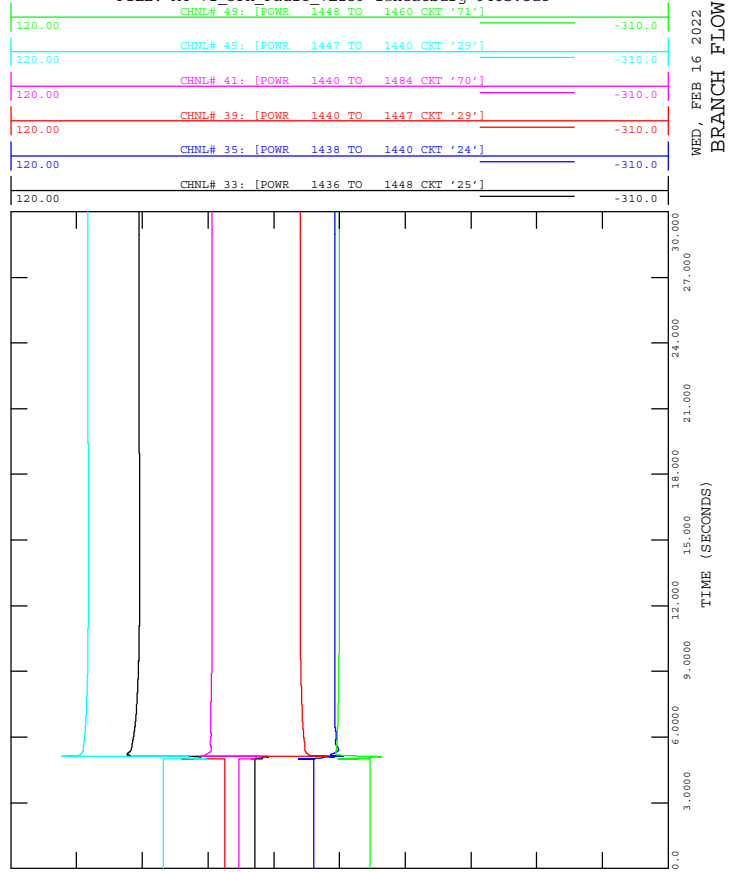




FIGURE A4-72B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-72_3PH_Fault_9L59@Anderson-801S.out

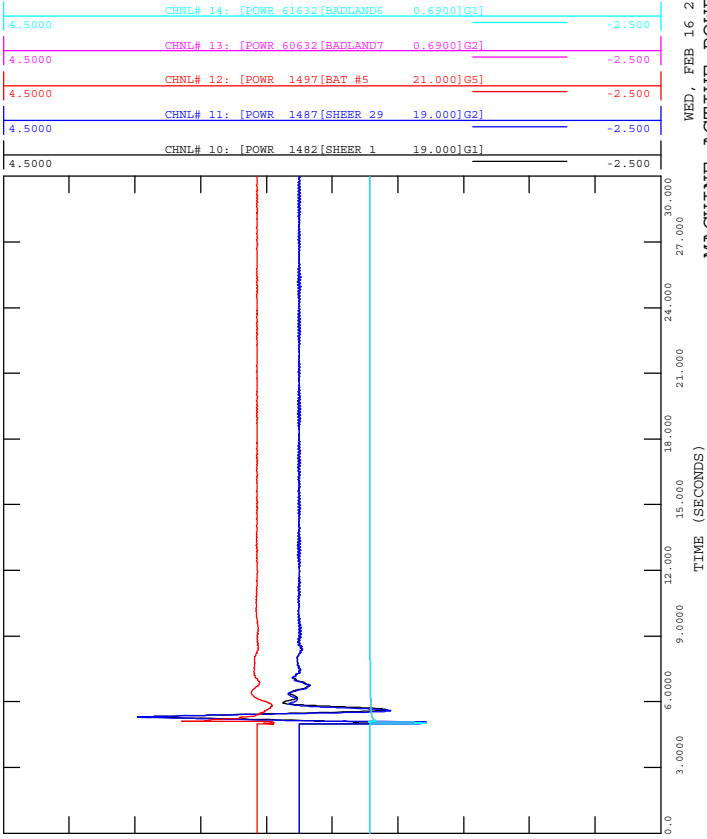


FIGURE A4-72D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-72_3PH_Fault_9L59@Anderson-801S.out

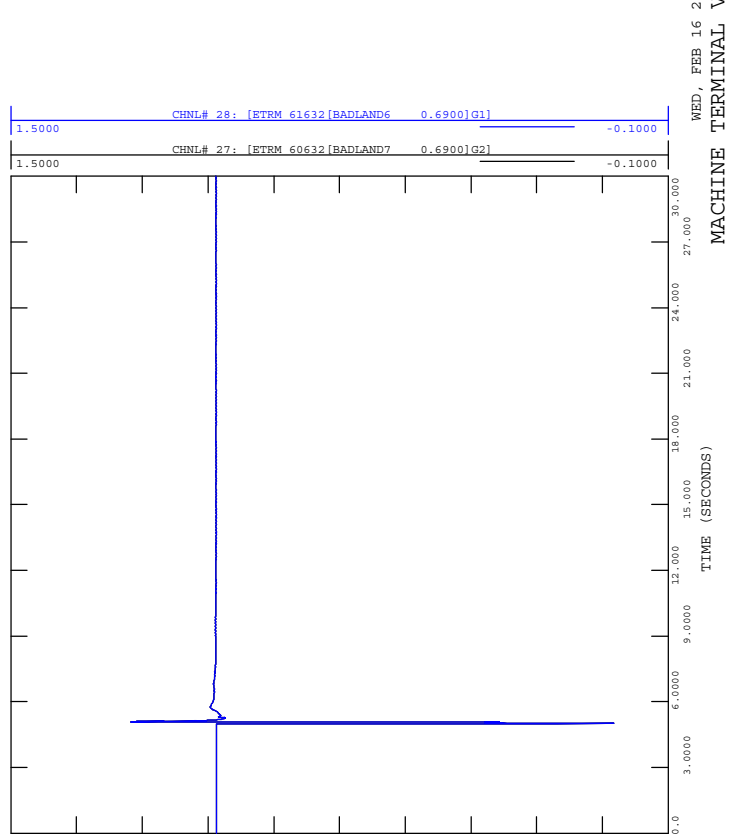


FIGURE A4-72A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-72_3PH_Fault_9L59@Anderson-801S.out

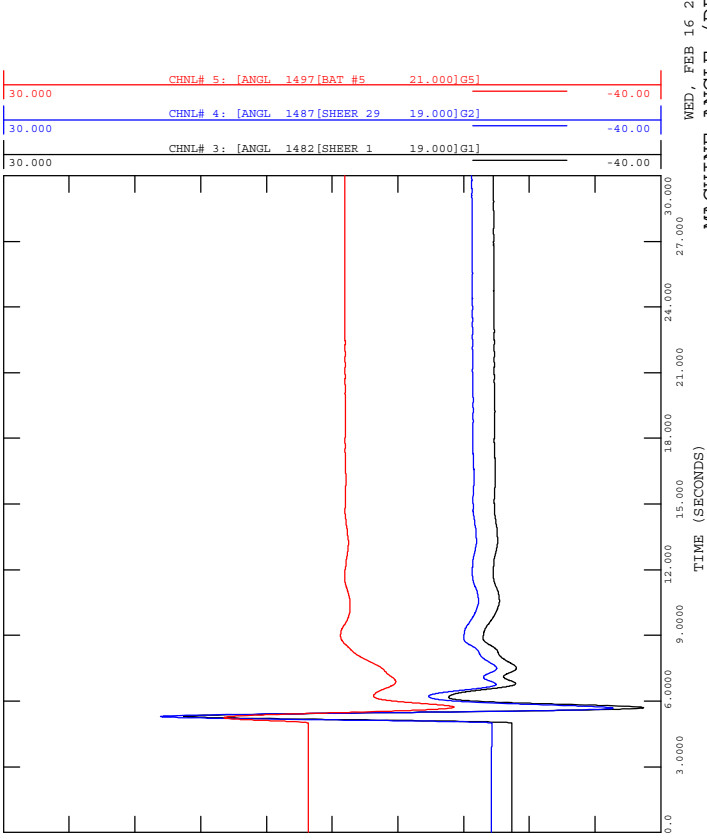


FIGURE A4-72C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-72_3PH_Fault_9L59@Anderson-801S.out

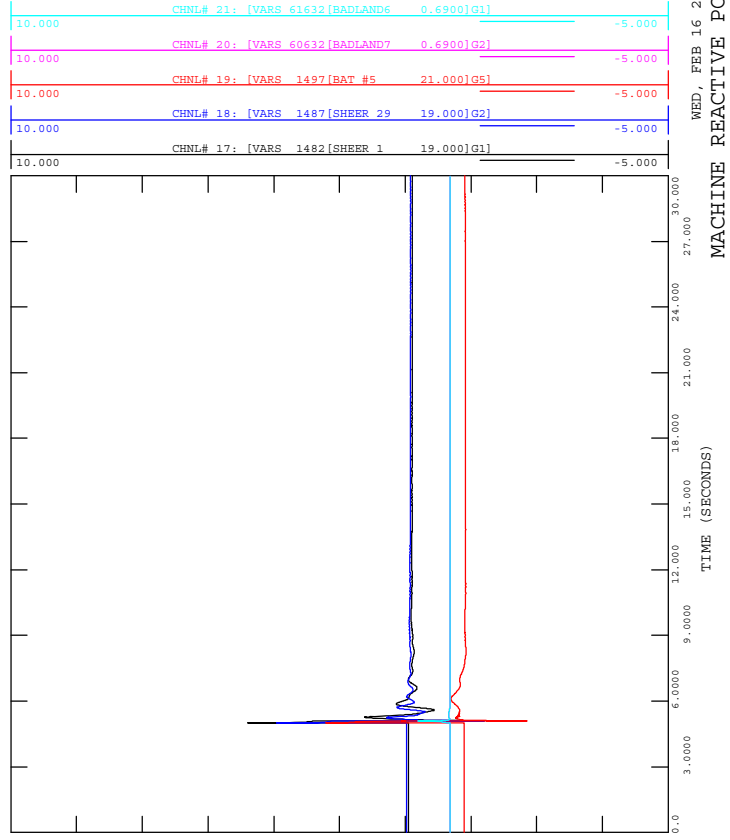




FIGURE A4-72F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-72_3PH_Fault_9L59@Anderson-801S.out

15:48
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

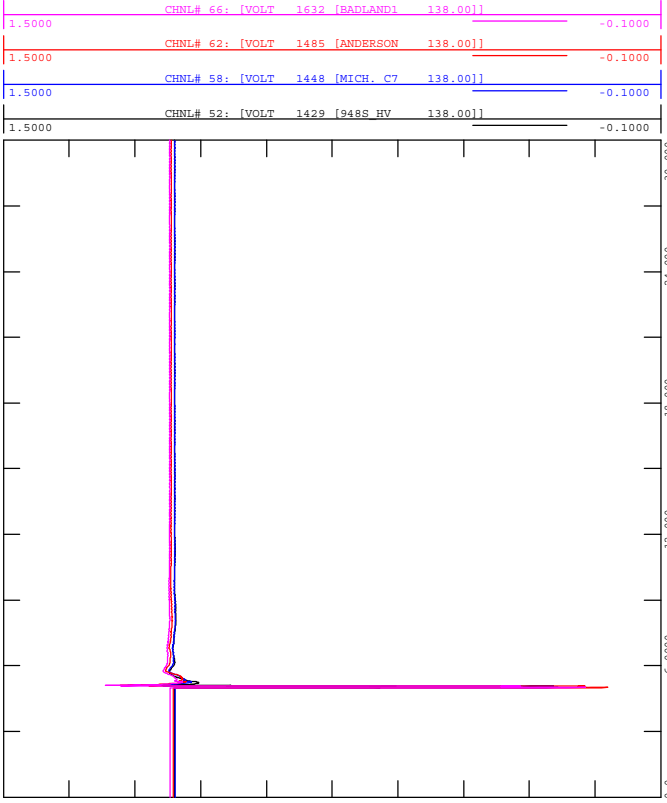


FIGURE A4-72H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-72_3PH_Fault_9L59@Anderson-801S.out

15:48
 WED, FEB 16 2022
 BRANCH FLOW (Q)

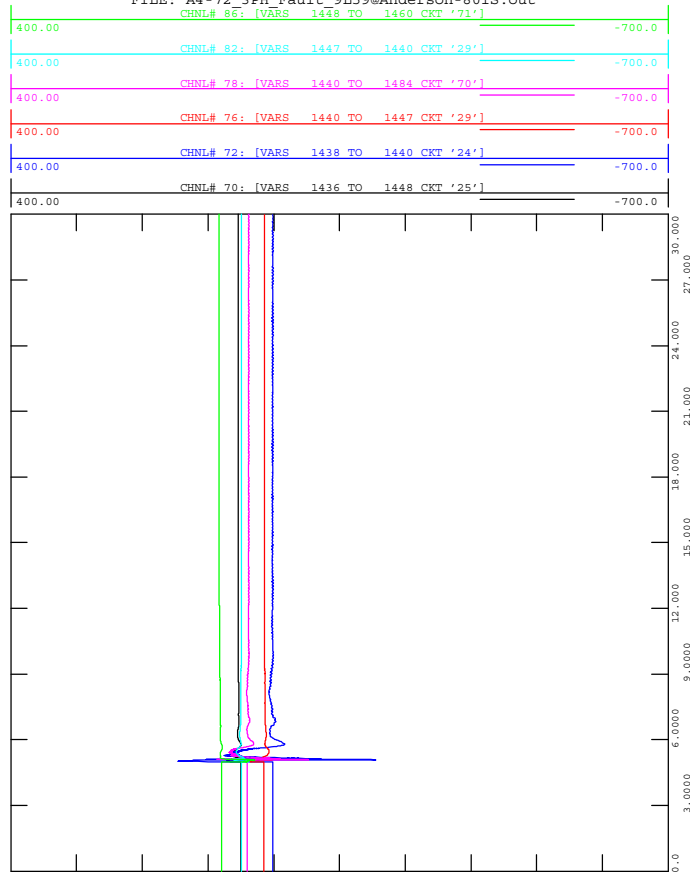


FIGURE A4-72E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-72_3PH_Fault_9L59@Anderson-801S.out

15:48
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

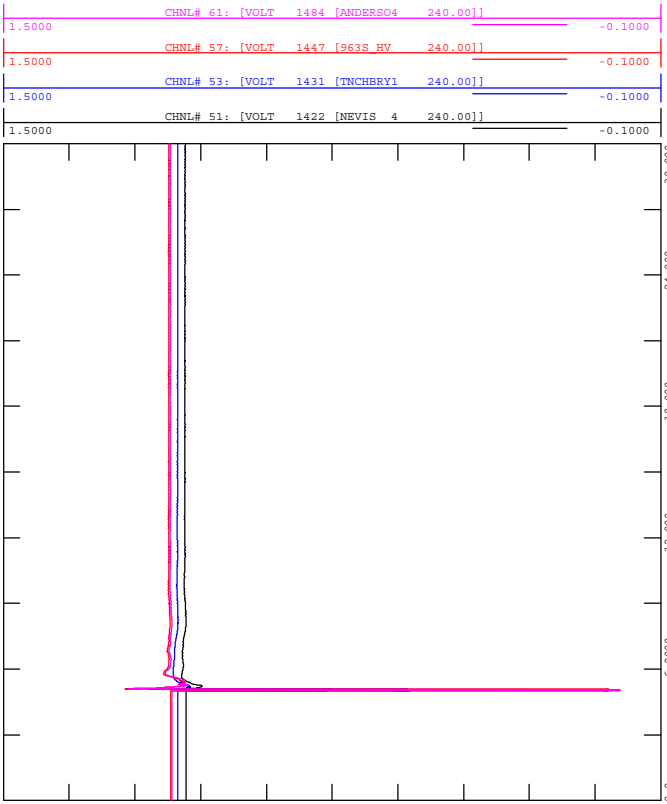


FIGURE A4-72G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-72_3PH_Fault_9L59@Anderson-801S.out

15:48
 WED, FEB 16 2022
 BRANCH FLOW (P)

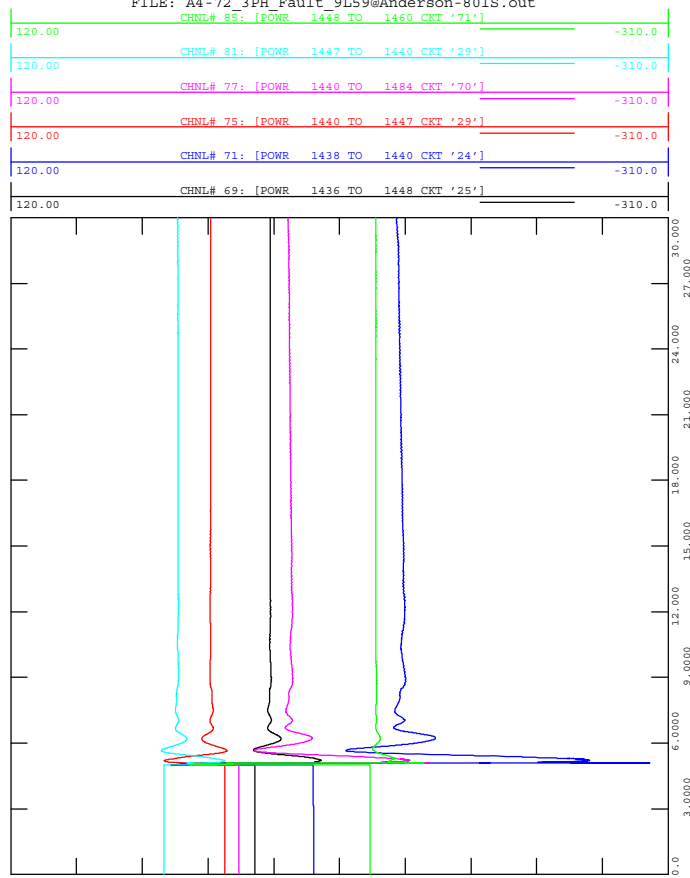




FIGURE A4-73B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-73_3PH_Fault_9L59@Tincbebray-972S.out

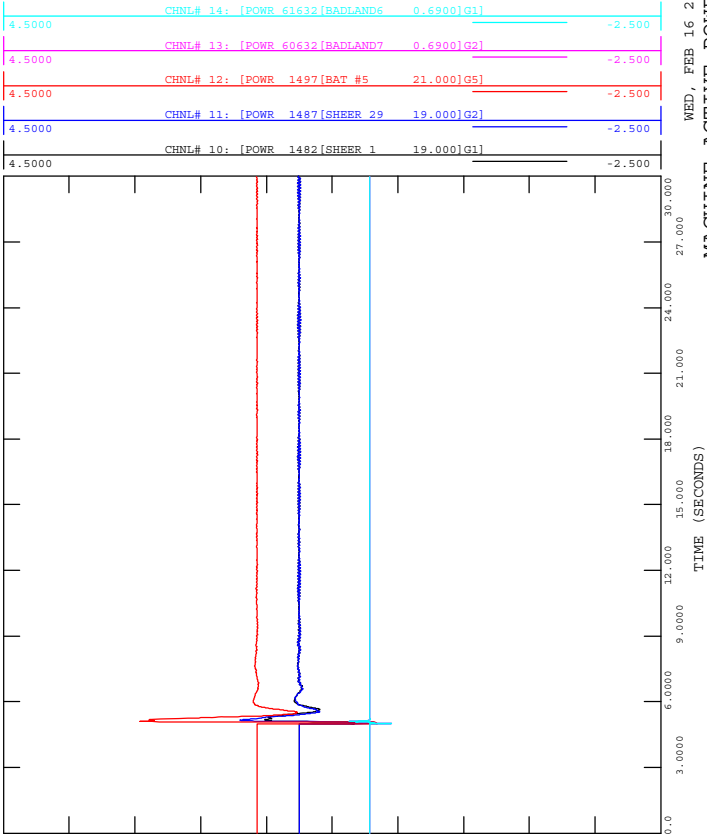


FIGURE A4-73D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-73_3PH_Fault_9L59@Tincbebray-972S.out

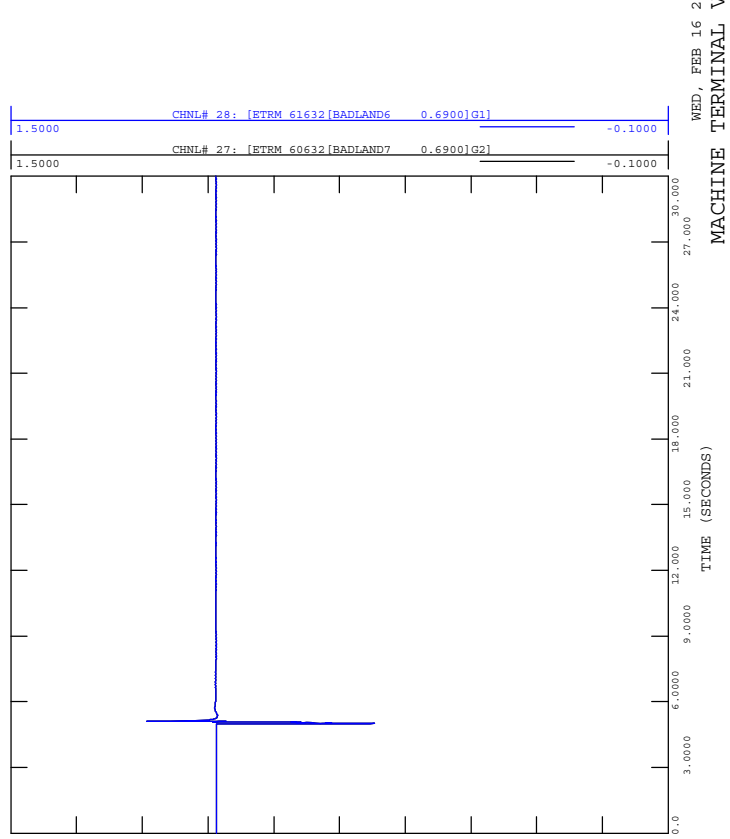


FIGURE A4-73A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-73_3PH_Fault_9L59@Tincbebray-972S.out

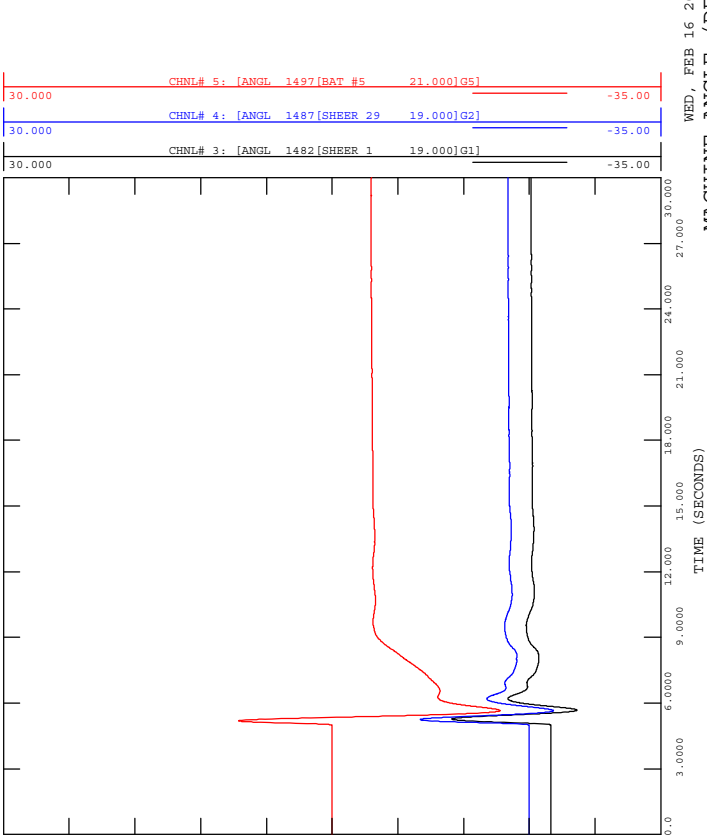


FIGURE A4-73C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-73_3PH_Fault_9L59@Tincbebray-972S.out

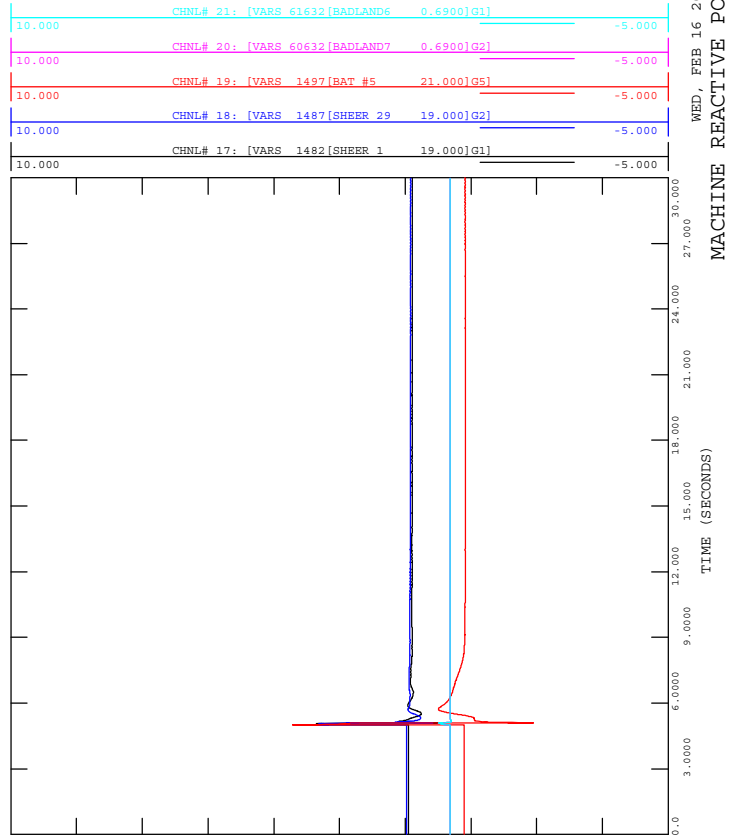




FIGURE A4-73F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-73_3PH_Fault_9L59@Tincchbray-972S.out

15:48
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

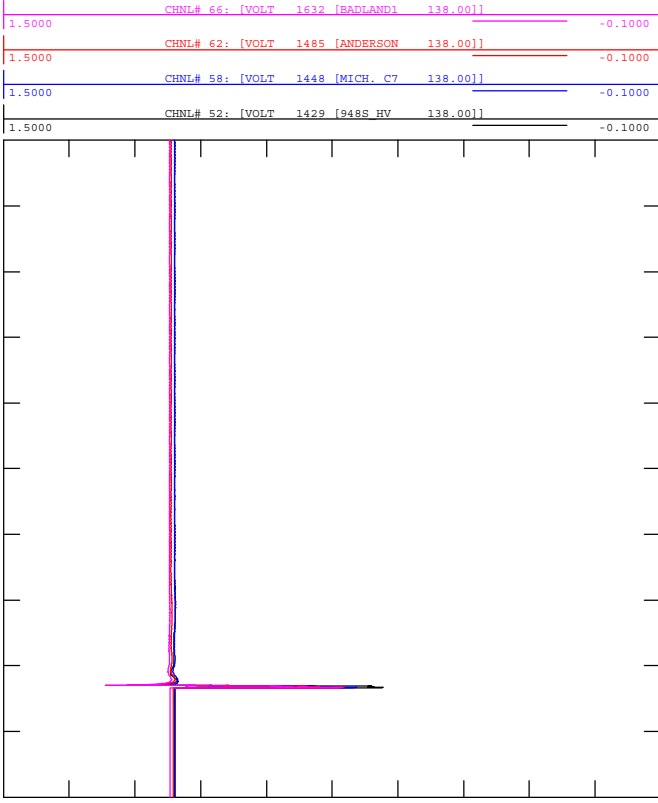


FIGURE A4-73H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-73_3PH_Fault_9L59@Tincchbray-972S.out

15:49
 WED, FEB 16 2022
 BRANCH FLOW (Q)

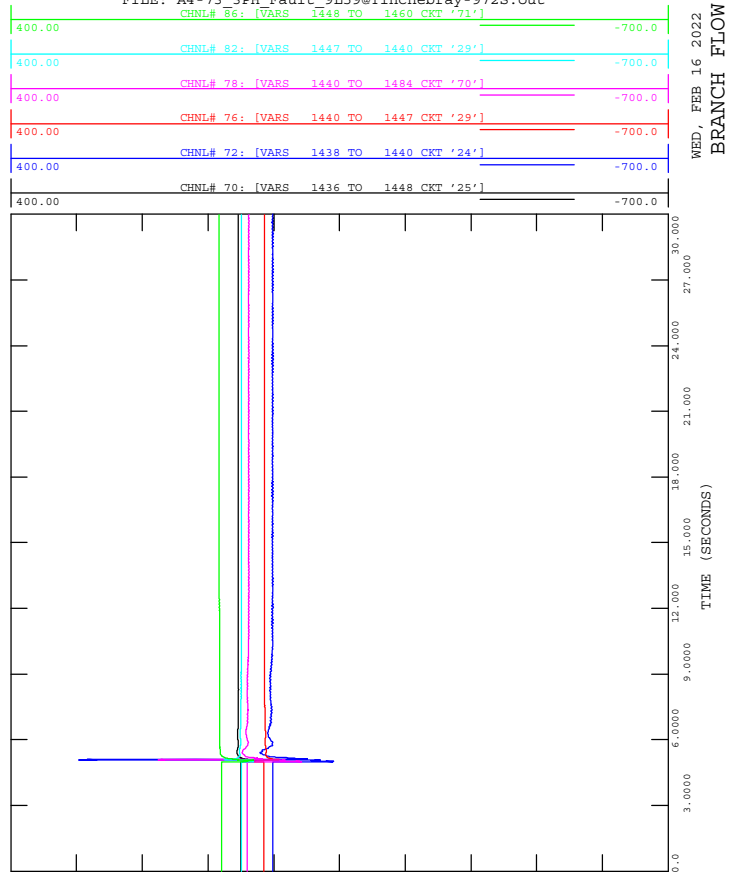


FIGURE A4-73E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-73_3PH_Fault_9L59@Tincchbray-972S.out

15:48
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

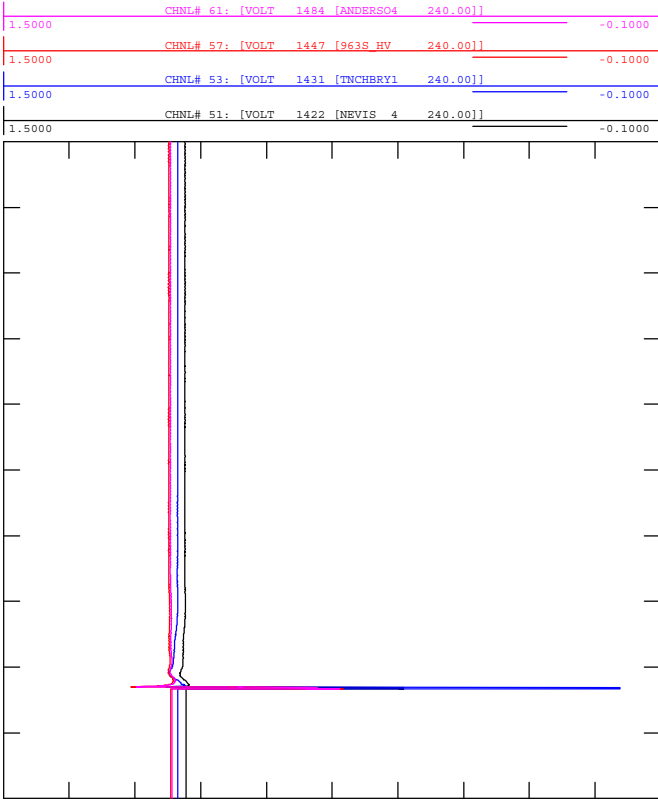


FIGURE A4-73G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT TINCHEBRAY 972S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-73_3PH_Fault_9L59@Tincchbray-972S.out

15:48
 WED, FEB 16 2022
 BRANCH FLOW (P)

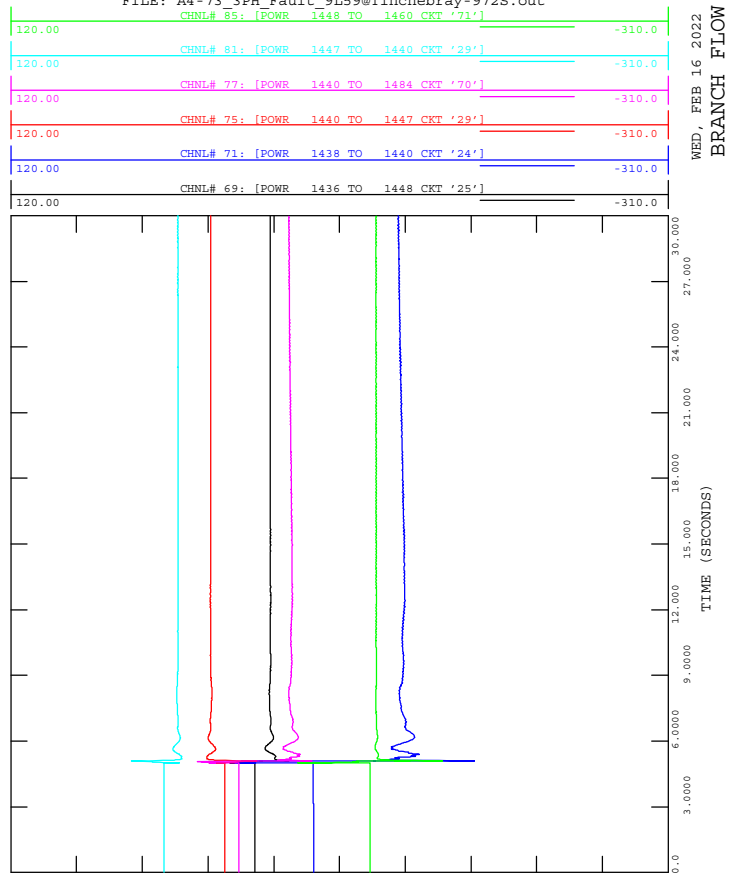
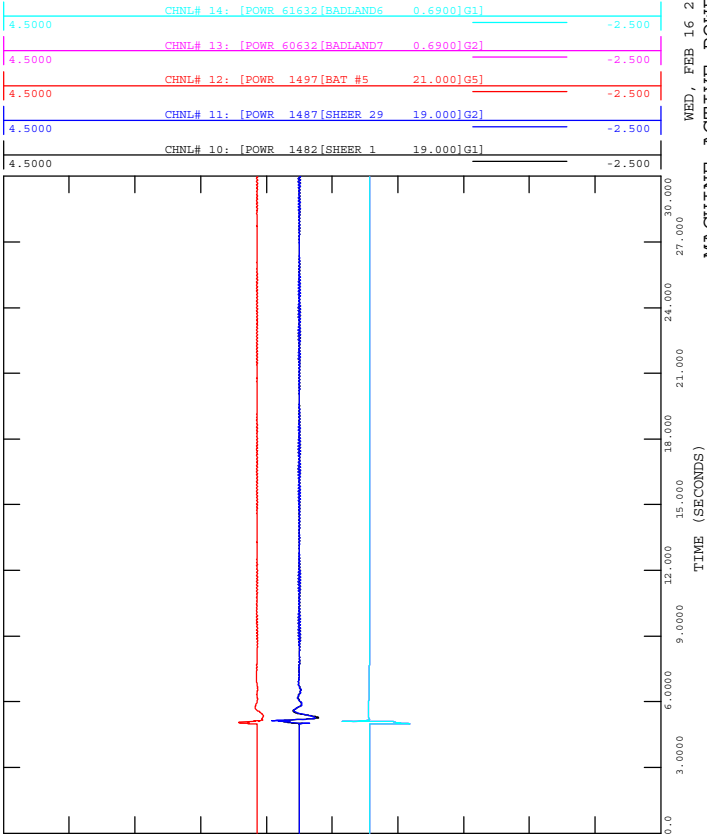




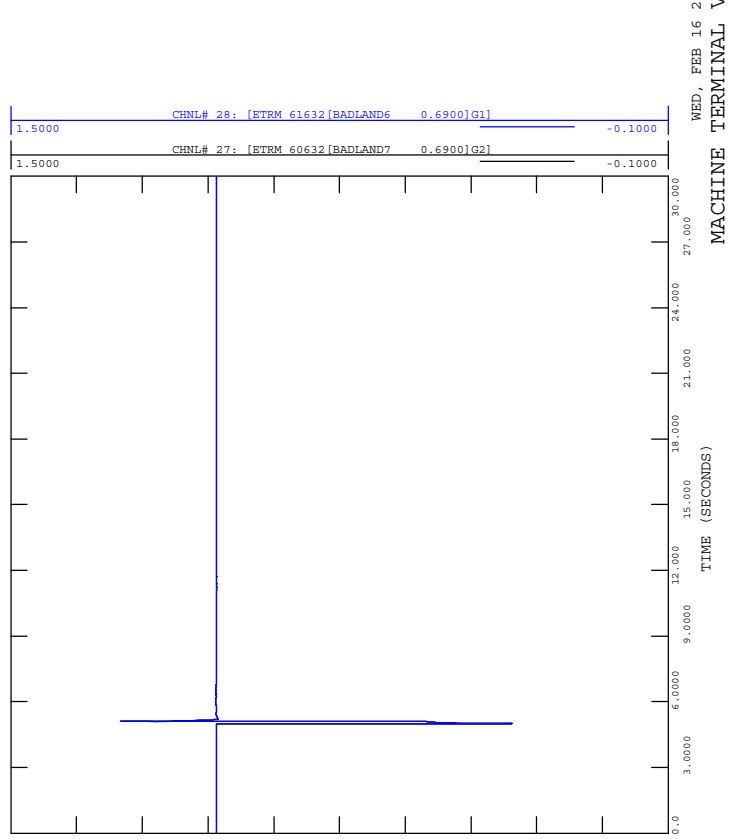
FIGURE A4-74B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-74_3PH_Fault_7L128@Michichi-Creek-802S.out



WED, FEB 16 2022 15:49
 MACHINE ACTIVE POWER (MW)



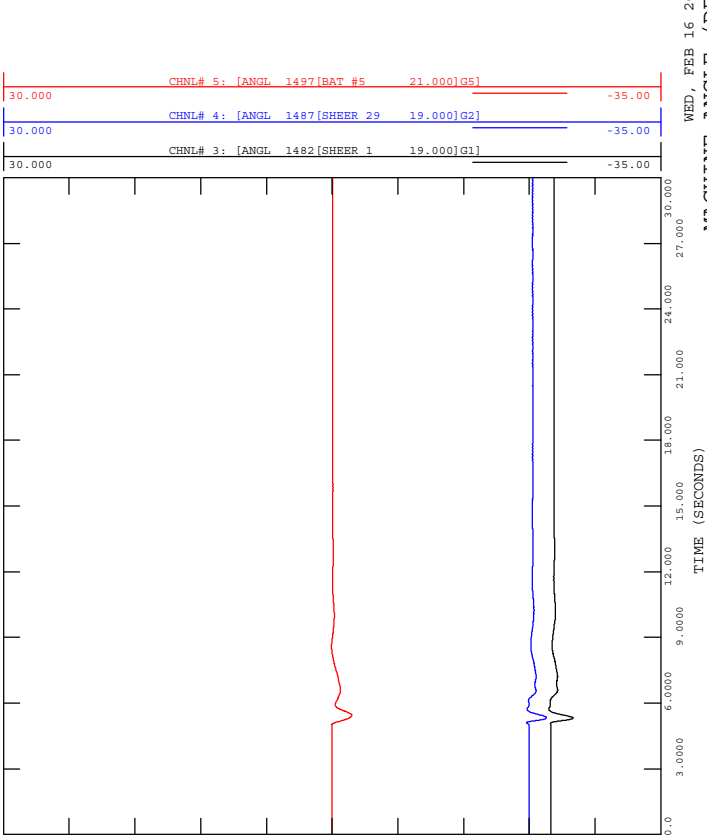
FIGURE A4-74D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-74_3PH_Fault_7L128@Michichi-Creek-802S.out



WED, FEB 16 2022 15:49
 MACHINE TERMINAL VOLTAGE



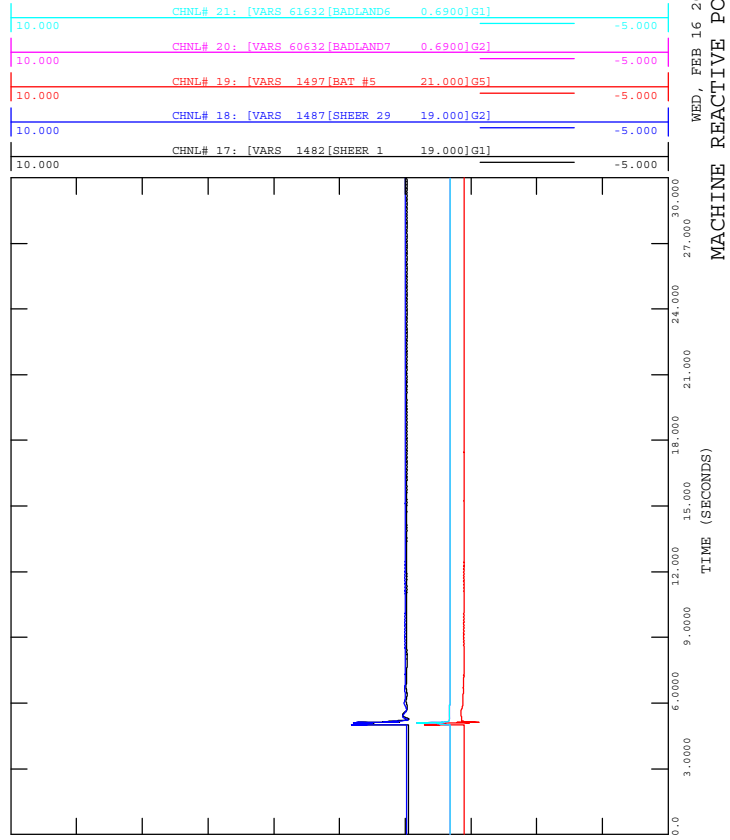
FIGURE A4-74A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-74_3PH_Fault_7L128@Michichi-Creek-802S.out



WED, FEB 16 2022 15:49
 MACHINE ANGLE (DEGREES)



FIGURE A4-74C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-74_3PH_Fault_7L128@Michichi-Creek-802S.out



WED, FEB 16 2022 15:49
 MACHINE REACTIVE POWER (M)



FIGURE A4-74F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-74_3PH_Fault_7L128@Michichi-Creek-802S.out

1.5000	CHNL# 66: [VOLT 1632 [BADLAND] 138.00]	-0.1000
1.5000	CHNL# 62: [VOLT 1485 [ANDERSON 138.00]	-0.1000
1.5000	CHNL# 58: [VOLT 1448 [MICH. C7 138.00]	-0.1000
1.5000	CHNL# 52: [VOLT 1429 [948S_HV 138.00]	-0.1000

138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:49

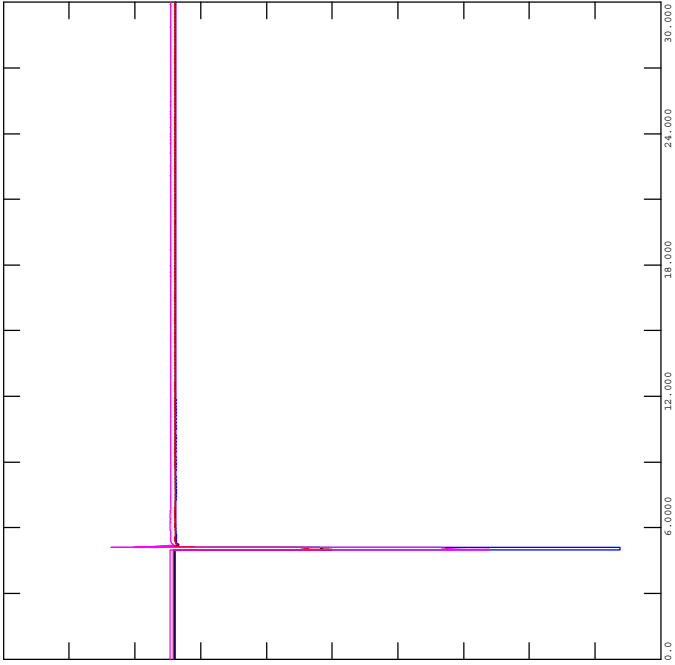


FIGURE A4-74H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-74_3PH_Fault_7L128@Michichi-Creek-802S.out

1100.0	CHNL# 82: [VARS 1447 TO 1440 CKT '29']	-700.0
1100.0	CHNL# 78: [VARS 1440 TO 1484 CKT '70']	-700.0
1100.0	CHNL# 76: [VARS 1440 TO 1447 CKT '29']	-700.0
1100.0	CHNL# 72: [VARS 1438 TO 1440 CKT '24']	-700.0
1100.0	CHNL# 70: [VARS 1436 TO 1448 CKT '25']	-700.0

BRANCH FLOW (Q)
 WED, FEB 16 2022 15:49

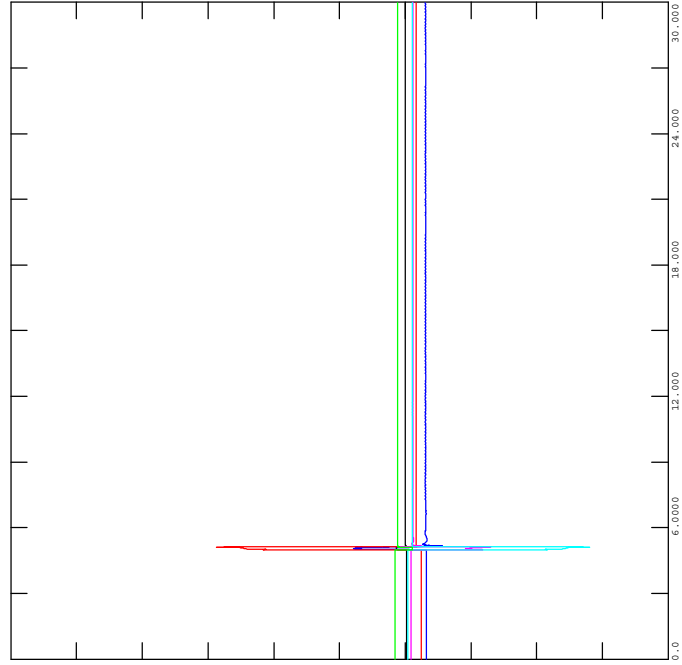


FIGURE A4-74E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-74_3PH_Fault_7L128@Michichi-Creek-802S.out

1.5000	CHNL# 61: [VOLT 1484 [ANDERSO4 240.00]	-0.1000
1.5000	CHNL# 57: [VOLT 1447 [963S_HV 240.00]	-0.1000
1.5000	CHNL# 53: [VOLT 1431 [TNCHBRY1 240.00]	-0.1000
1.5000	CHNL# 51: [VOLT 1422 [NEVIS 4 240.00]	-0.1000

240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:49

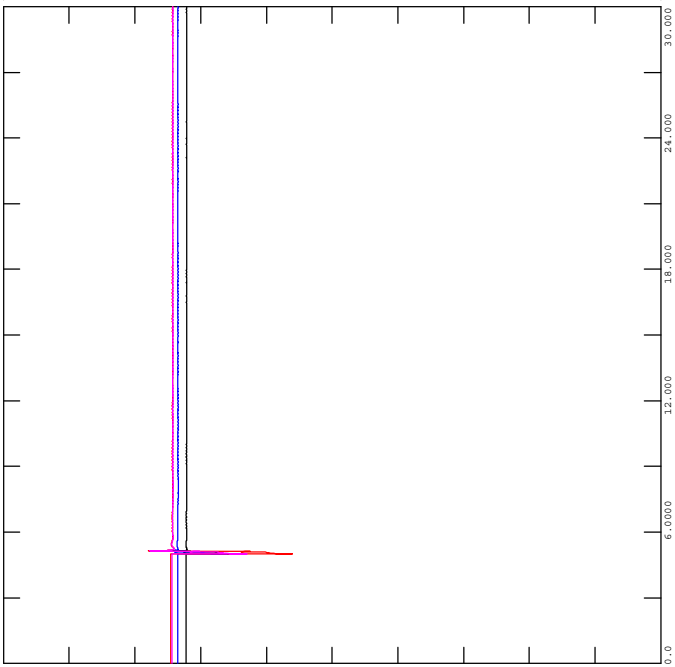


FIGURE A4-74G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT MICHICHI CREEK 802S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-74_3PH_Fault_7L128@Michichi-Creek-802S.out

120.00	CHNL# 85: [POWR 1448 TO 1460 CKT '71']	-310.0
120.00	CHNL# 81: [POWR 1447 TO 1440 CKT '29']	-310.0
120.00	CHNL# 77: [POWR 1440 TO 1484 CKT '70']	-310.0
120.00	CHNL# 75: [POWR 1440 TO 1447 CKT '29']	-310.0
120.00	CHNL# 71: [POWR 1438 TO 1440 CKT '24']	-310.0
120.00	CHNL# 69: [POWR 1436 TO 1448 CKT '25']	-310.0

BRANCH FLOW (P)
 WED, FEB 16 2022 15:49

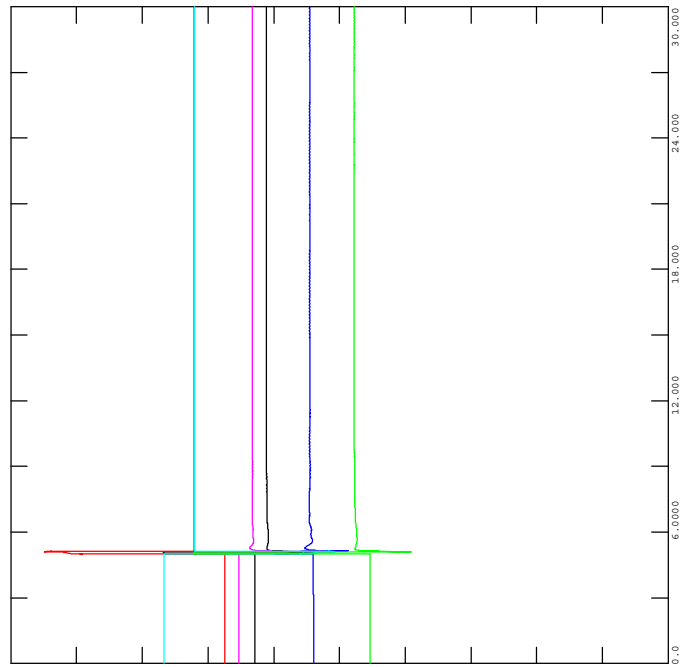
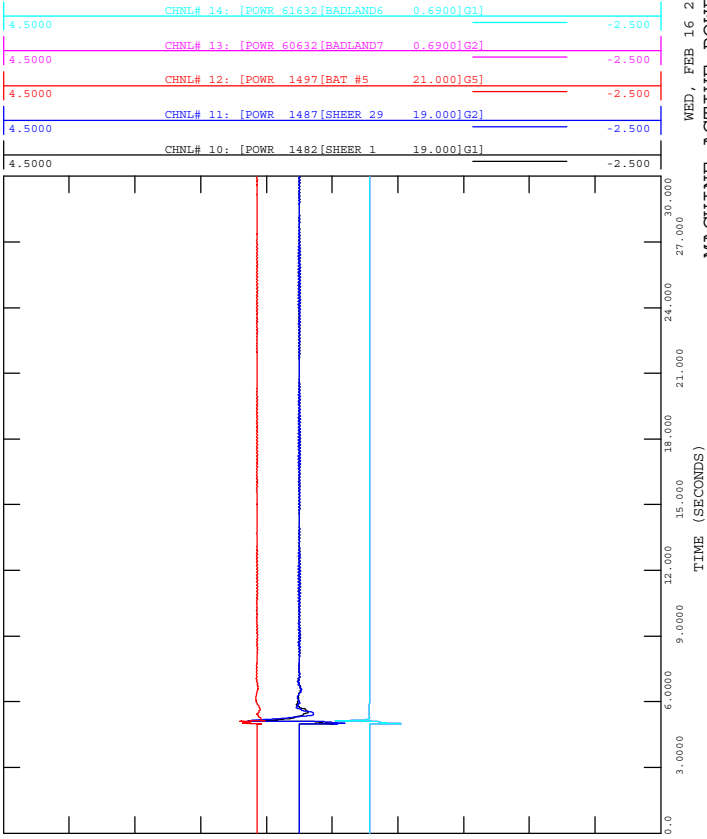




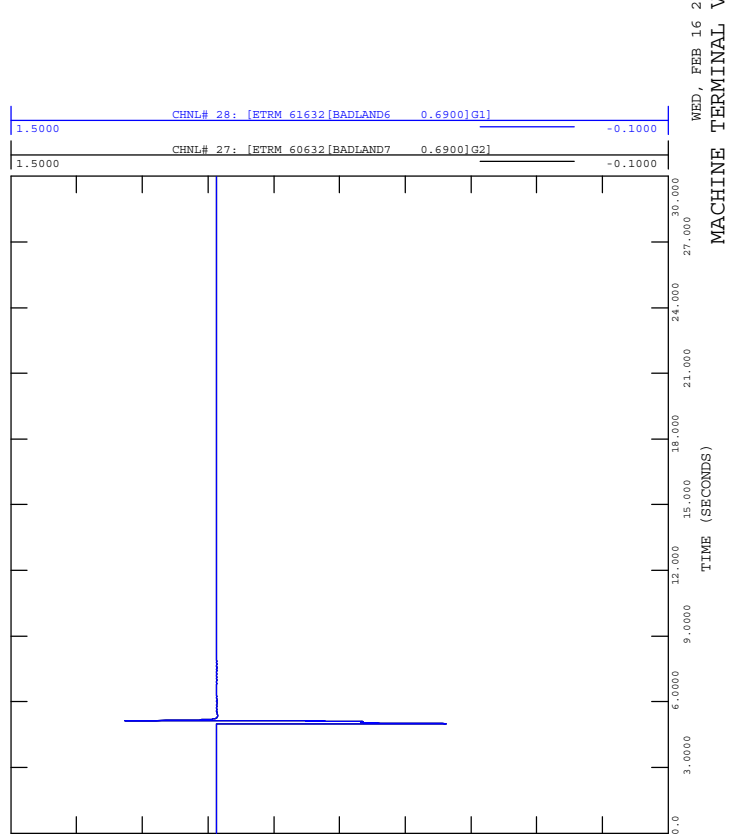
FIGURE A4-75B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-75_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 15:49
 MACHINE ACTIVE POWER (MW)



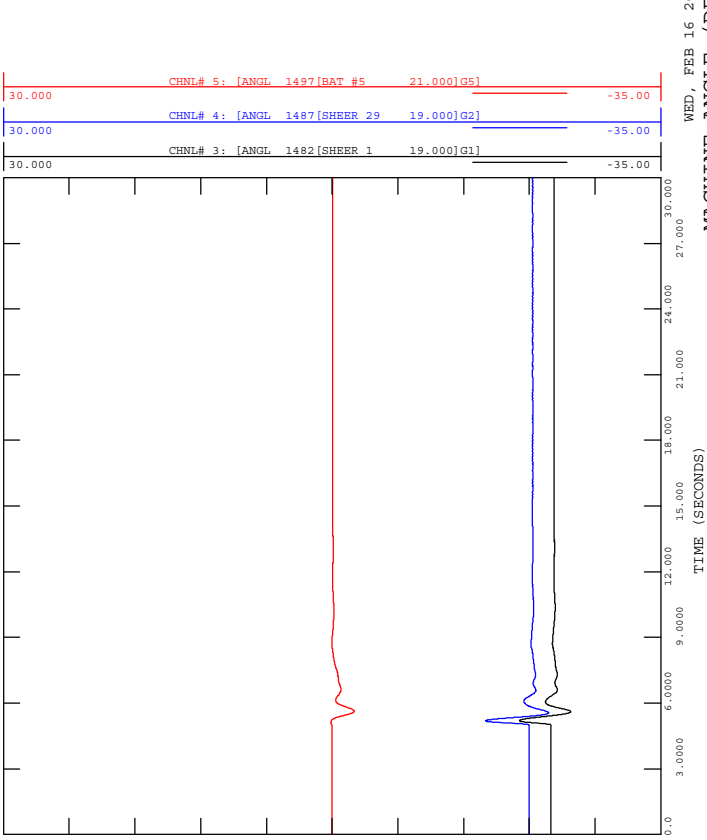
FIGURE A4-75D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-75_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 15:50
 MACHINE TERMINAL VOLTAGE



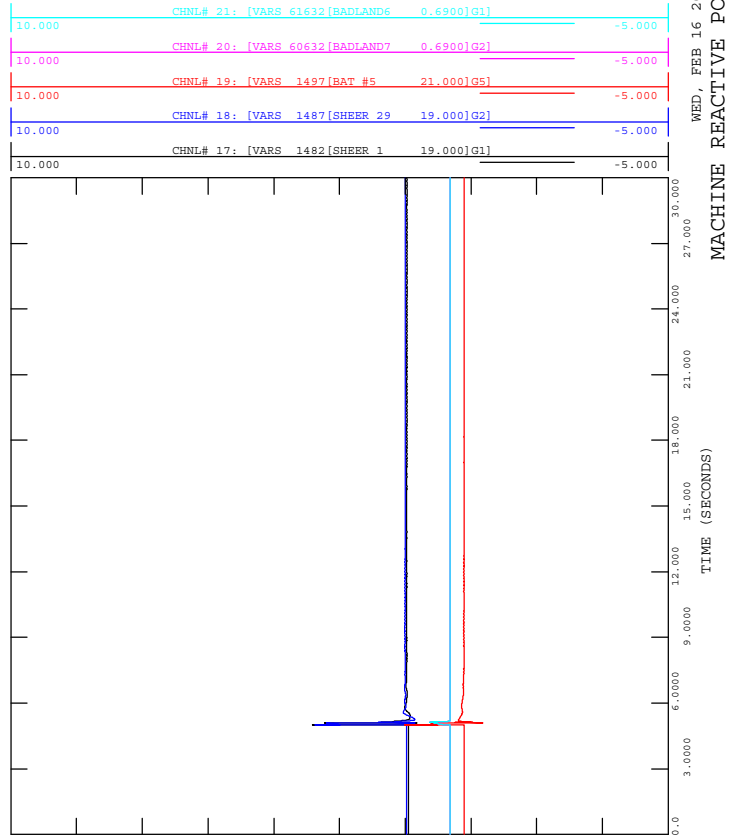
FIGURE A4-75A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-75_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 15:49
 MACHINE ANGLE (DEGREES)



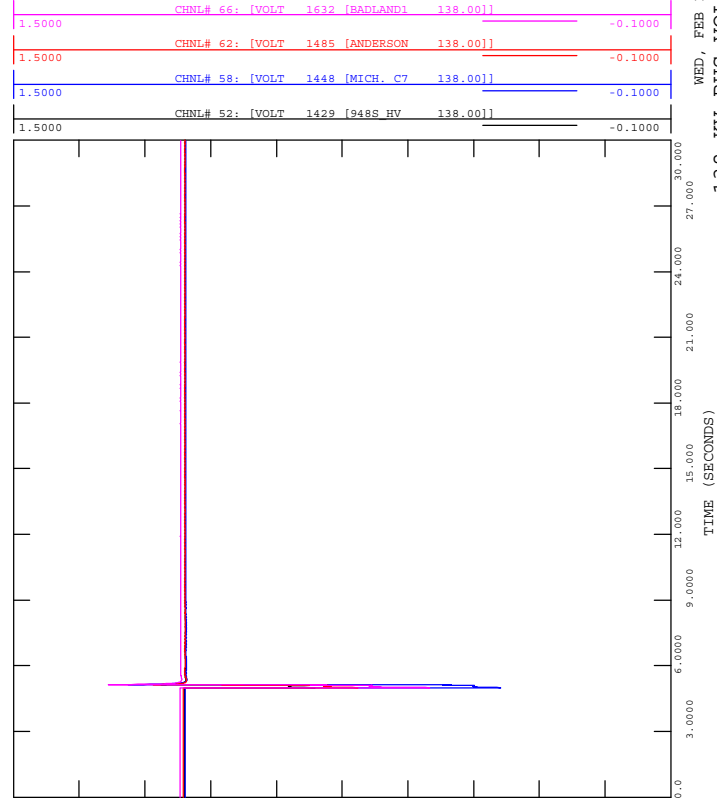
FIGURE A4-75C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-75_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 15:49
 MACHINE REACTIVE POWER (M)



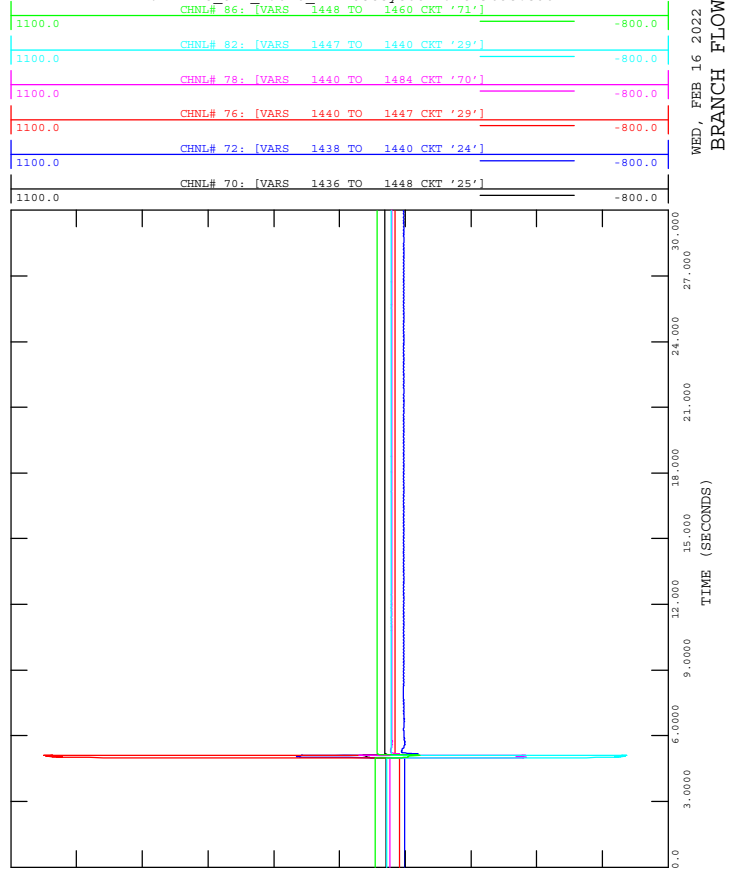
FIGURE A4-75F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-75_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 15:50



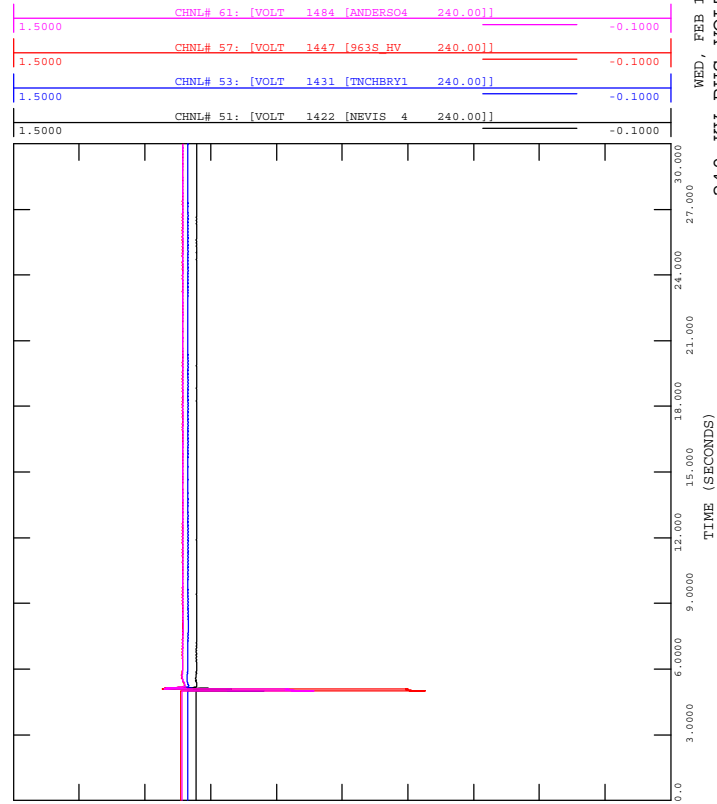
FIGURE A4-75H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-75_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 15:50



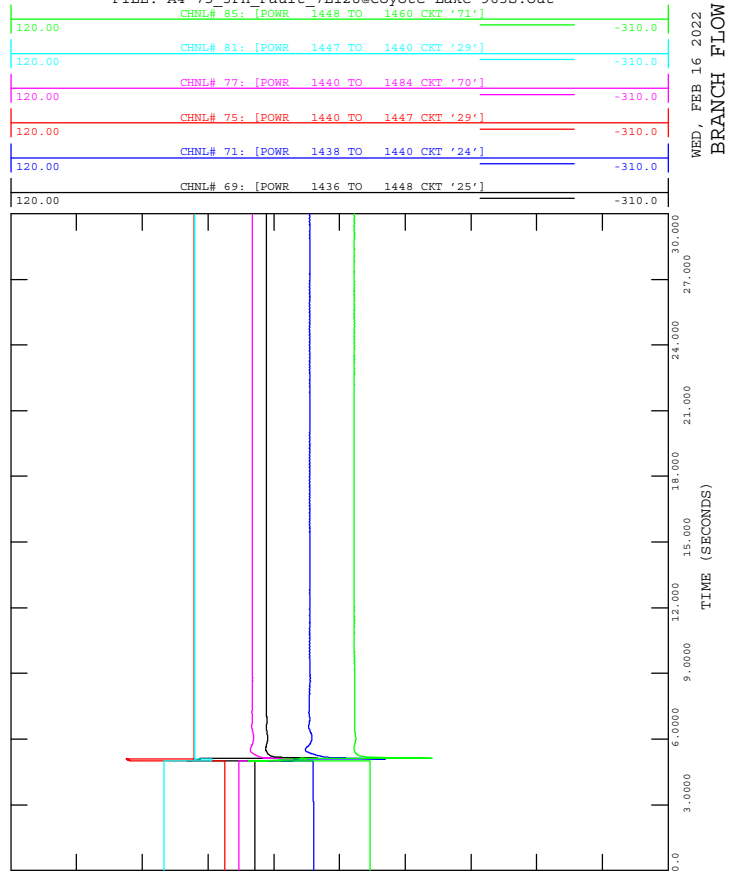
FIGURE A4-75E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-75_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 15:50



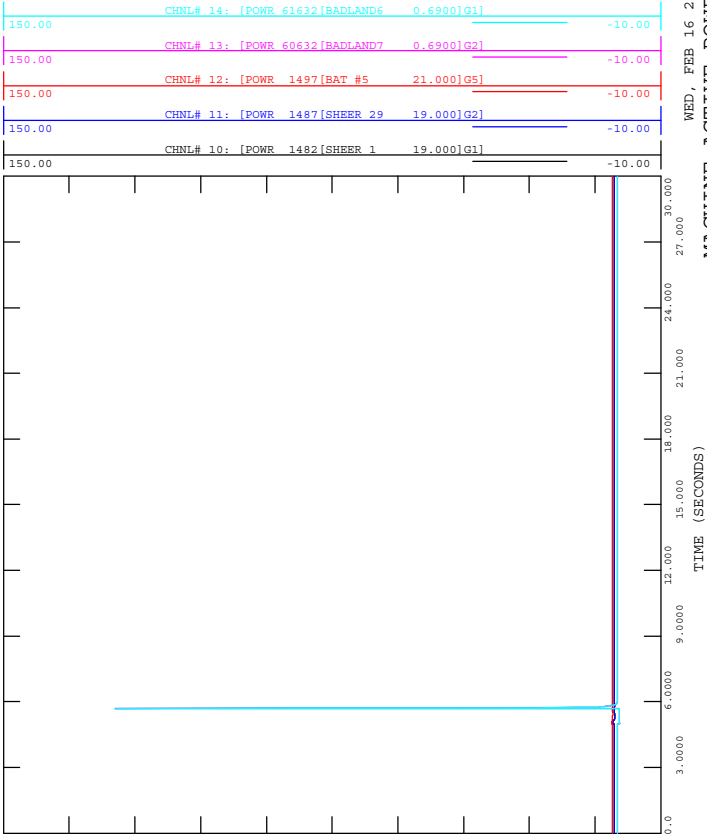
FIGURE A4-75G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT COYOTE LAKE 963S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 8 CYCLES
 FILE: A4-75_3PH_Fault_7L128@Coyote-Lake-963S.out



WED, FEB 16 2022 15:50



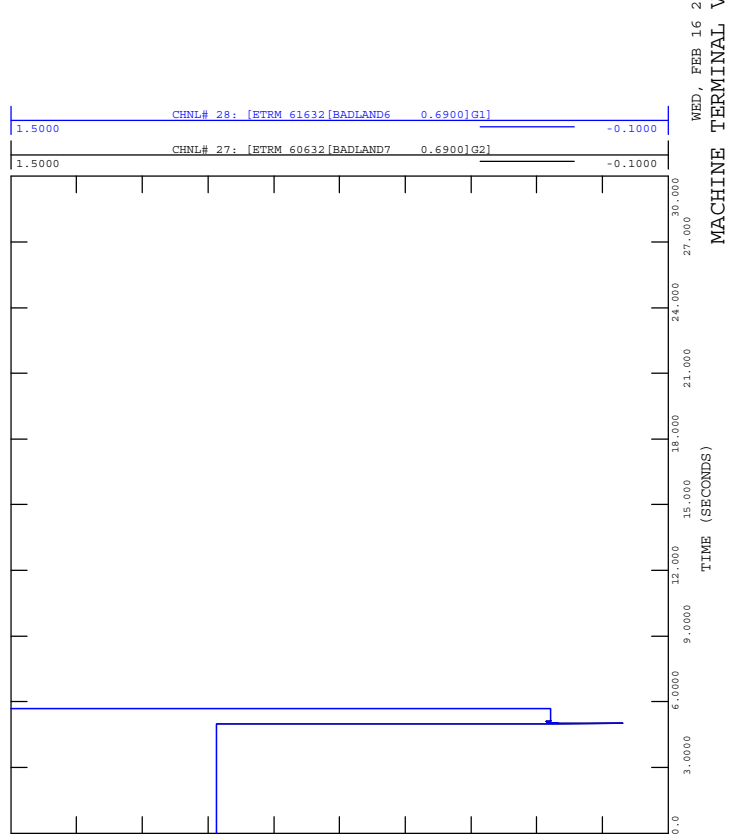
FIGURE A4-76B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-76_3PH_Fault_7L85@Wintering-Hills-804S.out



WED, FEB 16 2022 15:50
 MACHINE ACTIVE POWER (MW)



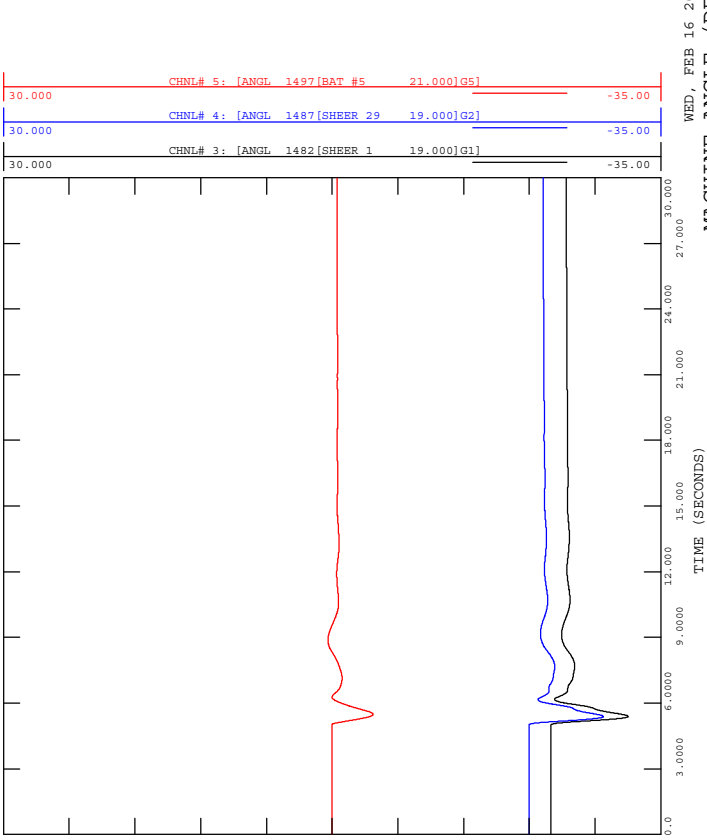
FIGURE A4-76D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-76_3PH_Fault_7L85@Wintering-Hills-804S.out



WED, FEB 16 2022 15:50
 TERMINAL VOLTAGE



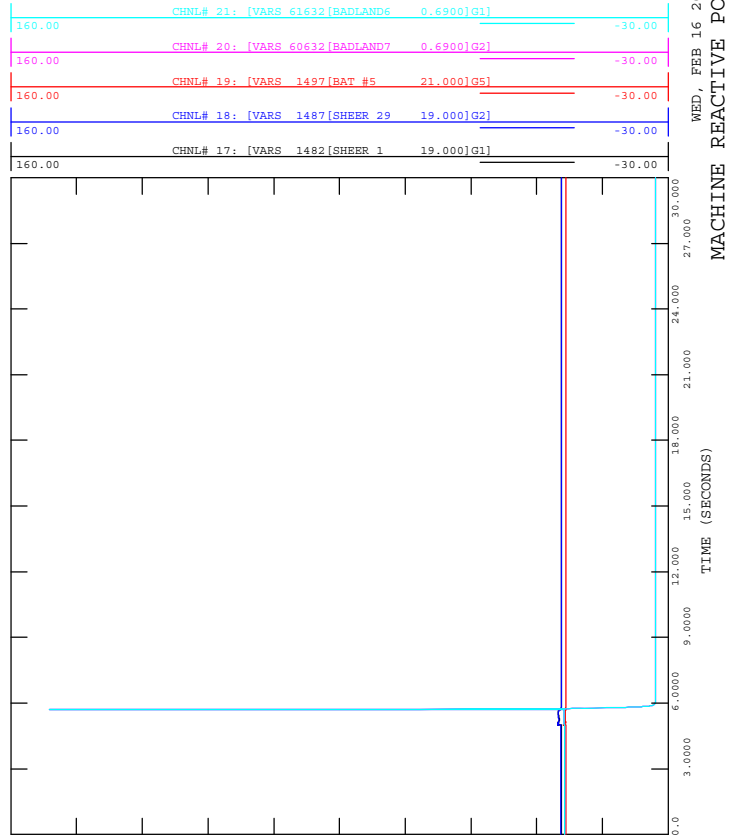
FIGURE A4-76A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-76_3PH_Fault_7L85@Wintering-Hills-804S.out



WED, FEB 16 2022 15:50
 MACHINE ANGLE (DEGREES)



FIGURE A4-76C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-76_3PH_Fault_7L85@Wintering-Hills-804S.out

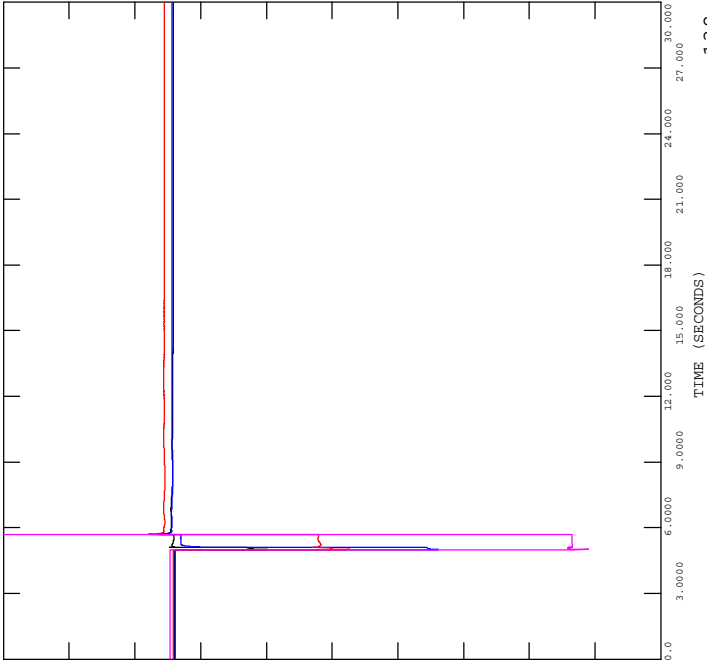


WED, FEB 16 2022 15:50
 MACHINE REACTIVE POWER (M)



FIGURE A4-76F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-76_3PH_Fault_7L85@Wintering-Hills-804S.out

1.5000	CHNL# 66: [VOLT 1632 [BADLAND] 138.00]	-0.1000
1.5000	CHNL# 62: [VOLT 1485 [ANDERSON 138.00]	-0.1000
1.5000	CHNL# 58: [VOLT 1448 [MICH. C7 138.00]	-0.1000
1.5000	CHNL# 52: [VOLT 1429 [948S HV 138.00]	-0.1000

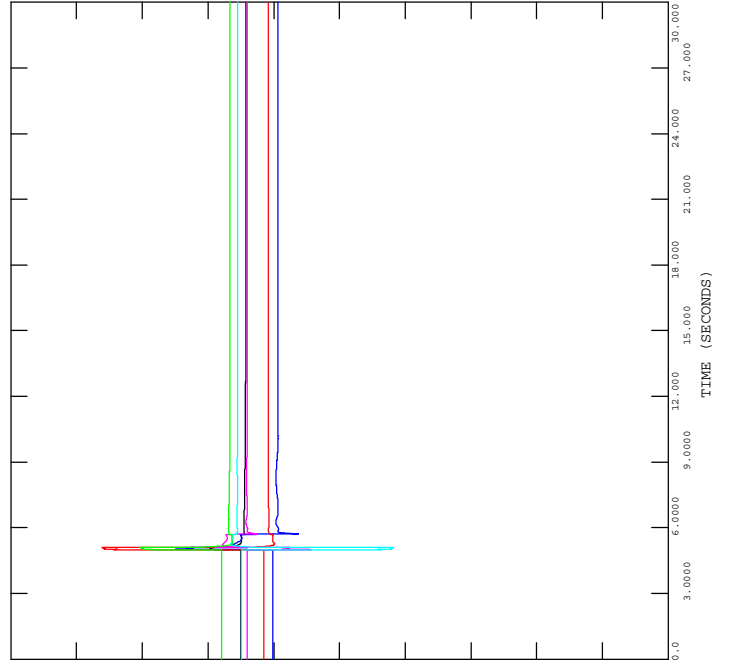


138 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:50



FIGURE A4-76H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-76_3PH_Fault_7L85@Wintering-Hills-804S.out

400.00	CHNL# 86: [VARS 1448 TO 1460 CKT '71']	-700.0
400.00	CHNL# 82: [VARS 1447 TO 1440 CKT '29']	-700.0
400.00	CHNL# 78: [VARS 1440 TO 1484 CKT '70']	-700.0
400.00	CHNL# 76: [VARS 1440 TO 1447 CKT '29']	-700.0
400.00	CHNL# 72: [VARS 1438 TO 1440 CKT '24']	-700.0
400.00	CHNL# 70: [VARS 1436 TO 1448 CKT '25']	-700.0

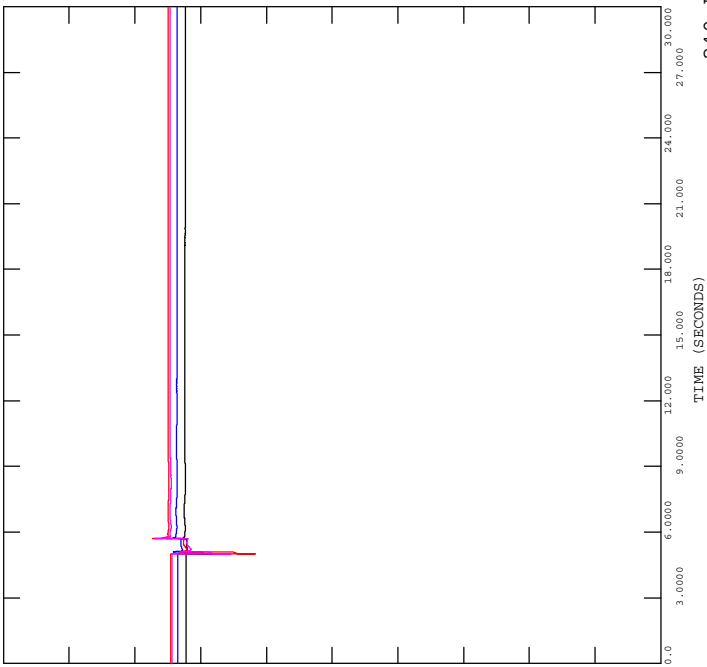


BRANCH FLOW (Q)
 WED, FEB 16 2022 15:50



FIGURE A4-76E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-76_3PH_Fault_7L85@Wintering-Hills-804S.out

1.5000	CHNL# 61: [VOLT 1484 [ANDERSO4 240.00]	-0.1000
1.5000	CHNL# 57: [VOLT 1447 [963S HV 240.00]	-0.1000
1.5000	CHNL# 53: [VOLT 1431 [TNCHBRY1 240.00]	-0.1000
1.5000	CHNL# 51: [VOLT 1422 [NEVIS 4 240.00]	-0.1000

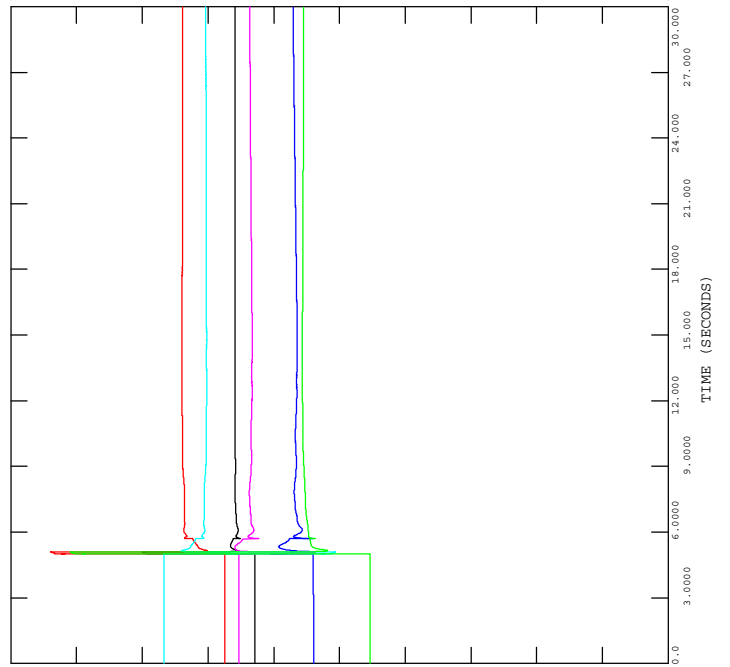


240 KV BUS VOLTAGE (PU)
 WED, FEB 16 2022 15:50



FIGURE A4-76G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT WINTERING HILLS 804S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-76_3PH_Fault_7L85@Wintering-Hills-804S.out

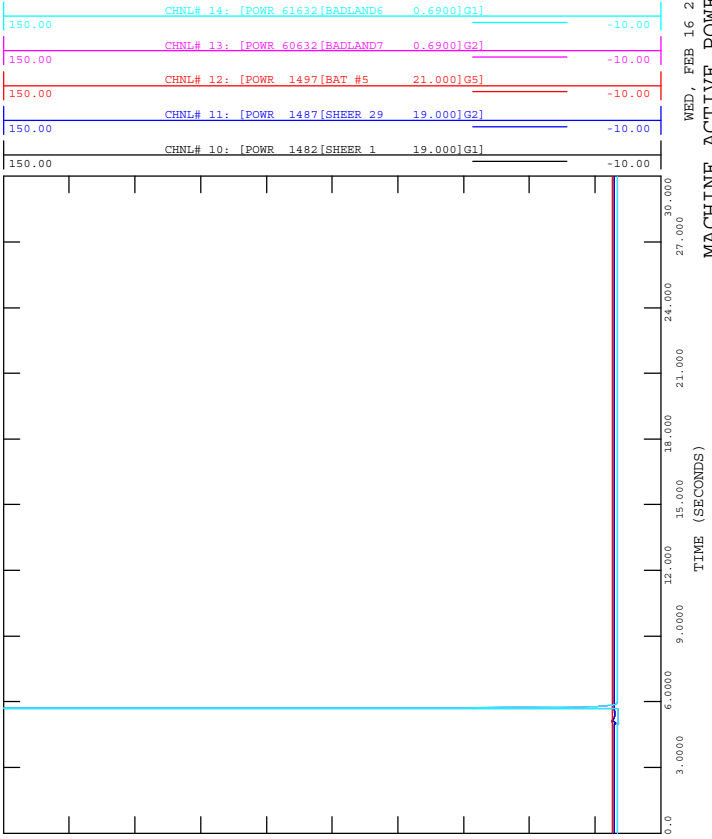
120.00	CHNL# 85: [POWR 1448 TO 1460 CKT '71']	-310.0
120.00	CHNL# 81: [POWR 1447 TO 1440 CKT '29']	-310.0
120.00	CHNL# 77: [POWR 1440 TO 1484 CKT '70']	-310.0
120.00	CHNL# 75: [POWR 1440 TO 1447 CKT '29']	-310.0
120.00	CHNL# 71: [POWR 1438 TO 1440 CKT '24']	-310.0
120.00	CHNL# 69: [POWR 1436 TO 1448 CKT '25']	-310.0



BRANCH FLOW (P)
 WED, FEB 16 2022 15:50



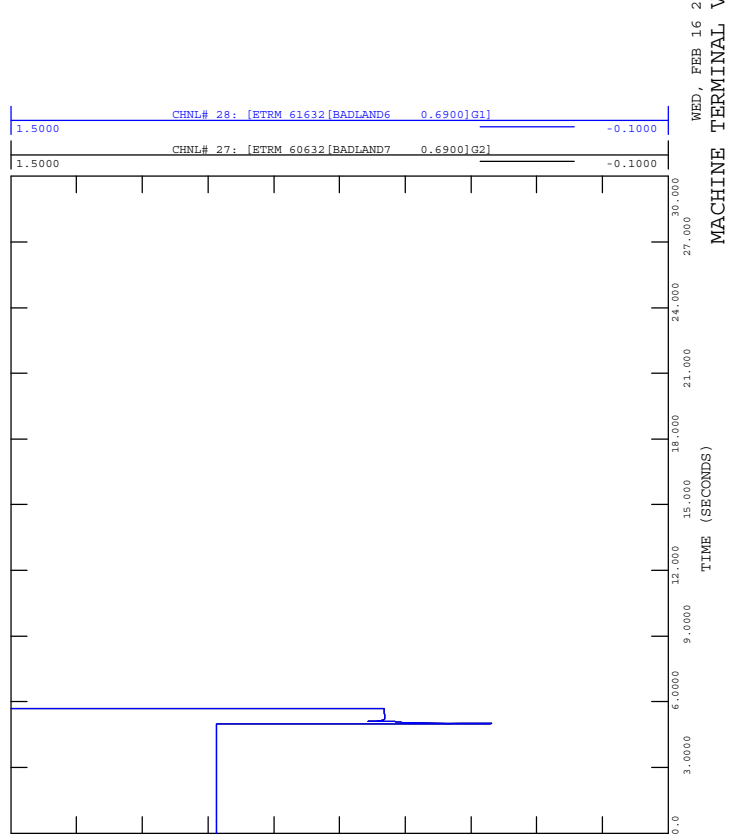
FIGURE A4-77B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-77_3PH_Fault_7L85@Anderson-801S.out



WED, FEB 16 2022 15:51
 MACHINE ACTIVE POWER (MW)



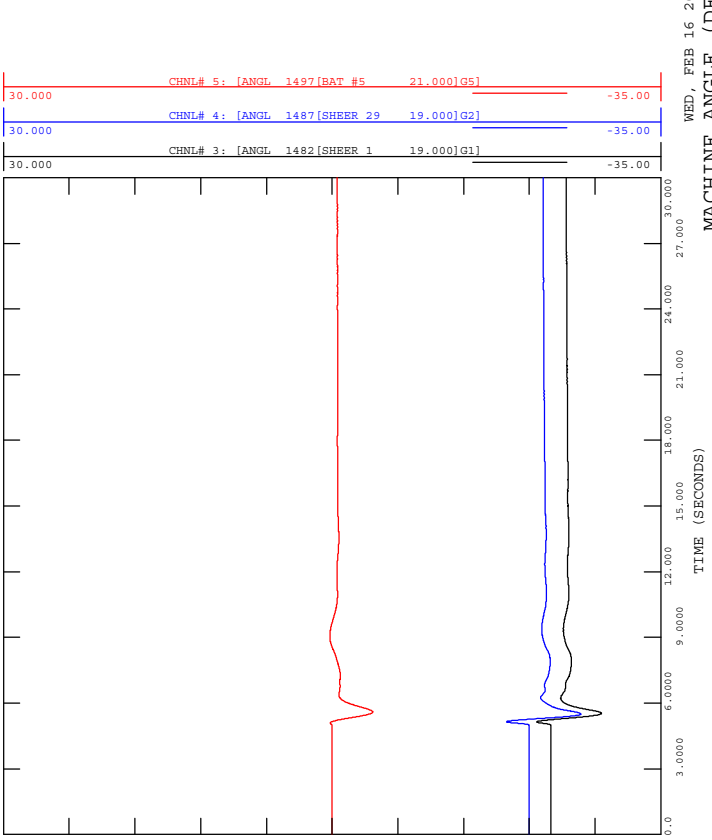
FIGURE A4-77D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-77_3PH_Fault_7L85@Anderson-801S.out



WED, FEB 16 2022 15:51
 TERMINAL VOLTAGE



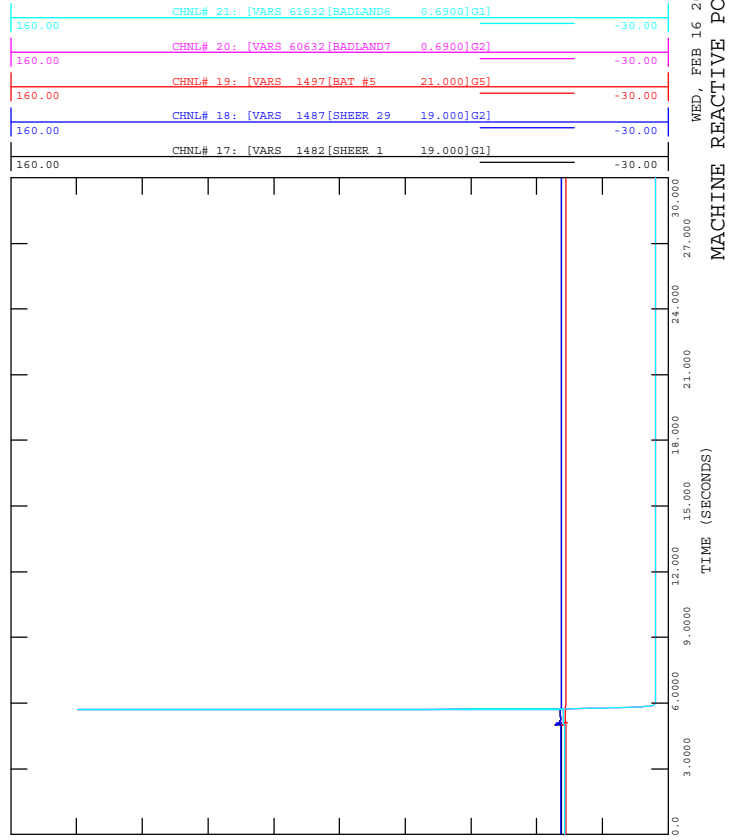
FIGURE A4-77A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-77_3PH_Fault_7L85@Anderson-801S.out



WED, FEB 16 2022 15:51
 MACHINE ANGLE (DEGREES)



FIGURE A4-77C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-77_3PH_Fault_7L85@Anderson-801S.out



WED, FEB 16 2022 15:51
 MACHINE REACTIVE POWER (M)



FIGURE A4-77F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-77_3PH_Fault_7L85@Anderson-801S.out

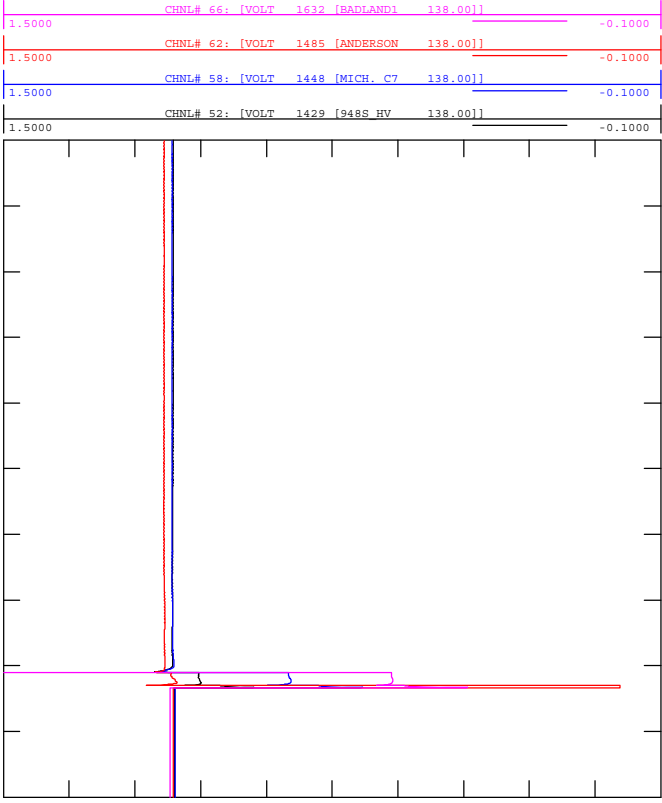


FIGURE A4-77H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-77_3PH_Fault_7L85@Anderson-801S.out

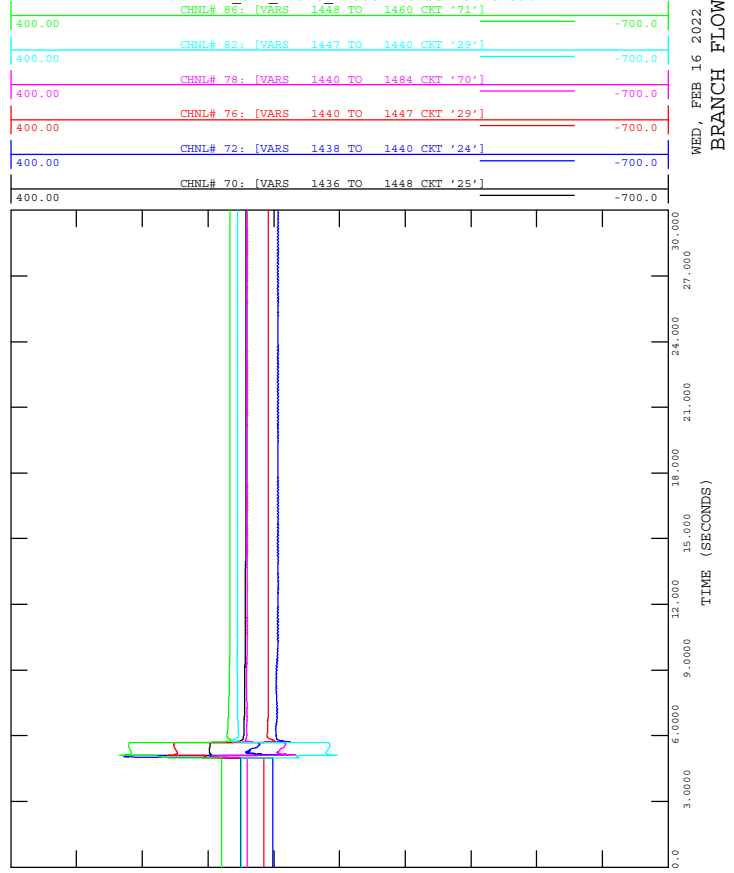


FIGURE A4-77E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-77_3PH_Fault_7L85@Anderson-801S.out

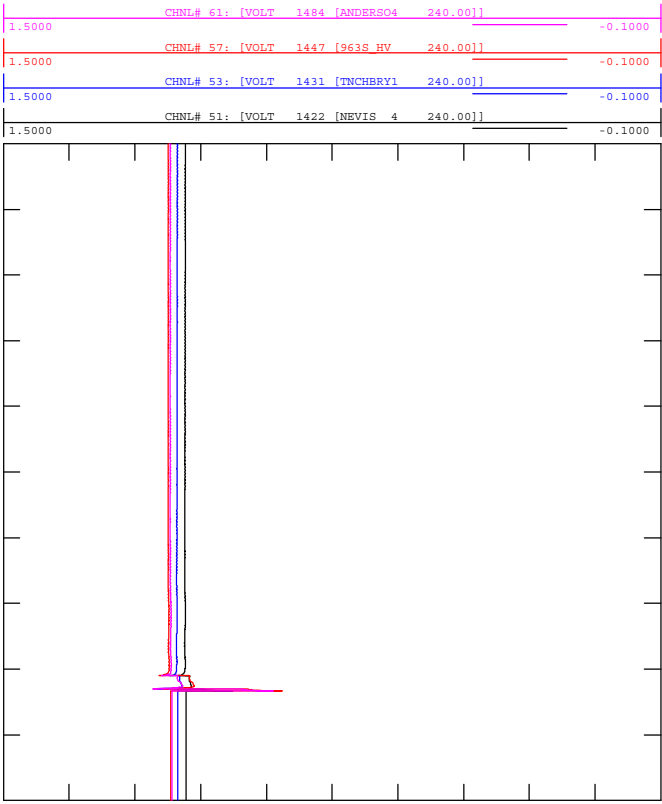


FIGURE A4-77G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT ANDERSON 801S
 CLEARED IN 6 CYCLES, FAR END CLEARED IN 42 CYCLES
 FILE: A4-77_3PH_Fault_7L85@Anderson-801S.out

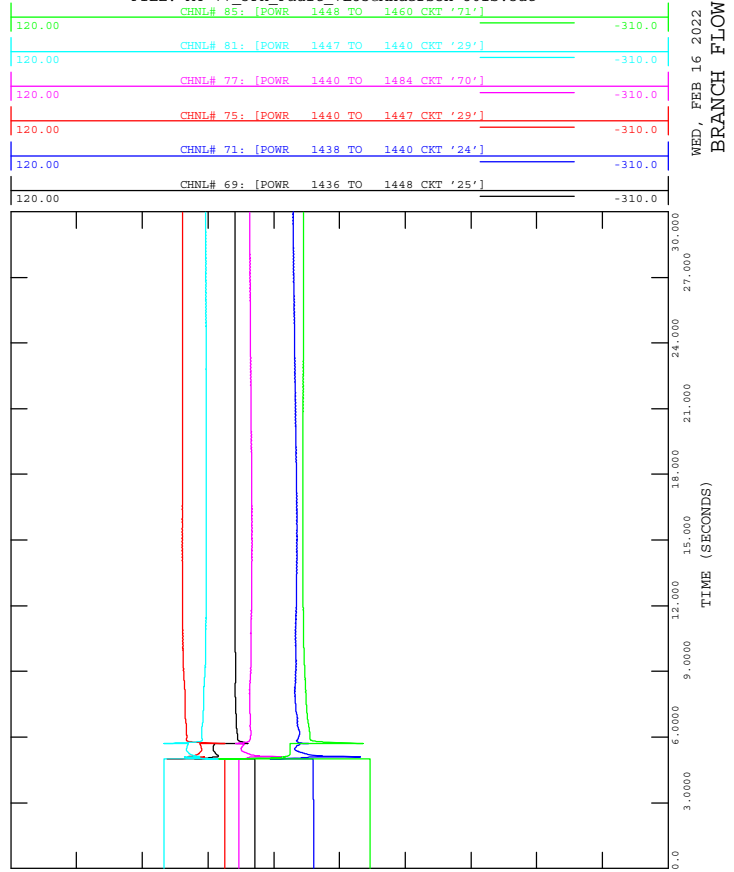
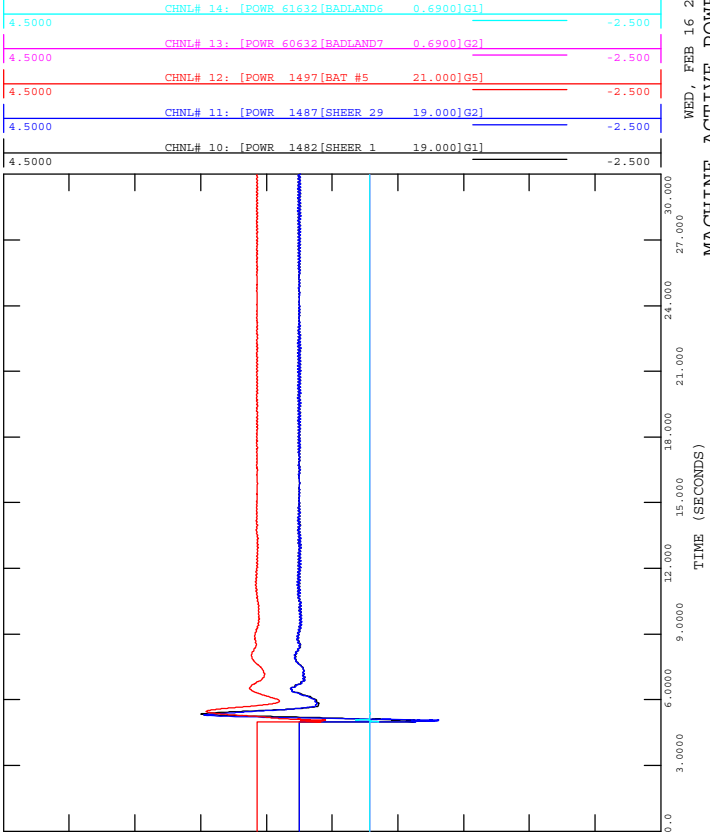




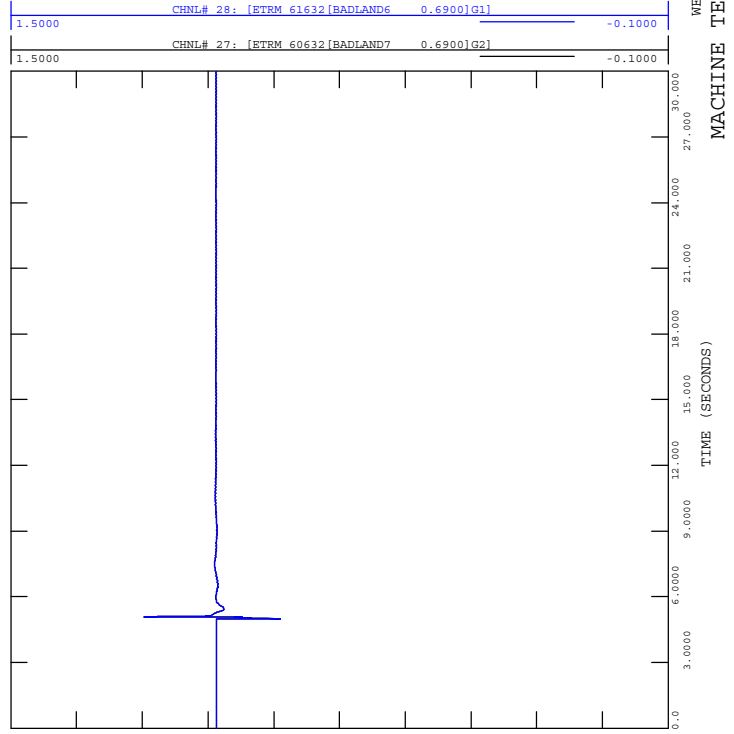
FIGURE A4-78B
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-78_3PH_Fault_EATL@Heathfield-2029S.out



WED, FEB 16 2022 15:51
 MACHINE ACTIVE POWER (MW)



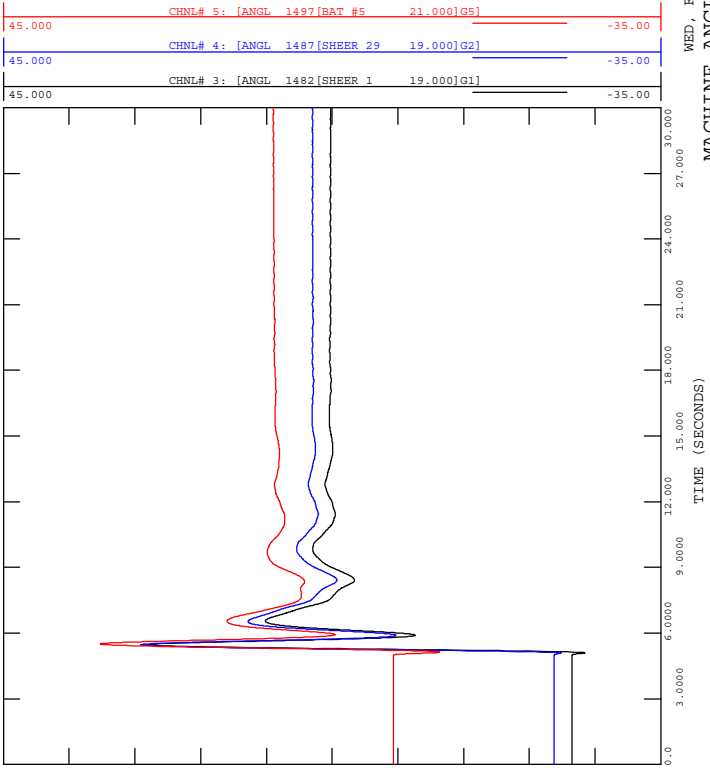
FIGURE A4-78D
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-78_3PH_Fault_EATL@Heathfield-2029S.out



WED, FEB 16 2022 15:51
 MACHINE TERMINAL VOLTAGE



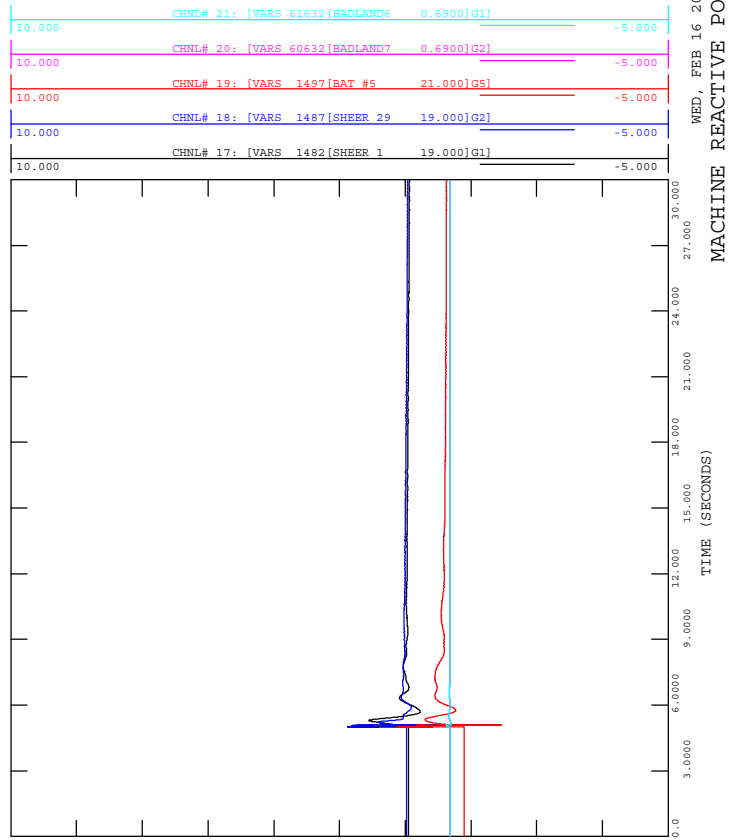
FIGURE A4-78A
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-78_3PH_Fault_EATL@Heathfield-2029S.out



WED, FEB 16 2022 15:51
 MACHINE ANGLE (DEGREES)



FIGURE A4-78C
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-78_3PH_Fault_EATL@Heathfield-2029S.out



WED, FEB 16 2022 15:51
 MACHINE REACTIVE POWER (M)



FIGURE A4-78F
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-78_3PH_Fault_EATL@Heathfield-2029S.out

15:51
 WED, FEB 16 2022
 138 KV BUS VOLTAGE (PU)

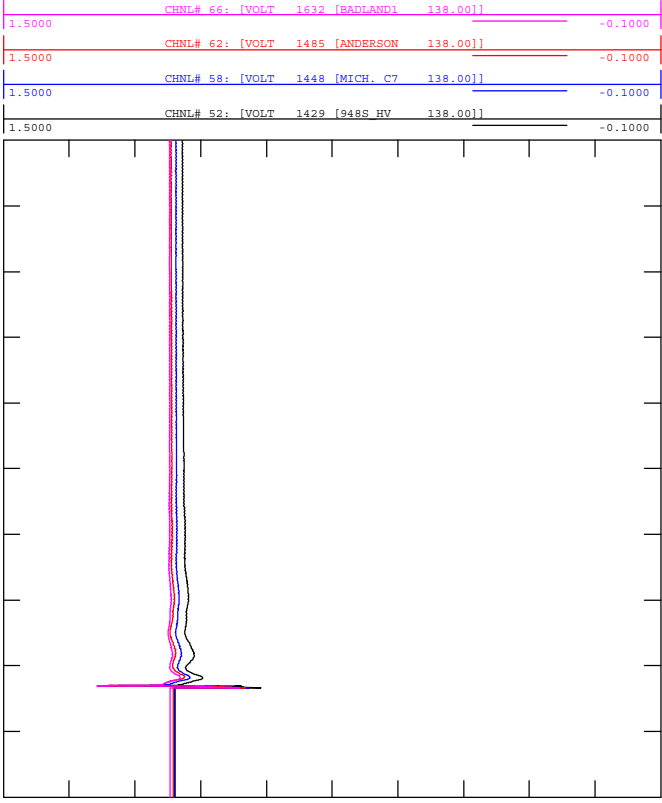


FIGURE A4-78H
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-78_3PH_Fault_EATL@Heathfield-2029S.out

15:52
 WED, FEB 16 2022
 BRANCH FLOW (Q)

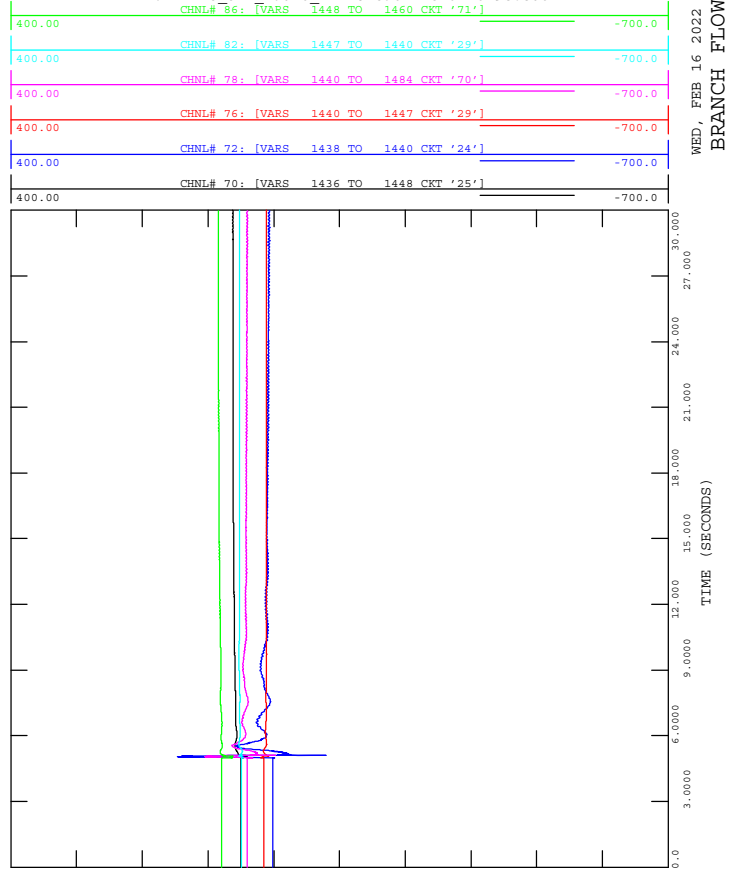


FIGURE A4-78E
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-78_3PH_Fault_EATL@Heathfield-2029S.out

15:51
 WED, FEB 16 2022
 240 KV BUS VOLTAGE (PU)

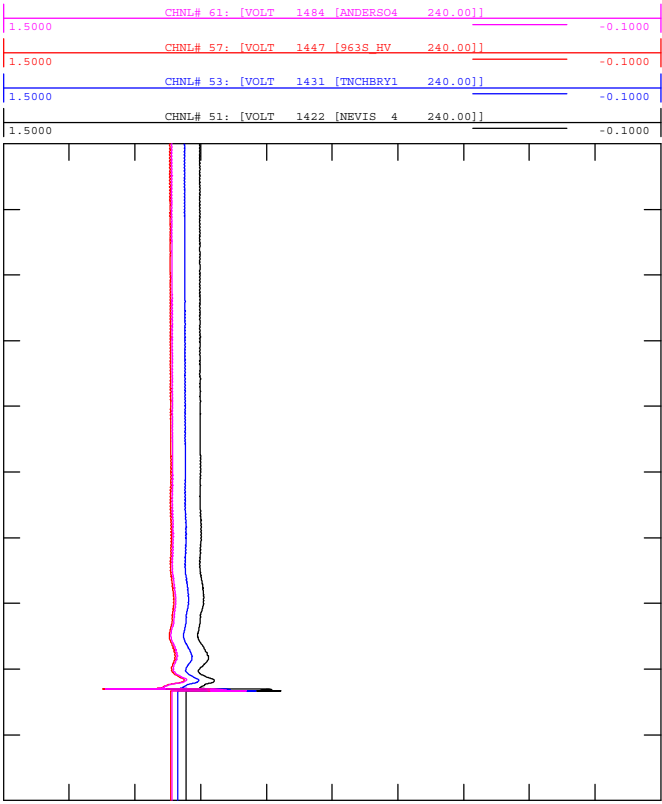
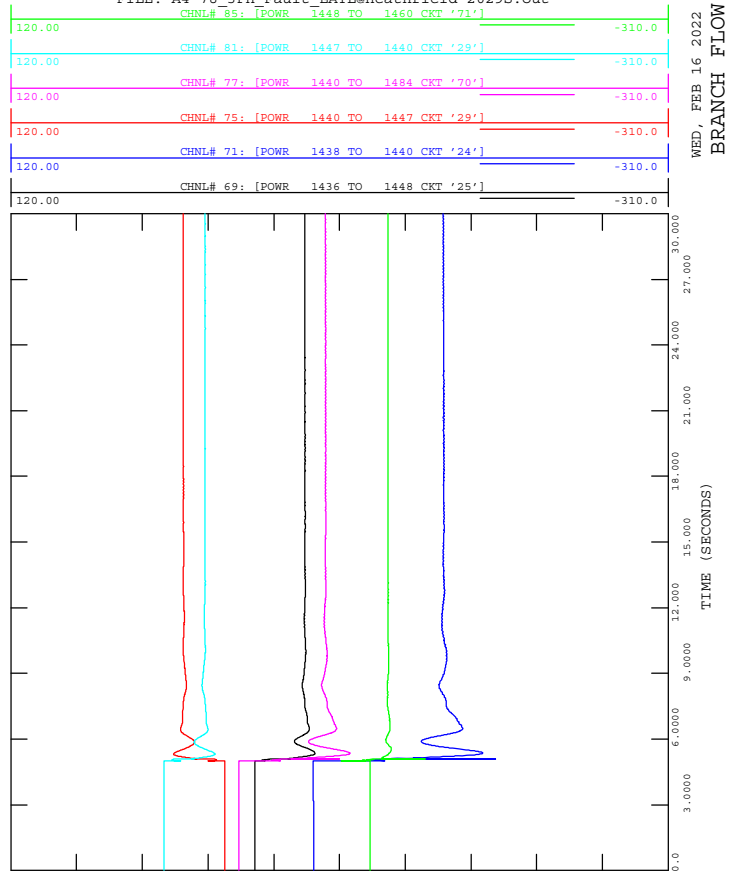


FIGURE A4-78G
 2022WP, POST-PROJECT
 3-PHASE FAULT AT HEATHFIELD 2029S
 CLEARED IN 5 CYCLES, FAR END CLEARED IN 6 CYCLES
 FILE: A4-78_3PH_Fault_EATL@Heathfield-2029S.out

15:51
 WED, FEB 16 2022
 BRANCH FLOW (P)



Attachment A5

Dynamic Data and Assumption

Attachment A5: Dynamic Data and Assumptions

Table A5-1: Generic Renewable Energy Generator/Converter Model (REGCAU1)

Tg	Rrpwr	Brkpt	Zerox	Lvp11	Volim	Lvpnt1	Lvpnt0
0.036	10	0.2	0.1	0.9	0	0.001	0
lolim	Tfltr	Khv	lqrmax	lqrmin	Accel	LVPL switch	
-999999	0.005	0	10000000	-10000000	1	1	

Table A5-2: Generic Renewable Electrical Control Model (REECAU1)

Vdip	Vup	Trv	dbd1	dbd2	Kqv	Iqhl	Iqll
0.9	1.12	0.001	9999	9999	0	9999	-9999
Vref0	lqfrz	Thld	Thld2	Tp	QMax	QMin	VMAX
1	0	9999	9999	0.001	0.5328	-0.3935	1.5
VMIN	Kqp	Kqi	Kvp	Kvi	Vbias	Tiq	dPmax
0.7	9999	9999	2	0	1	9999	0.3767
dPmin	PMAX	PMIN	lmax	Tpord	Vq1	Iq1	Vq2
-0.3767	1	0	1.5	0.001	0.75	0.9444	0.85
Iq2	Vq3	Iq3	Vq4	Iq4	Vp1	Ip1	Vp2
0.5667	1	0.5667	1.195	0.4496	0.1	0	0.2
Ip2	Vp3	Ip3	Vp4	Ip4	BUS	PFFLAG	VFLAG
0.9	0.85	1.318	1.7	1.318	0	0	0
QFLAG	PFLAG	PQFLAG					
1	1	0					

Table A5-3: Generic Drive Train Model for Type 3 and 4 Wind Machines (WTDTAU1)

H	DAMP	Htfrac	Freq1	Dshaft
6.0609	37.1395	0.8518	1.428	1

Table A5-4: Generic Renewable Plant Control Model (REPCAU1)

Tfltr	Kp	Ki	Tft	Tfv	Vfrz	Rc	Xc
0.04	0	0.726	0	0.02	0.9	0	0
Kc	emax	emin	dbd1	dbd2	Qmax	Qmin	Kpg
0.1515	1	-1	0	0	0.2	-0.2	0
Kig	Tp	fdbd1	fdbd2	femax	femin	Pmax	Pmin
0.6	0.1	-0.005	0	0.6667	-0.6667	1	0.1
Tg	Ddn	Dup	BUS	From Bus	To Bus	ID	VCFlag
0.02	25	0	0	0	0	'0'	0
RefFlag	Fflag						
1	1						

Attachment A6

Post-Mitigation Power Flow Diagrams

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

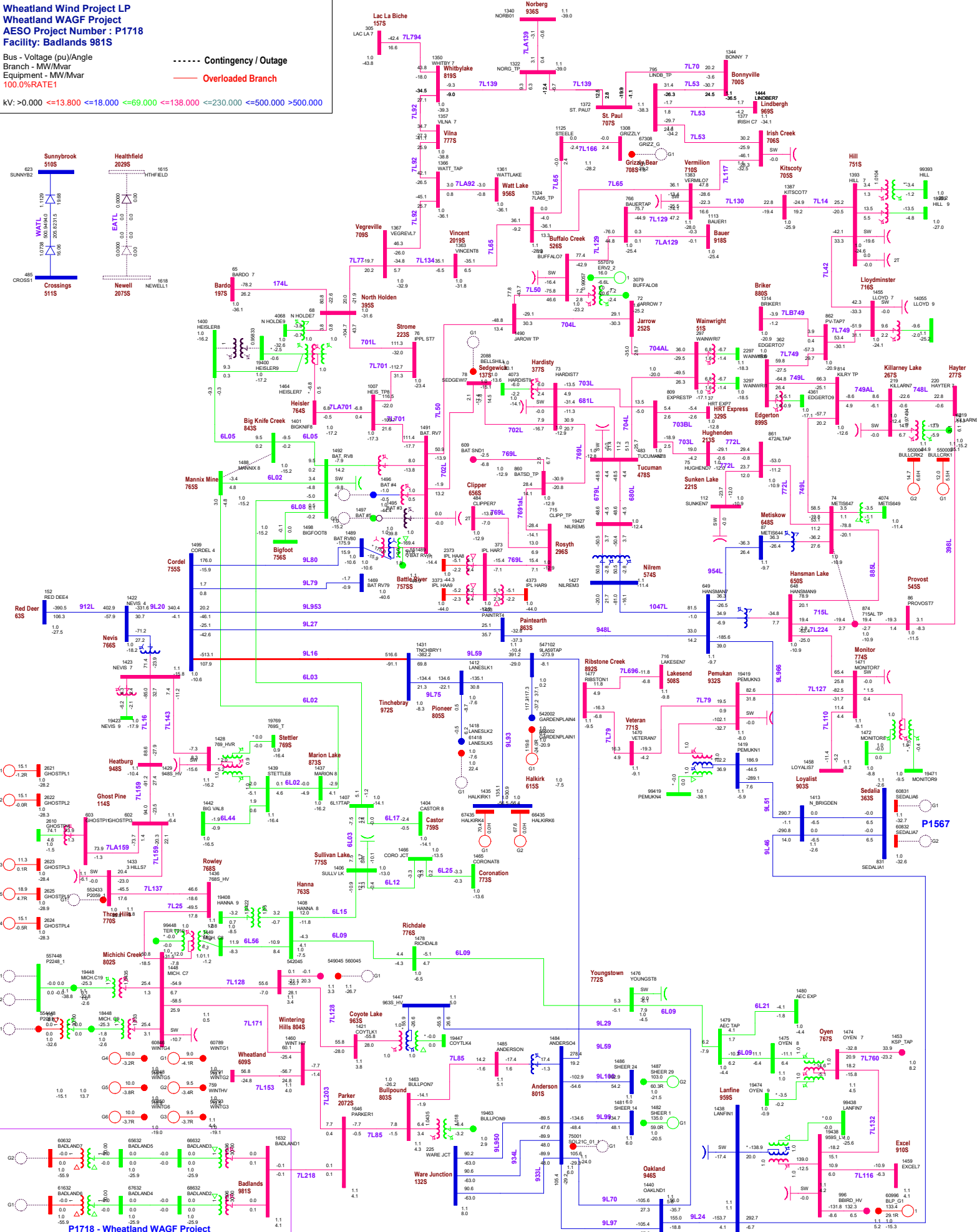


Figure A6-69

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

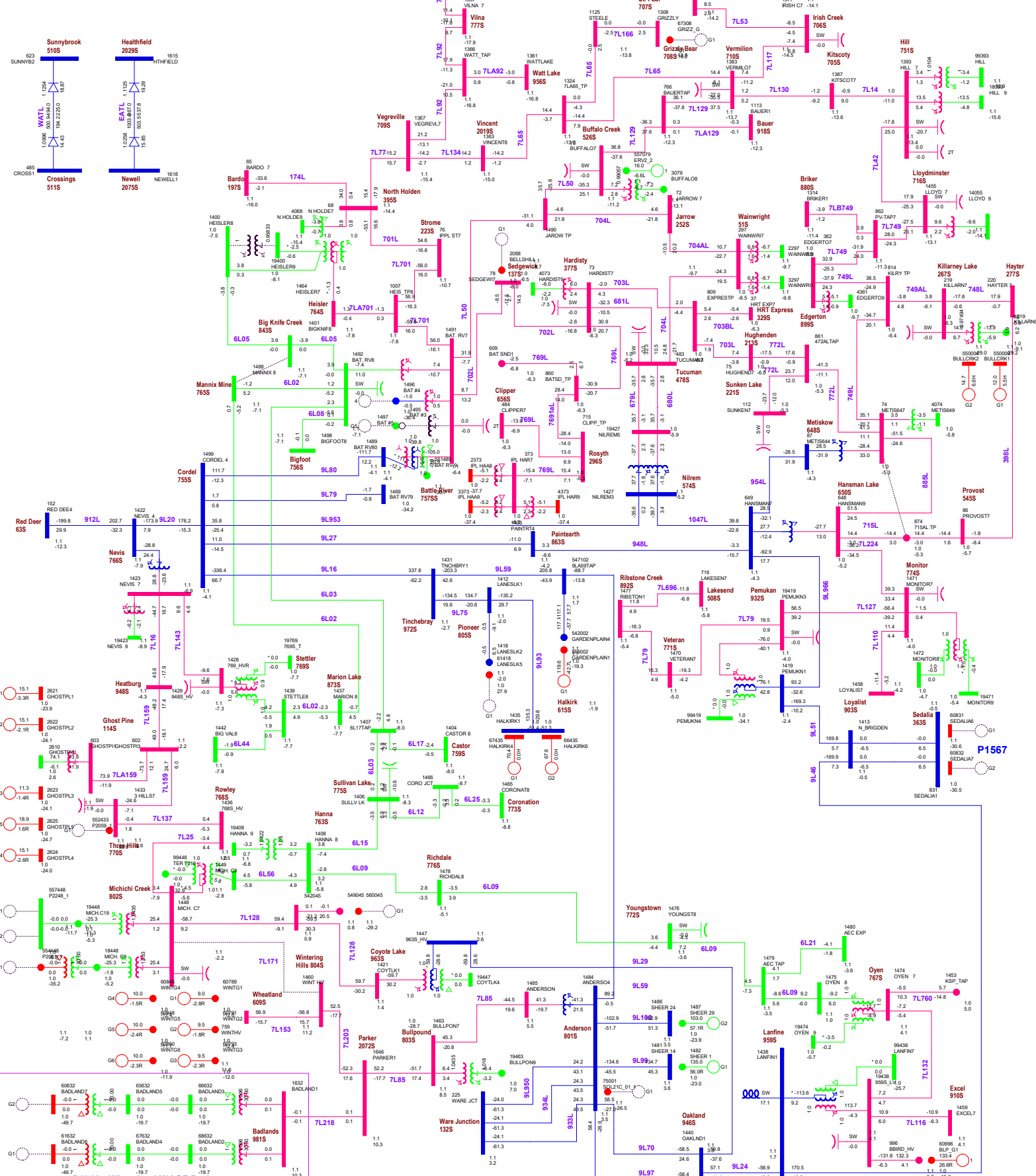


Figure A6-70

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

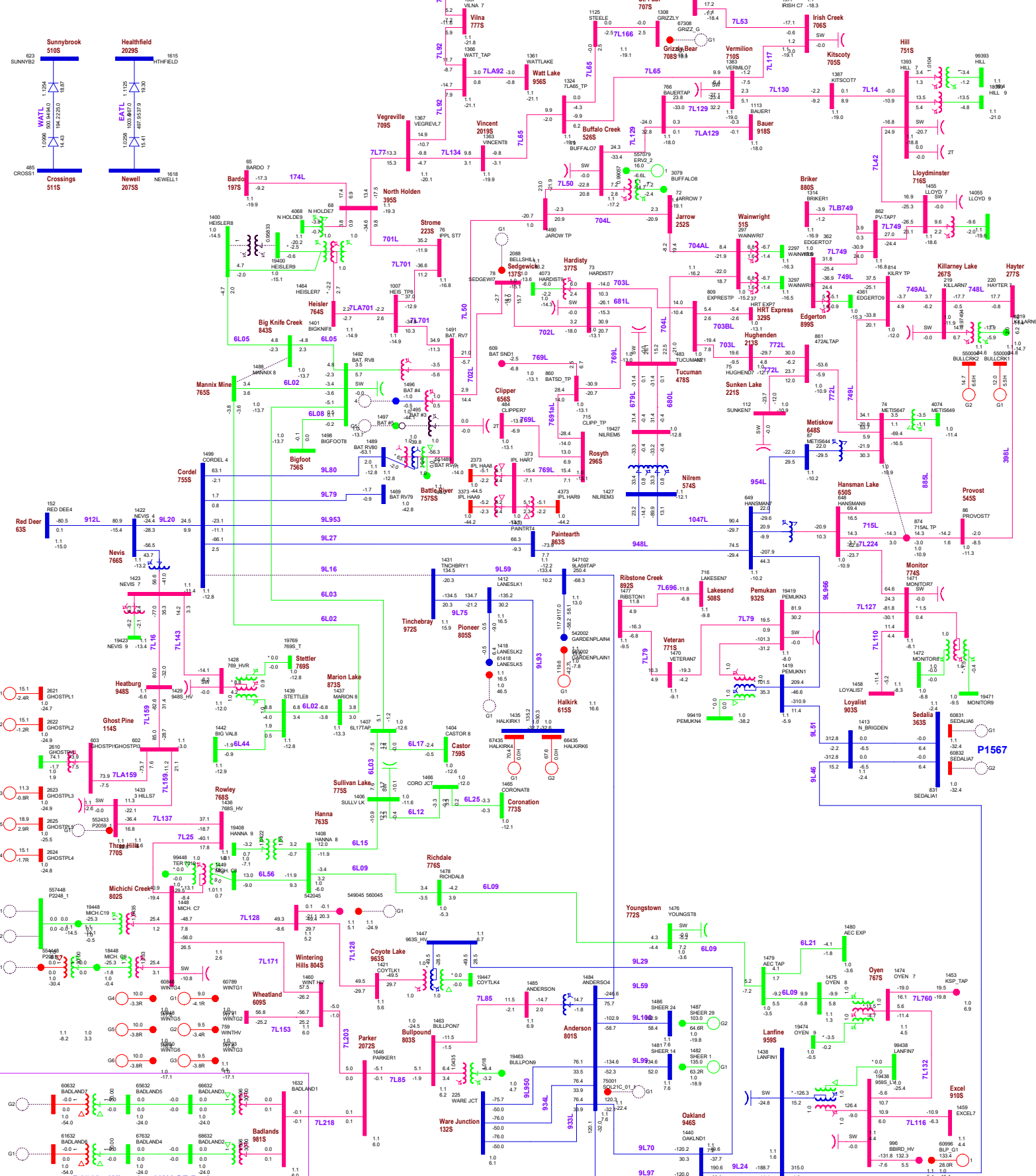


Figure A6-71

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

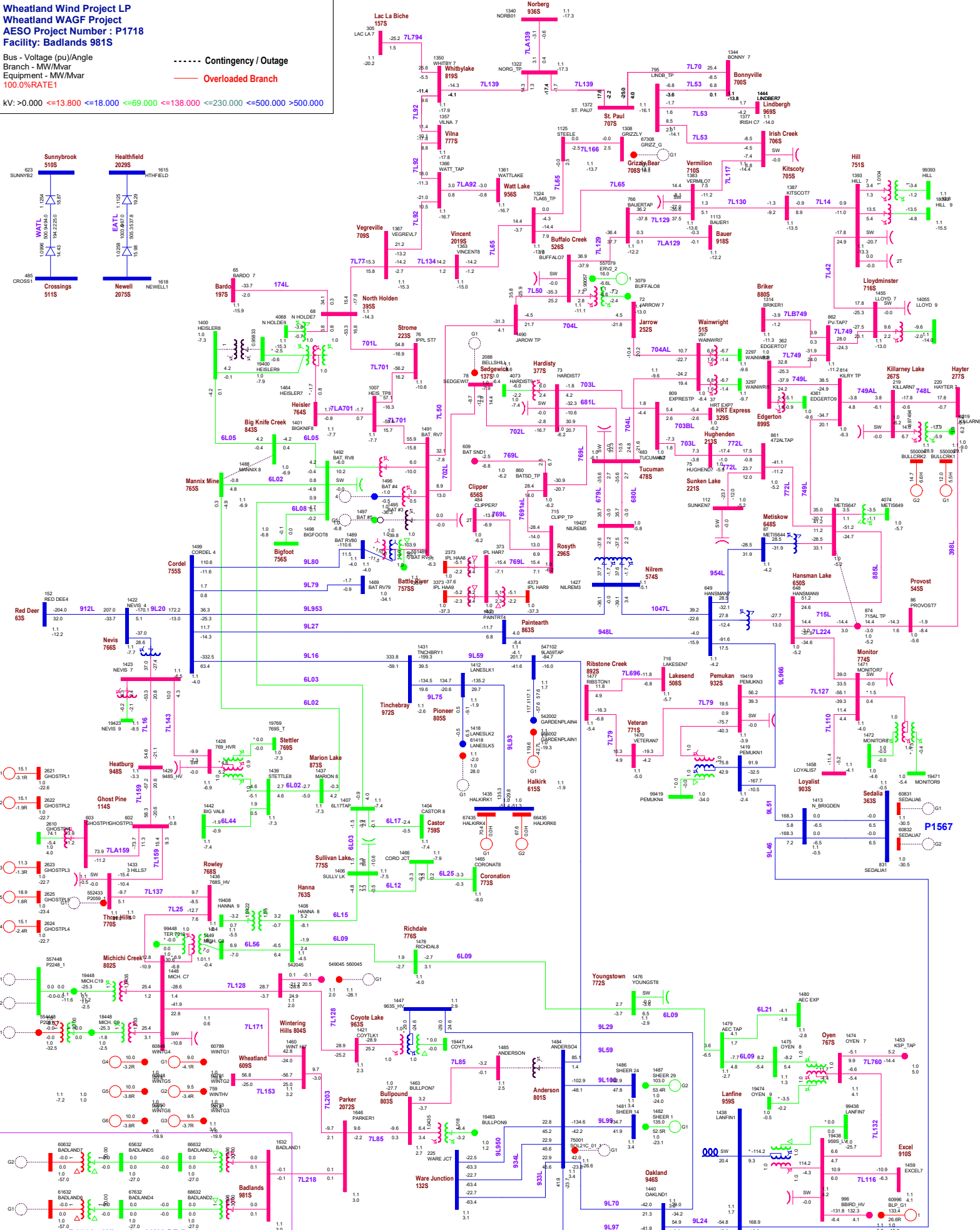


Figure A6-72

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

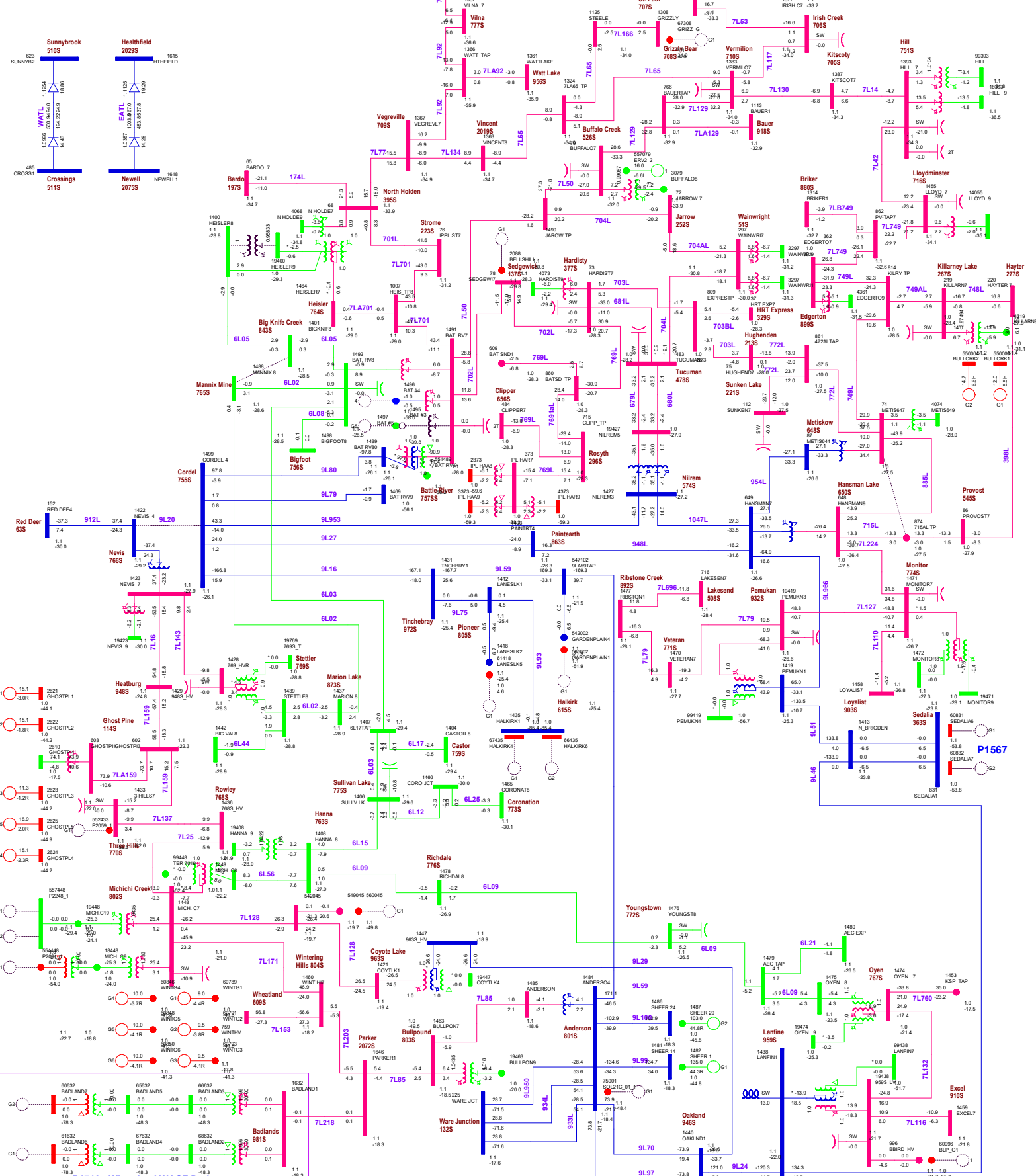


Figure A6-73

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

- - - - - Contingency / Outage
 Overloaded Branch

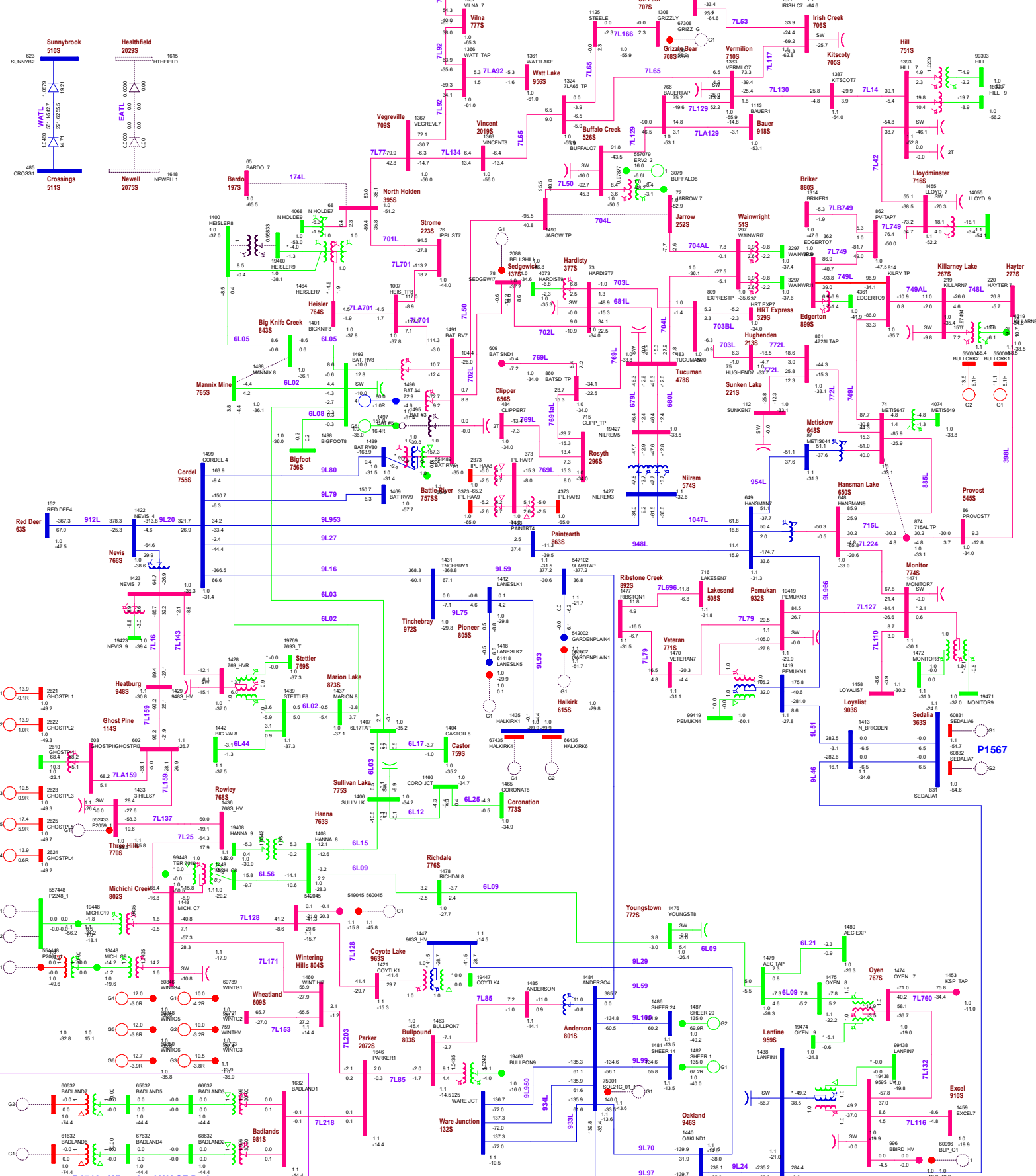


Figure A6-74

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

kv: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

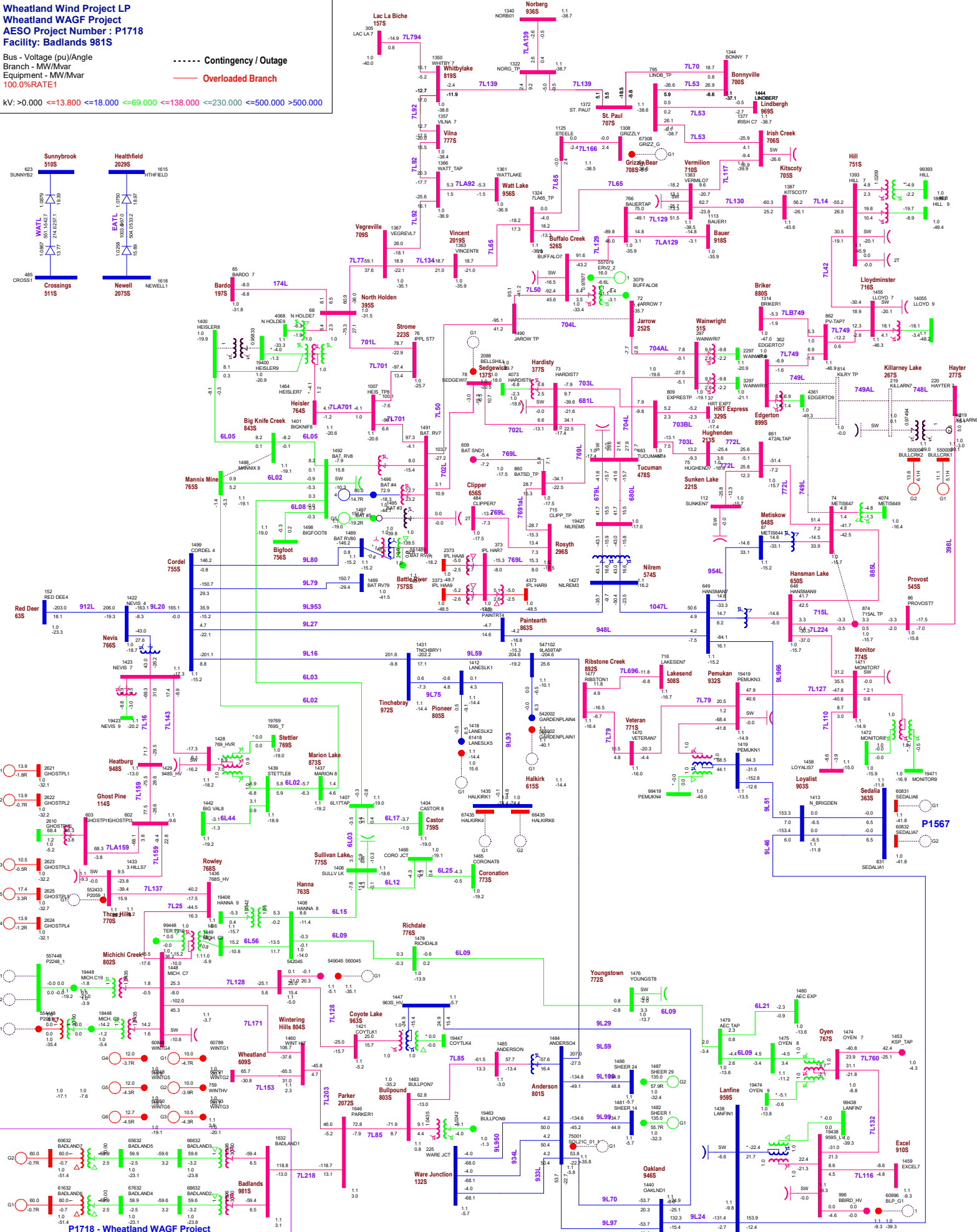


Figure A6-75

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

kv: >0.000 <=13.000 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

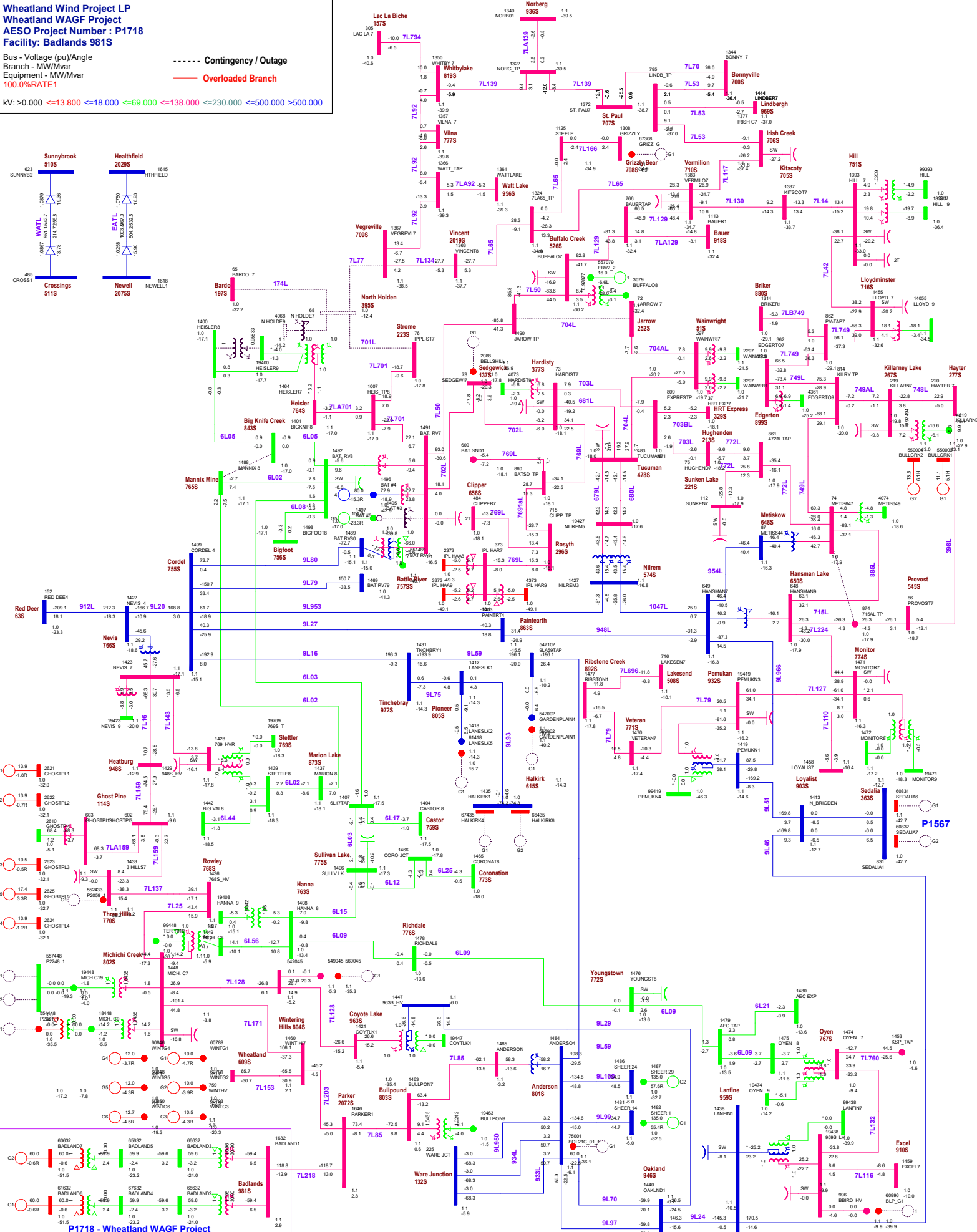


Figure A6-76

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 Overloaded Branch

kV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

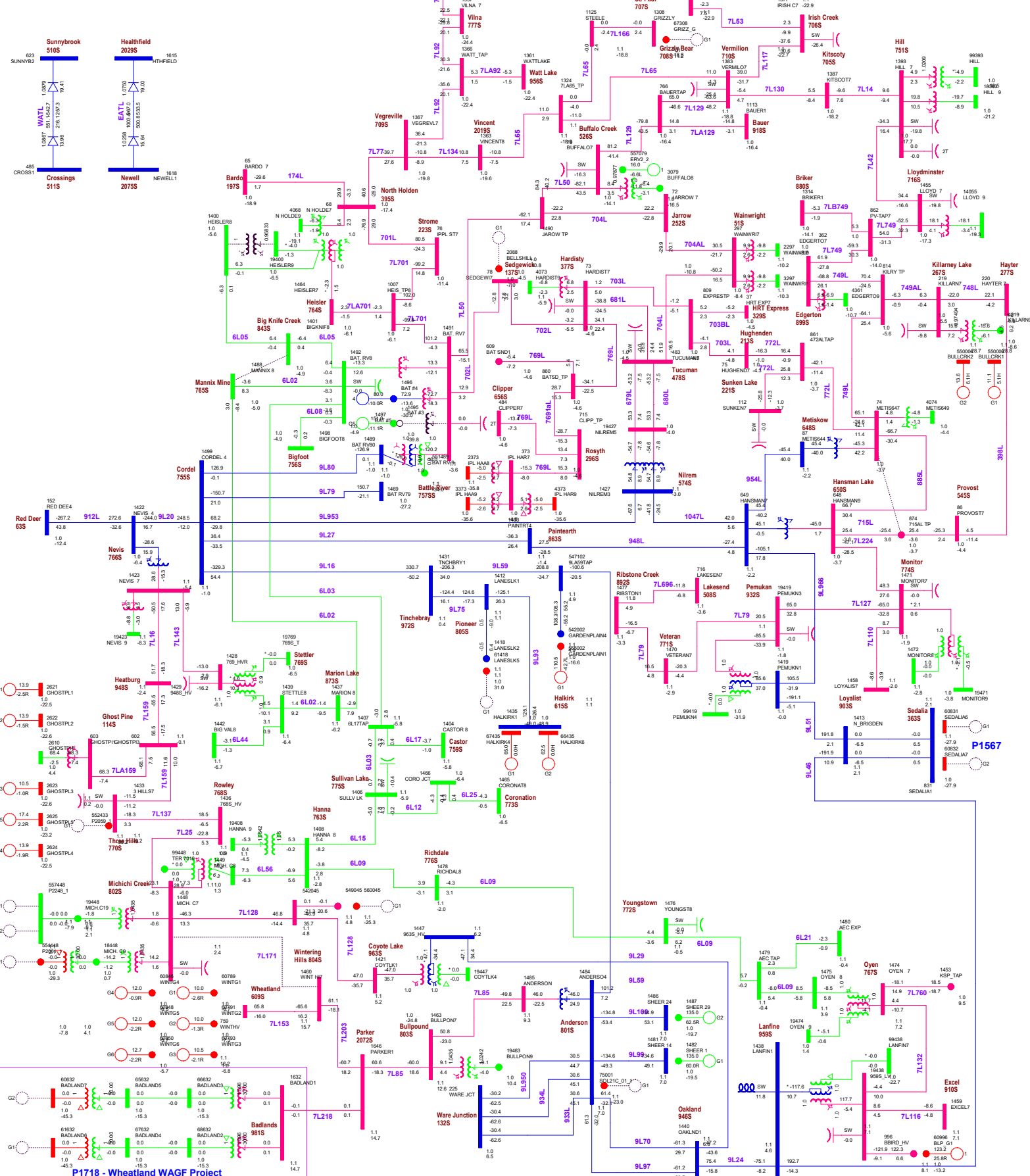


Figure A6-77

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

kV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

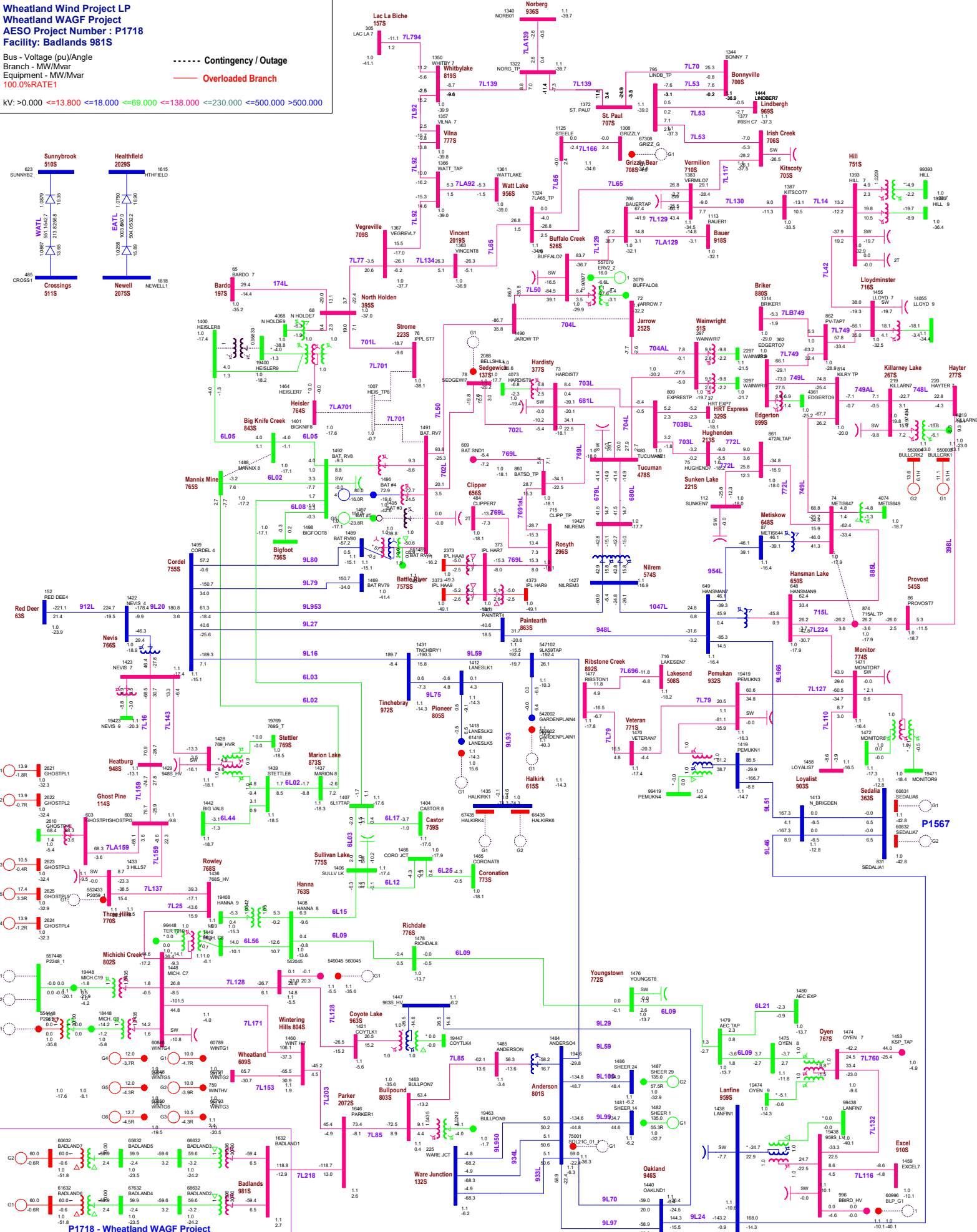


Figure A6-78

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

kv: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

----- Contingency / Outage
 ----- Overloaded Branch

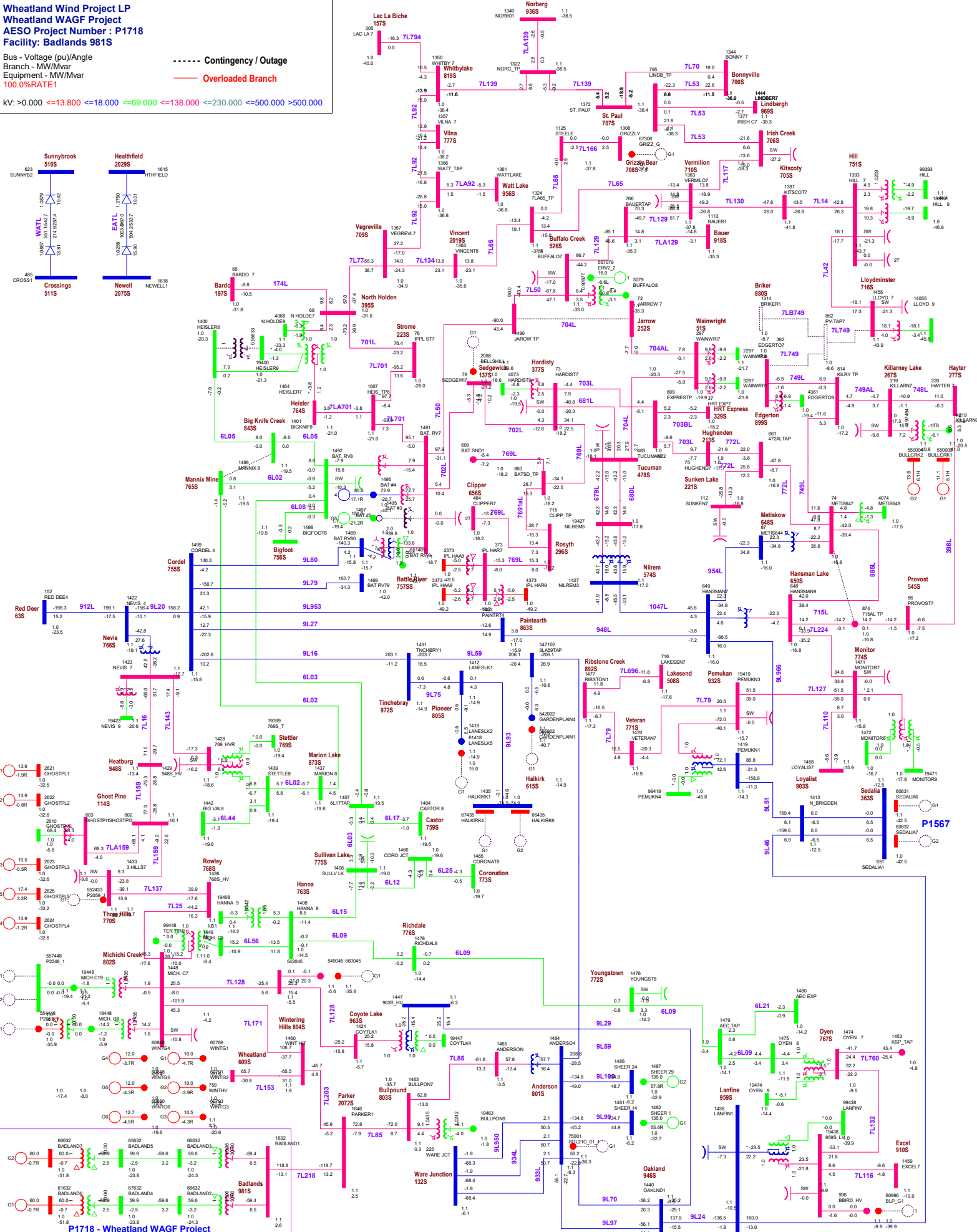


Figure A6-79

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

----- Contingency / Outage
 Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

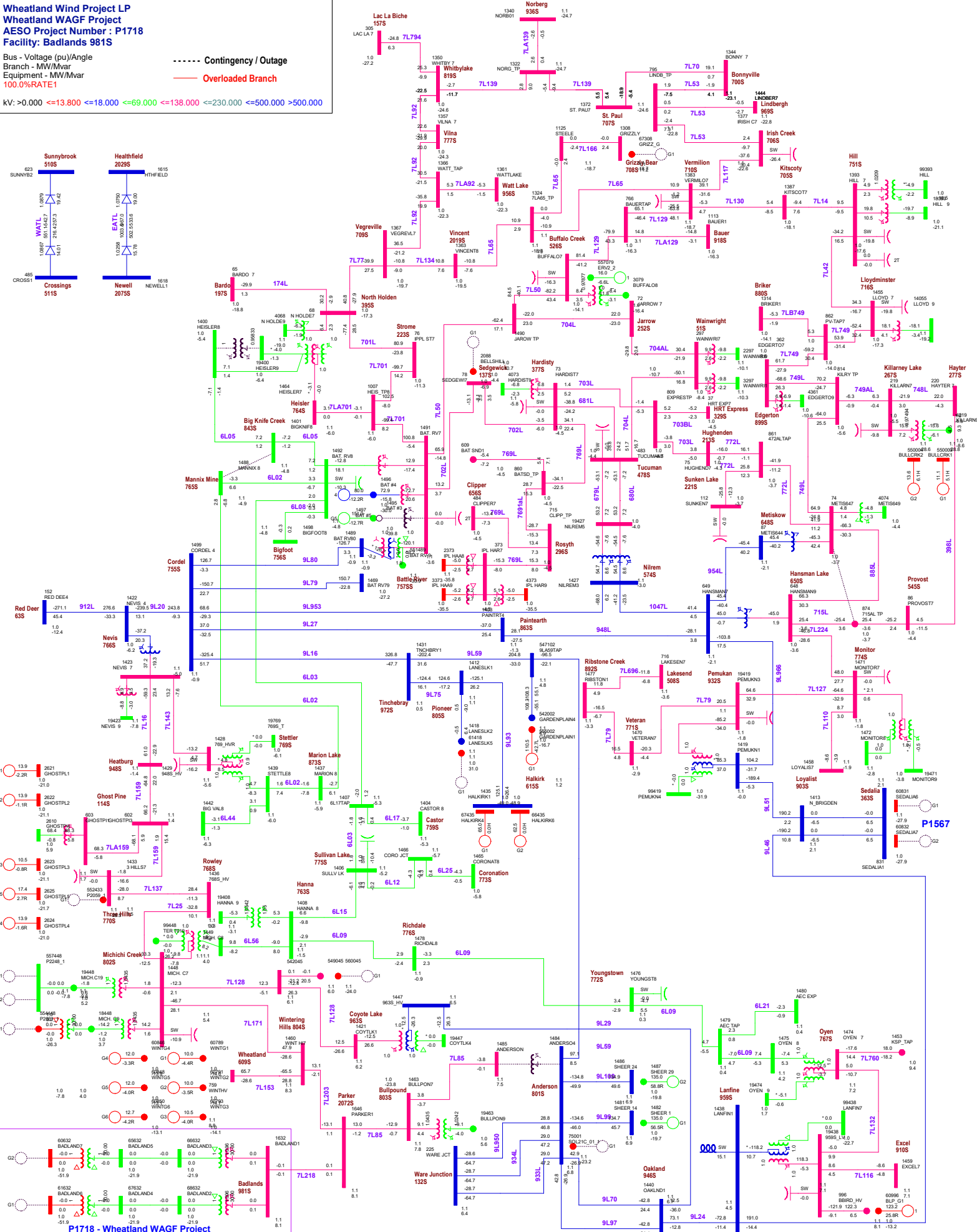


Figure A6-80

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

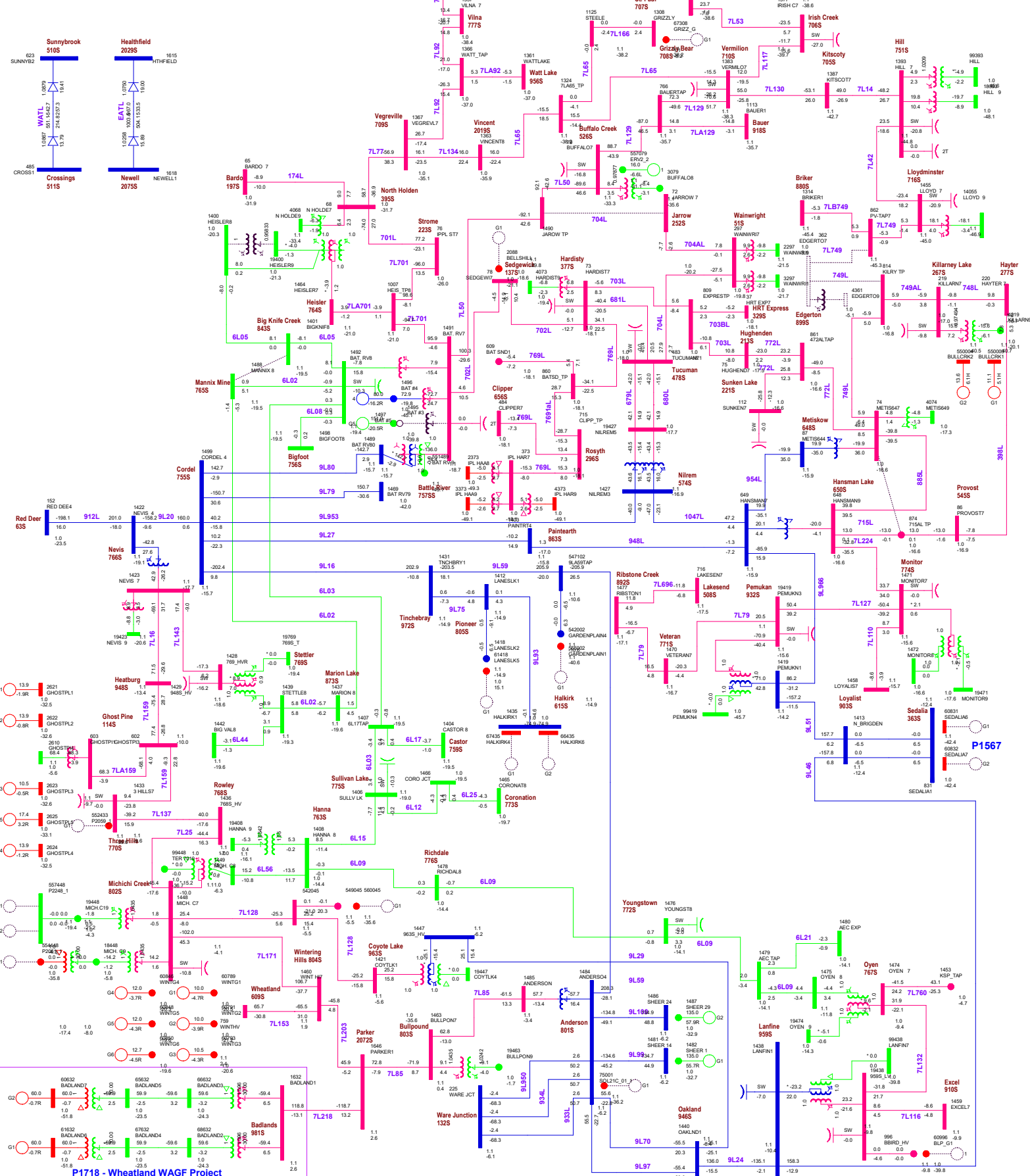


Figure A6-81

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

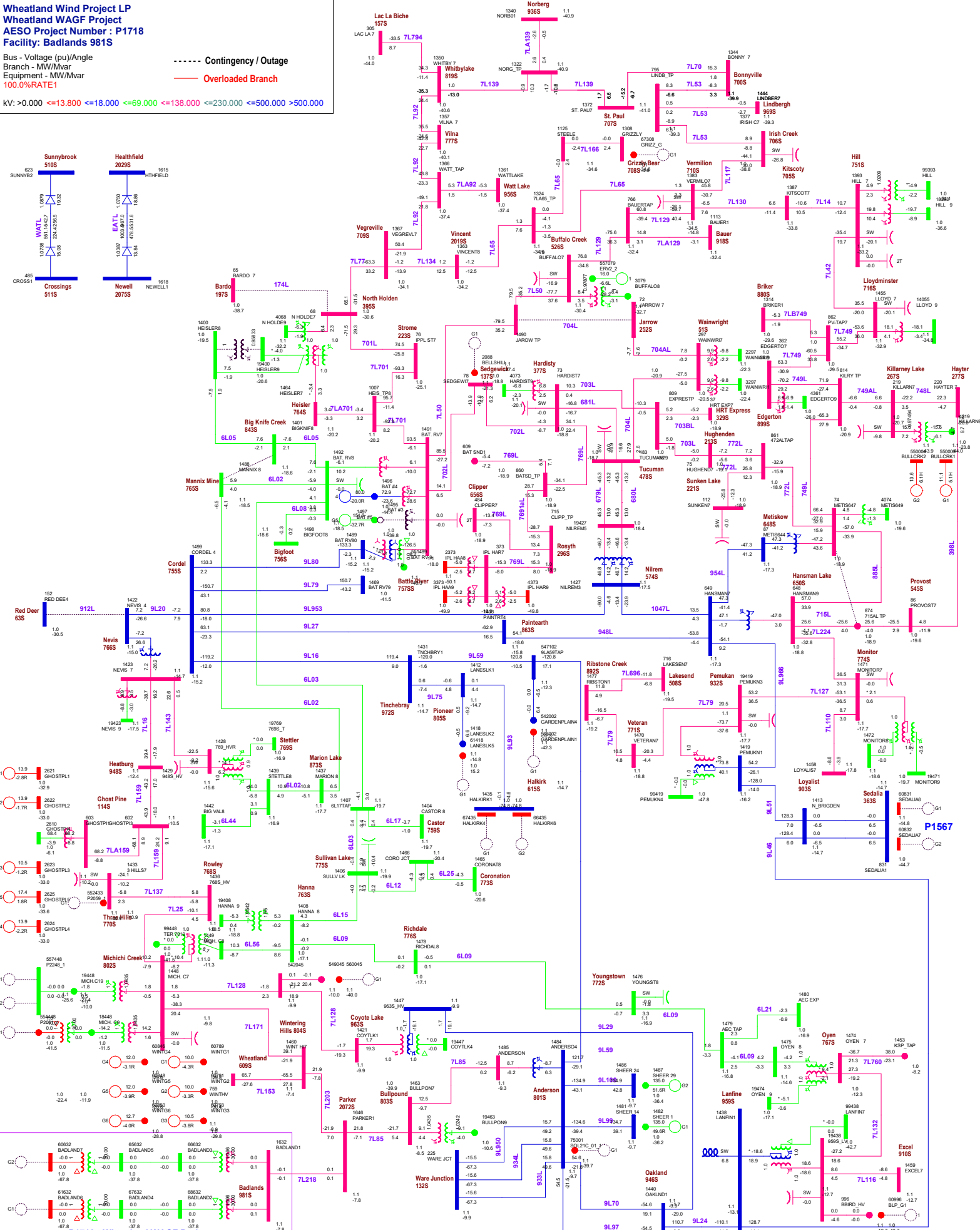


Figure A6-82

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

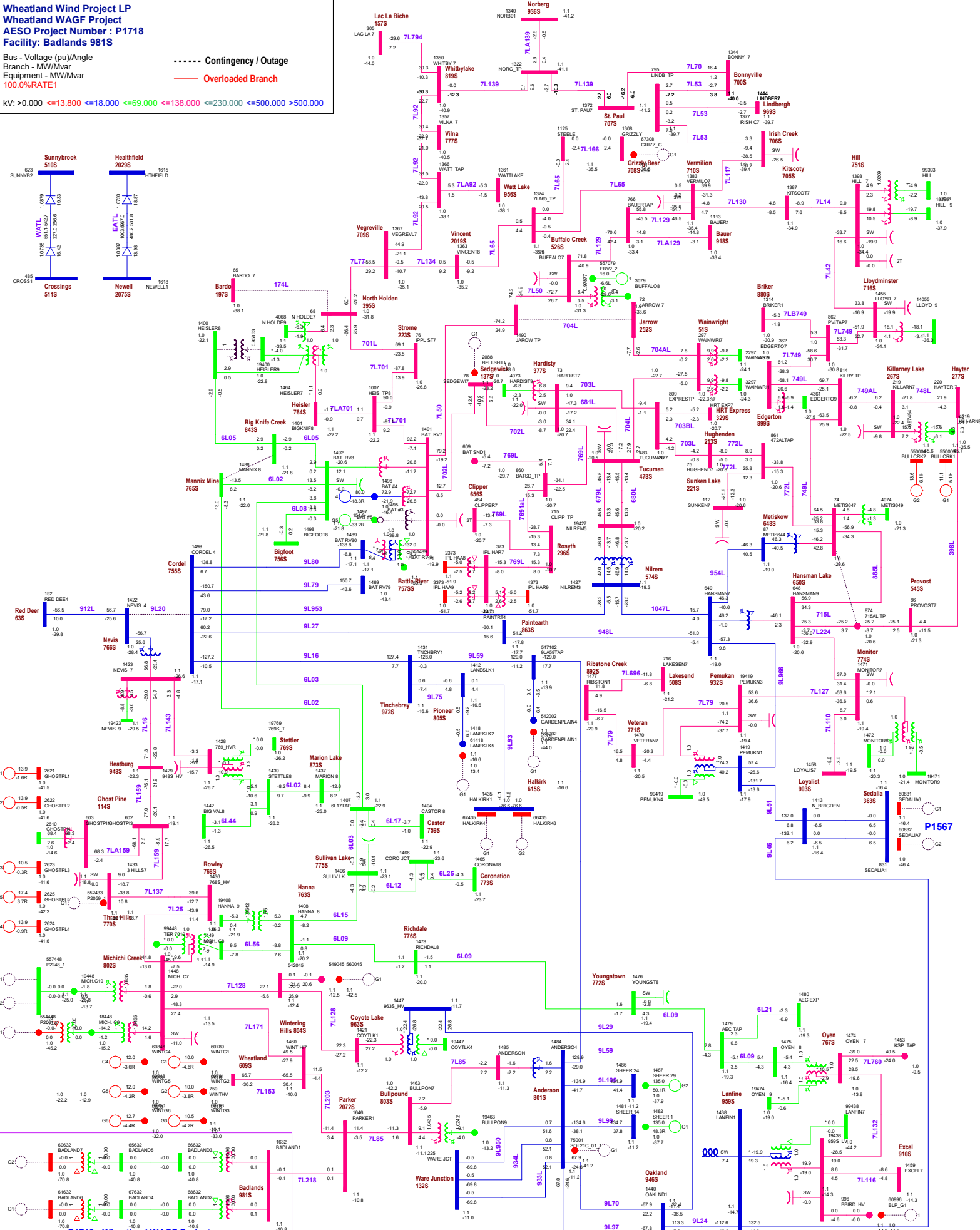


Figure A6-84

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE1

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

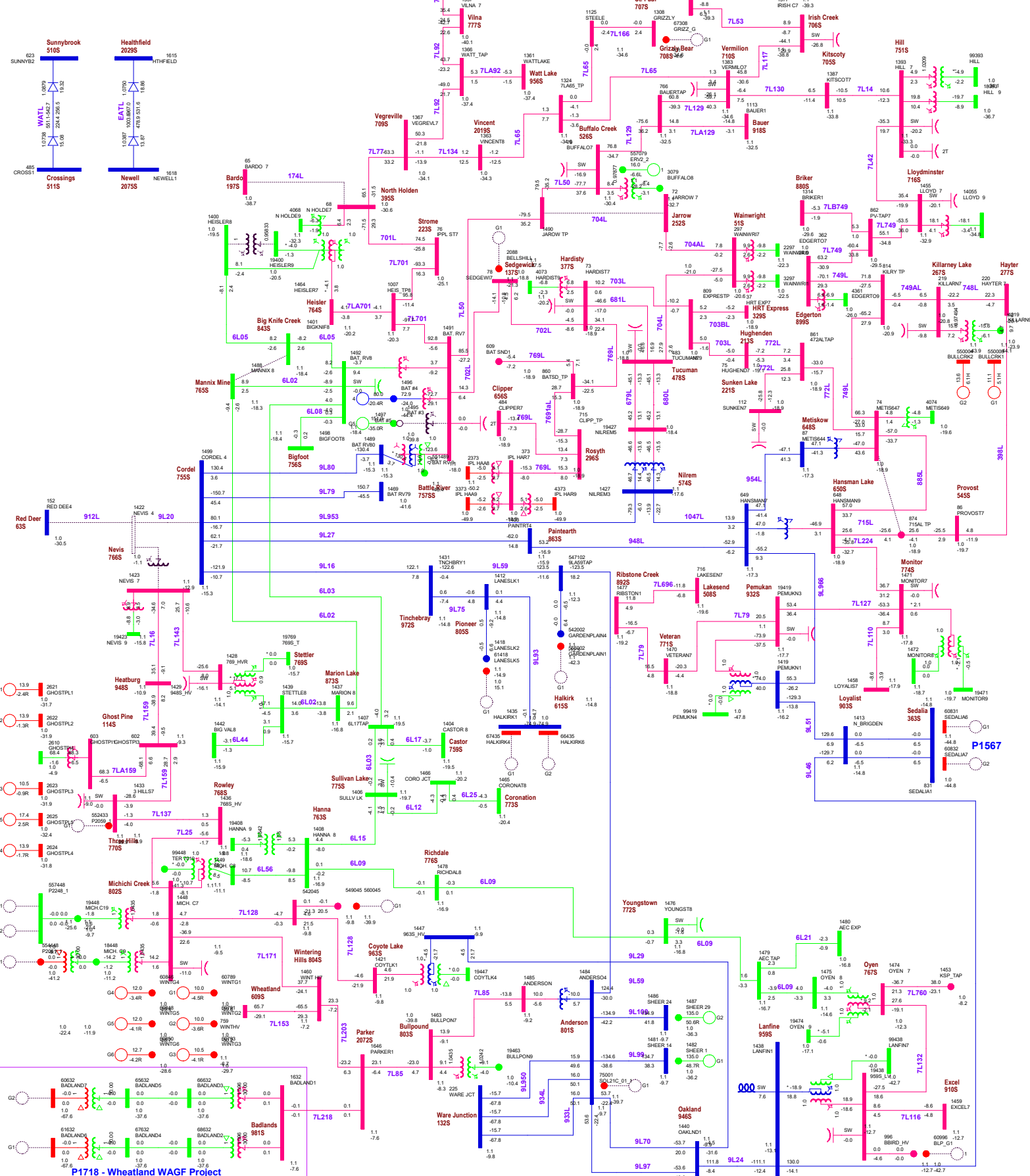


Figure A6-86

Wheatland Wind Project LP
Wheatland WAGF Project
AEO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE2

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

- - - - - Contingency / Outage
 Overloaded Branch

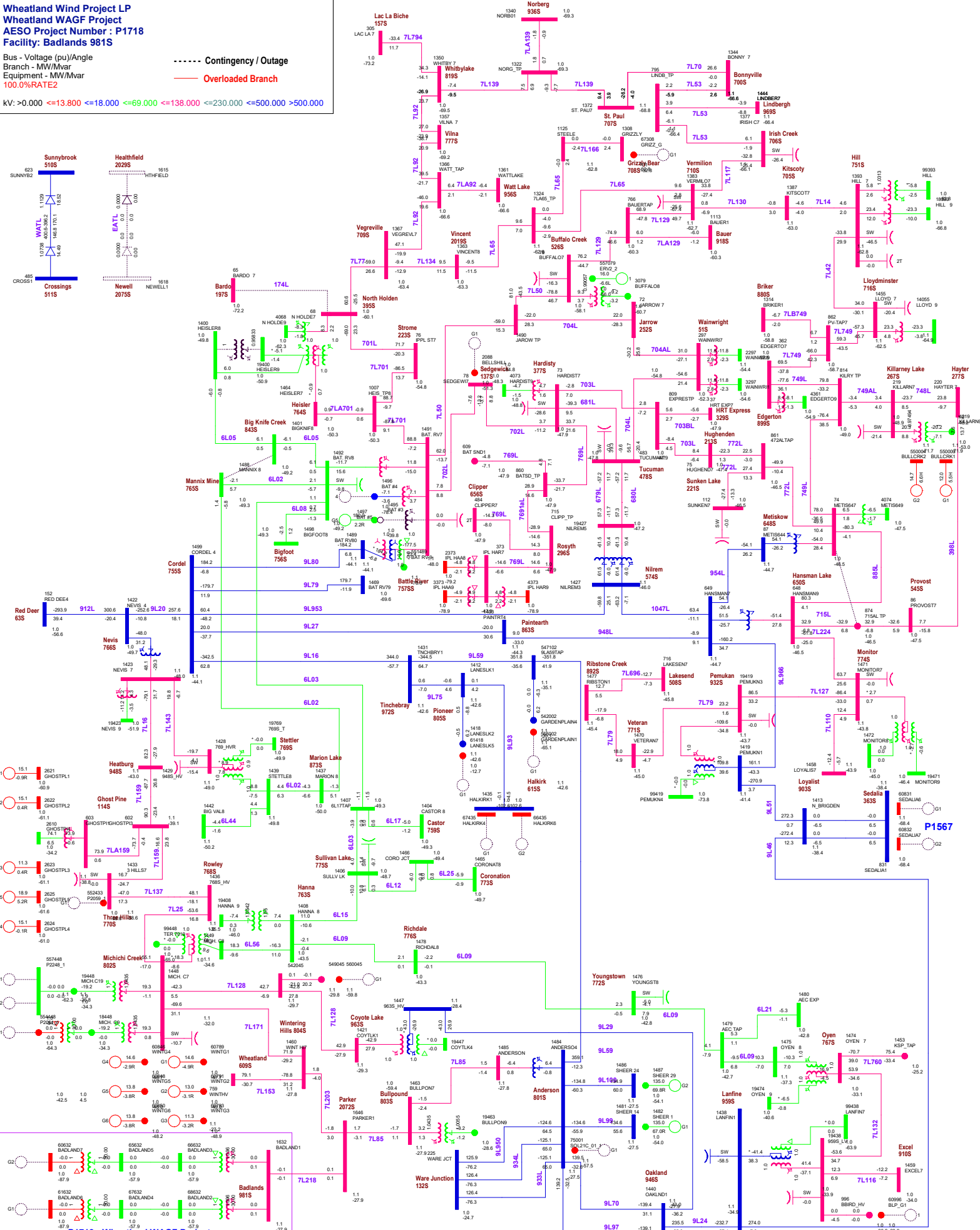


Figure A6-87

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
 100.0%RATE2

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

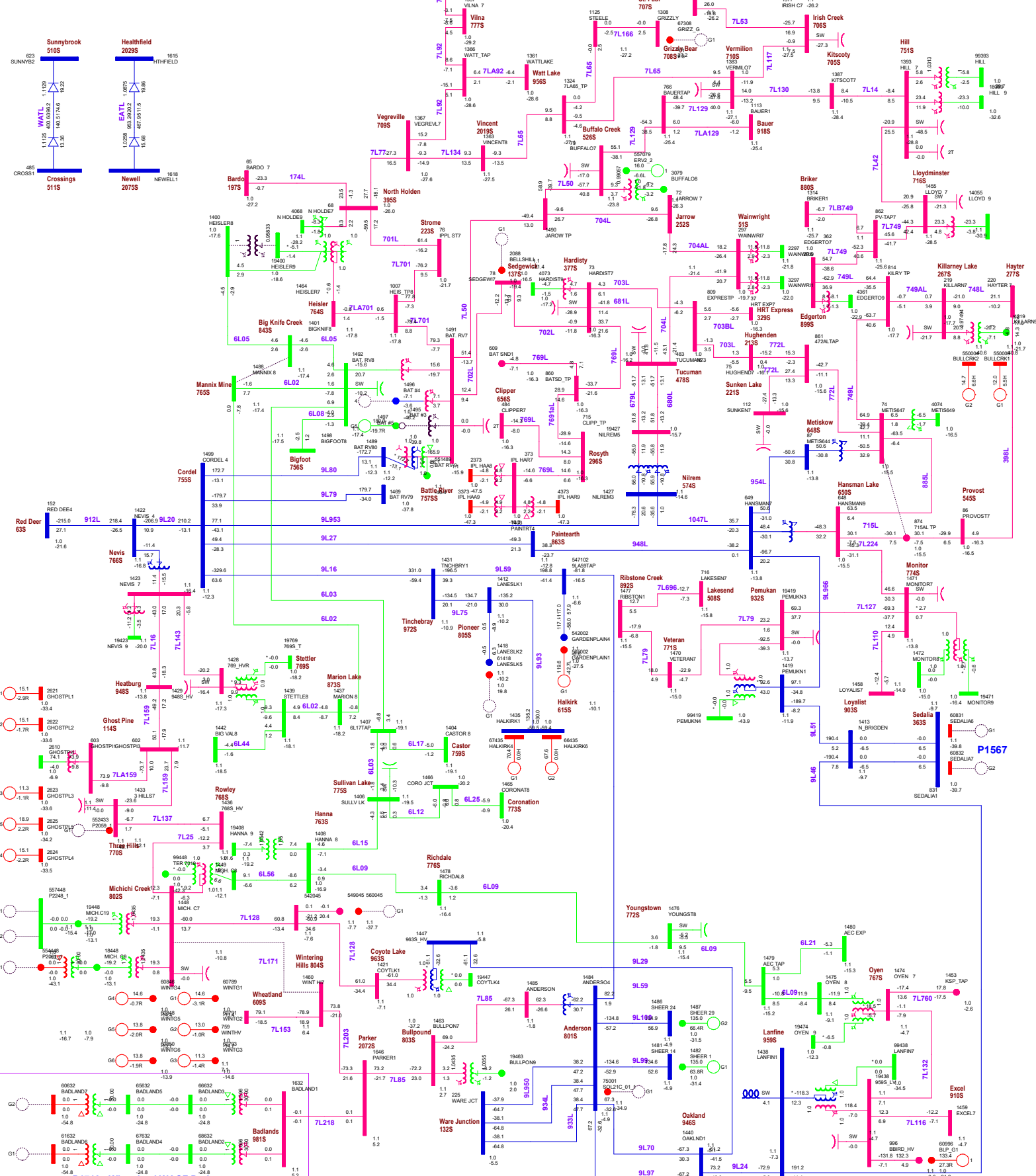


Figure A6-88

Wheatland Wind Project LP
Wheatland WAGF Project
AESO Project Number : P1718
Facility: Badlands 981S

Bus - Voltage (pu)/Angle
 Branch - MW/Mvar
 Equipment - MW/Mvar
100.0%RATE2

--- Contingency / Outage
 --- Overloaded Branch

KV: >0.000 <=13.800 <=18.000 <=69.000 <=138.000 <=230.000 <=500.000 >500.000

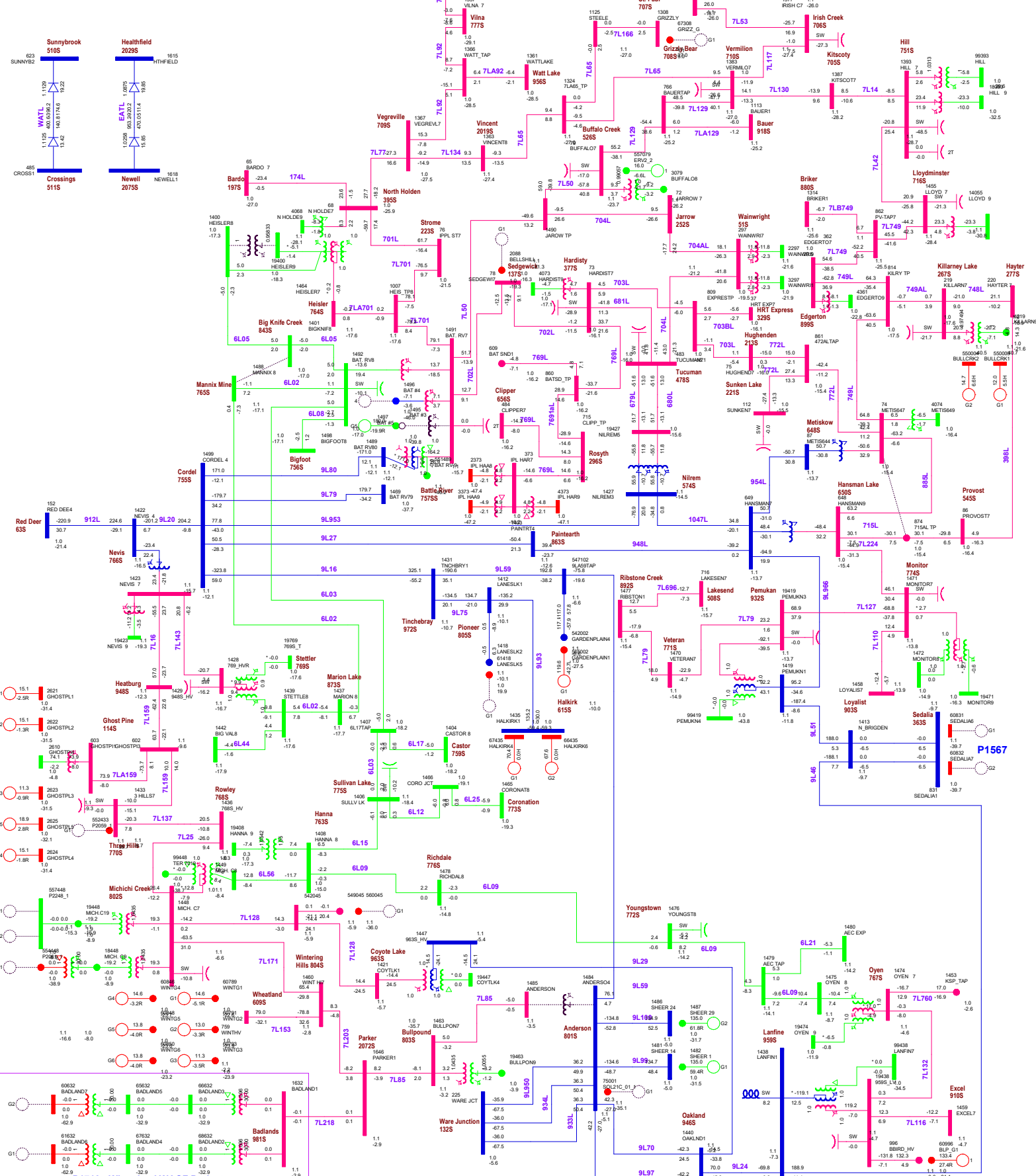


Figure A6-89

Attachment A7

Constraint Effective Factors Table

Table A5-1: Generator Types

Plant	Battle River 4	Battle River 5	Bull Creek 1	EATL	Ghost Pine 1	Halkirk 1	P1718	P1898	P1909	P1978	P2272	Sheerness	WATL	Wintering Hills
Type	<i>Coal</i>	<i>Coal</i>	<i>Wind</i>	<i>HVDC</i>	<i>Wind</i>	<i>Wind</i>	<i>Wind</i>	<i>Wind</i>	<i>Wind</i>	<i>Solar</i>	<i>Wind</i>	<i>Coal</i>	<i>HVDC</i>	<i>Wind</i>

Table A5-2: Generator Effectiveness Factors			Plant													
Scenario	Contingency	Line	Battle River 4	Battle River 5	Bull Creek 1	EATL	Ghost Pine	Halkirk	P1718	P1898	P1909	P1978	P2272	Sheerness	WATL	Wintering Hills
2022SL	Base Case	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.000	0.000	-0.002	-0.013	-0.108	-0.002	0.503	0.004	0.006	0.000	-0.005	0.014	-0.004	0.547
2022SP	Base Case	7L171 (Michichi Creek 802S to Wintering Hills 804S)	-0.007	-0.004	-0.002	-0.013	-0.111	-0.002	0.504	0.004	0.006	-0.227	-0.005	0.015	-0.004	0.545
2022SL	114ST1 (Ghost Pine)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.000	0.000	-0.002	-0.013	0.000	-0.002	0.502	0.004	0.006	0.000	-0.005	0.014	-0.004	0.547
2022SL	7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-2A (P1718 Tap to Bullpond 803S)	0.000	0.000	0.000	0.000	0.000	0.000	0.980	0.000	0.000	0.000	0.000	0.000	0.000	0.939
2022SL	7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-3 (Bullpond 803S to Anderson 801S)	0.000	0.000	0.000	0.000	0.000	0.000	0.921	0.000	0.000	0.000	0.000	0.000	0.000	0.882
2022SL	7L171 (Michichi Creek 802S to Wintering Hills 804S)	801S901T (Anderson)	0.000	0.000	0.000	0.000	0.000	0.000	0.813	0.000	0.000	0.000	0.000	0.000	0.000	0.777
2022SL	801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.000	0.000	0.000	0.000	0.000	0.000	0.963	0.000	0.000	0.000	0.000	0.000	0.000	0.949
2022SL	9L16 (Cordel 755S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.000	0.000	-0.007	-0.019	-0.113	0.020	0.508	0.006	0.020	0.000	-0.011	0.021	-0.006	0.553
2022SL	9L20 (Cordel 755S to Nevis 766S)	766S901T (Nevis)	0.000	0.000	0.069	-0.060	0.475	0.079	0.121	0.071	0.073	0.000	0.066	0.070	-0.013	0.124
2022SL	9L20 (Cordel 755S to Nevis 766S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.000	0.000	0.009	-0.019	-0.114	0.012	0.507	0.012	0.016	0.000	0.005	0.021	-0.005	0.552
2022SL	9L59 (Anderson 801S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.000	0.000	-0.006	-0.019	-0.110	-0.013	0.507	0.005	0.000	0.000	-0.011	0.021	-0.006	0.552
2022SL	EATL (Newell 2075S to Heathfield 2029S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.000	0.000	-0.001	N/A	-0.117	-0.002	0.502	0.004	0.006	0.000	-0.005	0.015	-0.005	0.546
2022SL	EATL (Newell 2075S to Heathfield 2029S)	9L16 (Cordel 755S to Tinchebray 972S)	0.000	0.000	-0.131	N/A	-0.025	0.650	0.126	0.054	0.406	0.000	-0.171	0.180	-0.064	0.118
2022SP	114ST1 (Ghost Pine)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	-0.007	-0.004	-0.002	-0.013	0.000	-0.002	0.502	0.004	0.006	-0.228	-0.005	0.014	-0.004	0.543
2022SP	267ST1 (Killarney Lake)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	0.063	0.046	0.047	-0.044	0.022	0.040	0.022	0.033	0.032	0.024	0.482	0.025	-0.027	0.021
2022SP	267ST1 (Killarney Lake)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.067	0.049	0.051	-0.047	0.024	0.043	0.024	0.035	0.034	0.026	-0.550	0.027	-0.029	0.023
2022SP	395ST1 (North Holden)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.083	0.051	0.012	-0.046	0.024	0.044	0.022	0.029	0.034	0.025	-0.538	0.025	-0.029	0.021
2022SP	526ST1 or 526ST2 (Buffalo Creek)	749L-2 (Edgerton 899S to Killarney Lake 267S)	0.026	0.032	0.119	-0.039	0.018	0.031	0.021	0.036	0.027	0.022	0.000	0.024	-0.022	0.020
2022SP	701L (Strome 223S to North Holden 395S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.089	0.056	0.021	-0.049	0.027	0.049	0.025	0.034	0.037	0.028	-0.507	0.028	-0.030	0.024
2022SP	701L/7L701 (North Holden 395S to Heisler 764S to Battle River 757S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.089	0.056	0.021	-0.049	0.027	0.049	0.025	0.034	0.037	0.028	-0.507	0.028	-0.030	0.024
2022SP	749L (Metiskow 648S to Edgerton 899S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	0.063	0.046	0.049	-0.044	0.022	0.040	0.022	0.033	0.032	0.024	0.481	0.025	-0.027	0.021
2022SP	749L (Metiskow 648S to Edgerton 899S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.067	0.049	0.052	-0.047	0.024	0.043	0.024	0.036	0.034	0.026	-0.551	0.027	-0.029	0.023

2022SP	766S901T (Nevis)	701L (North Holden 395S to Strome 223S)	0.117	0.063	0.041	-0.053	0.047	0.056	0.032	0.038	0.043	0.039	0.012	0.033	-0.031	0.031
2022SP	766S901T (Nevis)	701L/7L701 (Strome 223S to Heisler 764S)	0.124	0.067	0.044	-0.057	0.050	0.060	0.034	0.041	0.046	0.041	0.012	0.035	-0.033	0.033
2022SP	766S901T (Nevis)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	0.065	0.041	0.011	-0.037	0.026	0.036	0.020	0.025	0.028	0.023	0.501	0.021	-0.023	0.019
2022SP	766S901T (Nevis)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.068	0.043	0.012	-0.039	0.027	0.038	0.021	0.027	0.029	0.024	-0.517	0.022	-0.024	0.020
2022SP	766S901T (Nevis)	7L701-2 (Heisler 764S to Battle River 757S)	0.126	0.066	0.043	-0.051	0.007	0.059	0.023	0.037	0.043	0.021	0.016	0.031	-0.031	0.022
2022SP	7L129 (Buffalo Creek 526S to Vermilion 710S)	749L-2 (Edgerton 899S to Killarney Lake 267S)	0.026	0.033	0.119	-0.039	0.018	0.031	0.021	0.036	0.027	0.022	0.038	0.024	-0.023	0.020
2022SP	7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-2A (P1718 Tap to Bullpond 803S)	0.000	0.000	0.000	0.000	0.000	0.000	0.979	0.000	0.000	0.000	0.000	0.000	0.000	0.933
2022SP	7L171 (Michichi Creek 802S to Wintering Hills 804S)	7L85-3 (Bullpond 803S to Anderson 801S)	0.000	0.000	0.000	0.000	0.000	0.000	0.917	0.000	0.000	0.000	0.000	0.000	0.000	0.872
2022SP	7L171 (Michichi Creek 802S to Wintering Hills 804S)	801S901T (Anderson)	0.000	0.000	0.000	0.000	0.000	0.000	0.804	0.000	0.000	0.000	0.000	0.000	0.000	0.764
2022SP	7L42 (Lloydminster 716S to Hill 751S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.069	0.050	0.054	-0.049	0.025	0.045	0.025	0.037	0.035	0.027	-0.556	0.028	-0.029	0.024
2022SP	7L50 (Buffalo Creek 526S to Battle River 757S)	749L-2 (Edgerton 899S to Killarney Lake 267S)	0.024	0.032	0.120	-0.039	0.018	0.031	0.021	0.036	0.027	0.022	-0.272	0.024	-0.022	0.020
2022SP	7L749/749L (Lloydminster 716S to Edgerton 899S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.068	0.050	0.053	-0.048	0.024	0.044	0.024	0.036	0.035	0.027	-0.552	0.028	-0.029	0.023
2022SP	801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.000	0.000	0.000	0.000	0.000	0.000	0.963	0.000	0.000	0.000	0.000	0.000	0.000	0.945
2022SP	899ST3 (Edgerton)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	0.063	0.046	0.049	-0.044	0.022	0.041	0.022	0.033	0.032	0.025	0.479	0.026	-0.027	0.021
2022SP	899ST3 (Edgerton)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.068	0.050	0.053	-0.048	0.024	0.044	0.024	0.036	0.035	0.027	-0.551	0.028	-0.029	0.023
2022SP	912L/9L912 (Nevis 766S to Red Deer 63S)	701L (North Holden 395S to Strome 223S)	0.166	0.122	0.087	-0.080	0.088	0.108	0.063	0.076	0.085	0.074	0.058	0.065	-0.034	0.061
2022SP	912L/9L912 (Nevis 766S to Red Deer 63S)	701L/7L701 (Strome 223S to Heisler 764S)	0.183	0.134	0.095	-0.088	0.097	0.120	0.069	0.084	0.094	0.081	0.064	0.072	-0.038	0.068
2022SP	912L/9L912 (Nevis 766S to Red Deer 63S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	0.098	0.080	0.043	-0.055	0.057	0.071	0.041	0.050	0.056	0.048	0.553	0.043	-0.025	0.040
2022SP	912L/9L912 (Nevis 766S to Red Deer 63S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.106	0.086	0.046	-0.059	0.061	0.076	0.044	0.054	0.060	0.052	-0.473	0.046	-0.027	0.043
2022SP	912L/9L912 (Nevis 766S to Red Deer 63S)	7L701-2 (Heisler 764S to Battle River 757S)	0.184	0.130	0.093	-0.083	0.086	0.116	0.064	0.079	0.091	0.071	0.065	0.068	-0.036	0.062
2022SP	9L16 (Cordel 755S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	-0.015	-0.014	-0.007	-0.020	-0.116	0.020	0.509	0.006	0.020	-0.222	-0.012	0.021	-0.002	0.550
2022SP	9L20 (Cordel 755S to Nevis 766S)	701L (North Holden 395S to Strome 223S)	0.155	0.111	0.077	-0.071	0.025	0.099	0.045	0.066	0.075	0.047	0.047	0.055	-0.033	0.043
2022SP	9L20 (Cordel 755S to Nevis 766S)	701L/7L701 (Strome 223S to Heisler 764S)	0.168	0.121	0.084	-0.078	0.027	0.108	0.050	0.071	0.082	0.051	0.051	0.060	-0.036	0.047
2022SP	9L20 (Cordel 755S to Nevis 766S)	766S901T (Nevis)	0.091	0.081	0.067	-0.057	0.472	0.076	0.109	0.068	0.069	0.178	0.066	0.067	-0.011	0.110

2022SP	9L20 (Cordel 755S to Nevis 766S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.007	0.011	0.010	-0.019	-0.119	0.012	0.508	0.013	0.017	-0.223	0.005	0.022	-0.005	0.549
2022SP	9L20 (Cordel 755S to Nevis 766S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.098	0.080	0.040	-0.053	0.017	0.070	0.033	0.048	0.054	0.033	-0.483	0.040	-0.026	0.031
2022SP	9L59 (Anderson 801S to Tinchebray 972S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	-0.015	-0.014	-0.007	-0.020	-0.114	-0.013	0.509	0.006	0.000	-0.222	-0.012	0.021	-0.006	0.549
2022SP	EATL (Newell 2075S to Heathfield 2029S)	701L (North Holden 395S to Strome 223S)	0.106	0.057	0.037	N/A	0.028	0.049	0.024	0.033	0.038	0.028	0.012	0.028	-0.032	0.023
2022SP	EATL (Newell 2075S to Heathfield 2029S)	701L/7L701 (Strome 223S to Heisler 764S)	0.118	0.064	0.042	N/A	0.032	0.056	0.028	0.038	0.043	0.032	0.013	0.032	-0.036	0.027
2022SP	EATL (Newell 2075S to Heathfield 2029S)	704L (Wainwright 51S to Tucuman 478S)	-0.016	0.022	0.034	N/A	0.012	0.021	0.015	0.027	0.019	0.015	-0.262	0.017	-0.018	0.014
2022SP	EATL (Newell 2075S to Heathfield 2029S)	749L-2 (Edgerton 899S to Killarney Lake 267S)	0.007	0.021	0.112	N/A	0.013	0.020	0.016	0.028	0.019	0.016	-0.107	0.018	-0.018	0.015
2022SP	EATL (Newell 2075S to Heathfield 2029S)	7L129-1 (Buffalo Creek 526S to Bauer 918S)	0.061	0.040	0.013	N/A	0.020	0.034	0.018	0.024	0.027	0.020	0.527	0.020	-0.025	0.017
2022SP	EATL (Newell 2075S to Heathfield 2029S)	7L129-2 (Vermilion 710S to Bauer 918S Tap)	0.058	0.037	0.012	N/A	0.019	0.032	0.017	0.023	0.025	0.018	0.503	0.019	-0.024	0.016
2022SP	EATL (Newell 2075S to Heathfield 2029S)	7L159-1 (Ghost Pine 114S to Heatburg 948S)	-0.006	-0.005	0.003	N/A	0.610	-0.001	0.098	0.023	0.016	0.185	-0.005	0.032	-0.009	0.101
2022SP	EATL (Newell 2075S to Heathfield 2029S)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	-0.007	-0.004	-0.001	N/A	-0.120	-0.002	0.502	0.004	0.006	-0.228	-0.006	0.015	-0.005	0.543
2022SP	EATL (Newell 2075S to Heathfield 2029S)	7L50-1 (Buffalo Creek 526S to Jarrow 252S Tap)	0.067	0.043	0.014	N/A	0.022	0.038	0.020	0.027	0.029	0.022	-0.508	0.022	-0.028	0.019
2022SP	EATL (Newell 2075S to Heathfield 2029S)	7L701-2 (Heisler 764S to Battle River 757S)	0.125	0.066	0.044	N/A	0.026	0.058	0.028	0.038	0.044	0.028	0.019	0.032	-0.035	0.027
2022SP	EATL (Newell 2075S to Heathfield 2029S)	9L16 (Cordel 755S to Tinchebray 972S)	-0.219	-0.256	-0.133	N/A	-0.023	0.657	0.129	0.057	0.410	0.107	-0.184	0.184	-0.067	0.121
2022WP	7L171 (Michichi Creek 802S to Wintering Hills 804S)	801S901T (Anderson)	0.000	0.000	0.000	0.000	0.000	0.000	0.784	0.000	0.000	0.000	0.000	0.000	0.000	0.726
2022WP	801S901T (Anderson)	7L171 (Michichi Creek 802S to Wintering Hills 804S)	0.000	0.000	0.000	0.000	0.000	0.000	0.963	0.000	0.000	0.000	0.000	0.000	0.000	0.926
2022WP	EATL (Newell 2075S to Heathfield 2029S)	701L/7L701 (Strome 223S to Heisler 764S)	0.000	0.065	0.041	N/A	0.030	0.055	0.026	0.037	0.042	0.000	0.014	0.031	-0.035	0.025
2022WP	EATL (Newell 2075S to Heathfield 2029S)	9L16 (Cordel 755S to Tinchebray 972S)	0.000	-0.259	-0.136	N/A	-0.027	0.651	0.125	0.052	0.406	0.000	-0.182	0.180	-0.065	0.115