APPENDIX A CONNECTION ASSESSMENT

Engineering Connection Assessment

P2032 Cascade Power Plant Project Connection

Cascade Power Project Limited Partnership

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NOTE:

The conclusions and recommendations in this report are based on the results presented in *Attachment A: Engineering Connection Assessment: Study Results*, which was prepared by the AESO.

Contents

Tables

Figures

Attachments

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 are the results of the engineering studies (see Attachment A) and the scope and methodology used to perform the studies (see Attachment A1 to Attachment A). These attachments provide details regarding the technical criteria, assumptions, and methods for performing these engineering studies, and the results of the engineering studies.

1.1 Project Overview

Cascade Power Project Limited Partnership (Market Participant) has submitted a request for system access service to the Alberta Electric System Operator (AESO) to connect its approved Cascade Power Plant (Facility) to the AIES. The Facility includes a substation, to be designated Whisky Jack 1047S.

The market participant's request includes a request for new Rate STS, *Supply Transmission Service*, contract capacity of 900 MW and a new Rate DTS, *Demand Transmission Service*, contract capacity of 11.5 MW. There are two development phases for the Facility. Phase 1 includes the addition of one combined cycle gas generation unit with a maximum authorized real power (MARP) of 462.5 MW and a maximum capability (MC) of 450 MW. Phase 2 includes the addition of a second combined cycle generation unit with an MARP of 462.5 MW. After Phase 2, the MC of the Facility will be 900 MW.

The Project in-service date (ISD) for both Phase 1 and Phase 2 is March 25, 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 Hinton/Edson (Area 29), which is part of the AESO Central Planning Region.

From a transmission system perspective, Hinton/Edson (Area 29) consists primarily of a 240 kV and 138 kV transmission system. Hinton/Edson is connected to Wabamun (Area 40) via both 240 kV and 138 kV transmission lines, as well as Fox Creek (Area 24) and Drayton Valley (Area 30) via 138 kV transmission lines.

2.3 Study Area

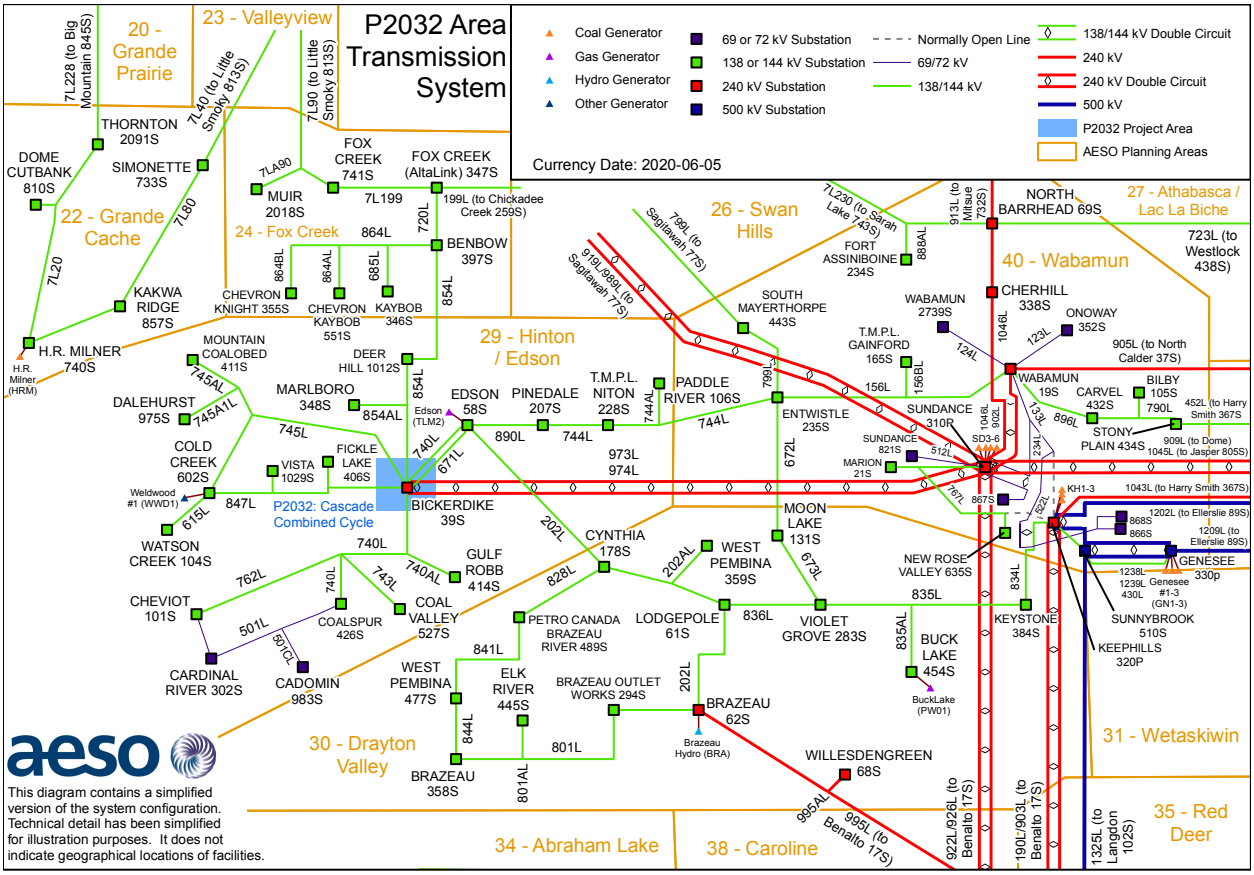
The Study Area consists of the AESO planning areas of Hinton/Edson (Area 29), Grande Cache (Area 22), Fox Creek (Area 24), Drayton Valley (Area 30) and Wabamun (Area 40), including the tie lines connecting these planning areas to the rest of the AIES.

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).

Additionally, there are a number of constraints in the Study Area that are mitigated by existing protection schemes. The following existing automatic protection schemes (APS) are used to manage constraints in the area:

- APS 25: Brazeau 62S Generation Tripping Scheme
- APS 46: Bickerdike 39S – 740L Load Trip Scheme
- APS 47: Obed Mountain Coal 411S - Load Trip Scheme
- APS 150: WATL HVDC

Figure 2-1: Transmission System in the Study Area



3 Connection Alternatives

3.1 Overview

The AESO, in consultation with the TFO in the Study Area and the MP, examined several transmission alternatives to meet the MP's request for system access service, as detailed in Section 3.3.[1]

Due to the location and the size of the project, the only viable connection was determined to be the 240 kV transmission system via the existing Bickerdike 39S substation. Other potential connections were not advanced beyond preliminary consideration due to either the distance involved or the insufficient capacity of a 138 kV connection.

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 –Connection to the existing Bickerdike 39S substation via three 240 kV circuits

- Add three 240 kV transmission lines to connect the Facility to the existing Bickerdike 39S substation;
- Modify the existing Bickerdike 39S substation, including adding four 240 kV circuit breakers; and
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 3-1.

Alternative 2 - Connection to the existing Bickerdike 39S substation via two 240 kV circuits

This alternative includes the following developments:

- Add two 240 kV transmission lines to connect the Facility to the existing Bickerdike 39S substation;
- Modify the existing Bickerdike 39S substation, including adding three 240 kV circuit breakers; and
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 3-2.

Figure 3-1: Connection Alternative 1

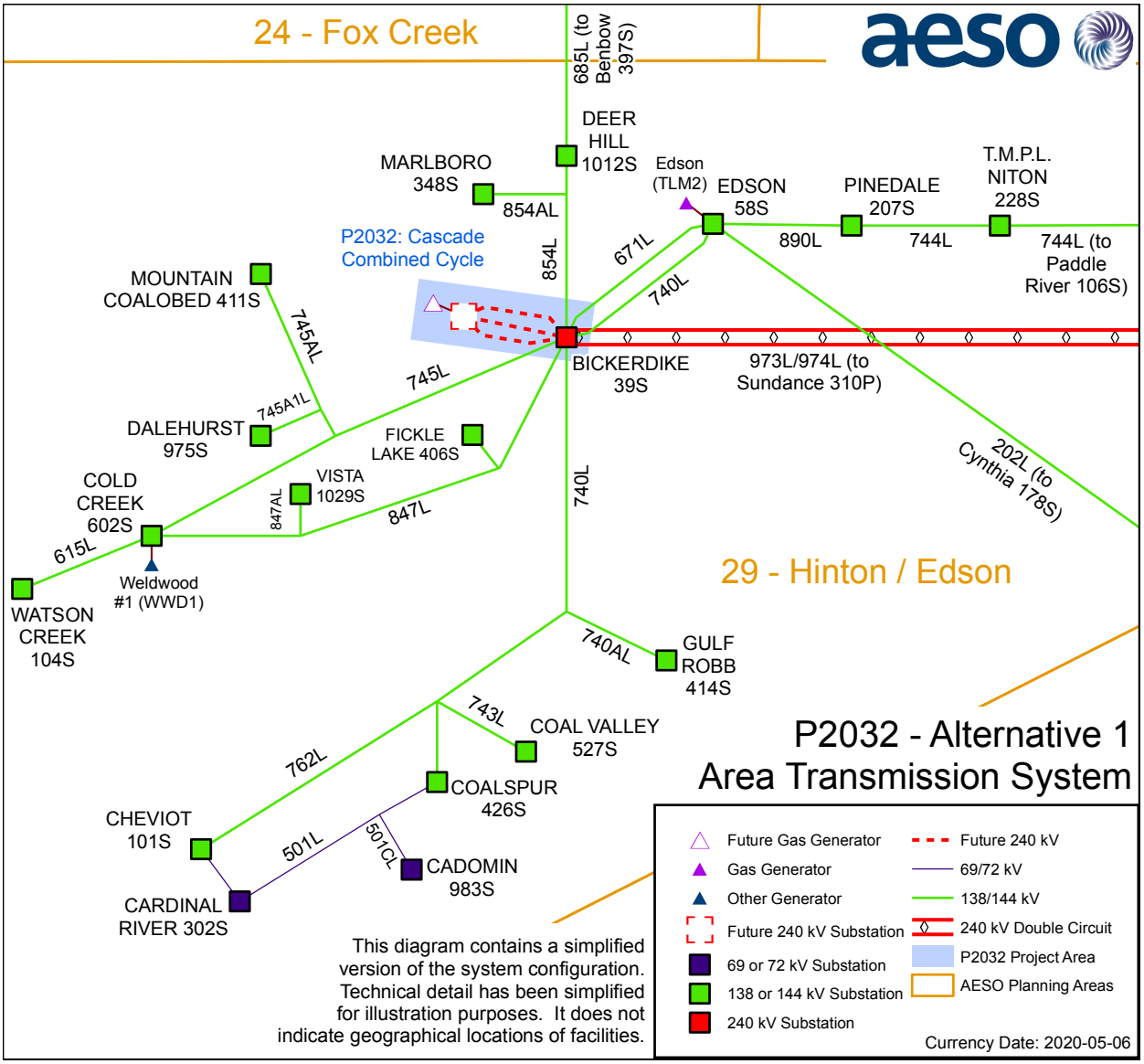
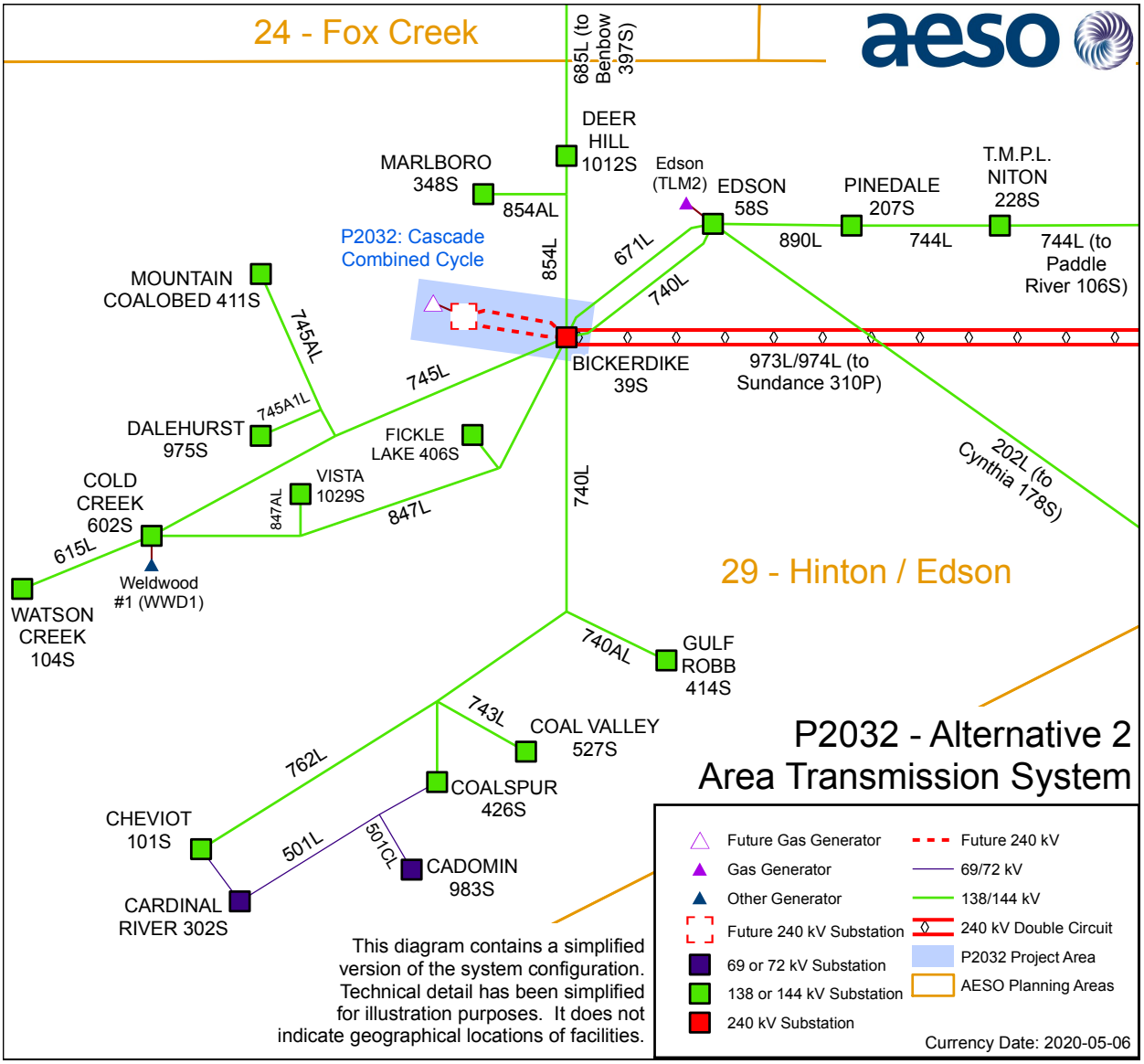


Figure 3-2: Connection Alternative 2



3.3 Connection Alternatives Selected for Further Study

Alternative 1 is considered technically feasible and was selected for further study.

3.4 Connection Alternatives Not Selected for Further Study

Alternative 2 can carry the full STS of the Project to the Bickerdike 39S substation following the loss of one of the two new 240 kV lines, similar to Alternative 1. However, under certain Category C conditions resulting in the loss of one of the new 240 kV lines and certain substation equipment, equipment ratings

within the Bickerdike 39S substation could be exceeded. Therefore, Alternative 2 is not viable and is not selected for further study.

4 Assessment Approach

4.1 Standards, Criteria and Assumptions

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

4.2 Studies Performed

The scheduled ISD for the Project is March 25, 2022. Therefore, studies were performed using scenarios for 2022 Summer Peak (SP), 2022 Summer Light (SL) and 2022 Winter Peak (WP). Short-circuit studies were performed using the 2022 WP and 2029 WP scenarios.

Table 4-1 lists the study scenarios. Post-Project scenarios reflect the requested Rate STS contract capacity 900 MW at the Bickerdike 39S substation. The relatively small DTS contract requested, which is for station service load, was assessed to have no adverse impact on the Study Area. A high Northwest import scenario was identified as being critical to study due to the potential impacts on the 138 kV transmission path serving the AESO Northwest Planning Region from Bickerdike 39S substation post-Project.

For post-Project transient stability studies, a high AESO Central Planning Region generation sensitivity scenario is added during 2022 Summer Light (SL) conditions, as low load and high local generation may impact system transient stability following the connection of the Project.

Table 4-1: Connection Study Scenarios

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Net-to-Grid Generation (MW)
Pre-Project				
1	2022 SP	High Northwest (NW) Import	2021 SP Pre-Project	0
2	2022 WP		2021 WP Pre-Project	0
Post-Project				
3	2022 SP	High NW Import	2022 SP Post-Project	900
4	2022 WP		2022 WP Post-Project	900
5	2029 WP	All study area generation online	2028 WP Post-Project	900
Post-Project Sensitivity (Transient Stability)				
6	2022 SL	High Central Generation	2022 SL Post-Project	900

The AESO Planning Region load forecasts used for the connection studies were based on the *2019 Long-Term Outlook (2019 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.

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.[2]

Power flow studies were performed for the 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 the 2022 SP and 2022 WP post-Project scenarios, as well as the 2022 SL post-Project sensitivity scenario.

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 2029 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 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 B conditions.

[2] 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 Interpretation of Results

5.1 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 5-1.

- Section 5.2 includes an overview of the pre-Project studies results.
- Section 5.3 includes an overview of the post-Project studies results.
- Section 5.4 includes a description of the proposed mitigation measures to address observed Reliability Criteria violations.
- Section 5.5 includes an overview of the post-mitigation studies results.

Detailed study results are provided in Attachment A.

Table 5-1: 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					
2022 SP	None	Thermal - above normal rating	None	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	TCM Rule
2022 SP	None	Thermal - above normal rating	None	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	TCM Rule
2022 SP	Thermal - above normal rating	None	995L (62S Brazeau – 68S Willesden Green – 17S Benalto	202L (61S Lodgepole – 62S Brazeau)	Resolved violation	Real time operational practices (RTOP)	None
2022 SP	None	Thermal - above normal rating	202L (178S Cynthia - 359S Esso West Pembina - 61S Lodgepole)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	202L (58S Edson - 178S Cynthia)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 744AL Tap)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above emergency rating	202L (58S Edson - 178S Cynthia)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above emergency rating	58S Edson T1/T2	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 720L RAS
2022 SP	None	Thermal - above normal rating	61S Lodgepole T1/T2	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above emergency rating	207S Pinedale T1/T2	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above normal rating	207S Pinedale T1/T2	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above normal rating	320P Keephills GT1	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	320P Keephills GT1	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	320P Keephills GT2	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	320P Keephills GT3	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	320P Keephills T1	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above normal rating	602S Cold Creek T1/T2	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above normal rating	602S Cold Creek T1/T2	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	62S Brazeau T5	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above emergency rating	671L (58S Edson - 39S Bickerdike)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 740L RAS
2022 SP	None	Thermal - above normal rating	672L (235S Entwistle - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above normal rating	673L (283S Violet Grove - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above emergency rating	685L (397S Benbow - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	685L (397S Benbow - 1012S Deer Hill)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	685L (397S Benbow - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	685L (397S Benbow - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	720L (347S Fox Creek - 397S Benbow)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	720L (347S Fox Creek - 397S Benbow)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	720L (347S Fox Creek - 397S Benbow)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS

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					
2022 SP	None	Thermal - above emergency rating	720L (347S Fox Creek - 397S Benbow)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	744L (228S T.M.P.L. Niton - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above emergency rating	744L (228S T.M.P.L. Niton - 106S Paddle River - 235S Entwistle)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above normal rating	7L199/199L (347S Fox Creek - 741S Fox Creek)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	7L199/199L (347S Fox Creek - 741S Fox Creek)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	178S Cynthia T1	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	178S Cynthia T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above emergency rating	178S Cynthia T1	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	834L (384S Keystone - 320P Keephills)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	834L (384S Keystone - 320P Keephills)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	836L (61S Lodgepole - 283S Violet Grove)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above emergency rating	1012S Deer Hill T1	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	1012S Deer Hill T1	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	1012S Deer Hill T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	1012S Deer Hill T1	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	890L (58S Edson - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above normal rating	890L (58S Edson - 207S Pinedale)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 202L RAS
2022 SP	None	Thermal - above emergency rating	902L (19S Wabamun Generation Station - 310P Sundance)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	902L (19S Wabamun Generation Station - 310P Sundance)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	902L (19S Wabamun Generation Station - 310P Sundance)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	902L (19S Wabamun Generation Station - 310P Sundance)	744L (228S T.M.P.L. Niton - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	902L (19S Wabamun Generation Station - 310P Sundance)	744L (235S Entwistle - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	902L (19S Wabamun Generation Station - 310P Sundance)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	902L (19S Wabamun Generation Station - 310P Sundance)	909L (310P Sundance - Dome)	Materially increased violation	None	New 890L RAS and New 202L RAS

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					
2022 SP	None	Thermal - above normal rating	905L (19S Wabamun Generation Station - 37S North Calder)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	905L (19S Wabamun Generation Station - 37S North Calder)	909L (310P Sundance - Dome)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	909L (310P Sundance - Dome)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	909L (310P Sundance - Dome)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	909L (310P Sundance - Dome)	902L (19S Wabamun Generation Station - 310P Sundance)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	913L (69S North Barrhead - 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	913L (69S North Barrhead - 338S Cherhill)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 SP	None	Thermal - above normal rating	919L (310P Sundance - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS and RTOP
2022 SP	None	Thermal - above normal rating	919L (310P Sundance - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and RTOP
2022 SP	None	Thermal - above normal rating	922L (310P Sundance - 17S Benalto)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	922L (310P Sundance - 17S Benalto)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	926L (310P Sundance - 17S Benalto)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	926L (310P Sundance - 17S Benalto)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	973L (39S Bickerdike - 310P Sundance)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	973L (39S Bickerdike - 310P Sundance)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	973L (39S Bickerdike - 310P Sundance)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	973L (39S Bickerdike - 310P Sundance)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	973L (39S Bickerdike - 310P Sundance)	744L (228S T.M.P.L. Niton - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	973L (39S Bickerdike - 310P Sundance)	744L (235S Entwistle - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	973L (39S Bickerdike - 310P Sundance)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	973L (39S Bickerdike - 310P Sundance)	974L (39S Bickerdike - 310P Sundance)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	974L (39S Bickerdike - 310P Sundance)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	974L (39S Bickerdike - 310P Sundance)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	974L (39S Bickerdike - 310P Sundance)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	974L (39S Bickerdike - 310P Sundance)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	974L (39S Bickerdike - 310P Sundance)	744L (228S T.M.P.L. Niton - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	974L (39S Bickerdike - 310P Sundance)	744L (235S Entwistle - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above emergency rating	974L (39S Bickerdike - 310P Sundance)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	974L (39S Bickerdike - 310P Sundance)	973L (39S Bickerdike - 310P Sundance)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 SP	None	Thermal - above normal rating	989L (310P Sundance - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS and RTOP

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					
2022 SP	None	Thermal - above normal rating	989L (310P Sundance - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and RTOP
2022 SP	None	Thermal - above normal rating	1046L (310P Sundance to 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS and RTOP
2022 SP	None	Thermal - above normal rating	1046L (310P Sundance to 338S Cherhill)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and RTOP
2022 SP	None	Thermal - above emergency rating	19S Wabamun T10	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and RTOP
2022 SP	None	Thermal - above emergency rating	39S Bickerdike T1	39S Bickerdike T2	Materially increased violation	None	New Bickerdike T1/T2 RAS
2022 SP	None	Thermal - above emergency rating	39S Bickerdike T1	39S Bickerdike T2	Materially increased violation	None	New Bickerdike T1/T2 RAS
2022 SP	None	Thermal - above emergency rating	39S Bickerdike T2	39S Bickerdike T1	Materially increased violation	None	New Bickerdike T1/T2 RAS
2022 SP	None	Thermal - above emergency rating	39S Bickerdike T2	39S Bickerdike T1	Materially increased violation	None	New Bickerdike T1/T2 RAS
2022 WP	None	Thermal - above normal rating	202L (178S Cynthia - 359S Esso West Pembina - 61S Lodgepole)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above normal rating	202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above emergency rating	202L (58S Edson - 178S Cynthia)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above normal rating	58S Edson T1/T2	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 720L RAS
2022 WP	None	Thermal - above normal rating	61S Lodgepole T1/T2	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above emergency rating	207S Pinedale T1/T2	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above normal rating	320P Keephills T1	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above normal rating	602S Cold Creek T1/T2	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	602S Cold Creek T1/T2	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	671L (58S Edson - 39S Bickerdike)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 740L RAS
2022 WP	None	Thermal - above normal rating	672L (235S Entwistle - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above normal rating	673L (283S Violet Grove - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above emergency rating	685L (397S Benbow - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	685L (397S Benbow - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	685L (397S Benbow - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	720L (347S Fox Creek - 397S Benbow)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	720L (347S Fox Creek - 397S Benbow)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	720L (347S Fox Creek - 397S Benbow)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	744L (228S T.M.P.L. Niton - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above emergency rating	744L (228S T.M.P.L. Niton - 106S Paddle River - 235S Entwistle)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above normal rating	7L199/199L (347S Fox Creek - 741S Fox Creek)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	7L199/199L (347S Fox Creek - 741S Fox Creek)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS

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					
2022 WP	None	Thermal - above normal rating	7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	62S Brazeau T1	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above normal rating	62S Brazeau T2	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above normal rating	178S Cynthia T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above emergency rating	178S Cynthia T1	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above normal rating	834L (384S Keystone - 320P Keephills)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above emergency rating	1012S Deer Hill T1	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	1012S Deer Hill T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	1012S Deer Hill T1	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	890L (58S Edson - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 202L RAS
2022 WP	None	Thermal - above emergency rating	902L (19S Wabamun Generation Station - 310P Sundance)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	902L (19S Wabamun Generation Station - 310P Sundance)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	902L (19S Wabamun Generation Station - 310P Sundance)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	905L (19S Wabamun Generation Station - 37S North Calder)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	909L (310P Sundance - Dome)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	909L (310P Sundance - Dome)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	909L (310P Sundance - Dome)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	909L (310P Sundance - Dome)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	913L (69S North Barrhead - 338S Cherhill)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	913L (69S North Barrhead - 338S Cherhill)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	919L (310P Sundance - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above normal rating	919L (310P Sundance - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above emergency rating	922L (310P Sundance - 17S Benalto)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	922L (310P Sundance - 17S Benalto)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	926L (310P Sundance - 17S Benalto)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	926L (310P Sundance - 17S Benalto)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS

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					
2022 WP	None	Thermal - above emergency rating	973L (39S Bickerdike - 310P Sundance)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	973L (39S Bickerdike - 310P Sundance)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	973L (39S Bickerdike - 310P Sundance)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	973L (39S Bickerdike - 310P Sundance)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	973L (39S Bickerdike - 310P Sundance)	744L (228S T.M.P.L. Niton - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	973L (39S Bickerdike - 310P Sundance)	744L (235S Entwistle - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	973L (39S Bickerdike - 310P Sundance)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	973L (39S Bickerdike - 310P Sundance)	974L (39S Bickerdike - 310P Sundance)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	974L (39S Bickerdike - 310P Sundance)	202L (58S Edson - 178S Cynthia)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	974L (39S Bickerdike - 310P Sundance)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	974L (39S Bickerdike - 310P Sundance)	740L (58S Edson - 39S Bickerdike)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	974L (39S Bickerdike - 310P Sundance)	744L (228S T.M.P.L. Niton - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	974L (39S Bickerdike - 310P Sundance)	744L (228S T.M.P.L. Niton - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	974L (39S Bickerdike - 310P Sundance)	744L (235S Entwistle - 744AL Tap)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	974L (39S Bickerdike - 310P Sundance)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	974L (39S Bickerdike - 310P Sundance)	973L (39S Bickerdike - 310P Sundance)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above normal rating	989L (310P Sundance - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above normal rating	989L (310P Sundance - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above emergency rating	1046L (310P Sundance to 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	1046L (310P Sundance to 338S Cherhill)	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS and New 202L RAS
2022 WP	None	Thermal - above emergency rating	19S Wabamun T10	890L (58S Edson - 207S Pinedale)	Materially increased violation	None	New 890L RAS
2022 WP	None	Thermal - above emergency rating	39S Bickerdike T1	39S Bickerdike T2	Materially increased violation	None	New Bickerdike T1/T2 RAS
2022 WP	None	Thermal - above emergency rating	39S Bickerdike T2	39S Bickerdike T1	Materially increased violation	None	New Bickerdike T1/T2 RAS

Notes:

- 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%).
- Due to the high Category A loading on 890L and 202L (>99%), only Category B conditions which result in more than a 1% loading increase over the Category A loading are reported.

5.2 Pre-Project Study Results

5.2.1 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.

5.2.2 Category B Conditions

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

No voltage criteria violations or voltage deviations were observed that were beyond the limits listed in Table 3-1 of Attachment A1 (hereafter referred to as point of delivery (POD) bus voltage deviations) under Category B conditions.

5.3 Post-Project Study Results

5.3.1 Category A Conditions

Marginal thermal criteria violations were observed under the Category A condition for the 2022 SP post-Project scenario.

Near-term Post-Project short-circuit fault levels are higher than pre-Project levels but do not approach or exceed existing equipment ratings at the respective substations. The long term short circuit levels were found to be within the designed capabilities of the nearby facilities.

5.3.2 Category B Conditions

Due to the Category A thermal violations observed for the 2022 SP post-Project scenario, the TCM Rule was first applied to mitigate the violations by re-dispatching effective generation prior to simulating any contingency. Post-Project power flow studies identified numerous thermal criteria violations under Category B conditions, as shown in Table 5-1.

No voltage criteria violations or POD bus voltage deviations were observed under Category B conditions.

The post-Project study results did not indicate any transient stability concerns, and the system showed acceptable dynamic response to all Category B conditions studied.

5.4 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.

5.4.1 Pre-Project

Prior to connection of the Project, the observed thermal criteria violation would be managed by using real-time operational practices.

5.4.2 Post-Project

5.4.2.1 Category A Conditions

The Category A violations observed in the study are mitigated by applying the TCM Rule to dispatch down effective generation. The forecast study conditions represent the credible worst case scenario, which assumes that the Facility is exporting its full STS to the system. The possibility of this scenario occurring is dependent on the generation profile of the Facility.

Should these Category A violations materialize, mitigations would be required to address the potential marginal thermal criteria violations under the Category A condition. The AESO would develop operational procedures or other mitigation measures, such as the following:

- Redispatching the 500 kV HVDC transmission lines EATL and WATL
- Operational system reconfiguration
- Increasing the thermal rating of 138 kV transmission lines 890L and 202L

5.4.2.2 Category B Conditions

After connection of the Project, all of the observed Category B thermal criteria violations observed would be mitigated by using new RASs and/or real-time operational practices. Five new RASs are proposed to mitigate thermal criteria violations observed under Category B conditions: 890L RAS, 202L RAS, 740L RAS, 720L RAS, and Bickerdike 39S substation transformer T1/T2 RAS.

The new 890L, 202L, 740L and 720L RASs will trip or send a runback signal to one of the two Facility generation units if one of the 138 kV transmission lines 890L, 202L, 740L or 720L exceeds its emergency or continuous thermal rating. Based on the post-mitigation studies, these RAS actions (in combination with real-time operational practices where appropriate) will successfully mitigate all other related (i.e. resulting from the same contingency) thermal criteria violations.

The new Bickerdike 39S substation T1/T2 RAS will trip or send a runback signal to one of the two Facility generators to mitigate thermal criteria violations on Bickerdike transformer T1 or T2, following the loss or either Bickerdike 39S transformer T1 or T2. In the Winter Peak scenario, real-time operational practices may also be required post RAS action, to fully mitigation thermal criteria violations.

5.4.3 Post-Project Mitigation Study Results

Under Category A and Category B conditions, all the observed Reliability Criteria violations were mitigated following simulated RAS action.

6 Project Dependencies

The Project is dependent upon the restoration of thermal ratings for two existing transmission lines; the 138 kV transmission line 720L, and the 144 kV transmission line 7L199.

The 138 kV transmission line 720L is currently limited to a normal rating of 86 MVA in the summer, and 91 MVA in the winter. The TFO, in discussion with the Market Participant, has committed to restoring 720L to seasonal normal ratings of 120/148 MVA prior to the ISD of the Project.

The 144 kV transmission line 7L199 is currently limited to a normal rating of 114 MVA in the summer and 146 MVA in the winter. ATCO Electric Ltd. has a planned capital maintenance project that will restore 7L199 to seasonal normal ratings of 129/157 MVA. The work is planned to be completed prior to the ISD of the Project as part of ATCO's capital maintenance program.

The studies were performed assuming the restored ratings for 720L and 7L199 as both transmission lines are being restored outside the scope of the Project and are planned to be in-service prior to the ISD of the Project. Additional mitigation measures may be required if these transmission line thermal rating restorations are not completed prior to the ISD of the Project.

7 Conclusions and Recommendations

Based on the study results, Alternative 1 is technically viable. The connection assessment identified pre-Project and post-Project system performance issues.

The connection assessment identified the potential for marginal system performance issues (thermal criteria violations) under the Category A condition when the Facility is exporting its full STS to the system.

The probability of Category A issues materializing is highly dependent upon the merit order generation profile of the Facility. Should the AESO determine that mitigation is required to address Category A issues based on the generation profile for the Facility, the AESO will develop operational procedures or other mitigation measures closer to the ISD of the Project.

It is recommended that Category B issues be mitigated through the use of five new RASs (890L RAS, 202L RAS, 740L RAS, 720L RAS, and Bickerdike 39S substation transformer T1/T2 RAS), and real-time operational practices, alone or in combination, as appropriate.

The AESO recommends proceeding with the Project using Alternative 1 as the preferred alternative to respond to the Market Participant's request for system access service. Alternative 1 involves adding three 240 kV transmission lines to connect the Facility to the existing Bickerdike 39S substation and modifying the existing Bickerdike 39S substation including adding four 240 kV circuit breakers. The conductor used for the new 240 kV circuits should have a minimum thermal rating of 514 MVA.

Attachment A:
Engineering Connection Assessment Results

Engineering Connection Assessment: Study Results

P2032 Cascade Power Plant Project Connection

Cascade Power Project Limited Partnership

Date: June 26, 2020
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Contents

Tables

Attachments

1 Introduction

This report presents the results of the engineering studies that were completed by the Alberta Electric System Operator (AESO) to assess the impact of the Project (as defined in Attachment A1: AESO Engineering Connection Assessment Scope) on the performance of the Alberta Interconnected Electric System (AIES). The studies were performed in accordance with Attachment A1: AESO Engineering Connection Assessment: Study Scope, which was prepared by the AESO.

The power system network analysis tools that were used for the studies in this connection assessment were PSS/E version 33 and PSS/E version 34.

2 Pre-Project Study Results

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

2.1 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.

2.1.1 Scenario 1: 2020 Summer Peak 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 were observed under certain Category B conditions as shown in Table 2-1.

Table 2-1: Thermal Criteria Violations under Category B Conditions for Scenario 1

Contingency (System Element Lost)	Violation Location Details	Thermal Ratings[a] (MVA)		Pre-Project Results	
		Normal Rating	Emergency Rating	Power Flow[b] (MVA)	% Loading[c]
995L (62S Brazeau – 68S Willesden Green – 17S Benalto	202L (61S Lodgepole – 62S Brazeau)	119	131	120.37	101.15

Notes:

[b] Power flow (MVA) is current expressed as MVA (i.e., $S = \sqrt{3} \times V_{base} \times I_{actual}$)

[c] 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.

2.1.2 Scenario 2: 2022 Winter Peak 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 Reliability Criteria violations were observed under Category B conditions.

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.

3 Post-Project Study Results

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

3.1 Power Flow Studies

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

3.1.1 Scenario 3: 2022 Summer Peak Post-Project

Category A Conditions

Thermal criteria violations were observed under Category A conditions as shown in Table 3-1.

Table 3-1: Thermal Criteria Violations under Category A Conditions for Scenario 3

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	
890L (58S Edson to 207S Pinedale)	75	83	15.55	20.73	78.59	104.78	84.05
202L (58S Edson to 178S Cynthia)	85	94	-7.81*	9.19	88.51	104.13	113.32*

Notes:

*Flow direction is from 178S Cynthia to 58S Edson in Pre-Project and from 58S Edson to 178S Cynthia in Post-Project

Category B Conditions

Due to the observed Category A thermal criteria violations, ISO TCM Rule 302.1 is applied to adjust effective generation until these violations are eliminated. This case with adjusted generation dispatch per ISO TCM Rule 302.1 is used for Category B power flow analysis for Scenario 3.

Thermal criteria violations were observed under certain Category B conditions as shown in Table 3-2.

Due to the high Category A loading on 890L (>99%), only Category B conditions which result in more than a 1% loading increase over the Category A loading are reported.

Table 3-2: Thermal Criteria Violations under Category B Conditions for Scenario 3

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	
1046L (310P Sundance (Plant) to 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)	120	132	68.09	56.74	124.43	103.69	46.95
1046L (310P Sundance (Plant) to 338S Cherhill)	890L (58S Edson - 207S Pinedale)	75	83	16.86	22.48	76.32	101.76	79.28
202L (178S Cynthia - 359S Esso West Pembina - 61S Lodgepole)	890L (58S Edson - 207S Pinedale)	75	83	15.20	20.27	79.85	106.46	86.19
202L (58S Edson - 178S Cynthia)	720L (347S Fox Creek - 397S Benbow)	120	132	56.15	46.79	121.76	101.47	54.68
202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	1.89	2.52	79.44	105.92	103.4
202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 744AL Tap)	75	83	4.76	6.35	75.08	100.11	93.76
202L (58S Edson - 178S Cynthia)	890L (58S Edson - 207S Pinedale)	75	83	16.50	22.00	91.97	122.63	100.63
58S Edson T1/T2	720L (347S Fox Creek - 397S Benbow)	120	132	60.55	50.46	139.76	116.47	66.01
61S Lodgepole T1/T2	890L (58S Edson - 207S Pinedale)	75	83	17.27	23.03	81.02	108.03	85
207S Pinedale T1/T2	202L (58S Edson - 178S Cynthia)	85	94	12.50	14.71	99.16	116.66	101.95
207S Pinedale T1/T2	720L (347S Fox Creek - 397S Benbow)	120	132	58.38	48.65	121.28	101.07	52.42
320P Keephills GT1	890L (58S Edson - 207S Pinedale)	75	83	16.82	22.42	75.92	101.22	78.8
320P Keephills GT2	890L (58S Edson - 207S Pinedale)	75	83	16.73	22.30	75.80	101.07	78.77
320P Keephills GT3	890L (58S Edson - 207S Pinedale)	75	83	16.33	21.77	75.40	100.53	78.76
Genesee GT3	890L (58S Edson - 207S Pinedale)	75	83	16.30	21.73	75.39	100.52	78.79
320P Keephills T1	202L (58S Edson - 178S Cynthia)	85	94	12.02	14.14	86.08	101.27	87.13
345S Hornbeck T1	890L (58S Edson – 207S Pinedale)	75	83	16.62	22.16	75.44	100.59	78.43
602S Cold Creek T1/T2	202L (58S Edson - 178S Cynthia)	85	94	11.48	13.50	85.51	100.6	87.1
602S Cold Creek T1/T2	890L (58S Edson - 207S Pinedale)	75	83	17.66	23.54	76.64	102.19	78.65
62S Brazeau T5	202L (58S Edson - 178S Cynthia)	85	94	28.92	34.02	88.30	103.88	69.86
671L (58S Edson - 39S Bickerdike)	740L (58S Edson - 39S Bickerdike)	112	124	36.09	32.22	167.16	149.25	117.03
672L (235S Entwistle - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	85	94	16.48	19.39	86.41	101.66	82.27

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	
673L (283S Violet Grove - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	85	94	17.17	20.20	85.36	100.42	80.22
685L (397S Benbow - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	85	94	9.96	11.72	97.12	114.26	102.54
685L (397S Benbow - 1012S Deer Hill)	740L (58S Edson - 39S Bickerdike)	112	124	26.78	23.91	116.98	104.45	80.54
685L (397S Benbow - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	9.41	12.54	76.97	102.63	90.09
685L (397S Benbow - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	75	83	22.31	29.75	89.48	119.31	89.56
720L (347S Fox Creek - 397S Benbow)	202L (58S Edson - 178S Cynthia)	85	94	8.98	10.56	95.57	112.43	101.87
720L (347S Fox Creek - 397S Benbow)	740L (58S Edson - 39S Bickerdike)	112	124	24.90	22.23	115.25	102.9	80.67
720L (347S Fox Creek - 397S Benbow)	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	8.05	10.73	75.33	100.44	89.71
720L (347S Fox Creek - 397S Benbow)	890L (58S Edson - 207S Pinedale)	75	83	20.54	27.39	87.79	117.05	89.66
744L (228S T.M.P.L. Niton - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	85	94	12.18	14.33	96.42	113.43	99.1
744L (228S T.M.P.L. Niton - 106S Paddle River - 235S Entwistle)	202L (58S Edson - 178S Cynthia)	85	94	12.78	15.04	95.33	112.15	97.11
7L199/199L (347S Fox Creek - 741S Fox Creek)	202L (58S Edson - 178S Cynthia)	85	94	9.43	11.09	88.25	103.82	92.73
7L199/199L (347S Fox Creek - 741S Fox Creek)	890L (58S Edson - 207S Pinedale)	75	83	18.89	25.18	79.31	105.75	80.57
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	202L (58S Edson - 178S Cynthia)	85	94	11.06	13.01	87.11	102.48	89.47
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	890L (58S Edson - 207S Pinedale)	75	83	17.53	23.37	77.84	103.78	80.41
178S Cynthia T1	720L (347S Fox Creek - 397S Benbow)	120	132	56.16	46.80	121.78	101.48	54.68
178S Cynthia T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	1.86	2.48	78.78	105.04	102.56
178S Cynthia T1	890L (58S Edson - 207S Pinedale)	75	83	16.06	21.41	91.29	121.72	100.31
834L (384S Keystone - 320P Keephills)	202L (58S Edson - 178S Cynthia)	85	94	12.15	14.29	85.71	100.83	86.54
834L (384S Keystone – 320P	890L (58S Edson - 207S Pinedale)	75	83	19.20	25.60	75.63	100.84	75.24

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	
Keephills)								
836L (61S Lodgepole - 283S Violet Grove)	890L (58S Edson - 207S Pinedale)	75	83	18.62	24.83	79.34	105.78	80.95
1012S Deer Hill T1	202L (58S Edson - 178S Cynthia)	85	94	10.48	12.33	98.12	115.44	103.11
1012S Deer Hill T1	740L (58S Edson - 39S Bickerdike)	112	124	27.73	24.76	117.95	105.31	80.55
1012S Deer Hill T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	10.09	13.45	77.72	103.63	90.18
1012S Deer Hill T1	890L (58S Edson - 207S Pinedale)	75	83	23.09	30.79	90.25	120.33	89.54
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	85	94	10.12	11.91	97.96	115.25	103.34
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	740L (58S Edson - 39S Bickerdike)	112	124	27.59	24.63	117.94	105.3	80.67
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	10.28	13.71	77.85	103.8	90.09
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	75	83	23.17	30.89	90.37	120.49	89.6
890L (58S Edson - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	85	94	12.81	15.07	99.60	117.18	102.11
890L (58S Edson - 207S Pinedale)	720L (347S Fox Creek - 397S Benbow)	120	132	58.57	48.81	121.52	101.27	52.46
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	85	94	12.12	14.26	95.94	112.87	98.61
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	112	124	30.76	27.46	119.59	106.78	79.32
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	13.67	18.23	82.97	110.63	92.4
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	75	83	9.26	12.34	78.56	104.75	92.41
902L (19S Wabamun	744L (235S Entwistle - 744AL	75	83	7.19	9.59	76.29	101.72	92.13

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	
Generation Station - 310P Sundance (Plant))	Tap)							
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	75	83	28.10	37.46	96.12	128.16	90.7
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	909L (310P Sundance (Plant) - Dome)	481	481	240.88	50.08	519.43	107.99	57.91
905L (19S Wabamun Generation Station - 37S North Calder)	202L (58S Edson - 178S Cynthia)	85	94	11.54	13.58	89.45	105.23	91.65
905L (19S Wabamun Generation Station - 37S North Calder)	909L (310P Sundance (Plant) - Dome)	481	481	215.15	44.73	483.69	100.56	55.83
909L (310P Sundance (Plant) - Dome)	202L (58S Edson - 178S Cynthia)	85	94	11.43	13.45	95.60	112.47	99.02
909L (310P Sundance (Plant) - Dome)	890L (58S Edson - 207S Pinedale)	75	83	18.25	24.33	80.83	107.77	83.44
909L (310P Sundance (Plant) - Dome)	902L (19S Wabamun Generation Station - 310P Sundance (Plant))	499	652	273.00	54.71	525.30	105.27	50.56
913L (69S North Barrhead - 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)	120	132	67.36	56.13	123.66	103.05	46.92
913L (69S North Barrhead - 338S Cherhill)	890L (58S Edson - 207S Pinedale)	75	83	17.45	23.26	76.20	101.6	78.34
919L (310P Sundance (Plant) - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	120	132	73.86	61.55	125.72	104.77	43.22
919L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	75	83	17.29	23.05	76.97	102.63	79.58
922L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	85	94	11.38	13.39	88.51	104.13	90.74
922L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)	75	83	16.07	21.43	75.85	101.13	79.7
926L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	85	94	11.37	13.38	88.52	104.14	90.76
926L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)	75	83	16.07	21.43	75.86	101.14	79.71

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	
973L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	85	94	17.31	20.36	108.91	128.13	107.77
973L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	120	132	47.88	39.90	142.45	118.71	78.81
973L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	112	124	14.43	12.88	128.21	114.47	101.59
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	7.94	10.59	85.47	113.96	103.37
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	75	83	12.43	16.57	81.12	108.16	91.59
973L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	75	83	14.72	19.62	78.83	105.11	85.49
973L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	75	83	8.96	11.94	97.98	130.64	118.7
973L (39S Bickerdike - 310P Sundance (Plant))	974L (39S Bickerdike - 310P Sundance (Plant))	333	499	133.27	40.02	353.48	106.15	66.13
974L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	85	94	17.36	20.42	108.88	128.09	107.67
974L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	120	132	47.84	39.87	142.34	118.62	78.75
974L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	112	124	14.63	13.06	128.16	114.43	101.37
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	7.85	10.47	85.41	113.88	103.41
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	75	83	12.35	16.47	81.07	108.09	91.62
974L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	75	83	14.66	19.54	78.77	105.03	85.49
974L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	75	83	9.13	12.17	97.91	130.55	118.38
974L (39S Bickerdike - 310P Sundance (Plant))	973L (39S Bickerdike - 310P Sundance (Plant))	333	499	133.27	40.02	353.85	106.26	66.24
989L (310P Sundance (Plant) - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	120	132	72.53	60.44	124.67	103.89	43.45
989L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	75	83	21.11	28.15	76.78	102.37	74.22
19S Wabamun T10	890L (58S Edson - 207S Pinedale)	75	83	24.26	32.34	84.38	112.5	80.16

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	
39S Bickerdike T1	39S Bickerdike T2	269	269	150.64	56.00	344.29	127.99	71.99
39S Bickerdike T2	39S Bickerdike T1	269	269	150.67	56.01	344.32	128	71.99

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed.

3.1.2 Scenario 4: 2022 Winter Peak 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 3-2. Due to the high Category A loading on 890L and 202L (>99%), only Category B conditions which result in more than a 1% loading increase over the Category A loading are reported.

Table 3-3: 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	
202L (178S Cynthia - 359S Esso West Pembina - 61S Lodgepole)	890L (58S Edson - 207S Pinedale)	79	87	16.13	20.42	85.64	108.41	87.99
202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	9.70	12.28	84.00	106.33	94.05
202L (58S Edson - 178S Cynthia)	890L (58S Edson - 207S Pinedale)	79	87	17.37	21.99	98.92	125.21	103.22
58S Edson T1/T2	720L (347S Fox Creek - 397S Benbow)	148	163	81.67	55.18	160.79	108.64	53.46
61S Lodgepole T1/T2	890L (58S Edson - 207S Pinedale)	79	87	19.84	25.12	85.15	107.78	82.66
207S Pinedale T1/T2	202L (58S Edson - 178S Cynthia)	90	99	8.70	9.67	108.52	120.58	110.91

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	
320P Keephills T1	202L (58S Edson - 178S Cynthia)	90	99	15.18	16.87	98.44	109.38	92.51
602S Cold Creek T1/T2	202L (58S Edson - 178S Cynthia)	90	99	5.15	5.72	92.30	102.55	98.82
602S Cold Creek T1/T2	890L (58S Edson - 207S Pinedale)	79	87	17.66	22.36	80.56	101.97	79.61
671L (58S Edson - 39S Bickerdike)	740L (58S Edson - 39S Bickerdike)	135	146	43.09	31.92	185.34	137.29	105.37
672L (235S Entwistle - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	90	99	2.53	2.81	97.04	107.82	105.01
673L (283S Violet Grove - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	90	99	3.49	3.88	95.54	106.15	102.27
685L (397S Benbow - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	90	99	12.48	13.87	107.33	119.25	105.38
685L (397S Benbow - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	14.31	18.11	81.73	103.46	85.35
685L (397S Benbow - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	79	87	26.39	33.41	96.47	122.12	88.71
720L (347S Fox Creek - 397S Benbow)	202L (58S Edson - 178S Cynthia)	90	99	11.75	13.05	106.16	117.96	104.91
720L (347S Fox Creek - 397S Benbow)	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	13.54	17.14	80.51	101.91	84.77
720L (347S Fox Creek - 397S Benbow)	890L (58S Edson - 207S Pinedale)	79	87	25.07	31.73	95.21	120.52	88.79
744L (228S T.M.P.L. Niton - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	90	99	8.72	9.69	105.26	116.96	107.27
744L (228S T.M.P.L. Niton - 106S Paddle River - 235S Entwistle)	202L (58S Edson - 178S Cynthia)	90	99	8.64	9.60	103.66	115.18	105.58
7L199/199L (347S Fox Creek - 741S Fox Creek)	202L (58S Edson - 178S Cynthia)	90	99	9.39	10.43	97.90	108.78	98.35
7L199/199L (347S Fox Creek - 741S Fox Creek)	890L (58S Edson - 207S Pinedale)	79	87	22.19	28.09	85.45	108.17	80.08
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	202L (58S Edson - 178S Cynthia)	90	99	9.58	10.64	96.50	107.22	96.58
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	890L (58S Edson - 207S Pinedale)	79	87	20.07	25.41	83.61	105.83	80.42
62S Brazeau T1	202L (58S Edson - 178S Cynthia)	90	99	6.73	7.48	91.22	101.35	93.87
62S Brazeau T2	202L (58S Edson - 178S Cynthia)	90	99	6.79	7.54	91.18	101.31	93.77
178S Cynthia T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	8.58	10.86	83.32	105.47	94.61

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	
178S Cynthia T1	890L (58S Edson - 207S Pinedale)	79	87	17.15	21.71	98.14	124.23	102.52
834L (384S Keystone - 320P Keephills)	202L (58S Edson - 178S Cynthia)	90	99	14.84	16.49	98.05	108.94	92.45
1012S Deer Hill T1	202L (58S Edson - 178S Cynthia)	90	99	13.25	14.72	108.36	120.4	105.68
1012S Deer Hill T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	14.84	18.79	82.51	104.44	85.65
1012S Deer Hill T1	890L (58S Edson - 207S Pinedale)	79	87	27.24	34.48	97.27	123.13	88.65
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	90	99	13.27	14.74	108.20	120.22	105.48
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	15.09	19.10	82.65	104.62	85.52
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	79	87	27.38	34.66	97.41	123.31	88.65
890L (58S Edson - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	90	99	8.67	9.63	109.06	121.18	111.55
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	90	99	10.81	12.01	102.41	113.79	101.78
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	15.59	19.74	82.62	104.58	84.84
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	79	87	30.78	38.96	98.08	124.15	85.19
905L (19S Wabamun Generation Station - 37S North Calder)	202L (58S Edson - 178S Cynthia)	90	99	8.02	8.91	96.53	107.25	98.34
909L (310P Sundance (Plant) - Dome)	202L (58S Edson - 178S Cynthia)	90	99	9.00	10.00	101.31	112.57	102.57
909L (310P Sundance (Plant) - Dome)	890L (58S Edson - 207S Pinedale)	79	87	20.19	25.56	84.90	107.47	81.91
913L (69S North Barrhead – 338S Cherhill)	890L (58S Edson - 207S Pinedale)	79	87	16.80	21.27	80.58	102.00	80.73
913L (69S North Barrhead – 338S Cherhill)	202L (58S Edson - 178S Cynthia)	90	99	6.74	7.49	90.50	100.55	93.06

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	
919L (310P Sundance (Plant) - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	148	163	99.52	67.24	151.52	102.38	35.14
919L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	79	87	21.60	27.34	83.23	105.36	78.02
922L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	90	99	7.88	8.75	99.21	110.23	101.48
922L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)	79	87	16.08	20.36	80.45	101.84	81.48
926L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	90	99	7.88	8.76	99.23	110.25	101.49
926L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)	79	87	16.08	20.36	80.45	101.84	81.48
973L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	90	99	14.25	15.83	118.80	132	116.17
973L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	148	163	61.78	41.74	163.16	110.24	68.5
973L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	135	146	11.14	8.25	138.48	102.58	94.33
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	13.56	17.17	89.70	113.55	96.38
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	79	87	19.25	24.37	83.32	105.47	81.1
973L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	79	87	19.77	25.03	81.85	103.61	78.58
973L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	79	87	7.89	9.99	104.72	132.56	122.57
973L (39S Bickerdike - 310P Sundance (Plant))	974L (39S Bickerdike - 310P Sundance (Plant))	333	499	144.06	43.26	381.15	114.46	71.2
974L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	90	99	14.05	15.61	118.72	131.91	116.3
974L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	148	163	61.73	41.71	163.01	110.14	68.43
974L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	135	146	11.26	8.34	138.39	102.51	94.17
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	13.37	16.93	89.62	113.44	96.51
974L (39S Bickerdike - 310P	744L (228S T.M.P.L. Niton -	79	87	19.09	24.16	83.24	105.37	81.21

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	
Sundance (Plant))	744AL Tap)							
974L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	79	87	19.62	24.83	81.77	103.51	78.68
974L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	79	87	7.92	10.03	104.62	132.43	122.4
974L (39S Bickerdike - 310P Sundance (Plant))	973L (39S Bickerdike - 310P Sundance (Plant))	333	499	144.09	43.27	381.42	114.54	71.27
989L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	79	87	21.31	26.98	82.97	105.02	78.04
1046L (310P Sundance (Plant) to 338S Cherhill)	202L (58S Edson - 178S Cynthia)	90	99	7.58	8.42	90.56	100.62	92.2
1046L (310P Sundance (Plant) to 338S Cherhill)	890L (58S Edson - 207S Pinedale)	79	87	18.91	23.94	80.74	102.20	78.26
19S Wabamun T10	890L (58S Edson - 207S Pinedale)	79	87	29.18	36.94	90.46	114.51	77.57
39S Bickerdike T1	39S Bickerdike T2	269	269	160.51	59.67	382.54	142.21	82.54
39S Bickerdike T2	39S Bickerdike T1	269	269	160.49	59.66	382.54	142.21	82.55

Voltage Criteria Violations

No voltage criteria violations were observed under Category B conditions.

POD Bus Voltage Deviations

No POD bus voltage deviations were observed.

3.2 Transient Stability Studies

Transient stability studies were completed for Scenario 3, 4, 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 3-4. 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 3-4: Transient Stability Study Results under Category B Conditions for All Scenarios

Studied Contingency	Fault Description and Location	Results
685L (Deer Hill 1012S to Benbow 397S)	3-phase fault at Deer Hill 1012S	Stable
	3-phase fault at Benbow 397S	Stable
854L (Deer Hill 1012S to Bickerdike 39S)	3-phase fault at Deer Hill 1012S	Stable
	3-phase fault at Bickerdike 39S	Stable
744L (Entwistle 235S to Pinedale 207S)	3-phase fault at Entwistle 235S	Stable
	3-phase fault at Pinedale 207S	Stable
890L (Edson 58S to Pinedale 207S)	3-phase fault at Edson 58S	Stable
	3-phase fault at Pinedale 207S	Stable
671L (Bickerdike 39S to Edson 58S)	3-phase fault at Bickerdike 39S	Stable
	3-phase fault at Edson 58S	Stable
740L (Bickerdike 39S to Edson 58S)	3-phase fault at Bickerdike 39S	Stable
	3-phase fault at Edson 58S	Stable
973L (Bickerdike 39S to Sundance 310P)	3-phase fault at Bickerdike 39S	Stable
	3-phase fault at Sundance 310P	Stable
202L (Edson 58S to Cynthia 178S)	3-phase fault at Edson 58S	Stable
	3-phase fault at Cynthia 178S	Stable
745L (Bickerdike 39S to Cold Creek 602S)	3-phase fault at Bickerdike 39S	Stable
	3-phase fault at Cold Creek 602S	Stable

4 Short Circuit Studies

4.1 Pre-Project Results

4.1.1 Scenario 2: 2022 WP Pre-Project

Pre-Project short-circuit current levels are provided in Table 4-1[1].

Table 4-1: Pre-Project Short-Circuit Current Levels for Scenario 2

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)
Mountain Obed 411S	138	134.71	2.8	0.041+0.140j	2	0.087+0.306j
Cold Creek 602S	138	133.19	3.6	0.033+0.108j	2.9	0.051+0.185j
Gulf Robb 414S	138	138.22	2.1	0.079+0.185j	1.4	0.162+0.489j
Edson 58S	138	139.09	8.2	0.015+0.049j	7.4	0.017+0.066j
Bickerdike 39S 138kV	138	139.39	10.1	0.011+0.041j	12.2	0.001+0.021j
Bickerdike 39S 240kV	240	257.52	6.2	0.010+0.040j	6.4	0.002+0.038j
Sundance 310P	240	259.54	23.7	0.002+0.011j	25.1	0.001+0.009j
Dalehurst 975S	138	134.81	3.5	0.032+0.114j	2.6	0.064+0.219j
Marlboro 348S	138	139.73	4.4	0.028+0.092j	3.1	0.059+0.206j
Hornbeck 345S	138	138.6	6.9	0.016+0.059j	6.2	0.020+0.078j
Deer Hill 1012S	138	140	5.3	0.020+0.077j	4	0.041+0.156j
Fickle Lake 406S	138	137.96	5.6	0.024+0.070j	4.7	0.035+0.113j

4.2 Post-Project Results

4.2.1 Scenario 4: 2022 WP Post-Project

Post-Project short-circuit current levels for Scenario 4 are provided in Table 4-2.

[1] 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.

Table 4-2: Post-Project Short-Circuit Current Levels for Scenario 4

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)
Mountain Obed 411S	138	141.79	3.1	0.036+0.132j	2.2	0.091+0.307j
Cold Creek 602S	138	141.38	4	0.030+0.102j	3.1	0.057+0.193j
Gulf Robb 414S	138	142.45	2.3	0.071+0.171j	1.5	0.161+0.480j
Edson 58S	138	142.95	11.2	0.009+0.038j	9.4	0.017+0.059j
Bickerdike 39S 138kV	138	143.52	16.2	0.004+0.027j	20.4	0.000+0.011j
Bickerdike 39S 240kV	240	263.12	14	0.002+0.019j	16.7	0.000+0.011j
Sundance 310P	240	258.48	26.1	0.002+0.010j	26.9	0.001+0.009j
Dalehurst 975S	138	141.88	3.9	0.028+0.105j	2.9	0.067+0.220j
Marlboro 348S	138	143	5.2	0.022+0.080j	3.5	0.059+0.200j
Hornbeck 345S	138	143.17	9.3	0.009+0.046j	7.9	0.020+0.070j
Deer Hill 1012S	138	142.68	6.3	0.015+0.067j	4.4	0.041+0.152j
Fickle Lake 406S	138	142.87	7.2	0.018+0.058j	5.6	0.035+0.107j
Whisky Jack 1047S	240	263.16	14	0.002+0.019j	16.8	0.000+0.011j

4.2.2 Scenario 5: 2029 WP Post-Project

Post-Project short-circuit current levels for Scenario 5 are provided in Table 4-3.

Table 4-3: Post-Project Short-Circuit Current Levels for Scenario 5

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)
Mountain Obed 411S	138	139.04	3.1	0.037+0.131j	2.1	0.091+0.307j
Cold Creek 602S	138	138.32	4	0.031+0.100j	3.1	0.057+0.193j
Gulf Robb 414S	138	140.6	2.3	0.072+0.170j	1.5	0.161+0.480j
Edson 58S	138	141.25	11.4	0.009+0.037j	9.5	0.016+0.058j
Bickerdike 39S 138kV	138	141.91	16.7	0.004+0.026j	20.9	0.000+0.011j
Bickerdike 39S 240kV	240	259.05	14.9	0.002+0.017j	17.7	0.000+0.010j
Sundance 310P	240	257.28	30.9	0.001+0.008j	32.9	0.000+0.007j
Dalehurst 975S	138	139.15	3.9	0.029+0.104j	2.8	0.067+0.220j

Marlboro 348S	138	142.46	5.3	0.022+0.079j	3.5	0.059+0.199j
Hornbeck 345S	138	141.38	9.4	0.009+0.045j	7.9	0.020+0.070j
Deer Hill 1012S	138	142.9	6.4	0.014+0.067j	4.4	0.041+0.152j
Fickle Lake 406S	138	140.87	7.2	0.018+0.057j	5.6	0.035+0.106j
Whisky Jack 1047S	240	259.53	14.9	0.002+0.017j	17.8	0.000+0.010j

5 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.

5.1 Pre-Project

Pre-Project mitigation measures are summarized in Table 5-1.

Table 5-1: Pre-Project Mitigation Measures

Mitigation Measure	Location of Observed Violation	Contingency
Real time operational practices	995L/995AL (62S Brazeau – 68S Willesden Green – 17S Benalto	202L (61S Lodgepole – 62S Brazeau)

5.2 Post-Project

Post-Project mitigation measures are summarized in Table 5-2.

Table 5-2: Post-Project Mitigation Measures

Mitigation Measure	Contingency	Location of Observed Violation
ISO TCM Rule 302.1	None	890L (58S Edson to 207S Pinedale)
ISO TCM Rule 302.1	None	202L (58S Edson to 178S Cynthia)
New T1 and T2 - 39S Bickerdike Overload Mitigation*	39S Bickerdike T1	39S Bickerdike T2
	39S Bickerdike T2	39S Bickerdike T1
New 890L overload mitigation scheme and New 202L overload mitigation scheme	685L (397S Benbow - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	685L (397S Benbow - 1012S Deer Hill)	740L (58S Edson - 39S Bickerdike)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	685L (397S Benbow - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	685L (397S Benbow - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	720L (347S Fox Creek - 397S Benbow)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	720L (347S Fox Creek - 397S Benbow)	740L (58S Edson - 39S Bickerdike)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	720L (347S Fox Creek - 397S Benbow)	744L (228S T.M.P.L. Niton - 207S Pinedale)

New 890L overload mitigation scheme and New 202L overload mitigation scheme	720L (347S Fox Creek - 397S Benbow)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	7L199/199L (347S Fox Creek - 741S Fox Creek)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	7L199/199L (347S Fox Creek - 741S Fox Creek)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	320P Keephills T1	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	320P Keephills T1	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	602S Cold Creek T1/T2	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	602S Cold Creek T1/T2	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	1012S Deer Hill T1	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	1012S Deer Hill T1	740L (58S Edson - 39S Bickerdike)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	1012S Deer Hill T1	744L (228S T.M.P.L. Niton - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	1012S Deer Hill T1	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	834L (384S Keystone - 320P Keephills)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	834L (384S Keystone - 320P Keephills)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	740L (58S Edson - 39S Bickerdike)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	902L (19S Wabamun Generation Station - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	902L (19S Wabamun Generation Station - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)
New 890L overload mitigation scheme and	902L (19S Wabamun Generation	744L (228S T.M.P.L. Niton

New 202L overload mitigation scheme	Station - 310P Sundance (Plant))	- 744AL Tap)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	902L (19S Wabamun Generation Station - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	902L (19S Wabamun Generation Station - 310P Sundance (Plant))	909L (310P Sundance (Plant) - Dome)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	905L (19S Wabamun Generation Station - 37S North Calder)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	905L (19S Wabamun Generation Station - 37S North Calder)	909L (310P Sundance (Plant) - Dome)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	909L (310P Sundance (Plant) - Dome)	202L (58S Edson - 178S Cynthia)
	909L (310P Sundance (Plant) - Dome)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	909L (310P Sundance (Plant) - Dome)	902L (19S Wabamun Generation Station - 310P Sundance (Plant))
New 890L overload mitigation scheme and New 202L overload mitigation scheme	913L (69S North Barrhead – 338S Cherhill)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	913L (69S North Barrhead – 338S Cherhill)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	922L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	922L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	926L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	926L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	973L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	973L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	973L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	973L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	973L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	973L (39S Bickerdike - 310P Sundance (Plant))	974L (39S Bickerdike - 310P Sundance (Plant))

New 890L overload mitigation scheme and New 202L overload mitigation scheme	974L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	974L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	974L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	974L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	974L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and New 202L overload mitigation scheme	974L (39S Bickerdike - 310P Sundance (Plant))	973L (39S Bickerdike - 310P Sundance (Plant))
New 890L overload mitigation scheme	202L (178S Cynthia - 359S Esso West Pembina - 61S Lodgepole)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme	202L (58S Edson - 178S Cynthia)	720L (347S Fox Creek - 397S Benbow)
New 890L overload mitigation scheme	202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 207S Pinedale)
New 890L overload mitigation scheme	202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 744AL Tap)
New 890L overload mitigation scheme	202L (58S Edson - 178S Cynthia)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme	61S Lodgepole T1/T2	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme	178S Cynthia T1	720L (347S Fox Creek - 397S Benbow)
New 890L overload mitigation scheme	178S Cynthia T1	744L (228S T.M.P.L. Niton - 207S Pinedale)
New 890L overload mitigation scheme	178S Cynthia T1	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme	836L (61S Lodgepole - 283S Violet Grove)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme	19S Wabamun T10	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and real-time operational practices	919L (310P Sundance (Plant) - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)
New 890L overload mitigation scheme	919L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme and real-time operational practices	989L (310P Sundance (Plant) - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)
New 890L overload mitigation scheme	989L (310P Sundance (Plant) - 77S	890L (58S Edson - 207S

	Sagitawah)	Pinedale)
New 890L overload mitigation scheme and real-time operational practices	1046L (310P Sundance (Plant) to 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)
New 890L overload mitigation scheme	1046L (310P Sundance (Plant) to 338S Cherhill)	890L (58S Edson - 207S Pinedale)
New 890L overload mitigation scheme	19S Wabamun T10	890L (58S Edson - 207S Pinedale)
New 202L overload mitigation scheme	207S Pinedale T1/T2	202L (58S Edson - 178S Cynthia)
New 202L overload mitigation scheme	207S Pinedale T1/T2	720L (347S Fox Creek - 397S Benbow)
New 202L overload mitigation scheme	62S Brazeau T5	202L (58S Edson - 178S Cynthia)
New 202L overload mitigation scheme	672L (235S Entwistle - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)
New 202L overload mitigation scheme	673L (283S Violet Grove - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)
New 202L overload mitigation scheme	744L (228S T.M.P.L. Niton - 207S Pinedale)	202L (58S Edson - 178S Cynthia)
New 202L overload mitigation scheme	744L (228S T.M.P.L. Niton - 106S Paddle River - 235S Entwistle)	202L (58S Edson - 178S Cynthia)
New 202L overload mitigation scheme	890L (58S Edson - 207S Pinedale)	202L (58S Edson - 178S Cynthia)
New 202L overload mitigation scheme	890L (58S Edson - 207S Pinedale)	720L (347S Fox Creek - 397S Benbow)
New 740L overload mitigation scheme	671L (58S Edson - 39S Bickerdike)	740L (58S Edson - 39S Bickerdike)
New 720L overload mitigation scheme	58S Edson T1/T2	720L (347S Fox Creek - 397S Benbow)

Notes:

*In the Winter Peak scenario, post-RAS loading observed on the remaining Bickerdike transformer is below the seasonal rating when calculated based on current, but above the seasonal rating when calculated based on MVA. Real-time operational practices may be required to completely mitigate the overload depending on system conditions.

5.3 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 Scenario 3 (after applying ISO TCM Rule 302.1 for Category A conditions) and Scenario 4 using Alternative 1 and the RASs described in the previous section.

The post-mitigation power flow diagrams for selected Category B conditions are provided in Attachment A6. Post-mitigation power flow diagrams present only selected 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.

5.3.1 Scenario 3: 2022 SP Post-Project

Category A Conditions

Thermal criteria violations observed under Category A conditions in the post-Project studies were mitigated by applying ISO TCM Rule 302.1 as shown in Table 5-3.

Table 5-3: Post-TCM Rule 302.1 Power Flow Study Results for Scenario 3

Details of Violation (Violation Observed On)	Seasonal Continuous Rating (MVA)	Short-term (Emergency) Rating (MVA)	Post-Project Results		Post-TCM Rule 302.1 Results	
			Power Flow (MVA)	% Loading	Power Flow (MVA)	% Loading
890L (58S Edson to 207S Pinedale)	75	83	78.59	104.78	74.35	99.13
202L (58S Edson to 178S Cynthia)	85	94	88.51	104.13	82.40	96.94

Category B Conditions

Thermal criteria violations observed under certain Category B conditions in the post-Project studies were mitigated by RASs as shown in Table 5-4.

Table 5-4: Post-RAS Power Flow Study Results for Scenario 3

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
202L (178S Cynthia - 359S Esso West Pembina - 61S Lodgepole)	890L (58S Edson - 207S Pinedale)	75	83	79.85	106.46	72.42	96.56
202L (58S Edson - 178S Cynthia)	720L (347S Fox Creek - 397S Benbow)	120	132	121.76	101.47	85.81	71.51
202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	79.44	105.92	43.65	58.20

202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 744AL Tap)	75	83	75.08	100.11	39.38	52.50
202L (58S Edson - 178S Cynthia)	890L (58S Edson - 207S Pinedale)	75	83	91.97	122.63	56.04	74.72
320P Keephills GT1	890L (58S Edson - 207S Pinedale)	75	83	75.92	101.22	72.60	96.80
320P Keephills GT2	890L (58S Edson - 207S Pinedale)	75	83	75.80	101.07	72.51	96.68
320P Keephills GT3	890L (58S Edson - 207S Pinedale)	75	83	75.40	100.53	72.10	96.13
58S Edson T1/T2	720L (347S Fox Creek - 397S Benbow)	120	132	139.76	116.47	98.05	81.71
61S Lodgepole T1/T2	890L (58S Edson - 207S Pinedale)	75	83	81.02	108.03	51.62	68.83
207S Pinedale T1/T2	202L (58S Edson - 178S Cynthia)	85	94	99.16	116.66	53.09	62.46
207S Pinedale T1/T2	720L (347S Fox Creek - 397S Benbow)	120	132	121.28	101.07	86.60	72.17
320P Keephills T1	202L (58S Edson - 178S Cynthia)	85	94	86.08	101.27	48.37	56.91
602S Cold Creek T1/T2	202L (58S Edson - 178S Cynthia)	85	94	85.51	100.60	79.81	93.89
602S Cold Creek T1/T2	890L (58S Edson - 207S Pinedale)	75	83	76.64	102.19	72.67	96.89
62S Brazeau T5	202L (58S Edson - 178S Cynthia)	85	94	88.30	103.88	62.08	73.03
671L (58S Edson - 39S Bickerdike)	740L (58S Edson - 39S Bickerdike)	112	124	167.16	149.25	104.82	93.59
672L (235S Entwistle - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	85	94	86.41	101.66	43.82	51.55
673L (283S Violet Grove - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	85	94	85.36	100.42	43.41	51.07
685L (397S Benbow - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	85	94	97.12	114.26	53.58	63.04
685L (397S Benbow -	740L (58S Edson - 39S Bickerdike)	112	124	116.98	104.45	75.61	67.51

1012S Deer Hill)							
685L (397S Benbow - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	76.97	102.63	45.87	61.16
685L (397S Benbow - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	75	83	89.48	119.31	58.25	77.66
720L (347S Fox Creek - 397S Benbow)	202L (58S Edson - 178S Cynthia)	85	94	95.57	112.43	52.04	61.22
720L (347S Fox Creek - 397S Benbow)	740L (58S Edson - 39S Bickerdike)	112	124	115.25	102.90	73.88	65.96
720L (347S Fox Creek - 397S Benbow)	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	75.33	100.44	44.24	58.99
720L (347S Fox Creek - 397S Benbow)	890L (58S Edson - 207S Pinedale)	75	83	87.79	117.05	56.57	75.43
744L (228S T.M.P.L. Niton - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	85	94	96.42	113.43	50.35	59.23
744L (235S Entwistle - 744AL Tap)	202L (58S Edson - 178S Cynthia)	85	94	94.94	111.69	48.86	57.48
744L (228S T.M.P.L. Niton - 106S Paddle River - 235S Entwistle)	202L (58S Edson - 178S Cynthia)	85	94	95.33	112.15	49.26	57.95
7L199/199L (347S Fox Creek - 741S Fox Creek)	202L (58S Edson - 178S Cynthia)	85	94	88.25	103.82	47.46	55.84
7L199/199L (347S Fox Creek - 741S Fox Creek)	890L (58S Edson - 207S Pinedale)	75	83	79.31	105.75	51.11	68.14
7L90 (347S Fox Creek - 2018S Muir -	202L (58S Edson - 178S Cynthia)	85	94	87.11	102.48	79.54	93.58

813S Little Smoky)							
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	890L (58S Edson - 207S Pinedale)	75	83	77.84	103.78	72.55	96.73
178S Cynthia T1	720L (347S Fox Creek - 397S Benbow)	120	132	121.78	101.48	85.82	71.52
178S Cynthia T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	78.78	105.04	43.06	57.41
178S Cynthia T1	890L (58S Edson - 207S Pinedale)	75	83	91.29	121.72	55.43	73.91
834L (384S Keystone - 320P Keephills)	202L (58S Edson - 178S Cynthia)	85	94	85.71	100.83	81.62	96.02
834L (384S Keystone – 320P Keephills)	890L (58S Edson - 207S Pinedale)	75	83	75.63	100.84	72.73	96.97
836L (61S Lodgepole - 283S Violet Grove)	890L (58S Edson - 207S Pinedale)	75	83	79.34	105.78	72.32	96.43
1012S Deer Hill T1	202L (58S Edson - 178S Cynthia)	85	94	98.12	115.44	54.58	64.21
1012S Deer Hill T1	740L (58S Edson - 39S Bickerdike)	112	124	117.95	105.31	76.57	68.37
1012S Deer Hill T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	77.72	103.63	46.61	62.15
1012S Deer Hill T1	890L (58S Edson - 207S Pinedale)	75	83	90.25	120.33	59.00	78.67
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	85	94	97.96	115.25	54.43	64.03
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	740L (58S Edson - 39S Bickerdike)	112	124	117.94	105.30	76.57	68.37
854L (39S Bickerdike -	744L (228S T.M.P.L. Niton -	75	83	77.85	103.80	46.76	62.34

348S Marlboro - 1012S Deer Hill)	207S Pinedale)						
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	75	83	90.37	120.49	59.13	78.84
890L (58S Edson - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	85	94	99.60	117.18	53.53	62.98
890L (58S Edson - 207S Pinedale)	720L (347S Fox Creek - 397S Benbow)	120	132	121.52	101.27	86.86	72.38
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	85	94	95.94	112.87	54.36	63.95
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	112	124	119.59	106.78	79.99	71.42
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	82.97	110.63	53.14	70.85
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	75	83	78.56	104.75	48.77	65.02
902L (19S Wabamun Generation Station - 310P Sundance	744L (235S Entwistle - 744AL Tap)	75	83	76.29	101.72	46.52	62.03

(Plant))							
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	75	83	96.12	128.16	66.35	88.47
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	909L (310P Sundance (Plant) - Dome)	481	481	519.43	107.99	431.22	89.65
905L (19S Wabamun Generation Station - 37S North Calder)	202L (58S Edson - 178S Cynthia)	85	94	89.45	105.23	48.36	56.89
905L (19S Wabamun Generation Station - 37S North Calder)	909L (310P Sundance (Plant) - Dome)	481	481	483.69	100.56	398.56	82.86
909L (310P Sundance (Plant) - Dome)	202L (58S Edson - 178S Cynthia)	85	94	95.60	112.47	53.23	62.62
909L (310P Sundance (Plant) - Dome)	890L (58S Edson - 207S Pinedale)	75	83	80.83	107.77	52.22	69.63
909L (310P Sundance (Plant) - Dome)	902L (19S Wabamun Generation Station - 310P Sundance (Plant))	499	652	525.30	105.27	447.30	89.64
913L (69S North Barrhead - 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)	120	132	123.66	103.05	119.66	99.72
913L (69S North Barrhead - 338S Cherhill)	890L (58S Edson - 207S Pinedale)	75	83	76.20	101.60	72.50	96.67
919L (310P	720L (347S	120	132	125.72	104.77	122.62	102.18

SUNDANCE (PLANT) to 77S SAGITAWAH)	FOXCREEK to 397S BENBOW)						
919L (310P SUNDANCE (PLANT) to 77S SAGITAWAH)	890L (58S EDSON to 207S Pinedale)	75	83	76.97	102.63	72.41	96.55
922L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	85	94	88.51	104.13	82.16	96.66
922L (310P Sundance (Plant) - 17S Benalto)	890L (58S EDSON to 207S Pinedale)	75	83	75.85	101.13	71.69	95.58
926L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	85	94	88.52	104.14	82.17	96.67
926L (310P Sundance (Plant) - 17S Benalto)	890L (58S EDSON to 207S Pinedale)	75	83	75.86	101.14	71.69	95.58
973L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	85	94	108.91	128.13	52.57	61.85
973L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	120	132	142.45	118.71	92.16	76.80
973L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	112	124	128.21	114.47	73.71	65.81
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	85.47	113.96	43.37	57.83
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	75	83	81.12	108.16	39.10	52.13

973L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	75	83	78.83	105.11	36.80	49.07
973L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	75	83	97.98	130.64	55.76	74.34
973L (39S Bickerdike - 310P Sundance (Plant))	974L (39S Bickerdike - 310P Sundance (Plant))	333	499	353.48	106.15	132.13	39.68
974L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	85	94	108.88	128.09	52.56	61.83
974L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	120	132	142.34	118.62	92.12	76.77
974L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	112	124	128.16	114.43	73.68	65.79
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	75	83	85.41	113.88	43.36	57.81
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	75	83	81.07	108.09	39.08	52.11
974L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	75	83	78.77	105.03	36.79	49.05
974L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	75	83	97.91	130.55	55.73	74.31

974L (39S Bickerdike - 310P Sundance (Plant))	973L (39S Bickerdike - 310P Sundance (Plant))	333	499	353.85	106.26	132.17	39.69
989L (310P SUNDANCE (PLANT) to 77S SAGITAWAH)	720L (347S FOXCREEK to 397S BENBOW)	120	132	124.67	103.89	121.79	101.49
989L (310P SUNDANCE (PLANT) to 77S SAGITAWAH)	890L (58S EDSON to 207S Pinedale)	75.05	83	76.83	102.37	72.60	96.73
1046L (310P Sundance (Plant) to 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)	120	132	124.43	103.69	120.41	100.34
1046L (310P Sundance (Plant) to 338S Cherhill)	890L (58S Edson - 207S Pinedale)	75	83	76.32	101.76	72.62	96.83
19S Wabamun T10	890L (58S Edson - 207S Pinedale)	75	83	84.38	112.50	57.13	76.17
39S Bickerdike T1	39S Bickerdike T2	269	269	344.29	127.99	252.81	93.98
39S Bickerdike T2	39S Bickerdike T1	269	269	344.32	128.00	252.81	93.98

5.3.2 Scenario 4: 2022 WP Post-Project

Category B Conditions

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

Table 5-5: 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
202L (178S Cynthia - 359S	890L (58S Edson - 207S Pinedale)	79	87	93.21	108.41	51.72	65.47

Esso West Pembina - 61S Lodgepole)							
202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	88.33	106.33	43.06	54.50
202L (58S Edson - 178S Cynthia)	890L (58S Edson - 207S Pinedale)	79	87	124.27	125.21	57.16	72.36
58S Edson T1/T2	720L (347S Fox Creek - 397S Benbow)	148	163	175.25	108.64	114.64	77.46
61S Lodgepole T1/T2	890L (58S Edson - 207S Pinedale)	79	87	92.00	107.78	56.25	71.20
207S Pinedale T1/T2	202L (58S Edson - 178S Cynthia)	90	99	131.40	120.58	46.32	51.47
320P Keephills T1	202L (58S Edson - 178S Cynthia)	90	99	108.07	109.38	43.13	47.92
602S Cold Creek T1/T2	202L (58S Edson - 178S Cynthia)	90	99	98.15	102.55	86.12	95.69
602S Cold Creek T1/T2	890L (58S Edson - 207S Pinedale)	79	87	85.08	101.97	76.24	96.50
671L (58S Edson - 39S Bickerdike)	740L (58S Edson - 39S Bickerdike)	135	146	255.88	137.29	99.06	73.38
672L (235S Entwistle - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	90	99	105.22	107.82	35.87	39.85
673L (283S Violet Grove - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	90	99	101.99	106.15	34.23	38.03
685L (397S Benbow - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	90	99	128.19	119.25	48.02	53.35
685L (397S Benbow - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	83.40	103.46	48.68	61.62
685L (397S Benbow - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	79	87	117.86	122.12	62.83	79.53
720L (347S Fox Creek - 397S Benbow)	202L (58S Edson - 178S Cynthia)	90	99	125.43	117.96	46.88	52.09
720L (347S Fox Creek - 397S Benbow)	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	80.95	101.91	47.49	60.11
720L (347S Fox Creek - 397S Benbow)	890L (58S Edson - 207S Pinedale)	79	87	114.80	120.52	61.58	77.95
744L (228S T.M.P.L. Niton -	202L (58S Edson - 178S Cynthia)	90	99	123.26	116.96	43.11	47.90

207S Pinedale)							
744L (235S Entwistle - 744AL Tap)	202L (58S Edson - 178S Cynthia)	90	99	119.08	114.94	41.30	45.89
744L (228S T.M.P.L. Niton - 106S Paddle River - 235S Entwistle)	202L (58S Edson - 178S Cynthia)	90	99	119.52	115.18	41.53	46.14
7L199/199L (347S Fox Creek - 741S Fox Creek)	202L (58S Edson - 178S Cynthia)	90	99	106.99	108.78	41.52	46.13
7L199/199L (347S Fox Creek - 741S Fox Creek)	890L (58S Edson - 207S Pinedale)	79	87	92.74	108.17	54.94	69.55
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	202L (58S Edson - 178S Cynthia)	90	99	103.71	107.22	40.10	44.56
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	890L (58S Edson - 207S Pinedale)	79	87	88.58	105.83	53.04	67.14
62S Brazeau T1	202L (58S Edson - 178S Cynthia)	90	99	95.84	101.35	87.03	96.70
62S Brazeau T2	202L (58S Edson - 178S Cynthia)	90	99	95.78	101.31	87.04	96.71
178S Cynthia T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	86.96	105.47	42.77	54.14
178S Cynthia T1	890L (58S Edson - 207S Pinedale)	79	87	122.37	124.23	56.76	71.85
834L (384S Keystone - 320P Keephills)	202L (58S Edson - 178S Cynthia)	90	99	107.19	108.94	42.71	47.45
1012S Deer Hill T1	202L (58S Edson - 178S Cynthia)	90	99	130.68	120.40	49.05	54.50
1012S Deer Hill T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	84.97	104.44	49.44	62.58
1012S Deer Hill T1	890L (58S Edson - 207S Pinedale)	79	87	119.83	123.13	63.61	80.52
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	90	99	130.22	120.22	48.88	54.31
854L (39S Bickerdike -	744L (228S T.M.P.L. Niton -	79	87	85.22	104.62	49.60	62.78

348S Marlboro - 1012S Deer Hill)	207S Pinedale)						
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	79	87	120.12	123.31	63.76	80.71
890L (58S Edson - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	90	99	132.64	121.18	46.88	52.09
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	90	99	116.73	113.79	47.41	52.68
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	84.84	104.58	54.30	68.73
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	79	87	121.82	124.15	69.63	88.14
905L (19S Wabamun Generation Station - 37S North Calder)	202L (58S Edson - 178S Cynthia)	90	99	104.13	107.25	41.00	45.56
909L (310P Sundance (Plant) - Dome)	202L (58S Edson - 178S Cynthia)	90	99	114.55	112.57	46.08	51.20
909L (310P Sundance (Plant) - Dome)	890L (58S Edson - 207S Pinedale)	79	87	91.52	107.47	55.28	69.97
913L (69S North Barrhead – 338S Cherhill)	202L (58S Edson - 178S Cynthia)	90	99	94.18	100.55	84.29	93.66
913L (69S North Barrhead – 338S Cherhill)	890L (58S Edson - 207S Pinedale)	79	87	84.96	102.00	76.24	96.51
919L (310P Sundance (Plant) - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	148	163	156.42	102.38	120.07	81.13
919L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	79	87	87.87	105.36	53.51	67.74

922L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	90	99	109.82	110.23	86.59	96.21
922L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)	79	87	84.76	101.84	73.16	92.61
926L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	90	99	109.86	110.25	86.60	96.22
926L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)	79	87	84.77	101.84	73.16	92.61
973L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	90	99	156.06	132.00	44.25	49.17
973L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	148	163	180.60	110.24	108.56	73.35
973L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	135	146	141.82	102.58	67.04	49.66
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	99.70	113.55	43.48	55.04
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	79	87	85.87	105.47	37.38	47.32
973L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	79	87	83.19	103.61	35.68	45.17
973L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	79	87	137.98	132.56	57.61	72.92
973L (39S Bickerdike - 310P Sundance (Plant))	974L (39S Bickerdike - 310P Sundance (Plant))	333	499	462.62	114.46	115.58	34.71
974L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	90	99	155.80	131.91	44.25	49.17
974L (39S Bickerdike -	720L (347S Fox Creek - 397S	148	163	180.23	110.14	108.54	73.34

310P Sundance (Plant))	Benbow)						
974L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	135	146	141.56	102.51	67.03	49.65
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	79	87	99.49	113.44	43.48	55.04
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	79	87	85.70	105.37	37.39	47.33
974L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	79	87	83.03	103.51	35.69	45.18
974L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	79	87	137.66	132.43	57.60	72.91
974L (39S Bickerdike - 310P Sundance (Plant))	973L (39S Bickerdike - 310P Sundance (Plant))	333	499	463.07	114.54	115.62	34.72
989L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	79	87	87.32	105.02	76.05	96.26
1046L (310P Sundance (Plant) to 338S Cherhill)	202L (58S Edson - 178S Cynthia)	90	99	94.28	100.62	84.35	93.72
1046L (310P Sundance (Plant) to 338S Cherhill)	890L (58S Edson - 207S Pinedale)	79	87	85.27	102.20	76.39	96.70
19S Wabamun T10	890L (58S Edson - 207S Pinedale)	79	87	103.76	114.51	61.57	77.94
39S Bickerdike T1*	39S Bickerdike T2	269	269	548.69	142.21	268.70	99.89
39S Bickerdike T2*	39S Bickerdike T1	269	269	548.70	142.21	268.73	99.90

Notes:

***Post-RAS loading observed on the remaining Bickerdike 39S transformer is below the seasonal rating when calculated based on current, but above the seasonal rating when calculated based on MVA. Real-time operational practices may be required to completely mitigate the overload depending on system conditions.

5.4 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% and were greater than the Category A loading by more than 1%. The results of the constraint effective factor studies are provided in Attachment A7.

Attachment A1
Engineering Connection Assessment: Study Scope

Engineering Connection Assessment: Study Scope

Cascade Power Plant Project Connection

Cascade Power Project Limited Partnership

AESO Project Number: P2032

Date: May 15th, 2020

Version: V4

Classification: Public

Company Name	Name and Credentials	Date	Signature
AESO	Myron Jin-Li, P. Eng	June 24, 2020	
Cascade Power Project LP (Market Participant)	Guido Bachmann	June 23, 2020	

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Contents

Tables

Figures

Attachments

1 Introduction

This Study Scope provides an overview of the engineering studies 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

Cascade Power Project Limited Partnership (Market Participant) has submitted a request for system access service to the Alberta Electric System Operator (AESO) to connect its approved Cascade Power Plant (Facility) to the AIES.

The Facility includes a proposed substation, to be designated Whisky Jack 1047S.

The market participant's request includes a request for new Rate STS, Supply Transmission Service, contract capacity of 900 MW and a new Rate DTS, Demand Transmission Service, contract capacity of 11.5 MW. There are two development phases for the Facility. Phase 1 includes the addition of one combined cycle gas generation unit with a maximum authorized real power (MARP) of 462.5 MW and a maximum capability (MC) of 450 MW. Phase 2 includes the addition of a second combined cycle generation unit with a MARP of 462.5 MW. After Phase 2, the MC of the Facility will be 900 MW.

The Project in-service date (ISD) used for the purpose of the studies is March 25, 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, *Demand Transmission Service,* contract capacity	No existing contract
	Requested Rate DTS	11.5 MW
	Type	Station service
	Motors (number and size)	N/A
	Power factor	0.9 pf
	Future load expansion plans	No
Generation	Generation type	Combined Cycle
	Existing Rate STS, *Supply Transmission Service,* contract capacity	No existing contract
	Requested Rate STS	900 MW
	Number and size of generating units	2 units at 549 MVA each
	Maximum authorized real power (MARP)	462.5 MW (individually)
	Maximum capability (MC)	450 MW (individually)

Project Component		Description
	Reactive power capability	220.7 MVAr (individually) (0.9 pf over-excited)
		149.8 MVAr (individually) (0.95 pf under-excited)
	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 Hinton/Edson (Area 29), which is part of the AESO Central Planning Region. The Hinton/Edson planning area borders the AESO Northwest Planning Region.

The Study Area consists of the AESO planning areas of Hinton/Edson (Area 29), Grande Cache (Area 22), Fox Creek (Area 24), Drayton Valley (Area 30) and Wabamun (Area 40), 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

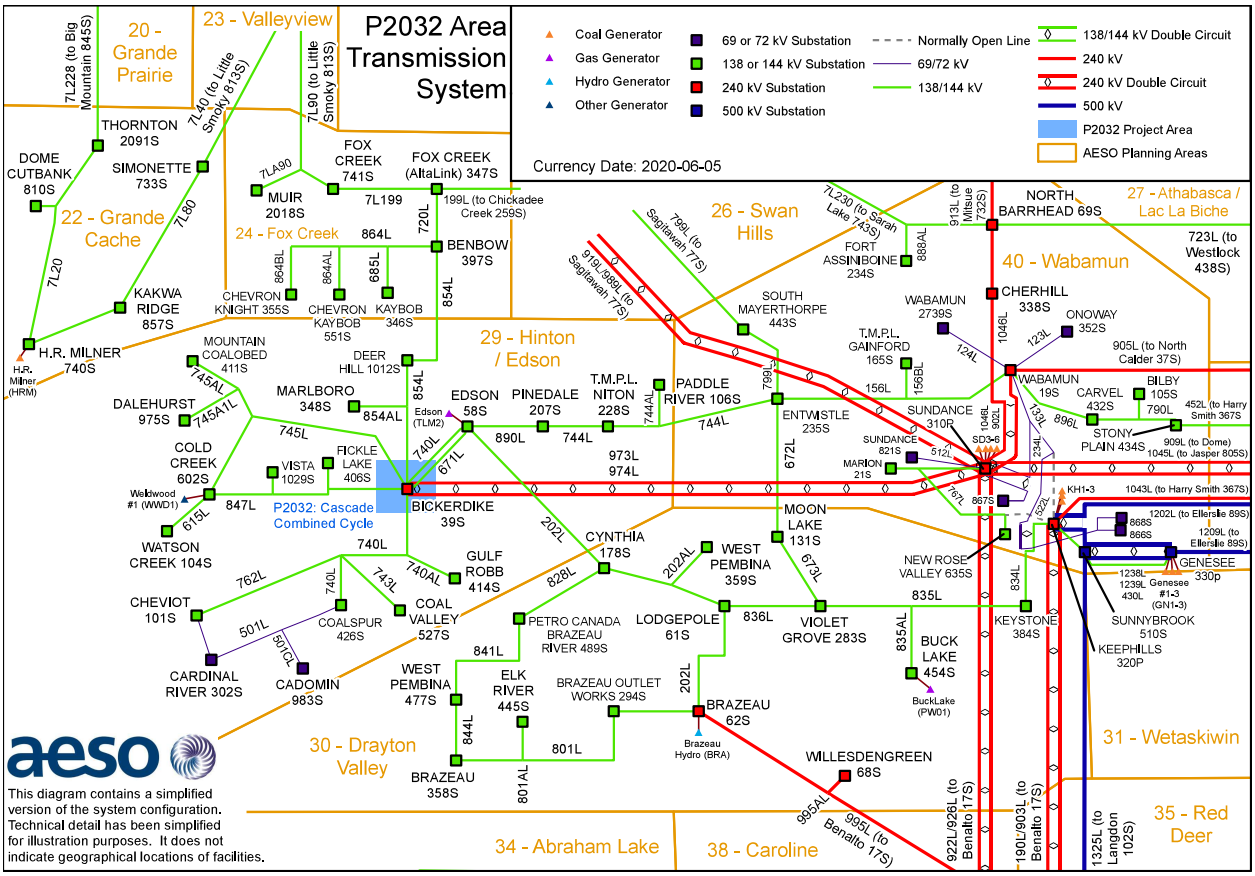
There are existing Category B thermal and voltage constraints in the Study Area. Notably, Hinton/Edson (Area 29) borders the AESO Northwest Planning Region.

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).

Additionally, there are a number of constraints in the Study Area that are mitigated by existing protection schemes. The following existing automatic protection schemes (APS) are used to manage constraints in the area:

- APS 25: Brazeau 62S Generation Tripping Scheme
- APS 46: Bickerdike 39S – 740L Load Trip Scheme
- APS 47: Obed Mountain Coal 411S - Load Trip Scheme
- APS 150: WATL HVDC

Figure 1-1: Transmission System in the Study Area



2 Connection Alternative to be Studied

The following alternative will be studied:

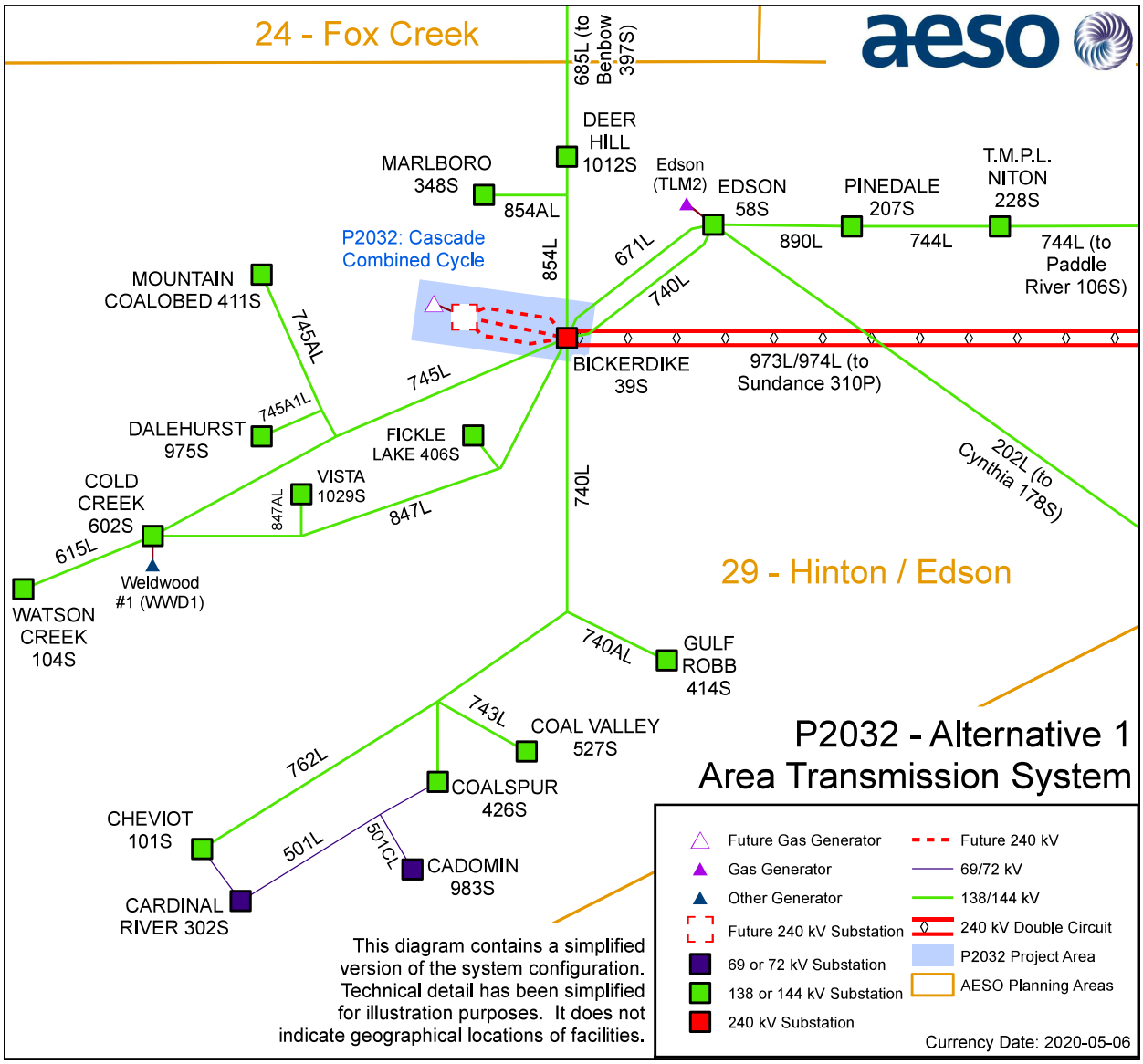
2.1 Alternative 1 –240 kV connection to the existing Bickerdike 39S substation with three 240 kV transmission lines

This alternative included the following developments:

- Add three 240 kilovolt (kV) transmission lines to connect the Facility to the existing Bickerdike 39S substation;
- Modify the existing Bickerdike 39S substation, including adding four 240 kV circuit breakers ; and
- 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 1



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 AESO's, Section 502.5 of the ISO rules *Generating Unit Technical Requirements*, and Section 502.6 of the ISO rules *Generating Unit 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.

For the main study scenarios, a light load scenario is not studied as high Northwest import is the most limiting study condition for power flow.

For transient stability studies, a high Central generation 2022 Summer Light sensitivity scenario is added, as low load is a critical study condition to assess the impact of the Project on system transient stability.

Table 4-1: Connection Study Scenarios

Scenario No.	Year/Season	System Generation Dispatch Conditions	Scenario Name	Net-to-Grid Generation (MW)
Pre-Project				
1	2022 SP	High Northwest (NW) Import	2021 SP Pre-Project	0
2	2022 WP		2021 WP Pre-Project	0
Post-Project				
3	2022 SP	High NW Import	2022 SP Post-Project	900
4	2022 WP		2022 WP Post-Project	900
5	2029 WP	All study area generation online	2029 WP Post-Project	900
Post-Project Sensitivity (Transient Stability)				
6	2022 SL	High Central Generation	2022 SL Post-Project	900

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.

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.
2012	Keyera West Pembina 359S Gas Turbine	30-Drayton Valley	0.0	0.0	Jun 3, 2020	25506-D01-2020
2224	Capital Power Genesee Unit 2 Change	40-Wabamun	0.0	0.0	Apr 6, 2021	24715-D01-2019

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 Northwest Planning Region peak based on the *AESO 2019 Long-Term Outlook* (2019 LTO)[1]. For the post-Project studies, when the Study Area loads are modified to align with the regional load forecast in the 2019 LTO, the active power to reactive power ratio in the base case scenarios shall be maintained.

Table 4-3: Forecast Load (at AESO Northwest Planning Region Peak)

AESO Planning Region Name	Forecast Peak Load by Year/Season (MW)	
	2022 SP	2022 WP
Northwest Planning Region[1]	1070	1254

Note:
[1] The Northwest Region comprises the following AESO planning areas: Rainbow Lake (Area 17), High Level (Area 18), Peace River (Area 19), Grande Prairie (Area 20), High Prairie (Area 21), Grande Cache (Area 22), Valleyview (Area 23), Fox Creek (Area 24), and Swan Hills (Area 26).

IDEV files contain non-motor loads in zones 34, 36, and 351. 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 2019 LTO with modifications to incorporate the latest forecasting intelligence. The generation assumptions for the studies will assume low Northwest generation in order to maximize Northwest import through the 138/144 kV transmission paths in Fox Creek (Area 24), which has been identified as a limiting factor for generation integration at Bickerdike 39S substation. In addition, Brazeau Hydro has been identified as a critical generator in the Study Area that can result in more severe thermal criteria violations when at lower dispatch and as such a high Central generation scenario is not selected. Additional studies may be required in the event of changes to the AESO's corporate forecast.

[1] The 2019 LTO is available on the AESO website.

The existing generation (excluding wind and solar) dispatch conditions for the study scenarios are described in Table 4-5, Table 4-5 and Table 4-6.

Table 4-4: Existing Generation (excluding Wind and Solar) Dispatch Conditions for 2022SP and 2022WP Pre-Project Scenarios

Facility Name	Unit No.	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario	
					2022 SP	2022 WP
Bear Creek 1 (BCRK)	1	19142	64	20	42	58
Bear Creek 2 (BCR2)	2	18142	36	20	19	16
Brazeau Hydro (BRA)	1, 2	151, 154	350	30	181.2	143.1
Gold Creek Facility (GOC1)	1	19145	5	20	Not in merit[b]	
Grande Prairie EcoPower (GPEC)	2	17101	27	20	5.2	5.1
H.R. Milner (HRM)	1	1148c	144	22	53.9	65.8
Northstone Power (NPC1 & NPC2)	5	17134	20	20	Not in merit	
	6	17134				
	7	18134				
	8	18134				
Northern Prairie Power Project (NPP1)	1	17120	105	20	69.9	63.8
Poplar Hill #1 (PH1)	1	16118	48	20	Not in merit	
Edson Gas Plant (TLM2)	G1	13020	13	29	8.5	10.6
Weldwood (WWD1)	1, 2	4017	50	29	37.1	36.5
Weyerhaeuser (WEY1)	1A	1146	48	20	17	34.6
Valley View 1 (VVW1)	1	1171	50	23	Not in merit	
Valley View 2 (VVW2)	2	1173	50	23	Not in merit	
DAI1 Daishowa (DAI1)	1	108	52	19	42	41

Table 4-5: Existing Generation (excluding Wind and Solar) Dispatch Conditions for 2022SP and 2022WP Post-Project Scenarios

Facility Name	Unit No.	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario	
					2022 SP	2022 WP
Bear Creek 1 (BCRK)	1	19142	64	20	42	58
Bear Creek 2 (BCR2)	2	18142	36	20	19	16
Brazeau Hydro (BRA)	1, 2	151, 154	350	30	61.9	47.3
Gold Creek Facility (GOC1)	1	19145	5	20	Not in merit[b]	
Grande Prairie EcoPower (GPEC)	2	17101	27	20	5.2	5.1
H.R. Milner (HRM)	1	1148c	144	22	53.9	65.8
Northstone Power (NPC1 & NPC2)	5	17134	20	20	Not in merit	
	6	17134				
	7	18134				
	8	18134				
Northern Prairie Power Project (NPP1)	1	17120	105	20	69.9	63.8
Poplar Hill #1 (PH1)	1	16118	48	20	Not in merit	
Edson Gas Plant (TLM2)	G1	13020	13	29	8.5	10.6
Weldwood (WWD1)	1, 2	4017	50	29	37.1	36.5
Weyerhaeuser (WEY1)	1A	1146	48	20	17	34.6
Valley View 1 (VVW1)	1	1171	50	23	Not in merit	
Valley View 2 (VVW2)	2	1173	50	23	Not in merit	
DAI1 Daishowa (DAI1)	1	108	52	19	42	41

Notes:
[a] "Unit Net Generation" refers to gross generating unit output (MW) less unit service load.
[b] "Not in merit" means that the generating unit has operating blocks whose prices are above the system marginal price.
[c] After the cases were prepared, the MC of H.R. Milner was changed to 167 MW (effective May 2, 2020)

Table 4-6: Existing Generation (excluding Wind and Solar) Dispatch Conditions for 2022SL Scenario

Facility Name	Unit No.	Bus No.	MC (MW)	AESO Planning Area No.	Unit Net Generation[a] (MW) by Scenario
					2022 SL
Brazeau Hydro (BRA)	1, 2	151, 154	350	30	58.5
H.R. Milner (HRM)	1	1148c	144	22	0
Edson Gas Plant (TLM2)	G1	13020	13	29	9.9
Weldwood (WWD1)	1, 2	4017	50	29	41.2

Notes:
[a] "Unit Net Generation" refers to gross generating unit output (MW) less unit service load.
[b] "Not in merit" means that the generating unit has operating blocks whose prices are above the system marginal price.

4.2.5 Intertie Flow Assumptions

The Alberta-British Columbia (AB-BC), Alberta-Saskatchewan (AB-SK), and Alberta-Montana (MATL) intertie points are deemed to be too far away from the Study Area to have any material impact on the connection assessment. Therefore, intertie flow values shall be set to the AESO planning base case values and will not be adjusted for the studies.

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 assumptions shall initially be set to be the same as in the AESO planning base cases which is set to minimize system losses.

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 4-7. These limits must be maintained when performing the studies.

Table 4-7: 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 4-8 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 4-8: 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
199L	Fox Creek 347S – 7L199 Tap	138	119	146	131	161
995L	Brazeau 62S – Benalto 17S	240	333	333	499	499
202L	Cynthia 178S – Lodgepole 61S	138	98	132	108	145
836L	Lodgepole 61S – Violet Grove 283S	138	119	146	131	161
740L	740AL Tap – 743L & 762L Tap	138	99	133	109	146
740L	743L & 762 Tap – Coalspur 462S	138	119	147	131	162
740L	740L Tap – Gulf Robb 414S	138	119	147	131	162
744L	TMPL Niton 228S - Entwistle 235S	138	75	79	83	87
890L	Edson 58S - Pinedale 207S	138	75	79	83	87
671L	Bickerdike 39S - Edson 58S	138	172	212	189	233
973L	Bickerdike 39S - Sundance 310P	240	333	333	499	499
974L	Bickerdike 39S - Sundance 310P	240	333	333	499	499
202L	Edson 58S - Cynthia 178S	138	85	90	94	99
745L	Bickerdike 39S - Cold Creek 602S	138	172	212	189	233
847L	Bickerdike 39S – Fickle Lake 406S	138	121	148	133	163
685L	Deer Hill 1012S - Benbow 397S	138	167	201	184	218
740L	Bickerdike 39S - Edson 58S	138	112	135	124	146
740L	Bickerdike 39S – 740AL Tap	138	99	133	109	146
744L	TMPL Niton 228S - Pinedale 207S	138	75	79	83	87
854L	Bickerdike 39S - Jct. 854AL	138	263	263	311	373
854L	Jct. 854AL -Deer Hill 1012S	138	283	287	311	373
720L	Benbow 397S – Fox Creek 347S	138	120	148	132	163
7L199	Fox Creek 741S – 7L199 Tap	144	129	157	129	157

Notes:

AltaLink submitted a facility ratings update dated May 12th 2020 which lists several temporary derates for lines in the Study Area. As AltaLink has confirmed that these temporary derates will be mitigated within 18 months (by January 2022), the original ratings for these lines is listed and assumed for the studies

7L199 line rating increase has been identified as part of ATCO TFO's Transmission Capital Maintenance program and is expected to be completed prior to the ISD of the Project. The ratings assumed in the study are the anticipated values after clearance mitigation work is complete.

720L line rating increase has been identified by AltaLink in communication with the Market Participant and is expected to be completed prior to the ISD of the Project. The ratings assumed in the study are the anticipated values after the work is completed.

The TFOs provided the details of the substation transformers in the Study Area. The key transformers in the Study Area are shown in Table 4-9.

Table 4-9: Summary of Key Transformer Ratings in the Study Area

Substation Name and Number	Transformer ID	Transformer Voltages (kV)	Transformer Rating (MVA)
Bickerdike 39S	T1	240/138	269
	T2	240/138	269

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 4-10.

Table 4-10: Summary of Key Shunt Elements in the Study Area

Substation Name and Number	Voltage Class (kV)	Capacitors		Reactors	
		Number of Switched Shunt Blocks	Total at Nominal Voltage (MVAr)	Number of Switched Shunt Blocks	Total at Nominal Voltage (MVAr)
Cold Creek 602S	138	1	32.5	-	-
Edson 58S	138	1	27.0	-	-
Brazeau 62S	138	1	33.	-	-
Cynthia 178S	138	1	27.0	-	-
Amoco Brazeau 358S	138	1	21.0	-	-
Violet Grove 283S	138	1	25.0	-	-

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 4-11. Only those contingencies shown in Table 4-11 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 4-11: Protection Fault Clearing Times

Contingency (System Element Lost)	Fault Location	Clearing Times (Cycles)

		Near End	Far End
685L (Deer Hill 1012S to Benbow 397S)	Deer Hill 1012S	6	27
	Benbow 397S	6	27
854L (Deer Hill 1012S to Benbow 397S)	Deer Hill 1012S	6	7
	Benbow 397S	6	7
744L (Entwistle 235S to Pinedale 207S)	Entwistle 235S	6	27
	Pinedale 207S	6	27
890L (Edson 58S to Pinedale 207S)	Edson 58S	6	7
	Pinedale 207S	6	7
671L (Bickerdike 39S to Edson 58S)	Bickerdike 39S	6	6
	Edson 58S	6	6
740L (Bickerdike 39S to Edson 58S)	Bickerdike 39S	6	6
	Edson 58S	6	6
973L (Bickerdike 39S to Sundance 310P)	Bickerdike 39S	5	6
	Sundance 310P	5	6
202L (Edson 58S to Cynthia 178S)	Edson 58S	7.25	28.25
	Cynthia 178S	7.25	28.25
745L (Bickerdike 39S to Cold Creek 602S)	Bickerdike 39S	6	32.75
	Cold Creek 602S	5.75	27

4.2.9 Project Dynamic Data

Dynamic data for the Project can be found in Attachment A5.

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.

4.2.11 Sub-synchronous Interaction (SSI) Screening

Screening for unit interaction factor (UIF) was deemed to be unnecessary for the Project, due to the large electrical distance and low likelihood of contingencies resulting in radial connections to series-compensated lines or HVDC converter stations.

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 Pre-Project	X	X							
2	2022 WP Pre-Project	X	X							X
Post-Project										
3	2022 SP Post-Project	X	X			X*	X*			
4	2022 WP Post-Project	X	X			X*	X*			X
5	2029 WP Post-Project									X
Post-Project Sensitivity (Transient Stability)										
6	2022 SL Post-Project					X*	X*			

*Pre-project transienty stability studies will be conducted if stability issues are identified in the post-Project studies

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 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 Shepard ST in Calgary (Area 6) 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 one generating unit at each of the following facilities in the Study Area as well as the Project facility.

- Brazeau Hydro
- Weldwood
- Genesee
- Sundance
- Keephills

The results report must also provide bus voltage levels for substations 138 kV and above 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 Category B events shown in Table 4-11

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:

- Edson 58S

- Bickerdike 39S
- Sundance 310P
- Cold Creek 602S
- Dalehurst 975S
- Mountain Obed 411S
- Hornbeck 345S
- Marlboro 348S
- Deer Hill 1012S
- Gulf Robb 414S
- Fickle Lake 406S

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 AESO will proceed as follows:

- Develop tables showing the constraint effective factors[2] for generation or load based on thermal criteria violations that are observed.
- Propose changes, if any, to the connection alternatives that could remove the requirement for a RAS.
- 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.
- Identify and study new RASs, if any, that may be required to ensure system reliability is maintained after connecting the Project to the AIES.

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.

[2] 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 include the AESO's current corporate forecast (2019 LTO). Sensitivity studies or restudy may be required in the event of revisions to the AESO's corporate forecast 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

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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 Criteria[1]

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	152
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 of 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	≥5%	Worst Case Scenario(8)
B	Bus Section	≥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	≥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

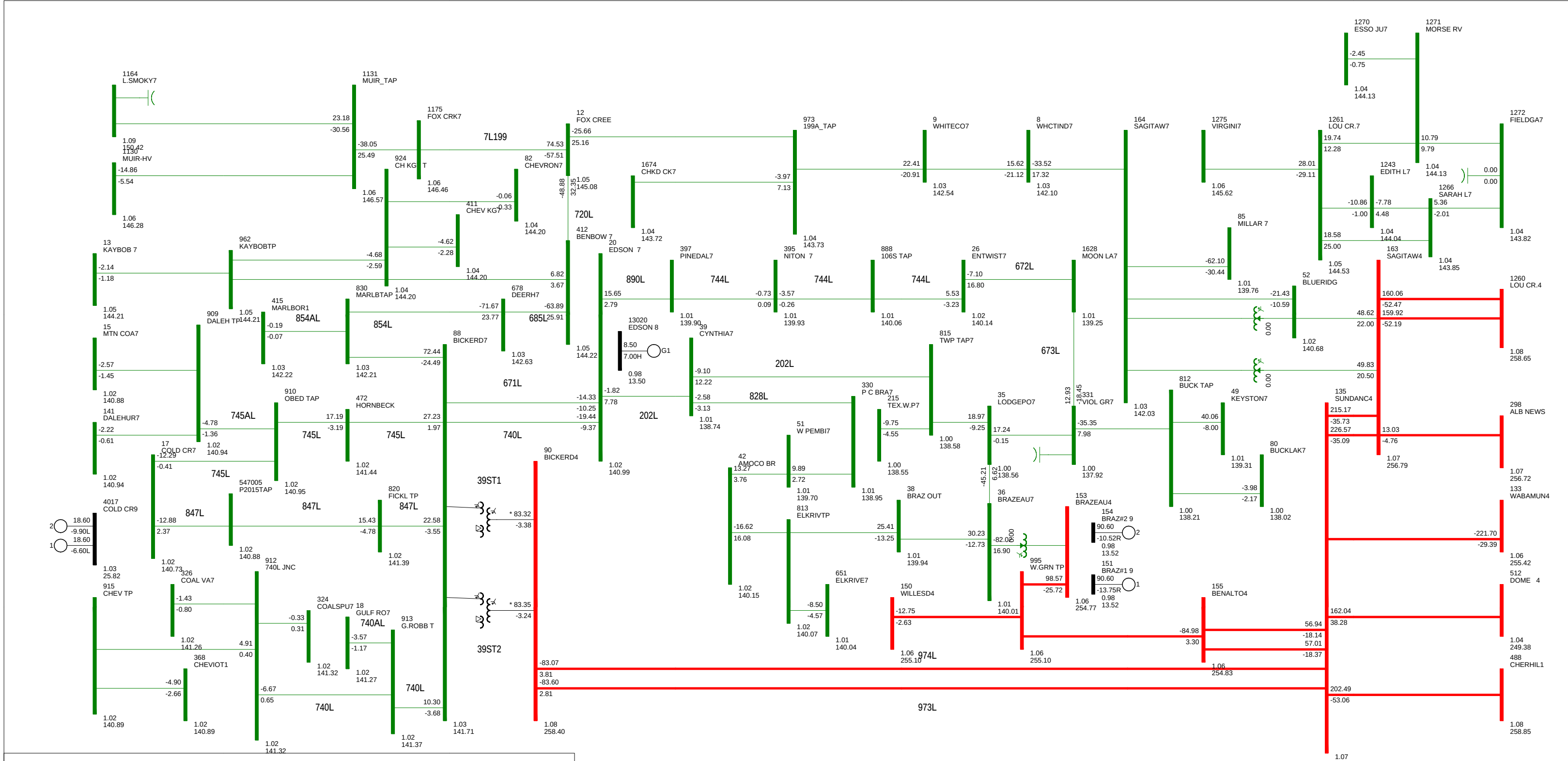
Table 2-4: Stuck Breaker Clearing Times for Lines

Voltage (kV)	Fault Clearing Times (Cycles)		
	Near End	Far End	2nd 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	2nd 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

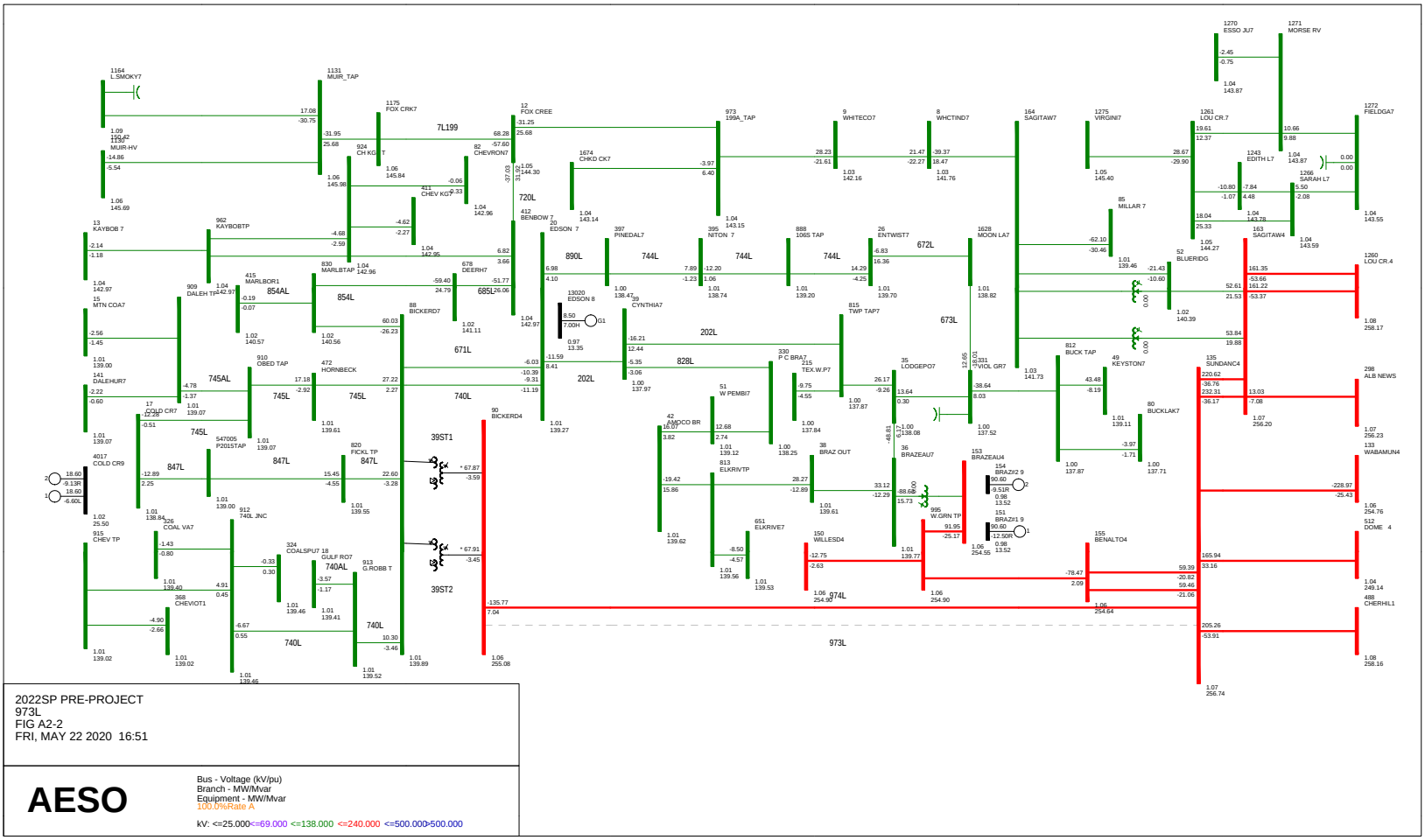
Attachment A2
Pre-Project Power Flow Diagrams



2022SP PRE-PROJECT
CATEGORY A
FIG A2-1
FRI, MAY 22 2020 16:51

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

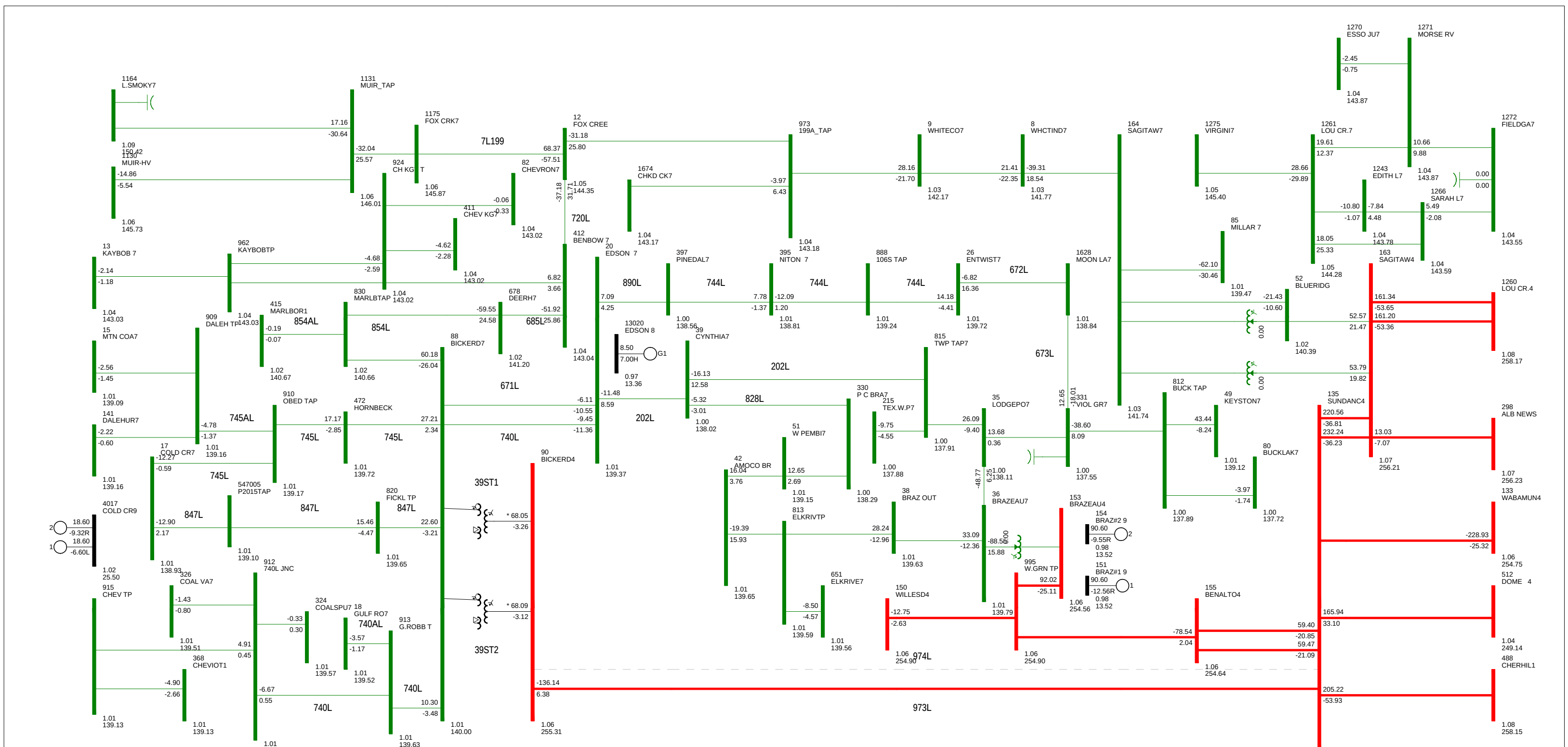


2022SP PRE-PROJECT
973L
FIG A2-2
FRI, MAY 22 2020 16:51

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

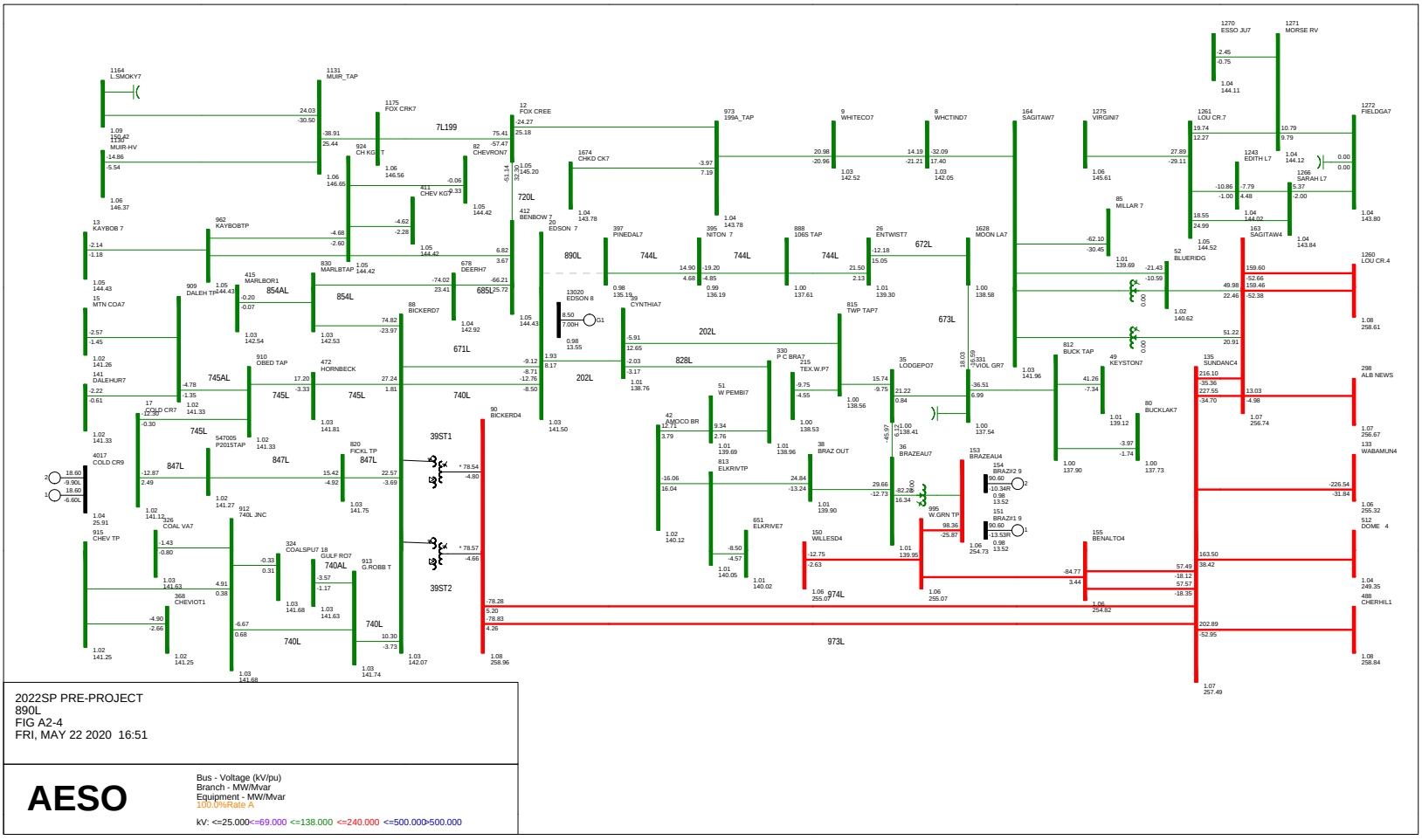

L.SMOKY7
MUIR_TAP
MUIR-HV
FOX CRK7
CH KGT T
CHEV KGT
CHEVRON7
FOX CREE
199A_TAP
CHKD CK7
WHITECO7
WHCTIND7
SAGITAW7
VIRGINI7
LOU CR.7
ESSO JU7
MORSE RV
FIELDGA7
EDITH L7
SARAH L7
MILLAR 7
SAGITAW4
KAYBOB 7
KAYBOBTP
MARLBTAP
DEERH7
BENBOW 7
EDSON 7
PINEDAL7
NITON 7
106S TAP
ENTWIST7
MOON LA7
BLUERIDG
LOU CR.4
MTN COA7
DALEH TP
MARLBOR1
BICKERD7
EDSON 8
CYNTHIA7
TWP TAP7
ALB NEWS
SUNDANC4
KEYSTON7
BUCK TAP
DALEHUR7
OBED TAP
HORNBECK
LODGEPO7
VIOL GR7
P C BRA7
TEX.W.P7
W PEMBI7
AMOCO BR
BICKERD4
BUCKLAK7
COLD CR7
P2015TAP
FICKL TP
BRAZ OUT
BRAZEAU7
BRAZEAU4
BRAZ#2 9
BRAZ#1 9
WABAMUN4
COLD CR9
ELKRIVTP
W.GRN TP
DOME 4
740L JNC
COAL VA7
ELKRIVE7
WILLESD4
BENALTO4
CHEV TP
COALSPU7
GULF RO7
G.ROBB T
CHEVIOT1
CHERHIL1
7L199
720L
890L
744L
672L
673L
854AL
854L
685L
671L
202L
828L
745AL
745L
740L
847L
39ST1
39ST2
740AL
974L
973L

2022SP PRE-PROJECT
974L
FIG A2-3
FRI, MAY 22 2020 16:51

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

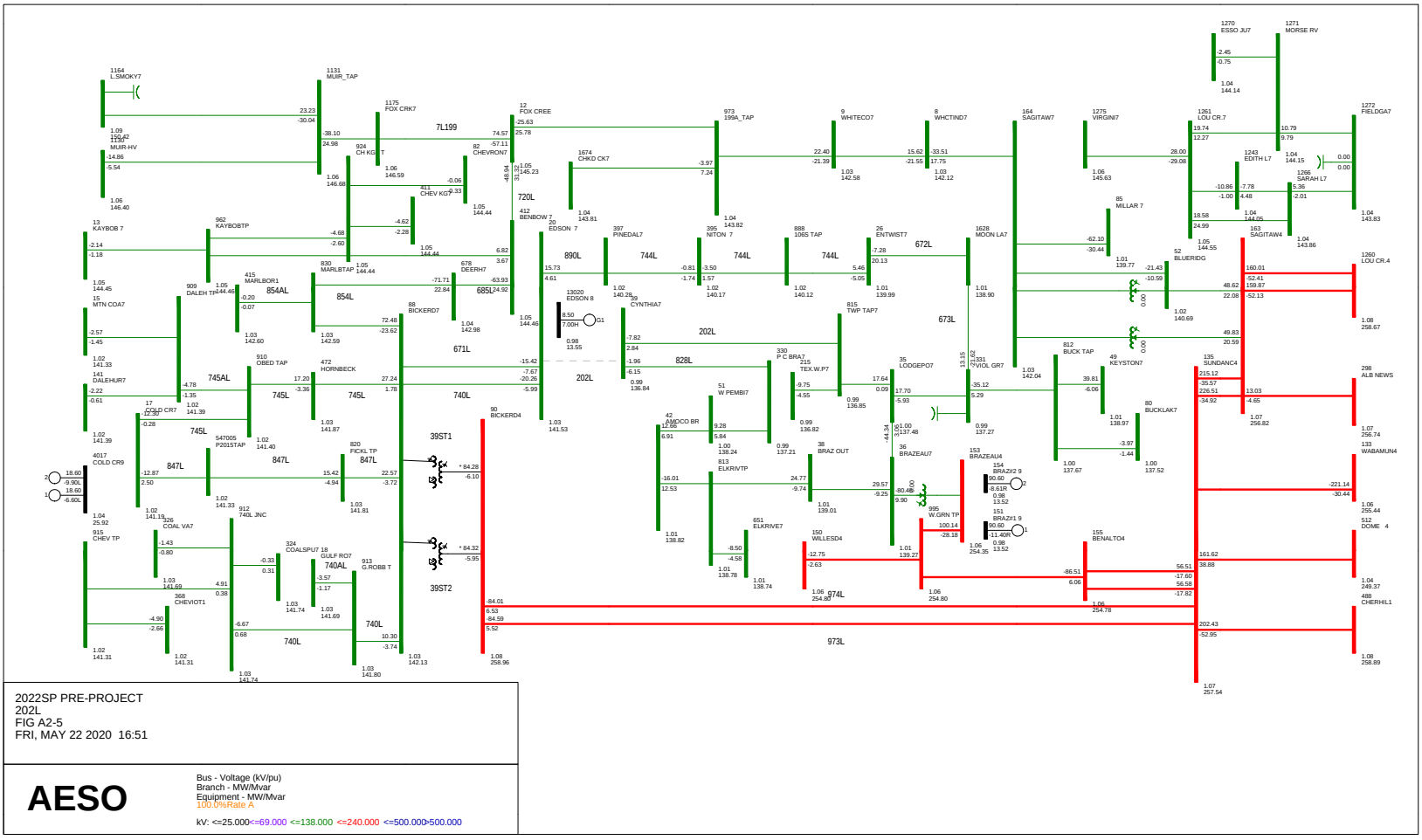


2022SP PRE-PROJECT
890L
FIG A2-4
FRI, MAY 22 2020 16:51

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

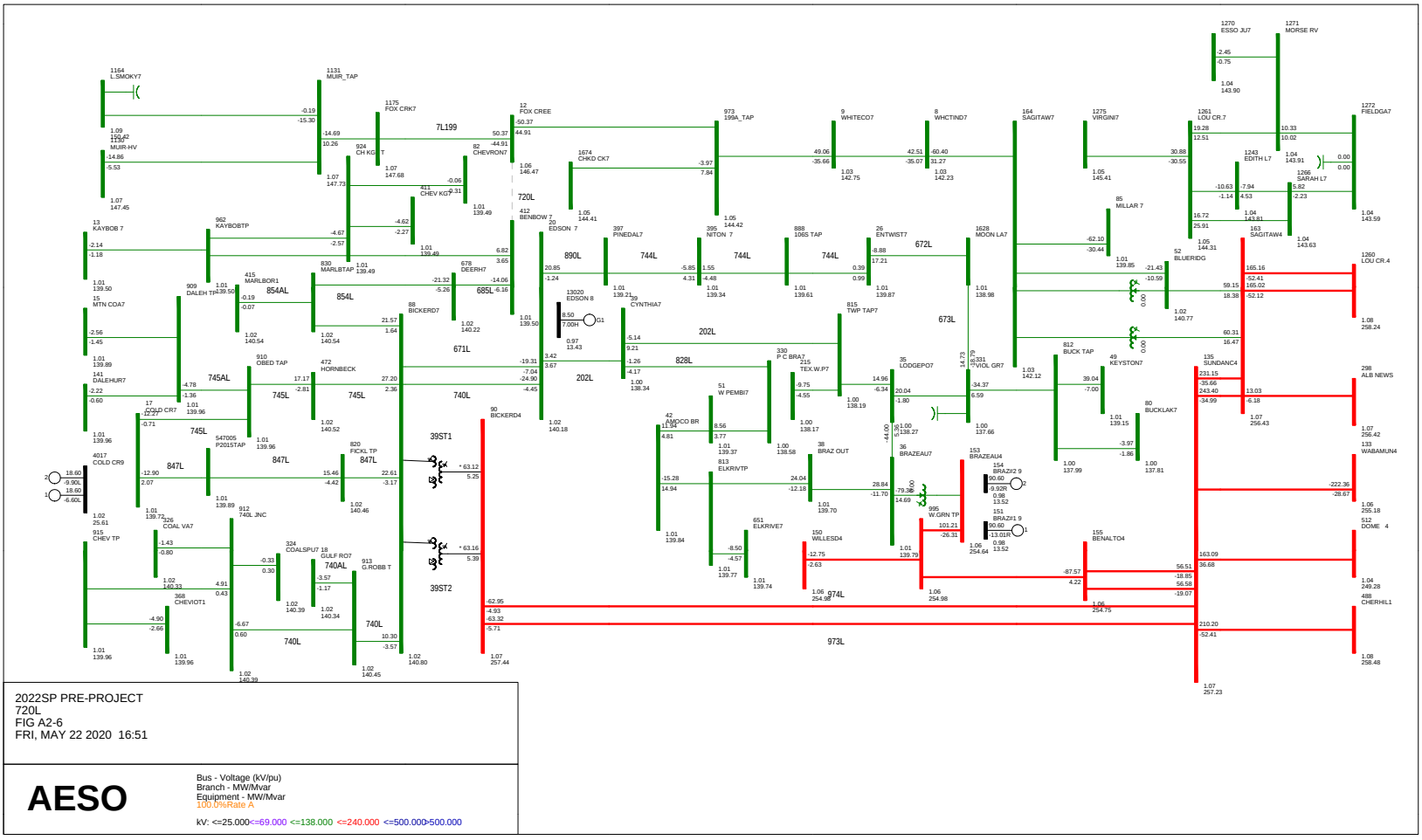


2022SP PRE-PROJECT
202L
FIG A2-5
FRI, MAY 22 2020 16:51

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

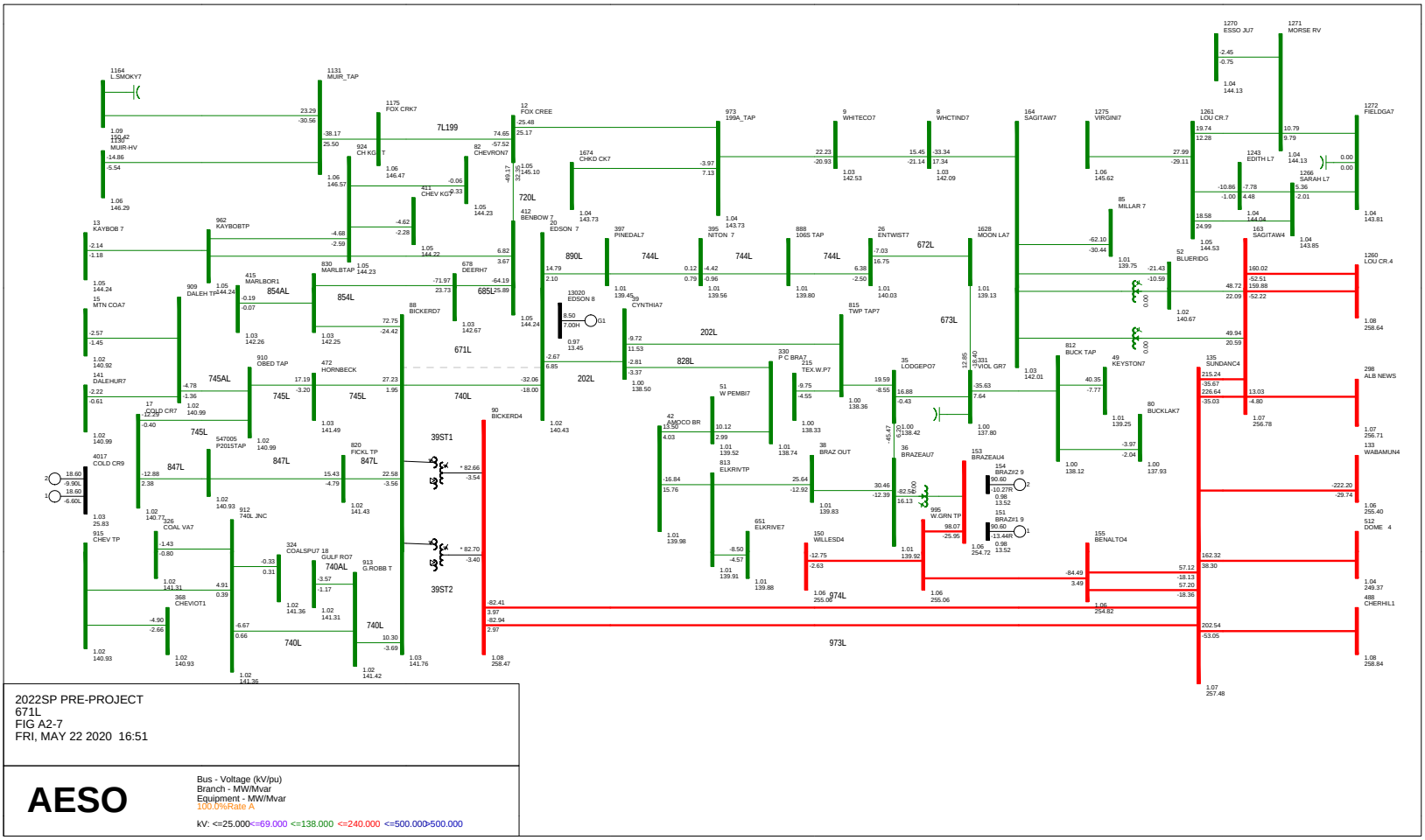


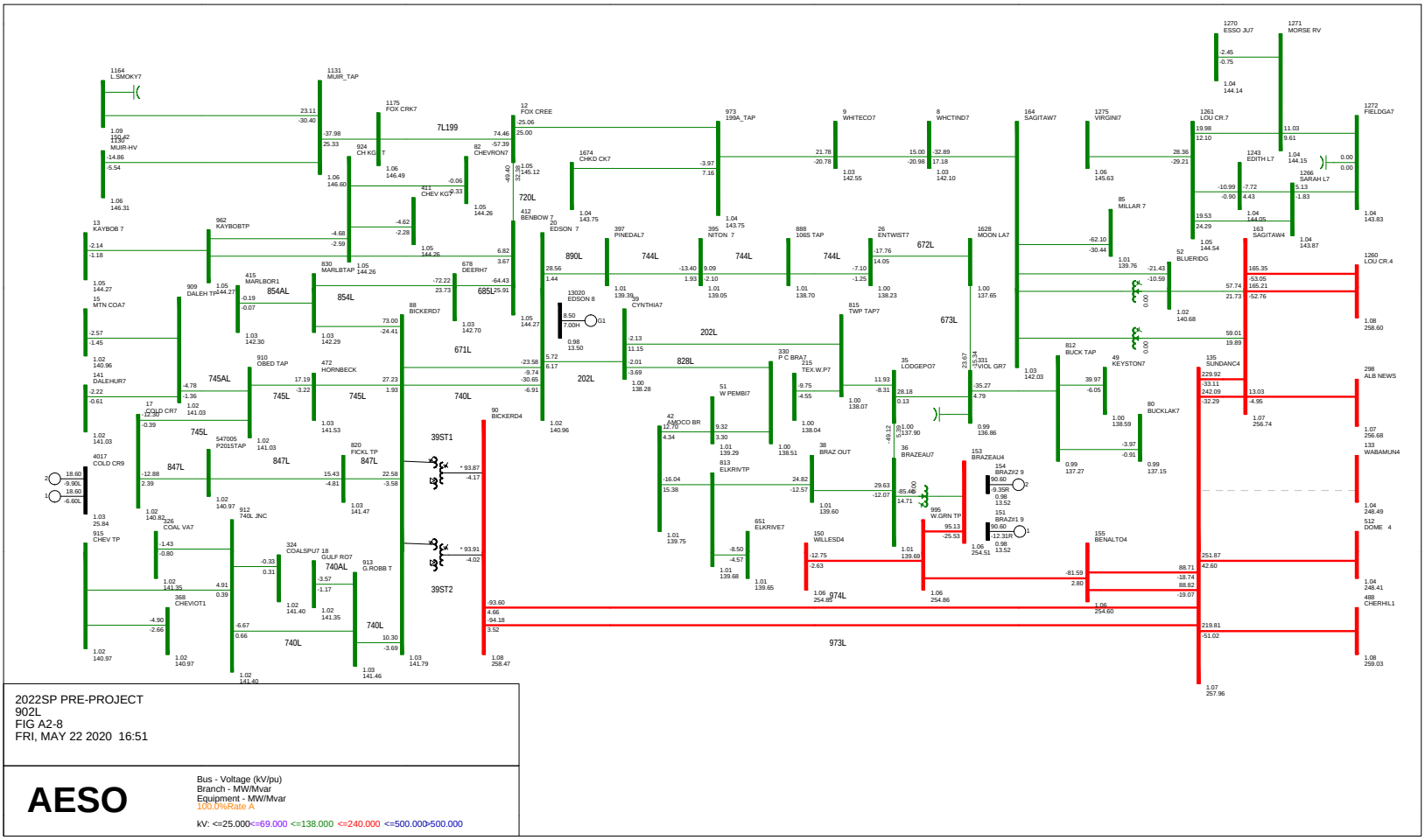
2022SP PRE-PROJECT
720L
FIG A2-6
FRI, MAY 22 2020 16:51

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


1164 L.SMOKY7
1131 MUIR_TAP
1130 MUIR-HV
1175 FOX CRK7
924 CH KG T
82 CHEVRON7
7L199
12 FOX CREE
720L
973 199A_TAP
1674 CHKD CK7
9 WHITECO7
8 WHCTIND7
164 SAGITAW7
1270 ESSO JU7
1271 MORSE RV
1275 VIRGIN7
1261 LOU CR.7
1272 FIELDGA7
1243 EDITH L7
1266 SARAH L7
85 MILLAR 7
163 SAGITAW4
52 BLUERIDG
1260 LOU CR.4
1628 MOON LA7
672L
962 KAYBOBTP
13 KAYBOB 7
411 CHEV KG7
412 BENBOW 7
20 EDSON 7
397 PINEDAL7
744L
395 NITON 7
888 106S TAP
26 ENTWIST7
890L
415 MARLBOR1
854AL
830 MARLBTAP
854L
678 DEERH7
685L
88 BICKERD7
671L
909 DALEH TP
15 MTN COA7
141 DALEHUR7
17 COLD CR7
745AL
910 OBED TAP
745L
472 HORNBECK
740L
202L
13020 EDSON 8
G1
39 CYNTHIA7
828L
815 TWP TAP7
673L
330 P C BRA7
215 TEX.W.P7
35 LODGEPO7
331 VIOL GR7
812 BUCK TAP
49 KEYSTON7
80 BUCKLAK7
135 SUNDANC4
298 ALB NEWS
133 WABAMUN4
512 DOME 4
4017 COLD CR9
847L
547005 P201STAP
820 FICKL TP
326 COAL VA7
912 740L JNC
915 CHEV TP
368 CHEVIOT1
324 COALSPU7
18 GULF RO7
740AL
913 G.ROBB T
39ST1
39ST2
90 BICKERD4
42 AMOCO BR
51 W PEMBI7
813 ELKRIVTP
651 ELKRIVE7
38 BRAZ OUT
36 BRAZEAU7
153 BRAZEAU4
154 BRAZ#2 9
151 BRAZ#1 9
995 W.GRN TP
150 WILLESD4
974L
155 BENALTO4
973L
2022SP PRE-PROJECT
671L
FIG A2-7
FRI, MAY 22 2020 16:51
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

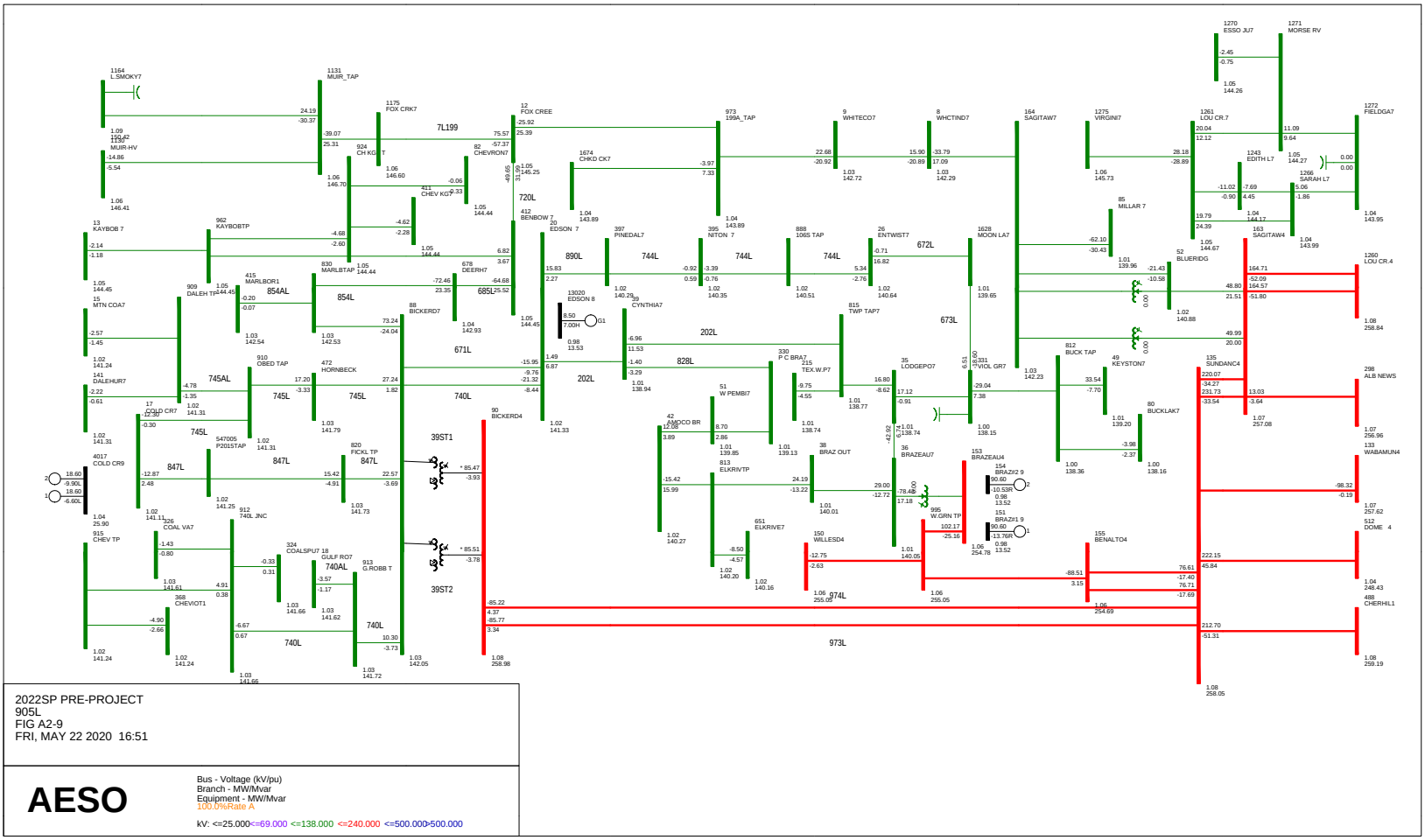


2022SP PRE-PROJECT
902L
FIG A2-8
FRI, MAY 22 2020 16:51

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

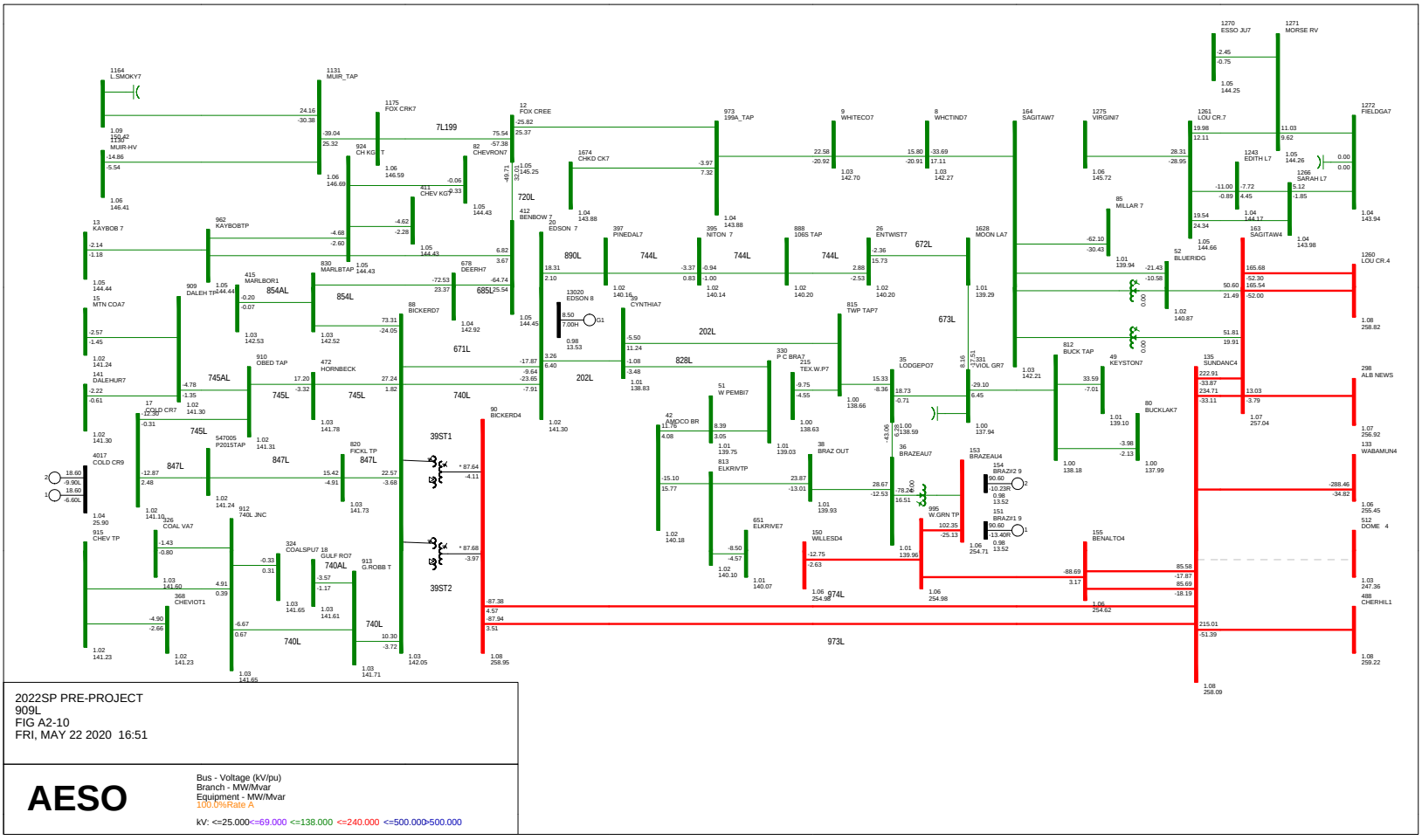


2022SP PRE-PROJECT
905L
FIG A2-9
FRI, MAY 22 2020 16:51

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

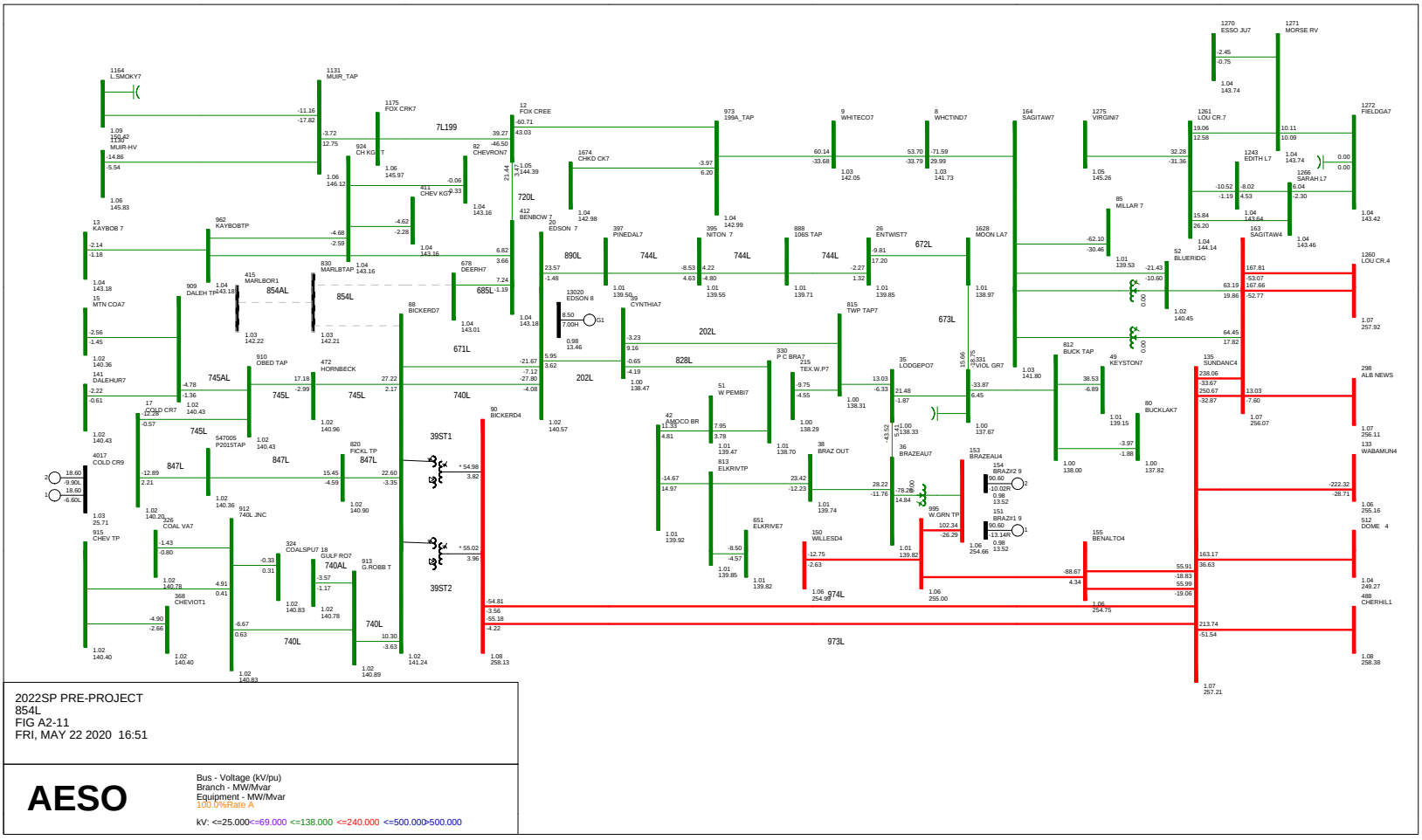


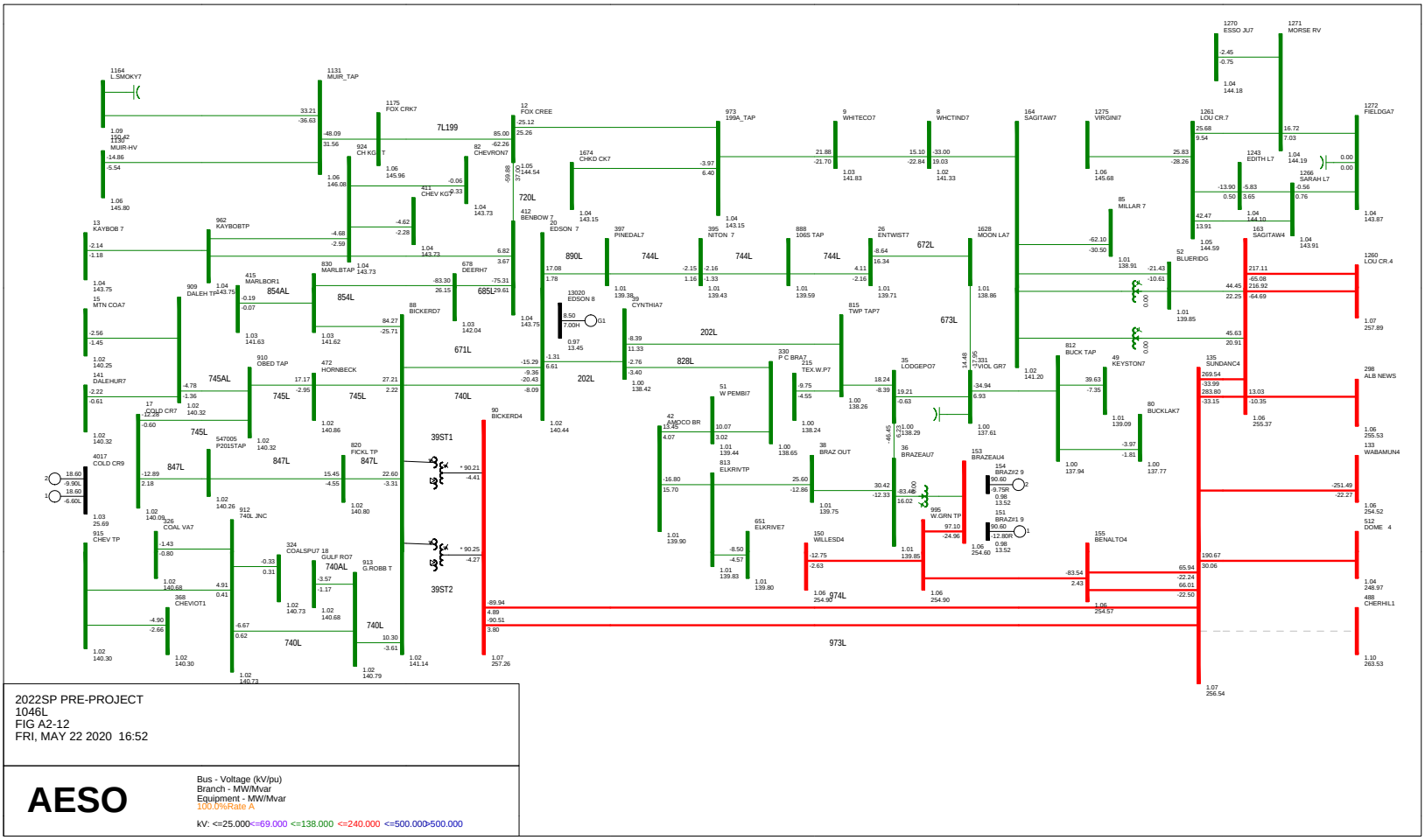
2022SP PRE-PROJECT
909L
FIG A2-10
FRI, MAY 22 2020 16:51

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


1164
L.SMOKY7
1131
MUIR_TAP
1175
FOX CRK7
12
FOX CREE
973
199A_TAP
9
WHITECO7
8
WHCTIND7
164
SAGITAW7
1270
ESSO JU7
1271
MORSE RV
1272
FIELDGA7
1261
LOU CR.7
1275
VIRGIN#7
1243
EDITH L7
1266
SARAH L7
1130
MUIR-HV
924
CH KG T
82
CHEVRON7
1674
CHKD CK7
7L199
720L
890L
744L
672L
673L
202L
828L
671L
740L
685L
854L
854AL
745L
745AL
847L
740AL
974L
973L
39ST1
39ST2
13
KAYBOB 7
962
KAYBOBTP
15
MTN COA7
141
DALEHUR7
17
COLD CR7
4017
COLD CR9
915
CHEV TP
368
CHEVIOT1
326
COAL VA7
909
DALEH TP
910
OBED TAP
547005
P201STAP
912
740L JNC
324
COALSPU7
18
GULF RO7
913
G.ROBB T
820
FICKL TP
472
HORNBECK
830
MARLBTAP
415
MARLBOR1
89
BICKERD7
678
DEERH7
412
BENBOW 7
20
EDSON 7
13020
EDSON 8
G1
397
PINEDAL7
29
CYNTHIA7
395
NITON 7
888
106S TAP
26
ENTWIST7
1628
MOON LA7
330
P C BRA7
215
TEX.W.P7
815
TWP TAP7
35
LODGEPO7
331
VIOL GR7
36
BRAZEAU7
153
BRAZEAU4
154
BRAZ#2 9
151
BRAZ#1 9
995
W.GRN TP
42
AMOCO BR
51
W PEMBI7
813
ELKRIVTP
651
ELKRIVE7
38
BRAZ OUT
150
WILLESD4
155
BENALTO4
812
BUCK TAP
49
KEYSTON7
80
BUCKLAK7
85
MILLAR 7
52
BLUERIDG
163
SAGITAW4
1260
LOU CR.4
135
SUNDANC4
298
ALB NEWS
133
WABAMUN4
512
DOME 4
488
CHERHIL1
90
BICKERD4
* 54.98
3.82
* 55.02
3.96
2022SP PRE-PROJECT
854L
FIG A2-11
FRI, MAY 22 2020 16:51
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

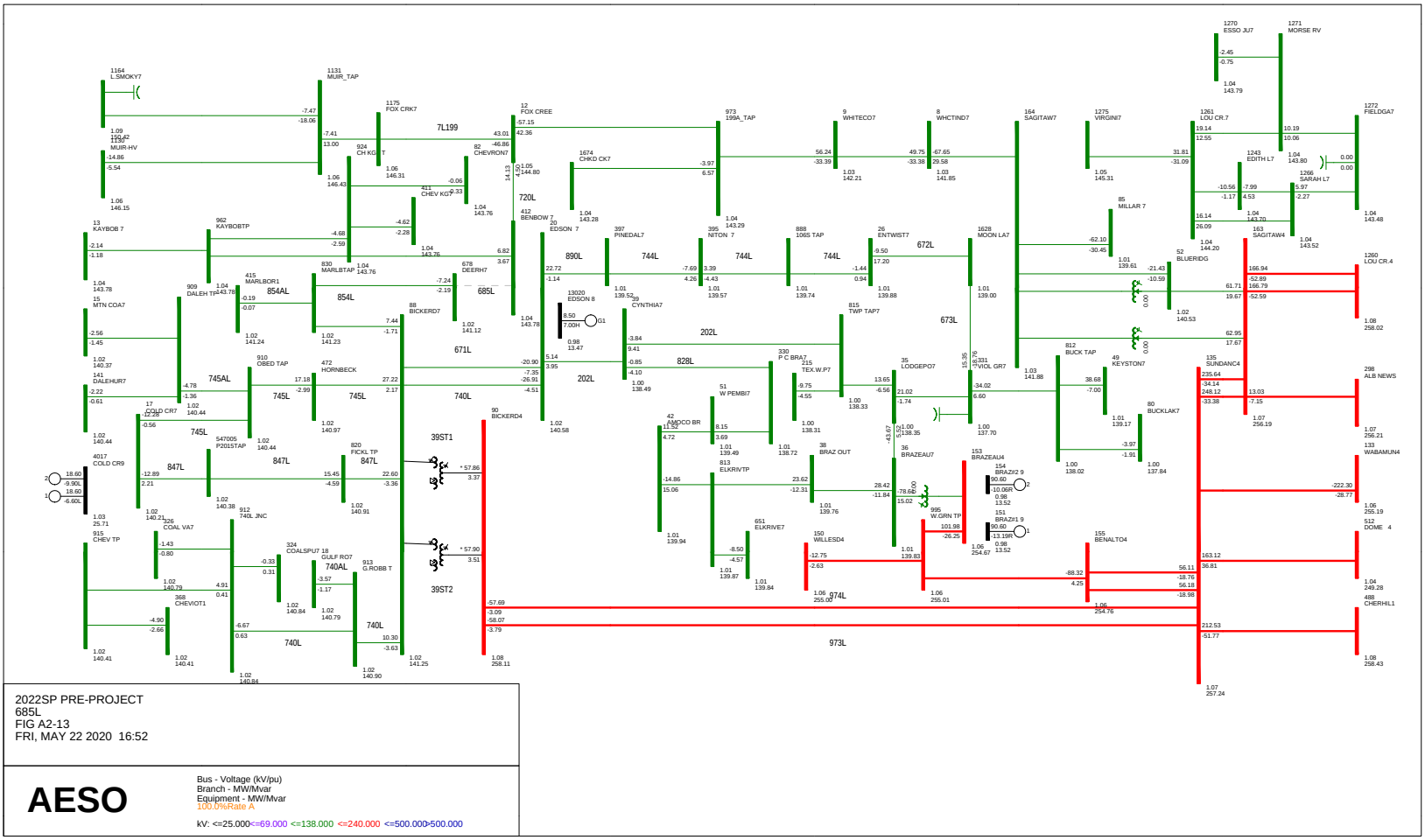


2022SP PRE-PROJECT
1046L
FIG A2-12
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

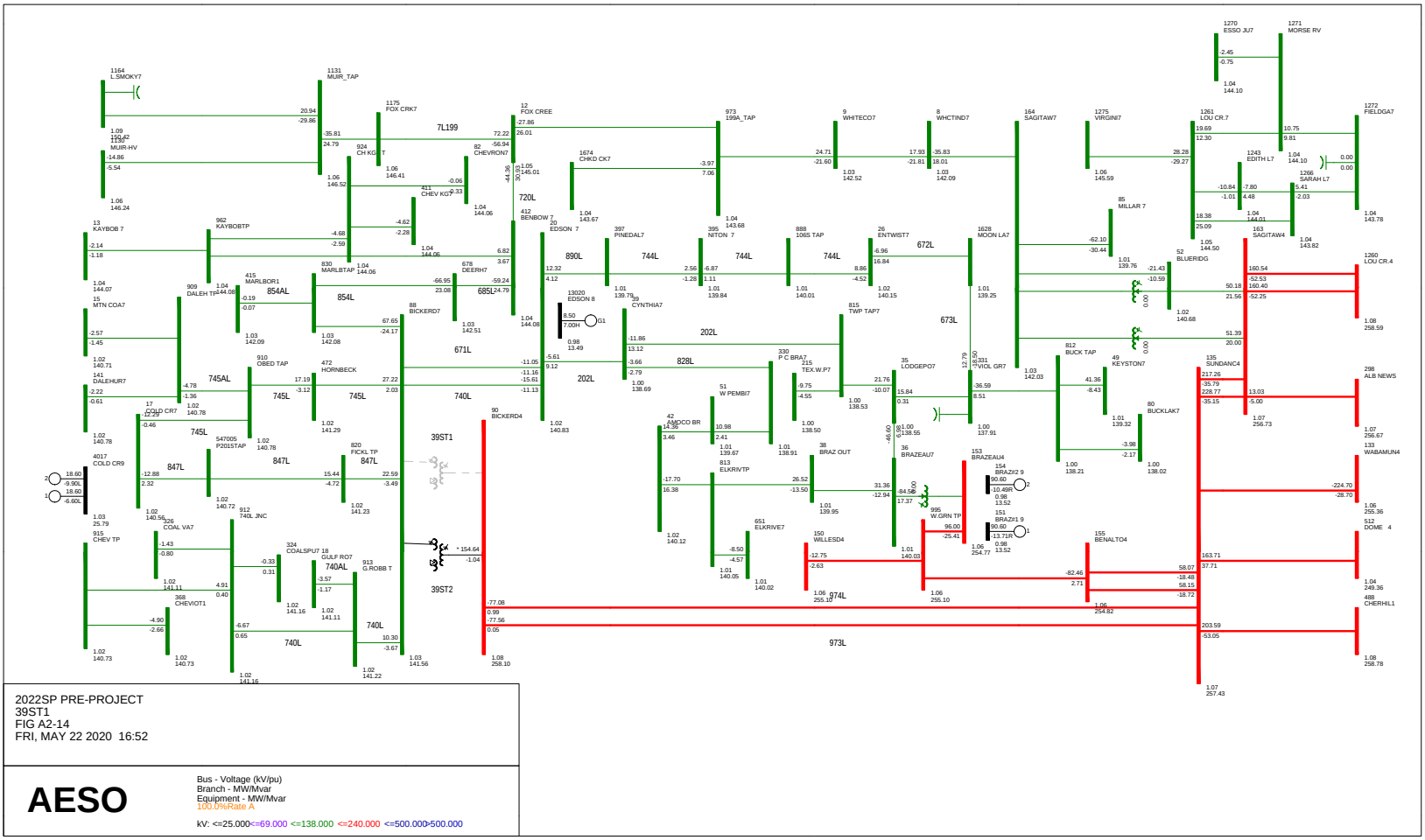


2022SP PRE-PROJECT
685L
FIG A2-13
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000<=69.000 <=138.000 <=240.000 <=500.000>500.000

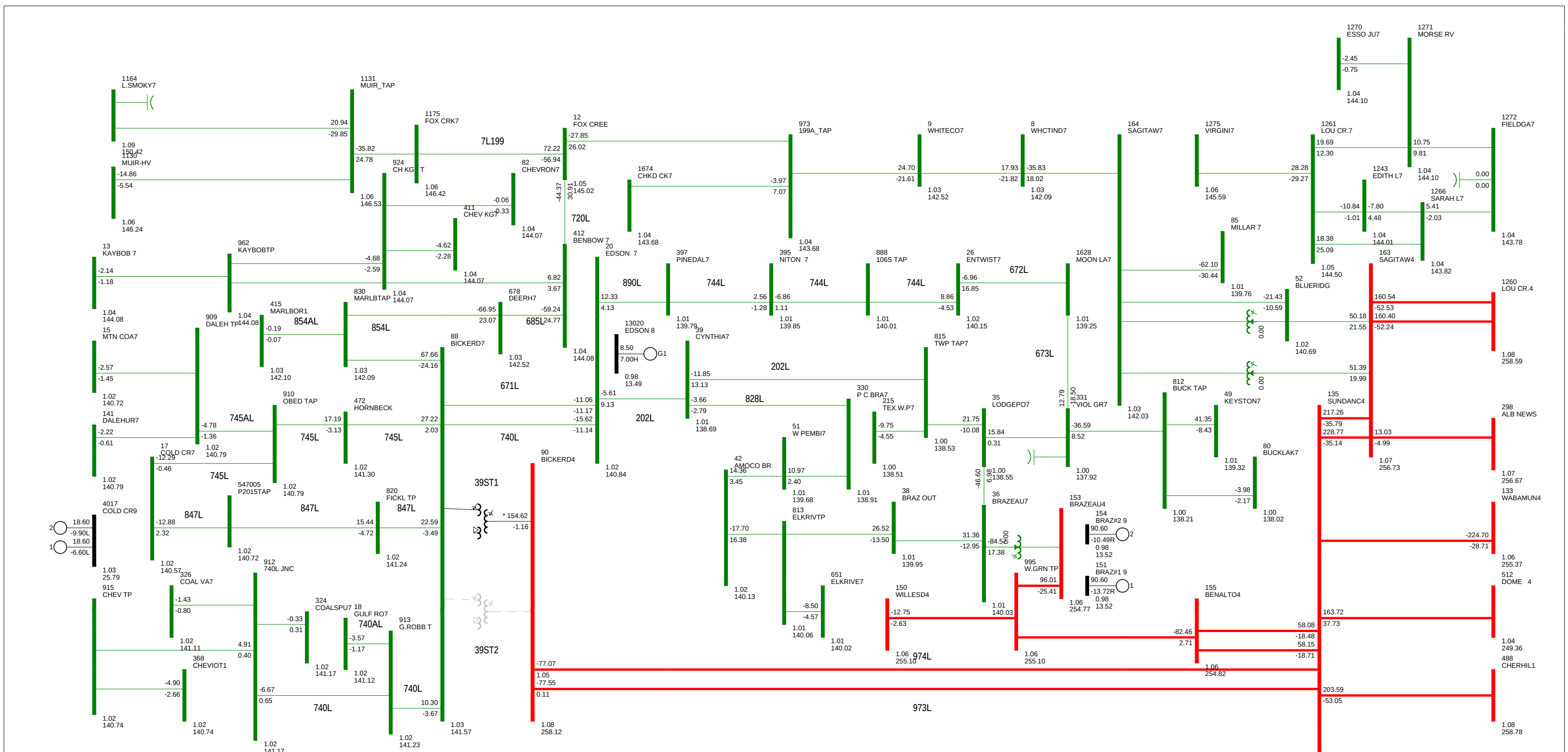


2022SP PRE-PROJECT
39ST1
FIG A2-14
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

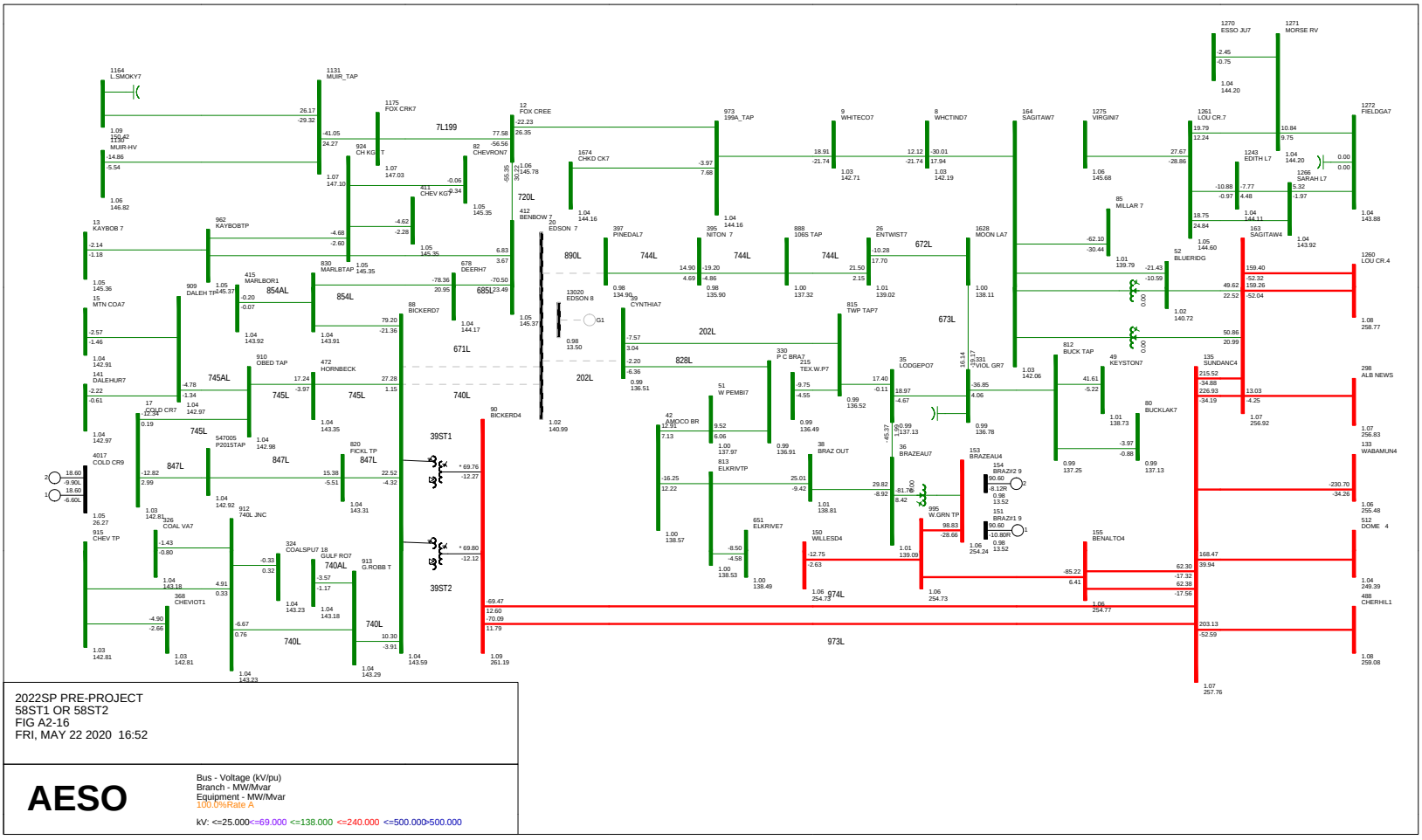


2022SP PRE-PROJECT
39ST2
FIG A2-15
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

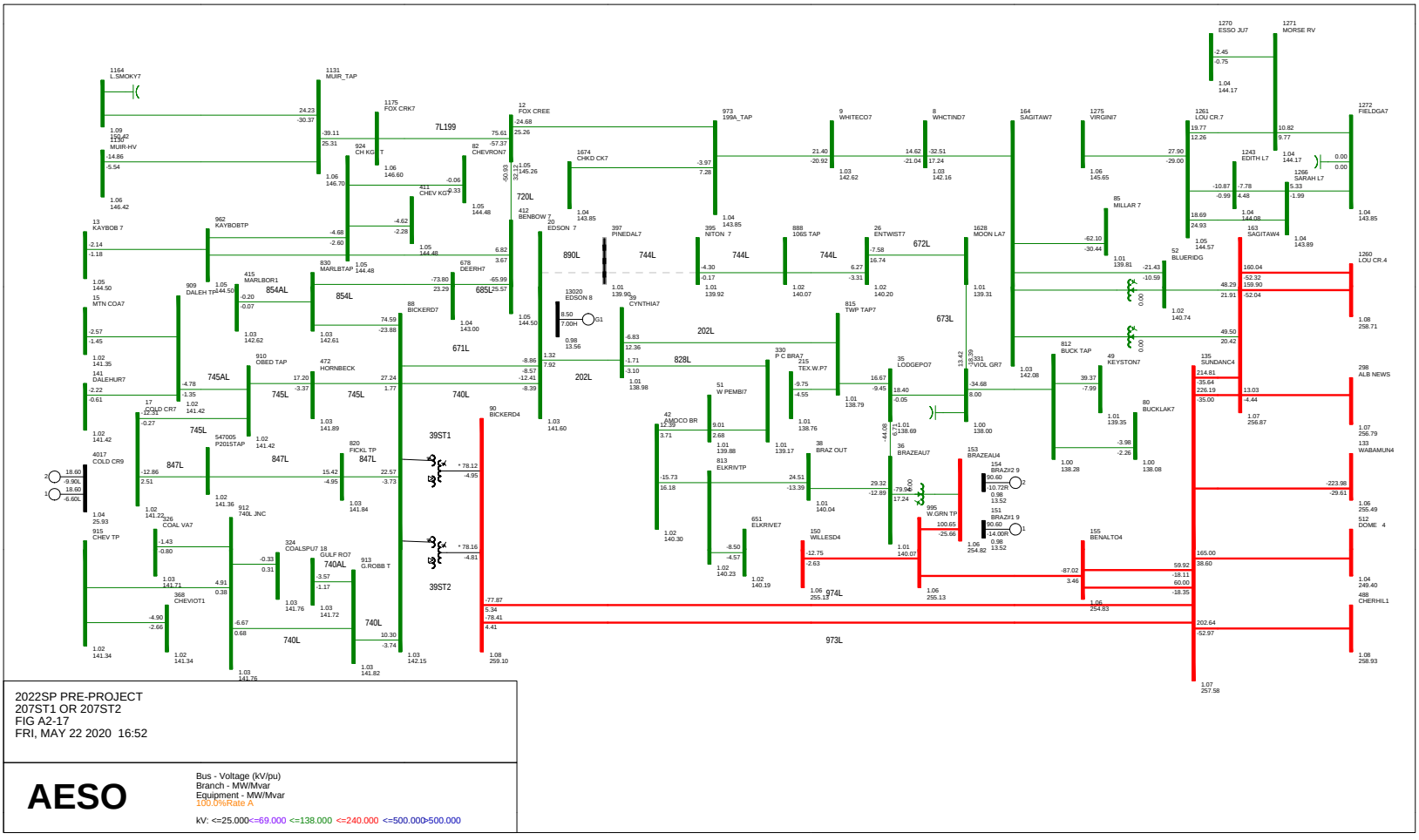


2022SP PRE-PROJECT
58ST1 OR 58ST2
FIG A2-16
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

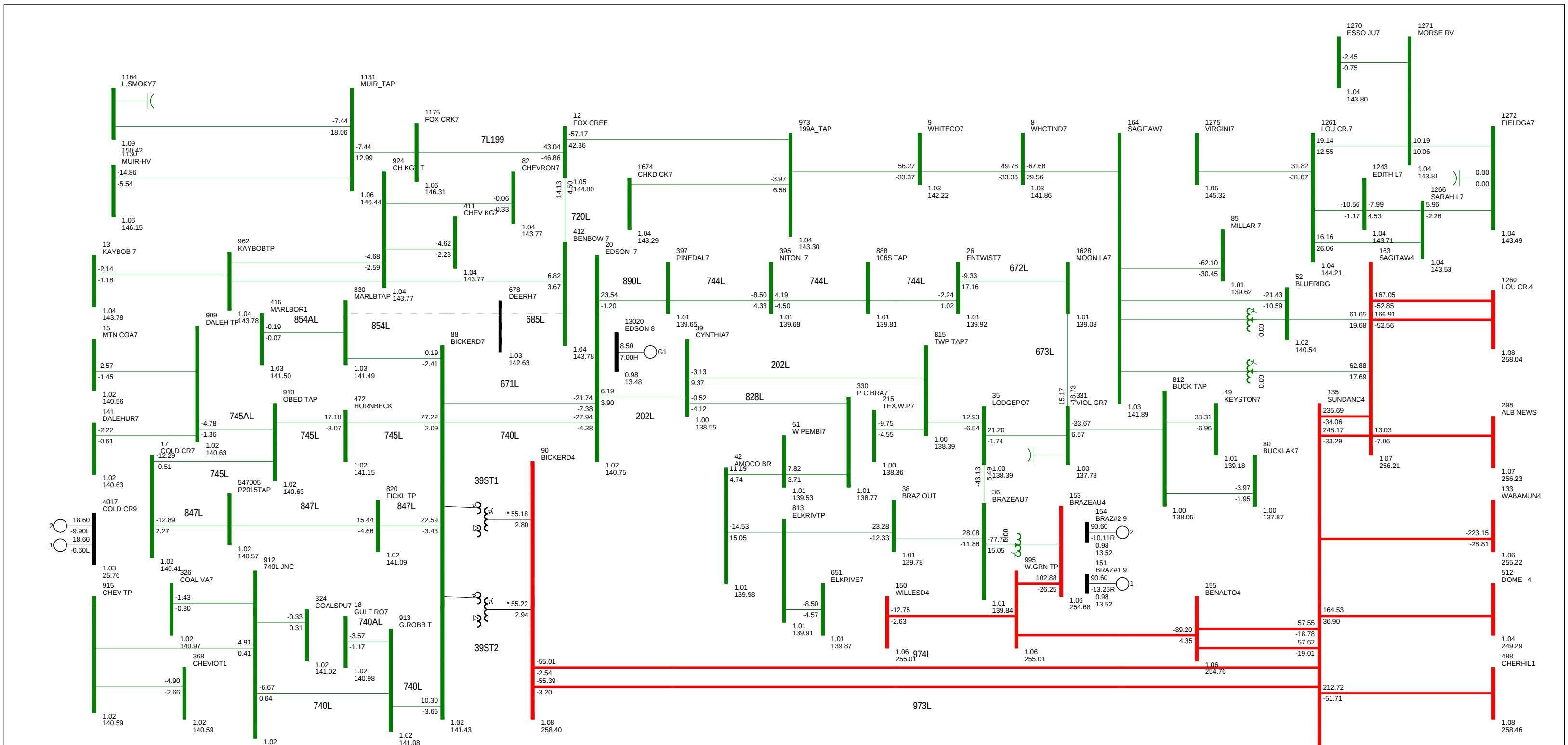


2022SP PRE-PROJECT
207ST1 OR 207ST2
FIG A2-17
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

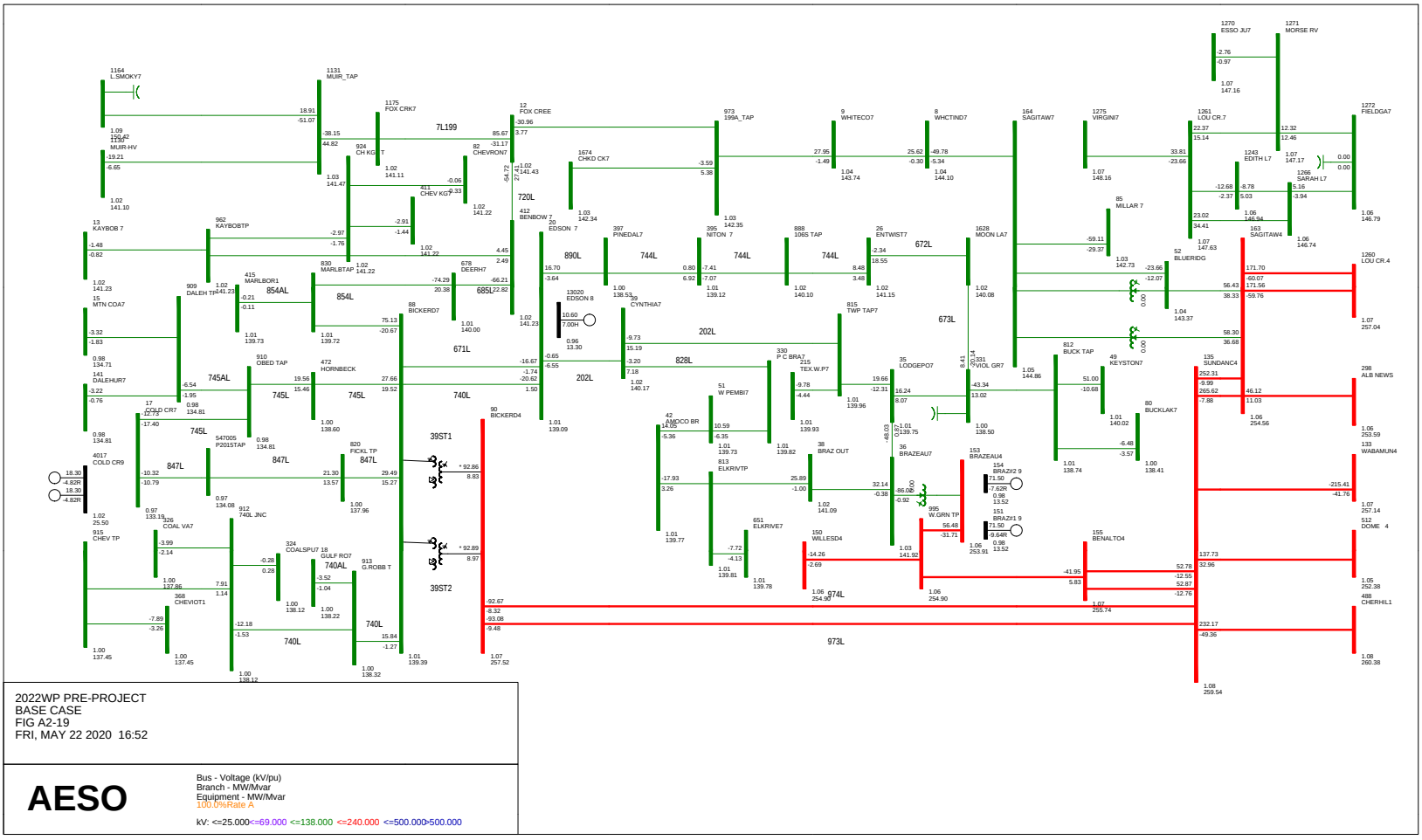


2022SP PRE-PROJECT
1012ST1
FIG A2-18
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

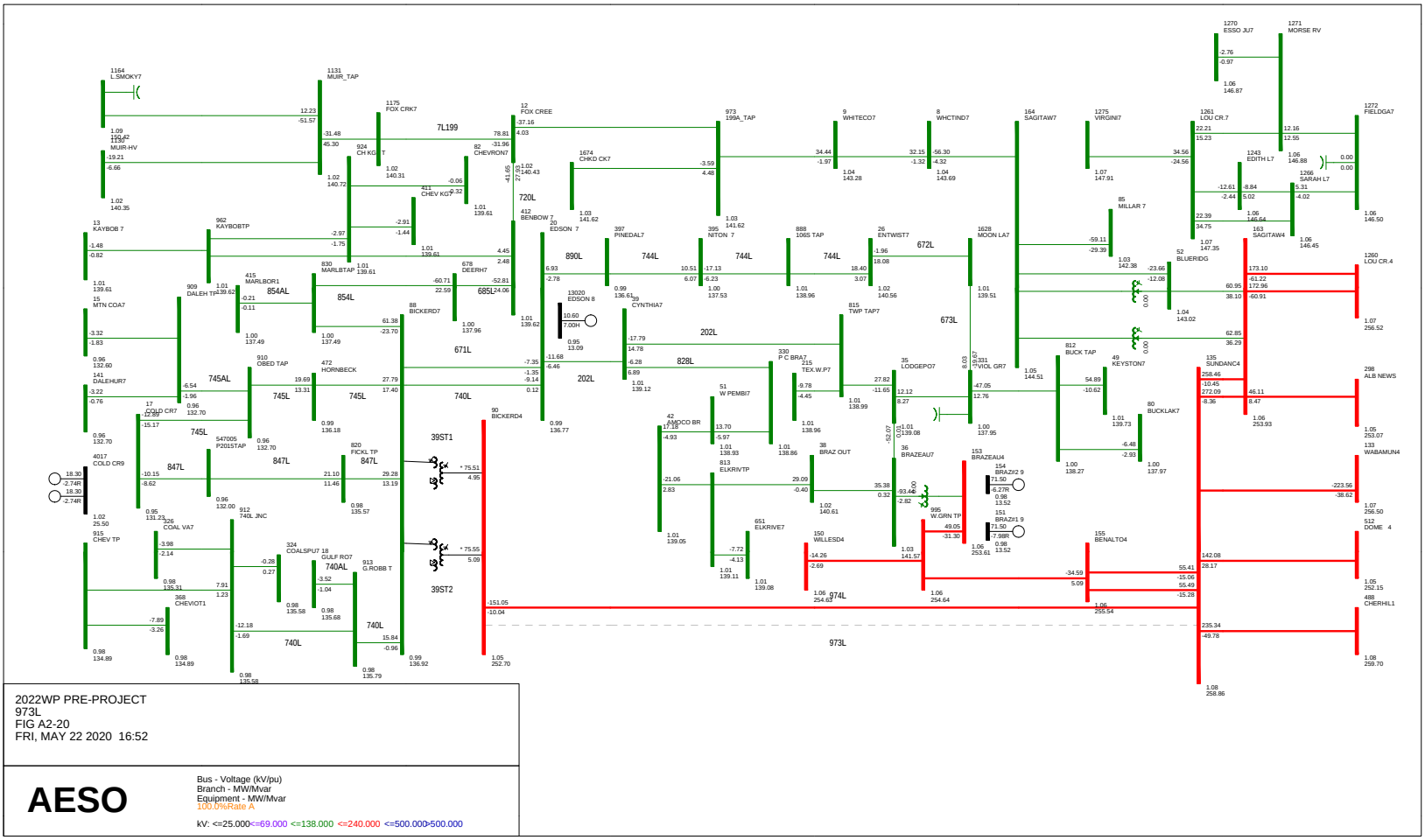


2022WP PRE-PROJECT
BASE CASE
FIG A2-19
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

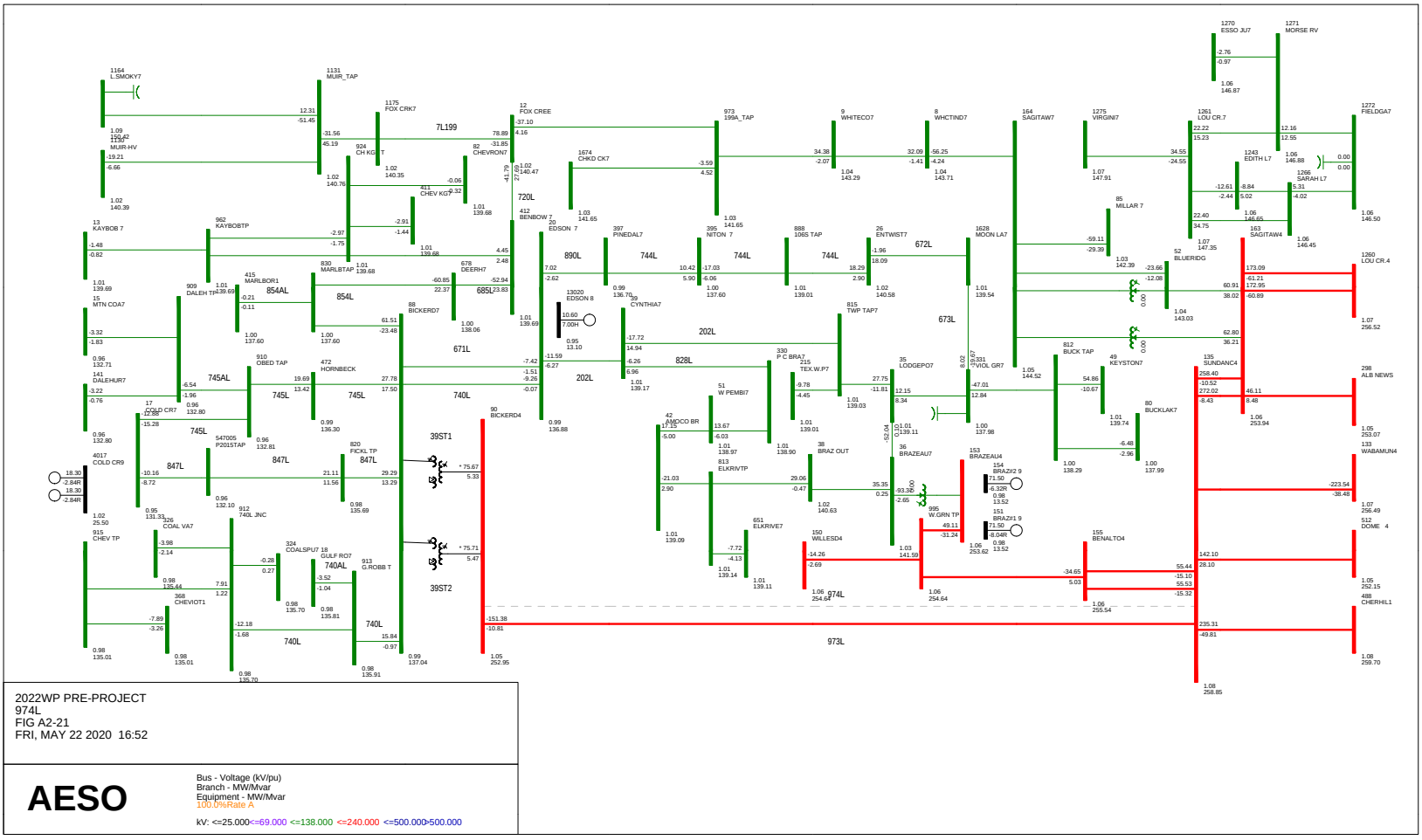


2022WP PRE-PROJECT
973L
FIG A2-20
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

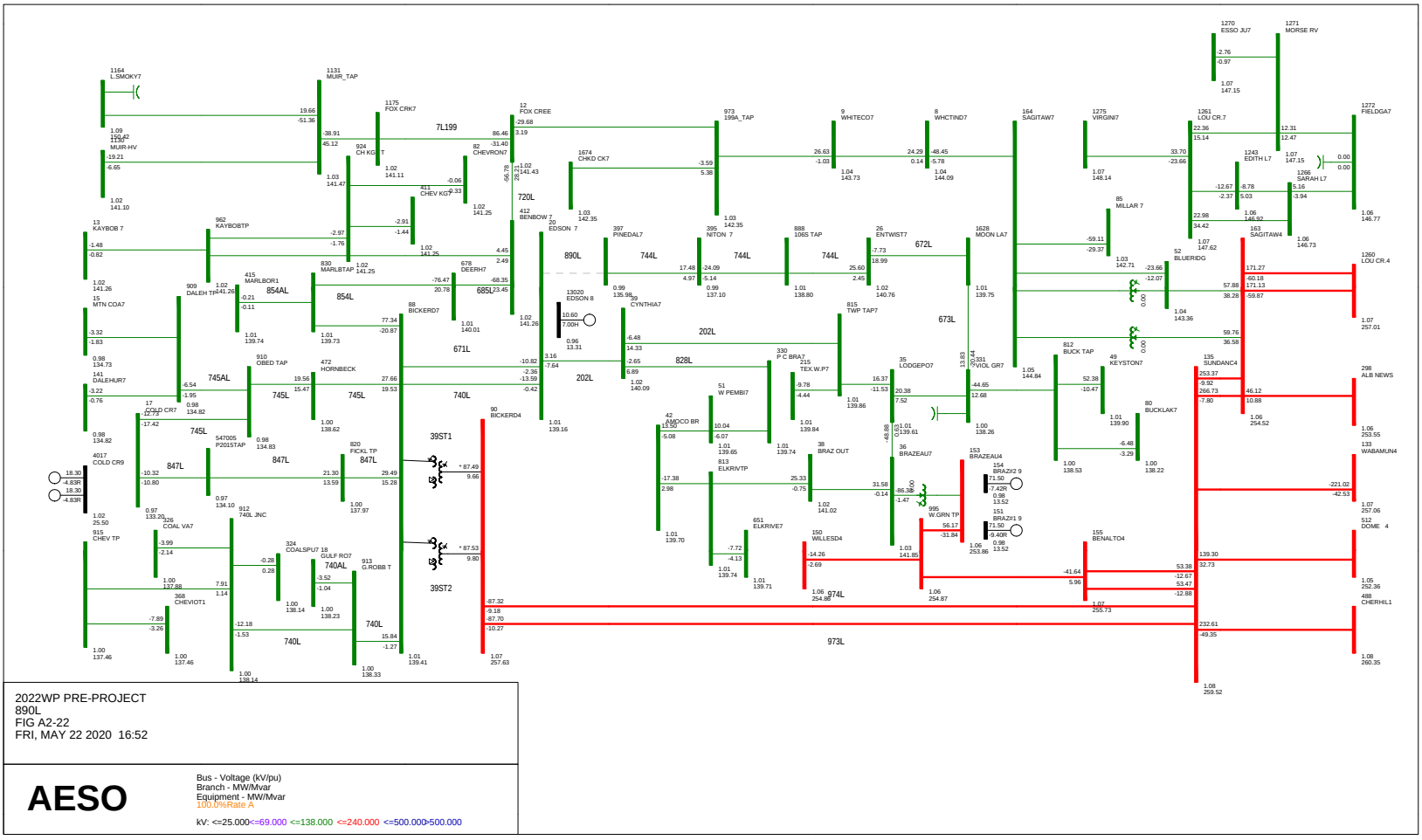


2022WP PRE-PROJECT
974L
FIG A2-21
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

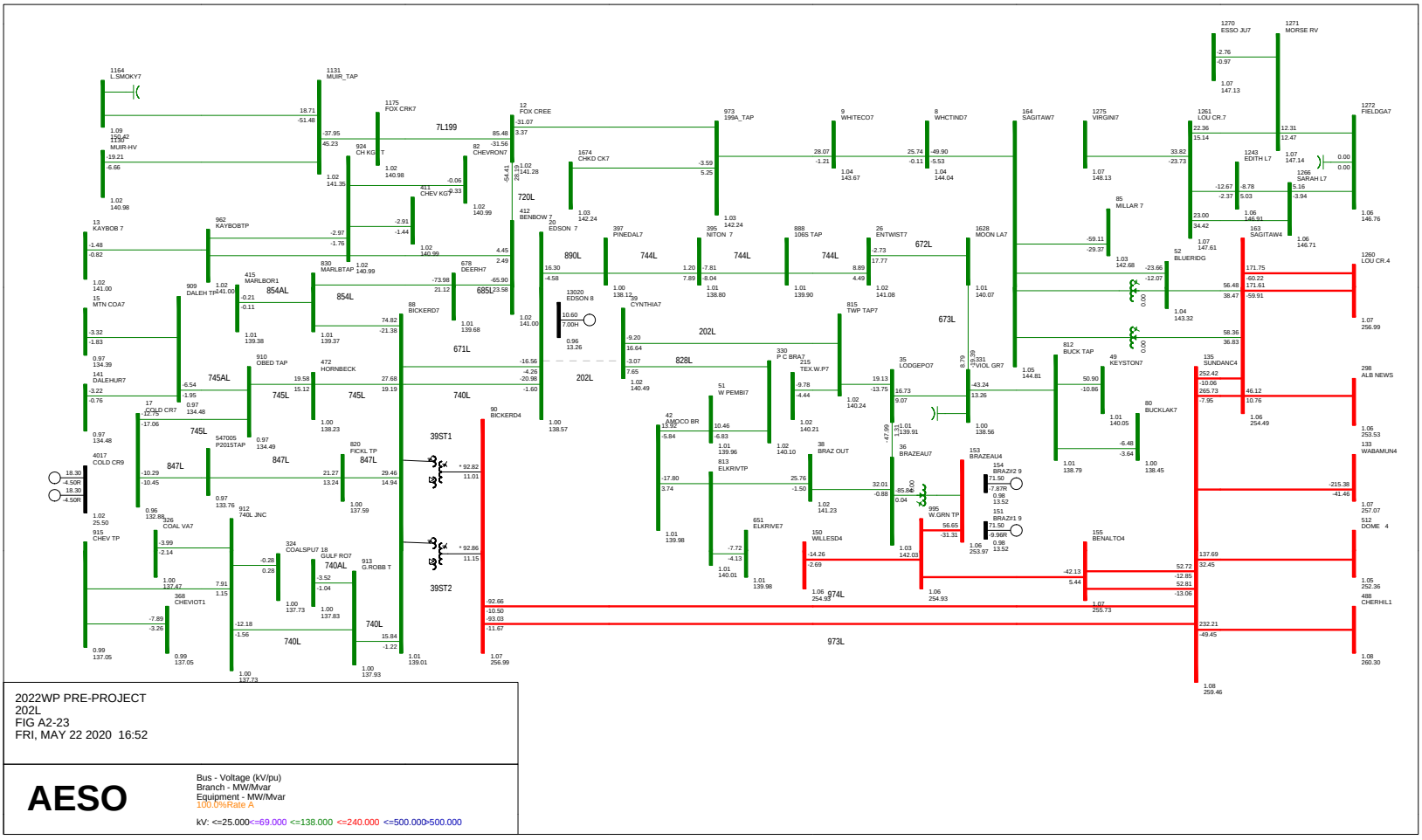


2022WP PRE-PROJECT
890L
FIG A2-22
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

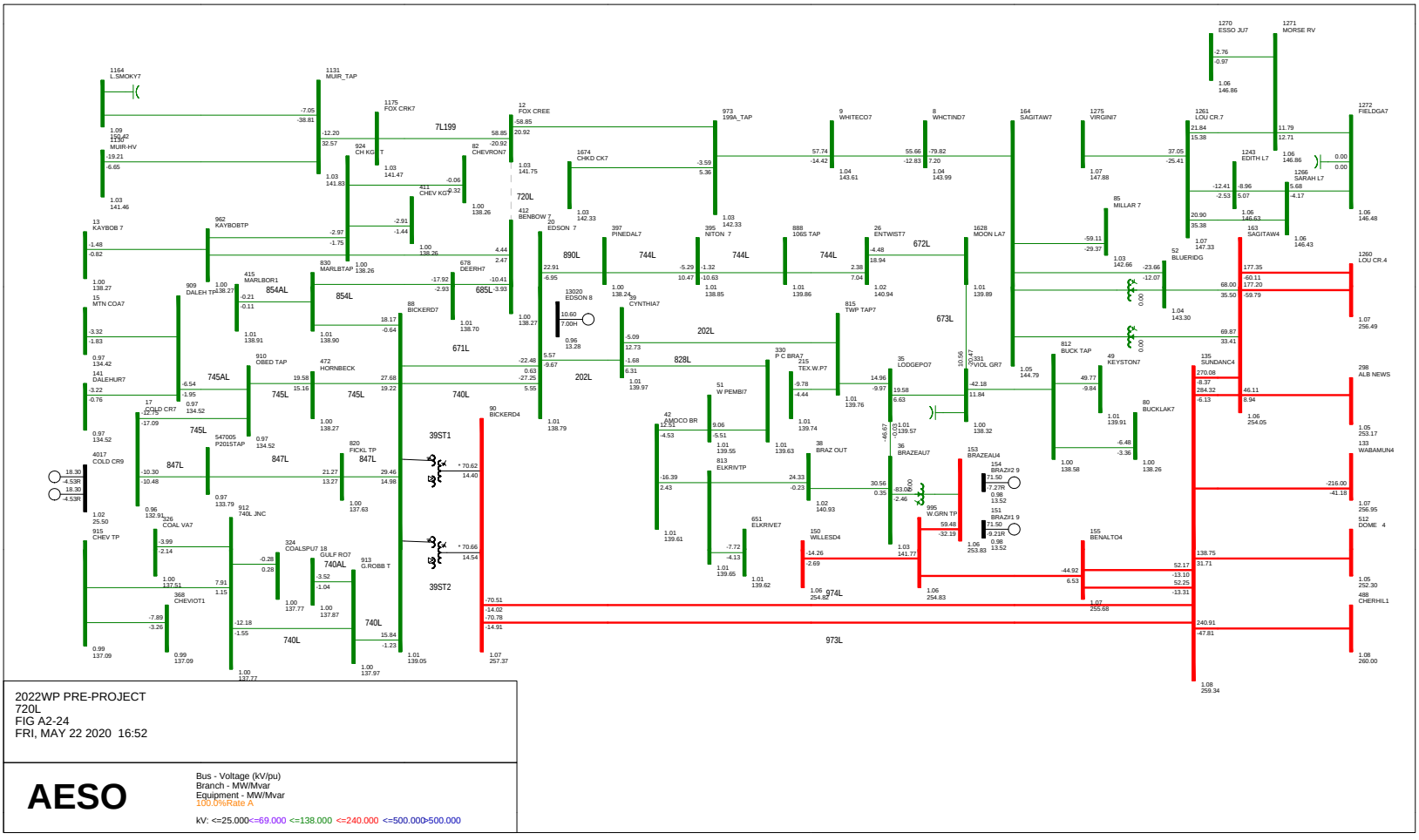


2022WP PRE-PROJECT
202L
FIG A2-23
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

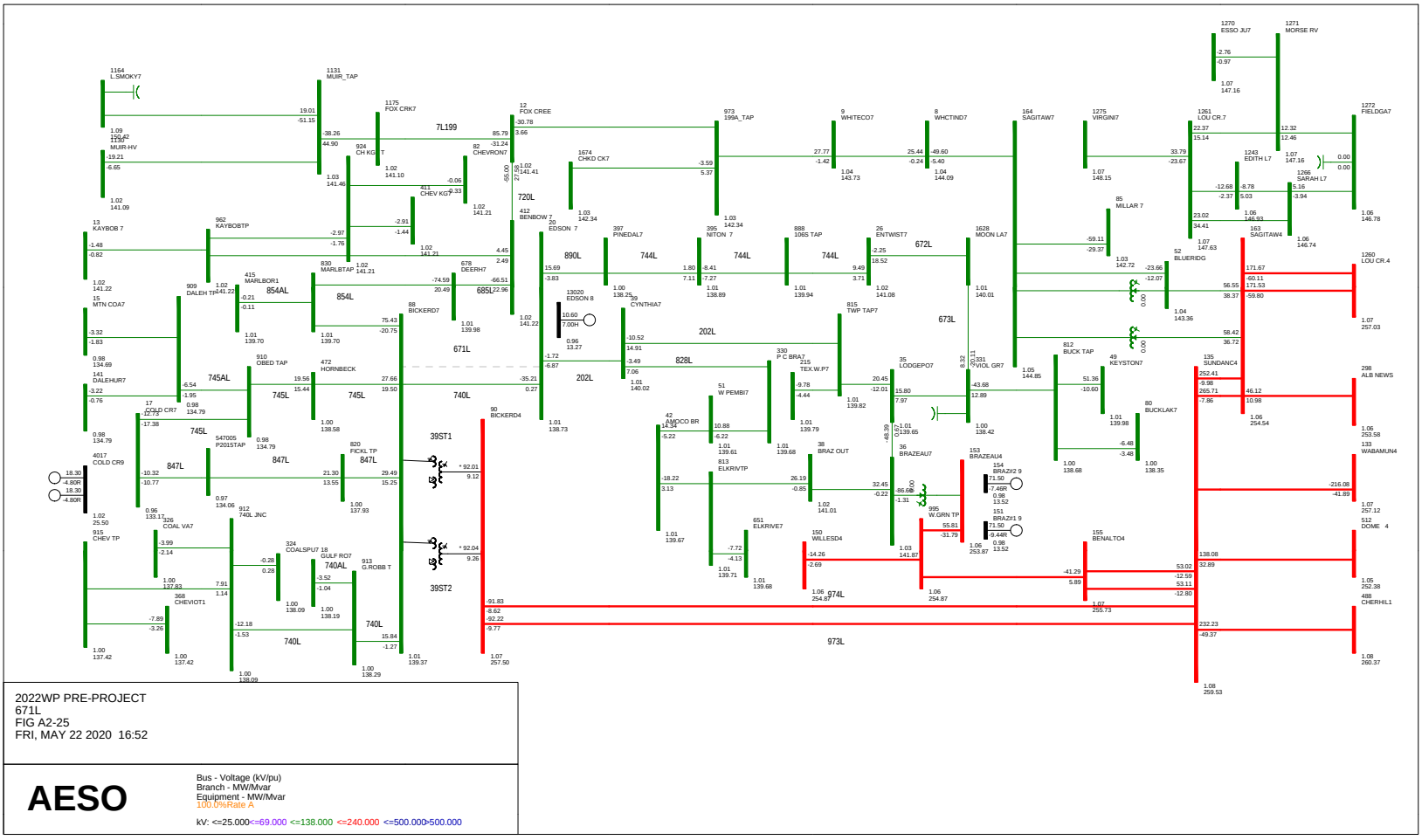


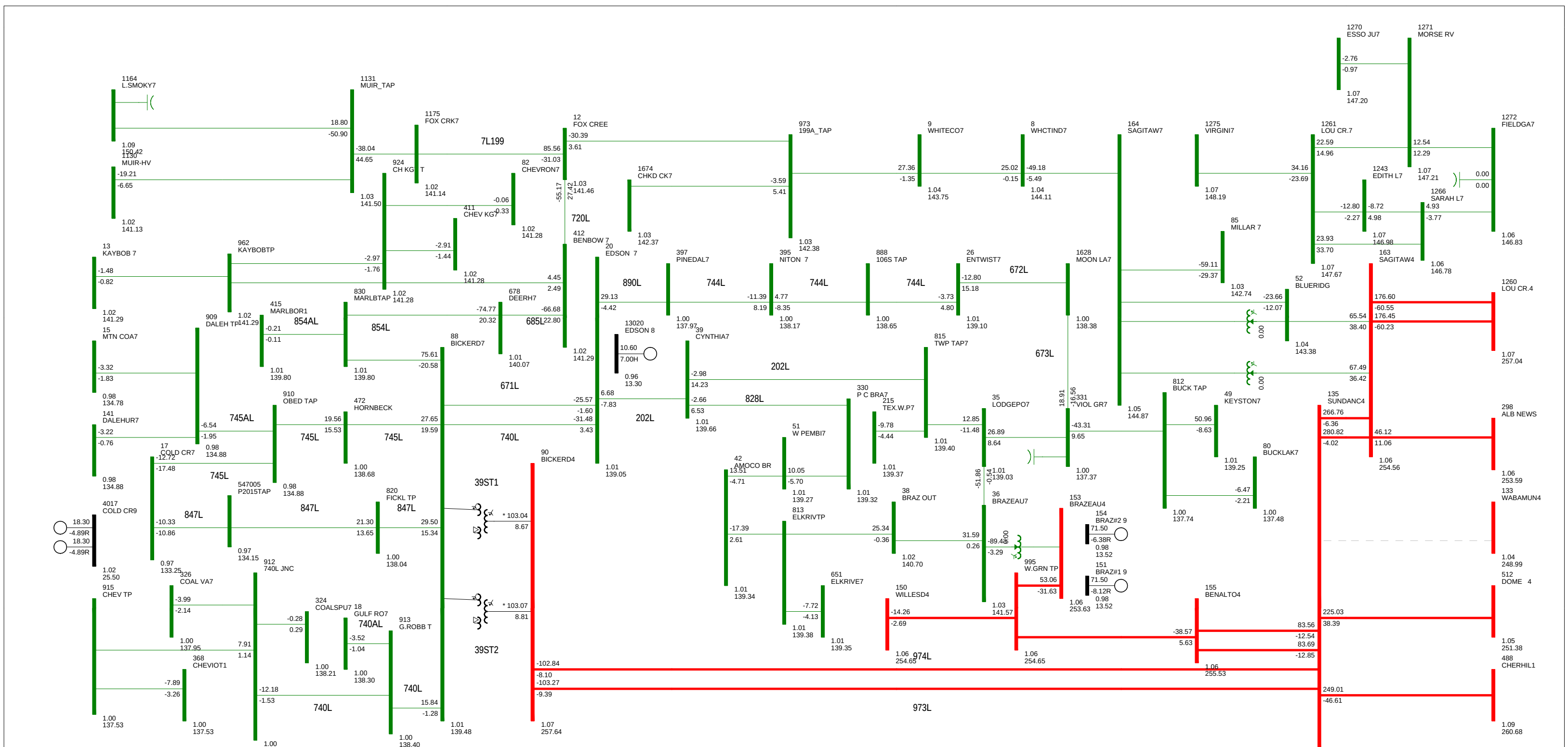
2022WP PRE-PROJECT
720L
FIG A2-24
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


1164 L.SMOKY7
1131 MUIR_TAP
1130 MUIR-HV
1175 FOX CRK7
924 CH KG T
82 CHEVRON7
12 FOX CREE
7L199
720L
411 CHEV KG7
412 BENBOW 7
20 EDSON 7
1674 CHKD CK7
973 199A_TAP
9 WHITECO7
8 WHCTIND7
164 SAGITAW7
1275 VIRGIN7
1270 ESSO JU7
1271 MORSE RV
1261 LOU CR.7
1272 FIELDGA7
1243 EDITH L7
1266 SARAH L7
85 MILLAR 7
163 SAGITAW4
52 BLUERIDG
1260 LOU CR.4
1257.03
13 KAYBOB 7
962 KAYBOBTP
415 MARLBOR1
830 MARLBTAP
678 DEERH7
854AL
854L
685L
15 MTN COA7
909 DALEH TP
141 DALEHUR7
17 COLD CR7
910 OBED TAP
745AL
745L
847L
4017 COLD CR9
547005 P201STAP
820 FICKL TP
326 COAL VA7
912 740L JNC
915 CHEV TP
368 CHEVIOT1
324 COALSPU7
18 GULF RO7
740AL
740L
913 G.ROBB T
88 BICKERD7
671L
39ST1
39ST2
90 BICKERD4
397 PINEDAL7
744L
395 NITON 7
888 106S TAP
26 ENTWIST7
672L
1628 MOON LA7
13020 EDSON 8
39 CYNTHIA7
202L
828L
330 P C BRA7
215 TEX.W.P7
815 TWP TAP7
673L
35 LODGEPO7
331 VIOL GR7
812 BUCK TAP
49 KEYSTON7
80 BUCKLAK7
135 SUNDANC4
298 ALB NEWS
133 WABAMUN4
512 DOME 4
488 CHERHIL1
42 AMOCO BR
51 W PEMBI7
813 ELKRIVTP
651 ELKRIVE7
38 BRAZ OUT
36 BRAZEAU7
153 BRAZEAU4
154 BRAZ#2 9
151 BRAZ#1 9
995 W.GRN TP
150 WILLESD4
974L
155 BENALTO4
973L
2022WP PRE-PROJECT
671L
FIG A2-25
FRI, MAY 22 2020 16:52
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

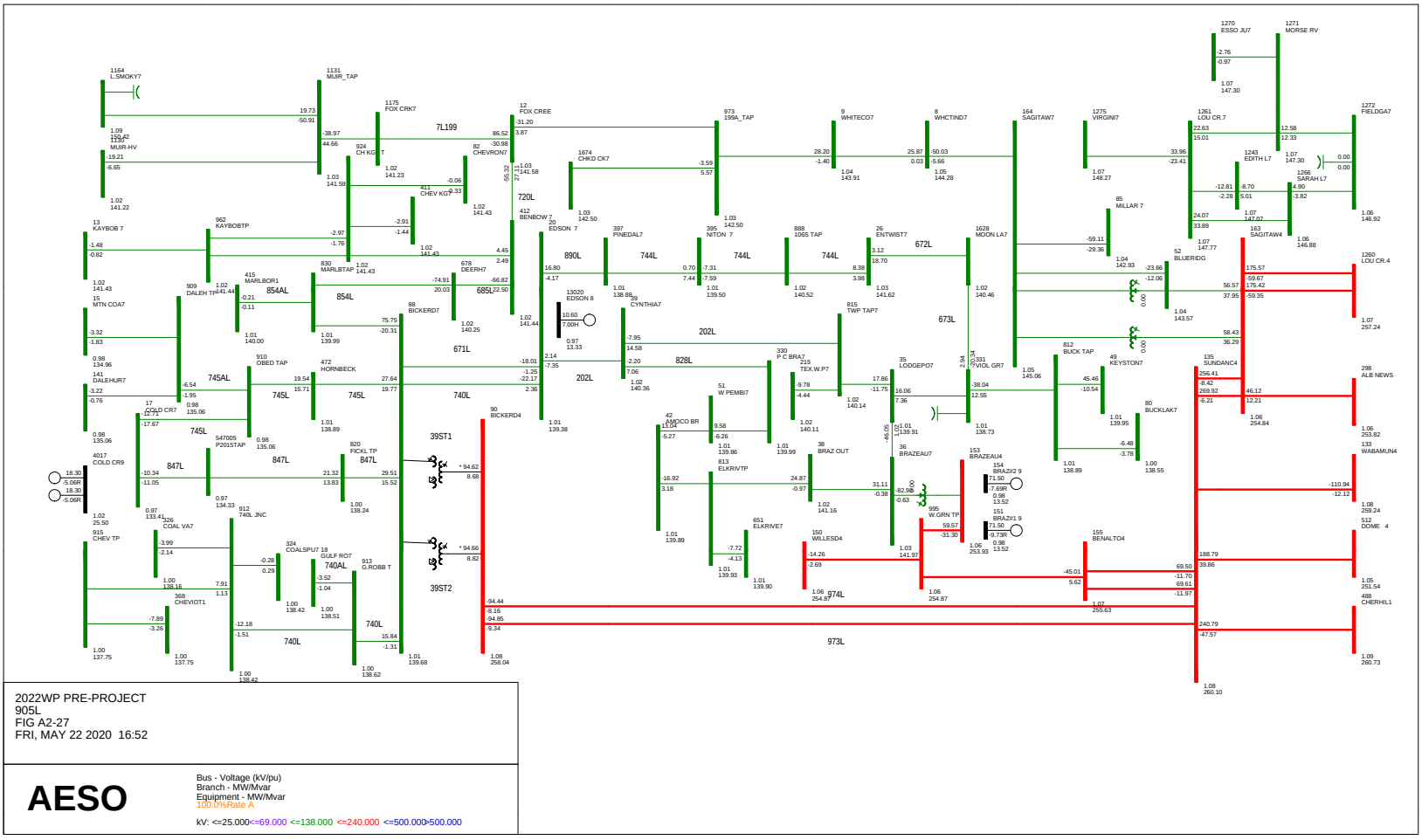


2022WP PRE-PROJECT
902L
FIG A2-26
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

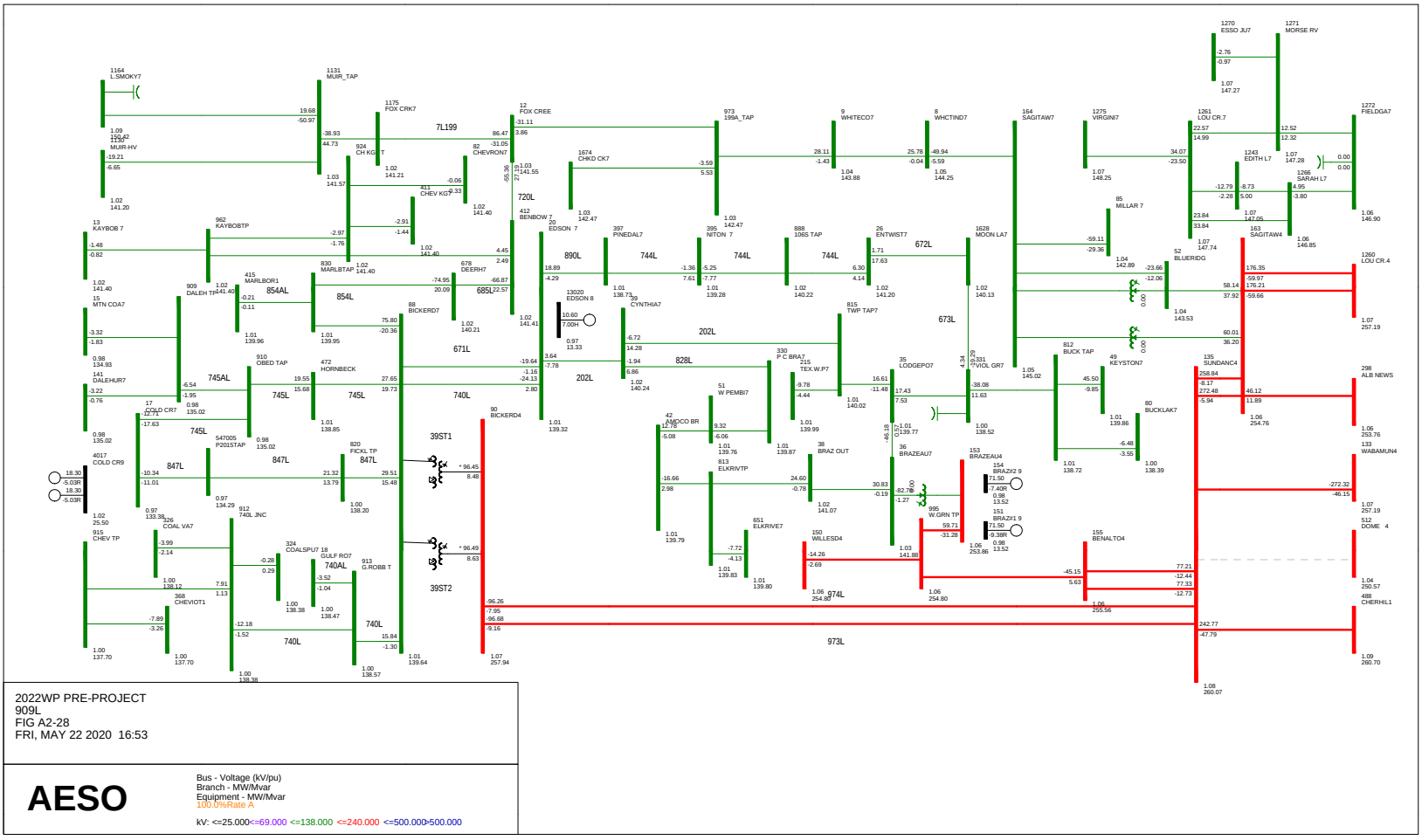


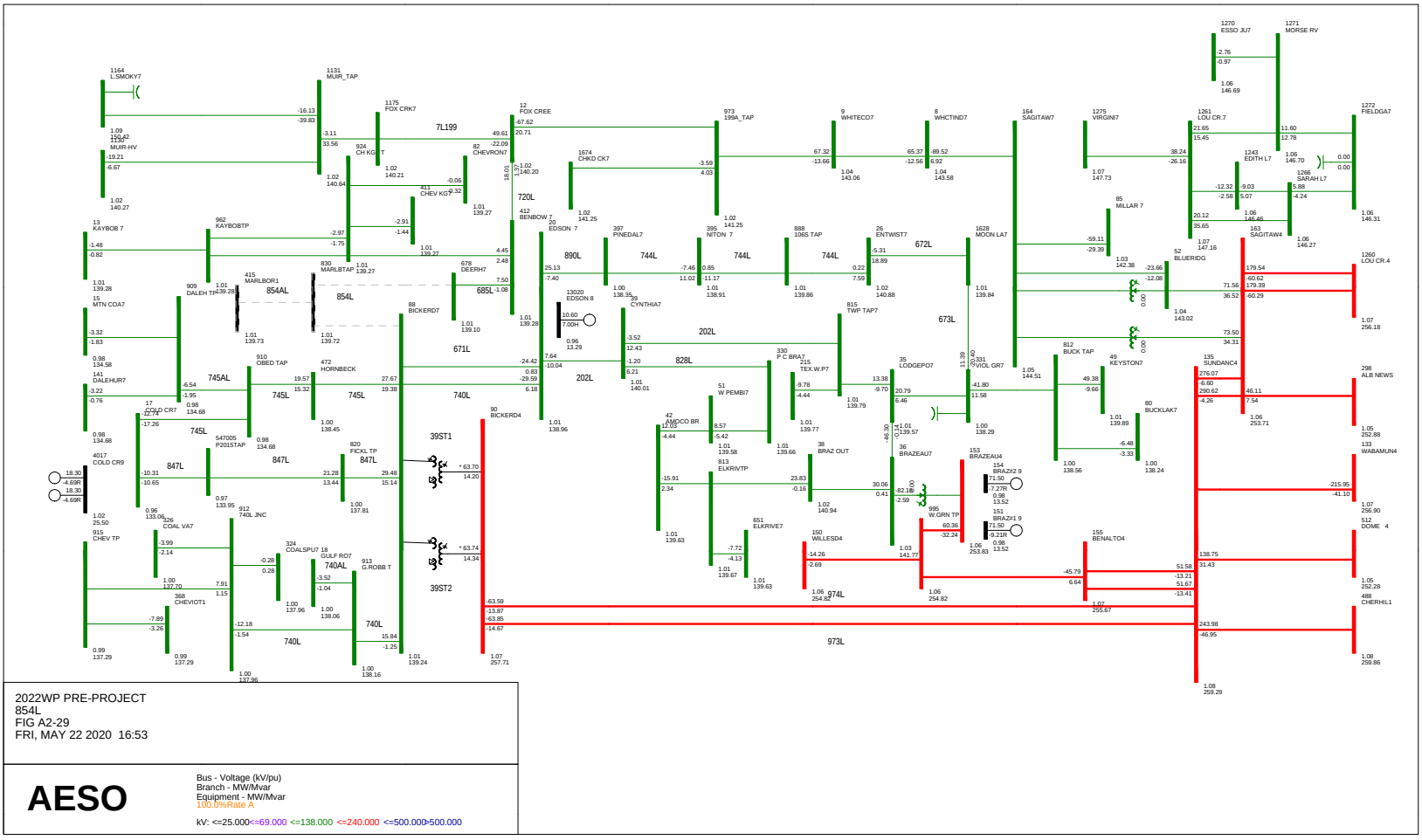
2022WP PRE-PROJECT
905L
FIG A2-27
FRI, MAY 22 2020 16:52

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


1164 L.SMOKY7
1131 MUIR_TAP
1130 MUIR-HV
1175 FOX CRK7
7L199
924 CH KG T
82 CHEVRON7
411 CHEV KG7
12 FOX CREE
720L
1674 CHKD CK7
973 199A_TAP
9 WHITECO7
8 WHCTIND7
164 SAGITAW7
1275 VIRGIN#7
1270 ESSO JU7
1271 MORSE RV
1261 LOU CR.7
1272 FIELDGA7
1243 EDITH L7
1266 SARAH L7
85 MILLAR 7
163 SAGITAW4
1628 MOON LA7
672L
52 BLUERIDG
1260 LOU CR.4
13 KAYBOB 7
962 KAYBOBTP
412 BENBOW 7
20 EDSON 7
397 PINEDAL7
744L
395 NITON 7
888 106S TAP
26 ENTWIST7
890L
415 MARLBOR1
854AL
830 MARLBTAP
854L
678 DEERH7
685L
88 BICKERD7
671L
909 DALEH TP
15 MTN COA7
141 DALEHUR7
745AL
910 OBED TAP
745L
472 HORNBECK
17 COLD CR7
547005 P201STAP
847L
820 FICKL TP
4017 COLD CR9
912 740L JNC
326 COAL VA7
915 CHEV TP
368 CHEVIOT1
324 COALSPU7
18 GULF RO7
740AL
913 G.ROBB T
740L
39ST1
39ST2
90 BICKERD4
13020 EDSON 8
10.60
7.00H
0.97
13.33
202L
828L
39 CYNTHIA7
815 TWP TAP7
330 P C BRA7
215 TEX.W.P7
973L
35 LODGEPO7
331 VIOL GR7
812 BUCK TAP
49 KEYSTON7
80 BUCKLAK7
135 SUNDANC4
298 ALB NEWS
133 WABAMUN4
512 DOME 4
488 CHERHIL1
42 AMOCO BR
51 W PEMBI7
813 ELKRIVTP
651 ELKRIVE7
38 BRAZ OUT
36 BRAZEAU7
153 BRAZEAU4
154 BRAZ#2 9
151 BRAZ#1 9
995 W.GRN TP
150 WILLESD4
974L
155 BENALTO4
2022WP PRE-PROJECT
909L
FIG A2-28
FRI, MAY 22 2020 16:53
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

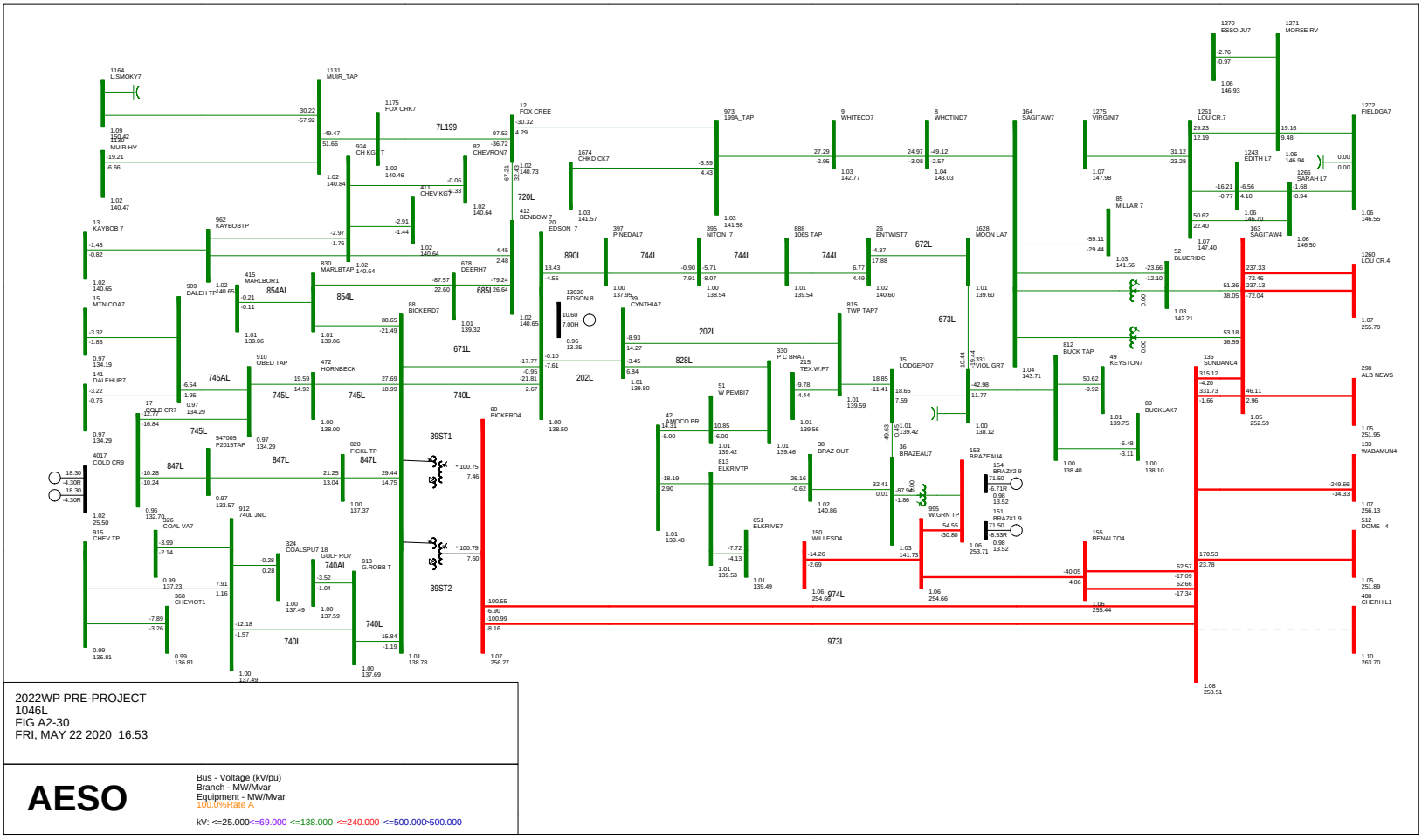


2022WP PRE-PROJECT
854L
FIG A2-29
FRI, MAY 22 2020 16:53

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

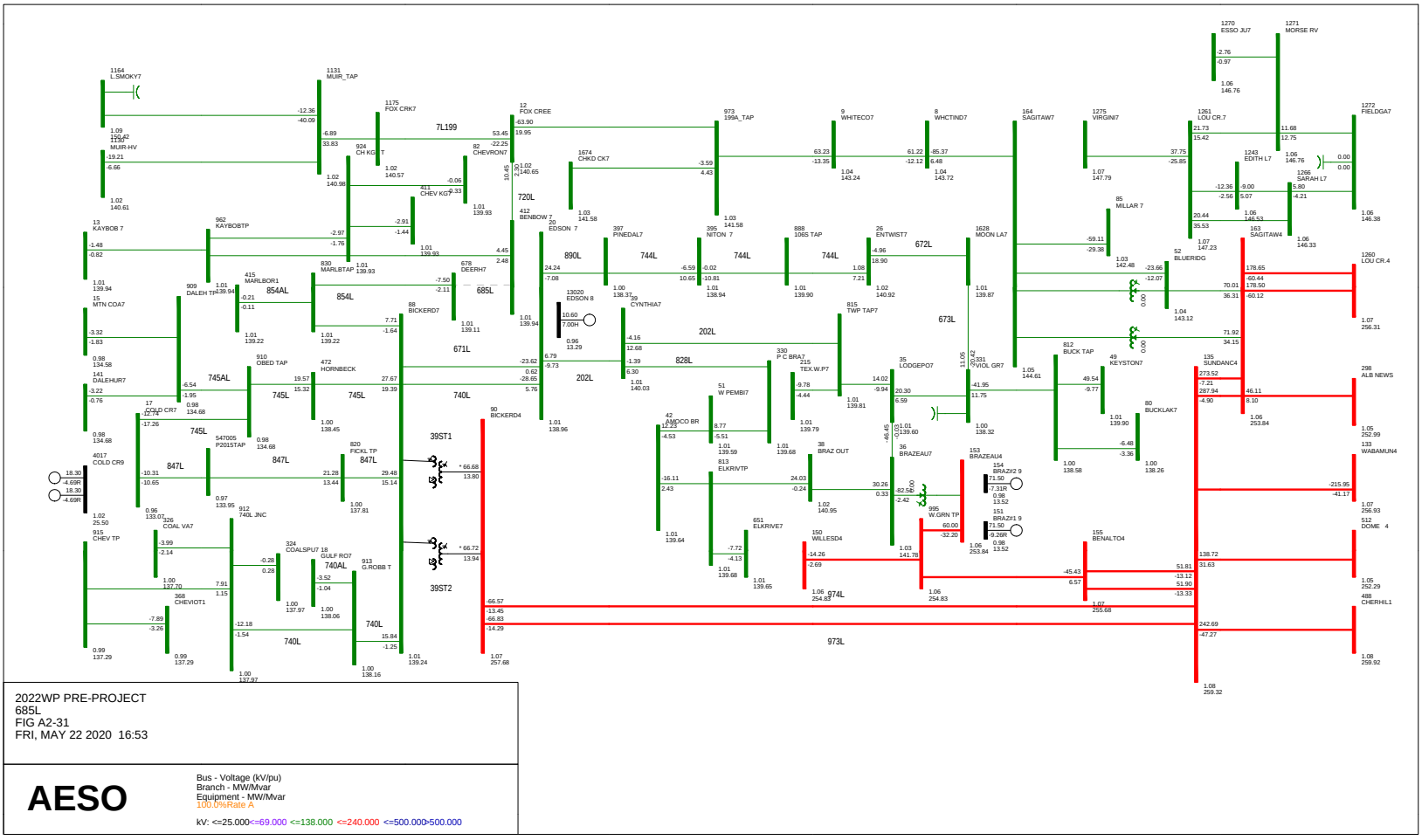


2022WP PRE-PROJECT
1046L
FIG A2-30
FRI, MAY 22 2020 16:53

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

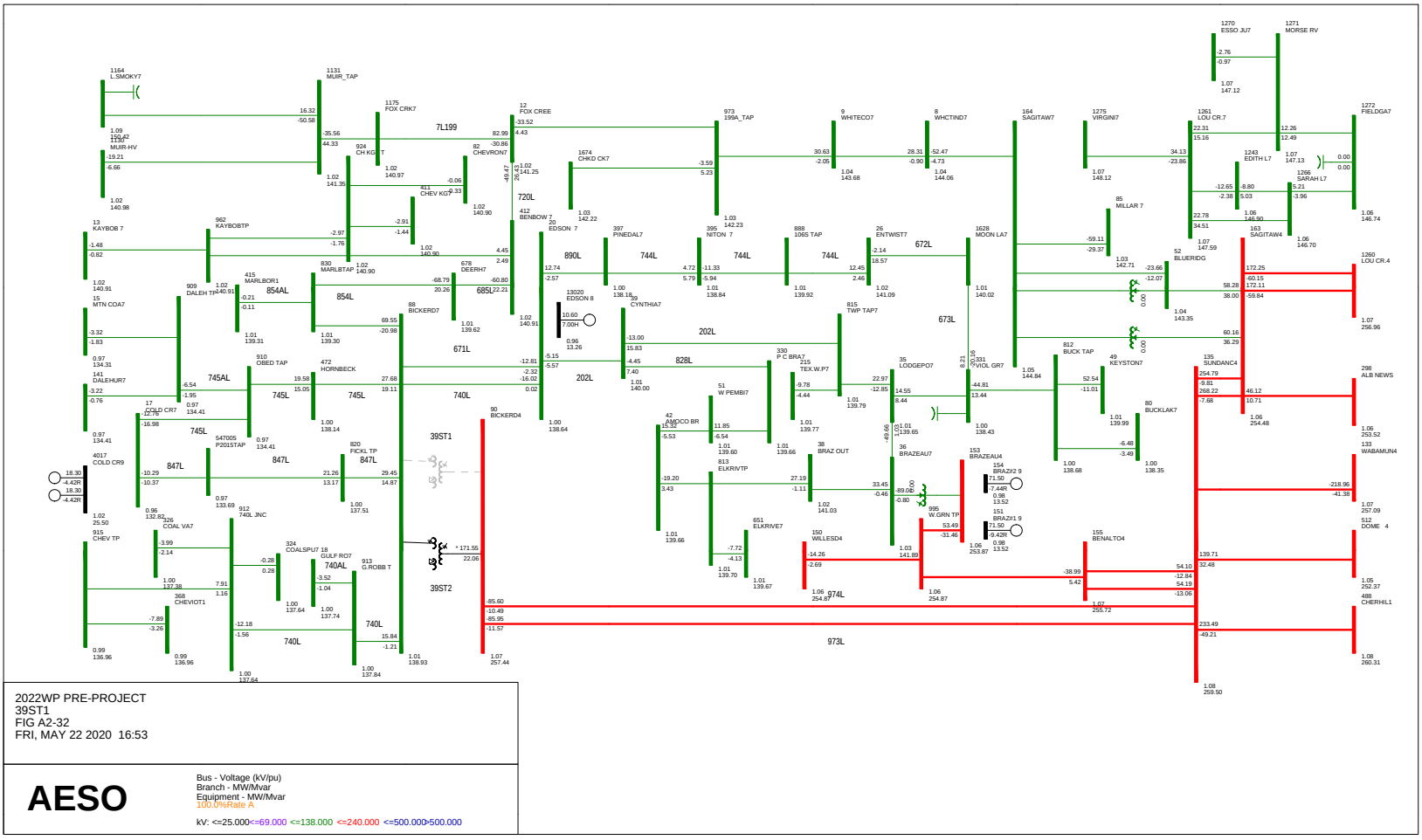


2022WP PRE-PROJECT
685L
FIG A2-31
FRI, MAY 22 2020 16:53

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

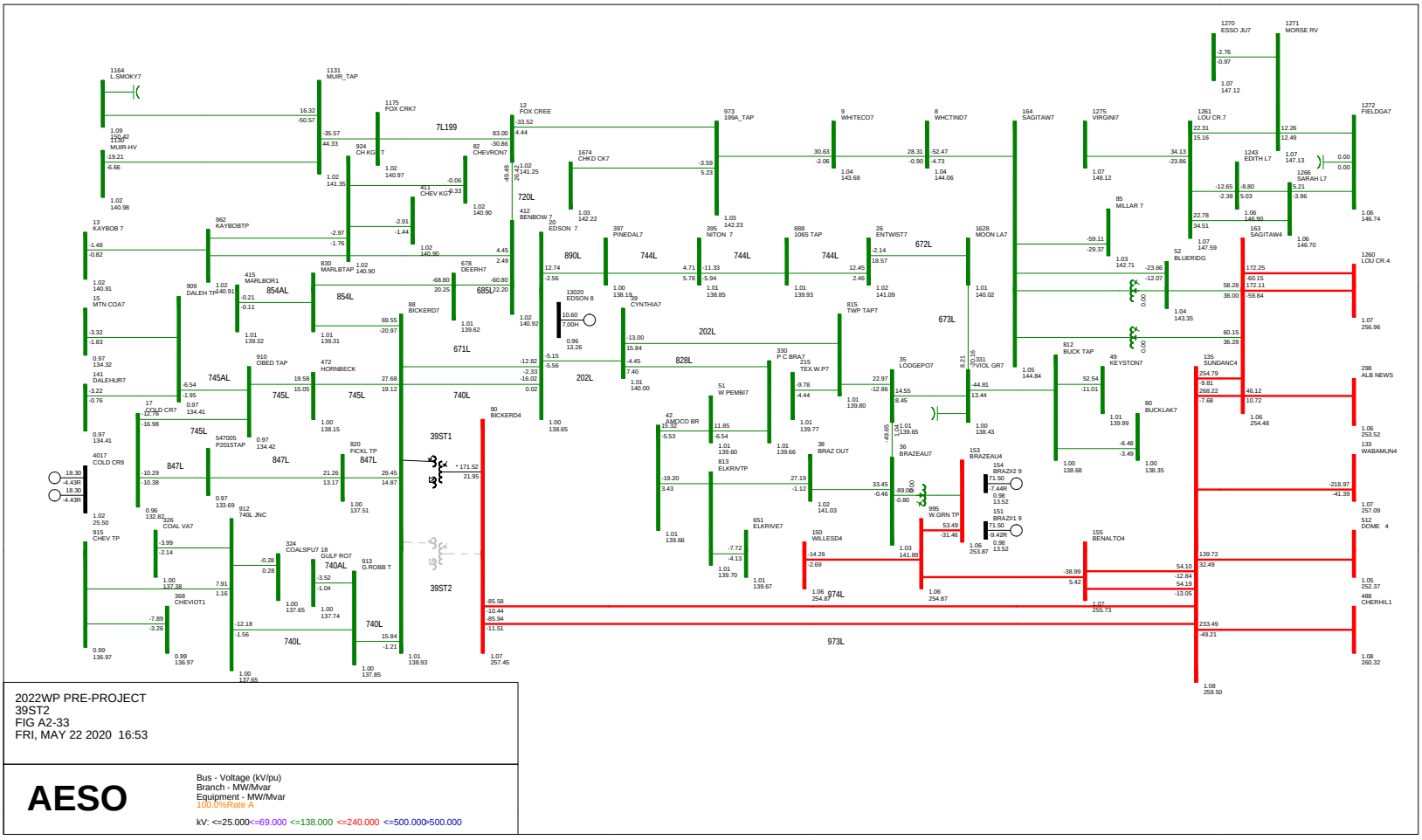


2022WP PRE-PROJECT
39ST1
FIG A2-32
FRI, MAY 22 2020 16:53

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000<=69.000 <=138.000 <=240.000 <=500.000>500.000

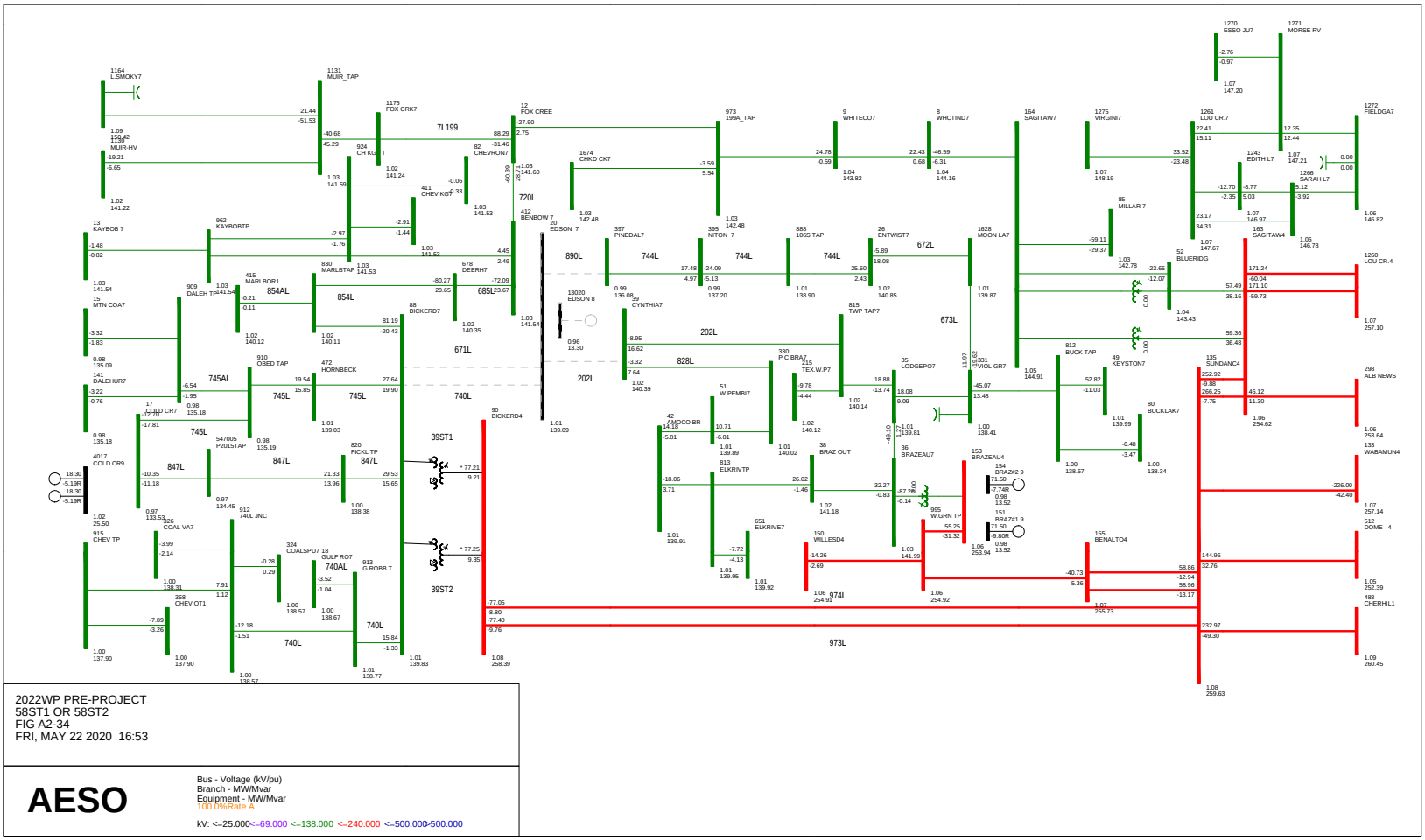


2022WP PRE-PROJECT
39ST2
FIG A2-33
FRI, MAY 22 2020 16:53

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

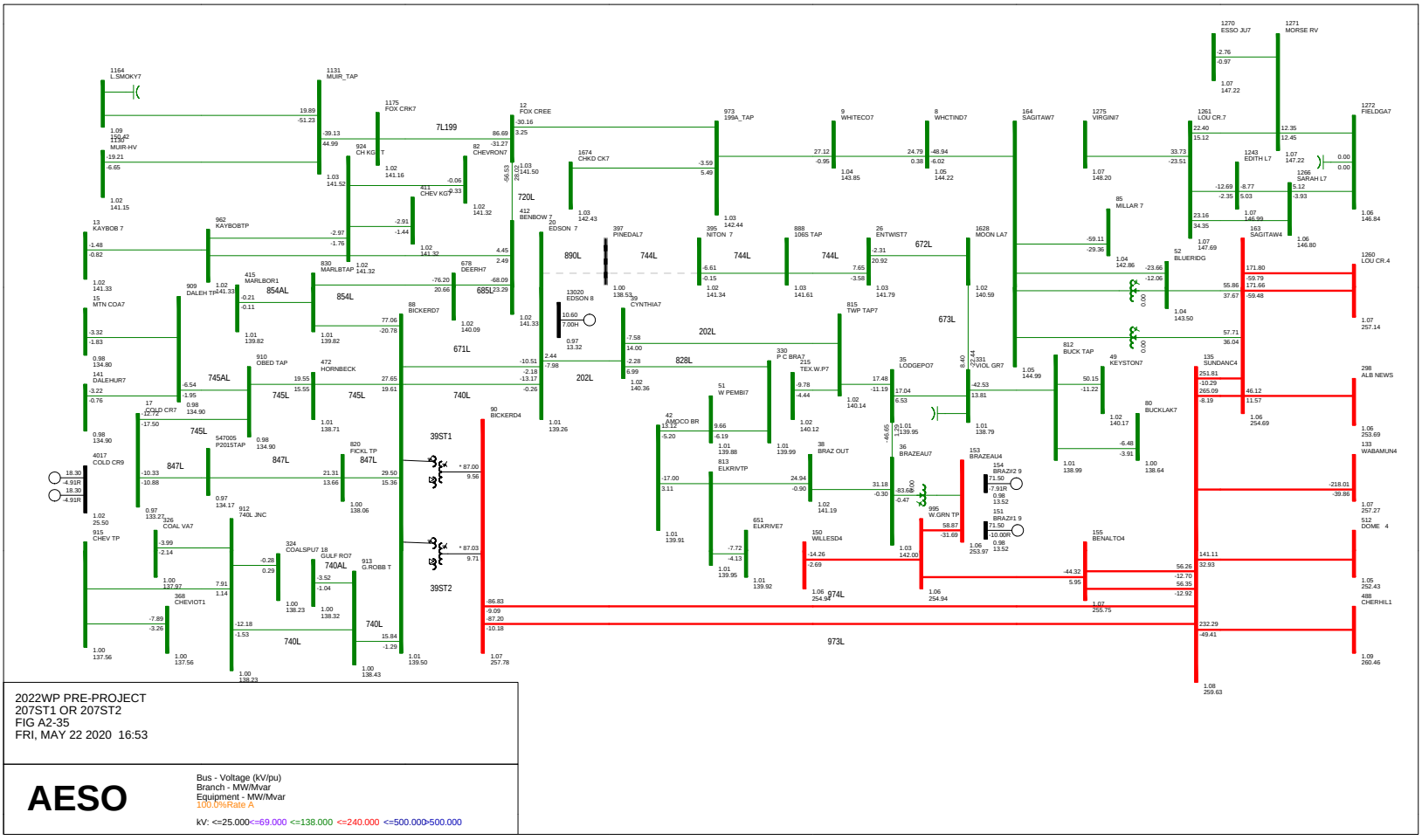


2022WP PRE-PROJECT
58ST1 OR 58ST2
FIG A2-34
FRI, MAY 22 2020 16:53

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

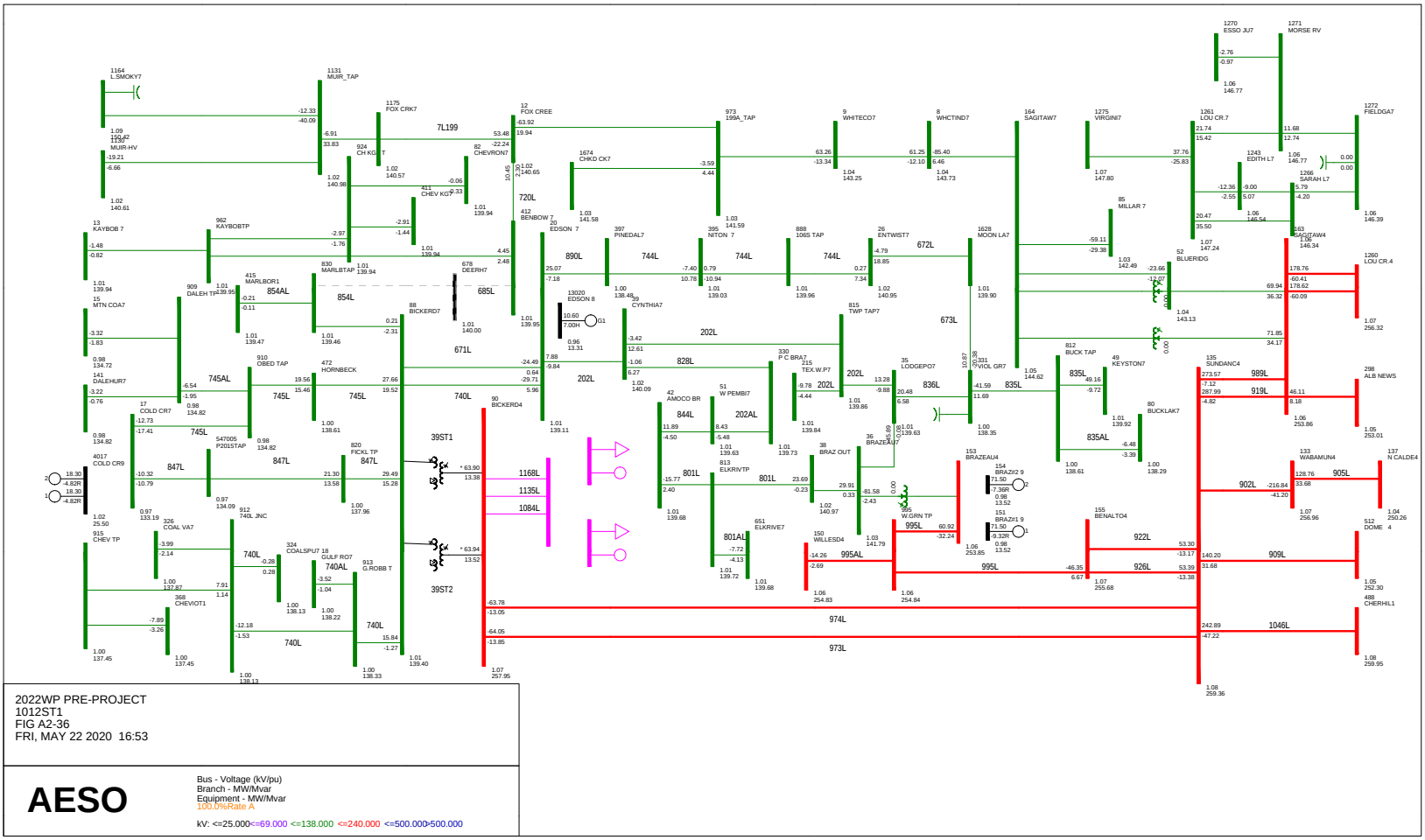


2022WP PRE-PROJECT
207ST1 OR 207ST2
FIG A2-35
FRI, MAY 22 2020 16:53

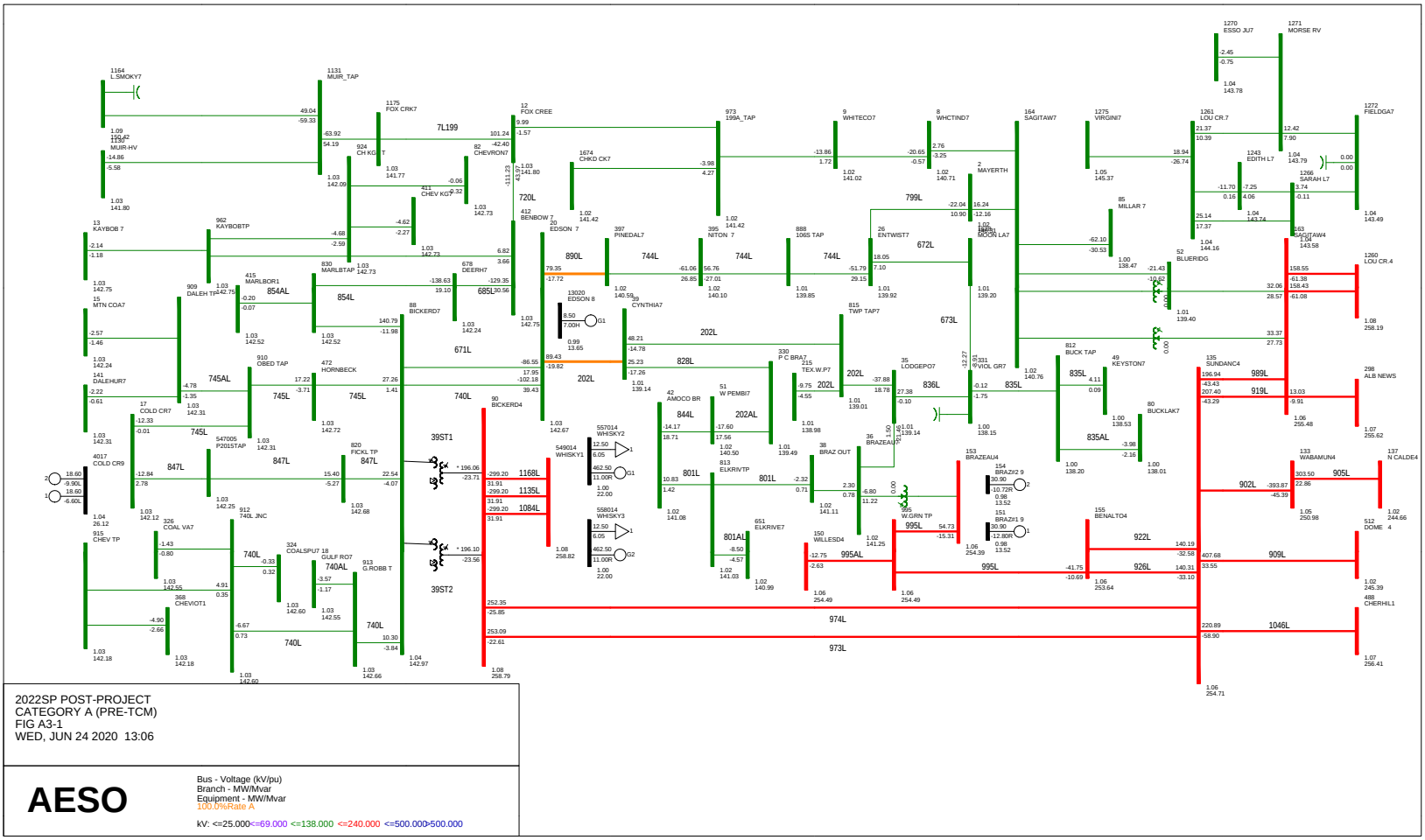
AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


1164 L.SMOKY7
1131 MUIR_TAP
1130 MUIR-HV
1175 FOX CRK7
7L199
924 CH KG T
82 CHEVRON7
411 CHEV KG7
12 FOX CREE
720L
412 BENBOW 7
20 EDSON 7
1674 CHKD CK7
973 199A_TAP
9 WHITECO7
8 WHCTIND7
164 SAGITAW7
1270 ESSO JU7
1271 MORSE RV
1275 VIRGIN7
1261 LOU CR.7
1272 FIELDGA7
1243 EDITH L7
1266 SARAH L7
85 MILLAR 7
52 BLUERIDG
1260 LOU CR.4
163 SAGITAW4
13 KAYBOB 7
962 KAYBOBTP
415 MARLBOR1
854AL
854L
830 MARLBTAP
678 DEERH7
685L
890L
744L
397 PINEDAL7
395 NITON 7
888 106S TAP
26 ENTWIST7
672L
1628 MOON LA7
15 MTN COA7
909 DALEH TP
910 OBED TAP
745AL
745L
472 HORNBECK
88 BICKERD7
671L
740L
202L
828L
330 P C BRA7
215 TEX.W.P7
815 TWP TAP7
673L
331 VIOL GR7
812 BUCK TAP
835L
49 KEYSTON7
80 BUCKLAK7
835AL
135 SUNDANC4
989L
919L
298 ALB NEWS
141 DALEHUR7
17 COLD CR7
745AL
745L
820 FICKL TP
847L
4017 COLD CR9
547005 P201STAP
912 740L JNC
326 COAL VA7
915 CHEV TP
368 CHEVIOT1
740L
324 COALSPU7
18 GULF RO7
740AL
913 G.ROBB T
740L
39ST1
39ST2
90 BICKERD4
1168L
1135L
1084L
42 AMOCO BR
844L
51 W PEMBI7
813 ELKRIVTP
801L
801AL
651 ELKRIVE7
202AL
38 BRAZ OUT
36 BRAZEAU7
153 BRAZEAU4
154 BRAZ#2 9
151 BRAZ#1 9
995L
995AL
150 WILLESD4
W.GRN TP
155 BENALTO4
922L
926L
909L
902L
905L
1046L
974L
973L
133 WABAMUN4
137 N CALDE4
512 DOME 4
488 CHERHIL1
1.02 140.61
1.09 190.42
1.02 140.98
1.02 140.57
1.01 139.94
1.03 141.58
1.03 141.59
1.04 143.25
1.04 143.73
1.07 147.80
1.07 147.24
1.06 146.77
1.06 146.54
1.06 146.34
1.06 146.39
1.01 139.94
1.01 139.96
1.01 139.47
1.01 139.46
1.01 139.95
1.01 140.00
1.01 139.11
1.02 140.09
1.01 139.84
1.01 139.73
1.01 139.63
1.01 139.68
1.01 139.72
1.01 139.86
1.01 139.92
1.00 138.61
1.00 137.96
1.00 138.35
1.00 138.61
1.00 138.29
1.02 25.50
1.00 137.45
1.00 137.87
1.00 137.45
1.00 138.13
1.00 138.22
1.00 138.33
1.01 139.40
1.07 257.95
1.06 254.83
1.06 254.84
1.07 255.68
1.08 259.36
1.04 143.13
1.03 142.49
1.05 144.62
1.01 139.90
1.00 138.48
1.01 139.03
1.01 139.96
1.02 140.95
1.00 138.13
1.01 139.63
1.02 140.97
1.03 141.79
1.01 139.72
1.06 253.85
1.07 256.96
1.05 253.01
1.06 253.86
1.05 252.30
1.08 259.95
1.04 250.26
2022WP PRE-PROJECT
1012ST1
FIG A2-36
FRI, MAY 22 2020 16:53
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

Attachment A3
Post-Project Power Flow Diagrams

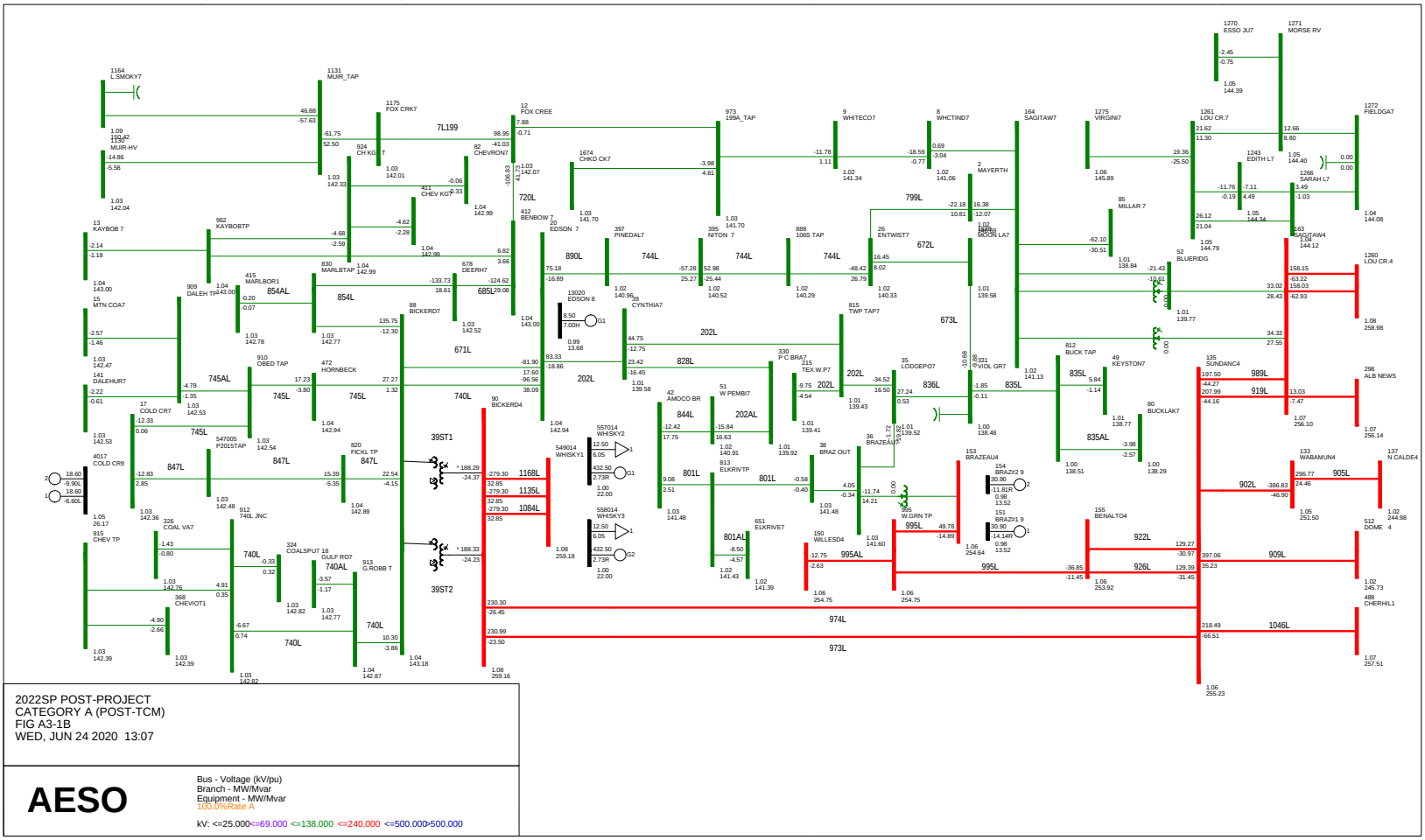


2022SP POST-PROJECT
CATEGORY A (PRE-TCM)
FIG A3-1
WED, JUN 24 2020 13:06

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

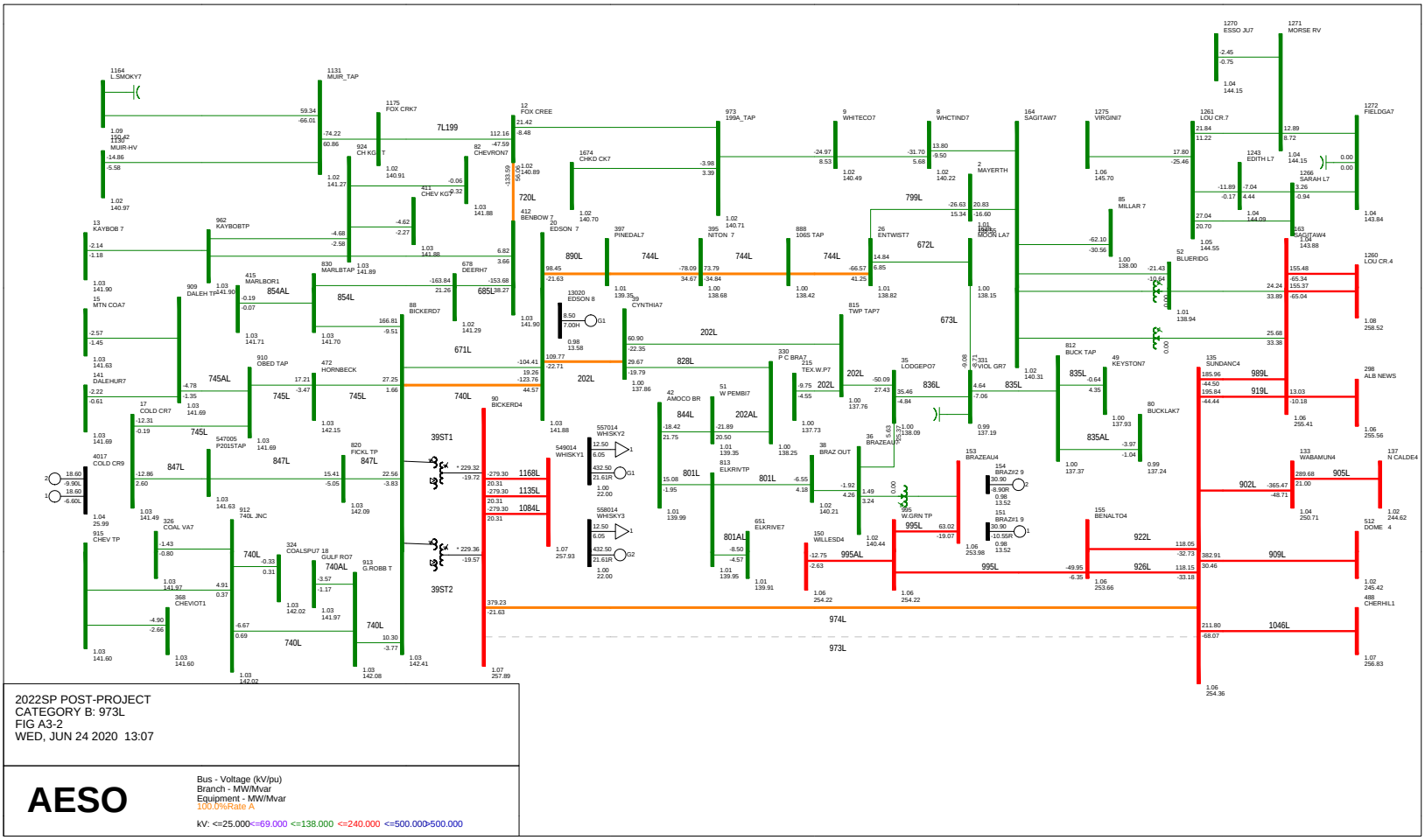


2022SP POST-PROJECT
CATEGORY A (POST-TCM)
FIG A3-1B
WED, JUN 24 2020 13:07

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

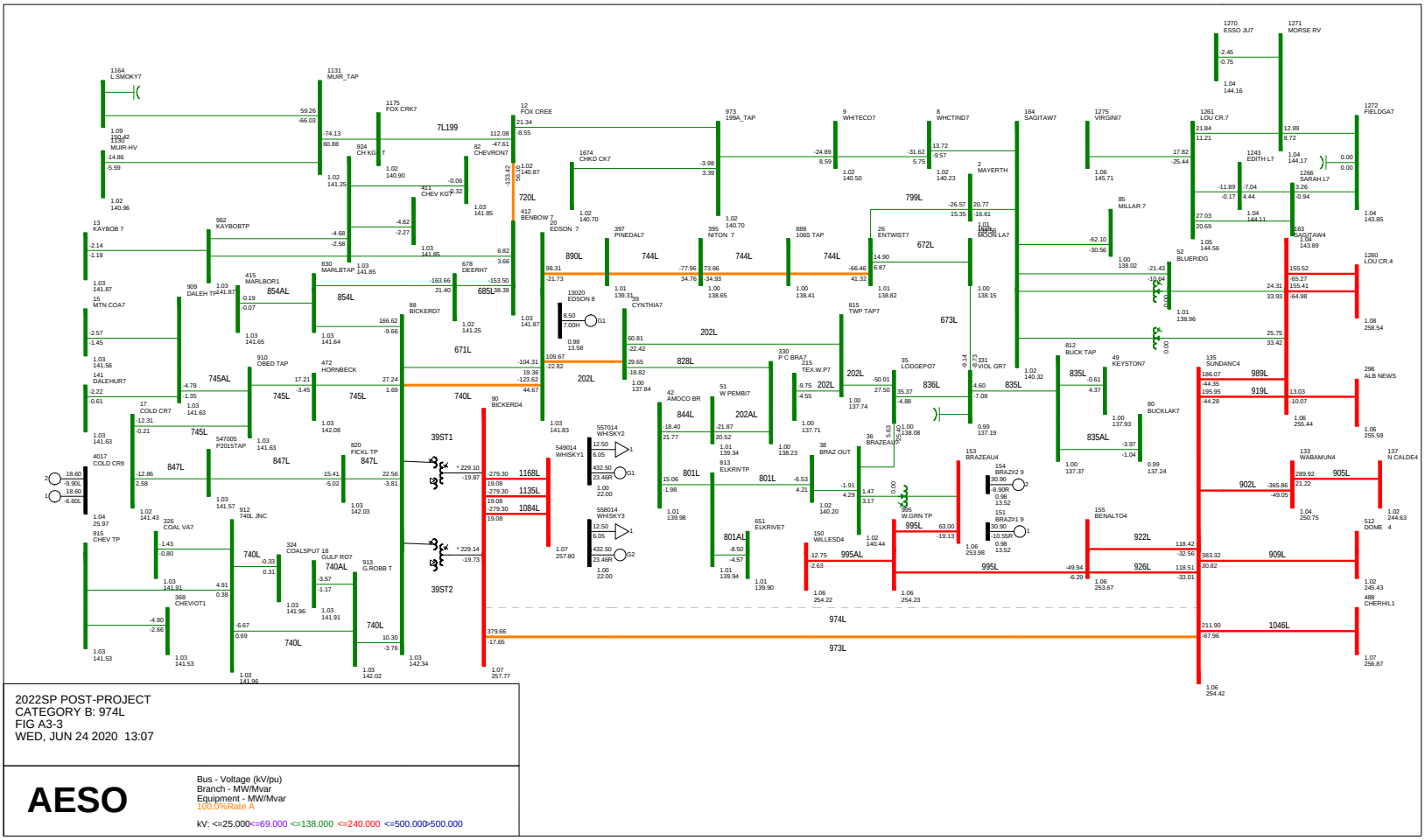


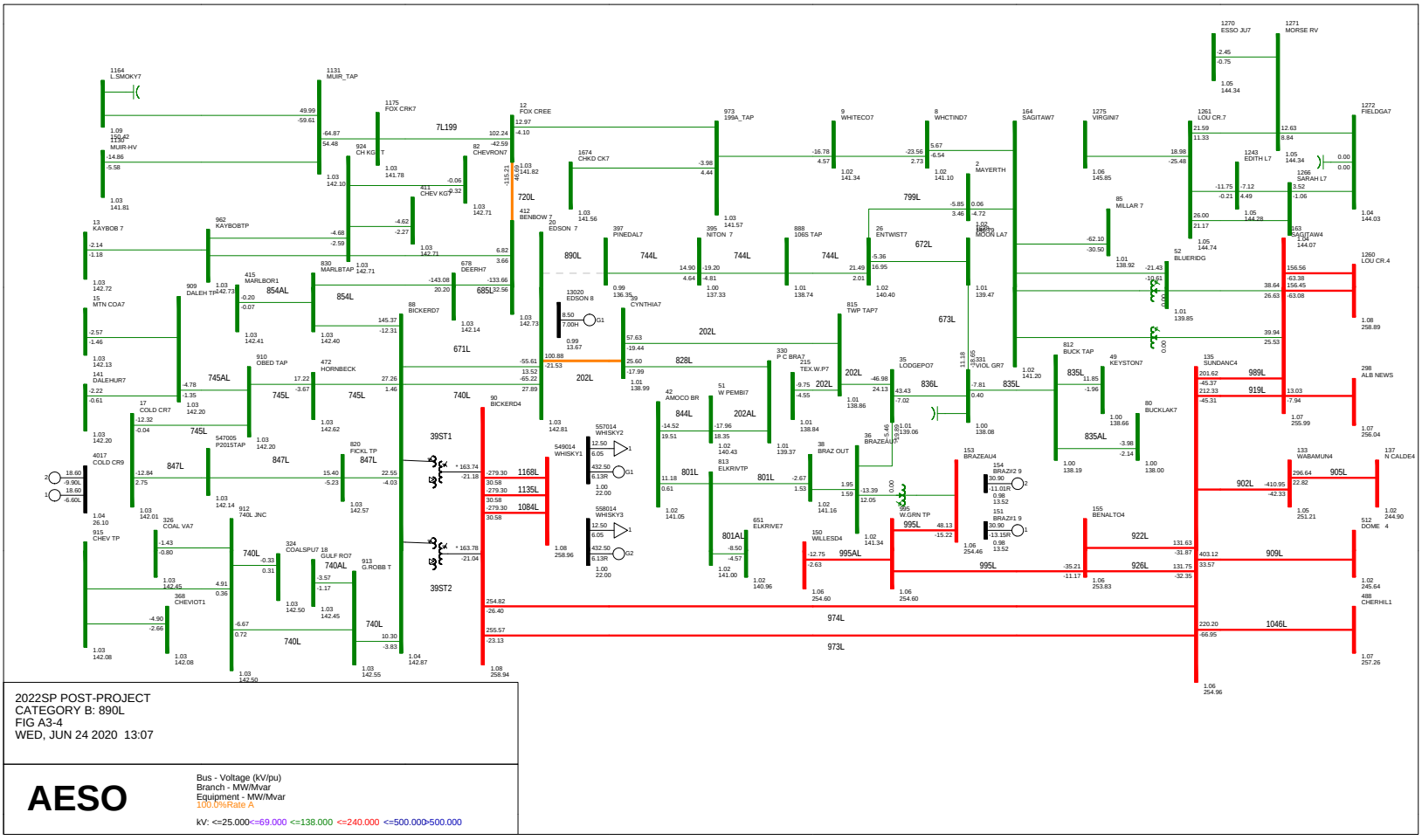
2022SP POST-PROJECT
CATEGORY B: 973L
FIG A3-2
WED, JUN 24 2020 13:07

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


1164 L.SMOKY7
1131 MUIR_TAP
1130 MUIR-HV
1175 FOX CRK7
924 CH KG T
7L199
82 CHEVRON7
12 FOX CREE
973 199A_TAP
1674 CHKD CK7
720L
412 BENBOW 7
20 EDSON 7
397 PINEDAL7
395 NITON 7
888 106S TAP
9 WHITECO7
8 WHCTIND7
164 SAGITAW7
1275 VIRGIN7
1270 ESSO JU7
1271 MORSE RV
1261 LOU CR.7
1272 FIELDGA7
1243 EDITH L7
1266 SARAH L7
263 SAGITAW4
962 KAYBOBTP
13 KAYBOB 7
415 MARLBOR1
854AL
854L
830 MARLBTAP
678 DEERH7
685L
890L
744L
799L
672L
26 ENTWIST7
2 MAYERTH
85 MILLAR 7
52 BLUERIDG
1260 LOU CR.4
909 DALEH TP
15 MTN COA7
910 OBED TAP
745AL
745L
472 HORNBECK
17 COLD CR7
547005 P201STAP
820 FICKL TP
847L
4017 COLD CR9
912 740L JNC
326 COAL VA7
915 CHEV TP
368 CHEVIOT1
740AL
740L
324 COALSPU7
18 GULF RO7
913 G.ROBB T
89 BICKERD7
671L
39ST1
39ST2
90 BICKERD4
1168L
1135L
1084L
549014 WHISKY1
557014 WHISKY2
558014 WHISKY3
13020 EDSON 8
29 CYNTHIA7
828L
202L
42 AMOCO BR
844L
801L
51 W PEMBI7
813 ELKRIVTP
801AL
651 ELKRIVE7
330 P C BRA7
215 TEX.W.P7
815 TWP TAP7
202AL
38 BRAZ OUT
36 BRAZEAU7
150 WILLESD4
995AL
995L
W.GRN TP
673L
331 W.VIOL GR7
836L
35 LODGEPO7
812 BUCK TAP
835L
835AL
49 KEYSTON7
80 BUCKLAK7
153 BRAZEAU4
154 BRAZ#2 9
151 BRAZ#1 9
155 BENALTO4
922L
926L
902L
905L
909L
989L
919L
1046L
974L
973L
135 SUNDANC4
133 WABAMUN4
137 N CALDE4
298 ALB NEWS
512 DOME 4
488 CHERHIL1
2022SP POST-PROJECT
CATEGORY B: 974L
FIG A3-3
WED, JUN 24 2020 13:07
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

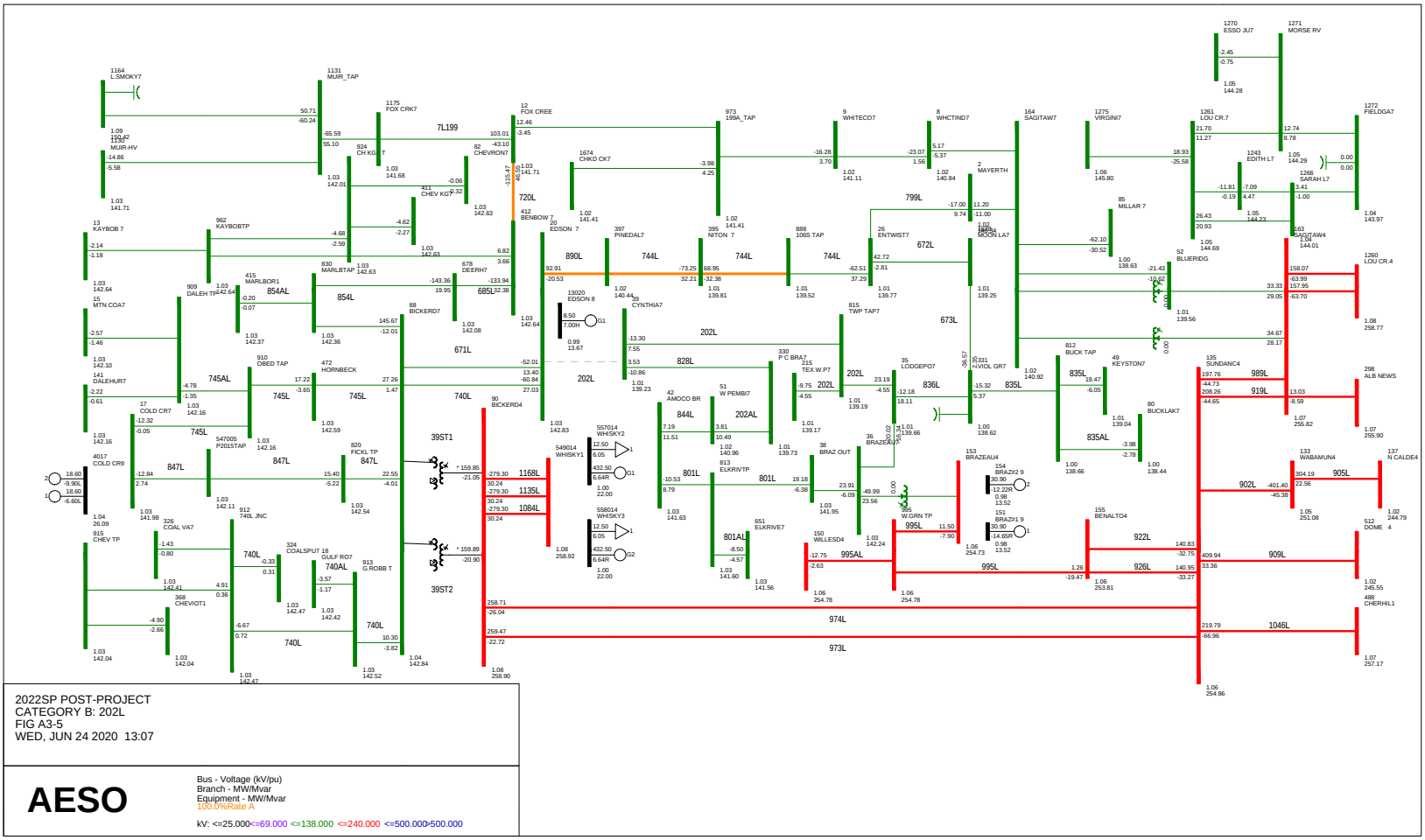


2022SP POST-PROJECT
CATEGORY B: 890L
FIG A3-4
WED, JUN 24 2020 13:07

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000<=69.000 <=138.000 <=240.000 <=500.000>500.000

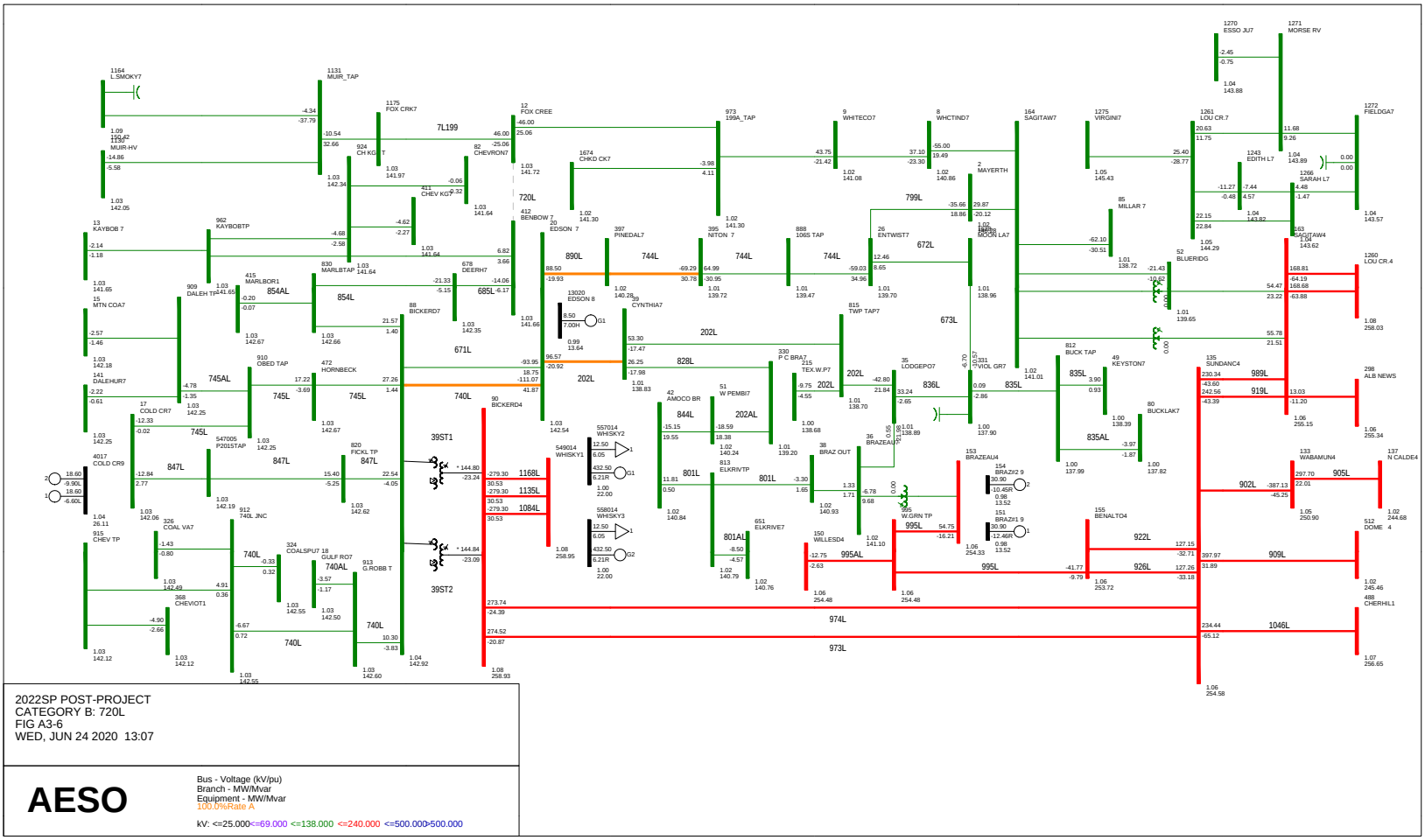


2022SP POST-PROJECT
CATEGORY B: 202L
FIG A3-5
WED, JUN 24 2020 13:07

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

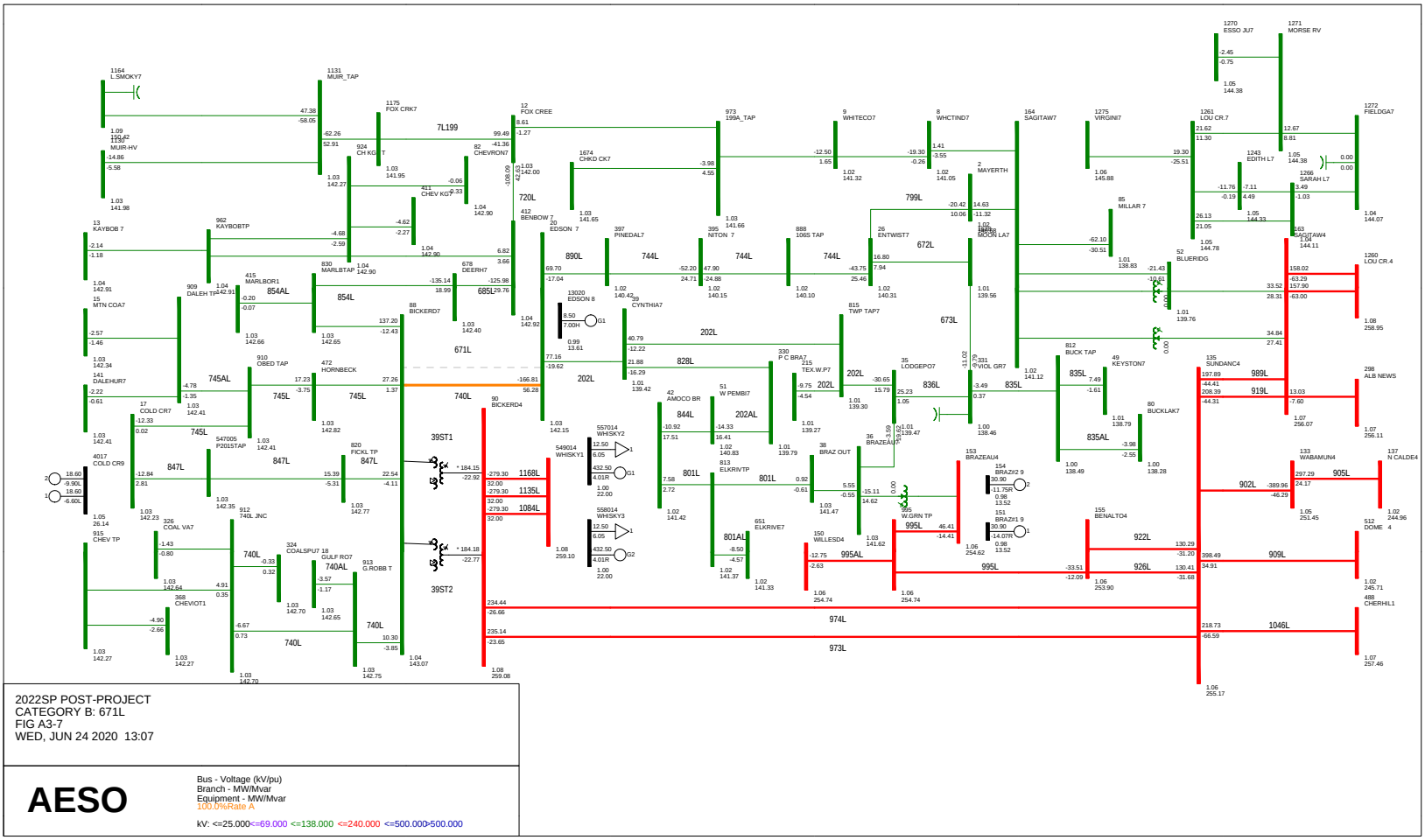


2022SP POST-PROJECT
CATEGORY B: 720L
FIG A3-6
WED, JUN 24 2020 13:07

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

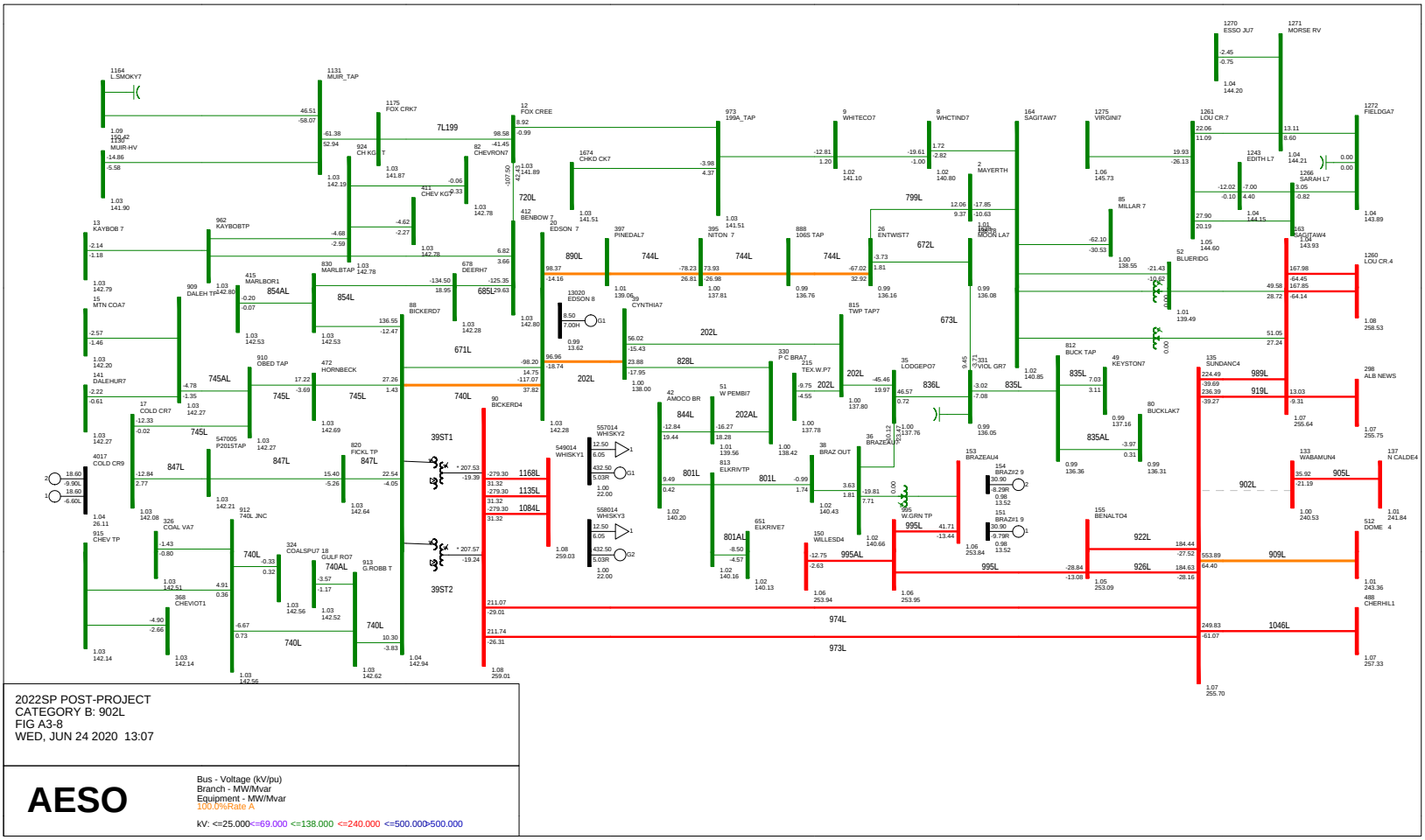


2022SP POST-PROJECT
CATEGORY B: 671L
FIG A3-7
WED, JUN 24 2020 13:07

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

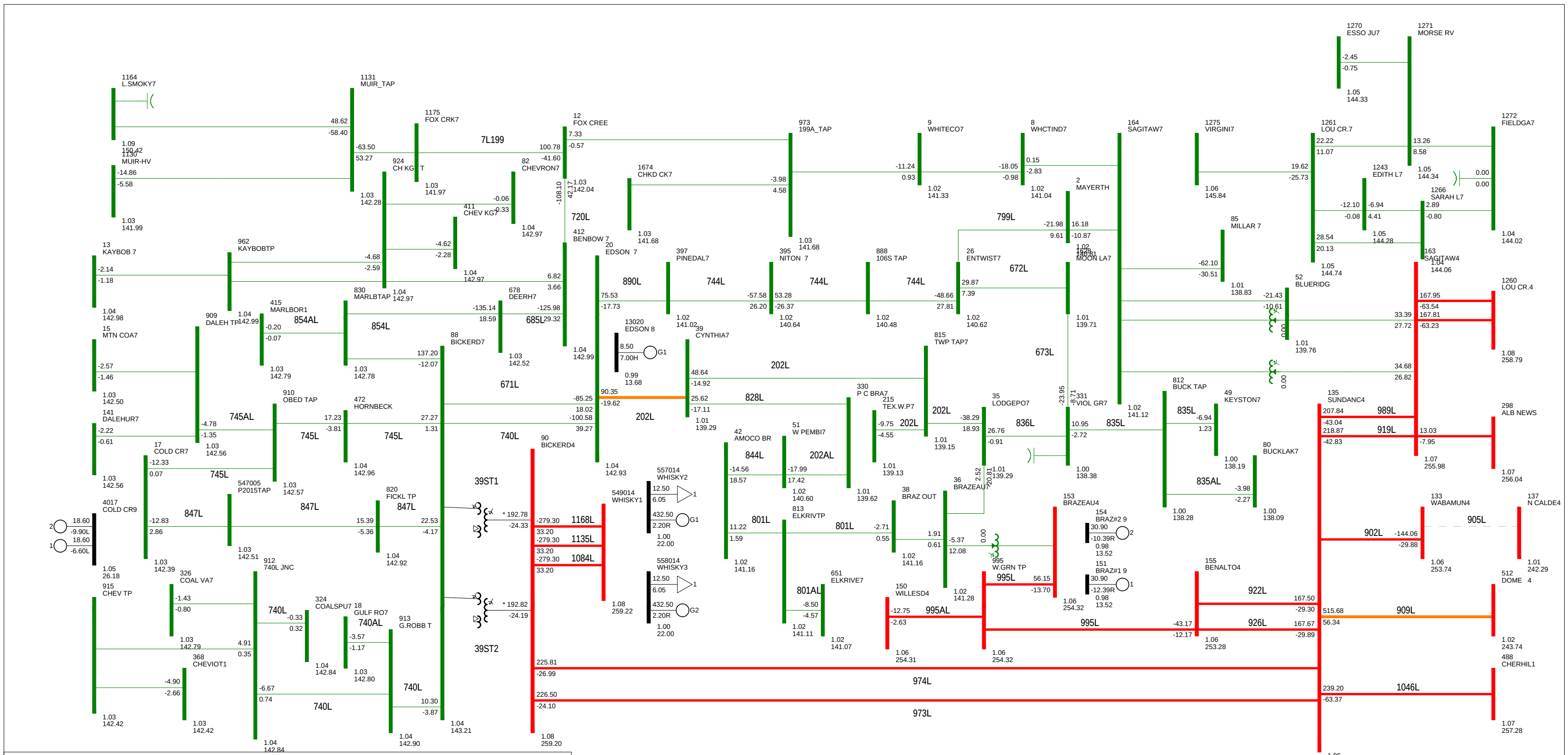


2022SP POST-PROJECT
CATEGORY B: 902L
FIG A3-8
WED, JUN 24 2020 13:07

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

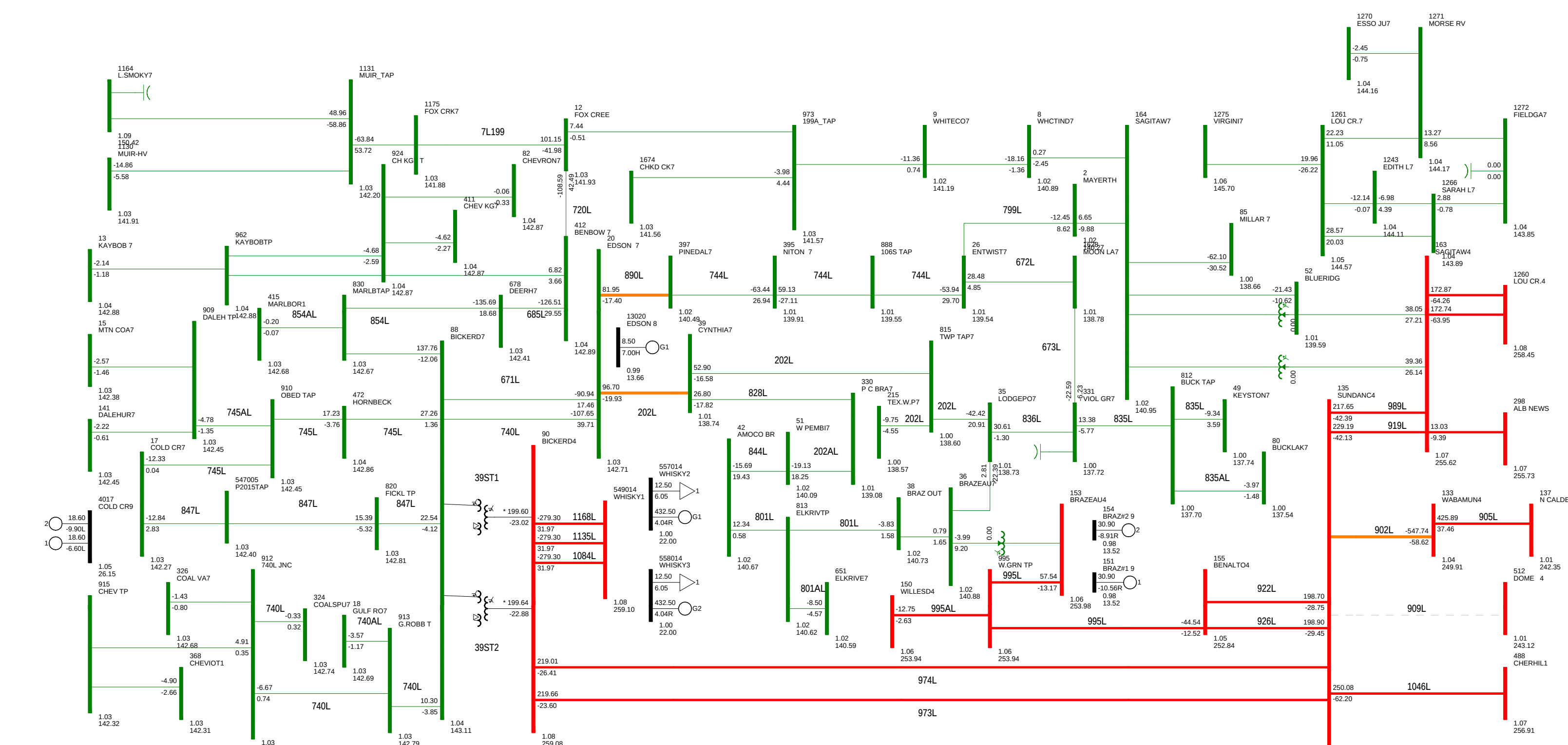

1164 L.SMOKY7
1131 MUIR_TAP
1175 FOX CRK7
12 FOX CREE
973 199A_TAP
9 WHITECO7
8 WHCTIND7
164 SAGITAW7
1275 VIRGINI7
1261 LOU CR.7
1270 ESSO JU7
1271 MORSE RV
1272 FIELDGA7
1130 MUIR-HV
924 CH KG T
82 CHEVRON7
411 CHEV KG7
1674 CHKD CK7
2 MAYERTH
85 MILLAR 7
1243 EDITH L7
1266 SARAH L7
13 KAYBOB 7
962 KAYBOBTP
830 MARLBTAP
412 BENBOW 7
20 EDSON 7
397 PINEDAL7
395 NITON 7
888 106S TAP
26 ENTWIST7
331 MOON LA7
163 SAGITAW4
52 BLUERIDG
1260 LOU CR.4
909 DALEH TP
415 MARLBOR1
678 DEERH7
88 BICKERD7
13020 EDSON 8
39 CYNTHIA7
815 TWP TAP7
15 MTN COA7
141 DALEHUR7
910 OBED TAP
472 HORNBECK
330 P C BRA7
215 TEX.W.P7
35 LODGEPO7
331 VIOL GR7
812 BUCK TAP
49 KEYSTON7
135 SUNDANC4
298 ALB NEWS
17 COLD CR7
90 BICKERD4
42 AMOCO BR
51 W PEMBI7
80 BUCKLAK7
547005 P2015TAP
820 FICKL TP
557014 WHISKY2
549014 WHISKY1
813 ELKRIVTP
38 BRAZ OUT
36 BRAZEAU7
153 BRAZEAU4
154 BRAZ#2 9
133 WABAMUN4
137 N CALDE4
4017 COLD CR9
558014 WHISKY3
995 W.GRN TP
151 BRAZ#1 9
155 BENALTO4
512 DOME 4
915 CHEV TP
326 COAL VA7
912 740L JNC
324 COALSPU7
18 GULF RO7
913 G.ROBB T
651 ELKRIVE7
150 WILLESD4
368 CHEVIOT1
488 CHERHIL1
7L199
720L
890L
744L
799L
672L
854AL
854L
685L
671L
202L
673L
828L
745AL
745L
740L
836L
835L
835AL
989L
919L
844L
202AL
847L
847L
1168L
1135L
1084L
801L
902L
905L
39ST1
39ST2
801AL
995AL
995L
922L
926L
909L
740AL
974L
973L
1046L

2022SP POST-PROJECT
CATEGORY B: 905L
FIG A3-9
WED, JUN 24 2020 13:08

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

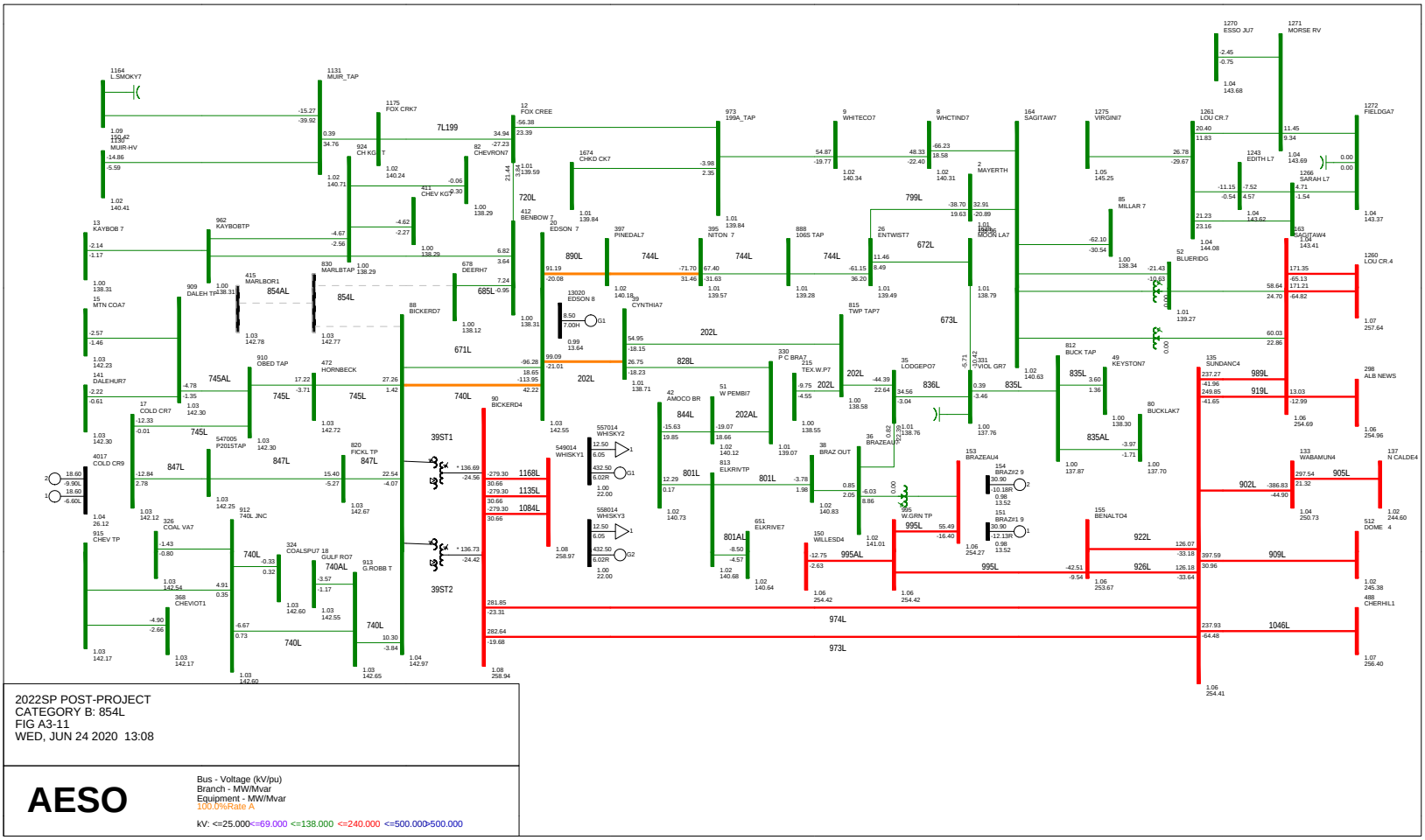


2022SP POST-PROJECT
CATEGORY B: 909L
FIG A3-10
WED, JUN 24 2020 13:08

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

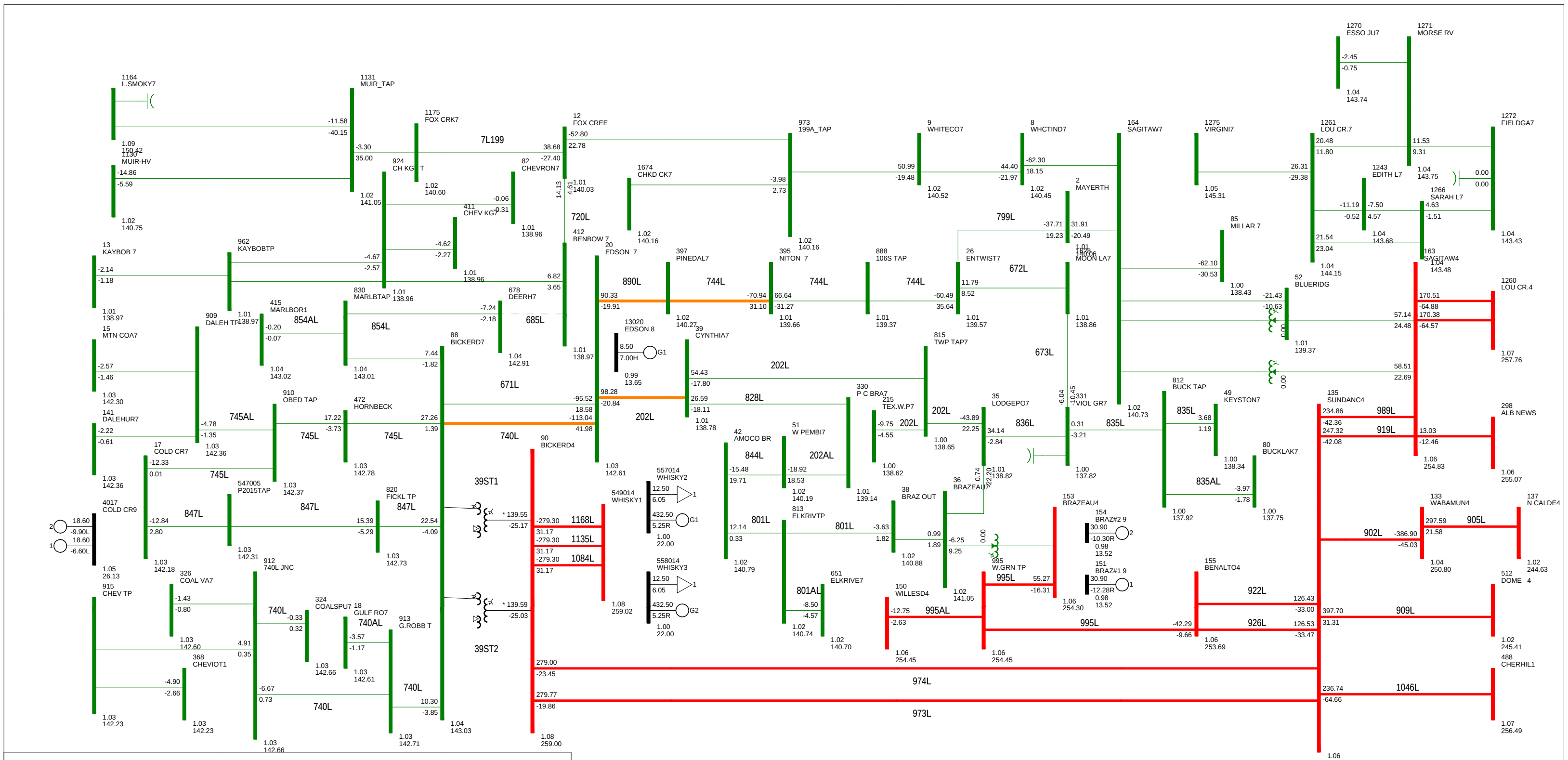


2022SP POST-PROJECT
CATEGORY B: 854L
FIG A3-11
WED, JUN 24 2020 13:08

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

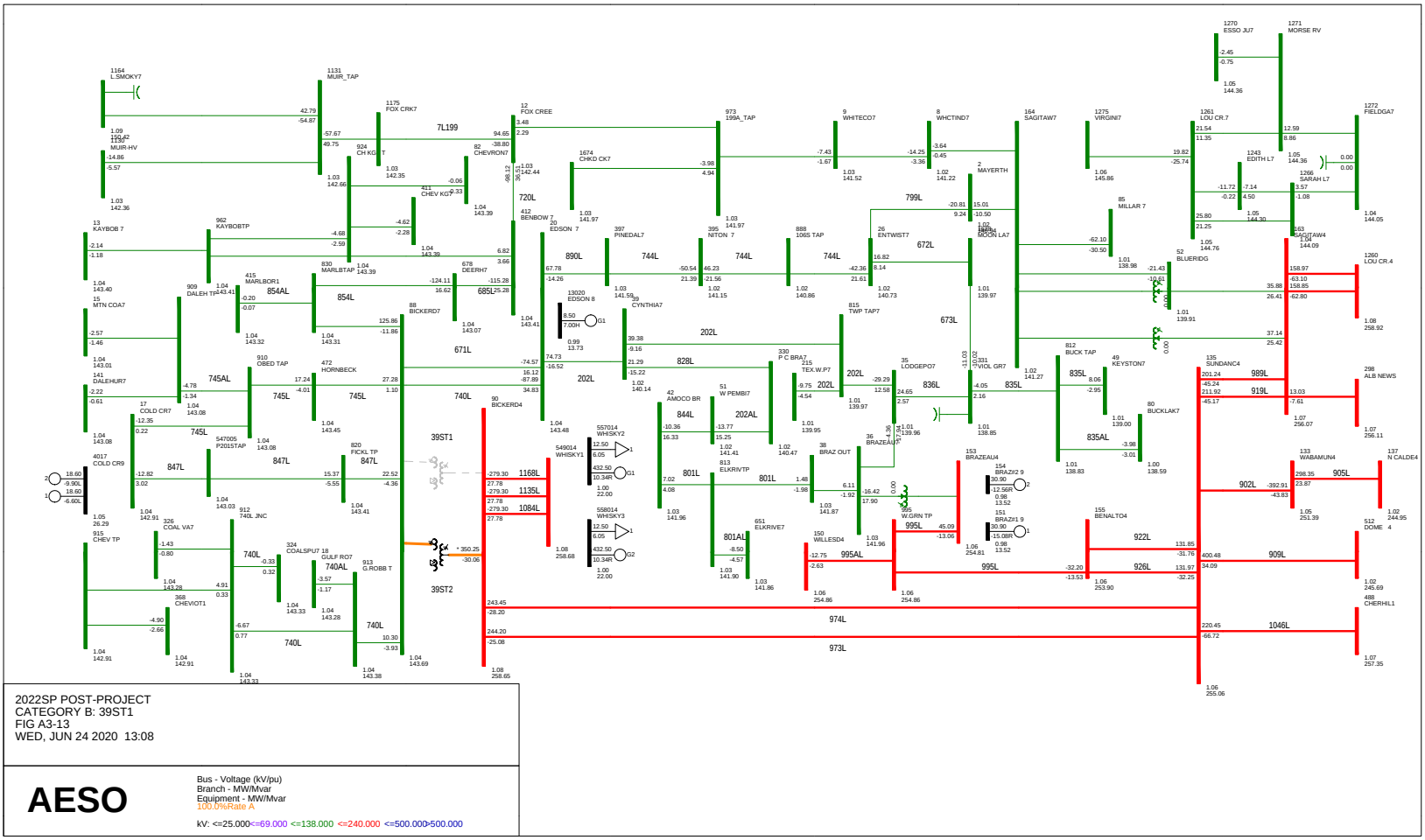


2022SP POST-PROJECT
CATEGORY B: 685L
FIG A3-12
WED, JUN 24 2020 13:08

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

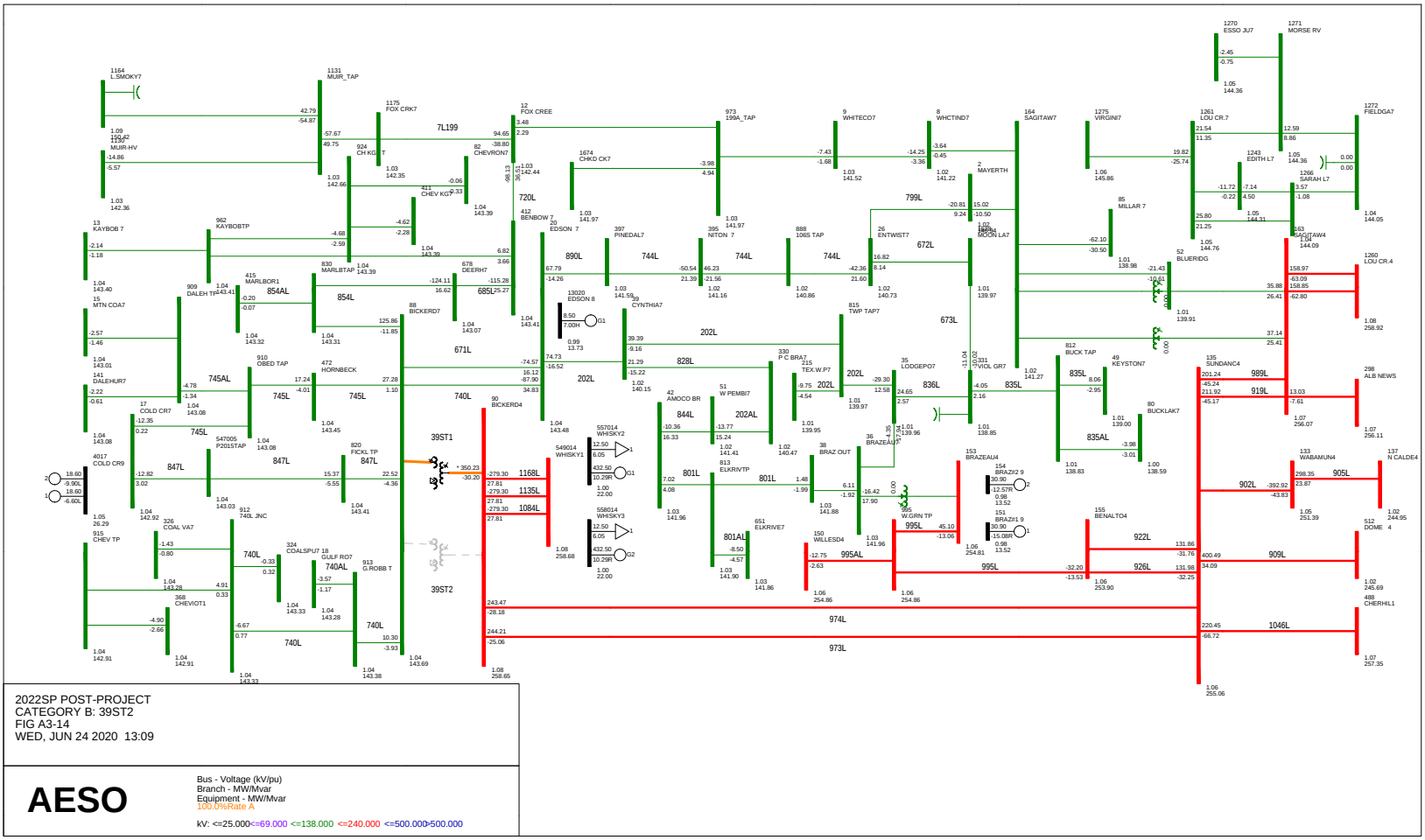


2022SP POST-PROJECT
CATEGORY B: 39ST1
FIG A3-13
WED, JUN 24 2020 13:08

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

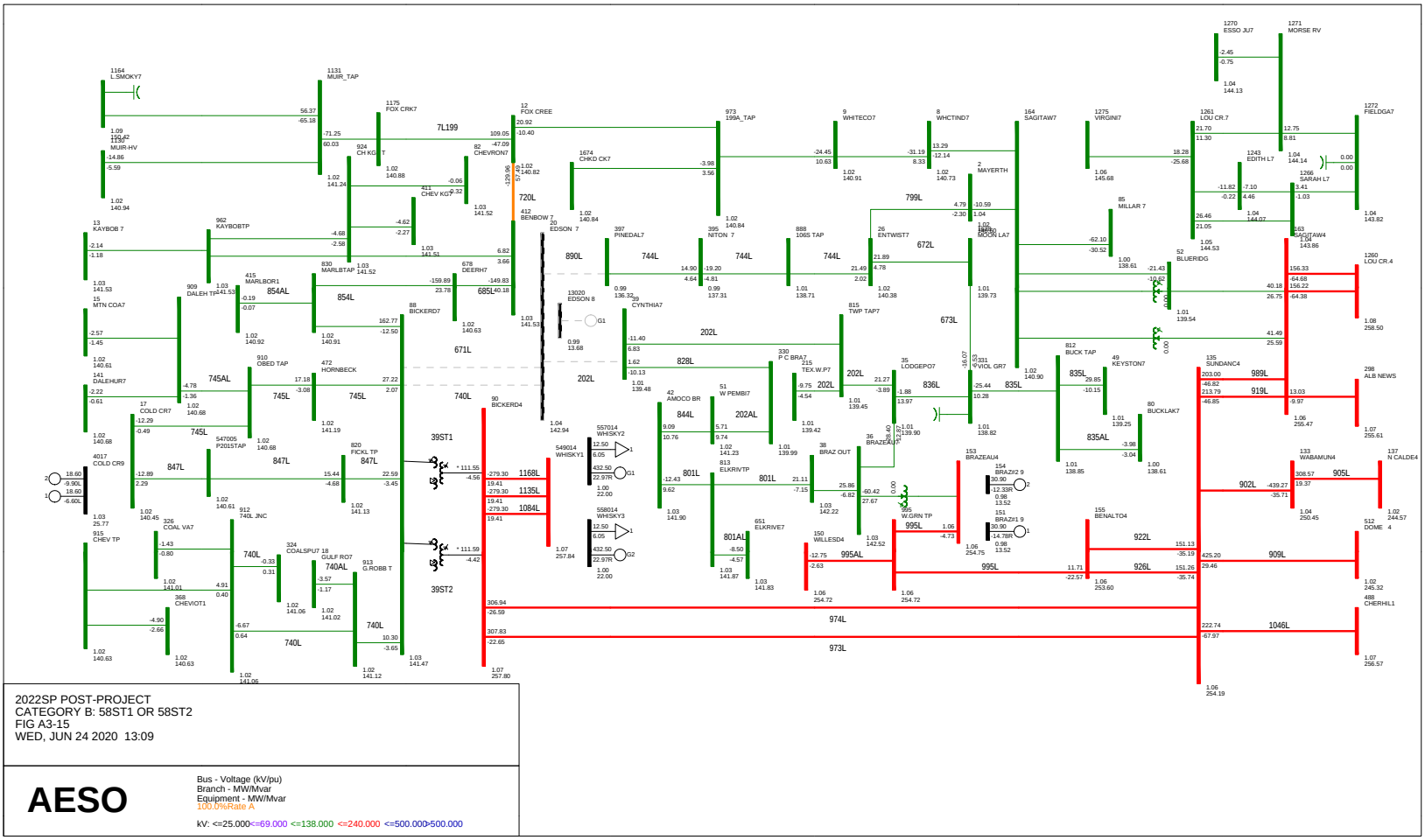


2022SP POST-PROJECT
CATEGORY B: 39ST2
FIG A3-14
WED, JUN 24 2020 13:09

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

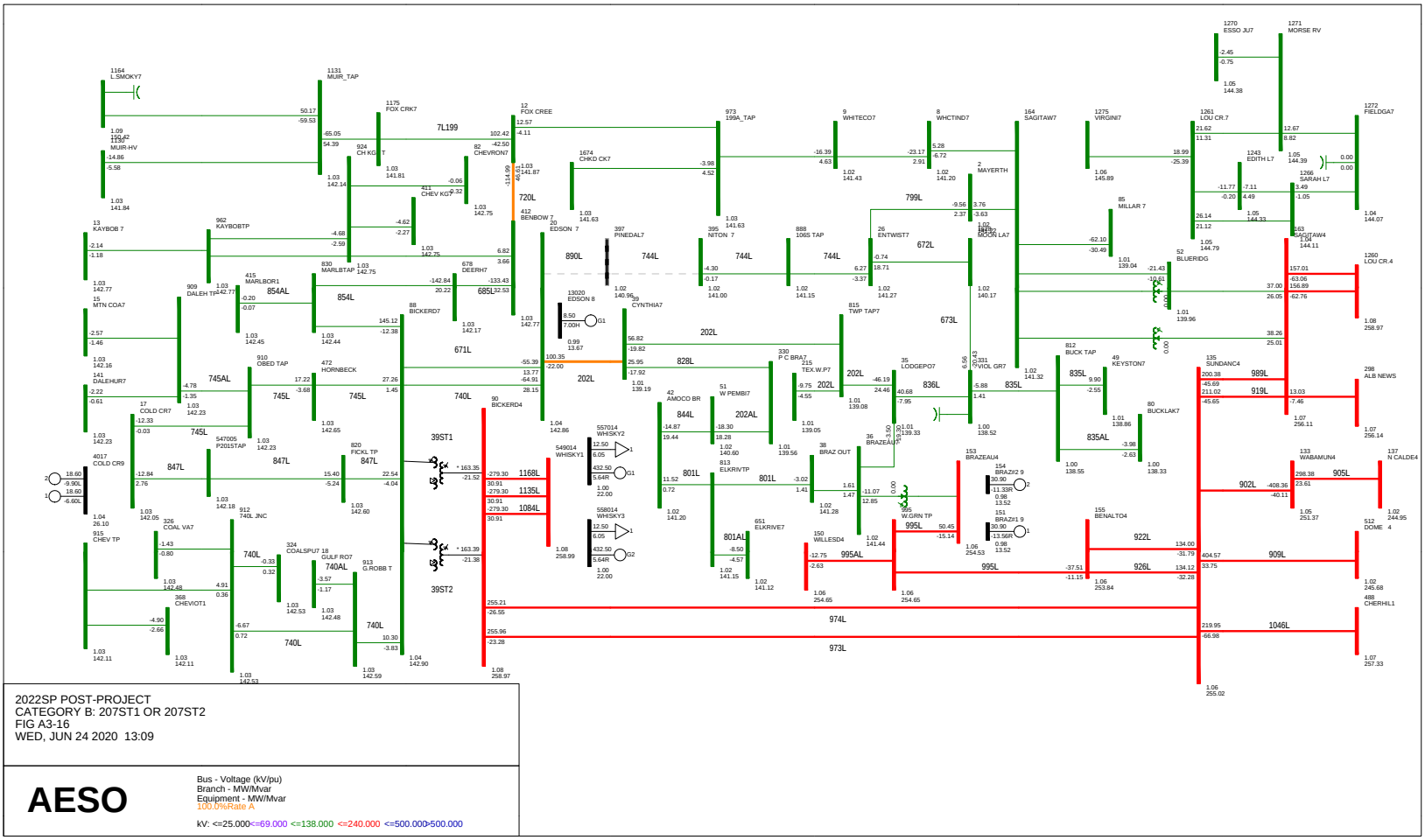


2022SP POST-PROJECT
CATEGORY B: 58ST1 OR 58ST2
FIG A3-15
WED, JUN 24 2020 13:09

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

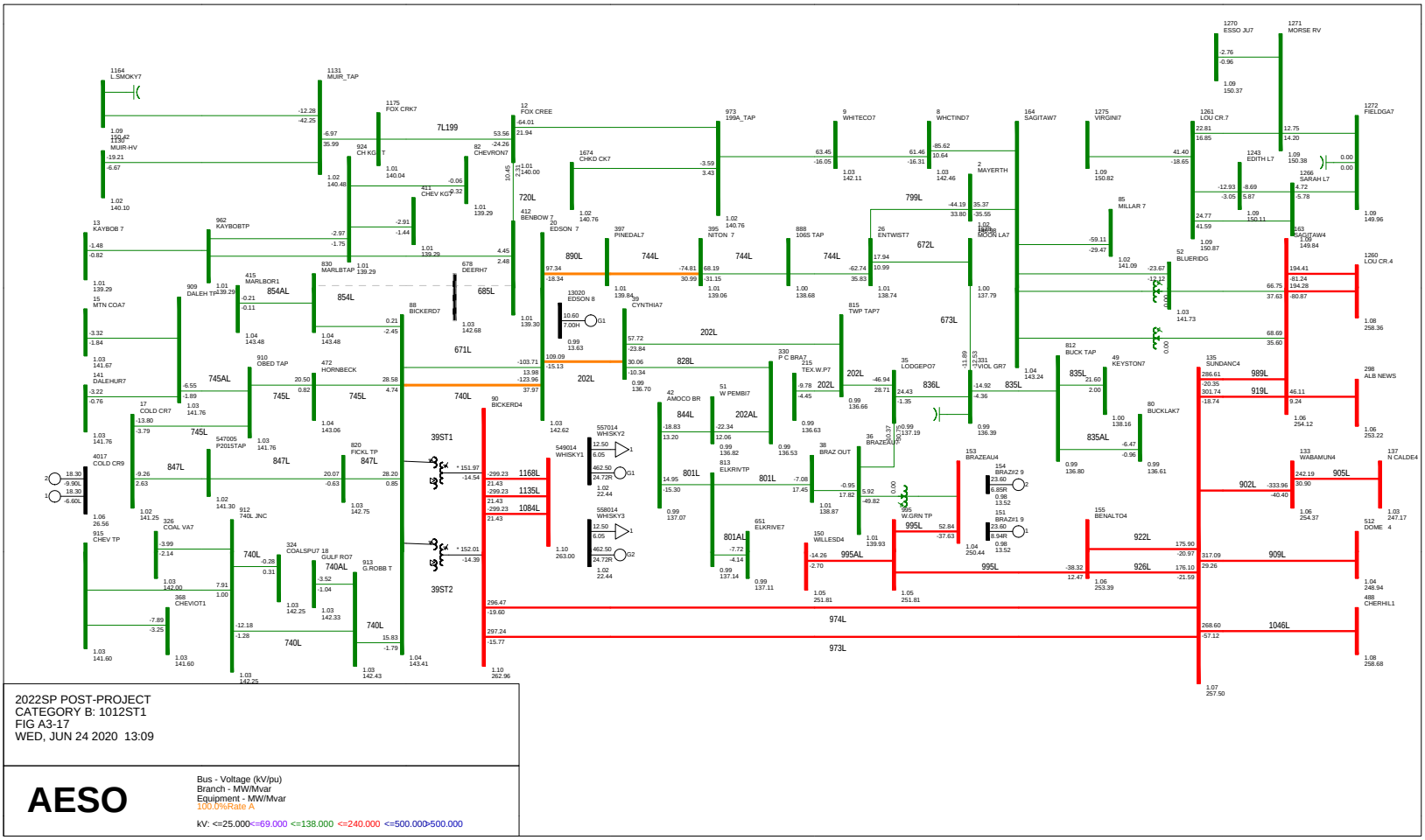


2022SP POST-PROJECT
CATEGORY B: 207ST1 OR 207ST2
FIG A3-16
WED, JUN 24 2020 13:09

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

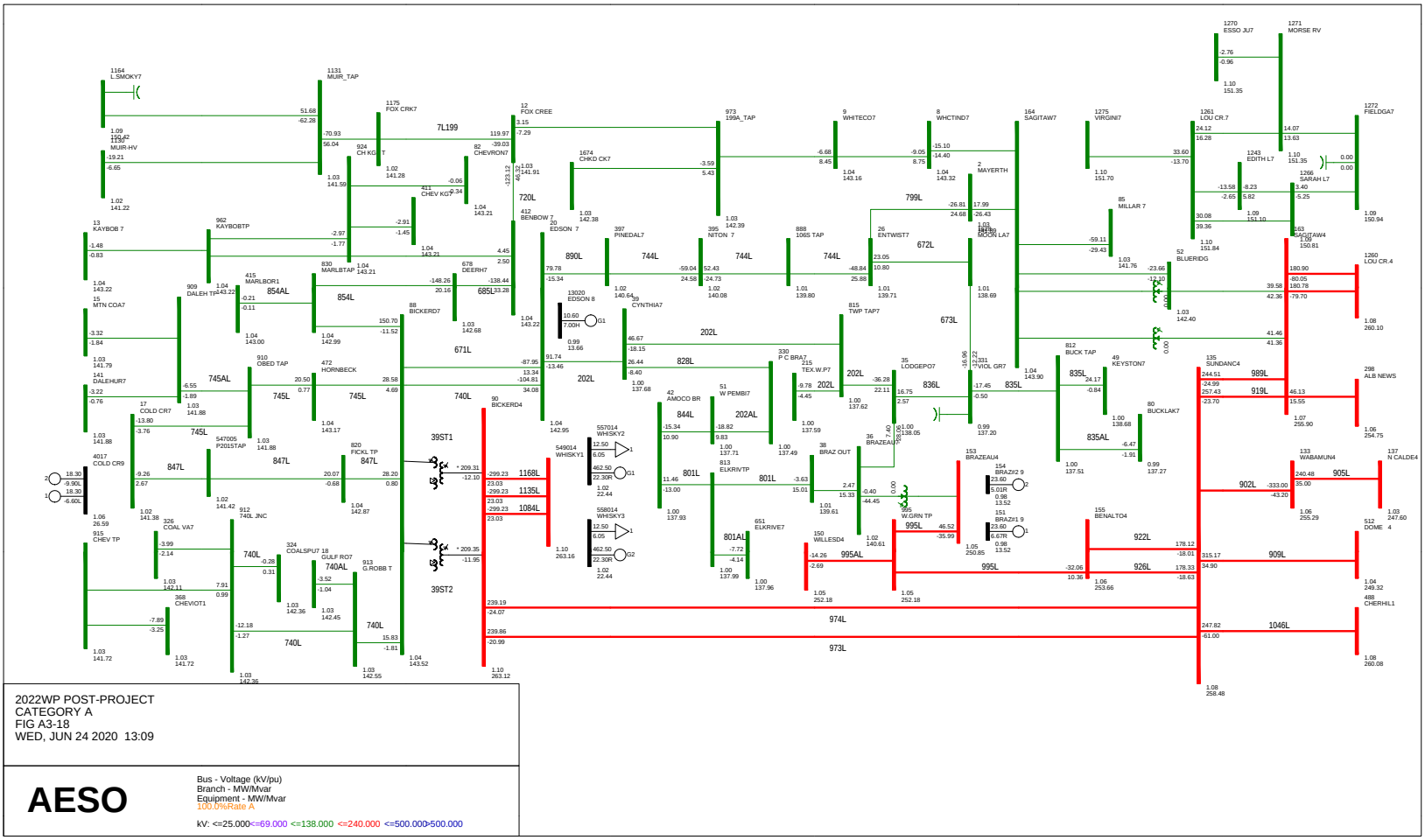


2022SP POST-PROJECT
CATEGORY B: 1012ST1
FIG A3-17
WED, JUN 24 2020 13:09

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

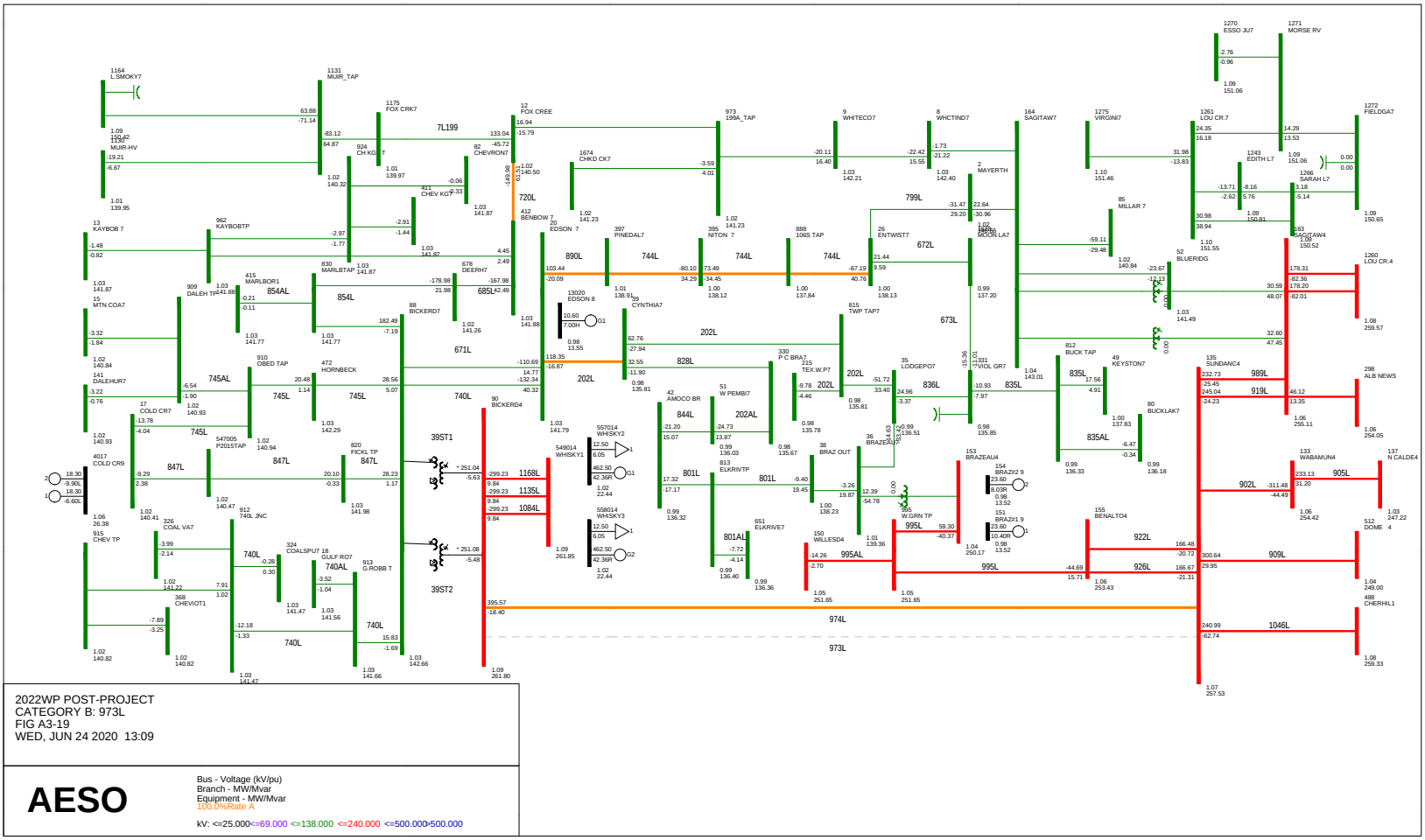


2022WP POST-PROJECT
CATEGORY A
FIG A3-18
WED, JUN 24 2020 13:09

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

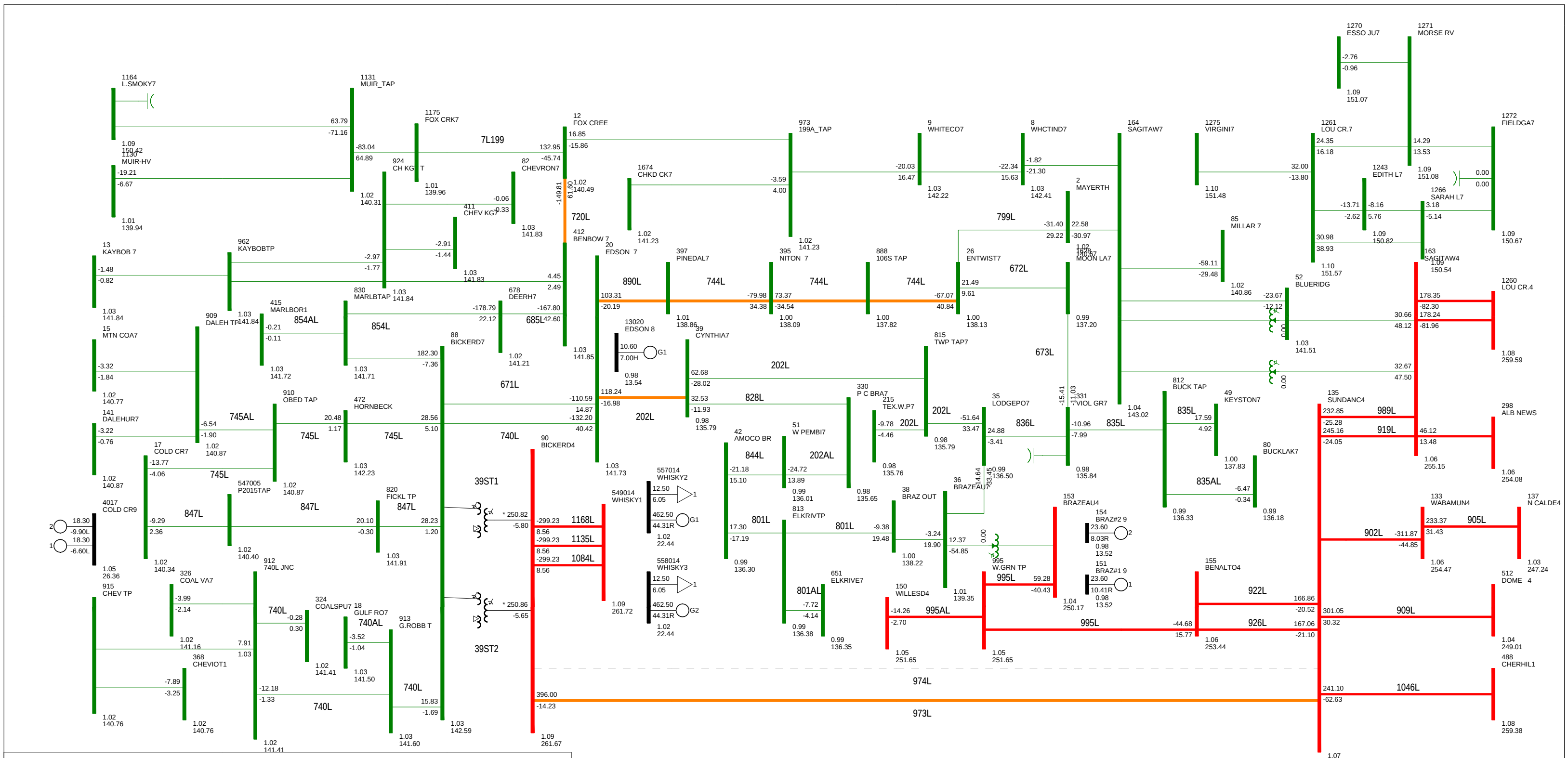


2022WP POST-PROJECT
CATEGORY B: 973L
FIG A3-19
WED, JUN 24 2020 13:09

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

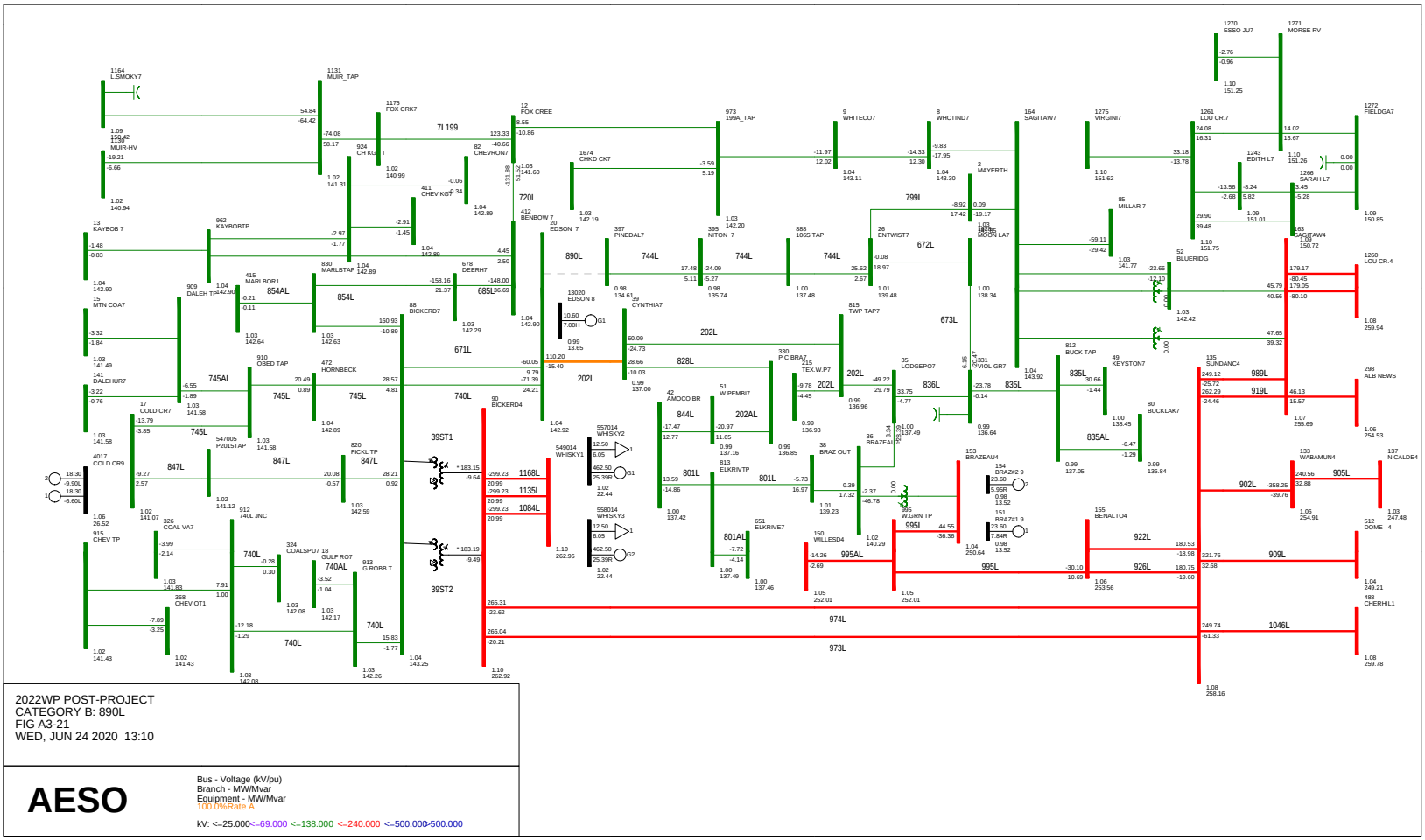
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

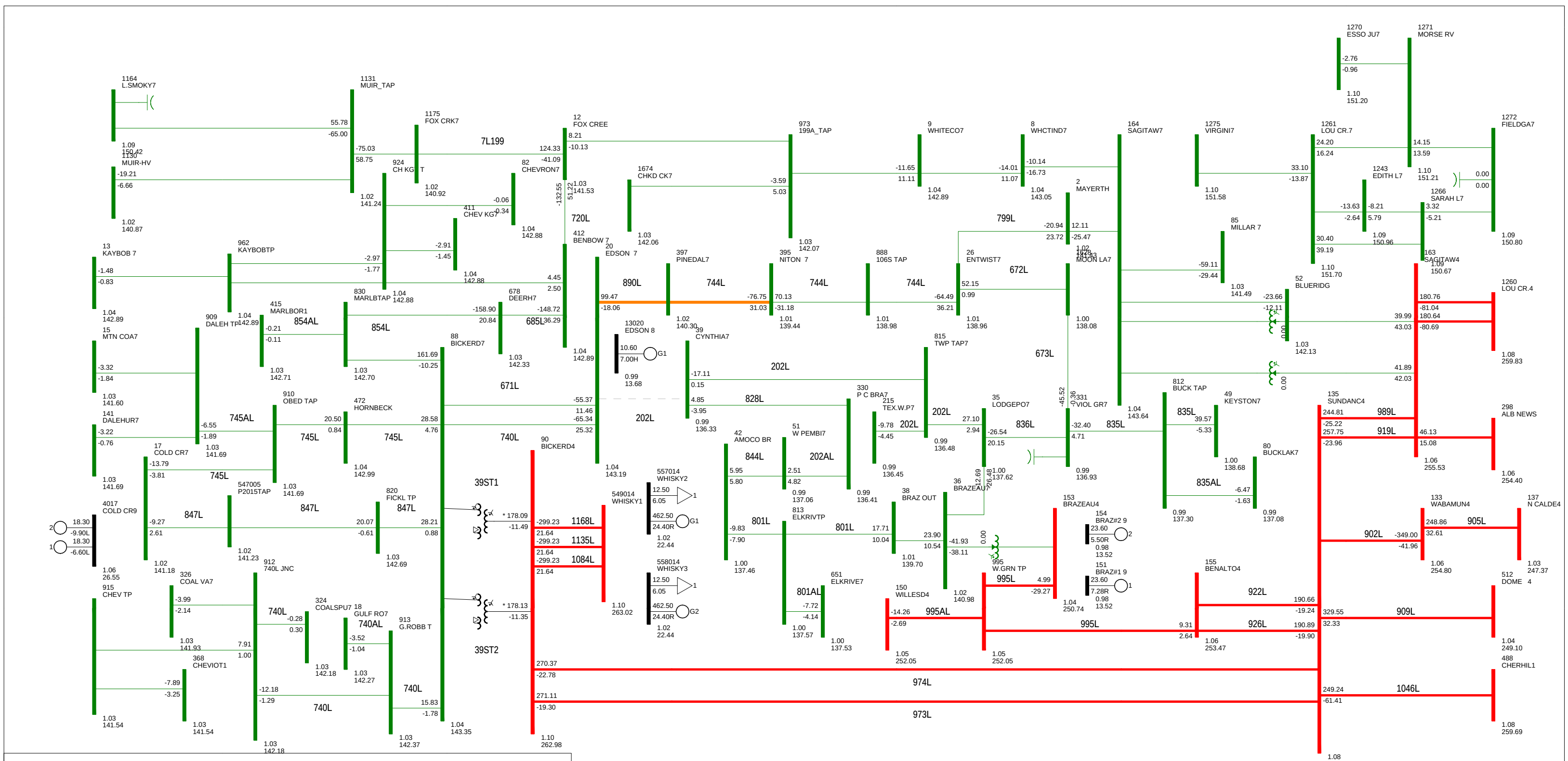


2022WP POST-PROJECT
CATEGORY B: 974L
FIG A3-20
WED, JUN 24 2020 13:09

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


1164 L.SMOKY7
1131 MUIR_TAP
1130 MUIR-HV
1175 FOX CRK7
924 CH KG T
82 CHEVRON7
12 FOX CREE
973 199A_TAP
1674 CHKD CK7
9 WHTECO7
8 WHCTIND7
164 SAGITAW7
1275 VIRGIN7
1270 ESSO JU7
1271 MORSE RV
1261 LOU CR.7
1272 FIELDGA7
1243 EDITH L7
1266 SARAH L7
2 MAYERTH
85 MILLAR 7
52 BLUERIDG
1260 LOU CR.4
962 KAYBOBTP
13 KAYBOB 7
415 MARLBOR1
830 MARLBTAP
678 DEERH7
685L
412 BENBOW 7
20 EDSON 7
397 PINEDAL7
395 NITON 7
888 106S TAP
26 ENTWIST7
672L
799L
720L
890L
744L
7L199
854L
854AL
909 DALEH TP
15 MTN COA7
141 DALEHUR7
910 OBED TAP
745AL
745L
17 COLD CR7
472 HORNBECK
820 FICKL TP
847L
4017 COLD CR9
547005 P201STAP
912 740L JNC
326 COAL VA7
915 CHEV TP
368 CHEVIOT1
740L
740AL
324 COALSPU7
18 GULF RO7
913 G.ROBB T
89 BICKERD7
671L
39ST1
39ST2
90 BICKERD4
1168L
1135L
1084L
549014 WHISKY1
557014 WHISKY2
558014 WHISKY3
13020 EDSON 8
10 CYNTHIA7
828L
202L
42 AMOCO BR
844L
801L
51 W PEMBI7
813 ELKRIVTP
801AL
651 ELKRIVE7
330 P C BRA7
215 TEX.W.P7
38 BRAZ OUT
36 BRAZEAU1
815 TWP TAP7
673L
202AL
35 LODGEPO7
836L
995L
995AL
150 WILLESD4
W.GRN TP
153 BRAZEAU4
154 BRAZ#2 9
151 BRAZ#1 9
155 BENALTO4
922L
926L
331 VIOL GR7
812 BUCK TAP
835L
835AL
49 KEYSTON7
80 BUCKLAK7
135 SUNDANC4
989L
919L
902L
905L
133 WABAMUN4
137 N CALDE4
512 DOME 4
488 CHERHIL1
298 ALB NEWS
1046L
974L
973L
909L
163 SAGITAW4
150.72
150.85
259.94
254.53
255.69
247.48
249.21
259.78
258.16
254.91
253.56
252.01
250.64
262.92
262.96
137.42
137.49
137.16
136.93
136.85
136.64
136.84
138.45
138.34
137.48
137.05
143.92
143.30
143.11
142.99
142.92
142.90
142.89
142.64
142.63
142.59
142.42
142.29
142.26
142.08
141.83
141.58
141.49
141.43
141.07
140.99
140.94
139.48
139.23
136.96
135.74
134.61
131.25
2022WP POST-PROJECT
CATEGORY B: 890L
FIG A3-21
WED, JUN 24 2020 13:10
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

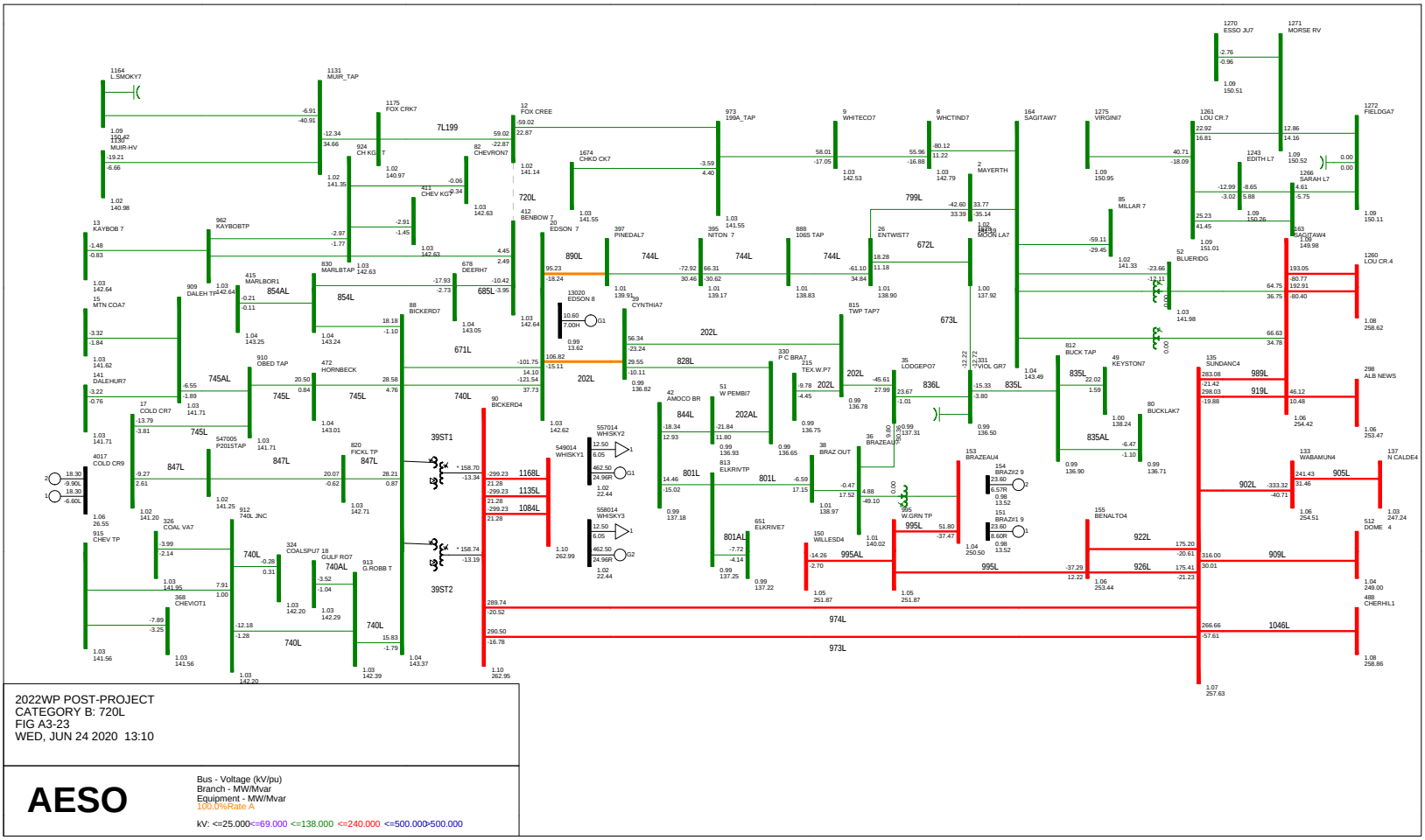


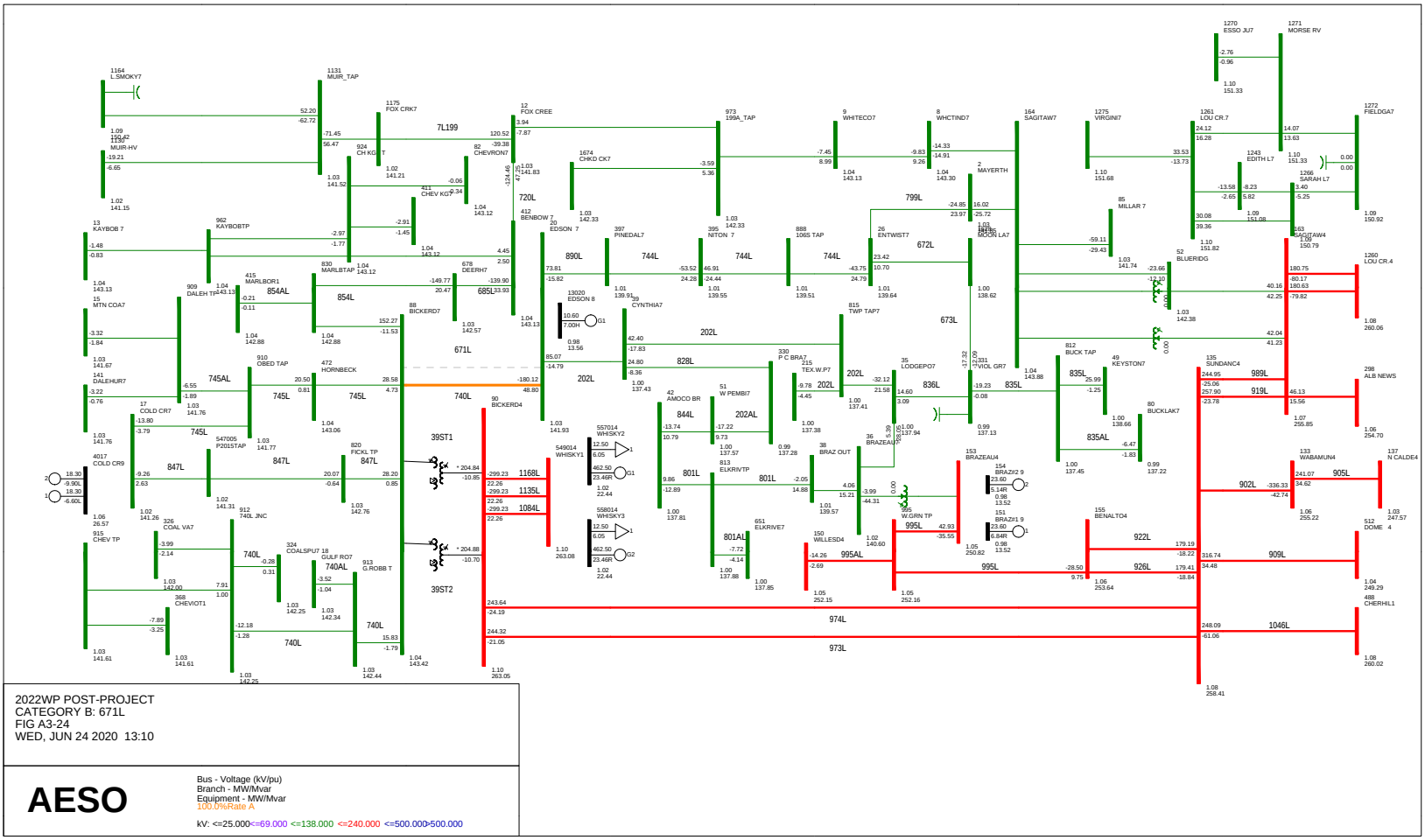
2022WP POST-PROJECT
CATEGORY B: 202L
FIG A3-22
WED, JUN 24 2020 13:10

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


2022WP POST-PROJECT
CATEGORY B: 720L
FIG A3-23
WED, JUN 24 2020 13:10
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

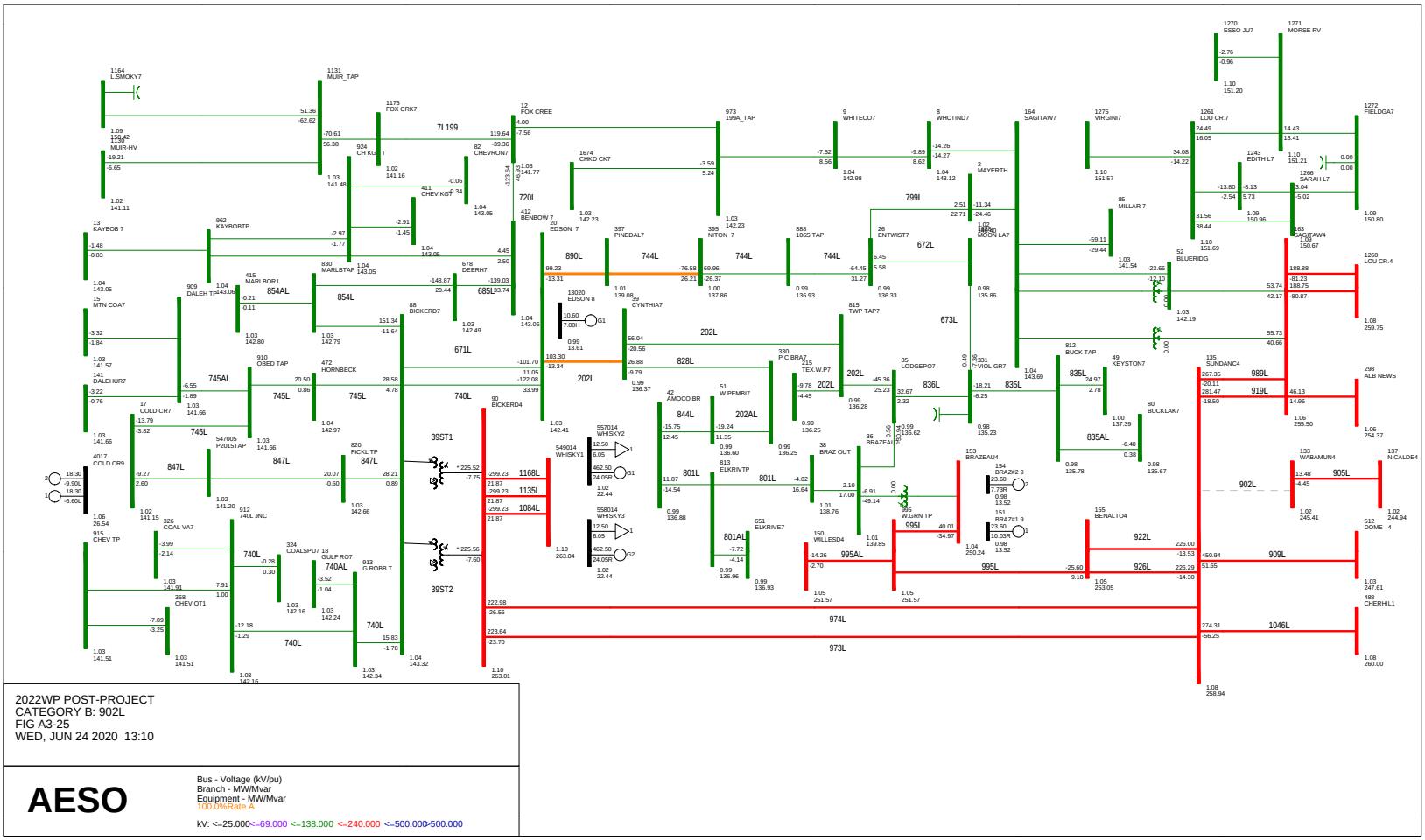


2022WP POST-PROJECT
CATEGORY B: 671L
FIG A3-24
WED, JUN 24 2020 13:10

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

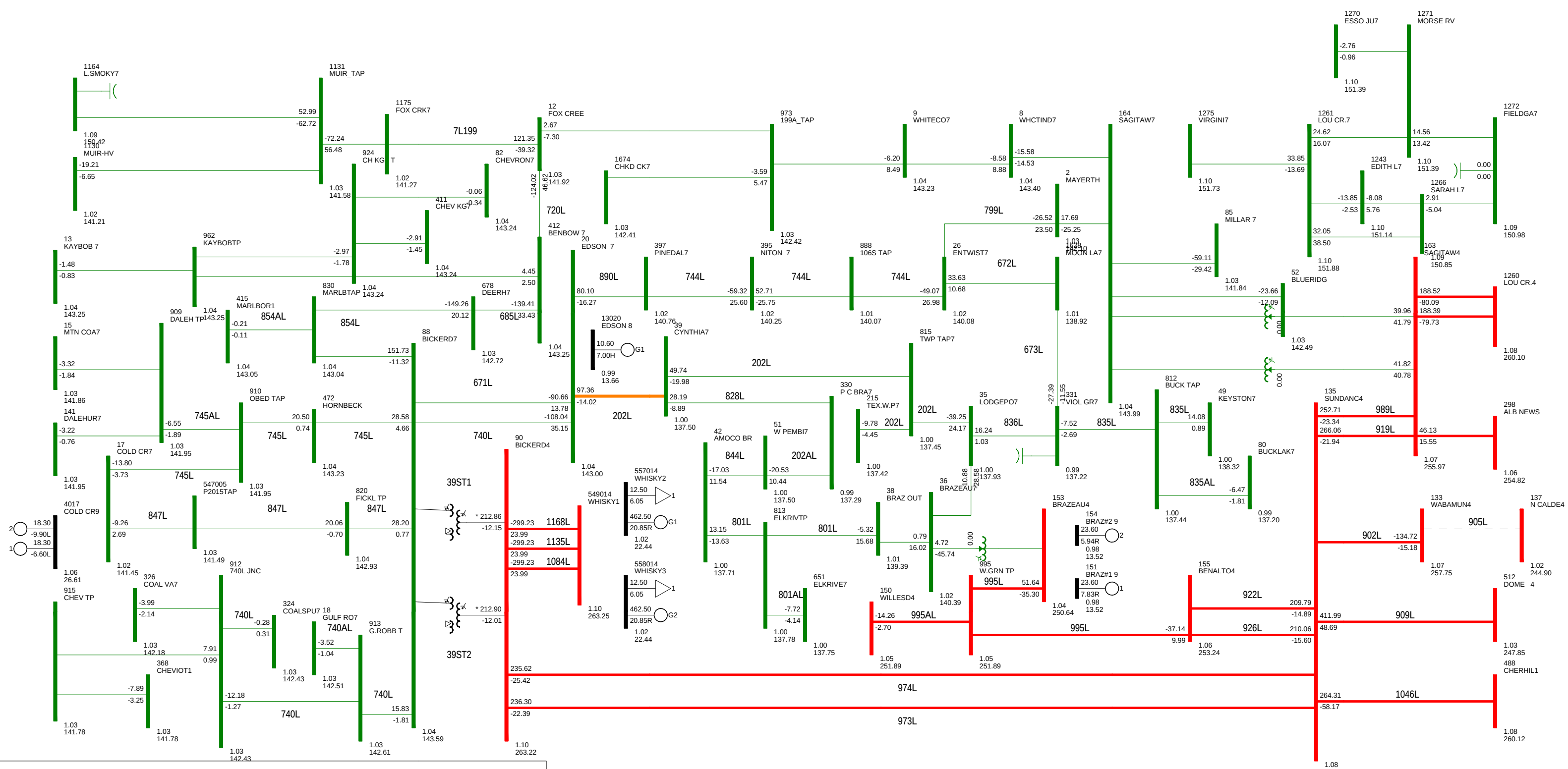


2022WP POST-PROJECT
CATEGORY B: 902L
FIG A3-25
WED, JUN 24 2020 13:10

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


1164 L.SMOKY7
1131 MUIR_TAP
1175 FOX CRK7
12 FOX CREE
973 199A_TAP
9 WHITECO7
8 WHCTIND7
164 SAGITAW7
1275 VIRGINI7
1261 LOU CR.7
1270 ESSO JU7
1271 MORSE RV
1272 FIELDGA7
1130 MUIR-HV
924 CH KG T
82 CHEVRON7
1674 CHKD CK7
2 MAYERTH
1243 EDITH L7
1266 SARAH L7
13 KAYBOB 7
962 KAYBOBTP
411 CHEV KG7
412 BENBOW 7
20 EDSON 7
397 PINEDAL7
395 NITON 7
888 106S TAP
26 ENTWIST7
33 MOON LA7
85 MILLAR 7
163 SAGITAW4
52 BLUERIDG
1260 LOU CR.4
415 MARLBOR1
830 MARLBTAP
678 DEERH7
15 MTN COA7
909 DALEH TP
88 BICKERD7
13020 EDSON 8
39 CYNTHIA7
815 TWP TAP7
141 DALEHUR7
910 OBED TAP
472 HORNBECK
330 P C BRA7
215 TEX.W.P7
35 LODGEPO7
331 VIOL GR7
812 BUCK TAP
49 KEYSTON7
135 SUNDANC4
298 ALB NEWS
17 COLD CR7
42 AMOCO BR
51 W PEMBI7
80 BUCKLAK7
90 BICKERD4
557014 WHISKY2
549014 WHISKY1
36 BRAZEAU7
38 BRAZ OUT
153 BRAZEAU4
154 BRAZ#2 9
133 WABAMUN4
137 N CALDE4
547005 P2015TAP
820 FICKL TP
4017 COLD CR9
813 ELKRIVTP
558014 WHISKY3
995 W.GRN TP
151 BRAZ#1 9
155 BENALTO4
512 DOME 4
912 740L JNC
326 COAL VA7
651 ELKRIVE7
150 WILLESD4
915 CHEV TP
324 COALSPU7
18 GULF RO7
913 G.ROBB T
368 CHEVIOT1
488 CHERHIL1
7L199
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854AL
854L
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673L
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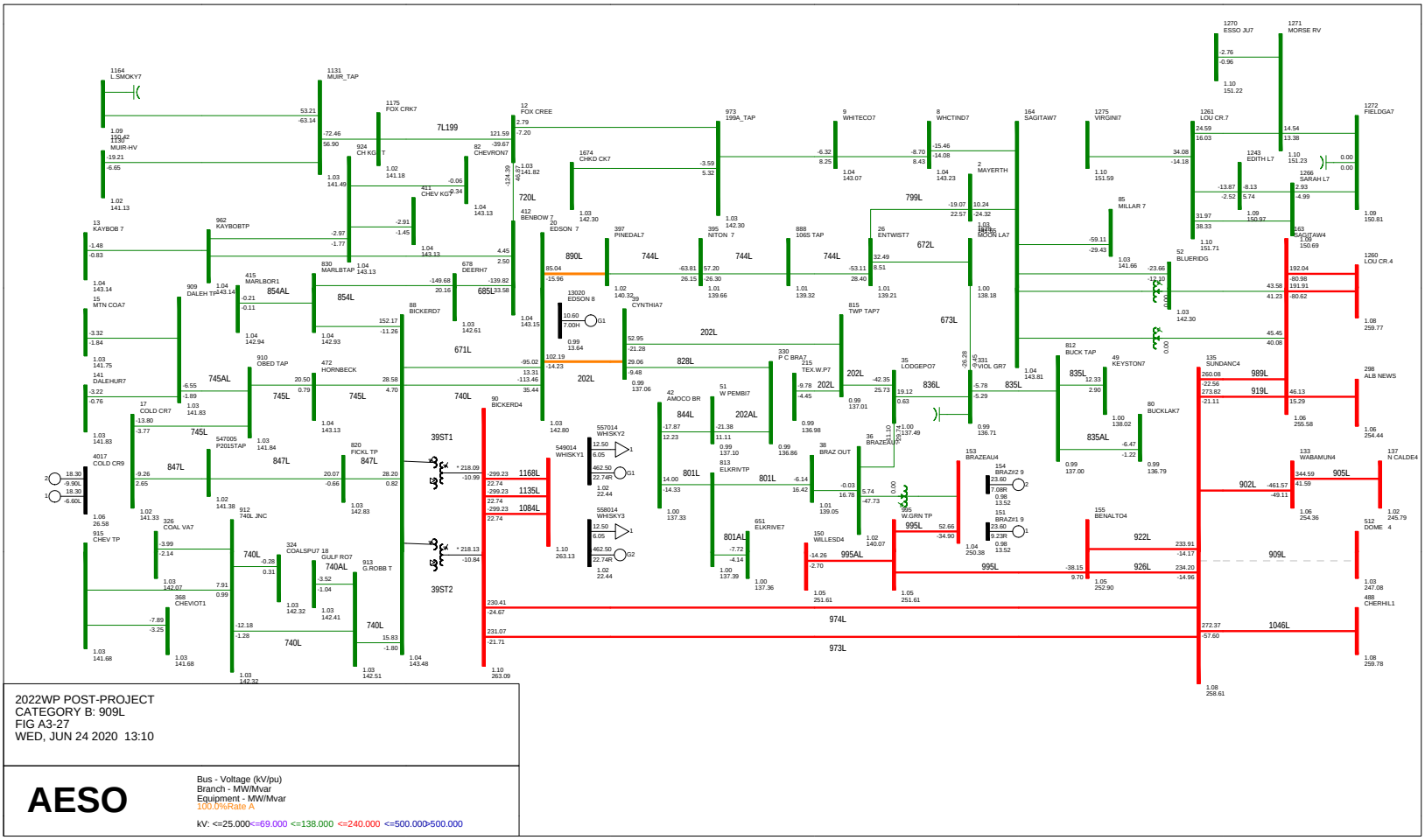
836L
835AL
989L
919L
844L
202AL
847L
39ST1
1168L
1135L
1084L
801L
902L
905L
801AL
995AL
995L
922L
926L
909L
740AL
39ST2
974L
973L
1046L

2022WP POST-PROJECT
CATEGORY B: 905L
FIG A3-26
WED, JUN 24 2020 13:10

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

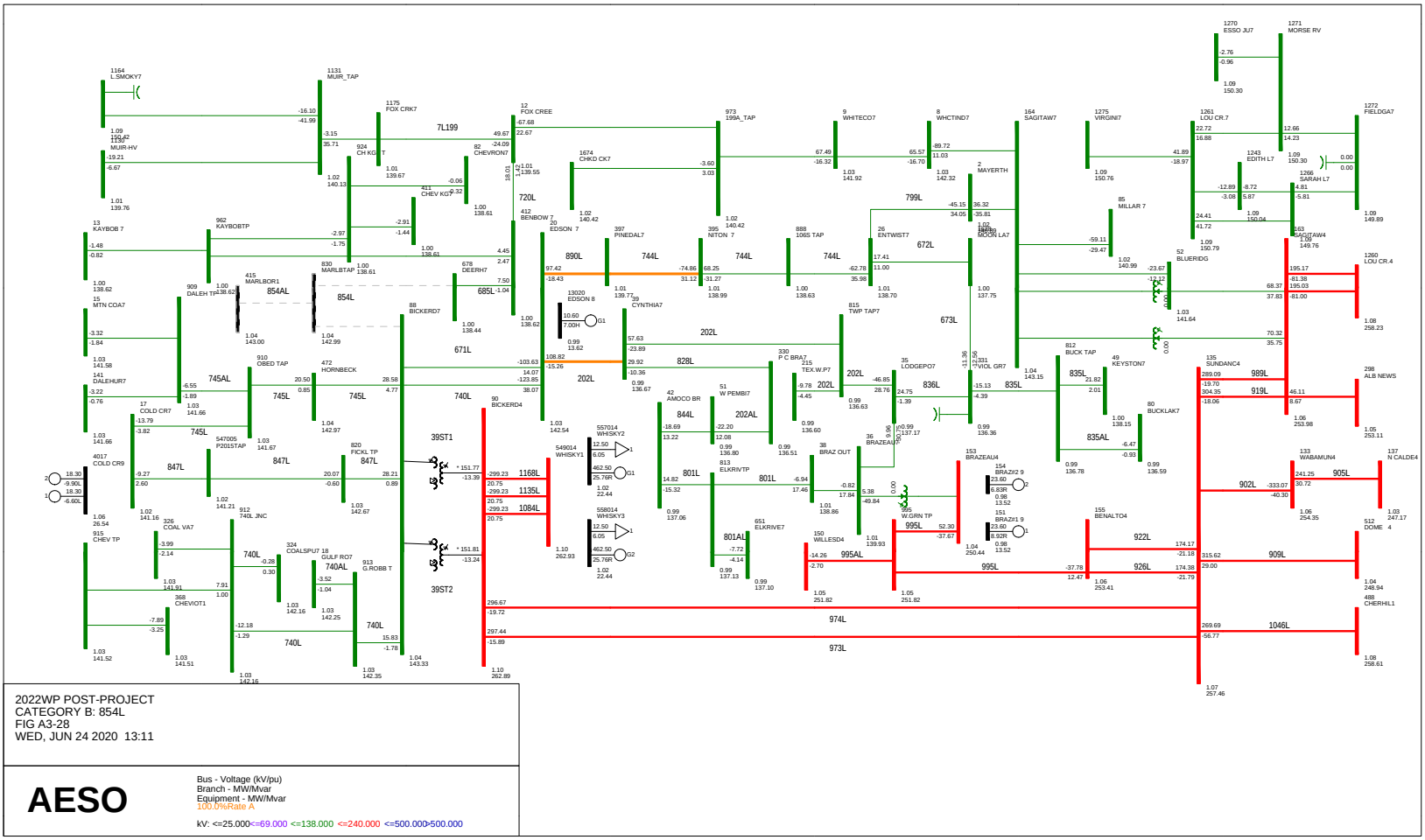


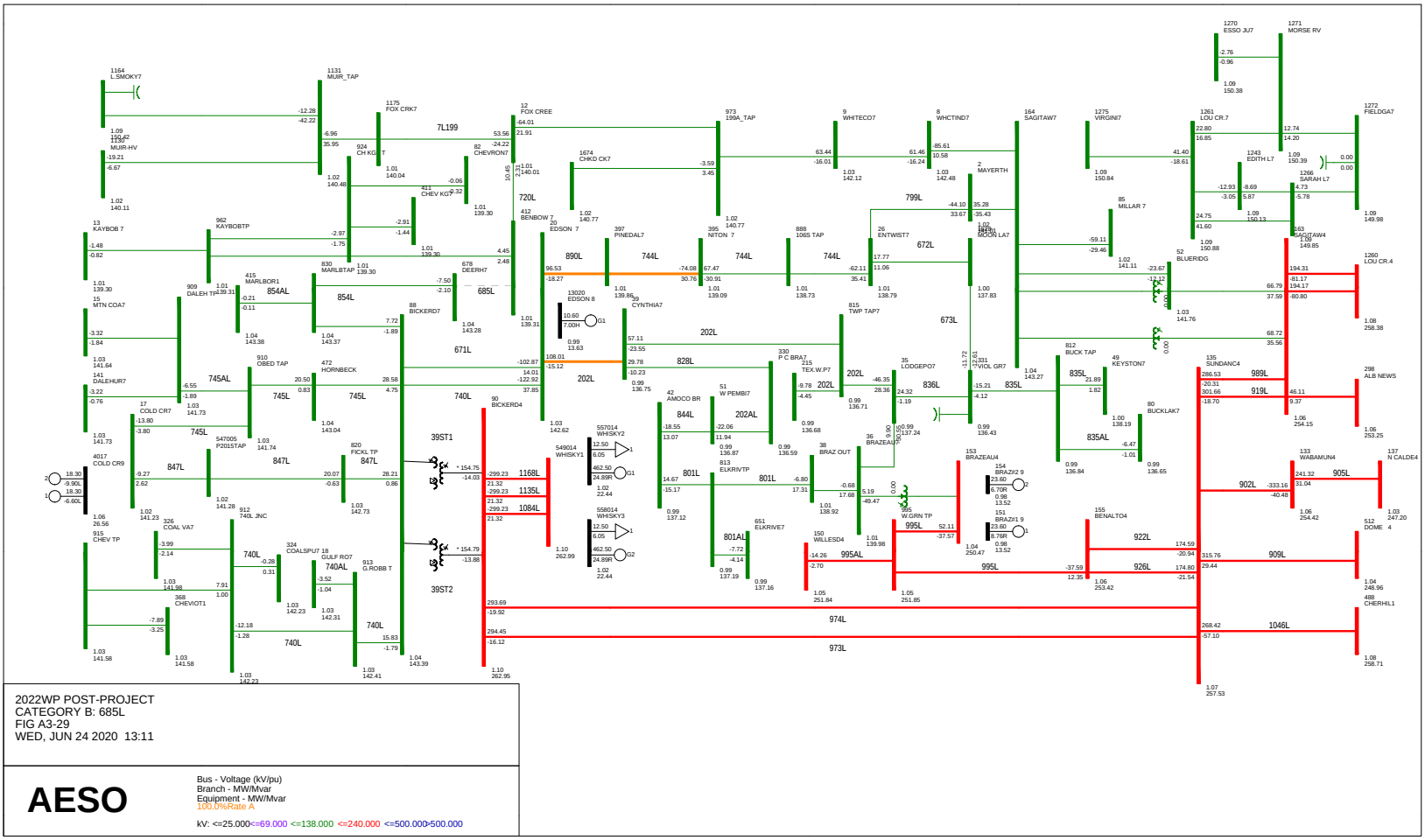
2022WP POST-PROJECT
CATEGORY B: 909L
FIG A3-27
WED, JUN 24 2020 13:10

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


2022WP POST-PROJECT
CATEGORY B: 854L
FIG A3-28
WED, JUN 24 2020 13:11
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000<=69.000 <=138.000 <=240.000 <=500.000>500.000

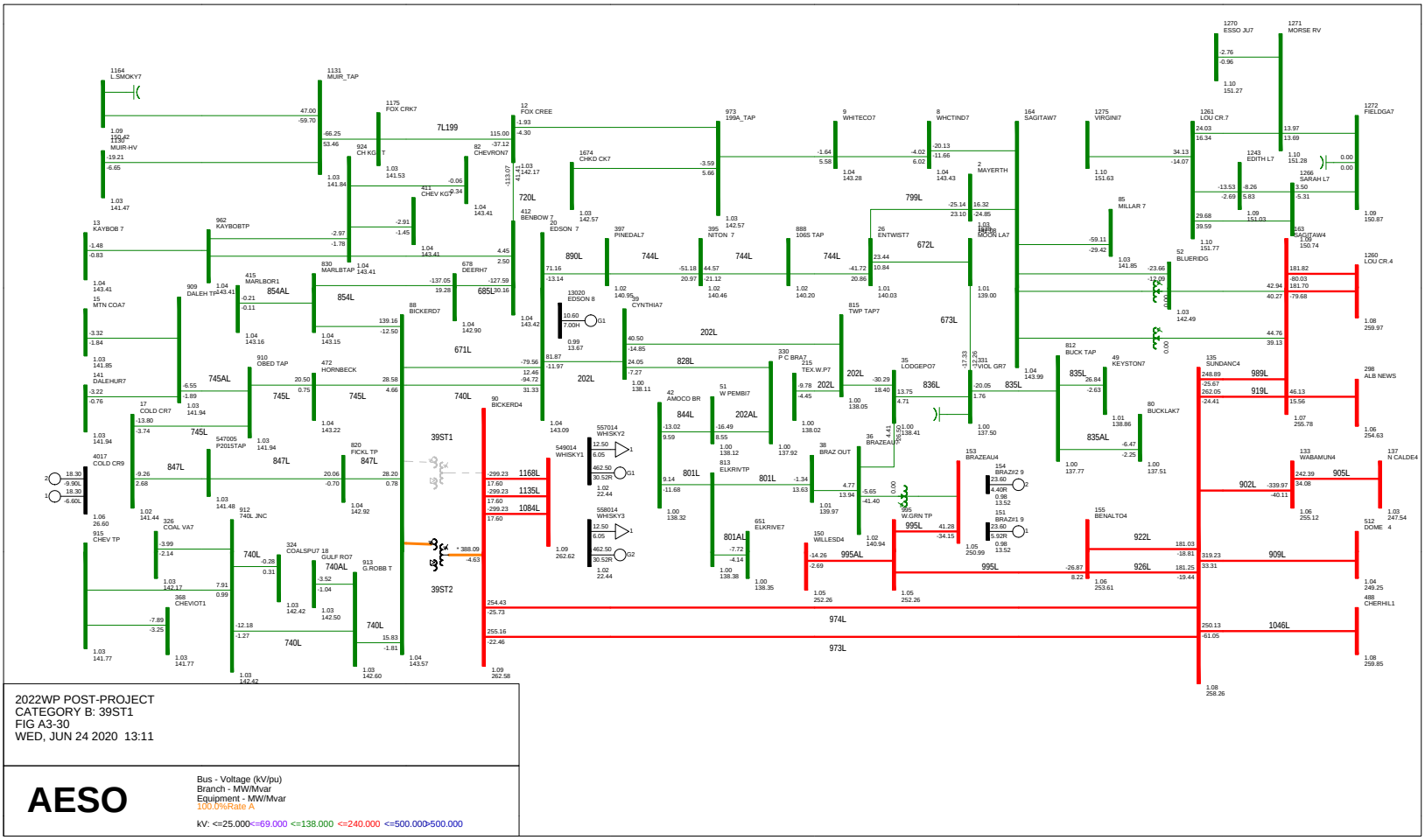


2022WP POST-PROJECT
CATEGORY B: 685L
FIG A3-29
WED, JUN 24 2020 13:11

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

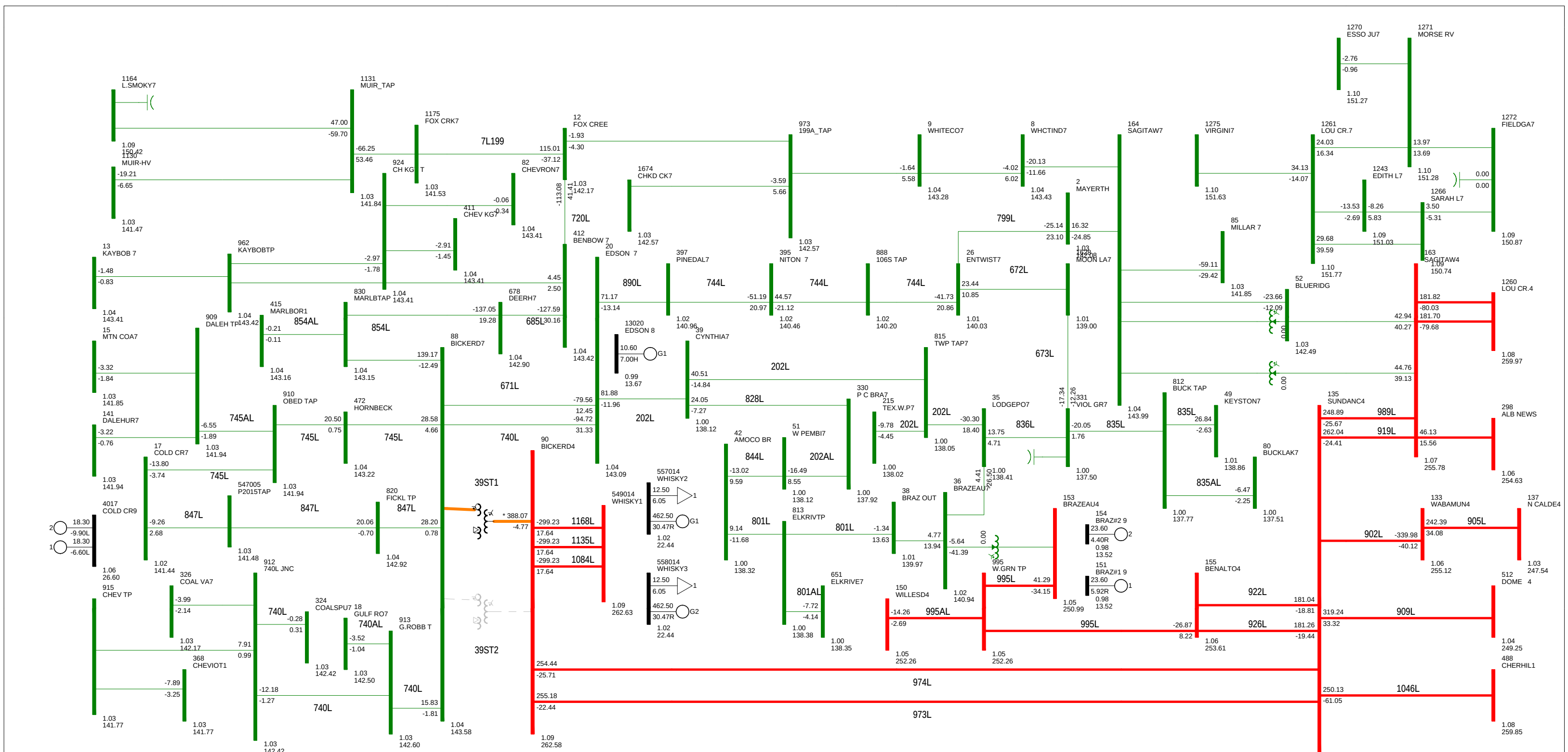


2022WP POST-PROJECT
CATEGORY B: 39ST1
FIG A3-30
WED, JUN 24 2020 13:11

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

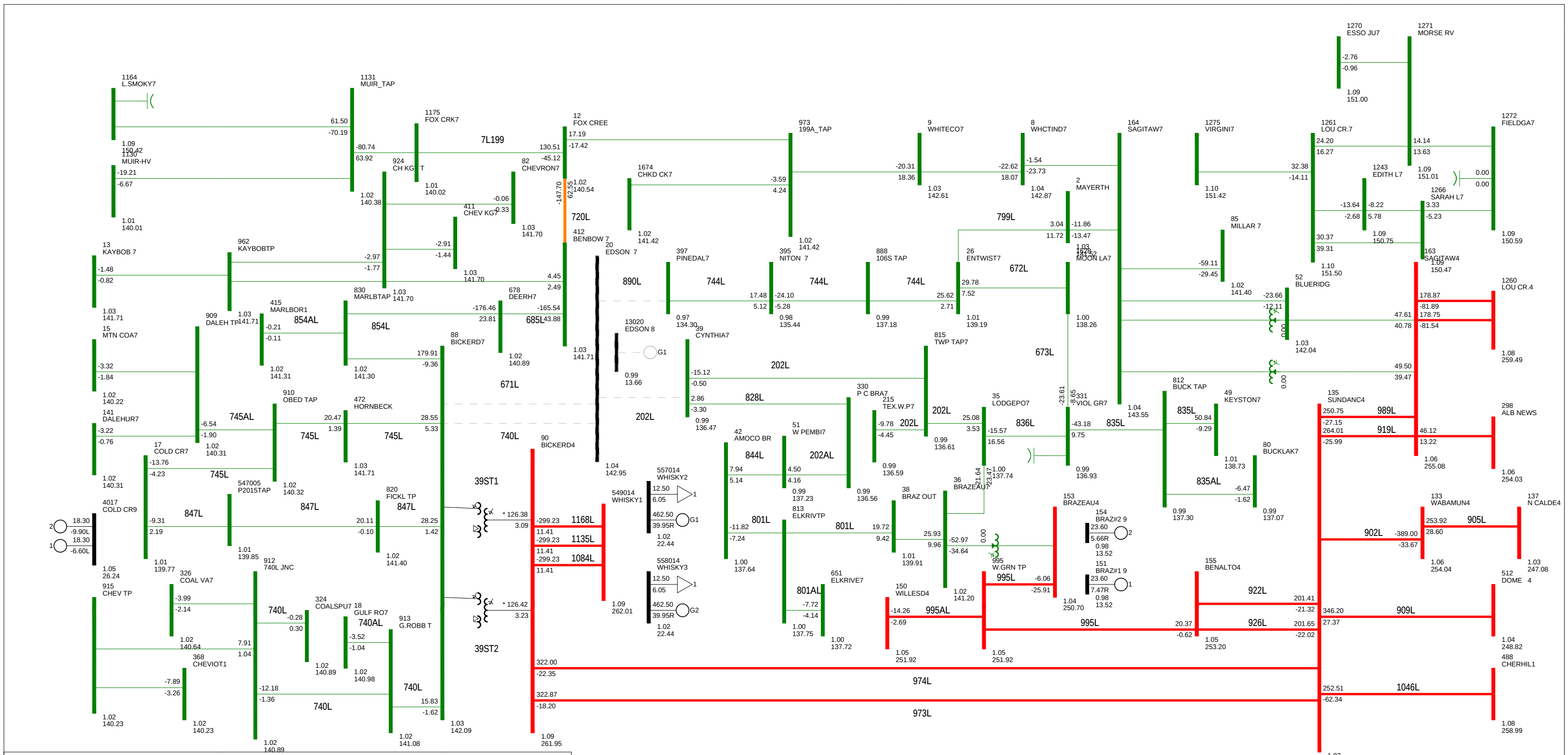

1164 L.SMOKY7
1131 MUIR_TAP
1175 FOX CRK7
12 FOX CREE
973 199A_TAP
9 WHITECO7
8 WHCTIND7
164 SAGITAW7
1275 VIRGINI7
1261 LOU CR.7
1270 ESSO JU7
1271 MORSE RV
1272 FIELDGA7
924 CH KG T
82 CHEVRON7
411 CHEV KG7
1674 CHKD CK7
2 MAYERTH
1243 EDITH L7
1266 SARAH L7
85 MILLAR 7
13 KAYBOB 7
962 KAYBOBTP
830 MARLBTAP
412 BENBOW 7
20 EDSON 7
397 PINEDAL7
395 NITON 7
888 106S TAP
26 ENTWIST7
MOON LA7
163 SAGITAW4
52 BLUERIDG
1260 LOU CR.4
15 MTN COA7
909 DALEH TP
415 MARLBOR1
678 DEERH7
88 BICKERD7
13020 EDSON 8
39 CYNTHIA7
815 TWP TAP7
331 VIOL GR7
812 BUCK TAP
49 KEYSTON7
135 SUNDANC4
298 ALB NEWS
141 DALEHUR7
910 OBED TAP
472 HORNBECK
330 P C BRA7
215 TEX.W.P7
35 LODGEPO7
80 BUCKLAK7
17 COLD CR7
547005 P2015TAP
820 FICKL TP
90 BICKERD4
549014 WHISKY1
557014 WHISKY2
42 AMOCO BR
51 W PEMBI7
36 BRAZEAU7
38 BRAZ OUT
153 BRAZEAU4
154 BRAZ#2 9
133 WABAMUN4
137 N CALDE4
4017 COLD CR9
813 ELKRIVTP
558014 WHISKY3
651 ELKRIVE7
150 WILLESD4
995 W.GRN TP
151 BRAZ#1 9
155 BENALTO4
512 DOME 4
488 CHERHIL1
915 CHEV TP
326 COAL VA7
912 740L JNC
324 COALSPU7
18 GULF RO7
913 G.ROBB T
368 CHEVIOT1
7L199
720L
799L
672L
673L
890L
744L
854AL
854L
685L
671L
202L
828L
835L
835AL
989L
919L
745AL
745L
740L
844L
202AL
836L
847L
1168L
1135L
1084L
39ST1
39ST2
801L
801AL
995AL
995L
902L
905L
922L
926L
909L
974L
973L
1046L
740AL

2022WP POST-PROJECT
CATEGORY B: 39ST2
FIG A3-31
WED, JUN 24 2020 13:11

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

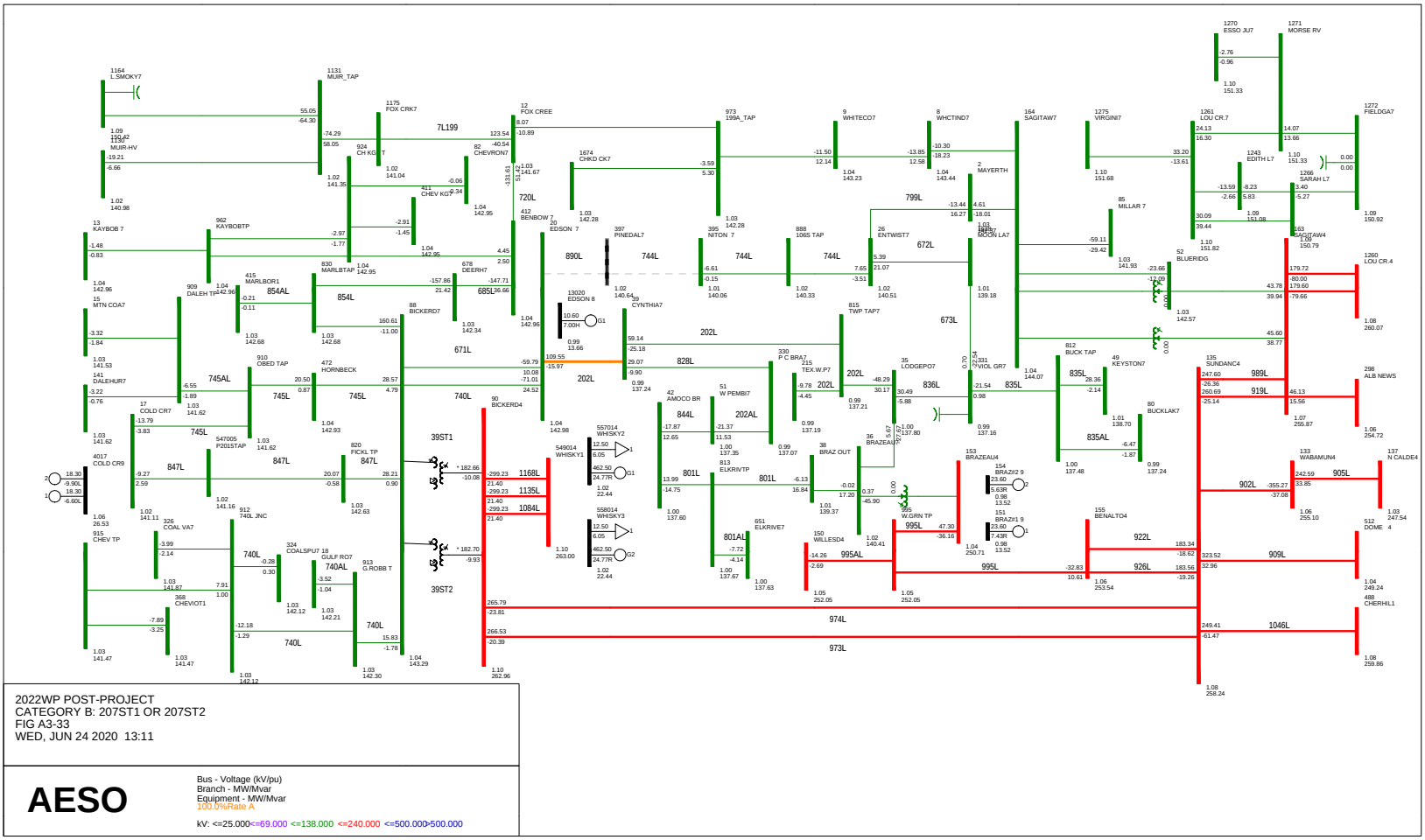


2022WP POST-PROJECT
CATEGORY B: 58ST1 OR 58ST2
FIG A3-32
WED, JUN 24 2020 13:11

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

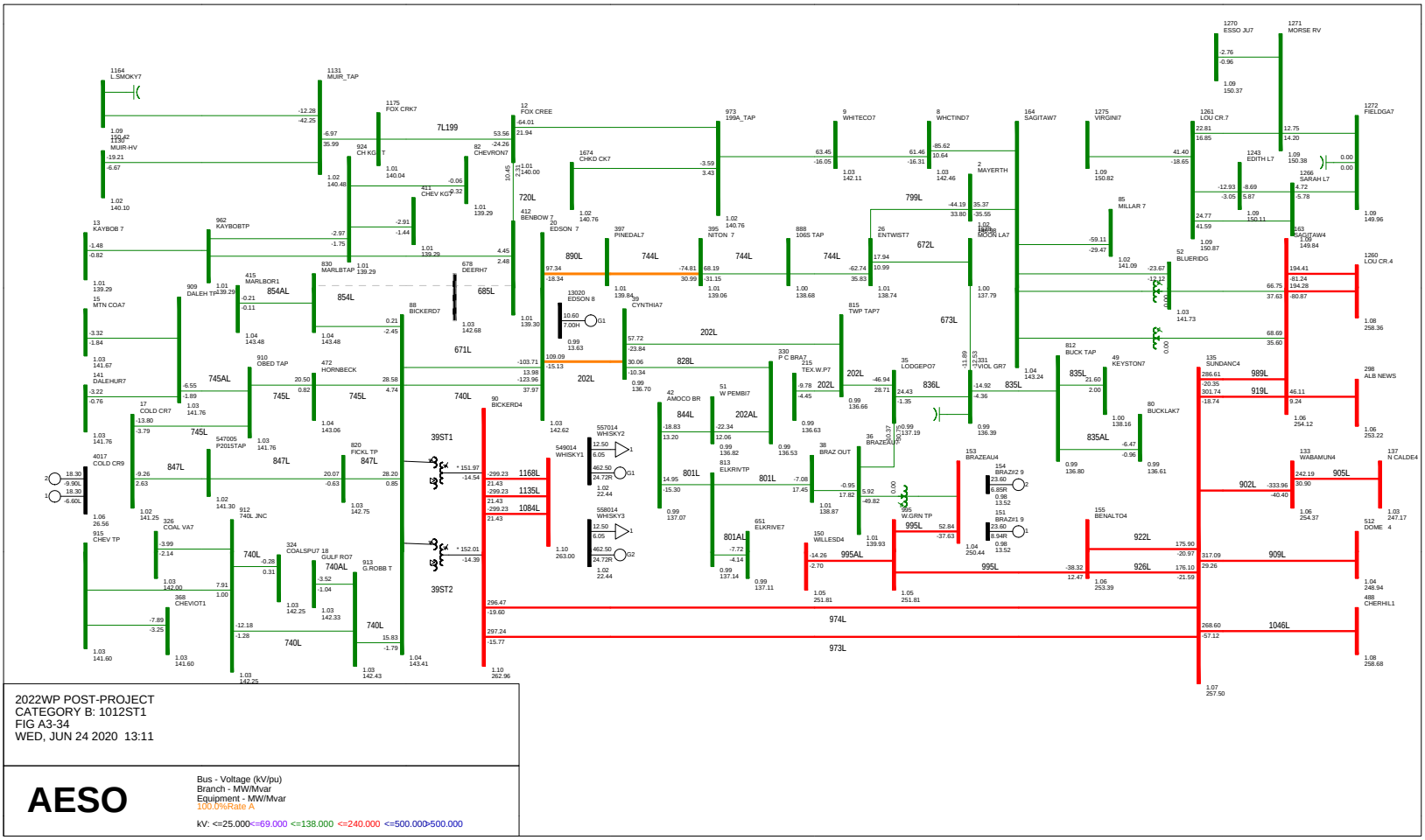


2022WP POST-PROJECT
CATEGORY B: 207ST1 OR 207ST2
FIG A3-33
WED, JUN 24 2020 13:11

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000



2022WP POST-PROJECT
CATEGORY B: 1012ST1
FIG A3-34
WED, JUN 24 2020 13:11

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

Attachment A4
Post-Project Transient Stability Diagrams

FIGURE D-1B
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out

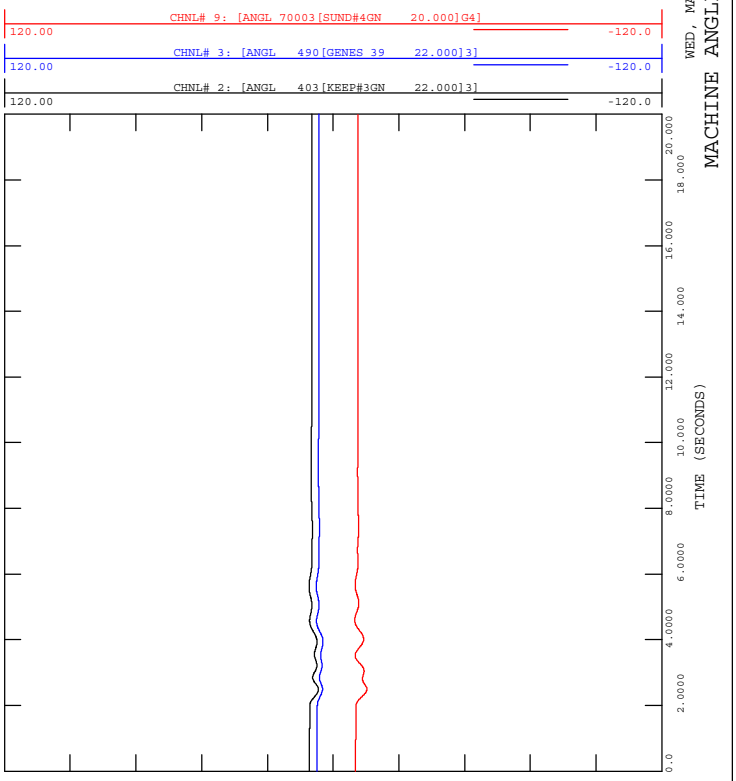


FIGURE D-1D
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out

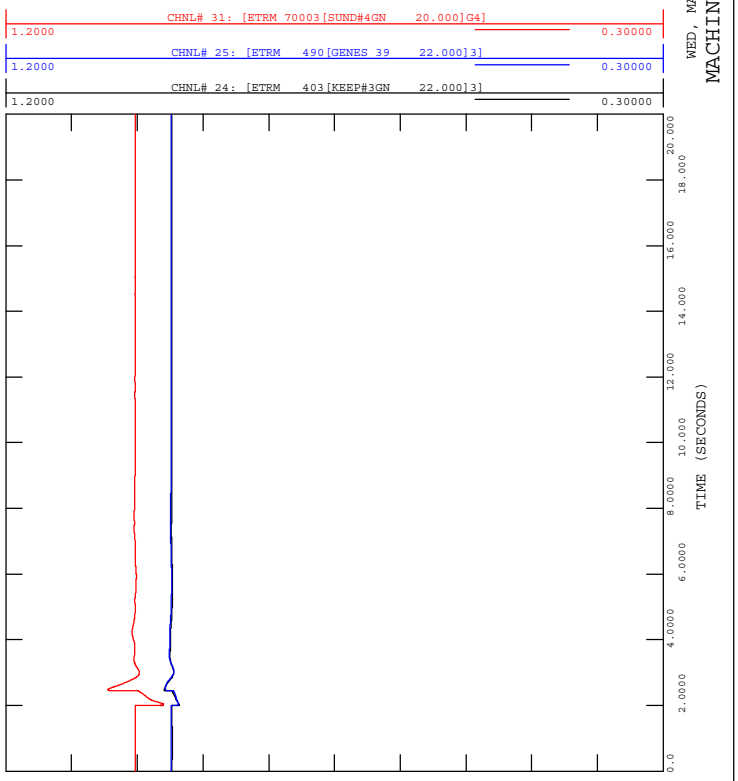


FIGURE D-1A
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out

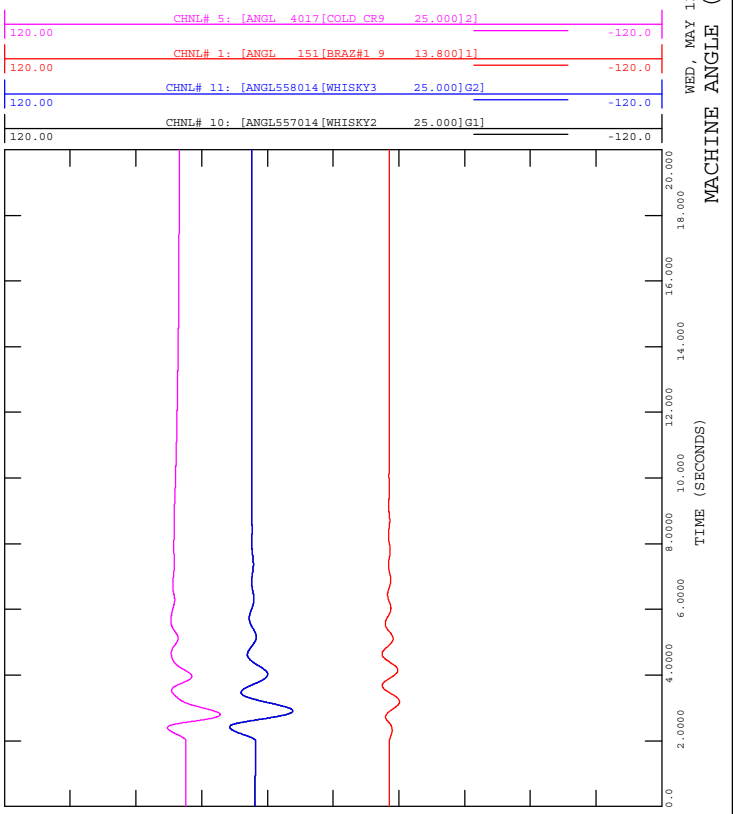


FIGURE D-1C
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out

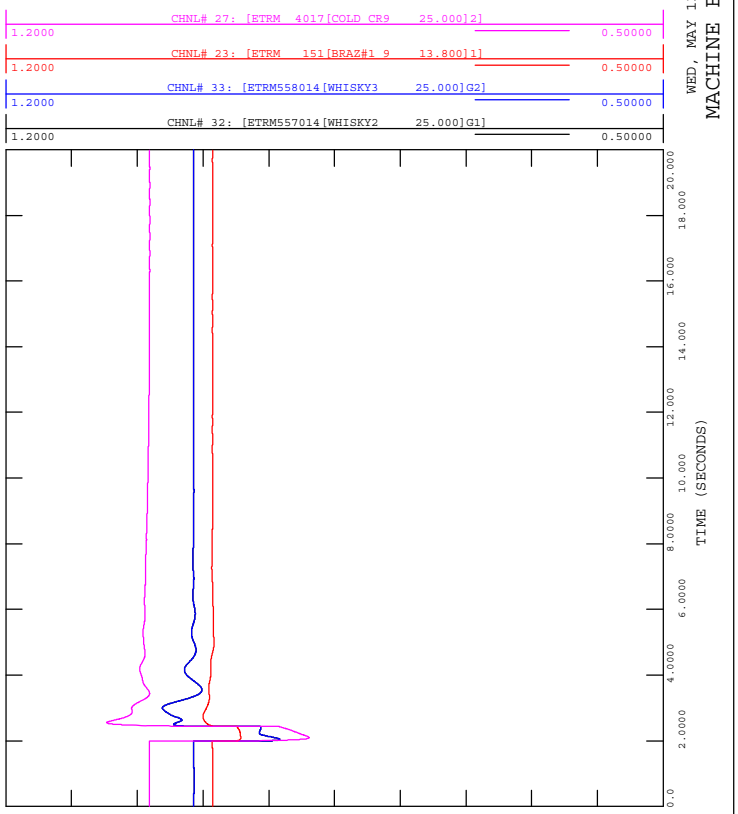
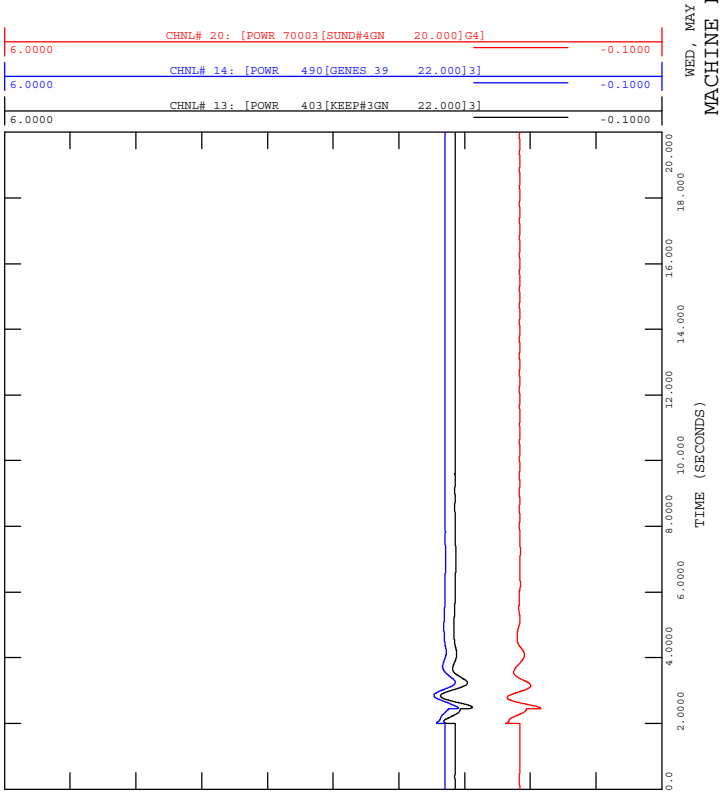
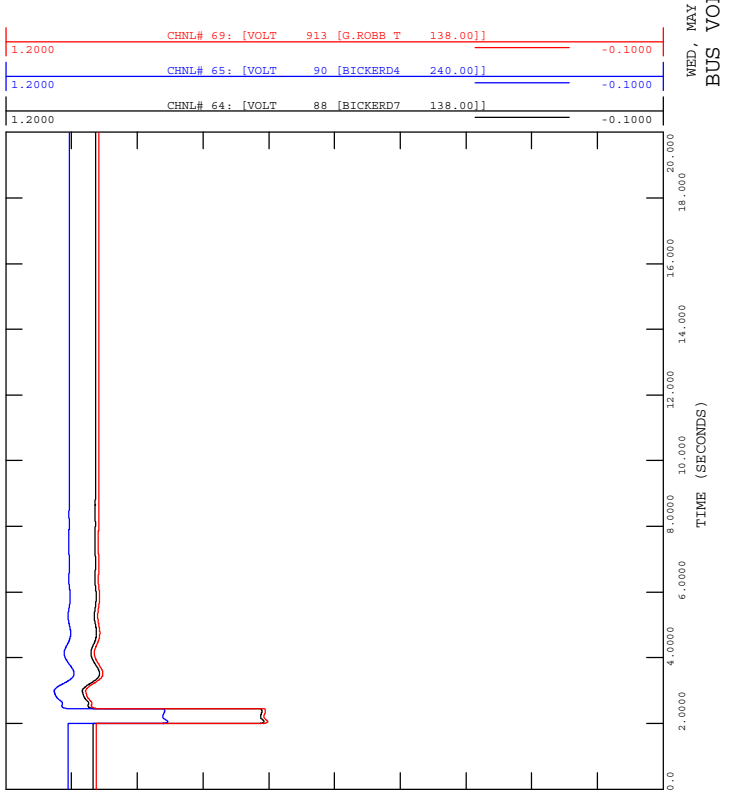


FIGURE D-1F
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out



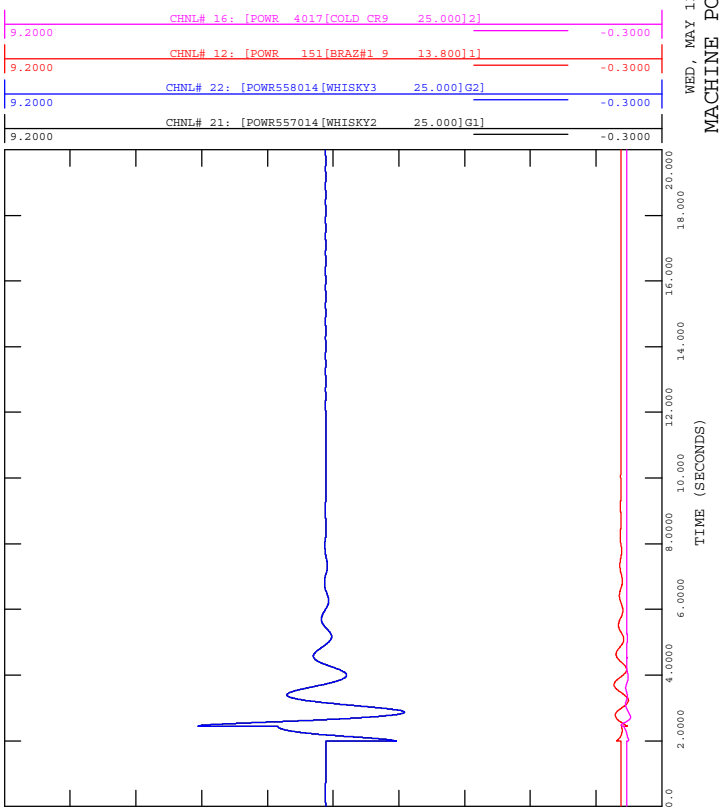
WED, MAY 13 2020 23:33
MACHINE POWER (MW)

FIGURE D-1H
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out



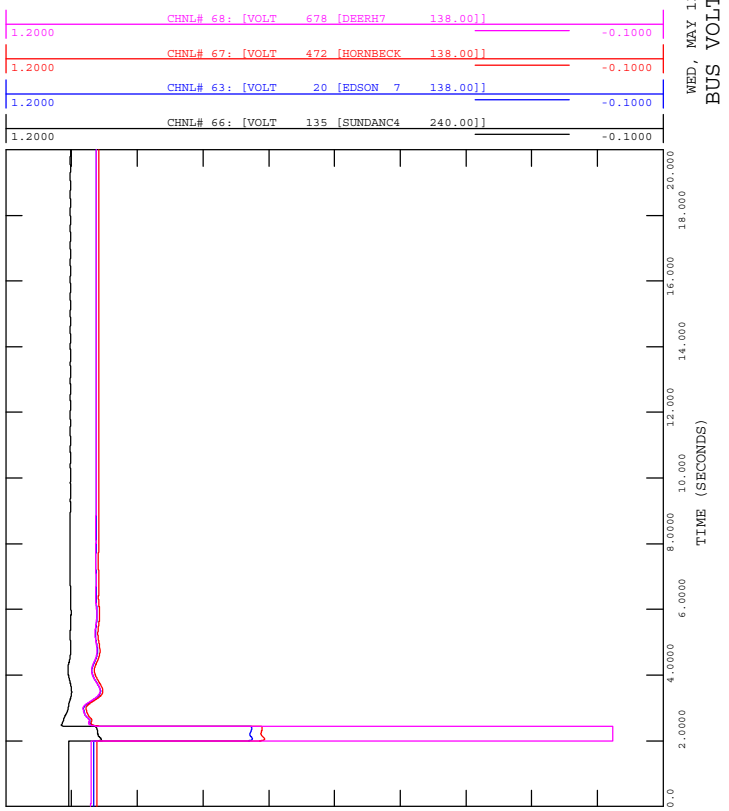
WED, MAY 13 2020 23:33
BUS VOLTAGE (PU)

FIGURE D-1E
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out



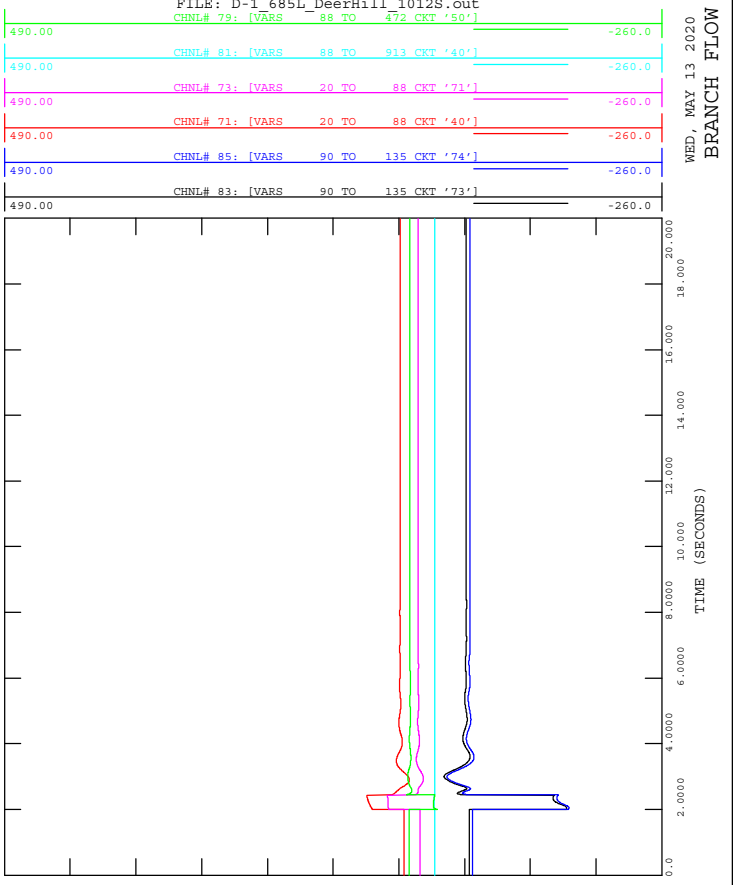
WED, MAY 13 2020 23:33
MACHINE POWER (MW)

FIGURE D-1G
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out



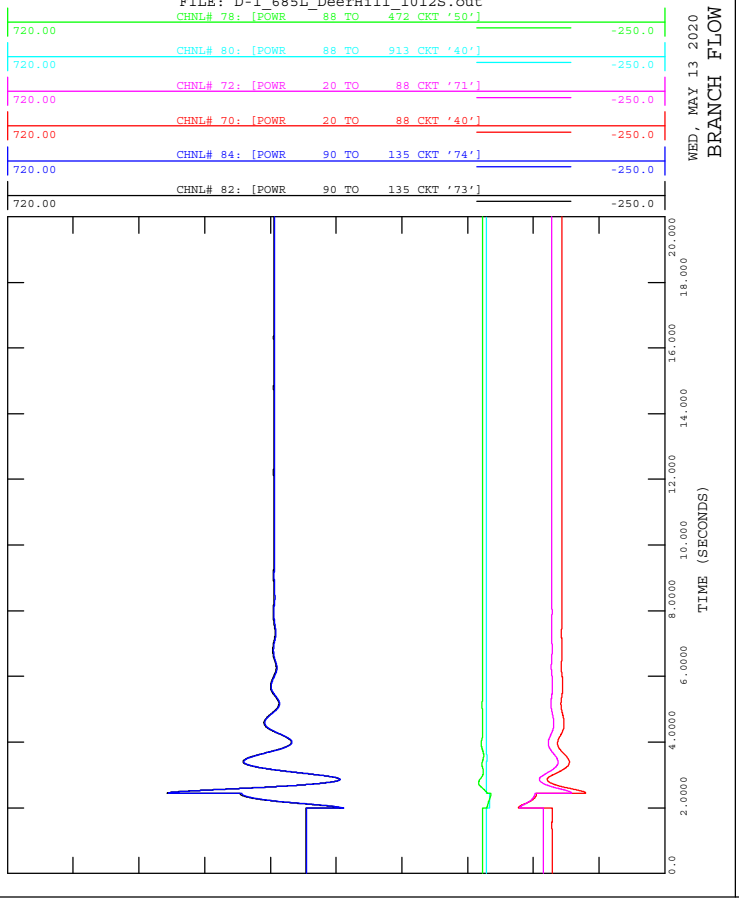
WED, MAY 13 2020 23:33
BUS VOLTAGE (PU)

FIGURE D-1J
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out



WED, MAY 13 2020 23:33
BRANCH FLOW (Q)

FIGURE D-1I
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-1_685L_DeerHill_1012S.out



WED, MAY 13 2020 23:33
BRANCH FLOW (P)

FIGURE D-2B
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out

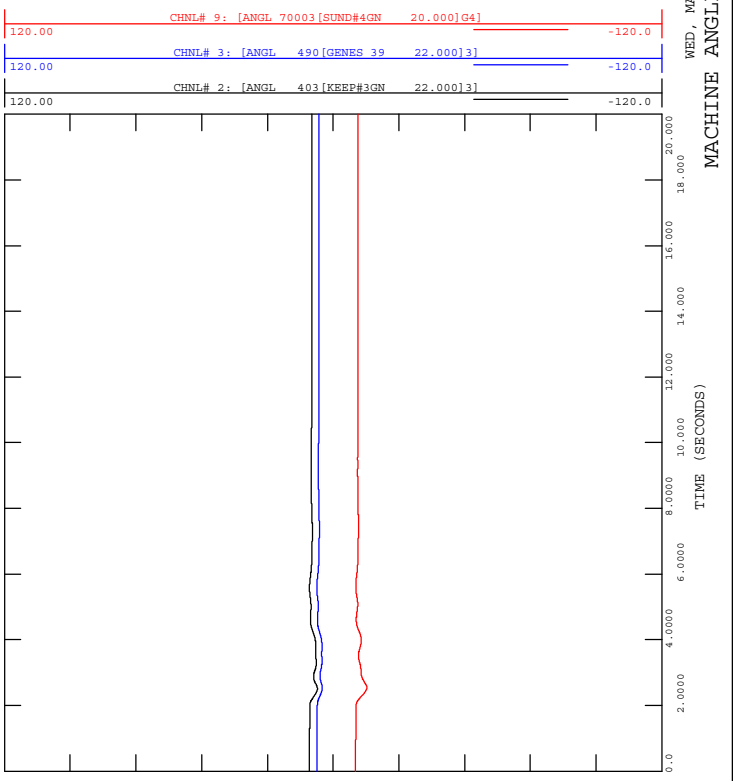


FIGURE D-2D
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out

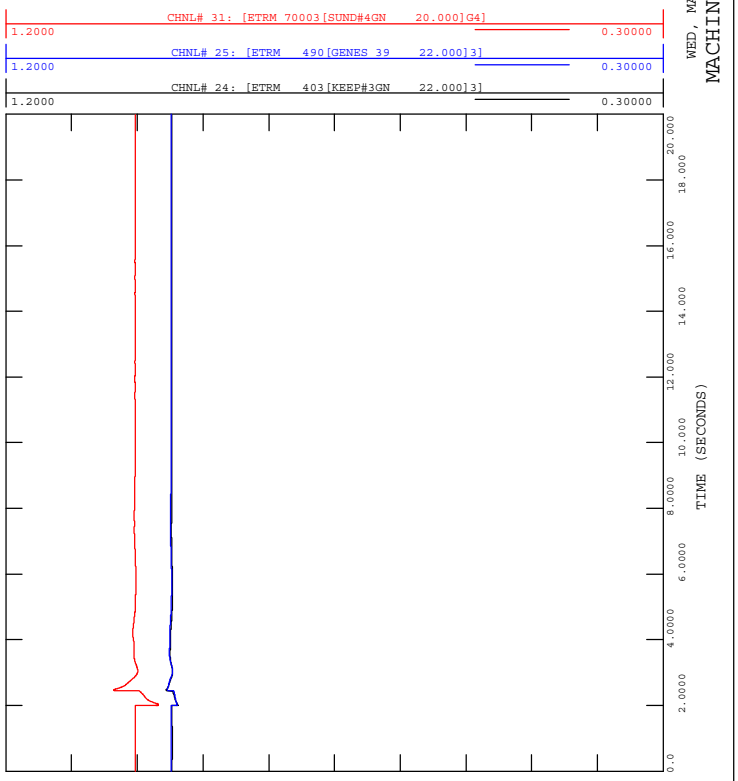


FIGURE D-2A
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out

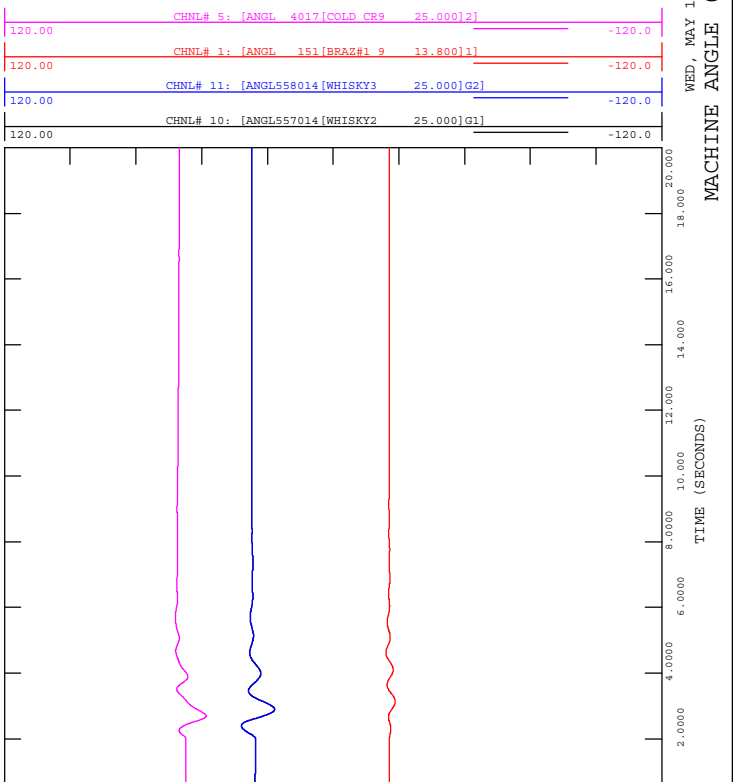


FIGURE D-2C
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out

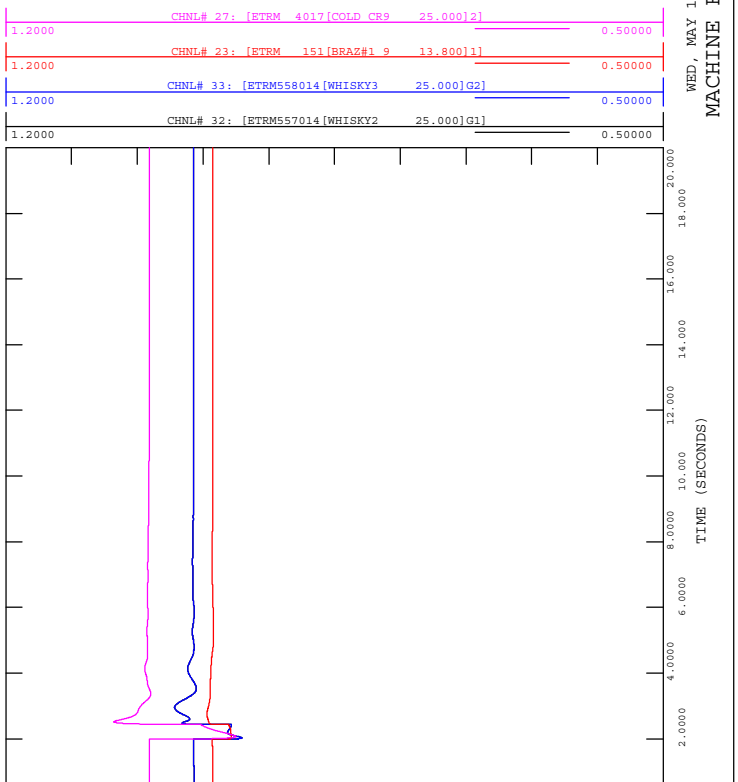
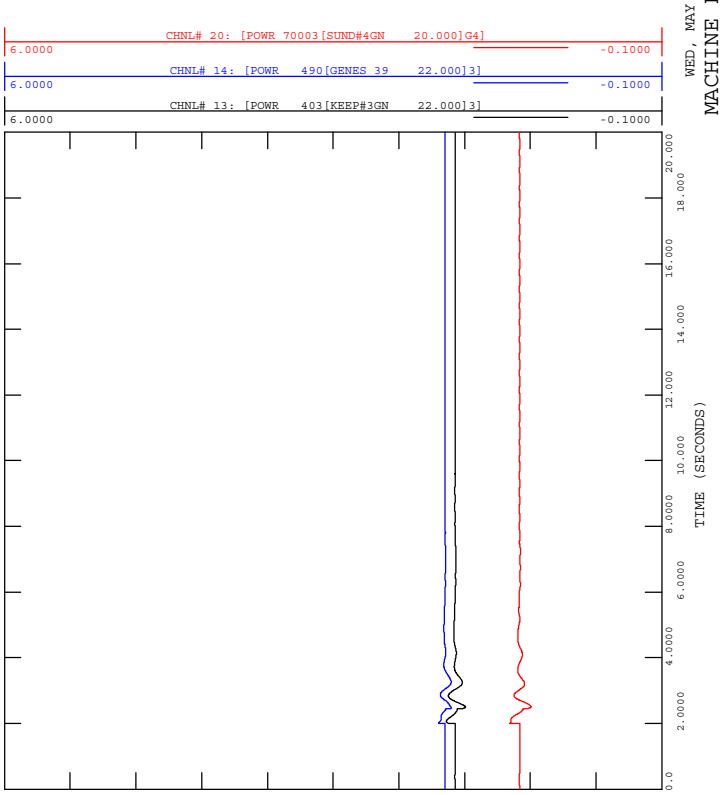
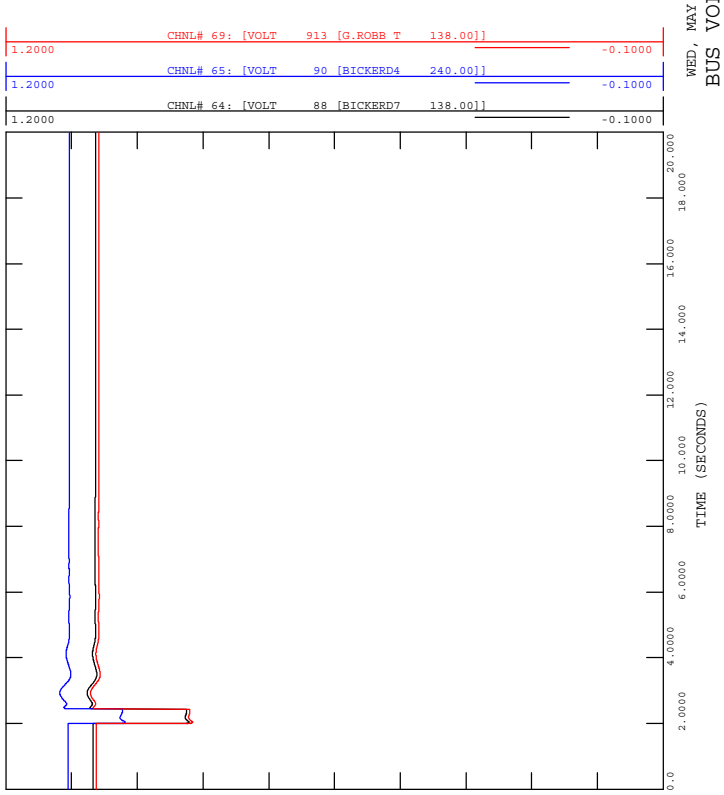


FIGURE D-2F
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out



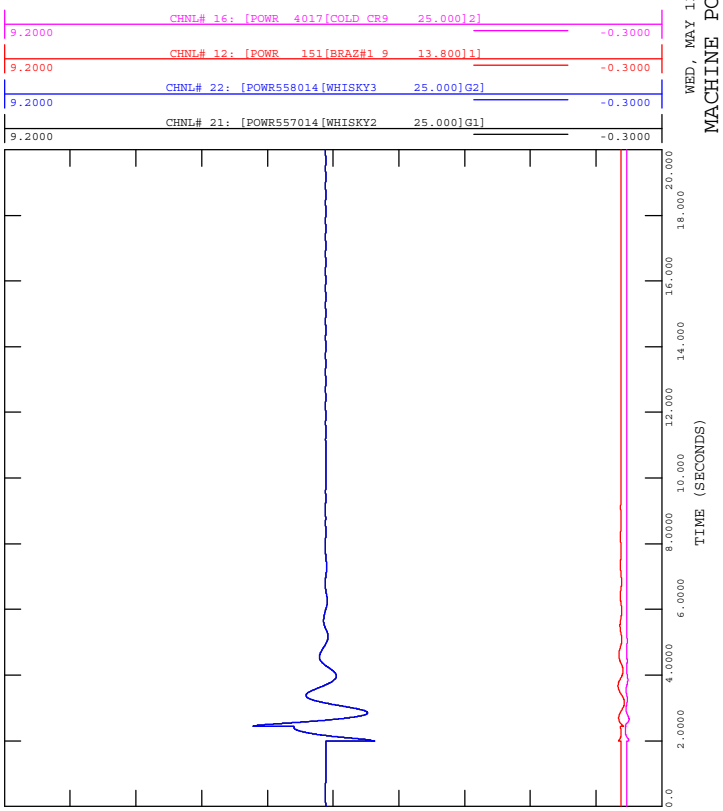
WED, MAY 13 2020 23:33
MACHINE POWER (MW)

FIGURE D-2H
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out



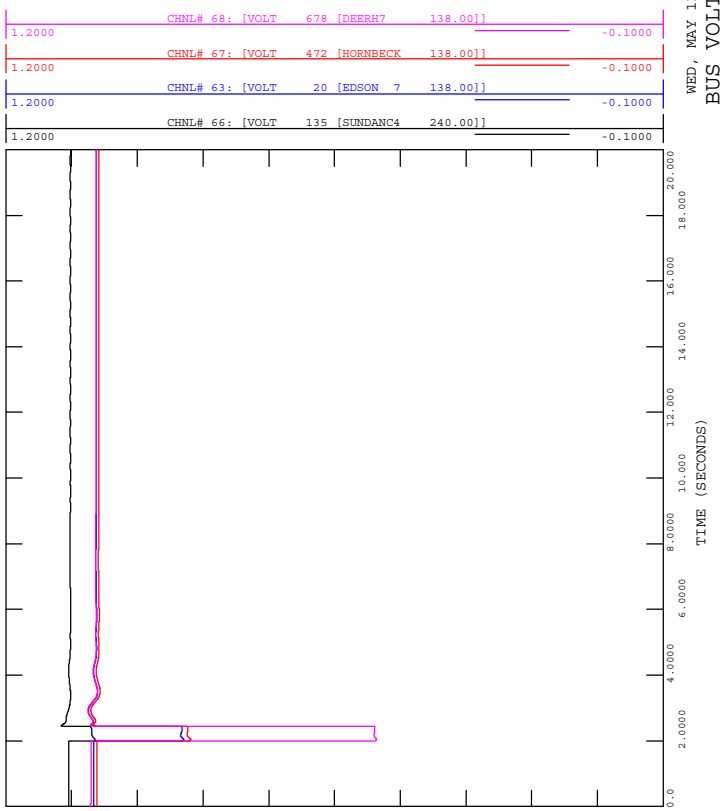
WED, MAY 13 2020 23:34
BUS VOLTAGE (PU)

FIGURE D-2E
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out



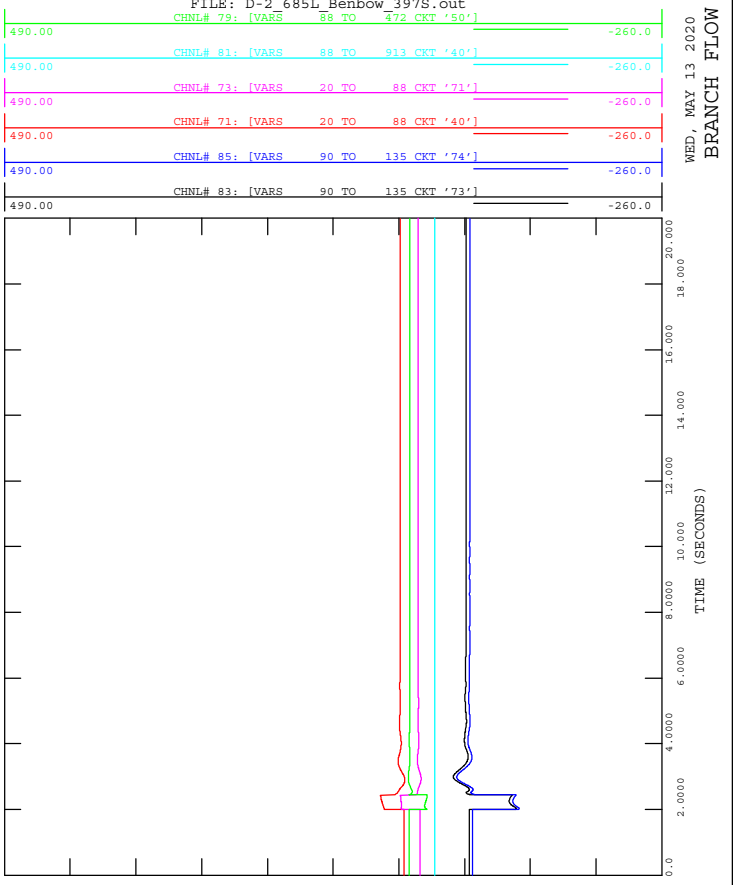
WED, MAY 13 2020 23:33
MACHINE POWER (MW)

FIGURE D-2G
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out



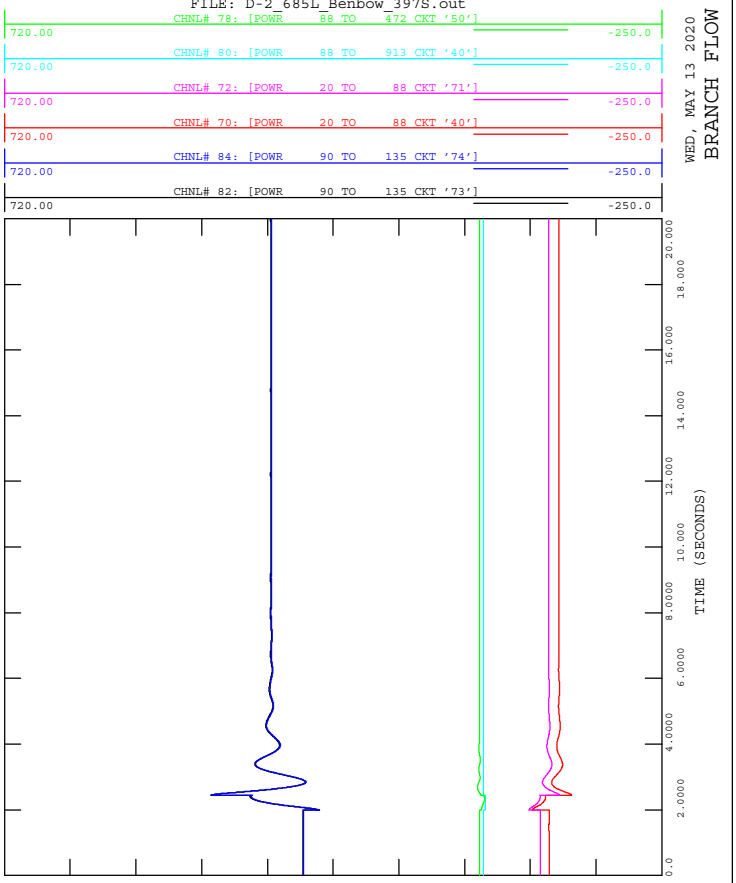
WED, MAY 13 2020 23:33
BUS VOLTAGE (PU)

FIGURE D-2J
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out



WED, MAY 13 2020 23:34
BRANCH FLOW (Q)

FIGURE D-2I
2022SP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-2_685L_Benbow_397S.out



WED, MAY 13 2020 23:34
BRANCH FLOW (P)

FIGURE D-3B
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out

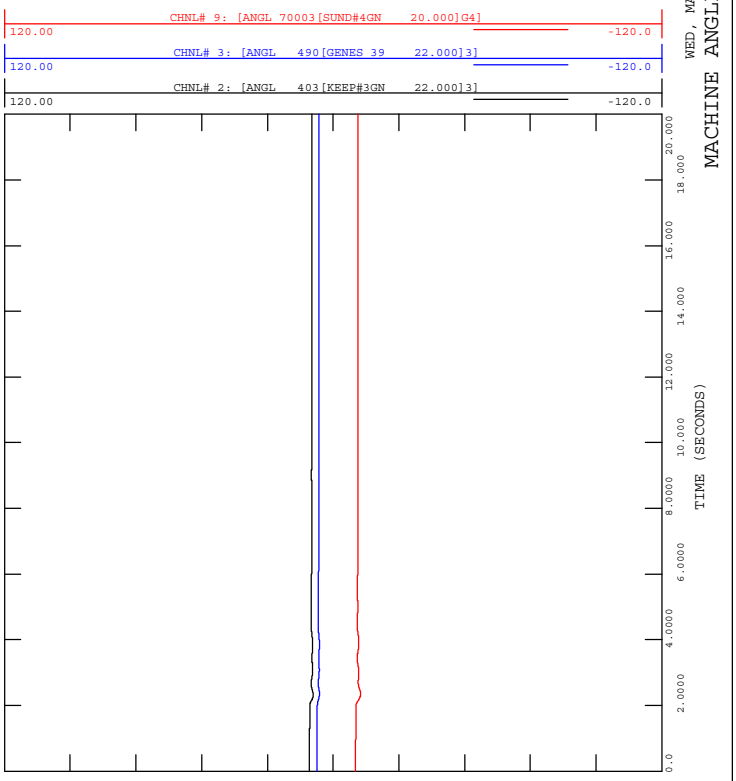


FIGURE D-3D
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out

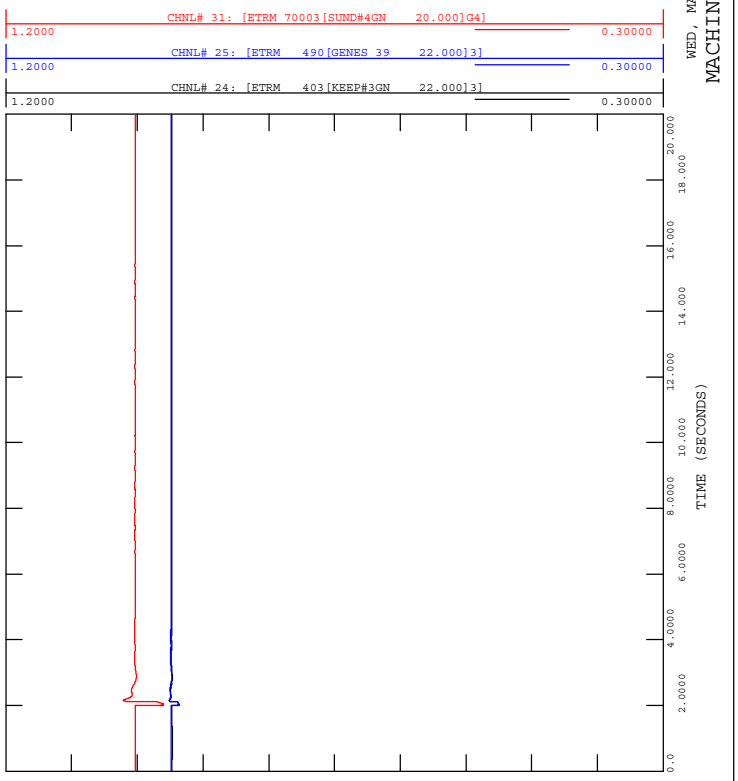


FIGURE D-3A
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out

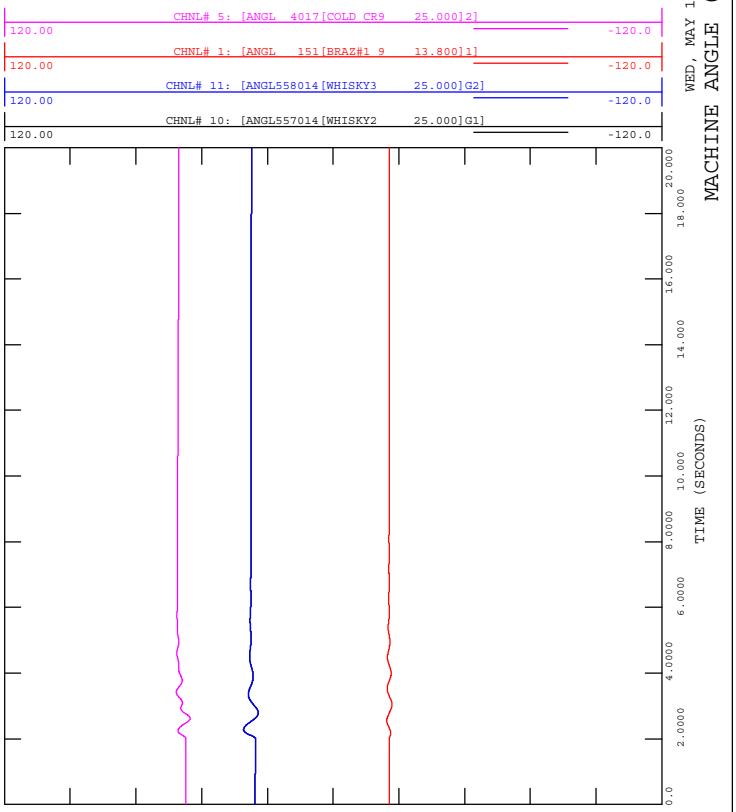


FIGURE D-3C
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out

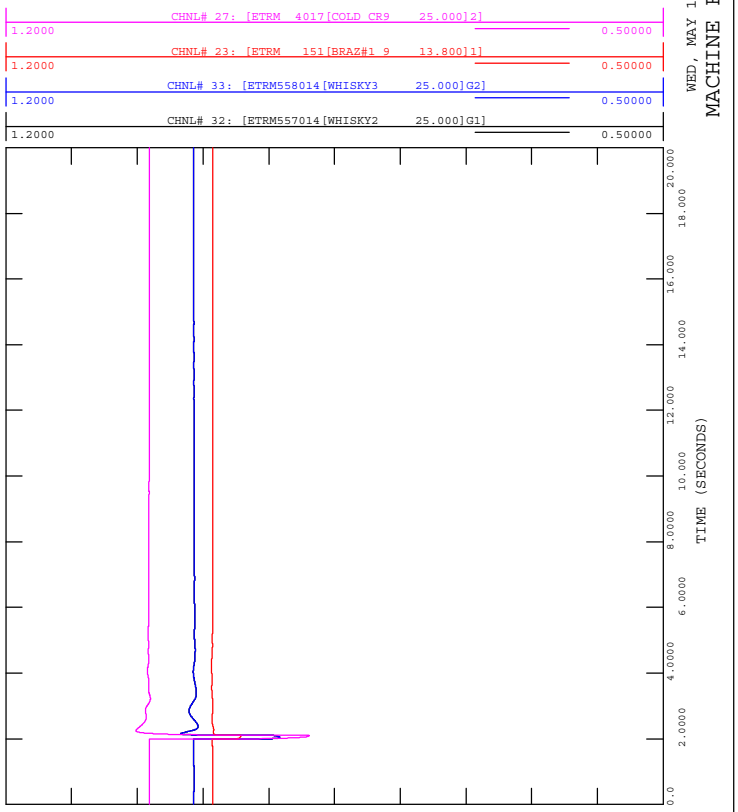


FIGURE D-3F
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out

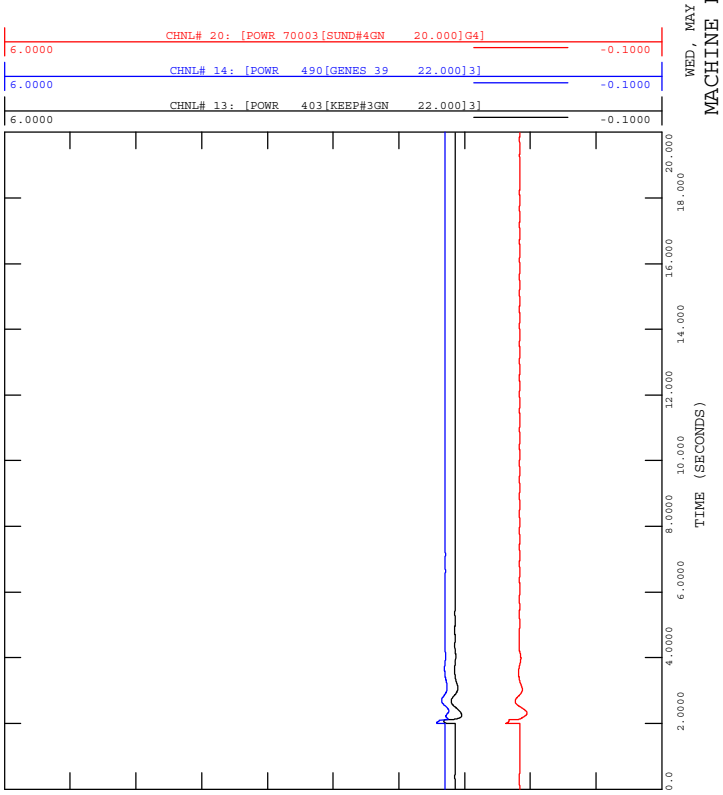


FIGURE D-3H
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out

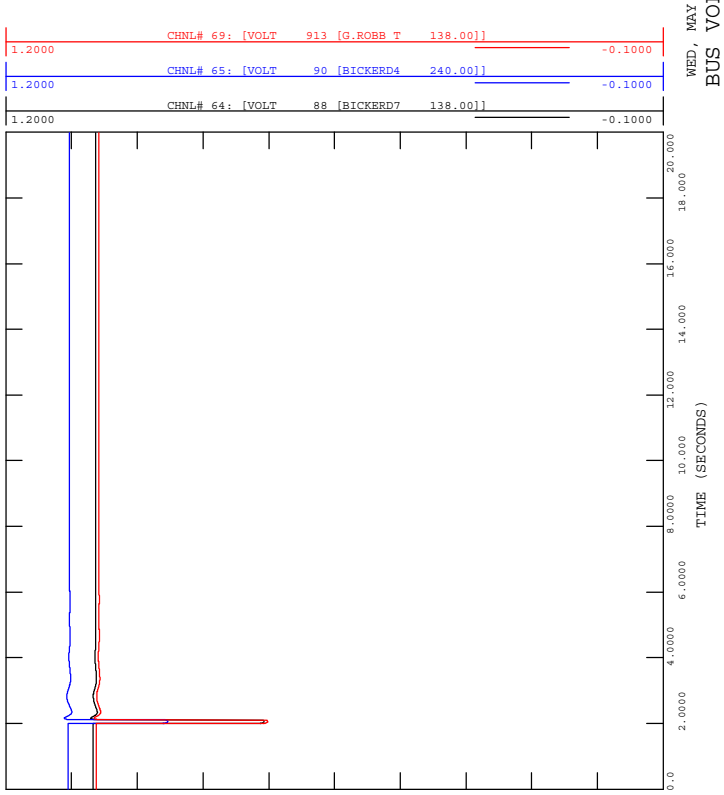


FIGURE D-3E
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out

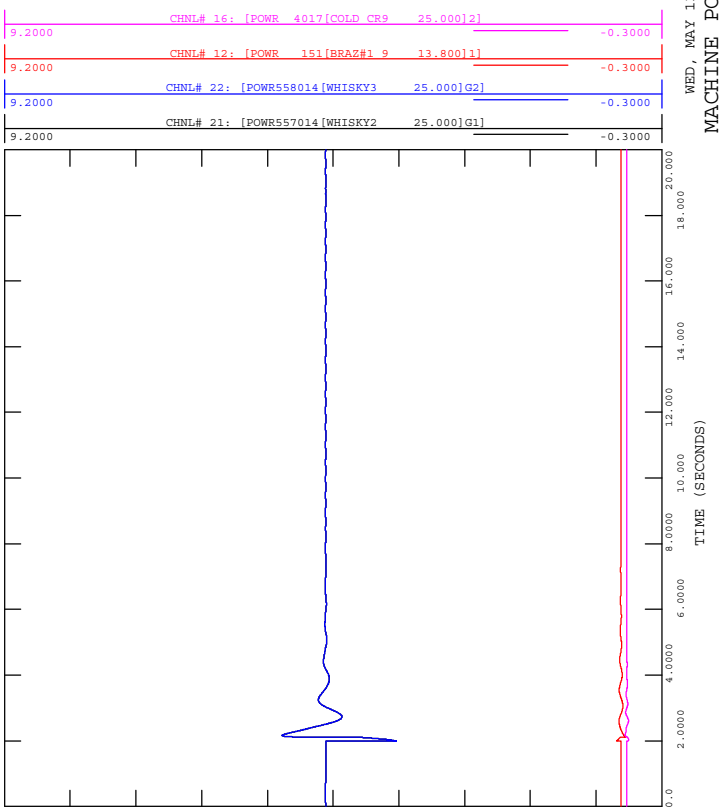


FIGURE D-3G
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out

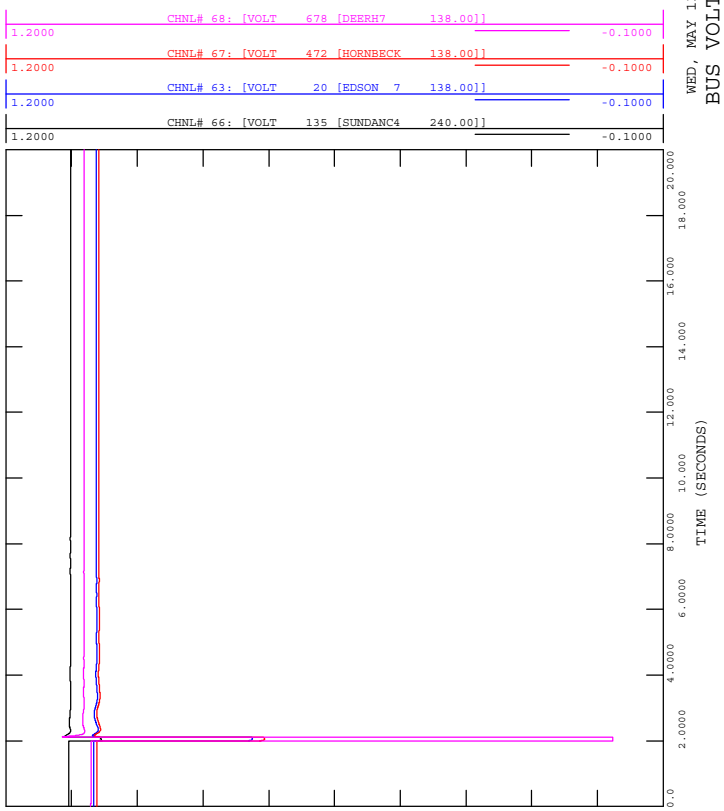
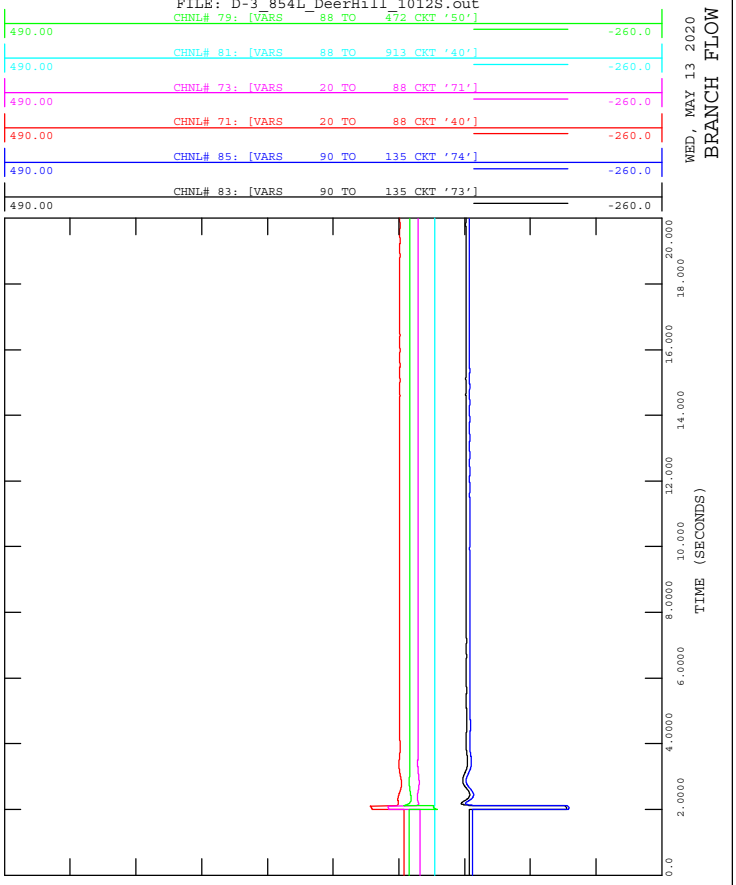
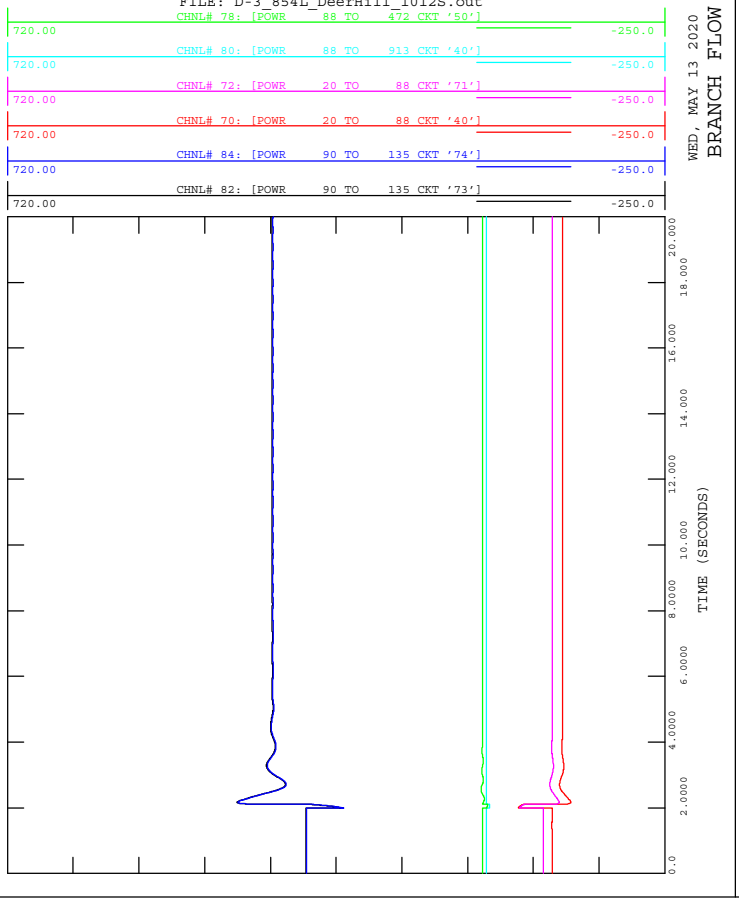


FIGURE D-3J
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out



WED, MAY 13 2020 23:34
BRANCH FLOW (Q)

FIGURE D-3I
2022SP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-3_854L_DeerHill_1012S.out



WED, MAY 13 2020 23:34
BRANCH FLOW (P)

FIGURE D-4B
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out

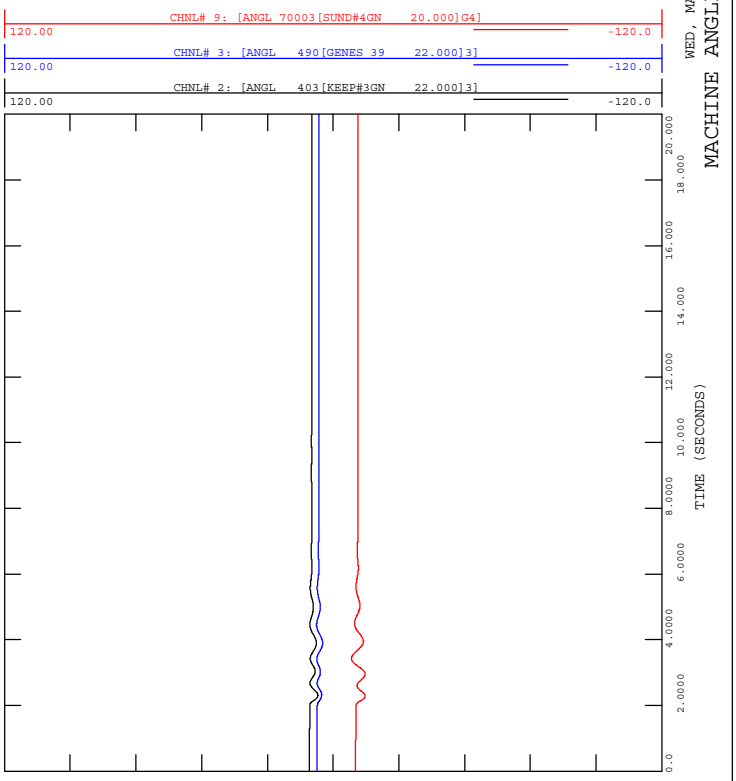


FIGURE D-4D
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out

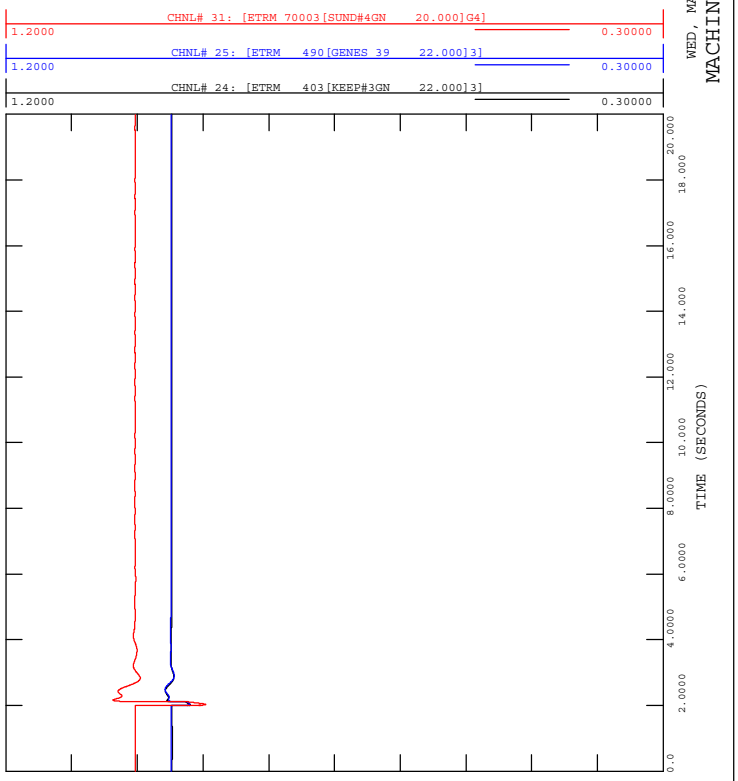


FIGURE D-4A
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out

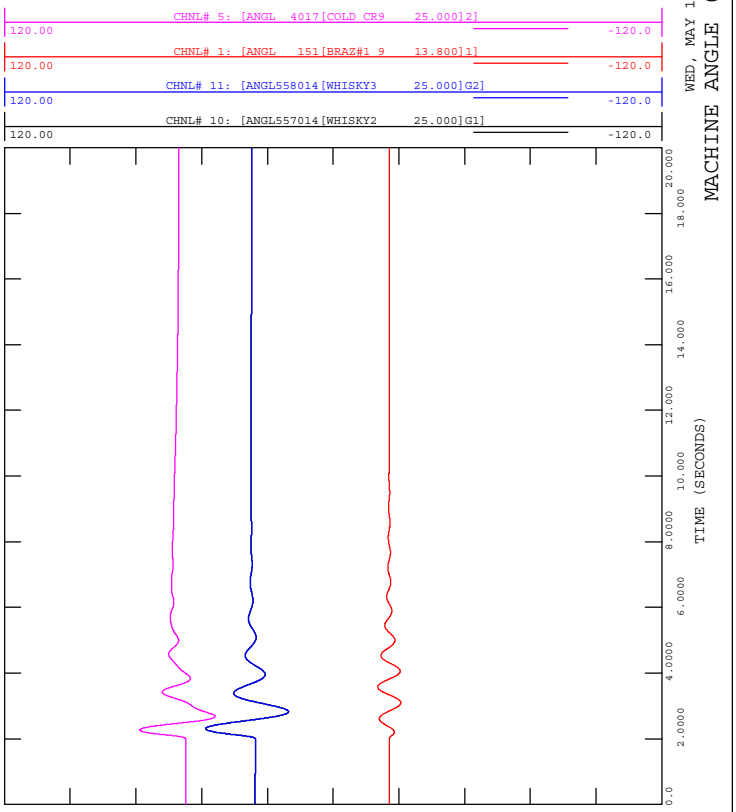


FIGURE D-4C
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out

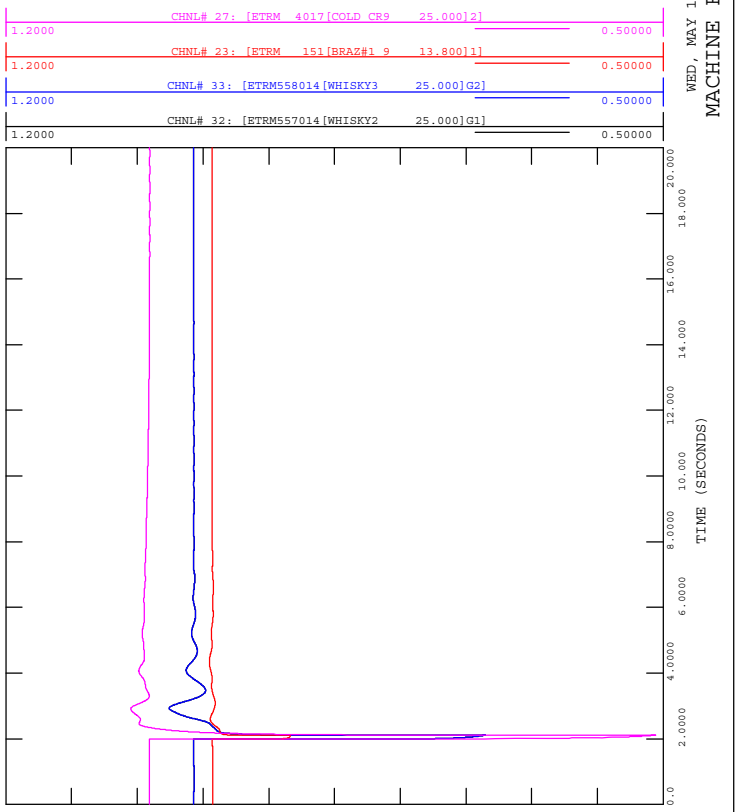
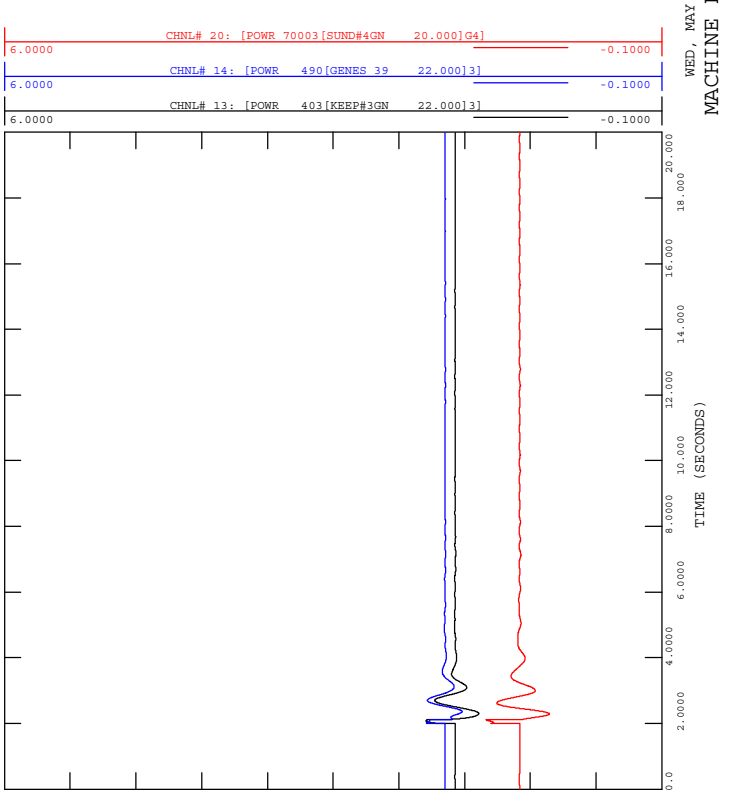


FIGURE D-4F
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out



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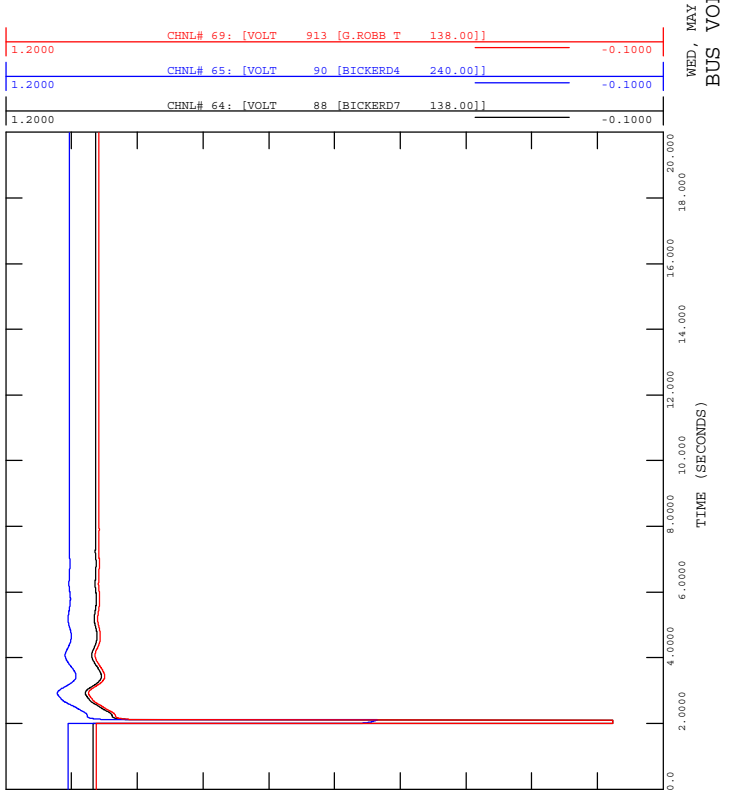
MACHINE POWER (MW)

FIGURE D-4H
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out



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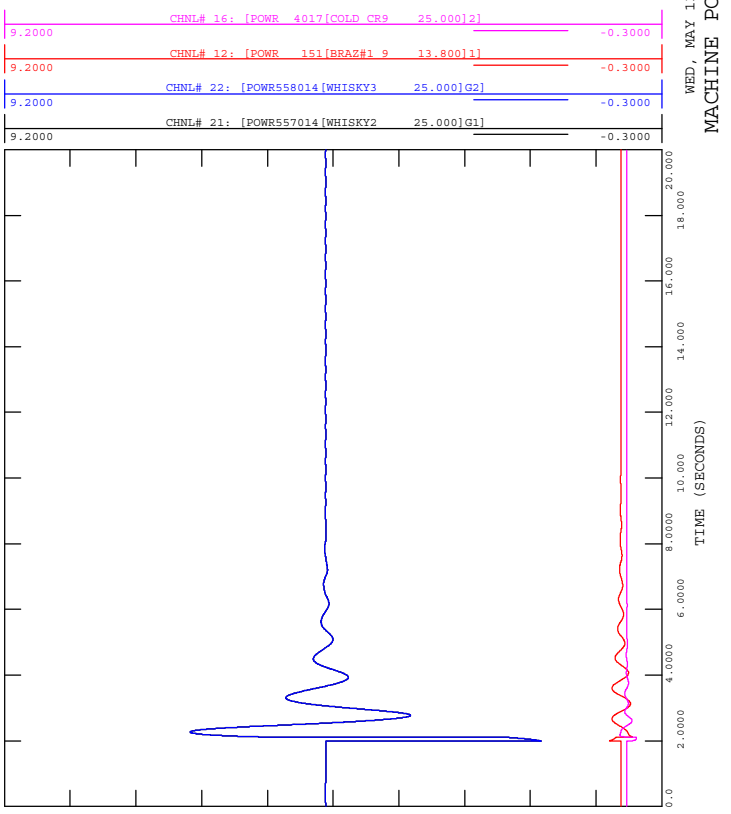
BUS VOLTAGE (PU)

FIGURE D-4E
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out



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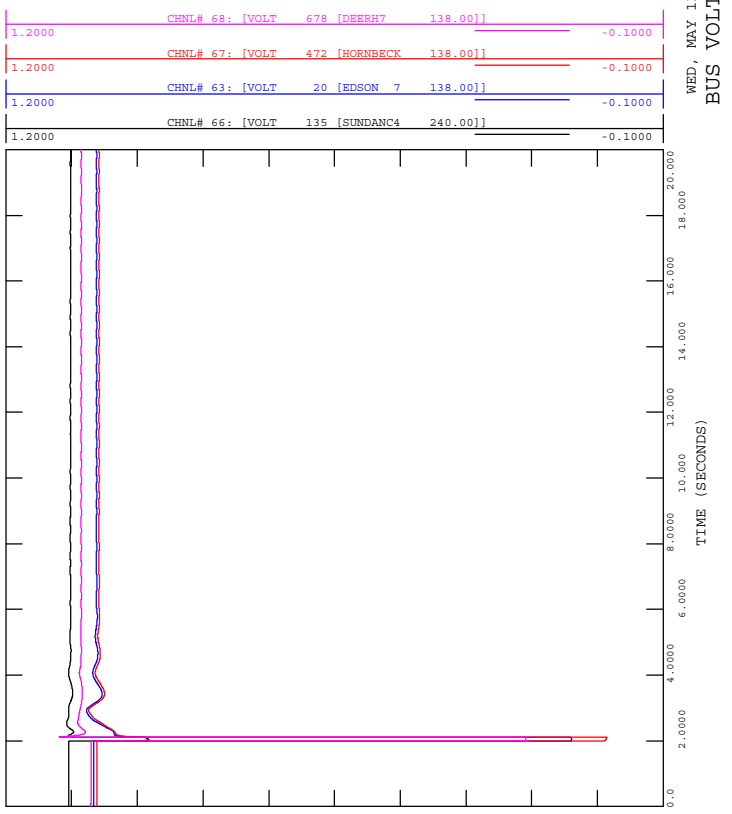
MACHINE POWER (MW)

FIGURE D-4G
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out



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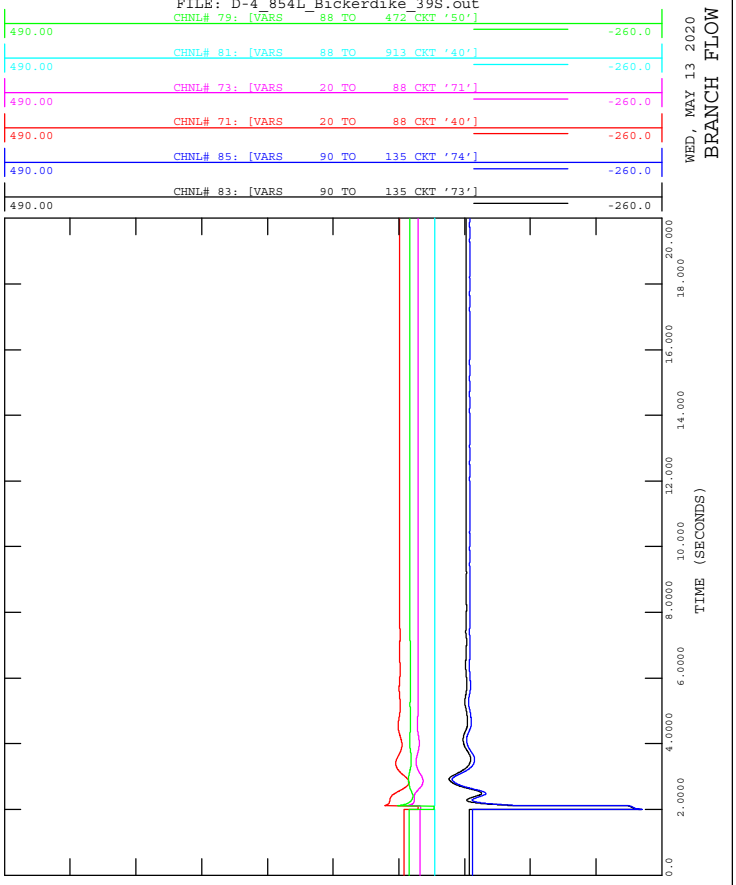
BUS VOLTAGE (PU)

FIGURE D-4J
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out



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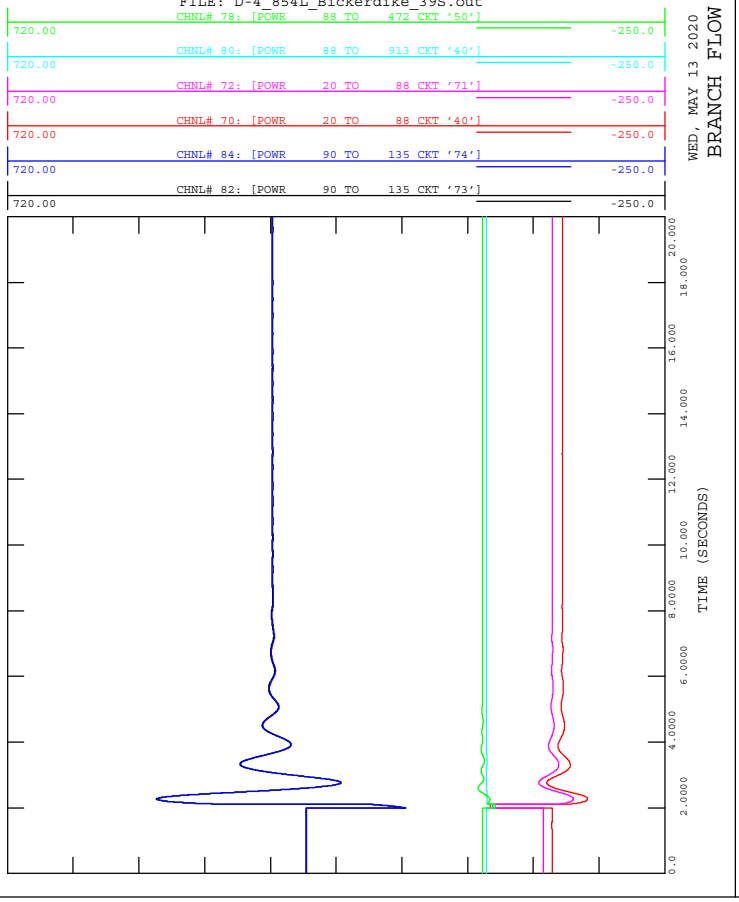
BRANCH FLOW (Q)

FIGURE D-4I
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-4_854L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-5B
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out

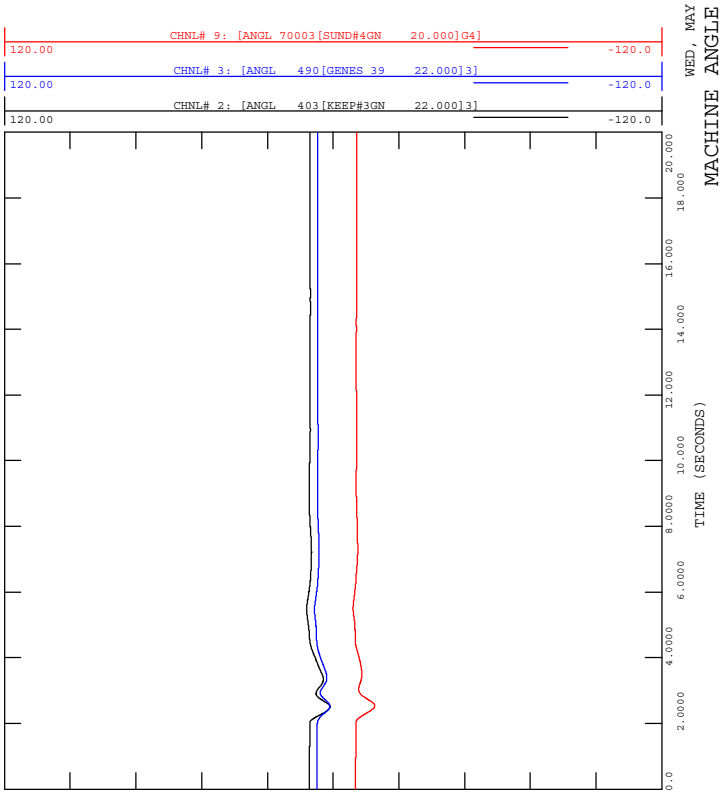


FIGURE D-5D
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out

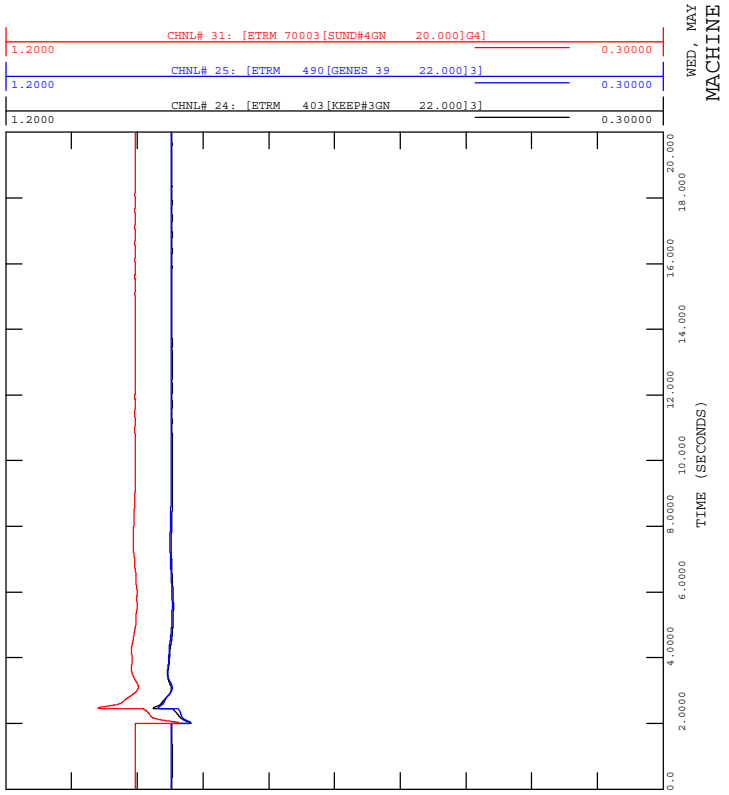


FIGURE D-5A
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out

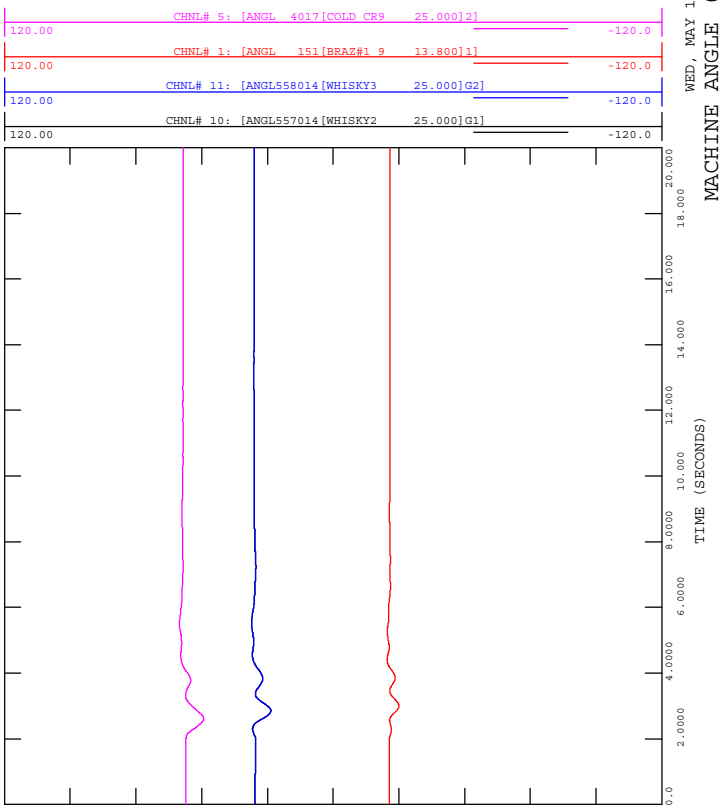


FIGURE D-5C
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out

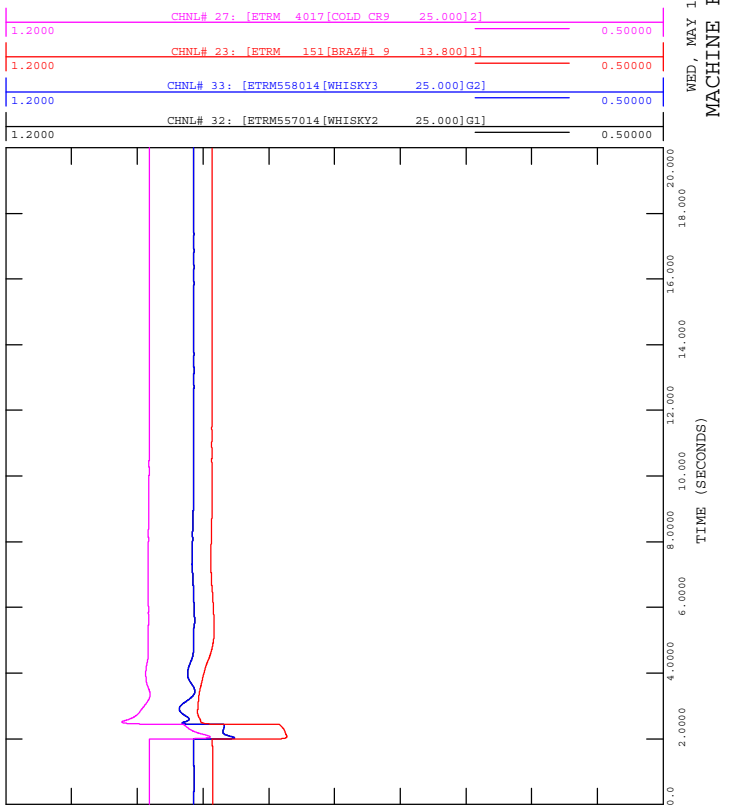
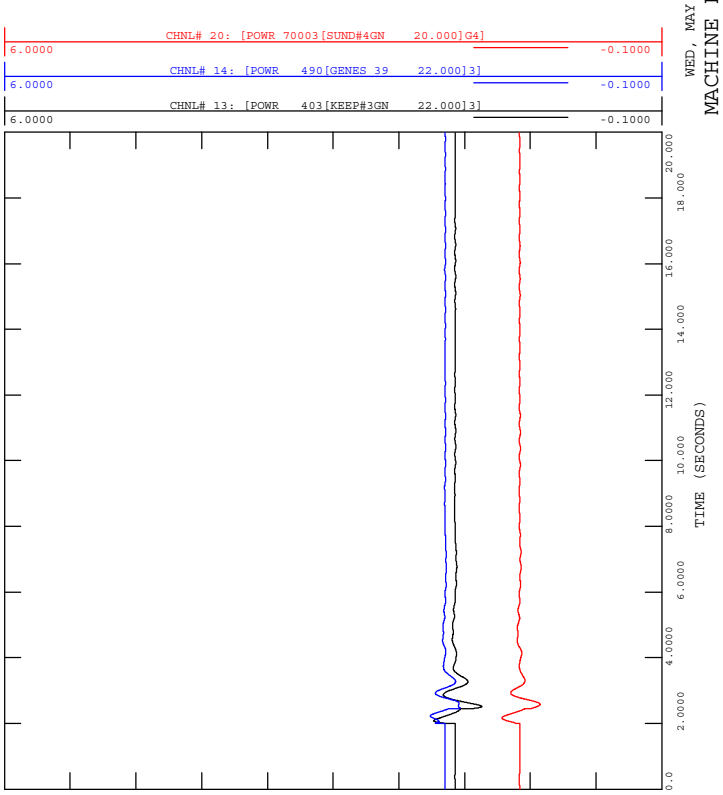


FIGURE D-5F
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out



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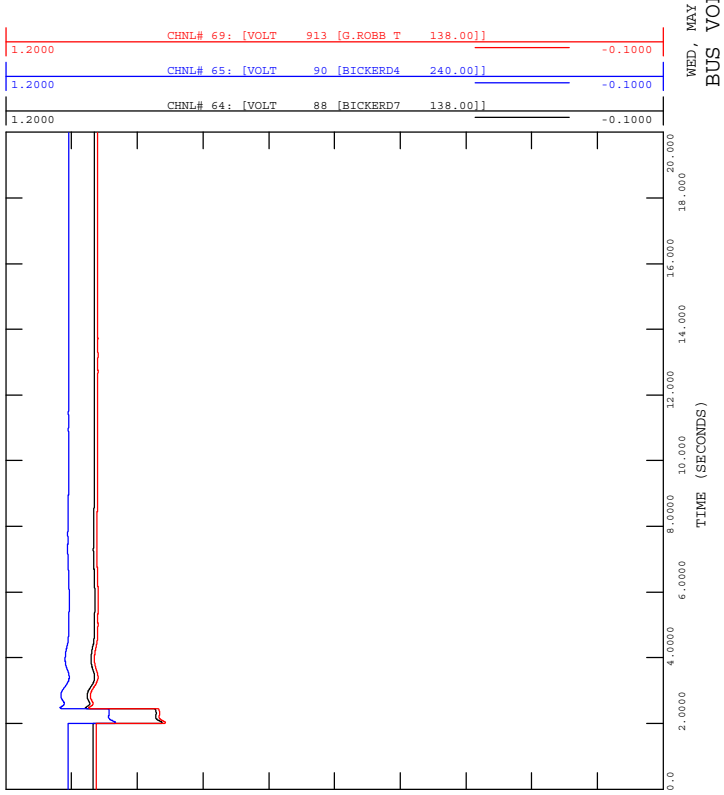
MACHINE POWER (MW)

FIGURE D-5H
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out



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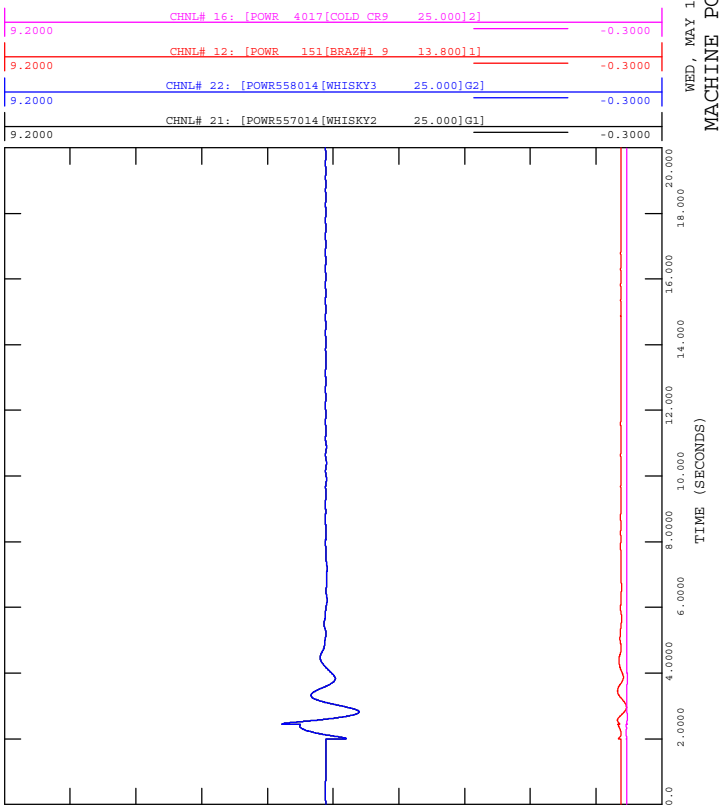
BUS VOLTAGE (PU)

FIGURE D-5E
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out



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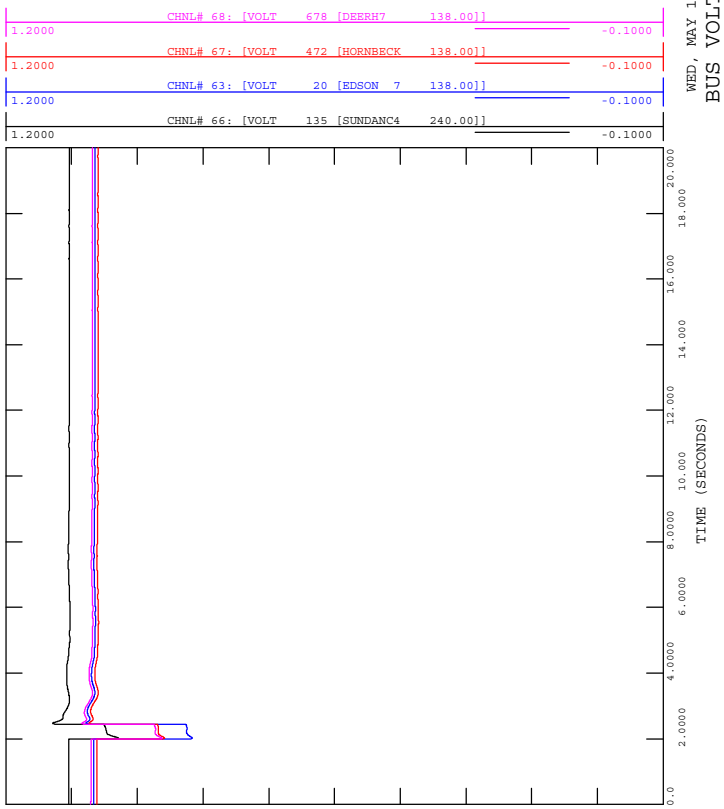
MACHINE POWER (MW)

FIGURE D-5G
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out



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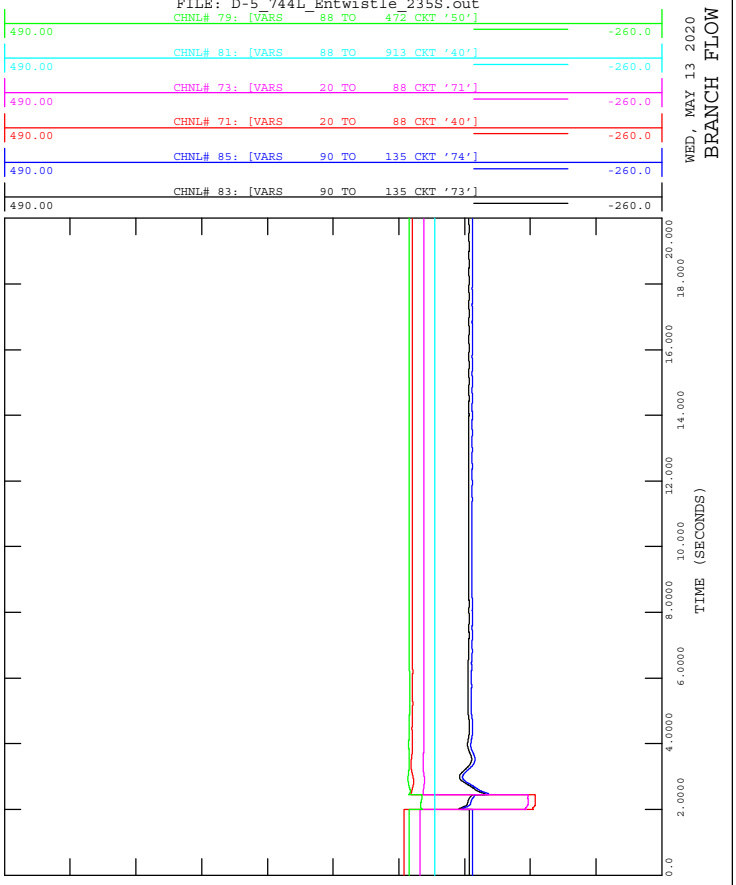
BUS VOLTAGE (PU)

FIGURE D-5J
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out



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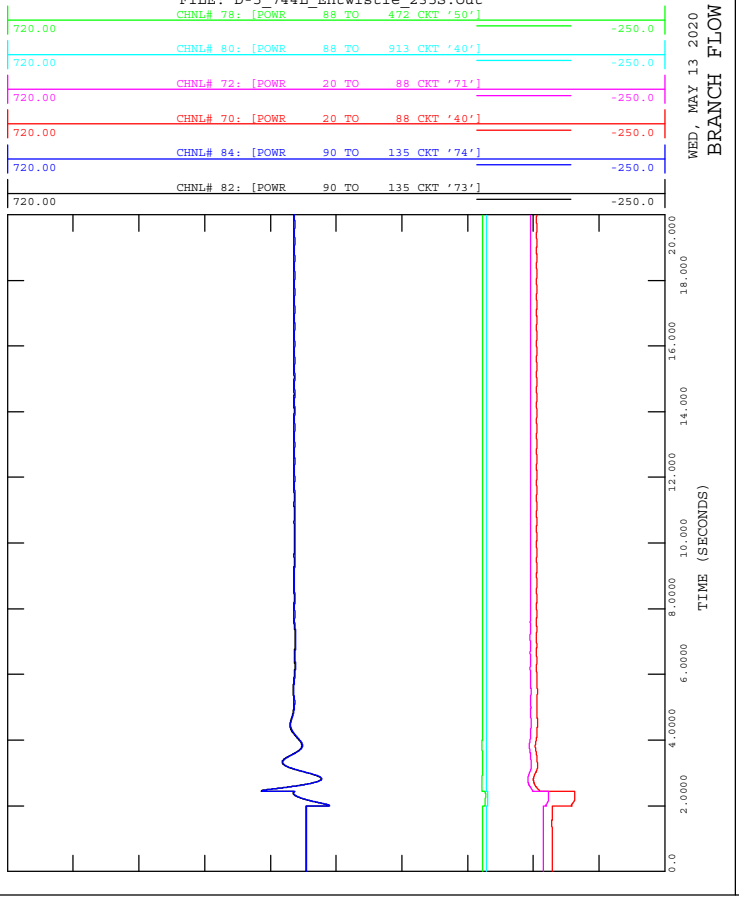
BRANCH FLOW (Q)

FIGURE D-5I
2022SP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-5_744L_Entwistle_235S.out



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BRANCH FLOW (P)

FIGURE D-6B
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out

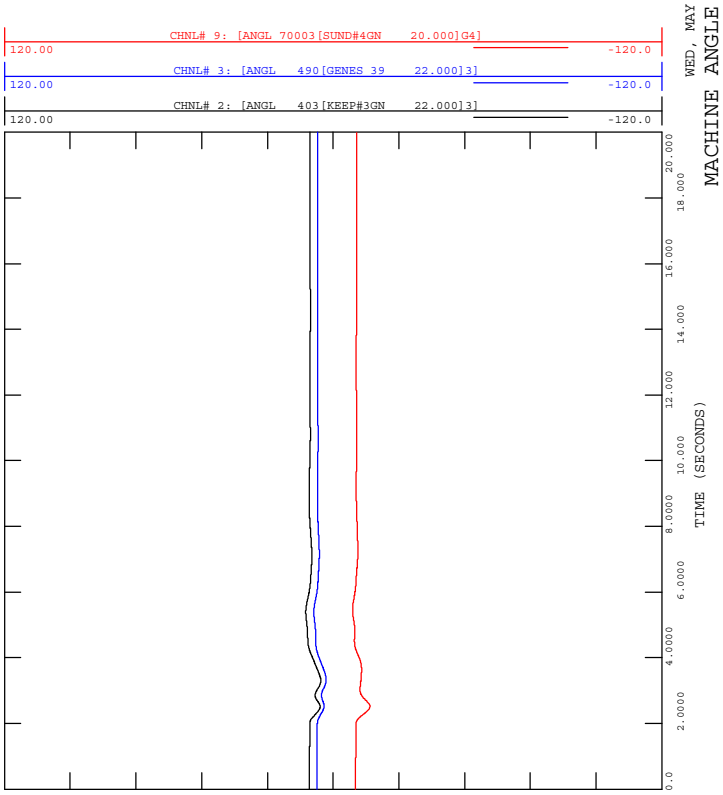


FIGURE D-6D
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out

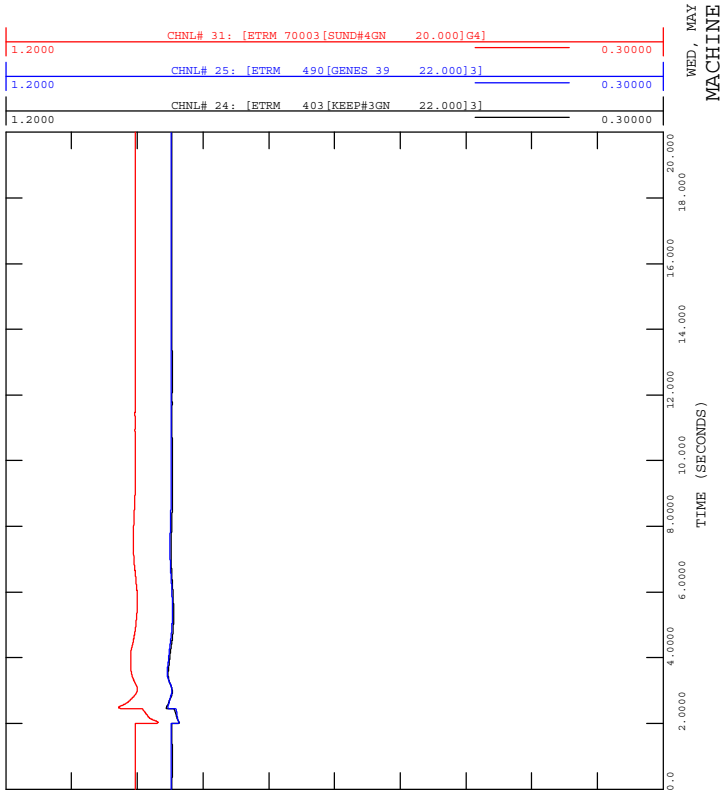


FIGURE D-6A
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out

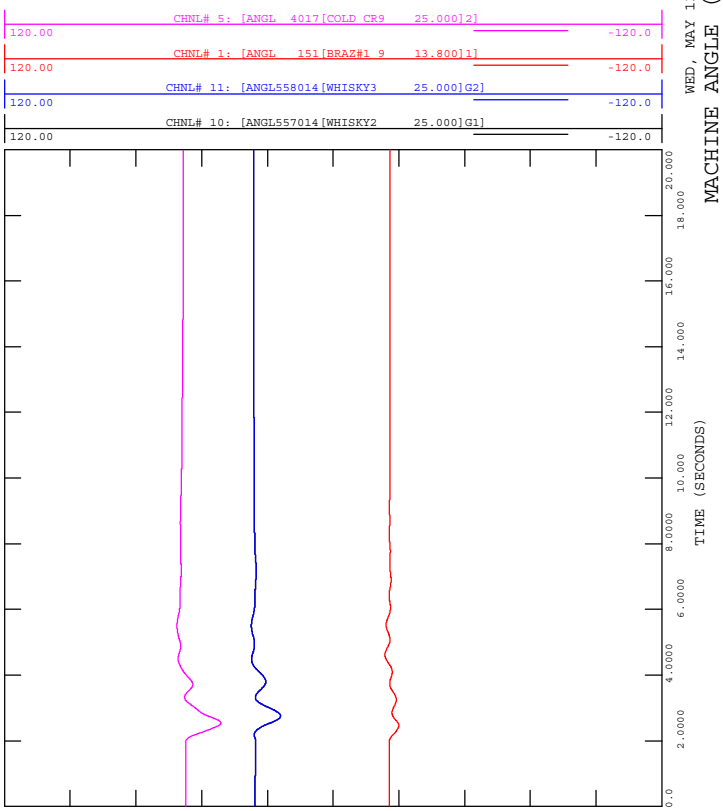


FIGURE D-6C
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out

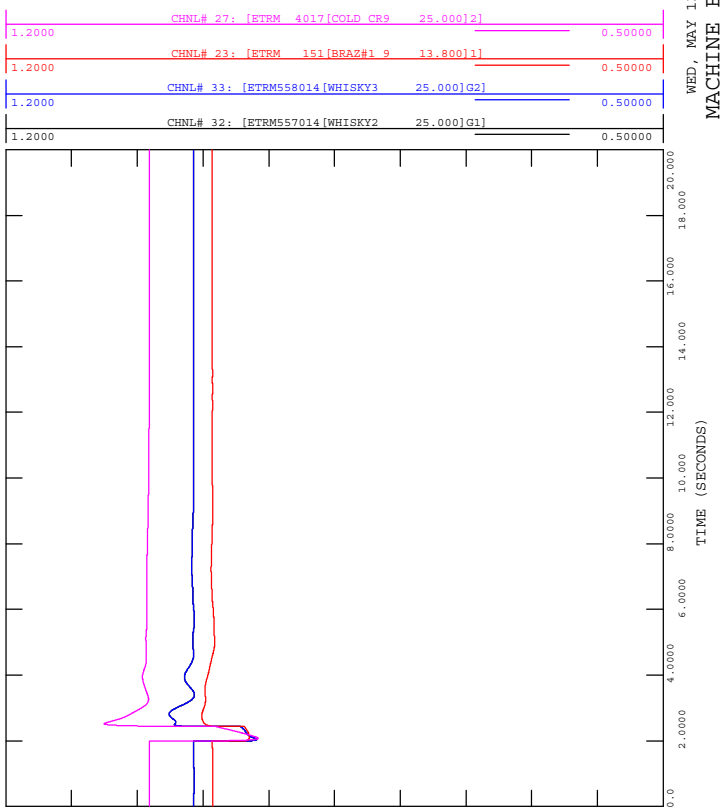
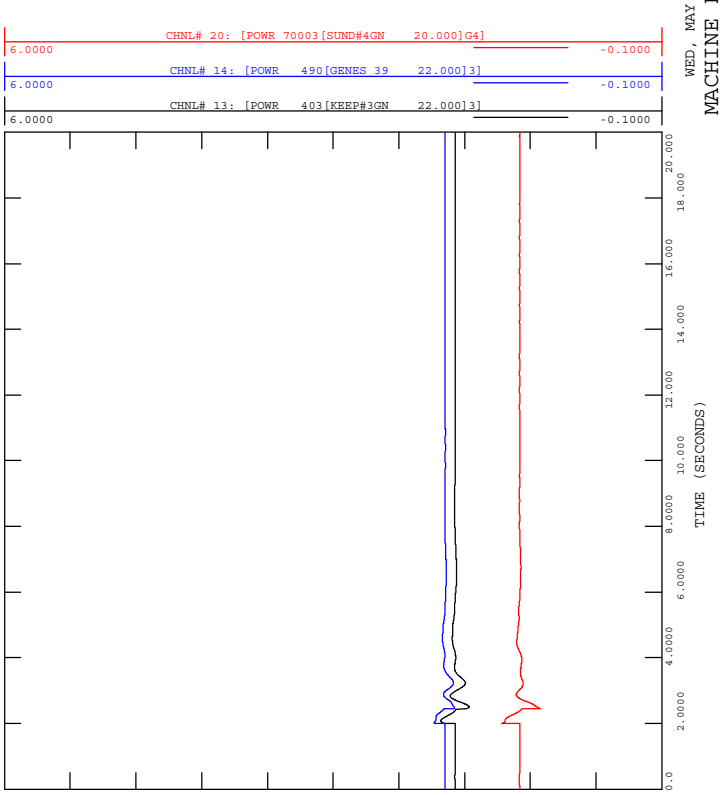


FIGURE D-6F
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out



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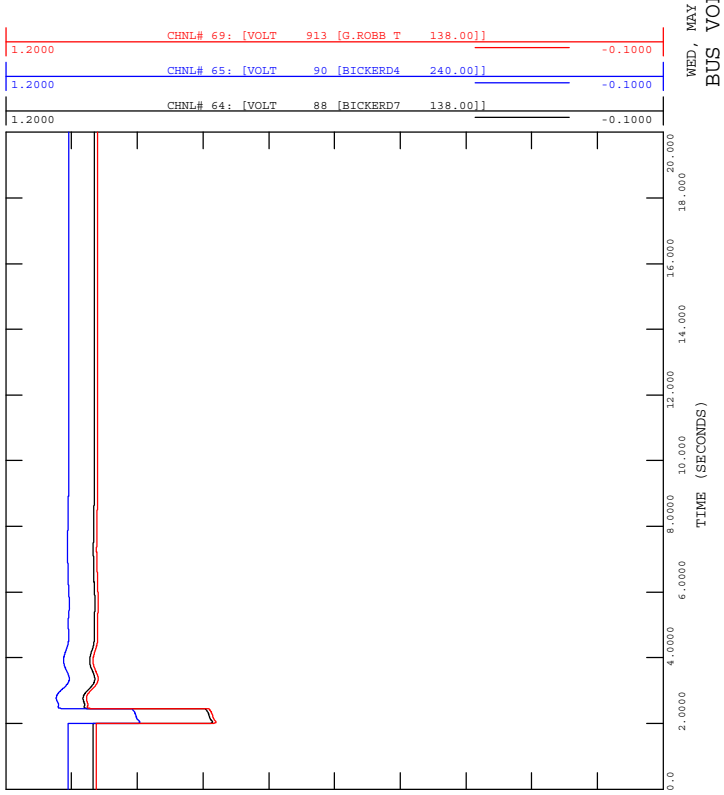
MACHINE POWER (MW)

FIGURE D-6H
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out



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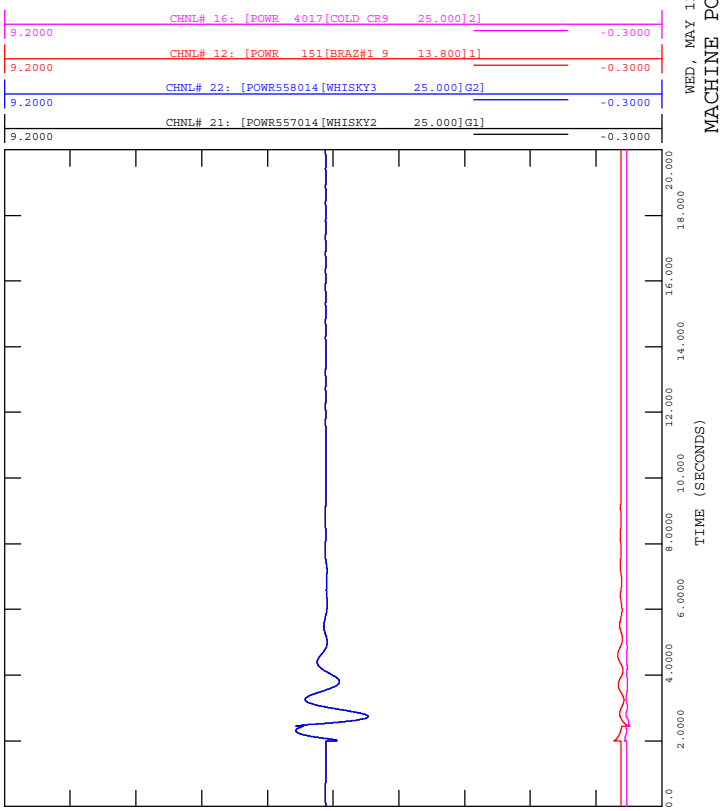
BUS VOLTAGE (PU)

FIGURE D-6E
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out



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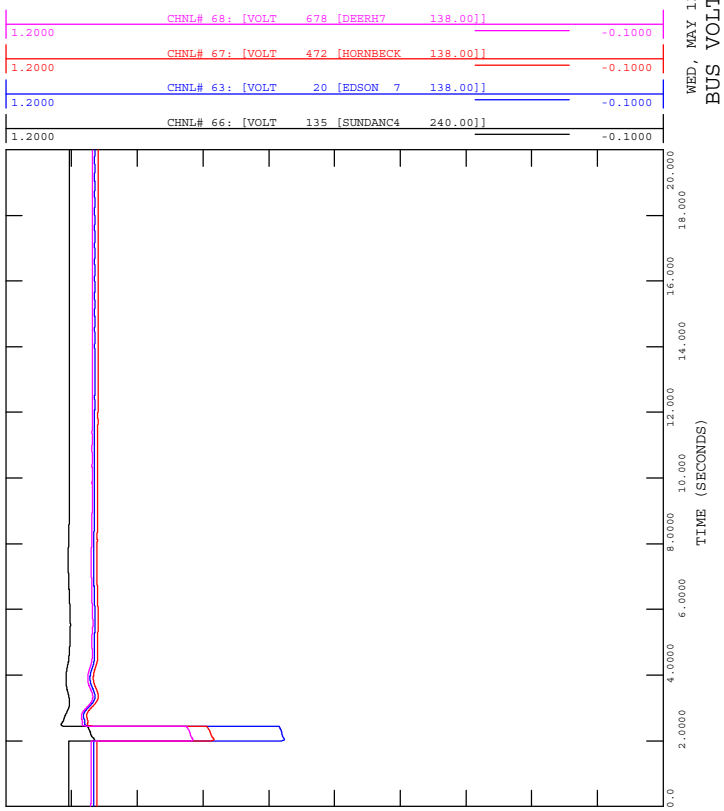
MACHINE POWER (MW)

FIGURE D-6G
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out



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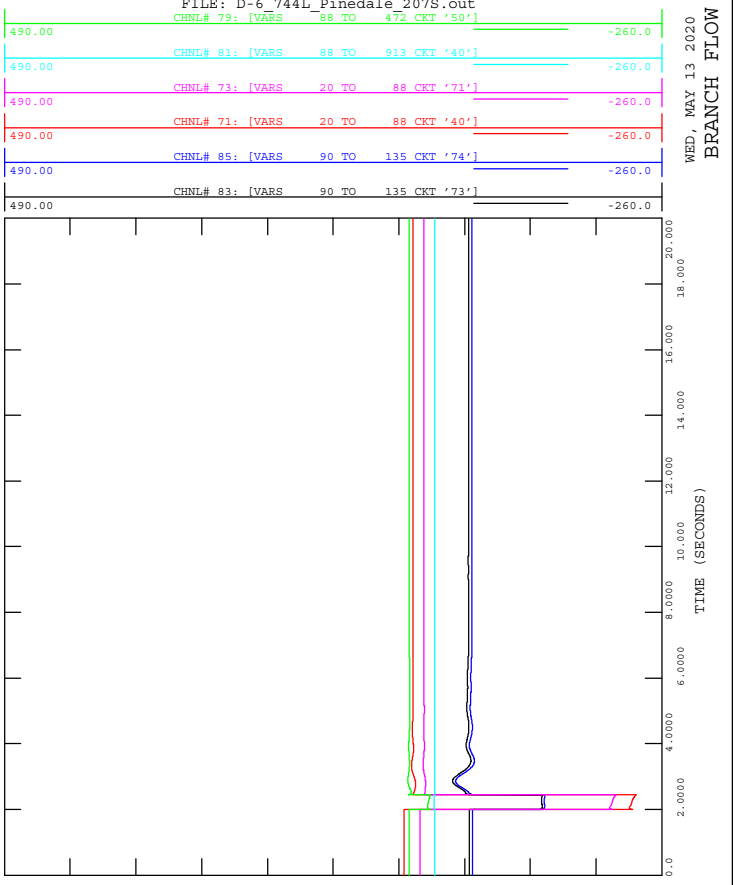
BUS VOLTAGE (PU)

FIGURE D-6J
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out



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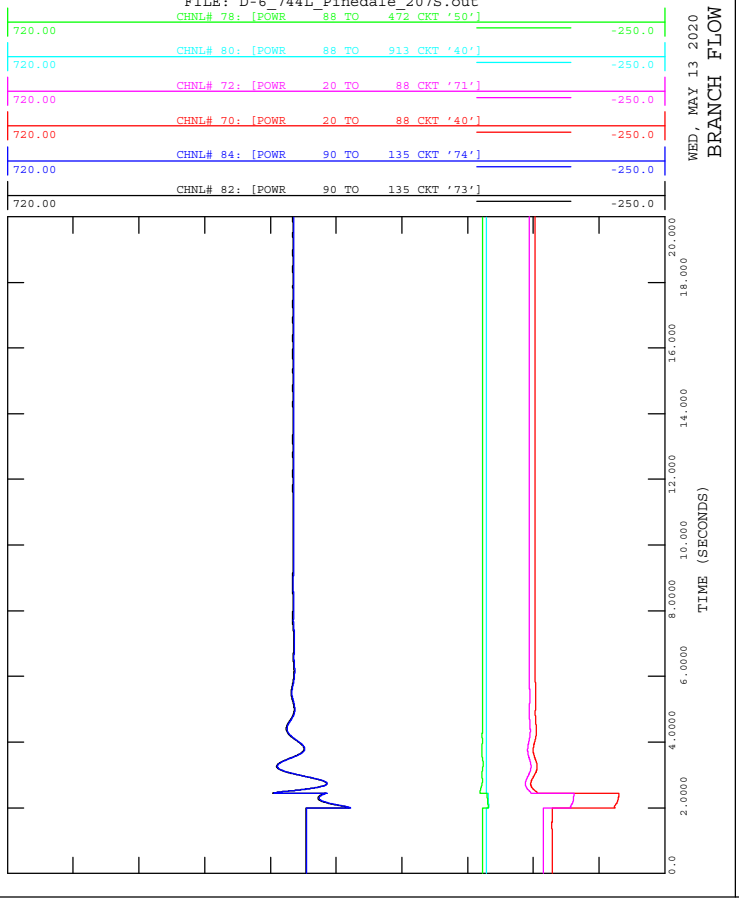
BRANCH FLOW (Q)

FIGURE D-6I
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-6_744L_Pinedale_207S.out



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BRANCH FLOW (P)

FIGURE D-7B
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out

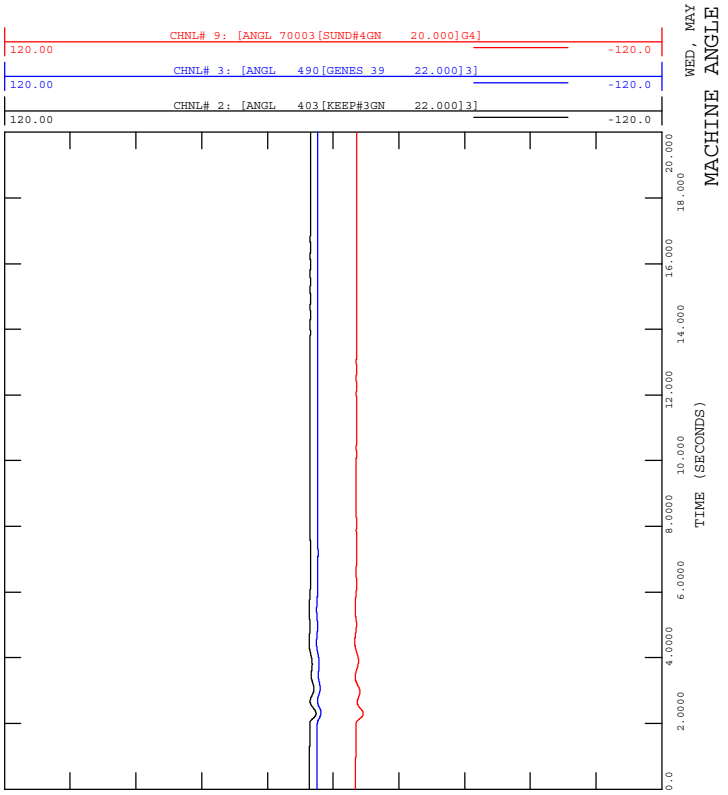


FIGURE D-7D
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out

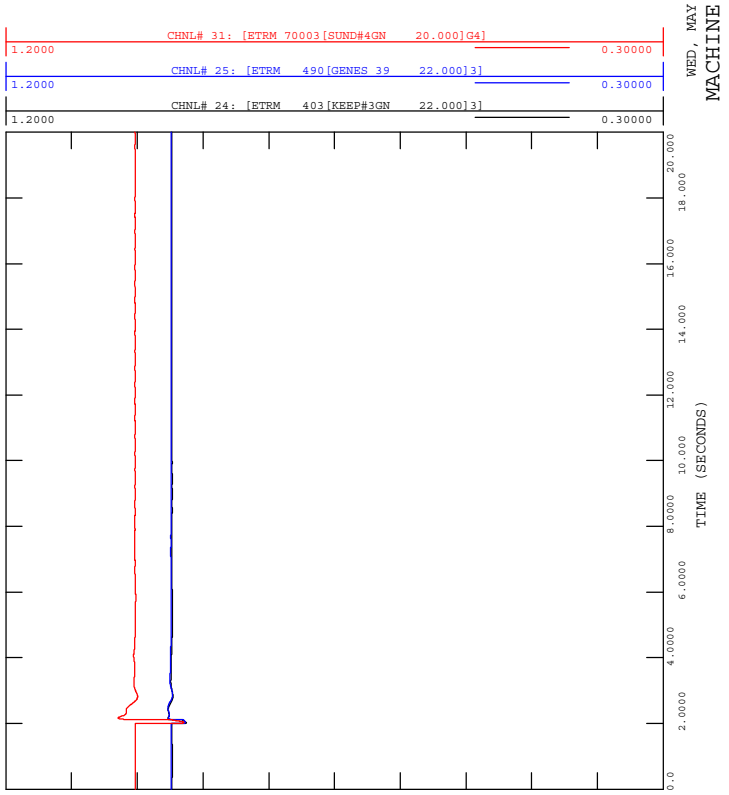


FIGURE D-7A
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out

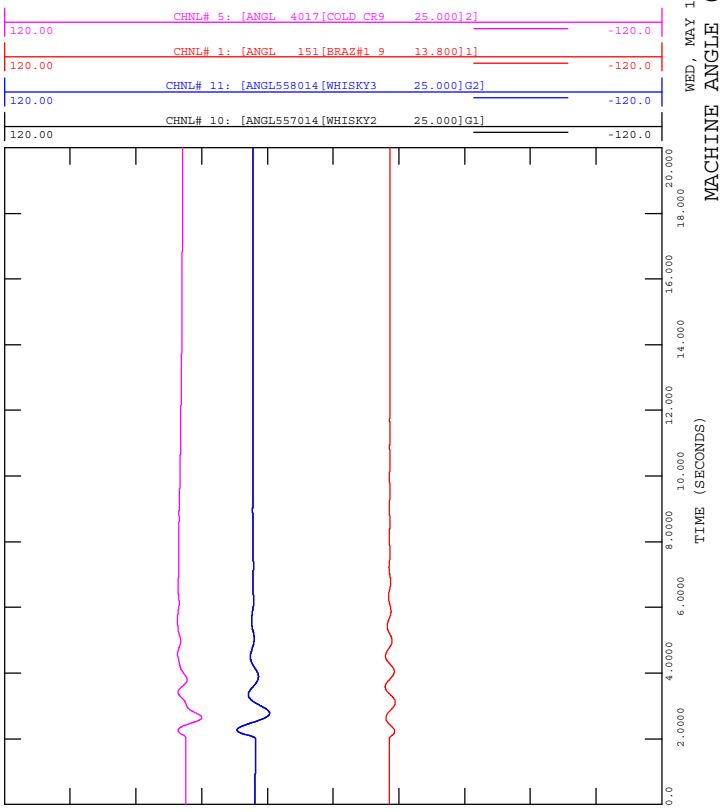


FIGURE D-7C
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out

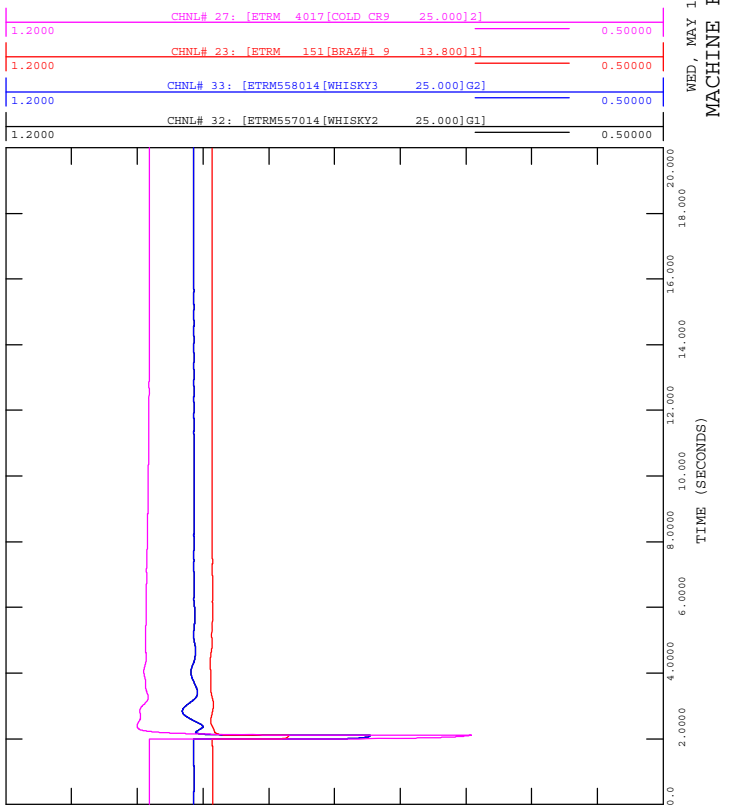
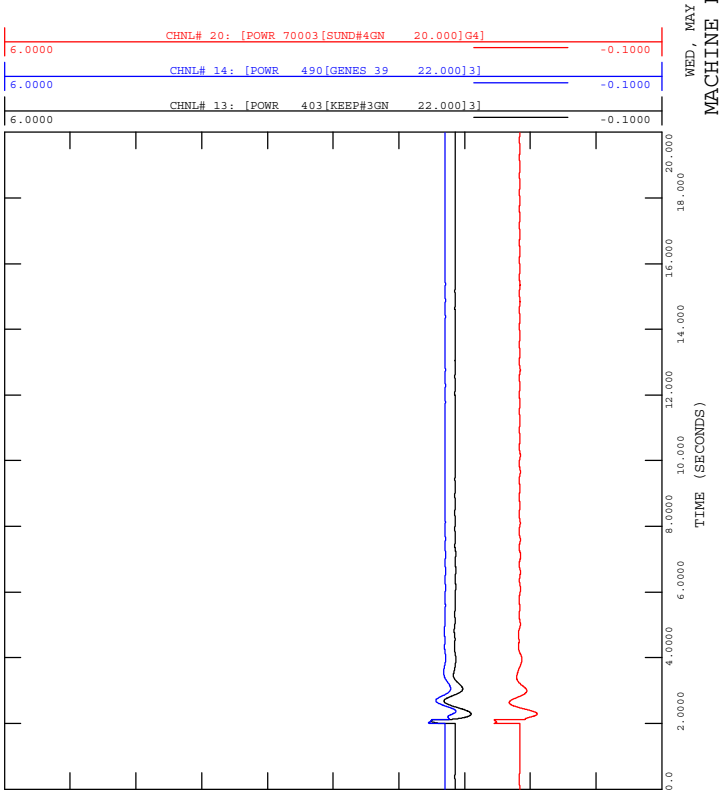


FIGURE D-7F
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out



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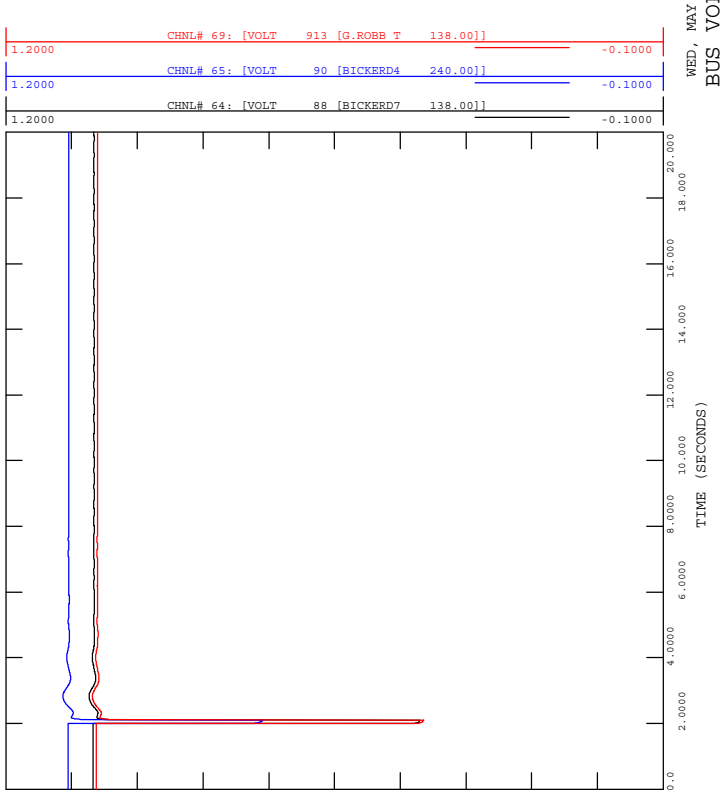
MACHINE POWER (MW)

FIGURE D-7H
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out



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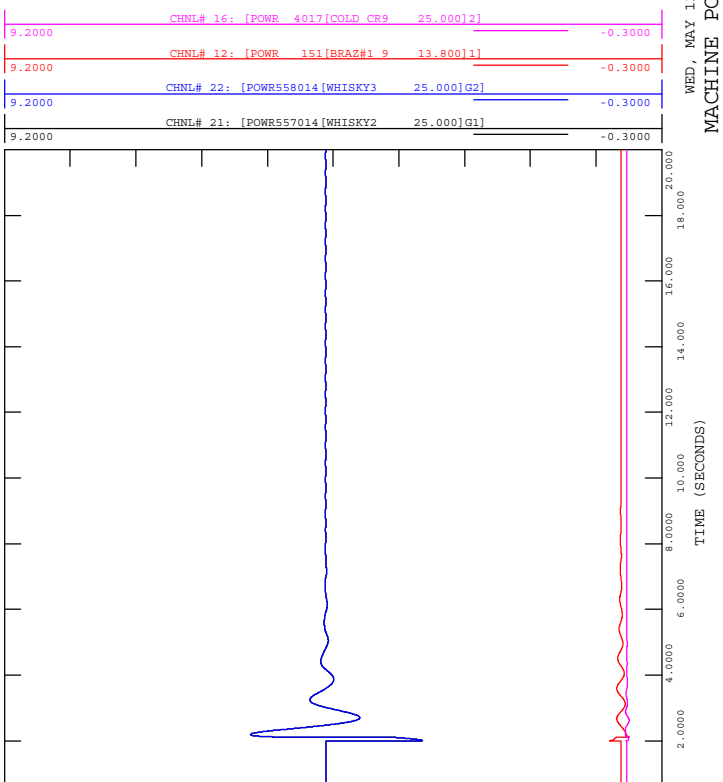
BUS VOLTAGE (PU)

FIGURE D-7E
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out



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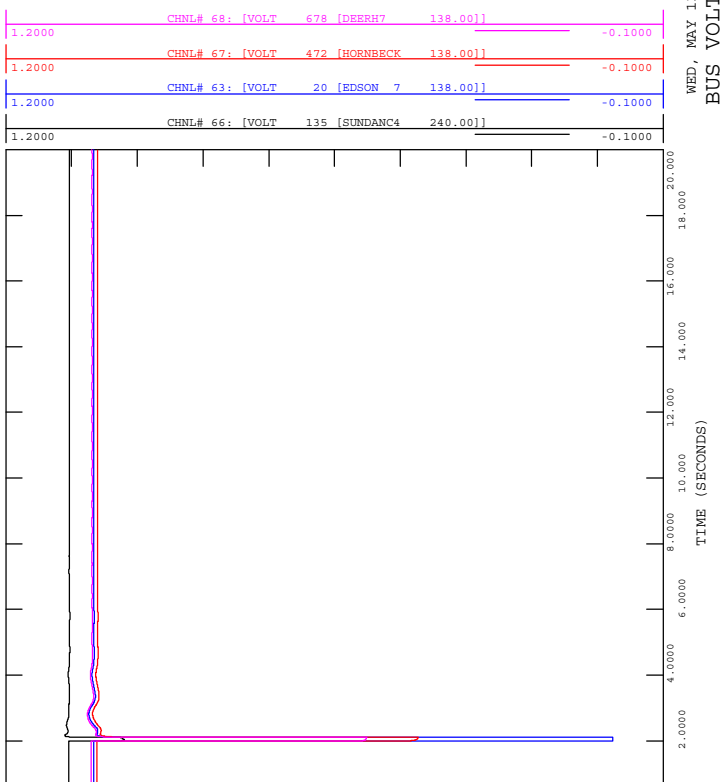
MACHINE POWER (MW)

FIGURE D-7G
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out



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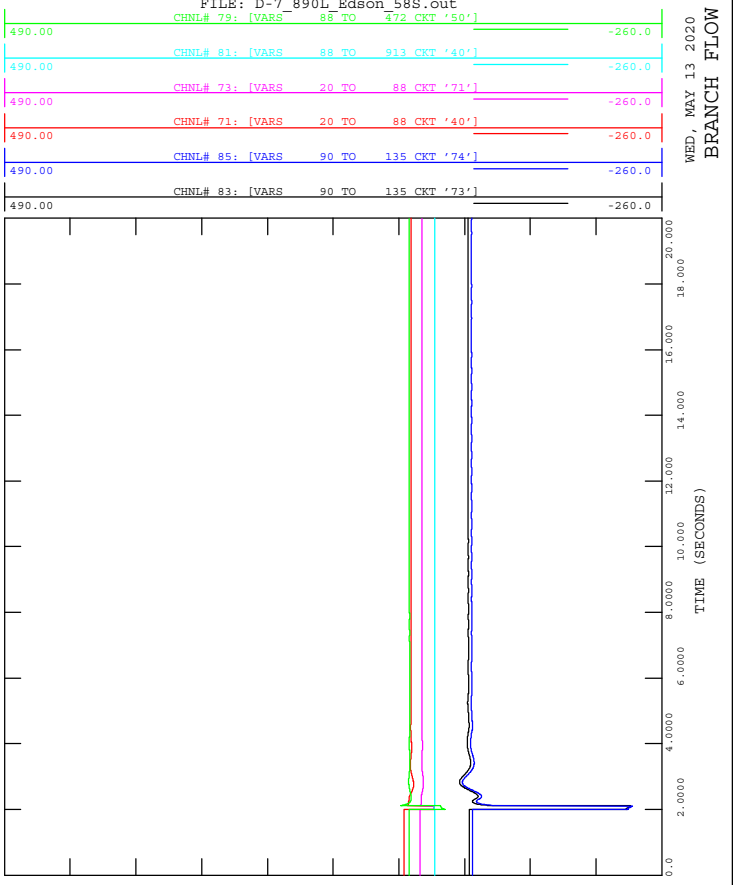
BUS VOLTAGE (PU)

FIGURE D-7J
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out



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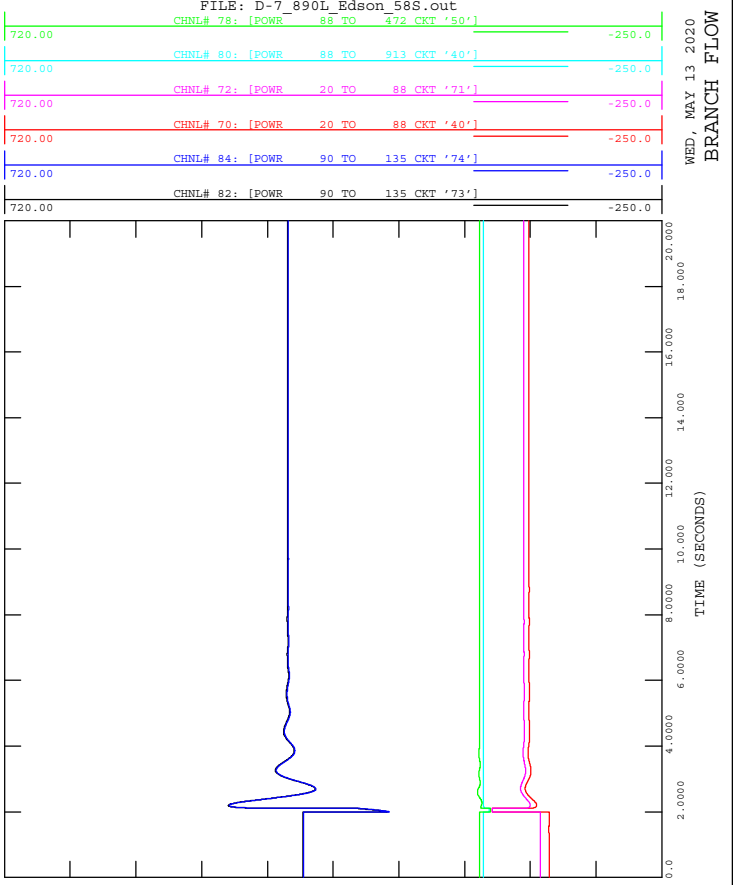
BRANCH FLOW (Q)

FIGURE D-7I
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-7_890L_Edson_58S.out



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BRANCH FLOW (P)

FIGURE D-8B
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out

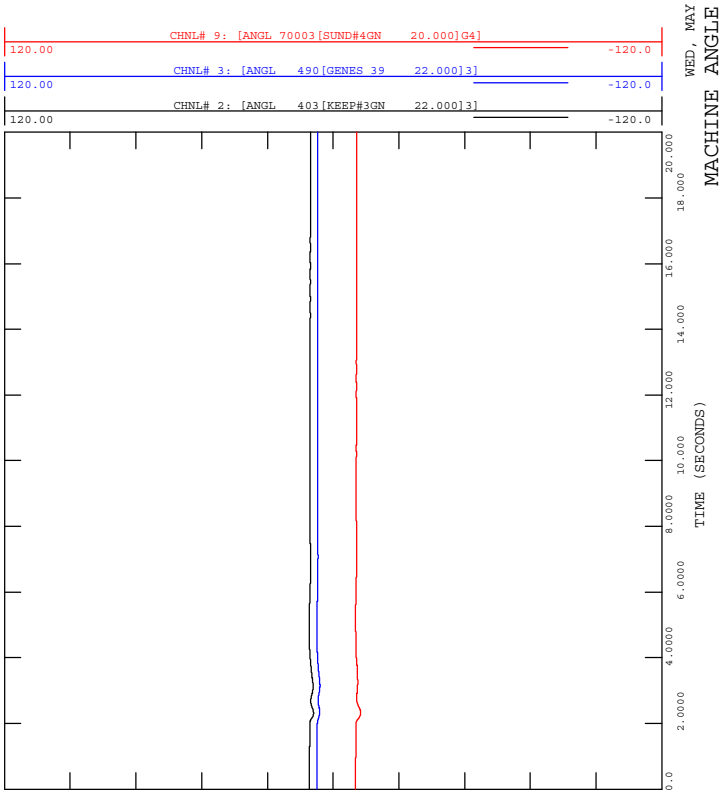


FIGURE D-8D
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out

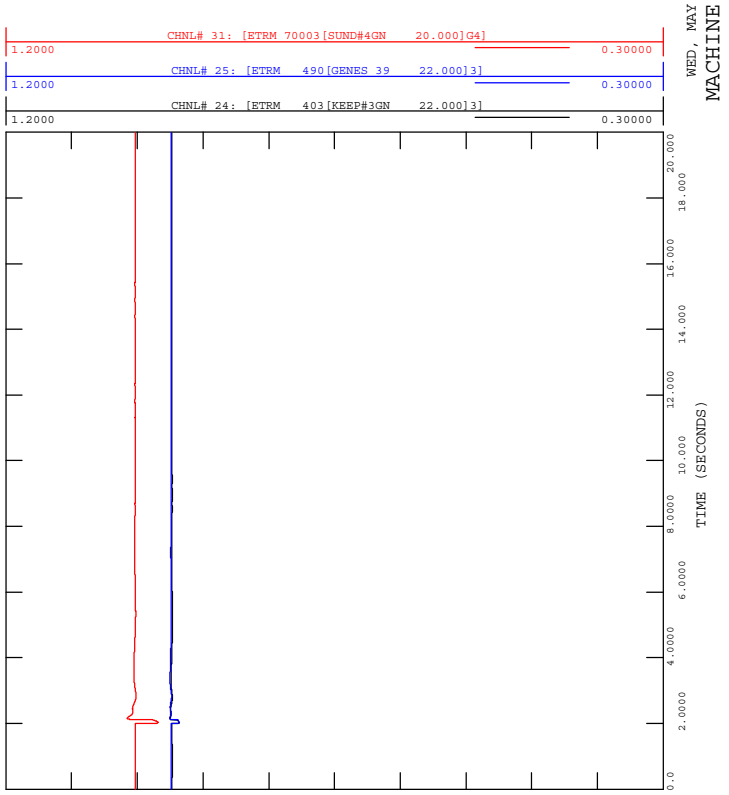


FIGURE D-8A
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out

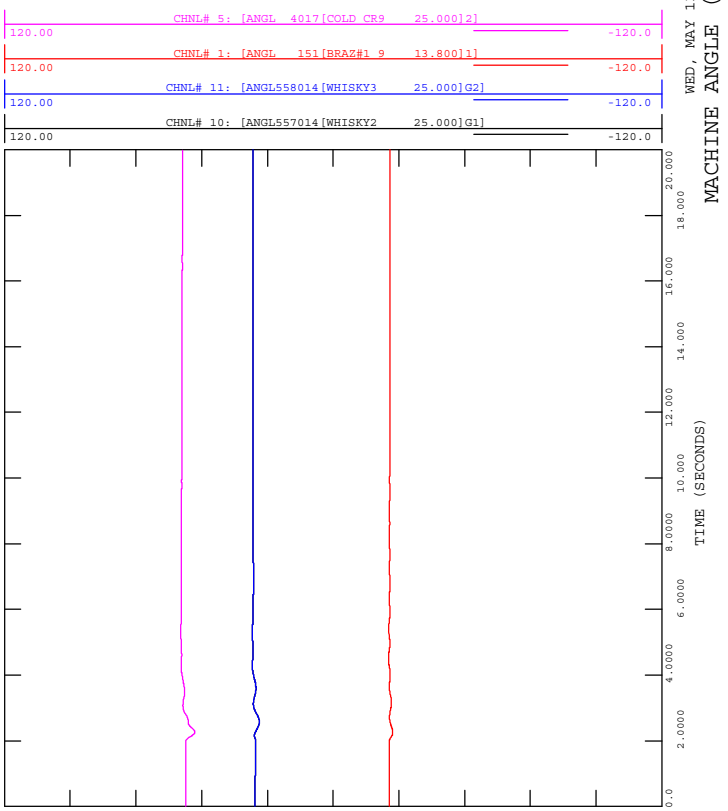


FIGURE D-8C
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out

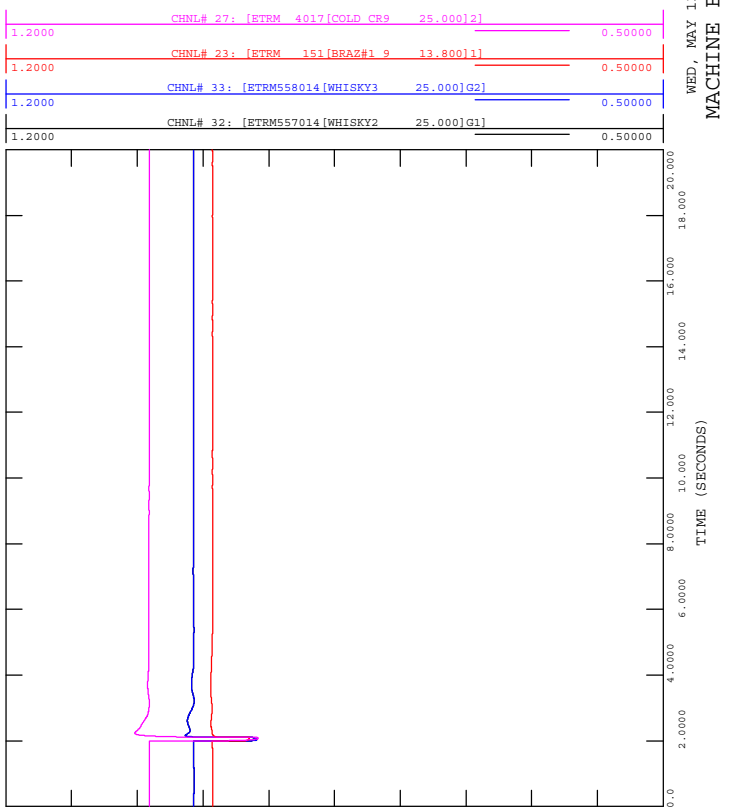
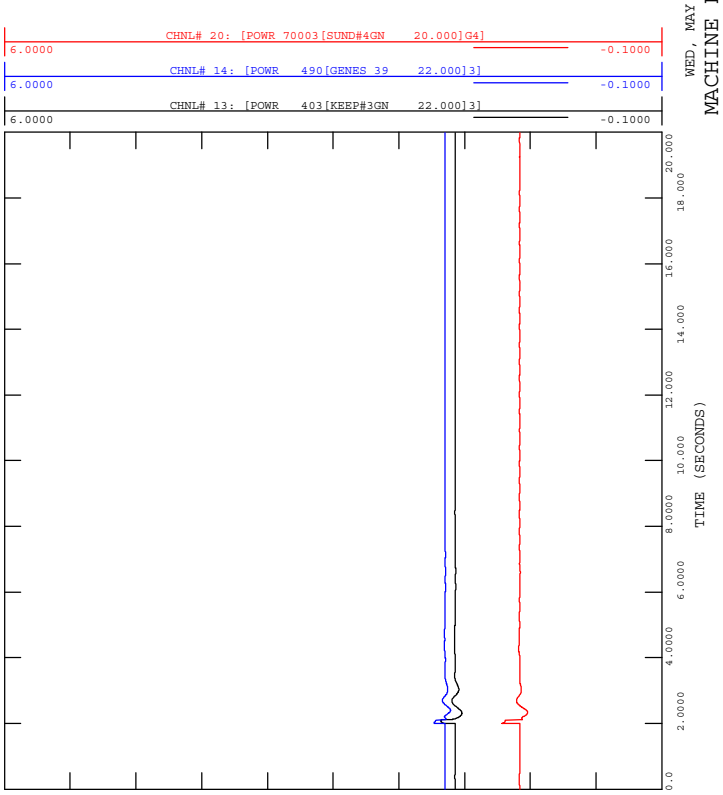


FIGURE D-8F
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out



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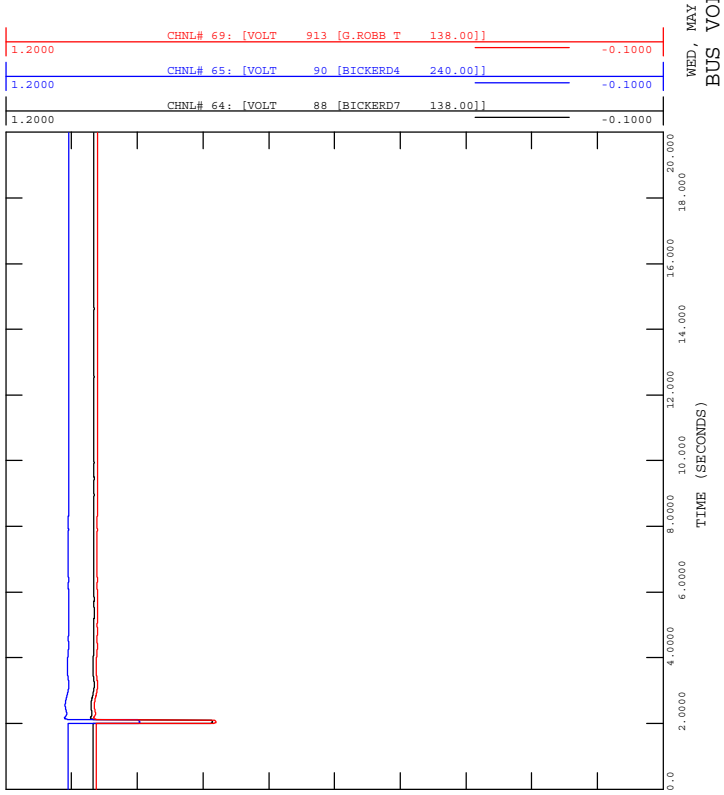
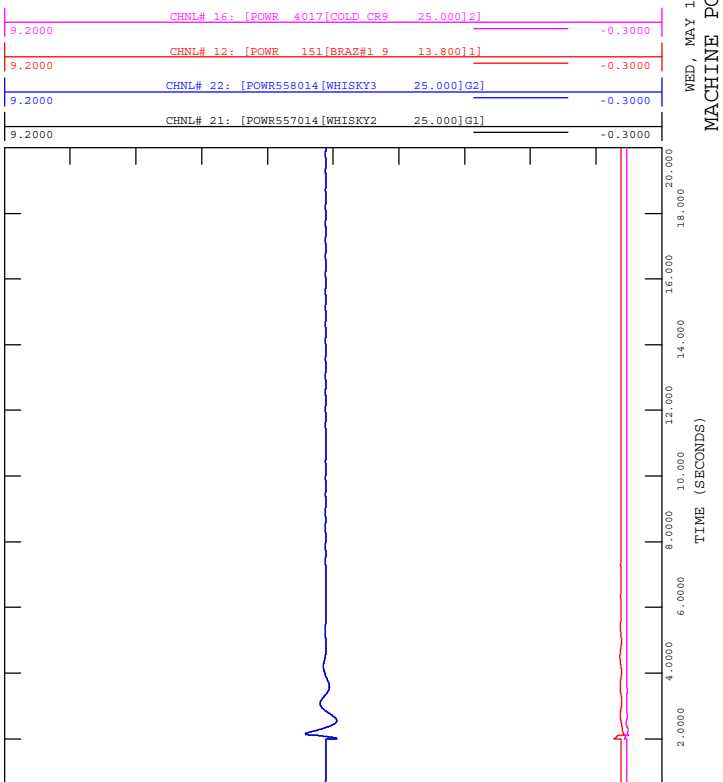
MACHINE POWER (MW)

FIGURE D-8H
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out



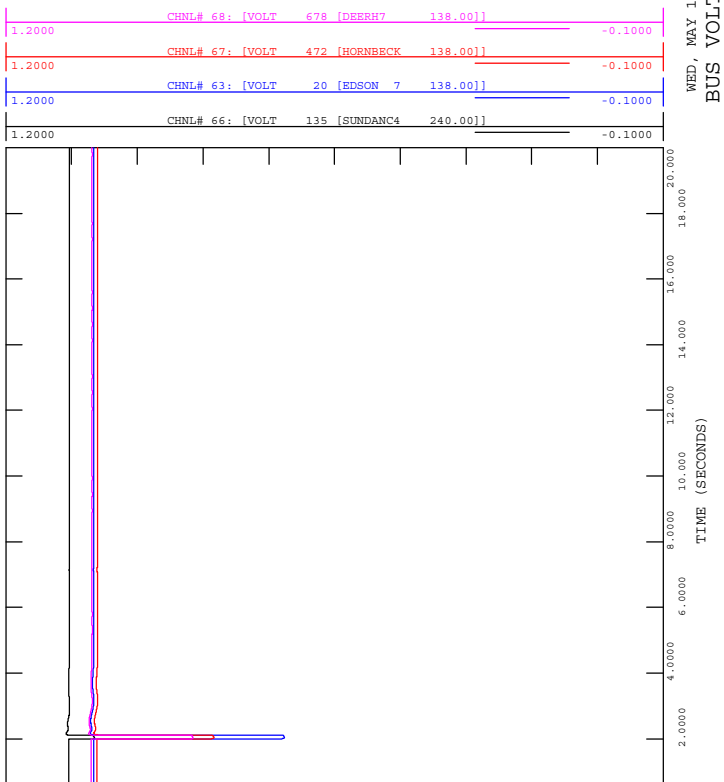
WED, MAY 13 2020 23:34
BUS VOLTAGE (PU)

FIGURE D-8E
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out



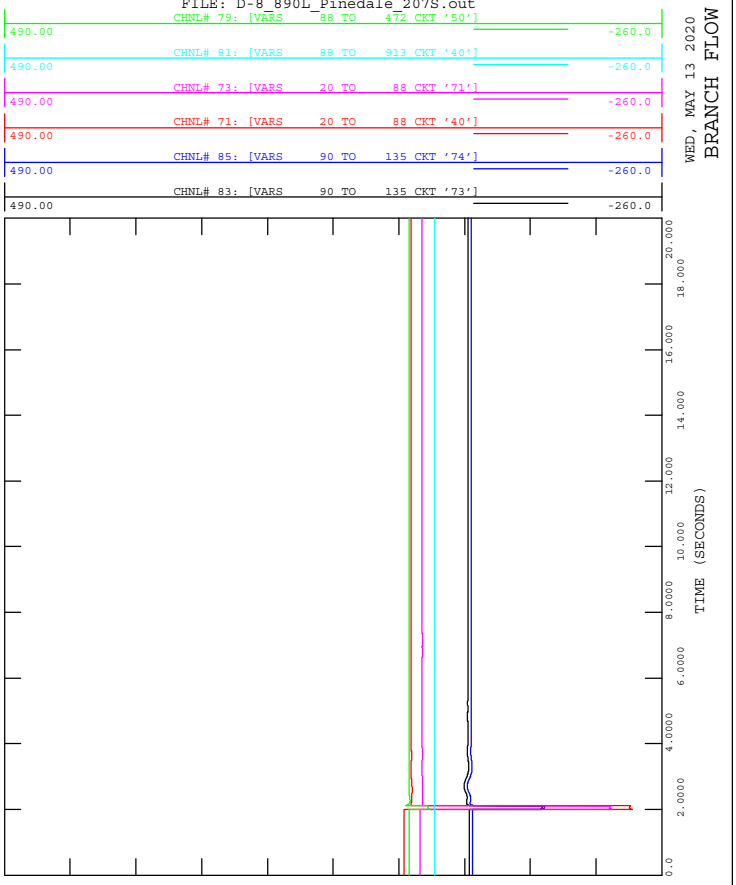
WED, MAY 13 2020 23:34
MACHINE POWER (MW)

FIGURE D-8G
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out



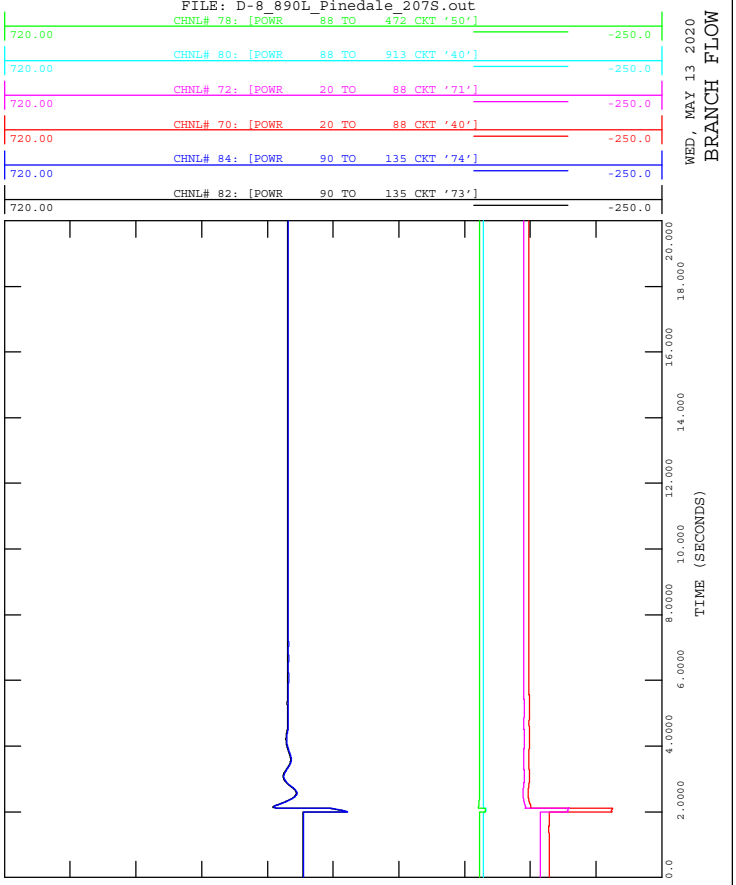
WED, MAY 13 2020 23:34
BUS VOLTAGE (PU)

FIGURE D-8J
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out



WED, MAY 13 2020 23:34
BRANCH FLOW (Q)

FIGURE D-8I
2022SP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-8_890L_Pinedale_207S.out



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BRANCH FLOW (P)

FIGURE D-9B
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out

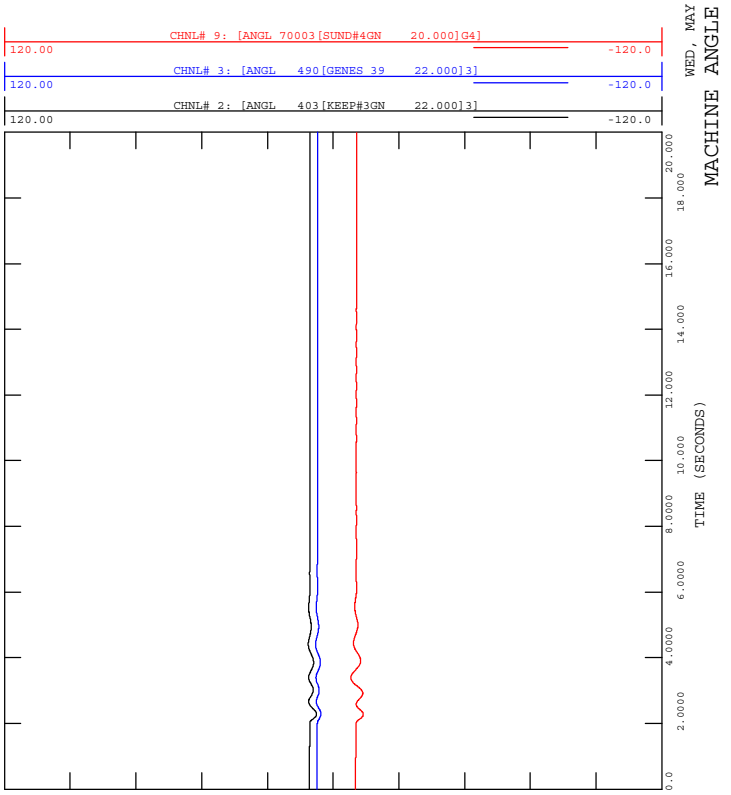


FIGURE D-9D
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out

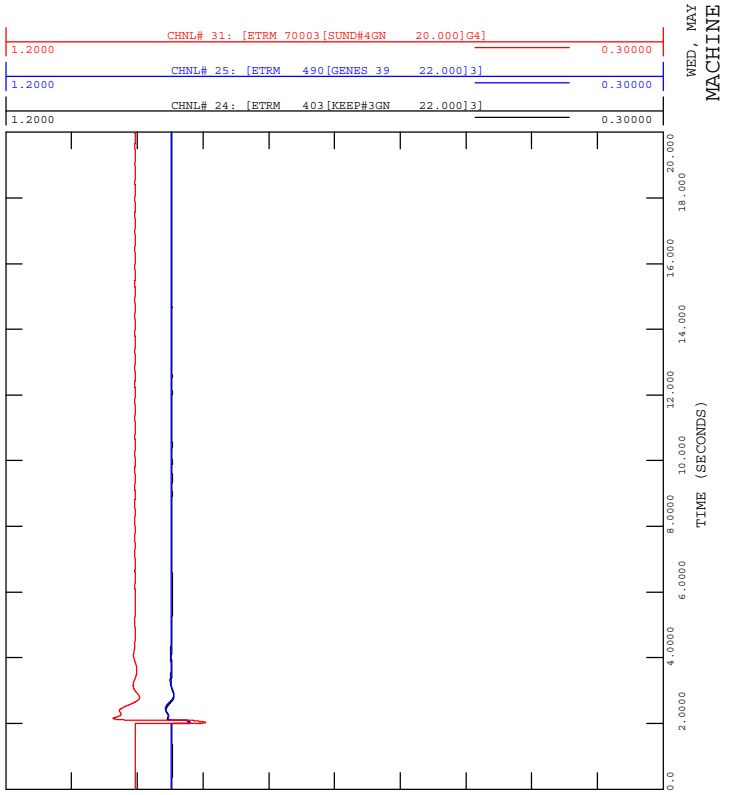


FIGURE D-9A
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out

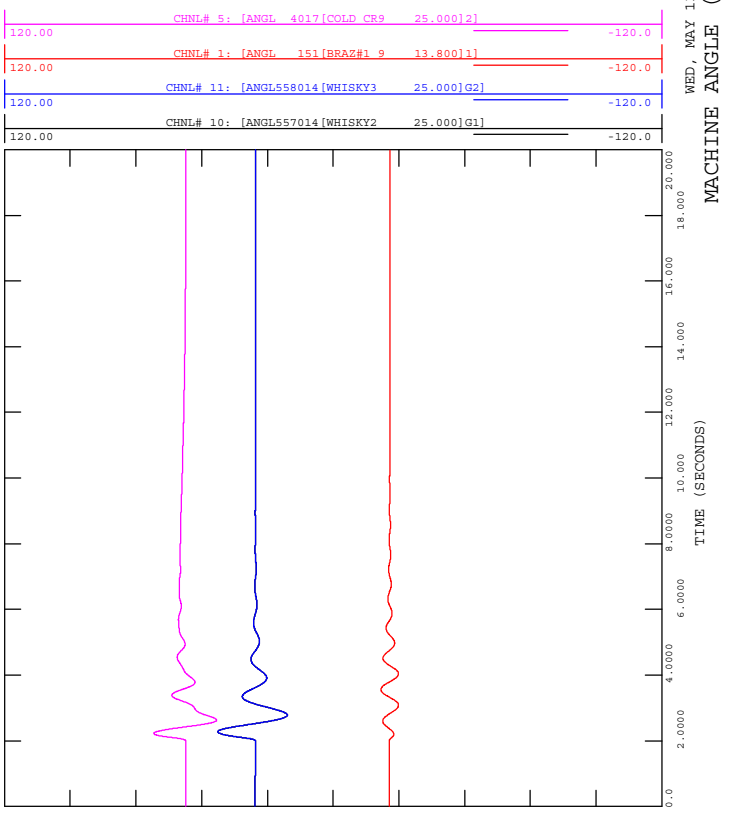


FIGURE D-9C
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out

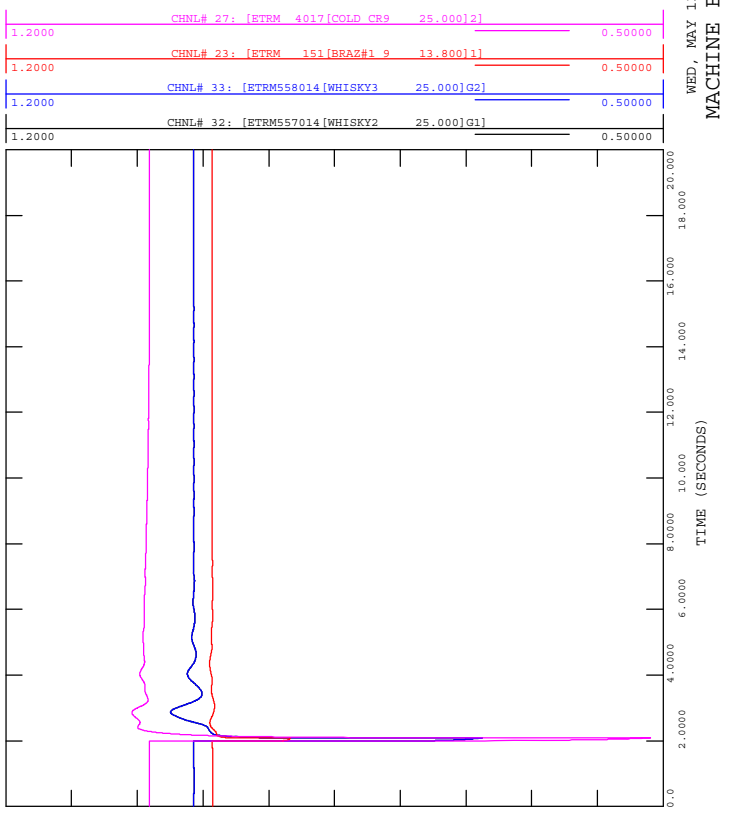
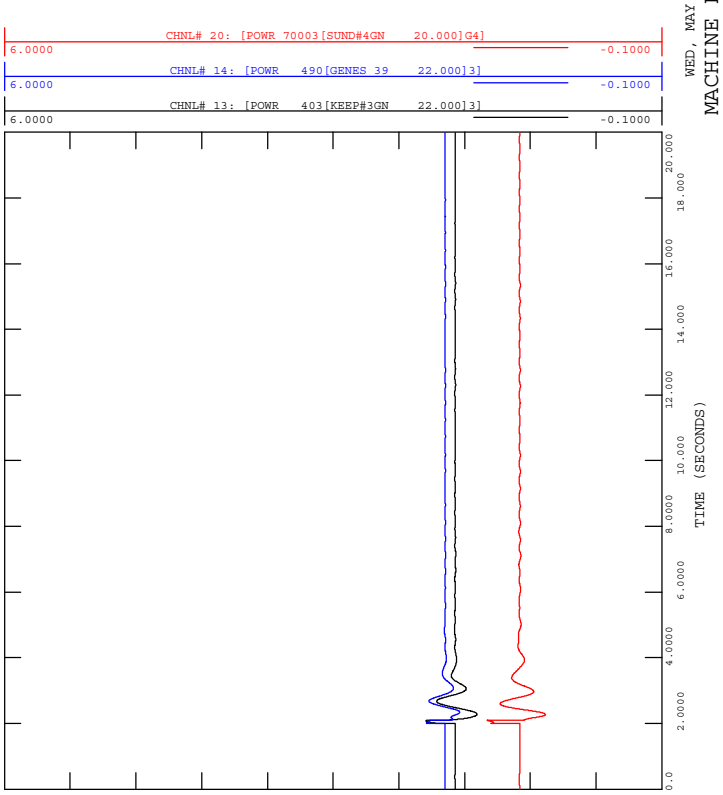


FIGURE D-9F
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out



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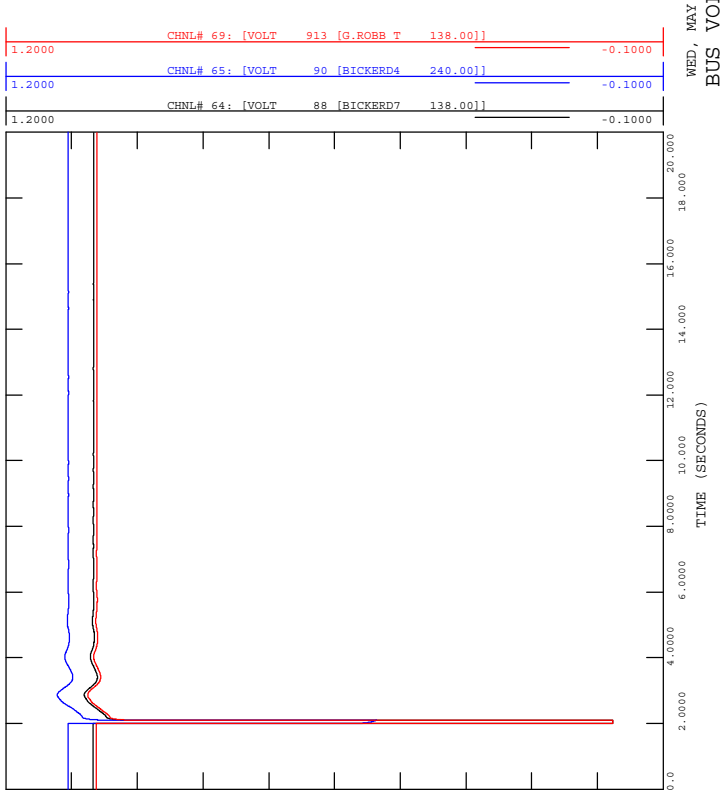
MACHINE POWER (MW)

FIGURE D-9H
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out



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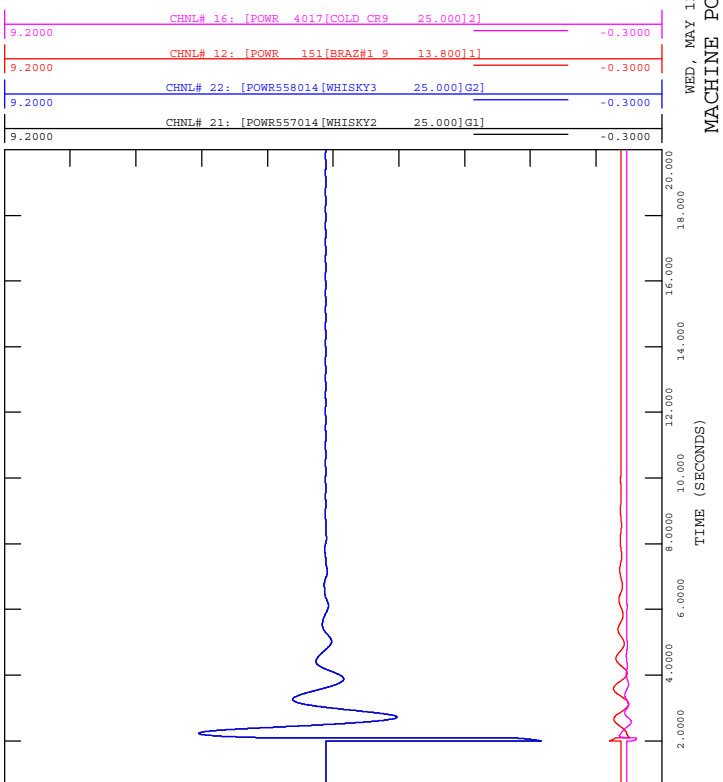
BUS VOLTAGE (PU)

FIGURE D-9E
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out



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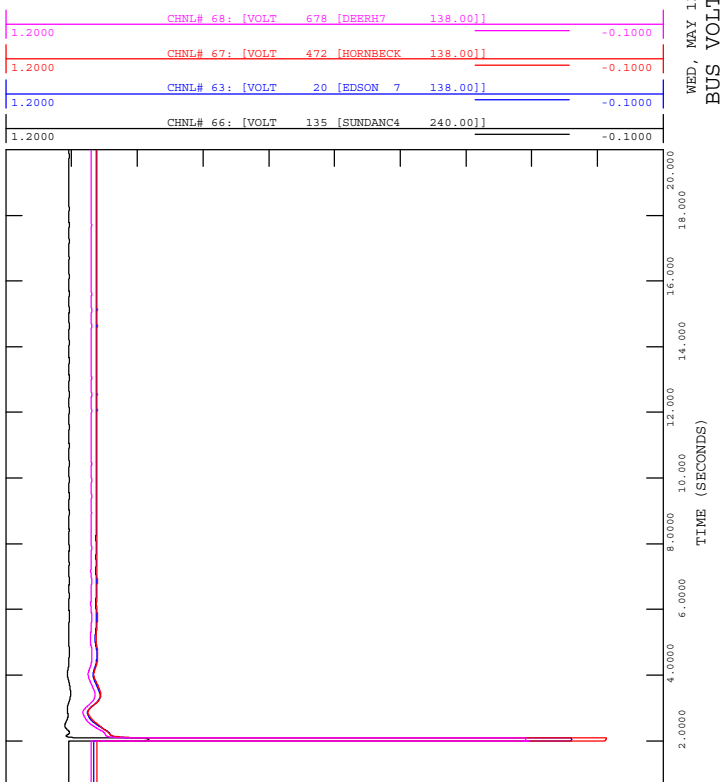
MACHINE POWER (MW)

FIGURE D-9G
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out



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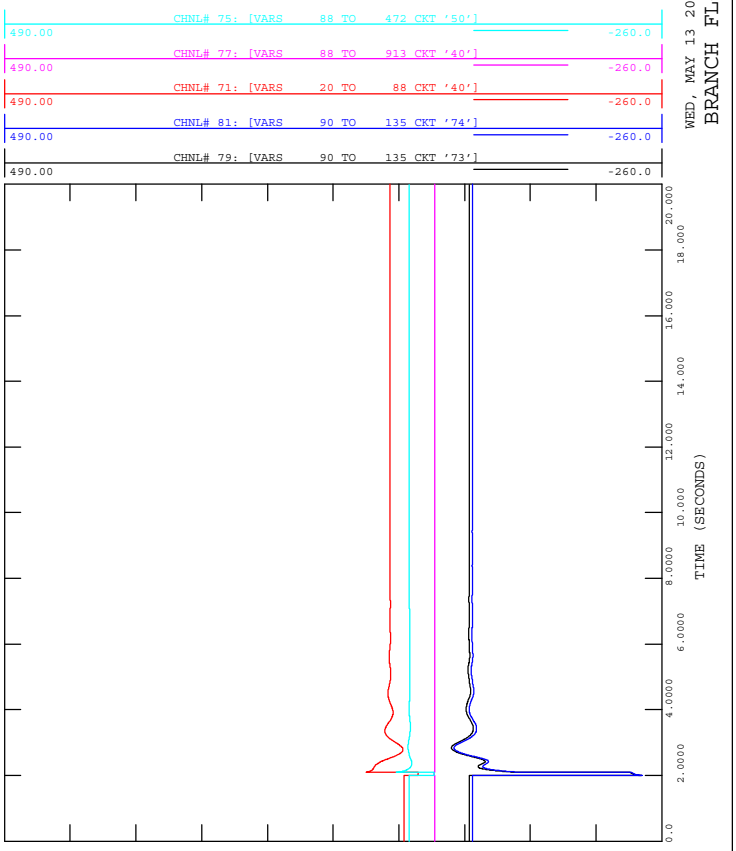
BUS VOLTAGE (PU)

FIGURE D-9J
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out



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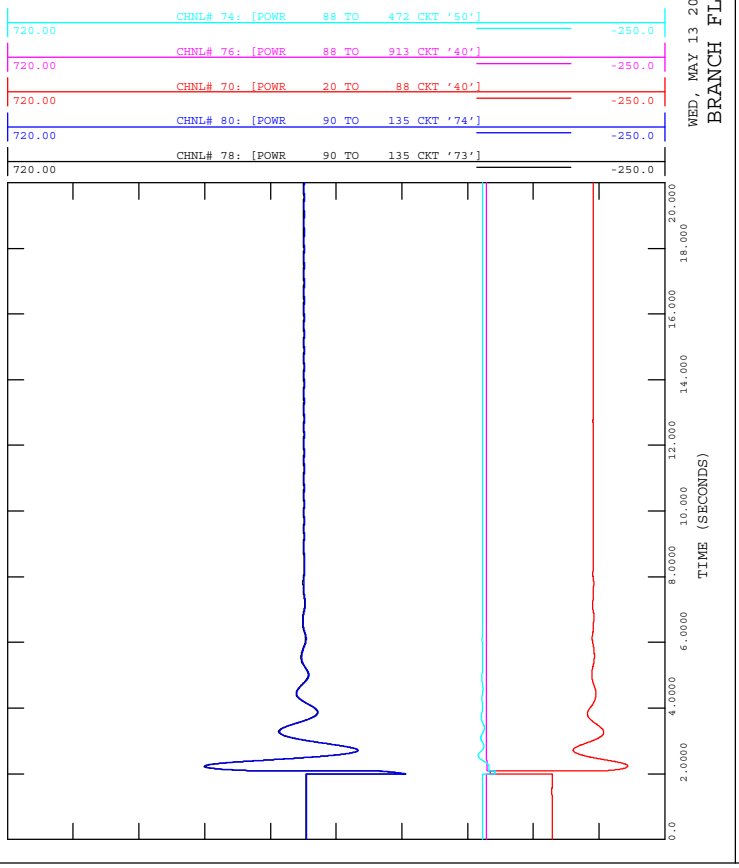
BRANCH FLOW (Q)

FIGURE D-9I
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-9_671L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-10B
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out

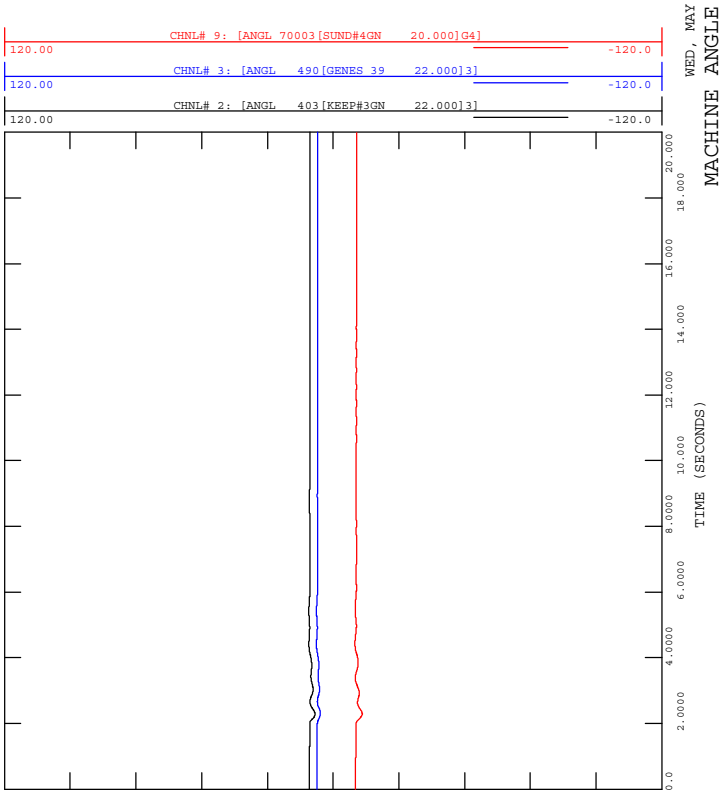


FIGURE D-10D
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out

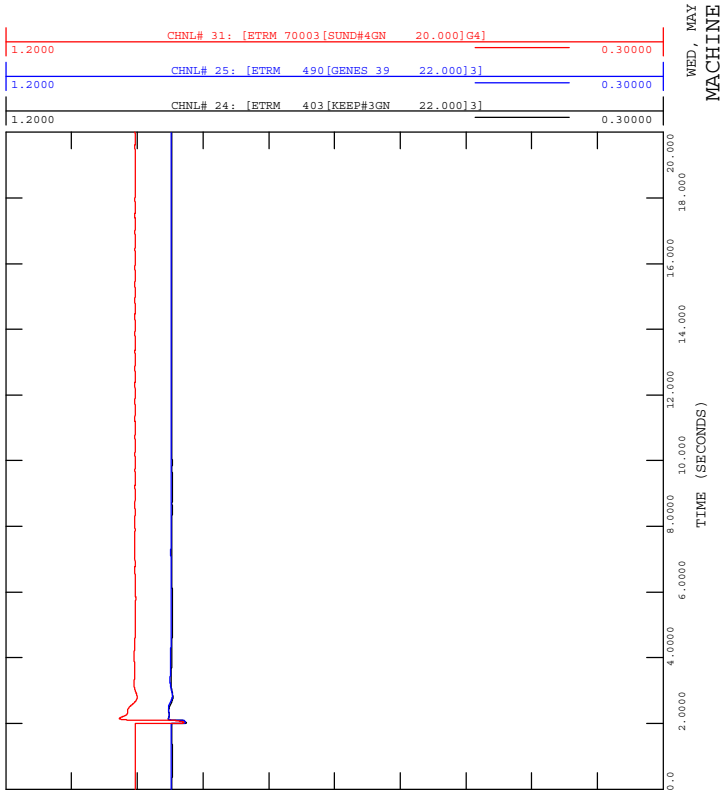


FIGURE D-10A
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out

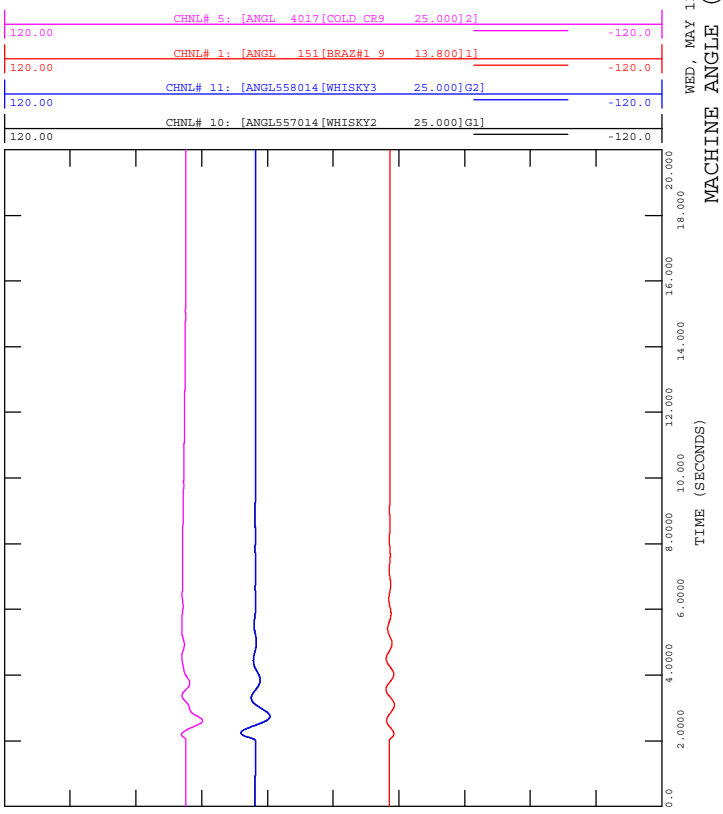


FIGURE D-10C
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out

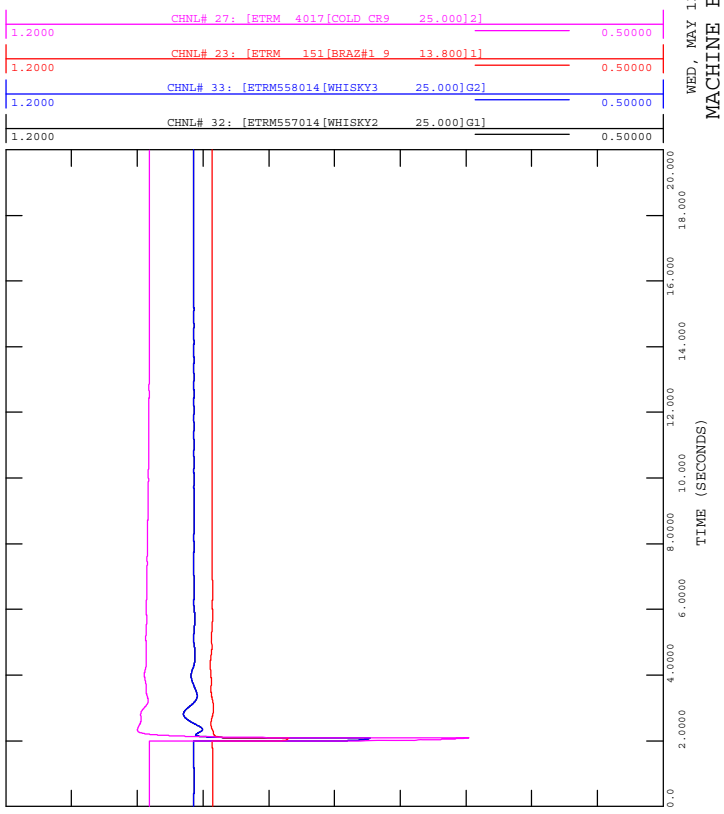


FIGURE D-10F
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out

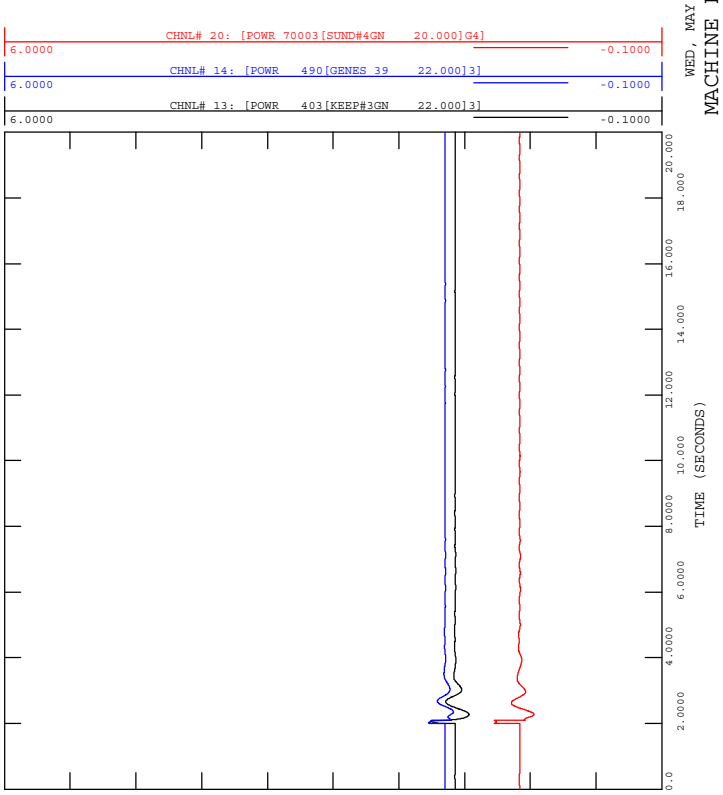


FIGURE D-10H
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out

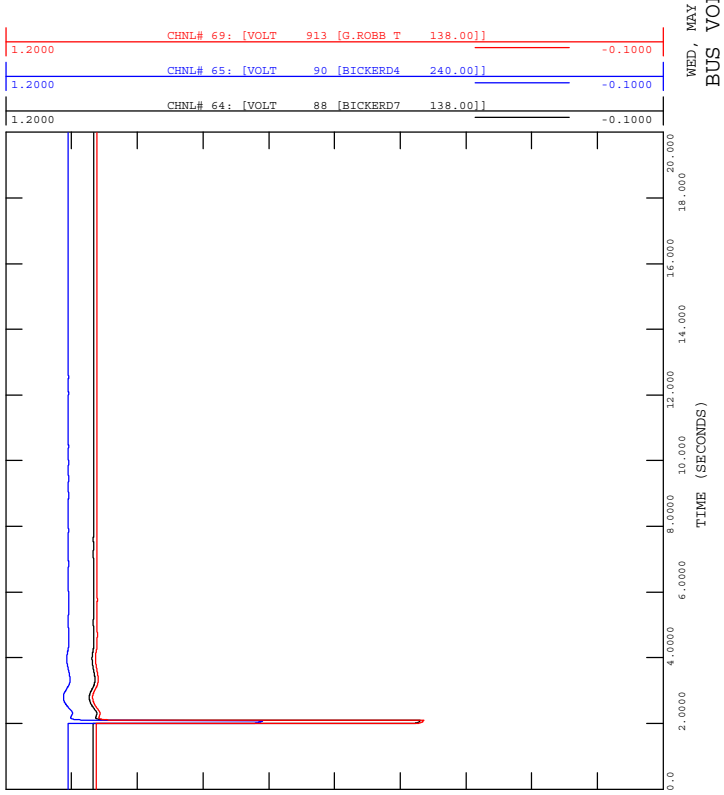


FIGURE D-10E
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out

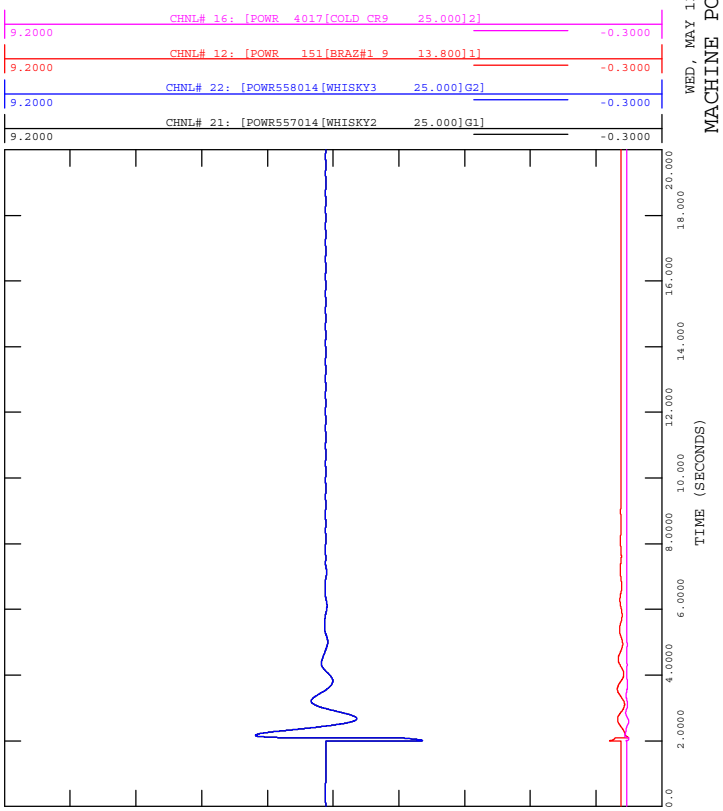


FIGURE D-10G
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out

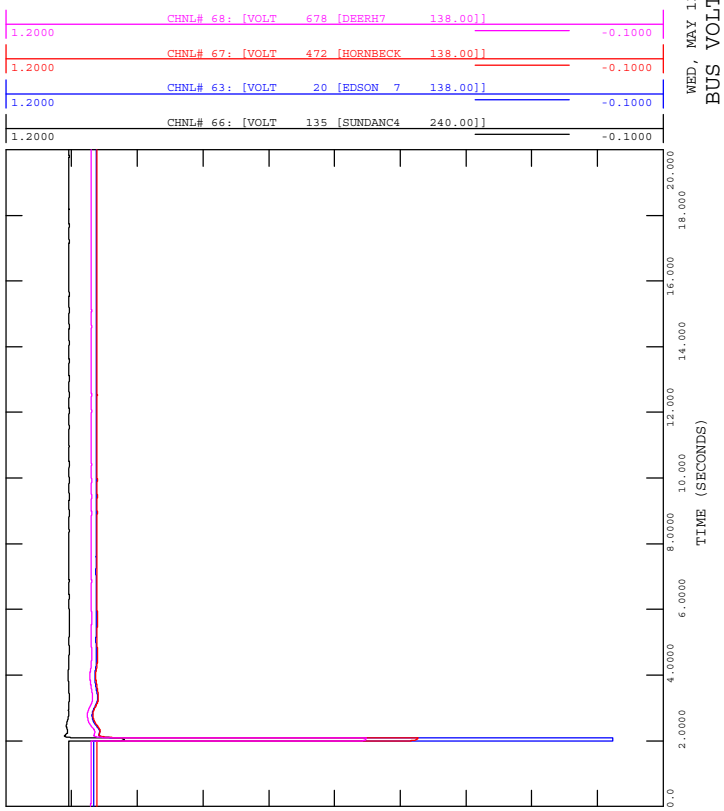
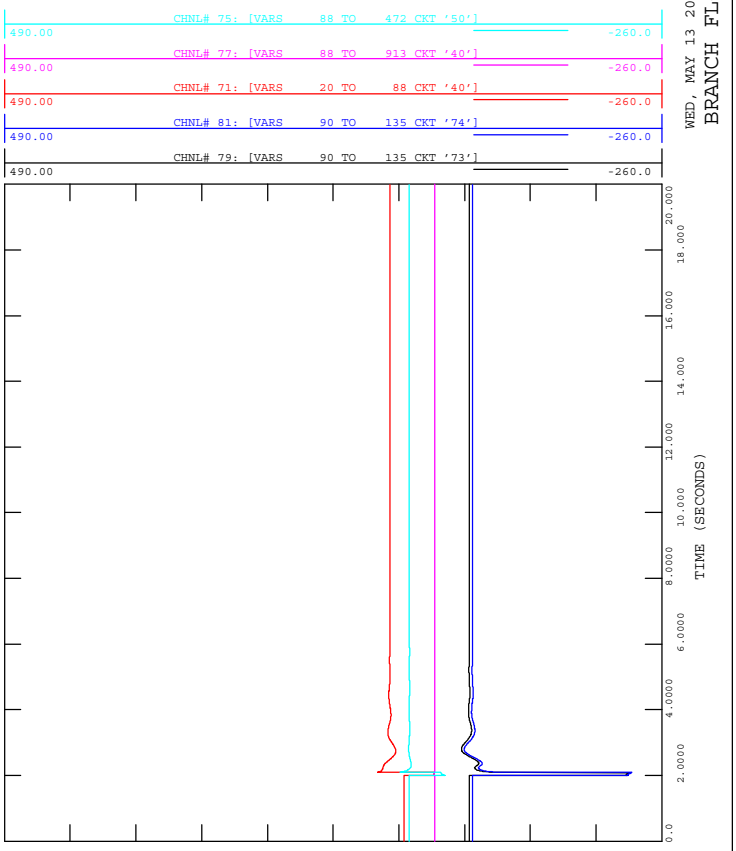


FIGURE D-10J
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out



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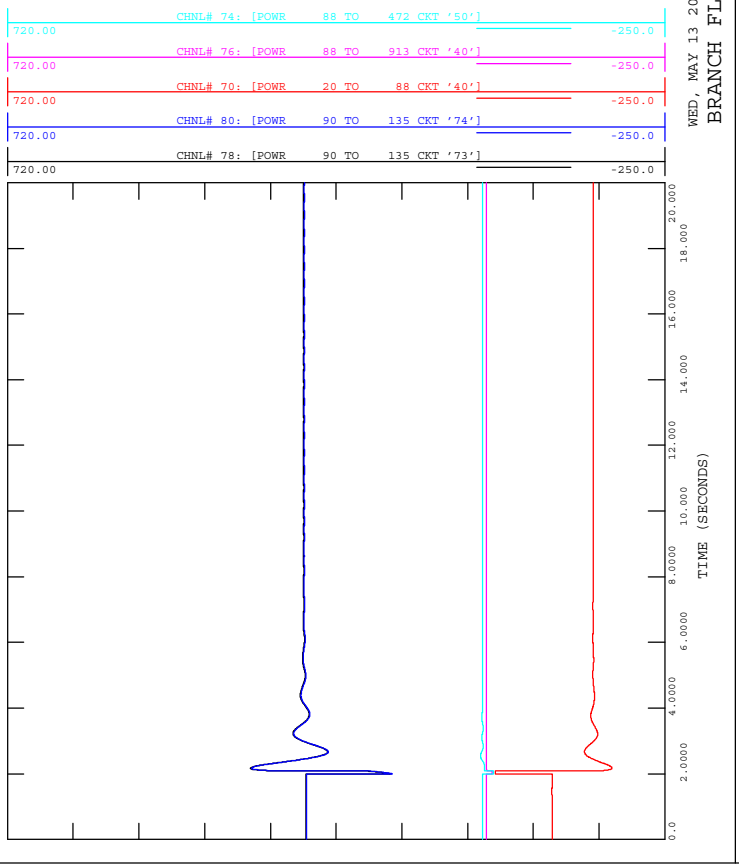
BRANCH FLOW (Q)

FIGURE D-10I
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-10_671L_Edson_58S.out



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BRANCH FLOW (P)

FIGURE D-11B
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out

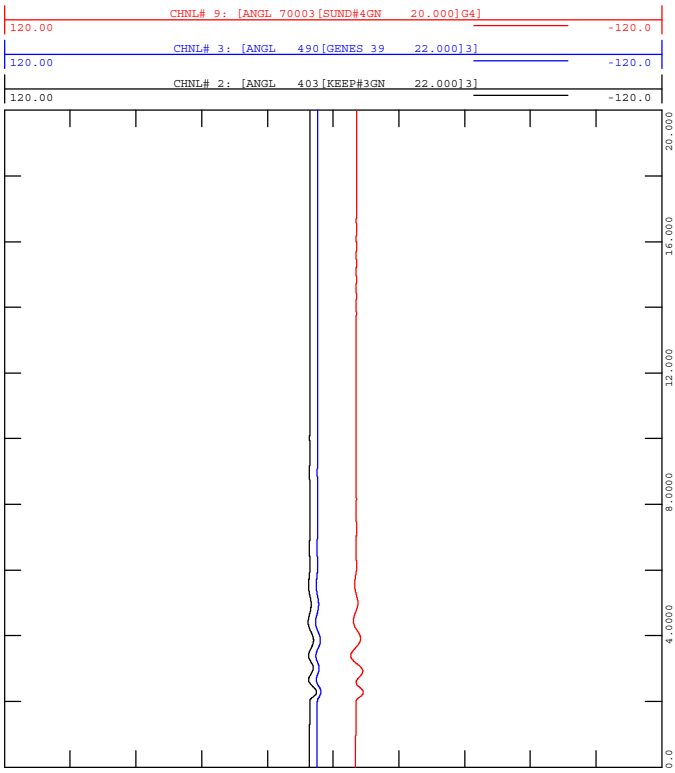


FIGURE D-11D
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out

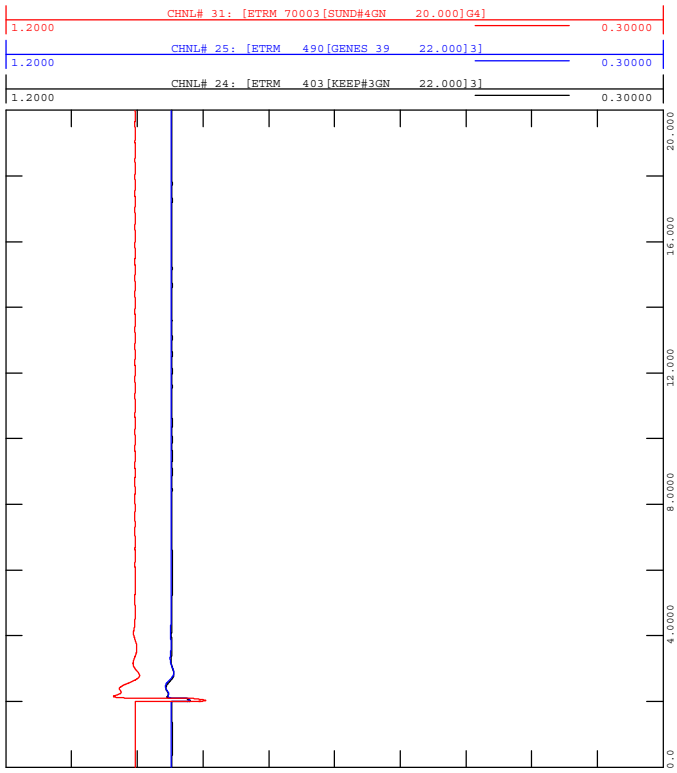


FIGURE D-11A
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out

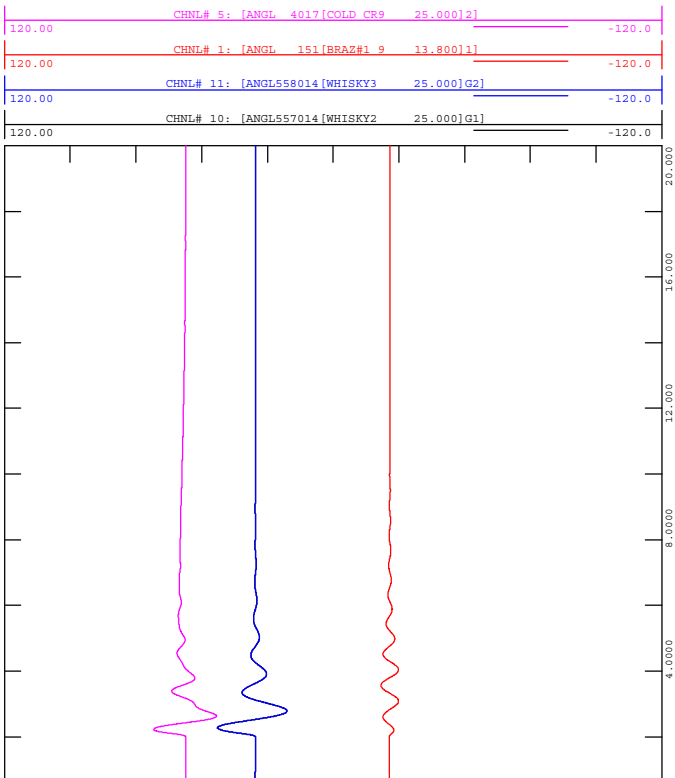


FIGURE D-11C
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out

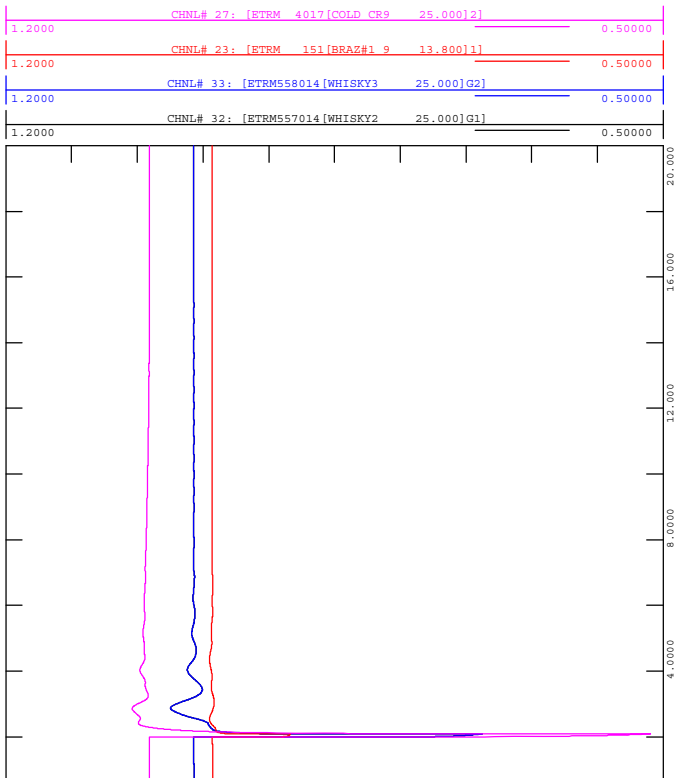
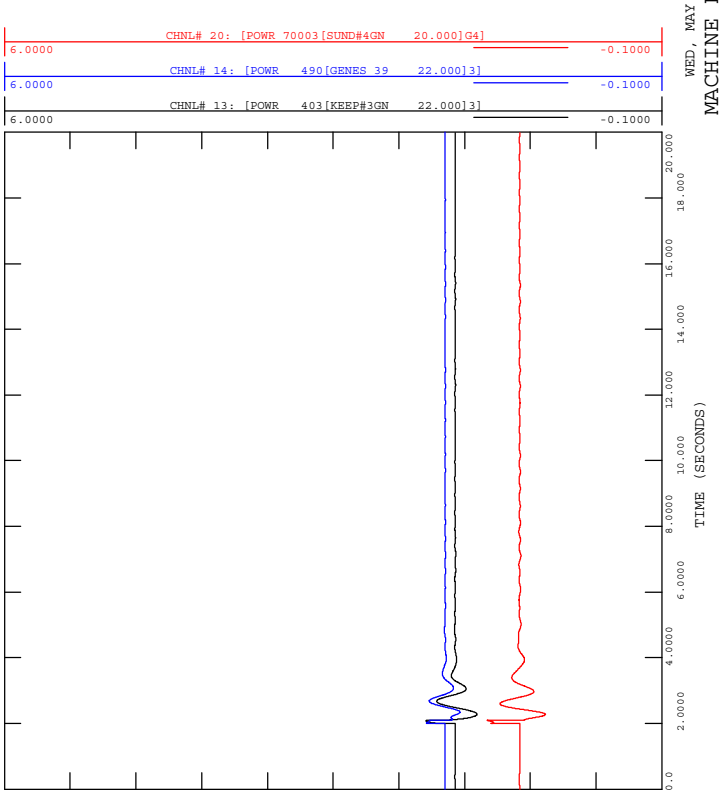


FIGURE D-11F
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out



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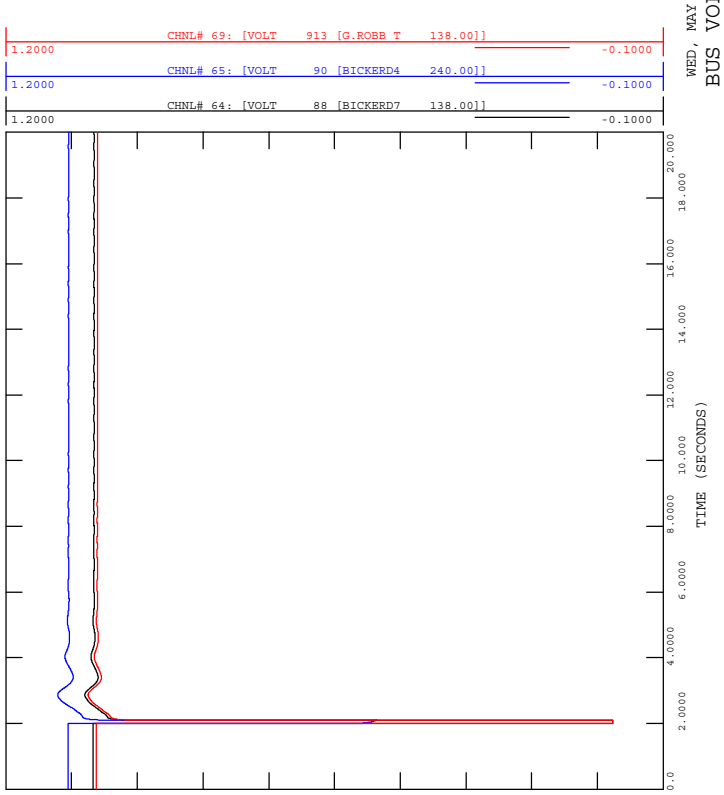
MACHINE POWER (MW)

FIGURE D-11H
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out



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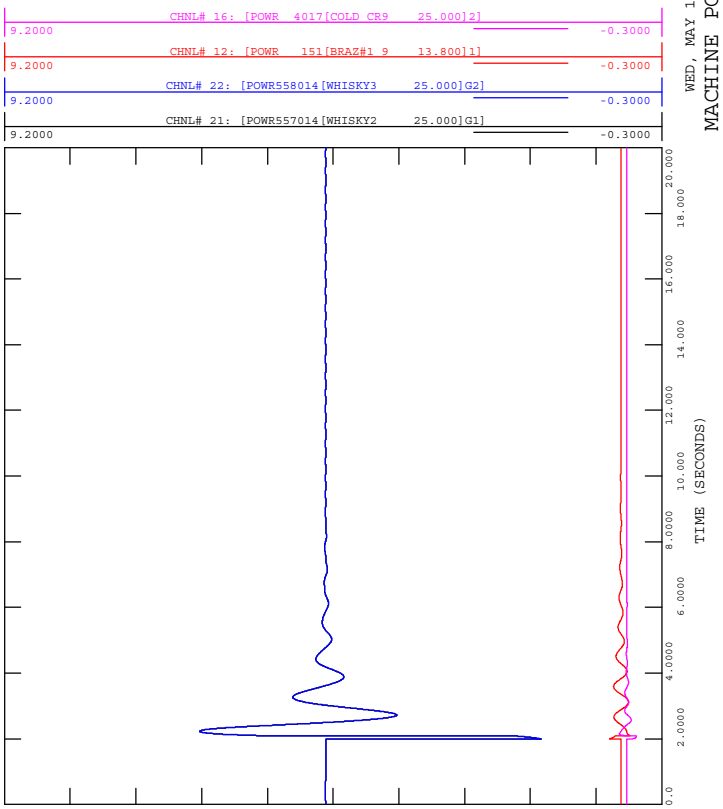
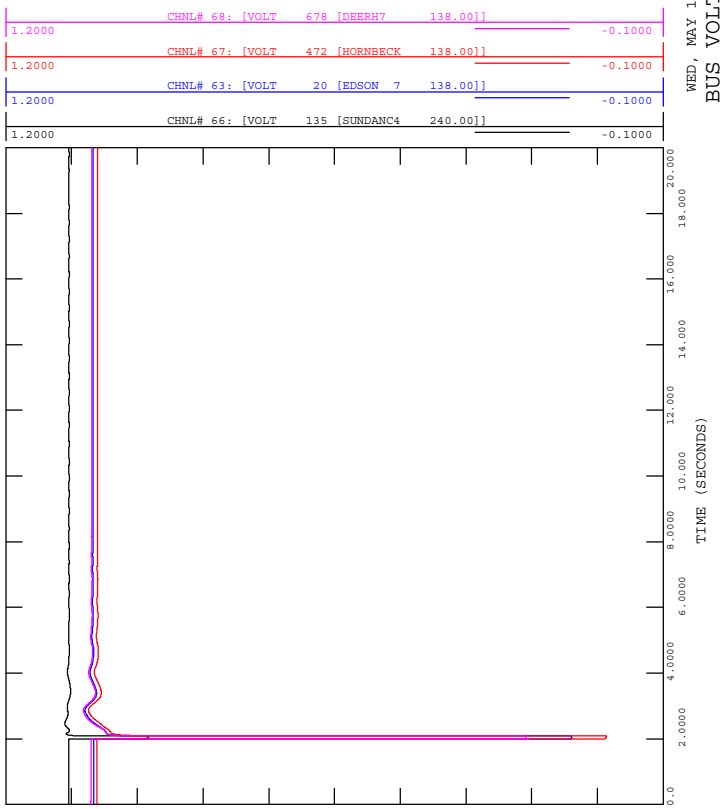
BUS VOLTAGE (PU)

FIGURE D-11E
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out



WED, MAY 13 2020 23:34
MACHINE POWER (MW)

FIGURE D-11G
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out



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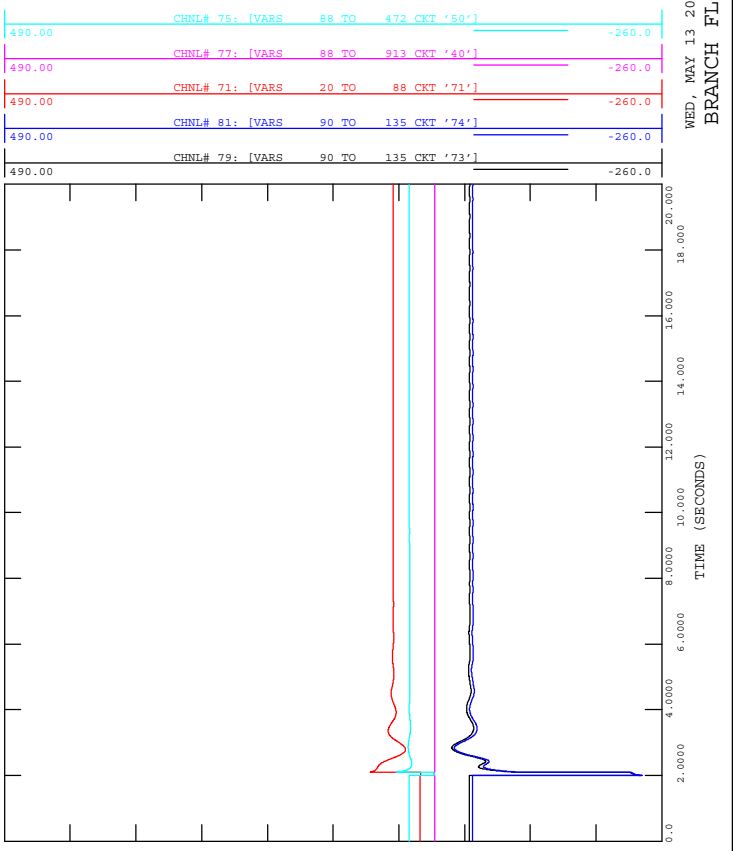
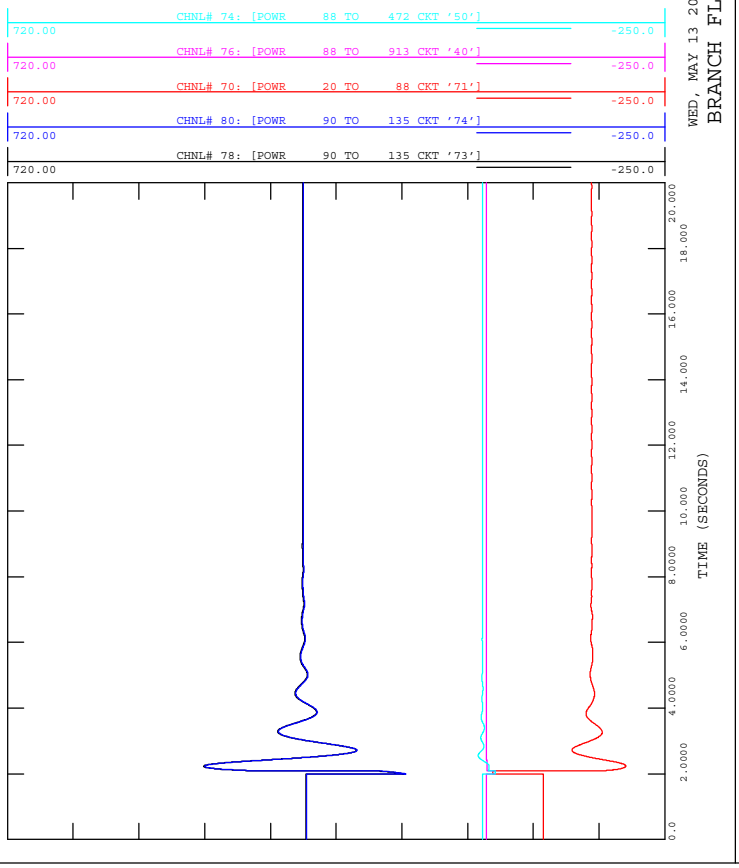
BUS VOLTAGE (PU)

FIGURE D-11J
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out



WED, MAY 13 2020 23:34
BRANCH FLOW (Q)

FIGURE D-11I
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-11_740L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-12B
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out

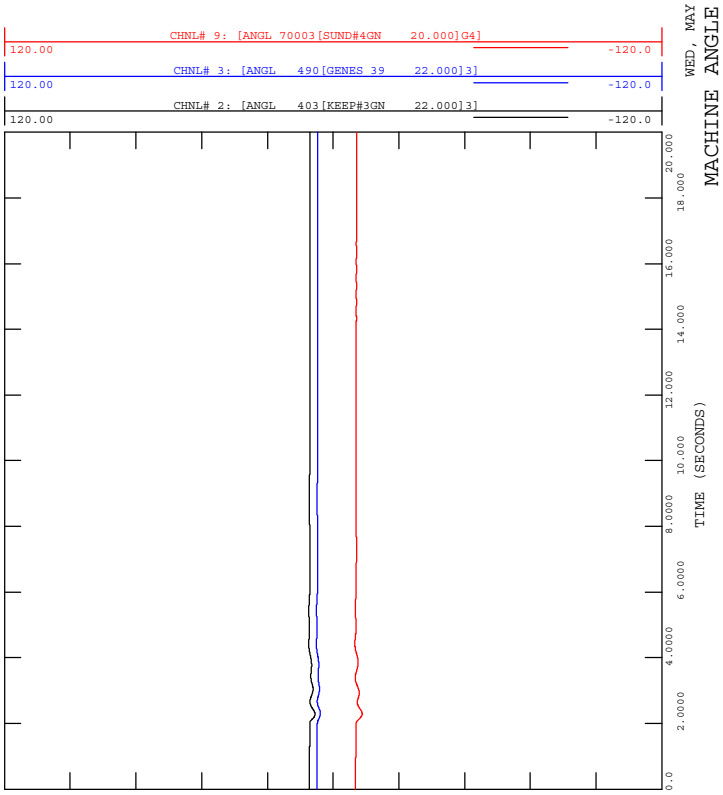


FIGURE D-12D
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out

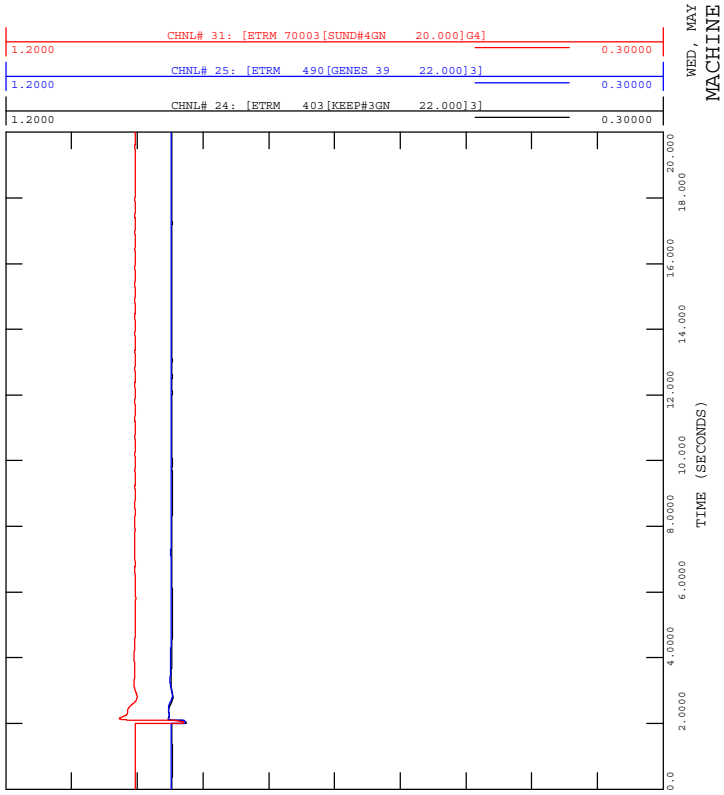


FIGURE D-12A
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out

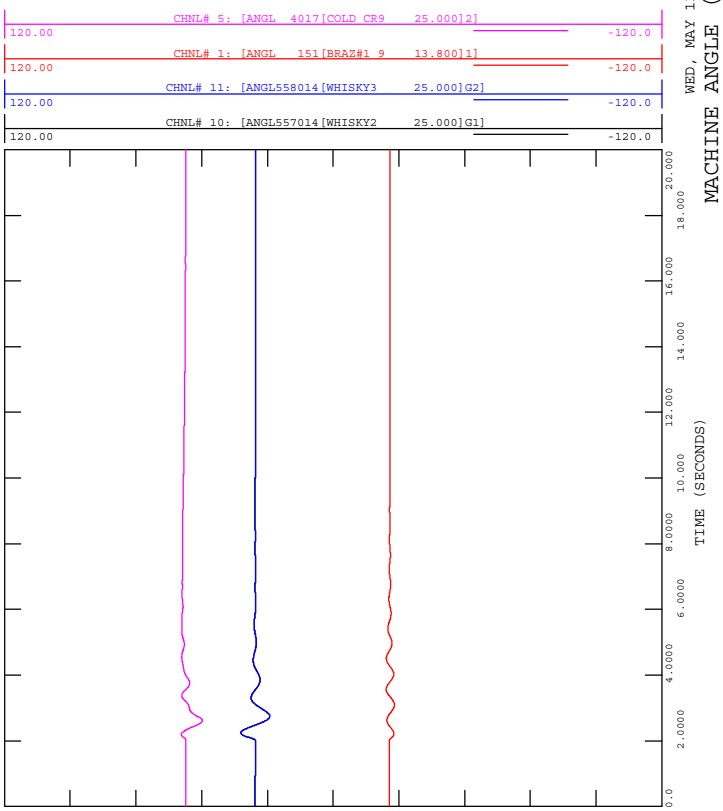


FIGURE D-12C
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out

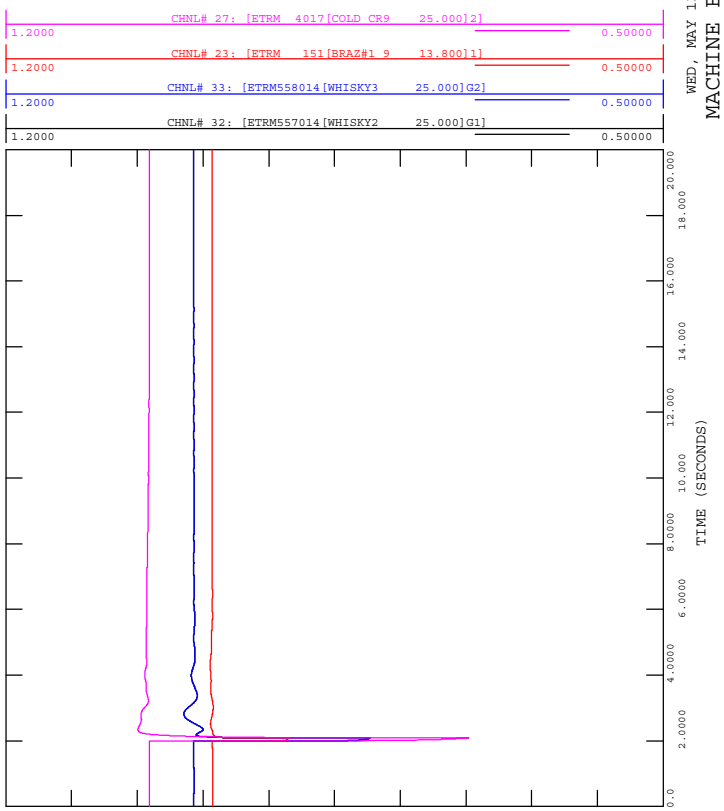
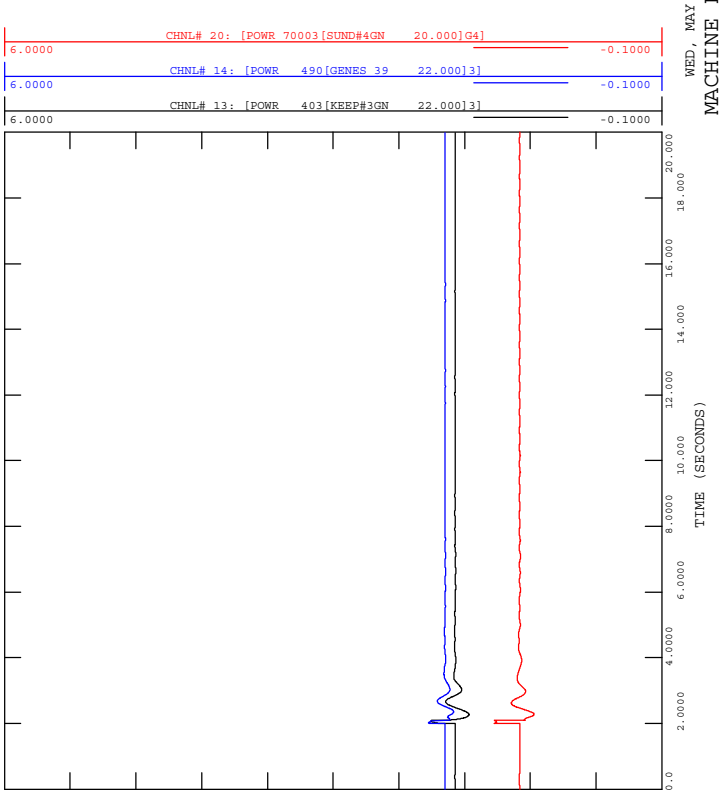


FIGURE D-12F
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out



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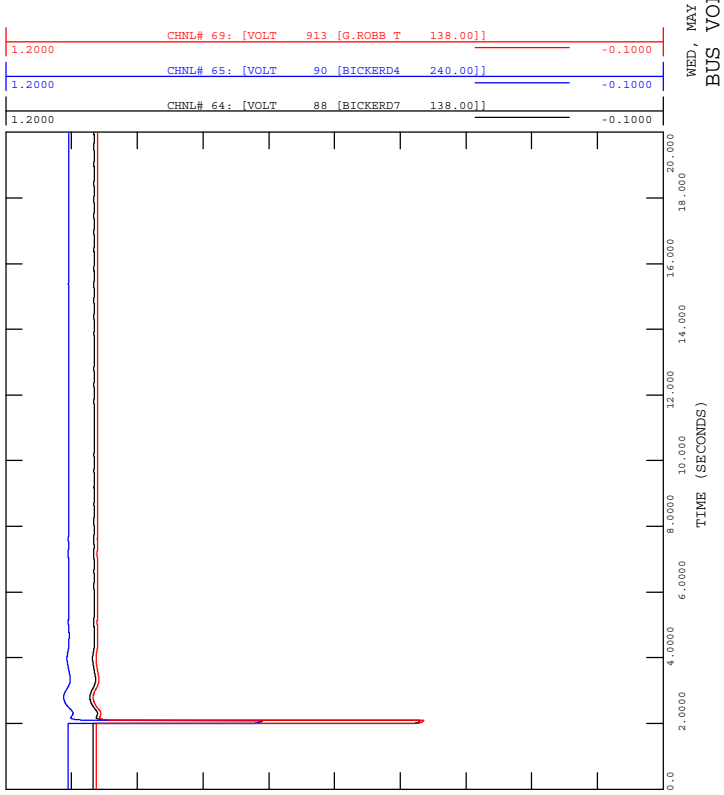
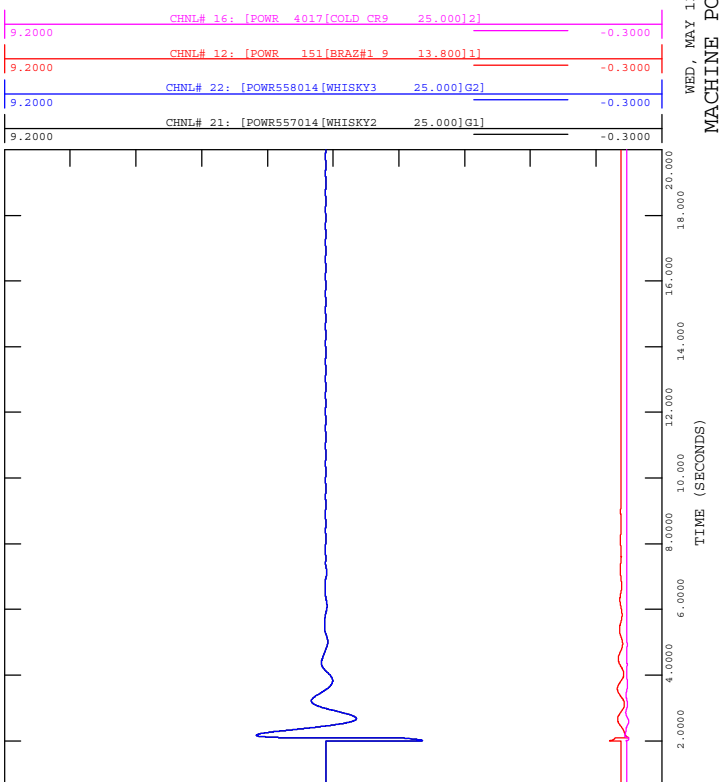
MACHINE POWER (MW)

FIGURE D-12H
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out



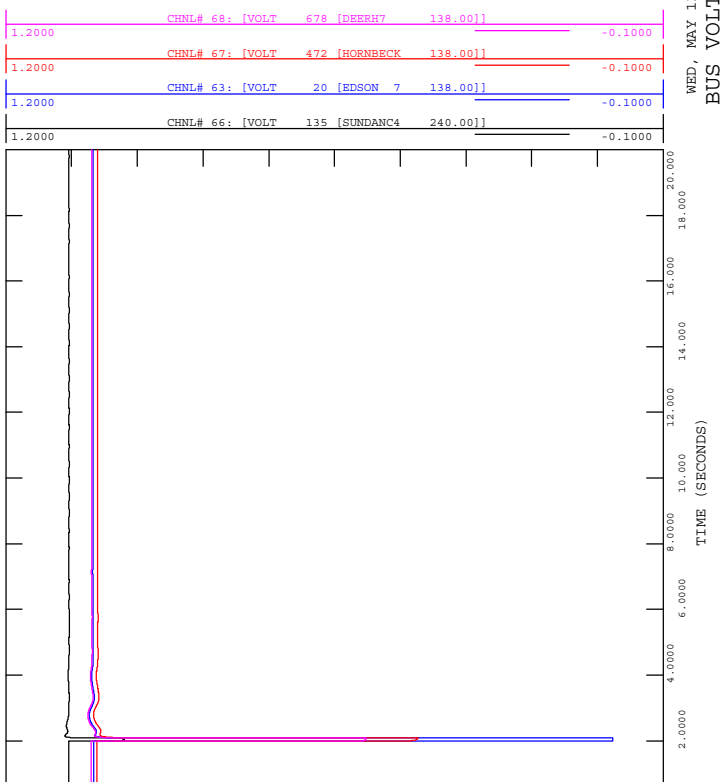
WED, MAY 13 2020 23:34
BUS VOLTAGE (PU)

FIGURE D-12E
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out



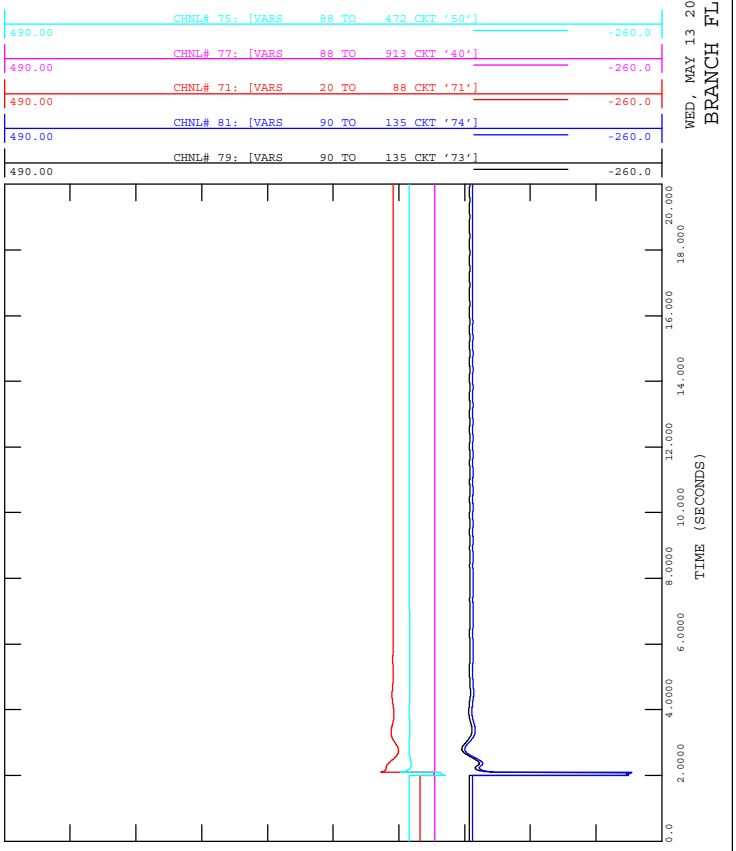
WED, MAY 13 2020 23:34
MACHINE POWER (MW)

FIGURE D-12G
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out



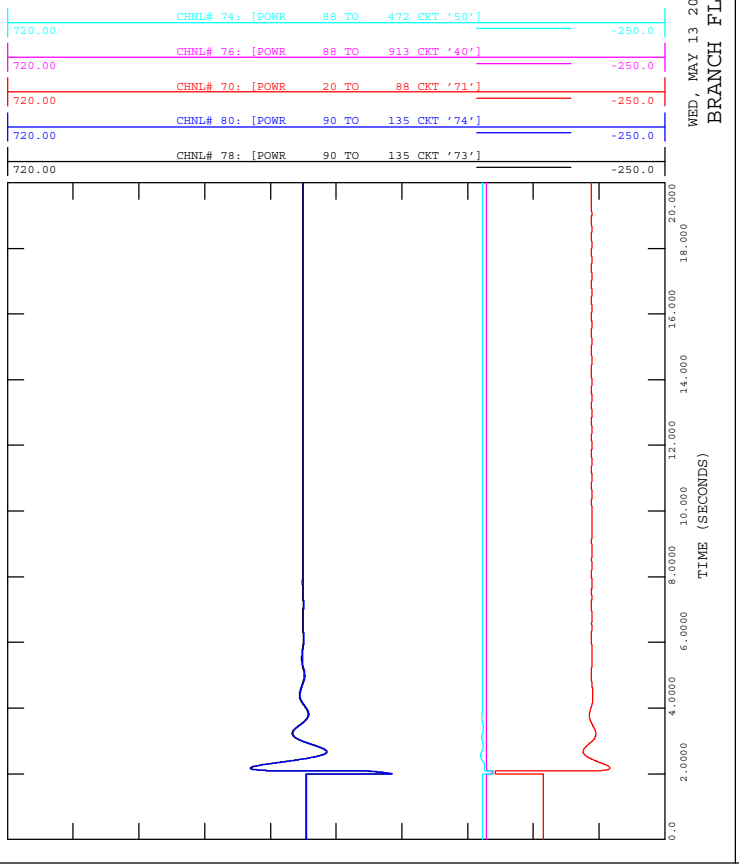
WED, MAY 13 2020 23:34
BUS VOLTAGE (PU)

FIGURE D-12J
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out



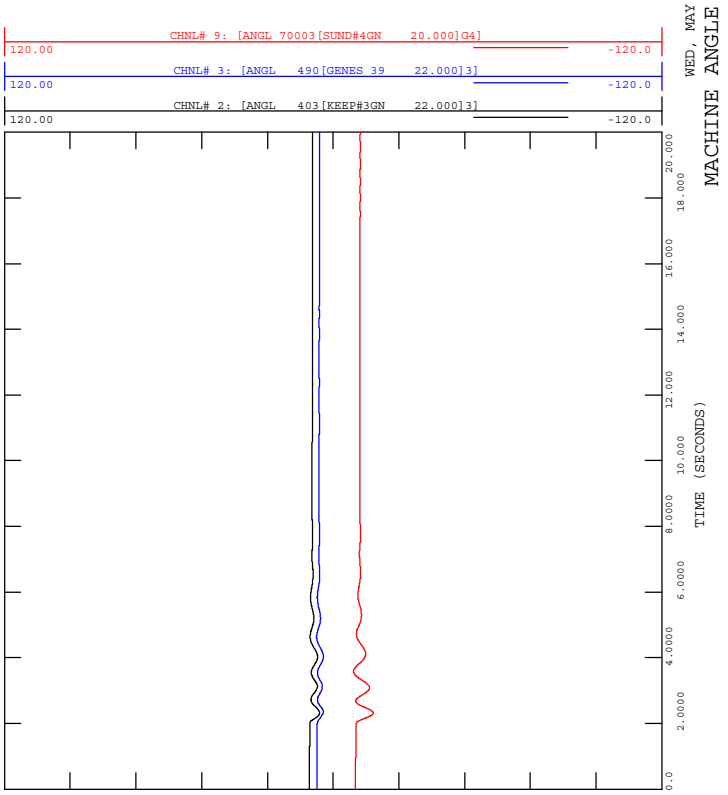
WED, MAY 13 2020 23:34
BRANCH FLOW (Q)

FIGURE D-12I
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-12_740L_Edson_58S.out



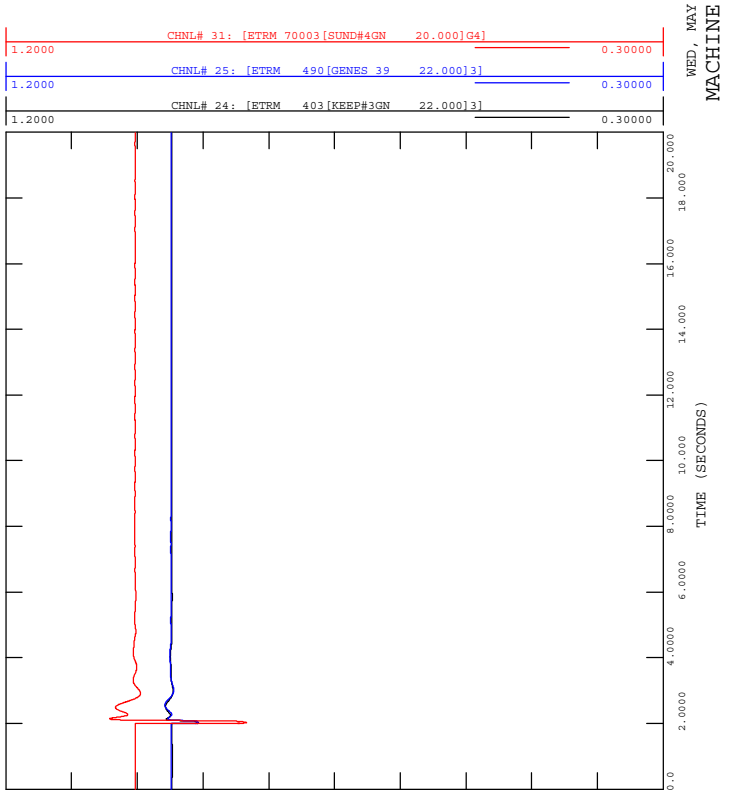
WED, MAY 13 2020 23:34
BRANCH FLOW (P)

FIGURE D-13B
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



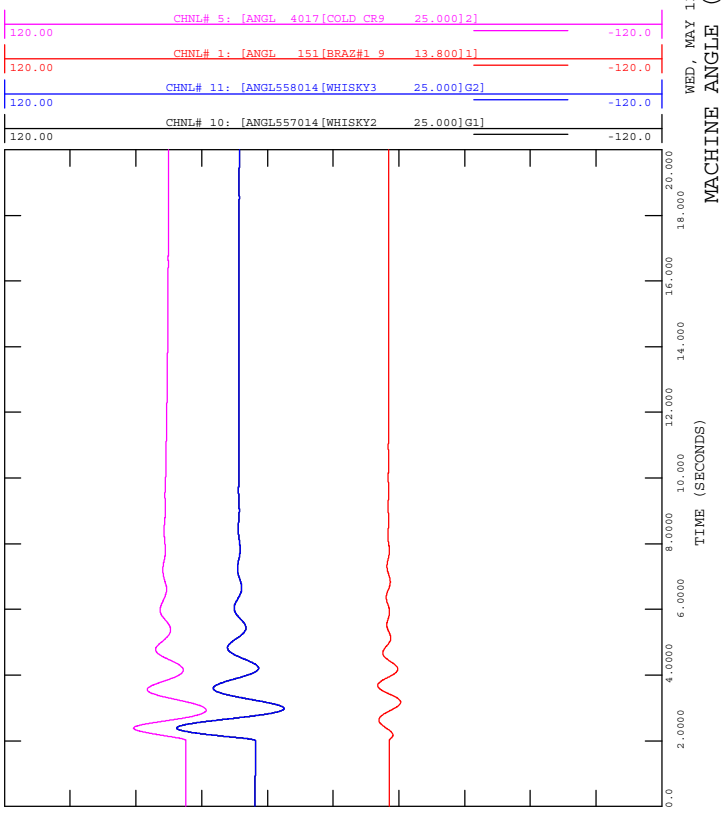
WED, MAY 13 2020 23:34
MACHINE ANGLE (DEGREES)

FIGURE D-13D
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



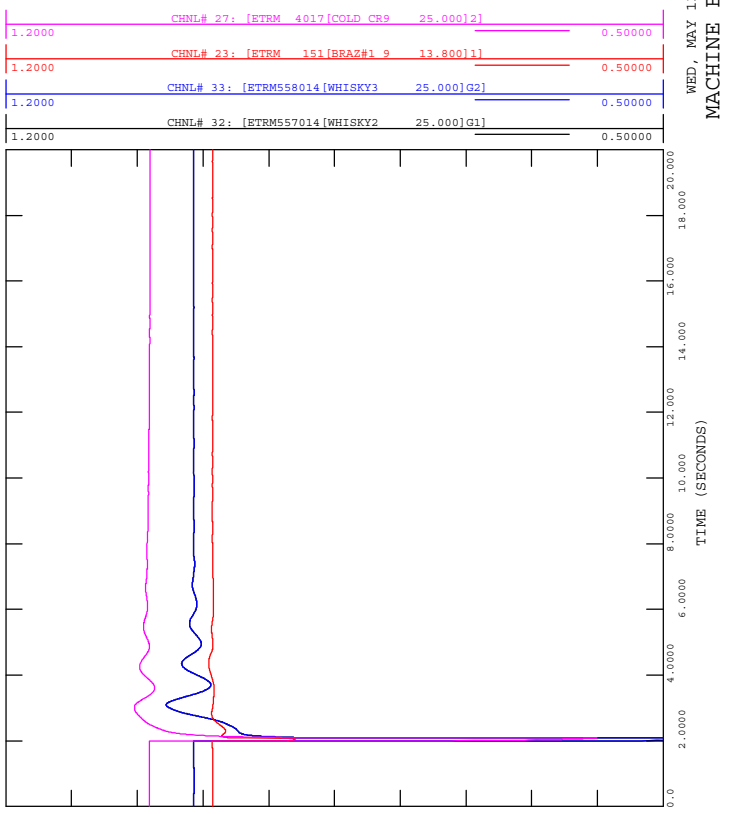
WED, MAY 13 2020 23:34
MACHINE ETERM (V)

FIGURE D-13A
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



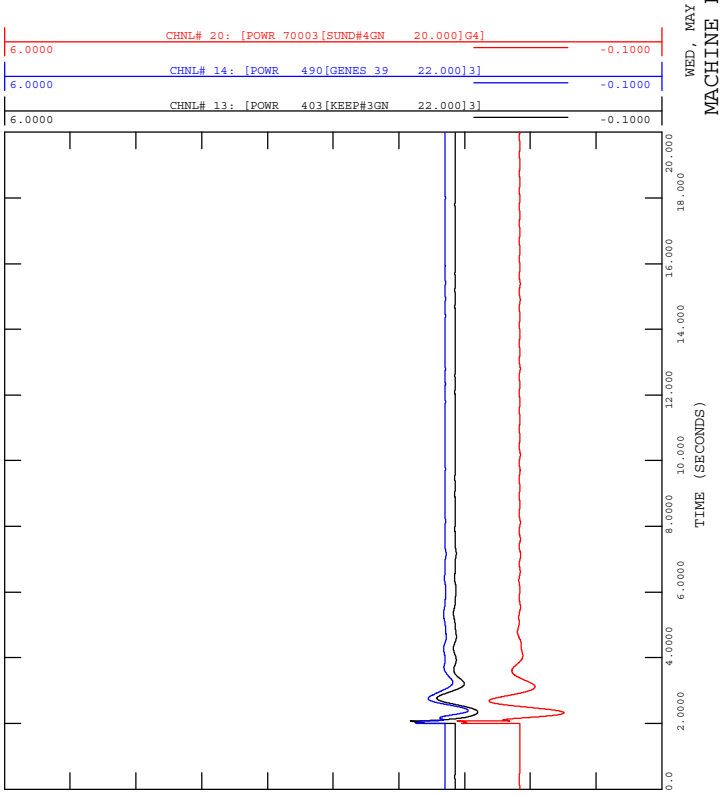
WED, MAY 13 2020 23:34
MACHINE ANGLE (DEGREES)

FIGURE D-13C
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



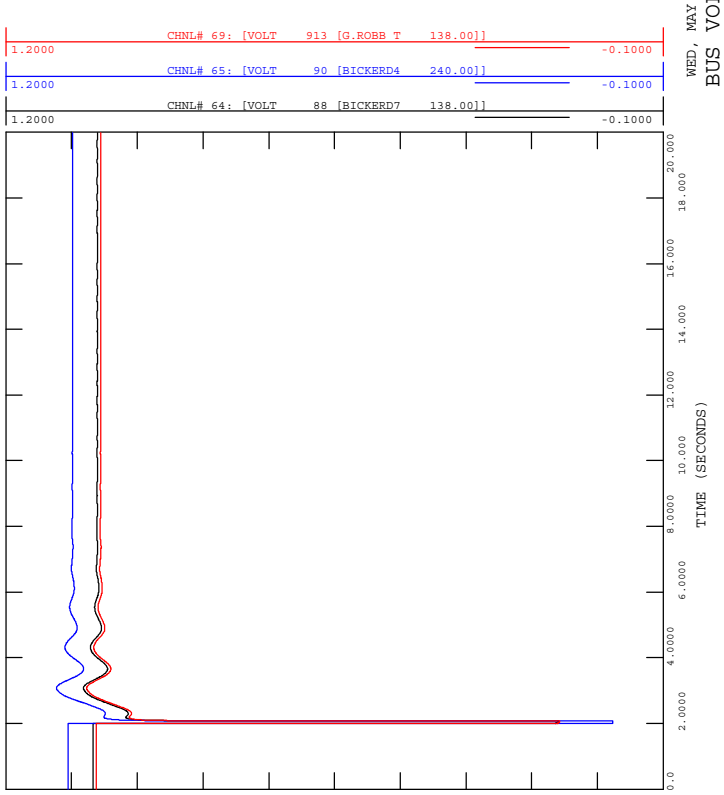
WED, MAY 13 2020 23:34
MACHINE ETERM (V)

FIGURE D-13F
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



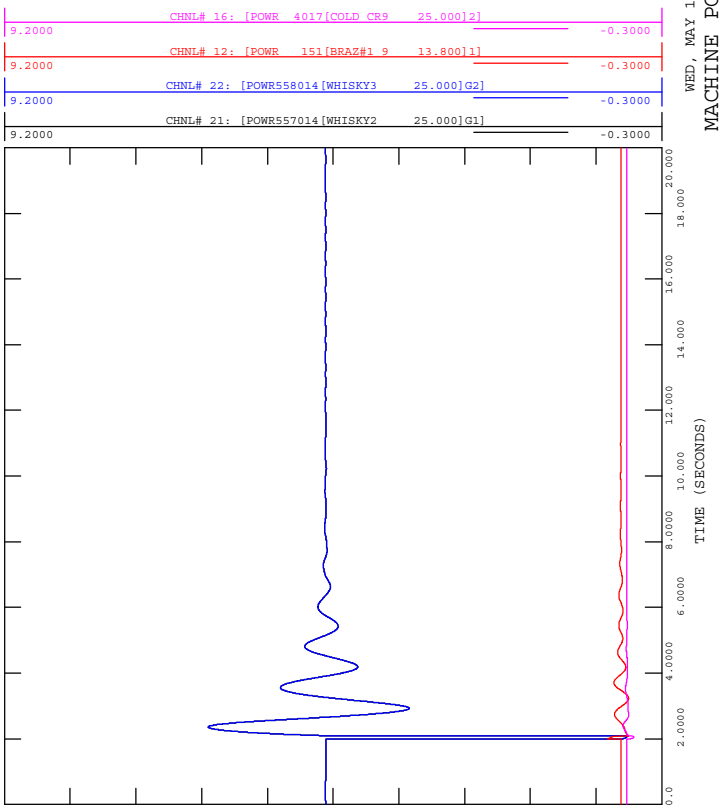
WED, MAY 13 2020 23:34
MACHINE POWER (MW)

FIGURE D-13H
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



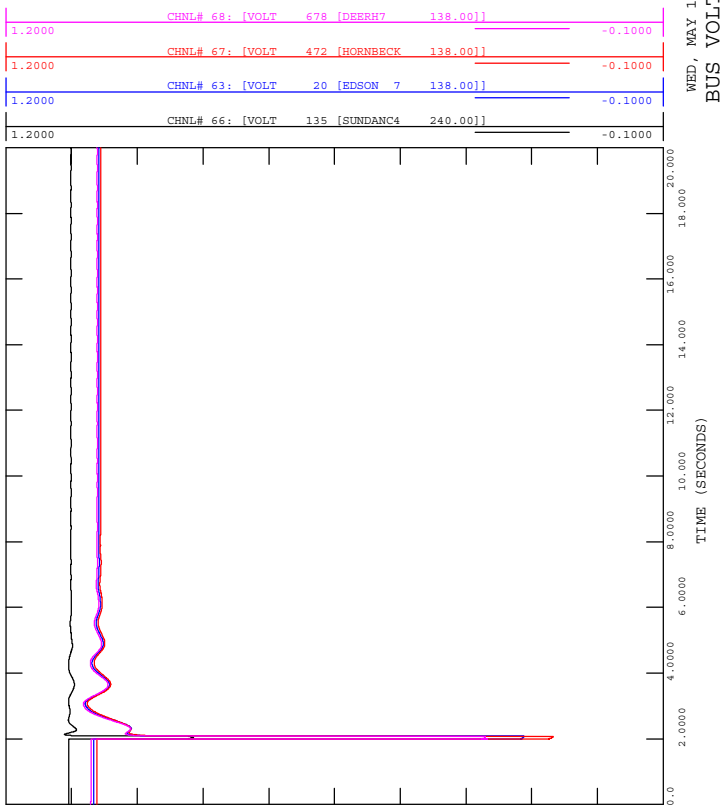
WED, MAY 13 2020 23:34
BUS VOLTAGE (PU)

FIGURE D-13E
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



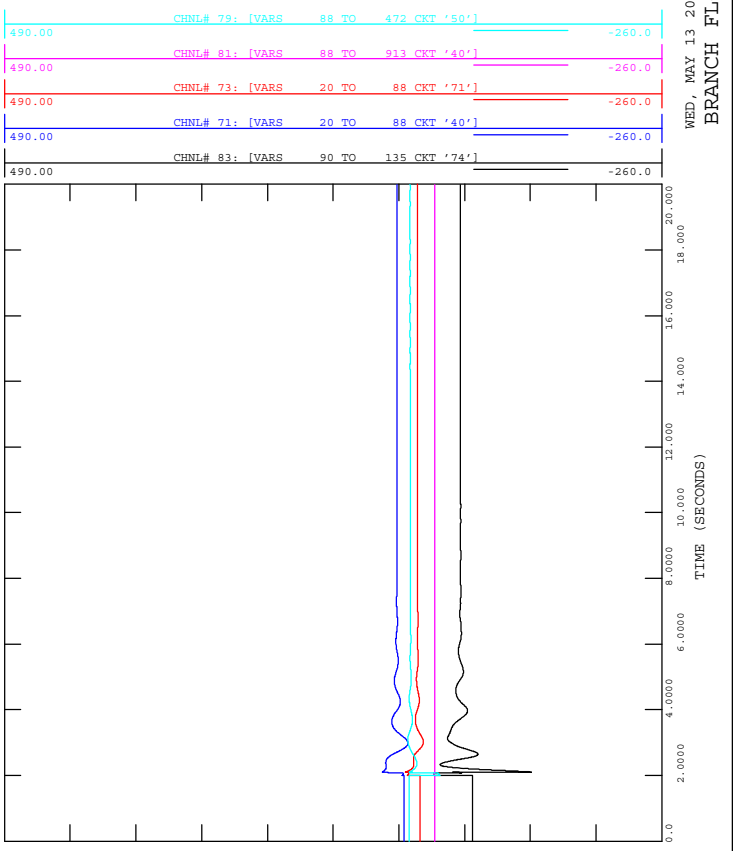
WED, MAY 13 2020 23:34
MACHINE POWER (MW)

FIGURE D-13G
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



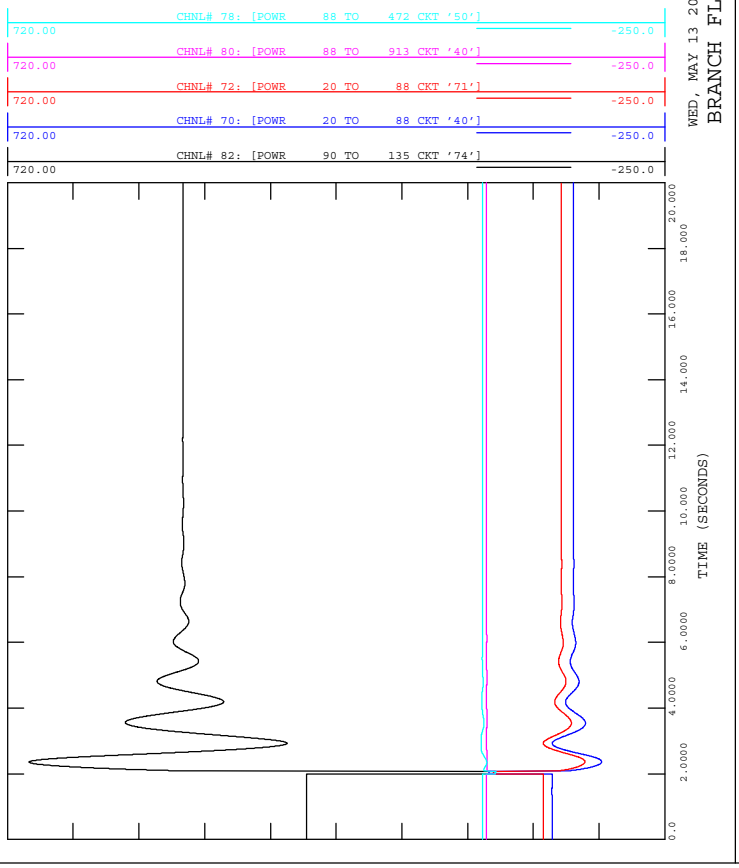
WED, MAY 13 2020 23:34
BUS VOLTAGE (PU)

FIGURE D-13J
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



WED, MAY 13 2020 23:34
BRANCH FLOW (Q)

FIGURE D-13I
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-13_973L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-14B
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out

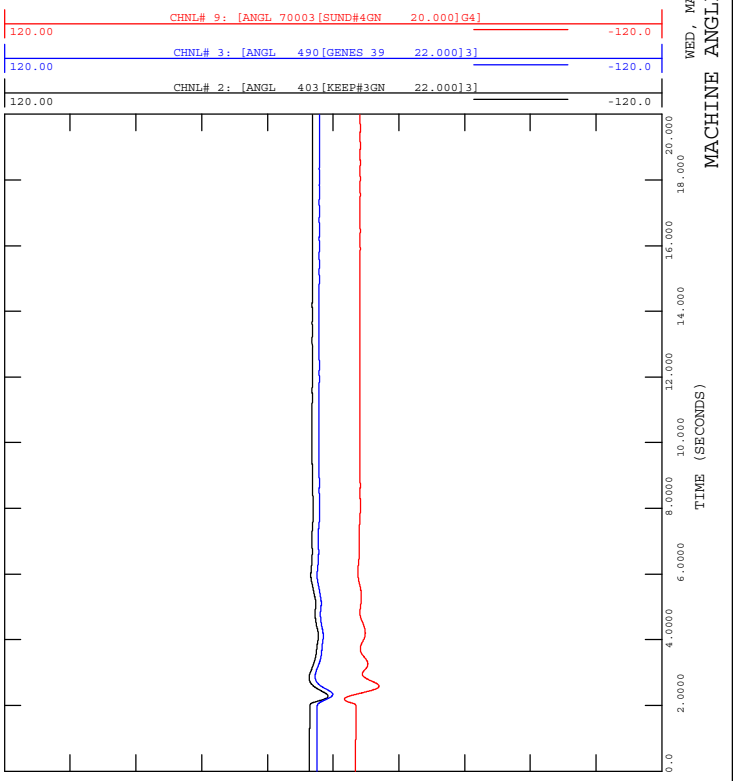


FIGURE D-14D
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out

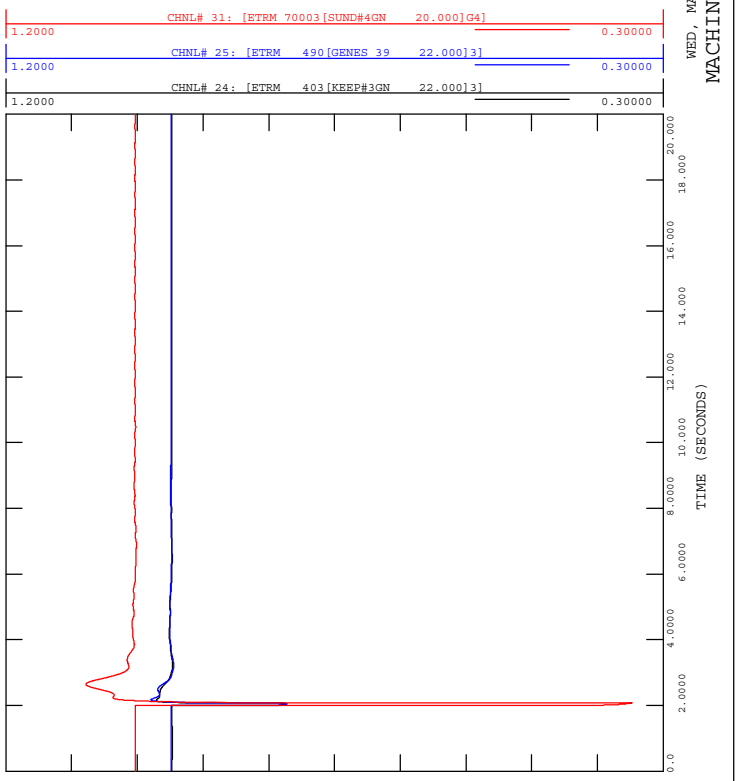


FIGURE D-14A
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out

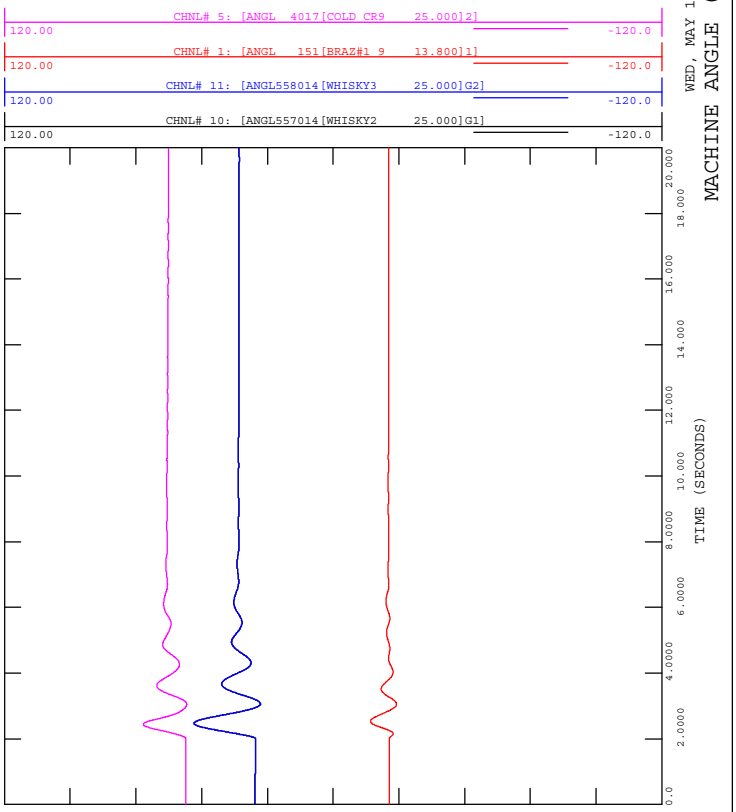


FIGURE D-14C
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out

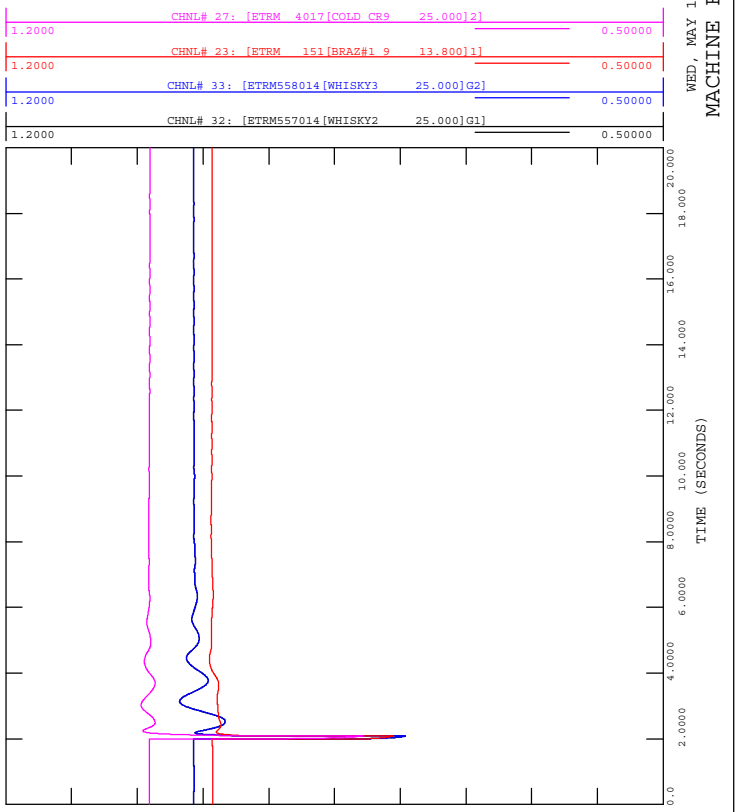
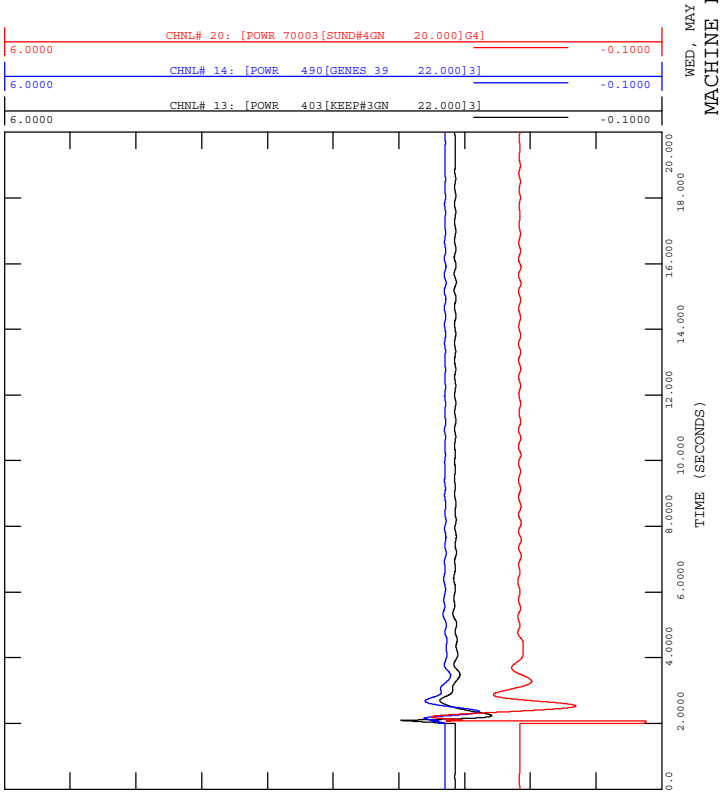


FIGURE D-14F
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out



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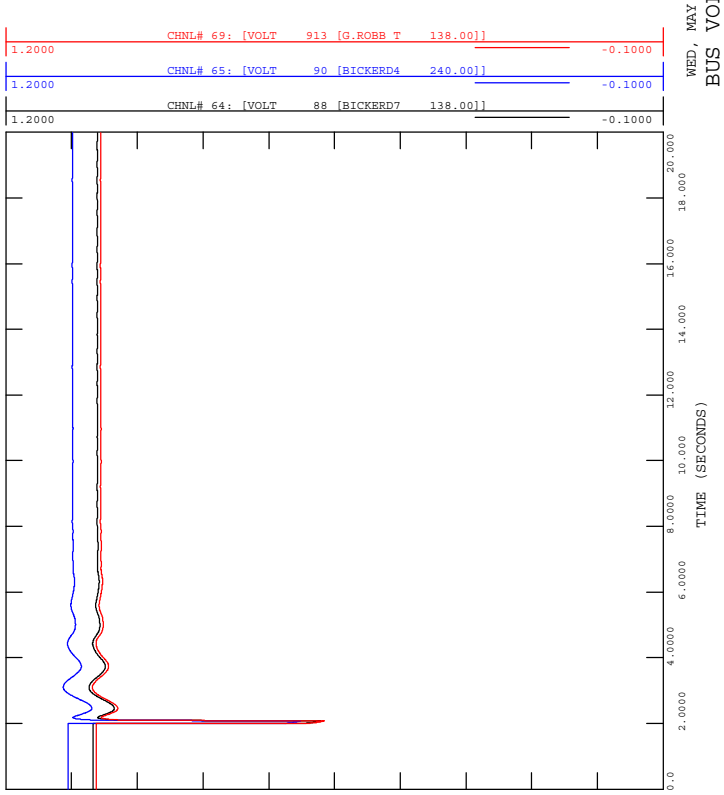
MACHINE POWER (MW)

FIGURE D-14H
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out



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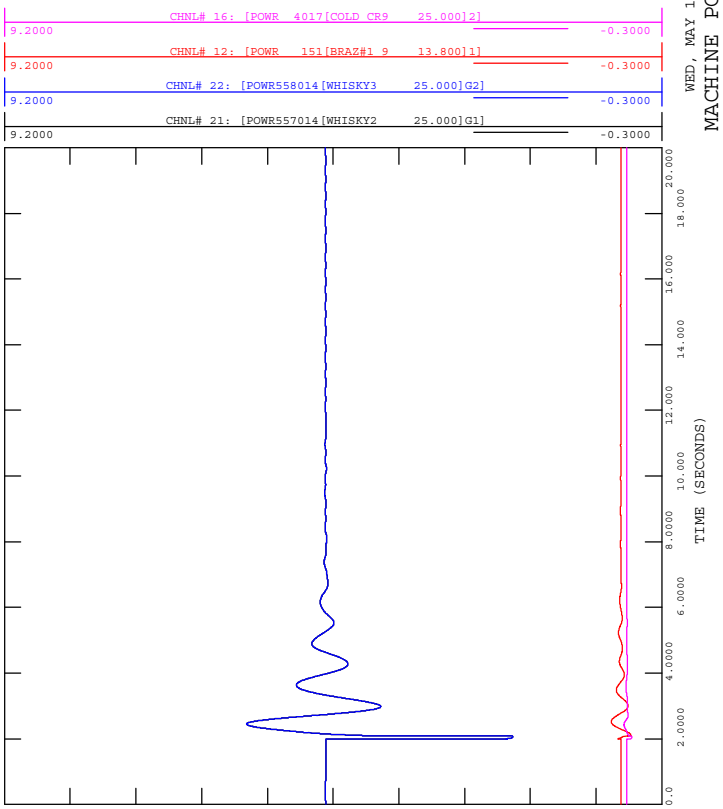
BUS VOLTAGE (PU)

FIGURE D-14E
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out



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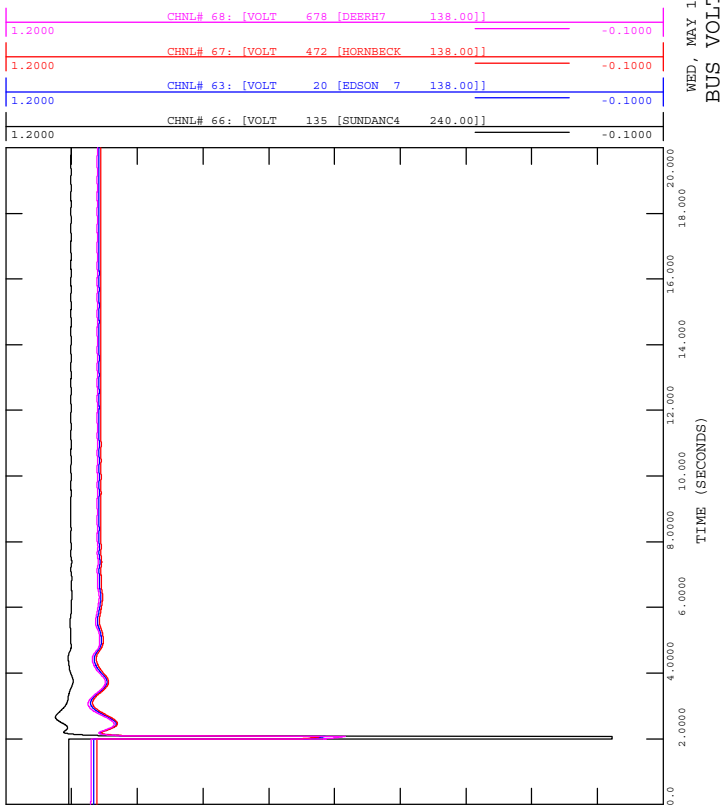
MACHINE POWER (MW)

FIGURE D-14G
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out



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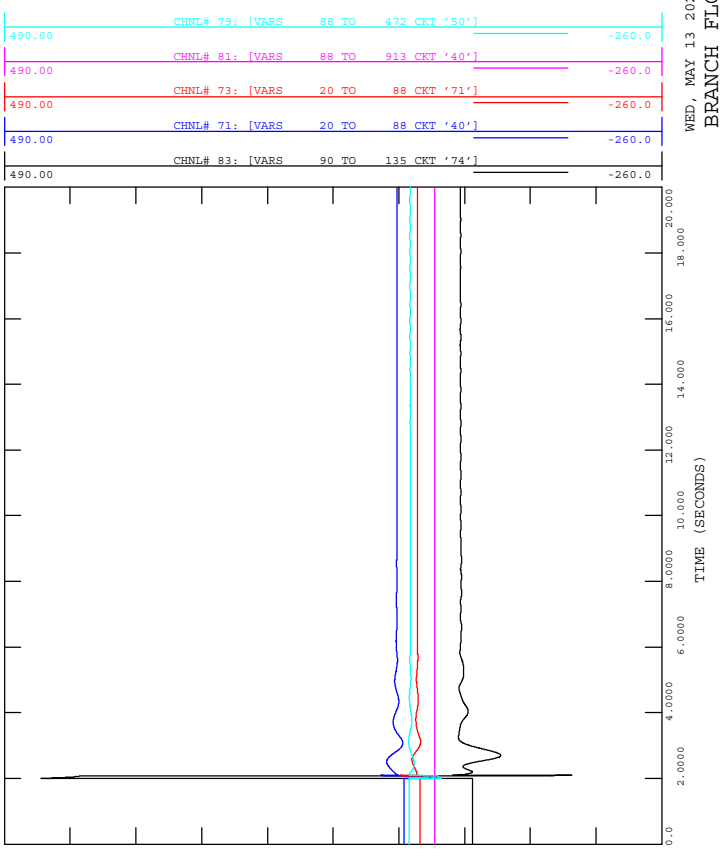
BUS VOLTAGE (PU)

FIGURE D-14J
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out



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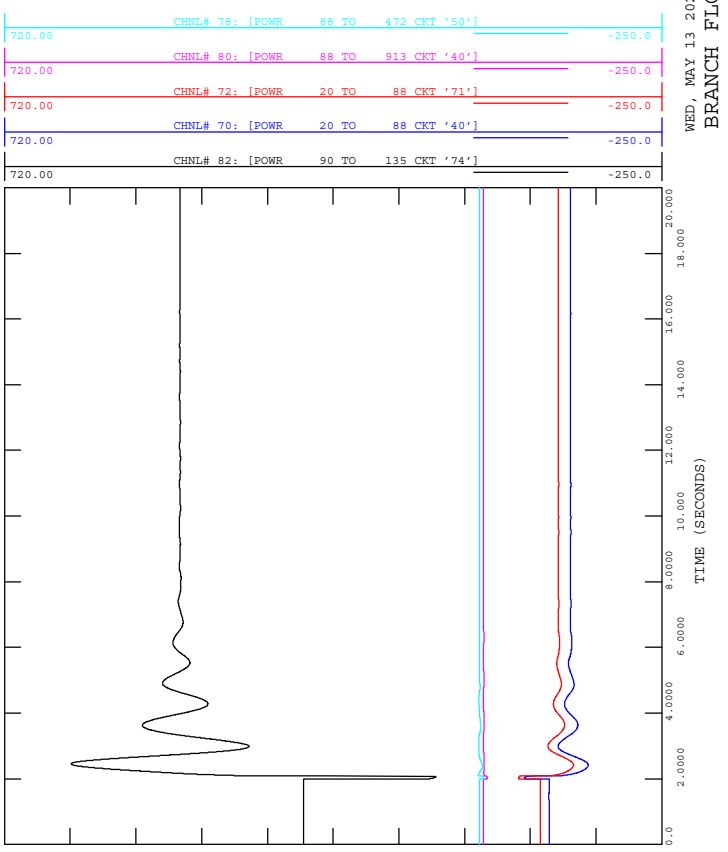
BRANCH FLOW (Q)

FIGURE D-14I
2022SP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-14_973L_Sundance_310P.out



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BRANCH FLOW (P)

FIGURE D-15B
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out

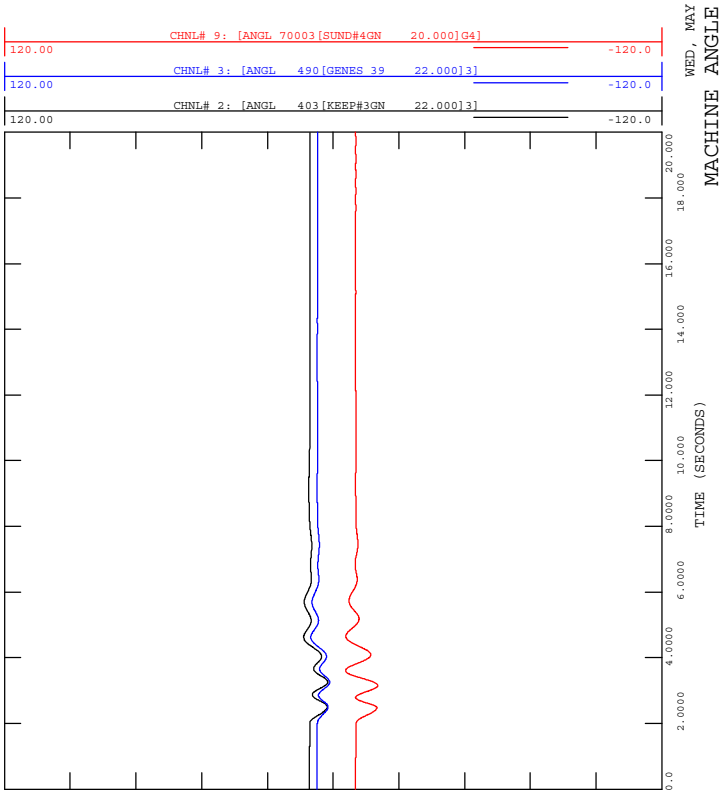


FIGURE D-15D
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out

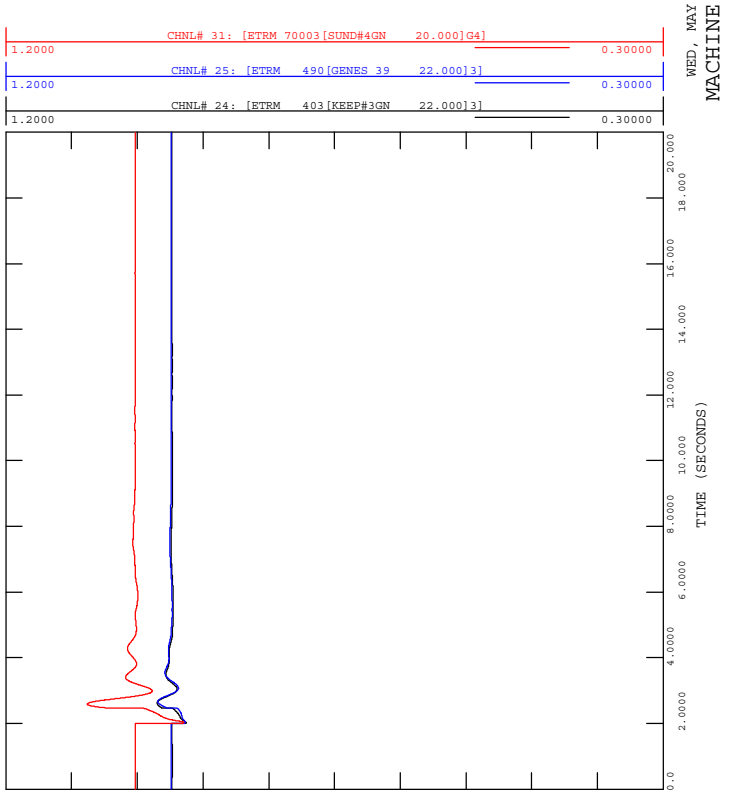


FIGURE D-15A
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out

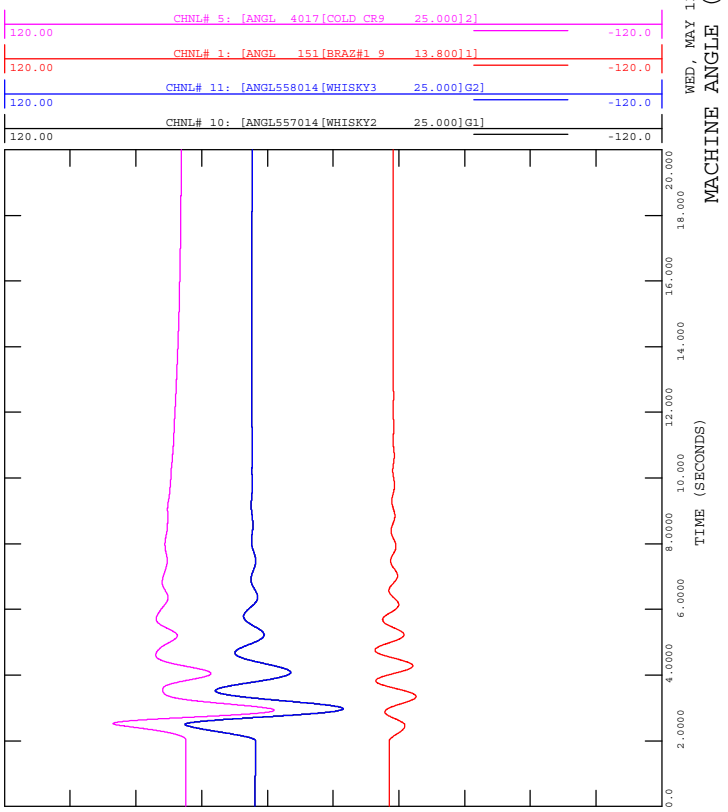


FIGURE D-15C
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out

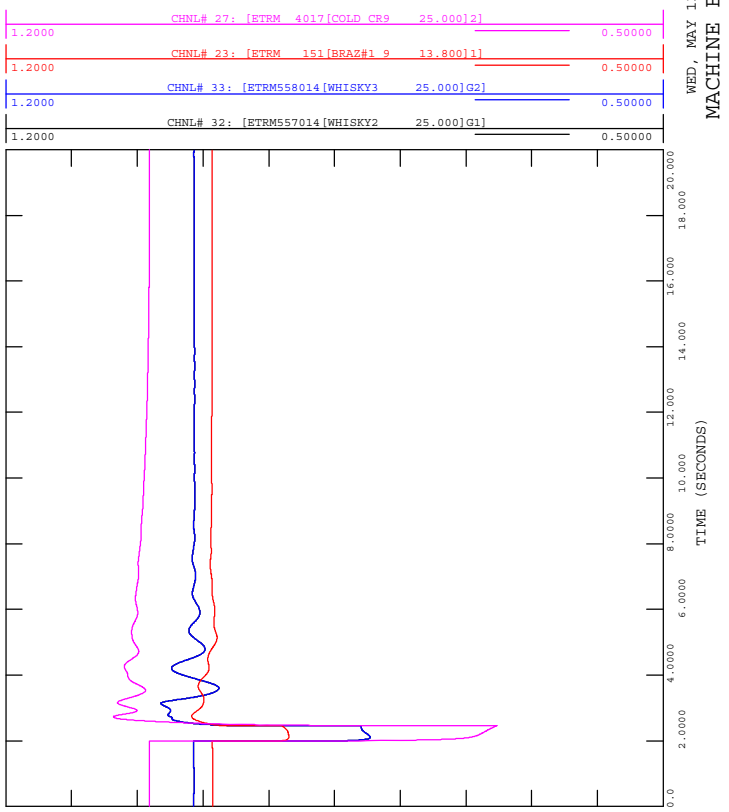
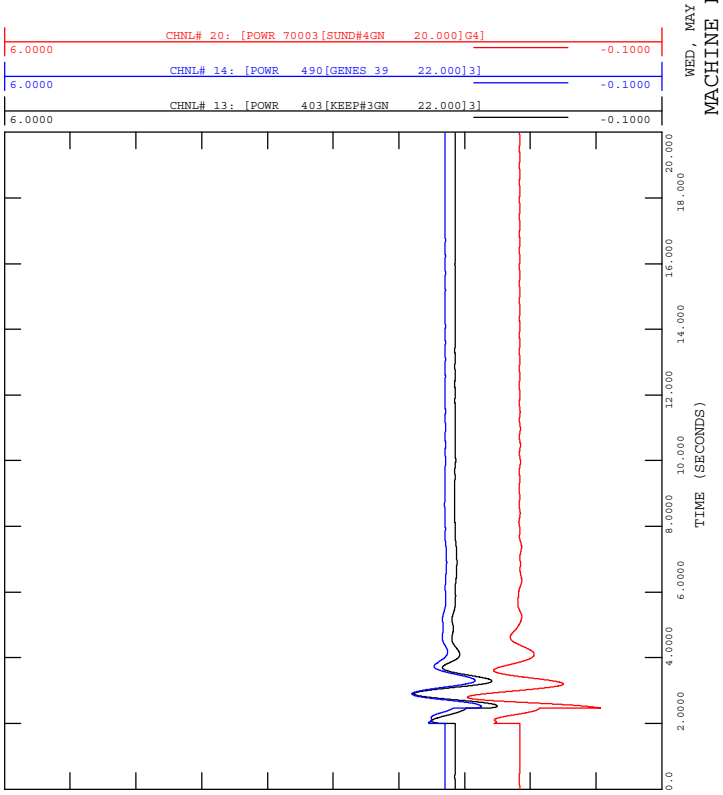


FIGURE D-15F
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out



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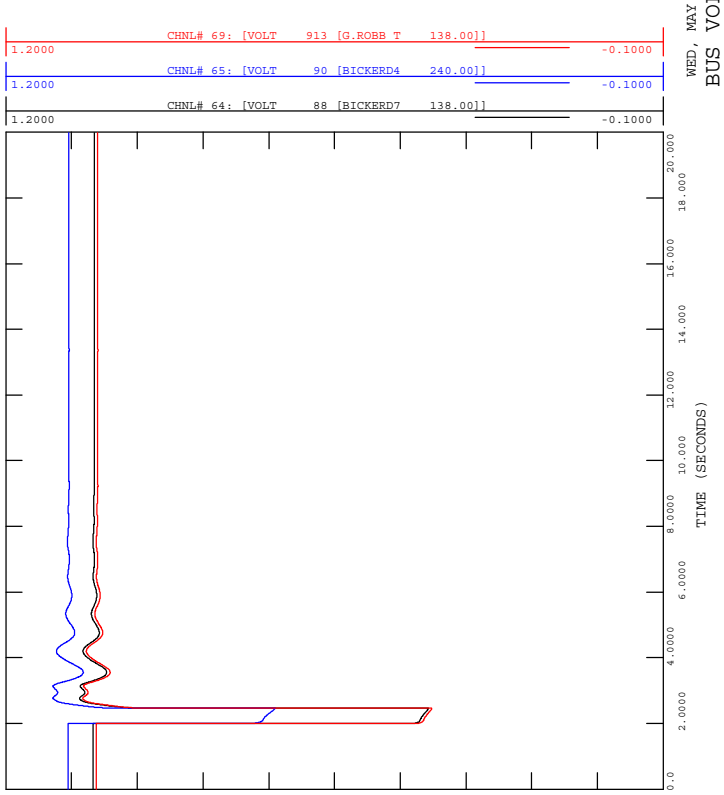
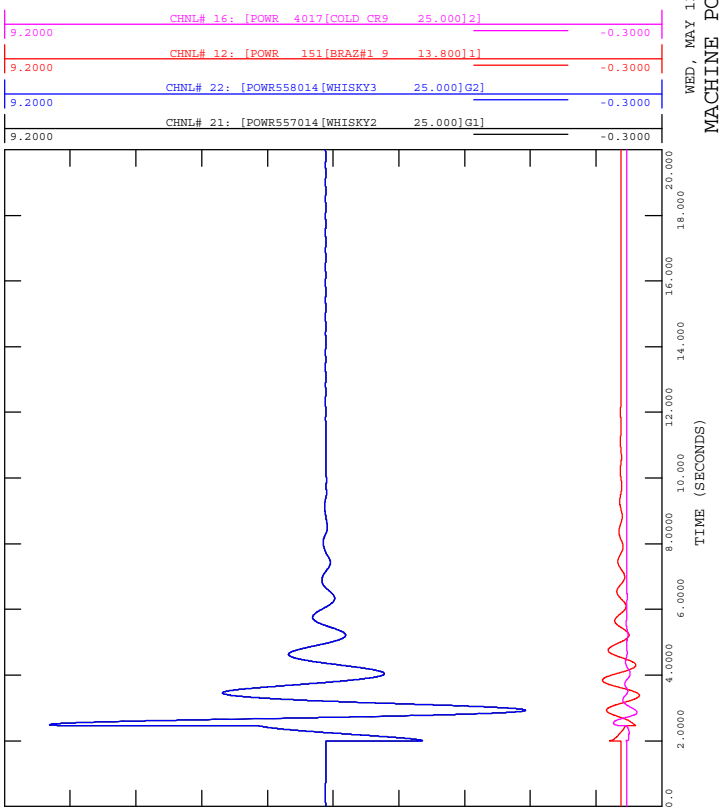
MACHINE POWER (MW)

FIGURE D-15H
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out



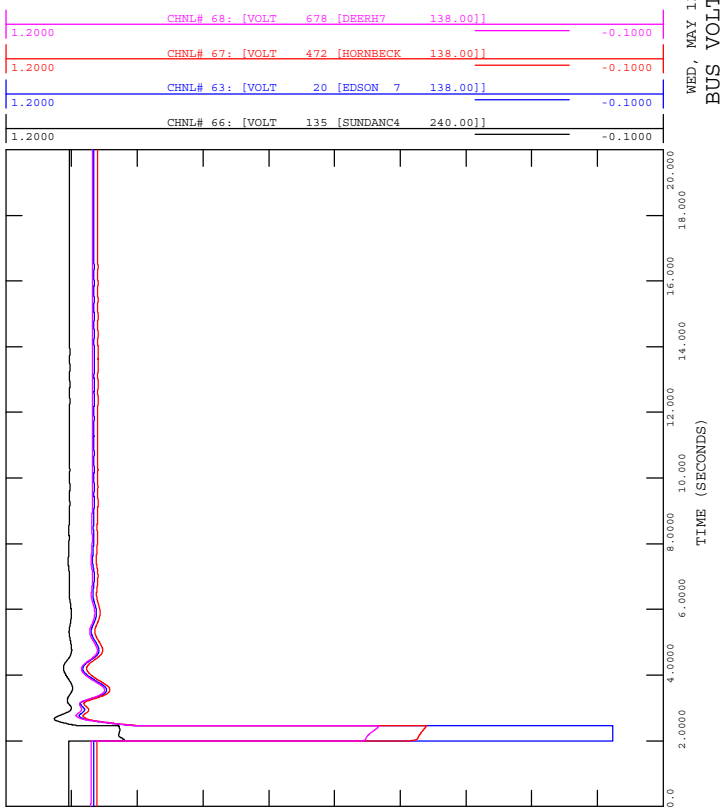
WED, MAY 13 2020 23:35
BUS VOLTAGE (PU)

FIGURE D-15E
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out



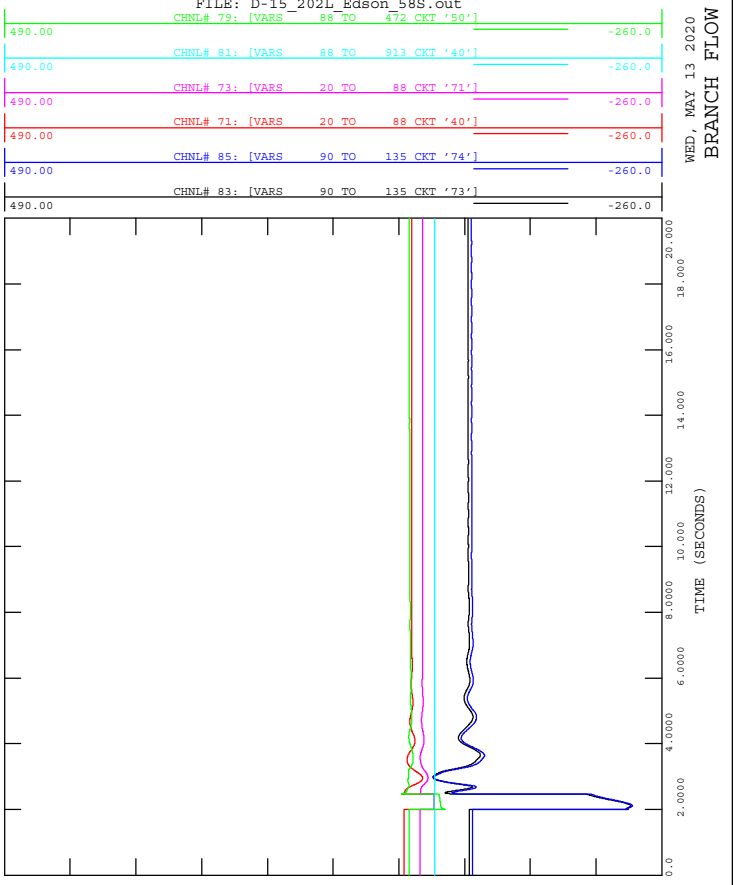
WED, MAY 13 2020 23:35
MACHINE POWER (MW)

FIGURE D-15G
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out



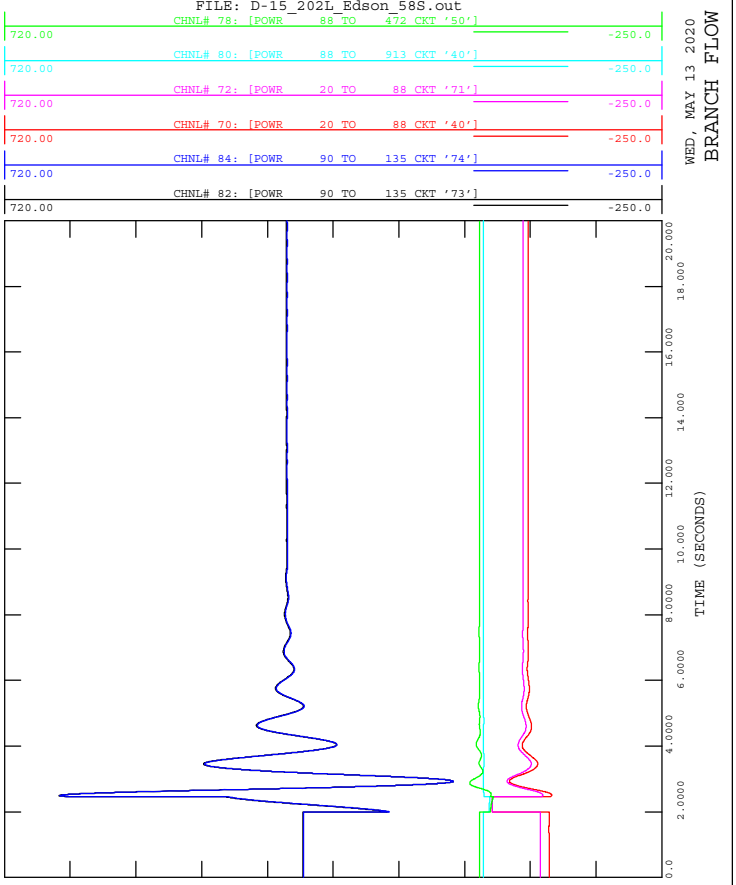
WED, MAY 13 2020 23:35
BUS VOLTAGE (PU)

FIGURE D-15J
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out



WED, MAY 13 2020 23:35
BRANCH FLOW (Q)

FIGURE D-15I
2022SP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-15_202L_Edson_58S.out



WED, MAY 13 2020 23:35
BRANCH FLOW (P)

FIGURE D-16B
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out

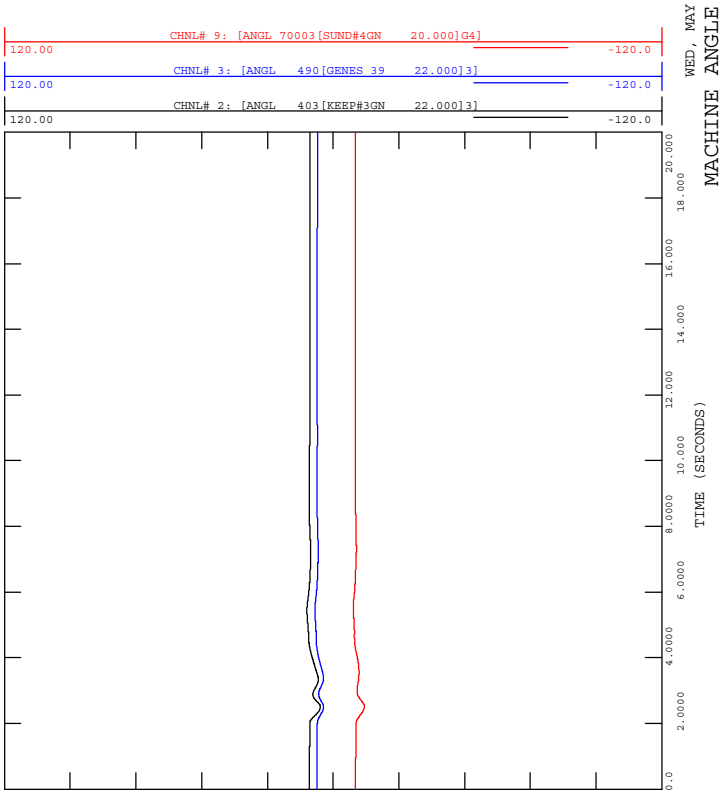


FIGURE D-16D
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out

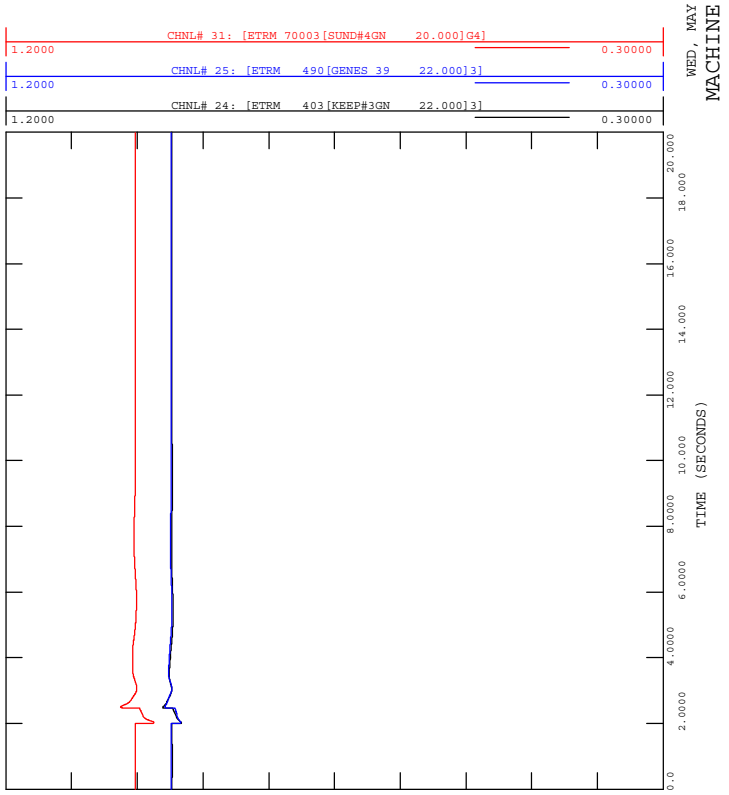


FIGURE D-16A
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out

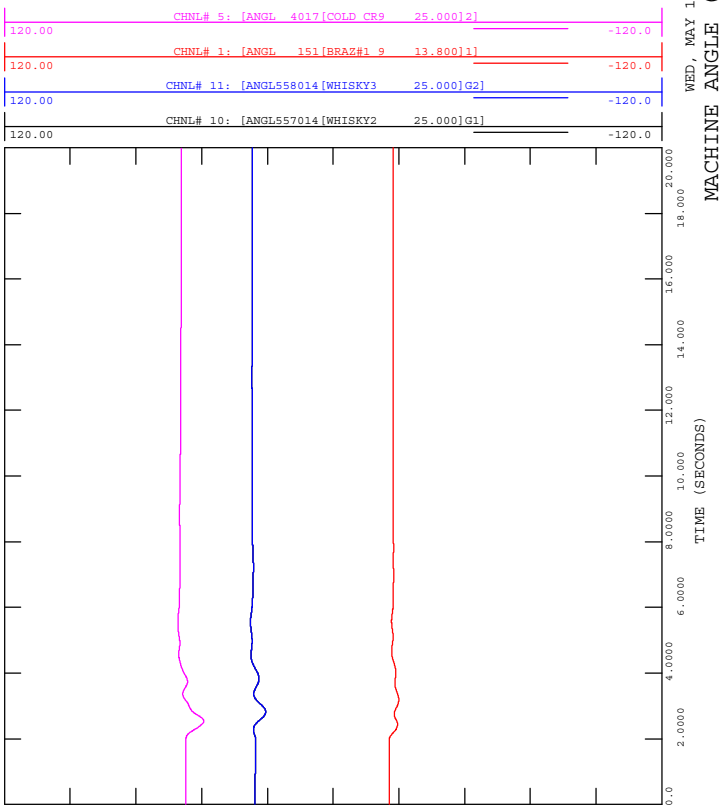


FIGURE D-16C
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out

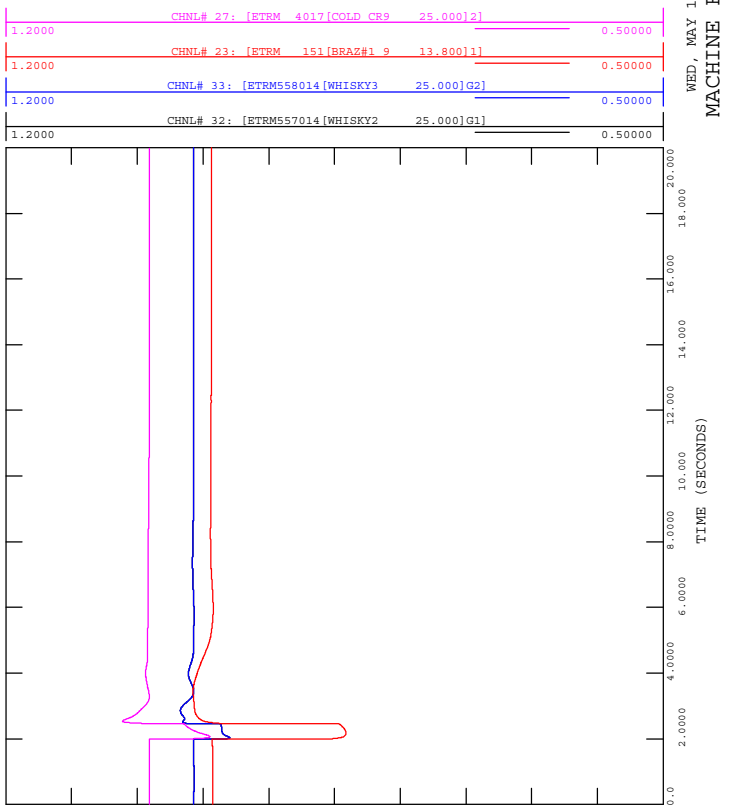
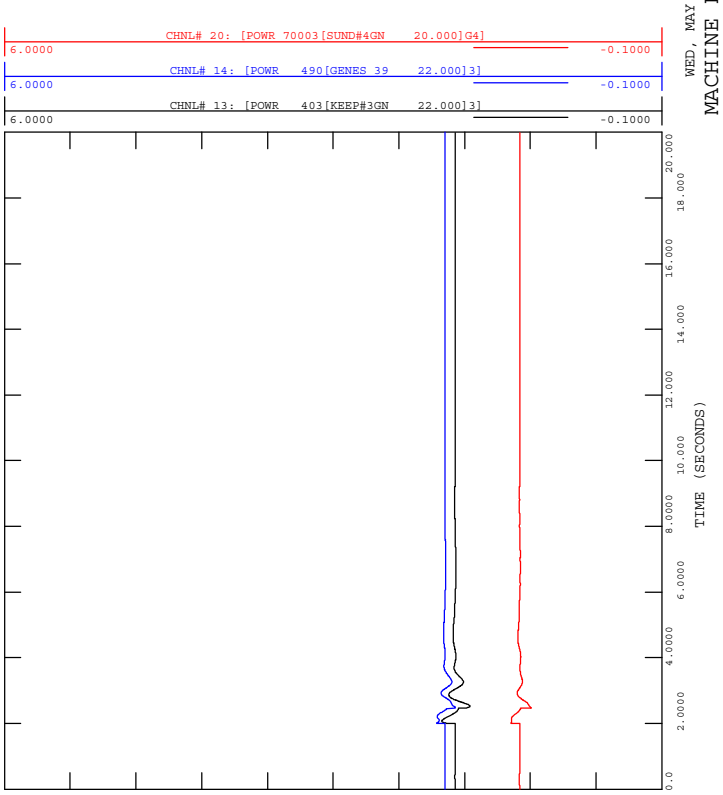


FIGURE D-16F
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out



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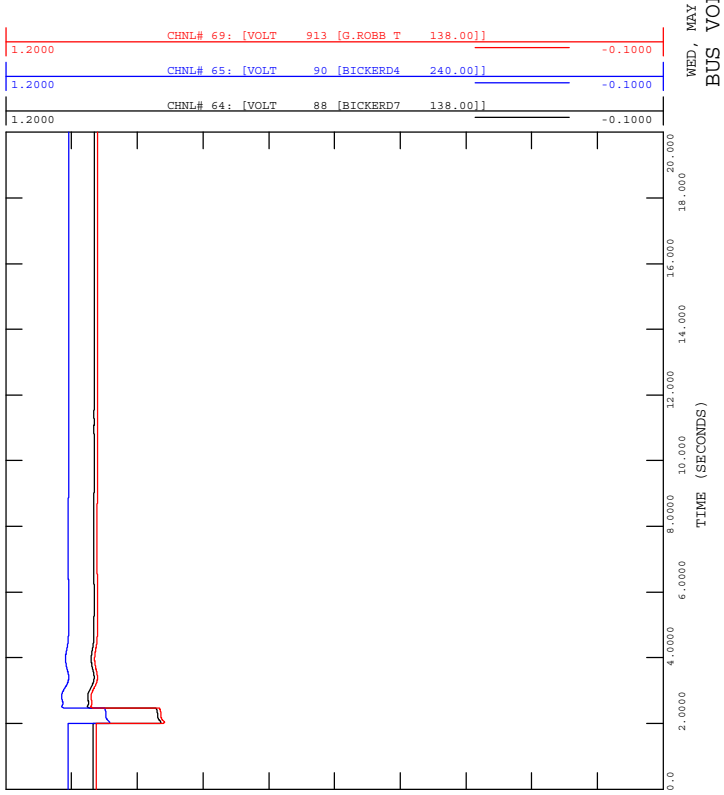
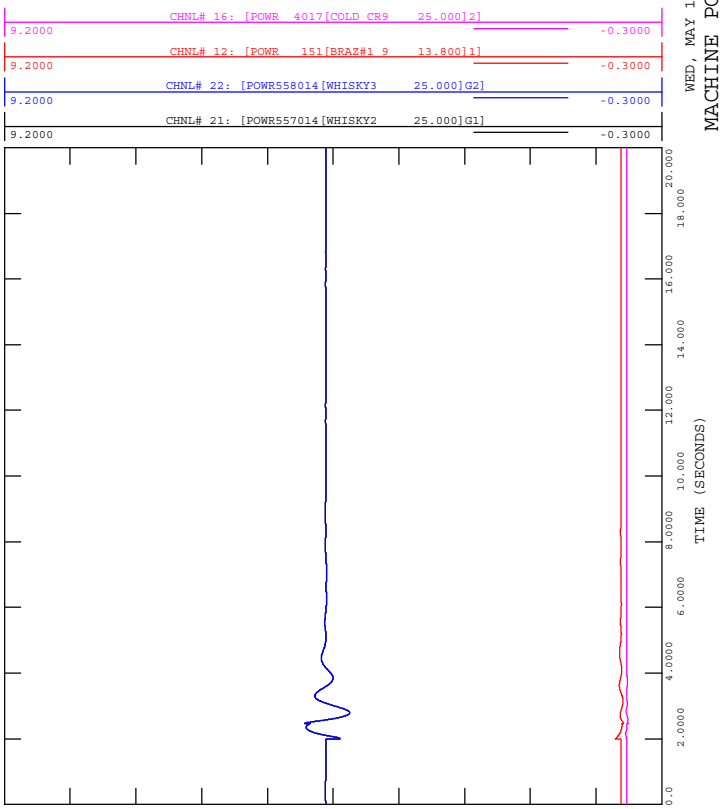
MACHINE POWER (MW)

FIGURE D-16H
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out



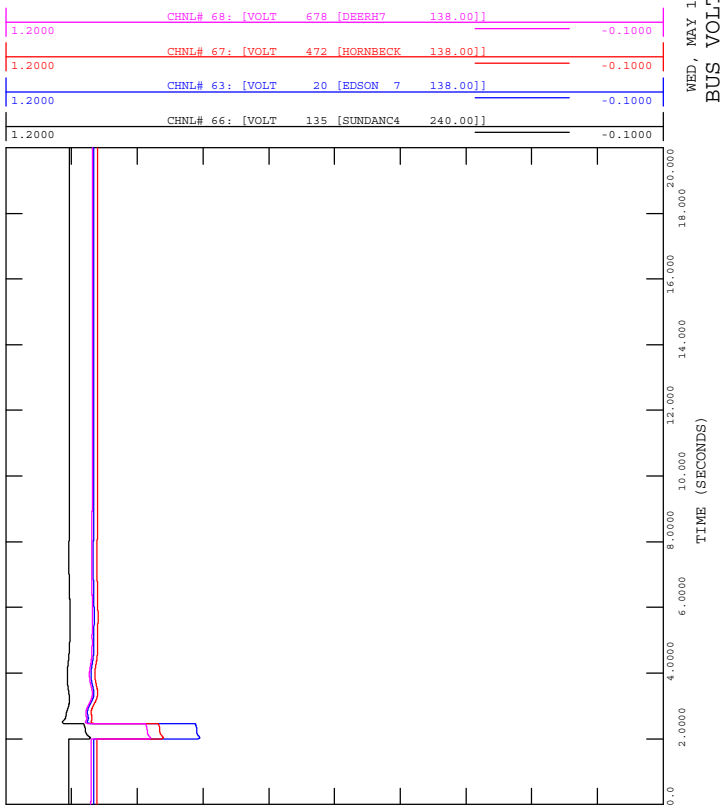
WED, MAY 13 2020 23:35
BUS VOLTAGE (PU)

FIGURE D-16E
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out



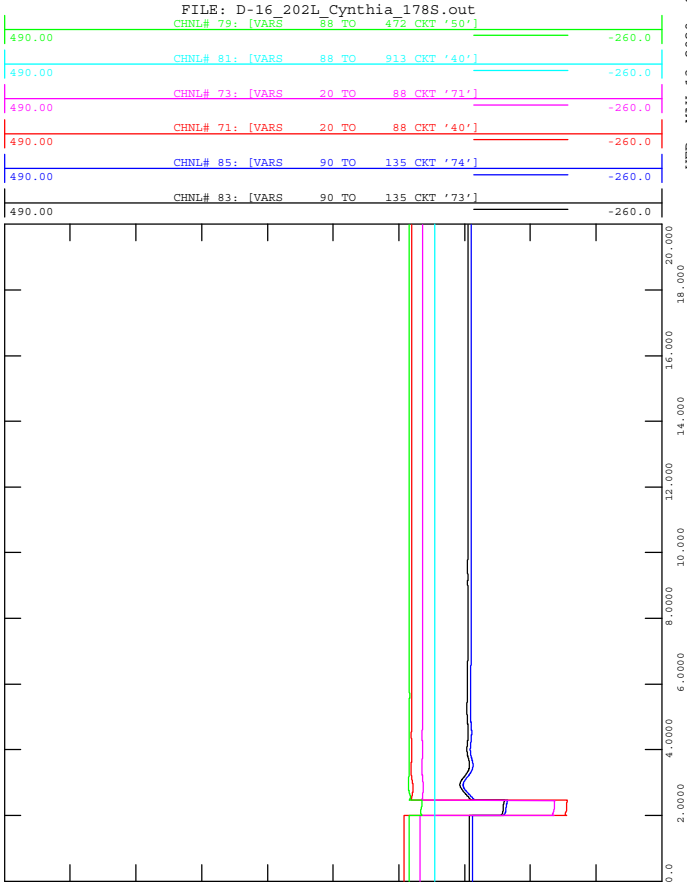
WED, MAY 13 2020 23:35
MACHINE POWER (MW)

FIGURE D-16G
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out



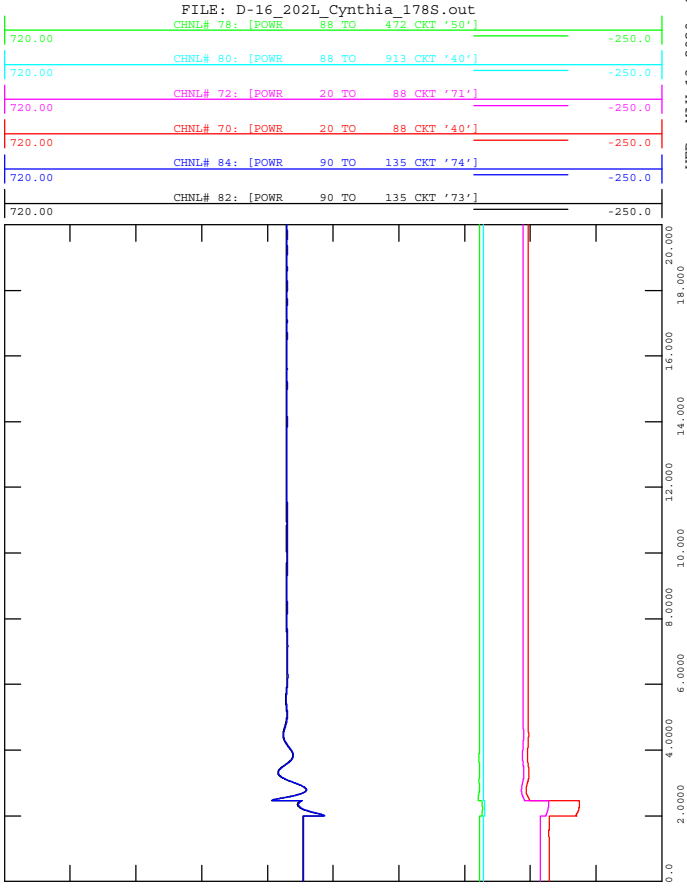
WED, MAY 13 2020 23:35
BUS VOLTAGE (PU)

FIGURE D-16J
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out



WED, MAY 13 2020 23:35
BRANCH FLOW (Q)

FIGURE D-16I
2022SP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-16_202L_Cynthia_178S.out



WED, MAY 13 2020 23:35
BRANCH FLOW (P)

FIGURE D-17B
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out

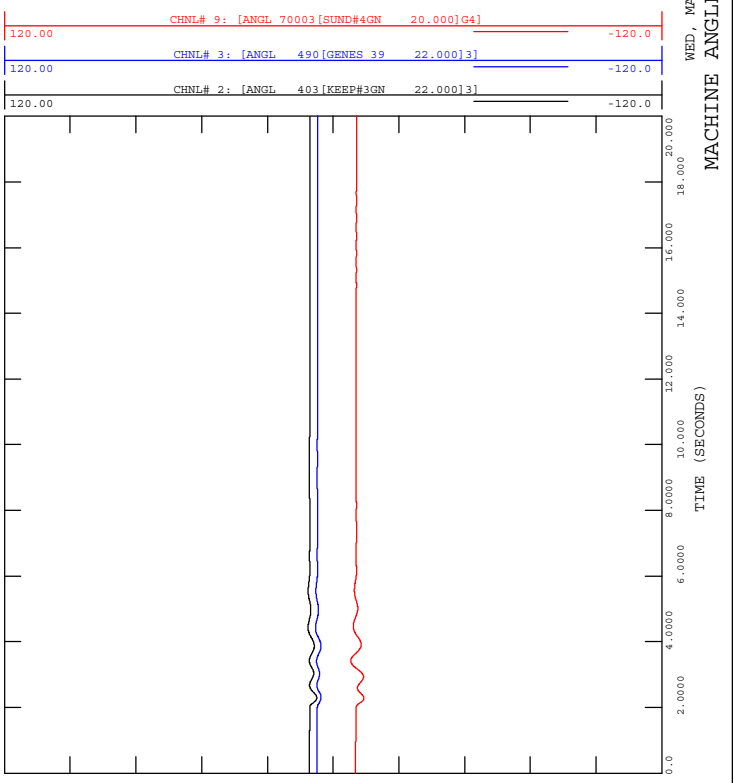


FIGURE D-17D
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out

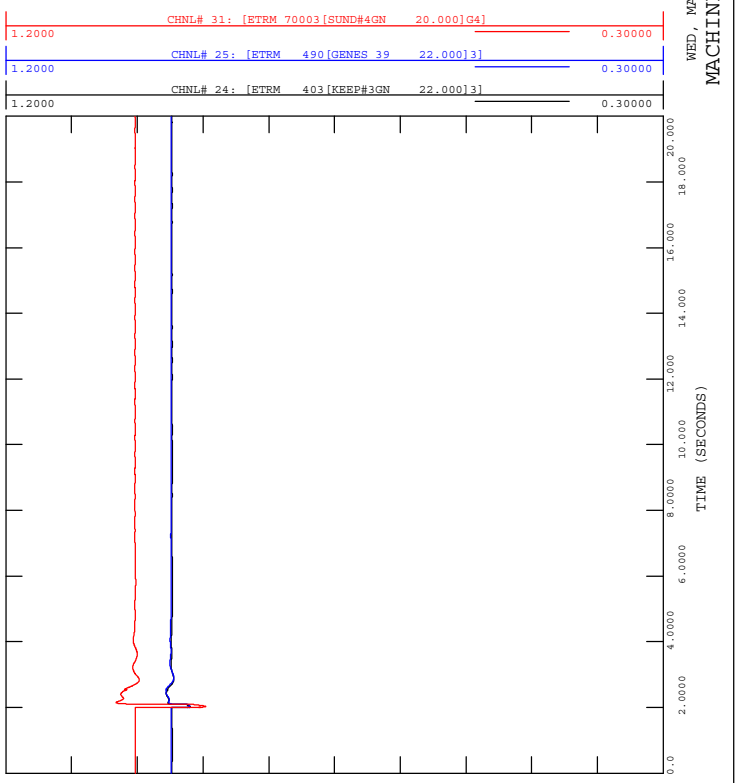


FIGURE D-17A
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out

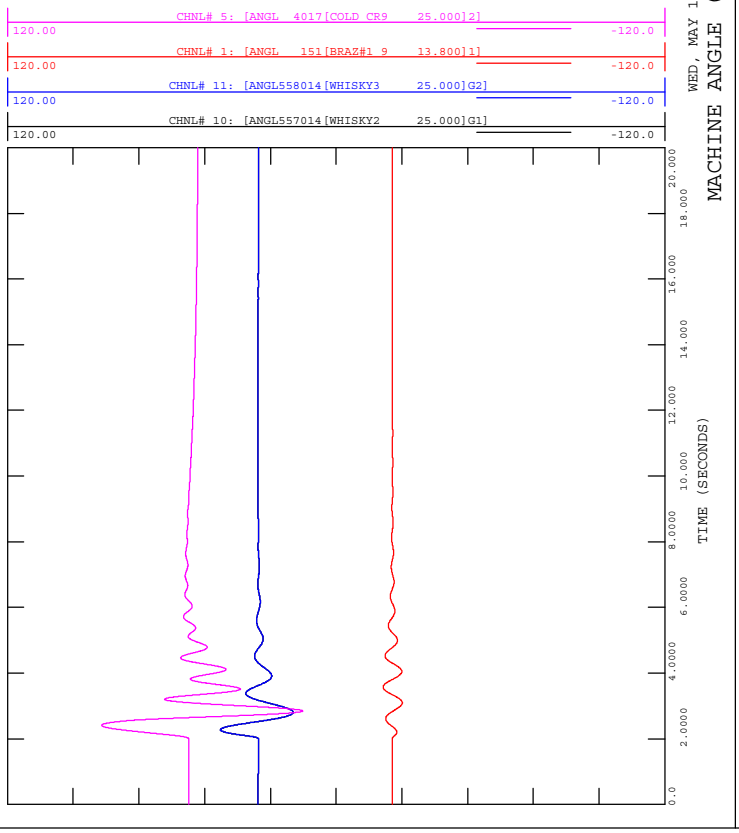


FIGURE D-17C
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out

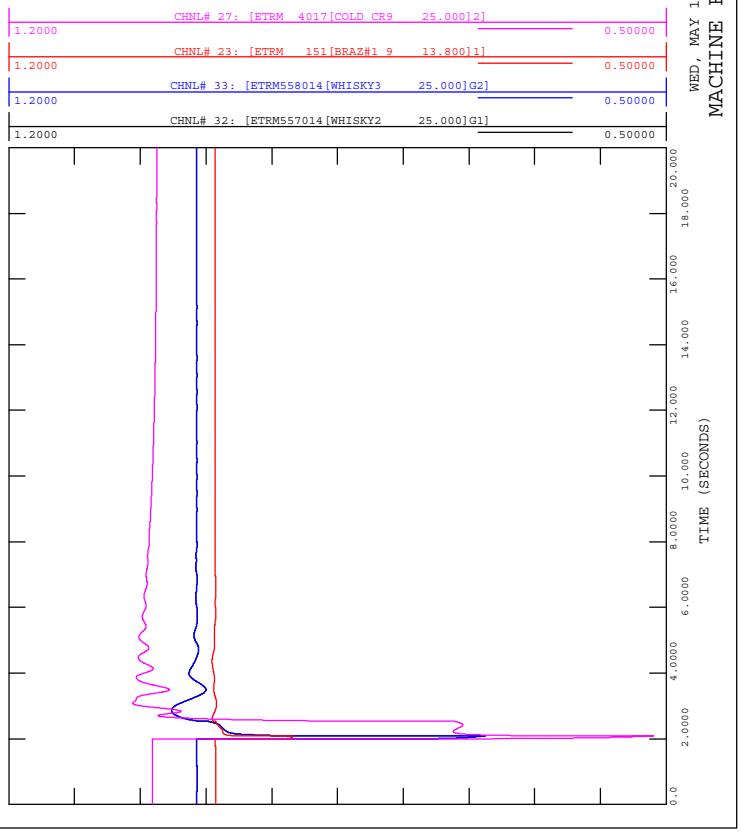
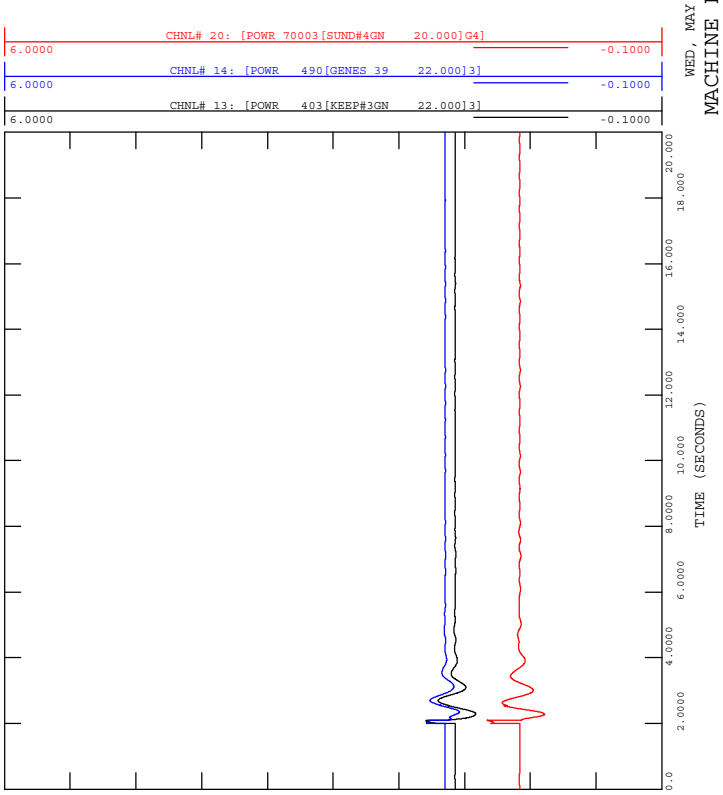


FIGURE D-17F
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out



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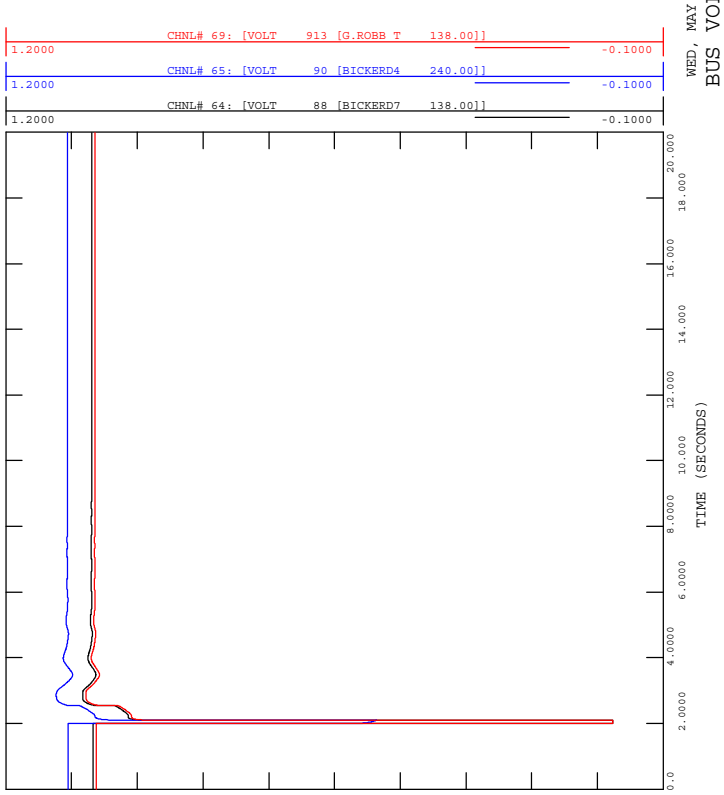
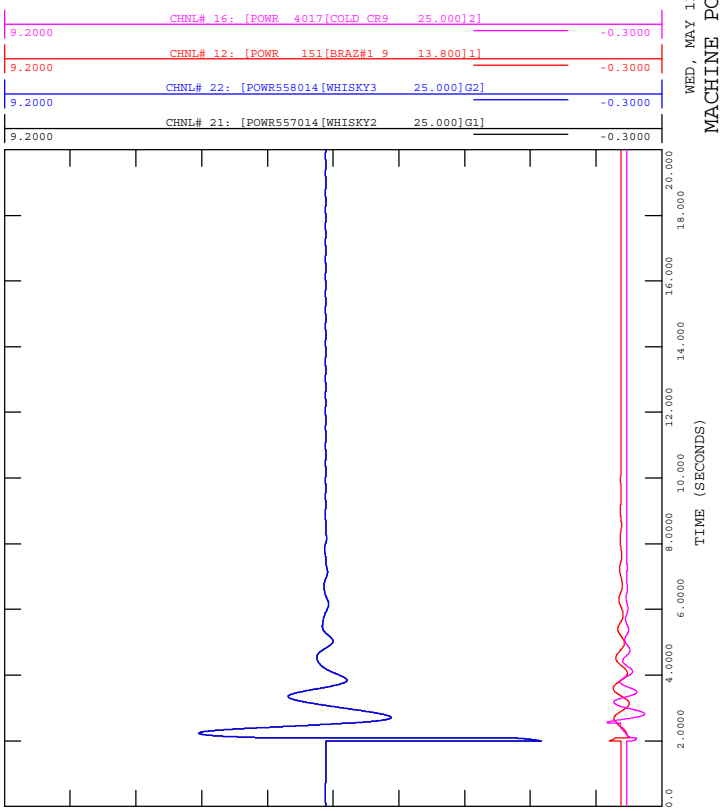
MACHINE POWER (MW)

FIGURE D-17H
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out



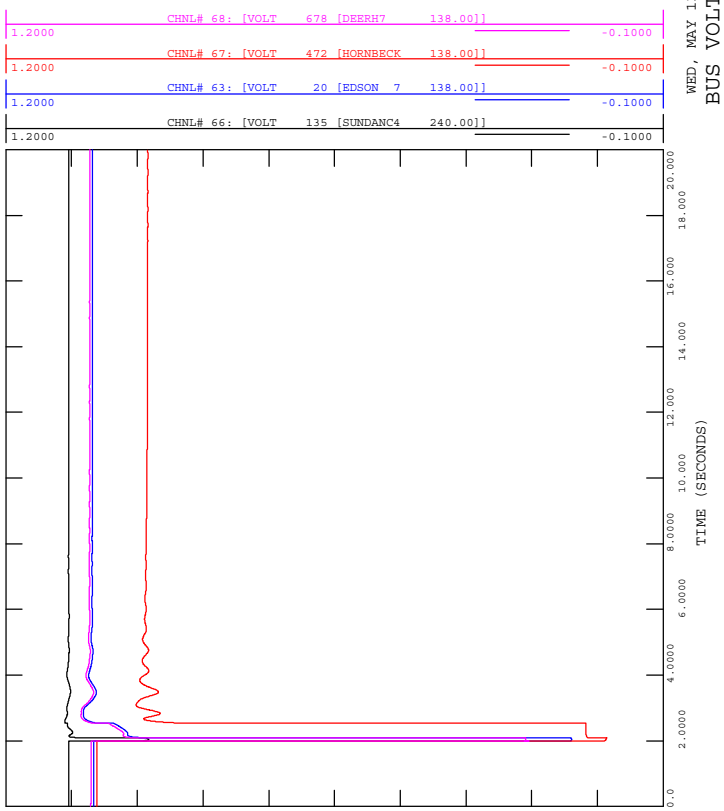
WED, MAY 13 2020 23:35
BUS VOLTAGE (PU)

FIGURE D-17E
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out



WED, MAY 13 2020 23:35
MACHINE POWER (MW)

FIGURE D-17G
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out



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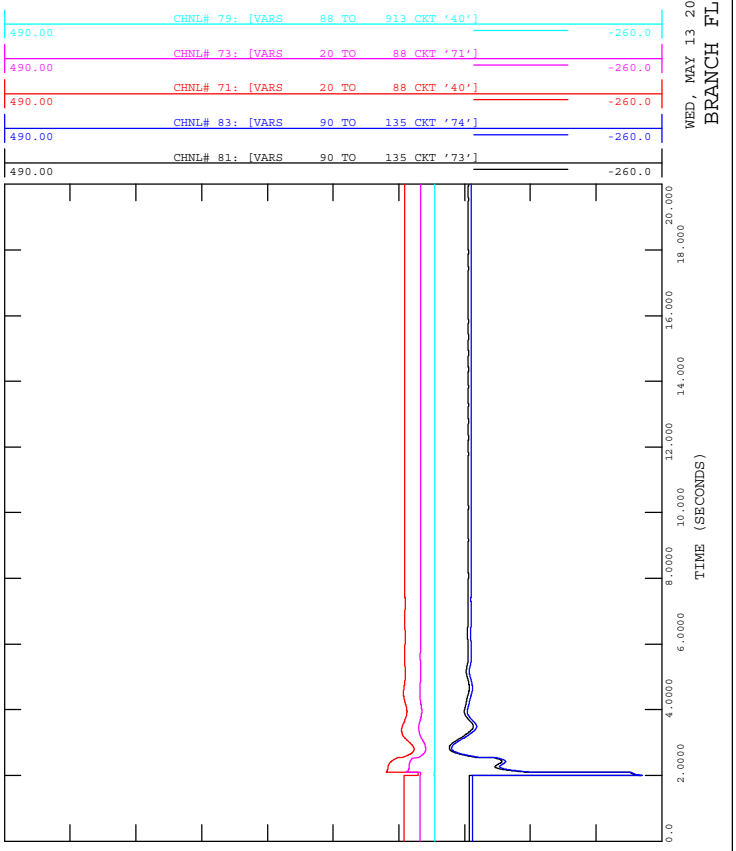
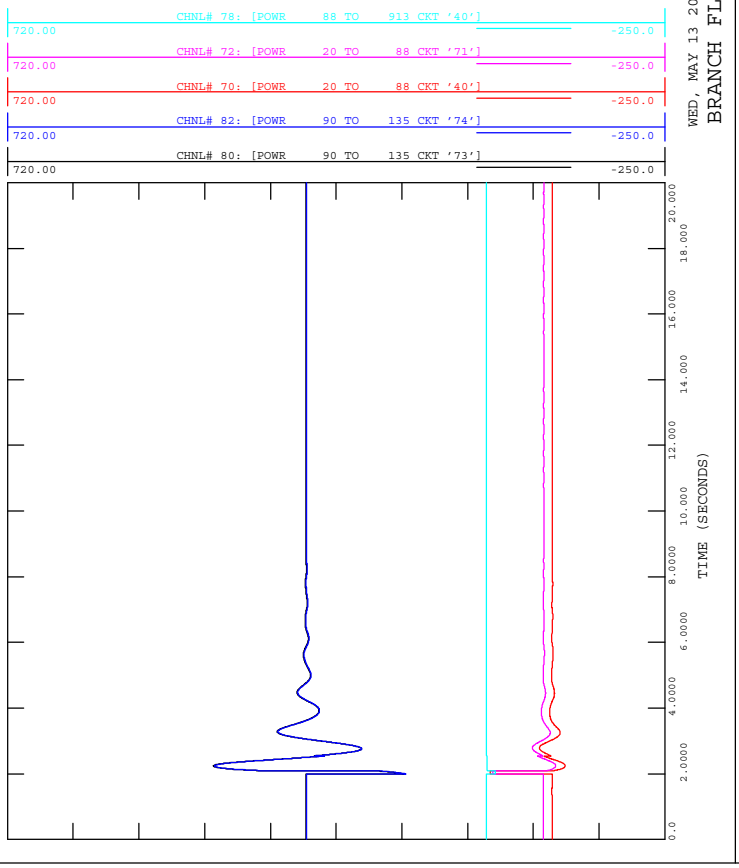
BUS VOLTAGE (PU)

FIGURE D-17J
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out



WED, MAY 13 2020 23:35
BRANCH FLOW (Q)

FIGURE D-17I
2022SP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-17_745L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-18B
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out

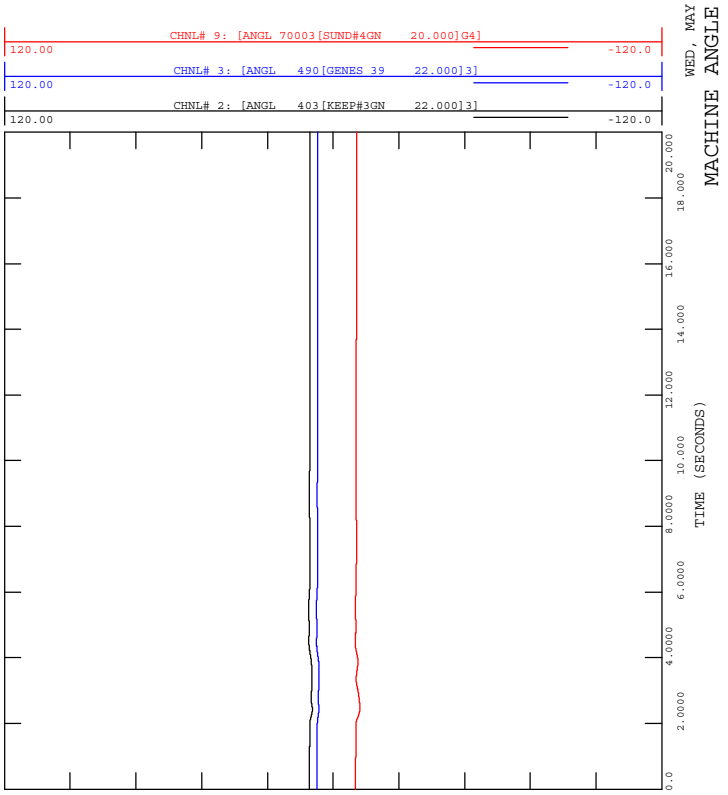


FIGURE D-18D
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out

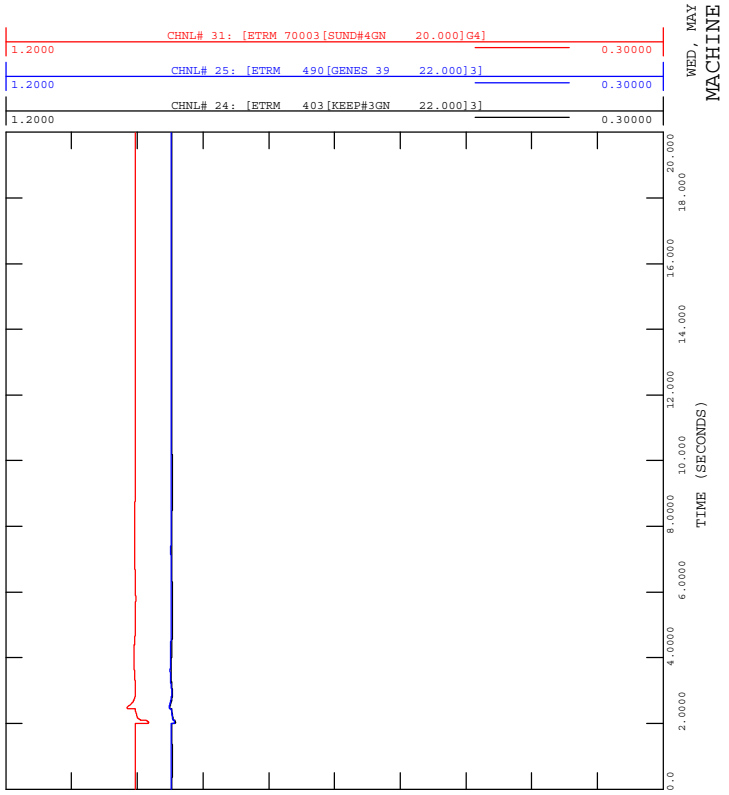


FIGURE D-18A
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out

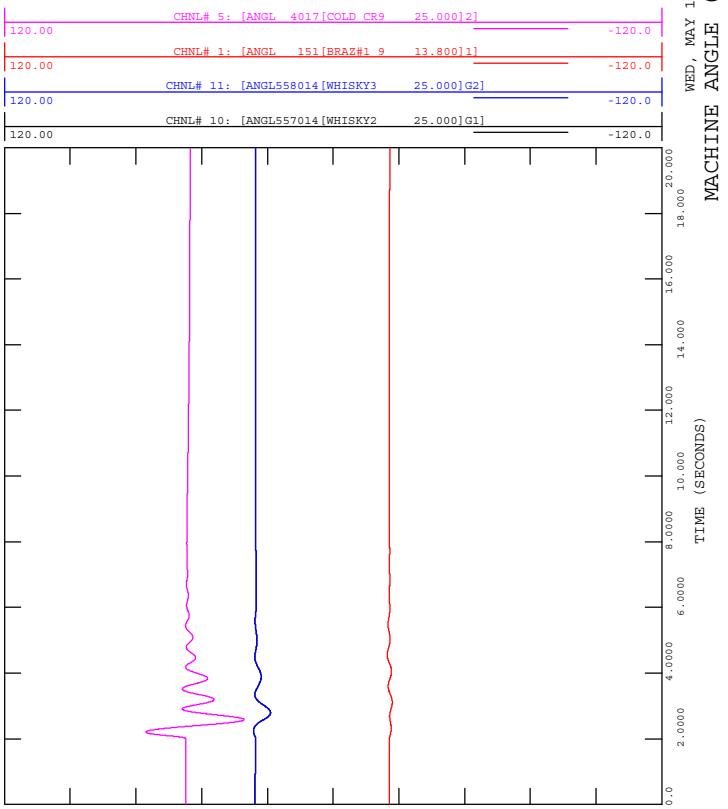


FIGURE D-18C
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out

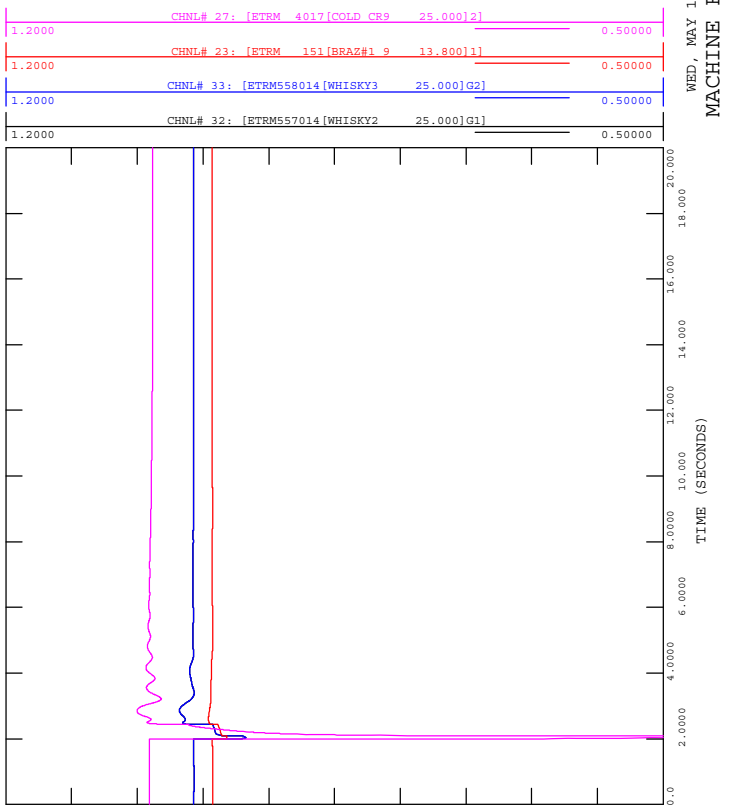
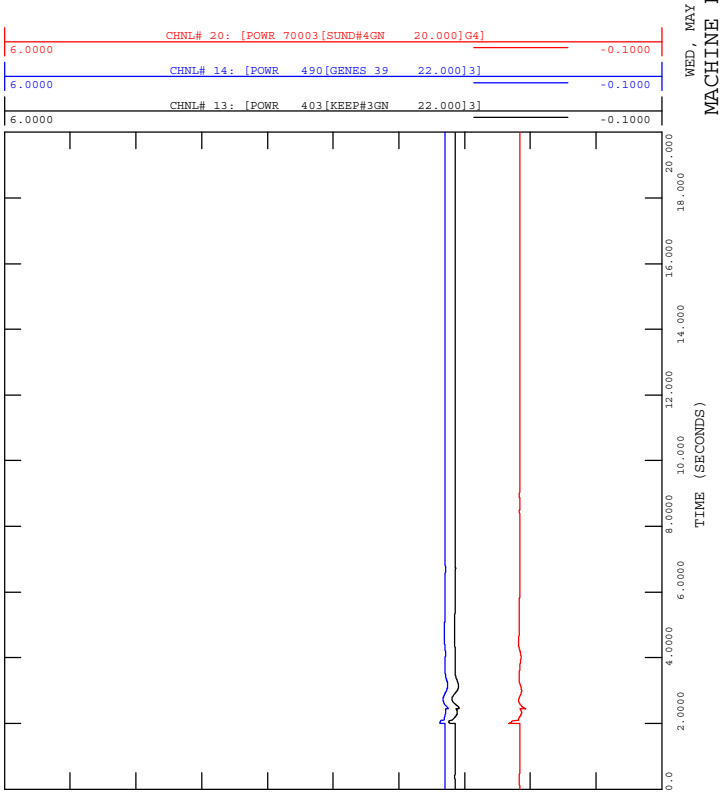


FIGURE D-18F
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out



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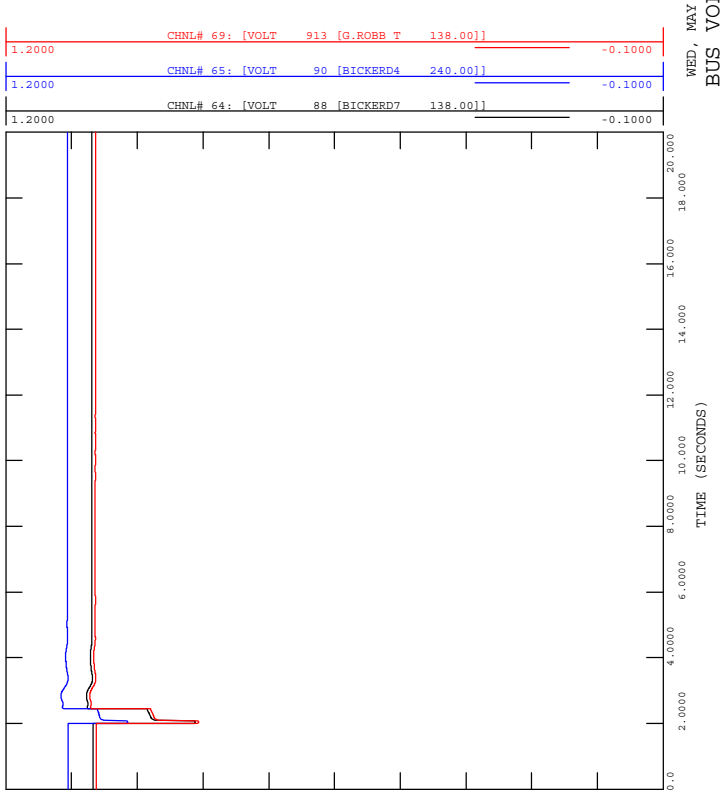
MACHINE POWER (MW)

FIGURE D-18H
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out



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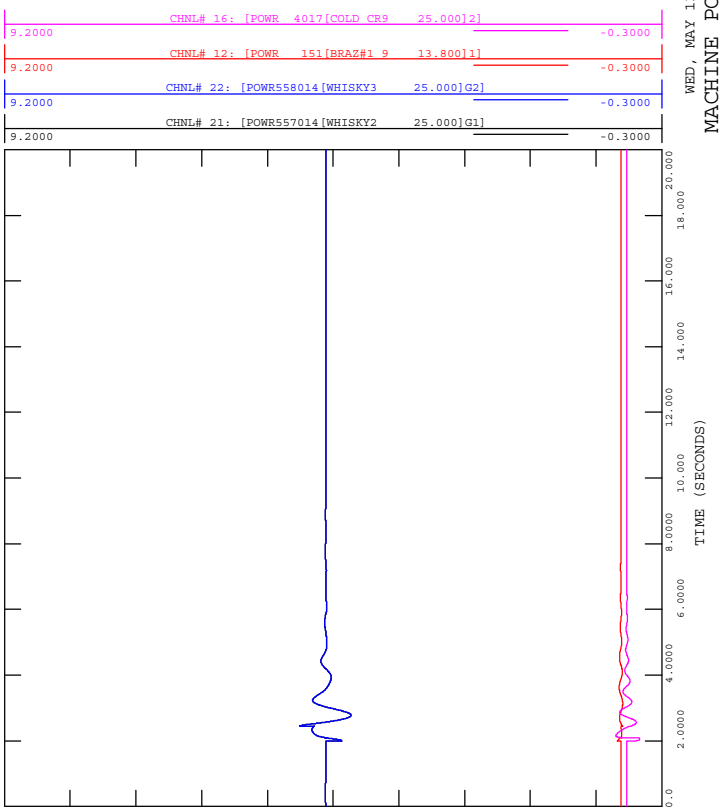
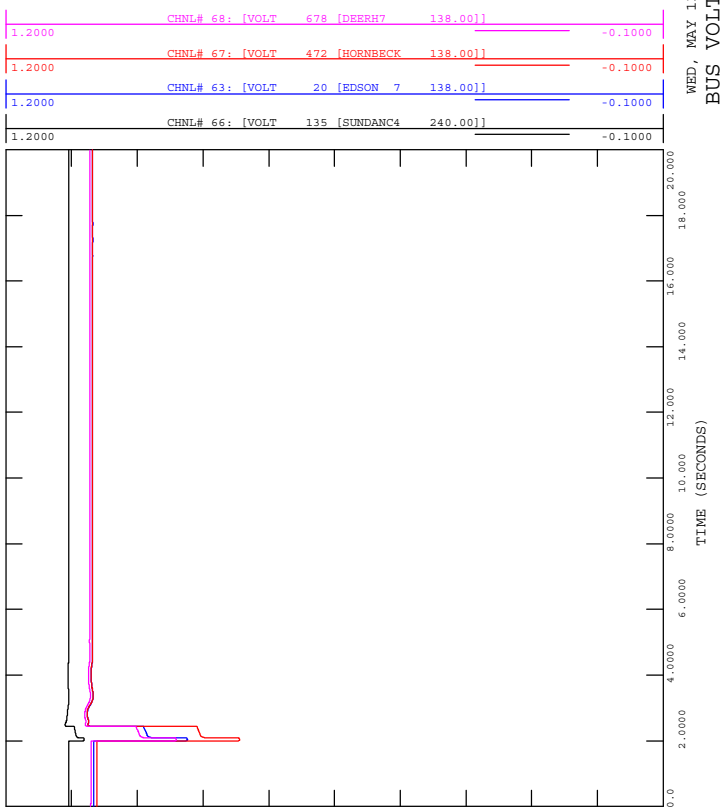
BUS VOLTAGE (PU)

FIGURE D-18E
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out



WED, MAY 13 2020 23:35
MACHINE POWER (MW)

FIGURE D-18G
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out



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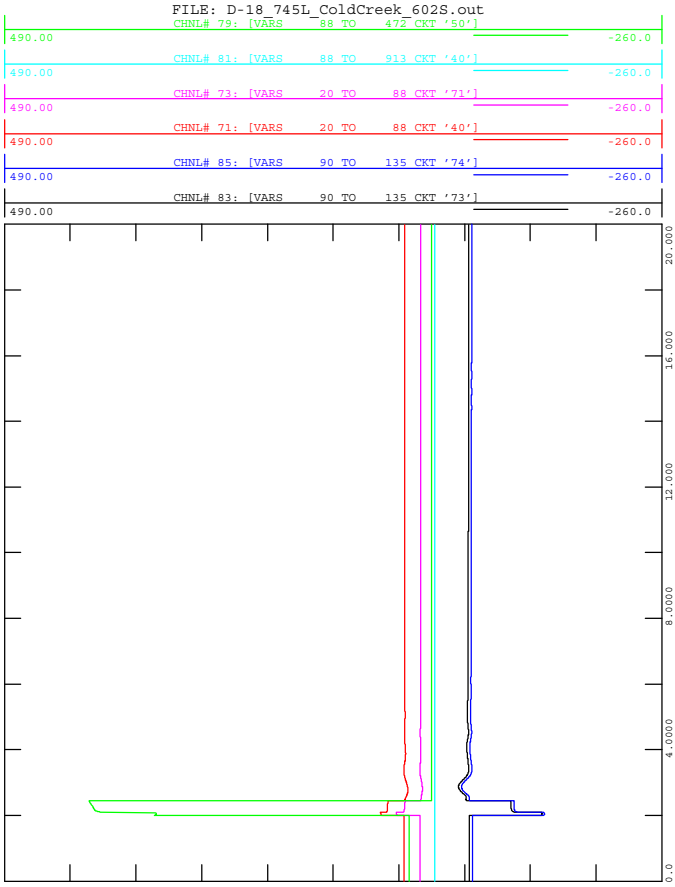
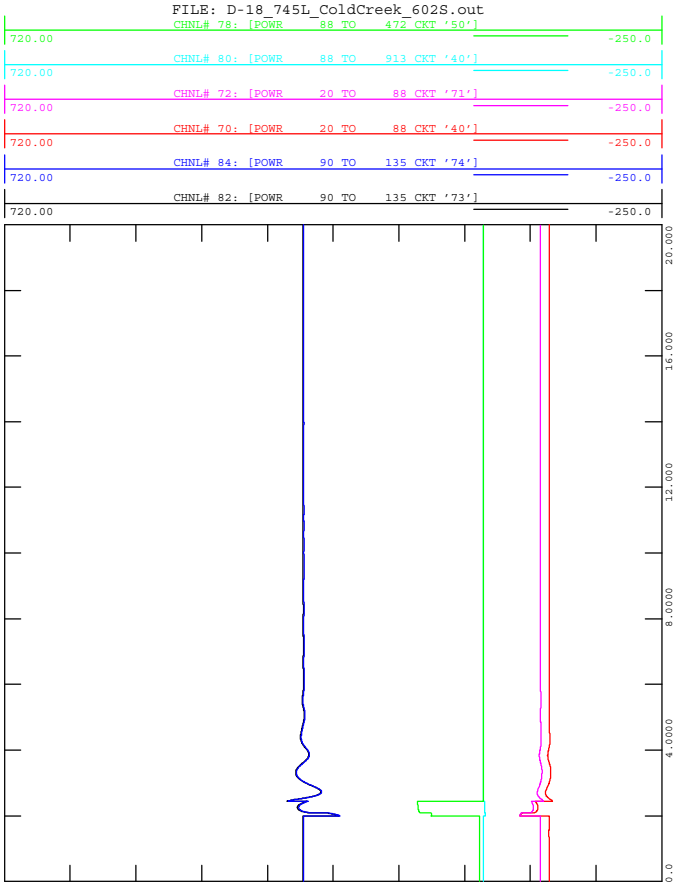
BUS VOLTAGE (PU)

FIGURE D-18J
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out



WED, MAY 13 2020 23:35
BRANCH FLOW (Q)

FIGURE D-18I
2022SP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-18_745L_ColdCreek_602S.out



WED, MAY 13 2020 23:35
BRANCH FLOW (P)

FIGURE D-19B
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out

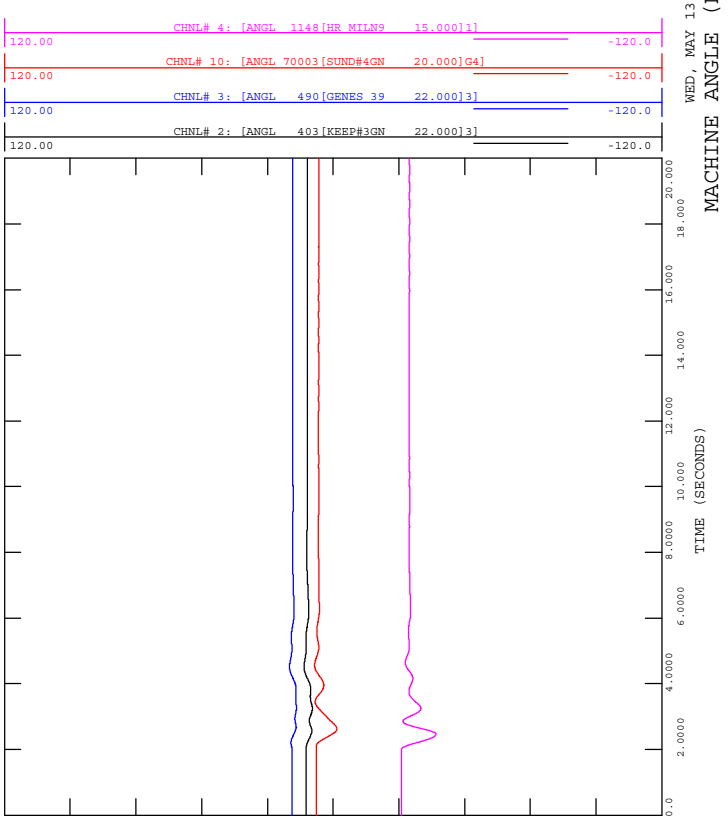


FIGURE D-19D
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out

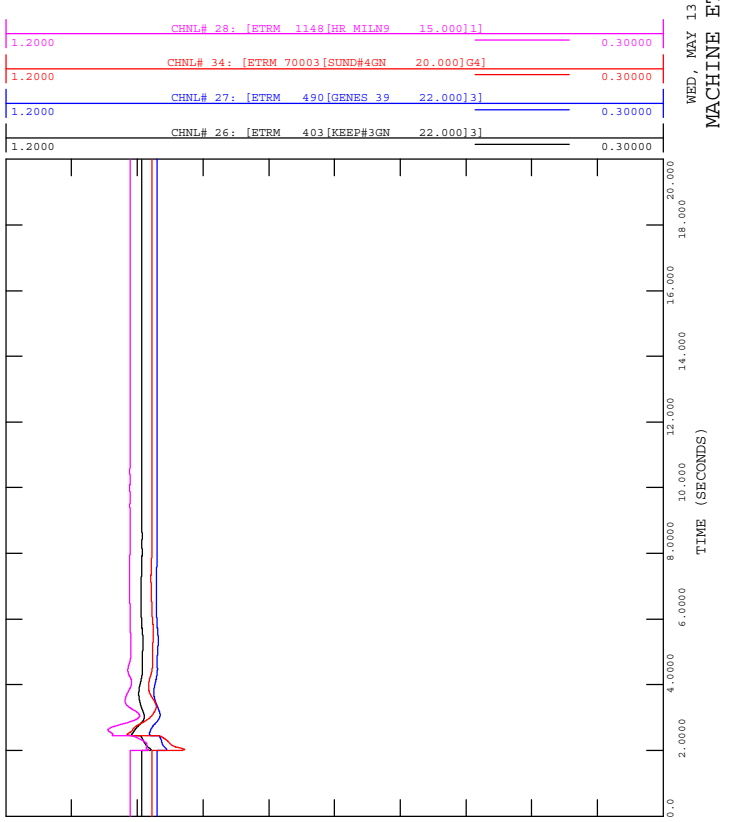


FIGURE D-19A
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out

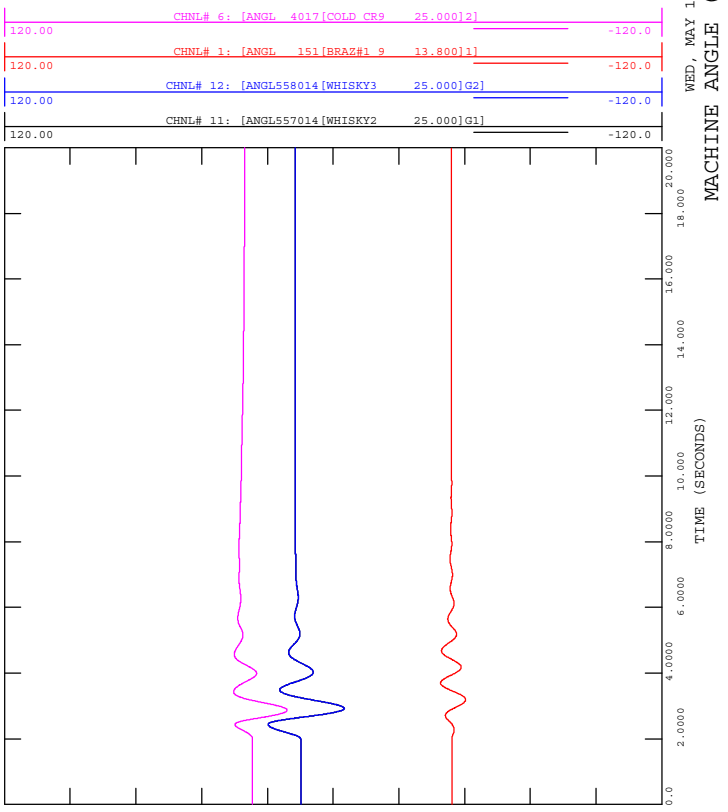


FIGURE D-19C
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out

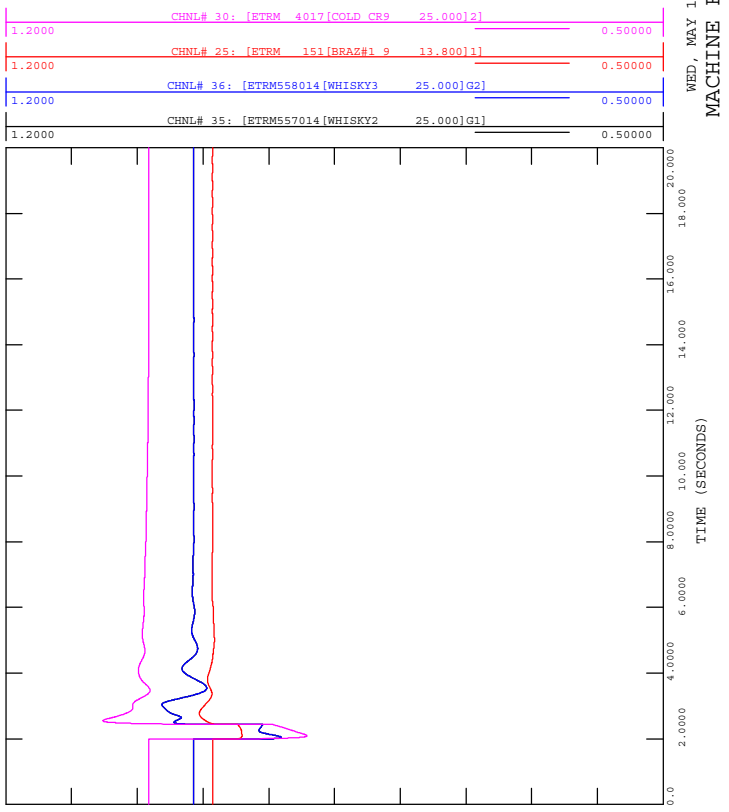


FIGURE D-19F
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out

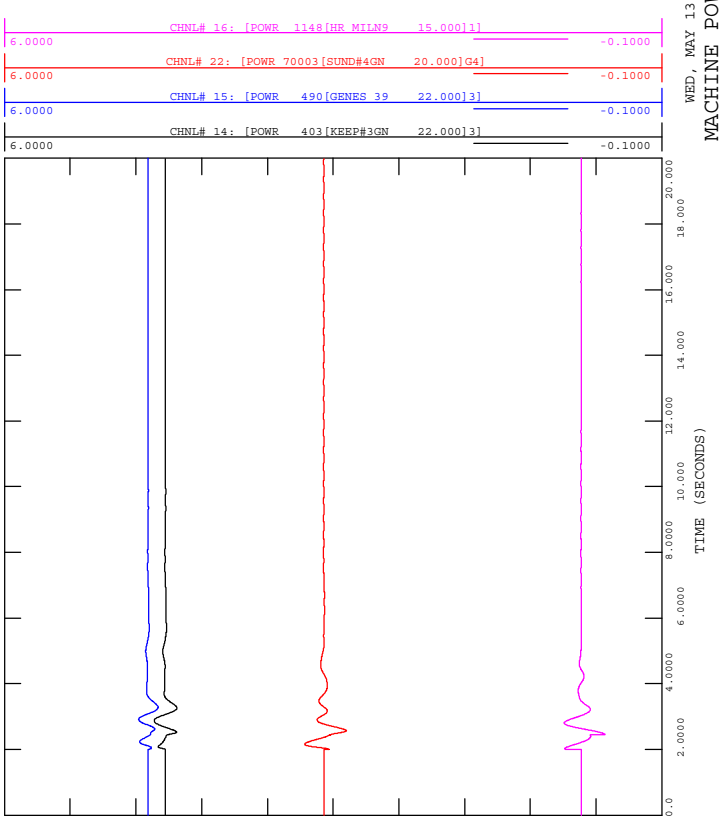


FIGURE D-19H
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out

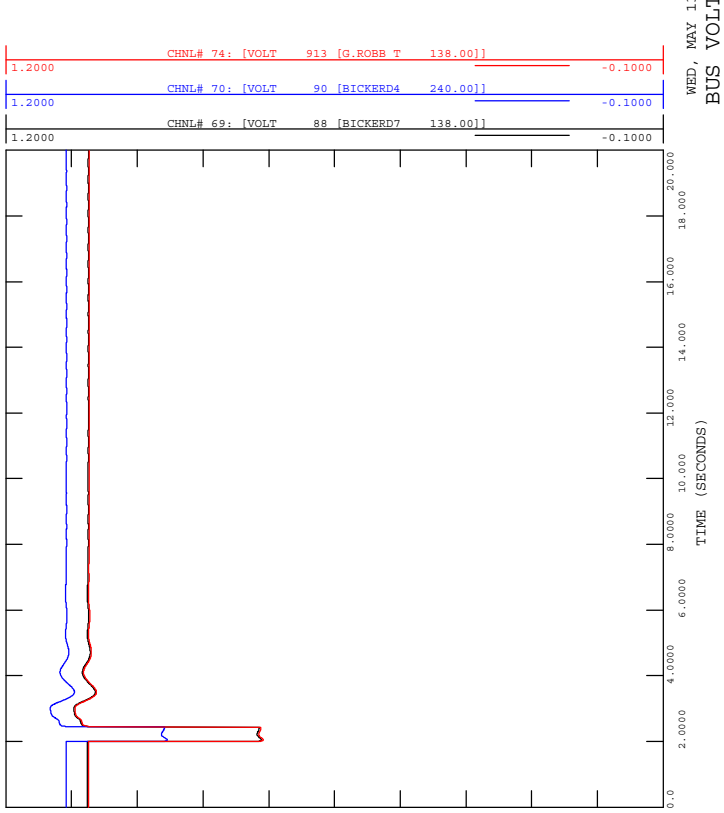


FIGURE D-19E
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out

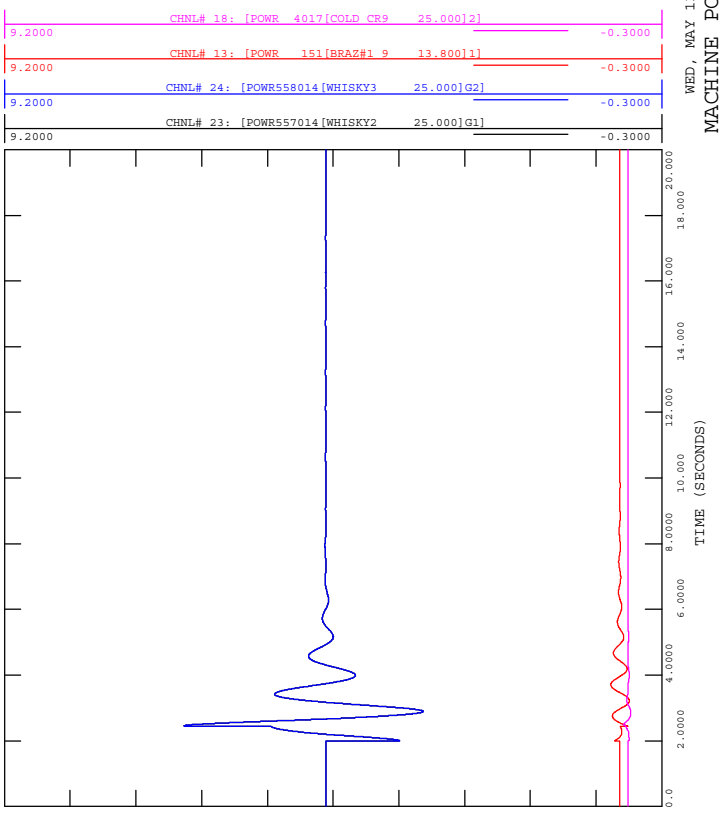


FIGURE D-19G
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out

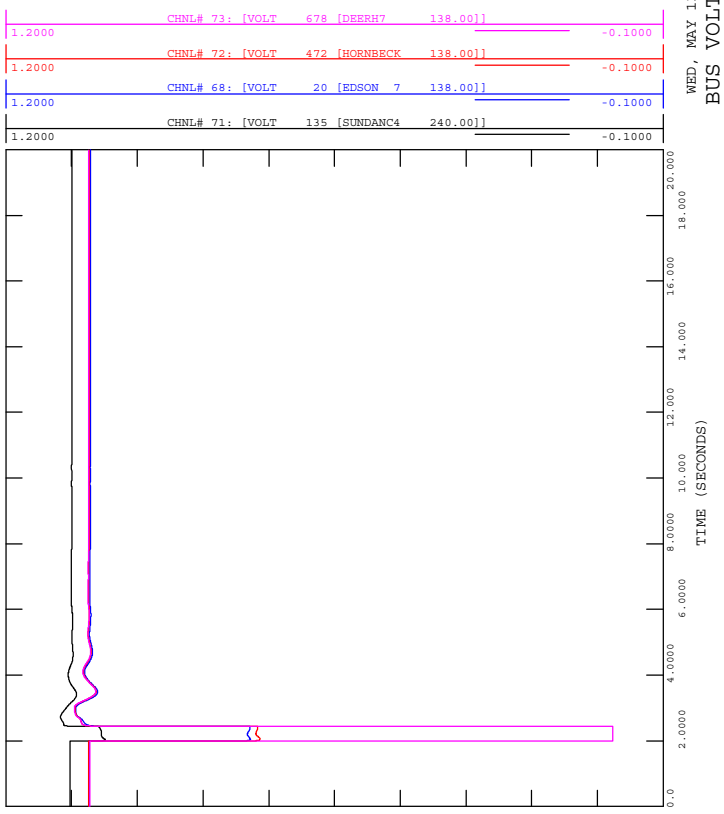
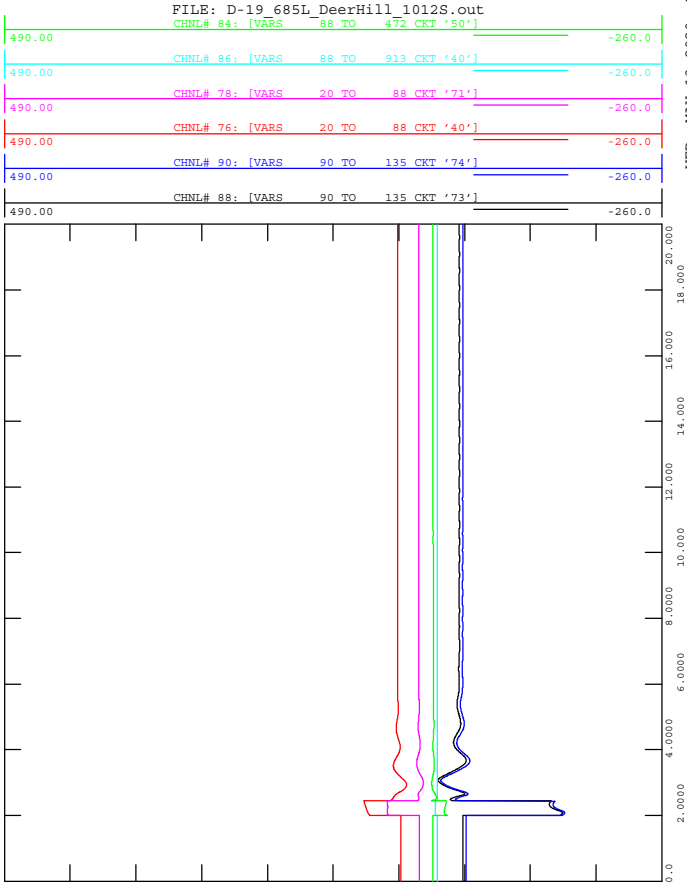


FIGURE D-19J
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out



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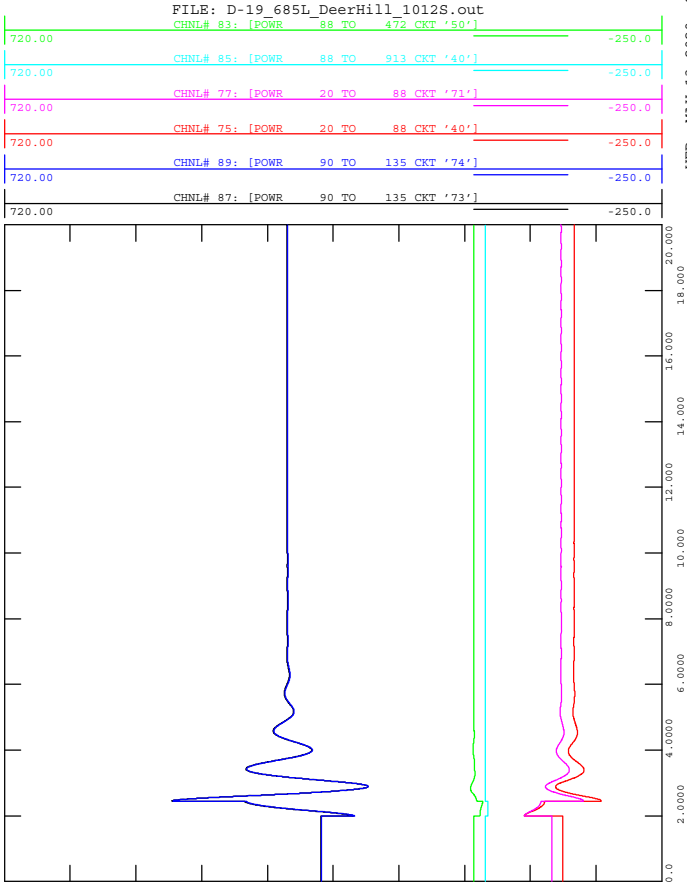
BRANCH FLOW (Q)

FIGURE D-19I
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-19_685L_DeerHill_1012S.out



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BRANCH FLOW (P)

FIGURE D-20B
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out

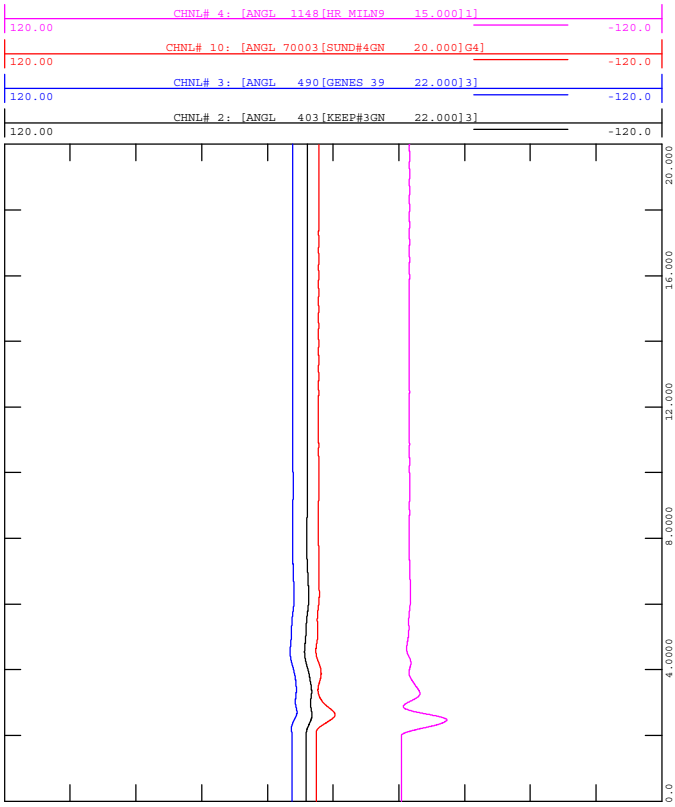


FIGURE D-20D
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out

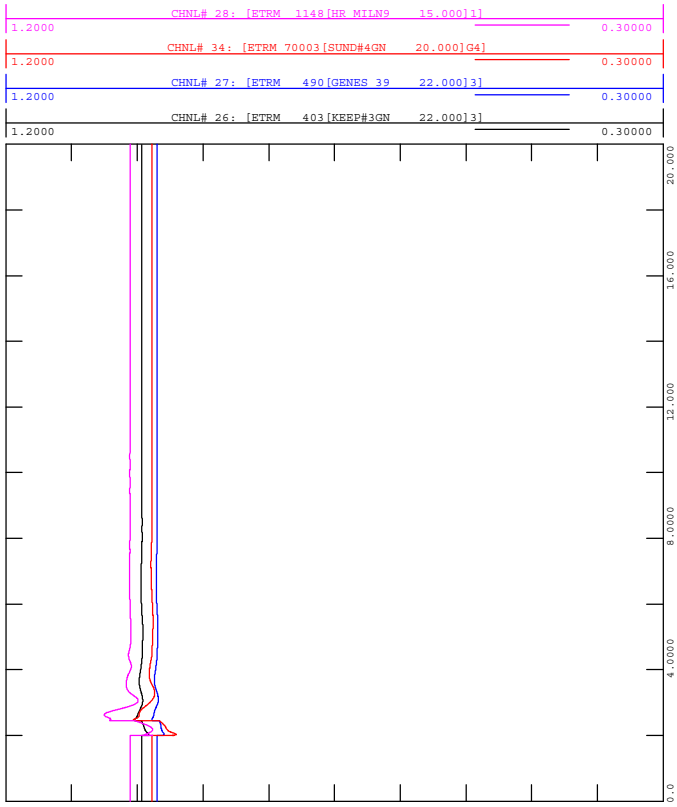


FIGURE D-20A
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out

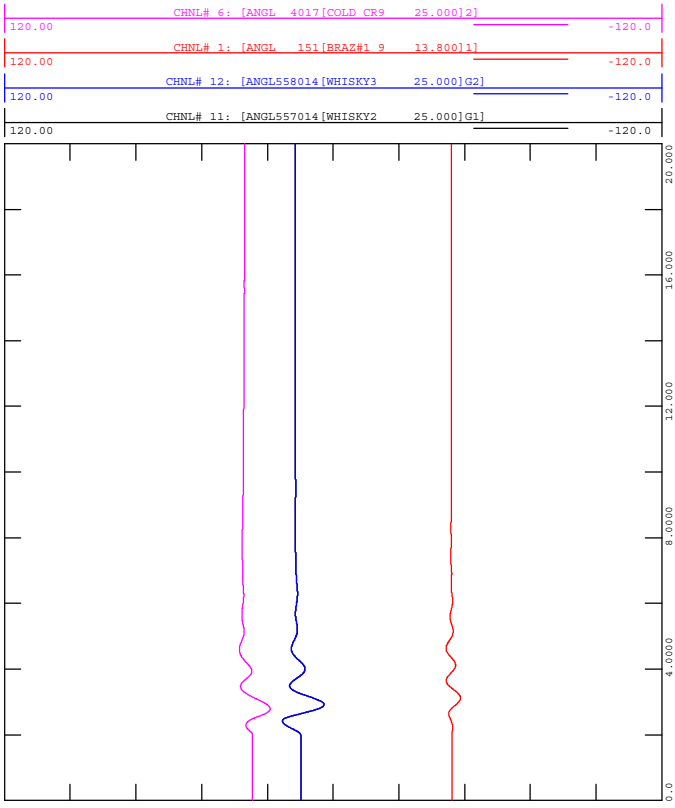


FIGURE D-20C
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out

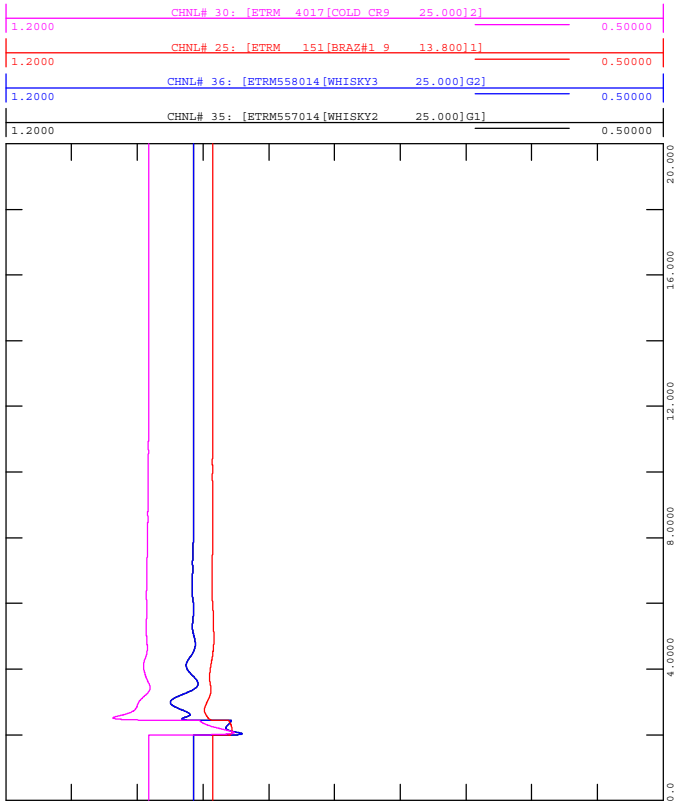
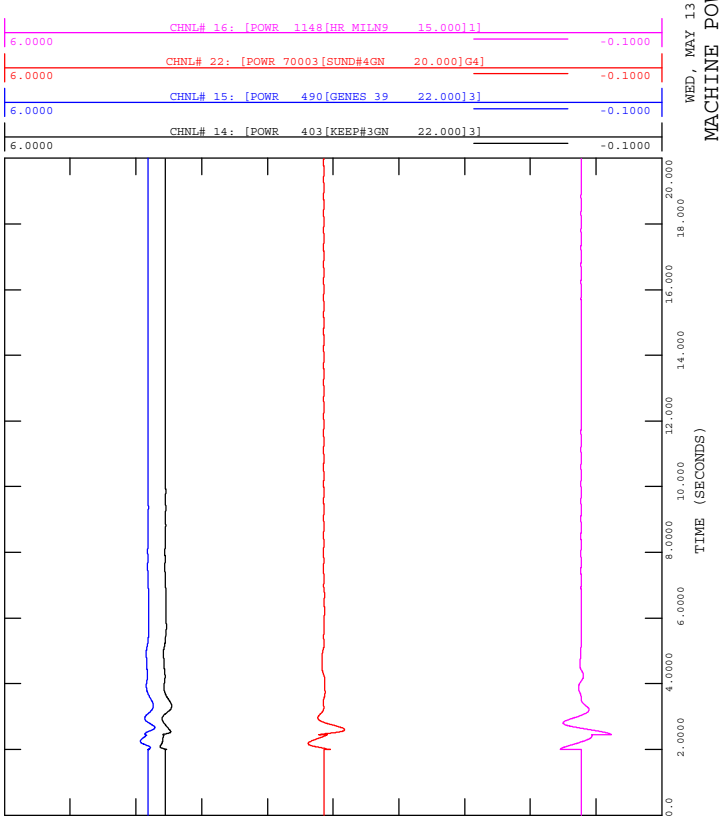


FIGURE D-20F
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out



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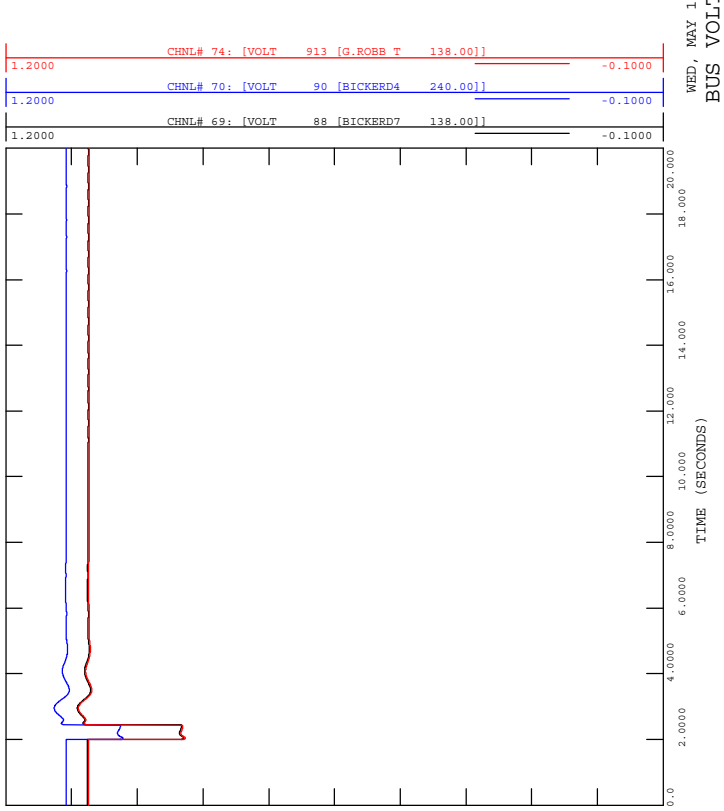
MACHINE POWER (MW)

FIGURE D-20H
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out



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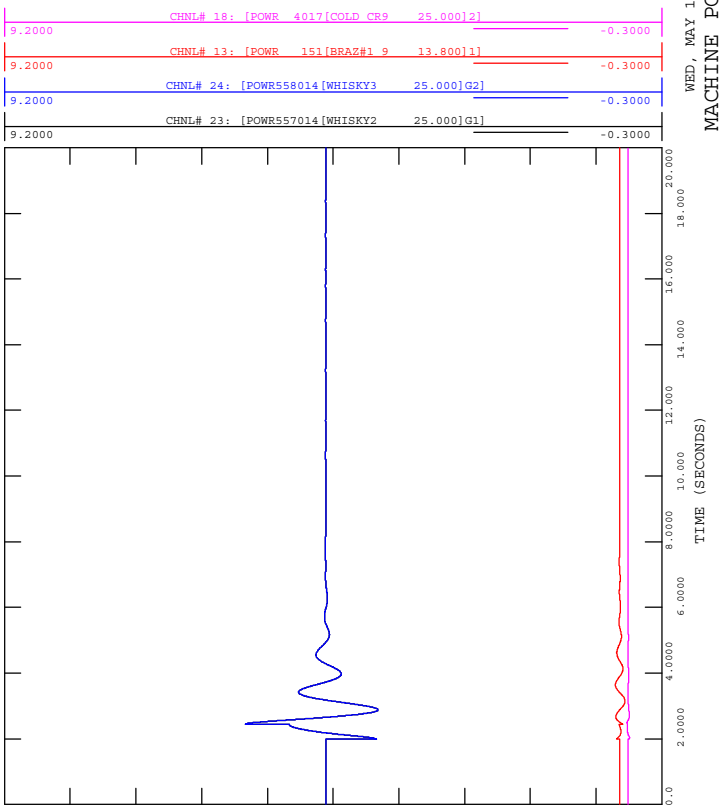
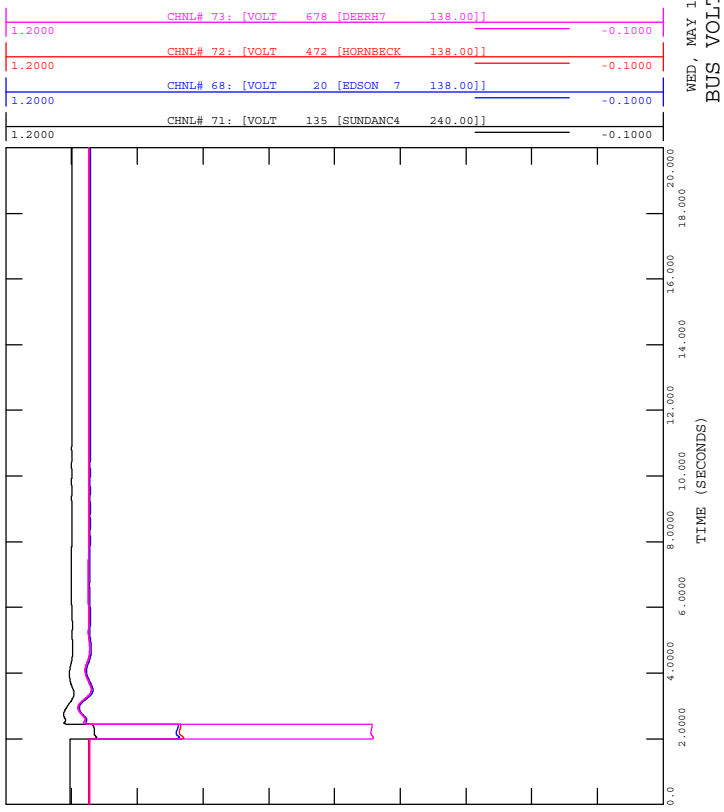
BUS VOLTAGE (PU)

FIGURE D-20E
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out



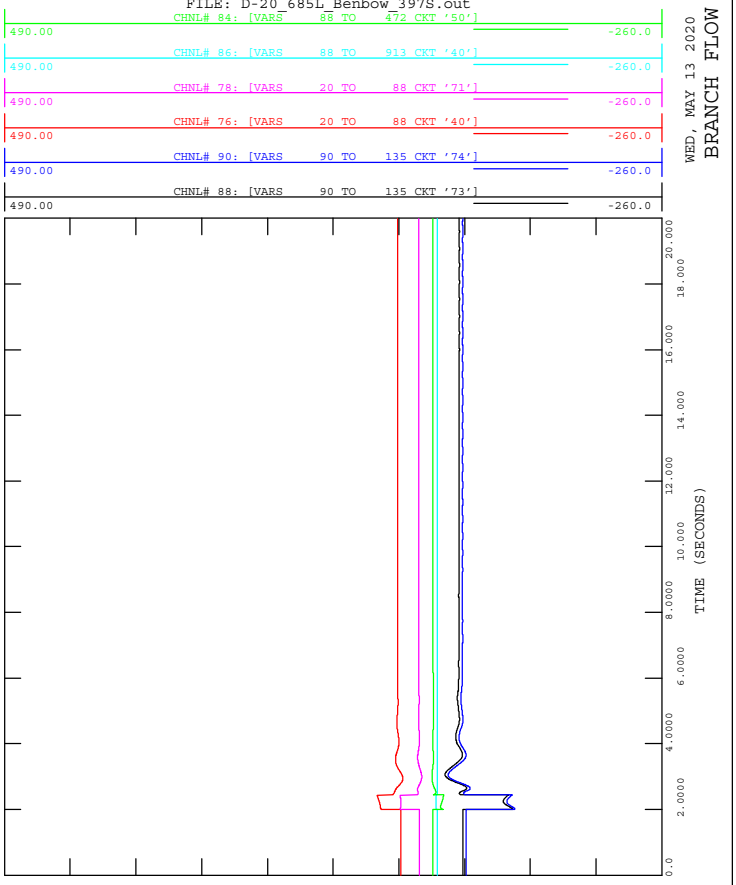
WED, MAY 13 2020 23:35
MACHINE POWER (MW)

FIGURE D-20G
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out



WED, MAY 13 2020 23:35
BUS VOLTAGE (PU)

FIGURE D-20J
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out



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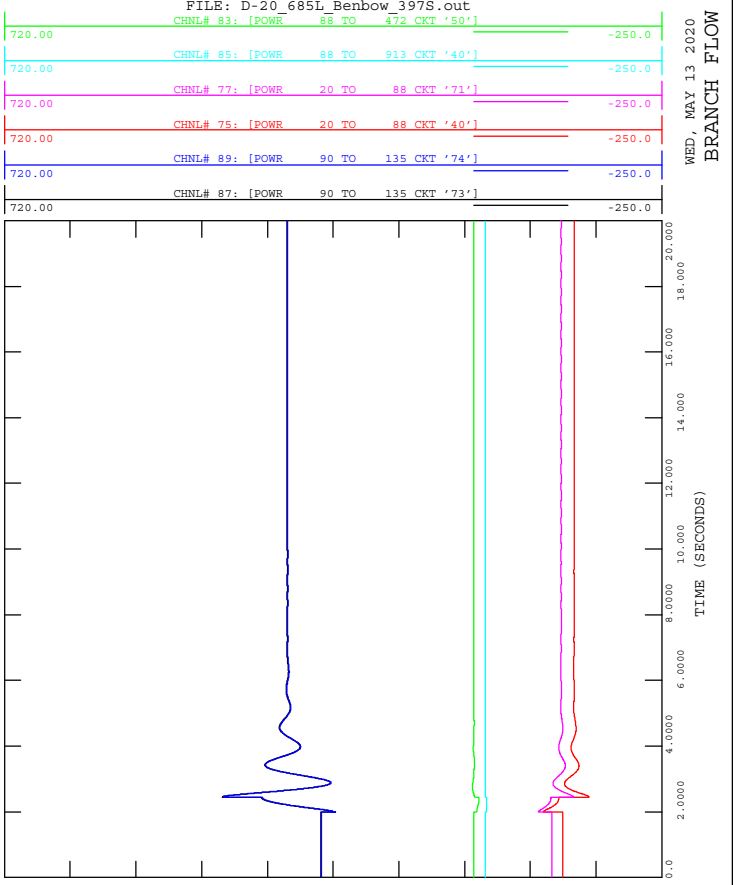
BRANCH FLOW (Q)

FIGURE D-20I
2022WP, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-20_685L_Benbow_397S.out



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BRANCH FLOW (P)

FIGURE D-21B
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out

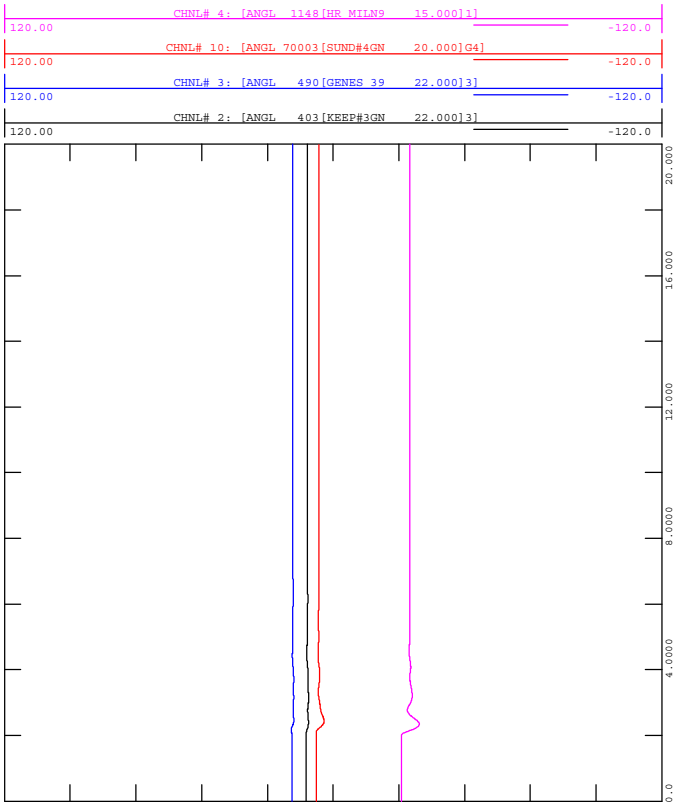


FIGURE D-21D
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out

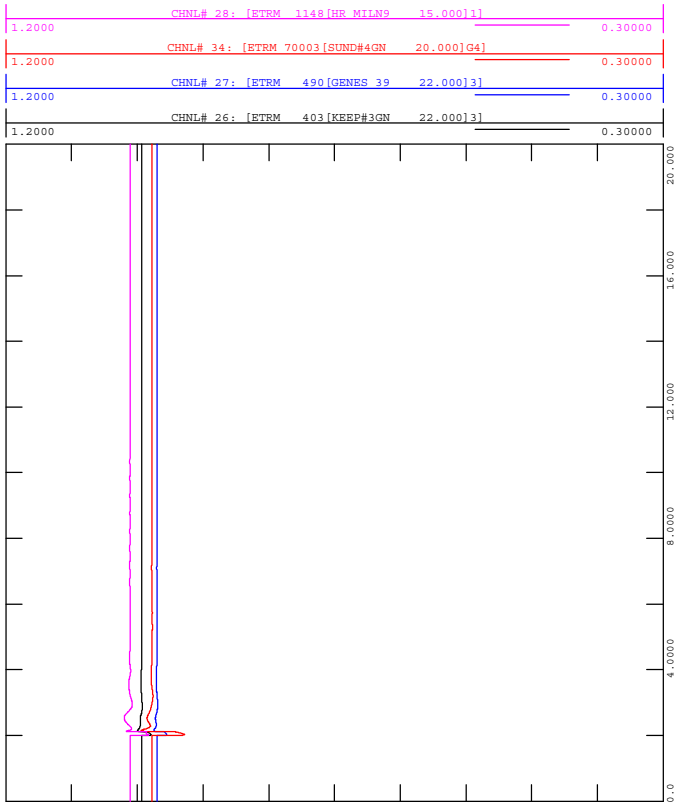


FIGURE D-21A
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out

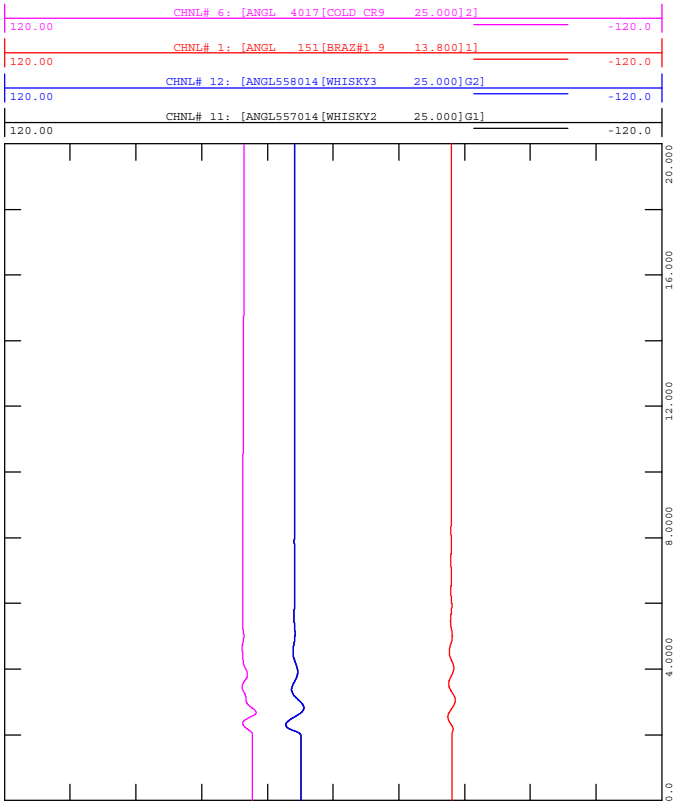


FIGURE D-21C
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out

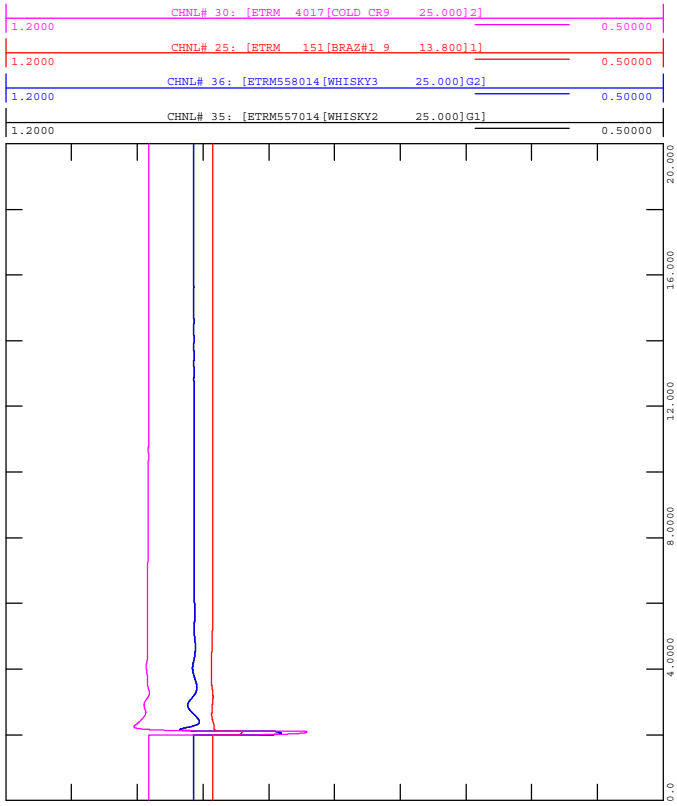


FIGURE D-21F
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out

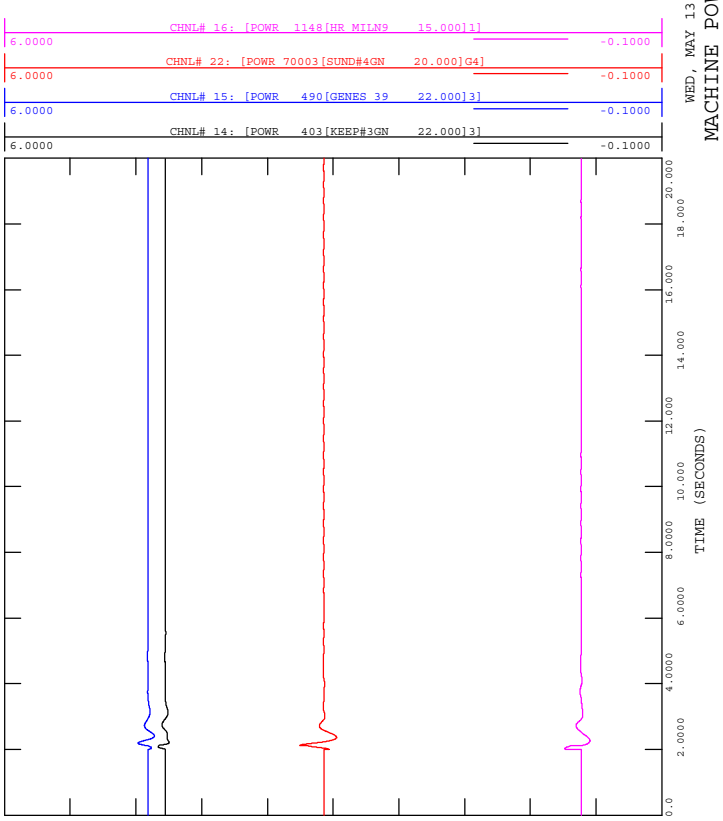


FIGURE D-21H
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out

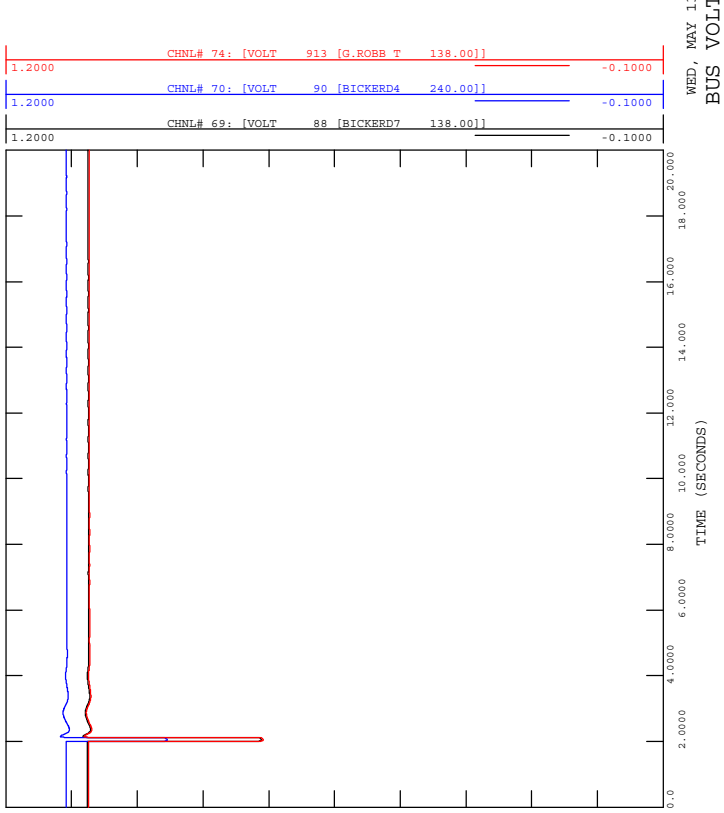


FIGURE D-21E
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out

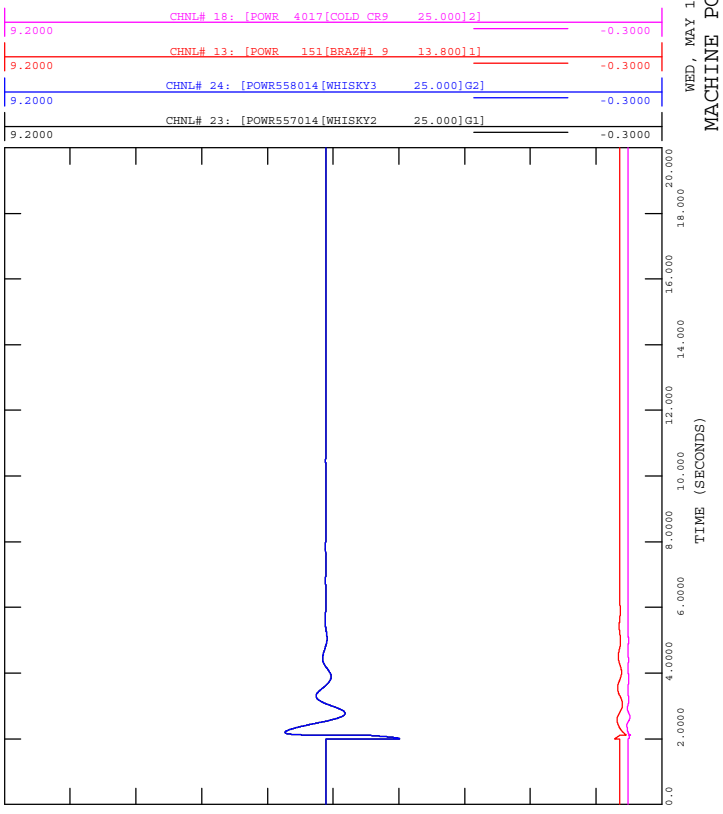


FIGURE D-21G
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out

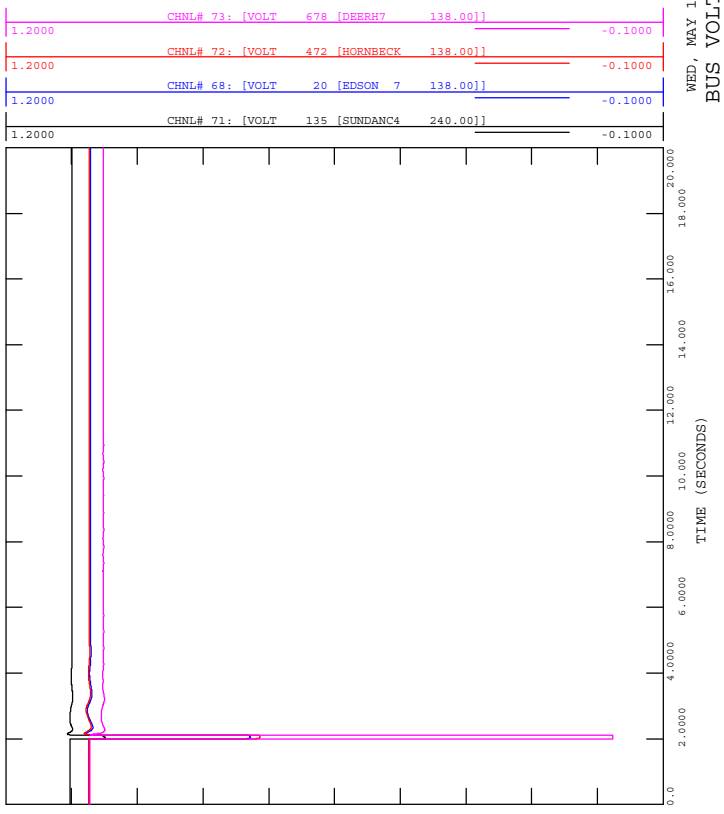
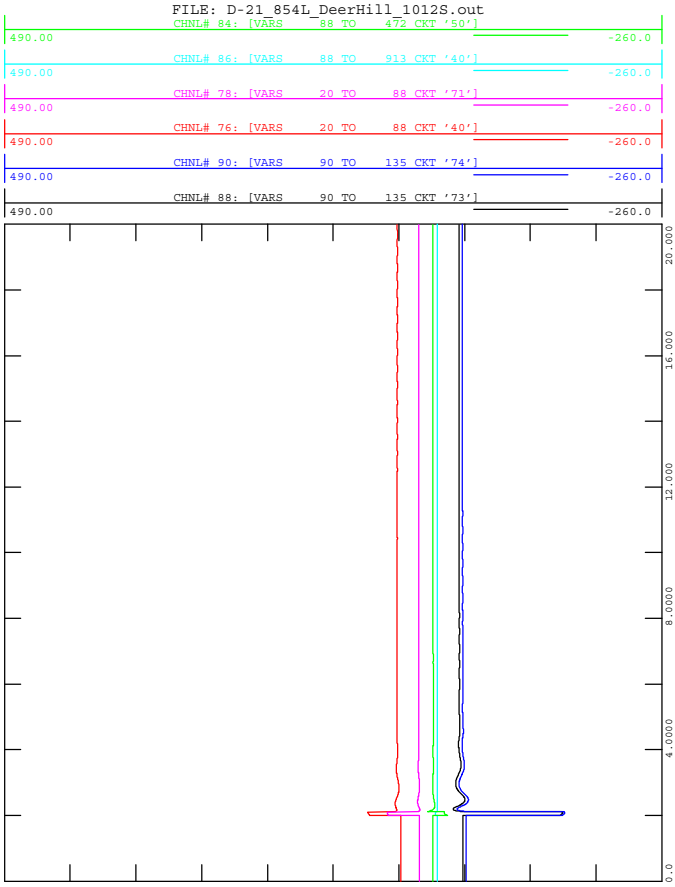


FIGURE D-21J
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out



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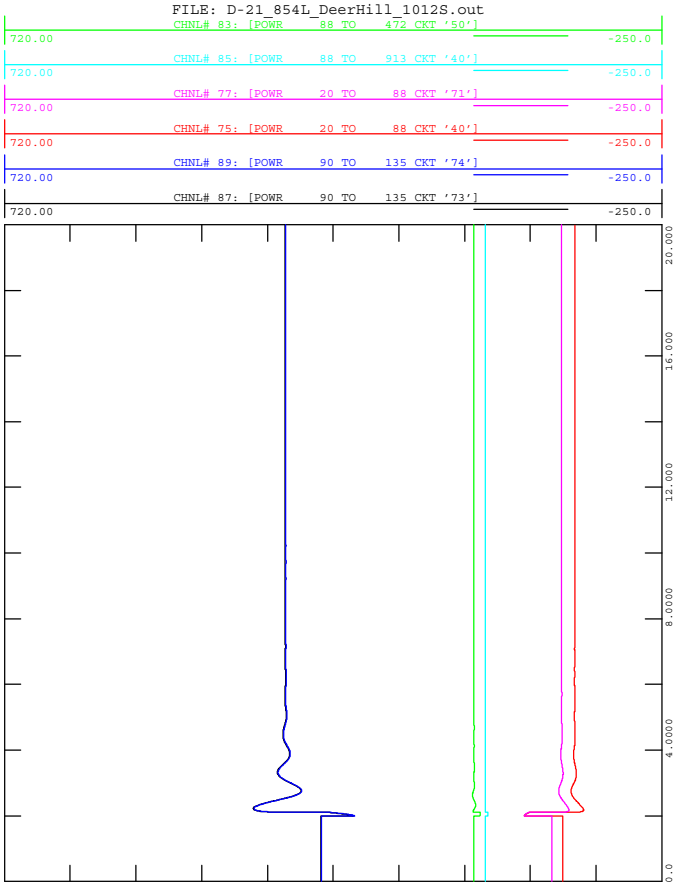
BRANCH FLOW (Q)

FIGURE D-21I
2022WP, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-21_854L_DeerHill_1012S.out



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BRANCH FLOW (P)

FIGURE D-22B
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out

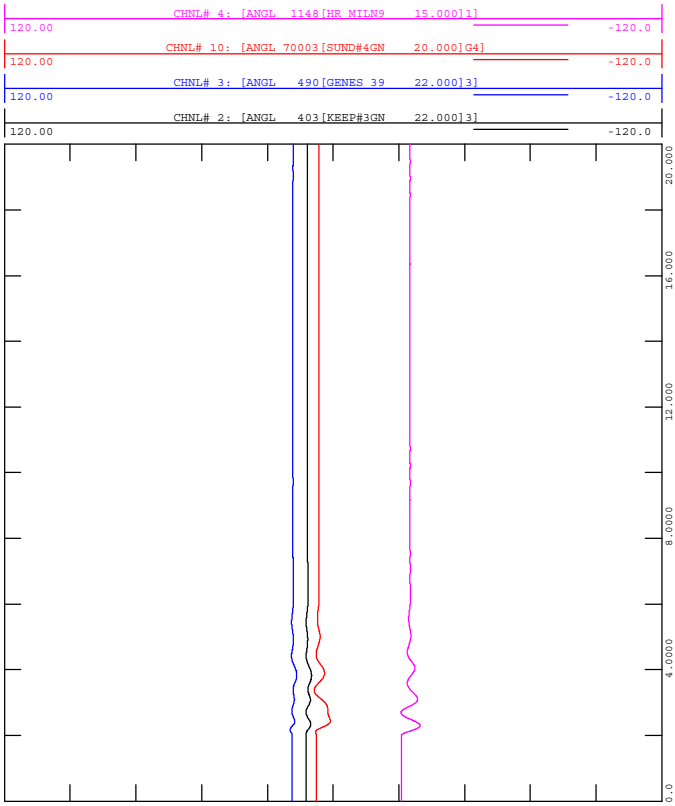


FIGURE D-22D
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out

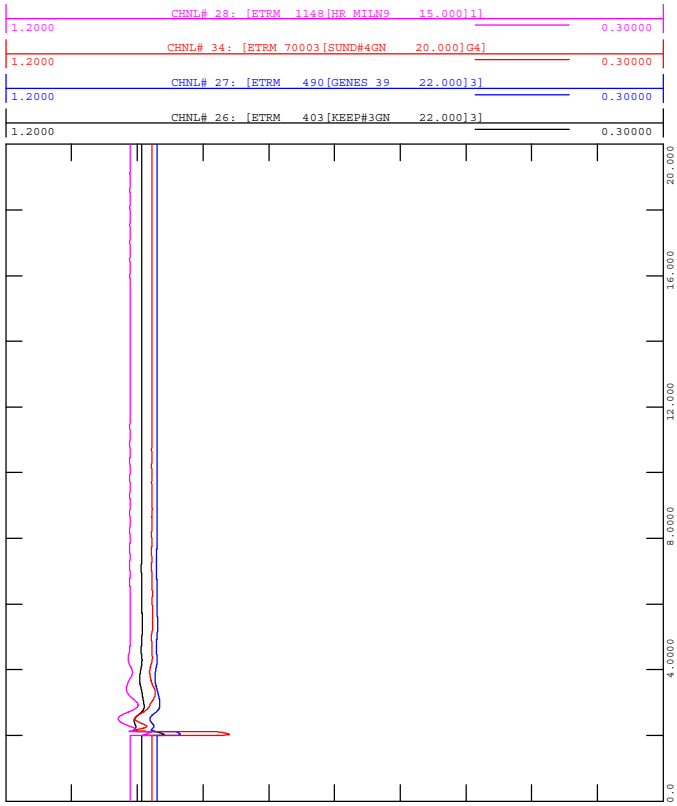


FIGURE D-22A
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out

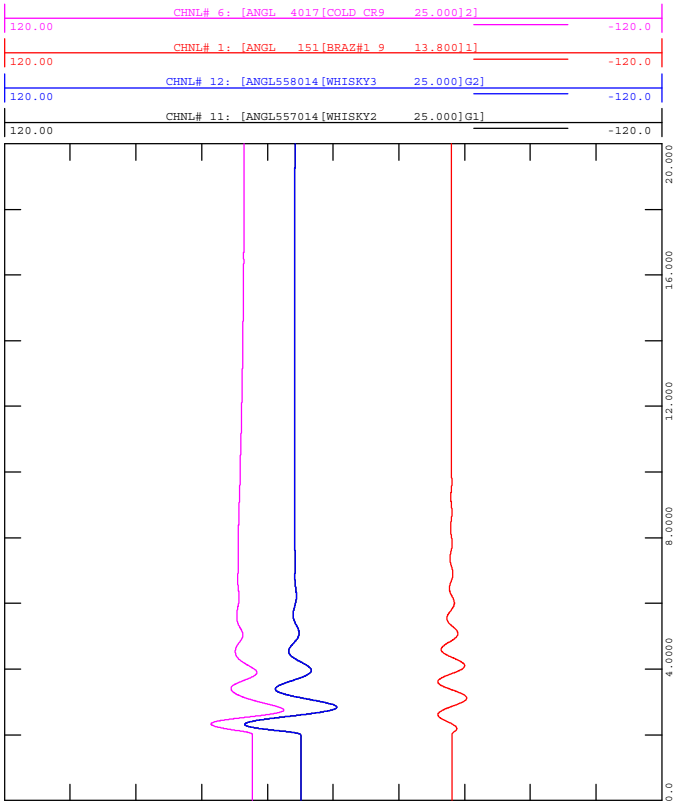


FIGURE D-22C
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out

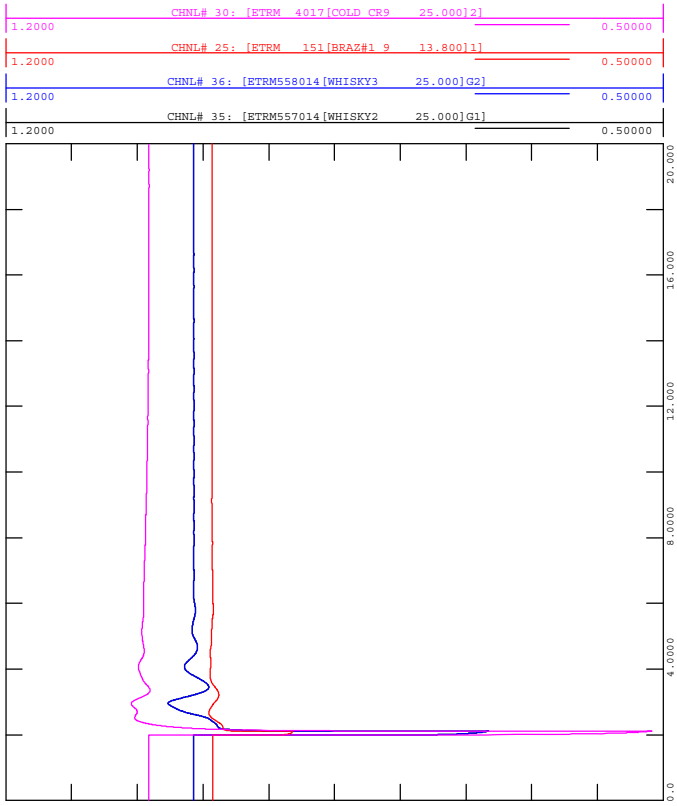


FIGURE D-22F
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out

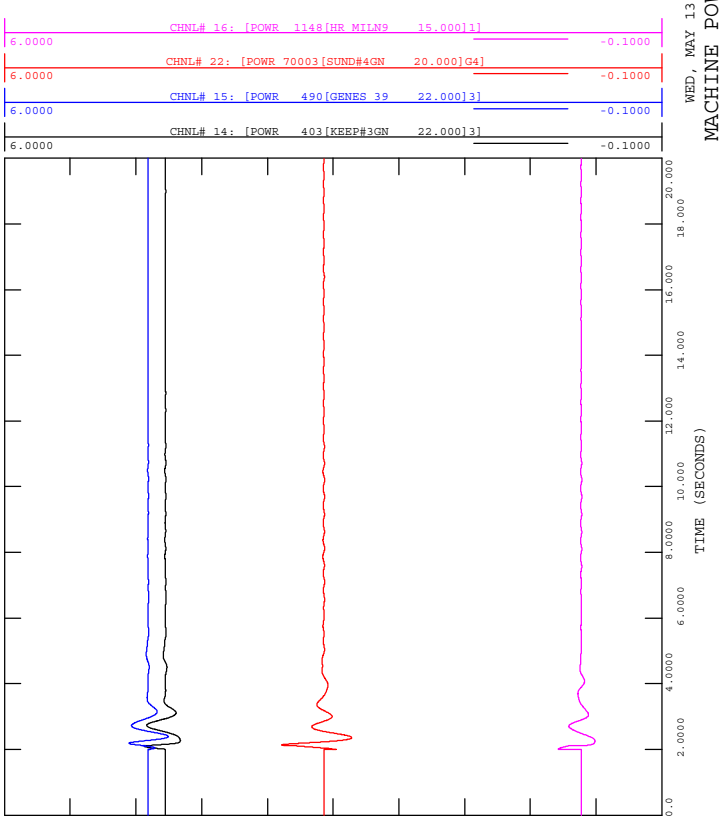


FIGURE D-22H
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out

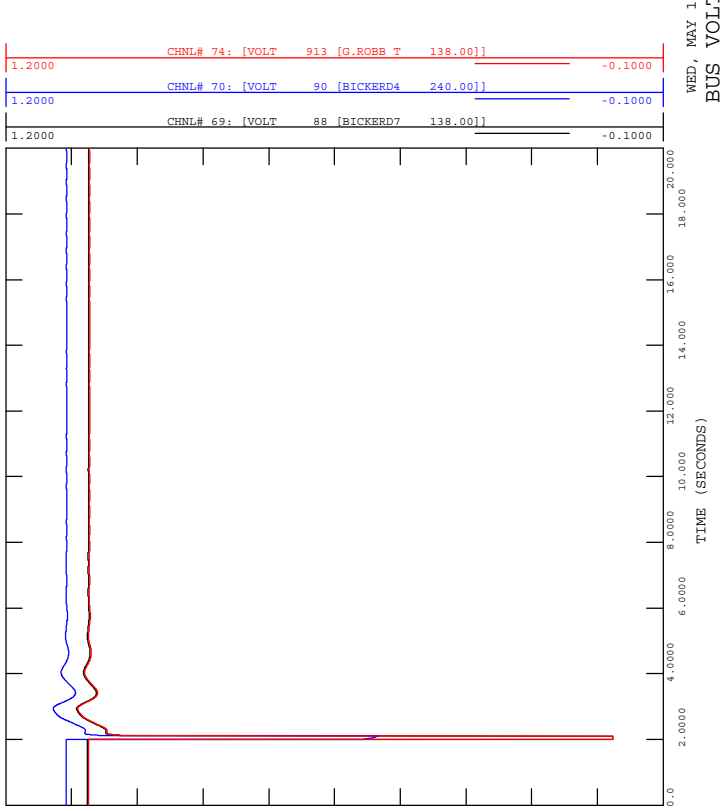


FIGURE D-22E
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out

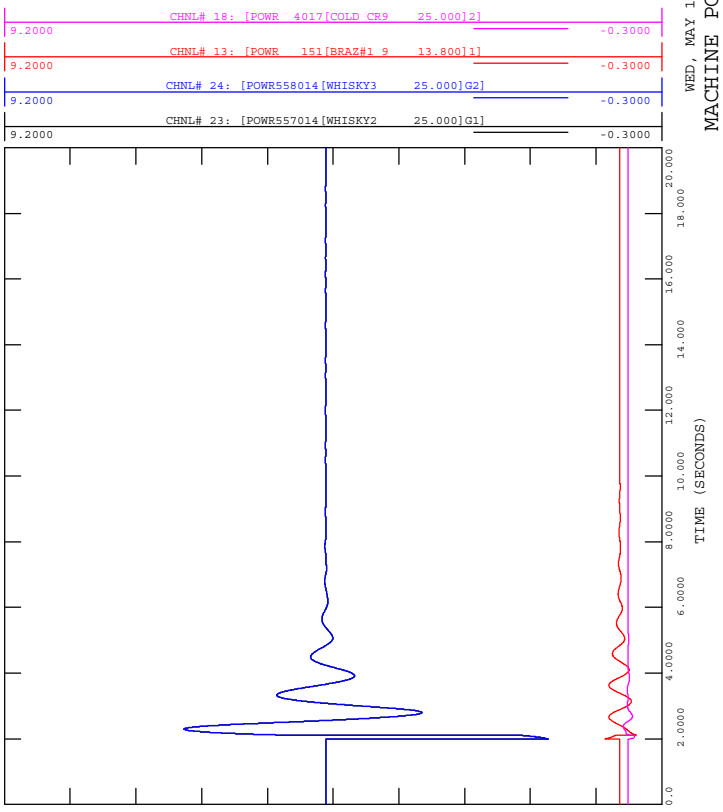


FIGURE D-22G
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out

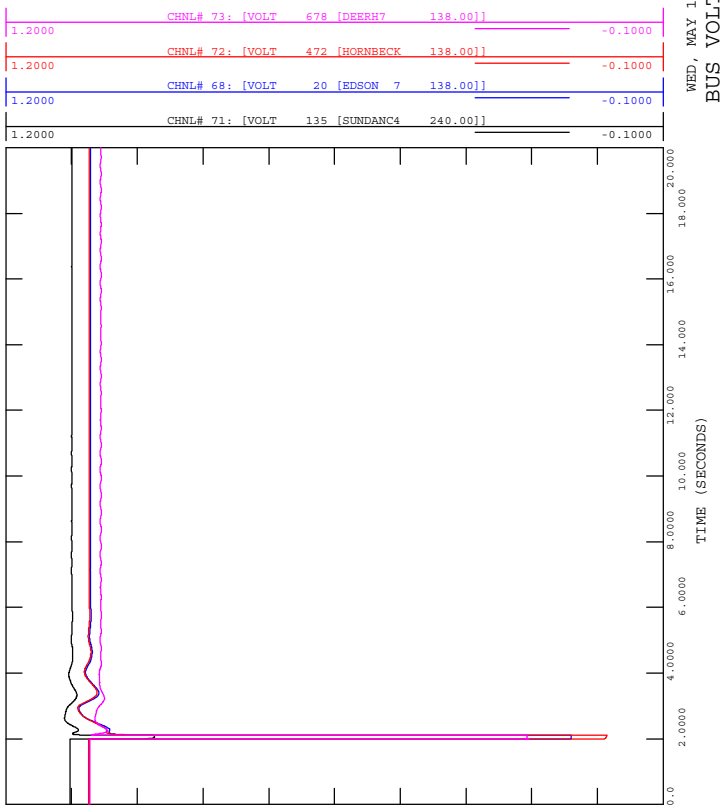
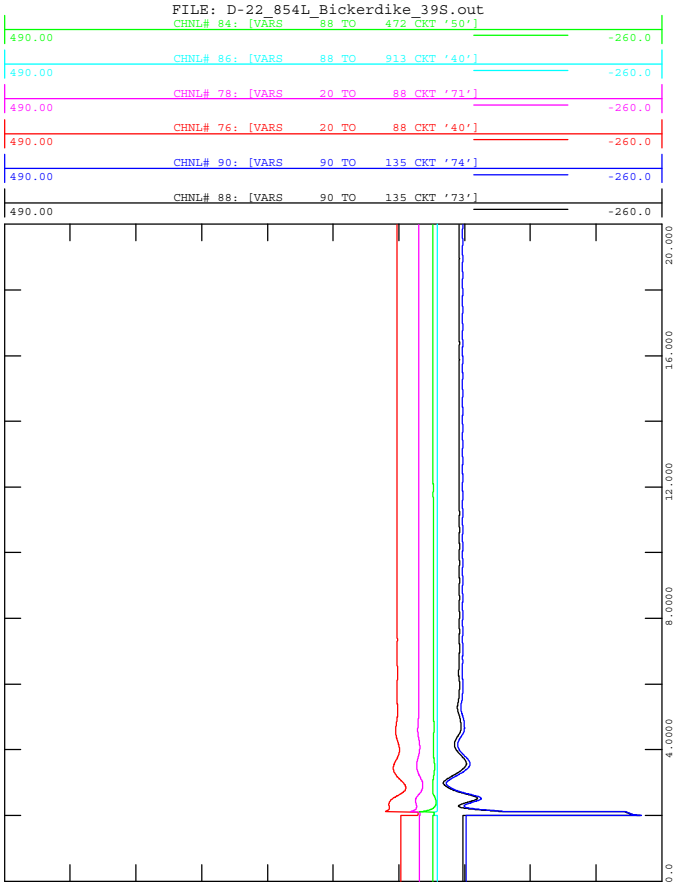


FIGURE D-22J
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out



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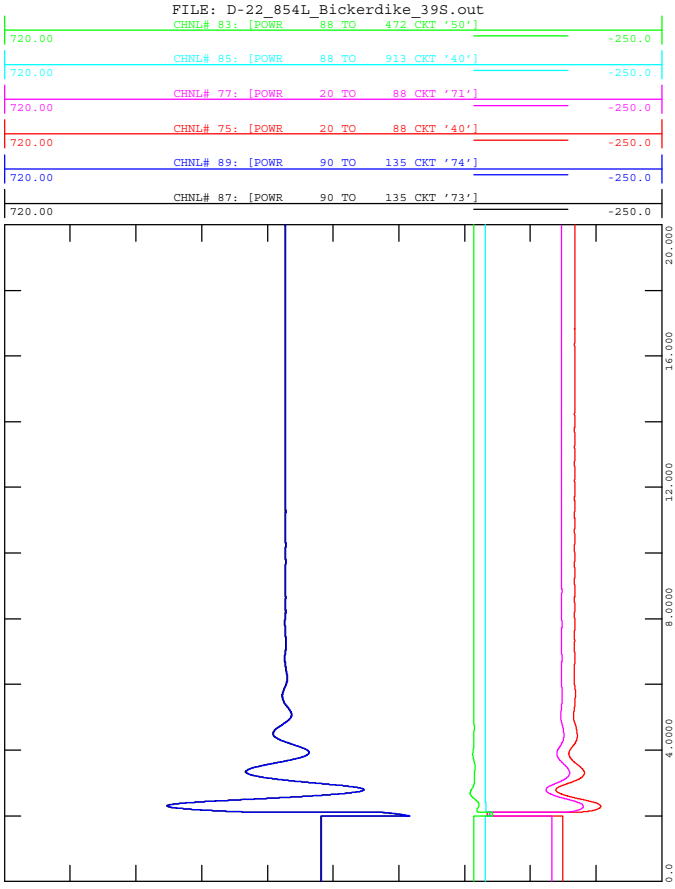
BRANCH FLOW (Q)

FIGURE D-22I
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-22_854L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-23B
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out

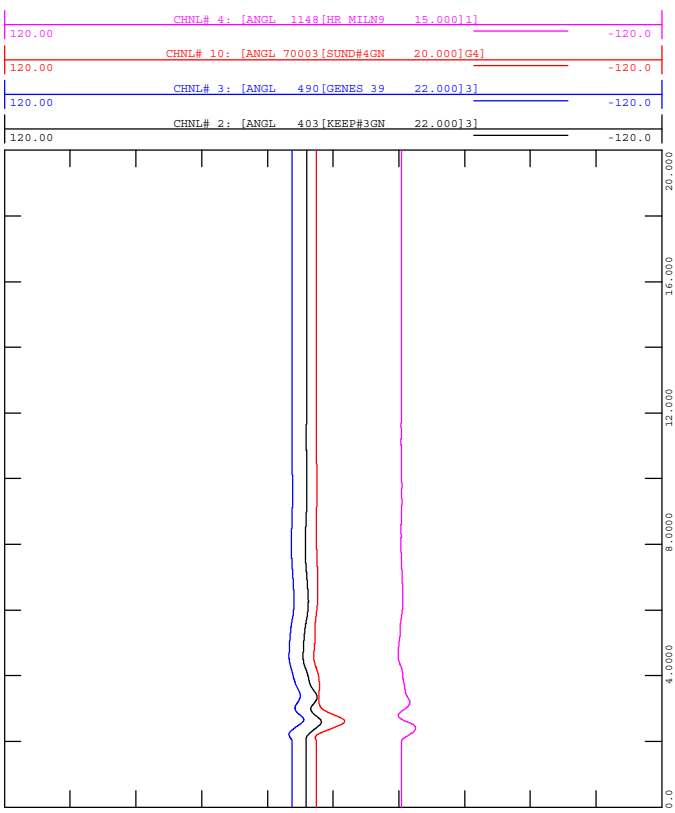


FIGURE D-23D
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out

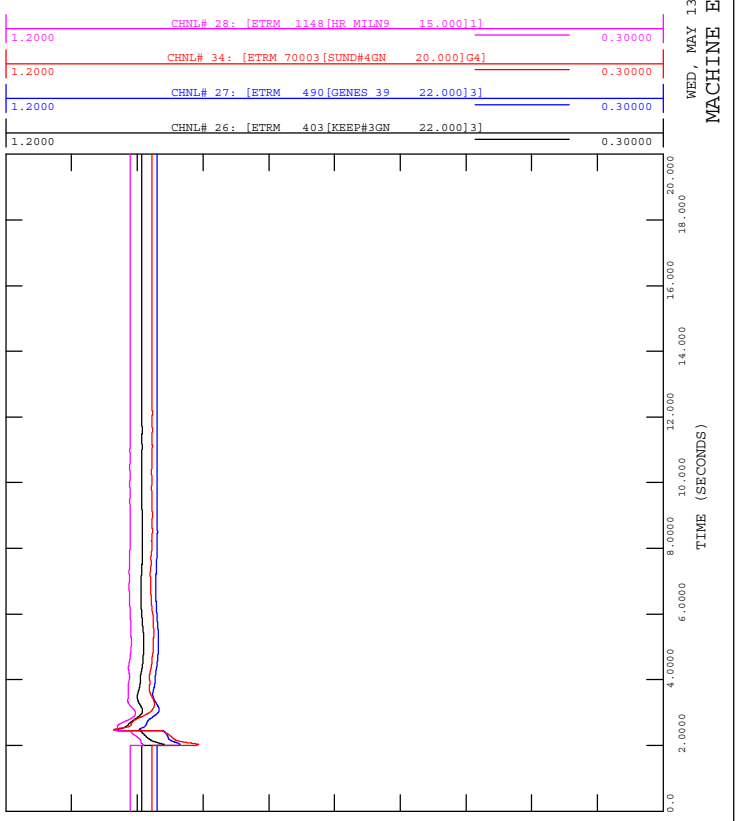


FIGURE D-23A
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out

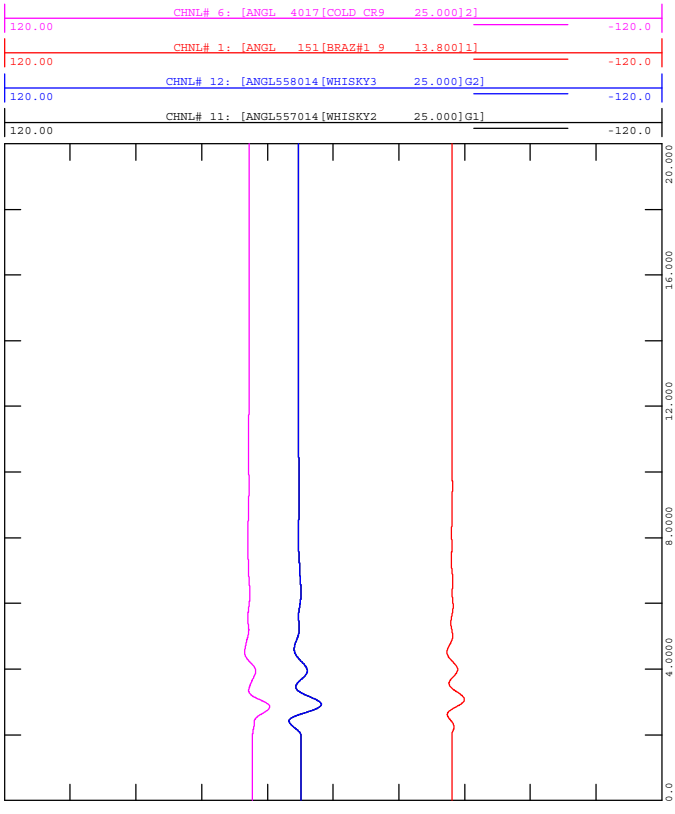


FIGURE D-23C
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out

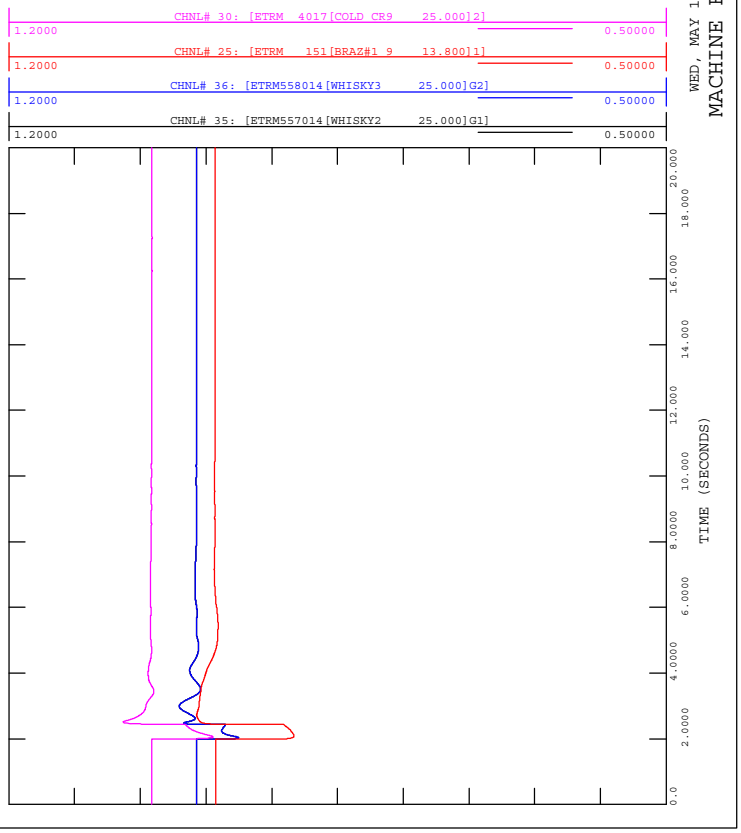


FIGURE D-23F
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out

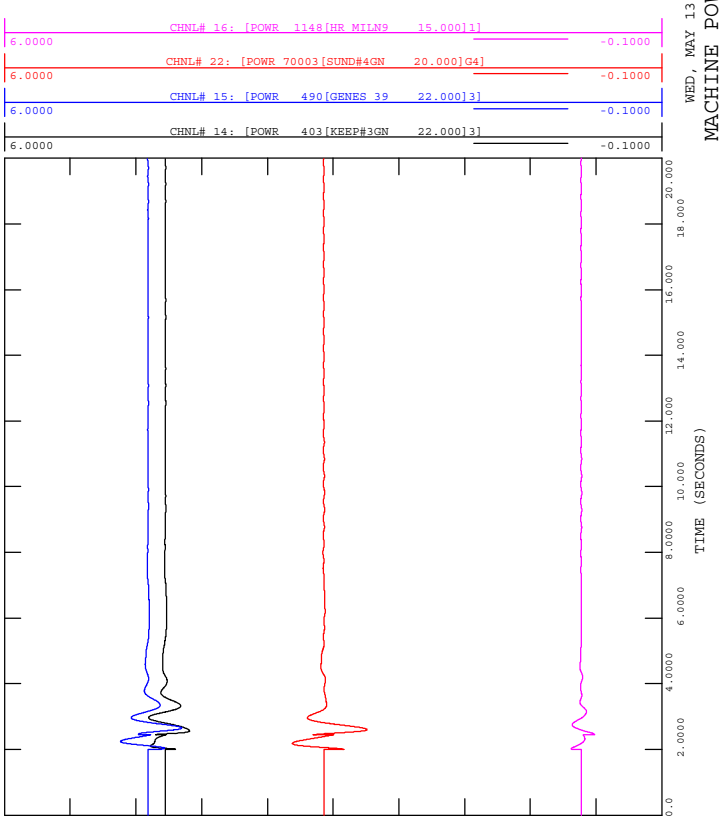


FIGURE D-23H
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out

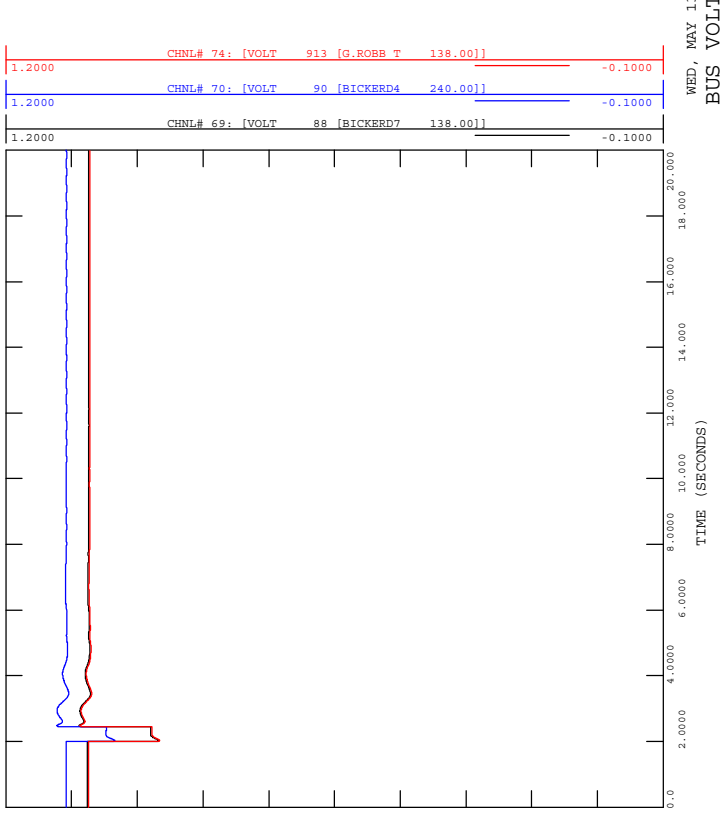


FIGURE D-23E
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out

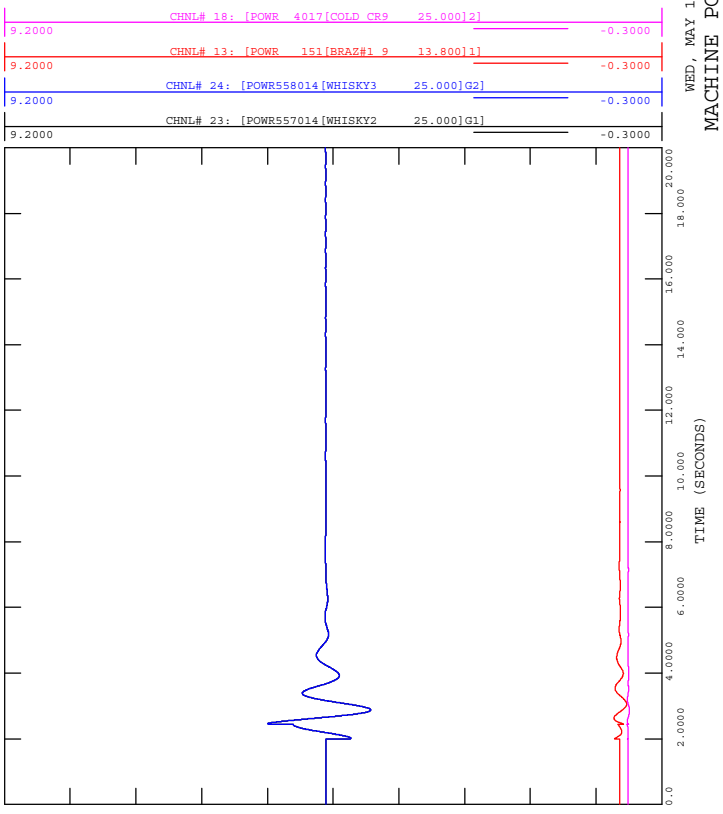


FIGURE D-23G
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out

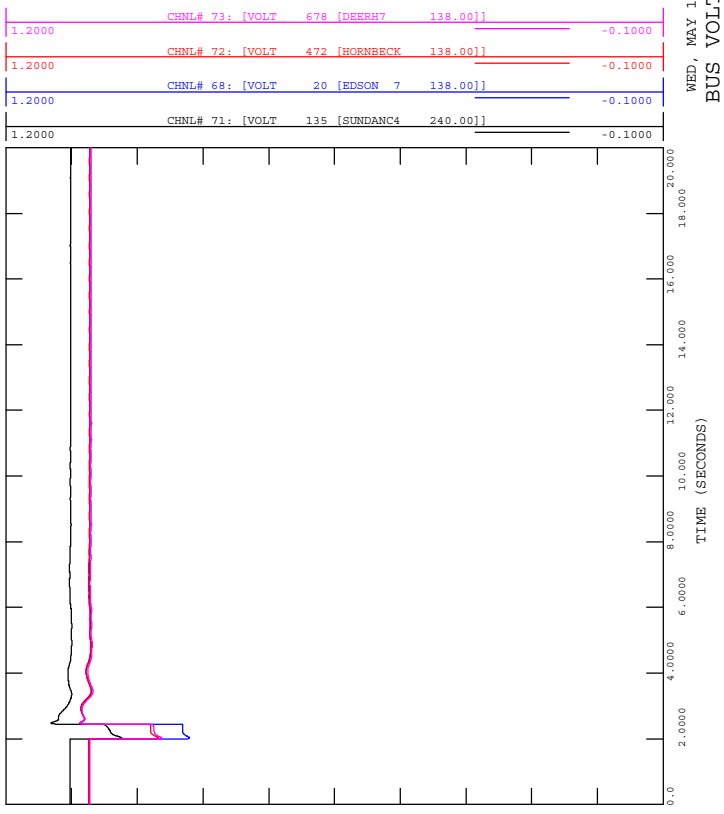
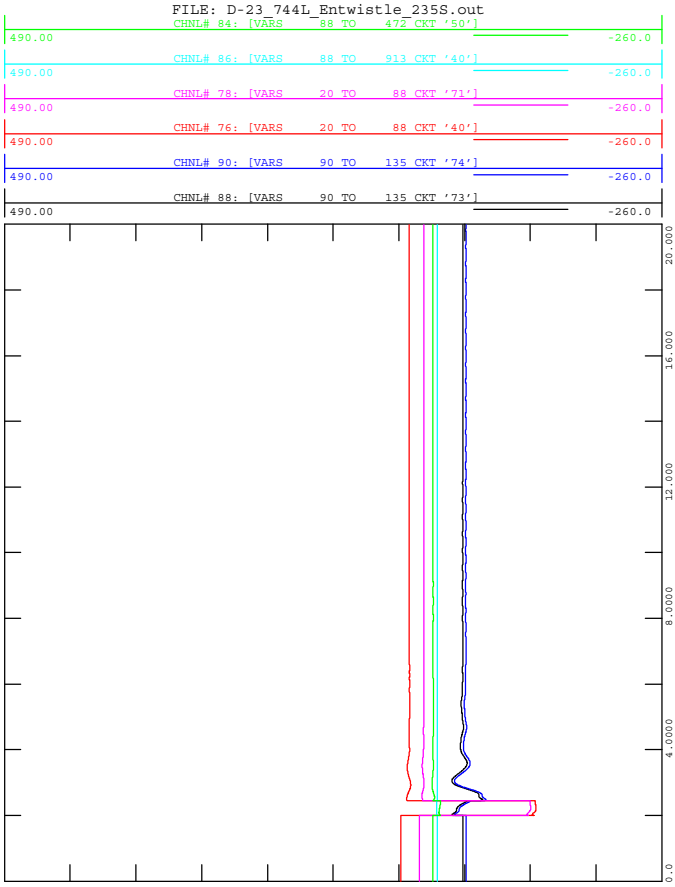


FIGURE D-23J
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out



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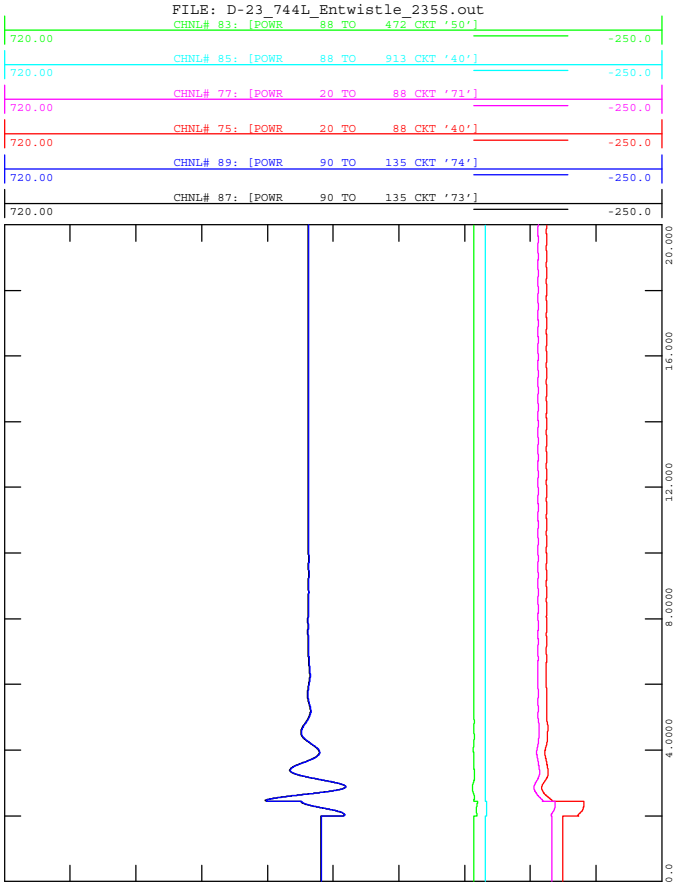
BRANCH FLOW (Q)

FIGURE D-23I
2022WP, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-23_744L_Entwistle_235S.out



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BRANCH FLOW (P)

FIGURE D-24B
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out

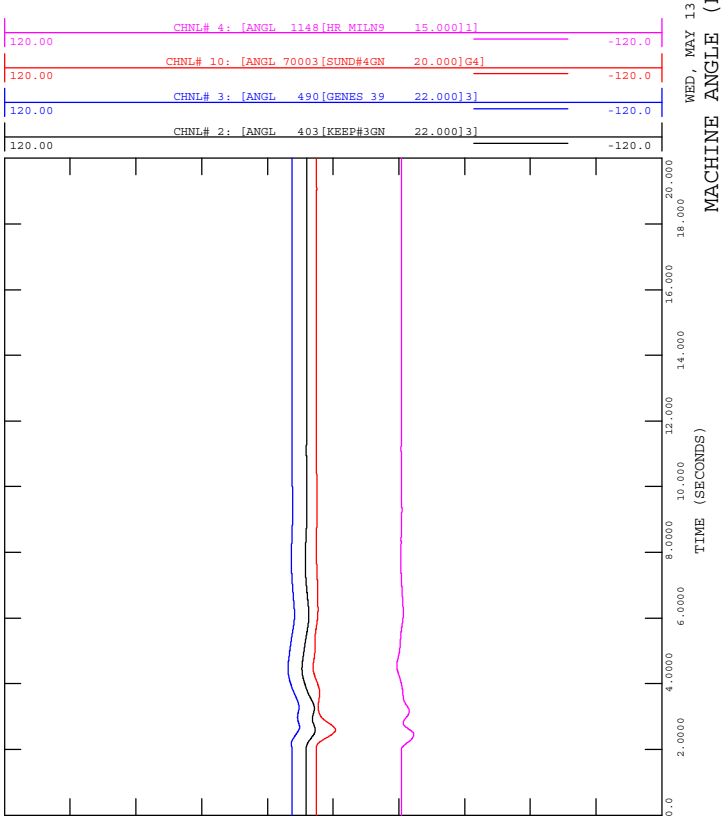


FIGURE D-24D
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out

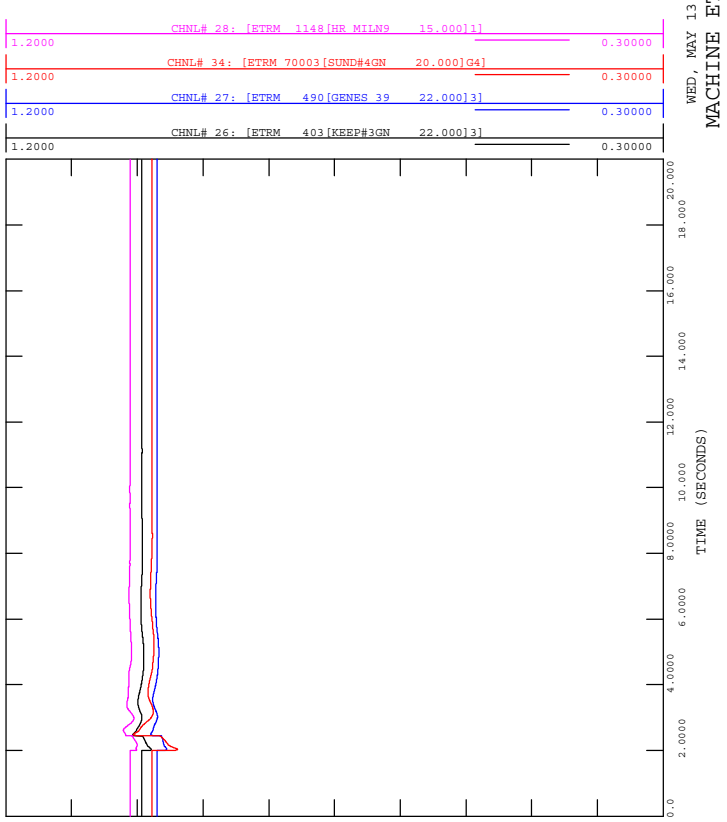


FIGURE D-24A
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out

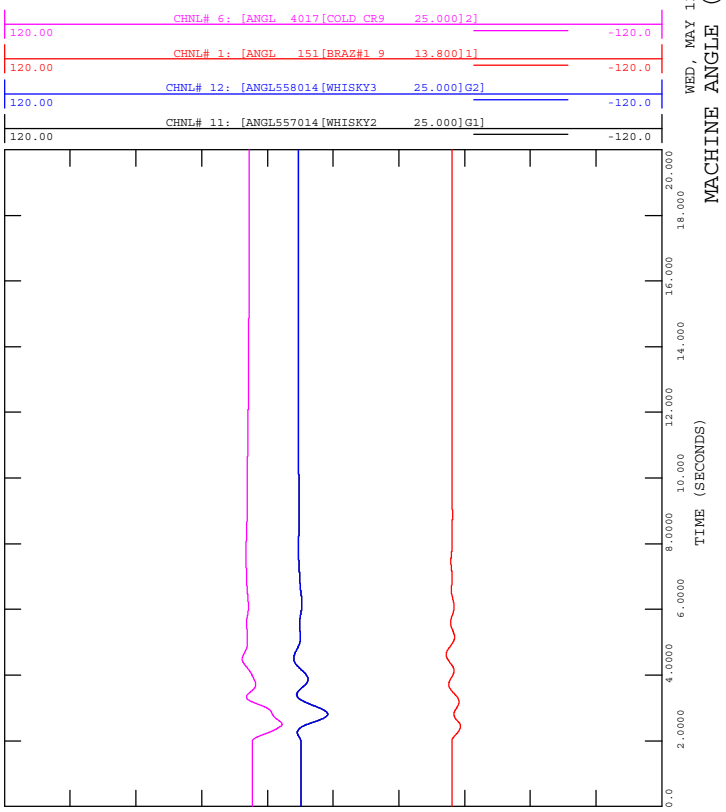


FIGURE D-24C
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out

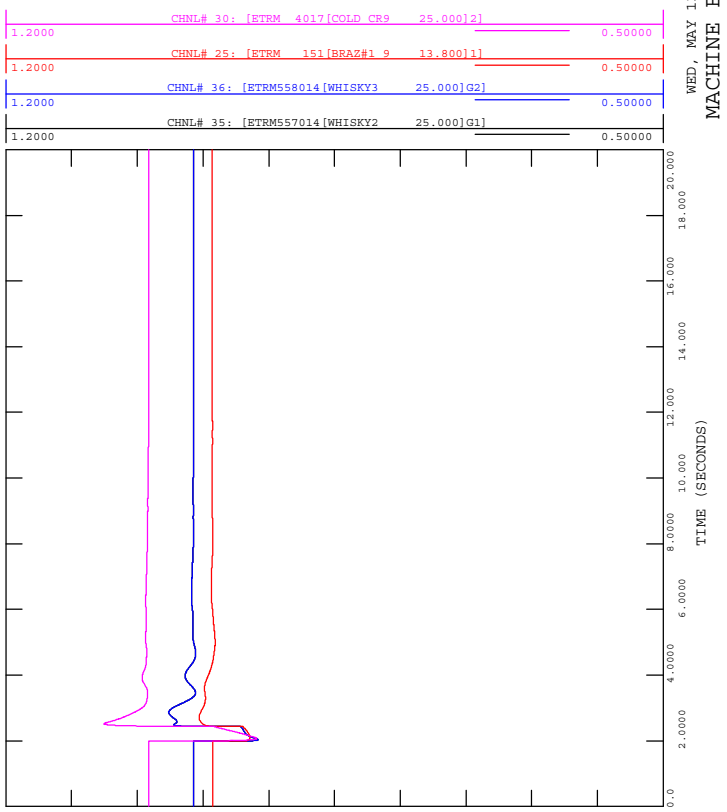


FIGURE D-24F
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out

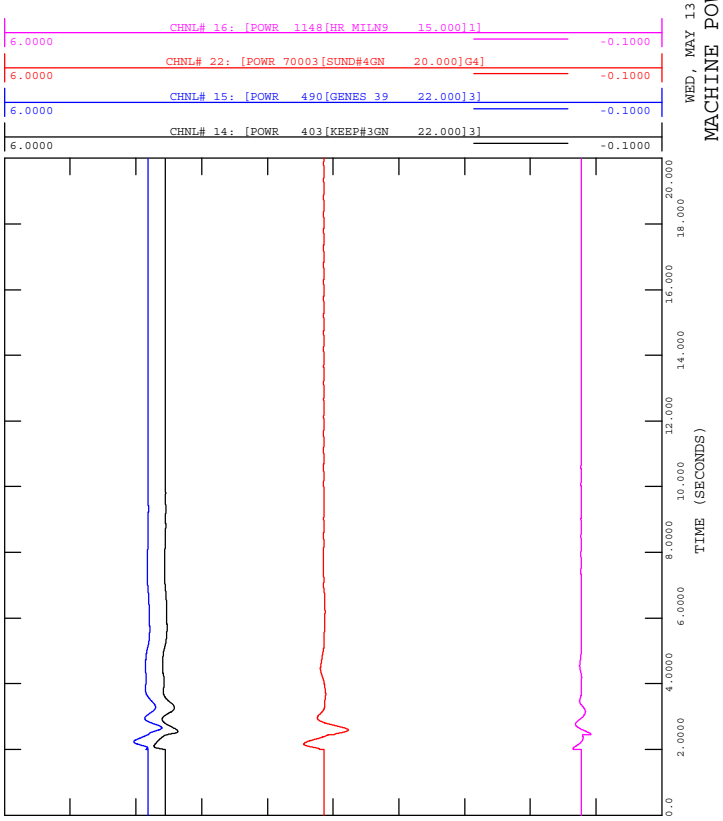


FIGURE D-24H
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out

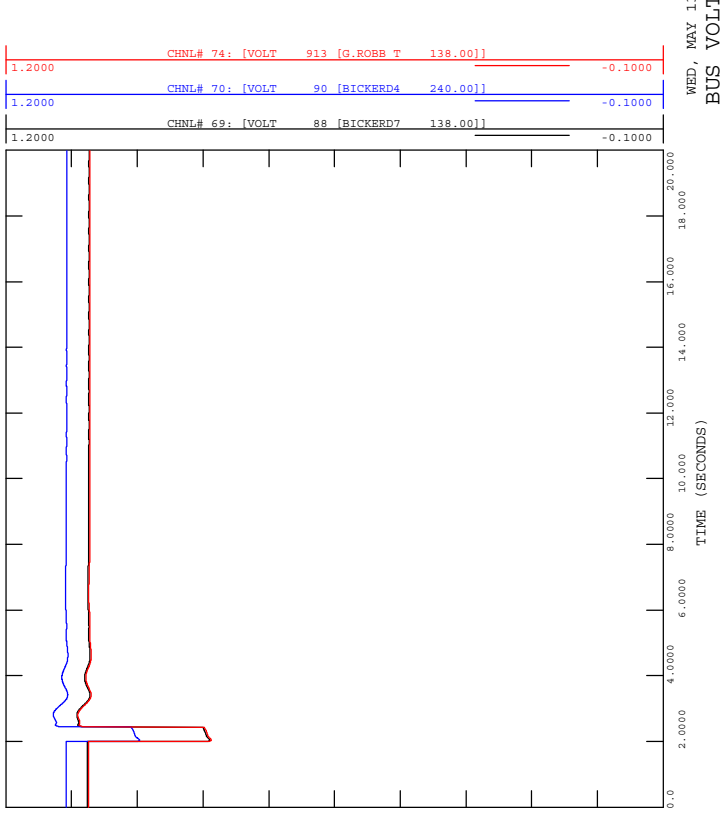


FIGURE D-24E
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out

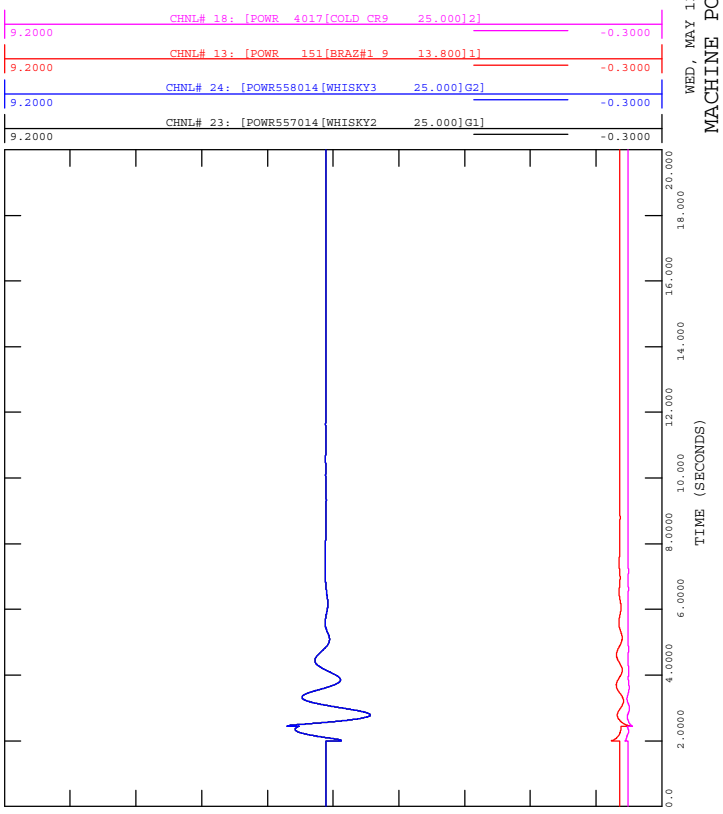


FIGURE D-24G
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out

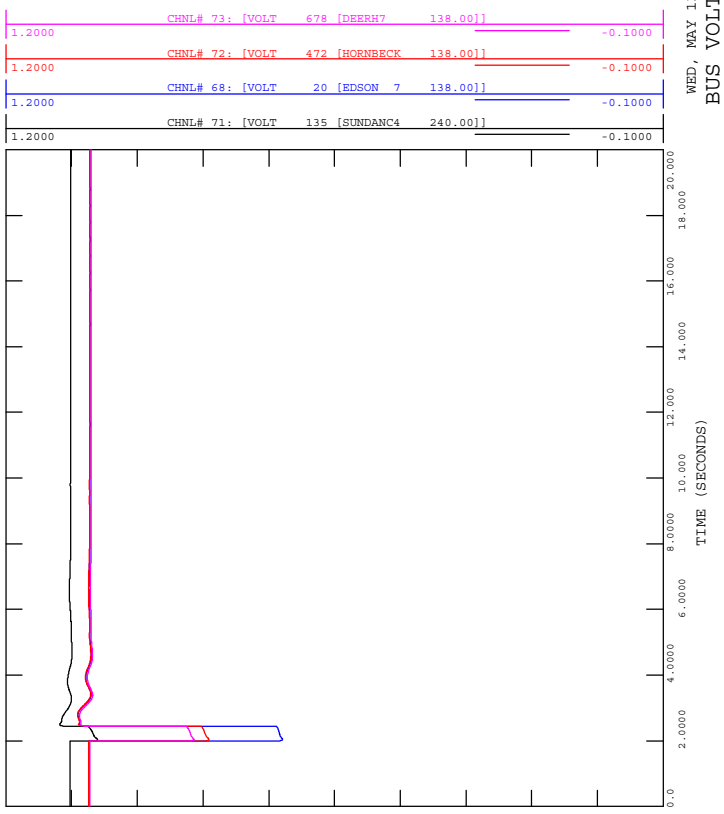
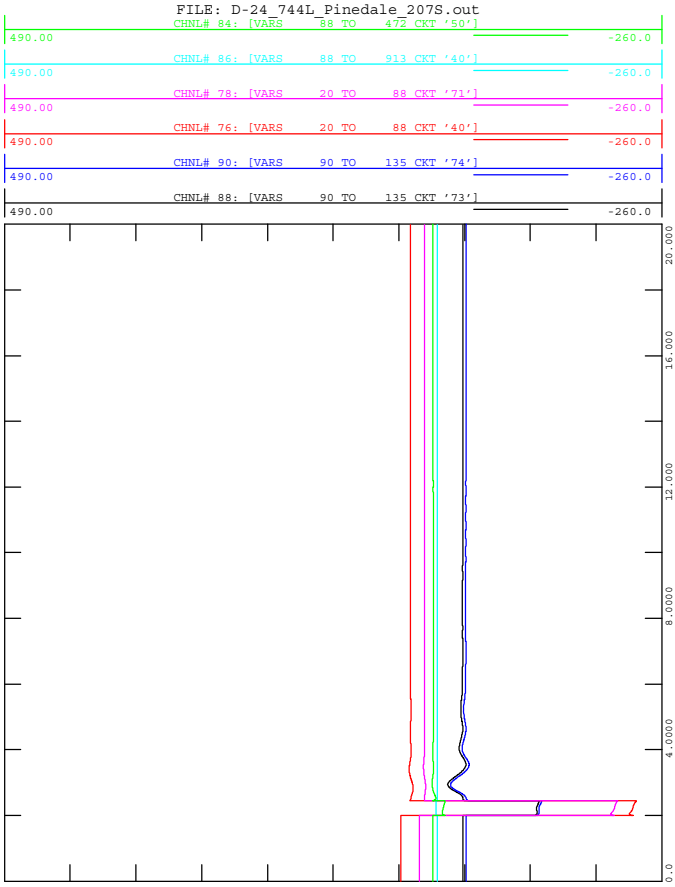


FIGURE D-24J
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out



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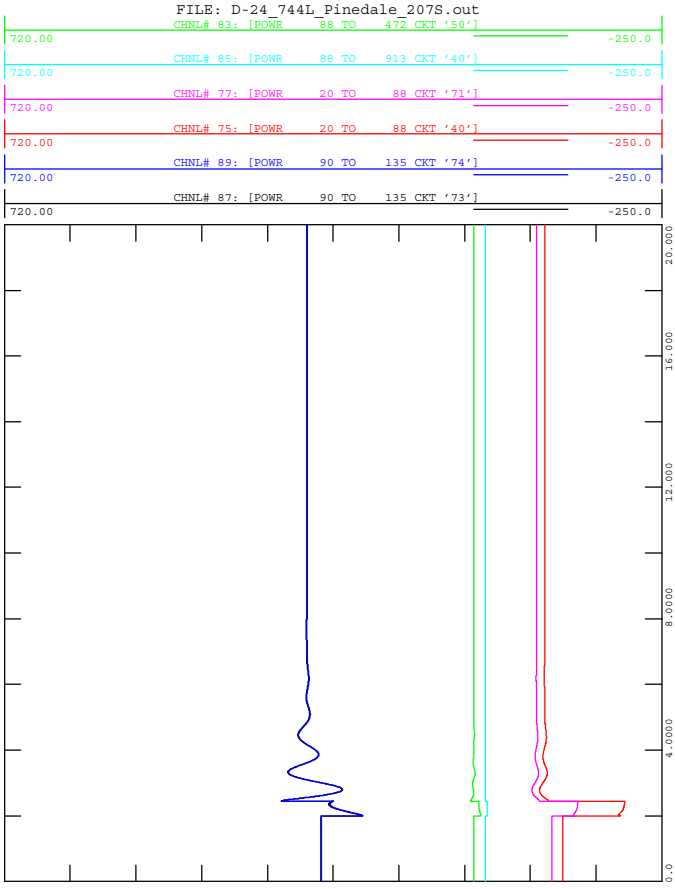
BRANCH FLOW (Q)

FIGURE D-24I
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-24_744L_Pinedale_207S.out



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BRANCH FLOW (P)

FIGURE D-25B
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out

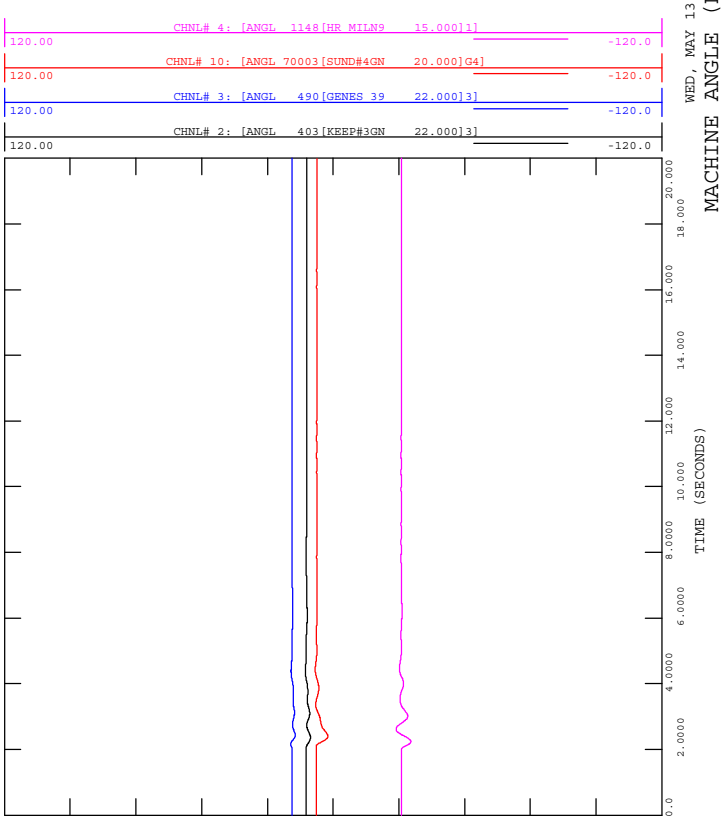


FIGURE D-25D
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out

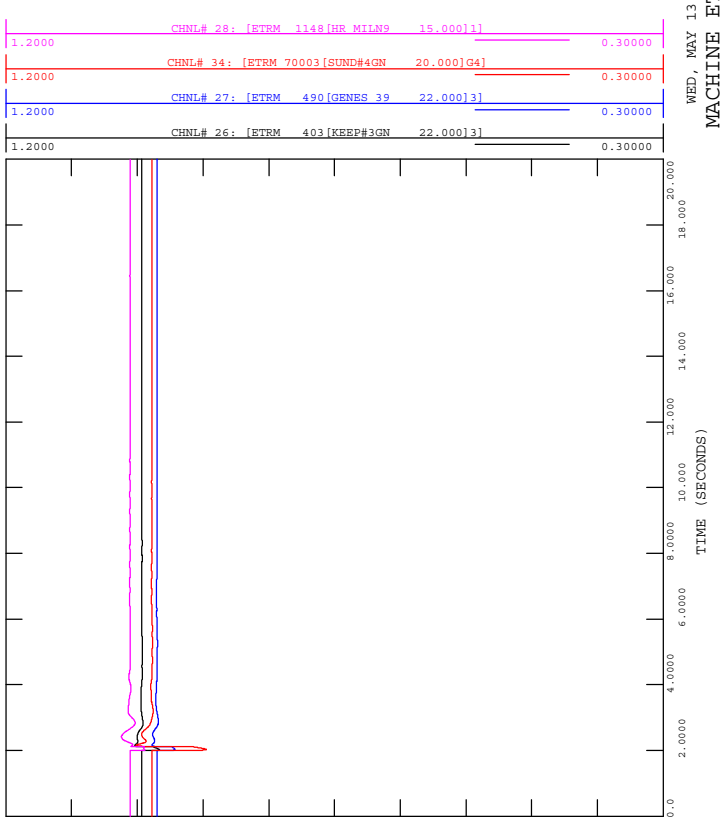


FIGURE D-25A
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out

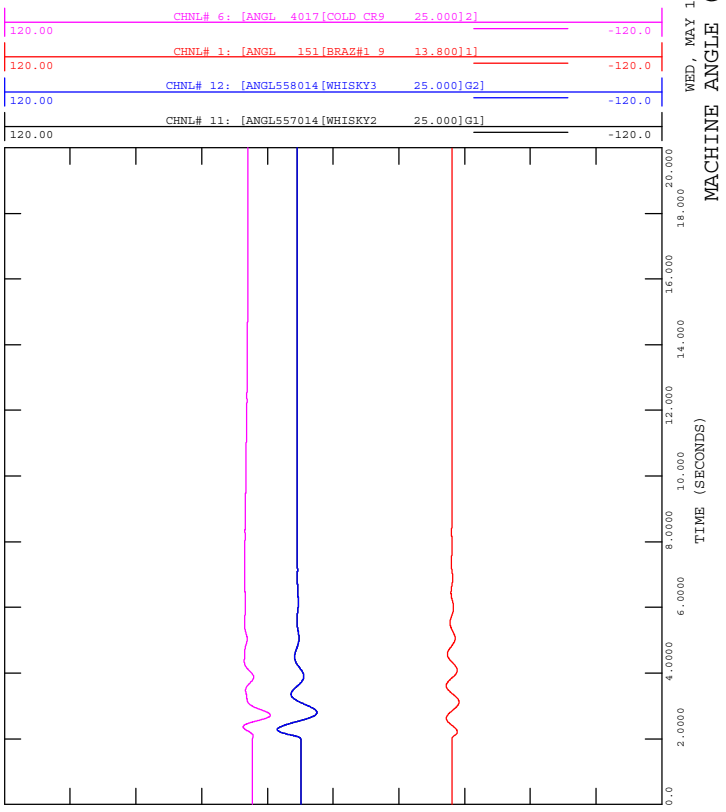


FIGURE D-25C
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out

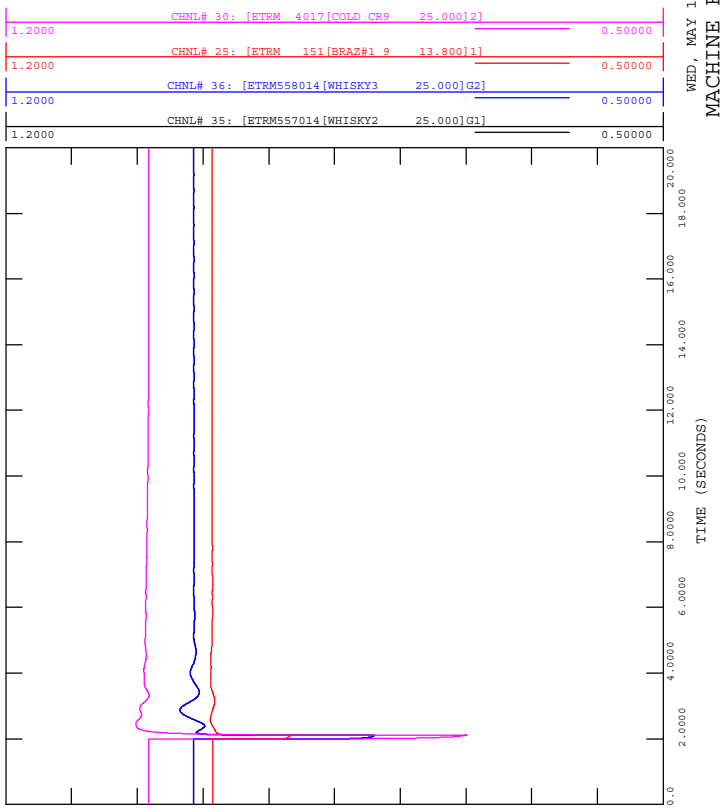
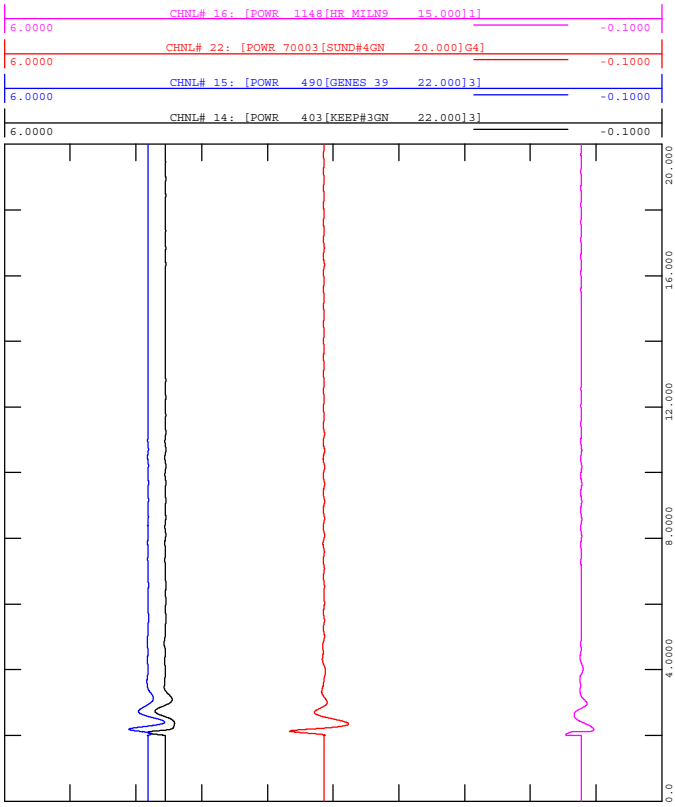


FIGURE D-25F
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out



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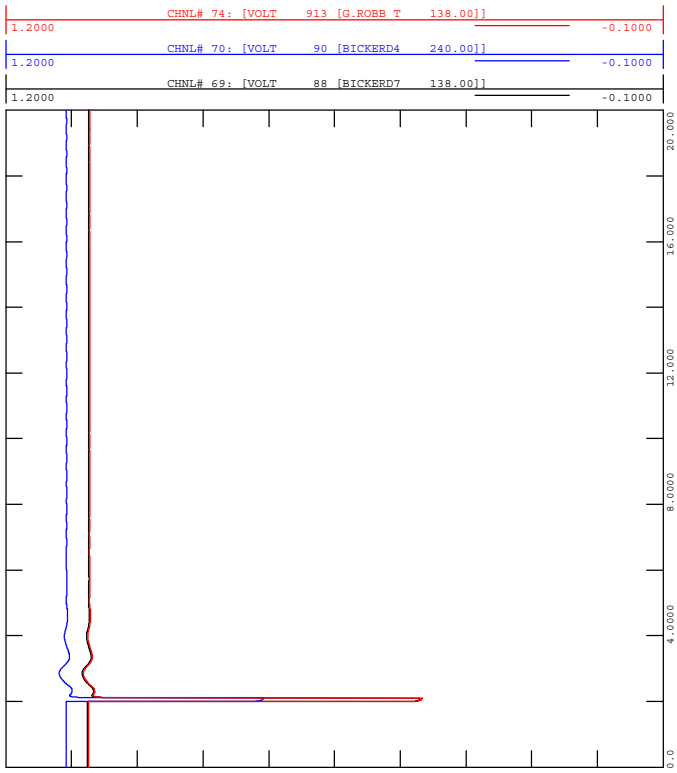
MACHINE POWER (MW)

FIGURE D-25H
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out



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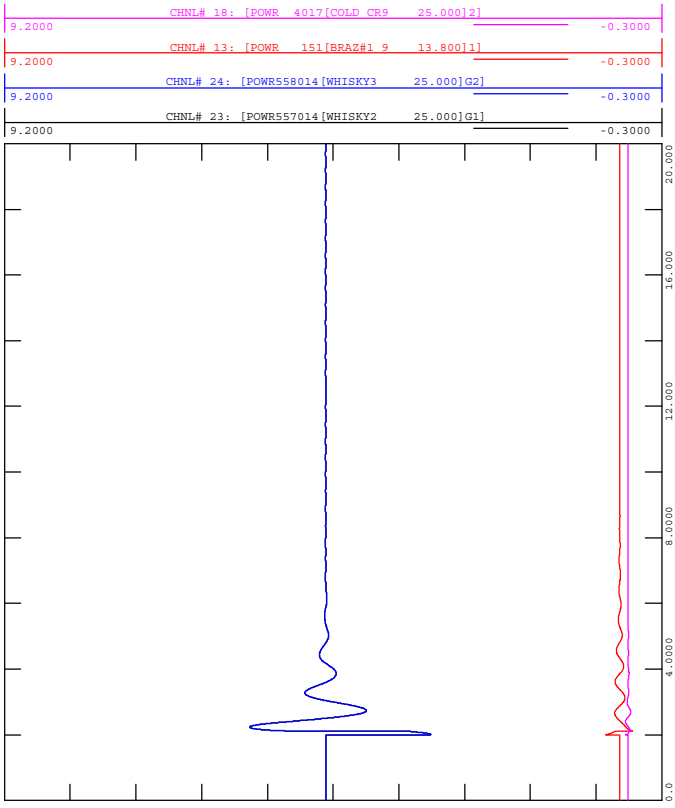
BUS VOLTAGE (PU)

FIGURE D-25E
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out



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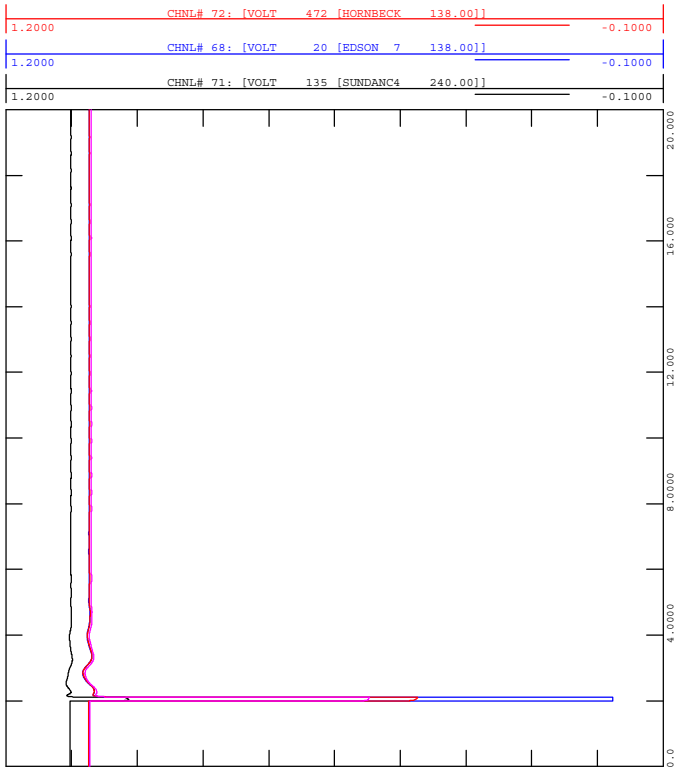
MACHINE POWER (MW)

FIGURE D-25G
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out



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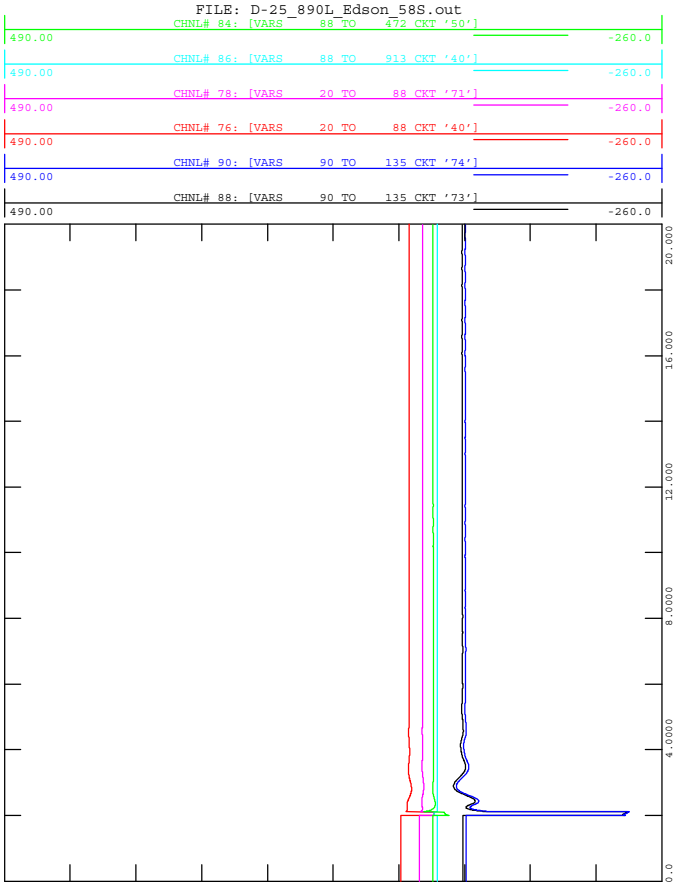
BUS VOLTAGE (PU)

FIGURE D-25J
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out



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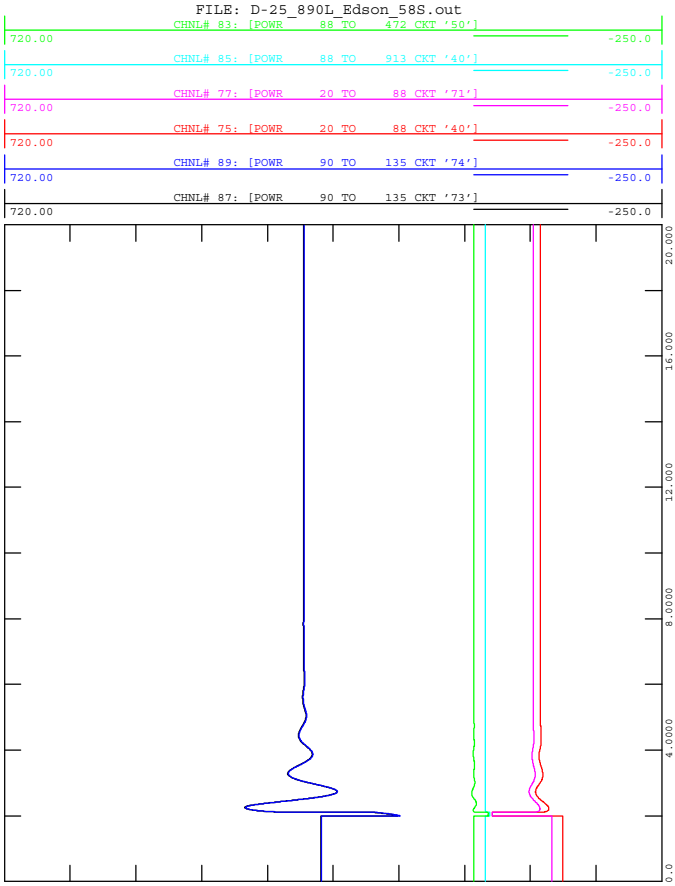
BRANCH FLOW (Q)

FIGURE D-25I
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-25_890L_Edson_58S.out



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BRANCH FLOW (P)

FIGURE D-26B
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out

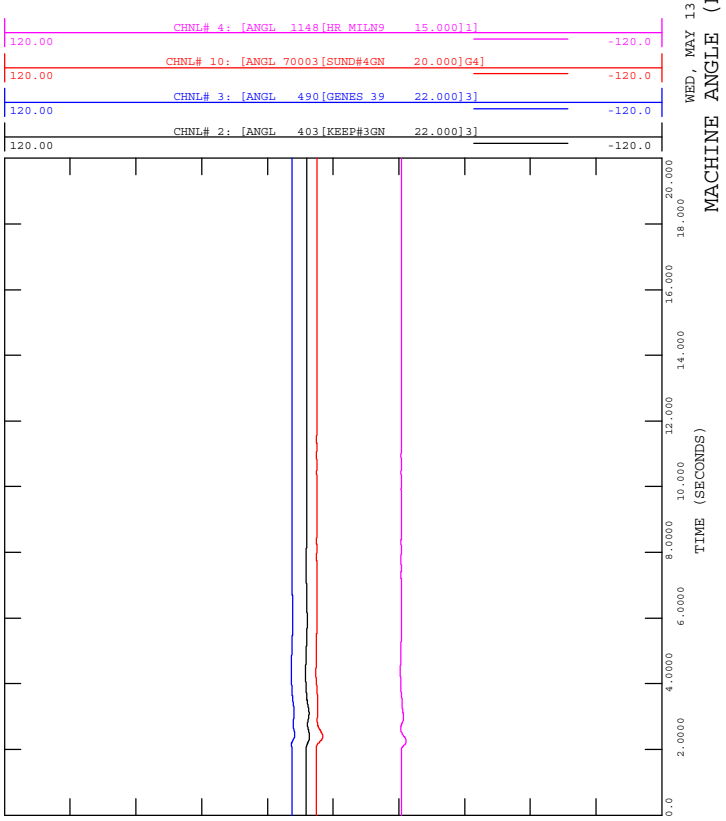


FIGURE D-26D
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out

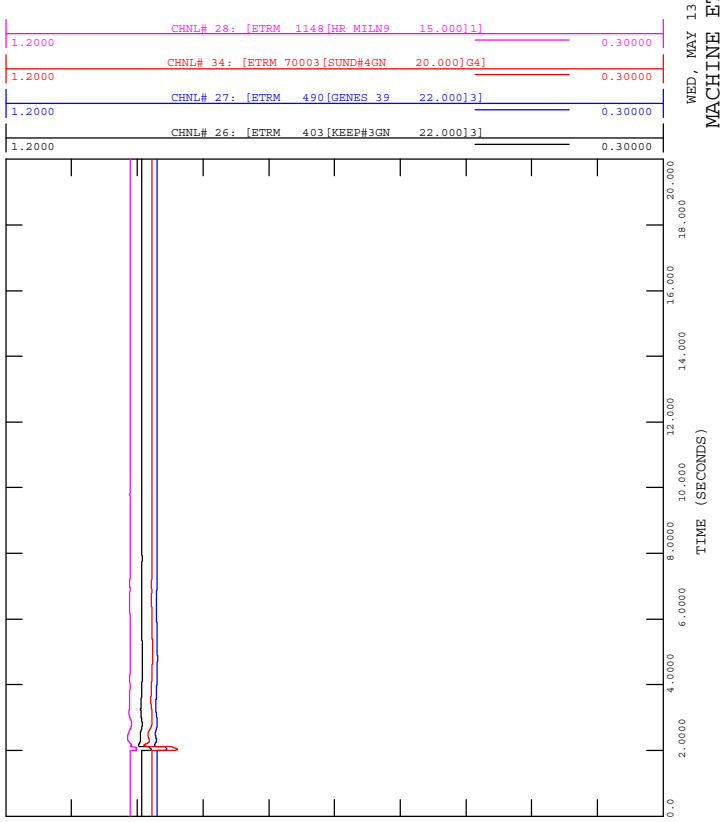


FIGURE D-26A
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out

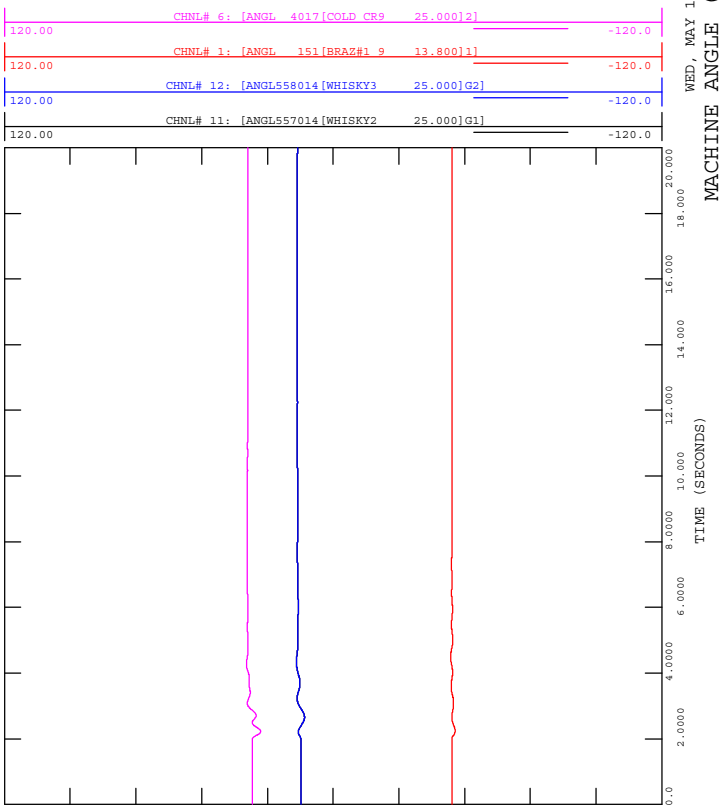


FIGURE D-26C
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out

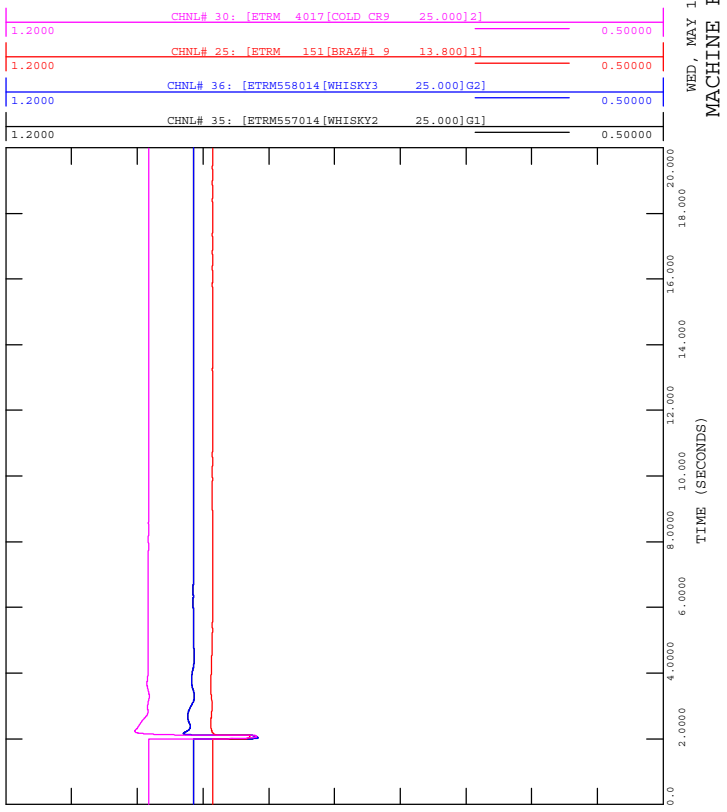
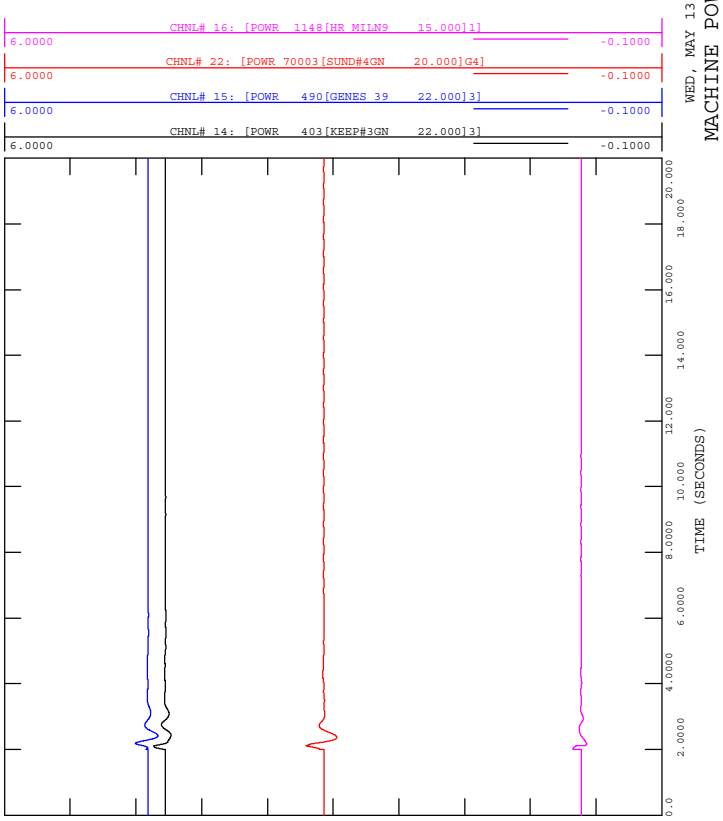


FIGURE D-26F
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out



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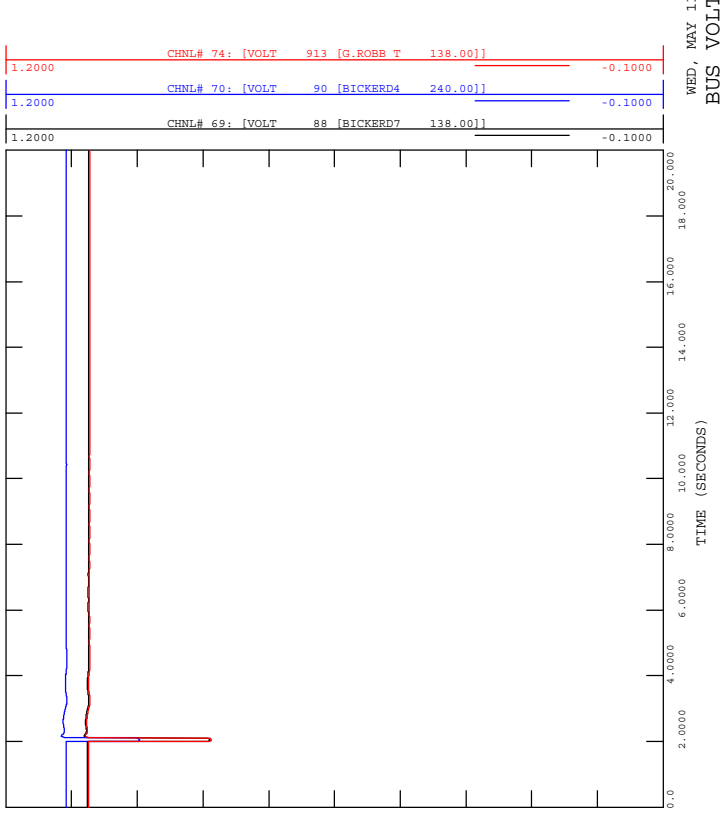
MACHINE POWER (MW)

FIGURE D-26H
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out



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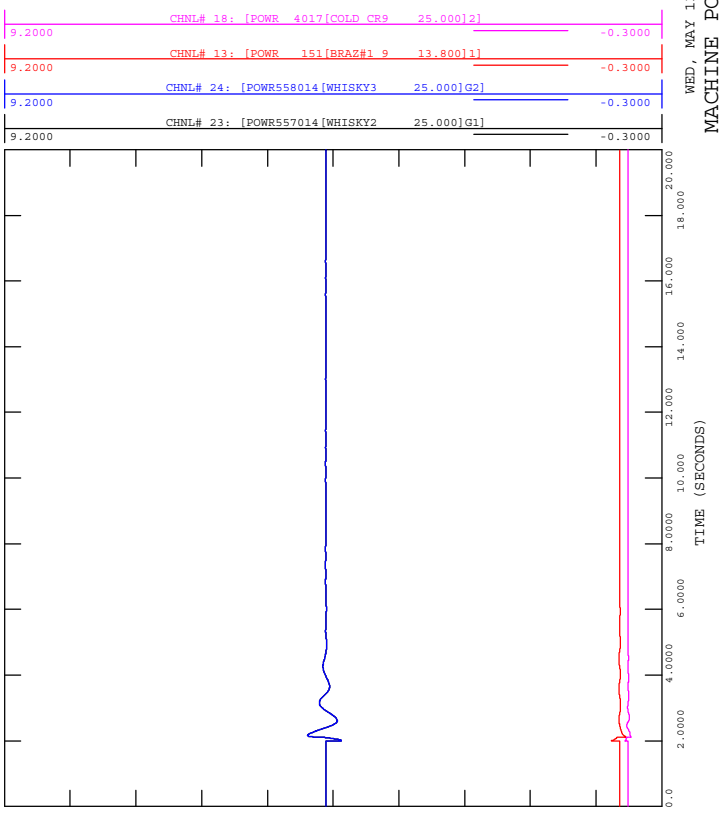
BUS VOLTAGE (PU)

FIGURE D-26E
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out



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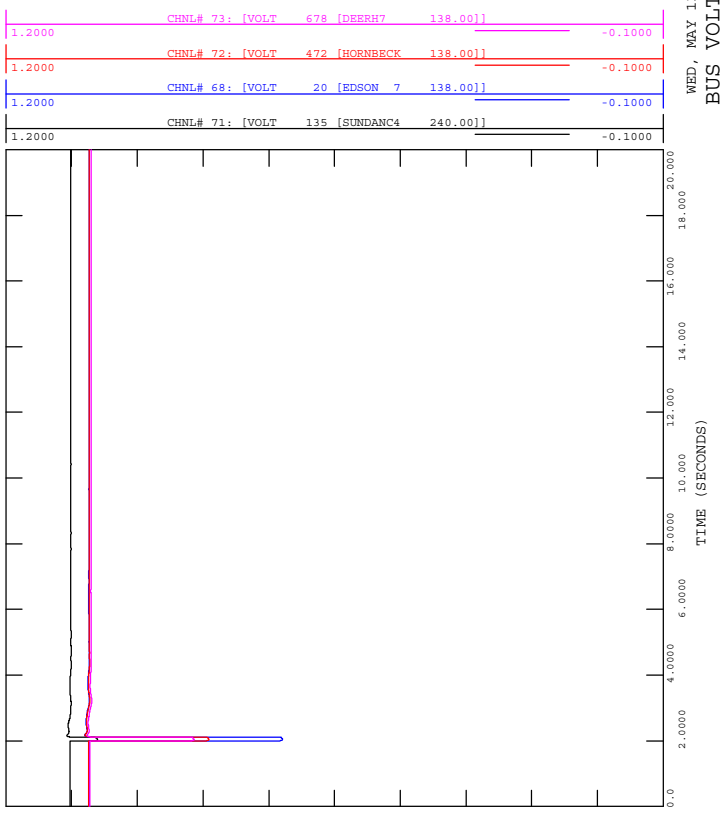
MACHINE POWER (MW)

FIGURE D-26G
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out



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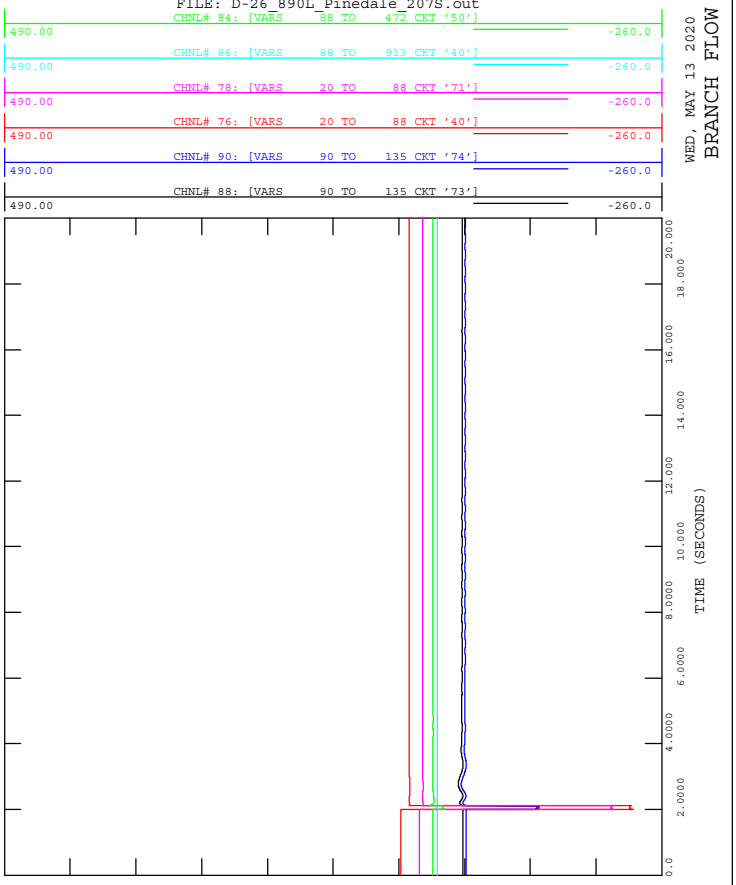
BUS VOLTAGE (PU)

FIGURE D-26J
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out



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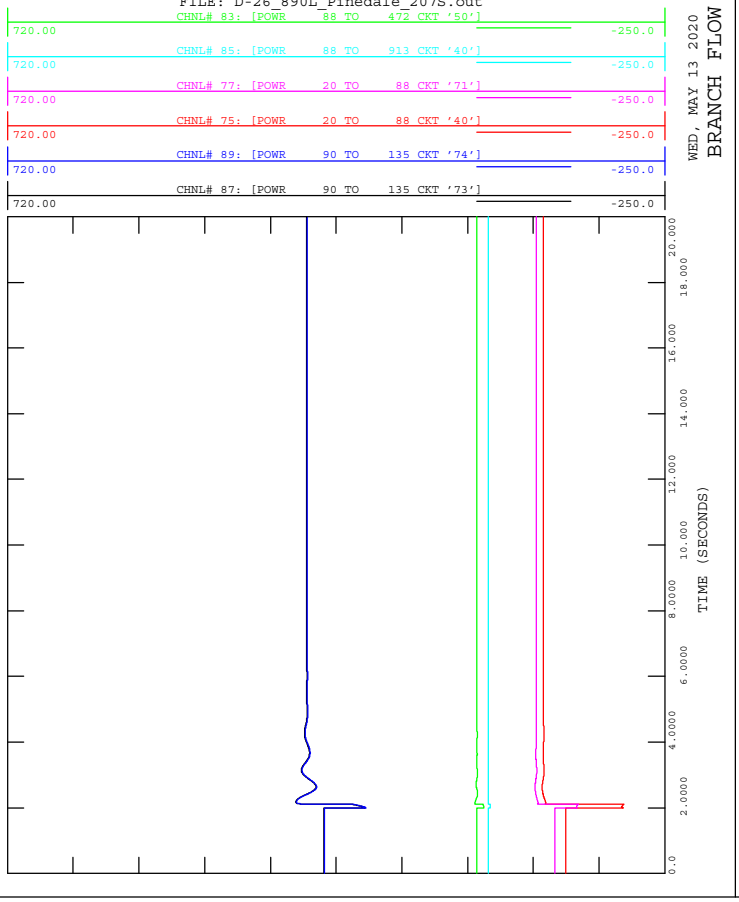
BRANCH FLOW (Q)

FIGURE D-26I
2022WP, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-26_890L_Pinedale_207S.out



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BRANCH FLOW (P)

FIGURE D-27B
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out

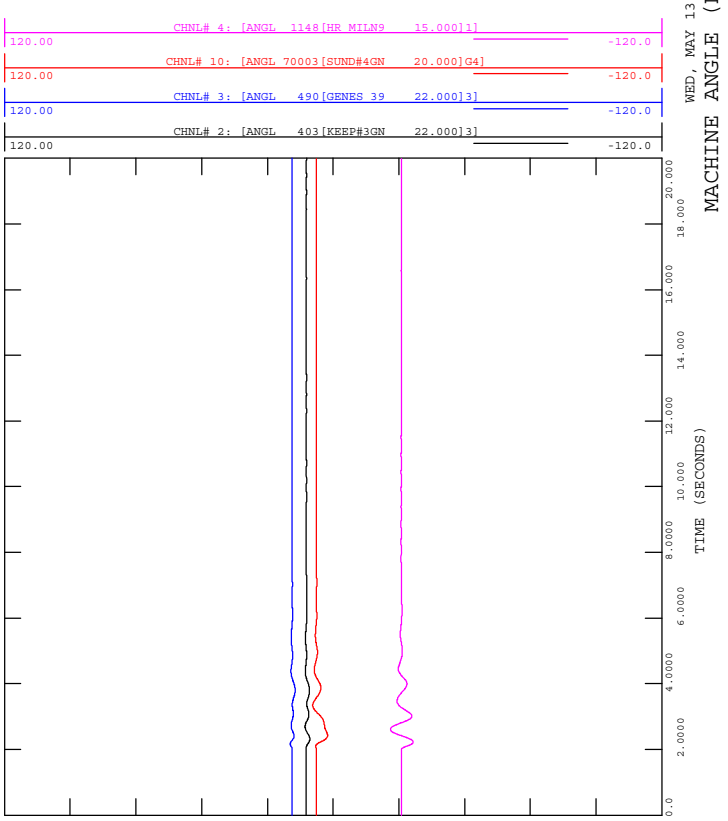


FIGURE D-27D
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out

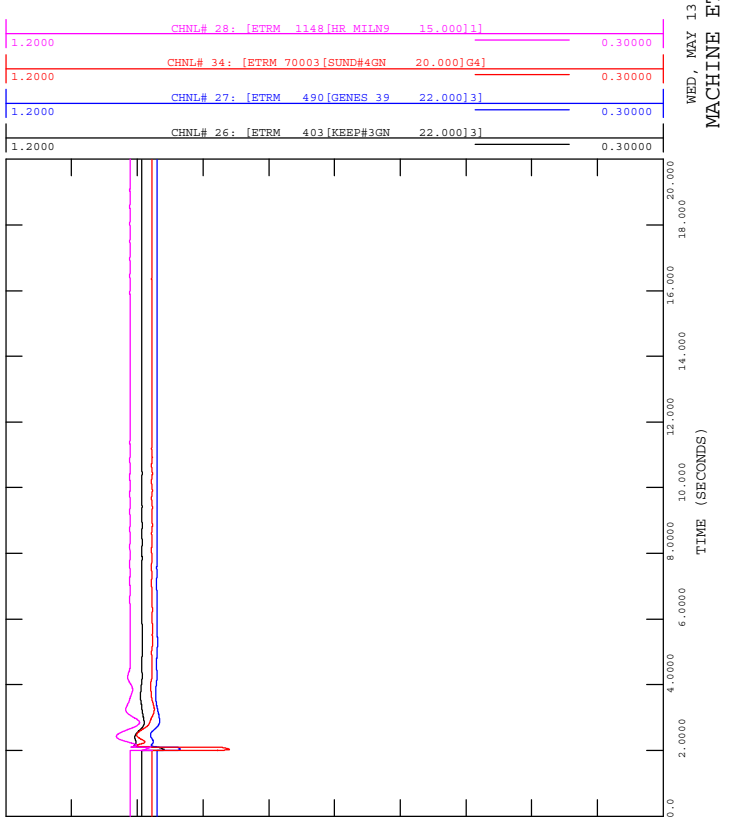


FIGURE D-27A
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out

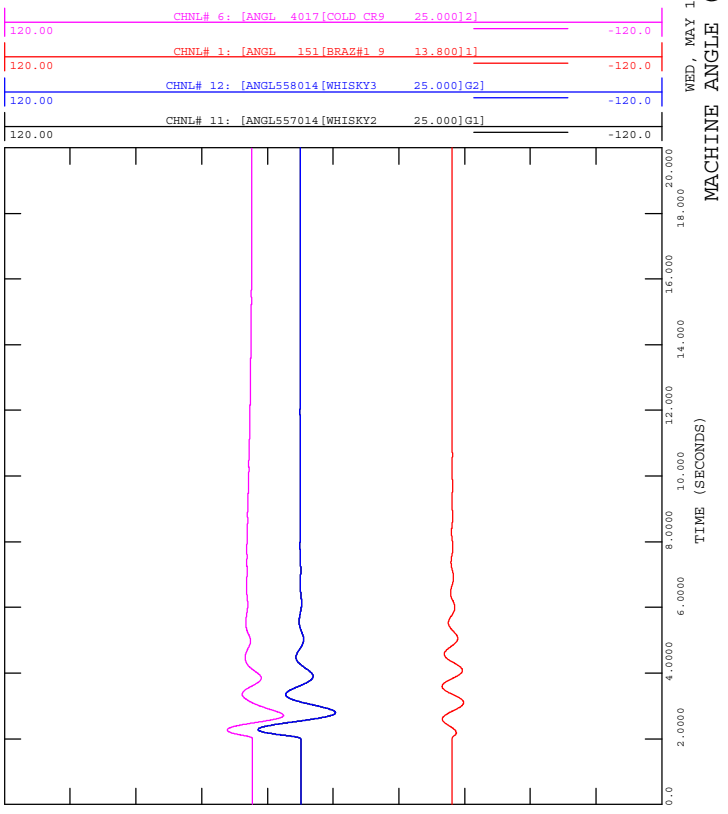


FIGURE D-27C
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out

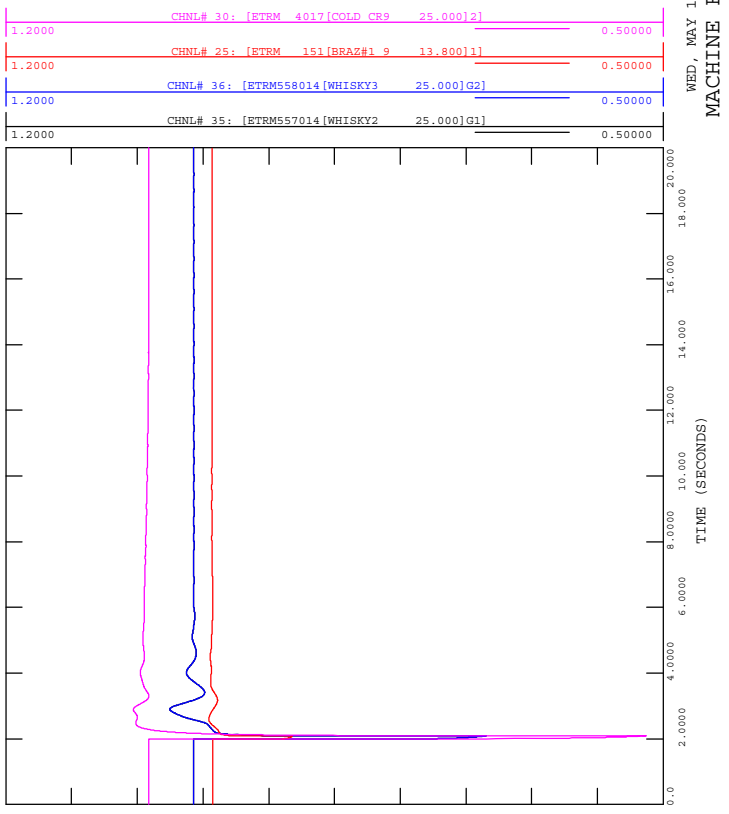


FIGURE D-27F
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out

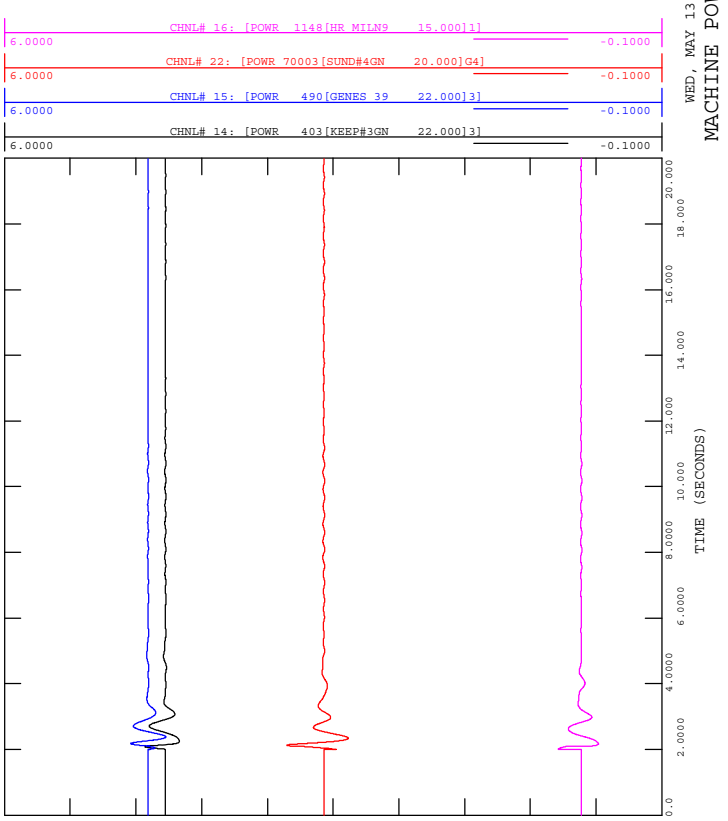


FIGURE D-27H
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out

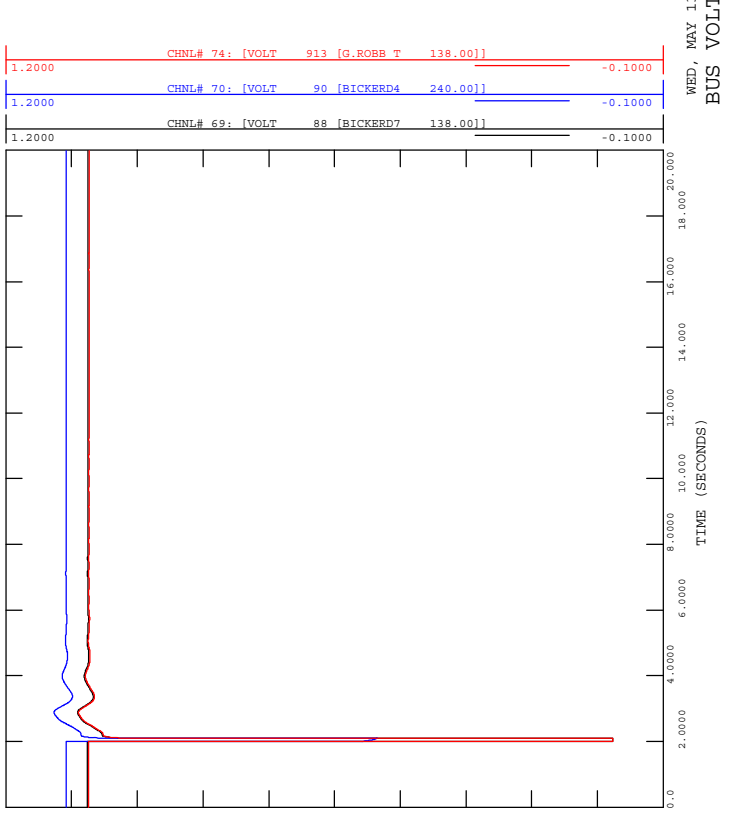


FIGURE D-27E
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out

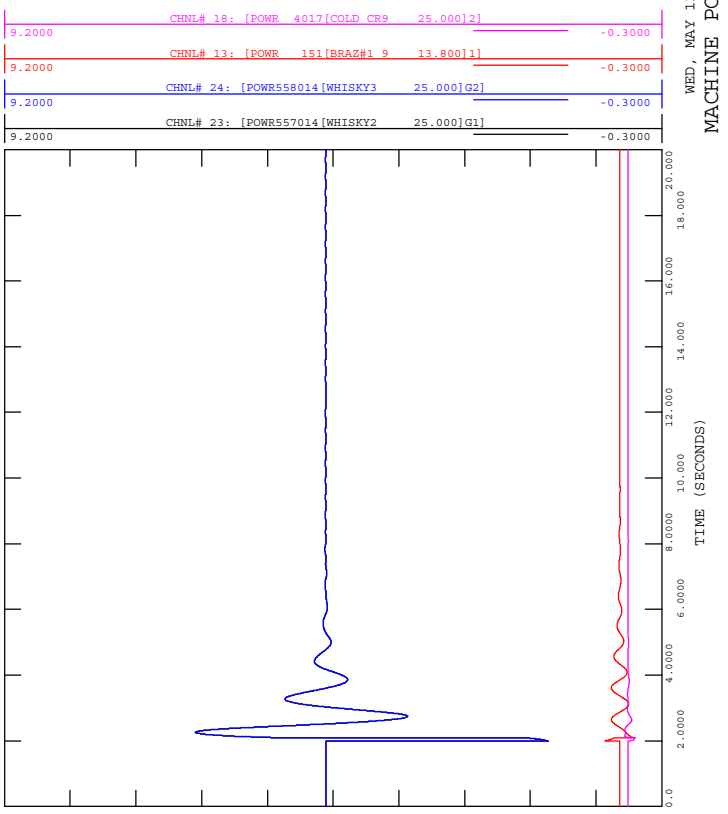


FIGURE D-27G
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out

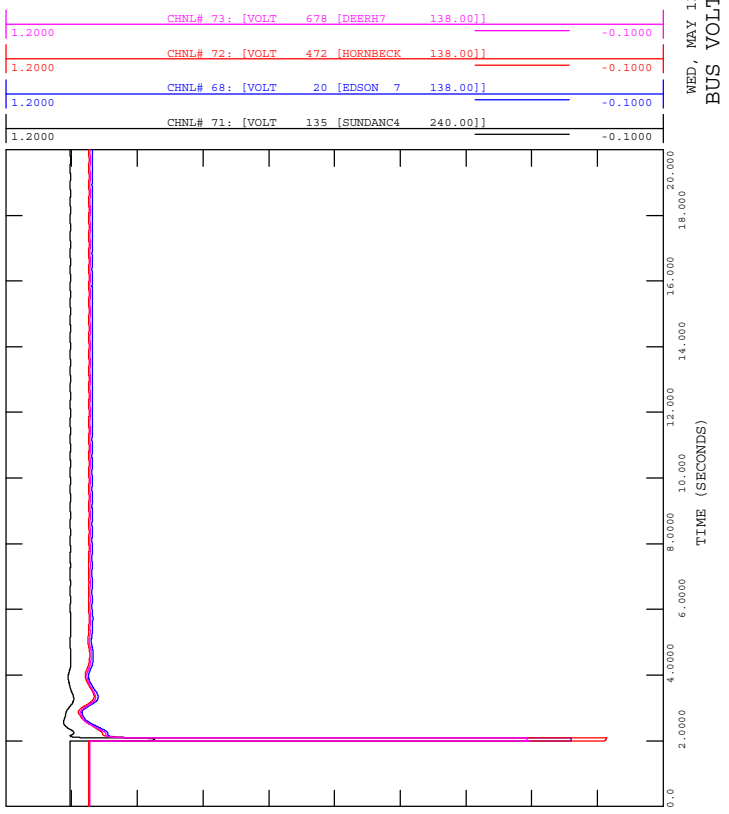
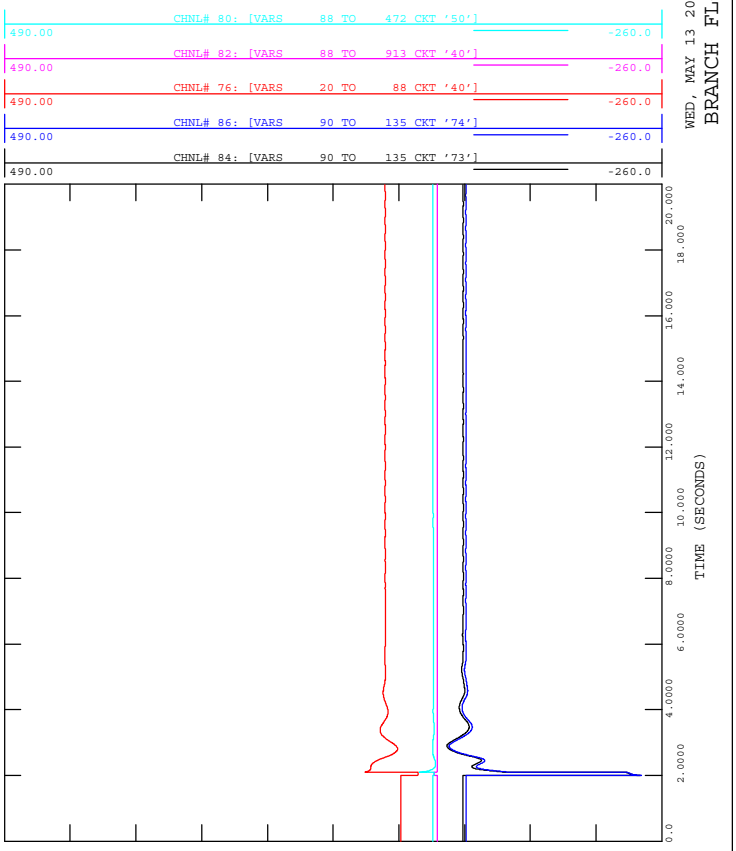


FIGURE D-27J
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out



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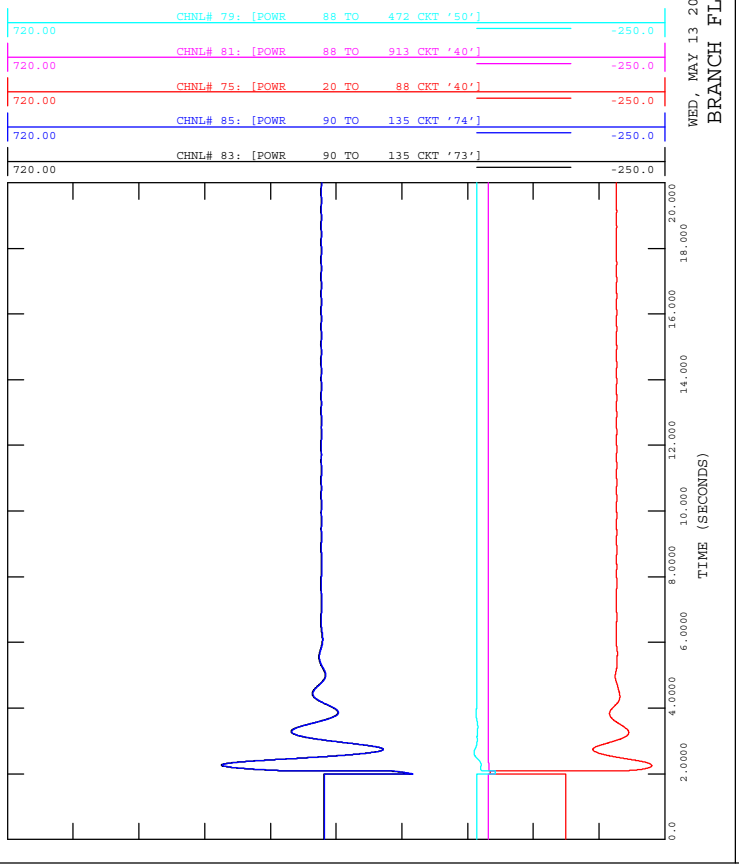
BRANCH FLOW (Q)

FIGURE D-27I
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-27_671L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-28B
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out

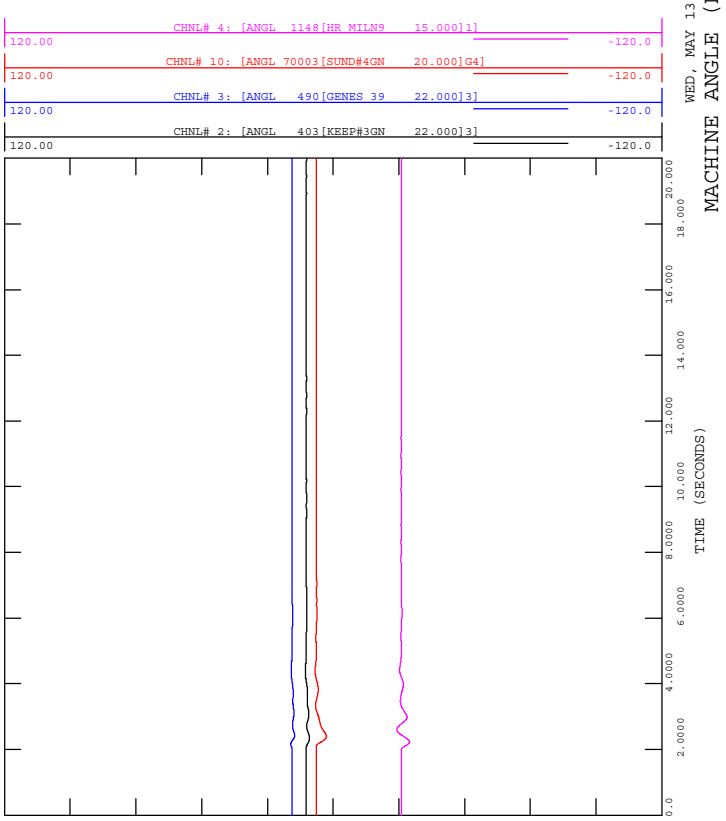


FIGURE D-28D
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out

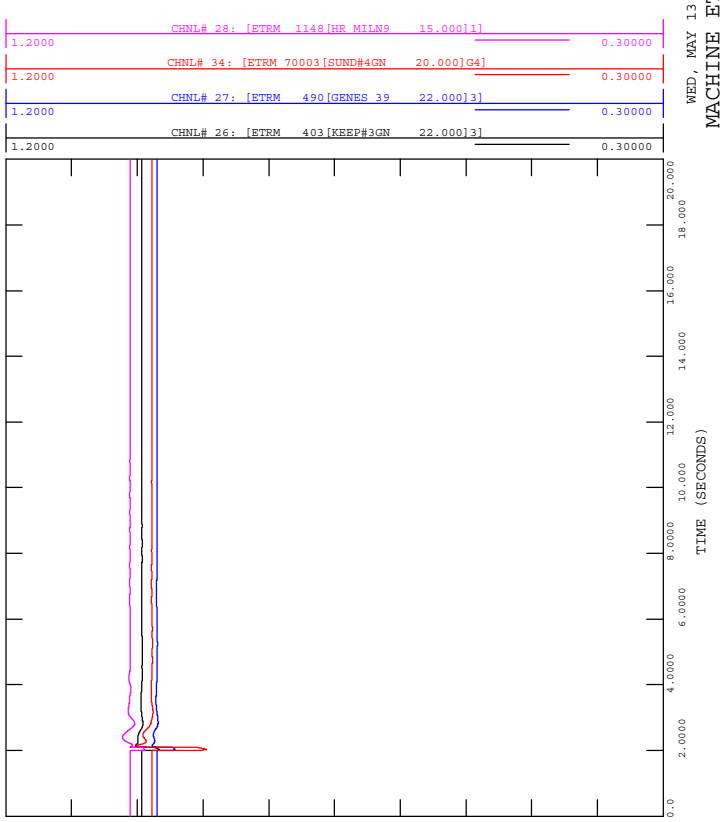


FIGURE D-28A
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out

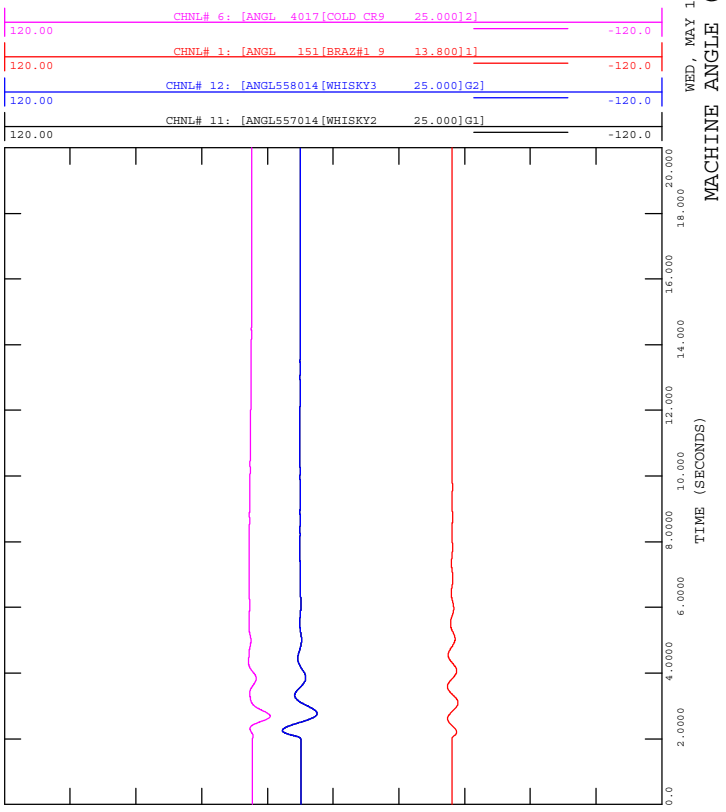


FIGURE D-28C
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out

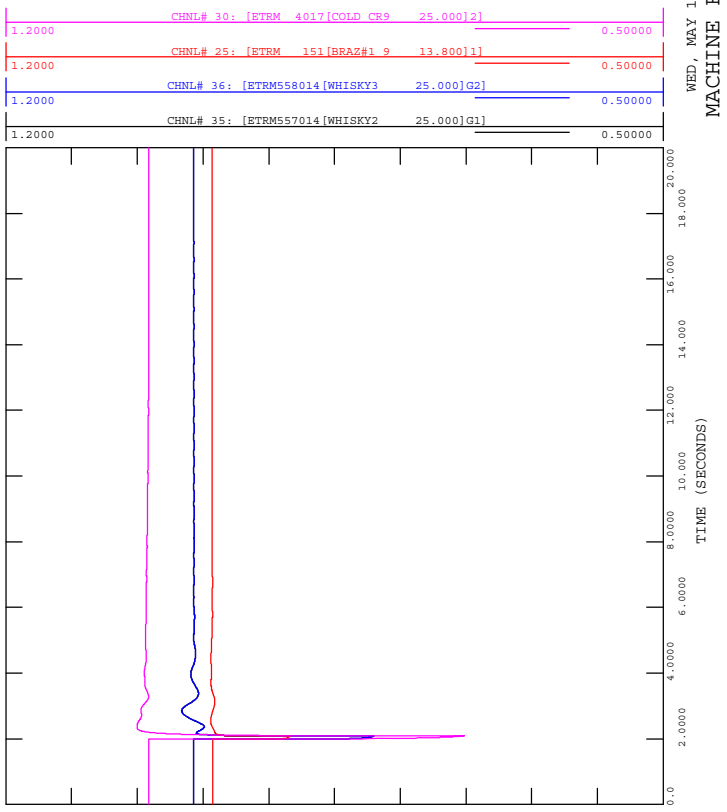


FIGURE D-28F
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out

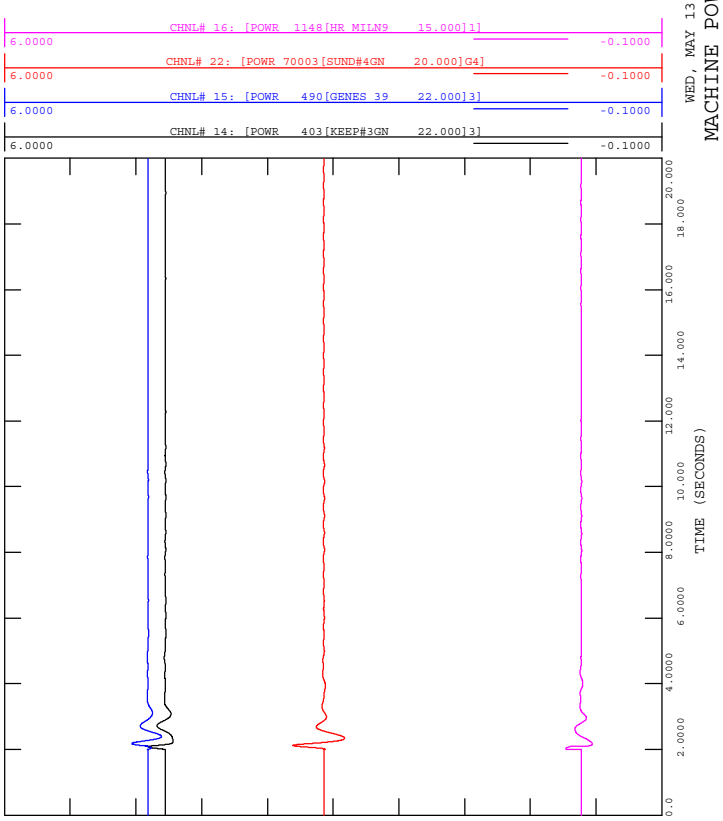


FIGURE D-28H
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out

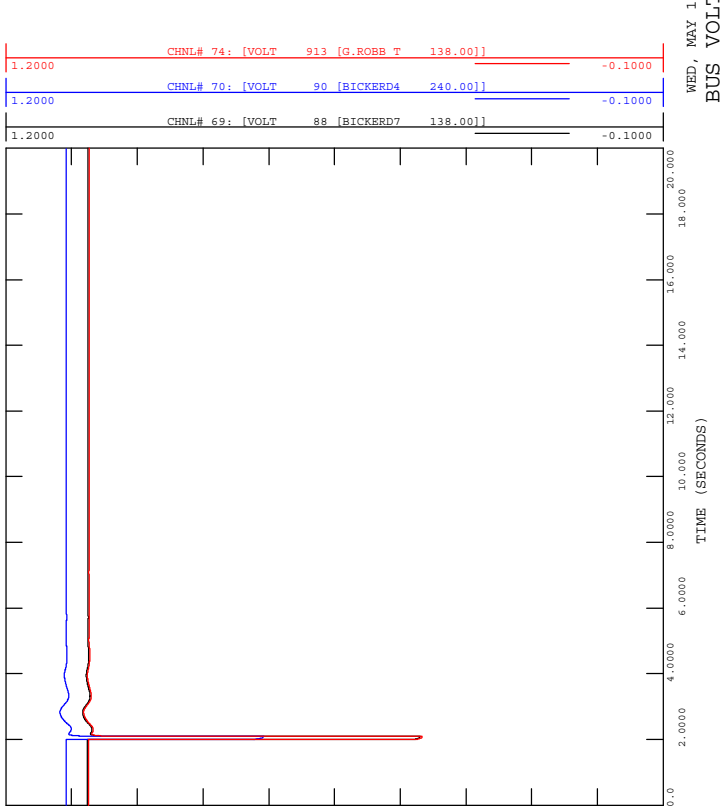


FIGURE D-28E
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out

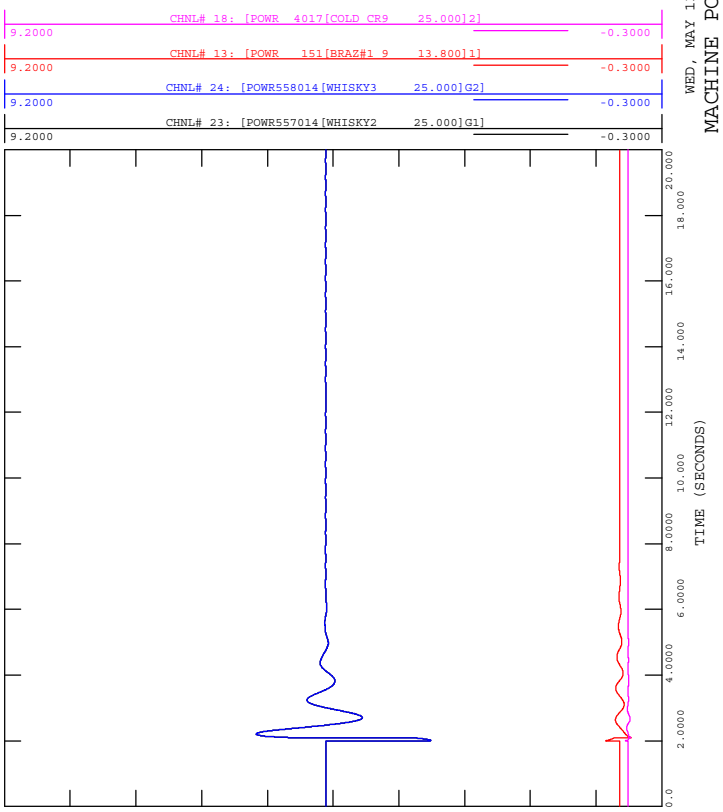


FIGURE D-28G
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out

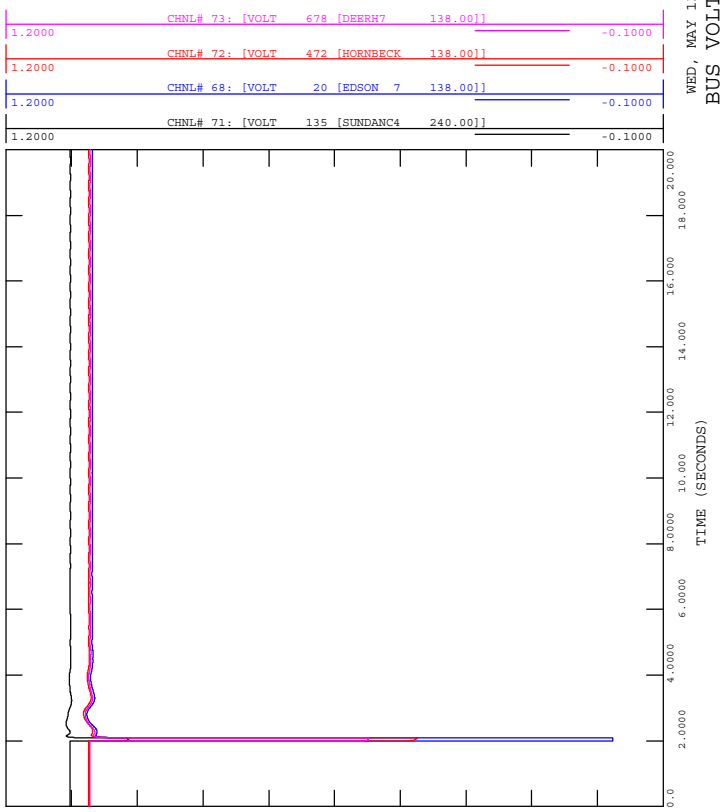
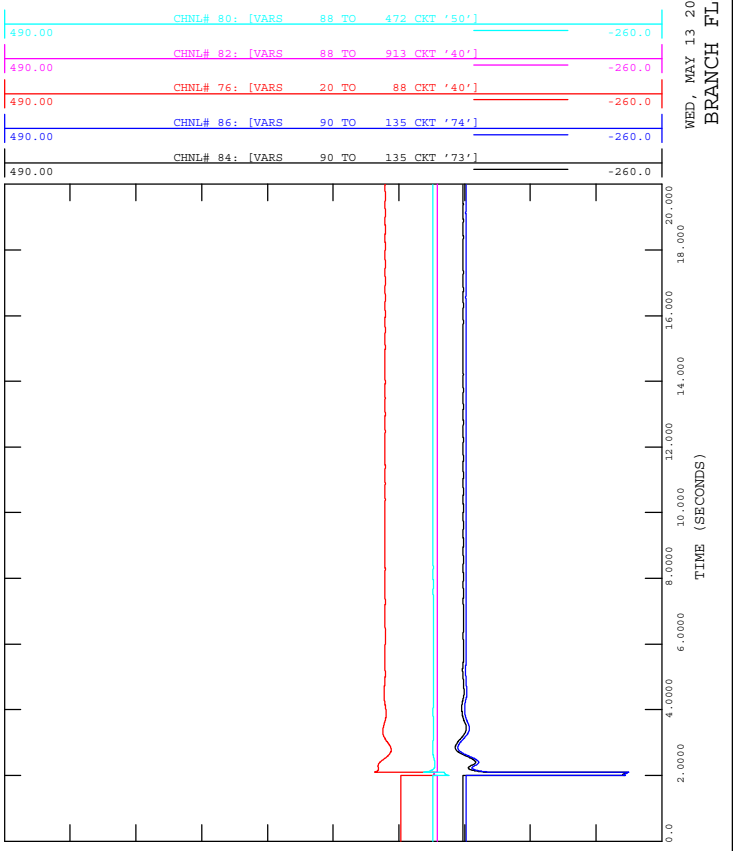
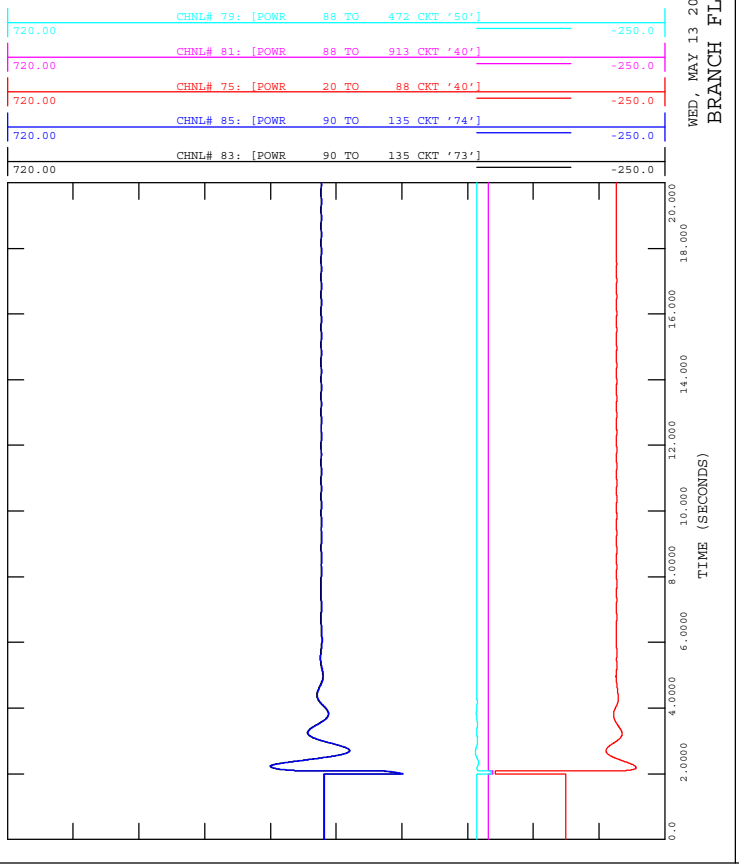


FIGURE D-28J
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out



WED, MAY 13 2020 23:36
BRANCH FLOW (Q)

FIGURE D-28I
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-28_671L_Edson_58S.out



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BRANCH FLOW (P)

FIGURE D-29B
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out

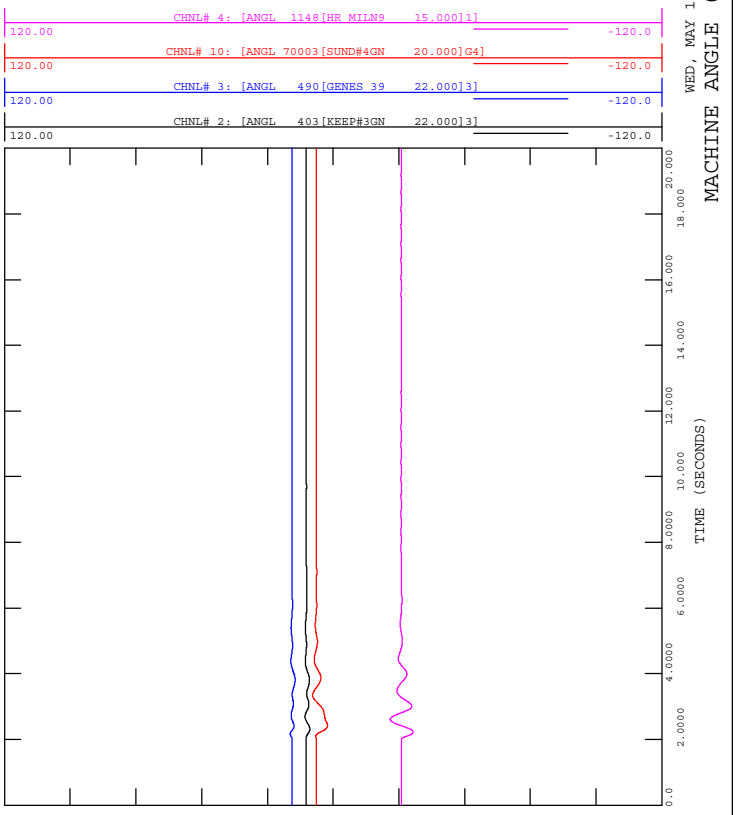


FIGURE D-29D
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out

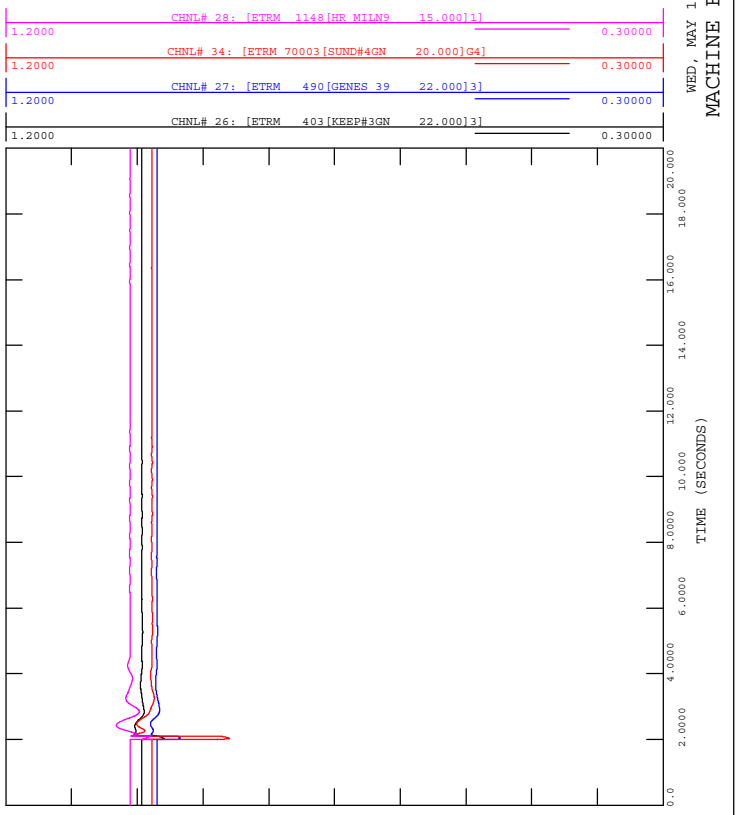


FIGURE D-29A
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out

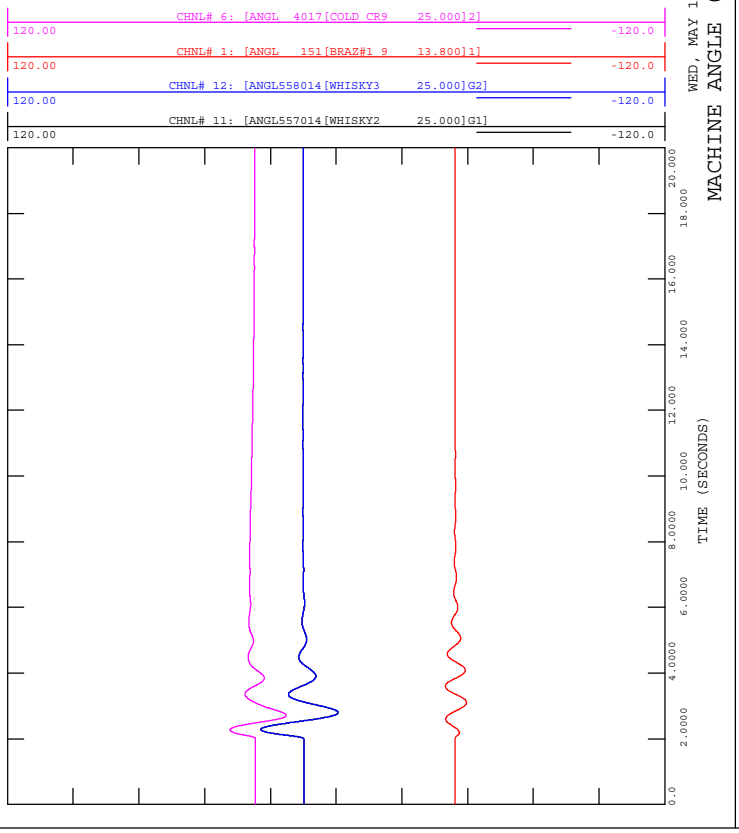


FIGURE D-29C
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out

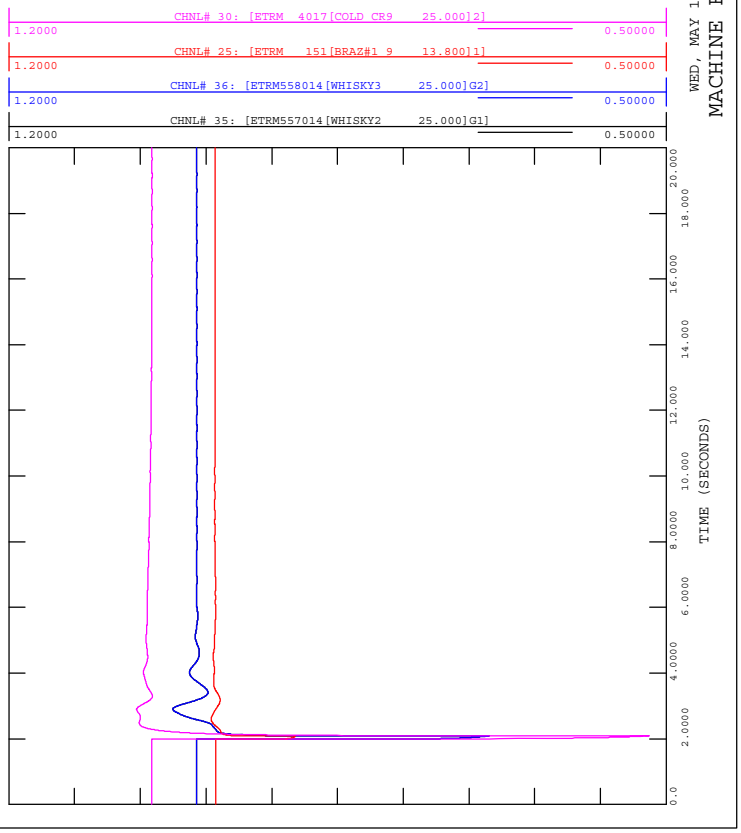
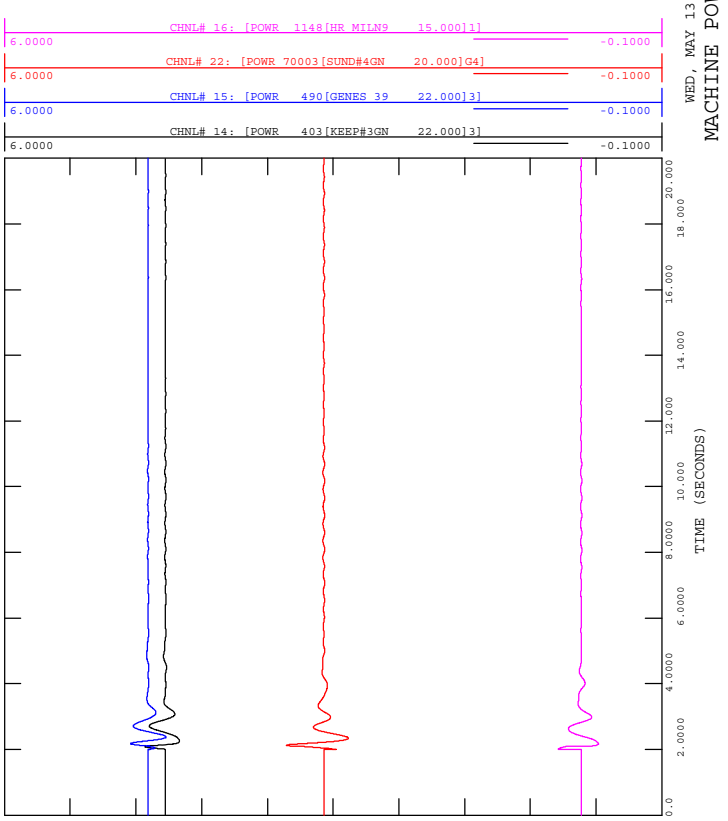
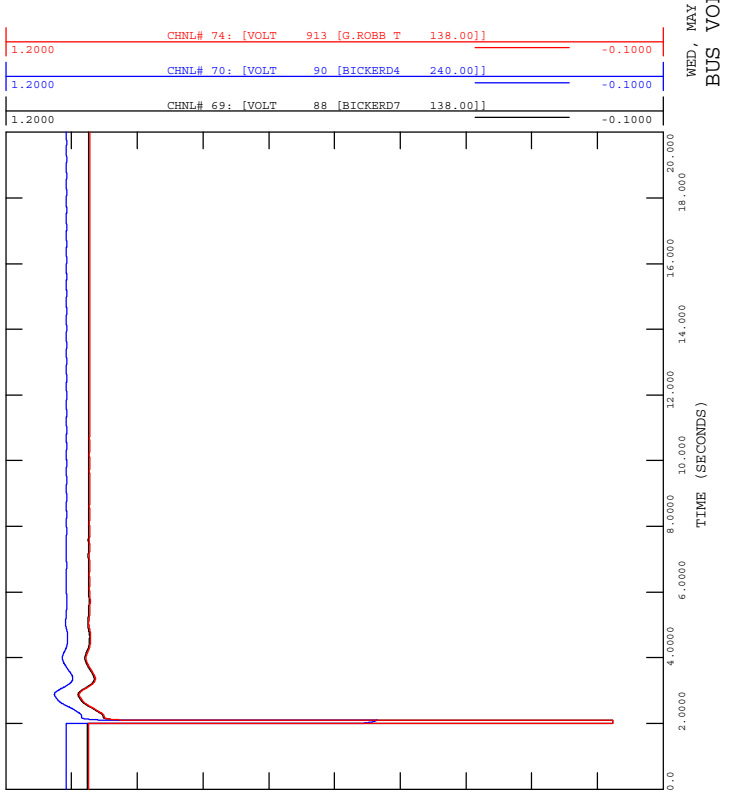


FIGURE D-29F
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out



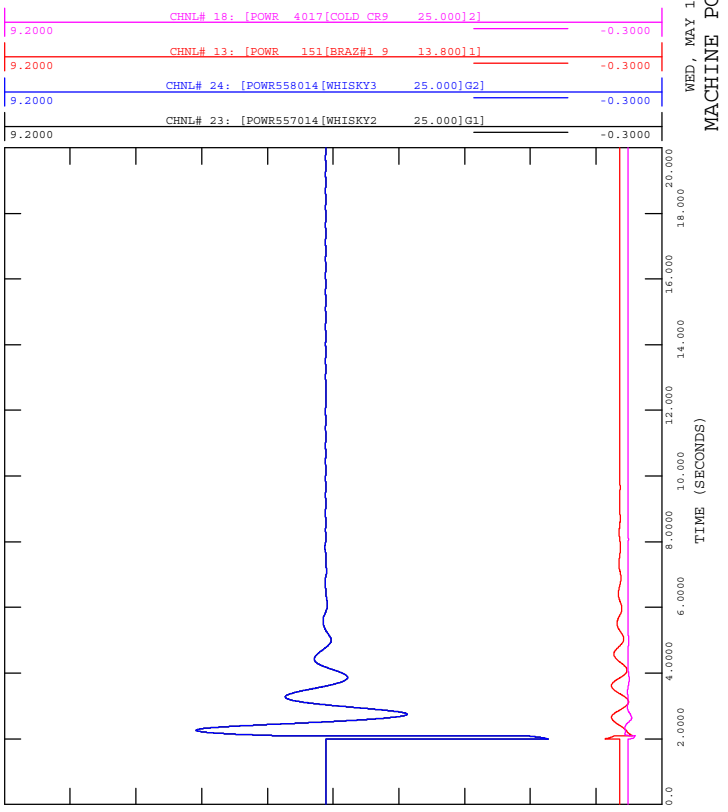
WED, MAY 13 2020 23:36
MACHINE POWER (MW)

FIGURE D-29H
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out



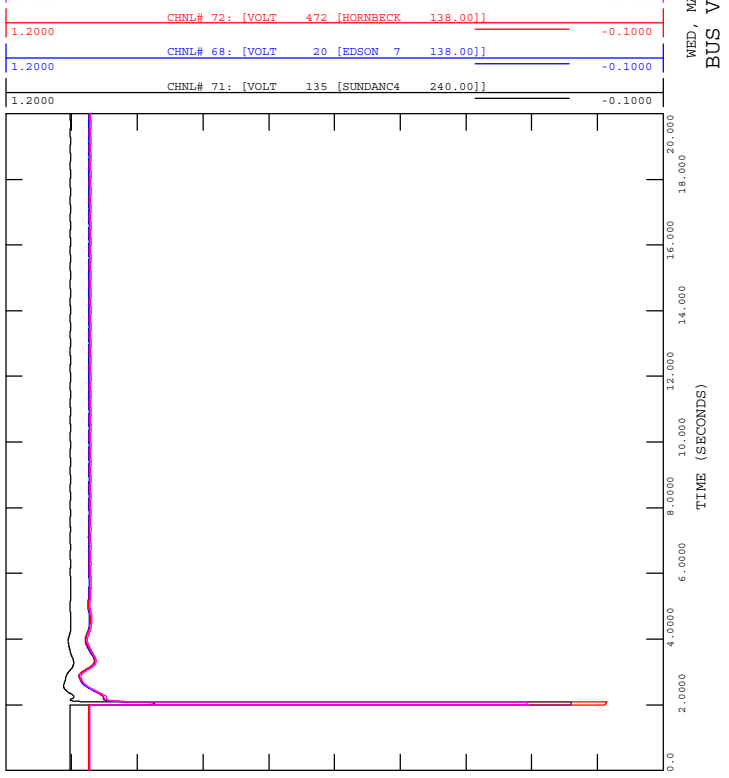
WED, MAY 13 2020 23:36
BUS VOLTAGE (PU)

FIGURE D-29E
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out



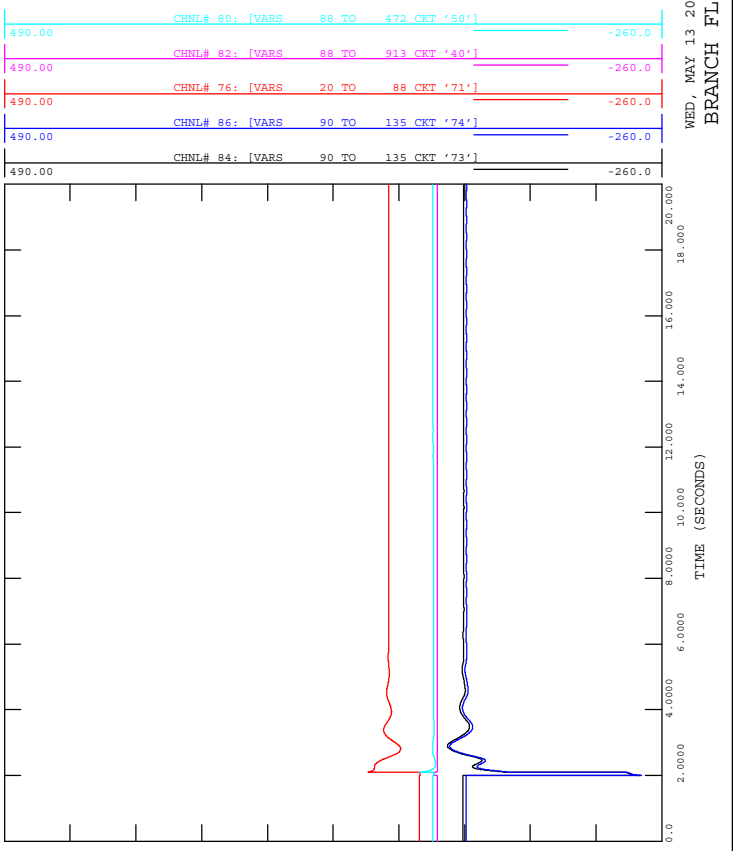
WED, MAY 13 2020 23:36
MACHINE POWER (MW)

FIGURE D-29G
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out



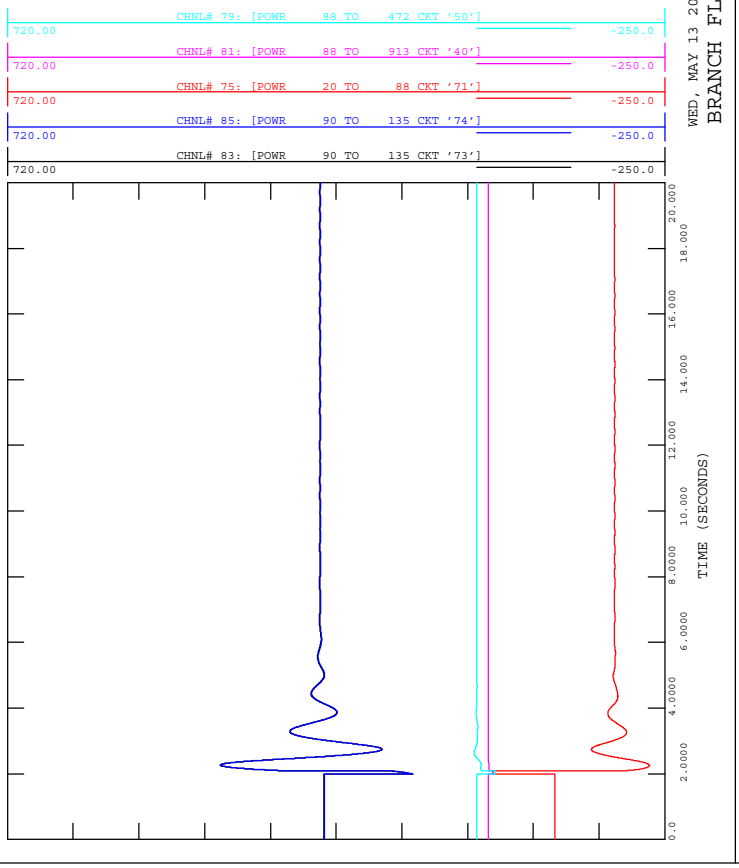
WED, MAY 13 2020 23:36
BUS VOLTAGE (PU)

FIGURE D-29J
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out



WED, MAY 13 2020 23:36
BRANCH FLOW (Q)

FIGURE D-29I
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-29_740L_Bickerdike_39S.out



WED, MAY 13 2020 23:36
BRANCH FLOW (P)

FIGURE D-30B
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

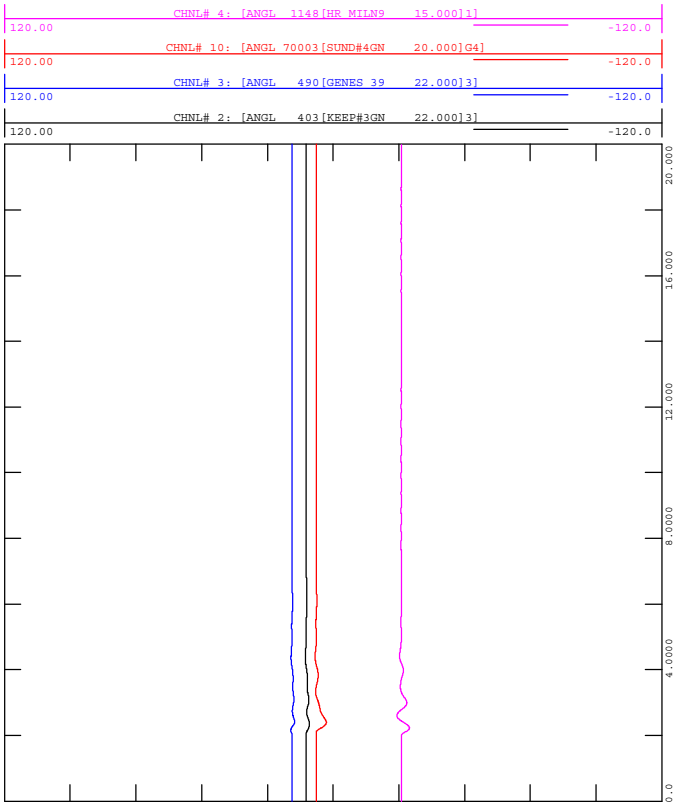


FIGURE D-30D
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

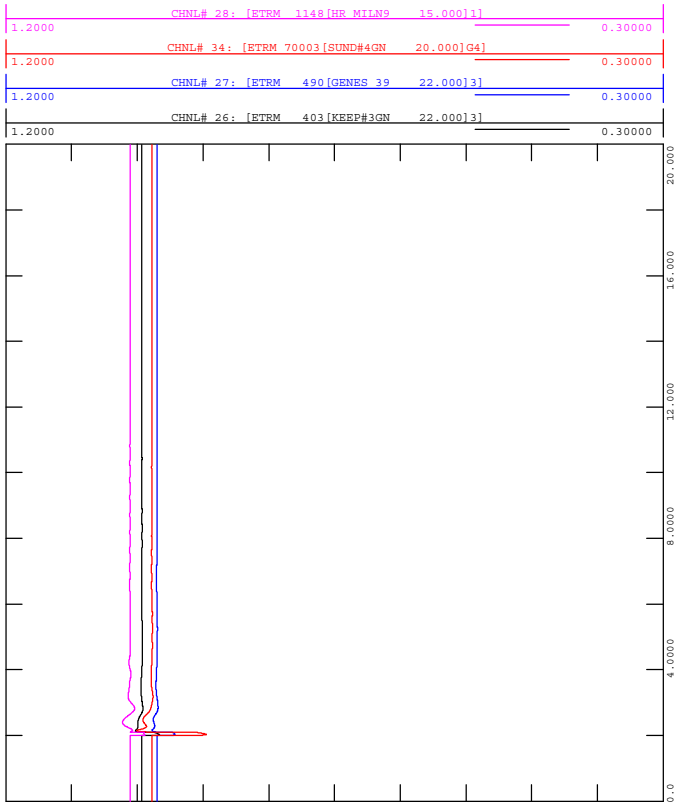


FIGURE D-30A
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

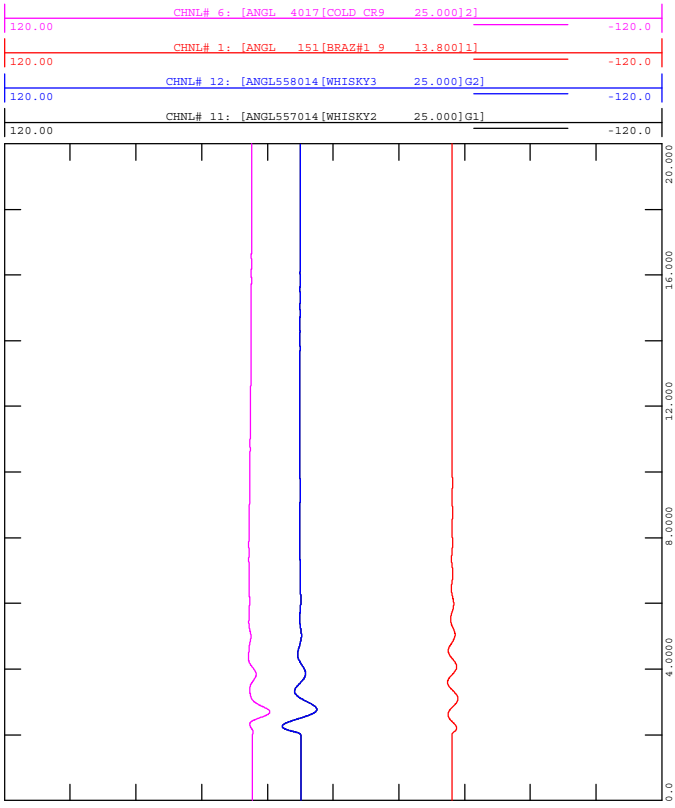


FIGURE D-30C
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

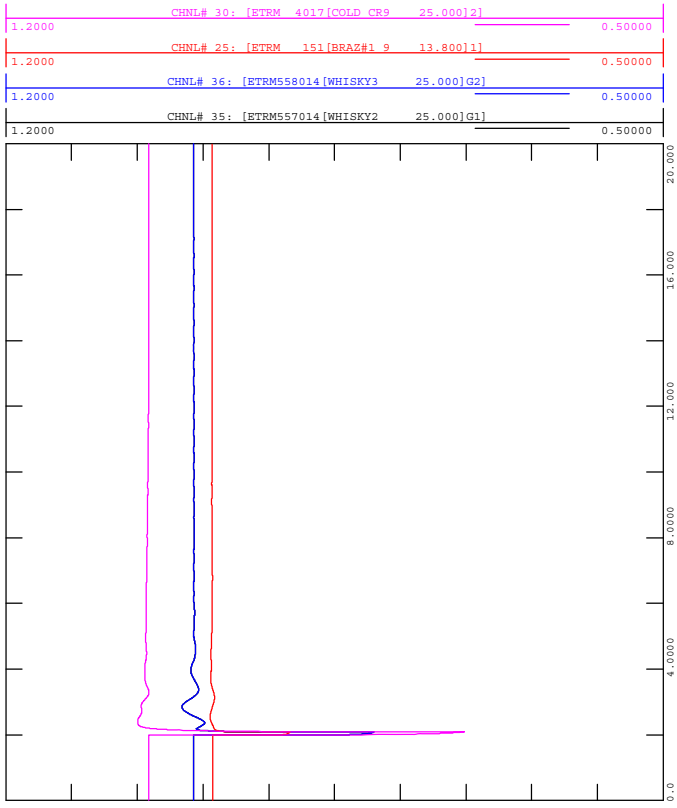


FIGURE D-30F
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

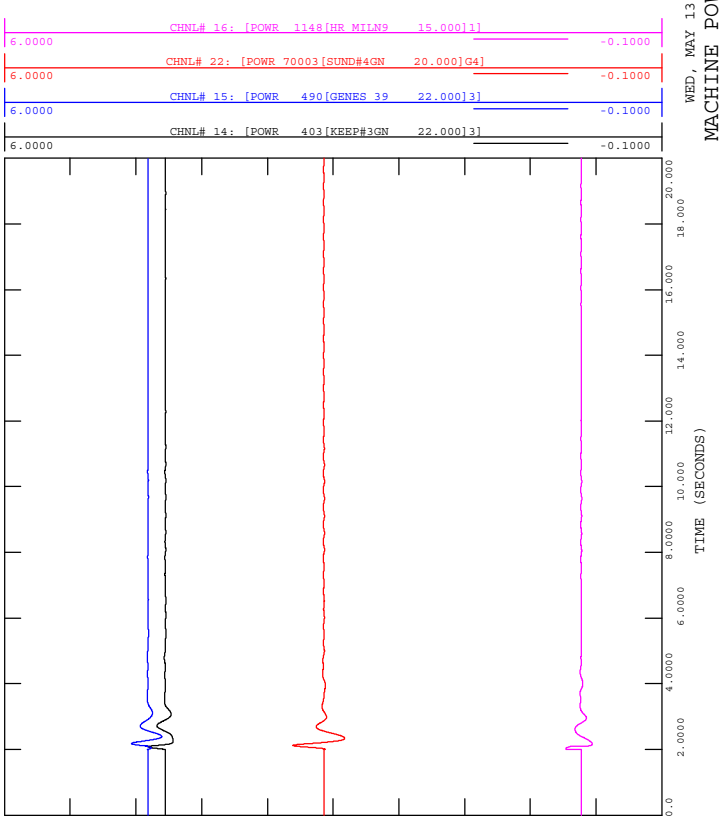


FIGURE D-30H
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

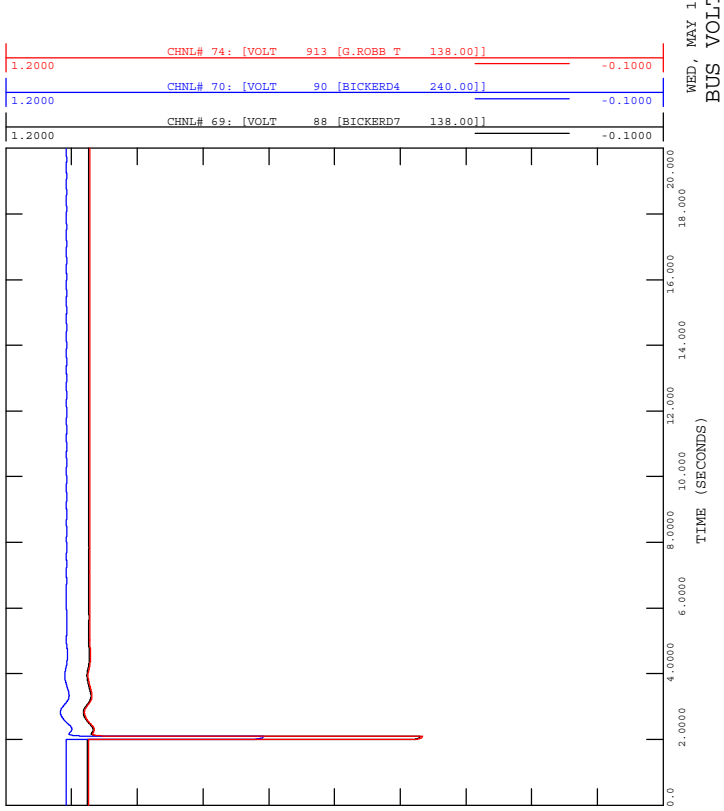


FIGURE D-30E
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

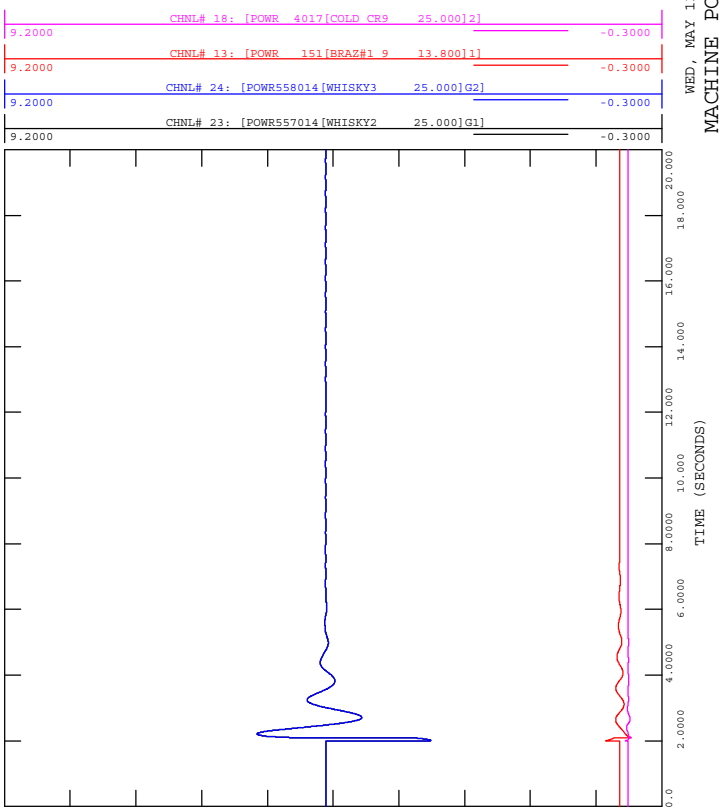


FIGURE D-30G
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

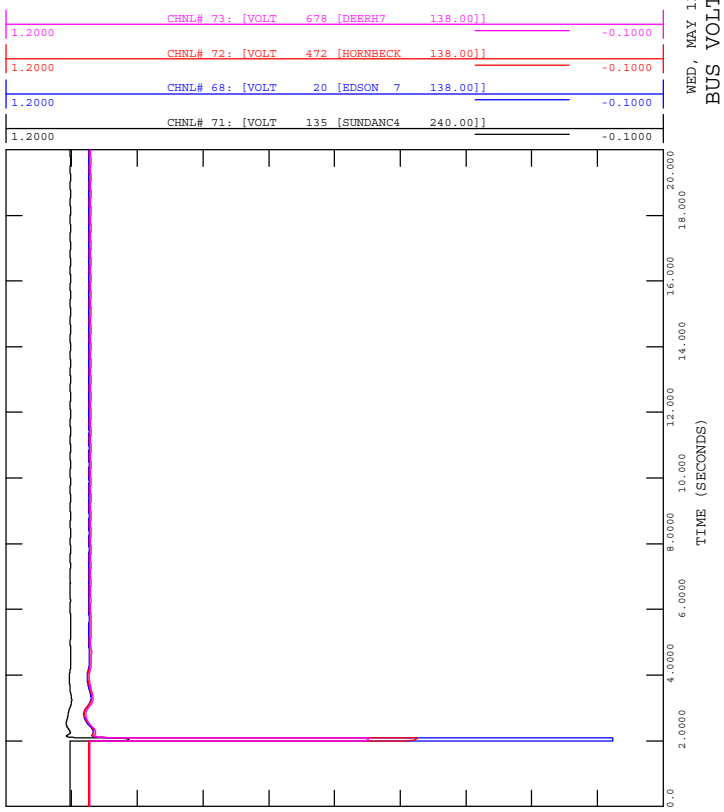


FIGURE D-30J
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

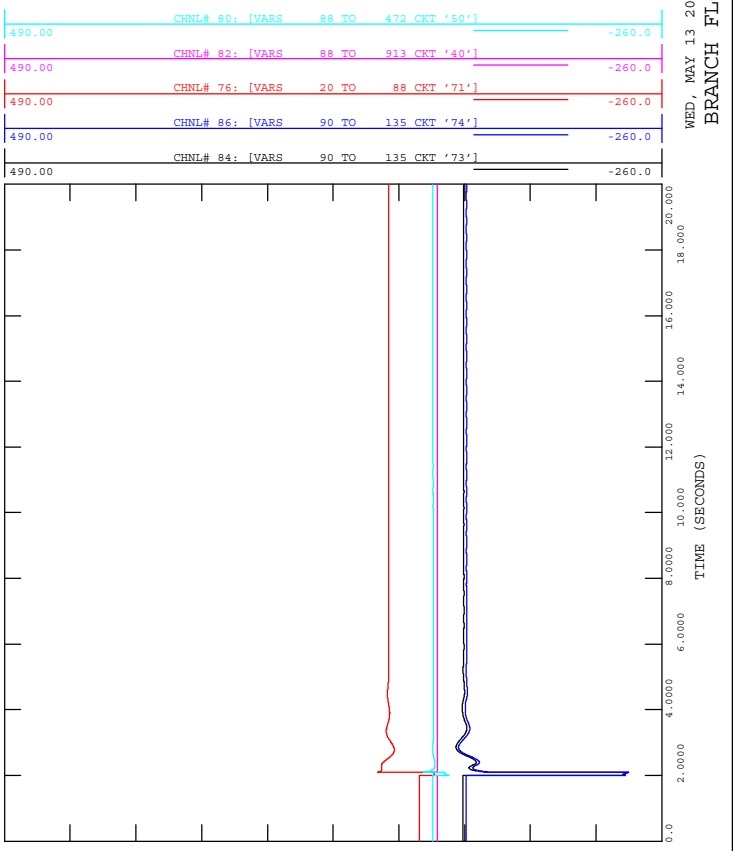


FIGURE D-30I
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-30_740L_Edson_58S.out

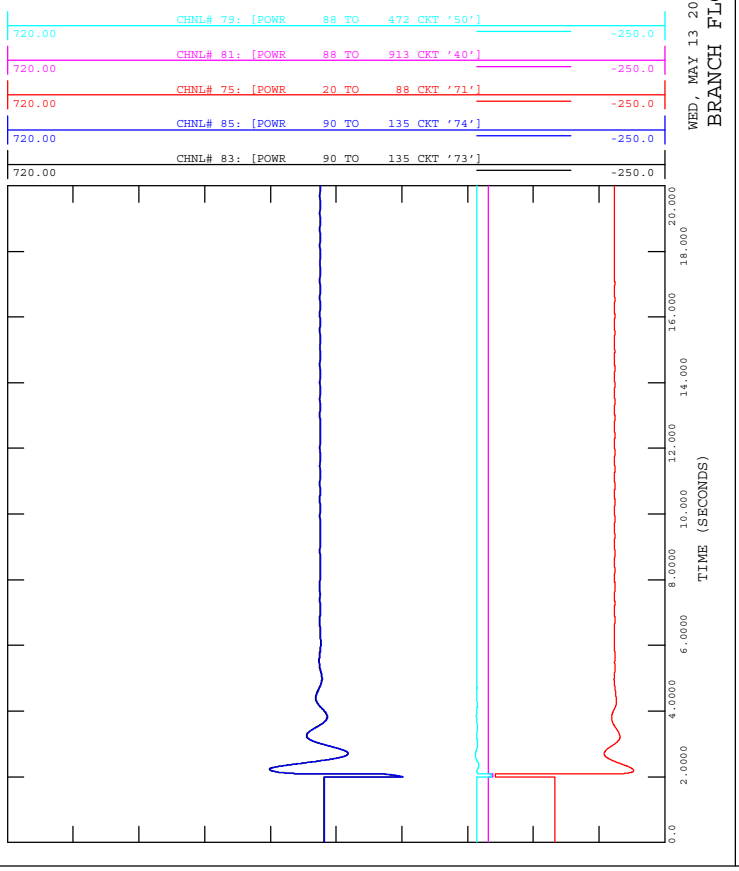


FIGURE D-31B
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out

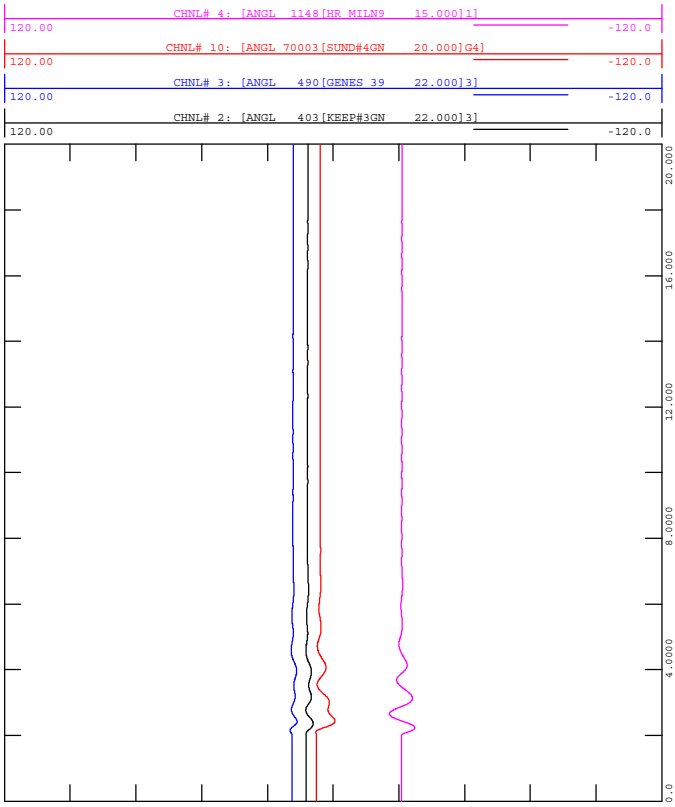


FIGURE D-31D
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out

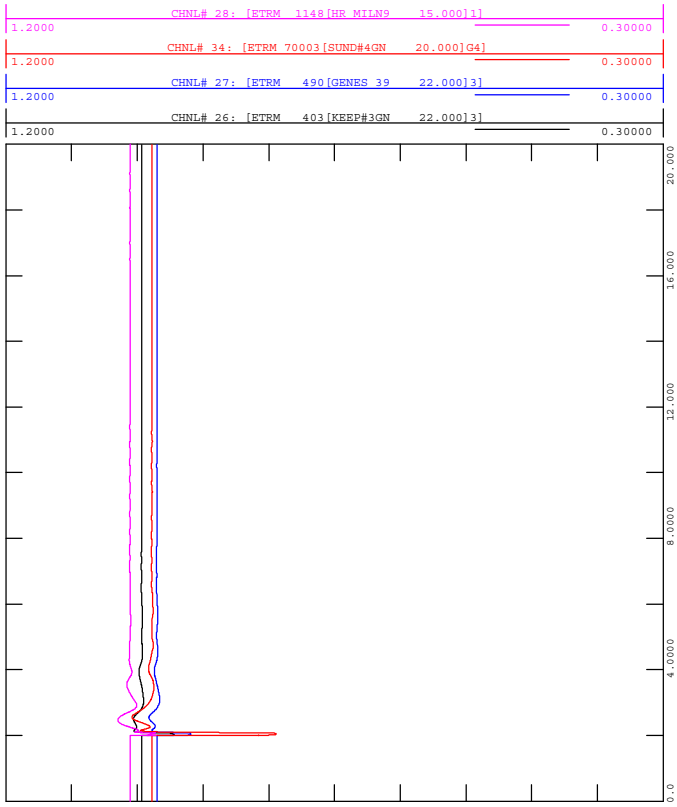


FIGURE D-31A
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out

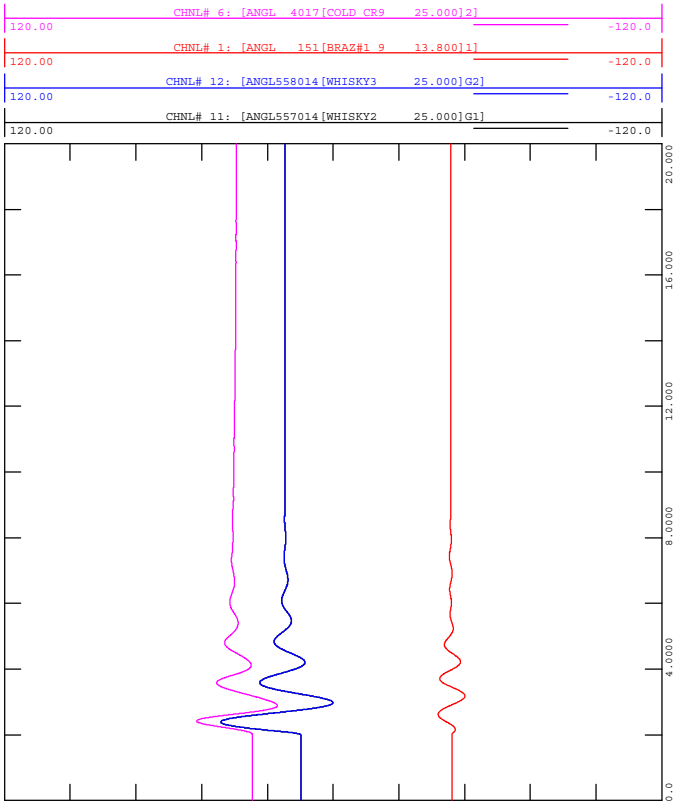


FIGURE D-31C
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out

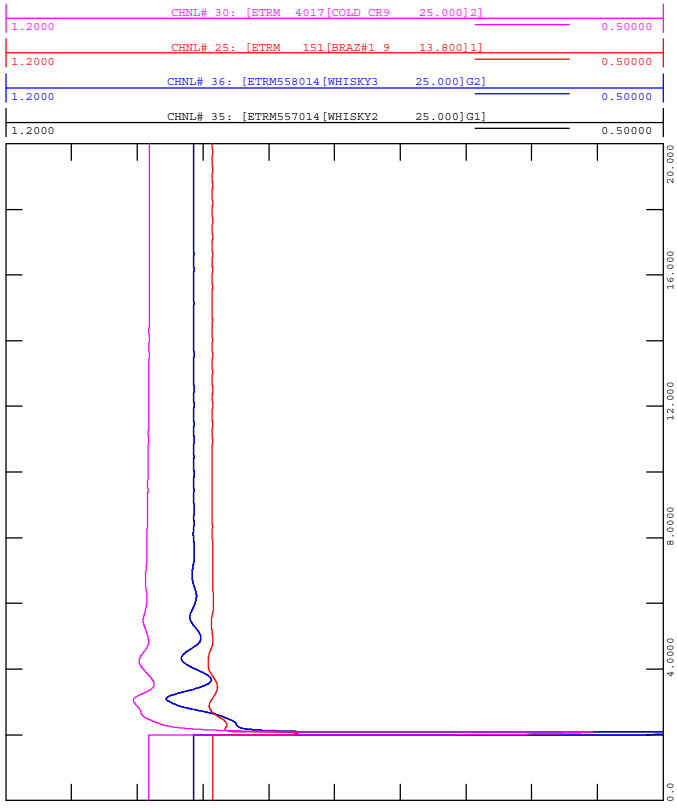


FIGURE D-31F
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out

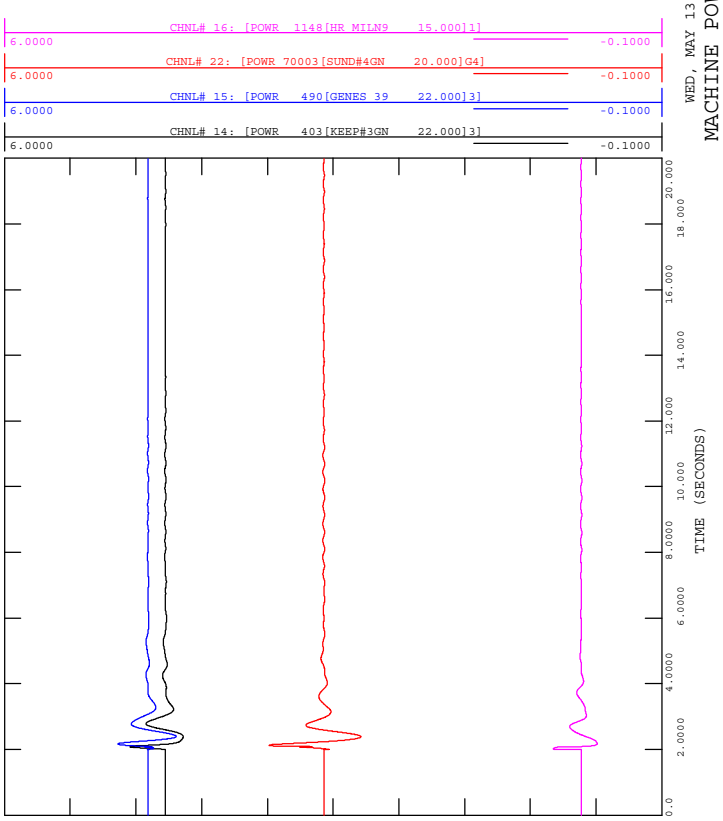


FIGURE D-31H
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out

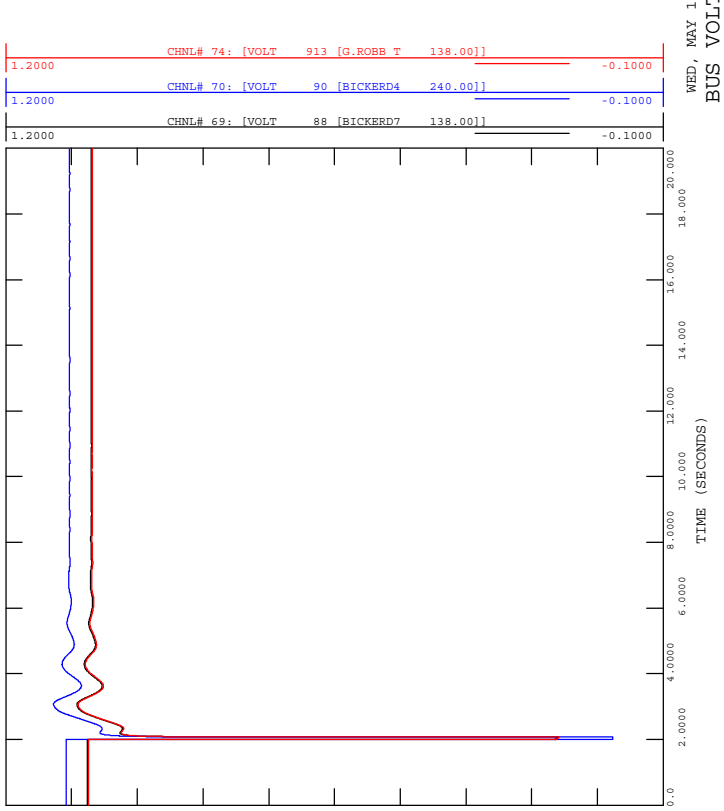


FIGURE D-31E
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out

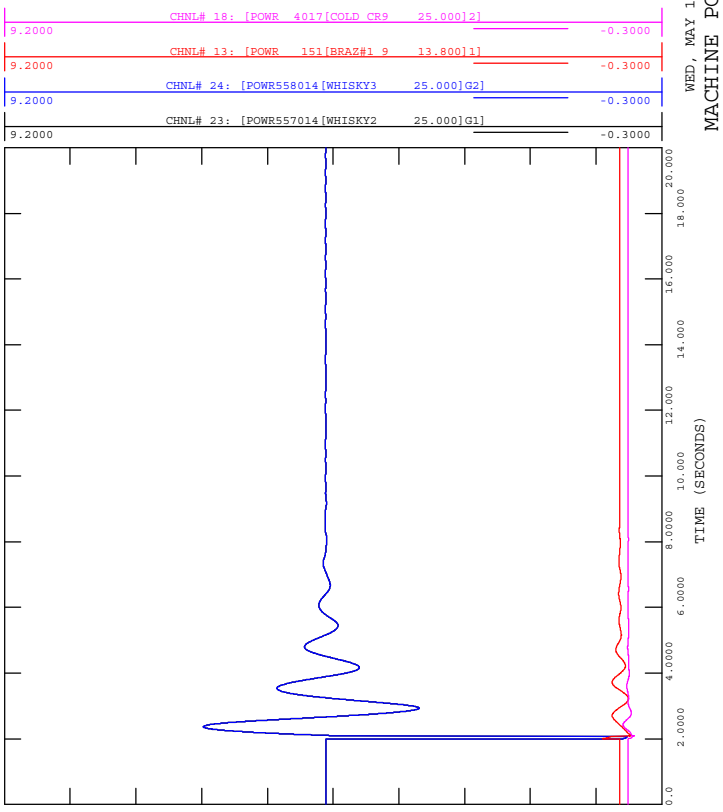


FIGURE D-31G
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out

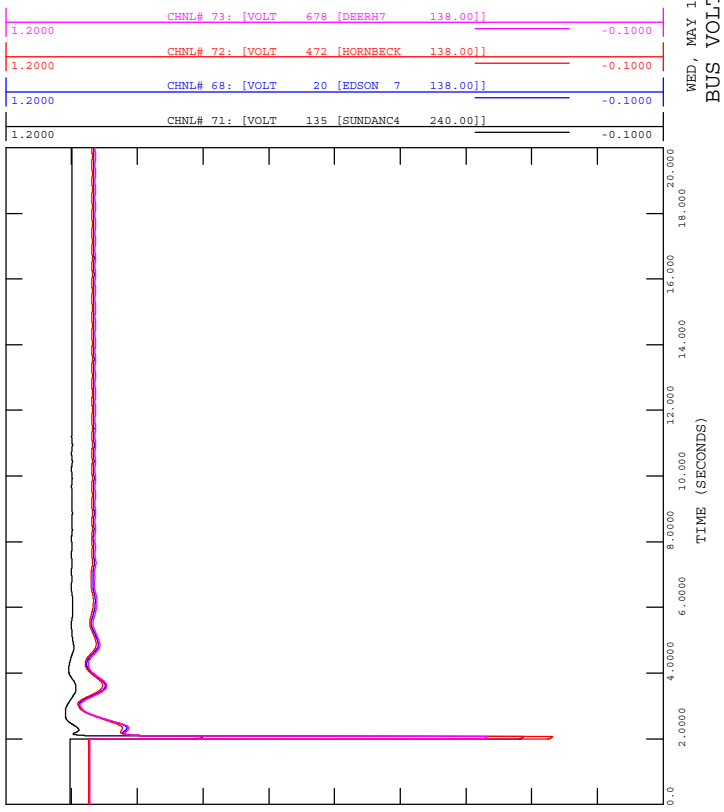
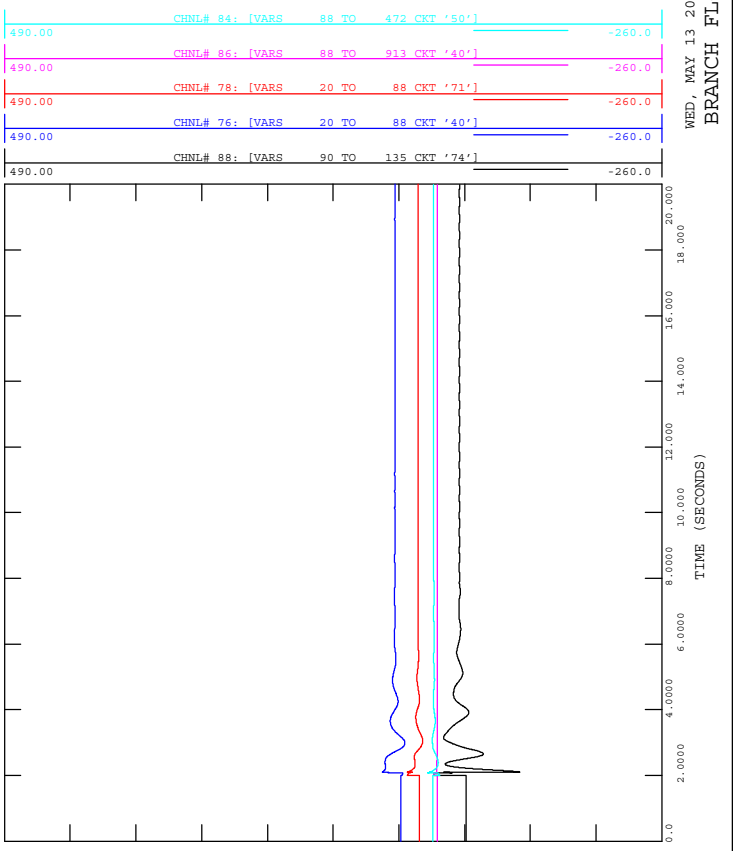


FIGURE D-31J
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out



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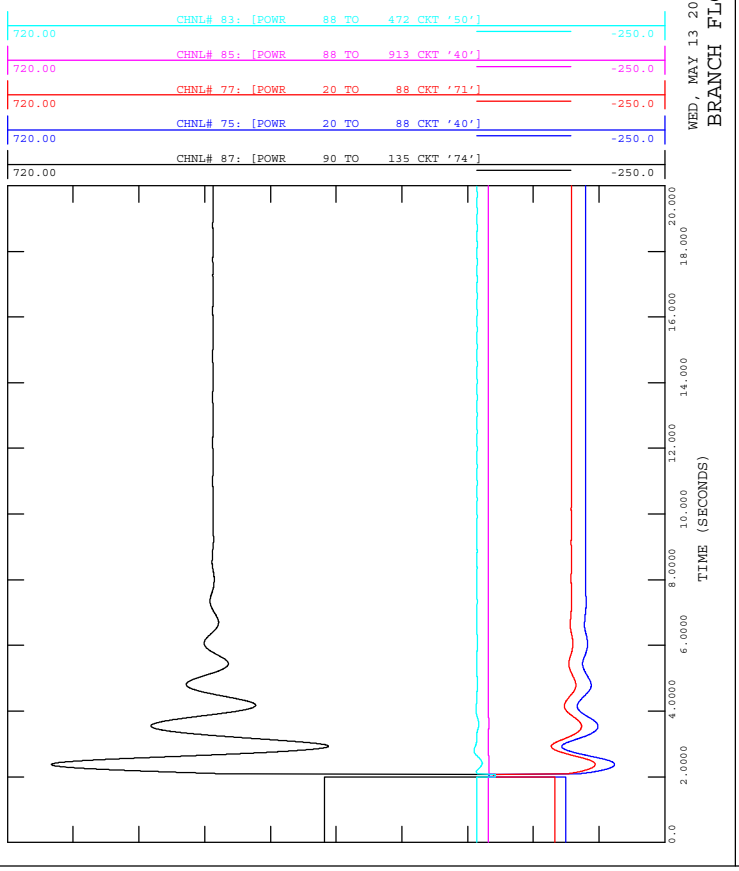
BRANCH FLOW (Q)

FIGURE D-31I
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-31_973L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-32B
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out

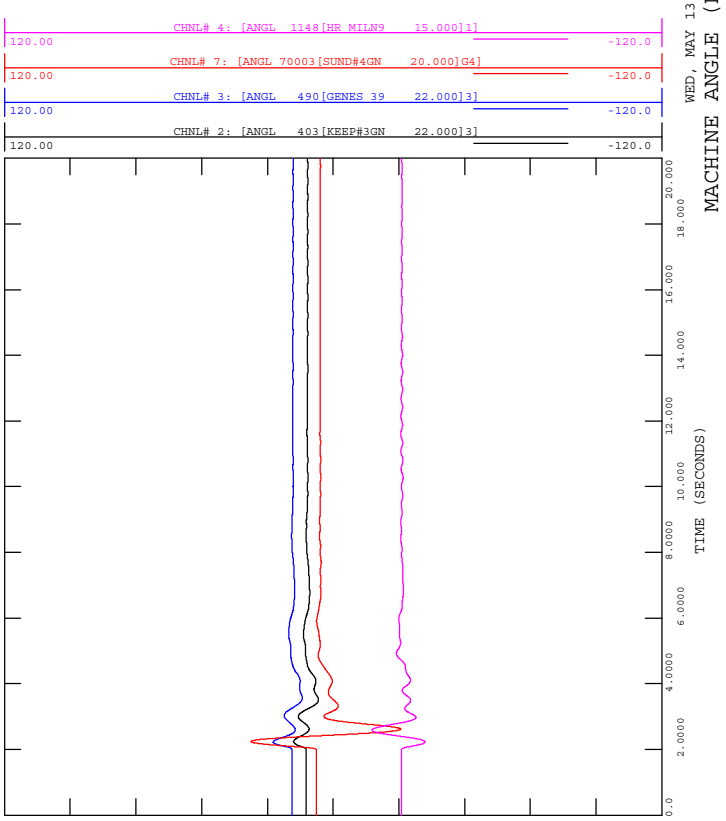


FIGURE D-32D
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out

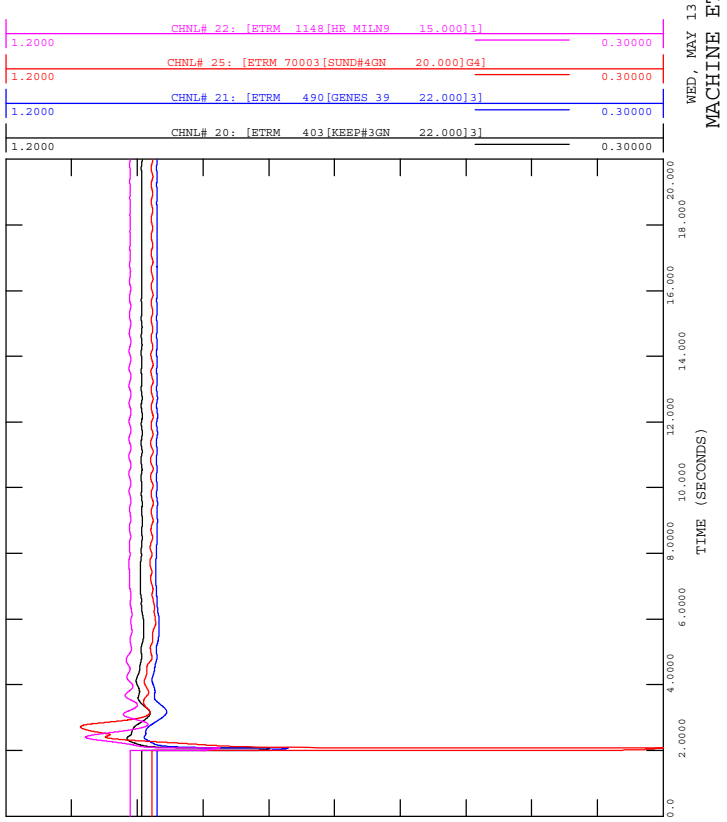


FIGURE D-32A
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out

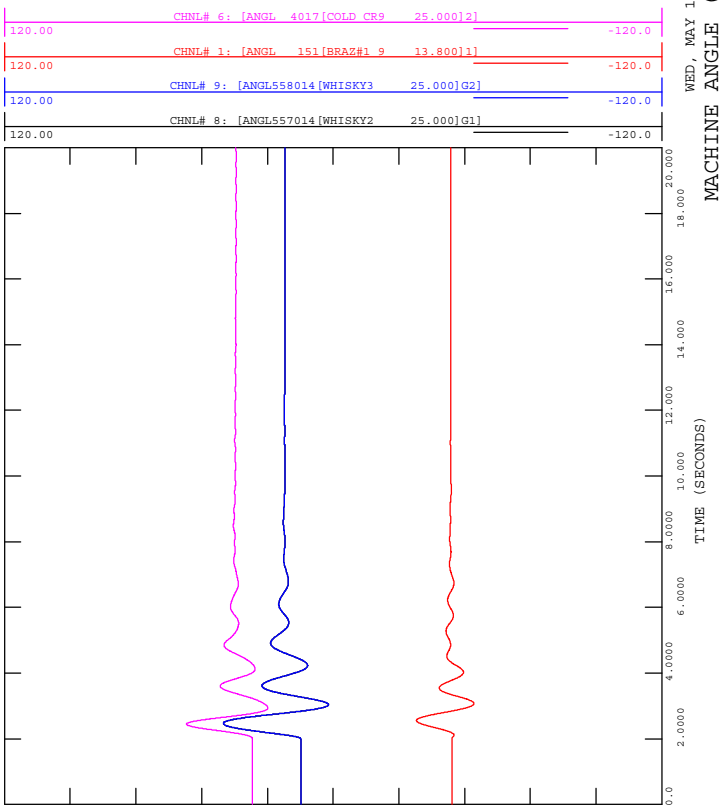


FIGURE D-32C
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out

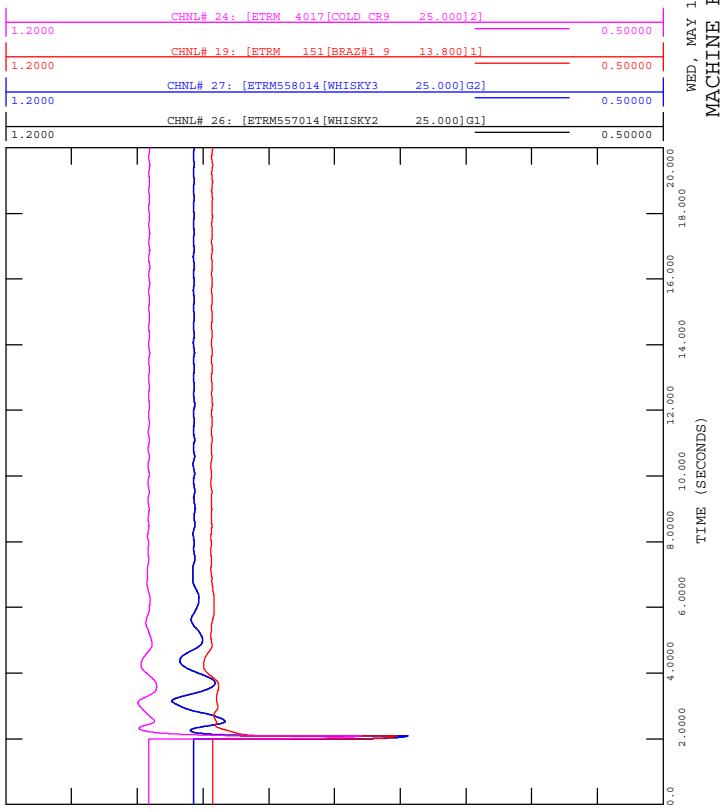


FIGURE D-32F
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out

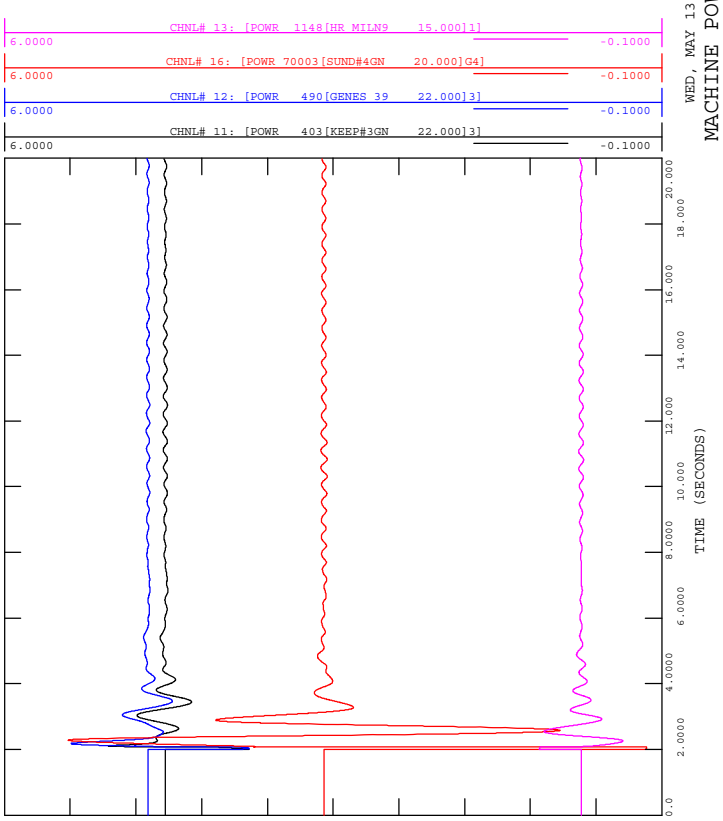


FIGURE D-32H
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out

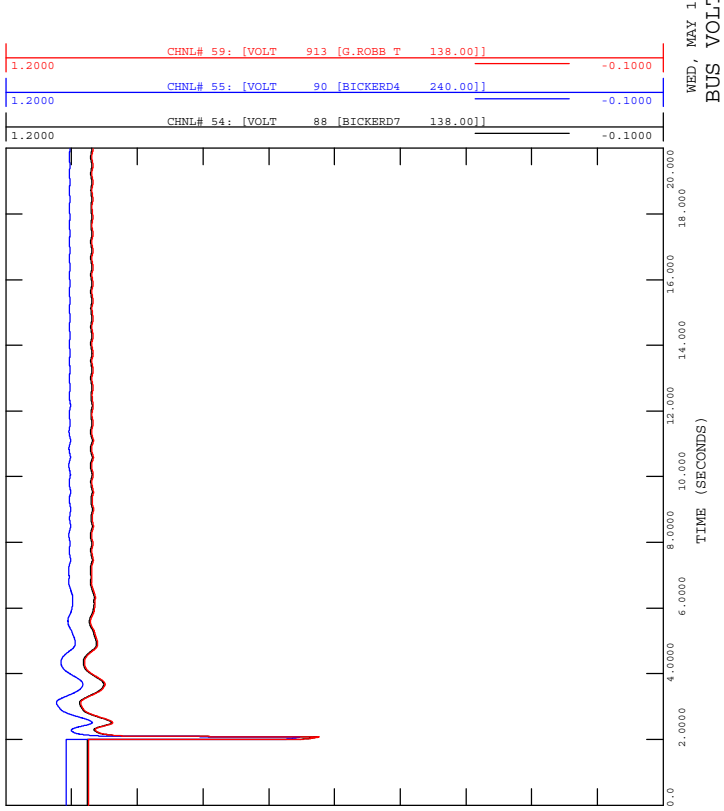


FIGURE D-32E
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out

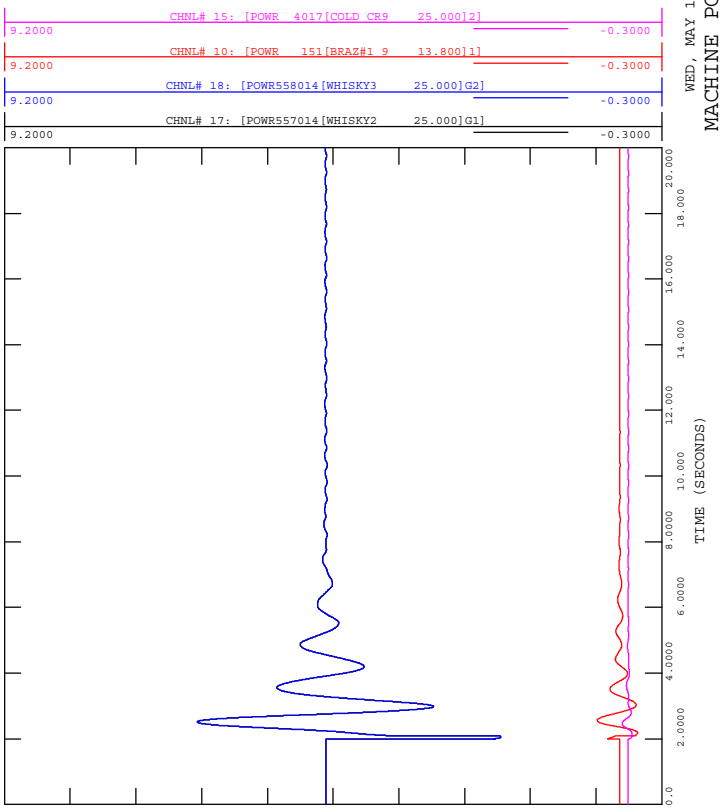


FIGURE D-32G
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out

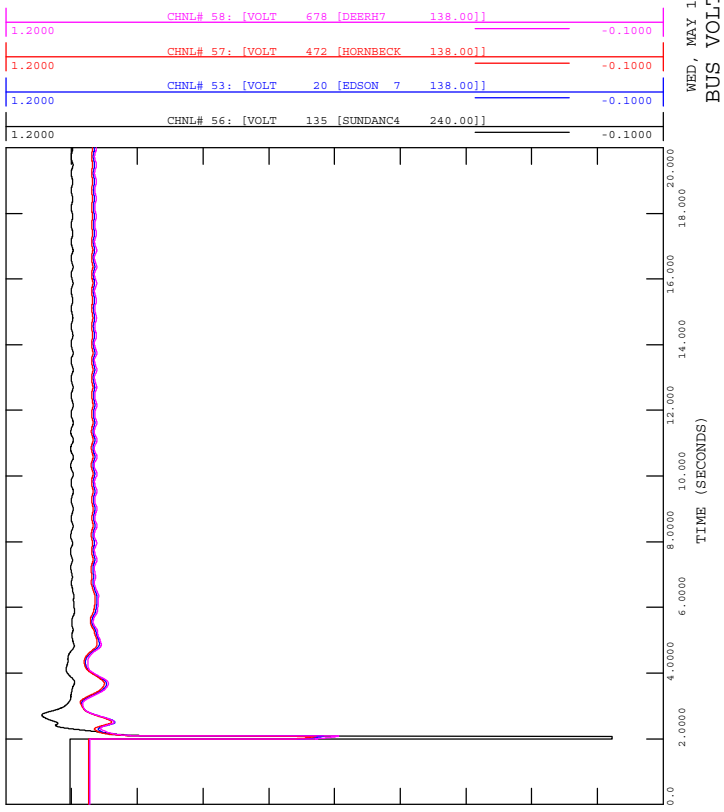
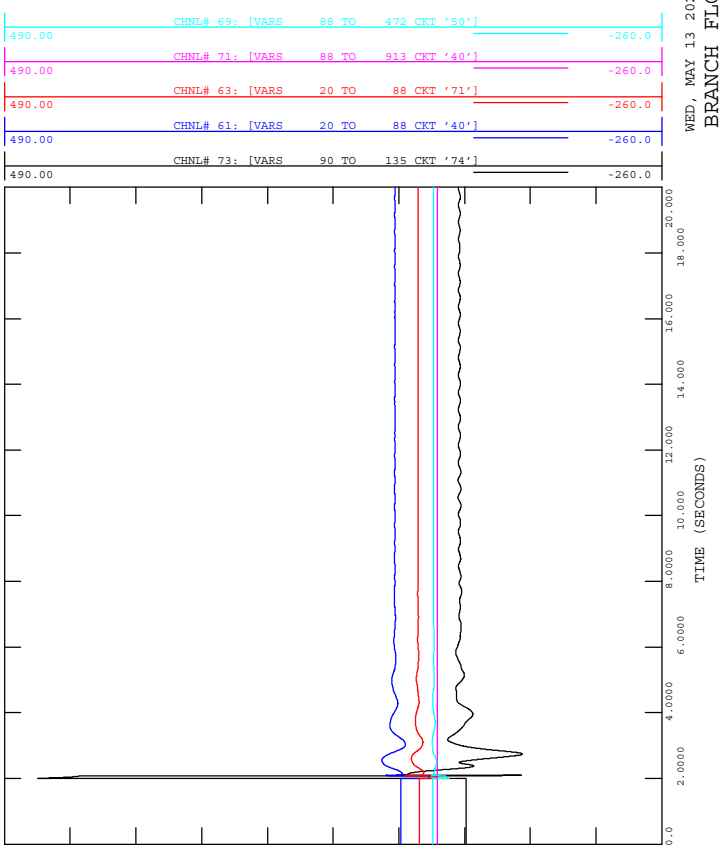


FIGURE D-32J
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out



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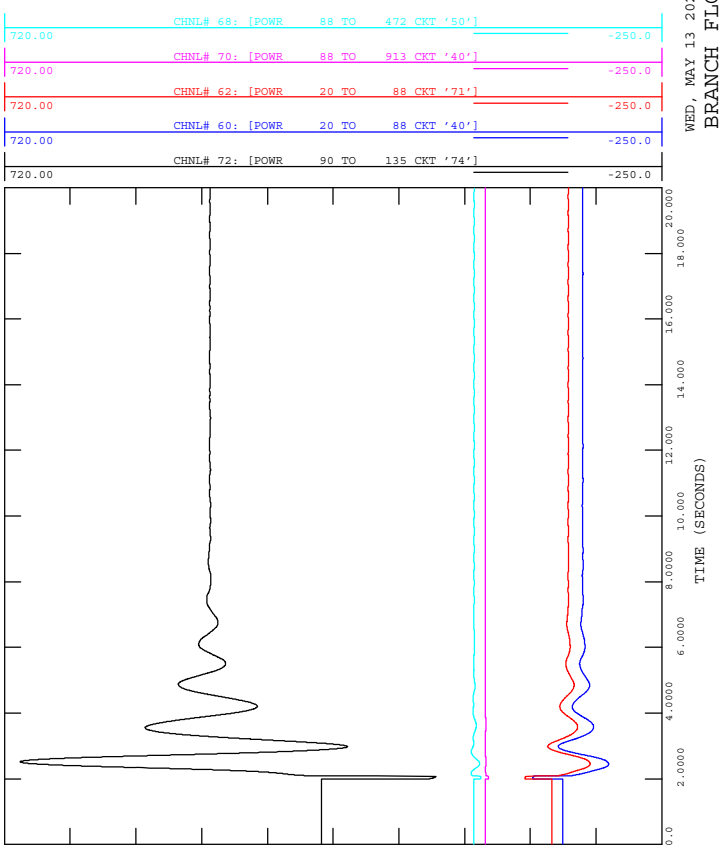
BRANCH FLOW (Q)

FIGURE D-32I
2022WP, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-32_973L_Sundance_310P.out



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BRANCH FLOW (P)

FIGURE D-33B
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out

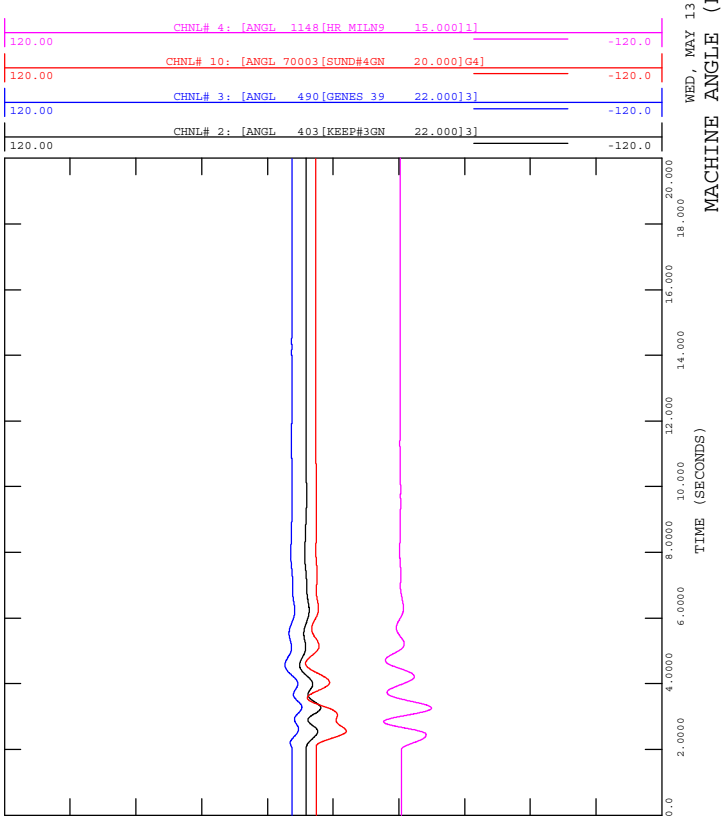


FIGURE D-33D
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out

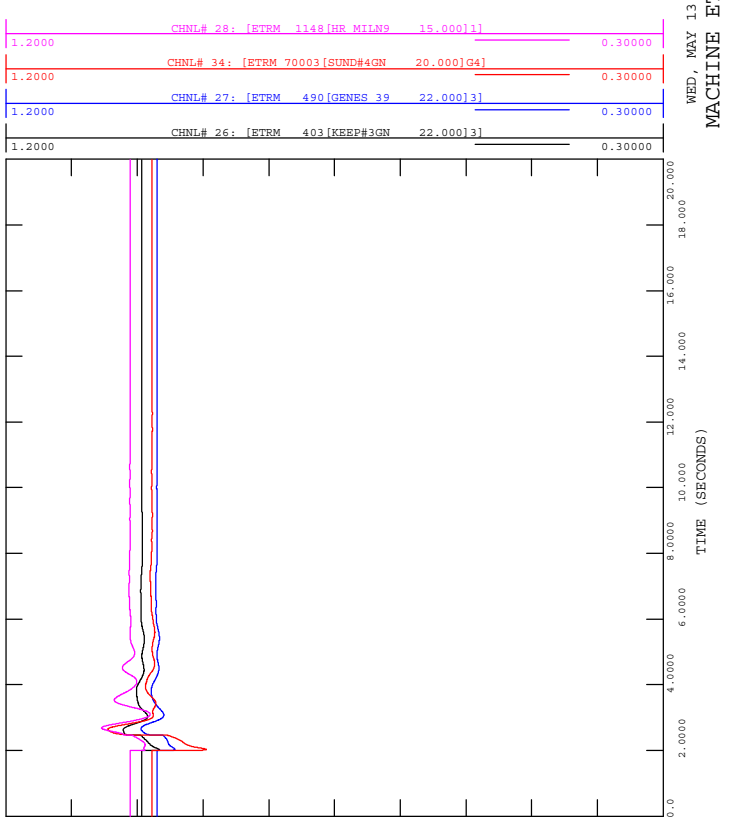


FIGURE D-33A
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out

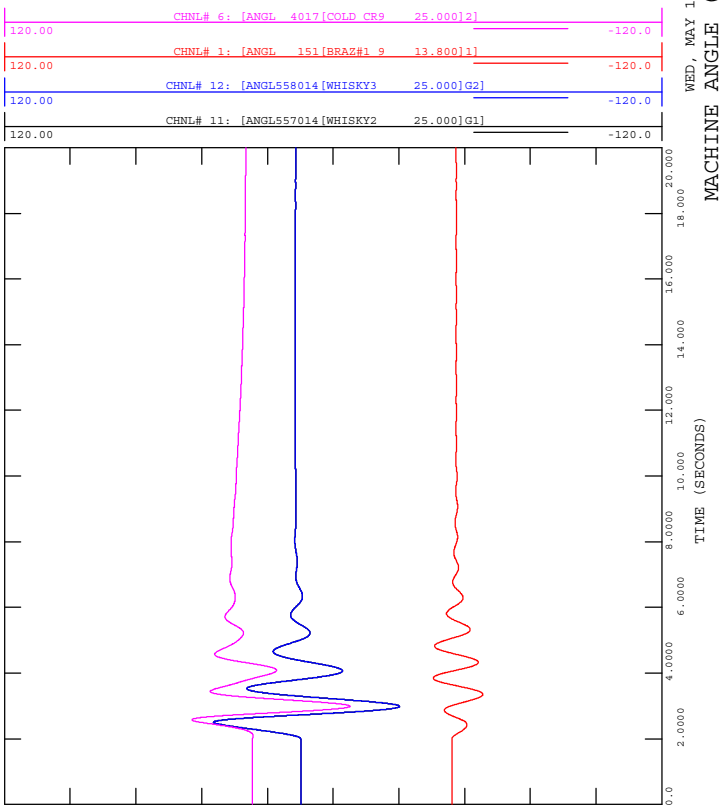


FIGURE D-33C
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out

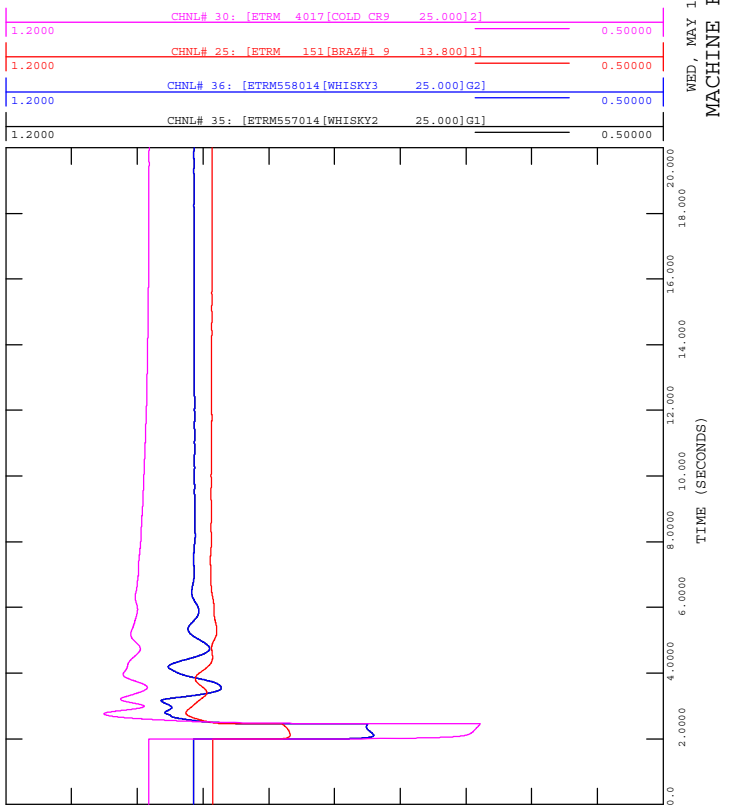


FIGURE D-33F
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out

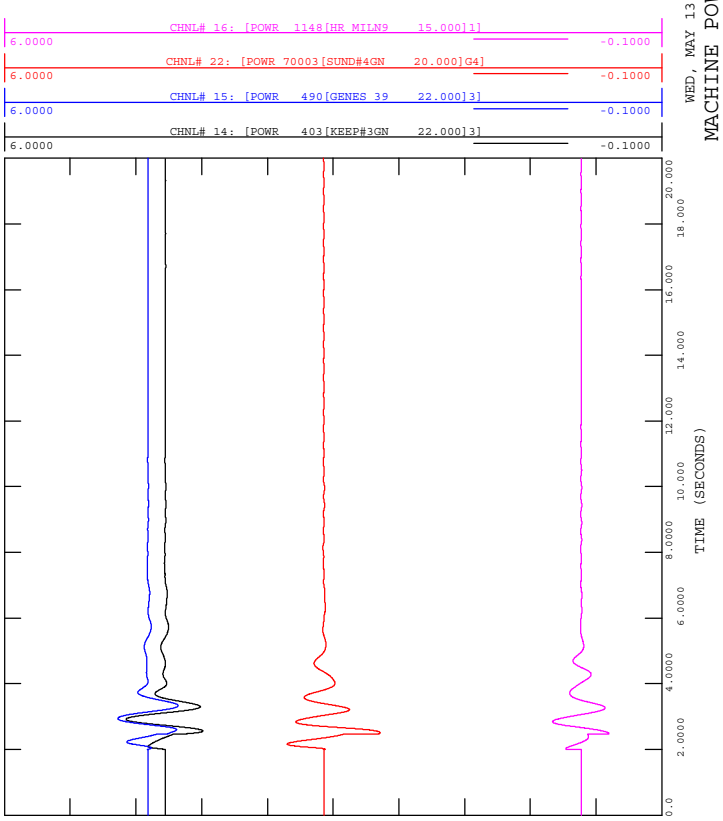


FIGURE D-33H
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out

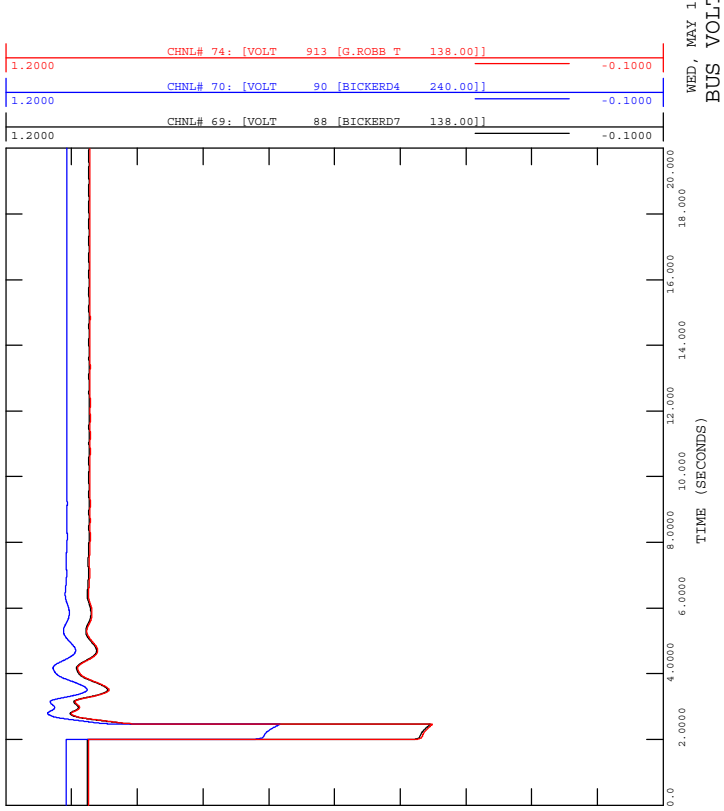


FIGURE D-33E
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out

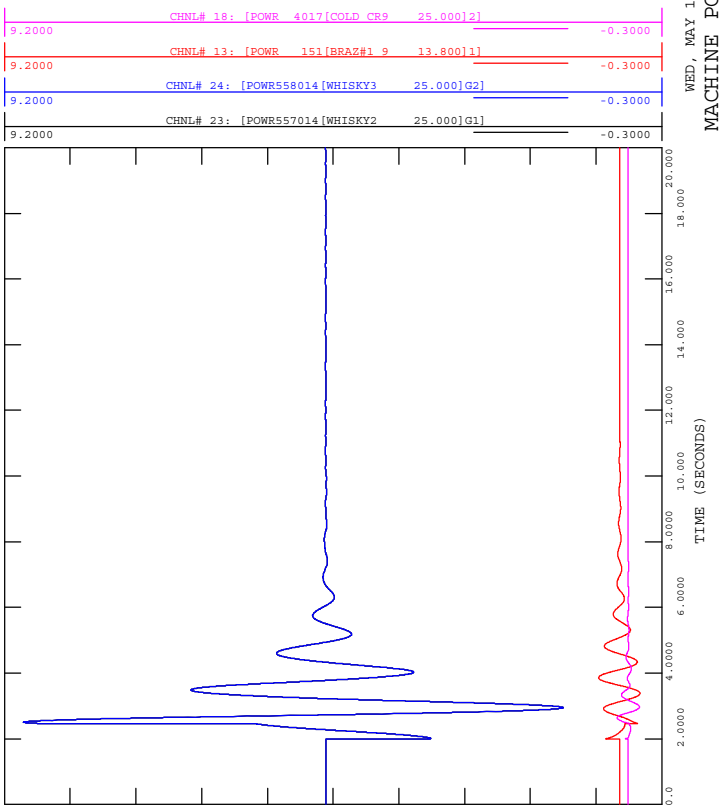


FIGURE D-33G
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out

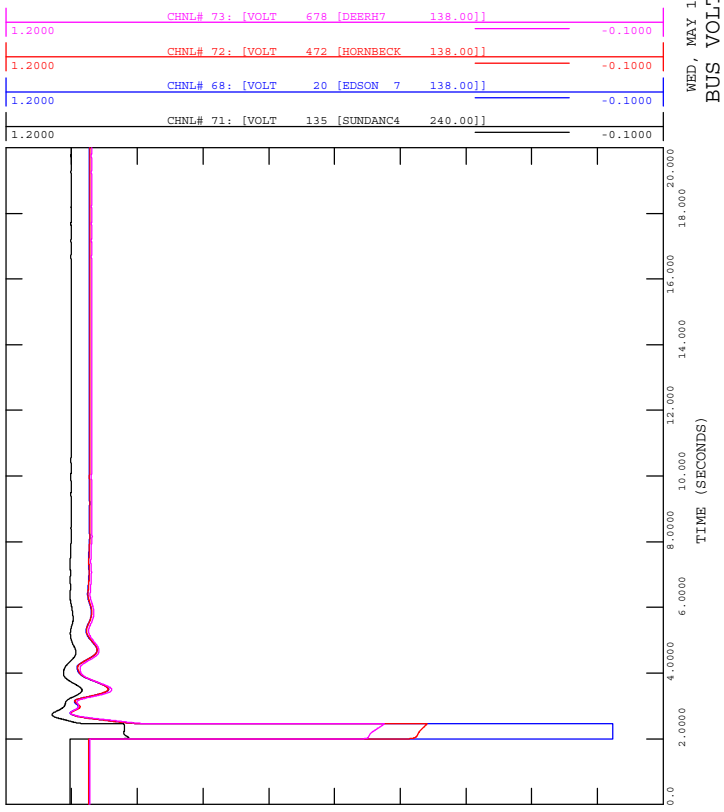
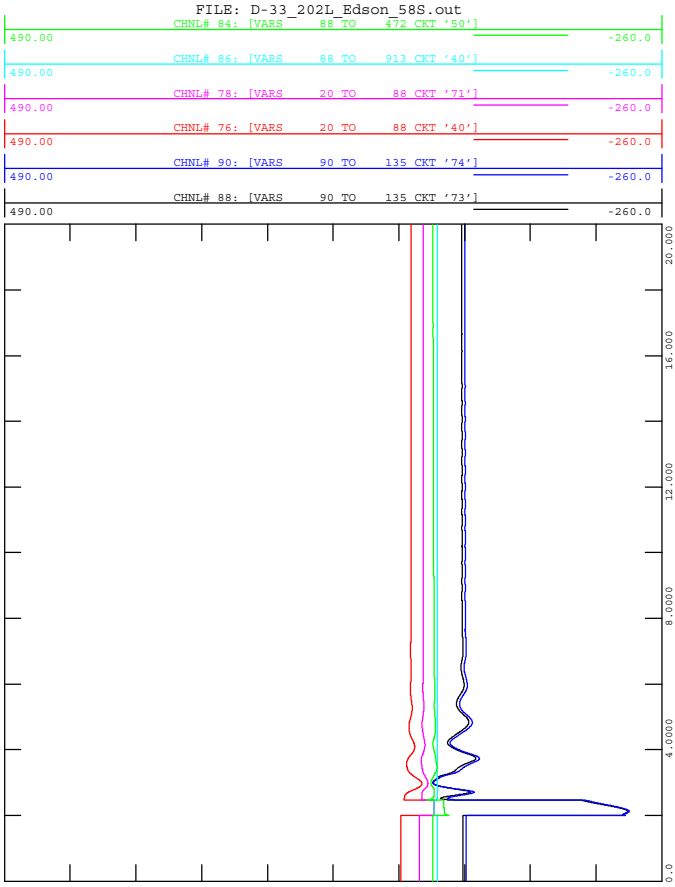


FIGURE D-33J
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out



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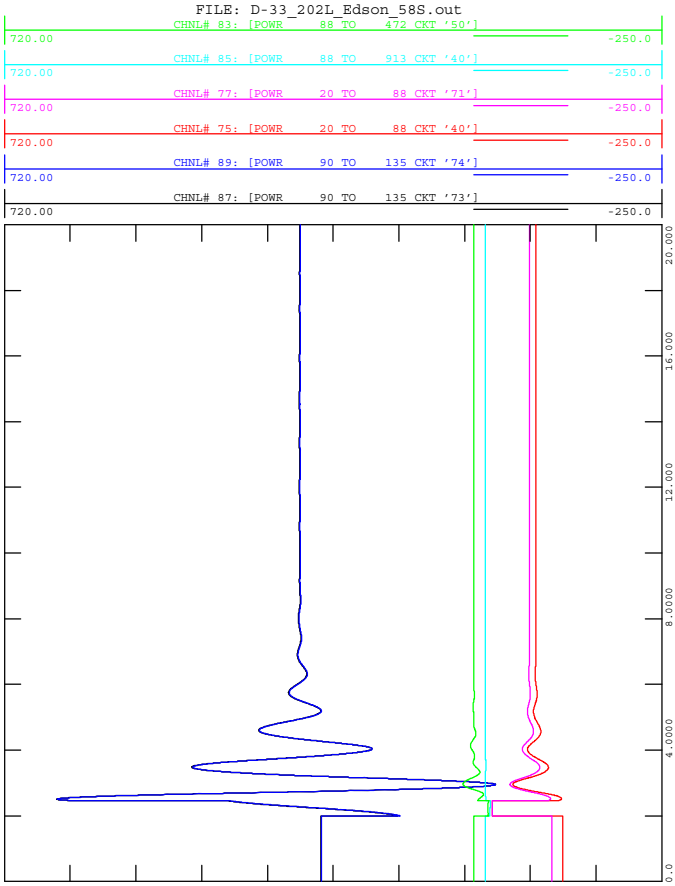
BRANCH FLOW (Q)

FIGURE D-33I
2022WP, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-33_202L_Edson_58S.out



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BRANCH FLOW (P)

FIGURE D-34B
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out

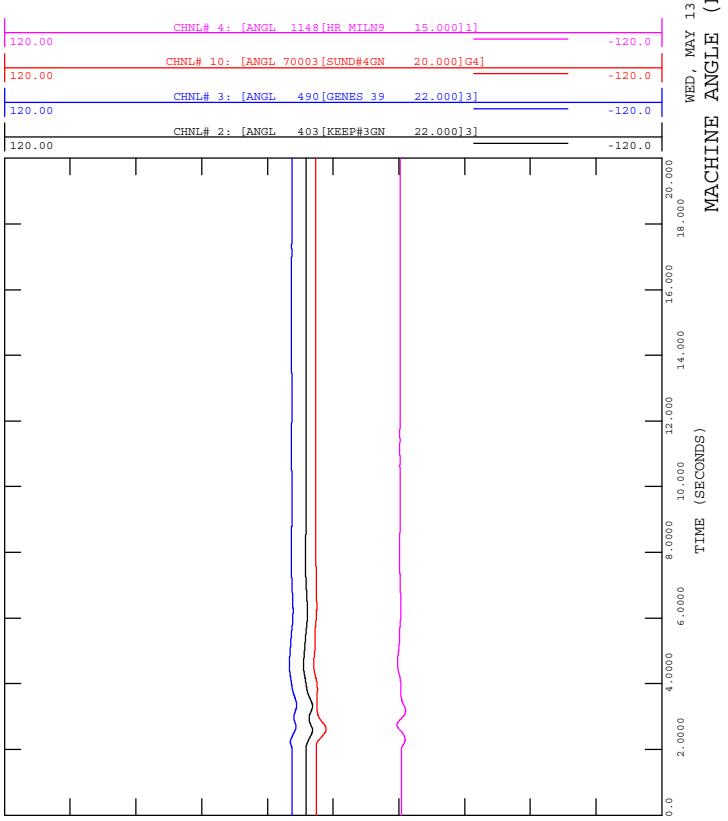


FIGURE D-34D
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out

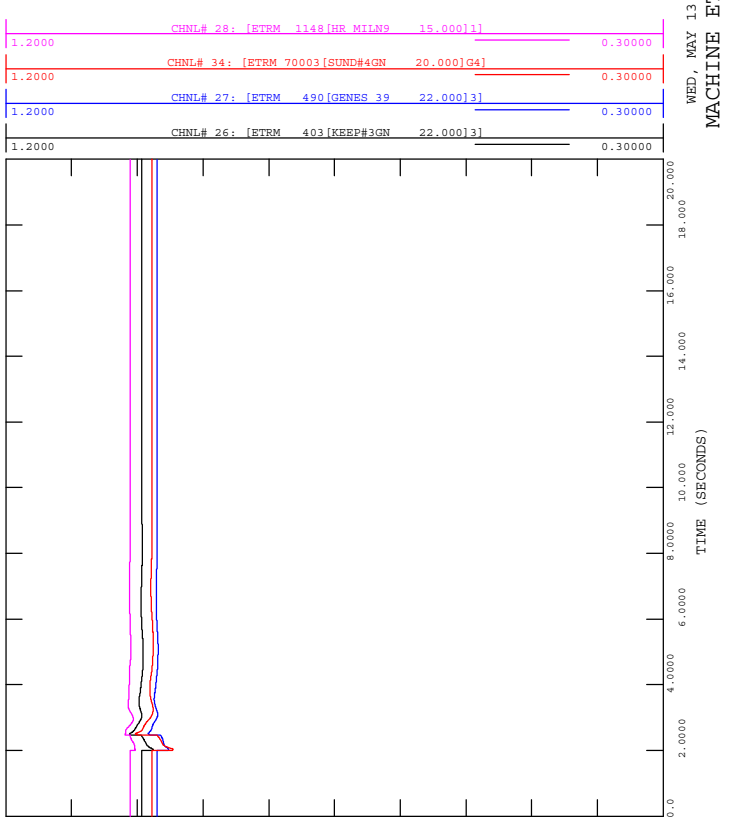


FIGURE D-34A
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out

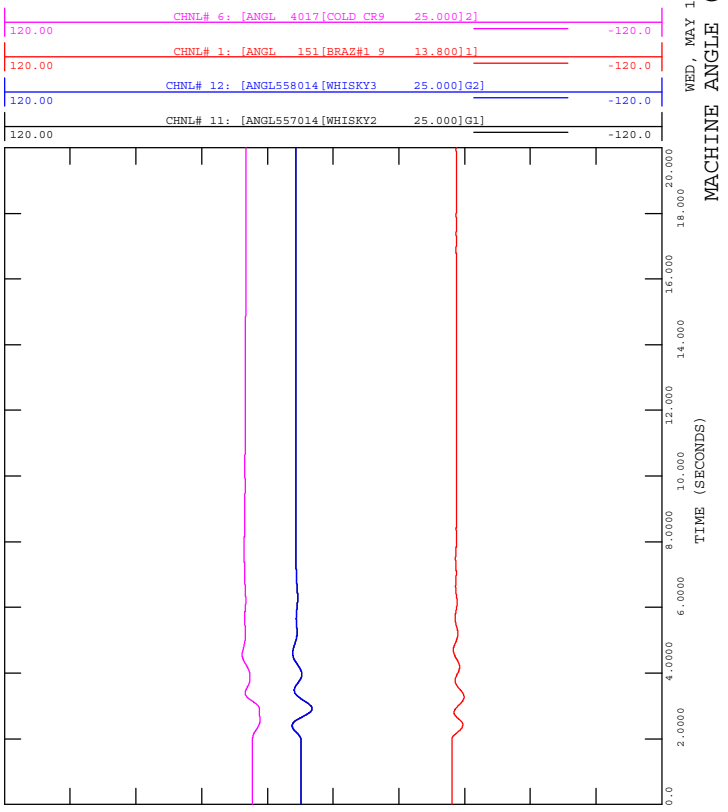


FIGURE D-34C
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out

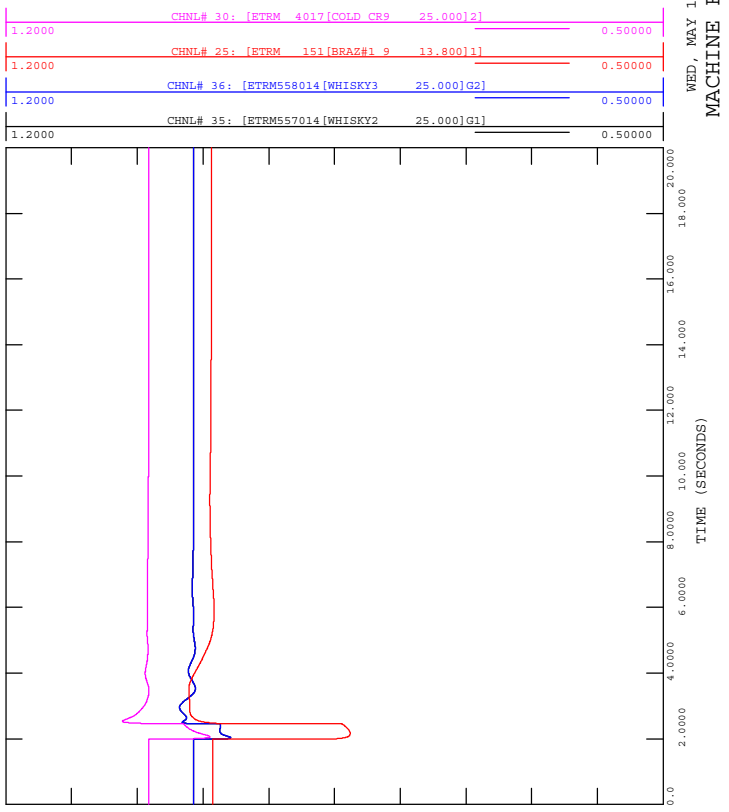
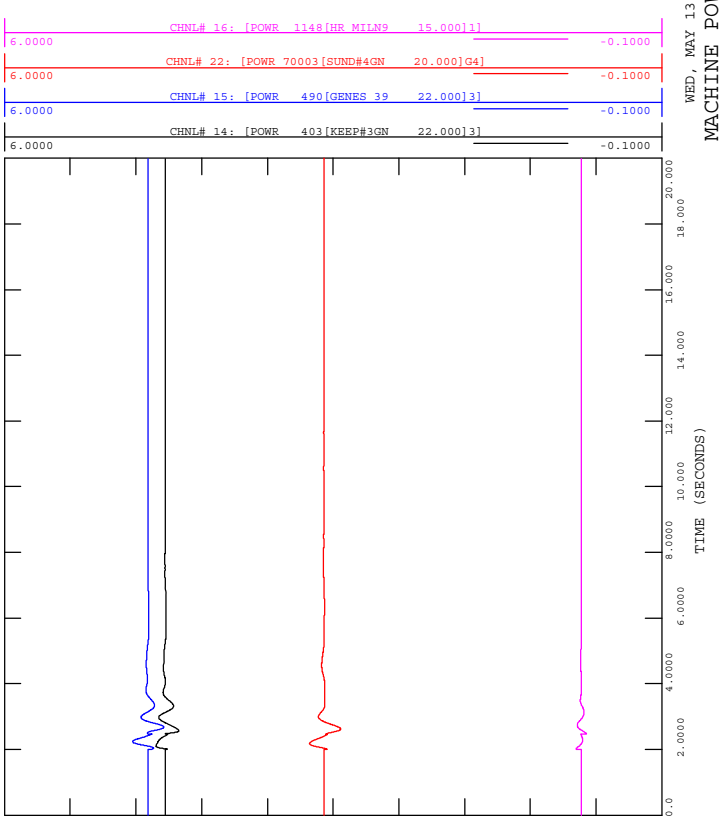


FIGURE D-34F
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out



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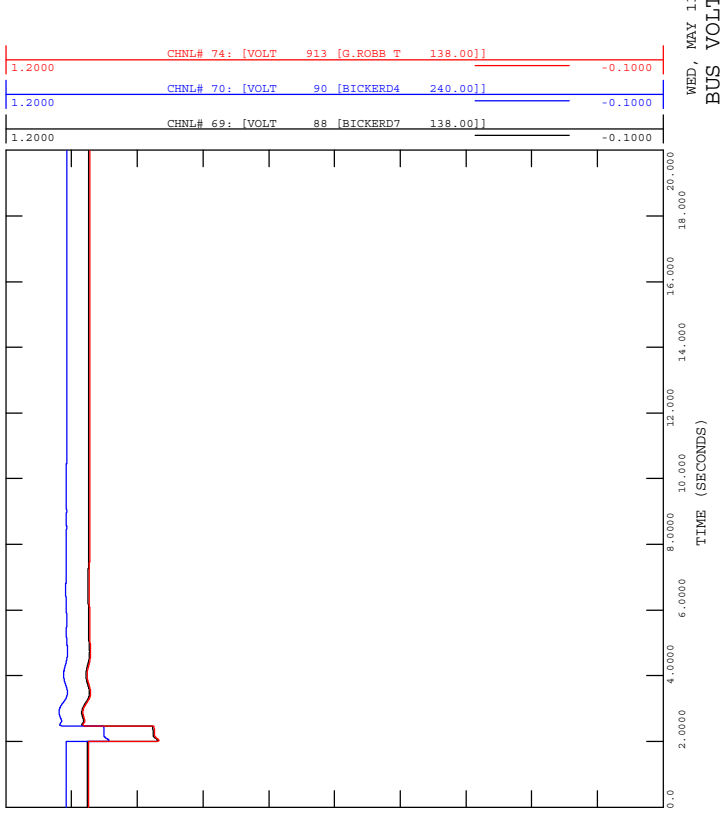
MACHINE POWER (MW)

FIGURE D-34H
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out



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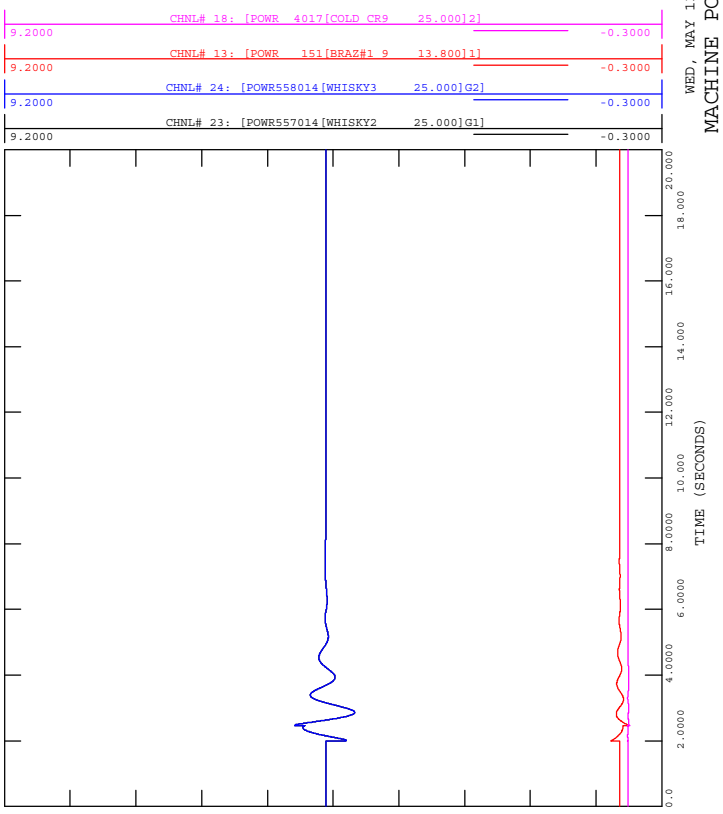
BUS VOLTAGE (PU)

FIGURE D-34E
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out



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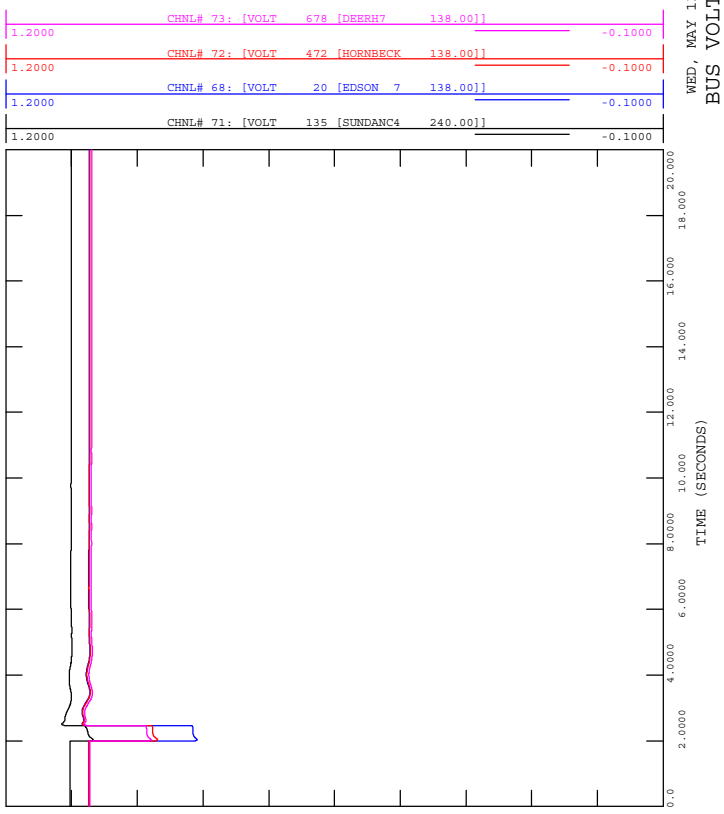
MACHINE POWER (MW)

FIGURE D-34G
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out



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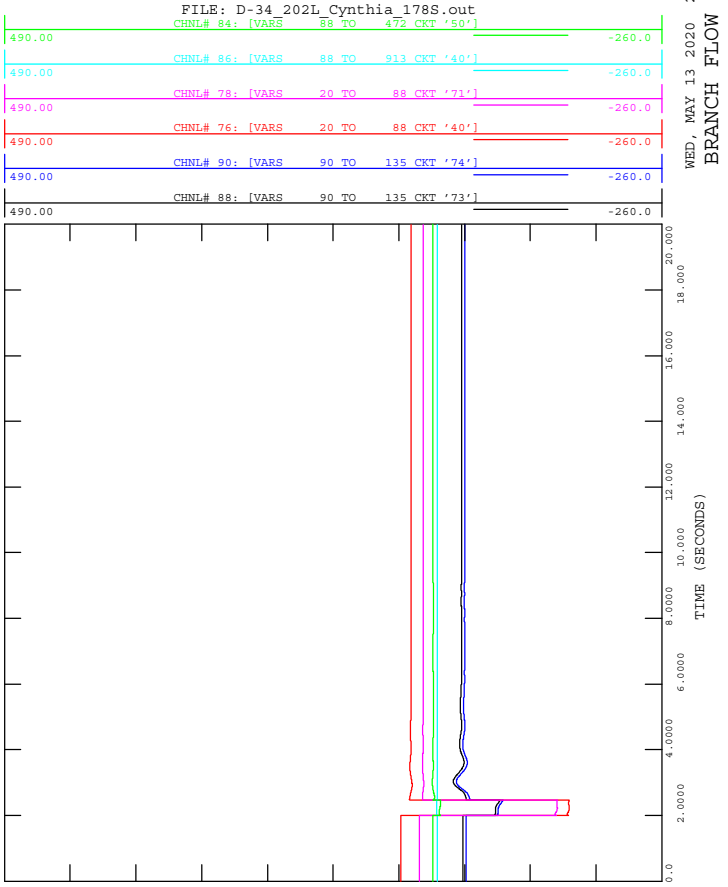
BUS VOLTAGE (PU)

FIGURE D-34J
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out



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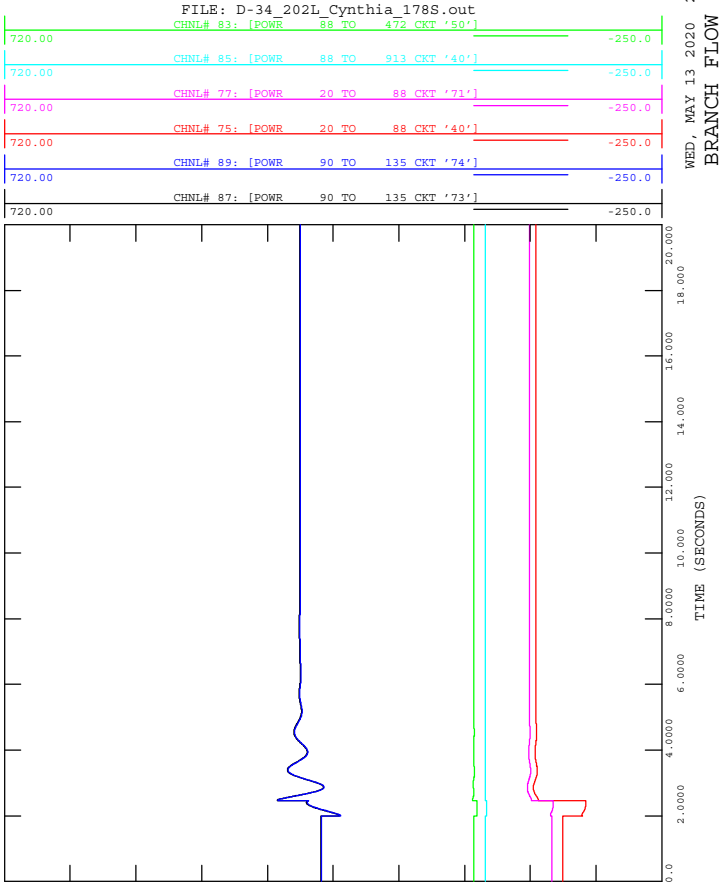
BRANCH FLOW (Q)

FIGURE D-34I
2022WP, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-34_202L_Cynthia_178S.out



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BRANCH FLOW (P)

FIGURE D-35B
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out

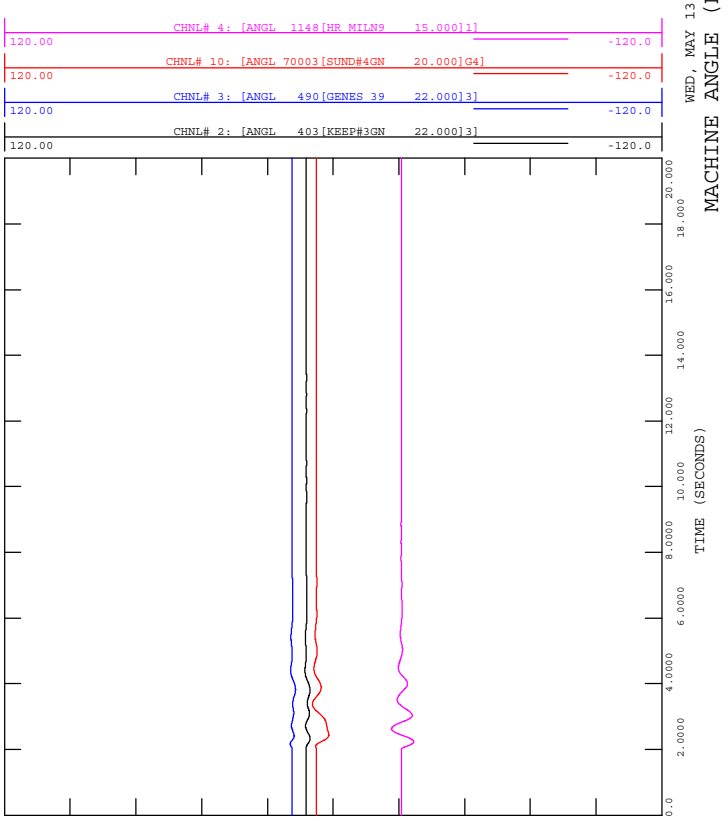


FIGURE D-35D
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out

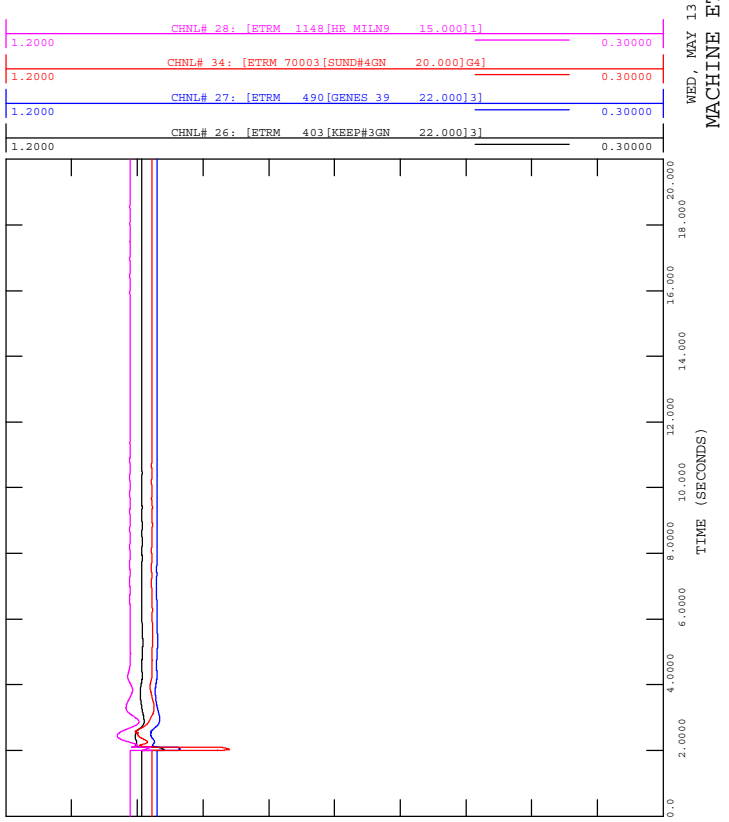


FIGURE D-35A
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out

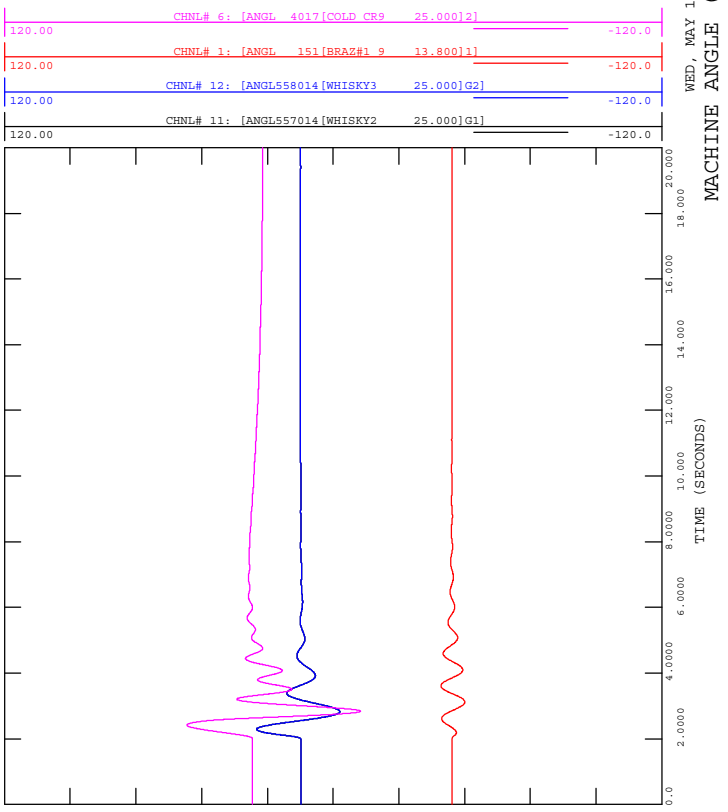


FIGURE D-35C
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out

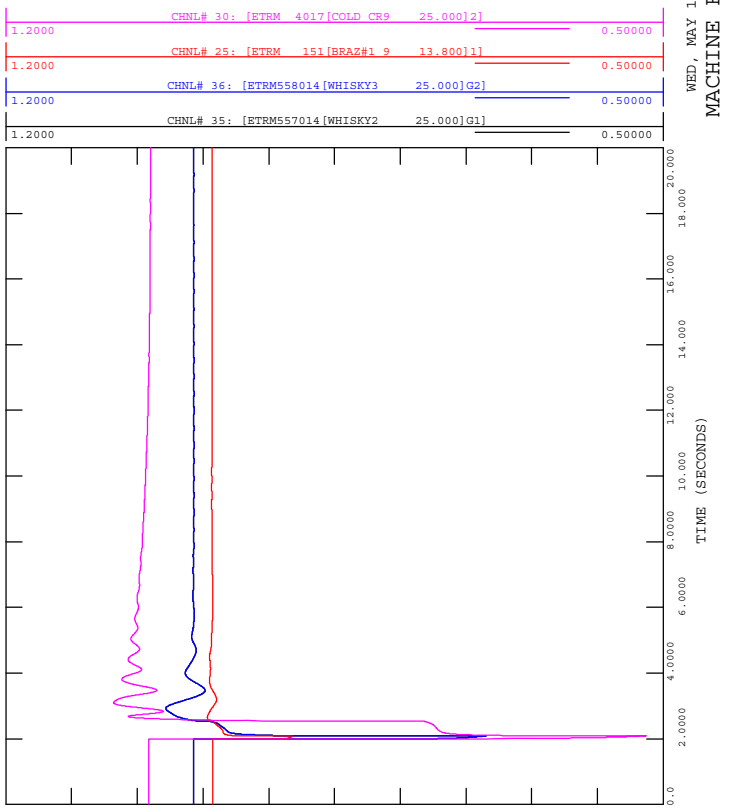


FIGURE D-35F
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out

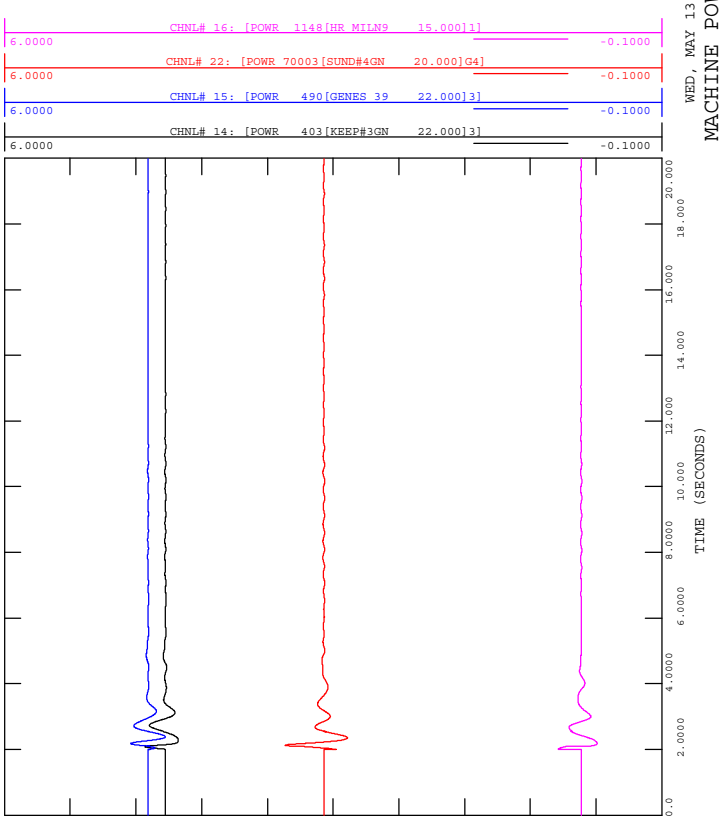


FIGURE D-35H
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out

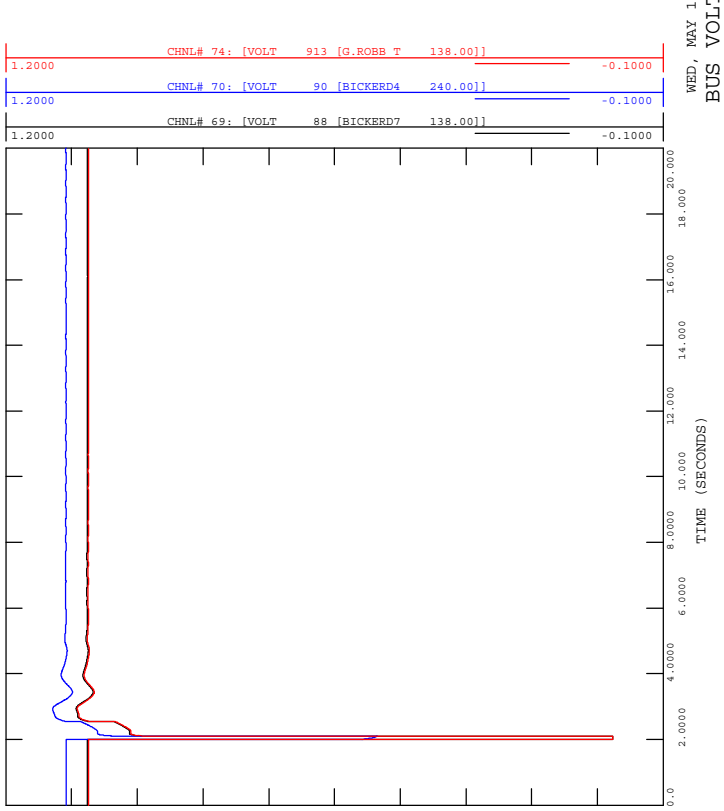


FIGURE D-35E
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out

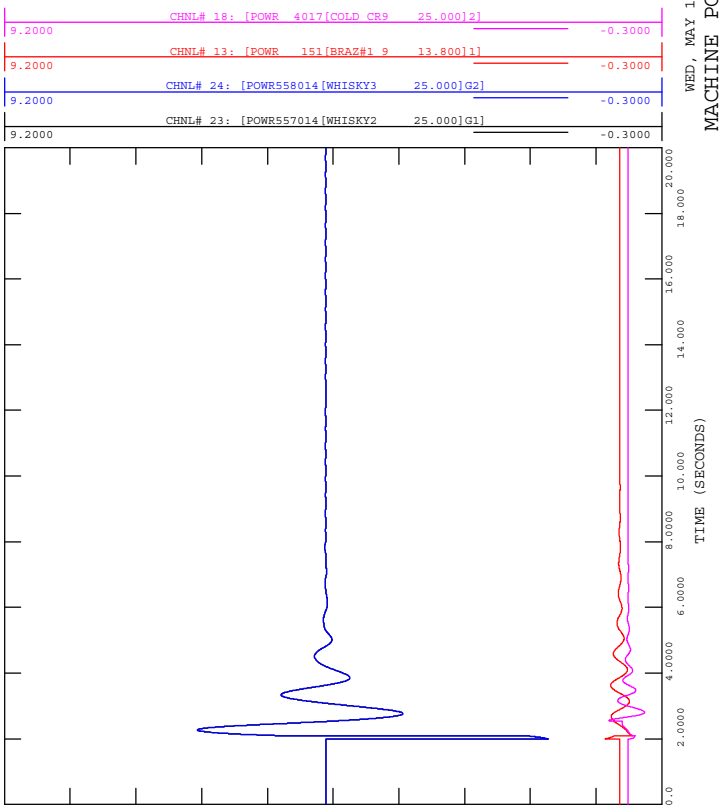


FIGURE D-35G
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out

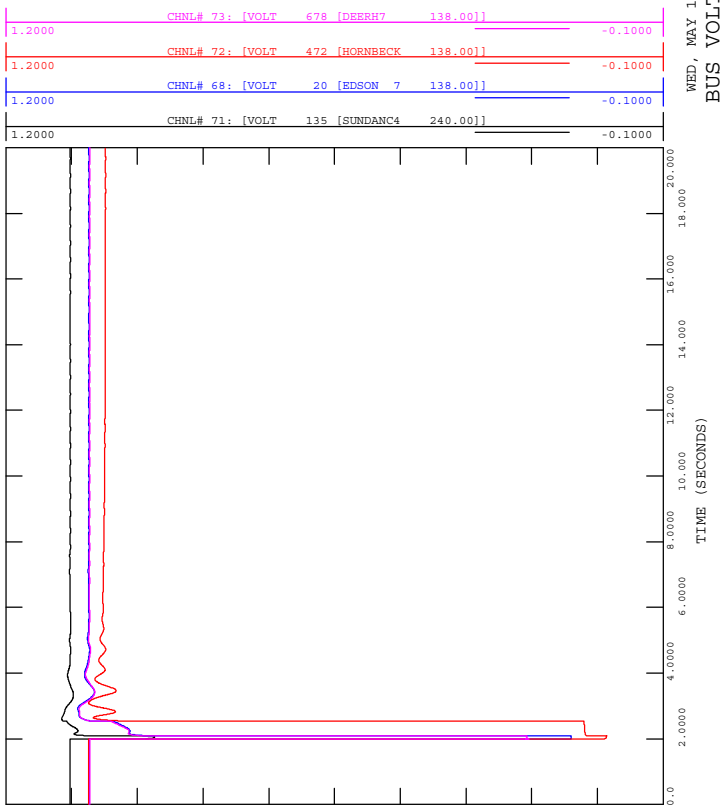
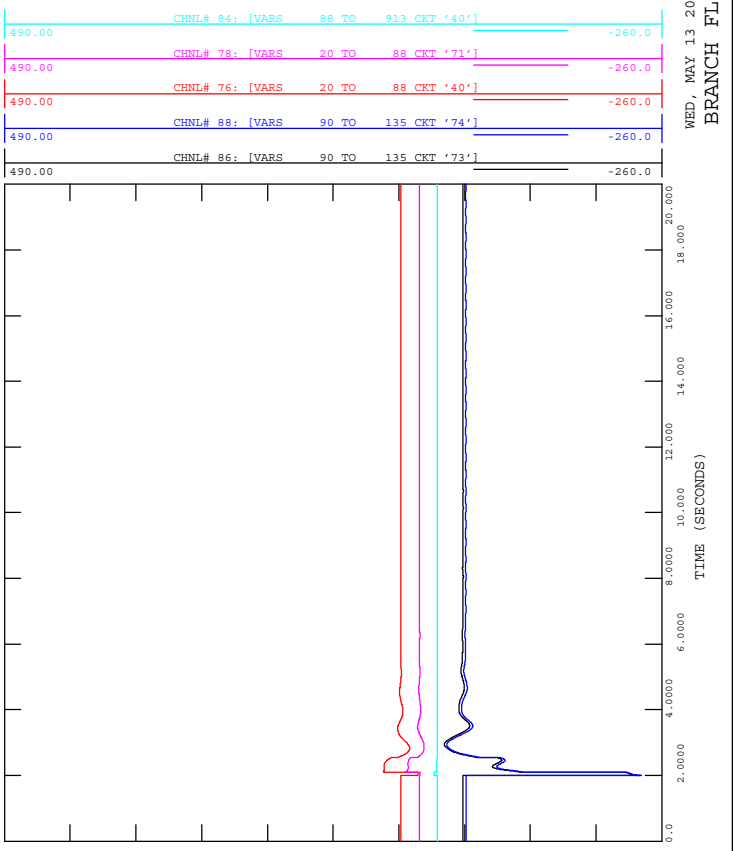


FIGURE D-35J
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out



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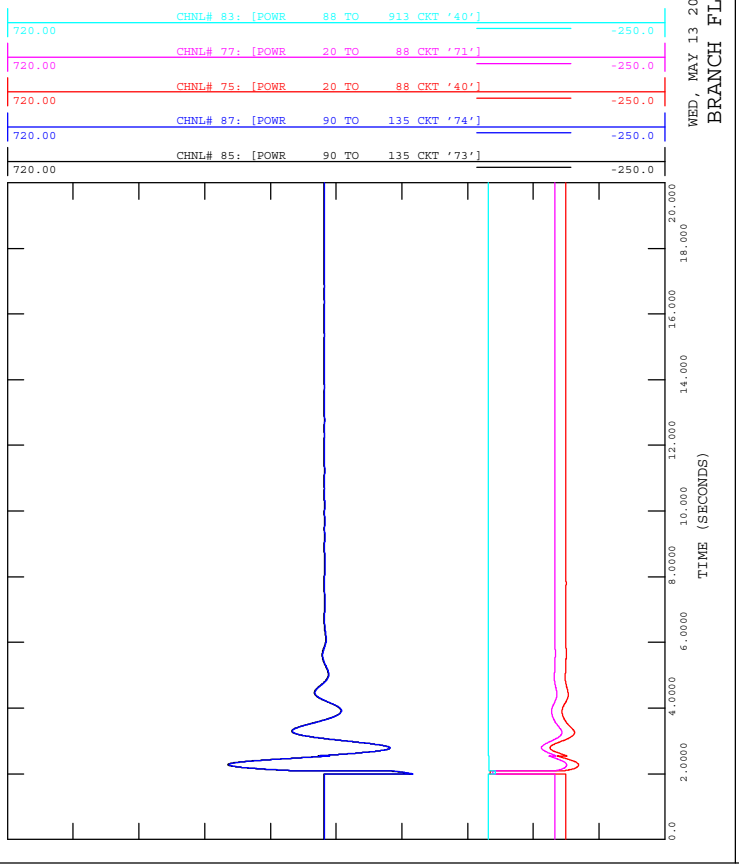
BRANCH FLOW (Q)

FIGURE D-35I
2022WP, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-35_745L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-36B
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out

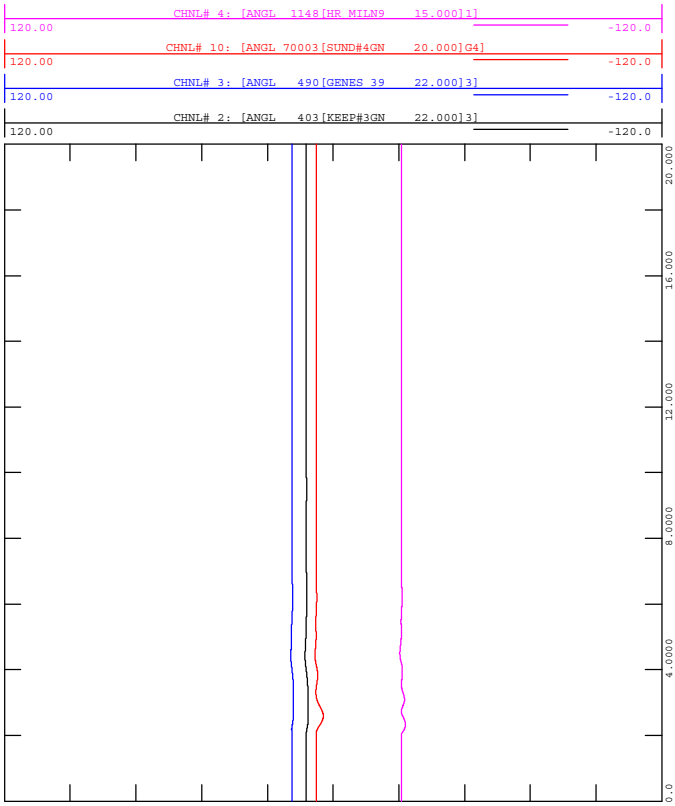


FIGURE D-36D
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out

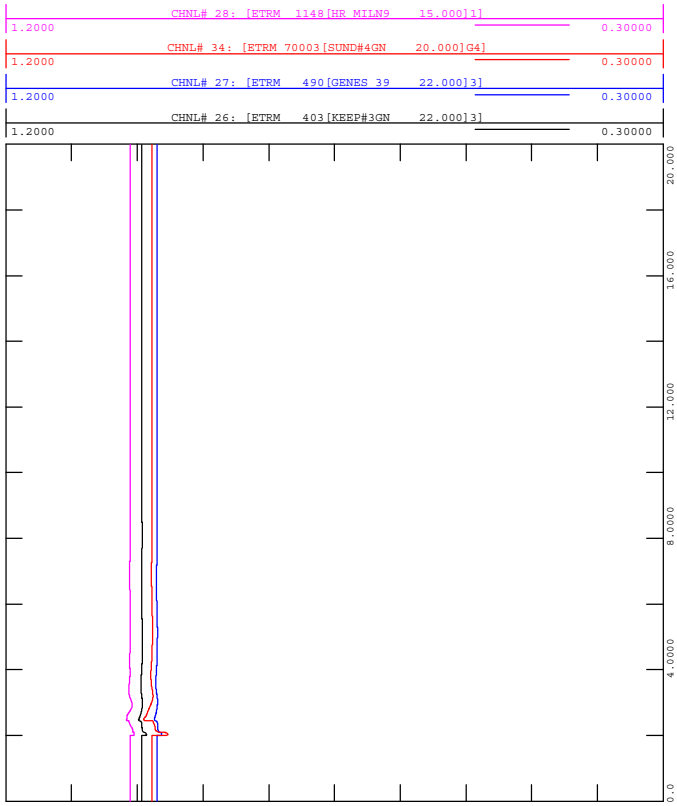


FIGURE D-36A
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out

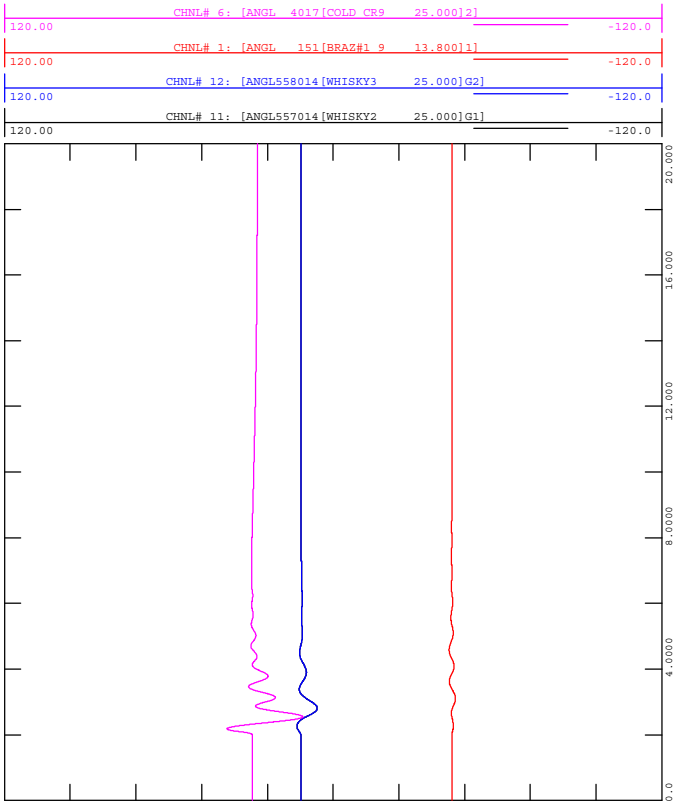


FIGURE D-36C
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out

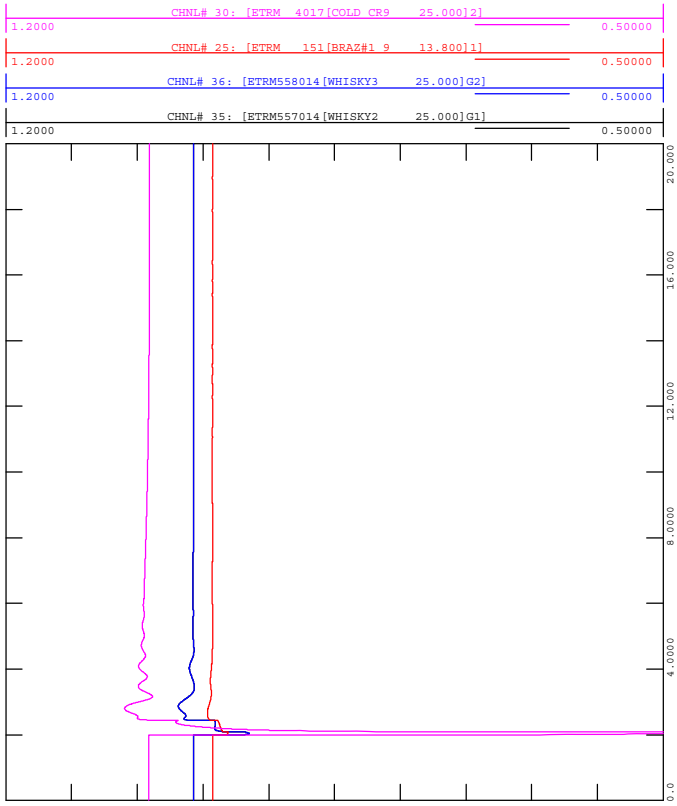


FIGURE D-36F
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out

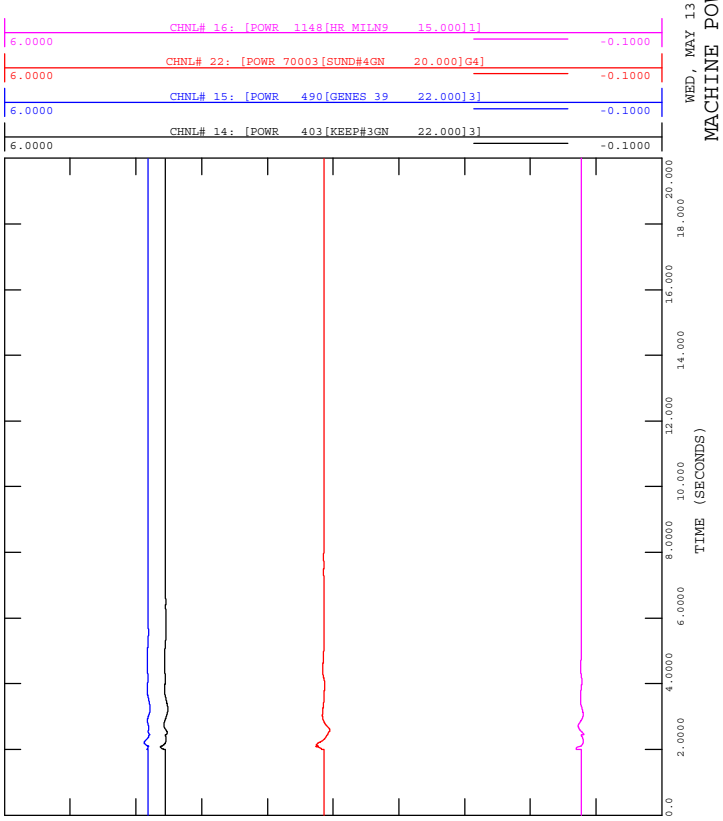


FIGURE D-36H
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out

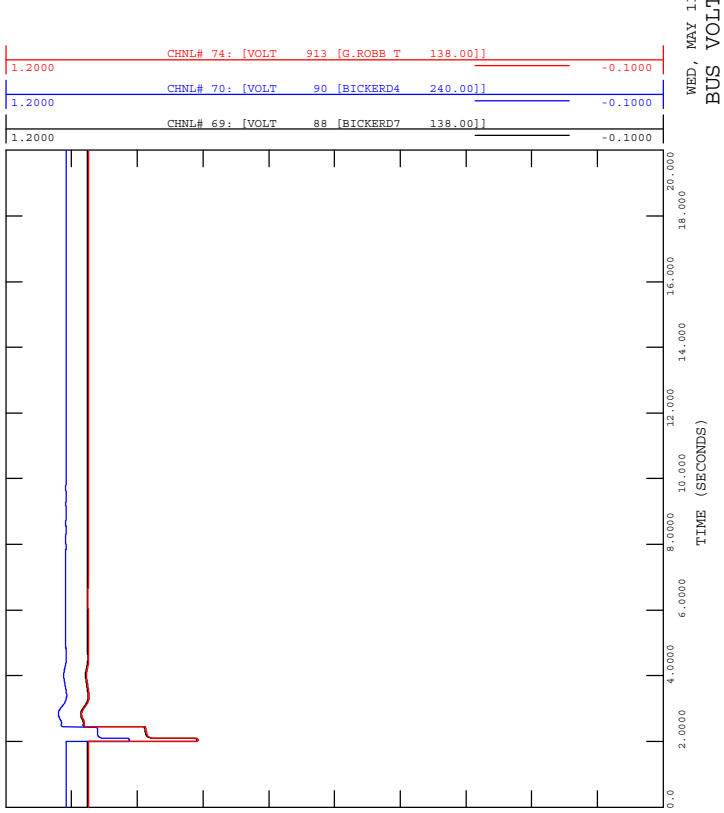


FIGURE D-36E
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out

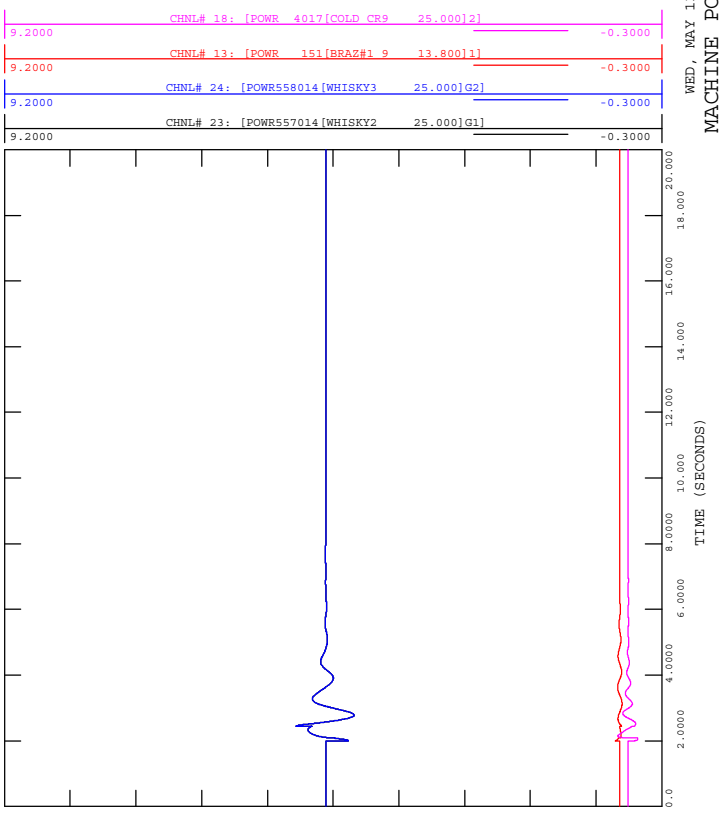


FIGURE D-36G
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out

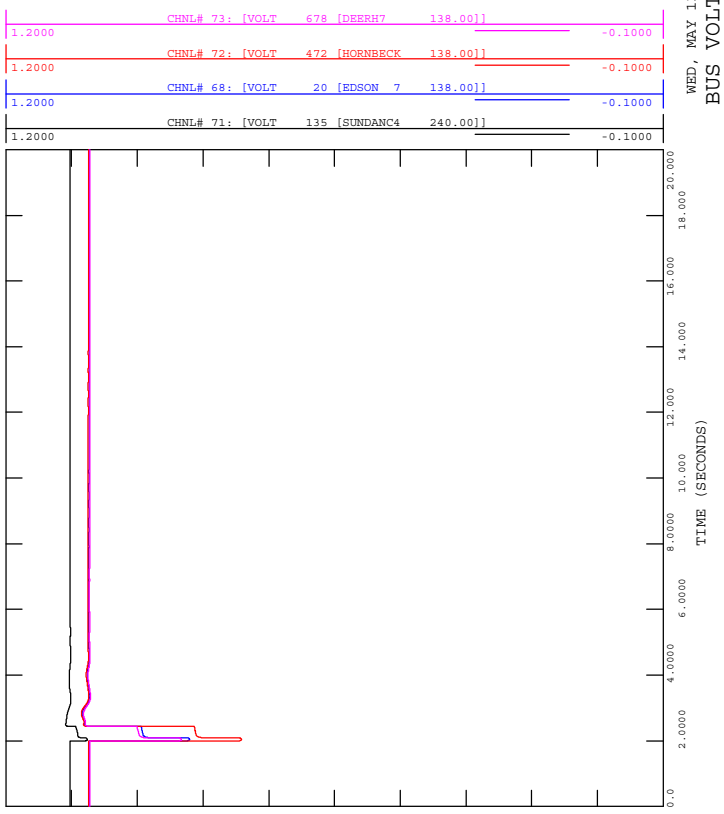
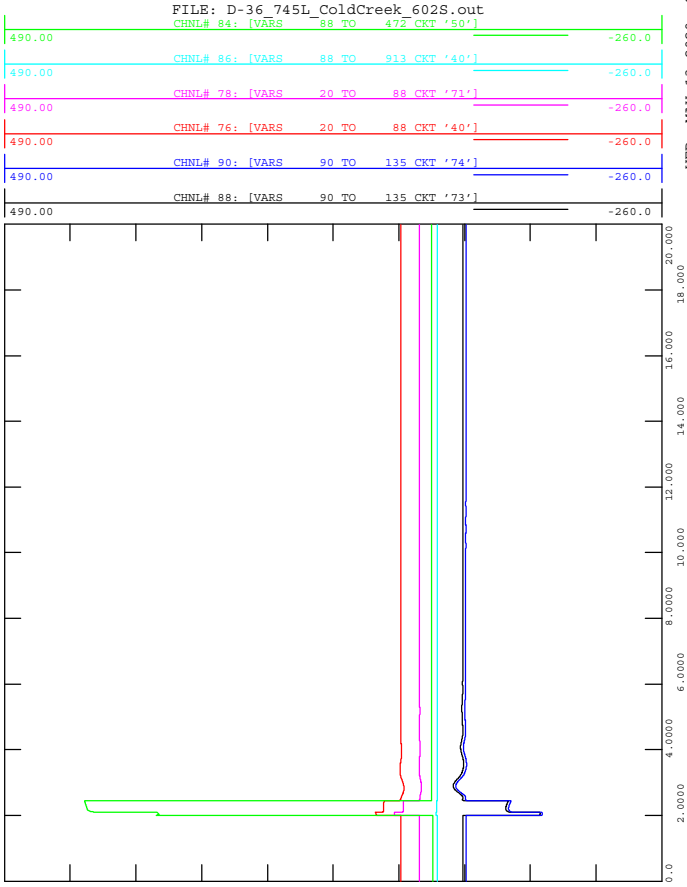


FIGURE D-36J
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out



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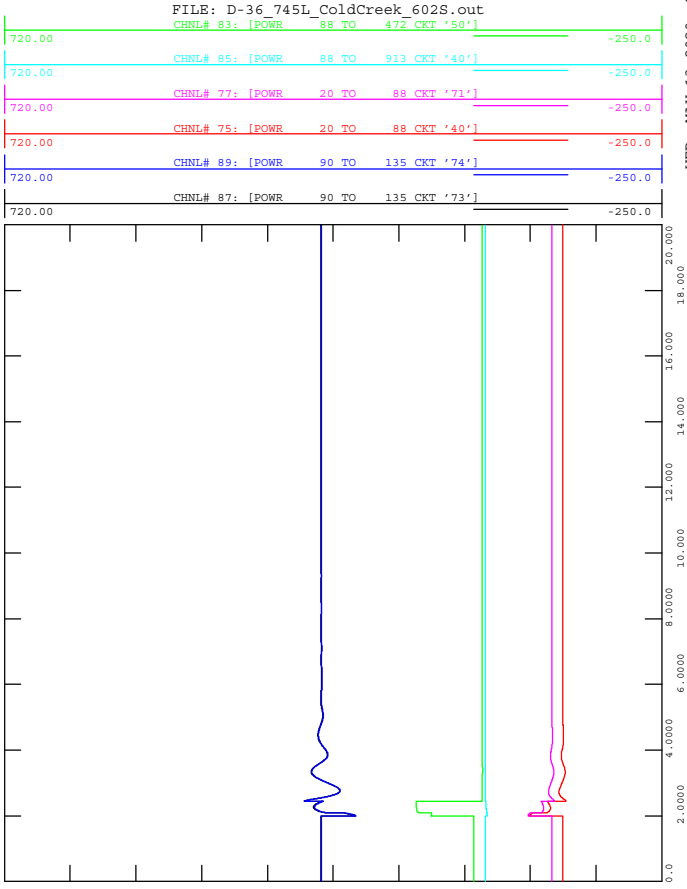
BRANCH FLOW (Q)

FIGURE D-36I
2022WP, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-36_745L_ColdCreek_602S.out



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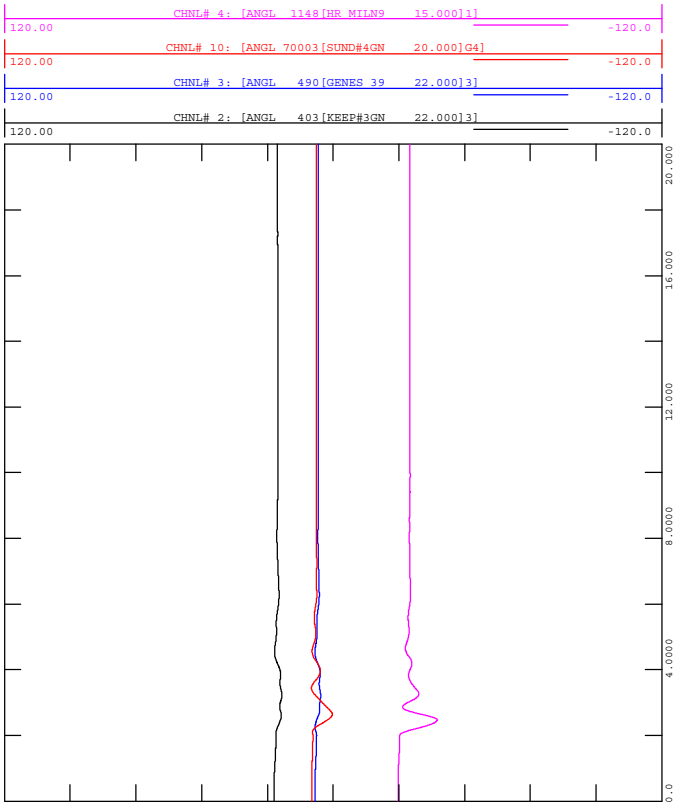
BRANCH FLOW (P)

FIGURE D-37B
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out



MACHINE ANGLE (DEGREES)
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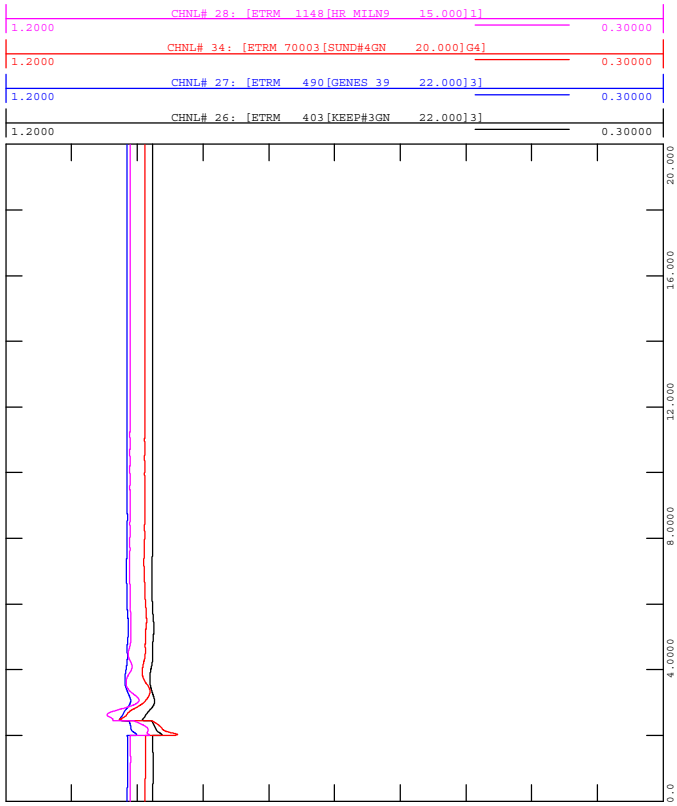
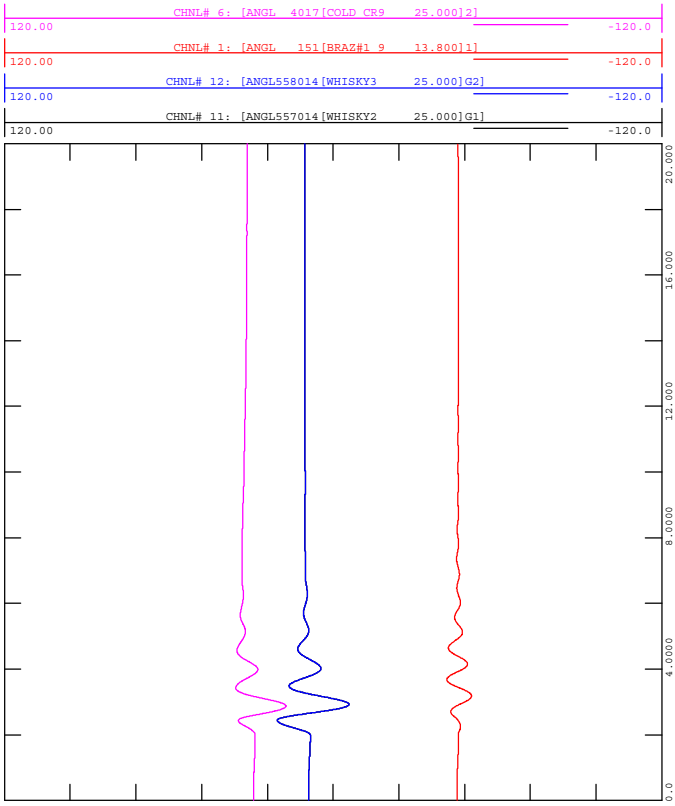
FIGURE D-37D
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out



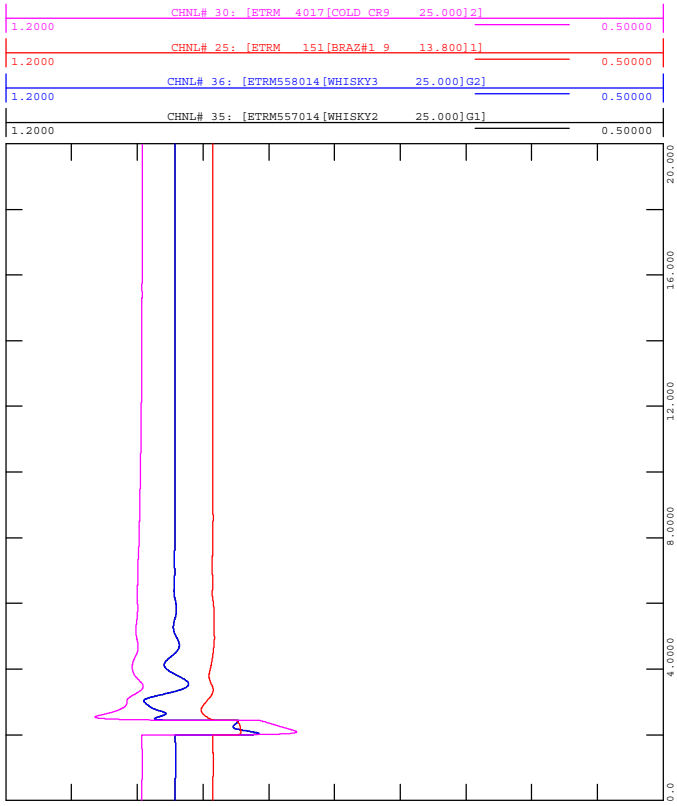
MACHINE ETERM (V)
WED, MAY 13 2020 23:37

FIGURE D-37A
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out



MACHINE ANGLE (DEGREES)
WED, MAY 13 2020 23:37

FIGURE D-37C
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out



MACHINE ETERM (V)
WED, MAY 13 2020 23:37

FIGURE D-37F
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out

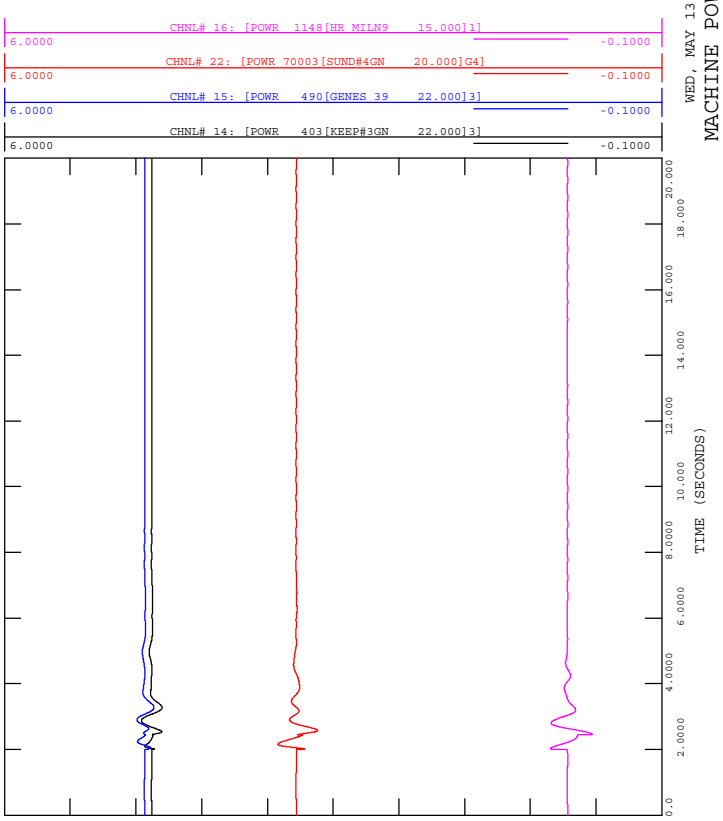


FIGURE D-37H
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out

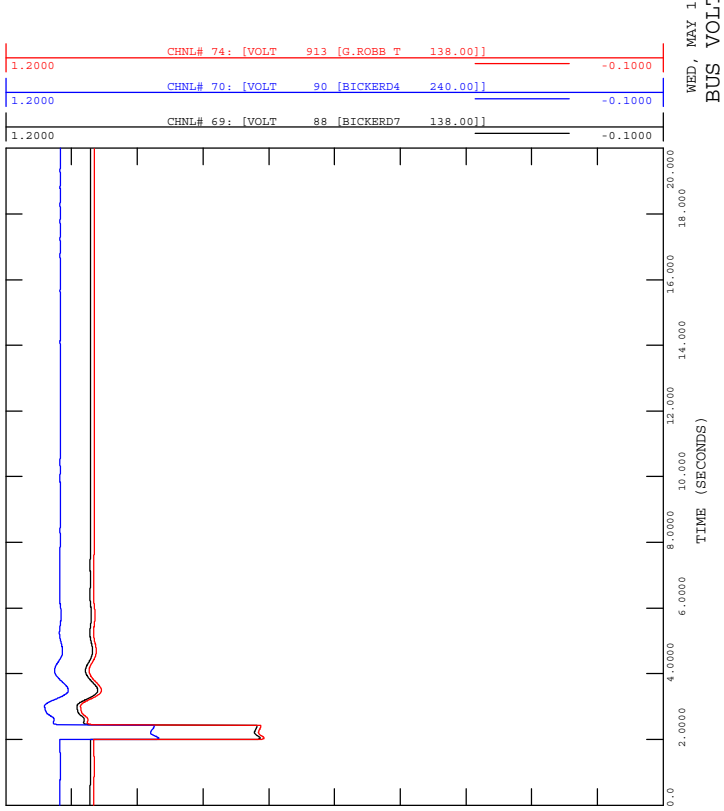


FIGURE D-37E
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out

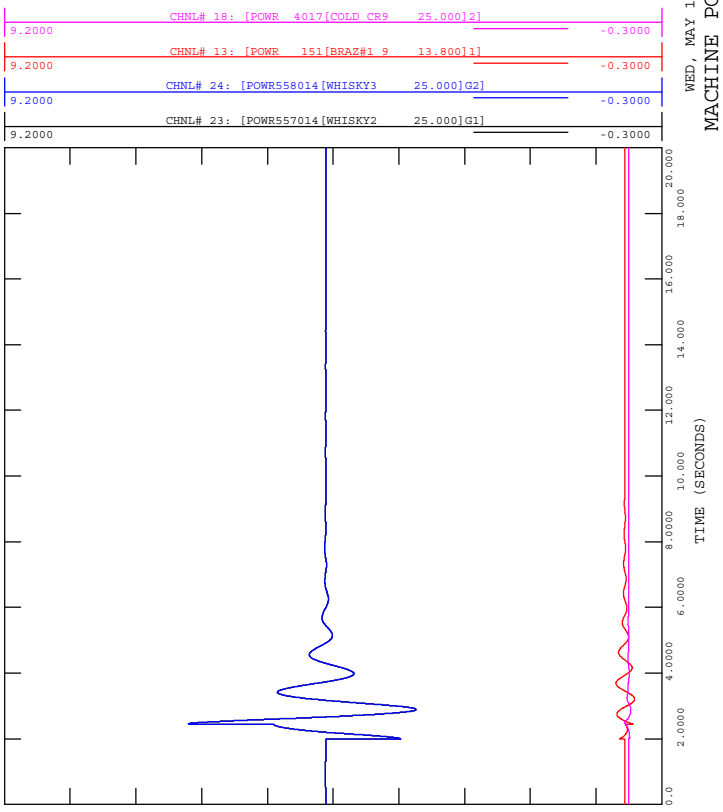


FIGURE D-37G
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out

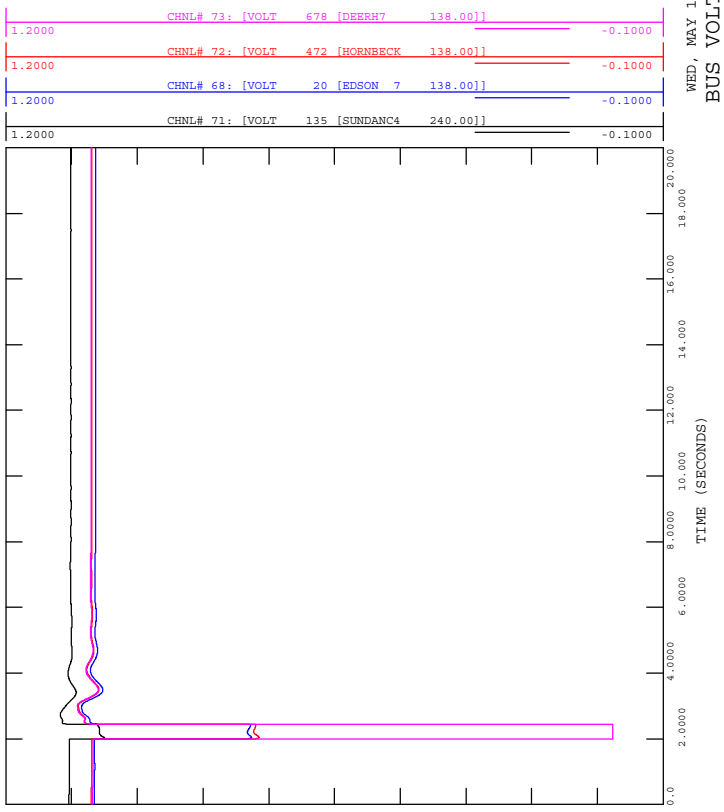
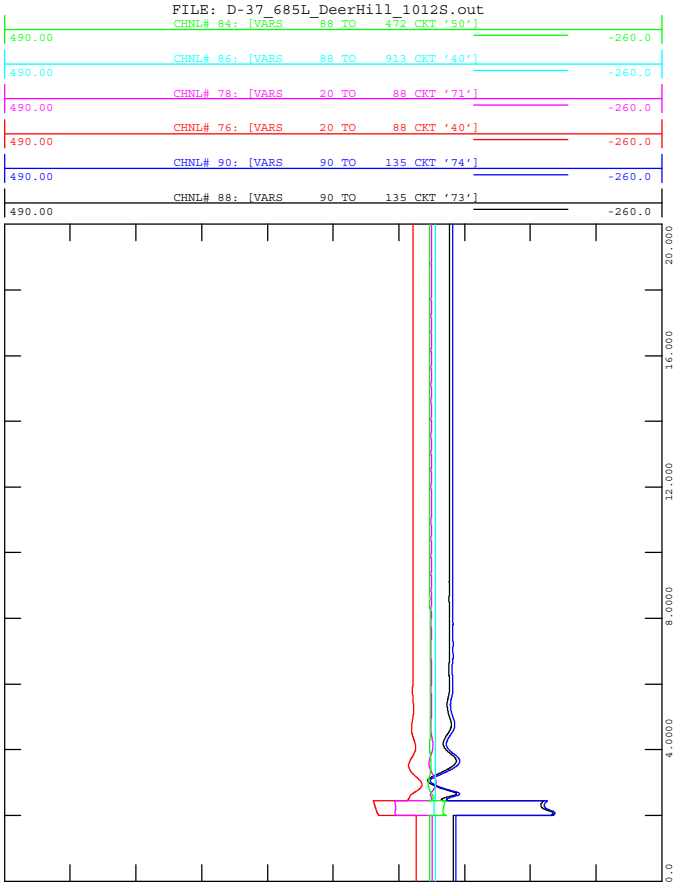


FIGURE D-37J
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out



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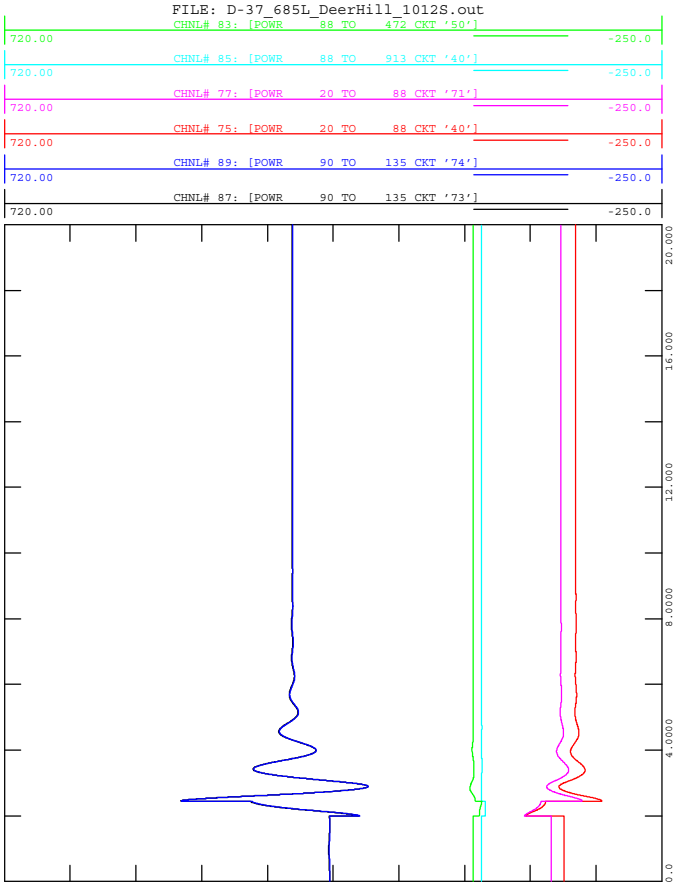
BRANCH FLOW (Q)

FIGURE D-37I
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-37_685L_DeerHill_1012S.out



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BRANCH FLOW (P)

FIGURE D-38B
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out

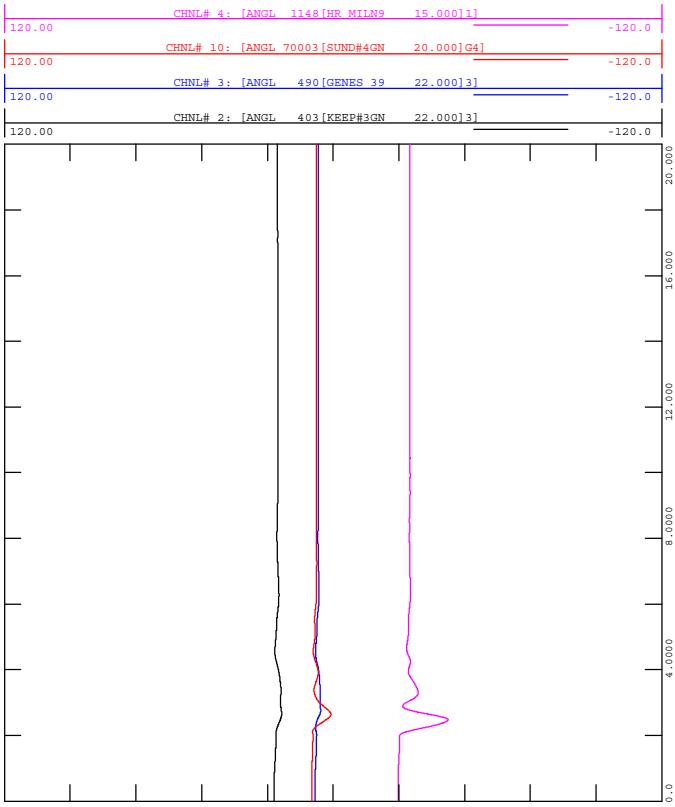


FIGURE D-38D
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out

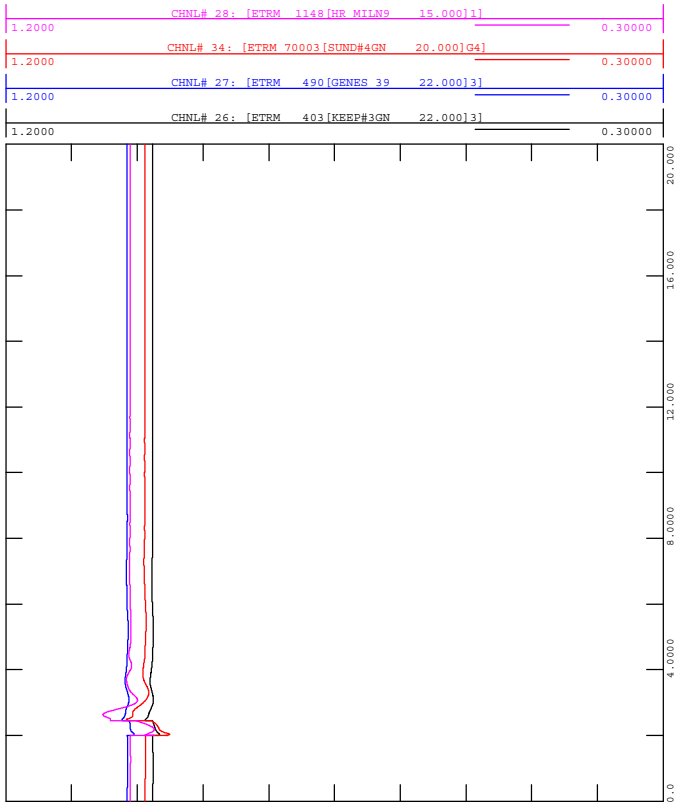


FIGURE D-38A
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out

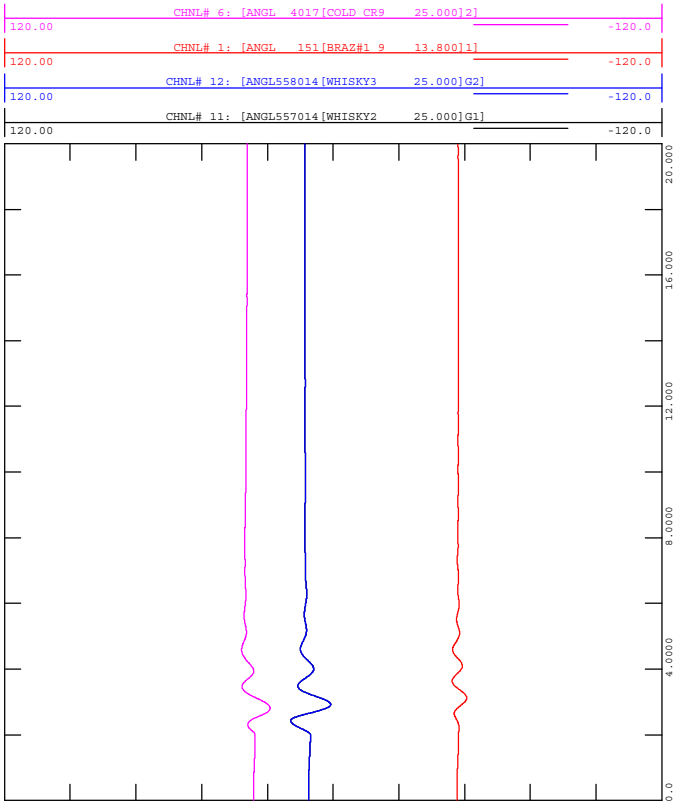


FIGURE D-38C
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out

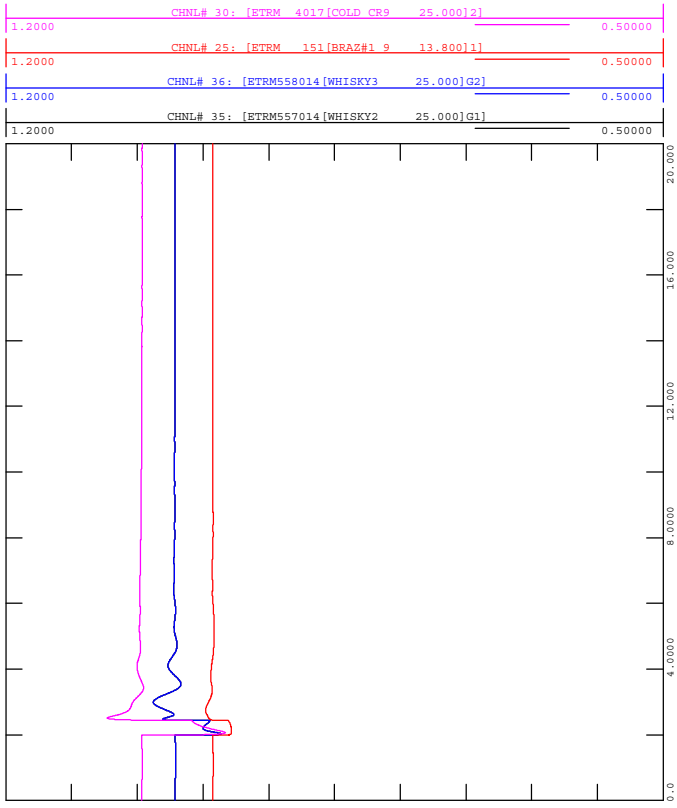
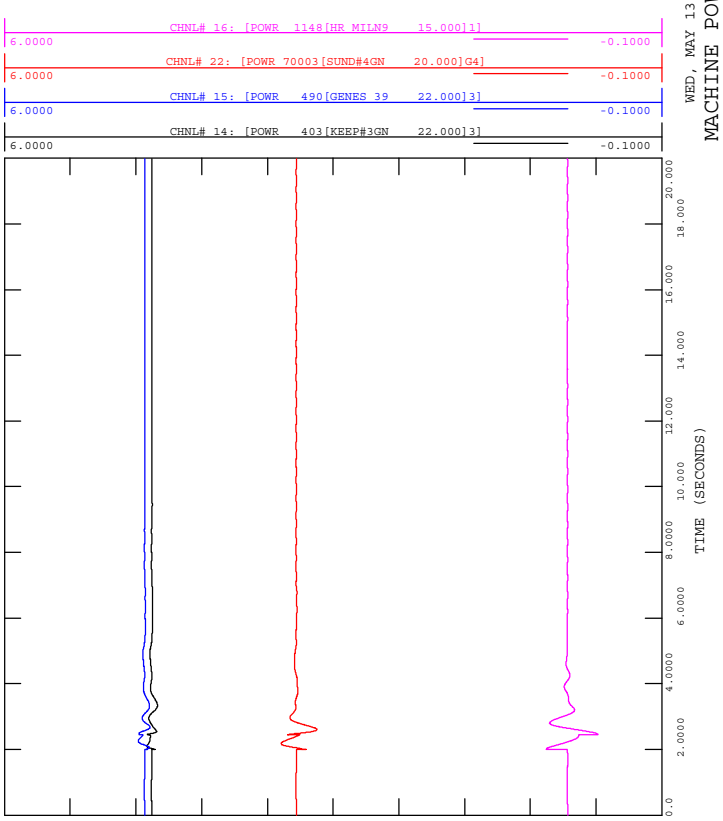


FIGURE D-38F
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out



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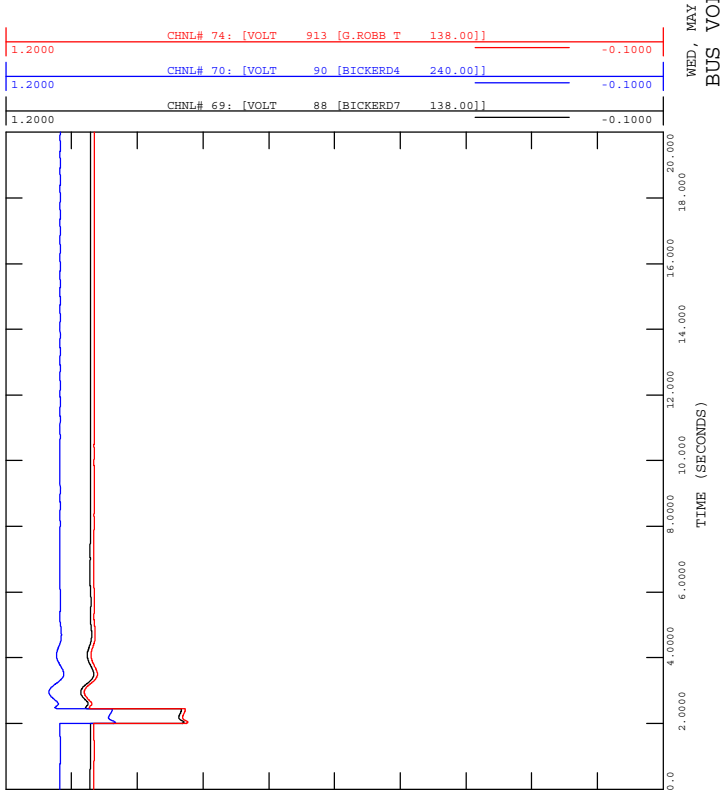
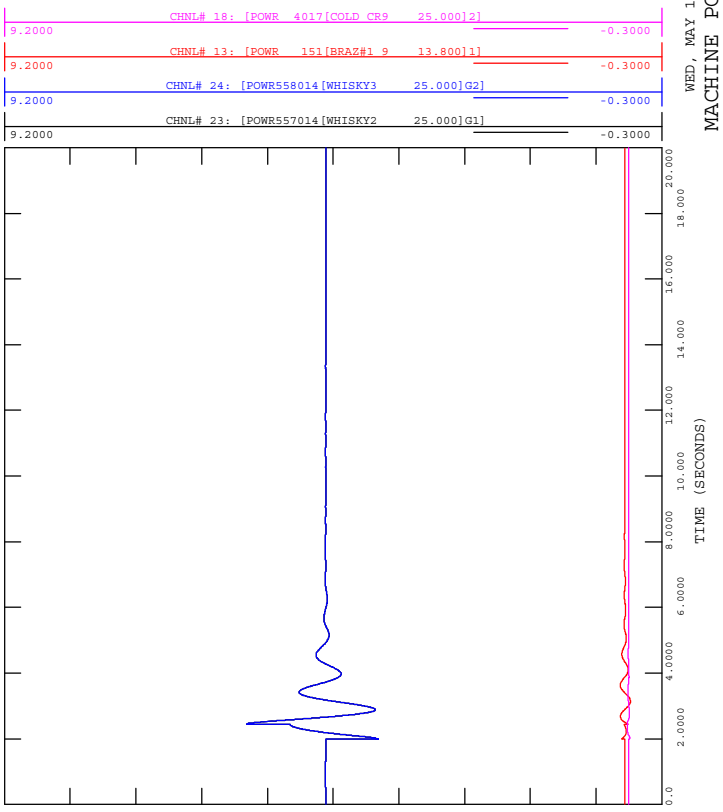
MACHINE POWER (MW)

FIGURE D-38H
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out



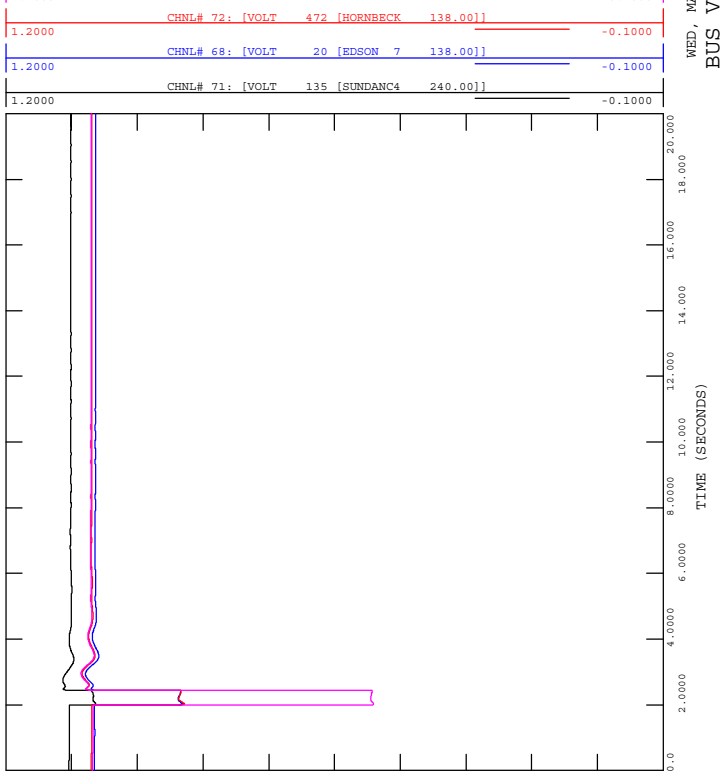
WED, MAY 13 2020 23:37
BUS VOLTAGE (PU)

FIGURE D-38E
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out



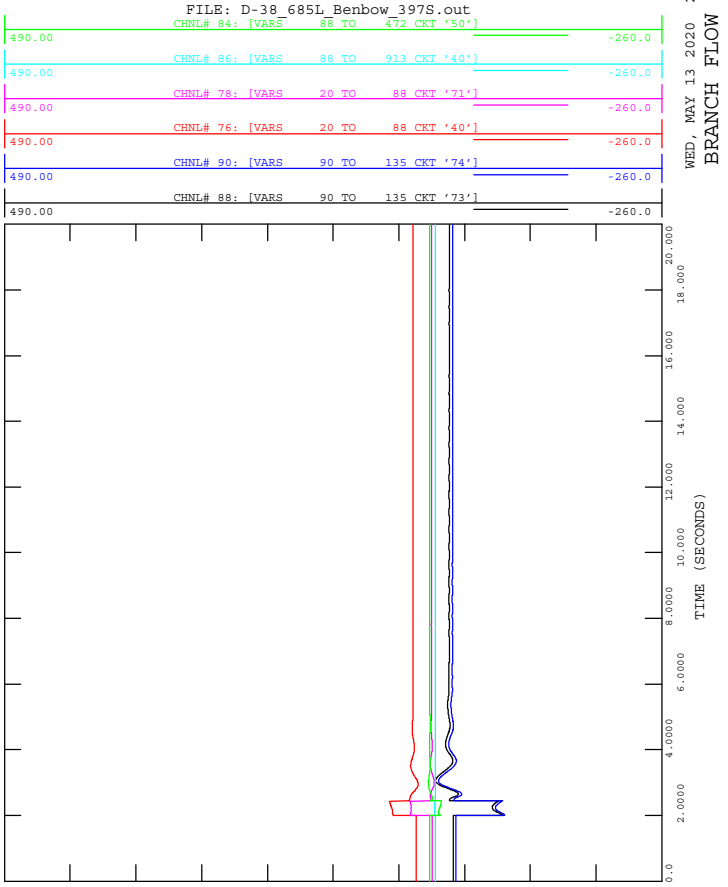
WED, MAY 13 2020 23:37
MACHINE POWER (MW)

FIGURE D-38G
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out



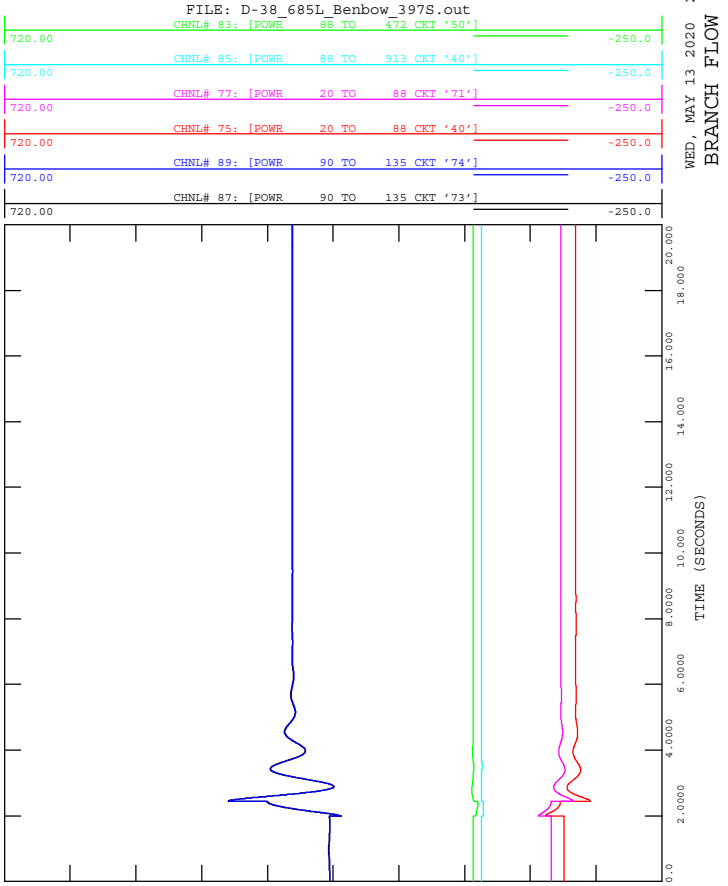
WED, MAY 13 2020 23:37
BUS VOLTAGE (PU)

FIGURE D-38J
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out



WED, MAY 13 2020 23:37
BRANCH FLOW (Q)

FIGURE D-38I
2022SL, POST-PROJECT
3-PHASE FAULT AT BENBOW 397S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-38_685L_Benbow_397S.out



WED, MAY 13 2020 23:37
BRANCH FLOW (P)

FIGURE D-39B
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out

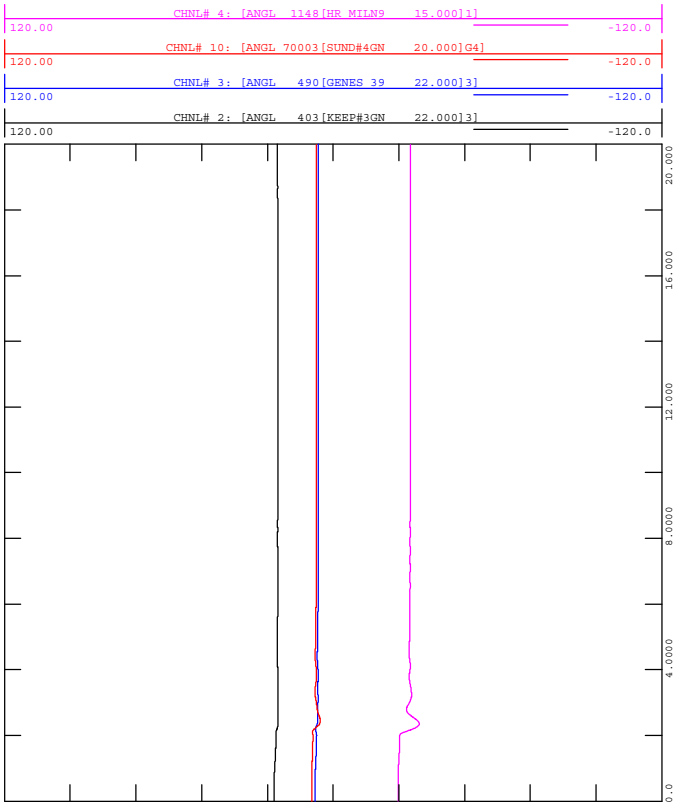


FIGURE D-39D
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out

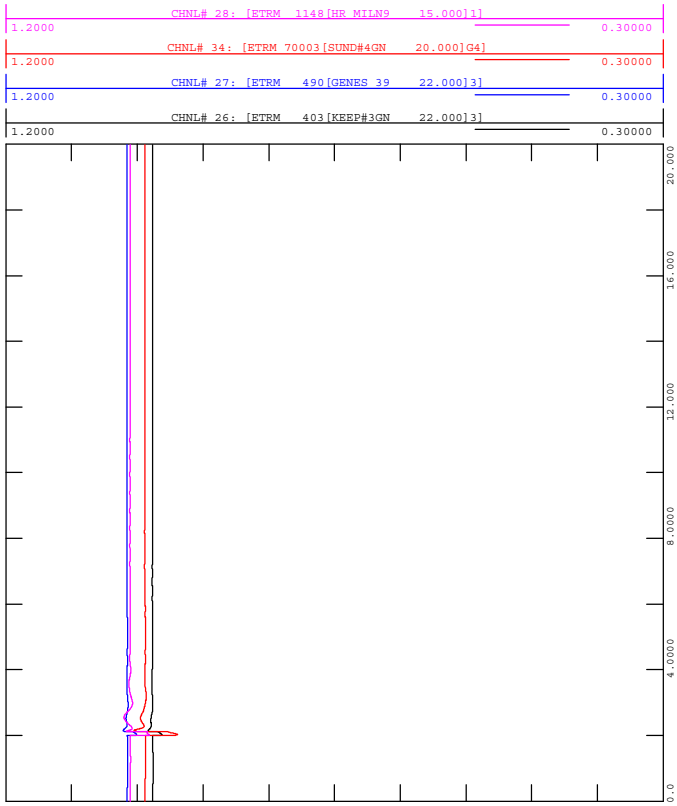


FIGURE D-39A
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out

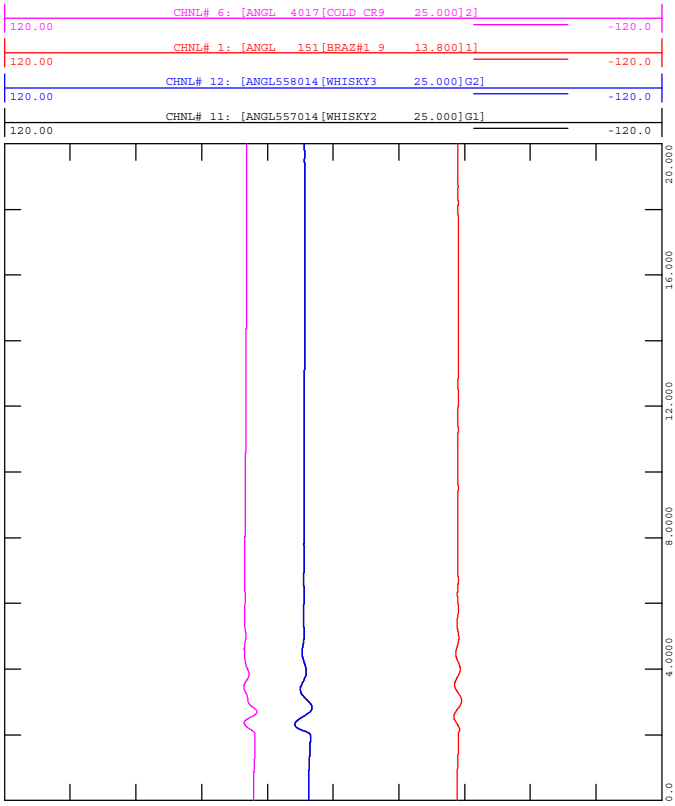


FIGURE D-39C
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out

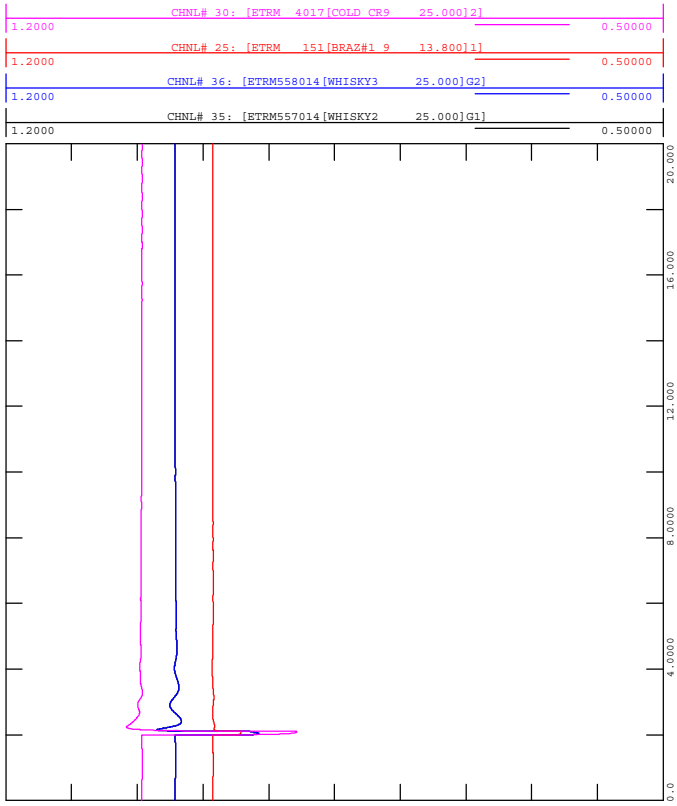


FIGURE D-39F
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out

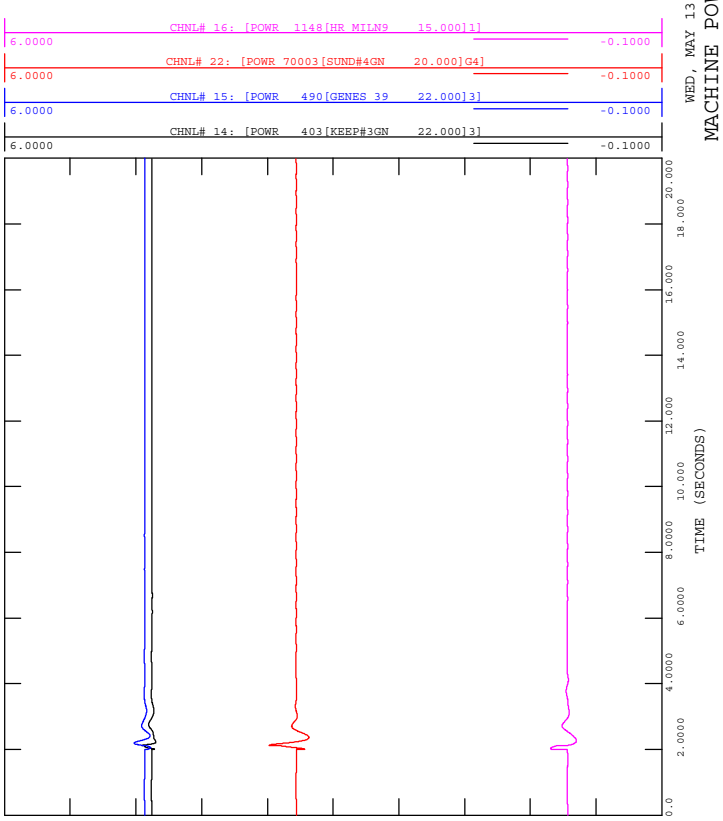


FIGURE D-39H
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out

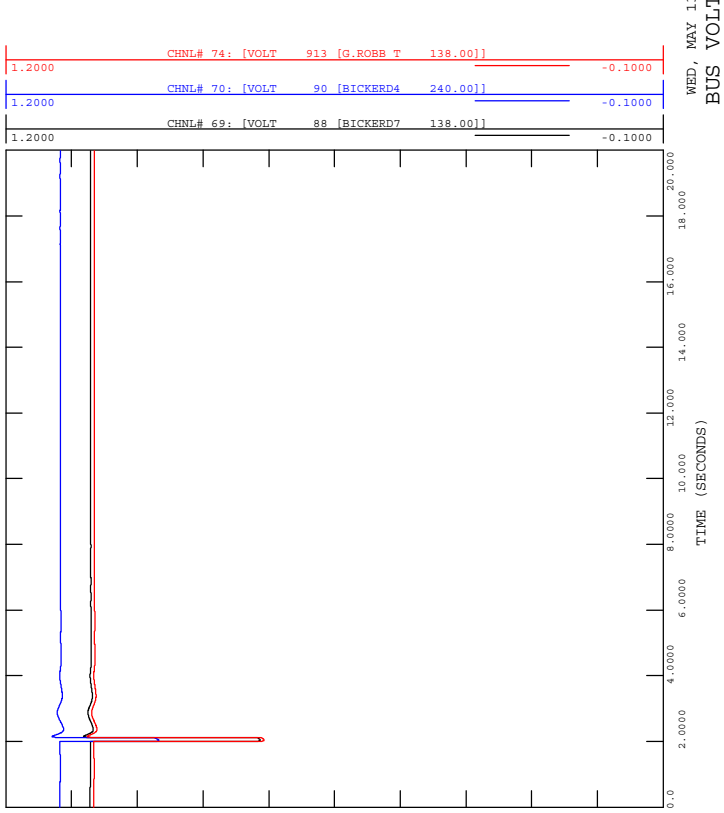


FIGURE D-39E
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out

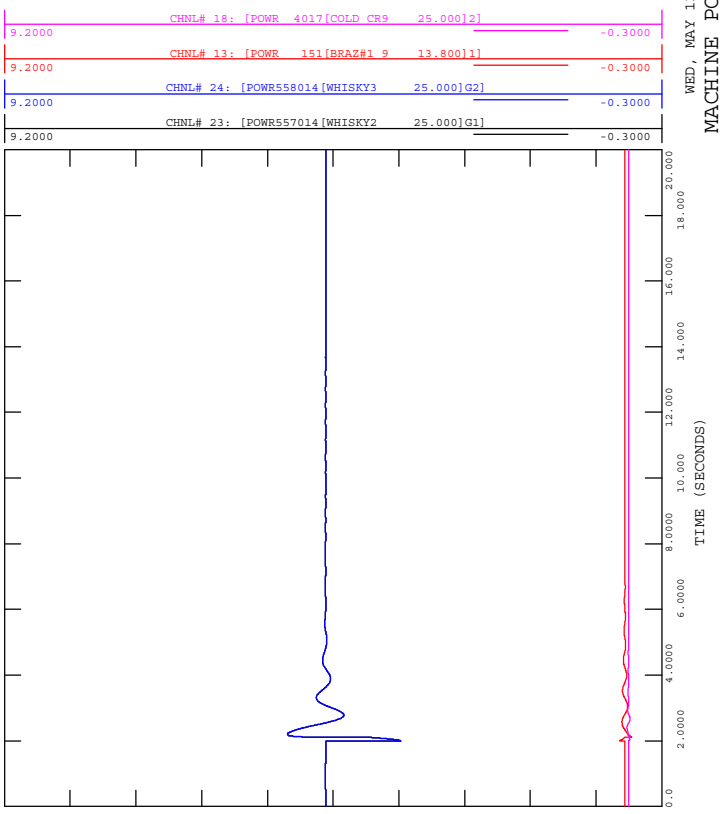


FIGURE D-39G
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out

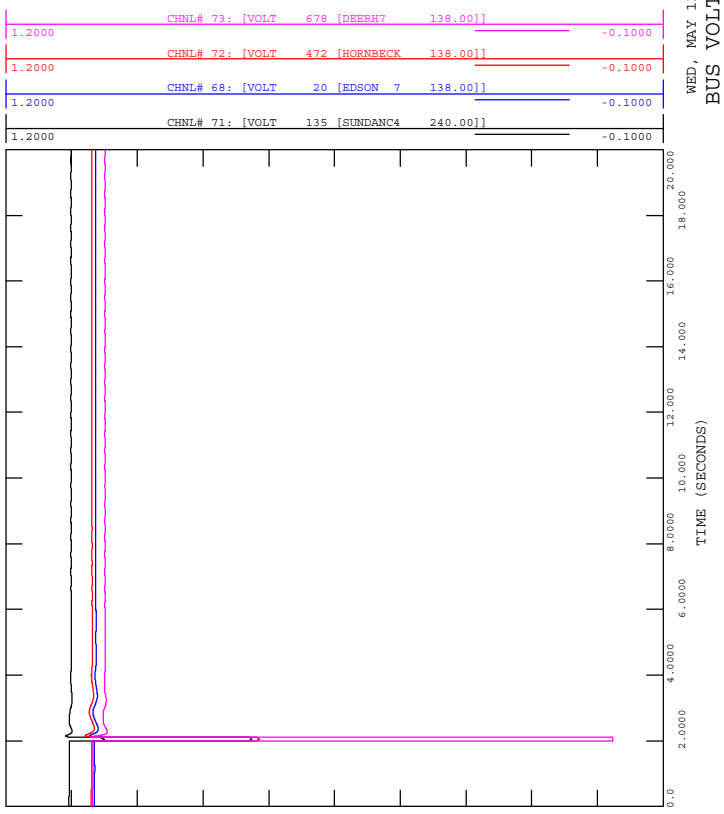
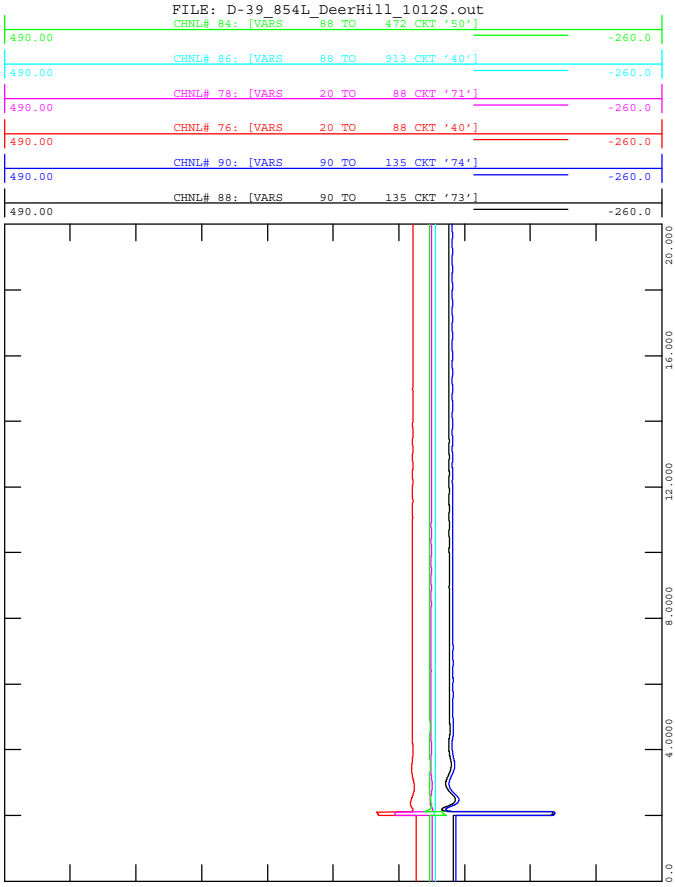


FIGURE D-39J
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out



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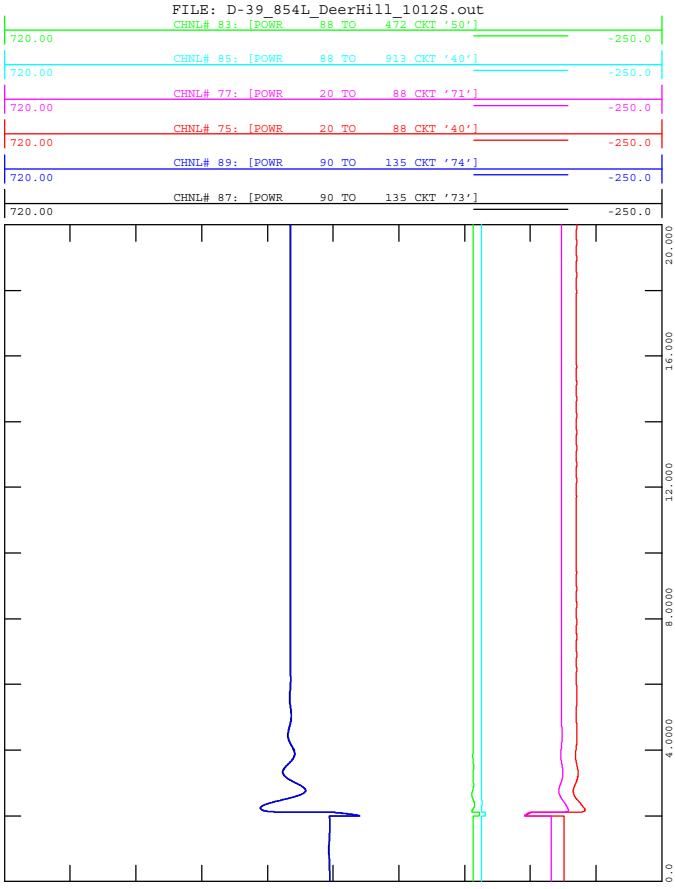
BRANCH FLOW (Q)

FIGURE D-39I
2022SL, POST-PROJECT
3-PHASE FAULT AT DEER HILL 1012S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-39_854L_DeerHill_1012S.out



WED, MAY 13 2020 23:37
BRANCH FLOW (P)

FIGURE D-40B
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out

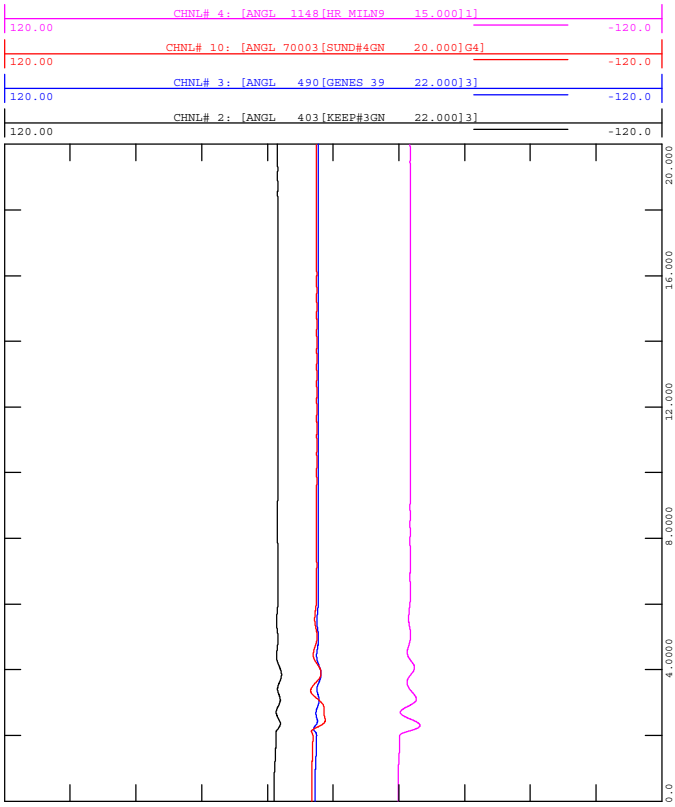


FIGURE D-40D
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out

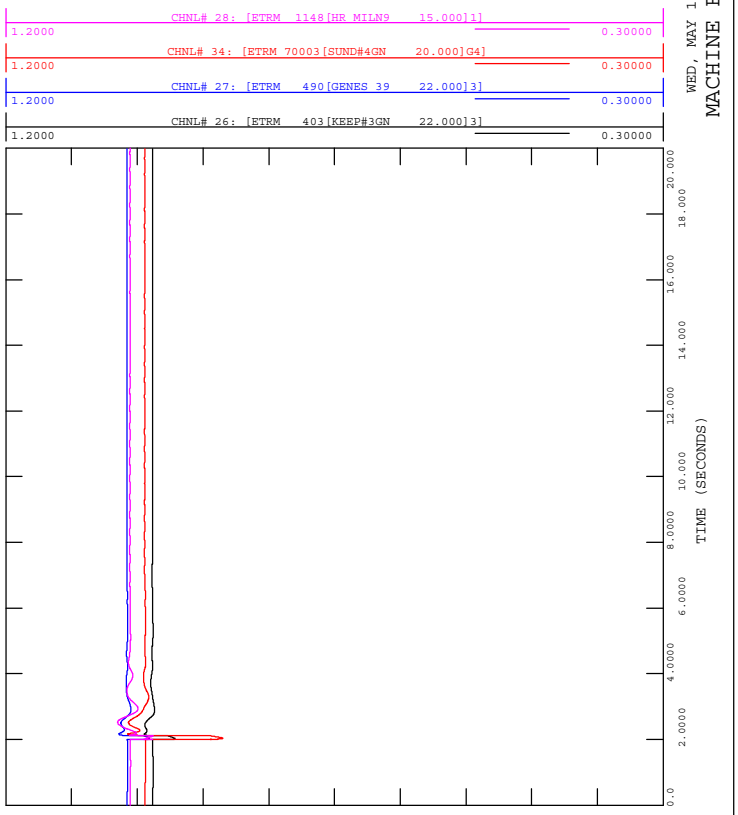


FIGURE D-40A
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out

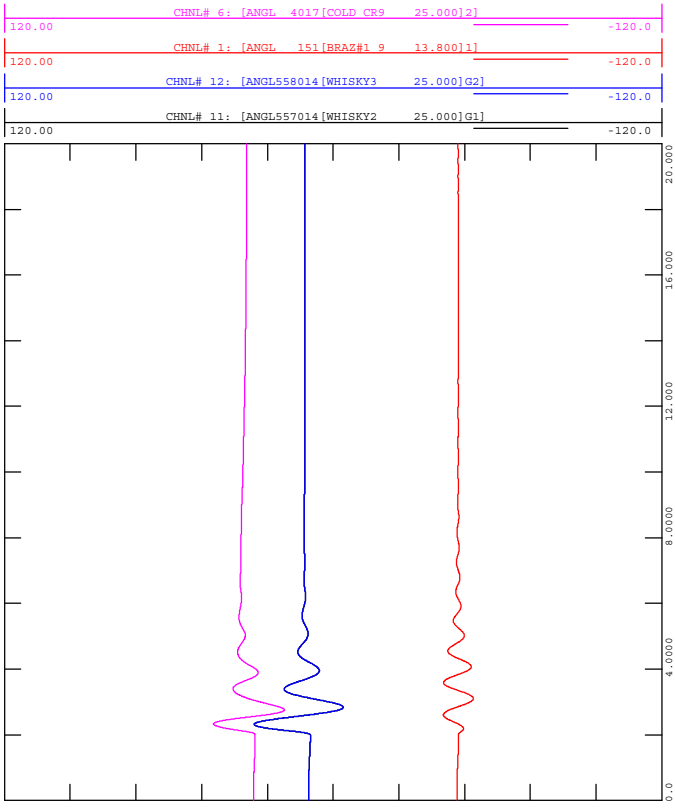


FIGURE D-40C
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out

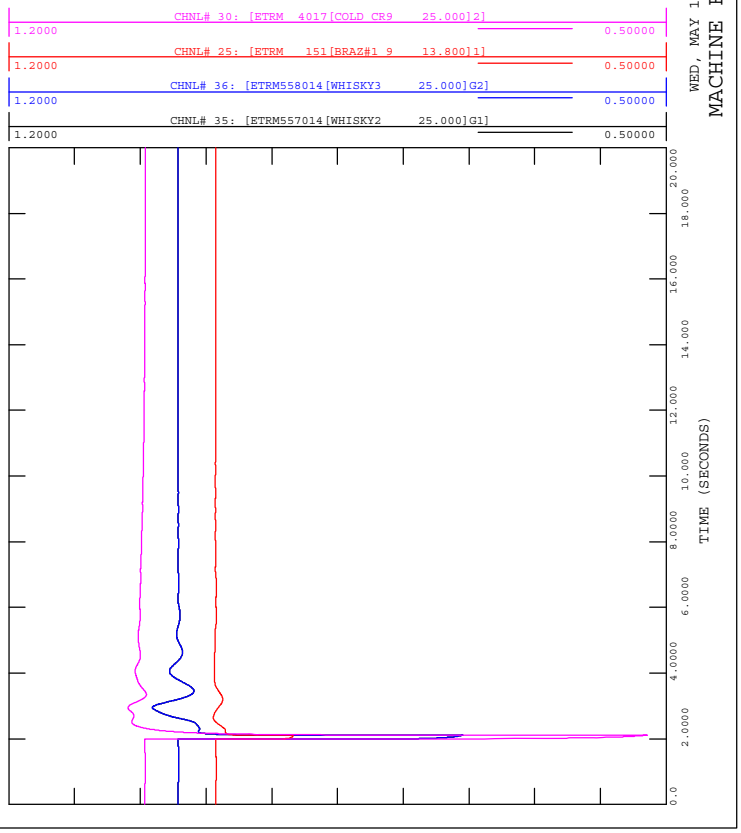
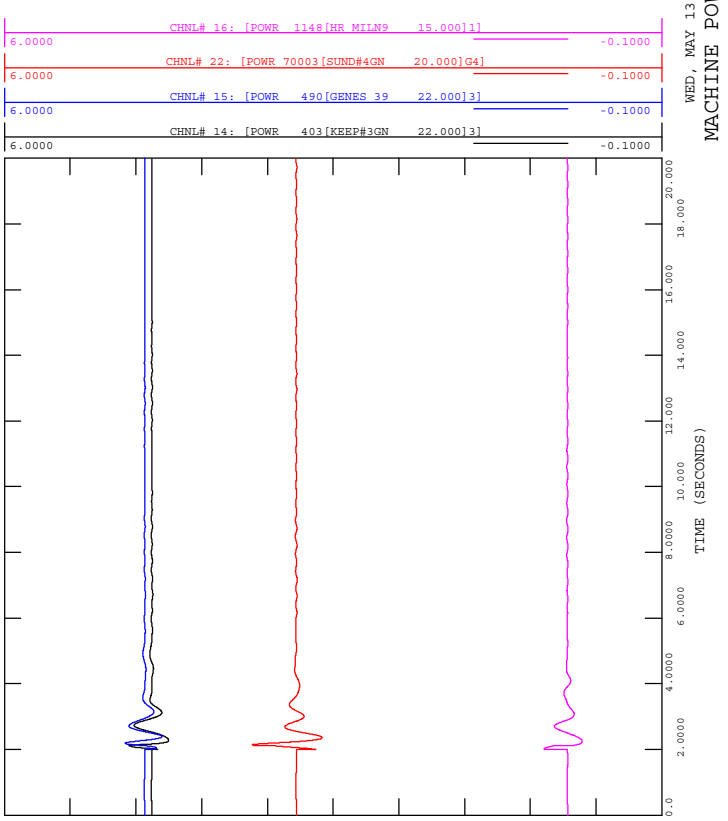


FIGURE D-40F
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out



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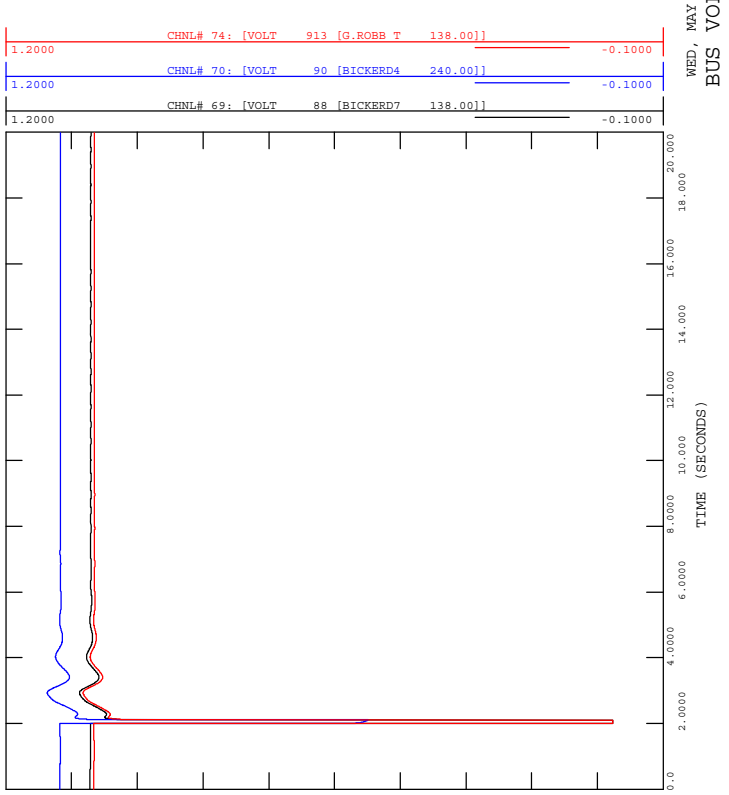
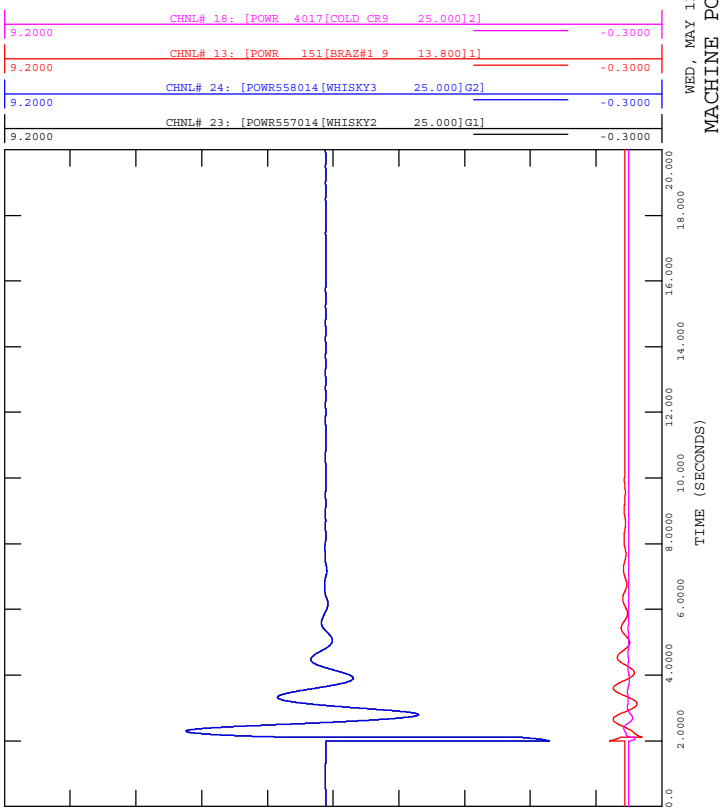
MACHINE POWER (MW)

FIGURE D-40H
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out



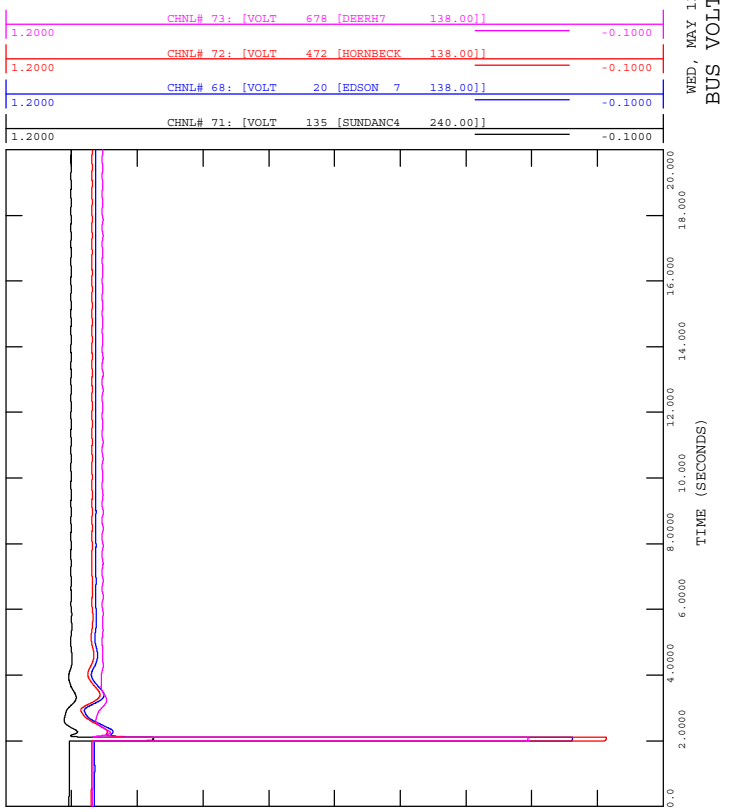
WED, MAY 13 2020 23:37
BUS VOLTAGE (PU)

FIGURE D-40E
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out



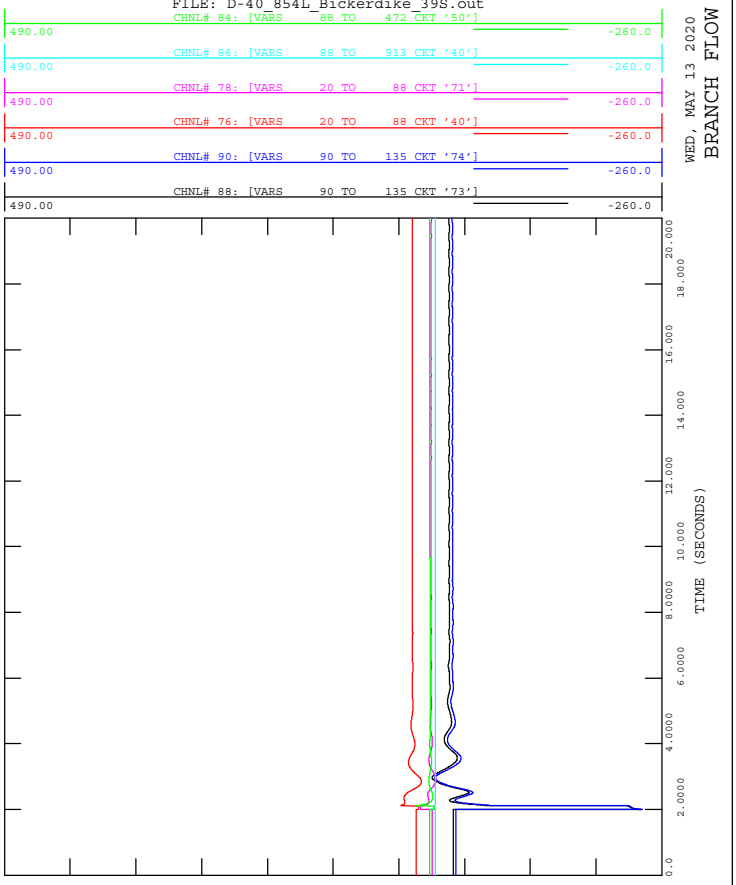
WED, MAY 13 2020 23:37
MACHINE POWER (MW)

FIGURE D-40G
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out



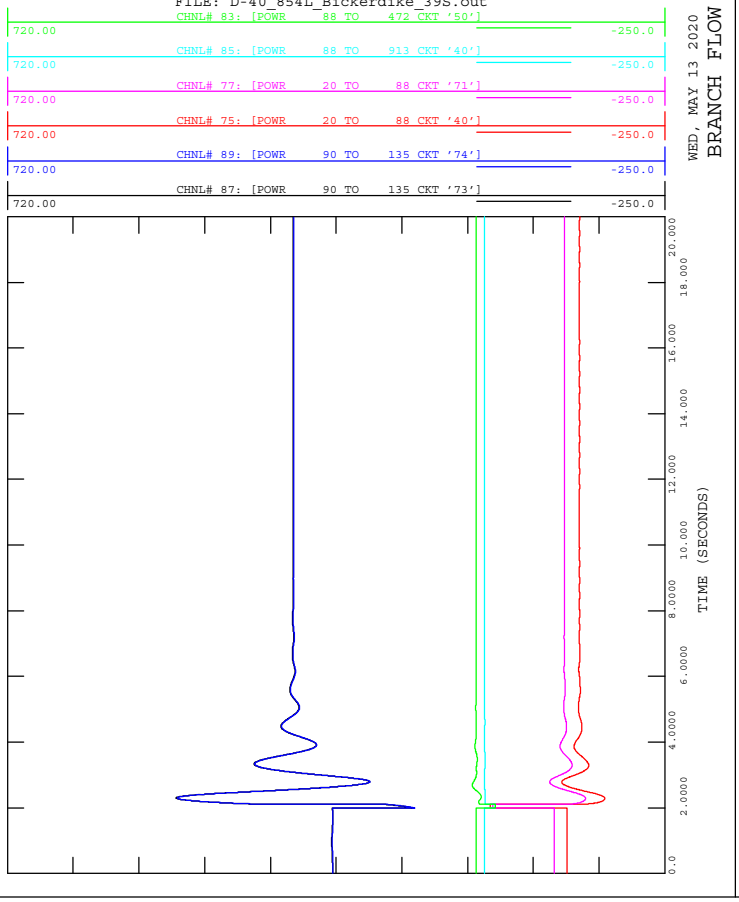
WED, MAY 13 2020 23:37
BUS VOLTAGE (PU)

FIGURE D-40J
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out



WED, MAY 13 2020 23:37
BRANCH FLOW (Q)

FIGURE D-40I
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-40_854L_Bickerdike_39S.out



WED, MAY 13 2020 23:37
BRANCH FLOW (P)

FIGURE D-41B
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out

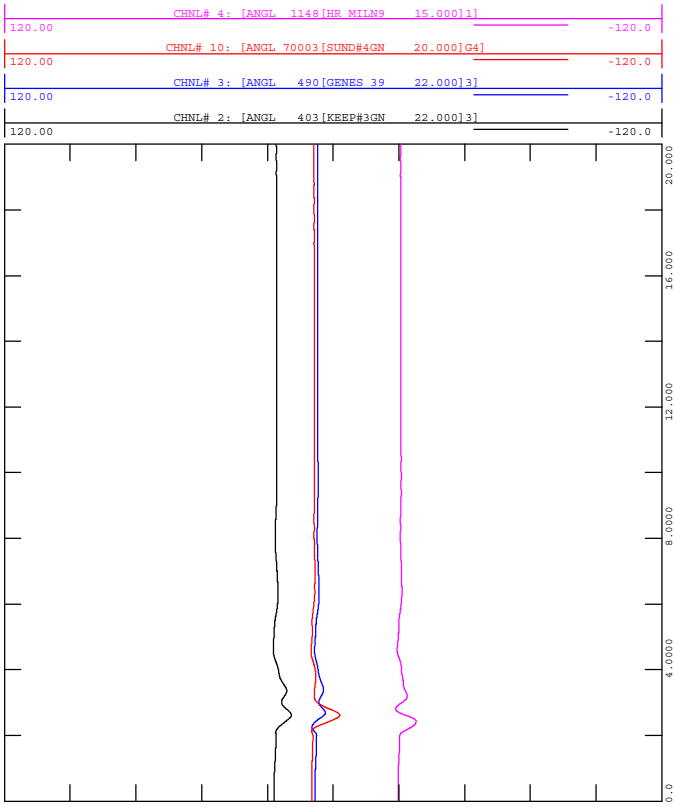


FIGURE D-41D
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out

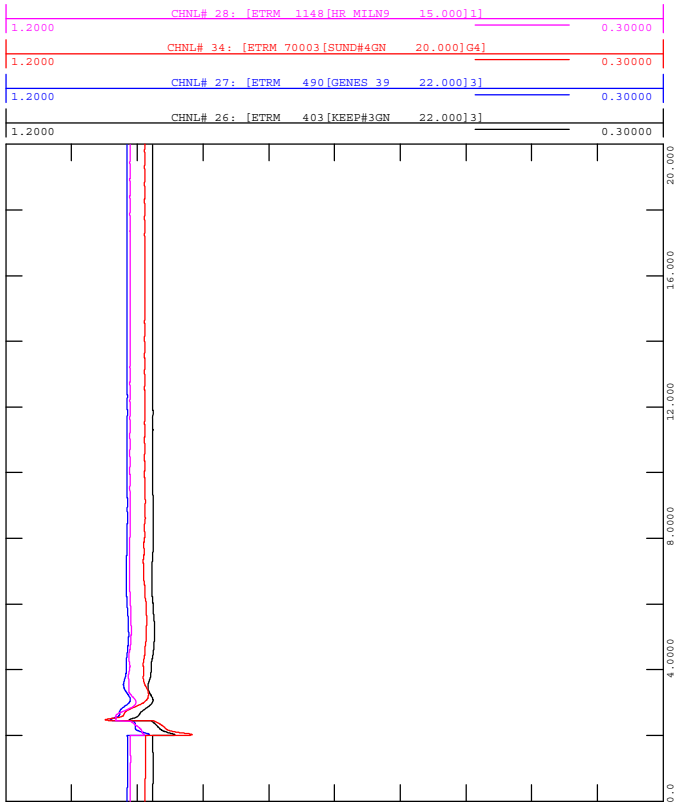


FIGURE D-41A
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out

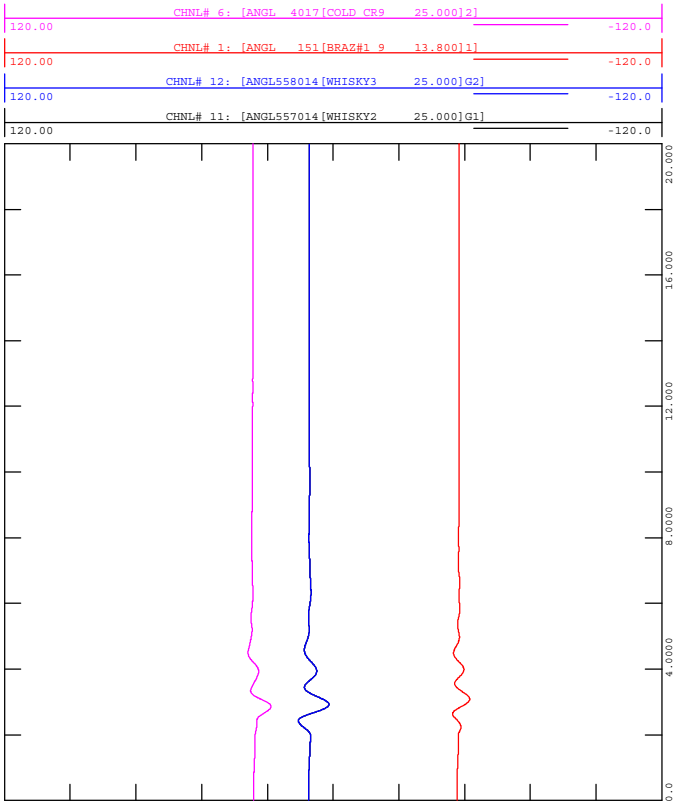


FIGURE D-41C
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out

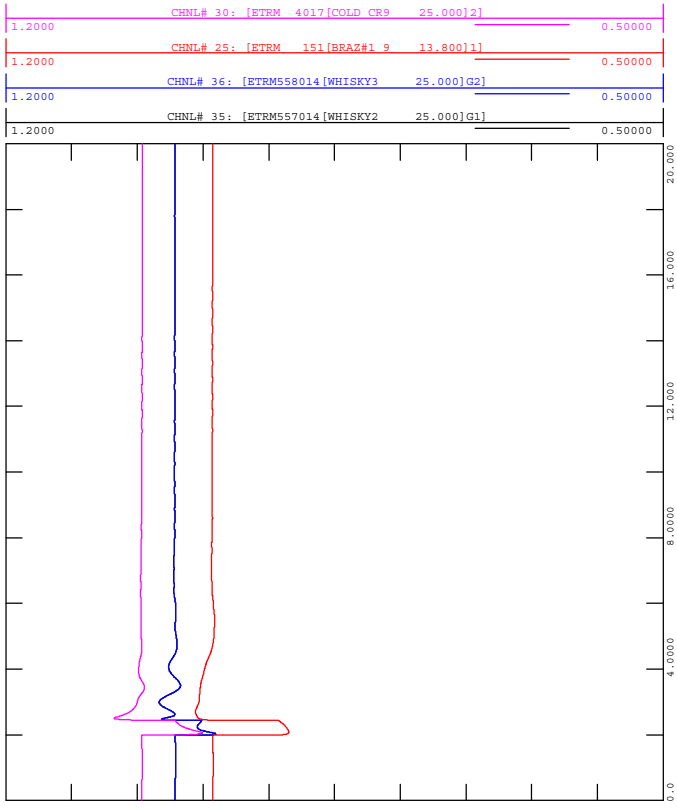


FIGURE D-41F
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out

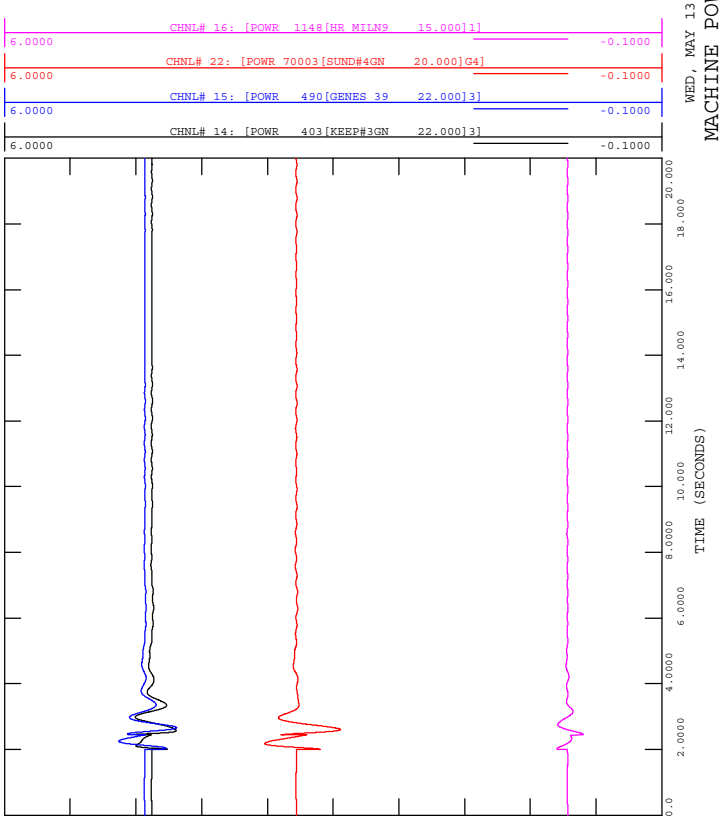


FIGURE D-41H
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out

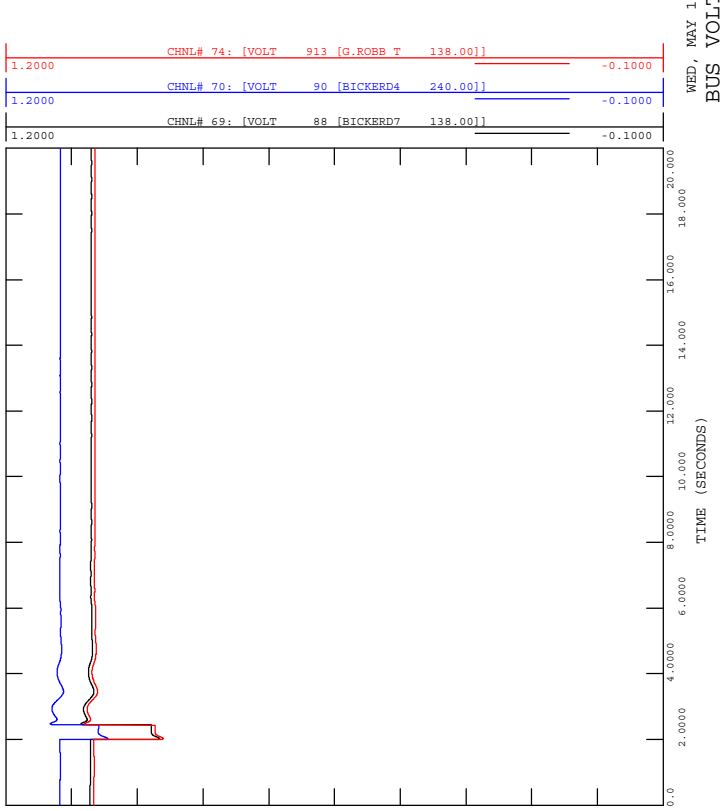


FIGURE D-41E
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out

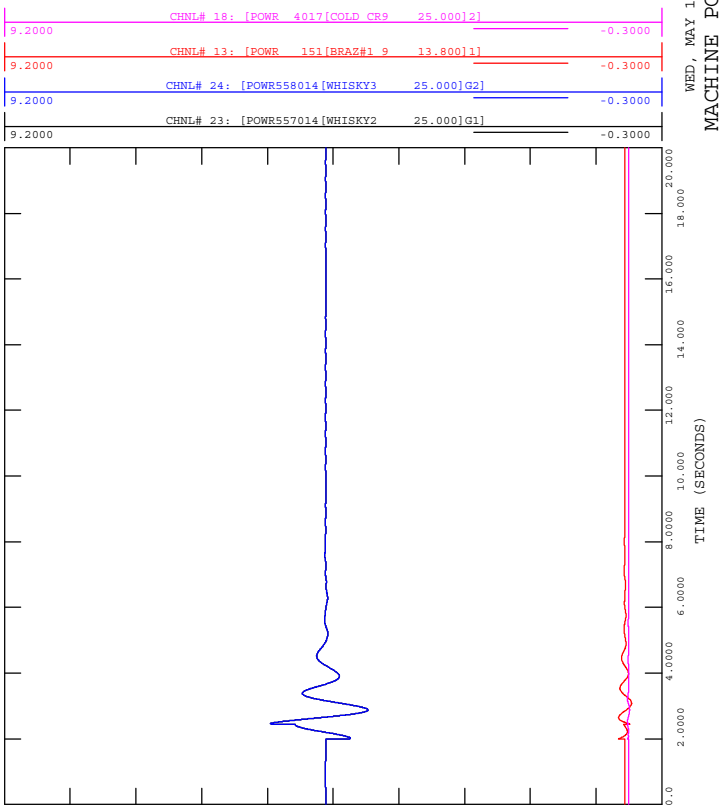


FIGURE D-41G
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out

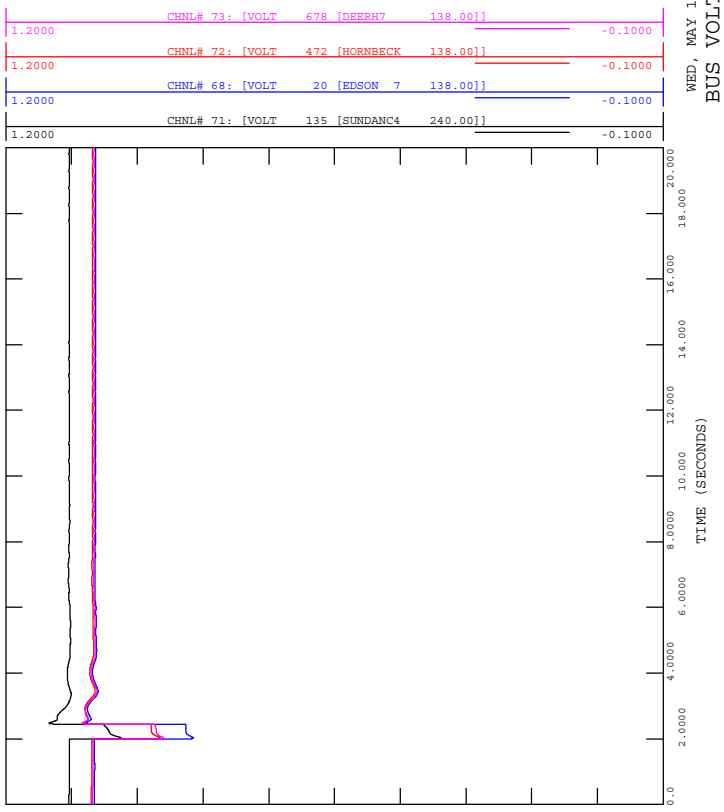
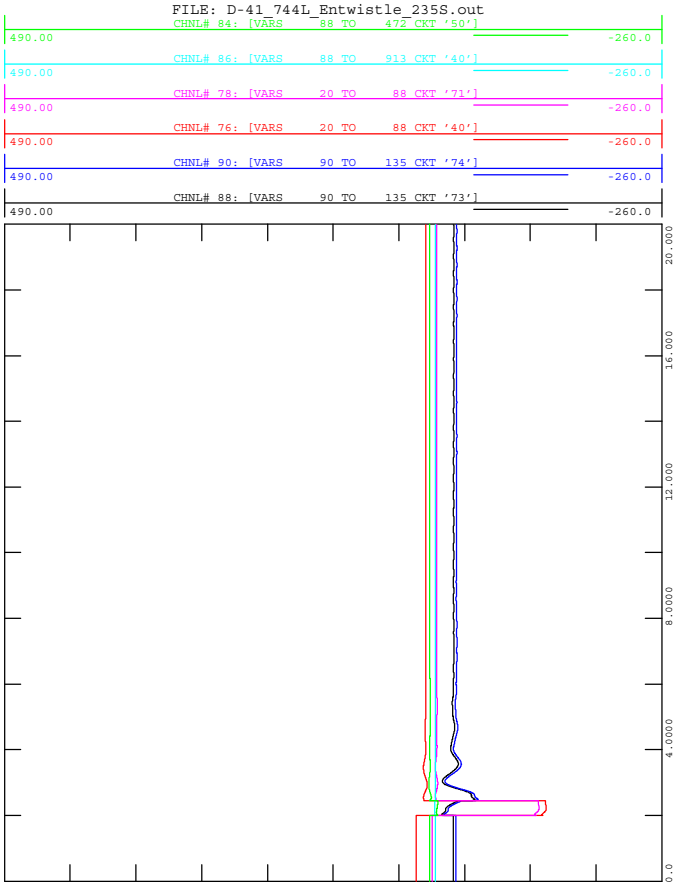


FIGURE D-41J
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out



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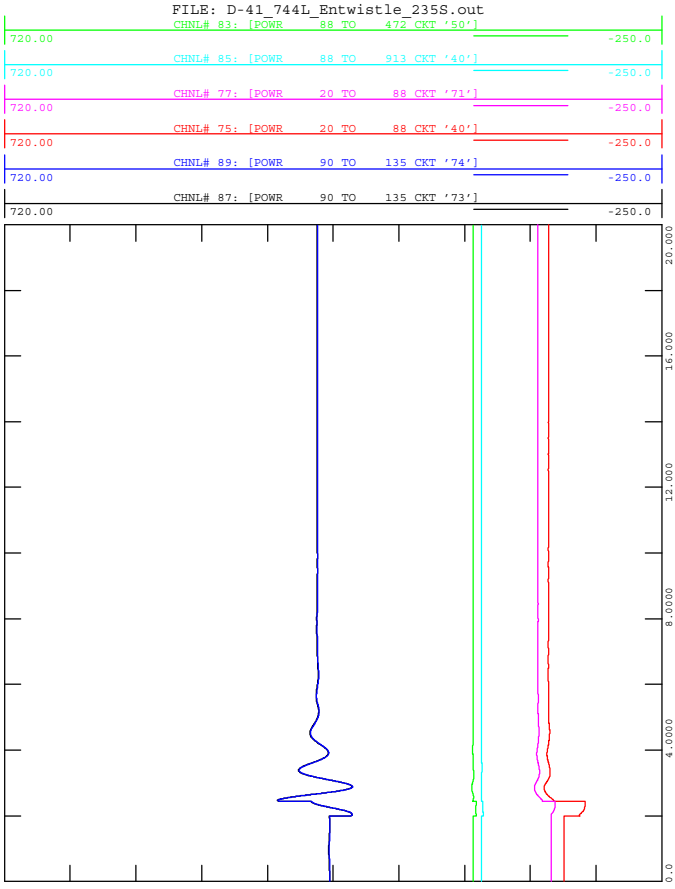
BRANCH FLOW (Q)

FIGURE D-41I
2022SL, POST-PROJECT
3-PHASE FAULT AT ENTWISTLE 235S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-41_744L_Entwistle_235S.out



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BRANCH FLOW (P)

FIGURE D-42B
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out

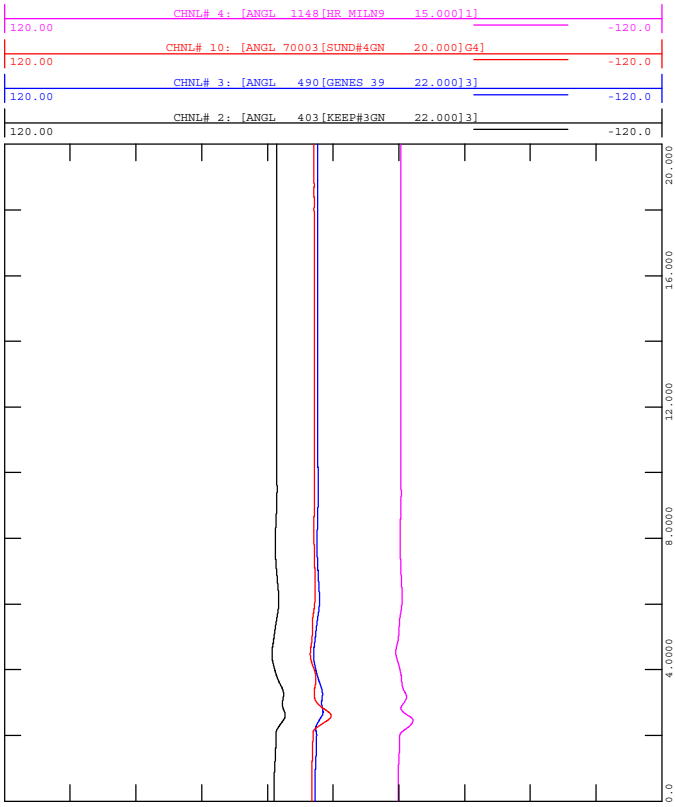


FIGURE D-42D
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out

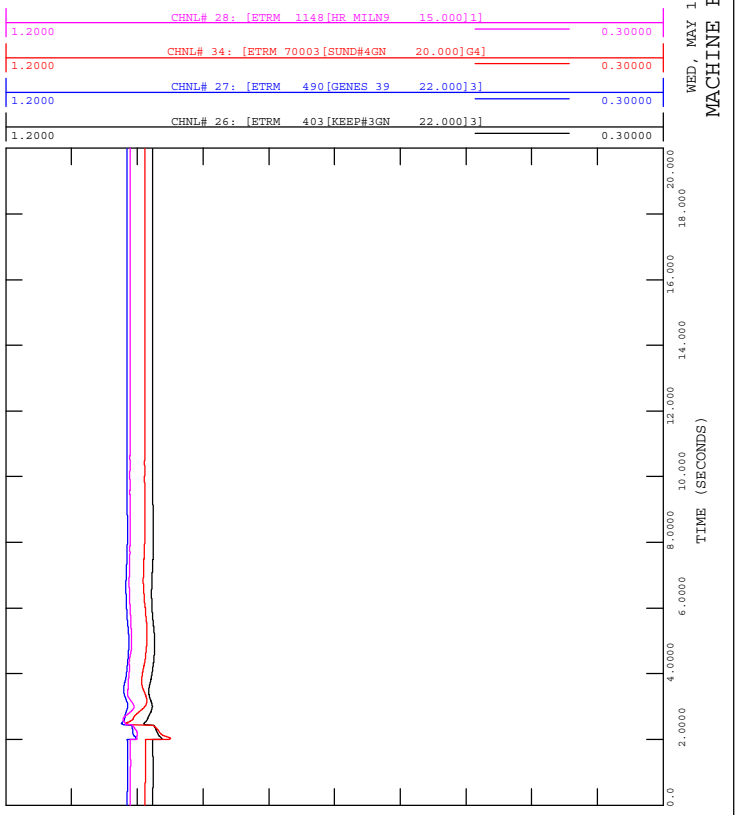


FIGURE D-42A
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out

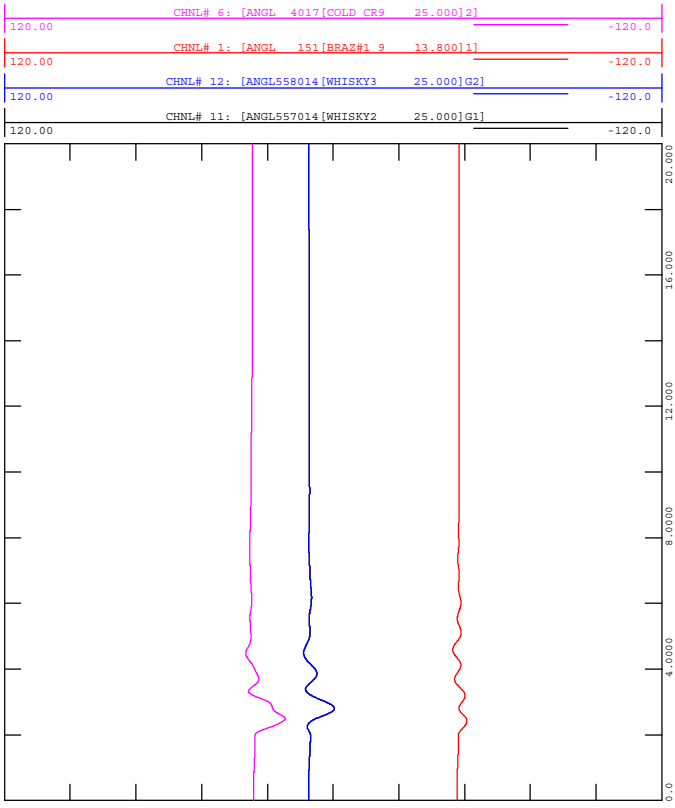


FIGURE D-42C
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out

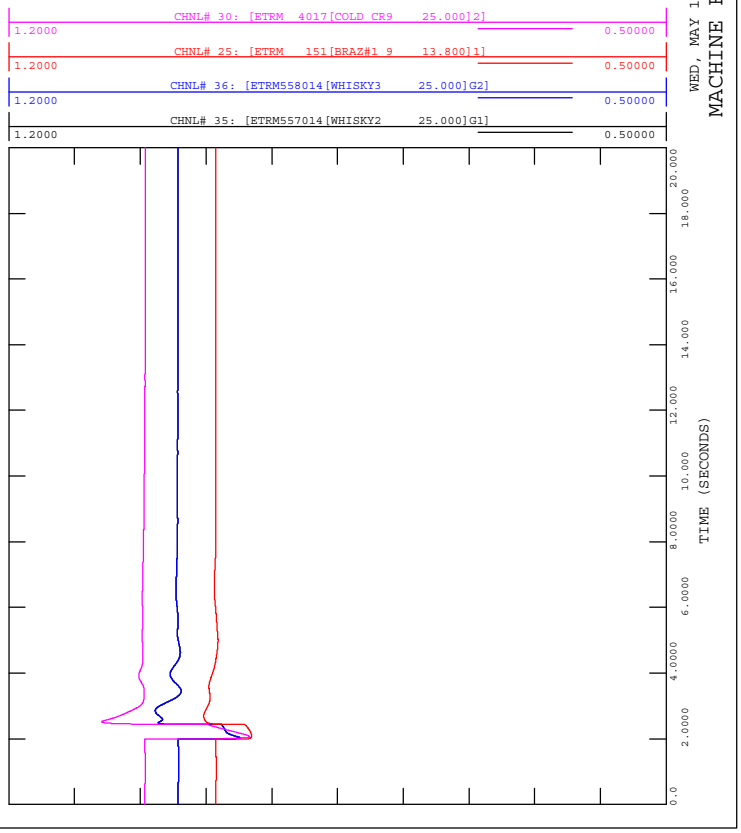
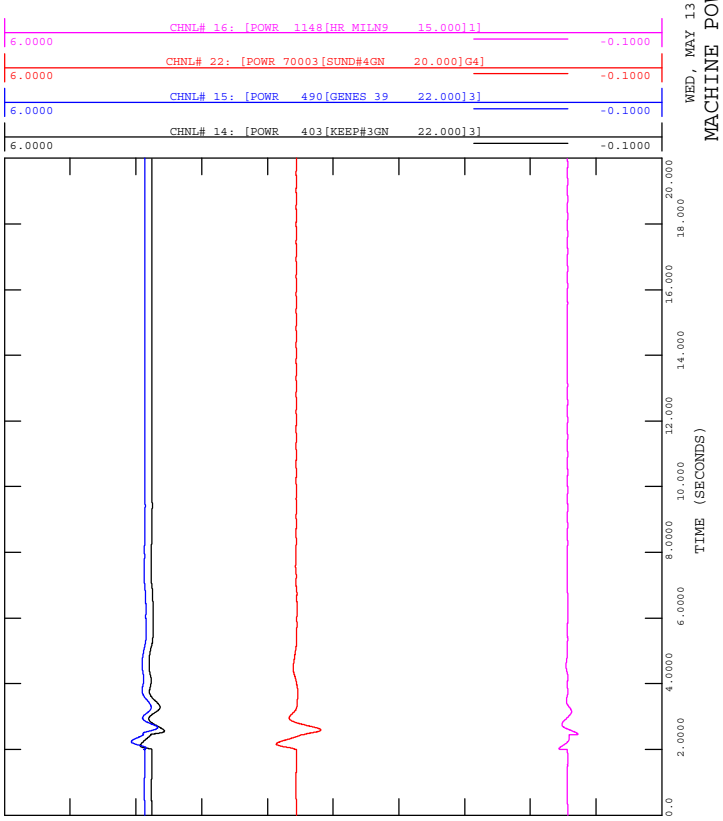
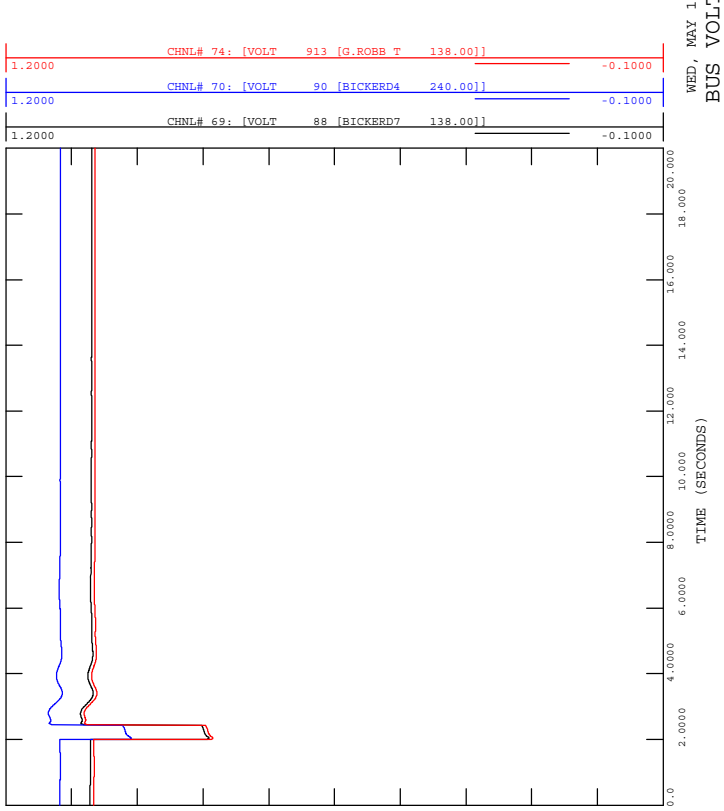


FIGURE D-42F
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out



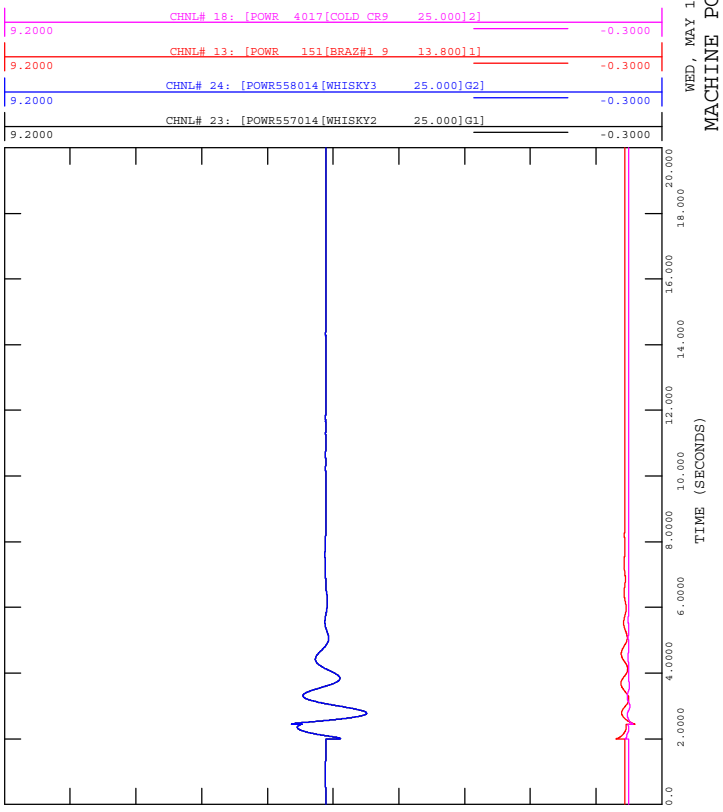
WED, MAY 13 2020 23:37
MACHINE POWER (MW)

FIGURE D-42H
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out



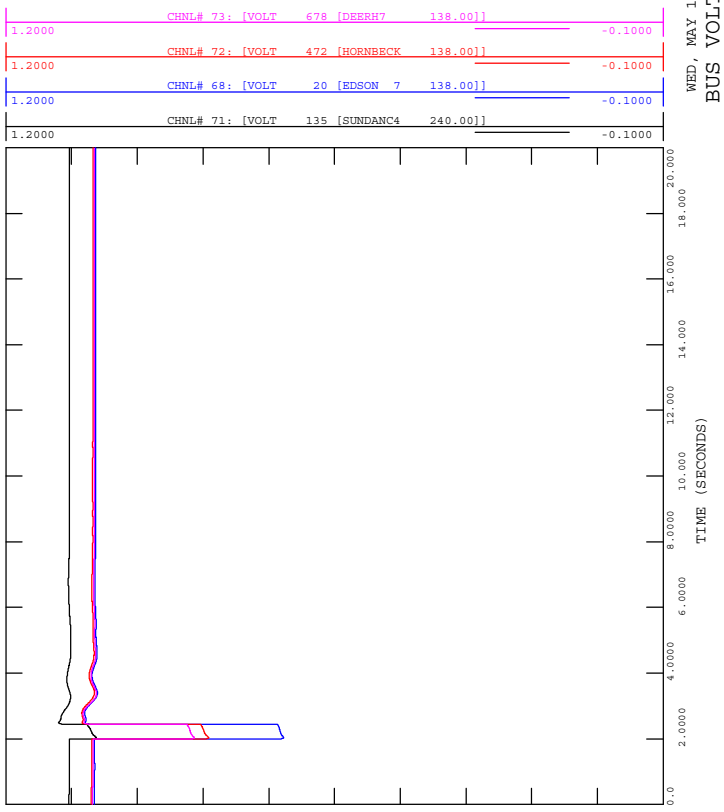
WED, MAY 13 2020 23:38
BUS VOLTAGE (PU)

FIGURE D-42E
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out



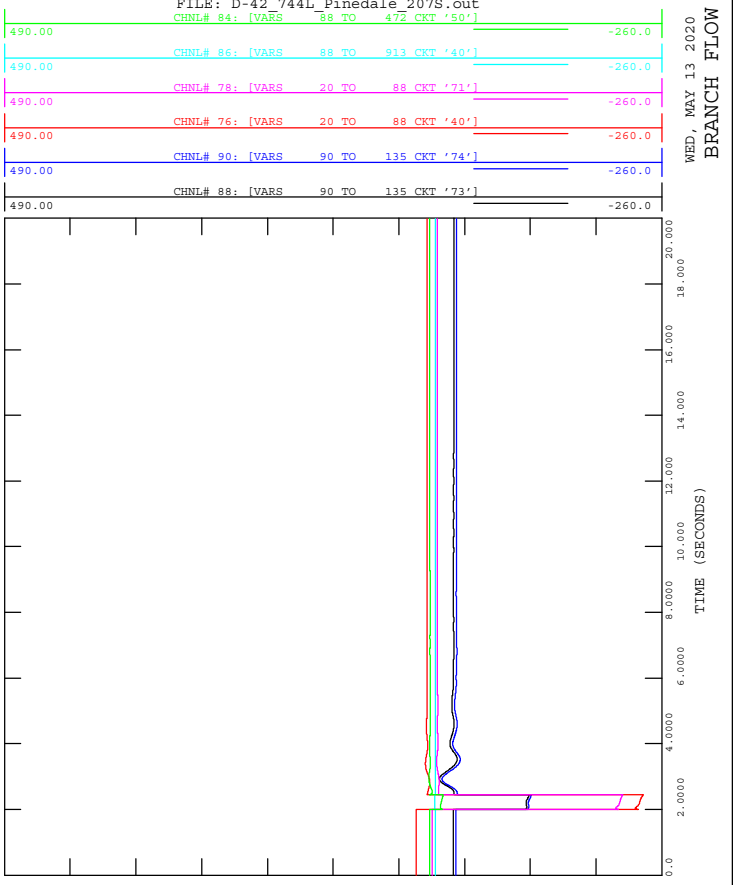
WED, MAY 13 2020 23:37
MACHINE POWER (MW)

FIGURE D-42G
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out



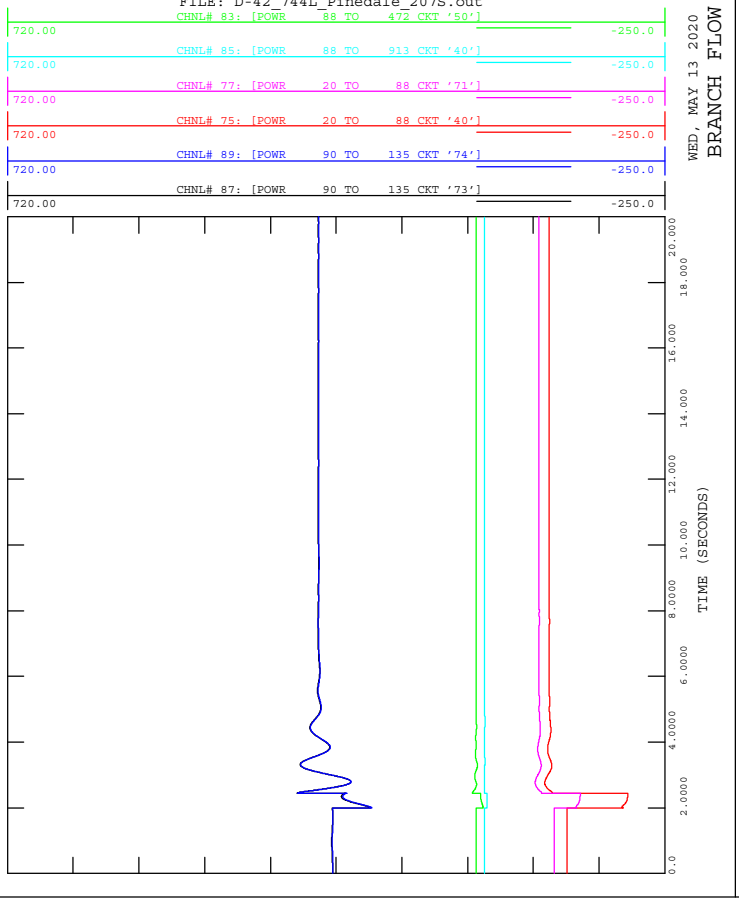
WED, MAY 13 2020 23:37
BUS VOLTAGE (PU)

FIGURE D-42J
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out



WED, MAY 13 2020 23:38
BRANCH FLOW (Q)

FIGURE D-42I
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 27 CYCLES
FILE: D-42_744L_Pinedale_207S.out



WED, MAY 13 2020 23:38
BRANCH FLOW (P)

FIGURE D-43B
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out

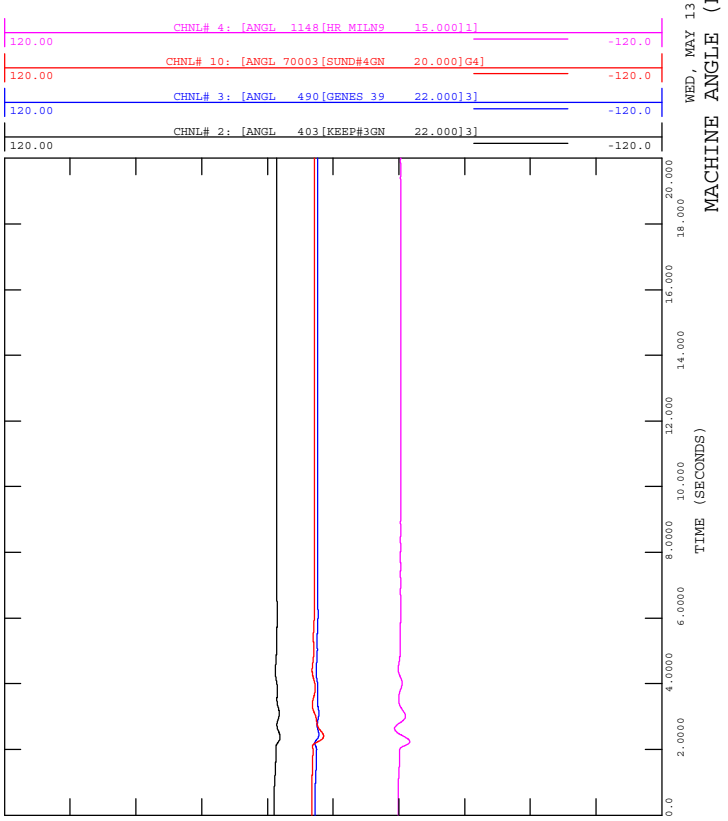


FIGURE D-43D
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out

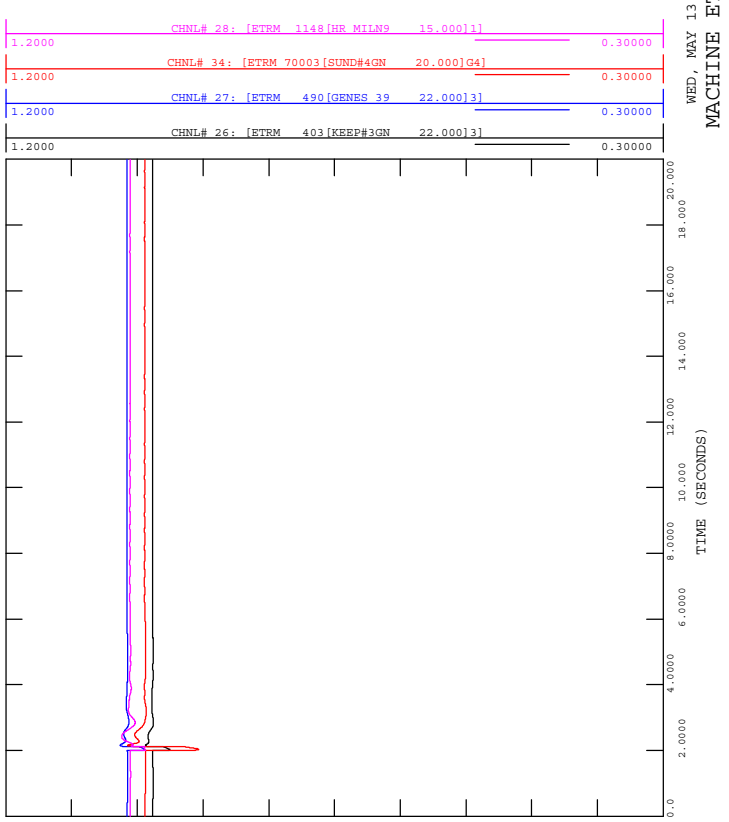


FIGURE D-43A
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out

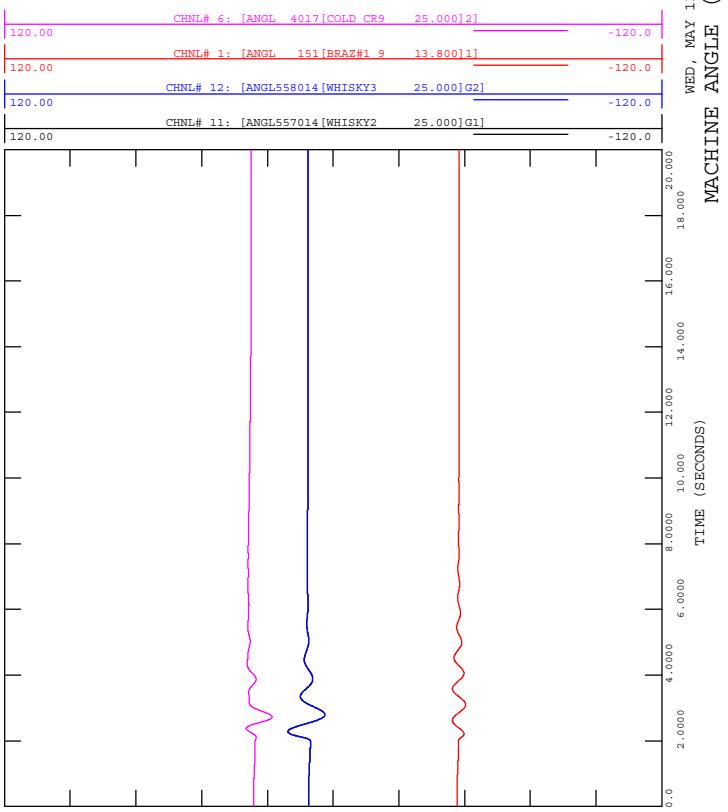


FIGURE D-43C
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out

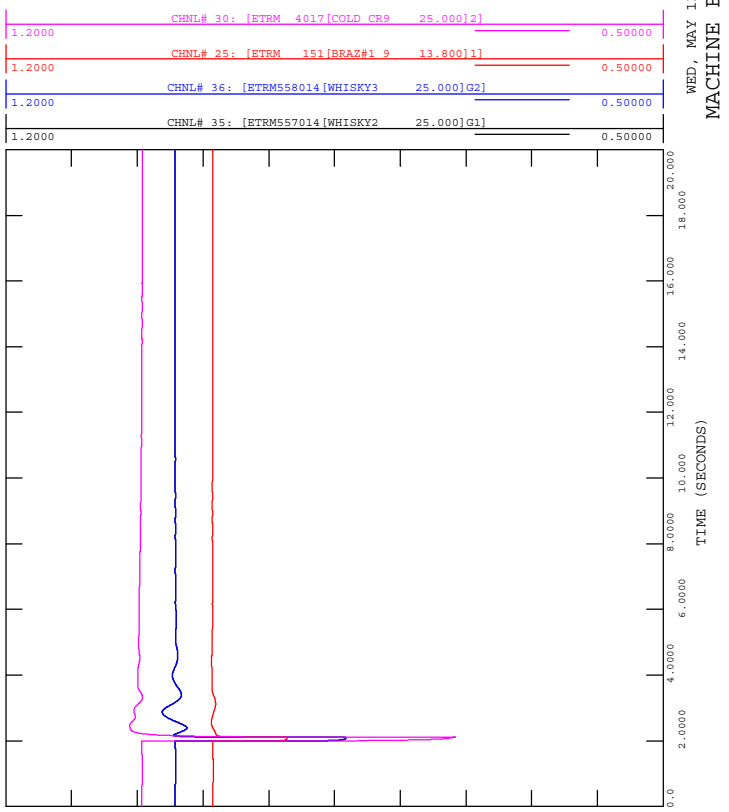
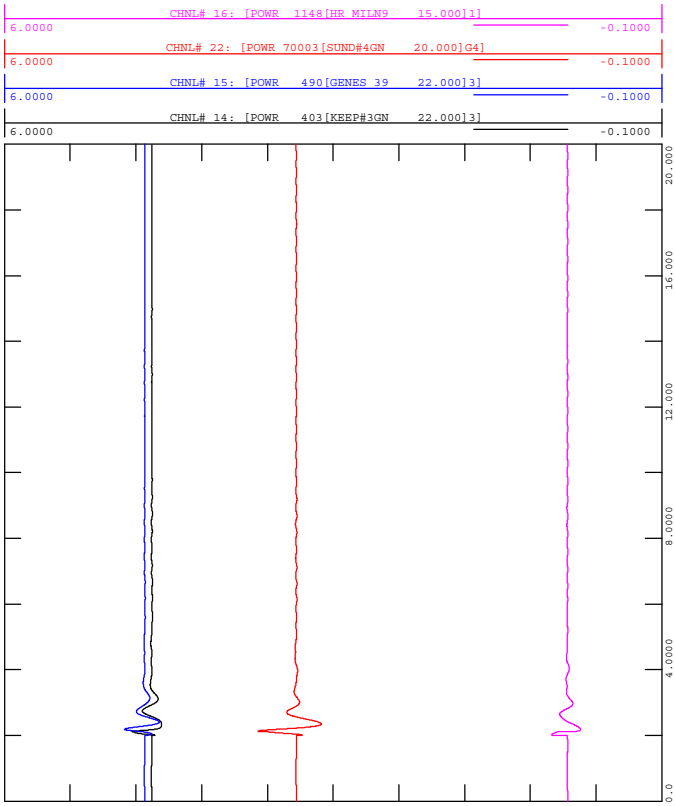
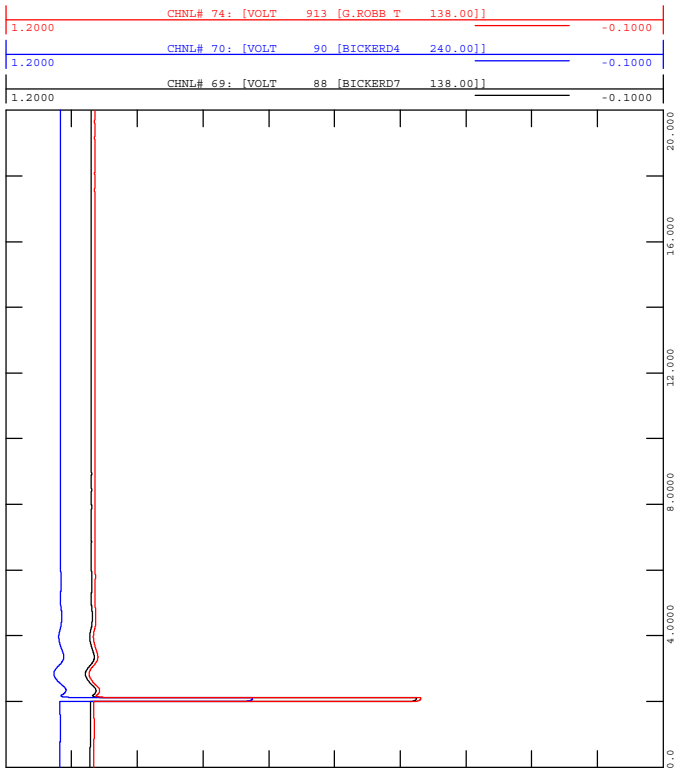


FIGURE D-43F
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out



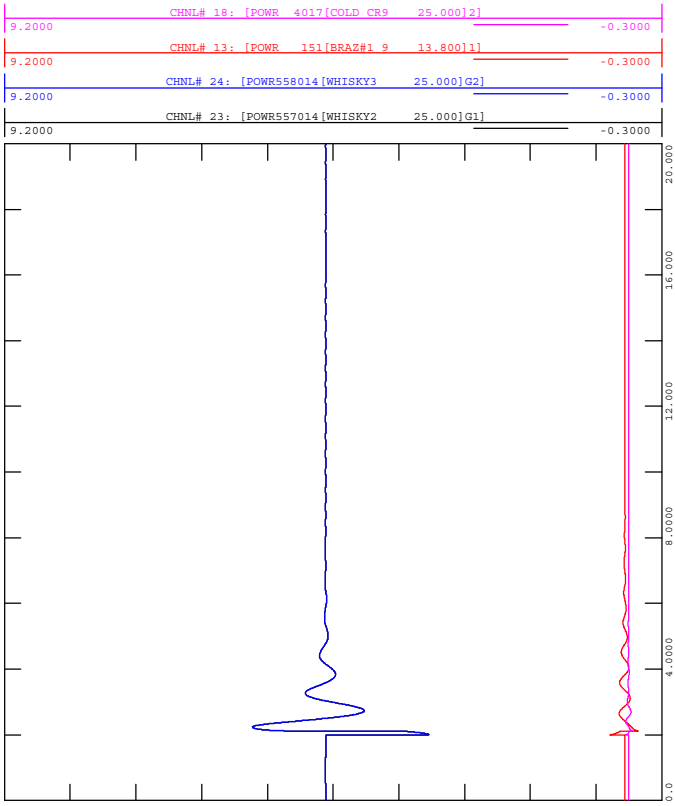
WED, MAY 13 2020 23:38
MACHINE POWER (MW)

FIGURE D-43H
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out



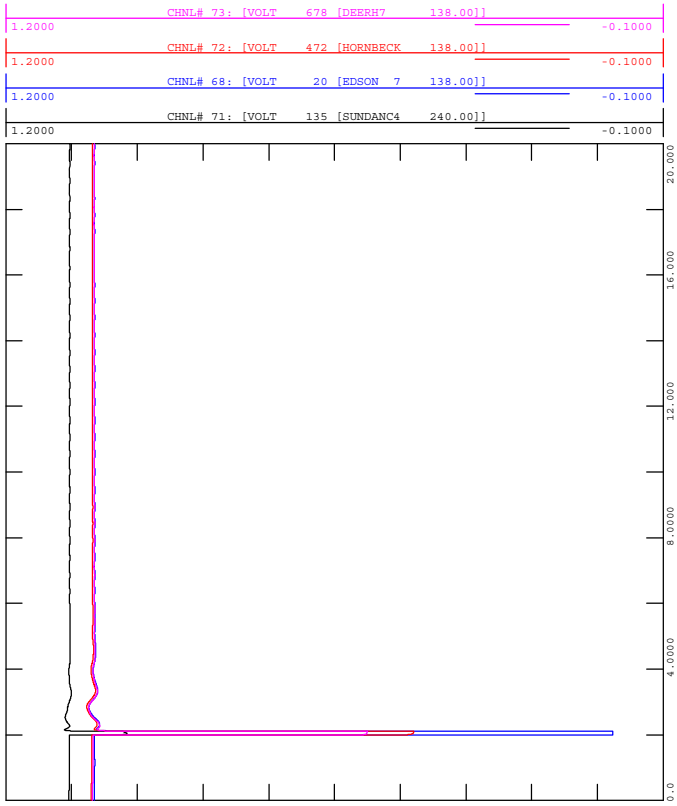
WED, MAY 13 2020 23:38
BUS VOLTAGE (PU)

FIGURE D-43E
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out



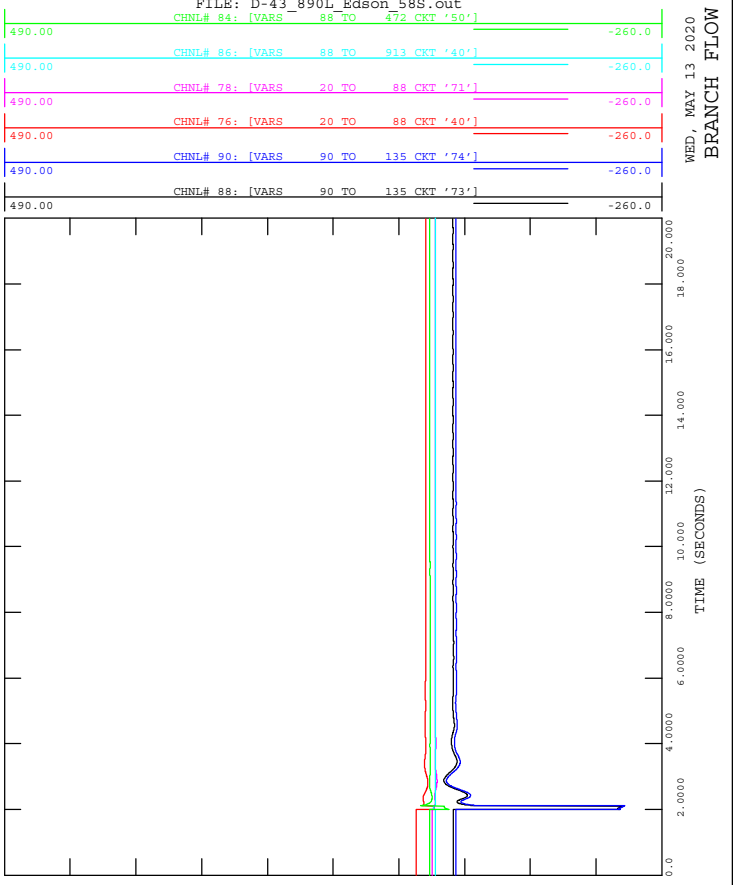
WED, MAY 13 2020 23:38
MACHINE POWER (MW)

FIGURE D-43G
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out



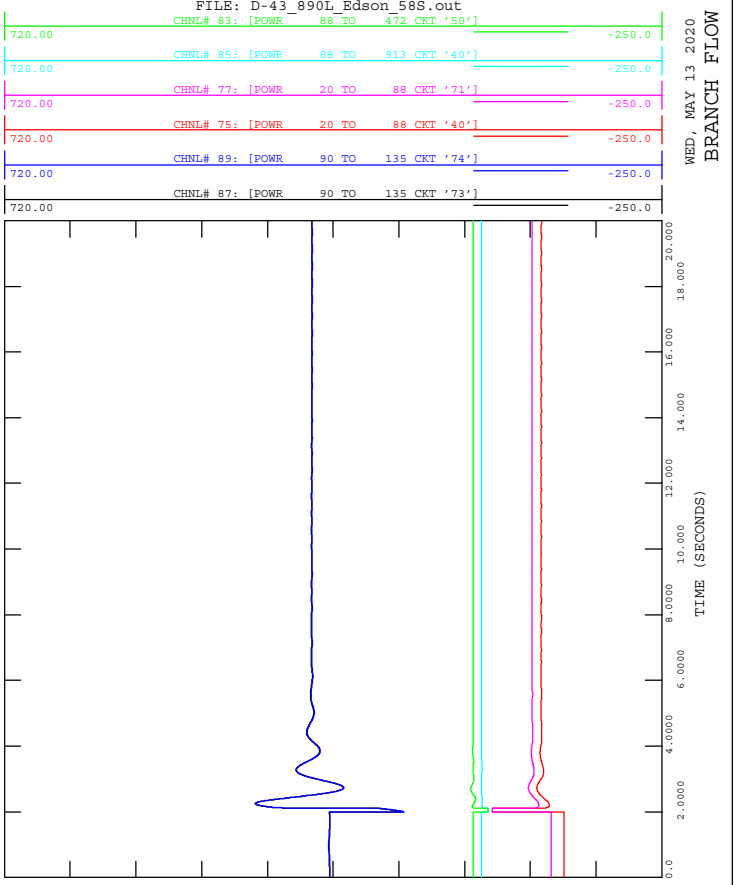
WED, MAY 13 2020 23:38
BUS VOLTAGE (PU)

FIGURE D-43J
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out



WED, MAY 13 2020 23:38
BRANCH FLOW (Q)

FIGURE D-43I
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-43_890L_Edson_58S.out



WED, MAY 13 2020 23:38
BRANCH FLOW (P)

FIGURE D-44B
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out

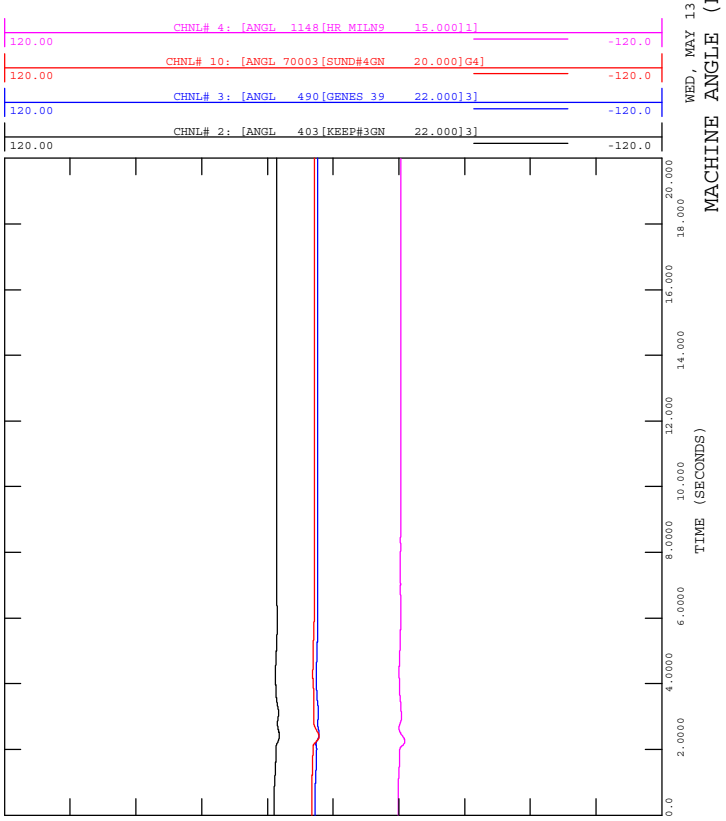


FIGURE D-44D
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out

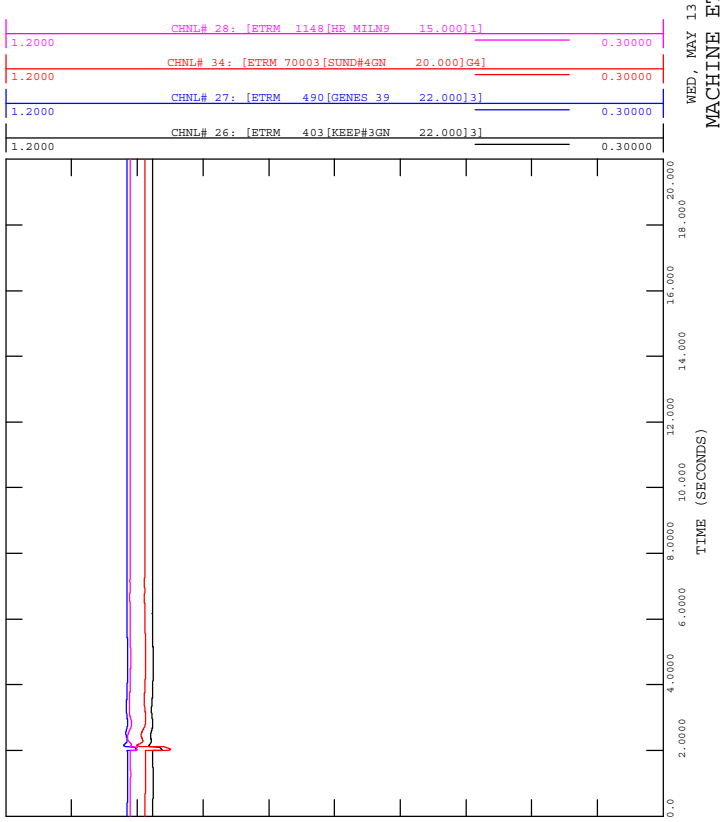


FIGURE D-44A
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out

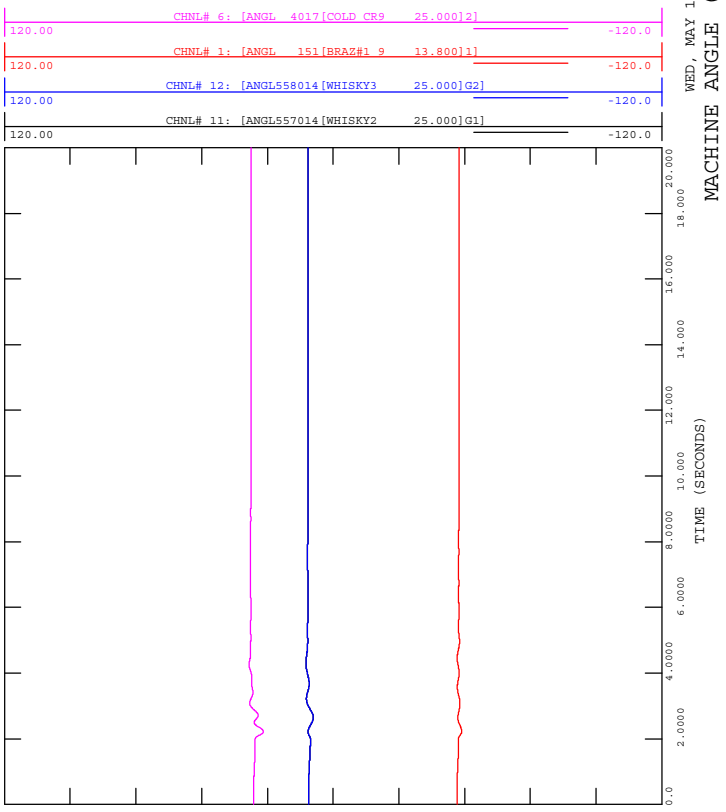


FIGURE D-44C
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out

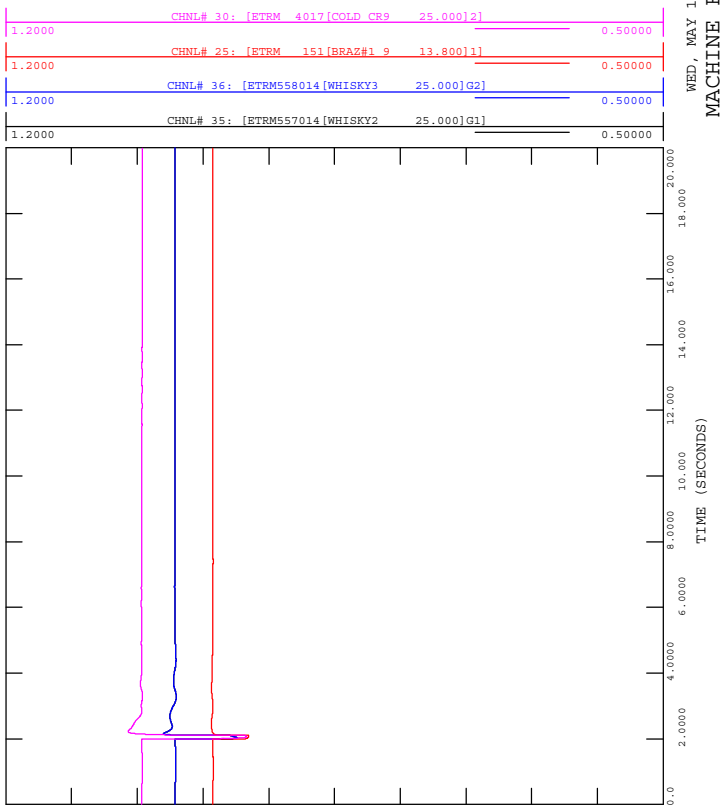
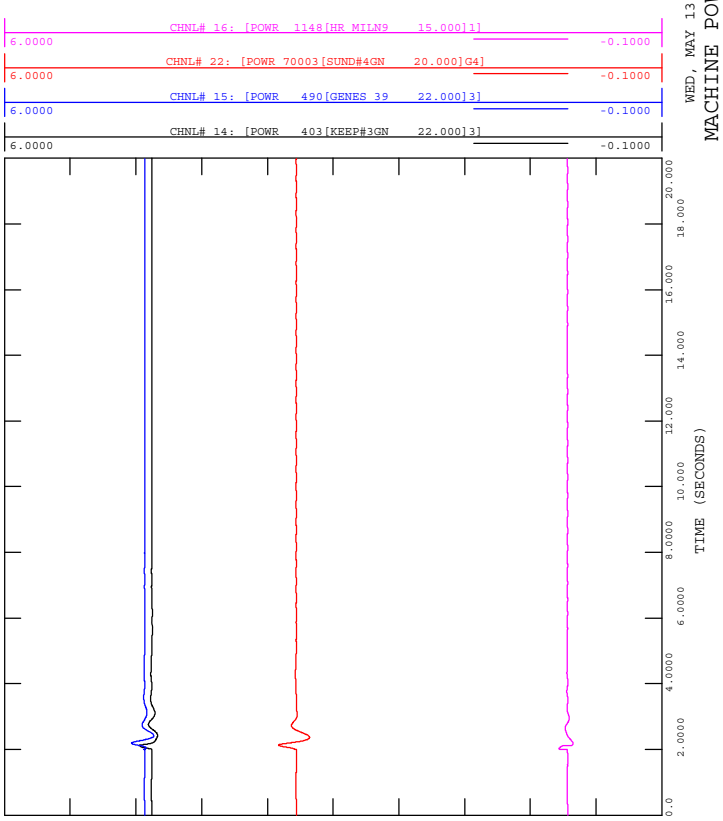


FIGURE D-44F
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out



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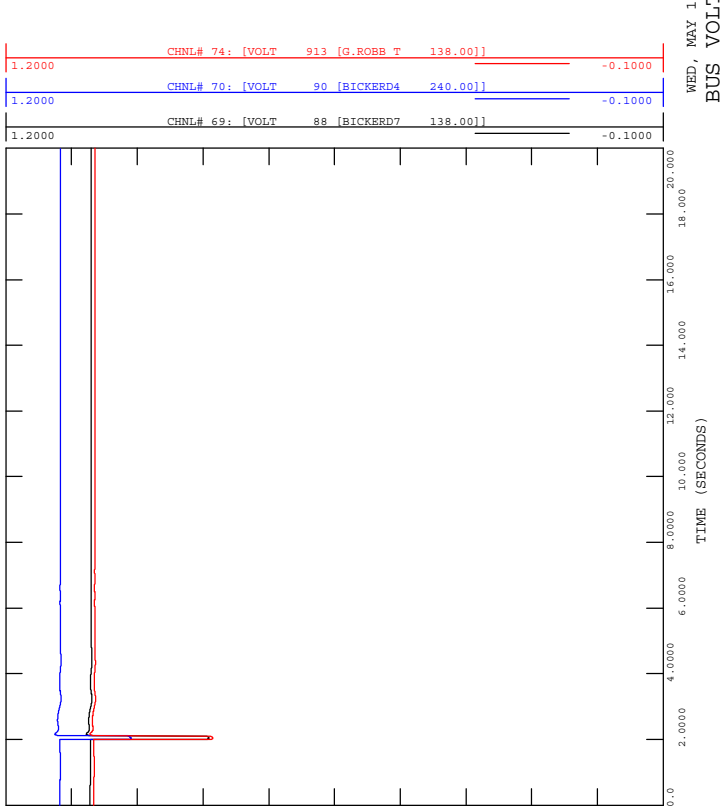
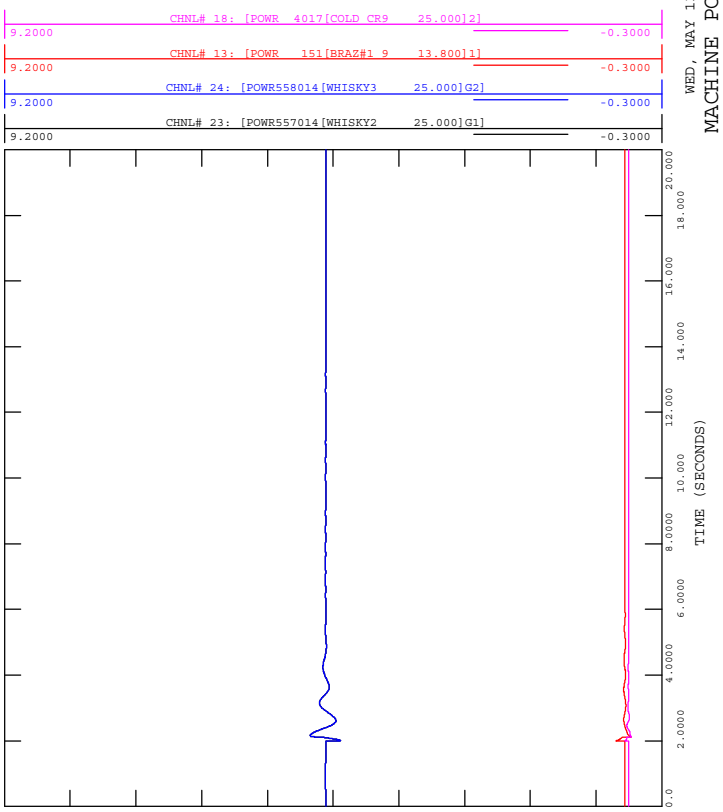
MACHINE POWER (MW)

FIGURE D-44H
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out



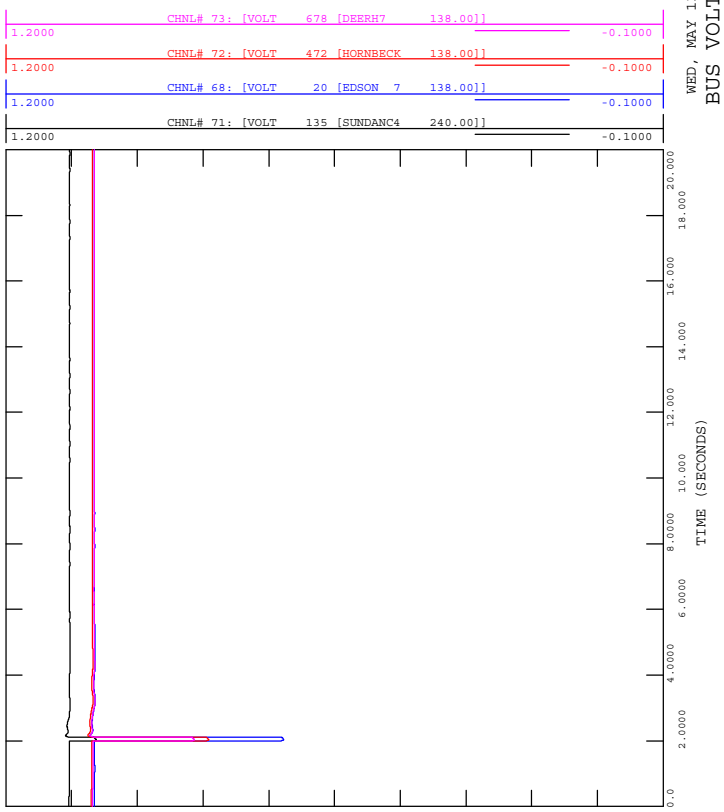
WED, MAY 13 2020 23:38
BUS VOLTAGE (PU)

FIGURE D-44E
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out



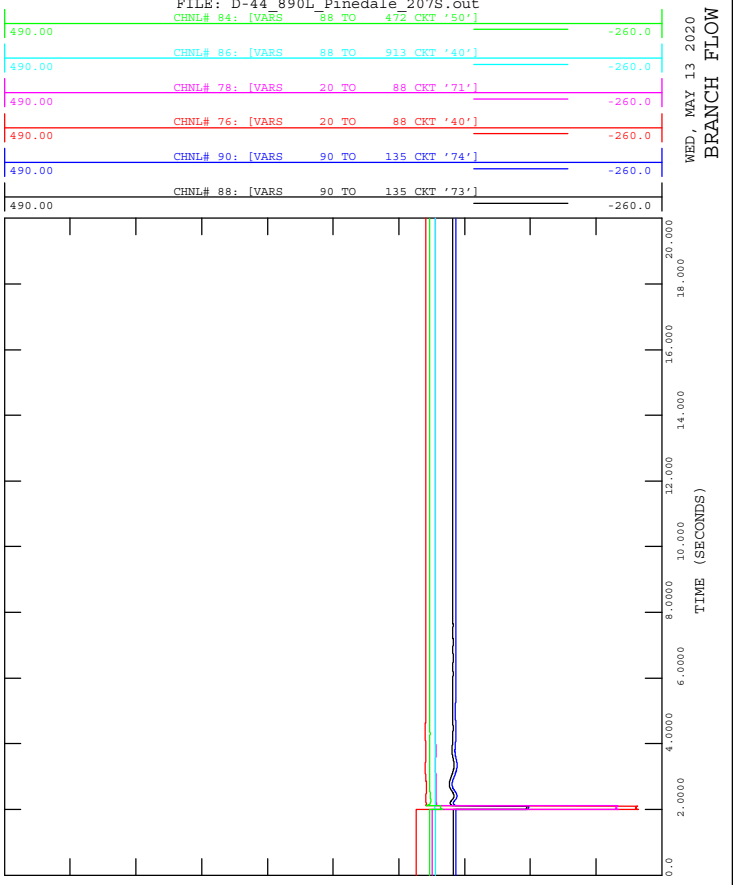
WED, MAY 13 2020 23:38
MACHINE POWER (MW)

FIGURE D-44G
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out



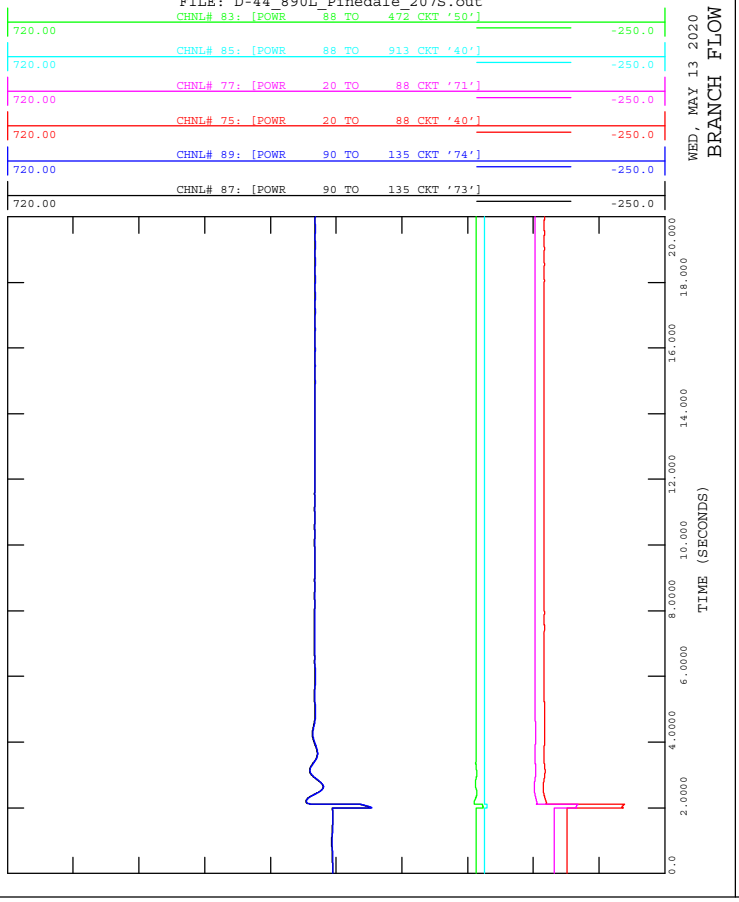
WED, MAY 13 2020 23:38
BUS VOLTAGE (PU)

FIGURE D-44J
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out



WED, MAY 13 2020 23:38
BRANCH FLOW (Q)

FIGURE D-44I
2022SL, POST-PROJECT
3-PHASE FAULT AT PINEDALE 207S
CLEARED IN 6 CYCLES, FAR END IN 7 CYCLES
FILE: D-44_890L_Pinedale_207S.out



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BRANCH FLOW (P)

FIGURE D-45B
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out

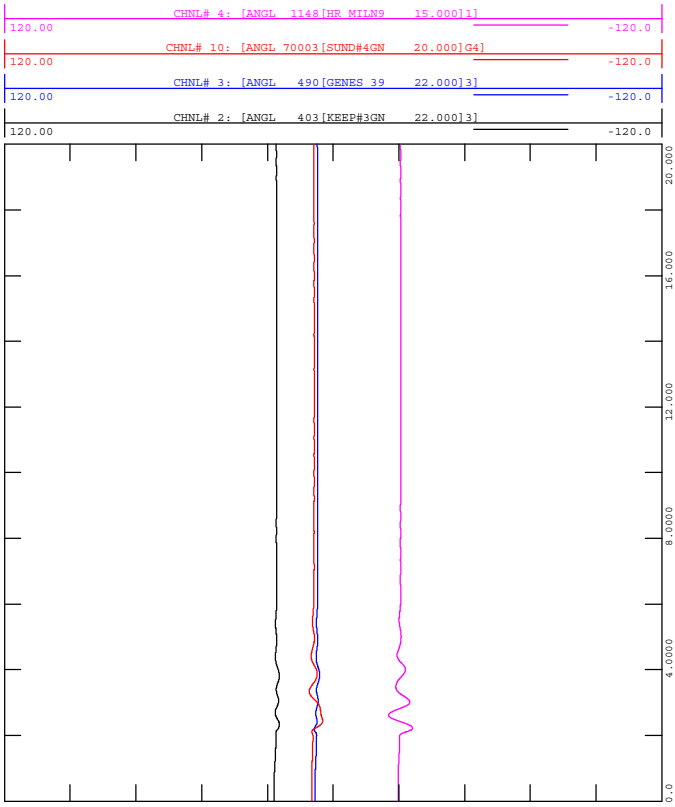


FIGURE D-45D
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out

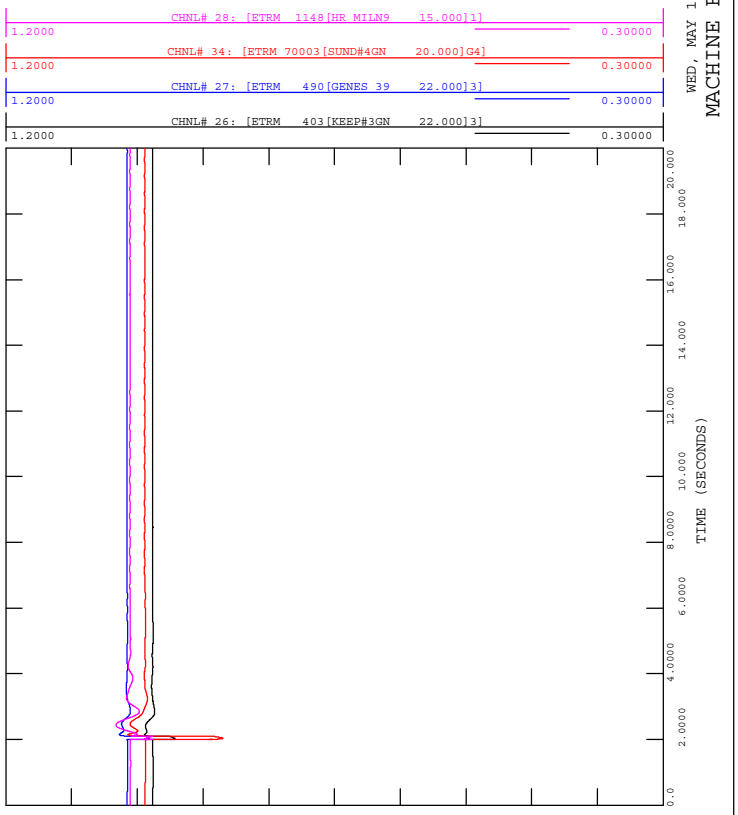


FIGURE D-45A
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out

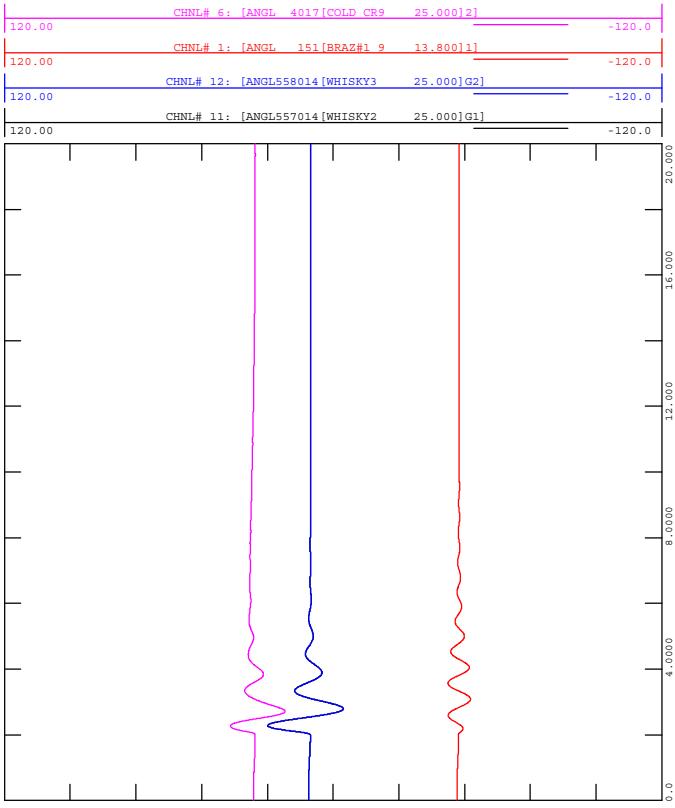


FIGURE D-45C
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out

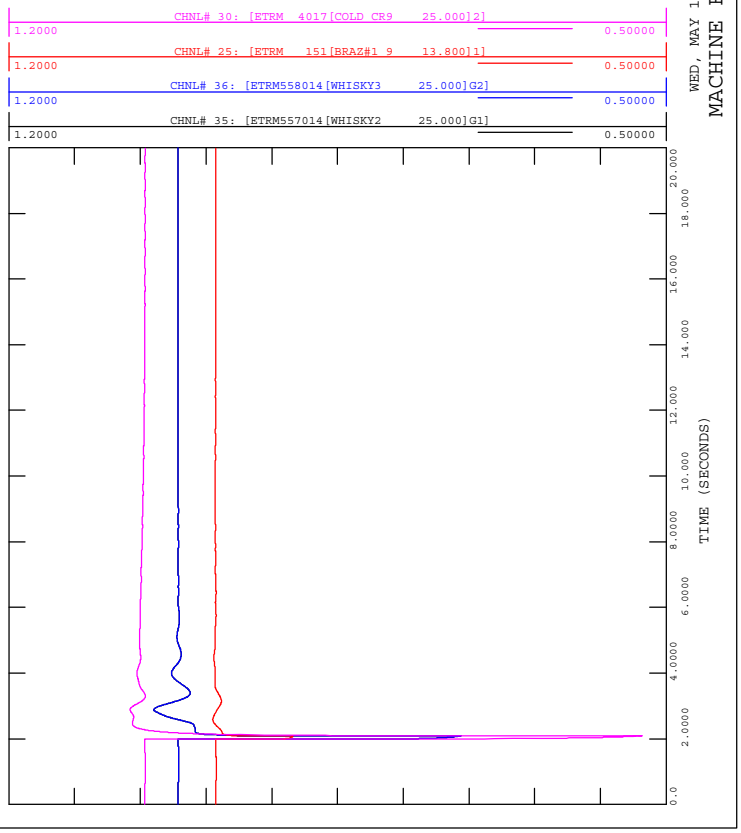


FIGURE D-45F
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out

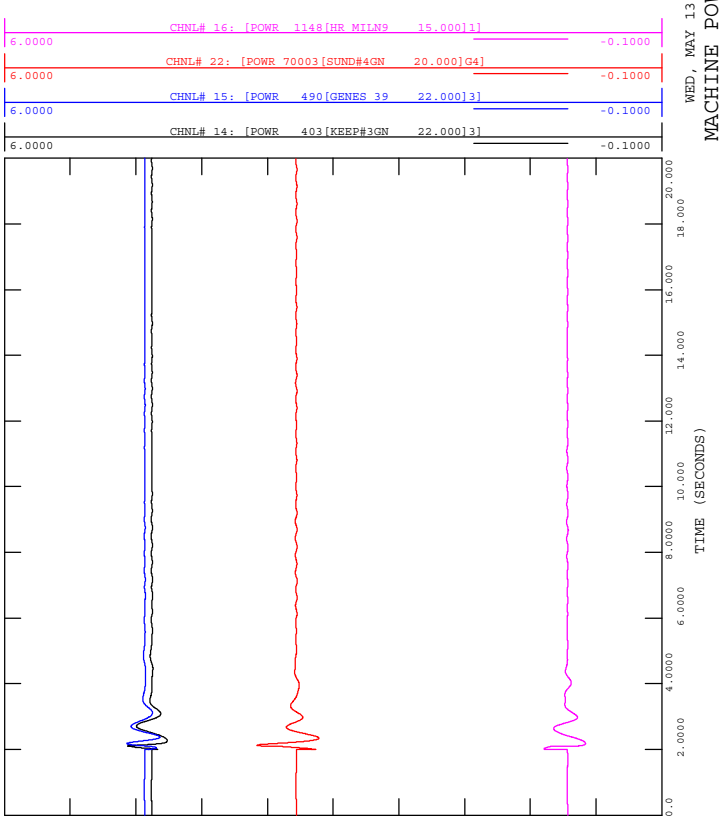


FIGURE D-45H
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out

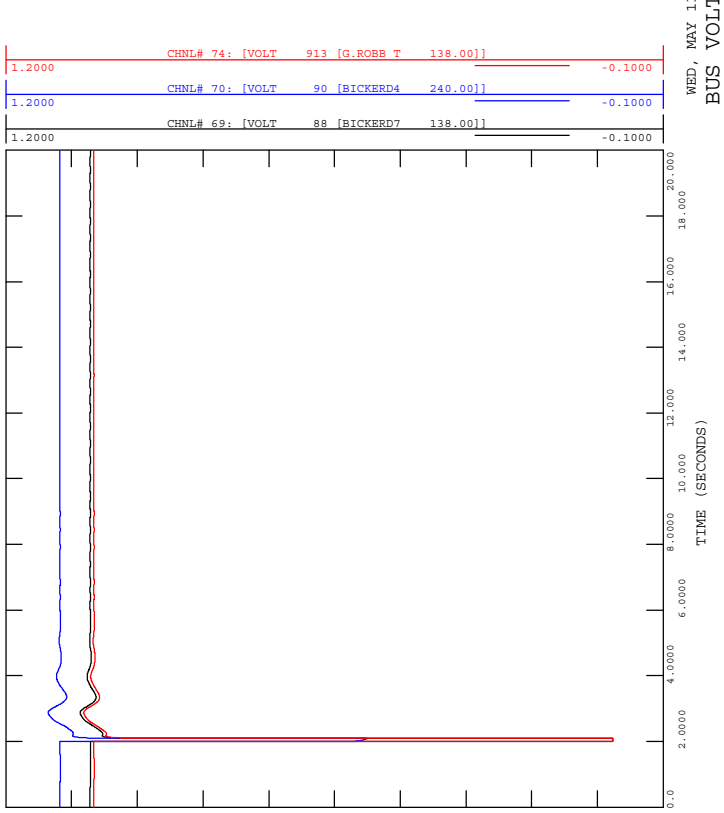


FIGURE D-45E
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out

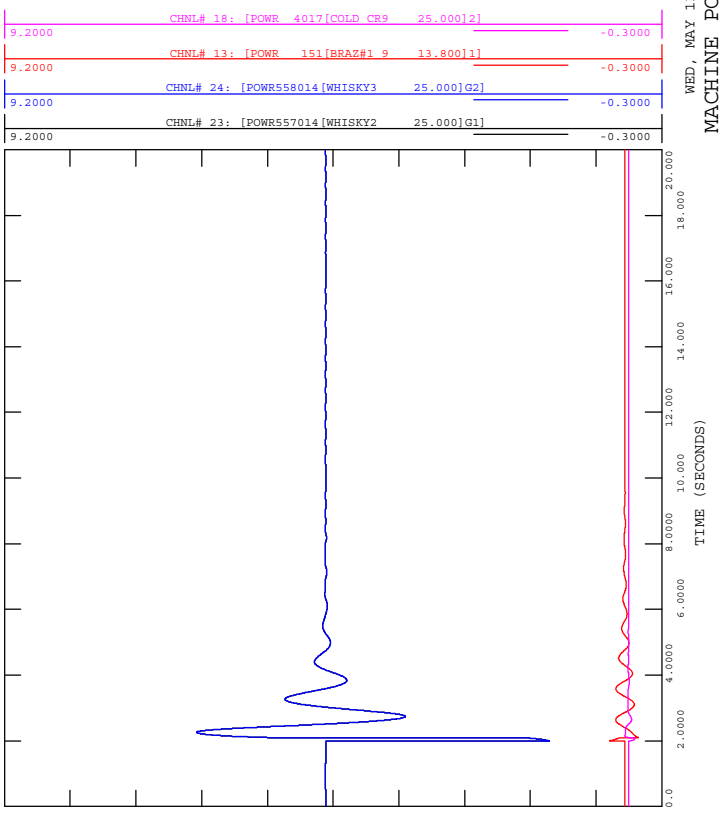


FIGURE D-45G
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out

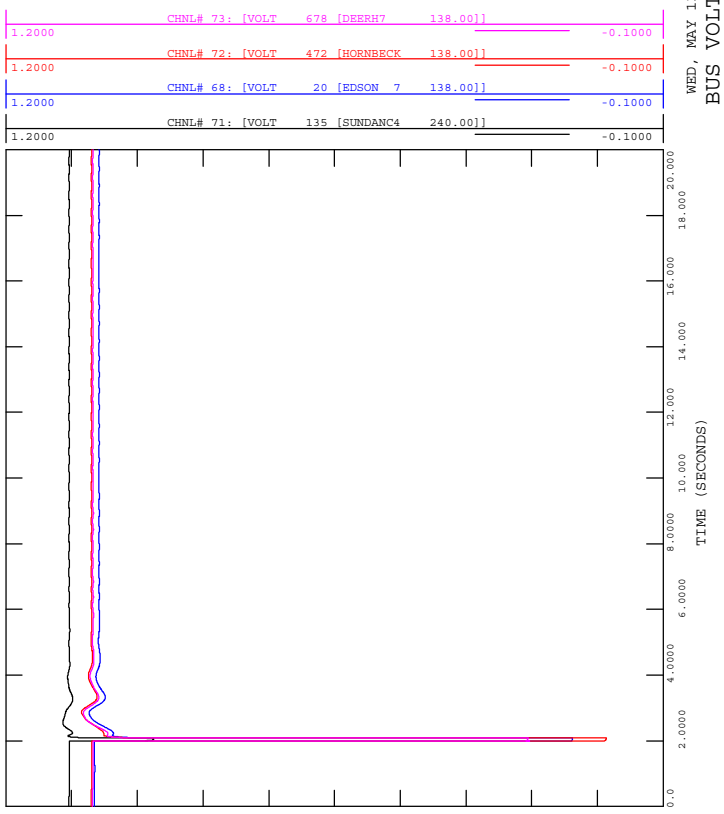
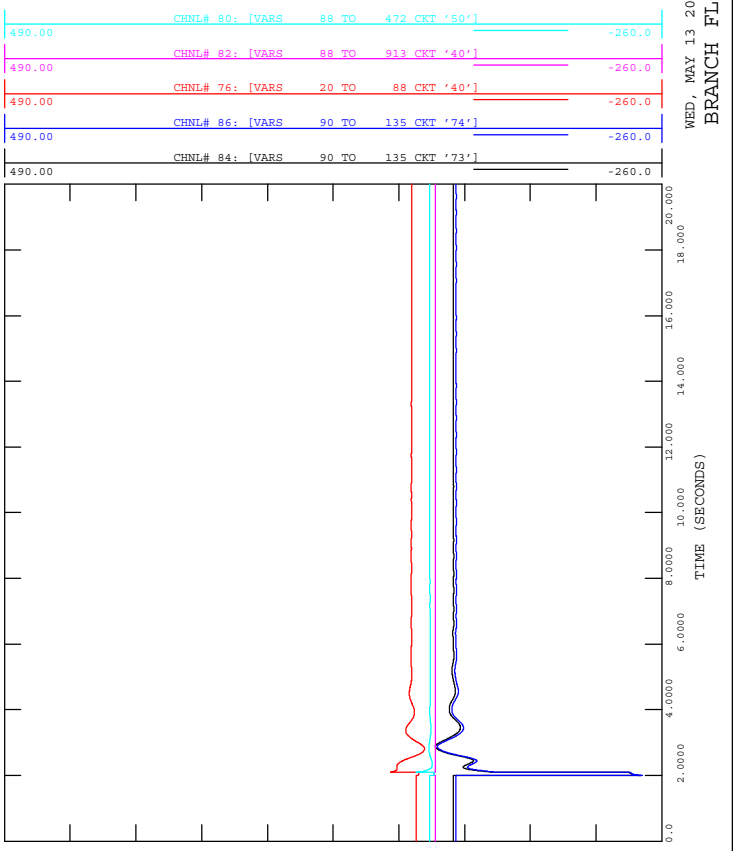


FIGURE D-45J
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out



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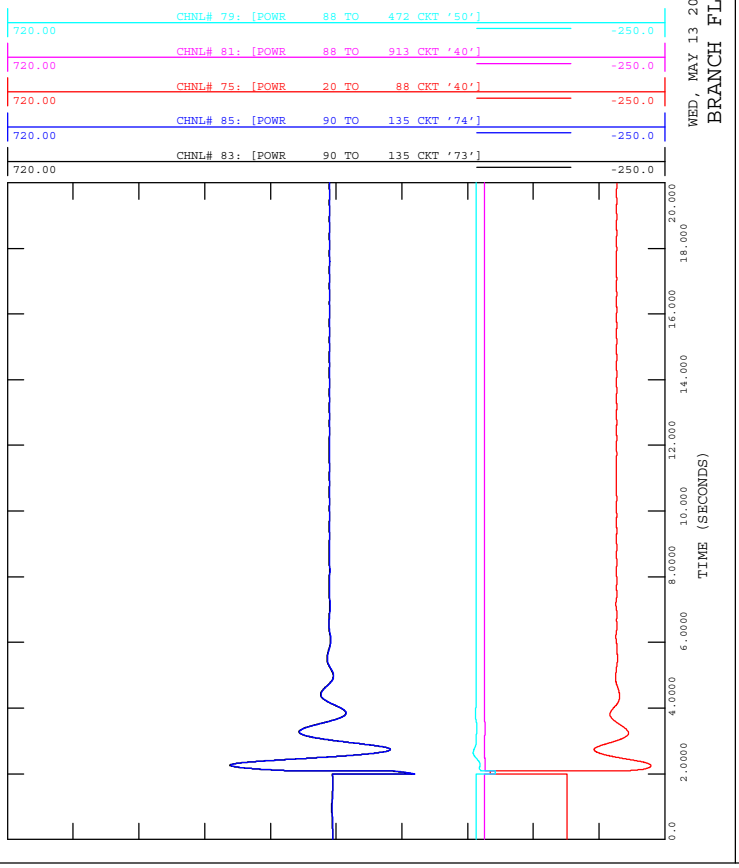
BRANCH FLOW (Q)

FIGURE D-45I
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-45_671L_Bickerdike_39S.out



WED, MAY 13 2020 23:38
BRANCH FLOW (P)

FIGURE D-46B
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out

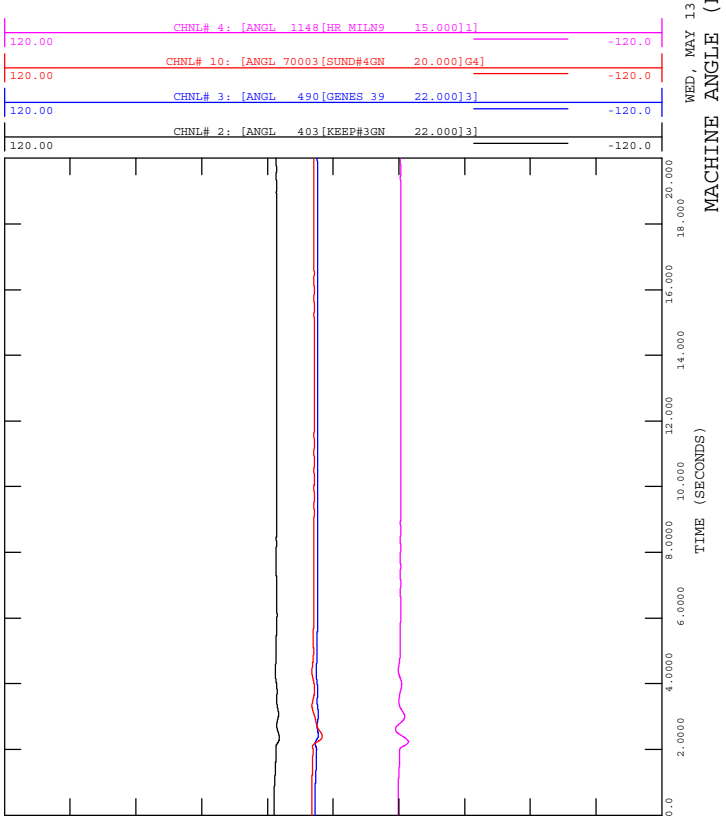


FIGURE D-46D
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out

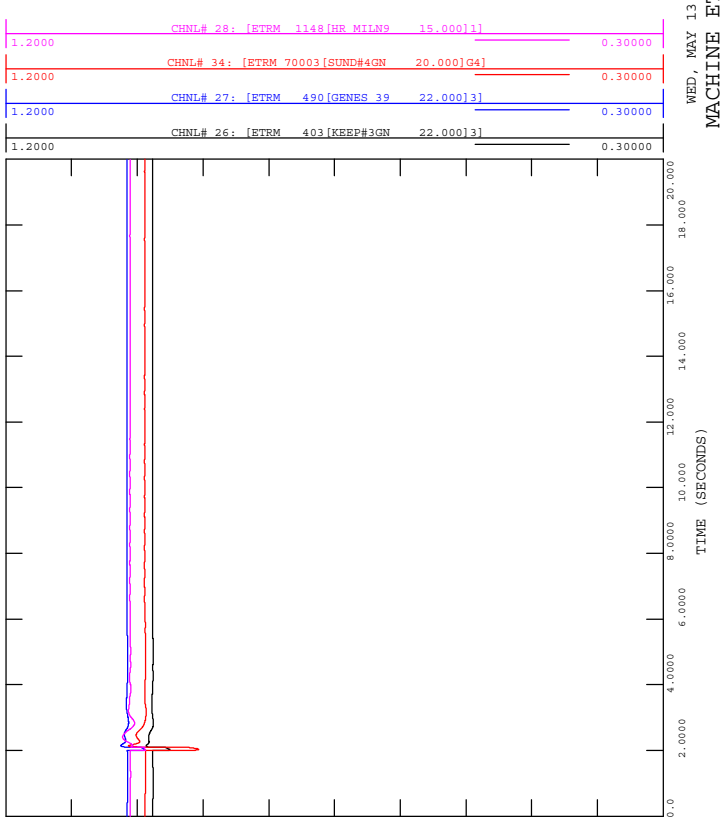


FIGURE D-46A
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out

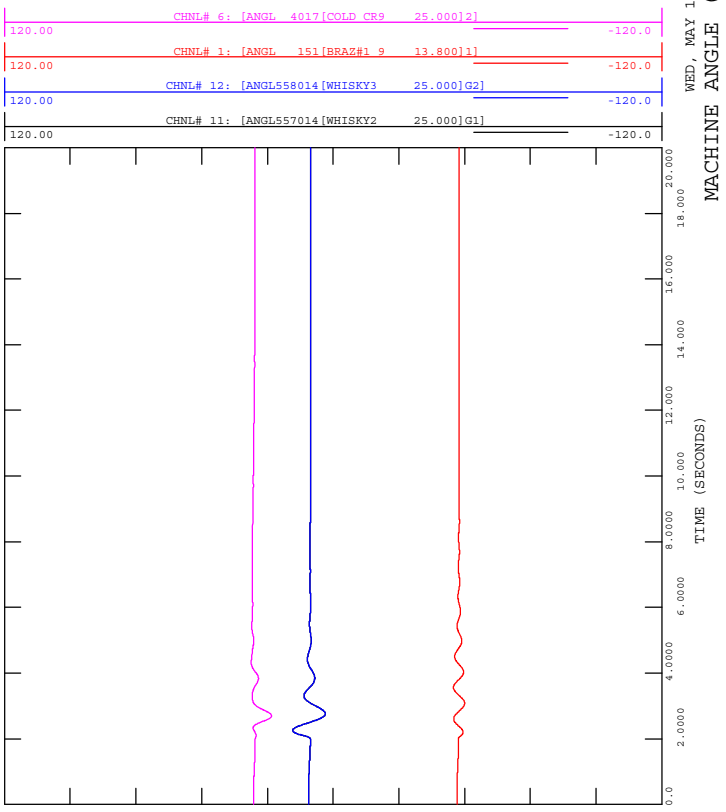


FIGURE D-46C
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out

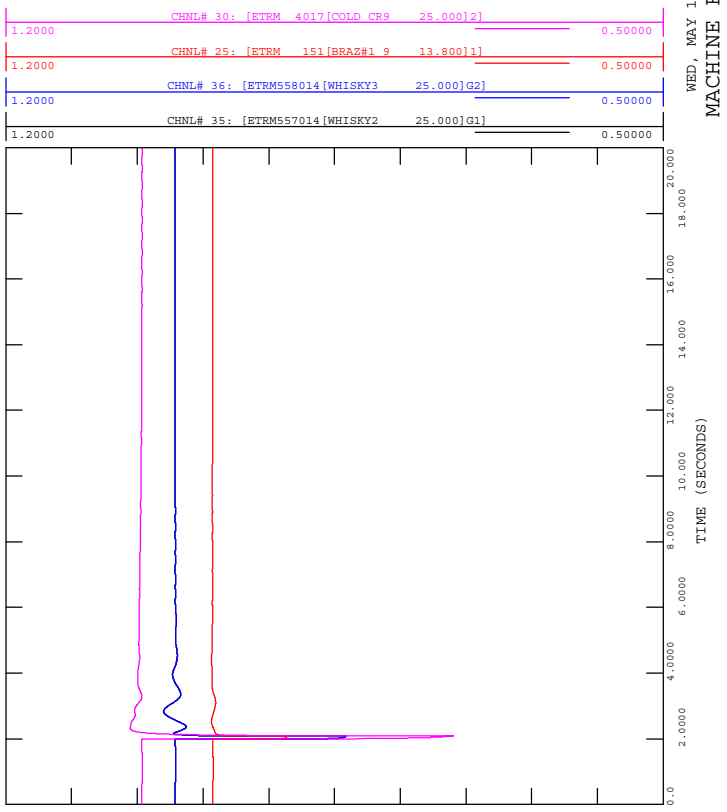


FIGURE D-46F
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out

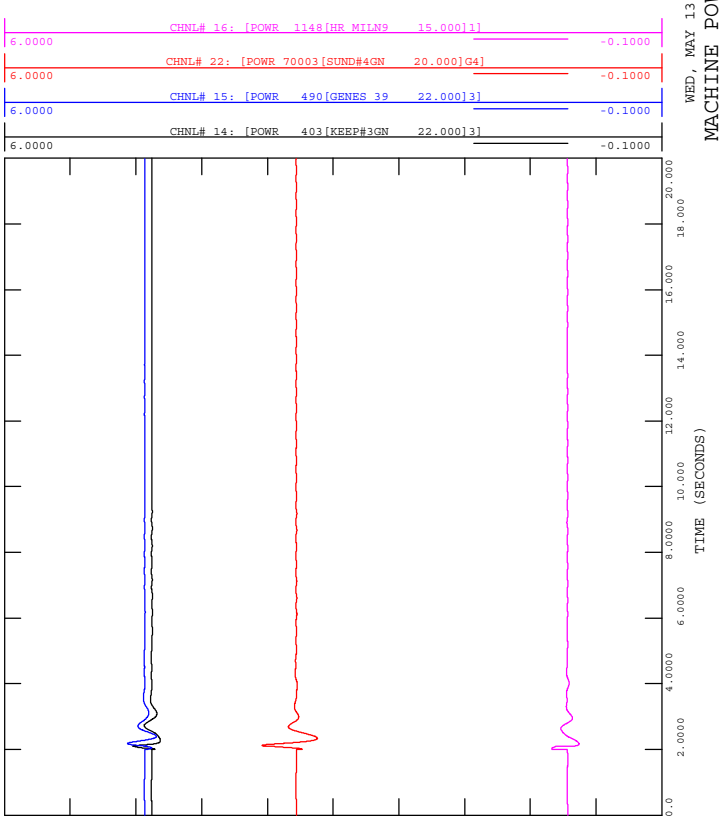


FIGURE D-46H
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out

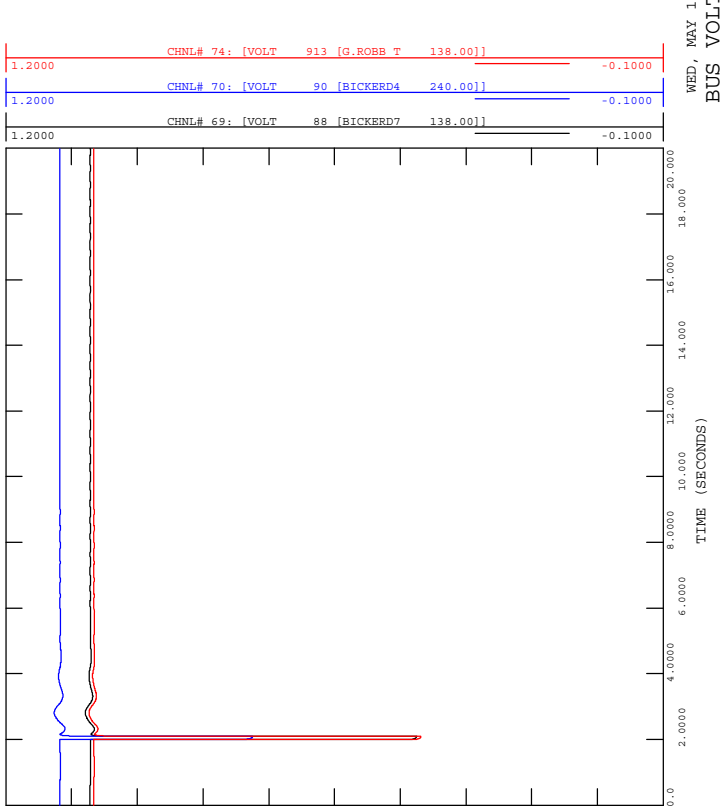


FIGURE D-46E
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out

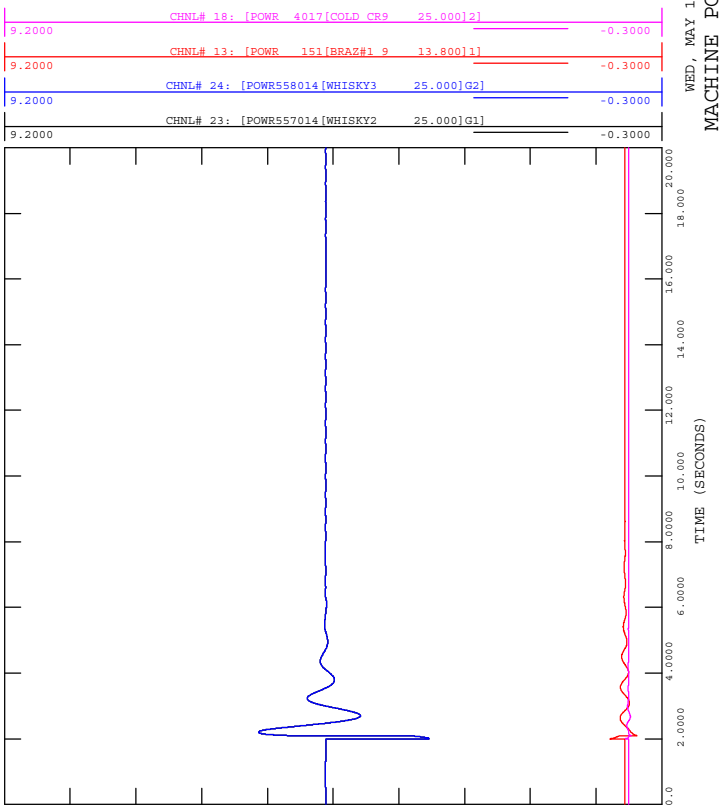


FIGURE D-46G
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out

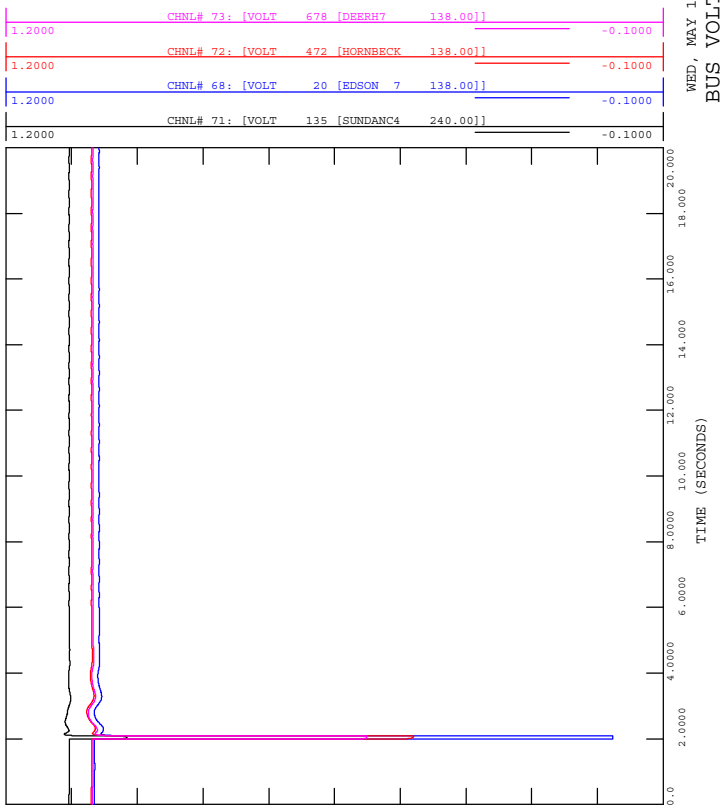
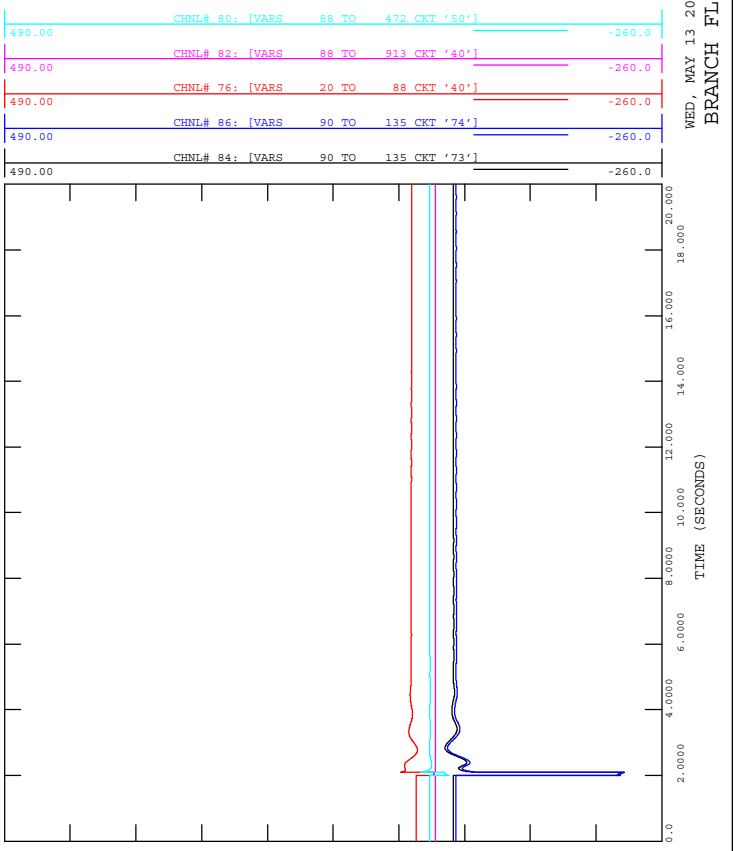


FIGURE D-46J
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out



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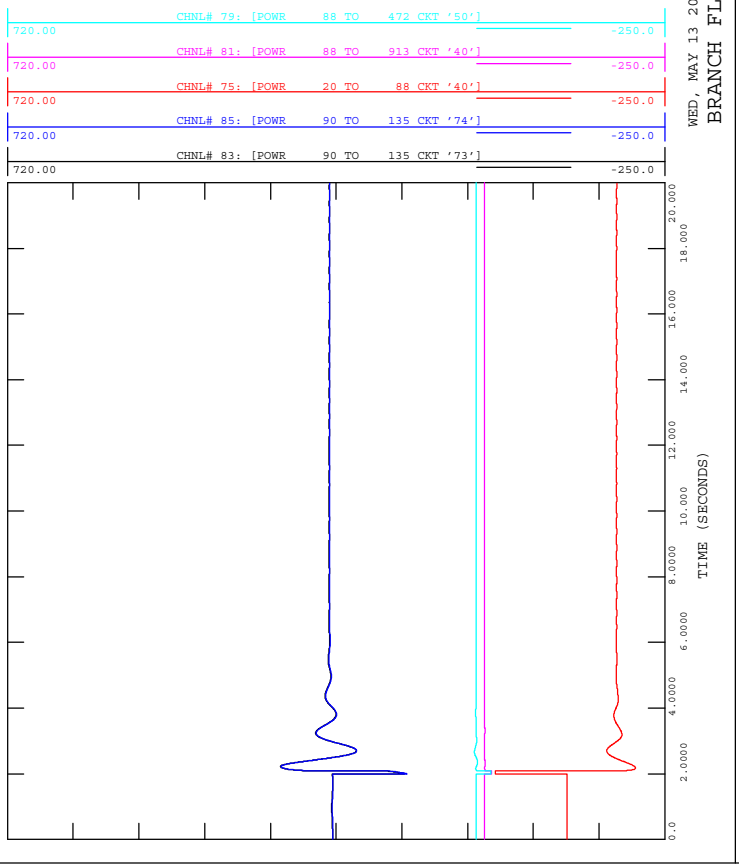
BRANCH FLOW (Q)

FIGURE D-46I
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-46_671L_Edson_58S.out



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BRANCH FLOW (P)

FIGURE D-47B
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out

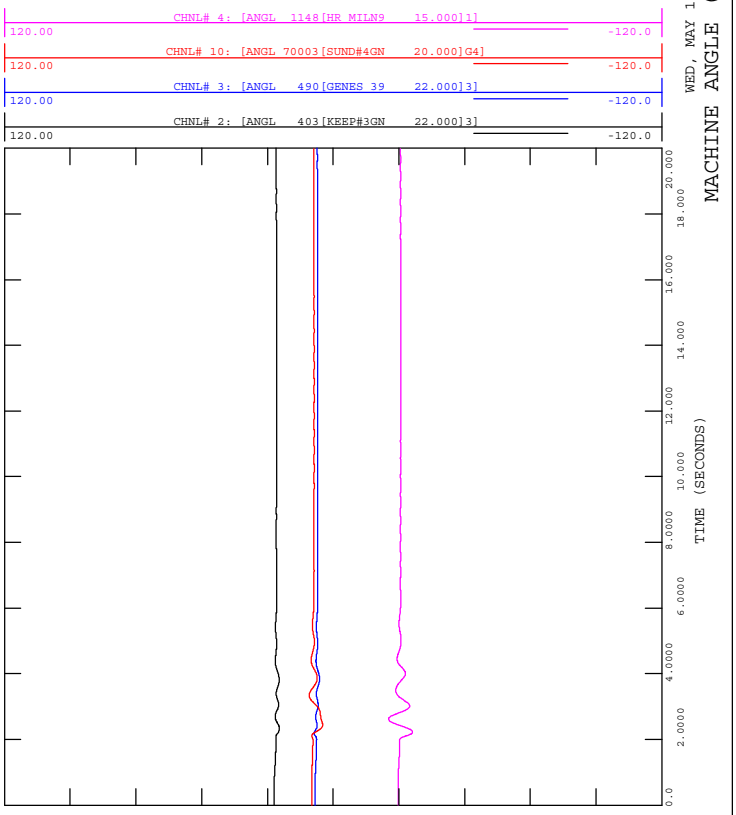


FIGURE D-47D
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out

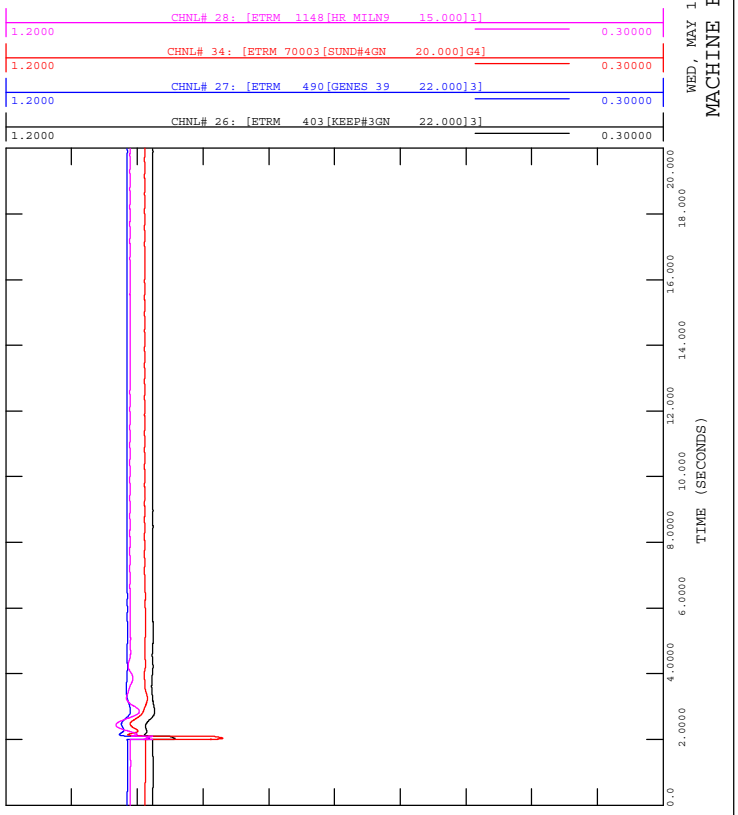


FIGURE D-47A
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out

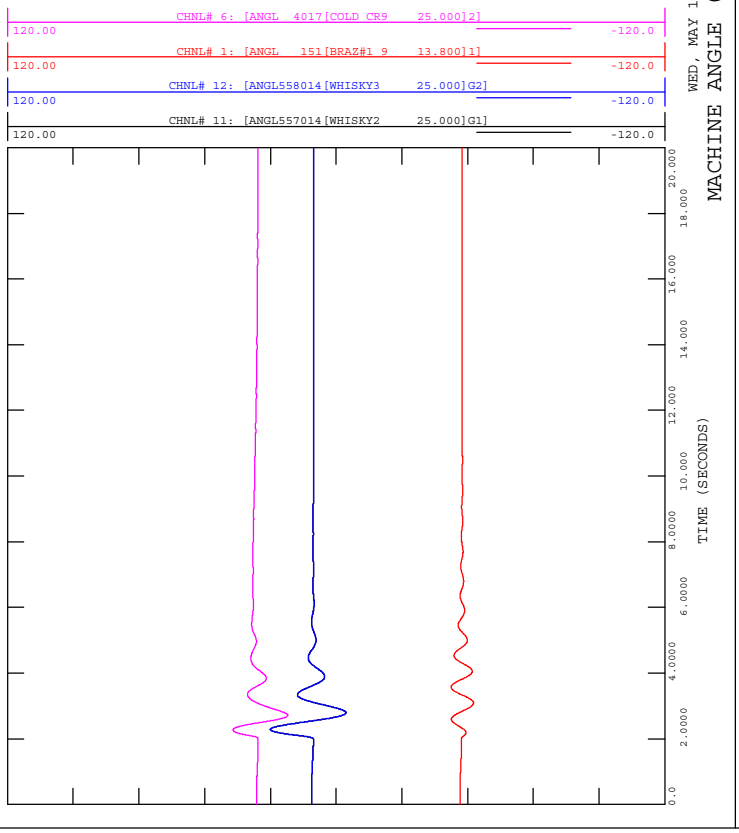


FIGURE D-47C
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out

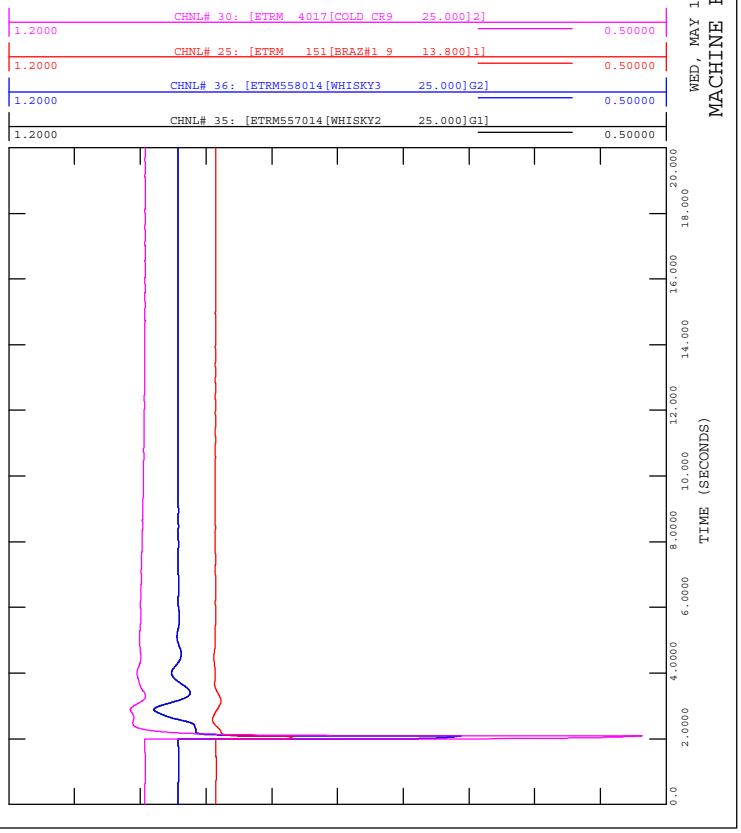


FIGURE D-47F
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out

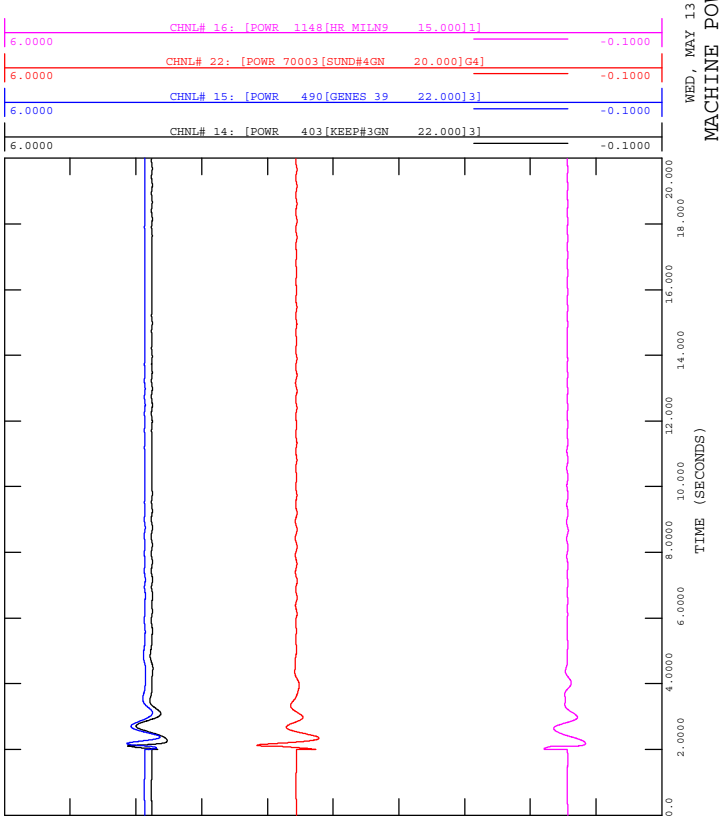


FIGURE D-47H
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out

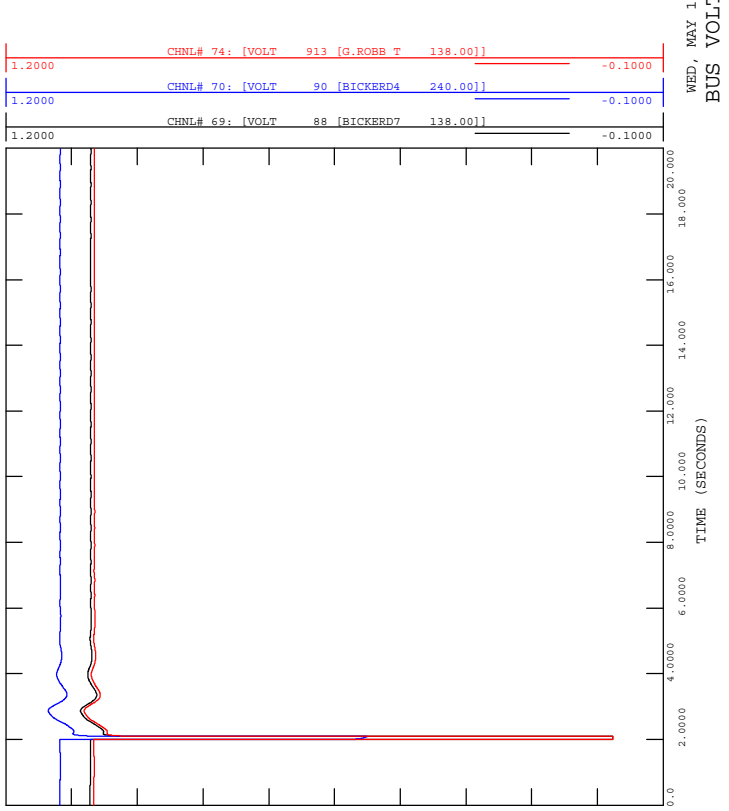


FIGURE D-47E
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out

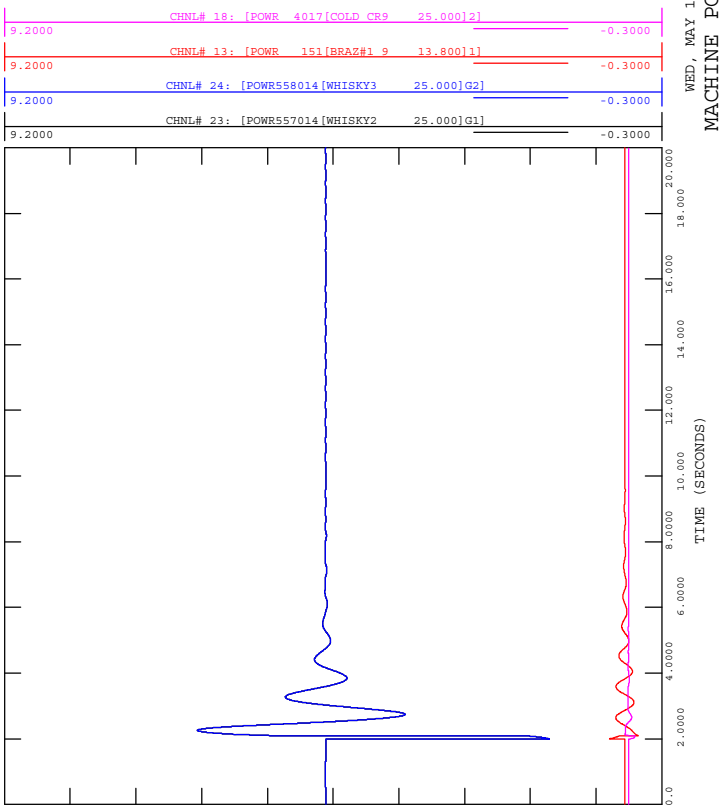


FIGURE D-47G
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out

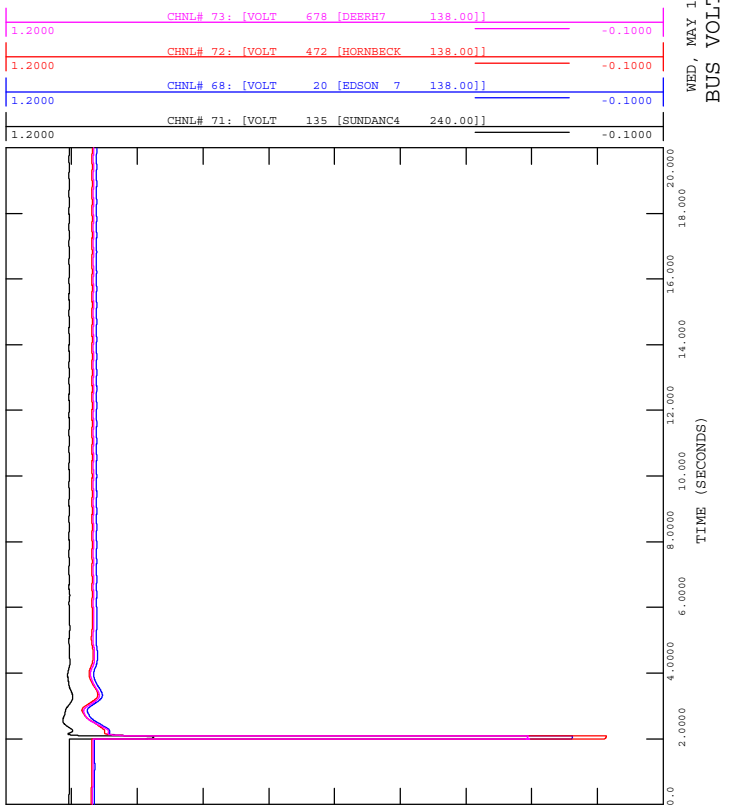
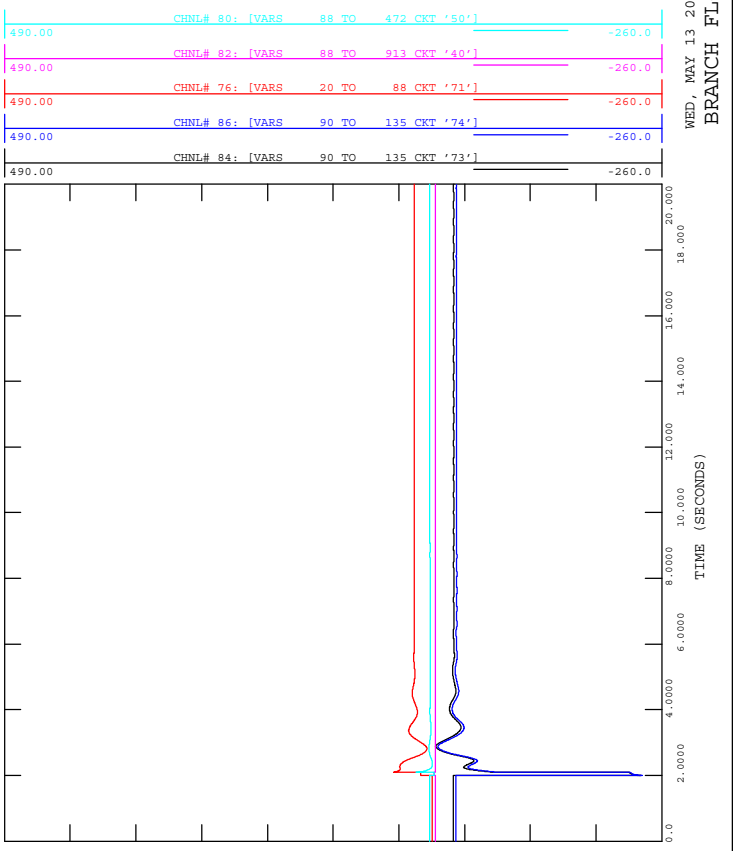


FIGURE D-47J
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out



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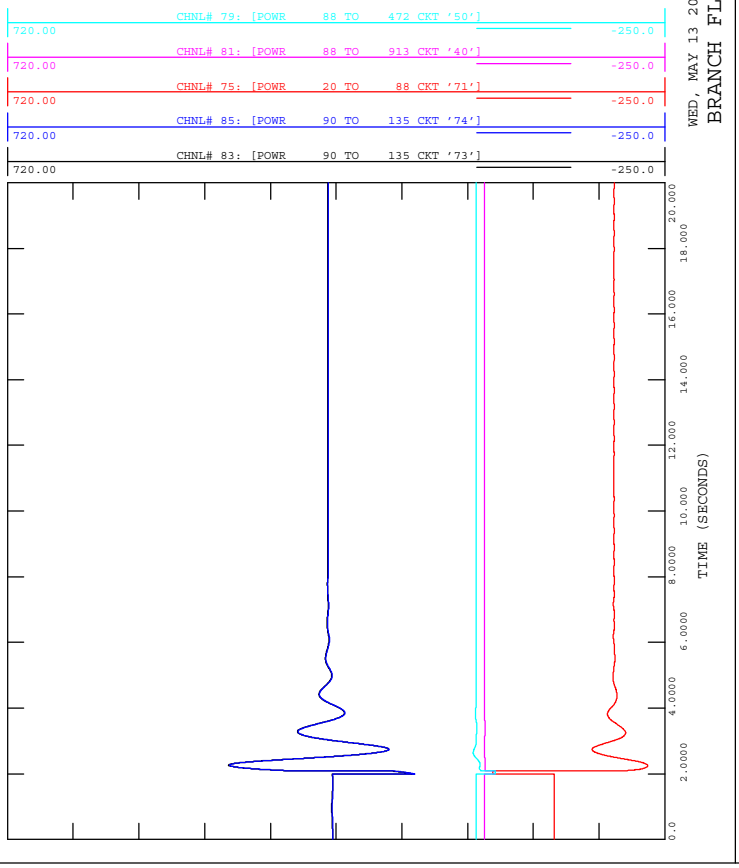
BRANCH FLOW (Q)

FIGURE D-47I
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-47_740L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-48B
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out

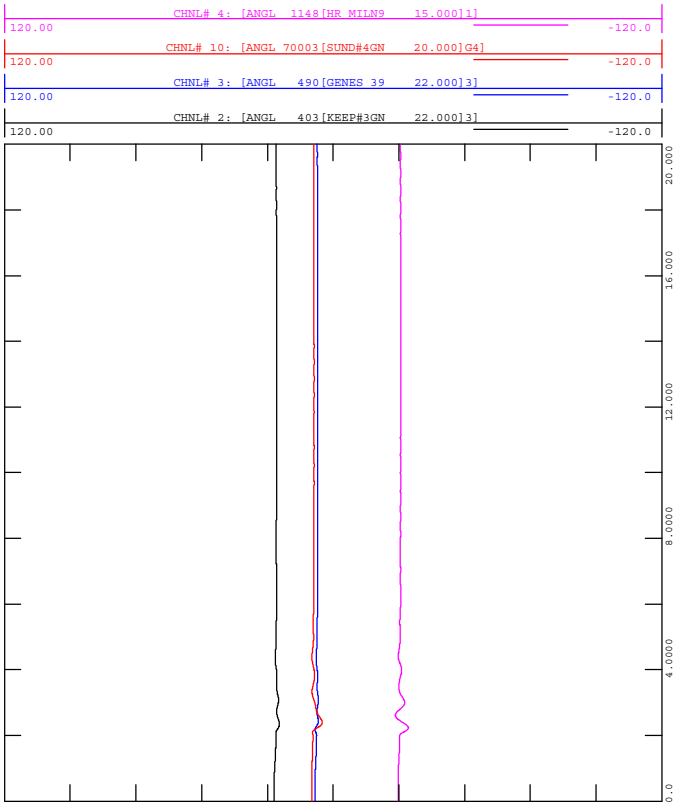


FIGURE D-48D
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out

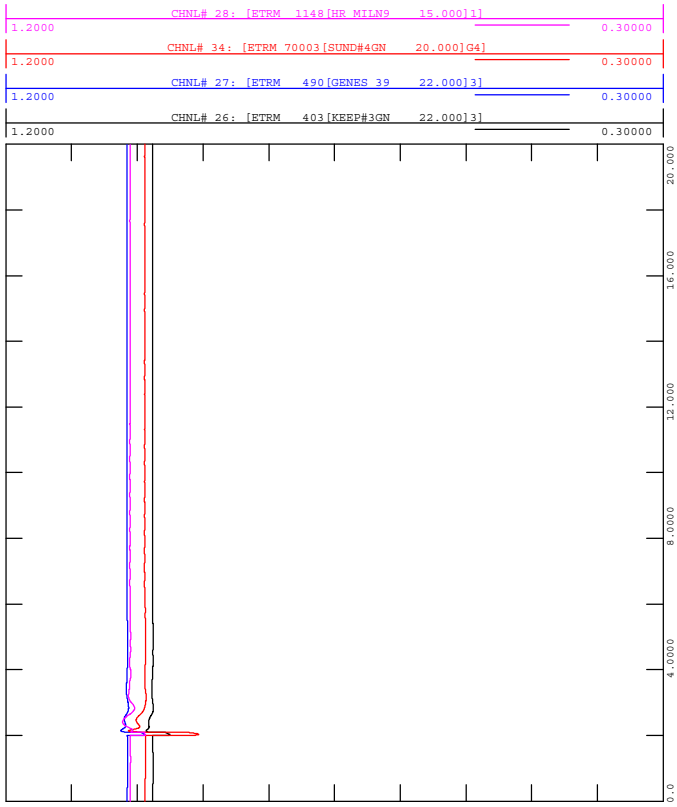


FIGURE D-48A
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out

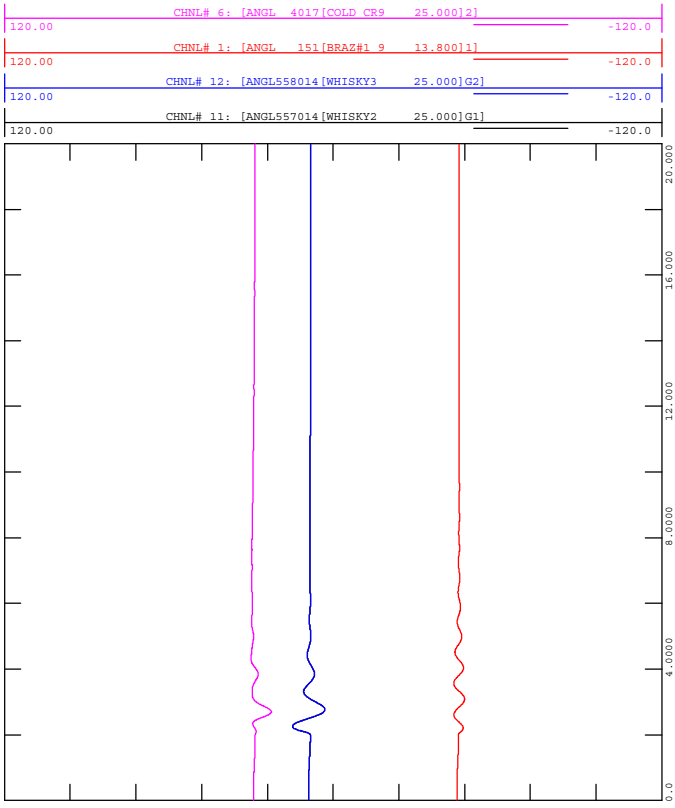


FIGURE D-48C
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out

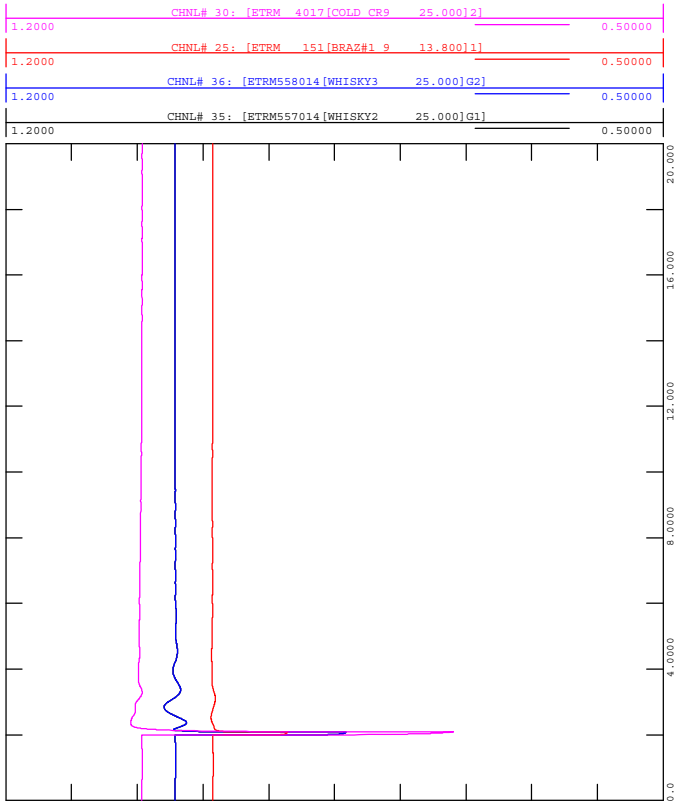
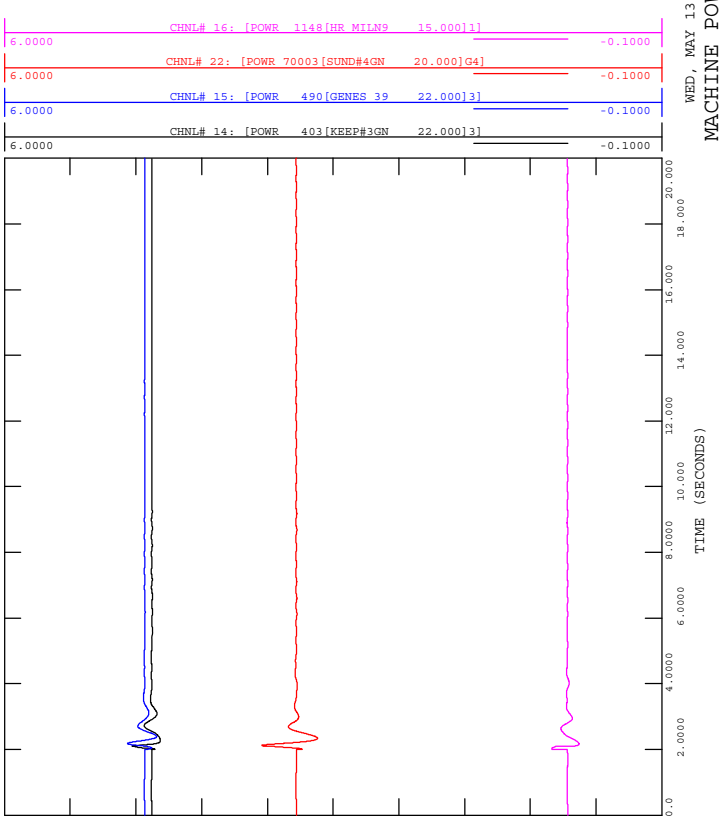


FIGURE D-48F
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out



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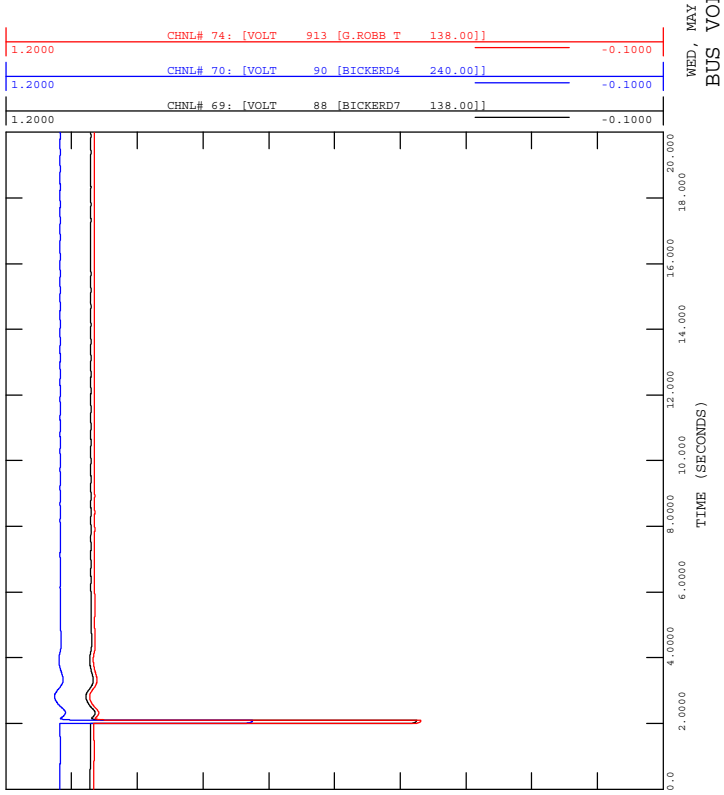
MACHINE POWER (MW)

FIGURE D-48H
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out



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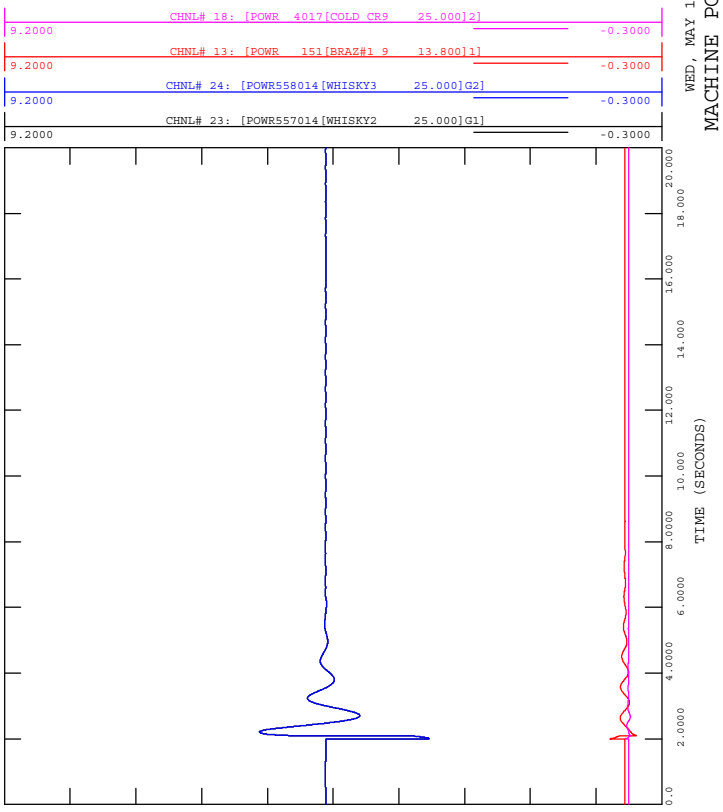
BUS VOLTAGE (PU)

FIGURE D-48E
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out



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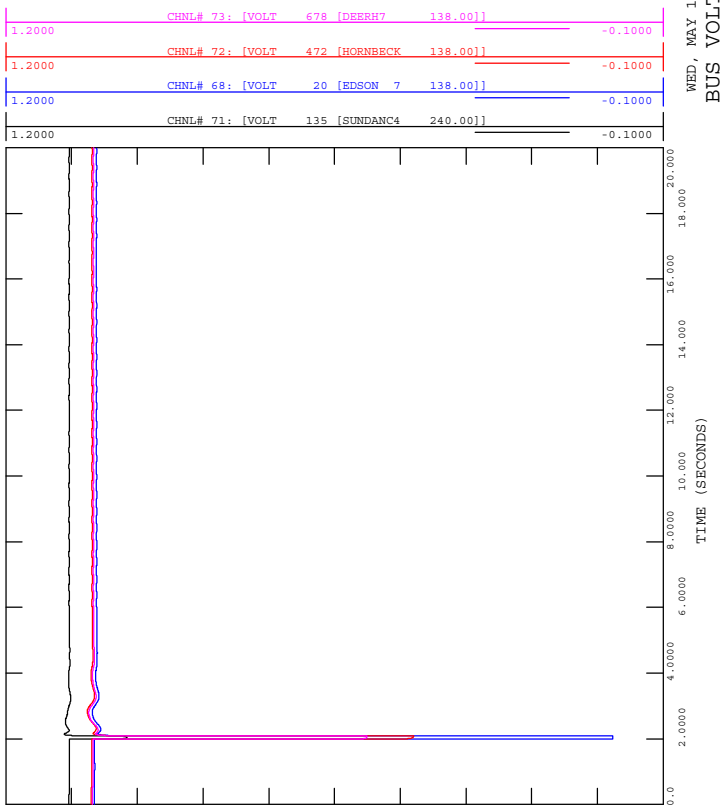
MACHINE POWER (MW)

FIGURE D-48G
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out



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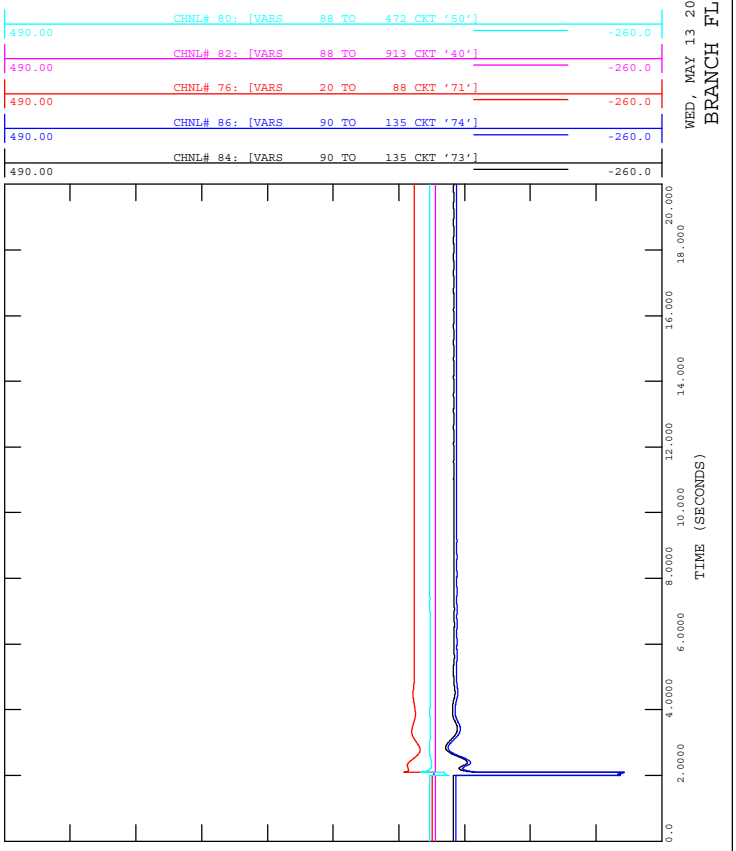
BUS VOLTAGE (PU)

FIGURE D-48J
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out



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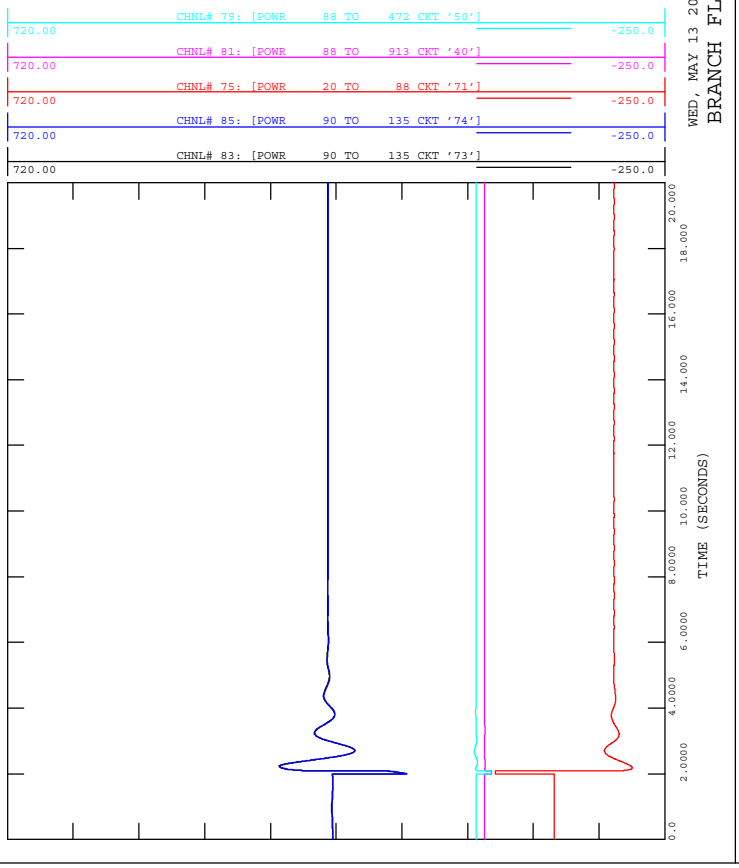
BRANCH FLOW (Q)

FIGURE D-48I
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 6 CYCLES, FAR END IN 6 CYCLES
FILE: D-48_740L_Edson_58S.out



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BRANCH FLOW (P)

FIGURE D-49B
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out

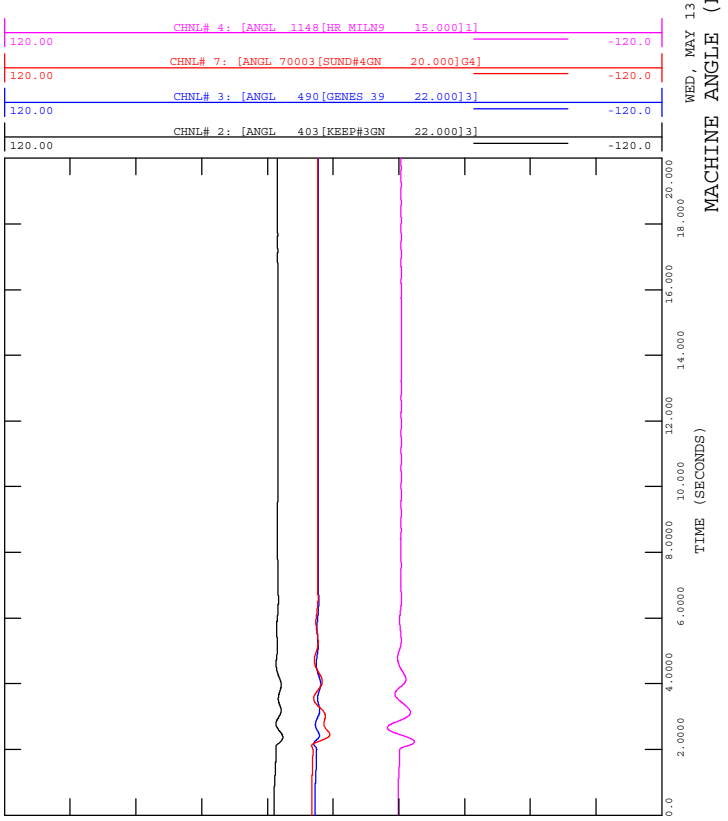


FIGURE D-49D
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out

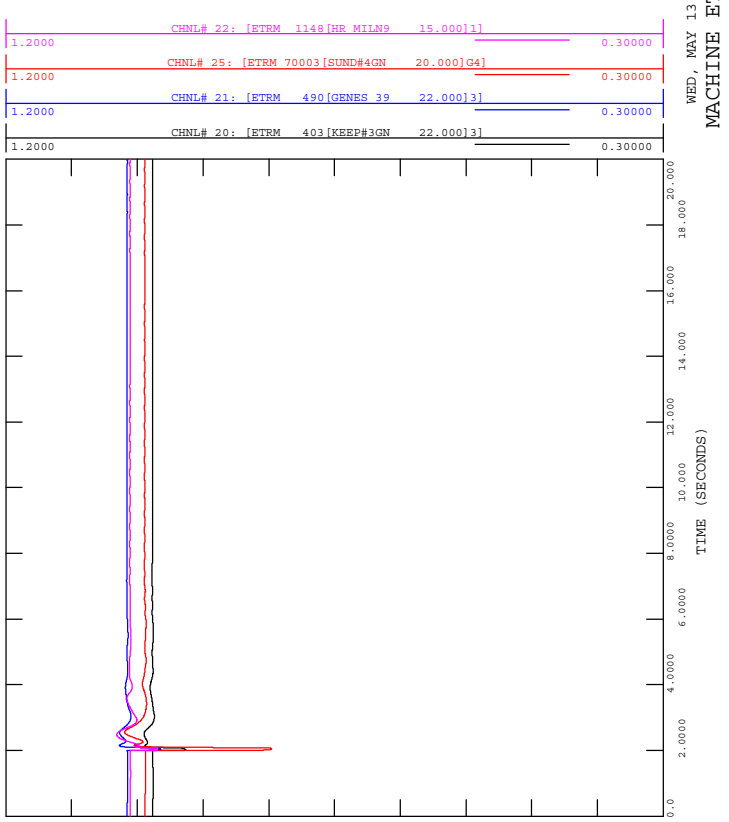


FIGURE D-49A
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out

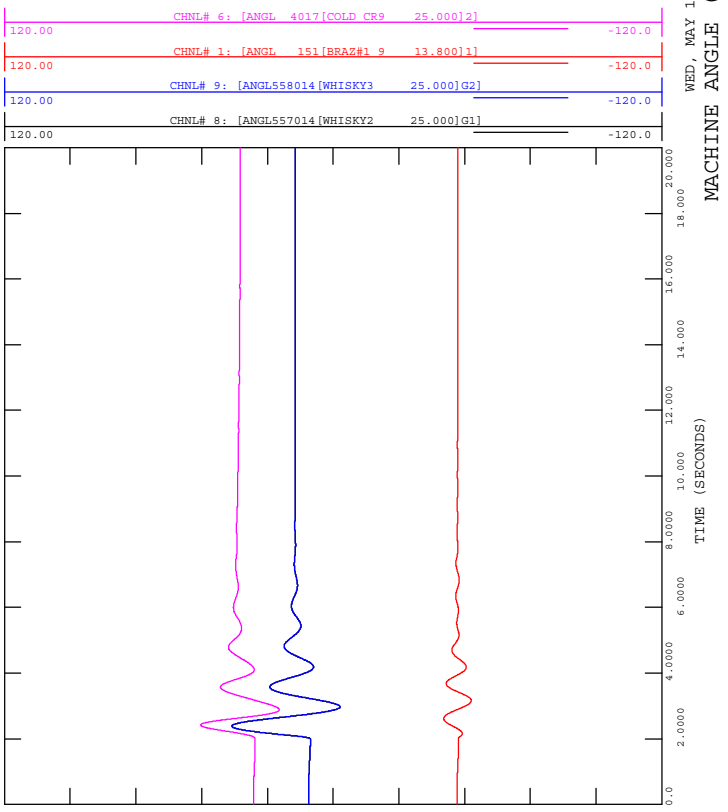


FIGURE D-49C
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out

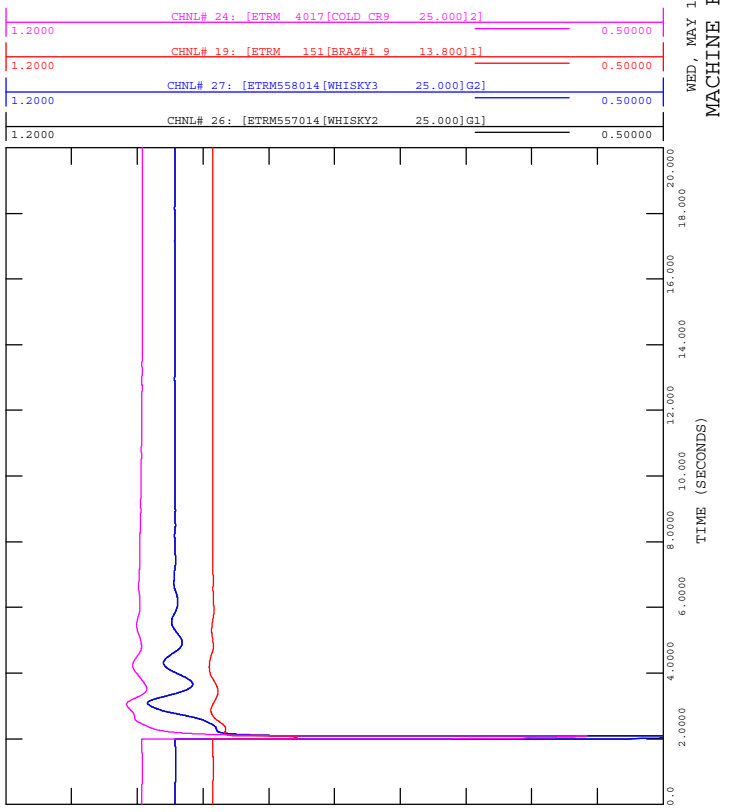
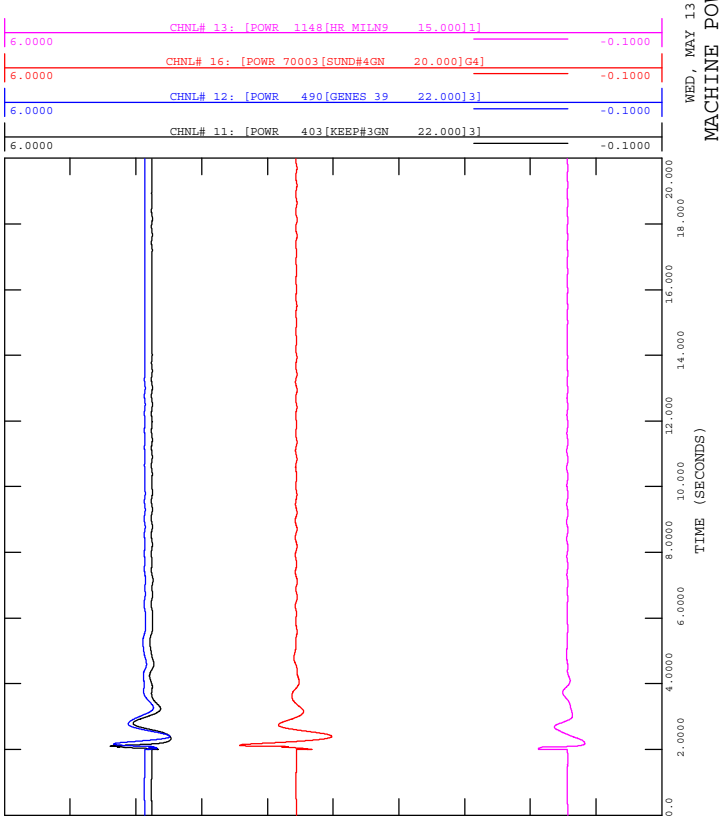


FIGURE D-49F
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out



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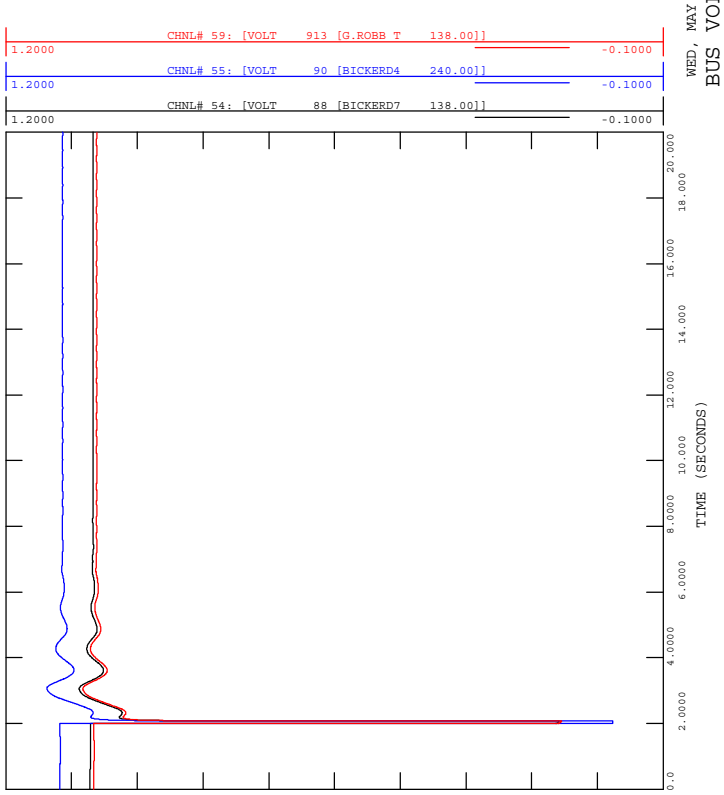
MACHINE POWER (MW)

FIGURE D-49H
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out



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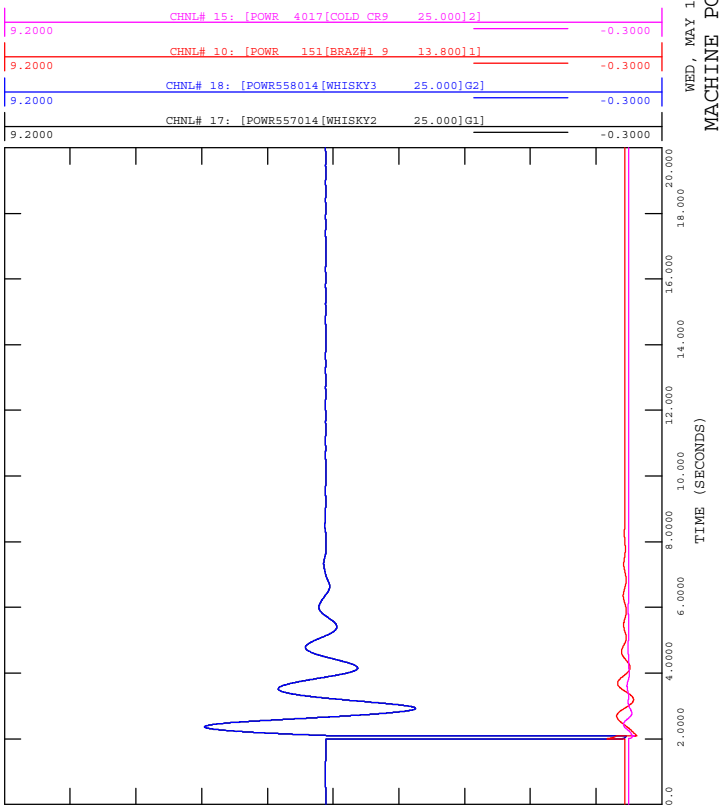
BUS VOLTAGE (PU)

FIGURE D-49E
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out



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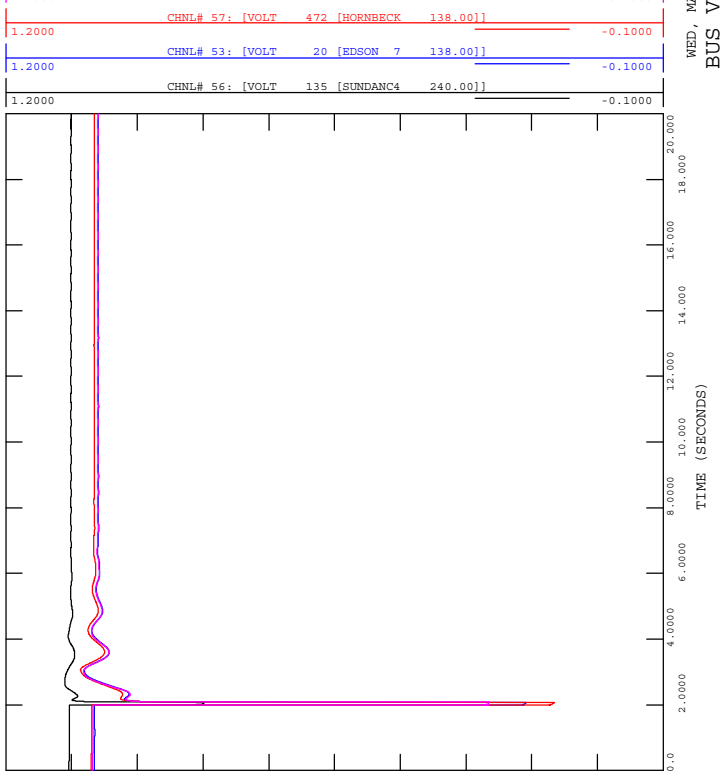
MACHINE POWER (MW)

FIGURE D-49G
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out



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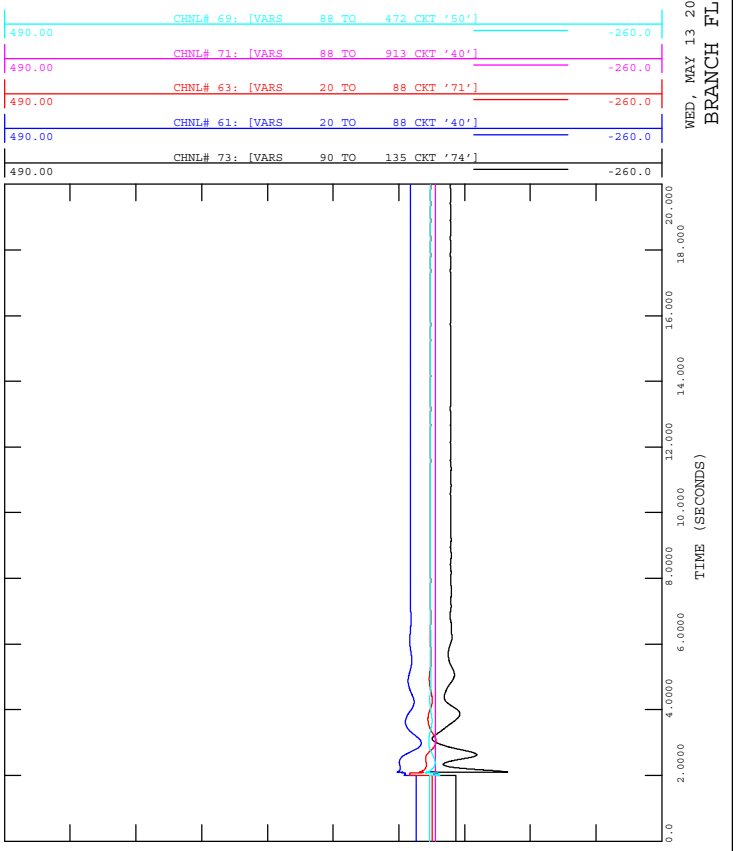
BUS VOLTAGE (PU)

FIGURE D-49J
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out



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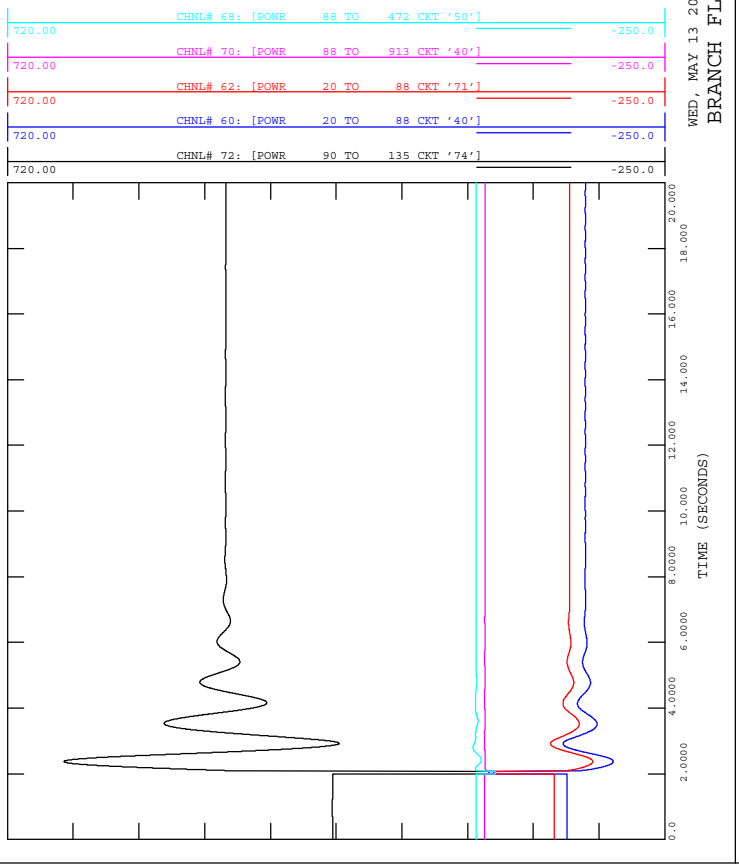
BRANCH FLOW (Q)

FIGURE D-49I
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 5 CYCLES, FAR END IN 5 CYCLES
FILE: D-49_973L_Bickerdike_39S.out



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BRANCH FLOW (P)

FIGURE D-50B
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out

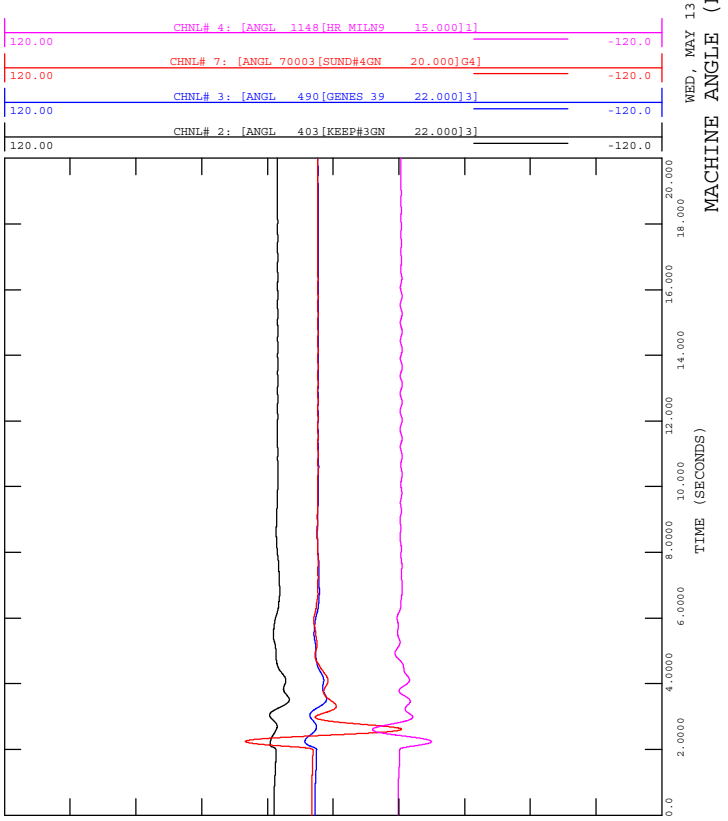


FIGURE D-50D
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out

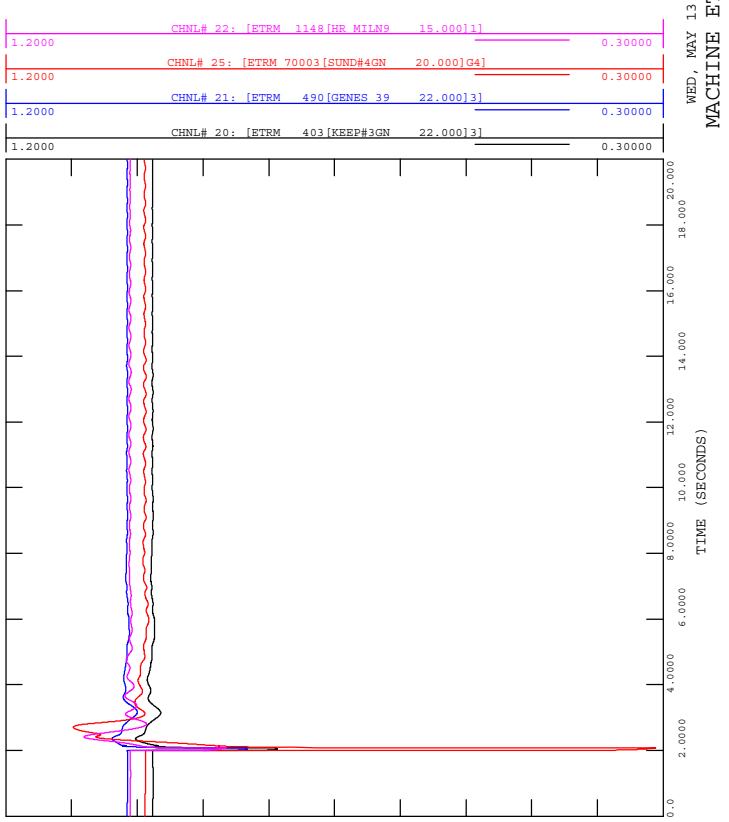


FIGURE D-50A
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out

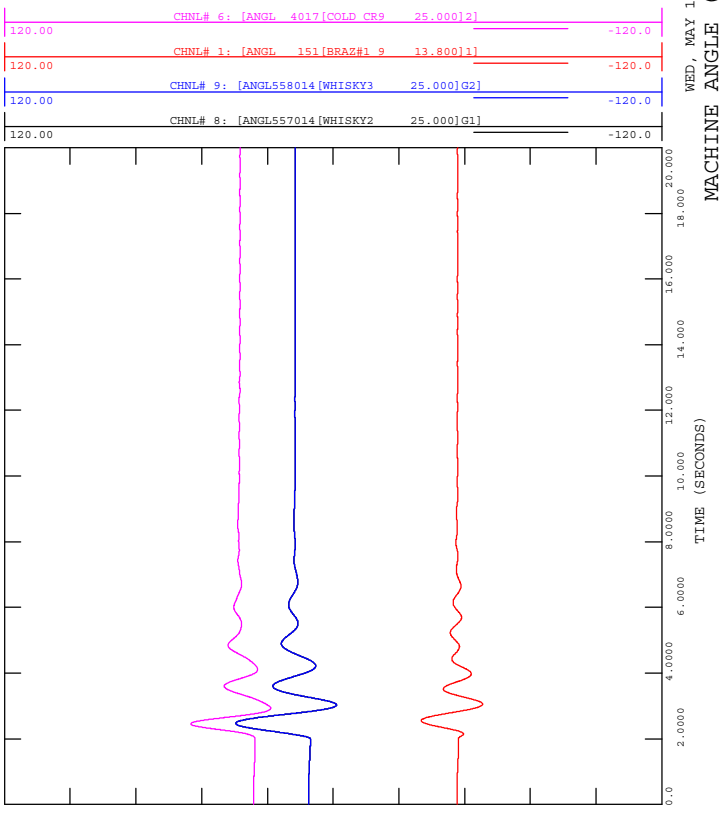


FIGURE D-50C
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out

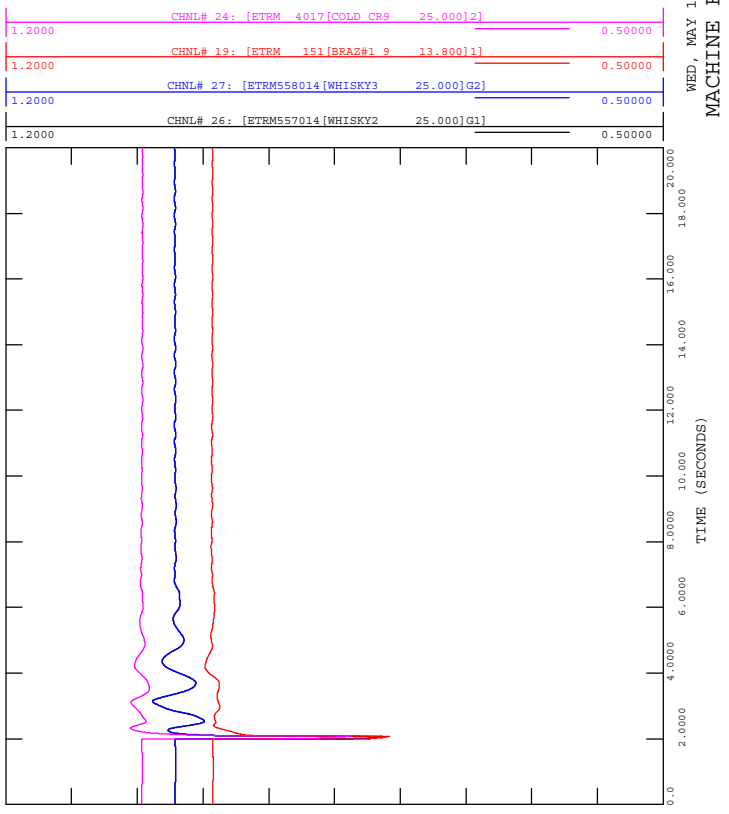
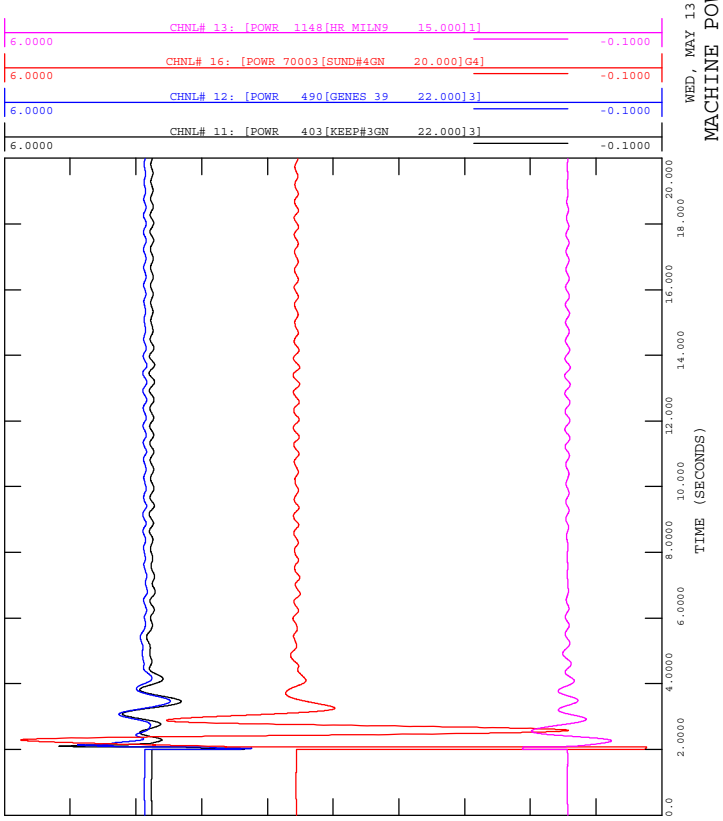
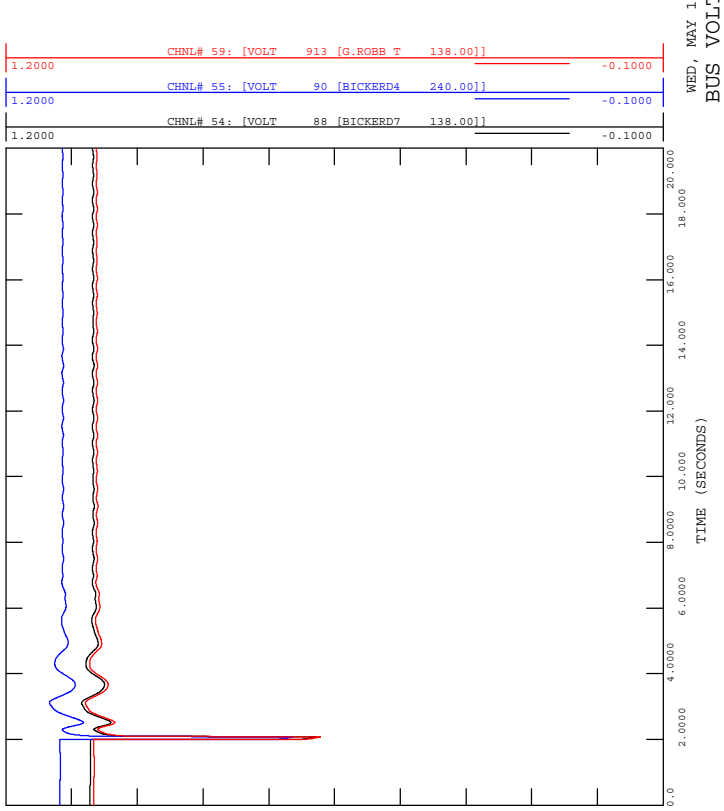


FIGURE D-50F
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out



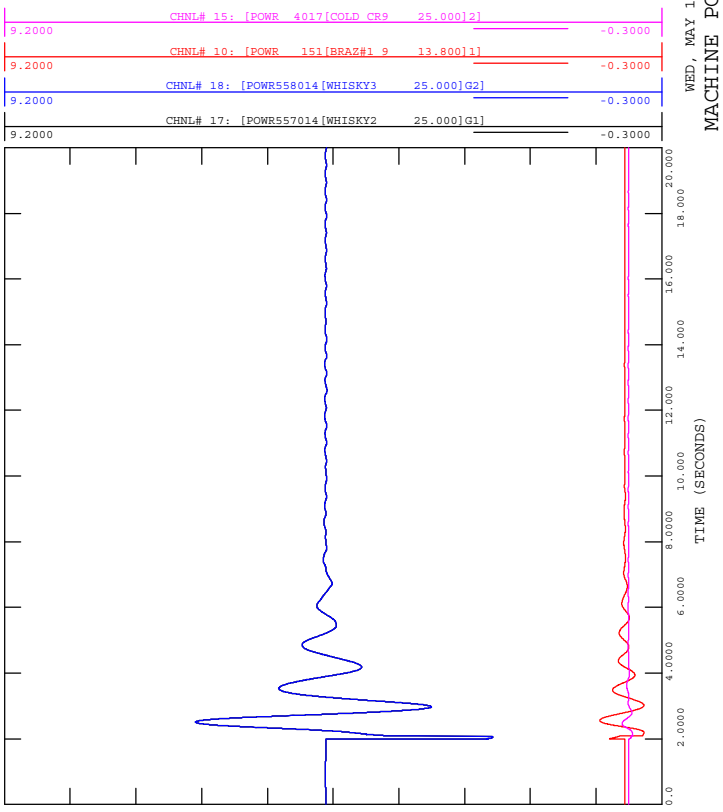
WED, MAY 13 2020 23:38
MACHINE POWER (MW)

FIGURE D-50H
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out



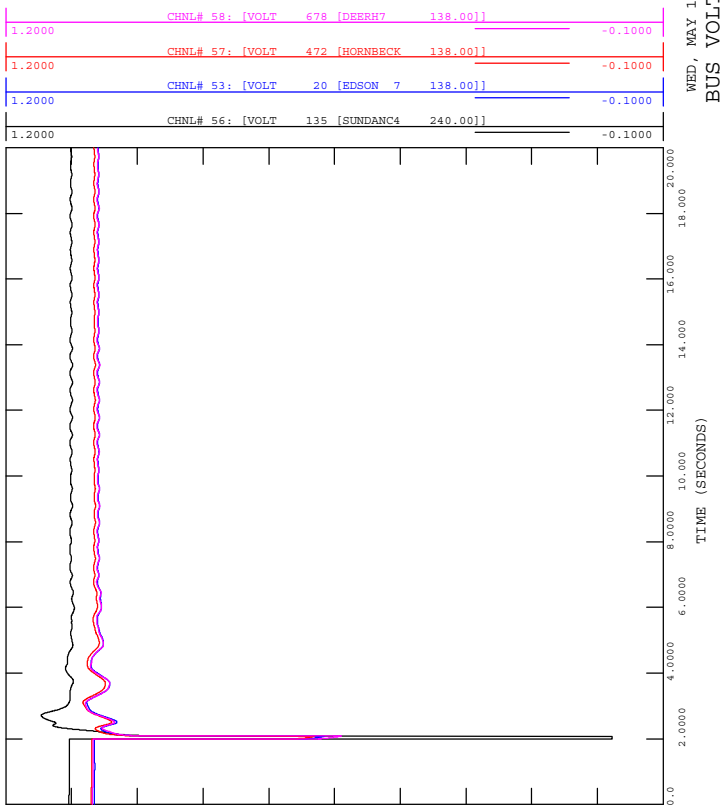
WED, MAY 13 2020 23:38
BUS VOLTAGE (PU)

FIGURE D-50E
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out



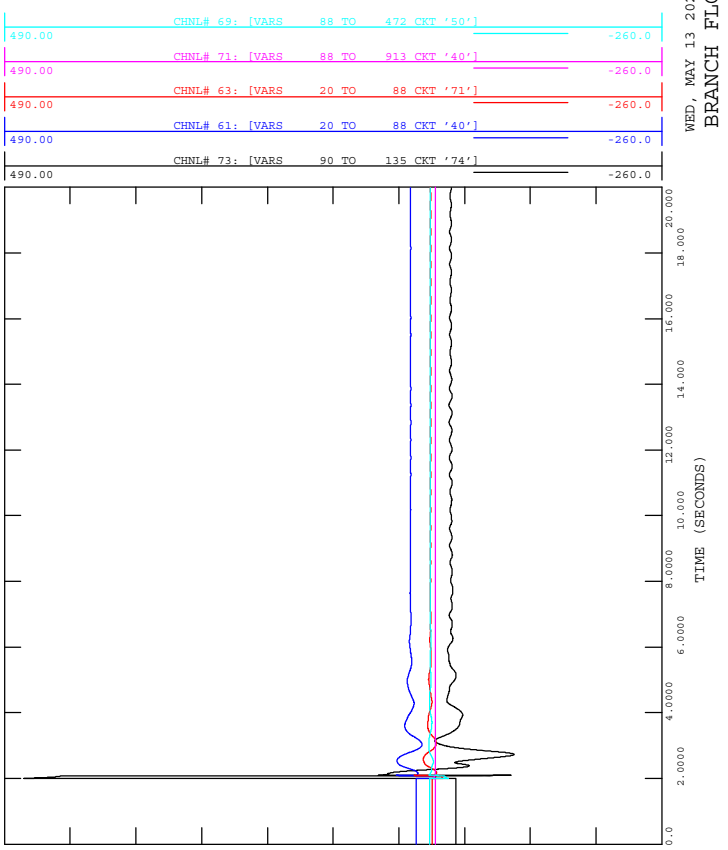
WED, MAY 13 2020 23:38
MACHINE POWER (MW)

FIGURE D-50G
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out



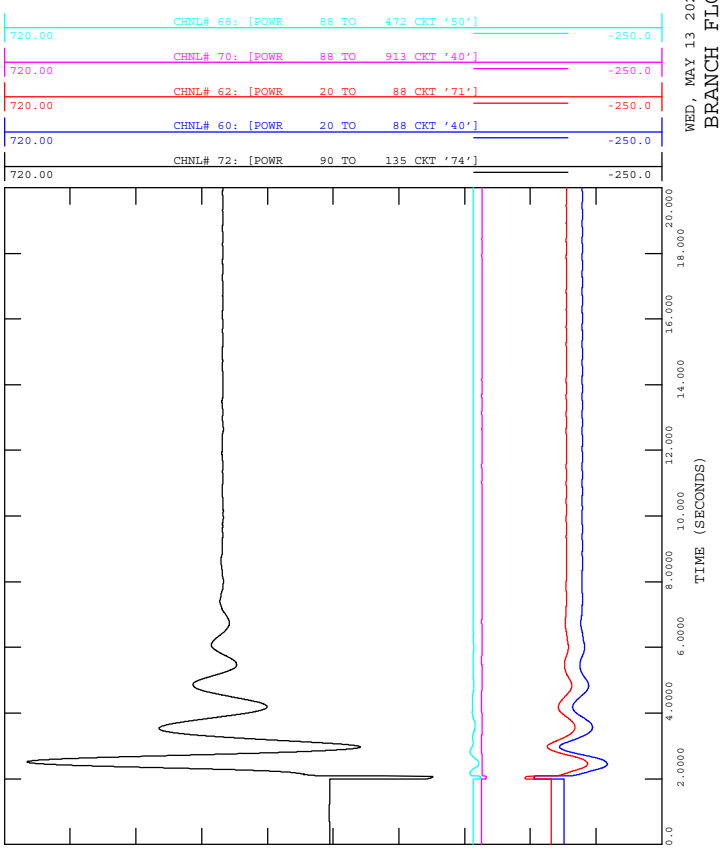
WED, MAY 13 2020 23:38
BUS VOLTAGE (PU)

FIGURE D-50J
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out



WED, MAY 13 2020 23:38
BRANCH FLOW (Q)

FIGURE D-50I
2022SL, POST-PROJECT
3-PHASE FAULT AT SUNDANCE 310P
CLEARED IN 4 CYCLES, FAR END IN 6 CYCLES
FILE: D-50_973L_Sundance_310P.out



WED, MAY 13 2020 23:38
BRANCH FLOW (P)

FIGURE D-51B
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out

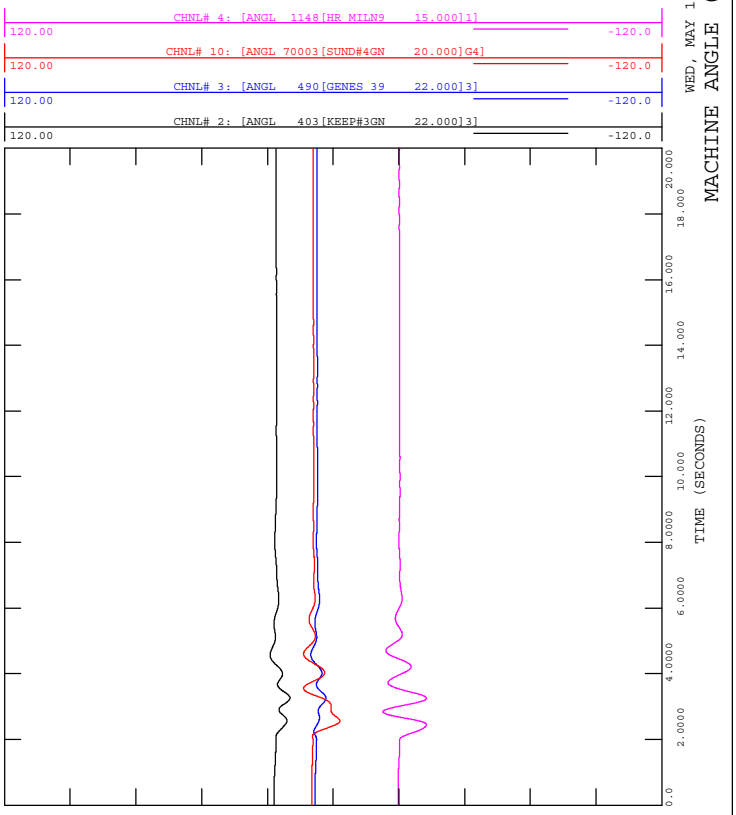


FIGURE D-51D
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out

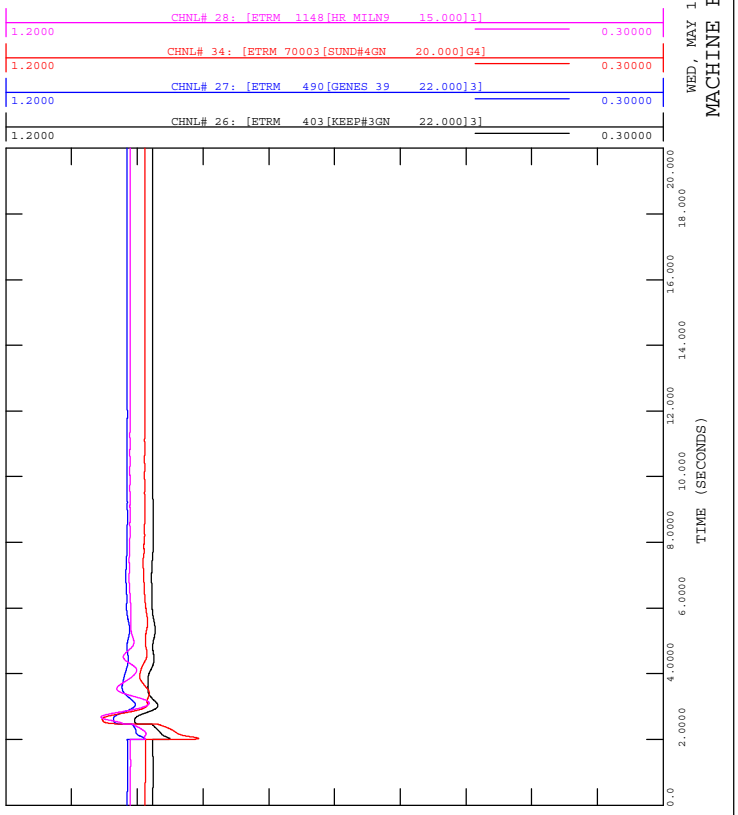


FIGURE D-51A
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out

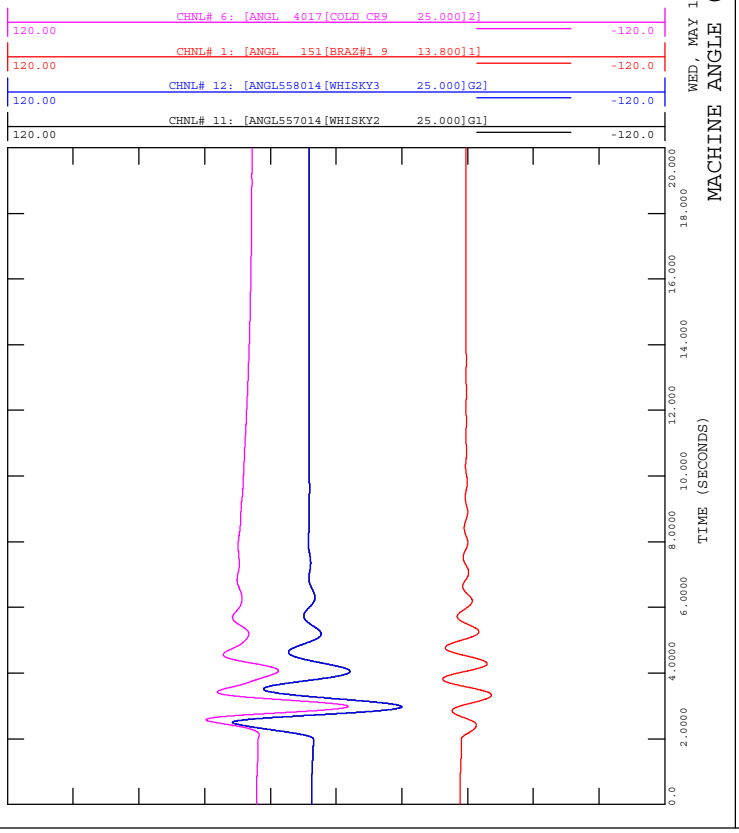


FIGURE D-51C
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out

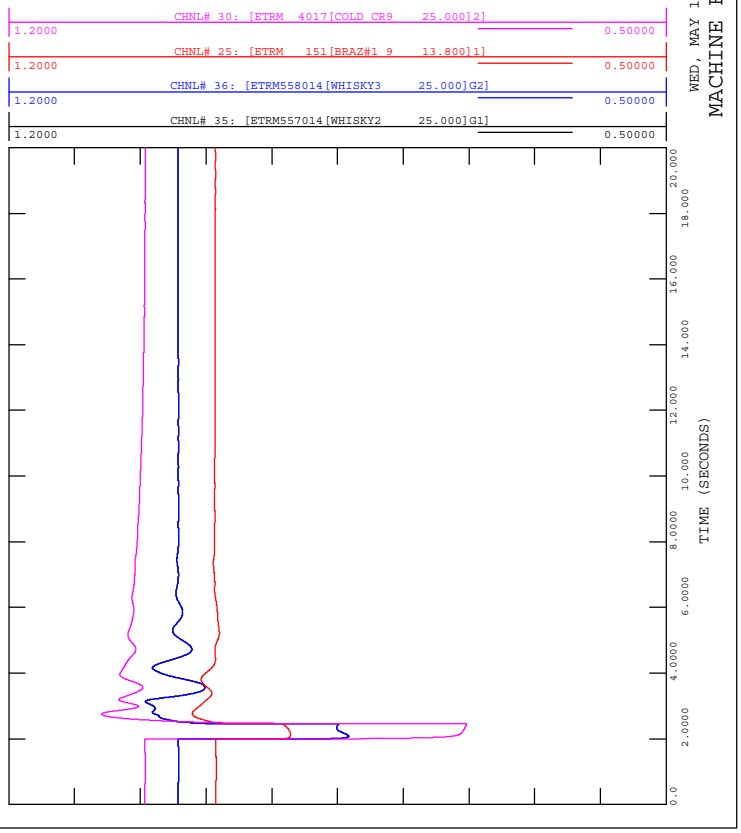
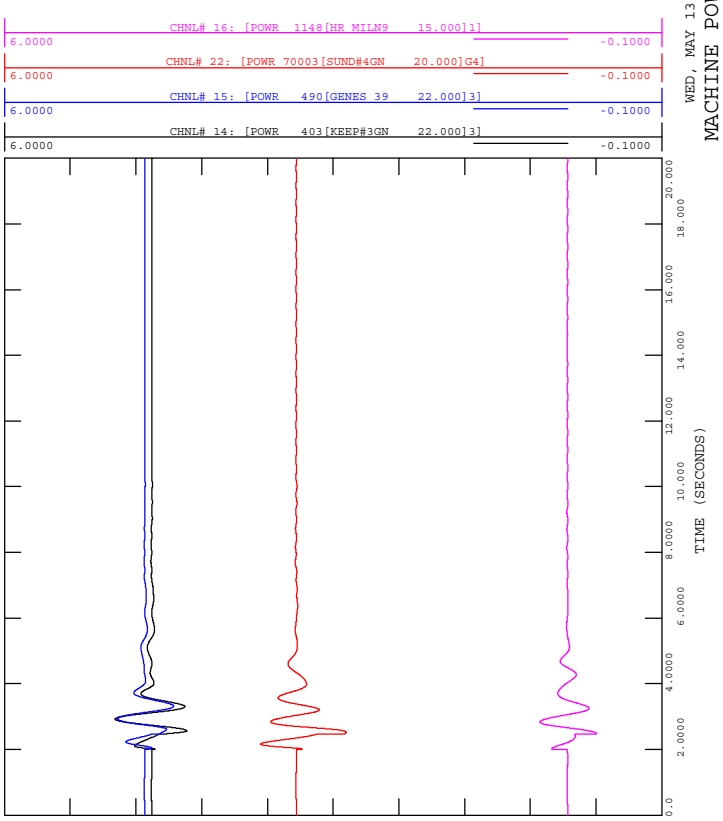
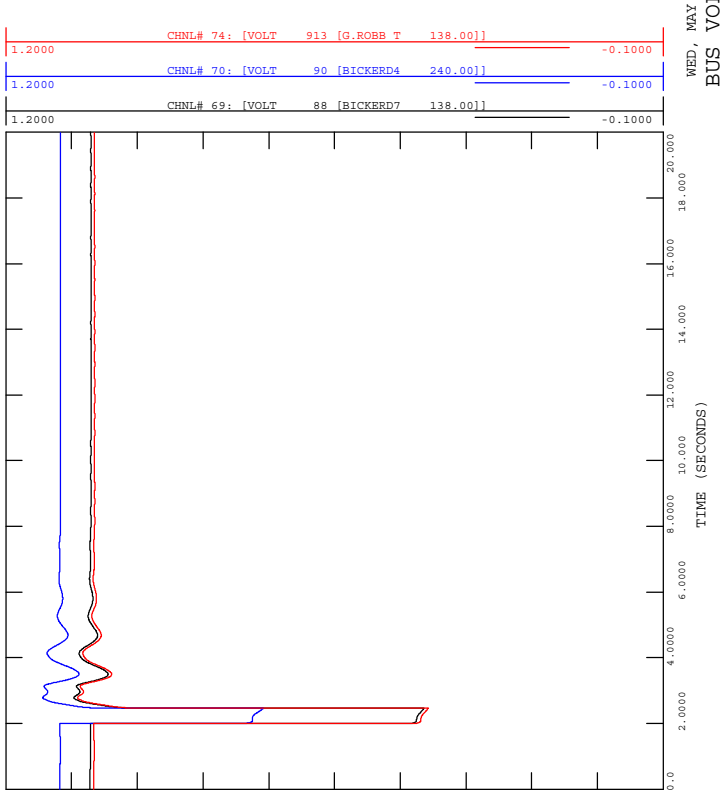


FIGURE D-51F
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out



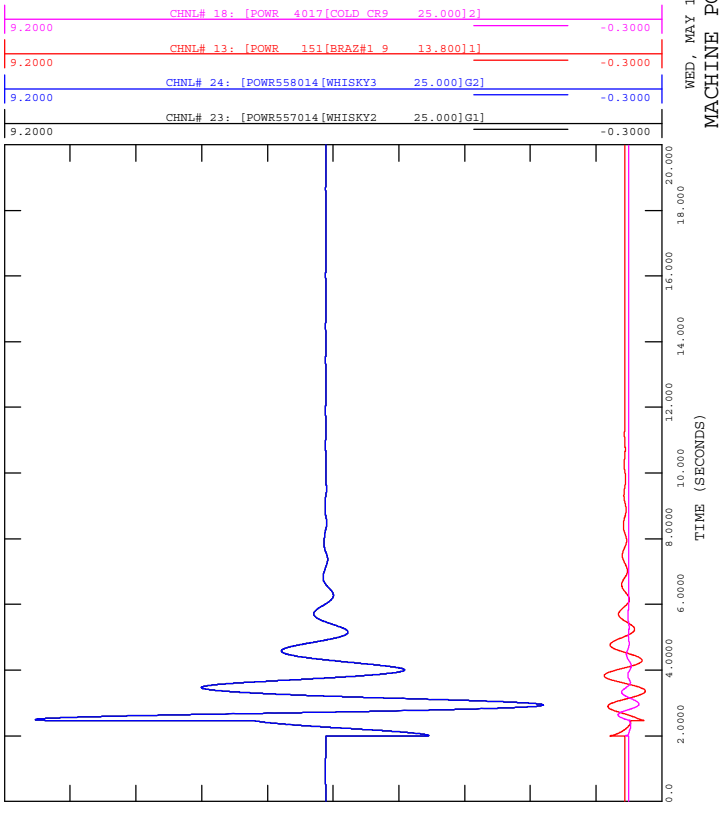
WED, MAY 13 2020 23:38
MACHINE POWER (MW)

FIGURE D-51H
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out



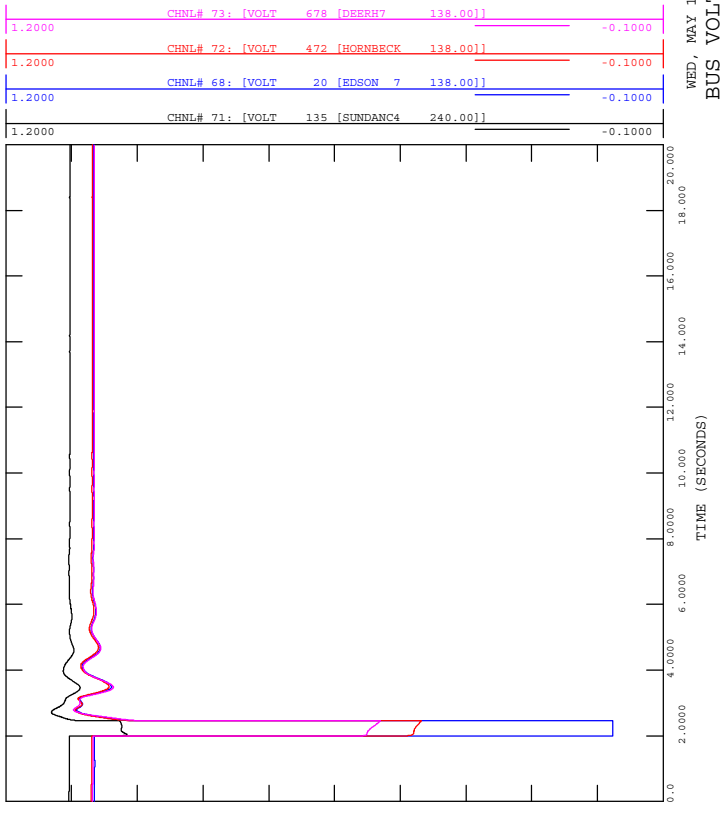
WED, MAY 13 2020 23:38
BUS VOLTAGE (PU)

FIGURE D-51E
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out



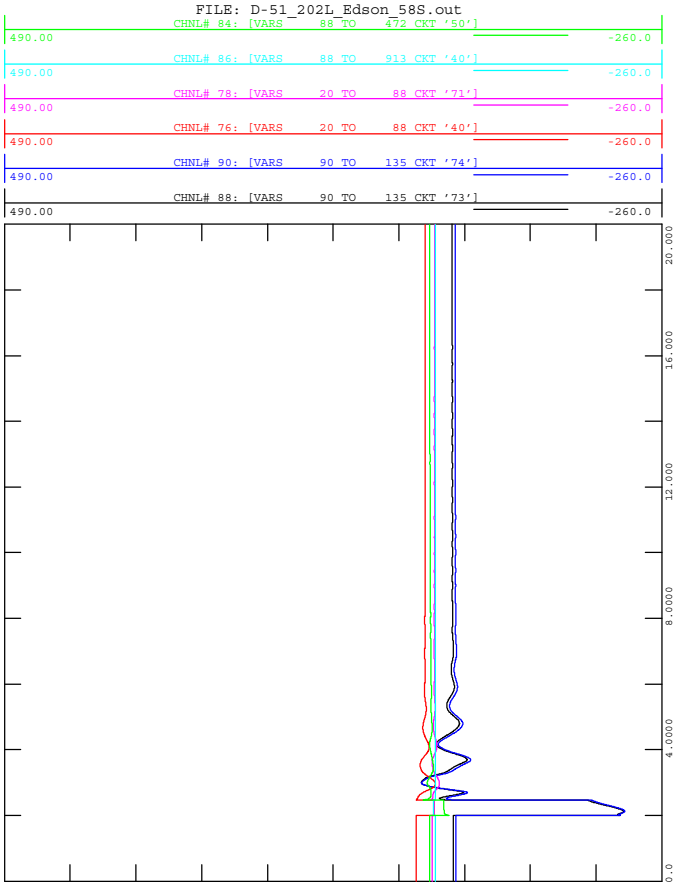
WED, MAY 13 2020 23:38
MACHINE POWER (MW)

FIGURE D-51G
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out



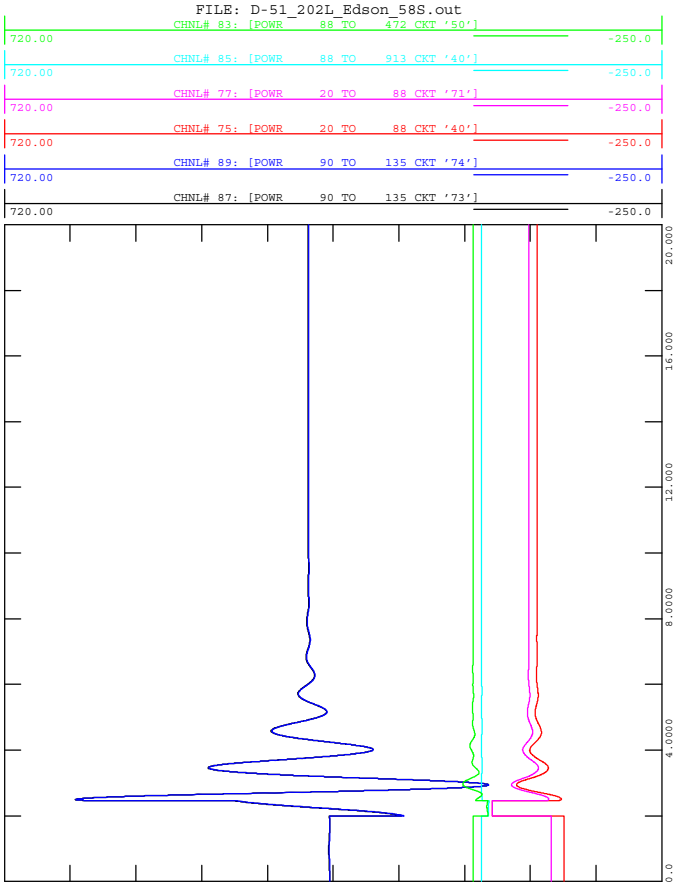
WED, MAY 13 2020 23:38
BUS VOLTAGE (PU)

FIGURE D-51J
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out



WED, MAY 13 2020 23:38
BRANCH FLOW (Q)

FIGURE D-51I
2022SL, POST-PROJECT
3-PHASE FAULT AT EDSON 58S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-51_202L_Edson_58S.out



WED, MAY 13 2020 23:38
BRANCH FLOW (P)

FIGURE D-52B
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out

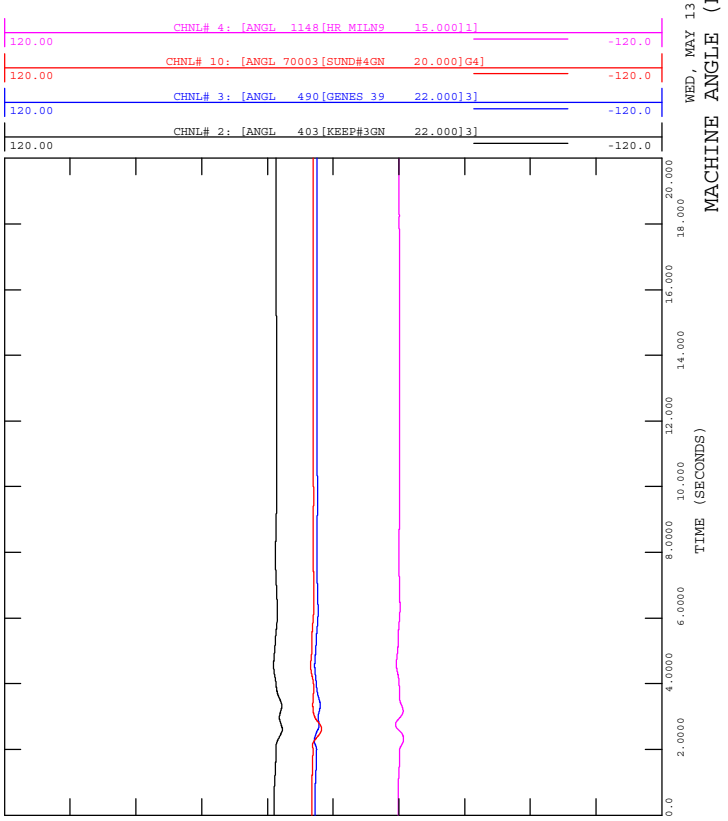


FIGURE D-52D
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out

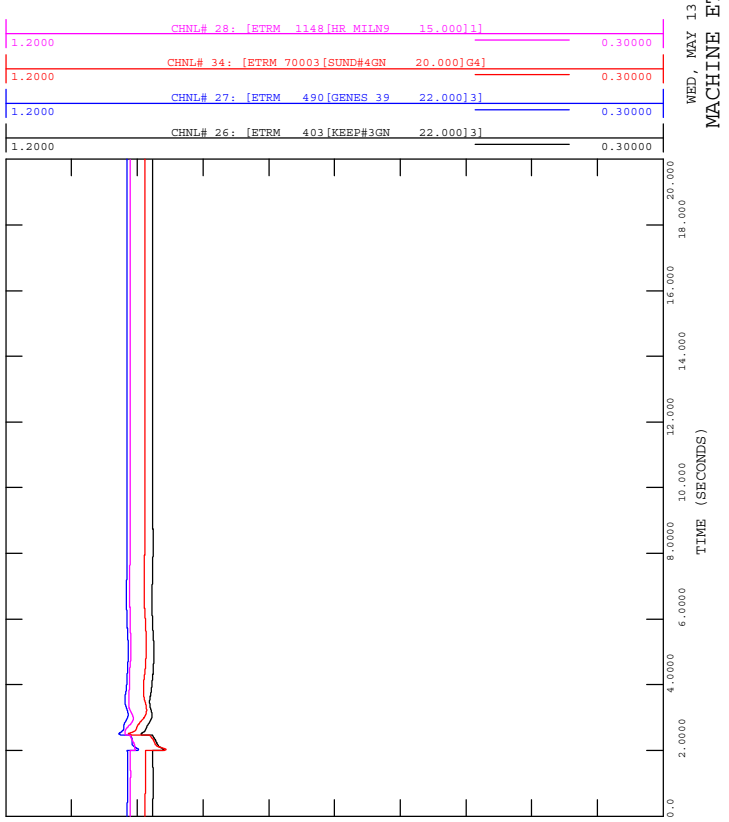


FIGURE D-52A
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out

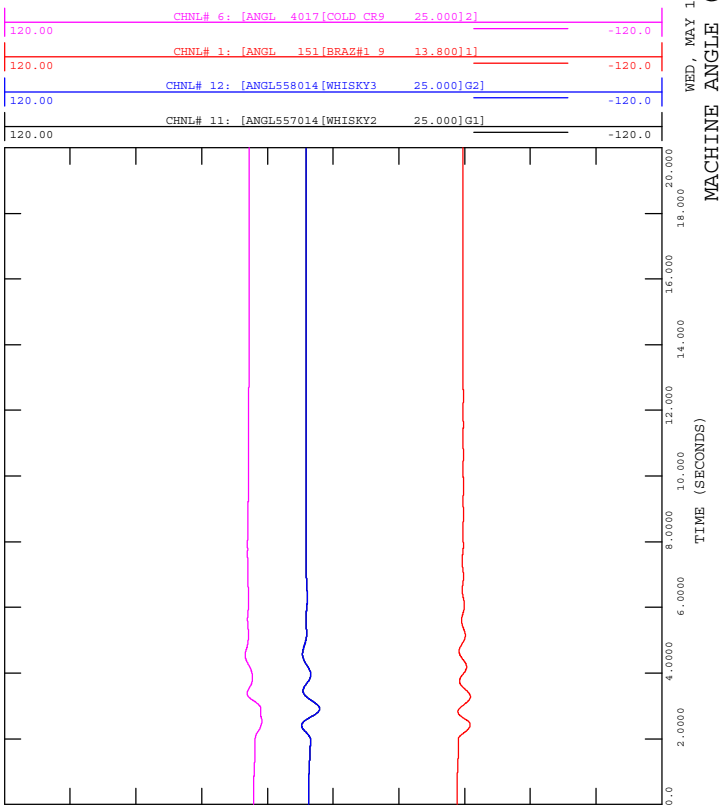


FIGURE D-52C
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out

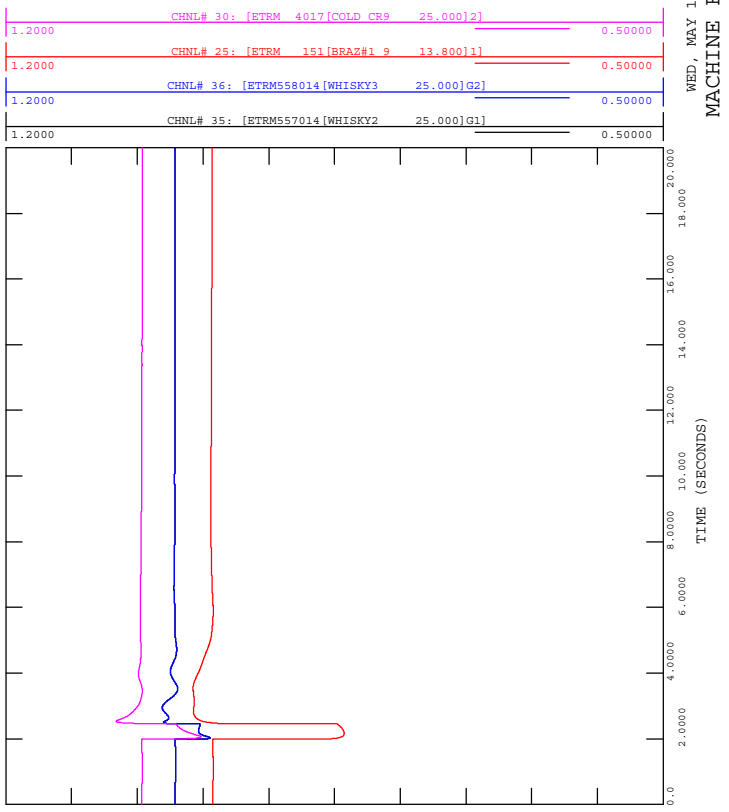
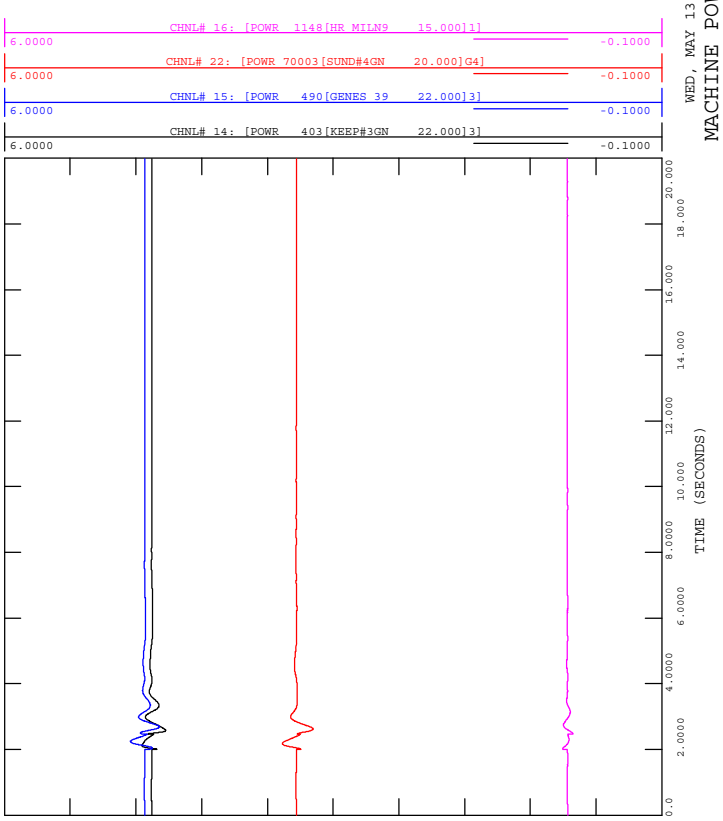
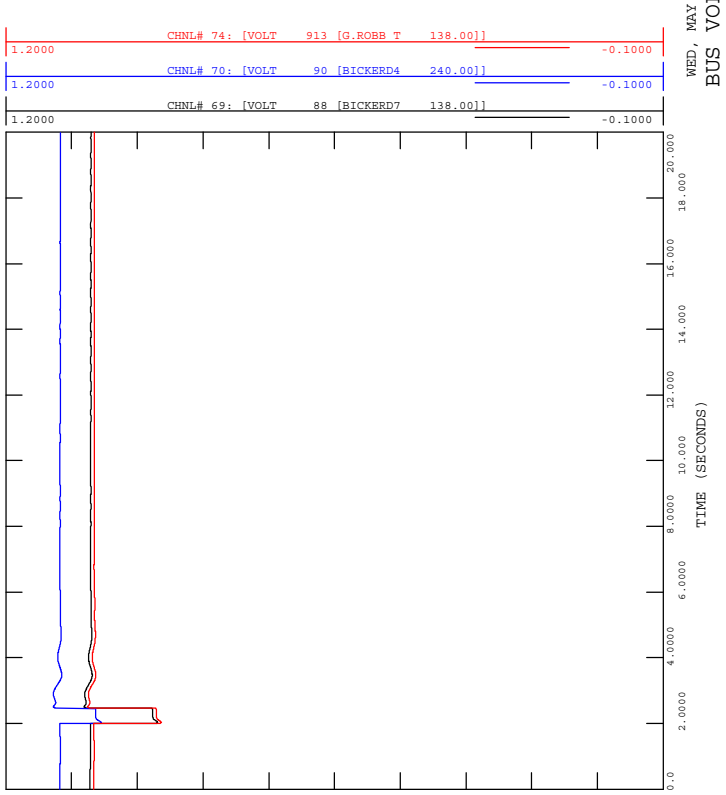


FIGURE D-52F
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out



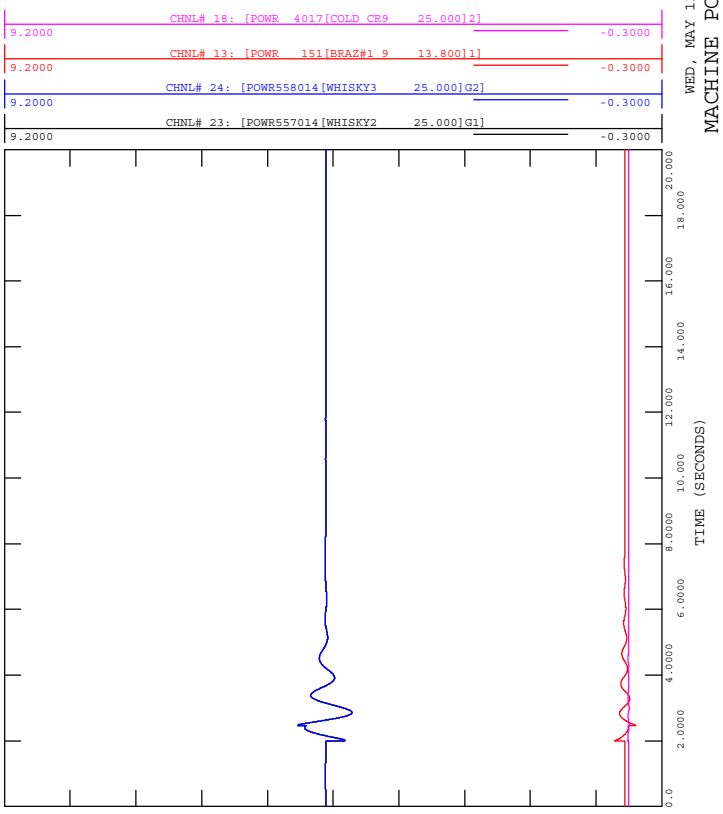
WED, MAY 13 2020 23:38
MACHINE POWER (MW)

FIGURE D-52H
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out



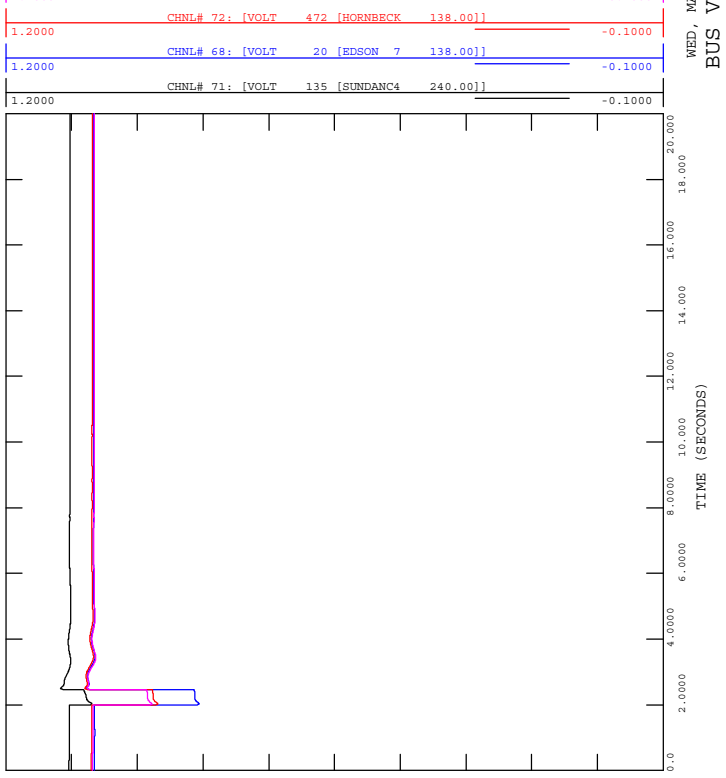
WED, MAY 13 2020 23:39
BUS VOLTAGE (PU)

FIGURE D-52E
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out



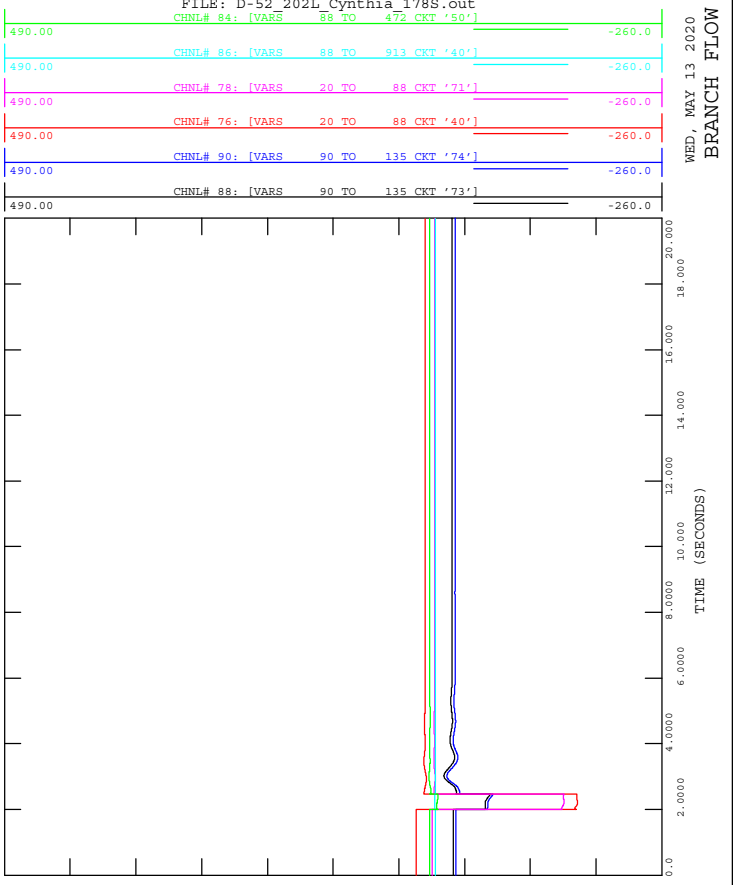
WED, MAY 13 2020 23:38
MACHINE POWER (MW)

FIGURE D-52G
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out



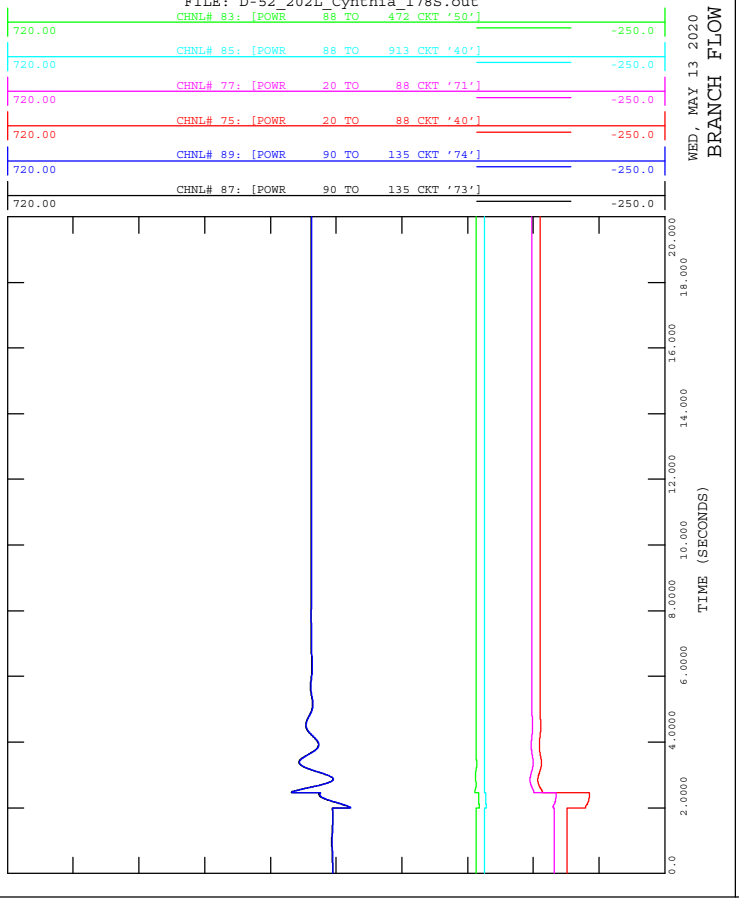
WED, MAY 13 2020 23:39
BUS VOLTAGE (PU)

FIGURE D-52J
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out



WED, MAY 13 2020 23:39
BRANCH FLOW (Q)

FIGURE D-52I
2022SL, POST-PROJECT
3-PHASE FAULT AT CYNTHIA 178S
CLEARED IN 7.5 CYCLES, FAR END IN 28.25 CYCLES
FILE: D-52_202L_Cynthia_178S.out



WED, MAY 13 2020 23:39
BRANCH FLOW (P)

FIGURE D-53B
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out

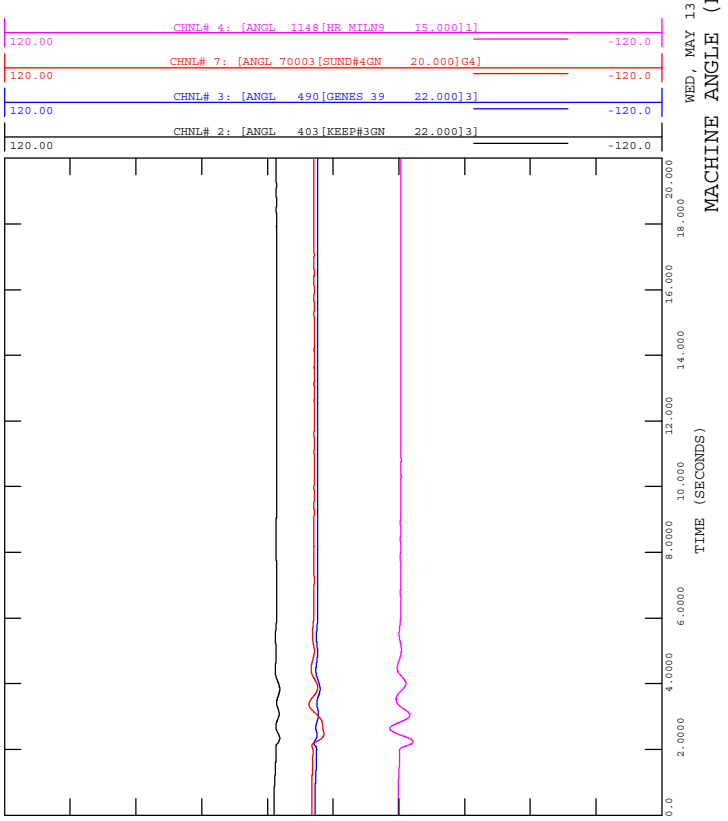


FIGURE D-53D
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out

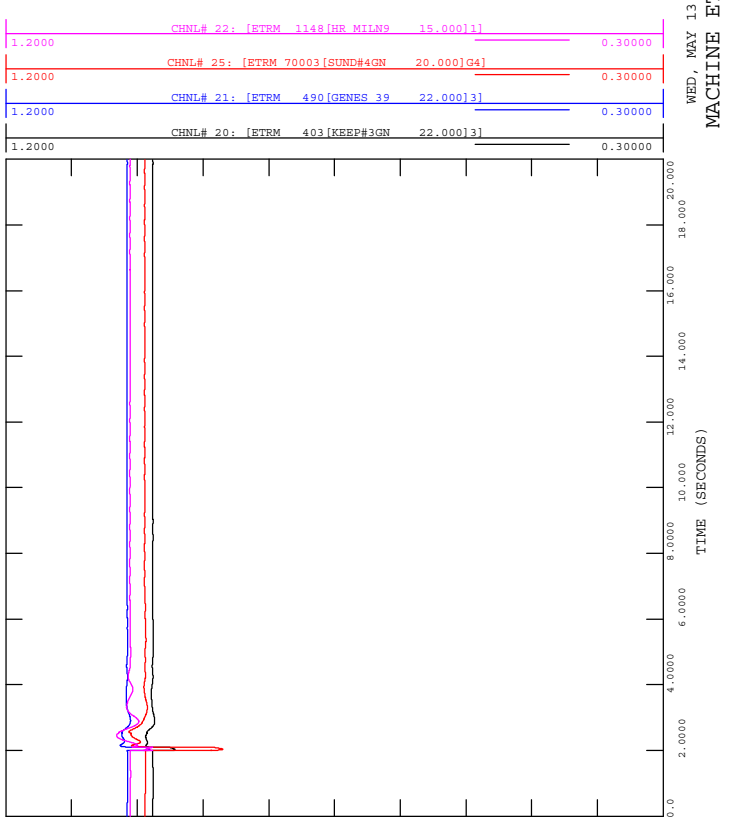


FIGURE D-53A
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out

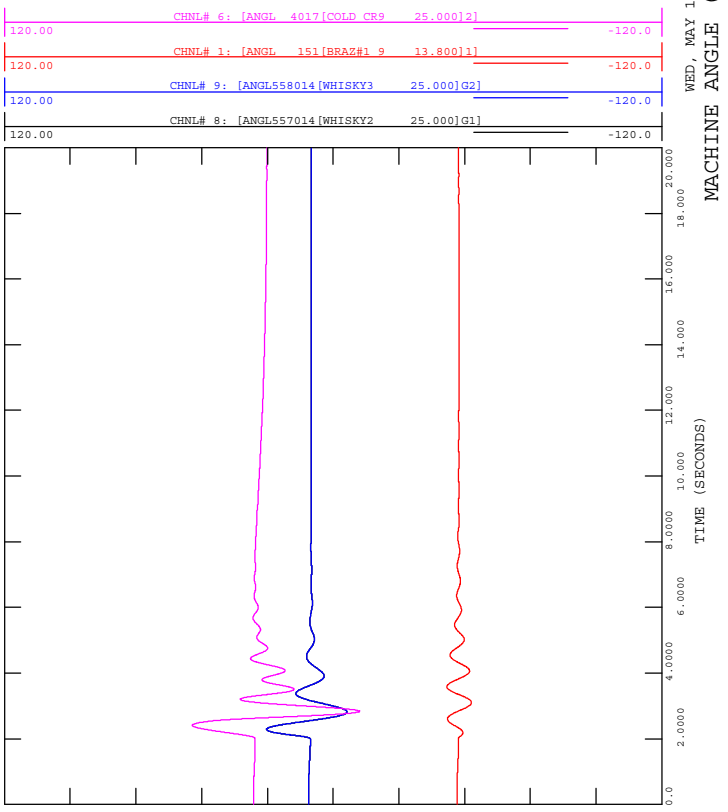


FIGURE D-53C
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out

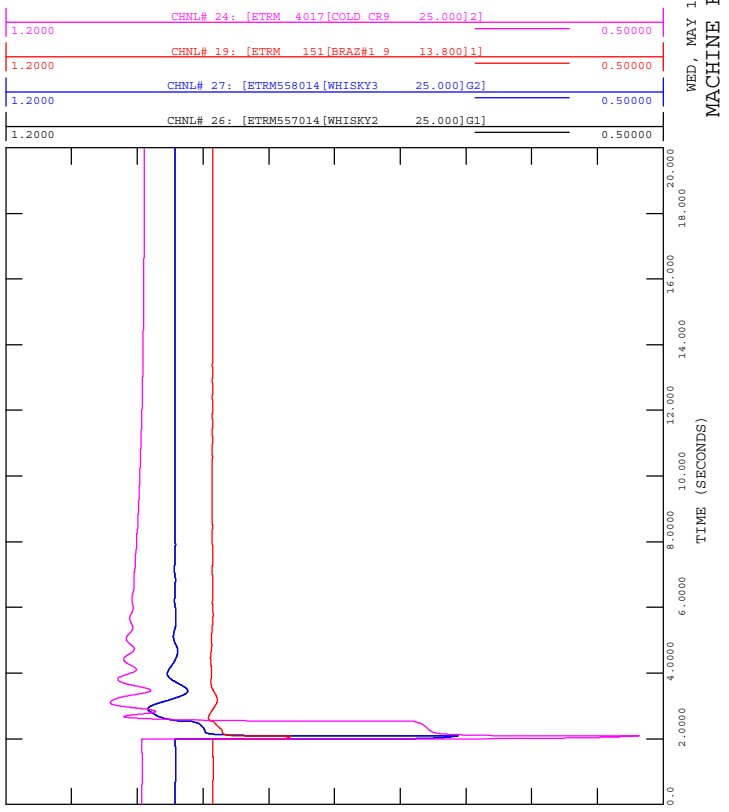


FIGURE D-53F
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out

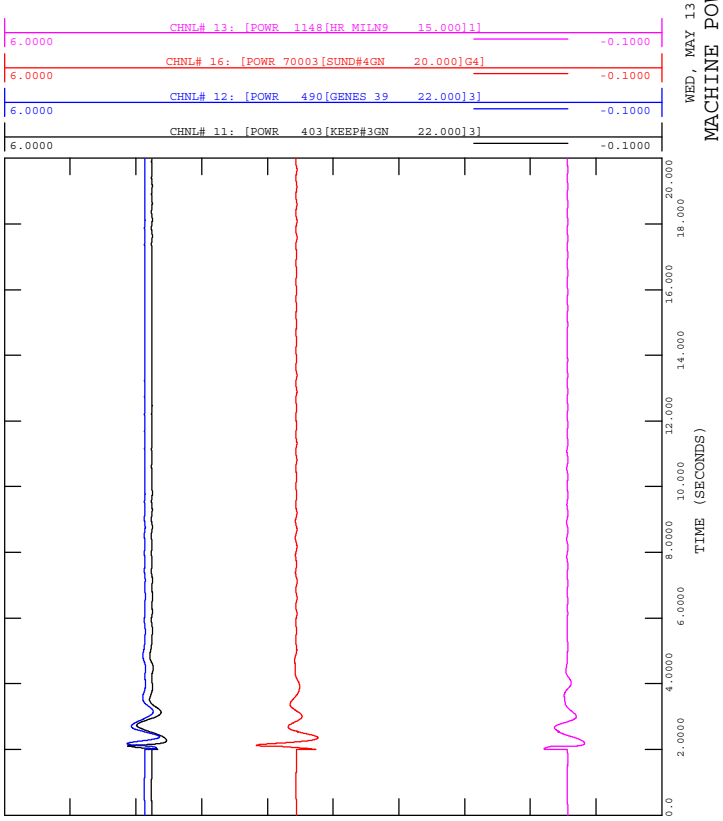


FIGURE D-53H
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out

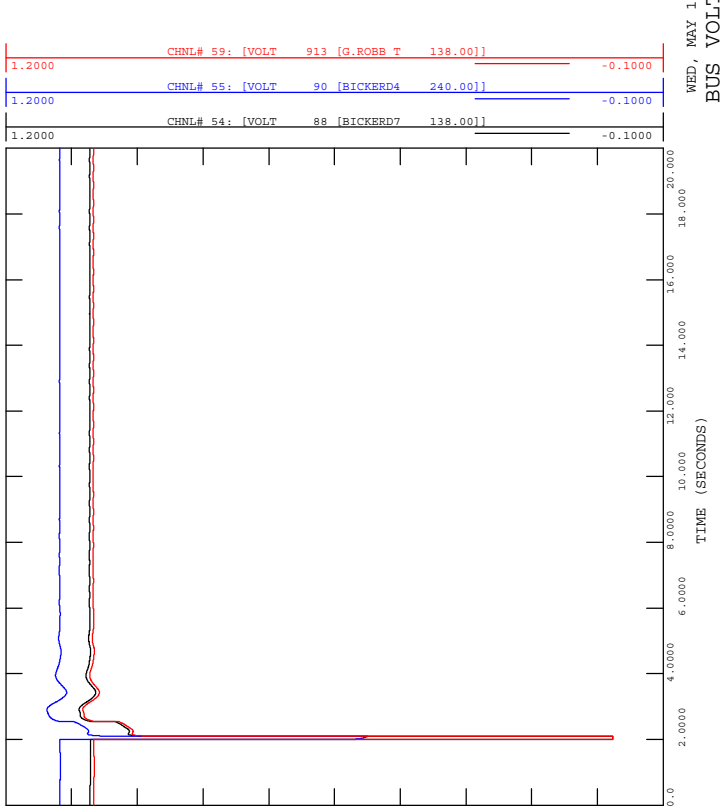


FIGURE D-53E
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out

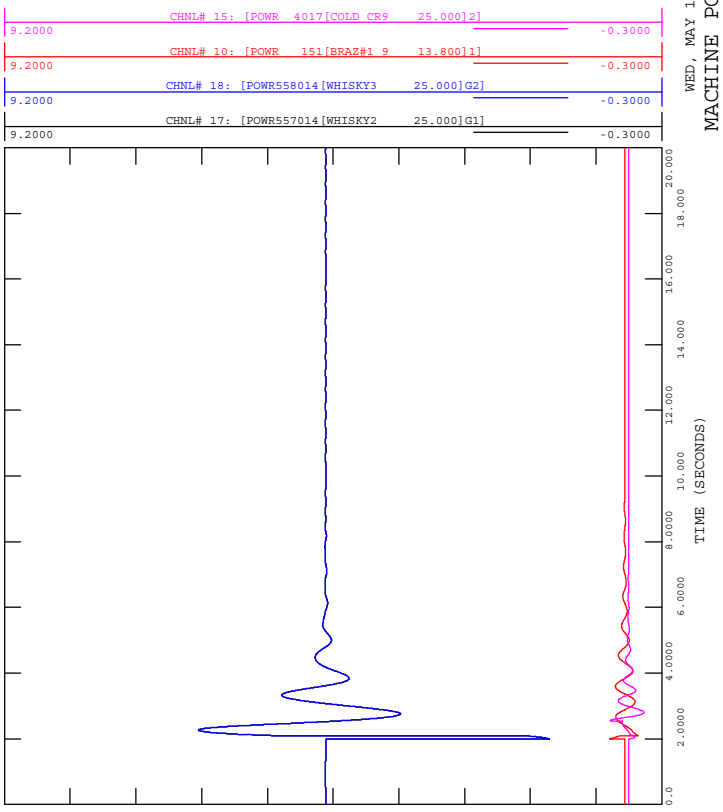


FIGURE D-53G
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out

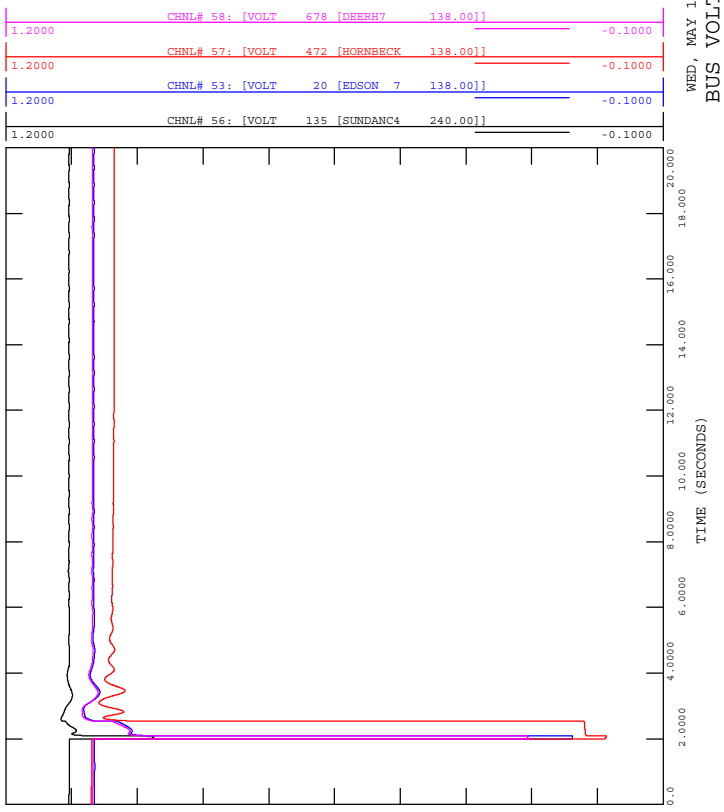
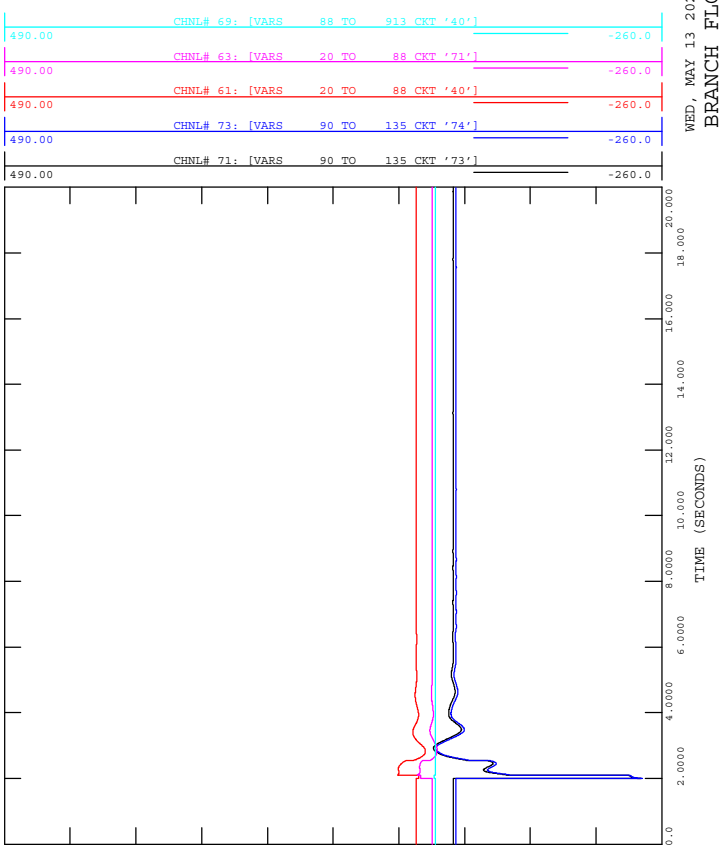
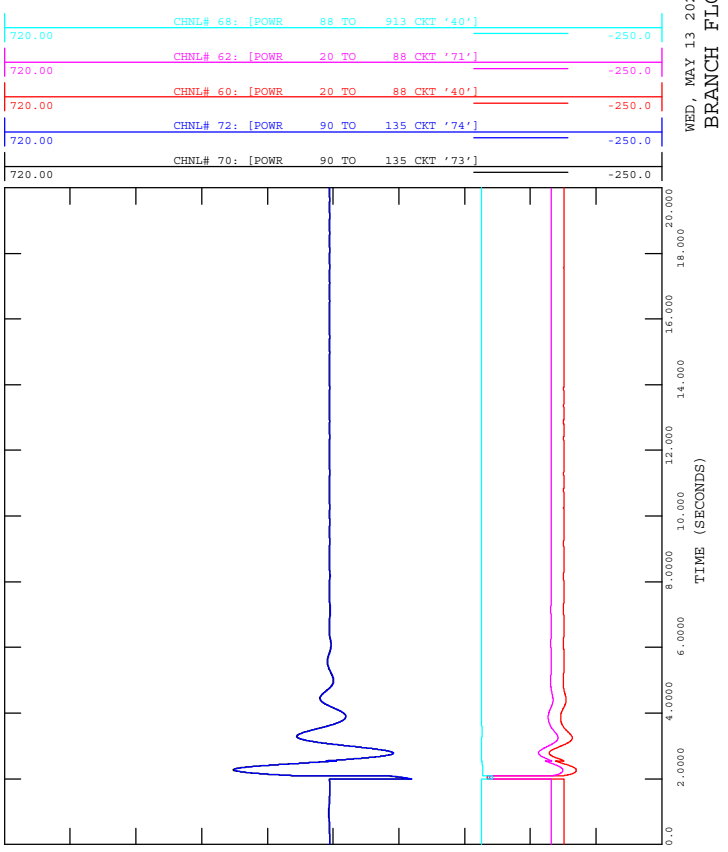


FIGURE D-53J
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out



WED, MAY 13 2020 23:39
BRANCH FLOW (Q)

FIGURE D-53I
2022SL, POST-PROJECT
3-PHASE FAULT AT BICKERDIKE 39S
CLEARED IN 6 CYCLES, FAR END IN 32.75 CYCLES
FILE: D-53_745L_Bickerdike_39S.out



WED, MAY 13 2020 23:39
BRANCH FLOW (P)

FIGURE D-54B
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out

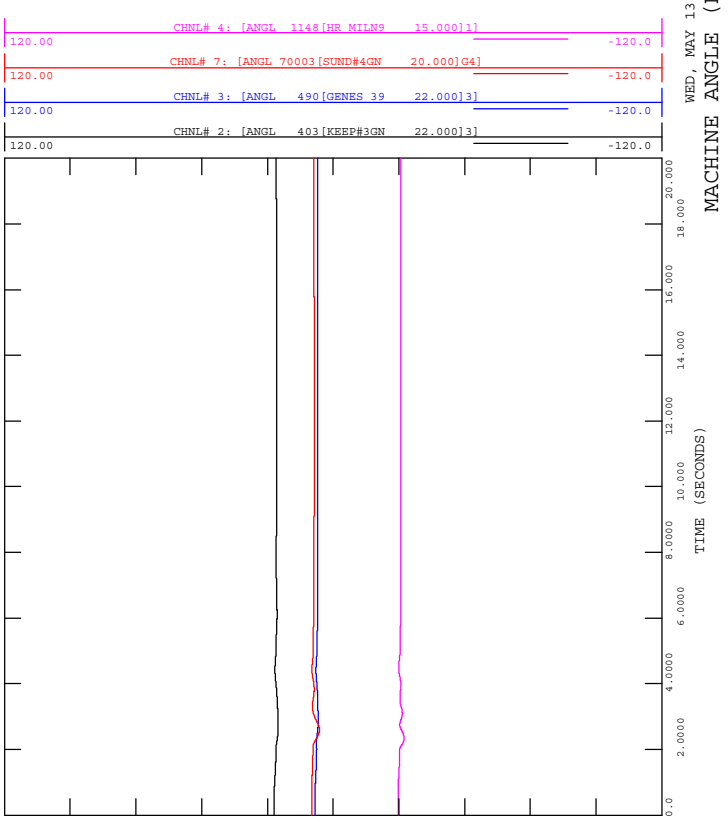


FIGURE D-54D
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out

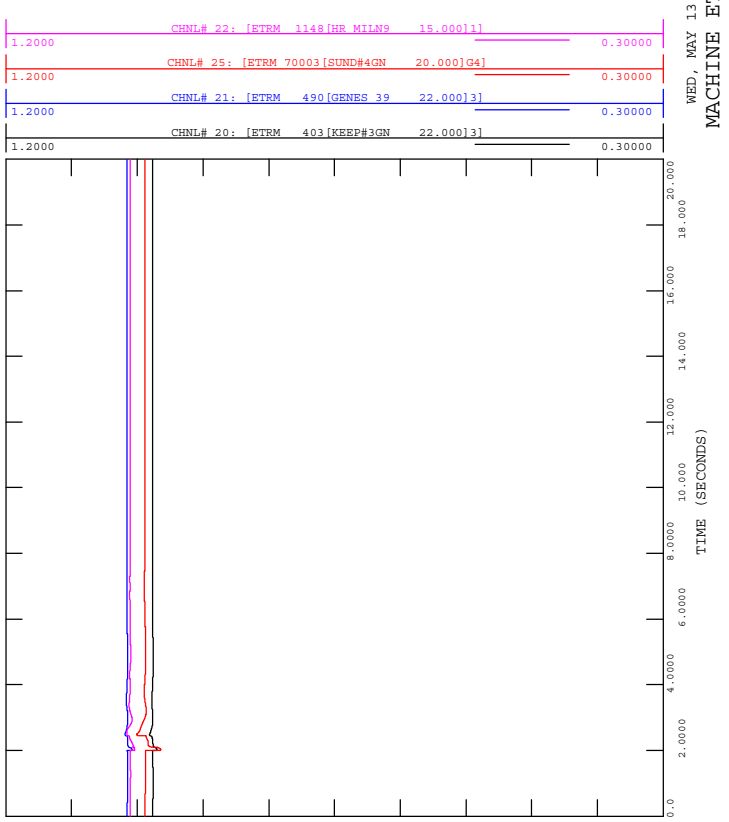


FIGURE D-54A
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out

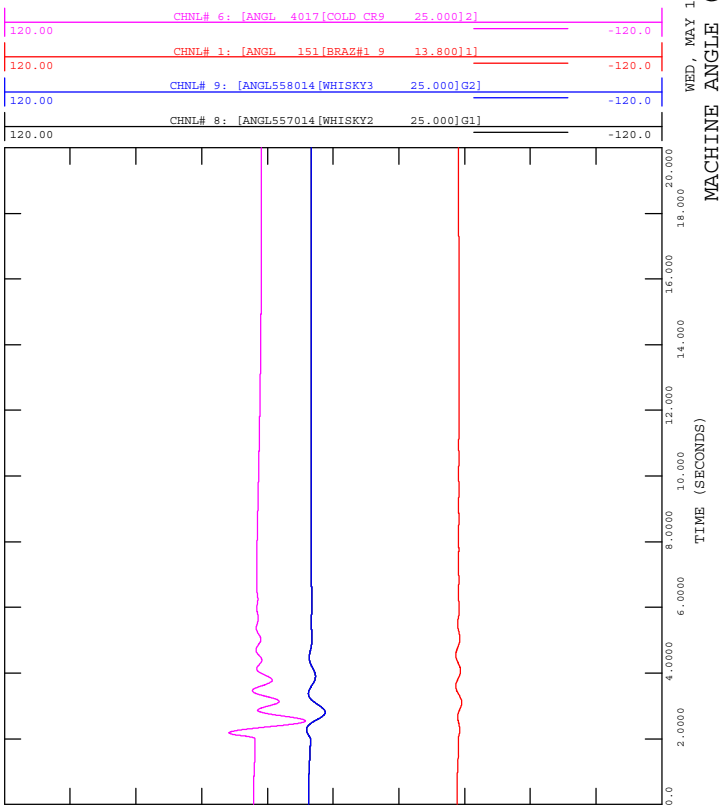


FIGURE D-54C
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out

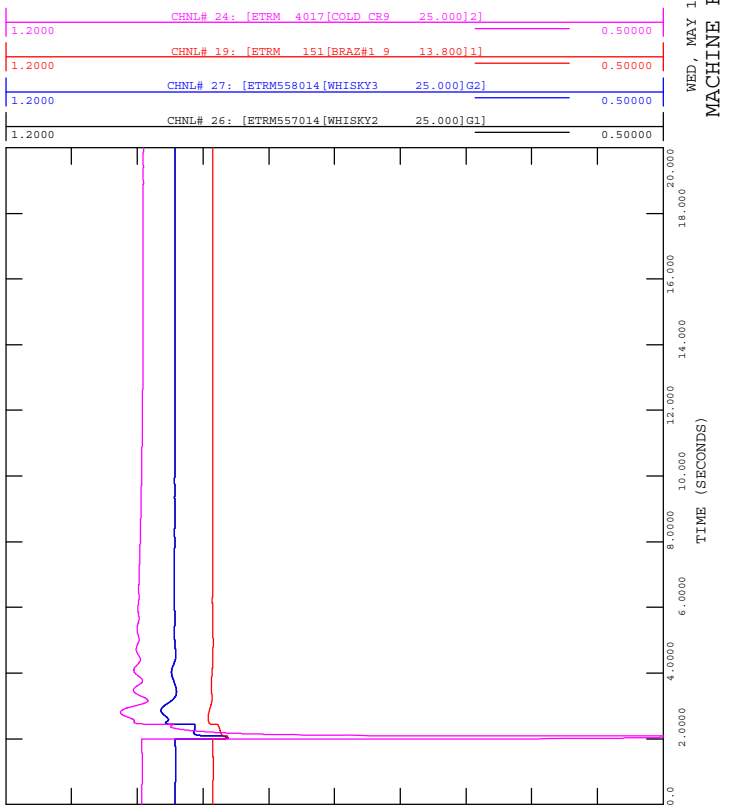


FIGURE D-54F
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out

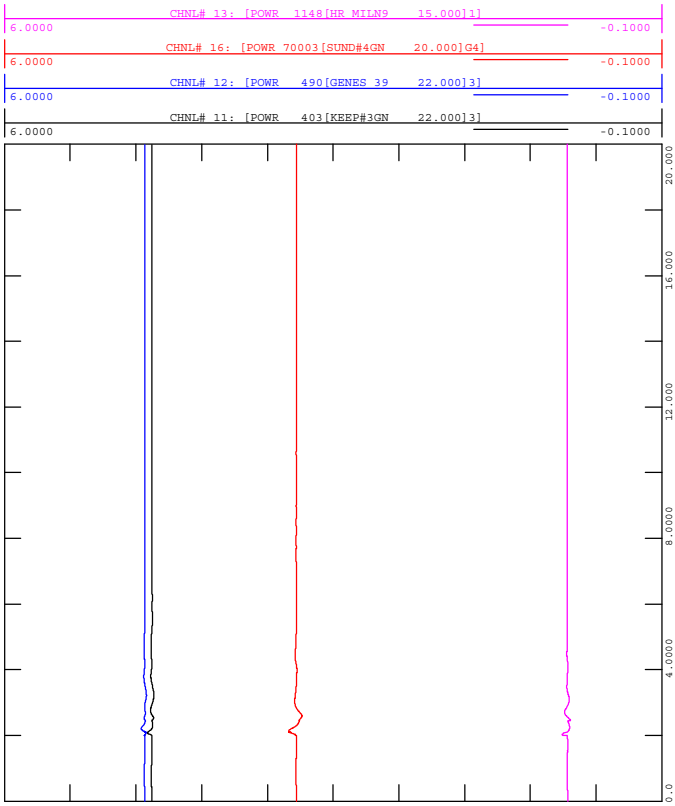


FIGURE D-54H
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out

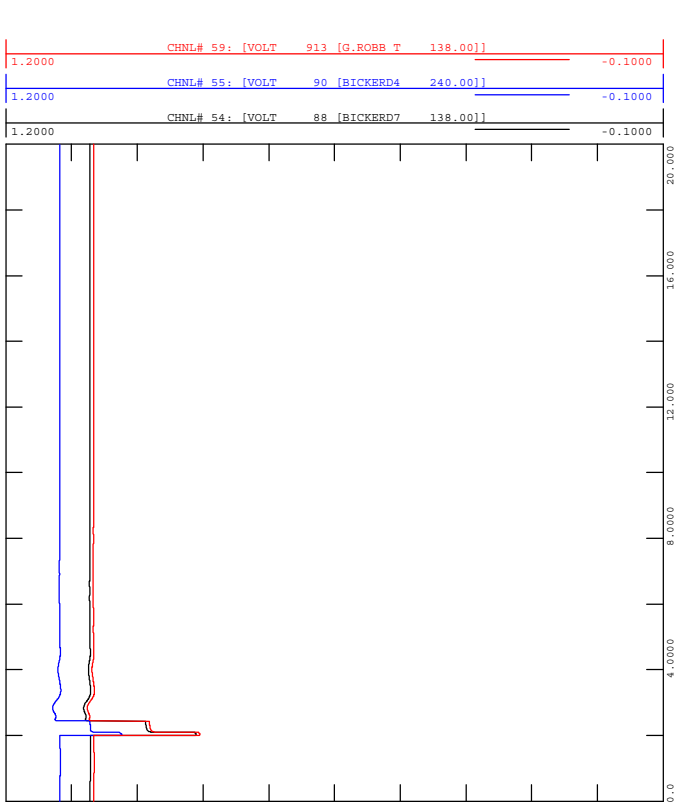


FIGURE D-54E
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out

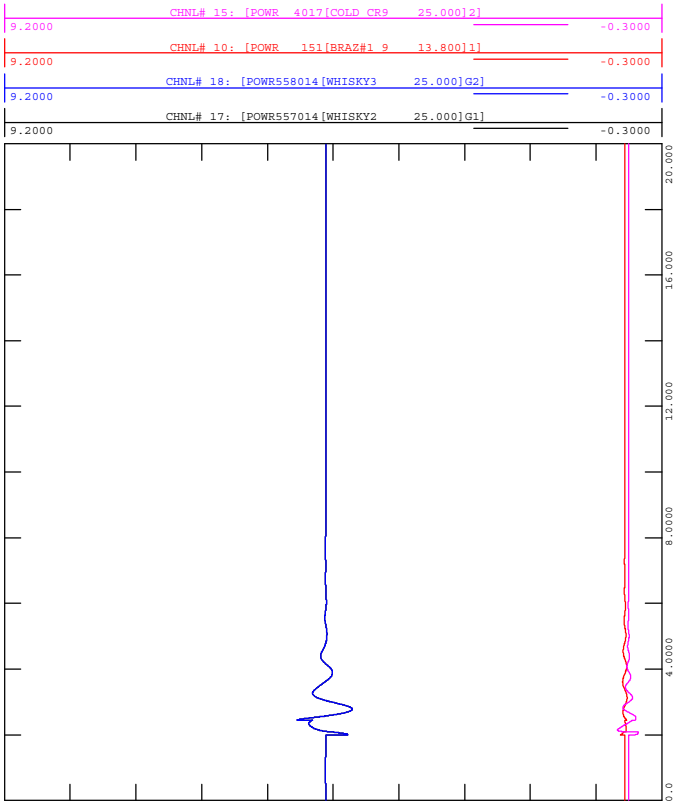


FIGURE D-54G
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out

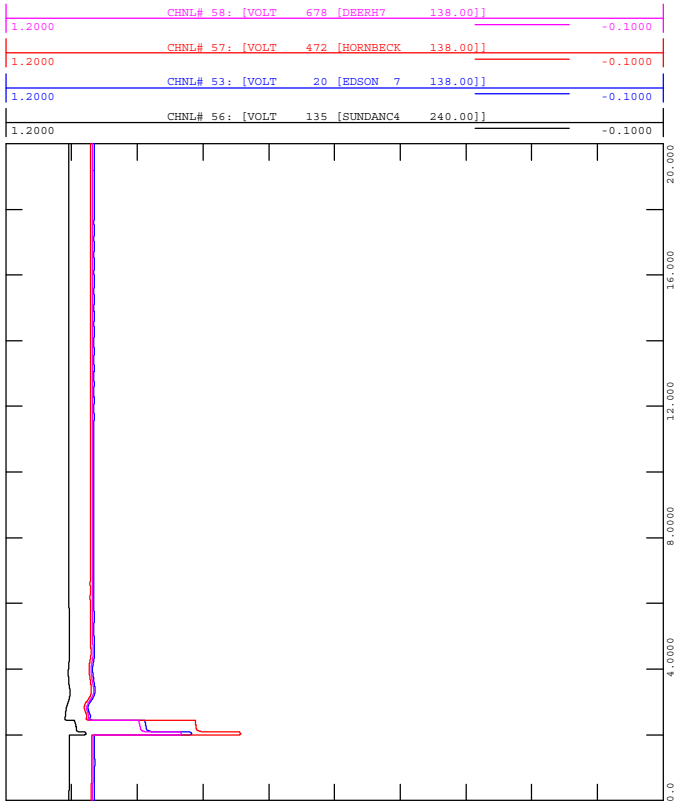
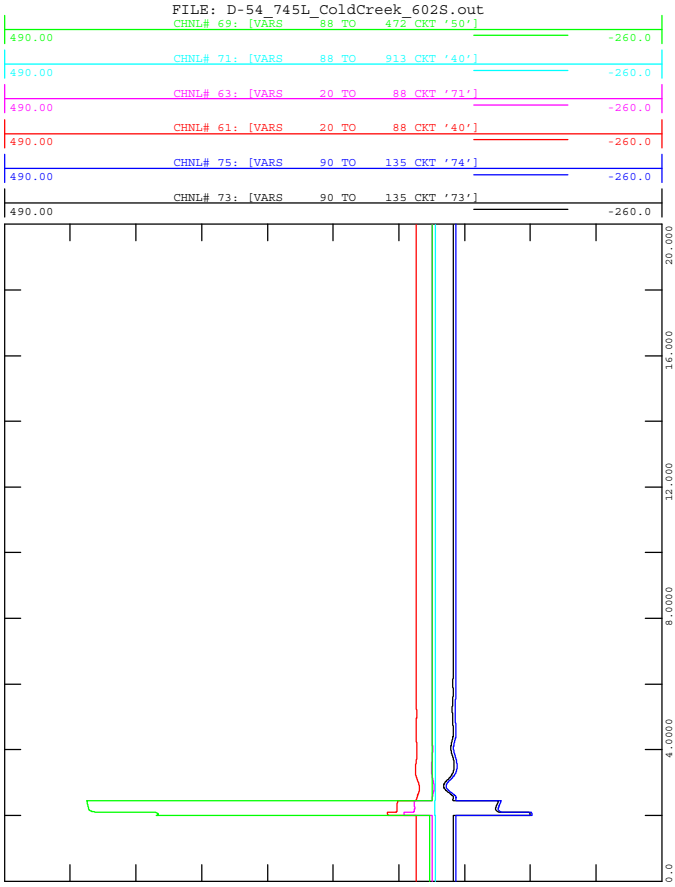
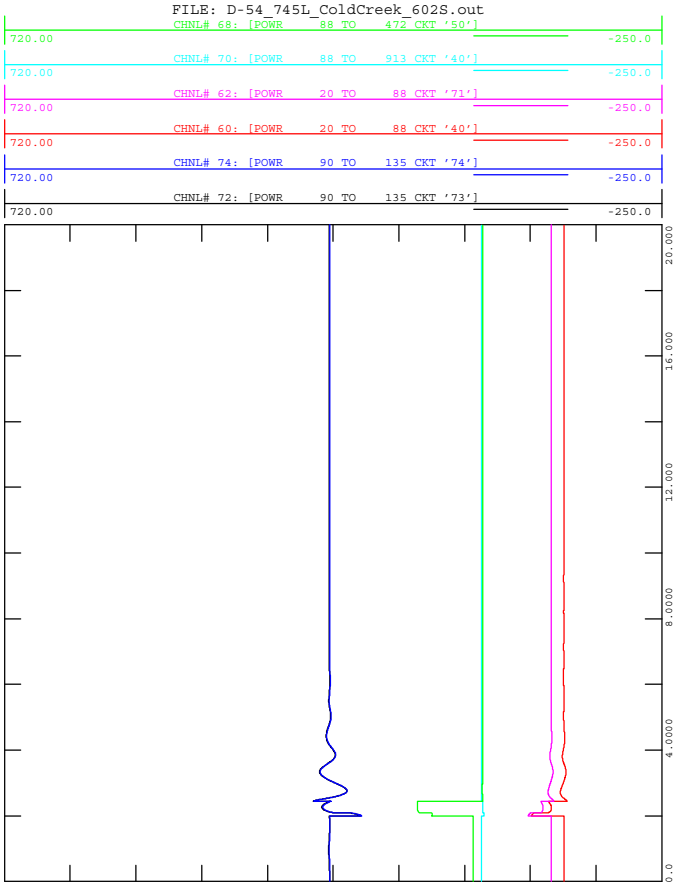


FIGURE D-54J
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out



WED, MAY 13 2020 23:39
BRANCH FLOW (Q)

FIGURE D-54I
2022SL, POST-PROJECT
3-PHASE FAULT AT COLD CREEK 602S
CLEARED IN 5.75 CYCLES, FAR END IN 27 CYCLES
FILE: D-54_745L_ColdCreek_602S.out



WED, MAY 13 2020 23:39
BRANCH FLOW (P)

Attachment A5
Dynamic Data and Assumptions

Table A-1: Generator Dynamic (Example)

Generator Dynamic Data (GENTPJ1 model)											
T'do	T"do	T'qo	T"qo	H	D	Xd	Xq	X'd	X'q	X"d	*X''q*
5.8470	*0.035*	*2.5*	*0.15*	*6.103*	*0.0*	*1.556*	*1.478*	*0.197*	*0.49*	*0.174*	*0.191*
Xl	S(1.0)	S(1.2)	Kis								
0.132	*0.179*	*0.818*	*0.014*								

Table A-2: Exciter Dynamic Data (Example)

Exciter Dynamic Data (ST6B model)											
Tr	KPA	KIA	KDA	TDA	VAMAX	VAMIN	KFF	KM	KCI	KLR	ILR
0.012	*37.23*	*7.45*	*0.0*	*1.0*	*6.205*	*-4.964*	*1.0*	*1.0*	*1.0*	*30.0*	*3.693*
VRMAX	VRMIN	KG	TG								
6.205	*-4.964*	*1.0*	*0.02*								

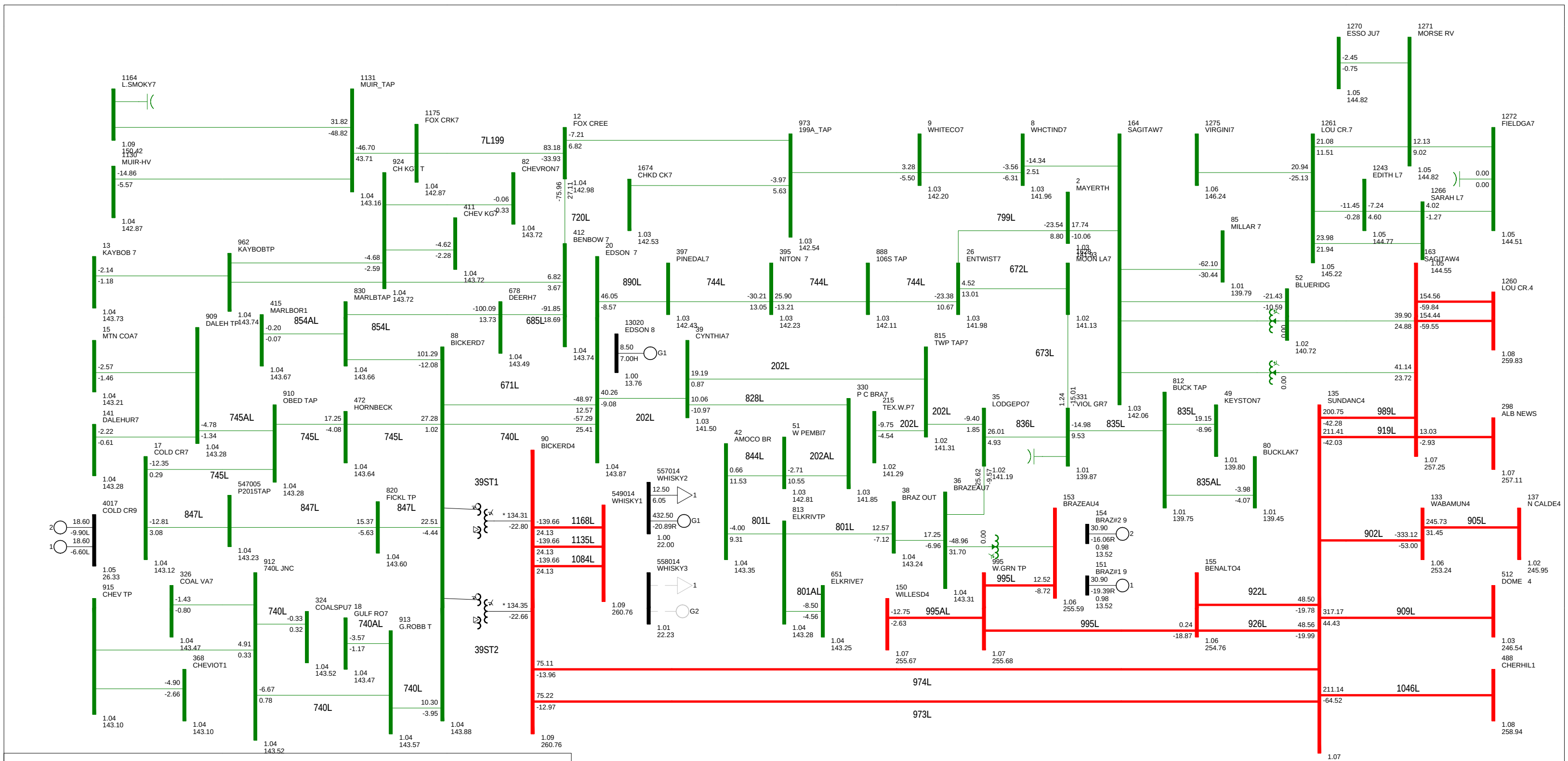
Table A-3: Stabilizer Dynamic Data (Example)

Stabilizer Dynamic Data (PSS2B model)											
Tw1	Tw2	T6	Tw3	Tw4	T7	KS2	KS3	T8	T9	KS1	T1
10.0	*10.0*	*0.0*	*10.0*	*0.0*	*10.0*	*0.81*	*1.0*	*0.6*	*0.12*	*10.0*	*0.5*
T2	T3	T4	T10	T11	VSI1MAX	VSI2MIN	VSI1MAX	VSI2MIN	VSTMAX	VSTMIN	ICS1
0.05	*0.5*	*0.05*	*0.5*	*2.0*	*0.5*	*-0.5*	*2.0*	*-2.0*	*0.05*	*-0.05*	*1*
REMBUS1	ICS2	REMBUS2	M	N							
0	*3*	*0*	*5*	*1*							

Table A-4: Governor Dynamic Data (Example)

Governor Dynamic Data (WSIEG11 model)											
K	T1	T2	T3	Uo	Uc	PMAX	PMIN	T4	K1	K2	T5
20.0	*0.1*	*0.0*	*0.05*	*1.0*	*-1.0*	*1.0*	*0.0*	*1.0*	*0.67*	*0.0*	*450*
K3	K4	T6	K5	K6	T7	K7	K8	Db1	Err	Db2	GV1
0.0660	*0.0*	*0.0*	*0.0*	*0.0*	*4.1*	*0.264*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
PGV1	GV2	PGV2	GV3	PGV3	GV4	PGV4	GV	PGV5	IBLOCK		
0.0	*1.0*	*1.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*		

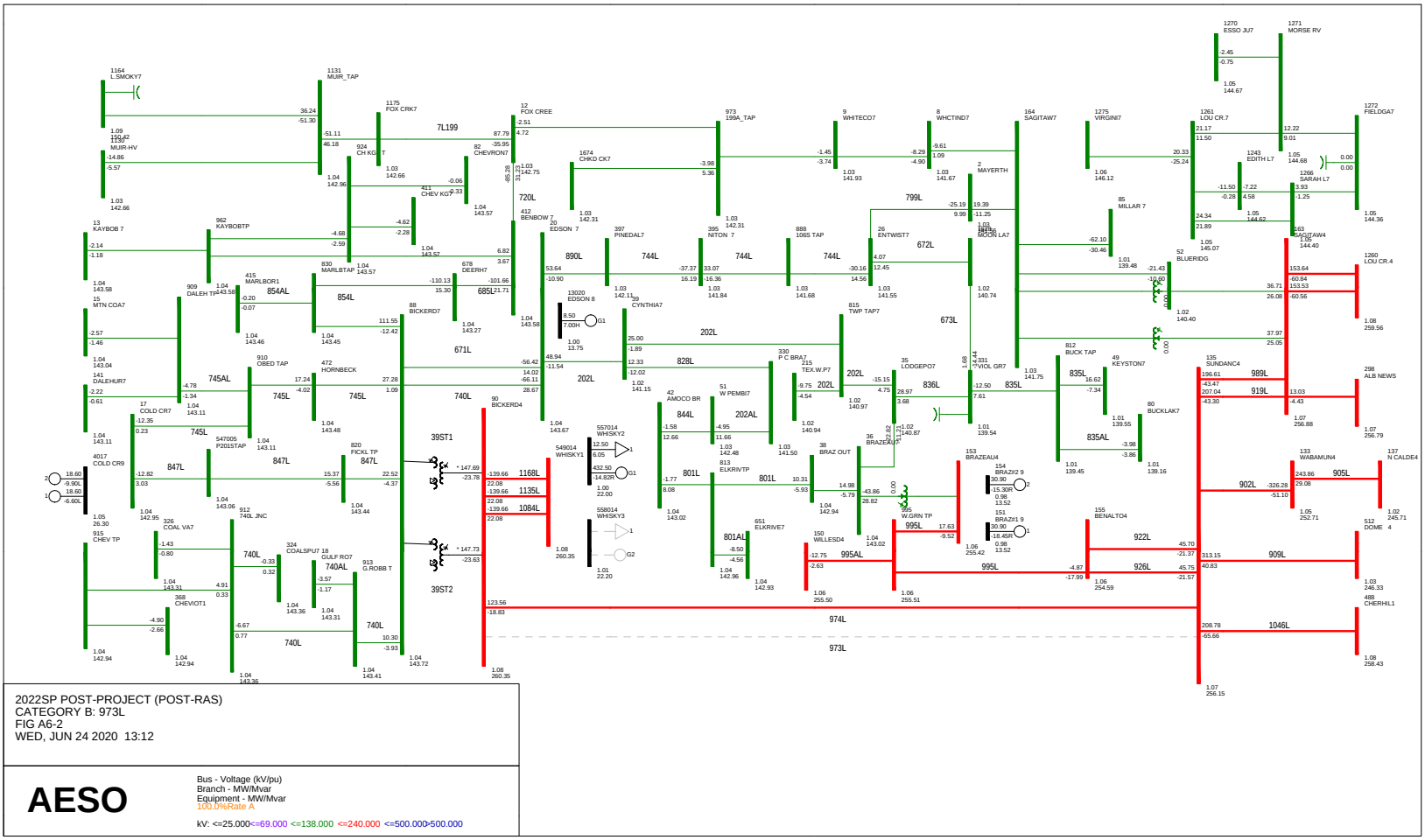
Attachment A6
Post-Mitigation Power Flow Diagrams



2022SP POST-PROJECT (POST-RAS)
CATEGORY A
FIG A6-1
WED, JUN 24 2020 13:11

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

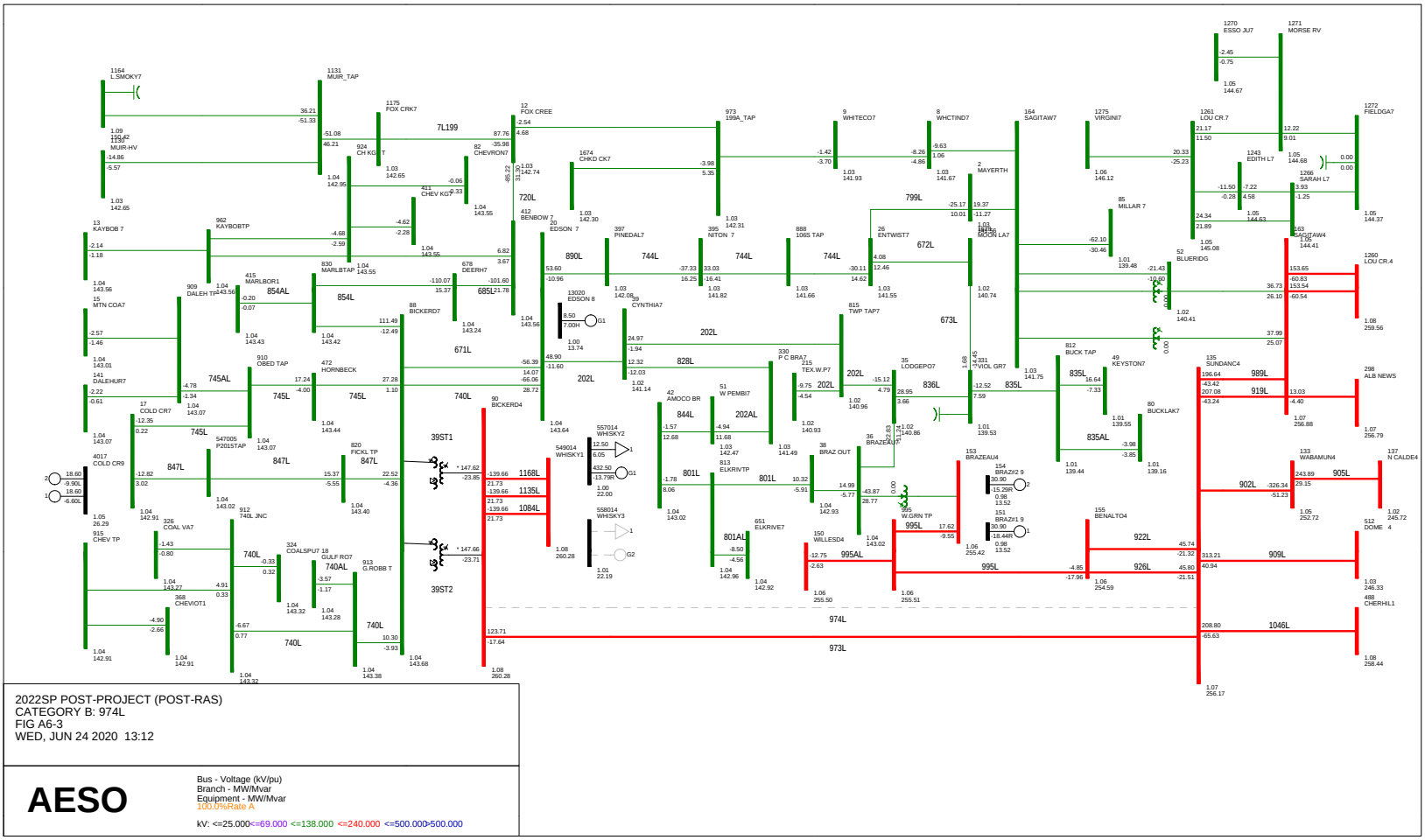


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 973L
FIG A6-2
WED, JUN 24 2020 13:12

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

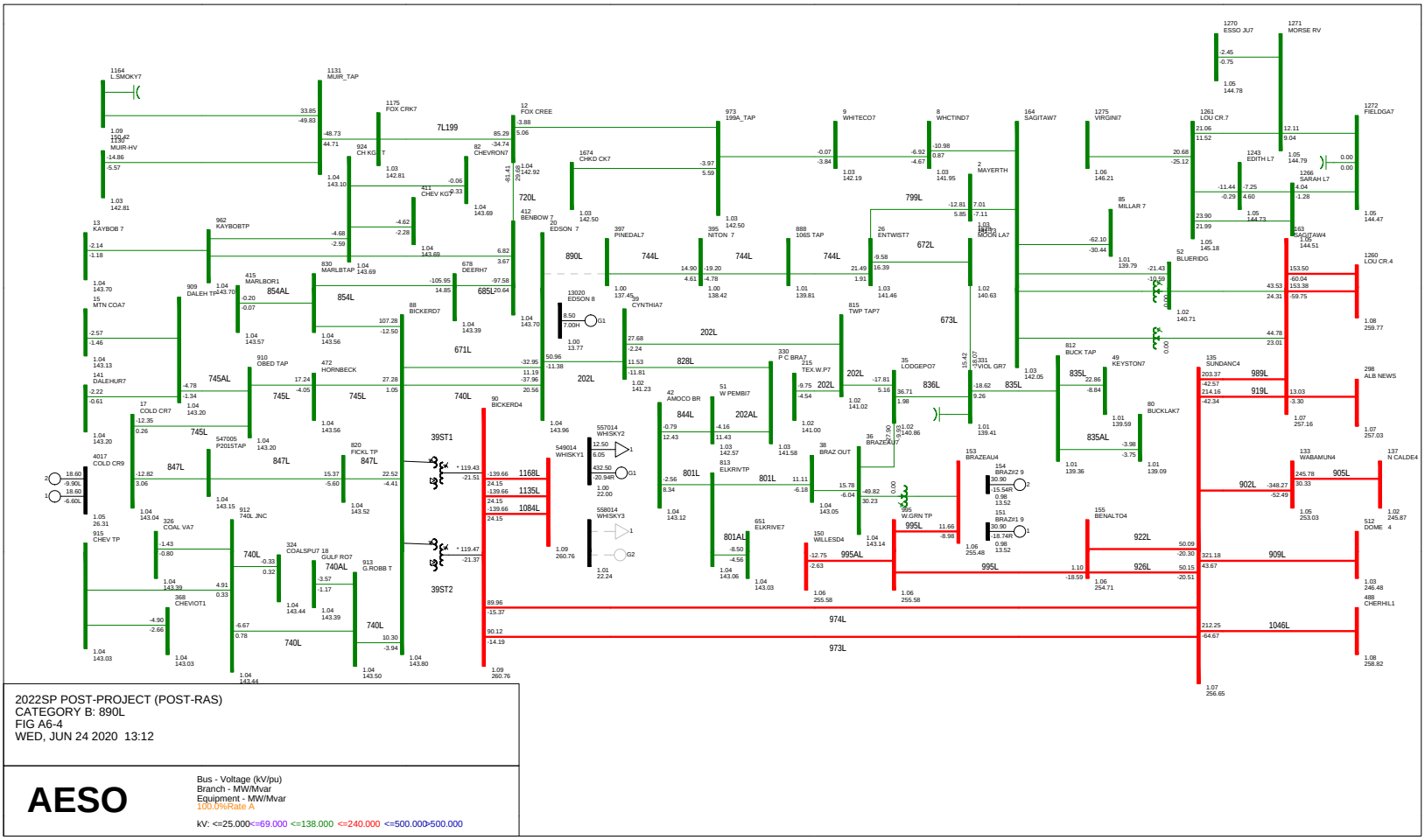


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 974L
FIG A6-3
WED, JUN 24 2020 13:12

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

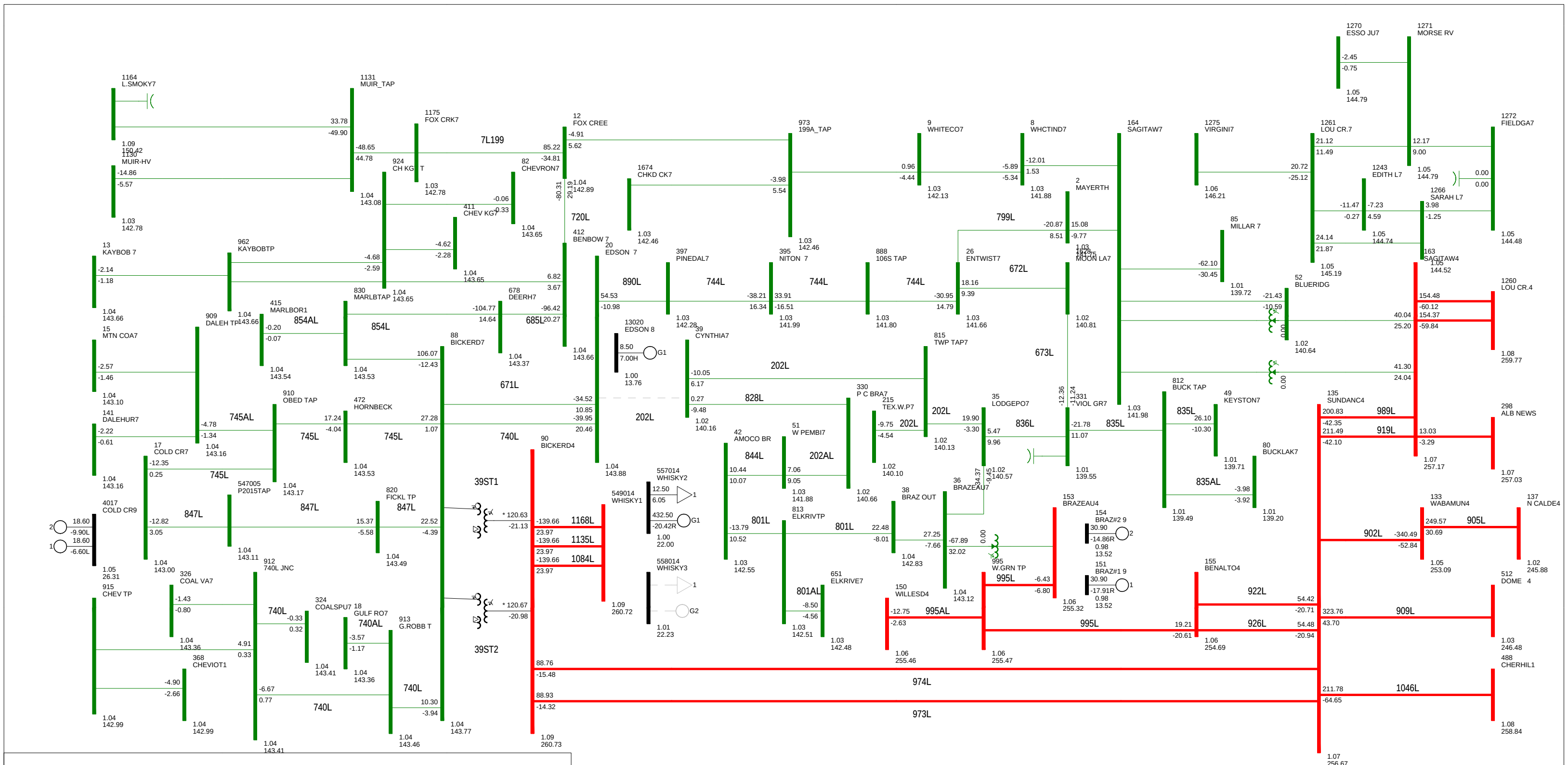


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 890L
FIG A6-4
WED, JUN 24 2020 13:12

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000



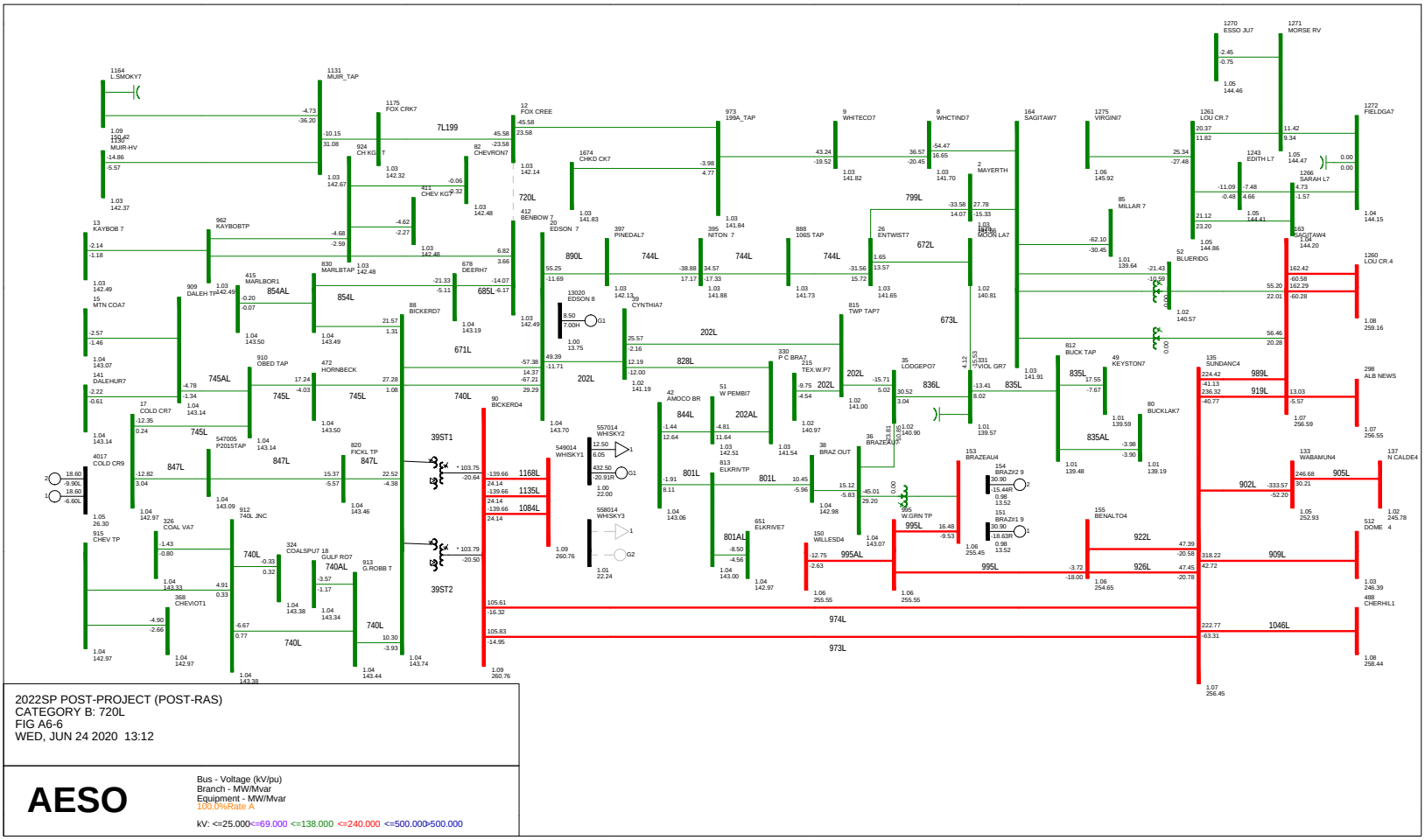
L.SMOKY7
MUIR_TAP
MUIR-HV
FOX CRK7
FOX CREE
CH KG T
CHEVRON7
CHEV KG7
199A_TAP
CHKD CK7
WHITECO7
WHCTIND7
MAYERTH
SAGITAW7
VIRGINI7
LOU CR.7
ESSO JU7
MORSE RV
FIELDGA7
EDITH L7
SARAH L7
SAGITAW4
LOU CR.4
MILLAR 7
BLUERIDG
KAYBOB 7
KAYBOBTP
MARLBTAP
MARLBOR1
MTN COA7
DALEH TP
DEERH7
BENBOW 7
EDSON 7
EDSON 8
PINEDAL7
NITON 7
106S TAP
ENTWIST7
MOON LA7
CYNTHIA7
TWP TAP7
BICKERD7
BICKERD4
HORNBECK
OBED TAP
DALEHUR7
COLD CR7
COLD CR9
P2015TAP
FICKL TP
CHEV TP
COAL VA7
CHEVIOT1
740L JNC
COALSPU7
GULF RO7
G.ROBB T
WHISKY1
WHISKY2
WHISKY3
AMOCO BR
W PEMBI7
ELKRIVTP
ELKRIVE7
P C BRA7
TEX.W.P7
BRAZ OUT
BRAZEAU7
LODGEPO7
VIOL GR7
BRAZEAU4
BRAZ#2 9
BRAZ#1 9
W.GRN TP
WILLESD4
BUCK TAP
KEYSTON7
BUCKLAK7
SUNDANC4
ALB NEWS
WABAMUN4
N CALDE4
BENALTO4
DOME 4
CHERHIL1
7L199
720L
890L
744L
799L
672L
673L
854L
854AL
685L
671L
202L
202AL
828L
844L
836L
835L
835AL
745L
745AL
847L
740L
740AL
39ST1
39ST2
1168L
1135L
1084L
801L
801AL
995L
995AL
922L
926L
974L
973L
989L
919L
902L
905L
909L
1046L

2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 202L
FIG A6-5
WED, JUN 24 2020 13:12

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

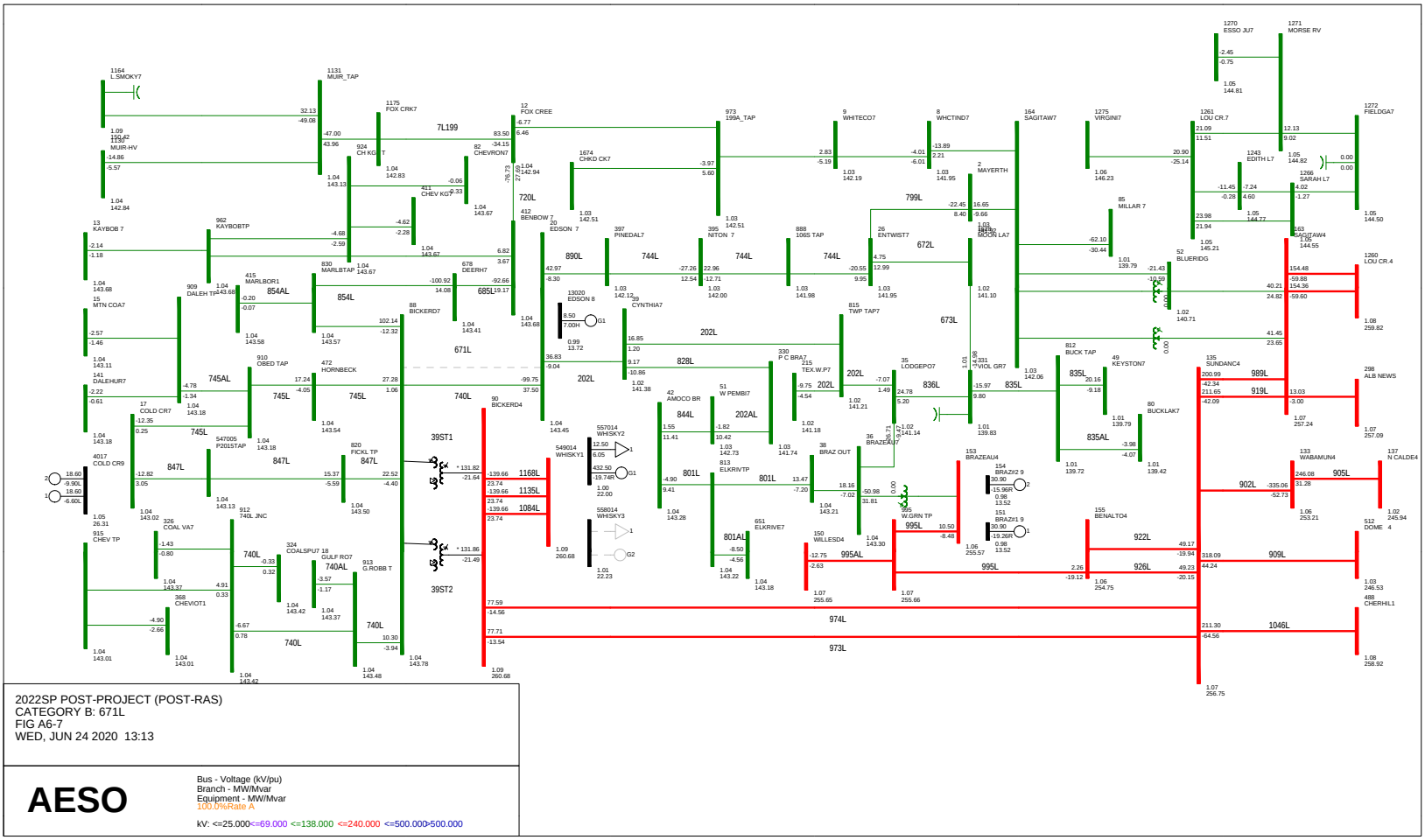


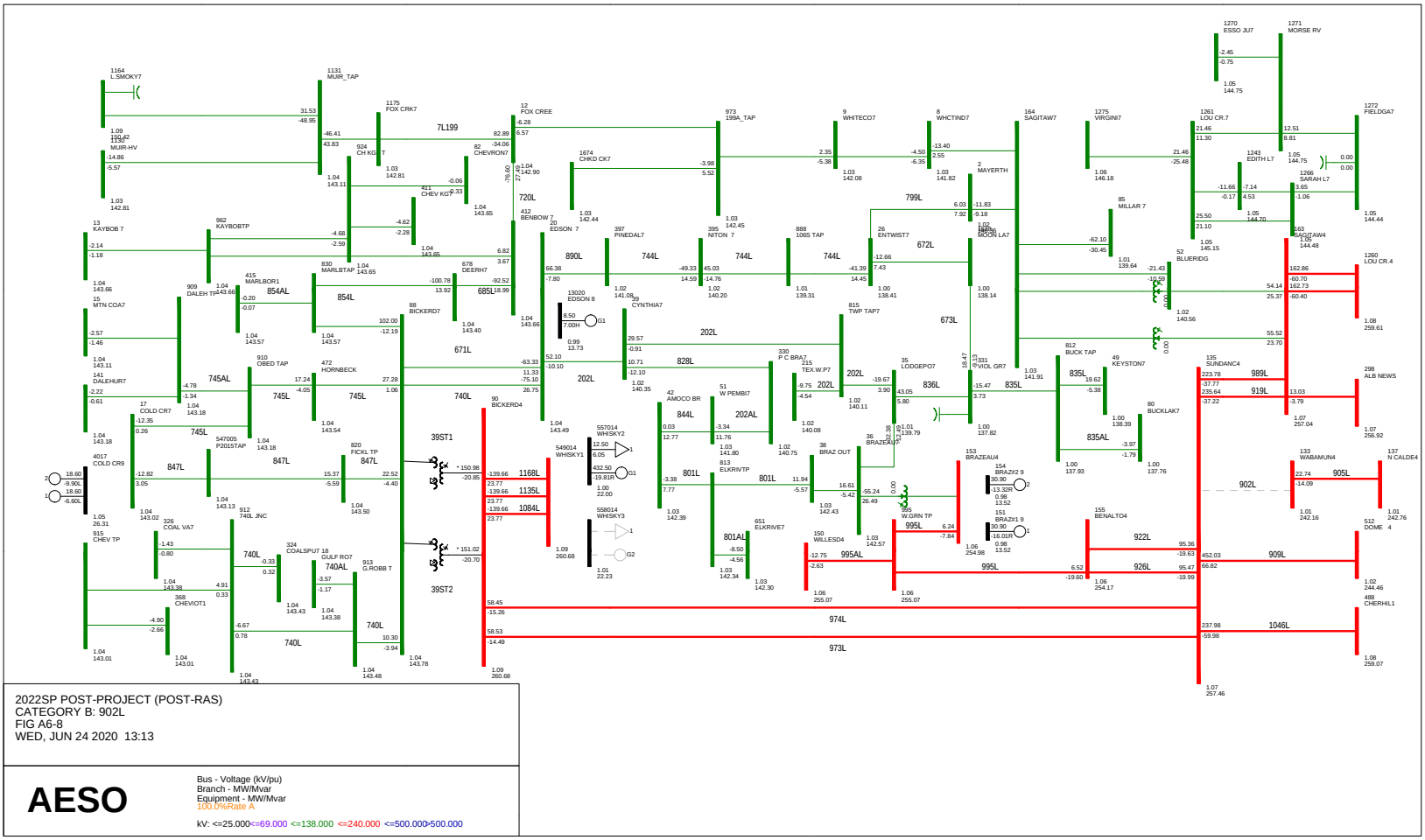
2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 720L
FIG A6-6
WED, JUN 24 2020 13:12

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 671L
FIG A6-7
WED, JUN 24 2020 13:13
AESO
Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

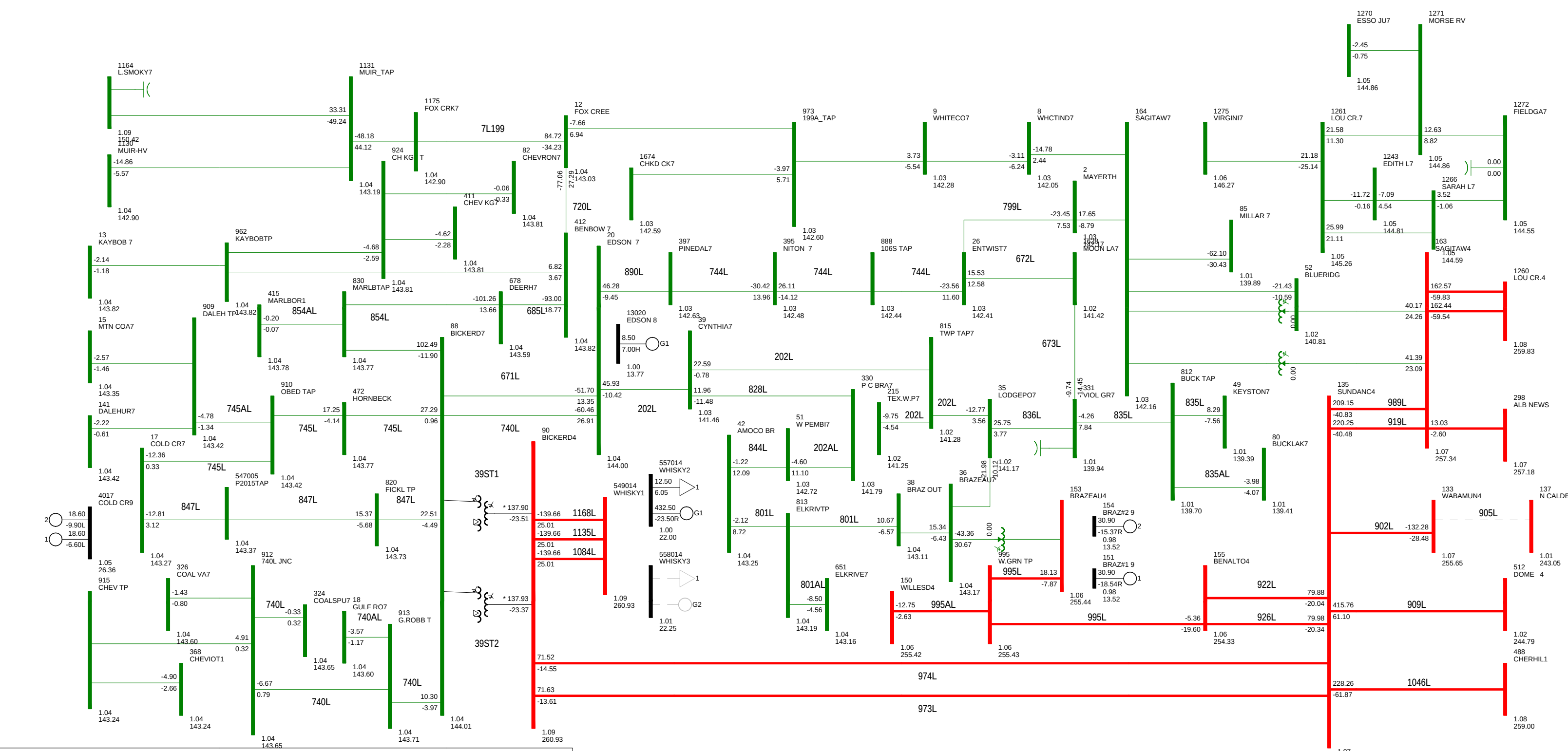


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 902L
FIG A6-8
WED, JUN 24 2020 13:13

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

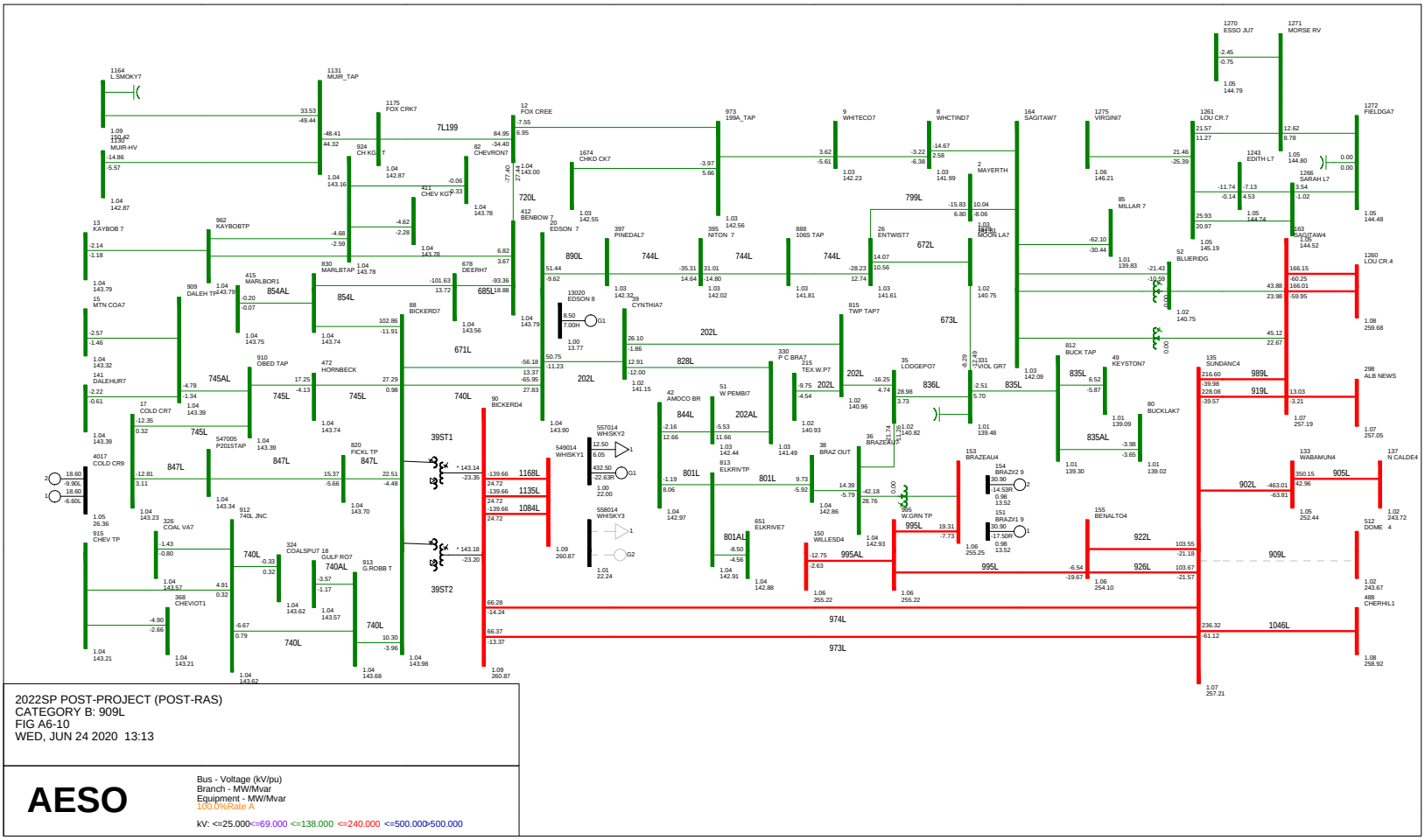


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 905L
FIG A6-9
WED, JUN 24 2020 13:13

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

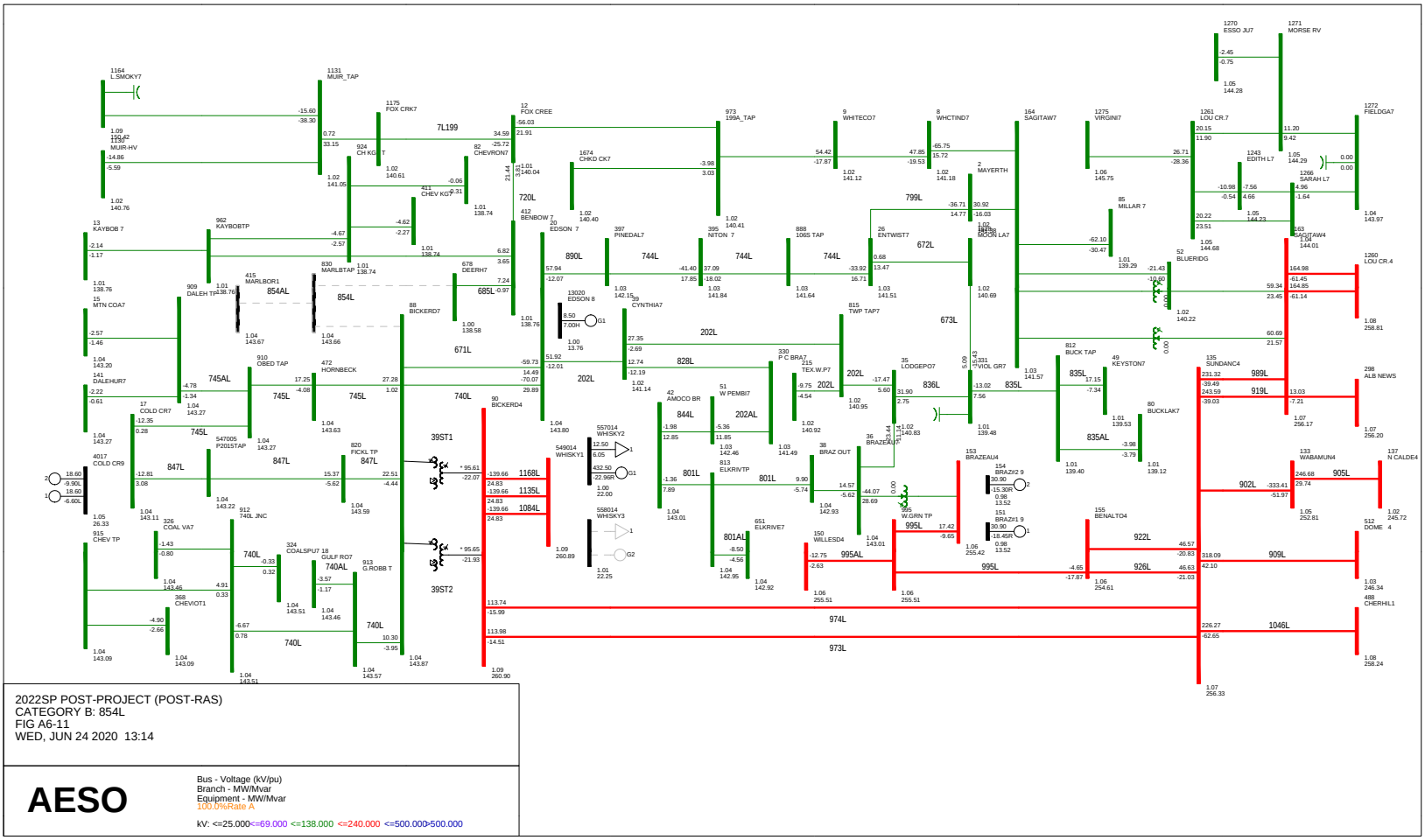


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 909L
FIG A6-10
WED, JUN 24 2020 13:13

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

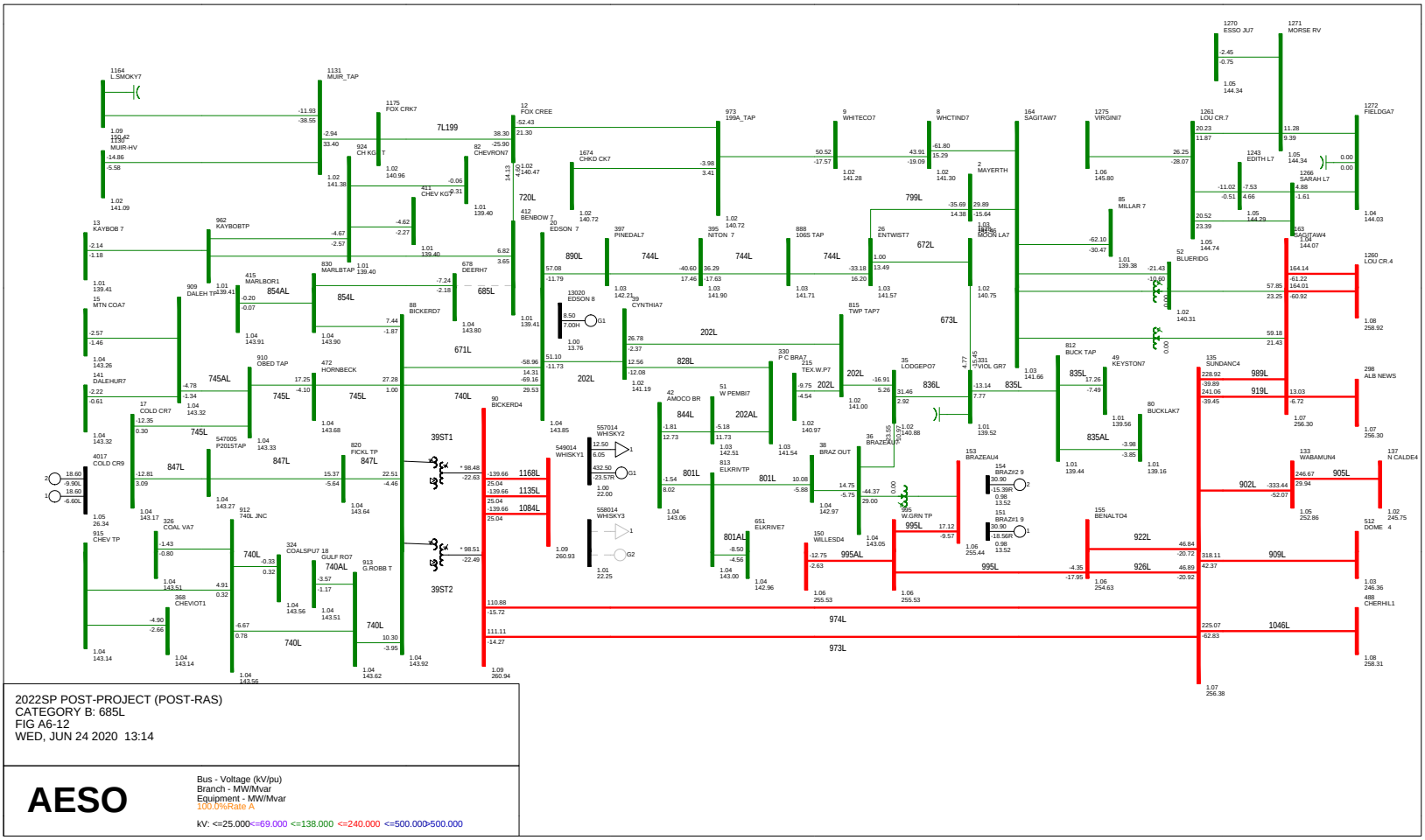


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 854L
FIG A6-11
WED, JUN 24 2020 13:14

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

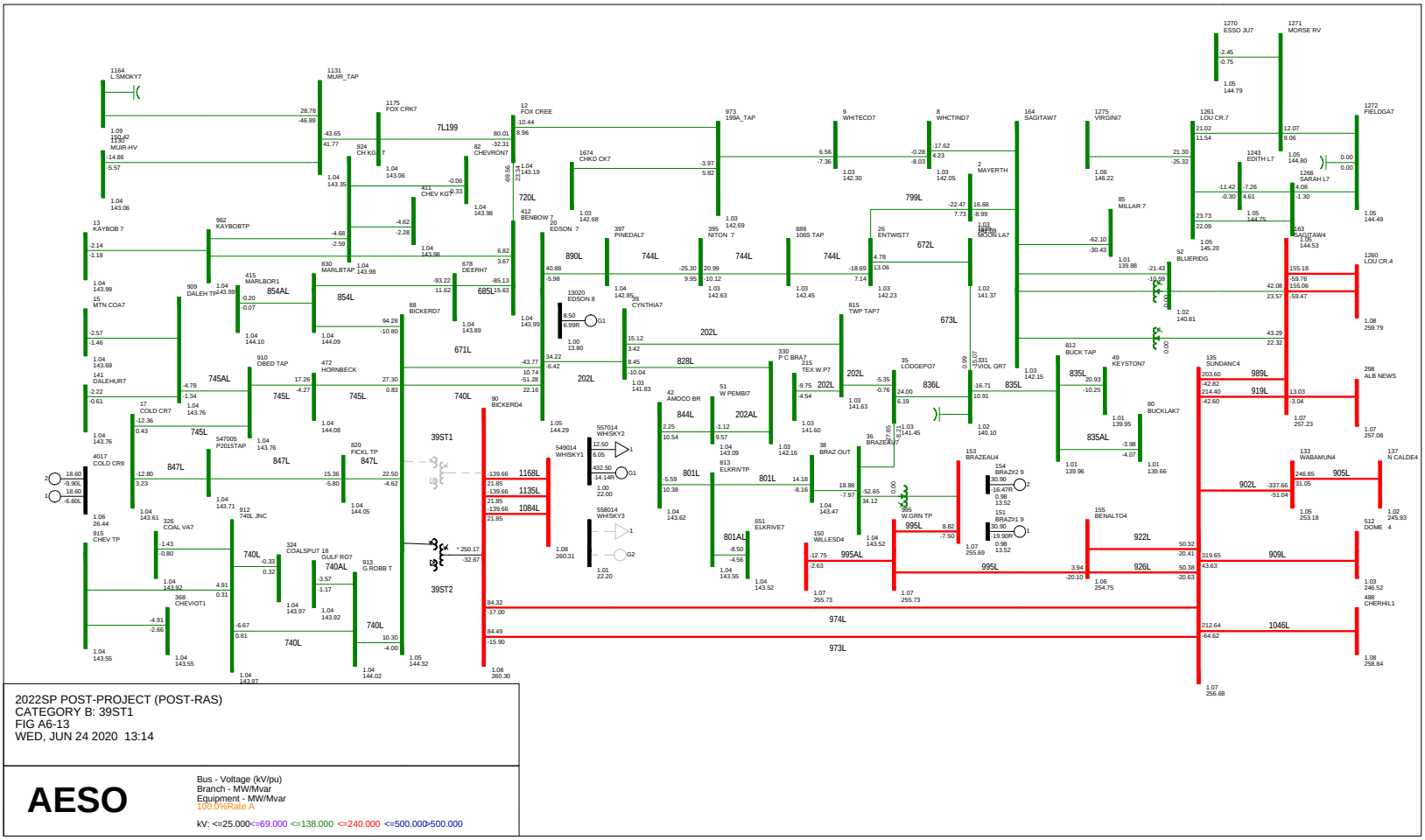


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 685L
FIG A6-12
WED, JUN 24 2020 13:14

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

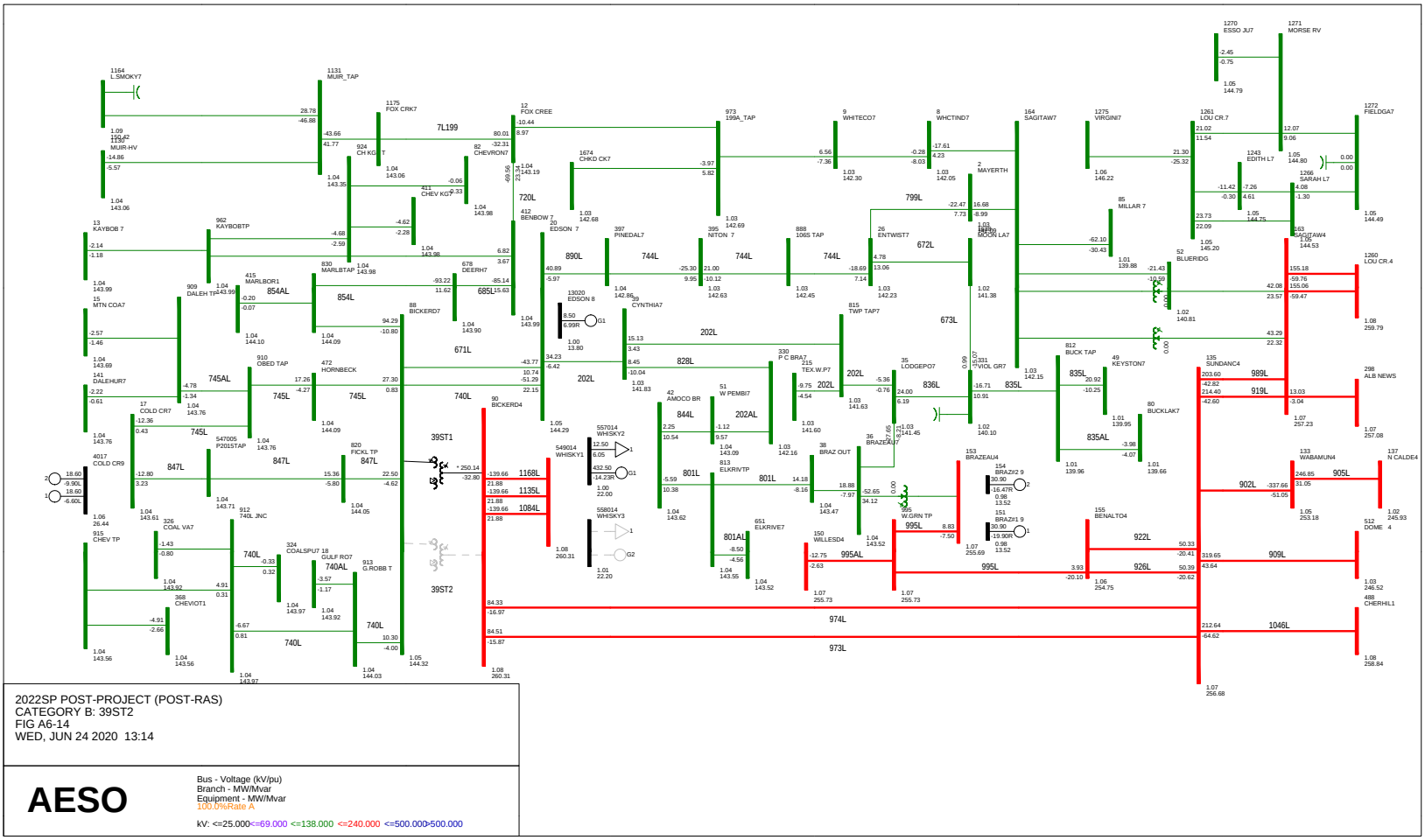


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 39ST1
FIG A6-13
WED, JUN 24 2020 13:14

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

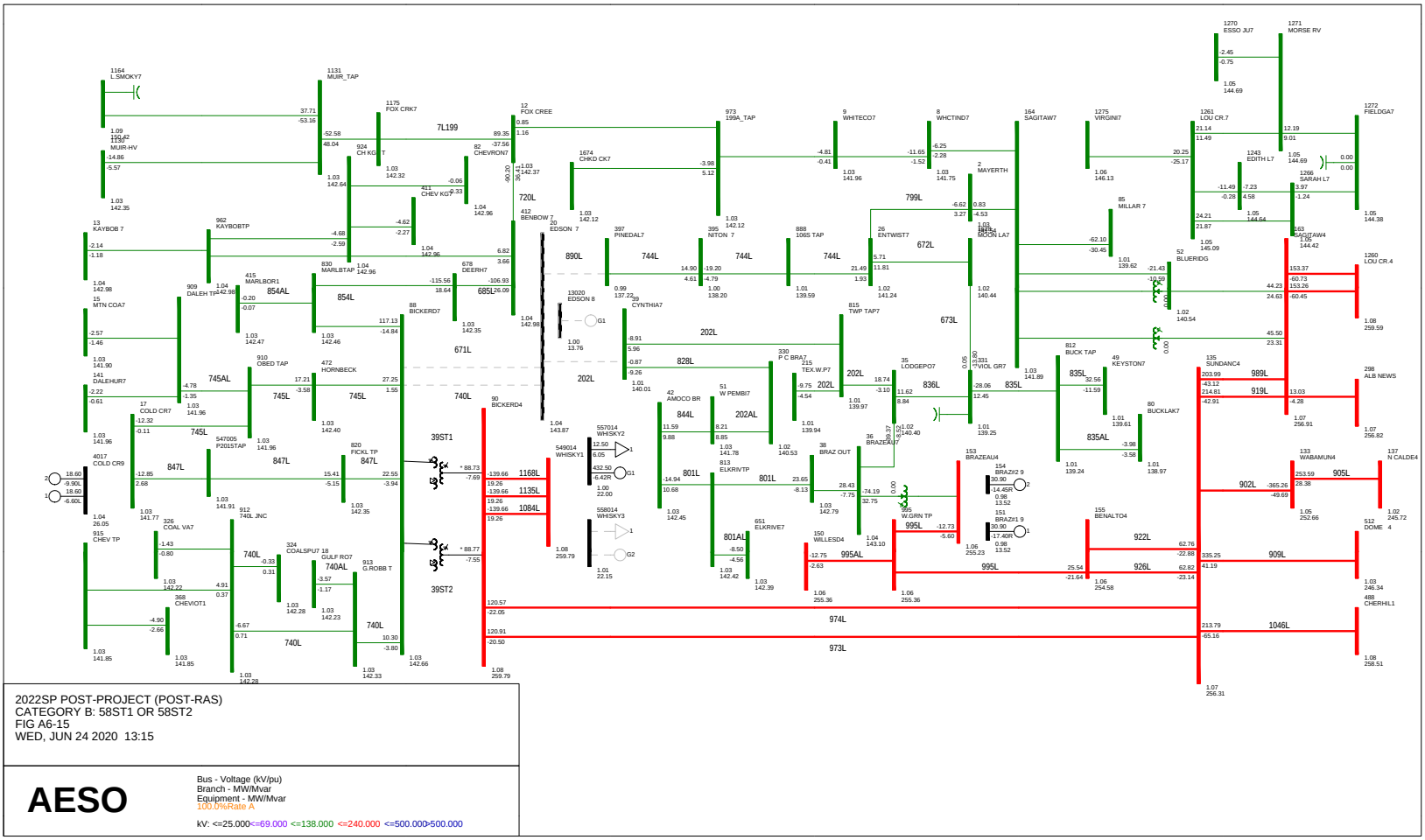


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 39ST2
FIG A6-14
WED, JUN 24 2020 13:14

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

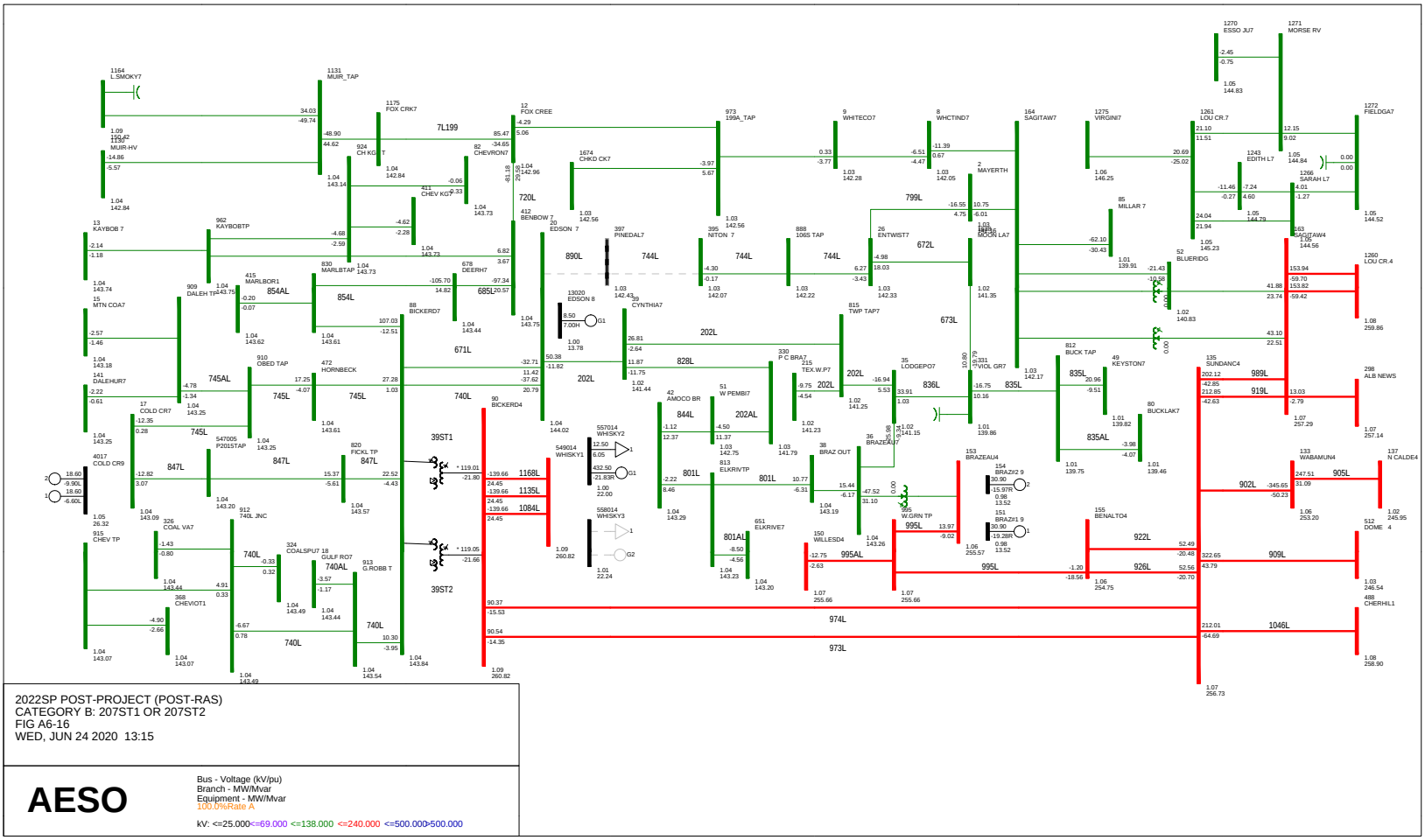


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 58ST1 OR 58ST2
FIG A6-15
WED, JUN 24 2020 13:15

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

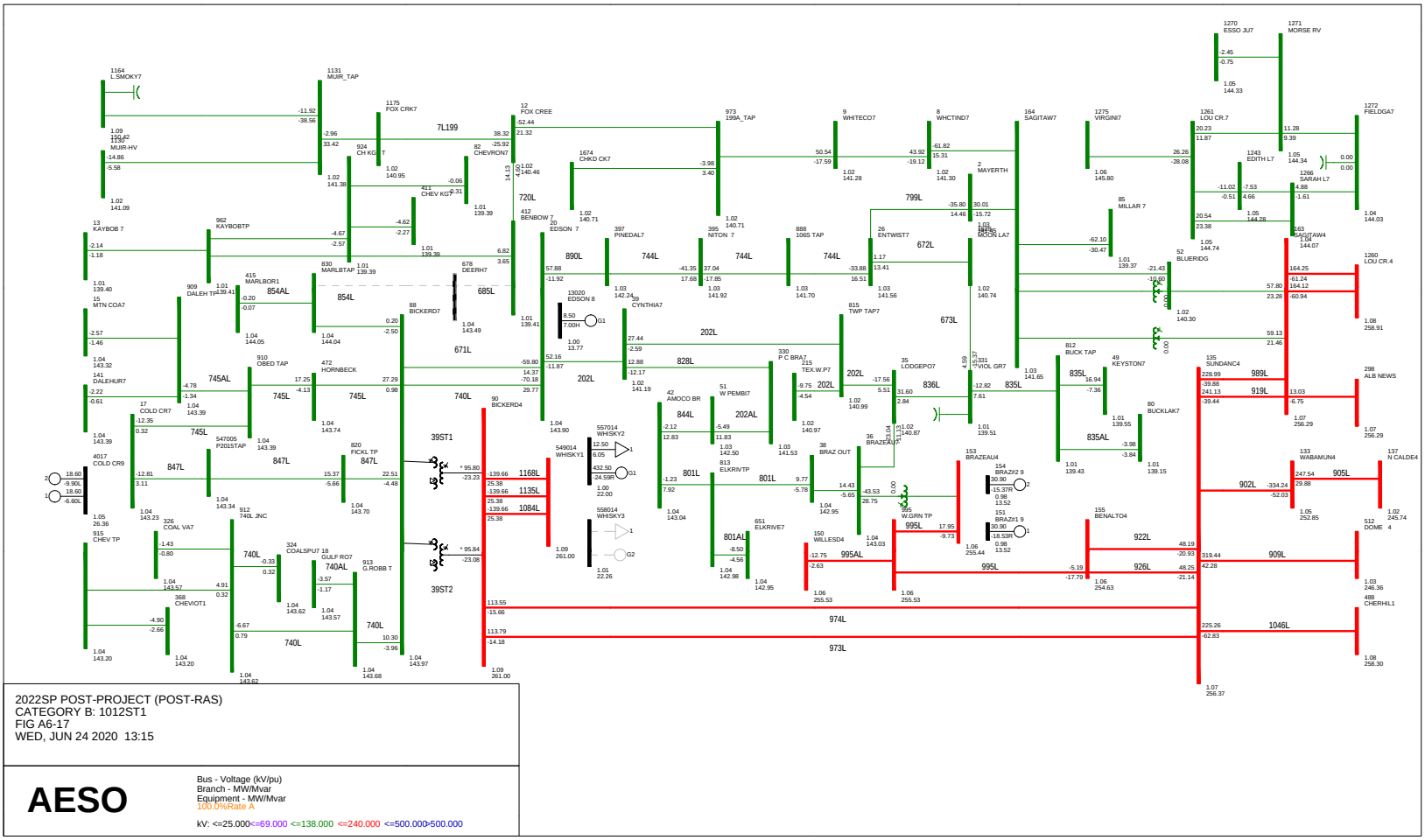


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 207ST1 OR 207ST2
FIG A6-16
WED, JUN 24 2020 13:15

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

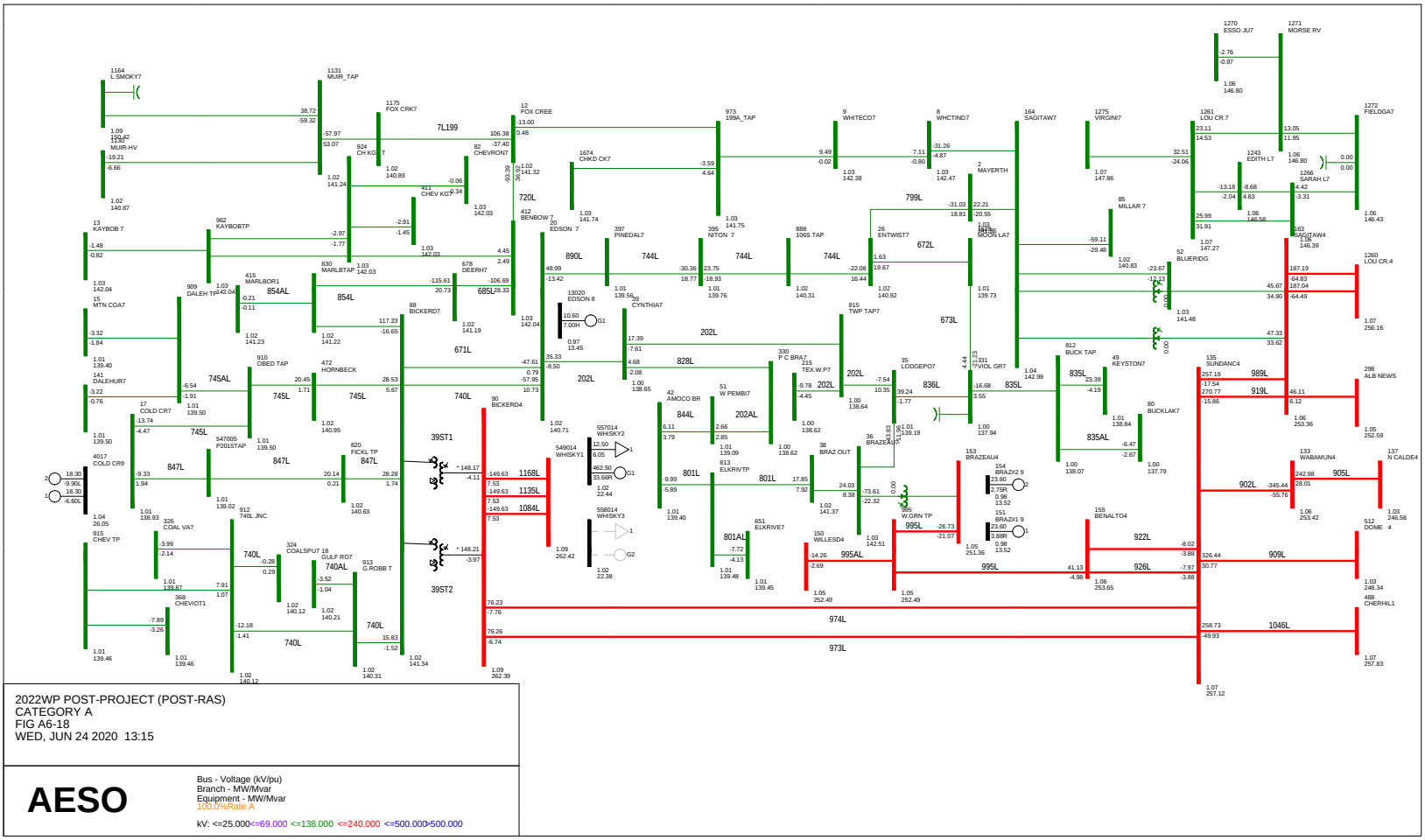


2022SP POST-PROJECT (POST-RAS)
CATEGORY B: 1012ST1
FIG A6-17
WED, JUN 24 2020 13:15

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

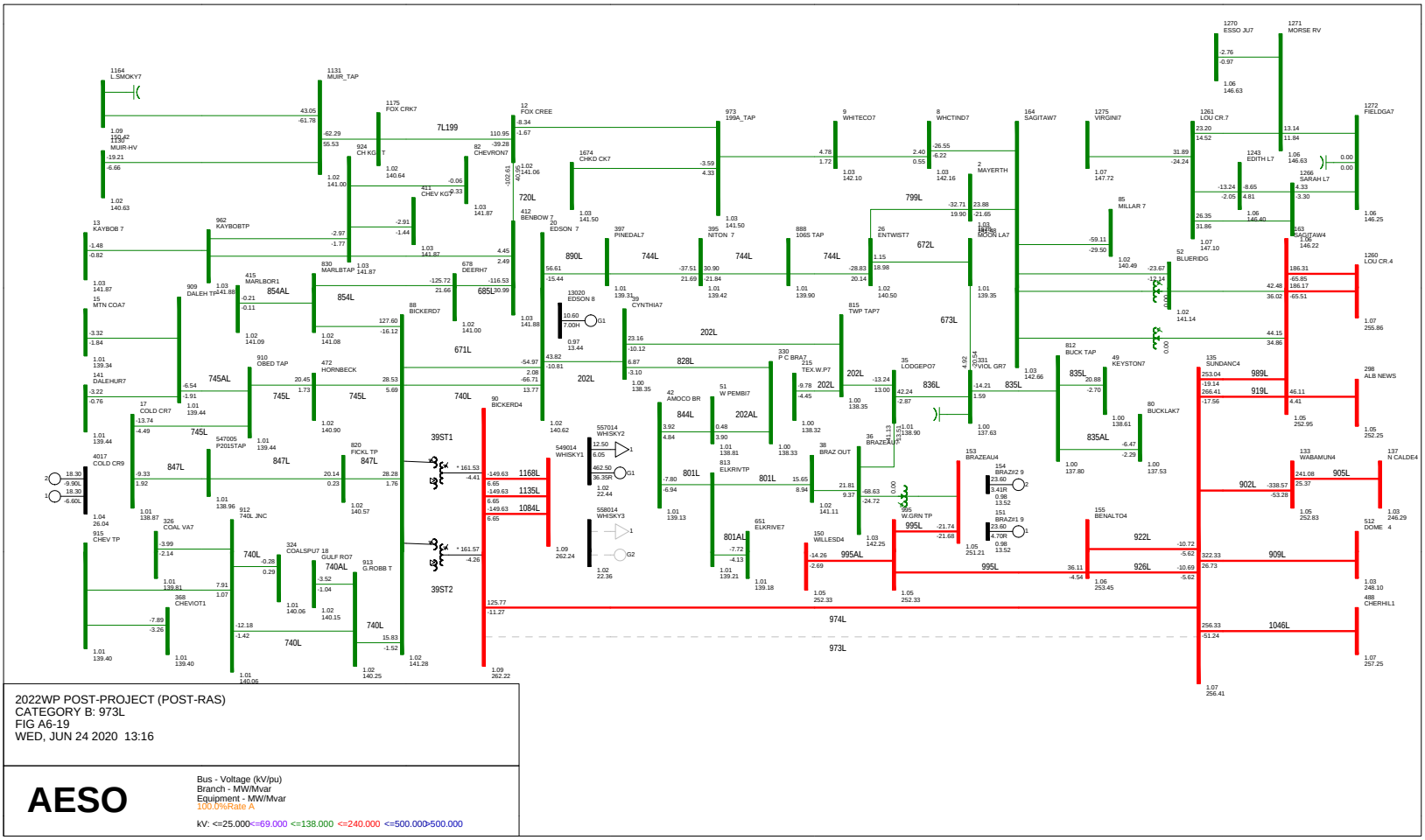


2022WP POST-PROJECT (POST-RAS)
CATEGORY A
FIG A6-18
WED, JUN 24 2020 13:15

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

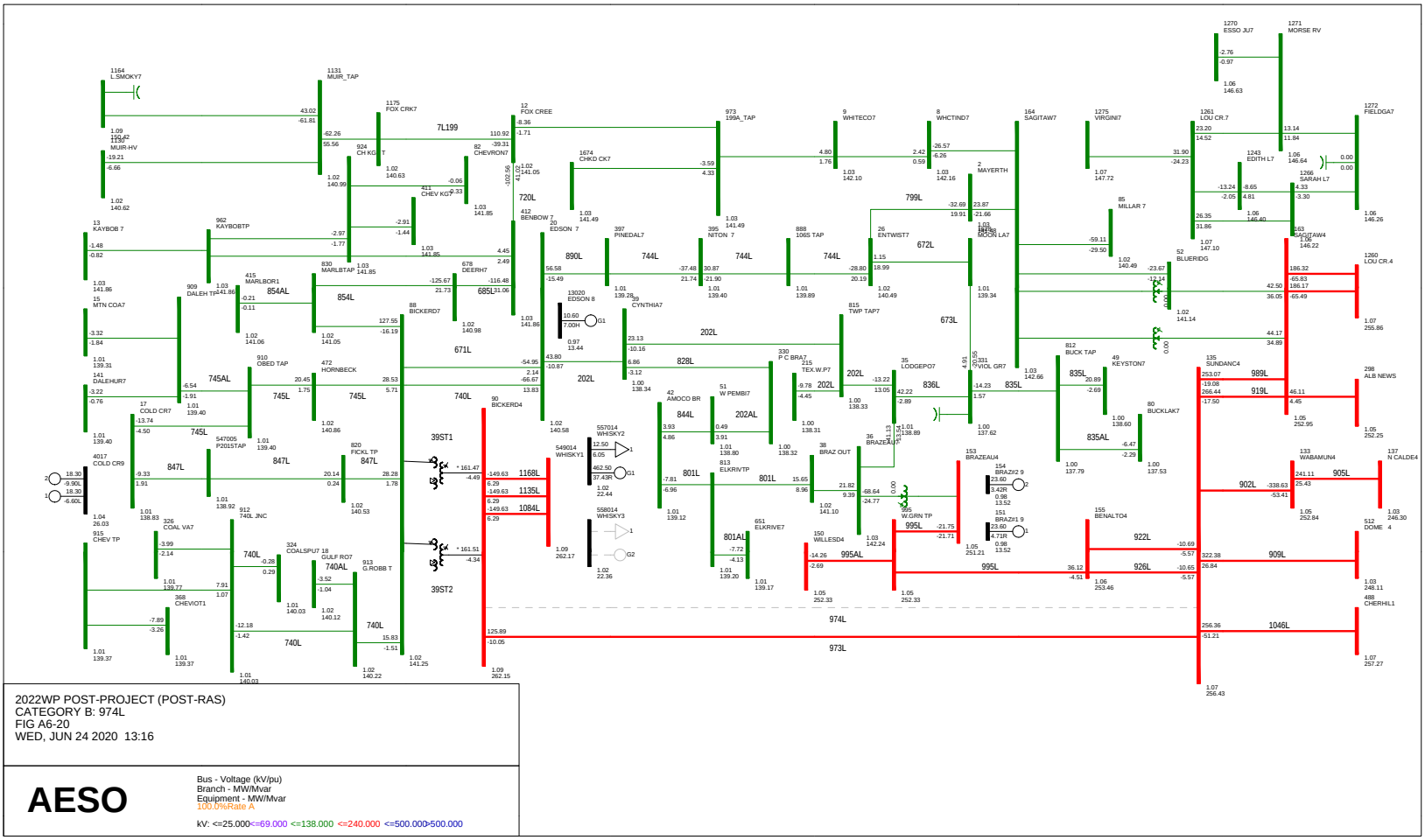


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 973L
FIG A6-19
WED, JUN 24 2020 13:16

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

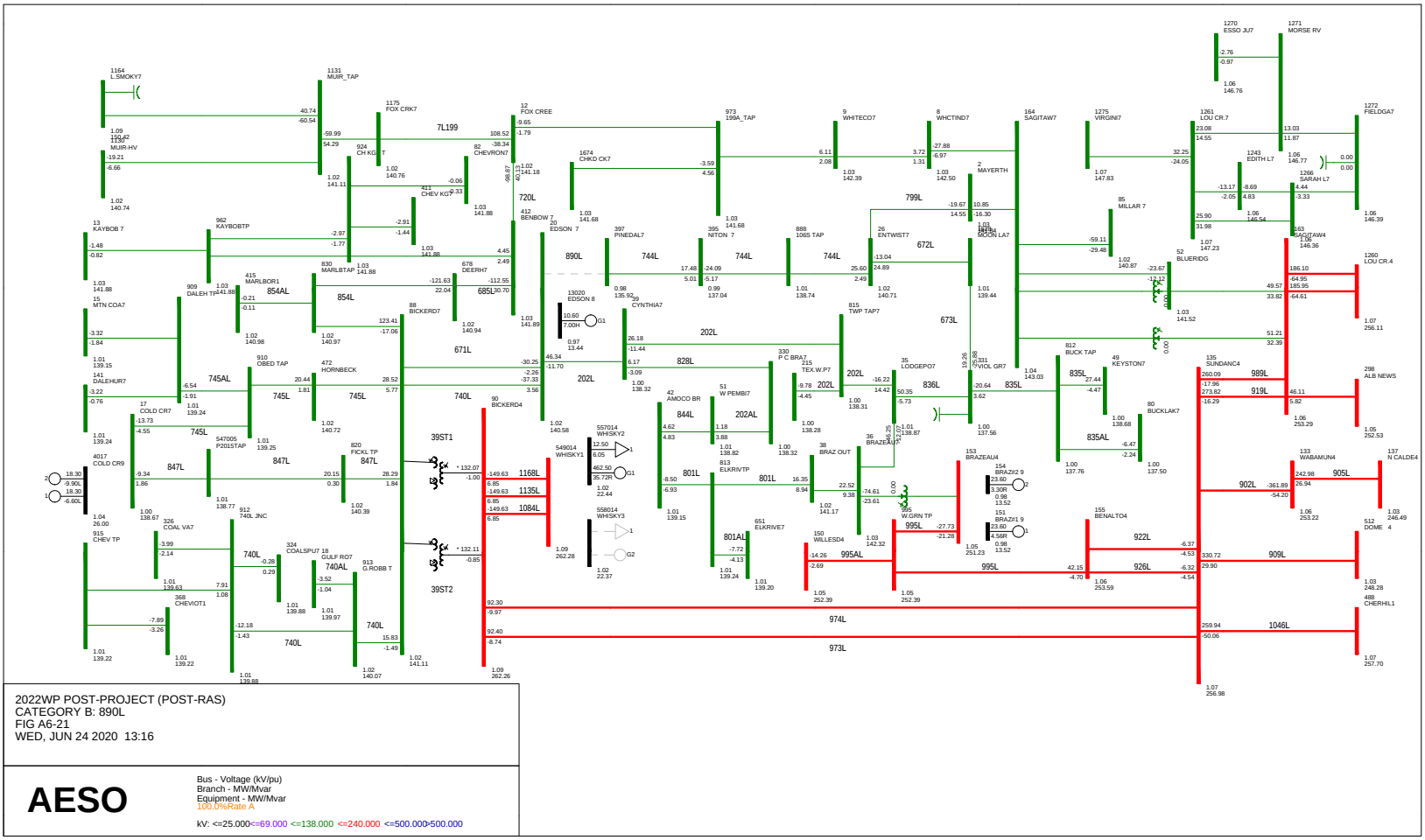


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 974L
FIG A6-20
WED, JUN 24 2020 13:16

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

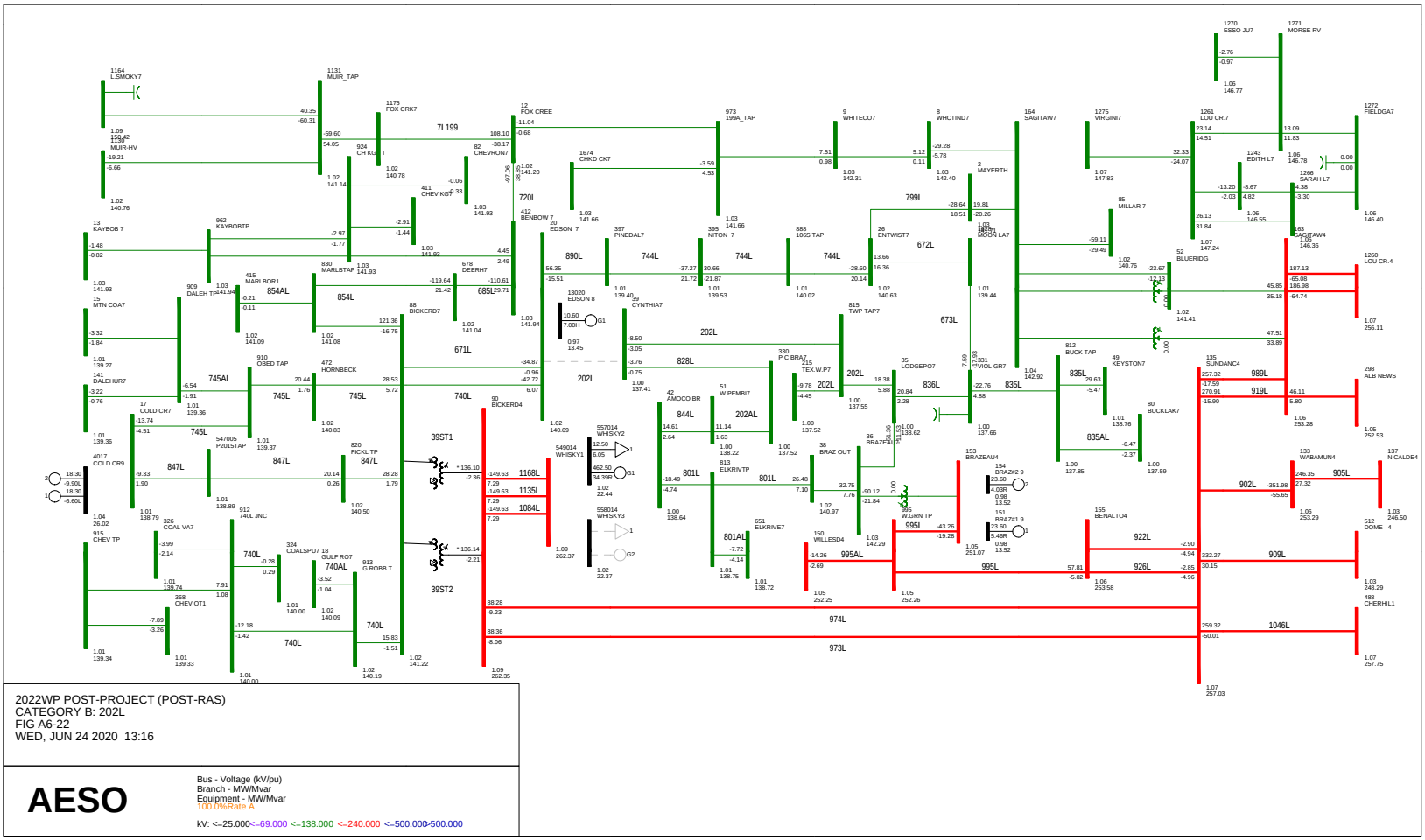


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 890L
FIG A6-21
WED, JUN 24 2020 13:16

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

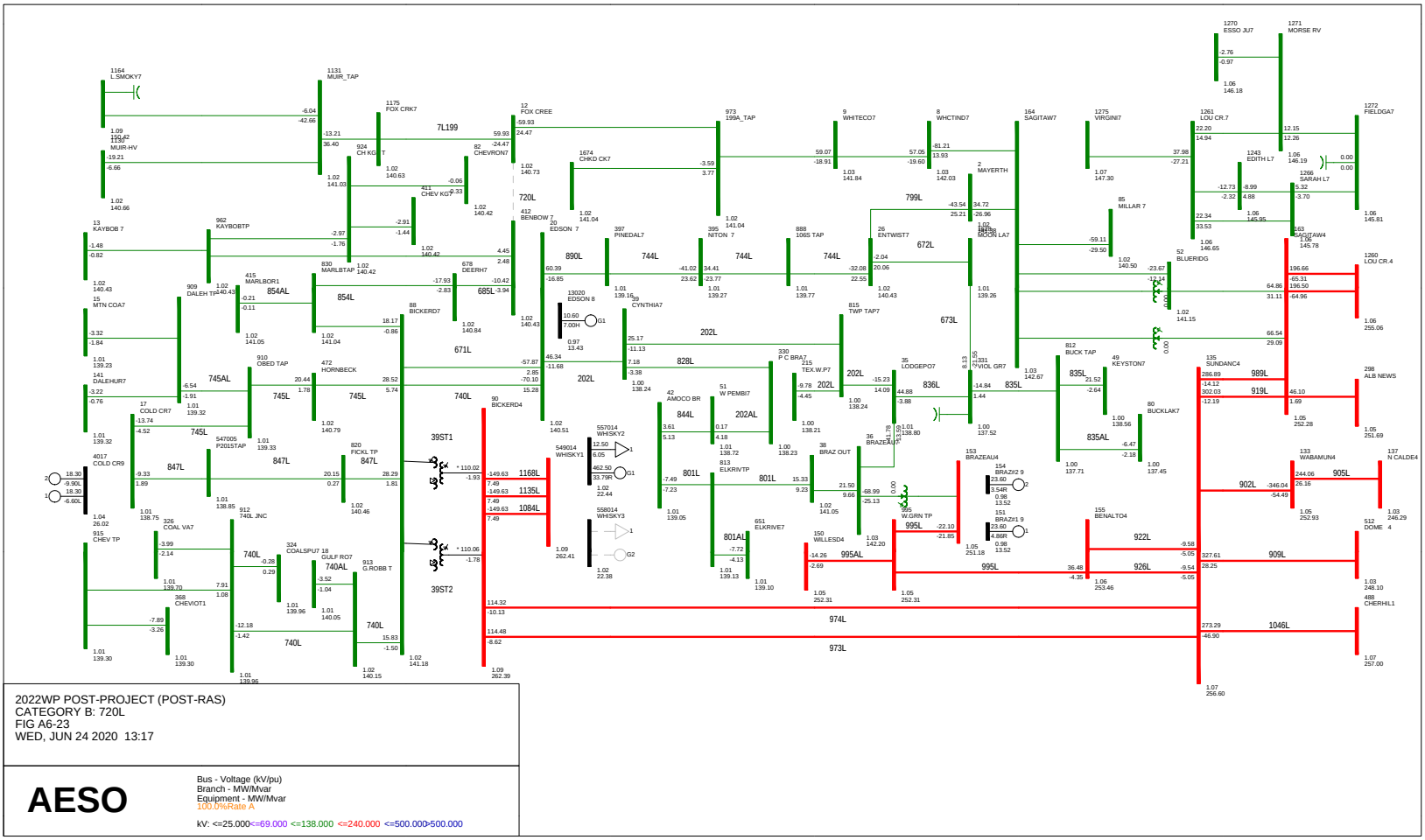


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 202L
FIG A6-22
WED, JUN 24 2020 13:16

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

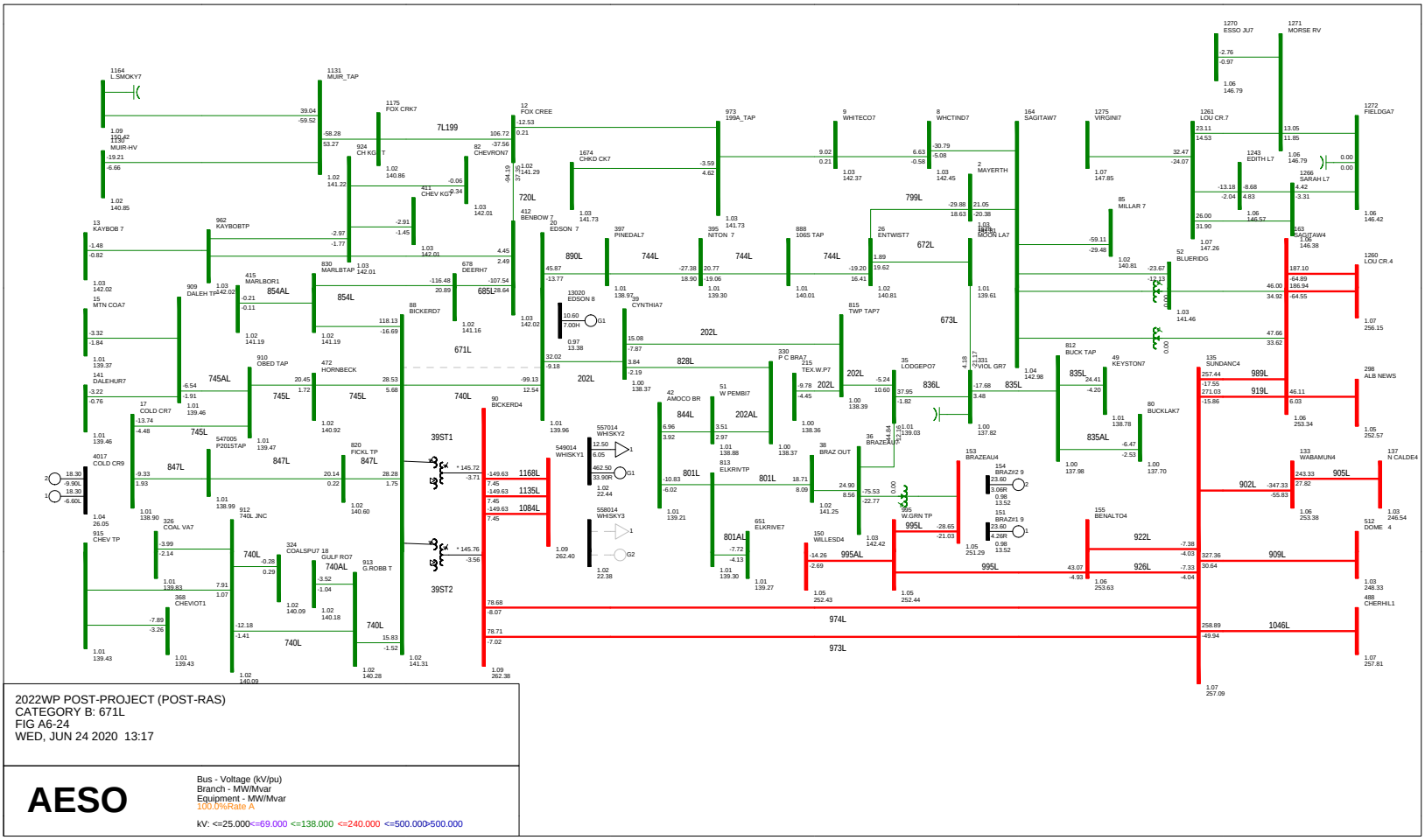


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 720L
FIG A6-23
WED, JUN 24 2020 13:17

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

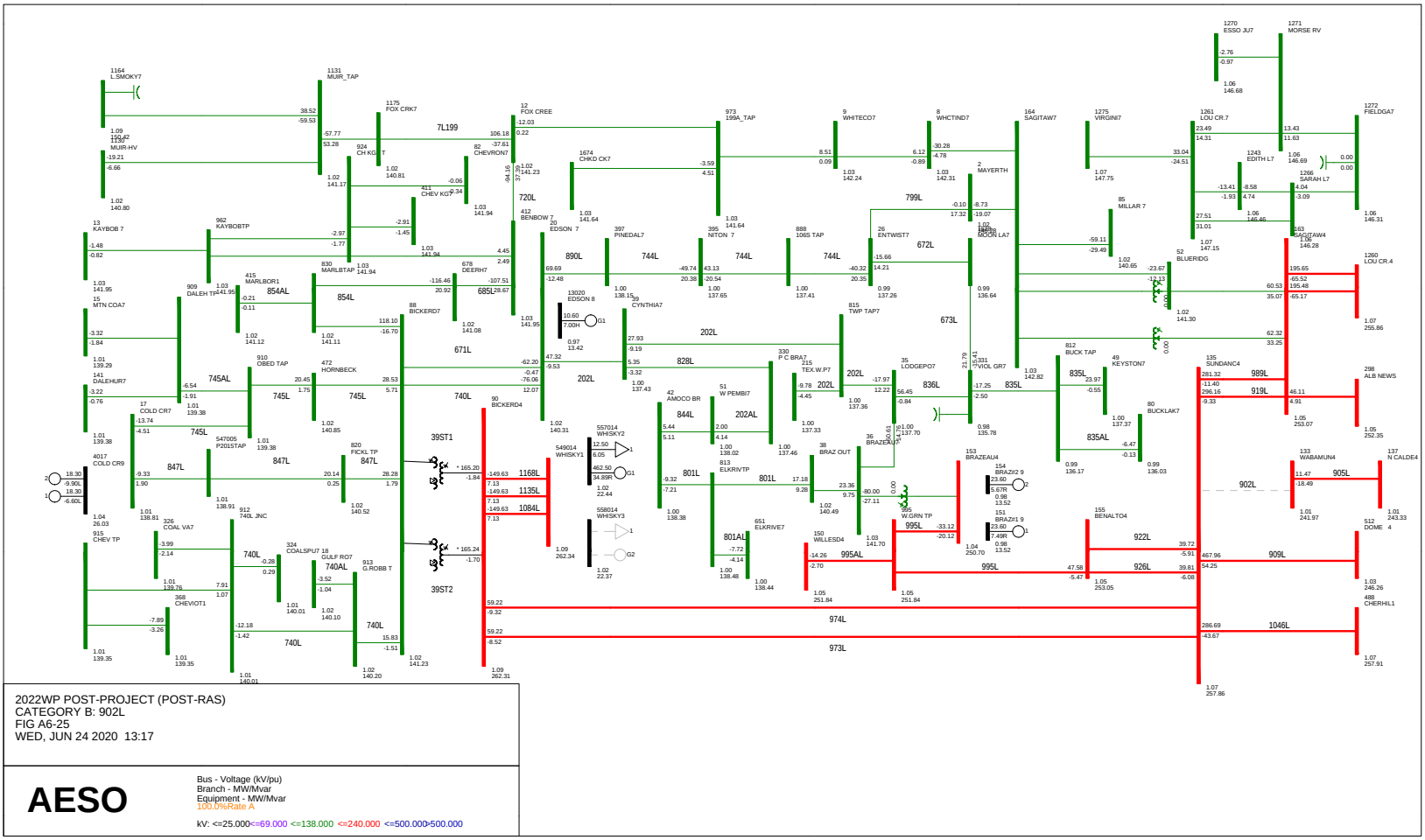


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 671L
FIG A6-24
WED, JUN 24 2020 13:17

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

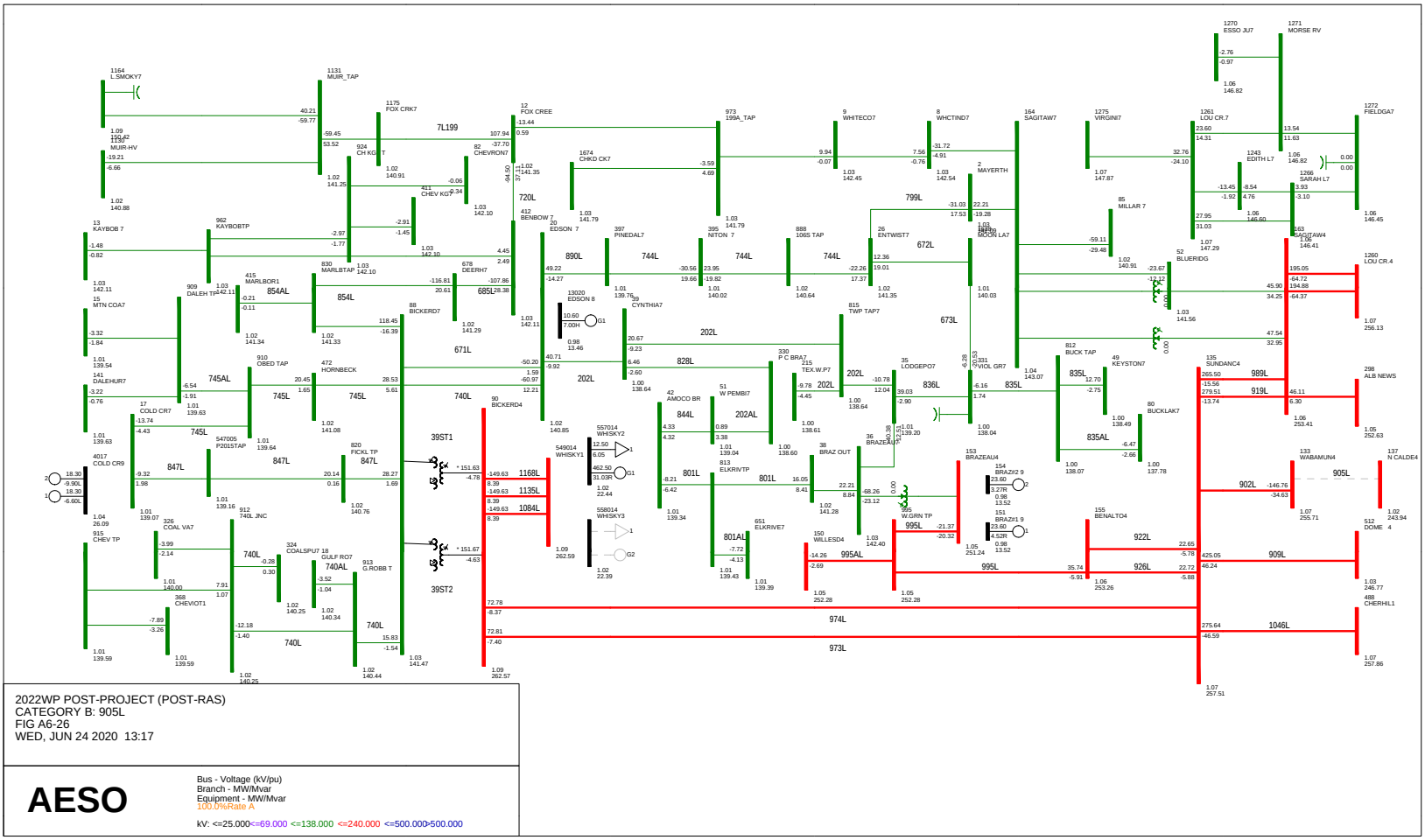


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 902L
FIG A6-25
WED, JUN 24 2020 13:17

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

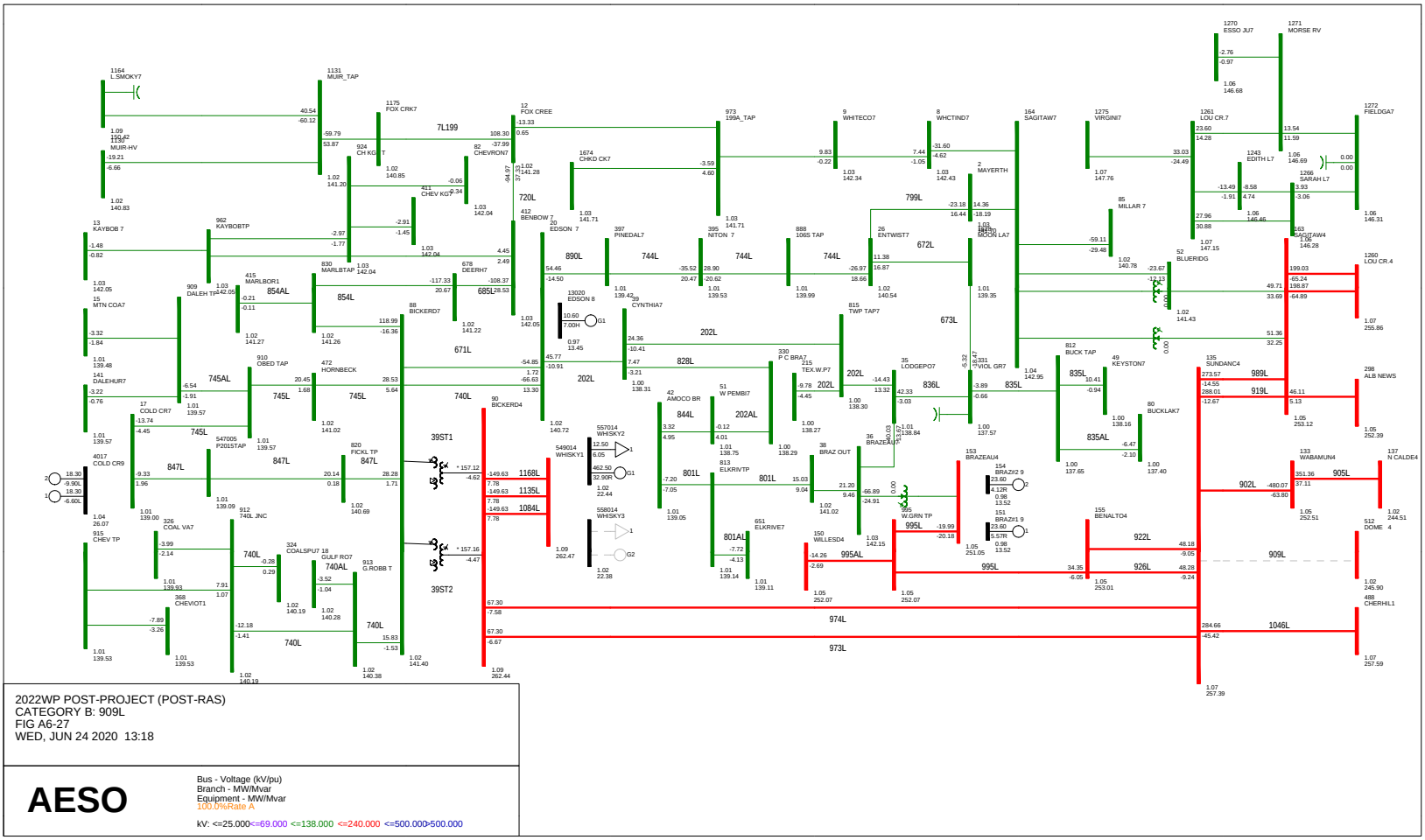


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 905L
FIG A6-26
WED, JUN 24 2020 13:17

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

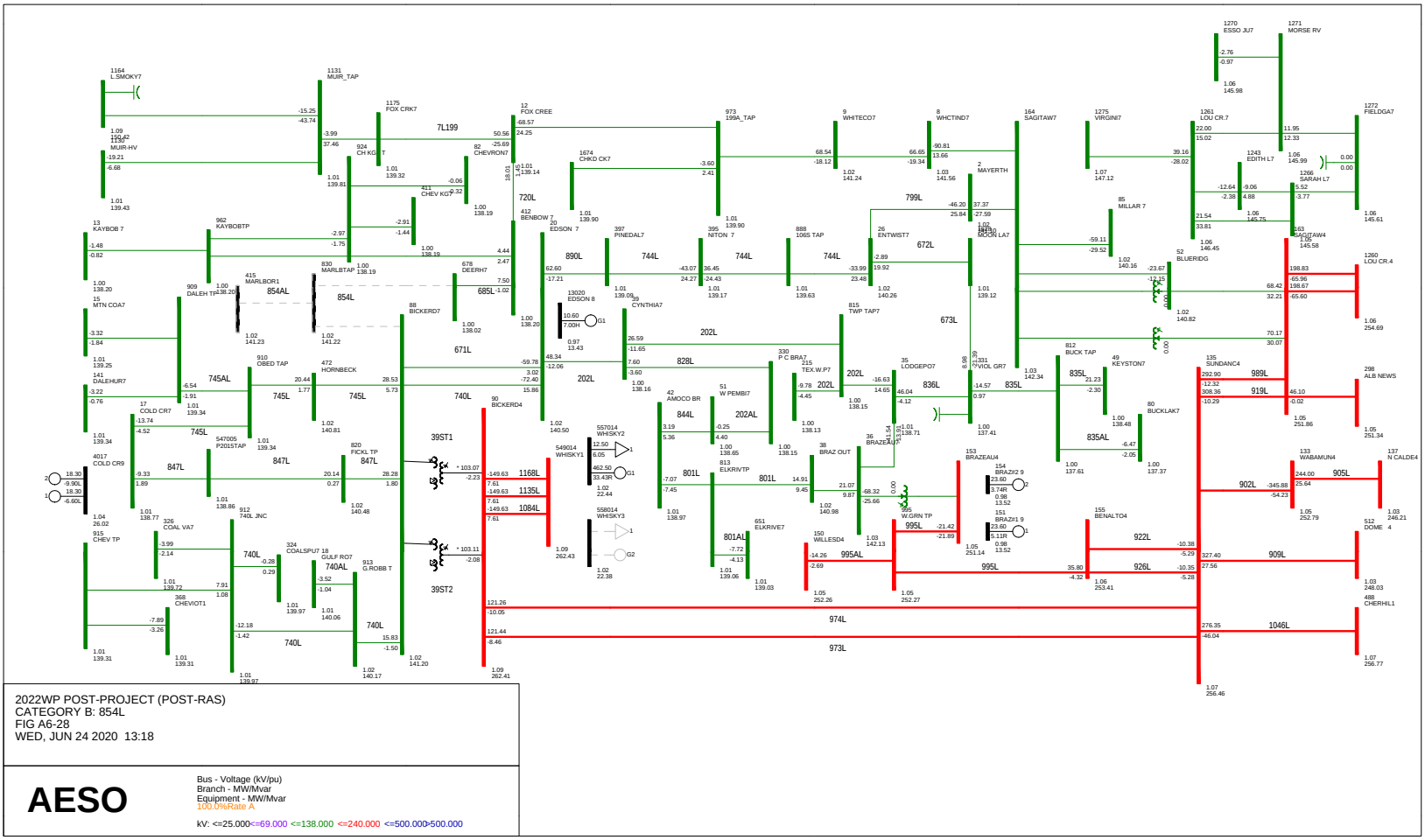


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 909L
FIG A6-27
WED, JUN 24 2020 13:18

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

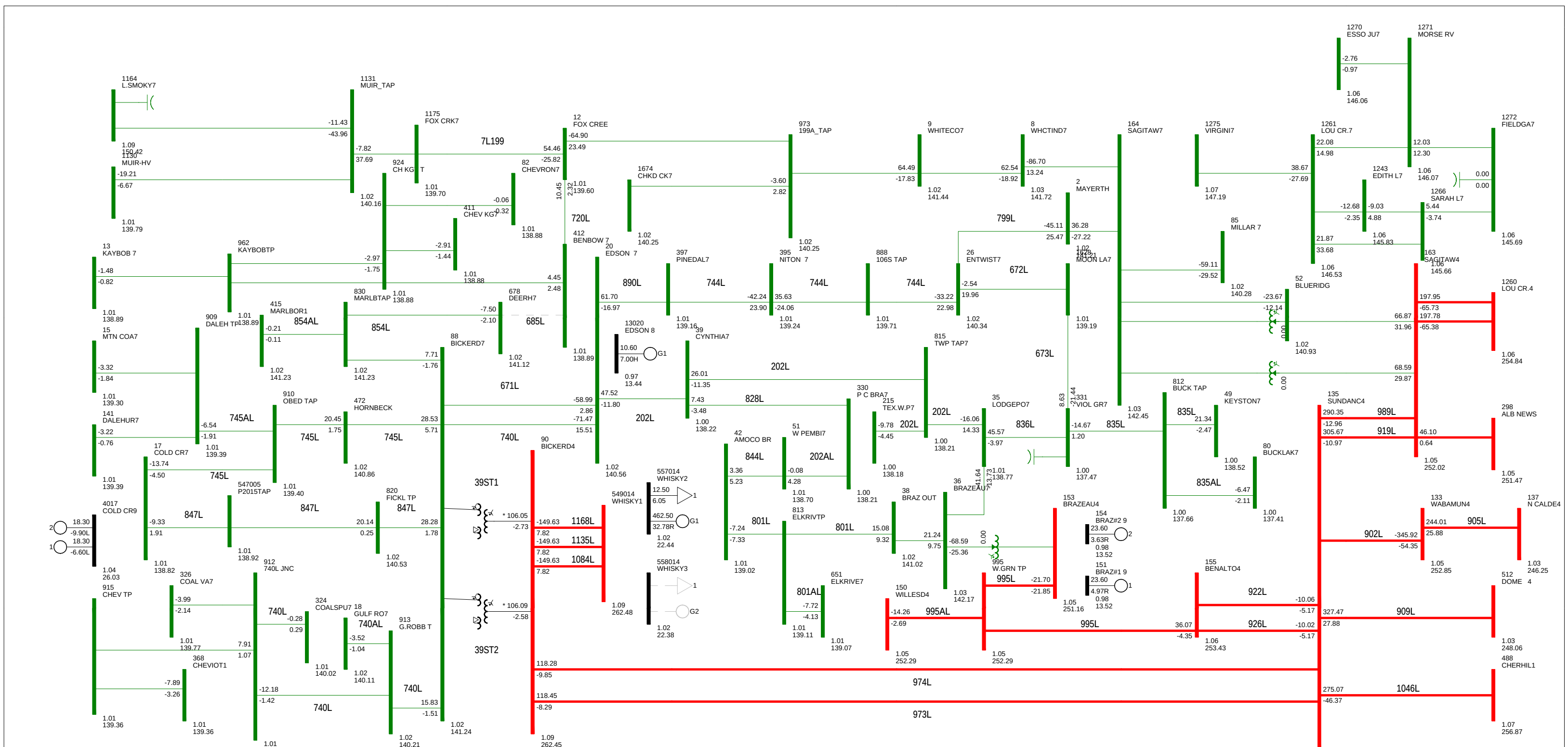


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 854L
FIG A6-28
WED, JUN 24 2020 13:18

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

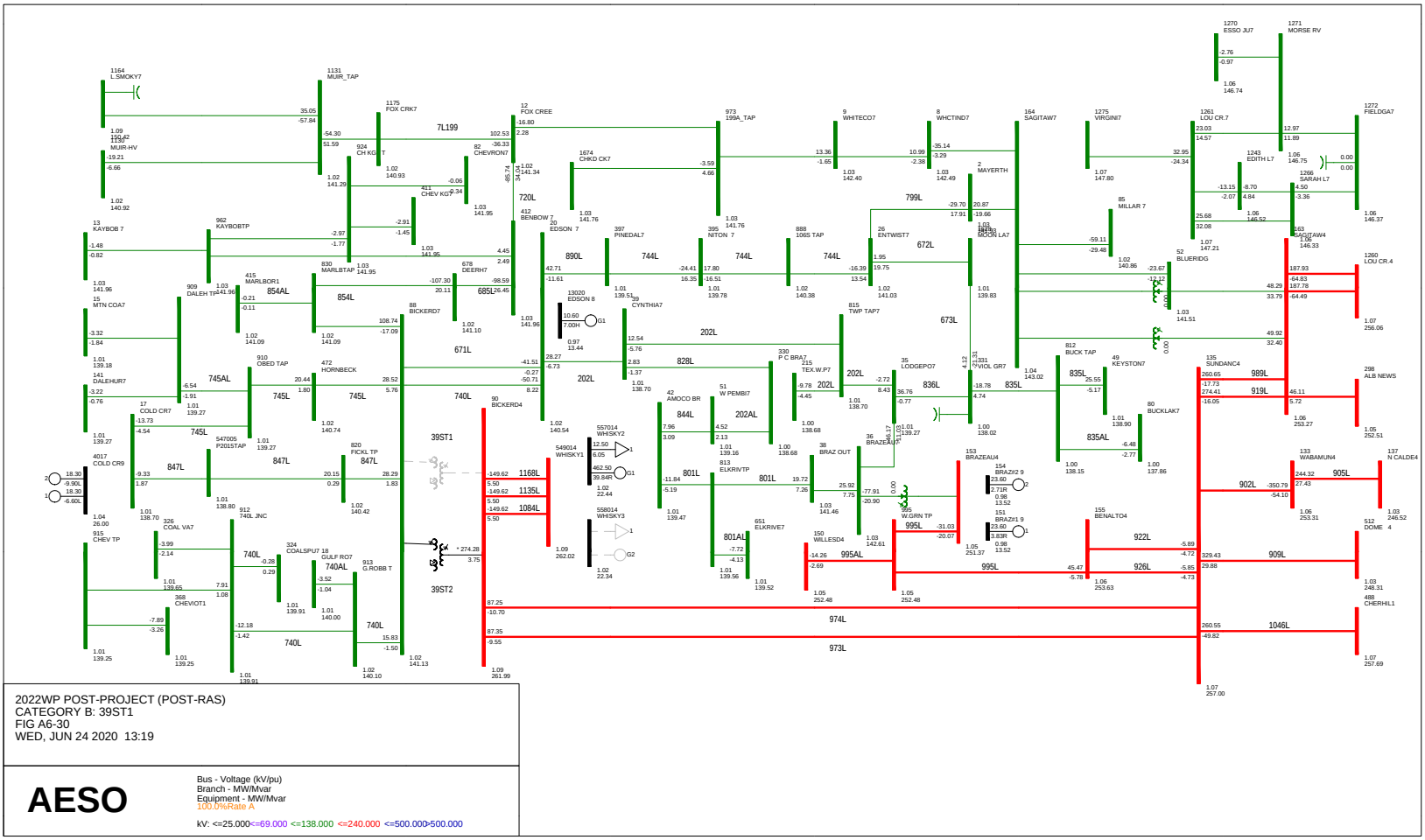
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000



2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 685L
FIG A6-29
WED, JUN 24 2020 13:19

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

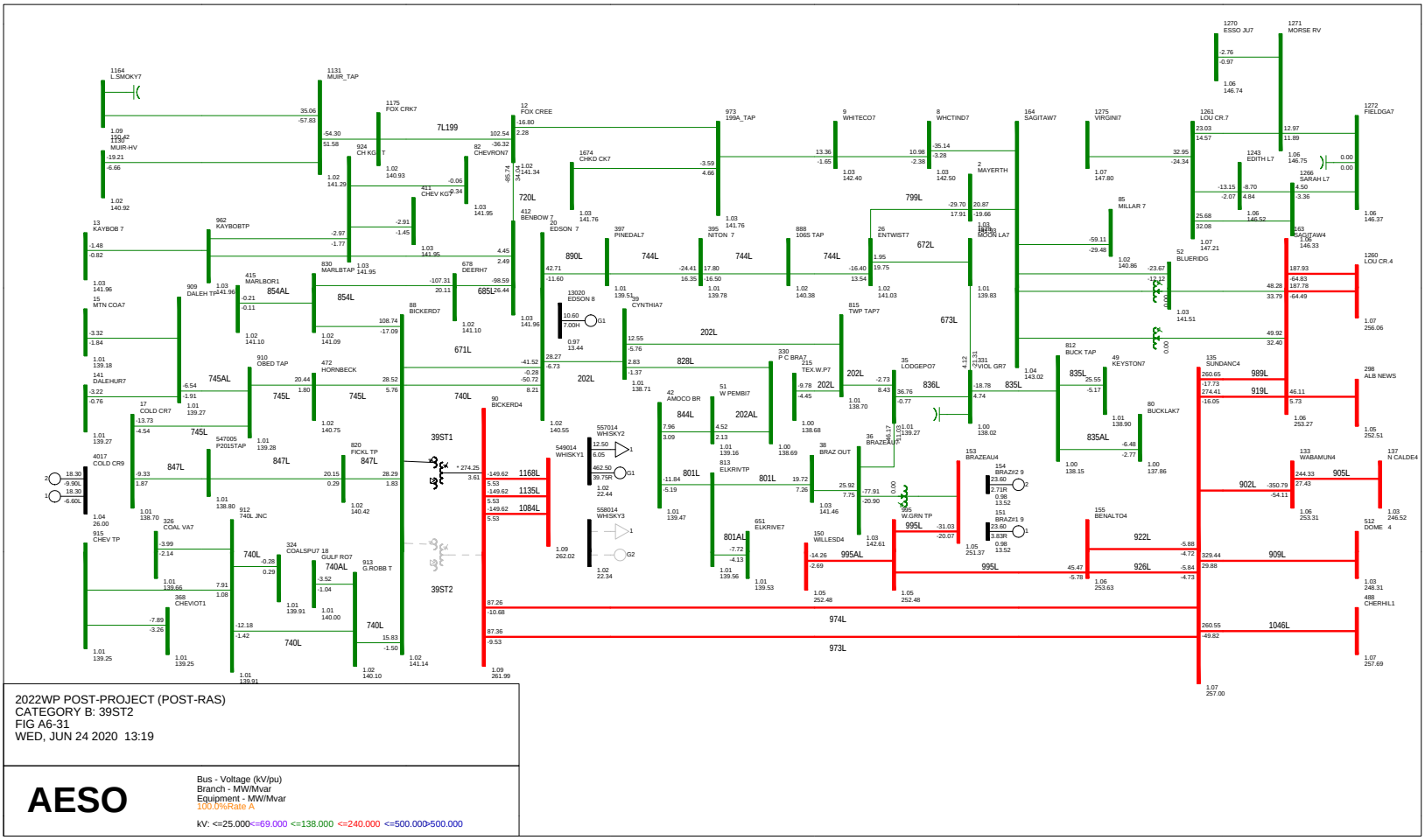


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 39ST1
FIG A6-30
WED, JUN 24 2020 13:19

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

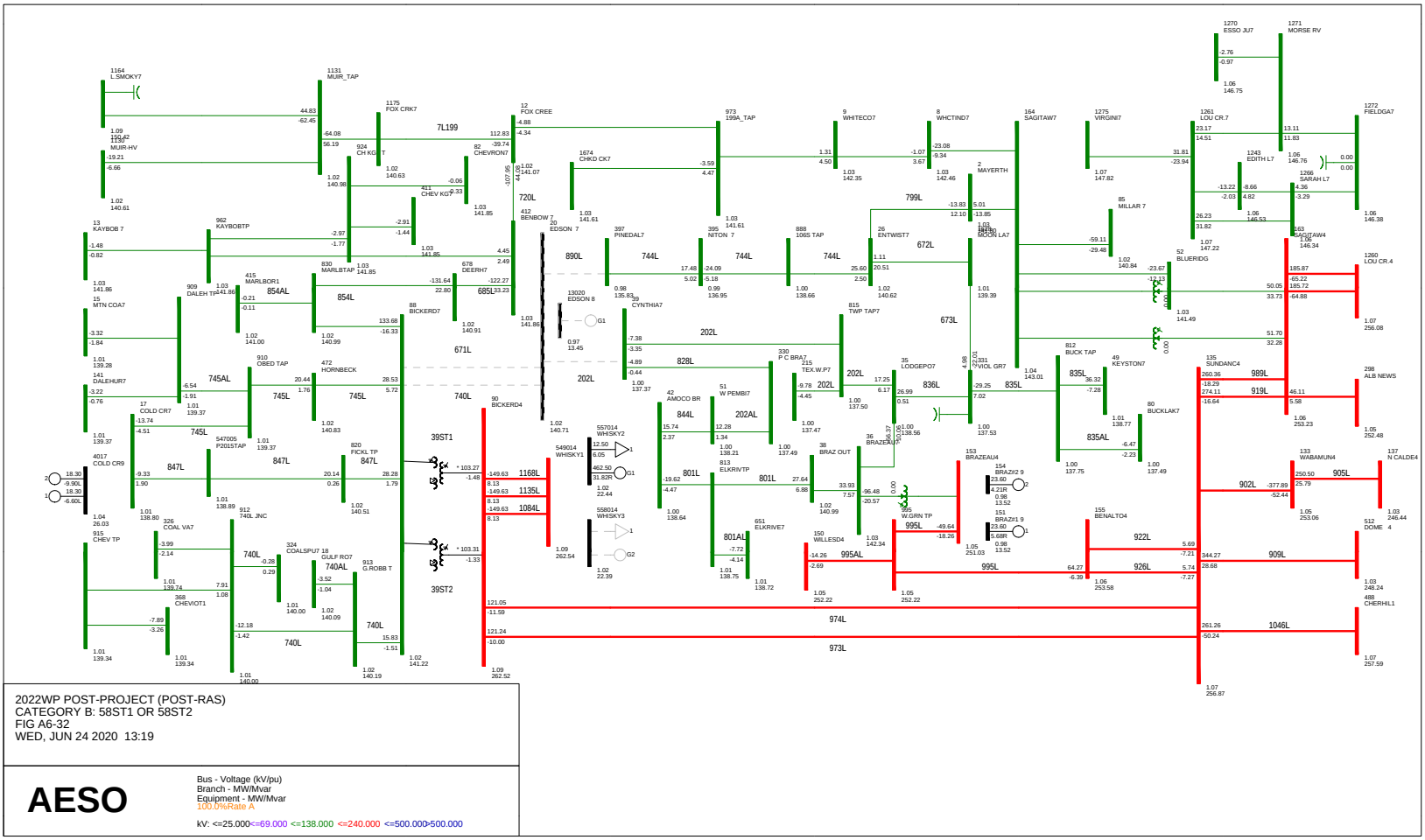


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 39ST2
FIG A6-31
WED, JUN 24 2020 13:19

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

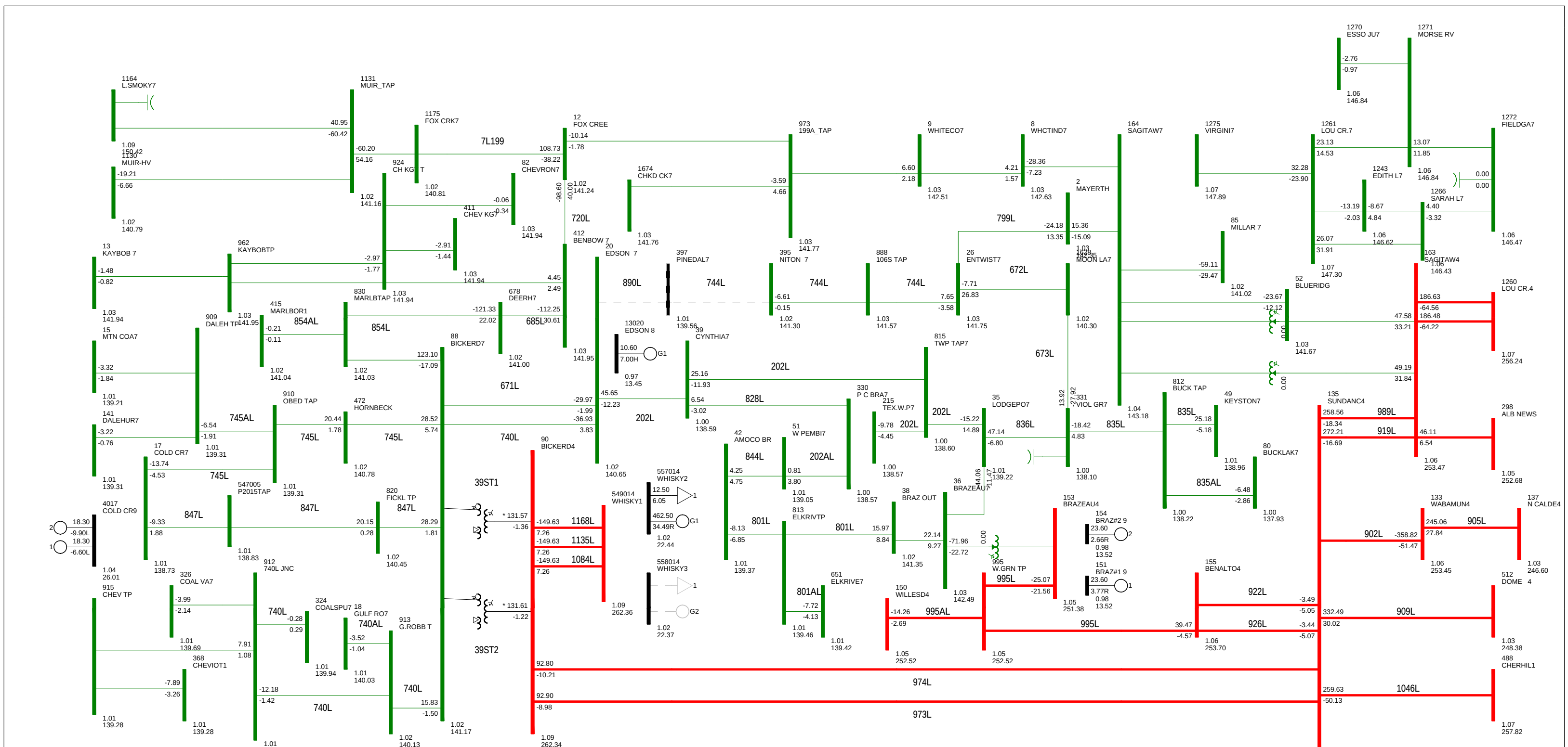


2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 58ST1 OR 58ST2
FIG A6-32
WED, JUN 24 2020 13:19

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

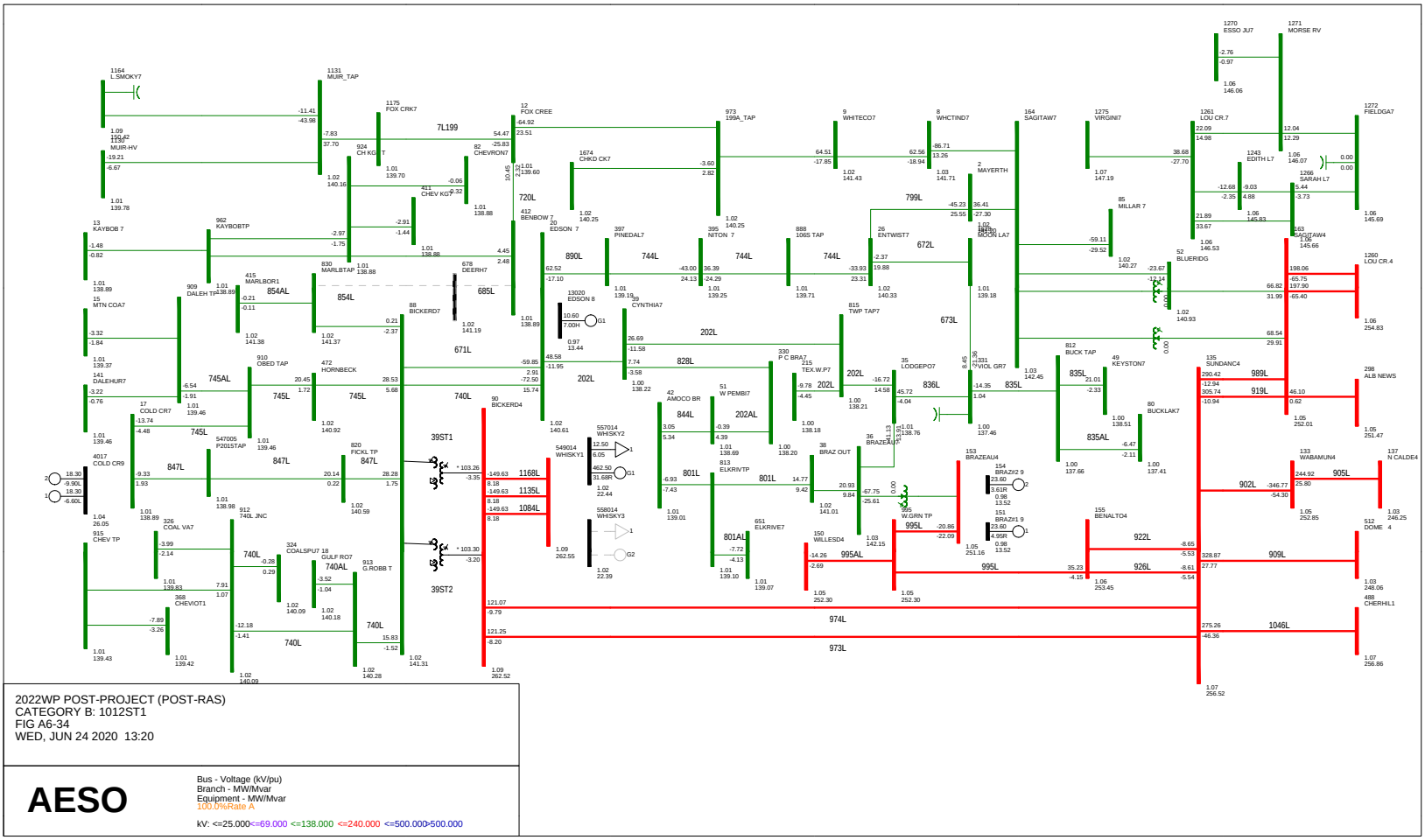
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000



2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 207ST1 OR 207ST2
FIG A6-33
WED, JUN 24 2020 13:20

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A
kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000



2022WP POST-PROJECT (POST-RAS)
CATEGORY B: 1012ST1
FIG A6-34
WED, JUN 24 2020 13:20

AESO

Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar
100.0%Rate A

kV: <=25.000 <=69.000 <=138.000 <=240.000 <=500.000 >500.000

Attachment A7
Constraint Effective Factors Table

Table M-1: Generator Types

Plant	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
Type	*Cogen*	*Cogen*	*Hydro*	*Combined Cycle*	*Biomass/ Other*	*HVDC*	*Cogen*	*Coal*	*Biomass/ Other*	*Biomass/ Other*	*Gas*	*Coal*	*Gas*	*Gas*	*Gas*	*Coal*	*Gas*	*Gas*	*HVDC*	*Biomass/ Other*	*Biomass/ Other*

Table M-2: 2022SP (Post-Project), Generators Effectiveness Factors under Normal Condition (N-0)

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
Base Case	202L (58S Edson - 178S Cynthia)	0.047	0.047	-0.083	0.102	-0.001	-0.011	0.175	0.012	0.047	0.047	0.045	0.011	0.047	0.048	0.047	0.034	0.045	0.045	0.012	0.133	0.047
Base Case	720L (347S Fox Creek - 397S Benbow)	-0.116	-0.116	0.011	0.077	0.000	0.004	0.097	-0.004	-0.116	-0.116	-0.112	-0.004	-0.114	-0.117	-0.115	0.000	-0.112	-0.112	-0.004	0.110	-0.116
Base Case	890L (58S Edson - 207S Pinedale)	0.009	0.009	-0.001	0.069	0.000	0.003	0.133	-0.002	0.009	0.009	0.008	-0.003	0.009	0.009	0.009	0.009	0.008	0.008	-0.002	0.096	0.009

Table M-3: 2022SP (Post- Project), Generators Effectiveness Factors under Normal Condition (N-1)

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
1012S Deer Hill T1	202L (58S Edson - 178S Cynthia)	0.032	0.032	-0.081	0.112	-0.001	-0.011	0.188	0.011	0.032	0.032	0.030	0.011	0.032	0.032	0.032	0.034	0.030	0.030	0.011	0.146	0.032
1012S Deer Hill T1	740L (58S Edson - 39S Bickerdike)	0.014	0.014	-0.046	0.108	0.000	-0.004	-0.375	0.005	0.014	0.014	0.013	0.004	0.014	0.014	0.014	0.025	0.013	0.013	0.005	0.146	0.014
1012S Deer Hill T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	-0.007	-0.007	0.001	0.073	0.000	0.003	0.137	-0.003	-0.007	-0.007	-0.007	-0.003	-0.007	-0.007	-0.007	0.008	-0.006	-0.006	-0.003	0.102	-0.007
1012S Deer Hill T1	890L (58S Edson - 207S Pinedale)	-0.007	-0.007	0.001	0.079	0.000	0.003	0.147	-0.003	-0.007	-0.007	-0.007	-0.003	-0.007	-0.007	-0.007	0.009	-0.007	-0.007	-0.003	0.110	-0.007
1046L (310P Sundance (Plant) to 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)	-0.125	-0.125	0.011	0.077	0.001	0.005	0.097	-0.006	-0.126	-0.125	-0.121	-0.005	-0.124	-0.127	-0.125	0.003	-0.121	-0.121	-0.005	0.110	-0.126
1046L (310P Sundance (Plant) to 338S Cherhill)	890L (58S Edson - 207S Pinedale)	0.007	0.007	-0.001	0.069	0.000	0.003	0.134	-0.003	0.007	0.007	0.007	-0.003	0.007	0.007	0.007	0.009	0.007	0.007	-0.003	0.096	0.007
178S Cynthia T1	720L (347S Fox Creek - 397S Benbow)	-0.109	-0.109	0.001	0.088	0.000	0.003	0.115	-0.003	-0.110	-0.109	-0.106	-0.003	-0.108	-0.111	-0.109	0.005	-0.106	-0.106	-0.003	0.124	-0.110
178S Cynthia T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	0.018	0.018	-0.017	0.085	0.000	0.000	0.160	0.000	0.018	0.018	0.017	0.000	0.018	0.018	0.018	0.015	0.017	0.017	0.000	0.117	0.018
178S Cynthia T1	890L (58S Edson - 207S Pinedale)	0.019	0.019	-0.019	0.091	0.000	0.000	0.171	0.000	0.019	0.019	0.018	0.000	0.019	0.019	0.019	0.016	0.018	0.018	0.000	0.125	0.019
19S Wabamun T10	890L (58S Edson - 207S Pinedale)	0.010	0.010	-0.005	0.069	0.000	0.003	0.129	-0.003	0.010	0.010	0.010	-0.003	0.010	0.010	0.010	0.015	0.010	0.010	-0.003	0.094	0.010
202L (178S Cynthia - 359S Esso West Pembina - 61S Lodgepole)	890L (58S Edson - 207S Pinedale)	0.012	0.012	-0.004	0.078	0.000	0.002	0.148	-0.002	0.012	0.012	0.011	-0.002	0.012	0.012	0.012	0.011	0.011	0.011	-0.002	0.107	0.012

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
202L (58S Edson - 178S Cynthia)	720L (347S Fox Creek - 397S Benbow)	-0.109	-0.109	0.001	0.088	0.000	0.003	0.115	-0.003	-0.110	-0.109	-0.106	-0.003	-0.108	-0.111	-0.109	0.005	-0.106	-0.106	-0.003	0.124	-0.110
202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 207S Pinedale)	0.018	0.018	-0.018	0.085	0.000	0.000	0.160	0.000	0.018	0.018	0.017	0.000	0.018	0.018	0.018	0.015	0.017	0.017	0.000	0.117	0.018
202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 744AL Tap)	0.017	0.017	-0.017	0.081	0.000	0.000	0.152	0.000	0.017	0.017	0.017	0.000	0.017	0.017	0.017	0.015	0.016	0.016	0.000	0.111	0.017
202L (58S Edson - 178S Cynthia)	890L (58S Edson - 207S Pinedale)	0.019	0.019	-0.019	0.092	0.000	0.000	0.171	0.000	0.019	0.019	0.019	0.000	0.019	0.020	0.019	0.017	0.018	0.018	0.000	0.125	0.019
207S Pinedale T1/T2	202L (58S Edson - 178S Cynthia)	0.049	0.049	-0.083	0.118	-0.001	-0.011	0.205	0.011	0.049	0.049	0.047	0.011	0.049	0.050	0.049	0.037	0.047	0.047	0.011	0.156	0.049
207S Pinedale T1/T2	720L (347S Fox Creek - 397S Benbow)	-0.113	-0.114	0.010	0.085	0.000	0.005	0.111	-0.005	-0.114	-0.113	-0.110	-0.004	-0.112	-0.115	-0.113	0.002	-0.110	-0.110	-0.005	0.120	-0.114
320P Keephills T1	202L (58S Edson - 178S Cynthia)	0.050	0.050	-0.093	0.101	-0.002	-0.023	0.169	0.024	0.050	0.050	0.048	0.024	0.050	0.051	0.050	0.037	0.047	0.047	0.024	0.130	0.050
39S Bickerdike T1	39S Bickerdike T2	-0.060	-0.061	-0.068	0.237	0.000	-0.004	-0.552	0.004	-0.061	-0.060	-0.059	0.004	-0.059	-0.061	-0.060	0.041	-0.059	-0.060	0.005	-0.610	-0.061
39S Bickerdike T2	39S Bickerdike T1	-0.060	-0.061	-0.068	0.237	0.000	-0.004	-0.552	0.004	-0.061	-0.060	-0.059	0.004	-0.059	-0.061	-0.060	0.041	-0.059	-0.059	0.005	-0.610	-0.061
58S Edson T1/T2	720L (347S Fox Creek - 397S Benbow)	-0.103	-0.104	-0.002	0.100	0.000	0.003	0.000	-0.003	-0.104	-0.103	-0.100	-0.003	-0.102	-0.105	-0.103	0.007	-0.101	-0.101	-0.003	0.141	-0.104
602S Cold Creek T1/T2	202L (58S Edson - 178S Cynthia)	0.047	0.047	-0.083	0.102	-0.001	-0.011	0.175	0.012	0.047	0.047	0.045	0.011	0.047	0.048	0.047	0.034	0.045	0.045	0.012	0.000	0.047
602S Cold Creek T1/T2	890L (58S Edson - 207S Pinedale)	0.009	0.009	-0.001	0.069	0.000	0.003	0.133	-0.002	0.009	0.009	0.008	-0.003	0.009	0.009	0.009	0.009	0.008	0.008	-0.002	0.000	0.009
61S Lodgepole T1/T2	890L (58S Edson - 207S Pinedale)	0.006	0.006	0.017	0.074	0.001	0.006	0.145	-0.006	0.006	0.006	0.006	-0.007	0.006	0.006	0.006	0.007	0.006	0.006	-0.006	0.104	0.006
62S Brazeau T5	202L (58S Edson - 178S	0.019	0.019	0.000	0.068	0.000	0.003	0.126	-0.004	0.019	0.019	0.018	-0.004	0.018	0.019	0.019	0.015	0.018	0.018	-0.004	0.093	0.019

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
	Cynthia)																					
671L (58S Edson - 39S Bickerdike)	740L (58S Edson - 39S Bickerdike)	0.054	0.054	-0.081	0.166	-0.001	-0.008	-0.672	0.009	0.054	0.054	0.052	0.009	0.054	0.055	0.054	0.042	0.051	0.051	0.009	0.222	0.054
672L (235S Entwistle - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	0.061	0.061	-0.104	0.109	-0.001	-0.015	0.181	0.015	0.062	0.061	0.059	0.015	0.061	0.063	0.062	0.043	0.058	0.058	0.015	0.140	0.062
673L (283S Violet Grove - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	0.061	0.061	-0.104	0.109	-0.001	-0.015	0.181	0.015	0.062	0.061	0.059	0.015	0.061	0.063	0.062	0.043	0.058	0.058	0.015	0.140	0.062
685L (397S Benbow - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	0.032	0.032	-0.081	0.112	-0.001	-0.011	0.188	0.011	0.032	0.032	0.030	0.011	0.032	0.032	0.032	0.034	0.030	0.030	0.011	0.146	0.032
685L (397S Benbow - 1012S Deer Hill)	740L (58S Edson - 39S Bickerdike)	0.014	0.014	-0.046	0.108	0.000	-0.004	-0.375	0.005	0.014	0.014	0.013	0.004	0.014	0.014	0.014	0.025	0.013	0.013	0.005	0.146	0.014
685L (397S Benbow - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	-0.007	-0.007	0.001	0.073	0.000	0.003	0.138	-0.003	-0.007	-0.007	-0.007	-0.003	-0.007	-0.007	-0.007	0.008	-0.006	-0.006	-0.003	0.102	-0.007
685L (397S Benbow - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	-0.007	-0.007	0.001	0.079	0.000	0.003	0.147	-0.003	-0.007	-0.007	-0.007	-0.003	-0.007	-0.007	-0.007	0.009	-0.007	-0.007	-0.003	0.110	-0.007
720L (347S Fox Creek - 397S Benbow)	202L (58S Edson - 178S Cynthia)	0.032	0.032	-0.081	0.112	-0.001	-0.011	0.188	0.011	0.032	0.032	0.030	0.011	0.032	0.032	0.032	0.034	0.030	0.030	0.011	0.146	0.032
720L (347S Fox Creek - 397S Benbow)	740L (58S Edson - 39S Bickerdike)	0.014	0.014	-0.046	0.108	0.000	-0.004	-0.375	0.005	0.014	0.014	0.013	0.004	0.014	0.014	0.014	0.025	0.013	0.013	0.005	0.146	0.014
720L (347S Fox Creek - 397S Benbow)	744L (228S T.M.P.L. Niton - 207S Pinedale)	-0.007	-0.007	0.001	0.074	0.000	0.003	0.138	-0.003	-0.007	-0.007	-0.006	-0.003	-0.007	-0.007	-0.007	0.008	-0.006	-0.006	-0.003	0.103	-0.007
720L (347S Fox Creek - 397S Benbow)	890L (58S Edson - 207S Pinedale)	-0.007	-0.007	0.001	0.079	0.000	0.003	0.147	-0.003	-0.007	-0.007	-0.007	-0.003	-0.007	-0.007	-0.007	0.009	-0.007	-0.007	-0.003	0.110	-0.007

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
744L (228S T.M.P.L. Niton - 106S Paddle River - 235S Entwistle)	202L (58S Edson - 178S Cynthia)	0.049	0.049	-0.083	0.118	-0.001	-0.011	0.205	0.011	0.049	0.049	0.047	0.011	0.049	0.050	0.049	0.036	0.047	0.047	0.011	0.155	0.049
744L (228S T.M.P.L. Niton - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	0.049	0.049	-0.083	0.118	-0.001	-0.011	0.205	0.011	0.049	0.049	0.047	0.011	0.049	0.050	0.049	0.036	0.047	0.047	0.011	0.156	0.049
7L199/199L (347S Fox Creek - 741S Fox Creek)	202L (58S Edson - 178S Cynthia)	0.036	0.036	-0.082	0.104	-0.001	-0.011	0.178	0.011	0.037	0.036	0.035	0.011	0.037	0.037	0.037	0.034	0.034	0.034	0.012	0.136	0.037
7L199/199L (347S Fox Creek - 741S Fox Creek)	890L (58S Edson - 207S Pinedale)	0.000	0.000	0.000	0.071	0.000	0.003	0.136	-0.003	0.000	0.000	0.000	-0.003	0.000	0.000	0.000	0.009	0.000	0.000	-0.003	0.099	0.000
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	202L (58S Edson - 178S Cynthia)	0.036	0.036	-0.082	0.104	-0.001	-0.011	0.178	0.011	0.036	0.036	0.035	0.011	0.036	0.037	0.036	0.034	0.034	0.034	0.011	0.136	0.036
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	890L (58S Edson - 207S Pinedale)	0.000	0.000	0.000	0.071	0.000	0.003	0.136	-0.003	0.000	0.000	0.000	-0.003	0.000	0.000	0.000	0.009	0.000	0.000	-0.003	0.099	0.000
834L (384S Keystone - 320P Keephills)	202L (58S Edson - 178S Cynthia)	0.043	0.043	-0.094	0.097	-0.001	-0.014	0.166	0.015	0.043	0.043	0.042	0.014	0.043	0.044	0.043	0.032	0.041	0.041	0.015	0.126	0.043
836L (61S Lodgepole - 283S Violet Grove)	202L (58S Edson - 178S Cynthia)	0.060	0.060	-0.142	0.101	-0.002	-0.023	0.163	0.024	0.060	0.060	0.058	0.024	0.060	0.062	0.061	0.043	0.057	0.057	0.024	0.128	0.060
836L (61S Lodgepole - 283S Violet Grove)	890L (58S Edson - 207S Pinedale)	0.003	0.003	0.024	0.069	0.001	0.008	0.138	-0.008	0.003	0.003	0.003	-0.008	0.003	0.003	0.003	0.005	0.003	0.003	-0.007	0.098	0.003

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	0.032	0.032	-0.081	0.112	-0.001	-0.011	0.188	0.011	0.032	0.032	0.030	0.011	0.032	0.032	0.032	0.034	0.030	0.030	0.011	0.146	0.032
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	740L (58S Edson - 39S Bickerdike)	0.014	0.014	-0.046	0.108	0.000	-0.004	-0.375	0.005	0.014	0.014	0.013	0.004	0.014	0.014	0.014	0.025	0.013	0.013	0.005	0.146	0.014
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	-0.007	-0.007	0.001	0.073	0.000	0.003	0.137	-0.003	-0.007	-0.007	-0.007	-0.003	-0.007	-0.007	-0.007	0.008	-0.007	-0.007	-0.003	0.102	-0.007
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	-0.007	-0.007	0.001	0.079	0.000	0.003	0.147	-0.003	-0.007	-0.007	-0.007	-0.003	-0.007	-0.007	-0.007	0.009	-0.007	-0.007	-0.003	0.110	-0.007
890L (58S Edson - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	0.049	0.049	-0.083	0.118	-0.001	-0.011	0.205	0.011	0.049	0.049	0.047	0.011	0.049	0.050	0.049	0.036	0.047	0.047	0.011	0.156	0.049
890L (58S Edson - 207S Pinedale)	720L (347S Fox Creek - 397S Benbow)	-0.113	-0.114	0.010	0.085	0.000	0.005	0.111	-0.005	-0.114	-0.113	-0.110	-0.004	-0.112	-0.115	-0.113	0.002	-0.110	-0.110	-0.005	0.120	-0.114
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	0.051	0.051	-0.083	0.106	-0.001	-0.009	0.178	0.009	0.052	0.051	0.050	0.009	0.051	0.052	0.052	0.041	0.049	0.049	0.009	0.136	0.052
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	0.039	0.039	-0.048	0.103	0.000	-0.001	-0.386	0.001	0.039	0.039	0.037	0.001	0.039	0.039	0.039	0.035	0.037	0.037	0.001	0.135	0.039

		Plant																		
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	0.015	0.015	-0.001	0.069	0.001	0.007	0.129	-0.006	0.015	0.015	0.015	-0.006	0.015	0.015	0.015	0.019	0.015	0.015	-0.006	0.094	0.015
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	0.014	0.014	-0.001	0.066	0.001	0.006	0.122	-0.006	0.015	0.014	0.014	-0.006	0.014	0.015	0.014	0.018	0.014	0.014	-0.006	0.089	0.015
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	0.013	0.014	0.000	0.061	0.001	0.006	0.114	-0.006	0.014	0.013	0.013	-0.006	0.013	0.014	0.013	0.017	0.013	0.013	-0.006	0.083	0.014
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	0.016	0.016	-0.001	0.075	0.001	0.007	0.138	-0.007	0.016	0.016	0.016	-0.007	0.016	0.017	0.016	0.020	0.016	0.016	-0.007	0.101	0.016
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	909L (310P Sundance (Plant) - Dome)	0.243	0.244	0.041	0.235	0.014	0.136	0.200	-0.138	0.244	0.244	0.235	-0.138	0.243	0.249	0.245	0.305	0.232	0.232	-0.138	0.221	0.244
905L (19S Wabamun Generation Station - 37S North Calder)	202L (58S Edson - 178S Cynthia)	0.050	0.050	-0.082	0.105	-0.001	-0.010	0.178	0.010	0.050	0.050	0.048	0.010	0.050	0.051	0.050	0.038	0.047	0.047	0.010	0.136	0.050
905L (19S Wabamun Generation Station - 37S North Calder)	909L (310P Sundance (Plant) - Dome)	0.237	0.237	0.053	0.230	0.013	0.134	0.207	-0.135	0.238	0.237	0.229	-0.134	0.237	0.242	0.238	0.286	0.226	0.226	-0.135	0.221	0.238

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
909L (310P Sundance (Plant) - Dome)	202L (58S Edson - 178S Cynthia)	0.054	0.054	-0.081	0.108	-0.001	-0.008	0.182	0.008	0.054	0.054	0.052	0.008	0.054	0.055	0.054	0.042	0.051	0.051	0.008	0.139	0.054
909L (310P Sundance (Plant) - Dome)	890L (58S Edson - 207S Pinedale)	0.012	0.012	0.000	0.072	0.000	0.005	0.137	-0.004	0.012	0.012	0.012	-0.004	0.012	0.012	0.012	0.013	0.012	0.012	-0.004	0.099	0.012
909L (310P Sundance (Plant) - Dome)	902L (19S Wabamun Generation Station - 310P Sundance (Plant))	0.209	0.210	0.015	0.199	0.011	0.116	0.151	-0.117	0.210	0.209	0.202	-0.117	0.209	0.214	0.210	0.283	0.199	0.199	-0.117	0.179	0.210
913L (69S North Barrhead - 338S Cherhill)	720L (347S Fox Creek - 397S Benbow)	-0.125	-0.125	0.011	0.077	0.001	0.005	0.097	-0.006	-0.126	-0.125	-0.121	-0.005	-0.124	-0.127	-0.125	0.003	-0.121	-0.121	-0.005	0.110	-0.126
913L (69S North Barrhead - 338S Cherhill)	890L (58S Edson - 207S Pinedale)	0.007	0.007	-0.001	0.069	0.000	0.003	0.134	-0.003	0.007	0.007	0.007	-0.003	0.007	0.007	0.007	0.009	0.007	0.007	-0.003	0.096	0.007
919L (310P Sundance (Plant) - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	-0.137	-0.137	0.010	0.076	0.001	0.005	0.095	-0.005	-0.138	-0.137	-0.133	-0.005	-0.136	-0.139	-0.137	0.003	-0.133	-0.133	-0.005	0.108	-0.138
919L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	0.005	0.005	-0.001	0.069	0.000	0.003	0.133	-0.003	0.005	0.005	0.005	-0.003	0.005	0.005	0.005	0.009	0.005	0.005	-0.003	0.096	0.005
922L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	0.058	0.058	-0.082	0.111	-0.002	-0.016	0.183	0.017	0.058	0.058	0.056	0.017	0.058	0.059	0.058	0.045	0.055	0.055	0.017	0.142	0.058
922L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)	0.011	0.011	-0.001	0.071	0.000	0.001	0.135	-0.001	0.011	0.011	0.011	-0.001	0.011	0.011	0.011	0.012	0.011	0.011	-0.001	0.098	0.011
926L (310P	202L (58S	0.058	0.058	-0.082	0.111	-0.002	-0.016	0.183	0.017	0.058	0.058	0.056	0.017	0.058	0.059	0.058	0.045	0.055	0.055	0.017	0.142	0.058

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
Sundance (Plant) - 17S Benalto)	Edson - 178S Cynthia)																					
926L (310P Sundance (Plant) - 17S Benalto)	890L (58S Edson - 207S Pinedale)	0.011	0.011	-0.001	0.071	0.000	0.001	0.135	-0.001	0.011	0.011	0.011	-0.001	0.011	0.011	0.011	0.012	0.011	0.011	-0.001	0.098	0.011
973L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	0.050	0.051	-0.078	0.143	-0.001	-0.011	0.211	0.011	0.051	0.051	0.049	0.011	0.050	0.052	0.051	0.032	0.048	0.048	0.011	0.170	0.051
973L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	-0.108	-0.108	0.015	0.121	0.001	0.005	0.133	-0.005	-0.108	-0.108	-0.105	-0.004	-0.107	-0.110	-0.108	-0.002	-0.105	-0.105	-0.005	0.149	-0.108
973L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	0.036	0.036	-0.043	0.142	0.000	-0.005	-0.352	0.005	0.036	0.036	0.035	0.005	0.036	0.036	0.036	0.022	0.034	0.034	0.005	0.171	0.036
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	0.011	0.011	0.003	0.098	0.000	0.003	0.154	-0.003	0.011	0.011	0.011	-0.003	0.011	0.011	0.011	0.006	0.011	0.011	-0.003	0.120	0.011
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	0.010	0.010	0.003	0.092	0.000	0.003	0.146	-0.002	0.011	0.010	0.010	-0.003	0.010	0.011	0.010	0.006	0.010	0.010	-0.002	0.113	0.011
973L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	0.010	0.010	0.003	0.084	0.000	0.002	0.136	-0.002	0.010	0.010	0.009	-0.002	0.010	0.010	0.010	0.005	0.010	0.010	-0.002	0.105	0.010
973L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	0.012	0.012	0.004	0.106	0.000	0.003	0.166	-0.003	0.012	0.012	0.012	-0.003	0.012	0.012	0.012	0.007	0.012	0.012	-0.003	0.130	0.012
973L (39S Bickerdike	974L (39S Bickerdike -	0.052	0.053	0.060	0.608	0.000	0.003	0.495	-0.004	0.053	0.052	0.051	-0.004	0.051	0.053	0.052	-0.037	0.052	0.052	-0.004	0.547	0.053

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
- 310P Sundance (Plant))	310P Sundance (Plant))																					
974L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	0.050	0.051	-0.078	0.143	-0.001	-0.011	0.211	0.011	0.051	0.051	0.049	0.011	0.050	0.052	0.051	0.032	0.048	0.048	0.011	0.170	0.051
974L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	-0.108	-0.108	0.015	0.120	0.001	0.005	0.133	-0.005	-0.108	-0.108	-0.105	-0.004	-0.107	-0.110	-0.108	-0.002	-0.105	-0.105	-0.005	0.149	-0.108
974L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	0.036	0.036	-0.043	0.142	0.000	-0.005	-0.352	0.005	0.036	0.036	0.035	0.005	0.036	0.036	0.036	0.022	0.034	0.034	0.005	0.171	0.036
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	0.011	0.011	0.003	0.097	0.000	0.003	0.154	-0.003	0.011	0.011	0.011	-0.003	0.011	0.011	0.011	0.006	0.011	0.011	-0.003	0.120	0.011
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	0.010	0.010	0.003	0.092	0.000	0.003	0.146	-0.002	0.010	0.010	0.010	-0.003	0.010	0.011	0.010	0.006	0.010	0.010	-0.002	0.113	0.010
974L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	0.010	0.010	0.003	0.084	0.000	0.002	0.136	-0.002	0.010	0.010	0.009	-0.002	0.010	0.010	0.010	0.005	0.010	0.010	-0.002	0.105	0.010
974L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	0.012	0.012	0.004	0.106	0.000	0.003	0.166	-0.003	0.012	0.012	0.012	-0.003	0.012	0.012	0.012	0.007	0.012	0.012	-0.003	0.130	0.012
974L (39S Bickerdike - 310P Sundance (Plant))	973L (39S Bickerdike - 310P Sundance (Plant))	0.052	0.053	0.060	0.608	0.000	0.003	0.495	-0.004	0.053	0.052	0.051	-0.004	0.051	0.053	0.052	-0.037	0.052	0.052	-0.004	0.547	0.053
989L (310P Sundance (Plant) -	720L (347S Fox Creek - 397S Benbow)	-0.135	-0.136	0.010	0.076	0.001	0.005	0.095	-0.005	-0.136	-0.136	-0.131	-0.005	-0.134	-0.138	-0.135	0.002	-0.131	-0.131	-0.005	0.108	-0.136

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
77S Sagitawah)																					
989L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	0.005	0.005	-0.001	0.069	0.000	0.003	0.133	-0.003	0.005	0.005	0.005	-0.003	0.005	0.005	0.005	0.009	0.005	0.005	-0.003	0.096	0.005

Table M-4: 2022WP (Post- Project), Generators Effectiveness Factors under Normal Condition (N-1)

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
1012S Deer Hill T1	202L (58S Edson - 178S Cynthia)	0.032	0.032	-0.081	0.108	-0.001	0.011	0.183	0.011	0.000	0.032	0.031	0.011	0.033	0.000	0.033	0.034	0.030	0.030	0.011	0.143	0.032
1012S Deer Hill T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	-0.007	-0.008	0.001	0.072	0.000	-0.002	0.135	-0.003	0.000	-0.008	-0.007	-0.003	-0.008	0.000	-0.008	0.008	-0.007	-0.007	-0.002	0.101	-0.008
1012S Deer Hill T1	890L (58S Edson - 207S Pinedale)	-0.008	-0.008	0.001	0.077	0.000	-0.002	0.144	-0.003	0.000	-0.008	-0.008	-0.003	-0.008	0.000	-0.008	0.009	-0.008	-0.008	-0.003	0.108	-0.008
1046L (310P Sundance (Plant) to 338S Cherhill)	202L (58S Edson - 178S Cynthia)	0.047	0.047	-0.083	0.099	-0.001	0.011	0.170	0.011	0.000	0.048	0.045	0.011	0.049	0.000	0.049	0.034	0.044	0.044	0.011	0.130	0.047
1046L (310P Sundance (Plant) to 338S Cherhill)	890L (58S Edson - 207S Pinedale)	0.007	0.007	-0.001	0.068	0.000	-0.002	0.131	-0.002	0.000	0.007	0.007	-0.002	0.007	0.000	0.007	0.009	0.007	0.007	-0.002	0.095	0.007
178S Cynthia T1	744L (228S T.M.P.L. Niton - 207S Pinedale)	0.017	0.018	-0.018	0.083	0.000	0.001	0.156	0.000	0.000	0.018	0.017	0.000	0.018	0.000	0.018	0.015	0.017	0.017	0.000	0.115	0.018
178S Cynthia T1	890L (58S Edson - 207S Pinedale)	0.019	0.019	-0.019	0.089	0.000	0.001	0.167	0.000	0.000	0.019	0.018	0.000	0.019	0.000	0.019	0.016	0.018	0.018	0.000	0.123	0.019
19S Wabamun T10	890L (58S Edson - 207S Pinedale)	0.010	0.010	-0.005	0.068	0.000	-0.002	0.127	-0.003	0.000	0.010	0.009	-0.003	0.010	0.000	0.010	0.015	0.009	0.009	-0.003	0.093	0.010
202L (178S Cynthia - 359S Esso West Pembina - 61S Lodgepole)	890L (58S Edson - 207S Pinedale)	0.011	0.011	-0.005	0.076	0.000	-0.001	0.146	-0.002	0.000	0.011	0.011	-0.002	0.012	0.000	0.012	0.011	0.011	0.011	-0.002	0.106	0.011
202L (58S Edson - 178S Cynthia)	744L (228S T.M.P.L. Niton - 207S Pinedale)	0.018	0.018	-0.018	0.083	0.000	0.001	0.156	0.000	0.000	0.018	0.017	0.000	0.018	0.000	0.018	0.015	0.017	0.017	0.001	0.115	0.018
202L (58S Edson - 178S Cynthia)	890L (58S Edson - 207S Pinedale)	0.019	0.019	-0.020	0.089	0.000	0.001	0.167	0.000	0.000	0.019	0.018	0.000	0.019	0.000	0.019	0.016	0.018	0.018	0.001	0.123	0.019

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
207S Pinedale T1/T2	202L (58S Edson - 178S Cynthia)	0.049	0.049	-0.083	0.115	-0.001	0.011	0.200	0.011	0.000	0.049	0.047	0.011	0.051	0.000	0.051	0.036	0.046	0.046	0.011	0.152	0.049
320P Keephills T1	202L (58S Edson - 178S Cynthia)	0.049	0.049	-0.094	0.097	-0.002	0.021	0.164	0.022	0.000	0.049	0.047	0.022	0.051	0.000	0.051	0.035	0.046	0.046	0.023	0.126	0.049
39S Bickerdike T1	39S Bickerdike T2	-0.063	-0.064	-0.069	0.231	0.000	0.006	-0.559	0.005	0.000	-0.064	-0.061	0.005	-0.064	0.000	-0.065	0.041	-0.061	-0.061	0.005	-0.616	-0.064
39S Bickerdike T2	39S Bickerdike T1	-0.063	-0.064	-0.069	0.231	0.000	0.006	-0.559	0.005	0.000	-0.064	-0.061	0.005	-0.064	0.000	-0.065	0.041	-0.061	-0.061	0.005	-0.616	-0.064
58S Edson T1/T2	720L (347S Fox Creek - 397S Benbow)	-0.106	-0.106	-0.002	0.098	0.000	-0.002	0.000	-0.002	0.000	-0.107	-0.102	-0.002	-0.108	0.000	-0.108	0.007	-0.101	-0.101	-0.002	0.139	-0.106
602S Cold Creek T1/T2	202L (58S Edson - 178S Cynthia)	0.047	0.047	-0.083	0.099	-0.001	0.011	0.170	0.011	0.000	0.048	0.045	0.011	0.049	0.000	0.049	0.033	0.044	0.044	0.011	0.000	0.047
61S Lodgepole T1/T2	890L (58S Edson - 207S Pinedale)	0.005	0.005	0.017	0.072	0.001	-0.005	0.142	-0.006	0.000	0.005	0.005	-0.006	0.005	0.000	0.005	0.007	0.005	0.005	-0.006	0.103	0.005
671L (58S Edson - 39S Bickerdike)	740L (58S Edson - 39S Bickerdike)	0.053	0.054	-0.082	0.162	-0.001	0.009	-0.678	0.009	0.000	0.054	0.051	0.009	0.055	0.000	0.055	0.041	0.050	0.050	0.009	0.218	0.054
672L (235S Entwistle - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	0.062	0.062	-0.104	0.106	-0.001	0.014	0.176	0.014	0.000	0.063	0.060	0.014	0.064	0.000	0.065	0.042	0.058	0.058	0.015	0.137	0.062
673L (283S Violet Grove - 131S Moon Lake)	202L (58S Edson - 178S Cynthia)	0.062	0.062	-0.104	0.106	-0.001	0.014	0.176	0.014	0.000	0.063	0.060	0.014	0.064	0.000	0.064	0.042	0.058	0.058	0.015	0.137	0.062
685L (397S Benbow - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	0.032	0.032	-0.081	0.108	-0.001	0.011	0.183	0.011	0.000	0.032	0.031	0.011	0.033	0.000	0.033	0.034	0.030	0.030	0.011	0.143	0.032
685L (397S Benbow - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	-0.007	-0.008	0.001	0.072	0.000	-0.002	0.135	-0.003	0.000	-0.008	-0.007	-0.003	-0.008	0.000	-0.008	0.008	-0.007	-0.007	-0.002	0.101	-0.008
685L (397S Benbow - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	-0.008	-0.008	0.001	0.077	0.000	-0.002	0.144	-0.003	0.000	-0.008	-0.008	-0.003	-0.008	0.000	-0.008	0.009	-0.008	-0.008	-0.003	0.108	-0.008

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
720L (347S Fox Creek - 397S Benbow)	202L (58S Edson - 178S Cynthia)	0.032	0.032	-0.081	0.108	-0.001	0.011	0.183	0.011	0.000	0.032	0.030	0.011	0.033	0.000	0.033	0.034	0.030	0.030	0.011	0.143	0.032
720L (347S Fox Creek - 397S Benbow)	744L (228S T.M.P.L. Niton - 207S Pinedale)	-0.007	-0.007	0.001	0.072	0.000	-0.002	0.135	-0.003	0.000	-0.008	-0.007	-0.003	-0.008	0.000	-0.008	0.008	-0.007	-0.007	-0.002	0.101	-0.007
720L (347S Fox Creek - 397S Benbow)	890L (58S Edson - 207S Pinedale)	-0.008	-0.008	0.001	0.077	0.000	-0.002	0.144	-0.003	0.000	-0.008	-0.008	-0.003	-0.008	0.000	-0.008	0.009	-0.008	-0.008	-0.003	0.109	-0.008
744L (228S T.M.P.L. Niton - 106S Paddle River - 235S Entwistle)	202L (58S Edson - 178S Cynthia)	0.049	0.049	-0.083	0.114	-0.001	0.011	0.200	0.011	0.000	0.049	0.047	0.011	0.050	0.000	0.051	0.036	0.046	0.046	0.011	0.152	0.049
744L (228S T.M.P.L. Niton - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	0.049	0.049	-0.083	0.114	-0.001	0.011	0.200	0.011	0.000	0.049	0.047	0.011	0.050	0.000	0.051	0.036	0.046	0.046	0.011	0.152	0.049
7L199/199L (347S Fox Creek - 741S Fox Creek)	202L (58S Edson - 178S Cynthia)	0.037	0.037	-0.083	0.101	-0.001	0.011	0.174	0.011	0.000	0.037	0.035	0.011	0.038	0.000	0.038	0.034	0.034	0.034	0.011	0.134	0.037
7L199/199L (347S Fox Creek - 741S Fox Creek)	890L (58S Edson - 207S Pinedale)	-0.001	-0.001	-0.001	0.070	0.000	-0.002	0.134	-0.002	0.000	-0.001	-0.001	-0.002	-0.001	0.000	-0.001	0.009	-0.001	-0.001	-0.002	0.098	-0.001
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	202L (58S Edson - 178S Cynthia)	0.036	0.036	-0.082	0.101	-0.001	0.011	0.174	0.011	0.000	0.037	0.035	0.011	0.038	0.000	0.038	0.034	0.034	0.034	0.011	0.134	0.036
7L90 (347S Fox Creek - 2018S Muir - 813S Little Smoky)	890L (58S Edson - 207S Pinedale)	0.000	0.000	-0.001	0.070	0.000	-0.002	0.134	-0.002	0.000	0.000	0.000	-0.002	0.000	0.000	0.000	0.009	0.000	0.000	-0.002	0.098	0.000

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
834L (384S Keystone - 320P Keephills)	202L (58S Edson - 178S Cynthia)	0.043	0.043	-0.094	0.094	-0.001	0.013	0.162	0.014	0.000	0.044	0.042	0.014	0.045	0.000	0.045	0.031	0.041	0.041	0.014	0.123	0.043
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	202L (58S Edson - 178S Cynthia)	0.032	0.032	-0.081	0.108	-0.001	0.011	0.183	0.011	0.000	0.032	0.031	0.011	0.033	0.000	0.033	0.034	0.030	0.030	0.011	0.143	0.032
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	744L (228S T.M.P.L. Niton - 207S Pinedale)	-0.008	-0.008	0.001	0.072	0.000	-0.002	0.135	-0.003	0.000	-0.008	-0.007	-0.003	-0.008	0.000	-0.008	0.008	-0.007	-0.007	-0.002	0.101	-0.008
854L (39S Bickerdike - 348S Marlboro - 1012S Deer Hill)	890L (58S Edson - 207S Pinedale)	-0.008	-0.008	0.001	0.077	0.000	-0.002	0.144	-0.003	0.000	-0.008	-0.008	-0.003	-0.008	0.000	-0.008	0.009	-0.008	-0.008	-0.003	0.108	-0.008
890L (58S Edson - 207S Pinedale)	202L (58S Edson - 178S Cynthia)	0.049	0.049	-0.083	0.115	-0.001	0.011	0.199	0.011	0.000	0.049	0.047	0.011	0.050	0.000	0.051	0.036	0.046	0.046	0.011	0.152	0.049
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	0.052	0.052	-0.083	0.103	-0.001	0.009	0.174	0.009	0.000	0.052	0.050	0.009	0.053	0.000	0.054	0.040	0.049	0.049	0.009	0.134	0.052
902L (19S Wabamun Generation Station - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	0.015	0.015	-0.001	0.069	0.001	-0.006	0.127	-0.006	0.000	0.015	0.015	-0.006	0.015	0.000	0.016	0.019	0.014	0.014	-0.006	0.094	0.015
902L (19S Wabamun Generation Station - 310P Sundance	890L (58S Edson - 207S Pinedale)	0.016	0.016	-0.001	0.074	0.001	-0.006	0.136	-0.006	0.000	0.016	0.016	-0.006	0.017	0.000	0.017	0.020	0.015	0.015	-0.006	0.100	0.016

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
(Plant))																					
905L (19S Wabamun Generation Station - 37S North Calder)	202L (58S Edson - 178S Cynthia)	0.050	0.050	-0.082	0.102	-0.001	0.010	0.173	0.010	0.000	0.051	0.048	0.010	0.052	0.000	0.052	0.037	0.047	0.047	0.010	0.133	0.050
909L (310P Sundance (Plant) - Dome)	202L (58S Edson - 178S Cynthia)	0.054	0.054	-0.082	0.105	-0.001	0.008	0.177	0.008	0.000	0.055	0.052	0.008	0.056	0.000	0.056	0.041	0.051	0.051	0.008	0.137	0.054
909L (310P Sundance (Plant) - Dome)	890L (58S Edson - 207S Pinedale)	0.012	0.012	0.000	0.071	0.000	-0.004	0.134	-0.004	0.000	0.012	0.011	-0.004	0.012	0.000	0.012	0.013	0.011	0.011	-0.004	0.098	0.012
919L (310P Sundance (Plant) - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	-0.141	-0.142	0.010	0.074	0.001	-0.004	0.093	-0.005	0.000	-0.143	-0.136	-0.005	-0.145	0.000	-0.145	0.003	-0.135	-0.135	-0.005	0.106	-0.142
919L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	0.004	0.004	-0.001	0.068	0.000	-0.002	0.131	-0.002	0.000	0.004	0.004	-0.002	0.004	0.000	0.004	0.009	0.004	0.004	-0.002	0.095	0.004
922L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	0.058	0.059	-0.082	0.108	-0.002	0.016	0.179	0.017	0.000	0.059	0.056	0.016	0.060	0.000	0.061	0.044	0.055	0.055	0.017	0.139	0.059
926L (310P Sundance (Plant) - 17S Benalto)	202L (58S Edson - 178S Cynthia)	0.058	0.059	-0.082	0.108	-0.002	0.016	0.179	0.017	0.000	0.059	0.056	0.016	0.060	0.000	0.061	0.044	0.055	0.055	0.017	0.139	0.059
973L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	0.051	0.051	-0.078	0.139	-0.001	0.011	0.205	0.011	0.000	0.051	0.049	0.011	0.052	0.000	0.053	0.031	0.048	0.048	0.011	0.167	0.051
973L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	-0.110	-0.110	0.015	0.118	0.001	-0.003	0.131	-0.004	0.000	-0.111	-0.106	-0.004	-0.112	0.000	-0.113	-0.002	-0.105	-0.105	-0.004	0.148	-0.110

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
973L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	0.036	0.036	-0.043	0.138	0.000	0.005	-0.355	0.005	0.000	0.036	0.034	0.005	0.037	0.000	0.037	0.022	0.034	0.034	0.005	0.169	0.036
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 207S Pinedale)	0.011	0.011	0.003	0.096	0.000	-0.002	0.152	-0.002	0.000	0.011	0.010	-0.002	0.011	0.000	0.011	0.006	0.010	0.010	-0.002	0.119	0.011
973L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	0.010	0.010	0.003	0.091	0.000	-0.002	0.144	-0.002	0.000	0.010	0.010	-0.002	0.010	0.000	0.010	0.006	0.010	0.010	-0.002	0.113	0.010
973L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	0.010	0.010	0.003	0.084	0.000	-0.002	0.134	-0.002	0.000	0.010	0.009	-0.002	0.010	0.000	0.010	0.005	0.009	0.009	-0.002	0.105	0.010
973L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	0.012	0.012	0.003	0.104	0.000	-0.002	0.163	-0.002	0.000	0.012	0.011	-0.003	0.012	0.000	0.012	0.007	0.011	0.011	-0.002	0.128	0.012
973L (39S Bickerdike - 310P Sundance (Plant))	974L (39S Bickerdike - 310P Sundance (Plant))	0.055	0.055	0.061	0.616	0.000	-0.005	0.504	-0.004	0.000	0.055	0.053	-0.004	0.056	0.000	0.056	-0.036	0.053	0.053	-0.004	0.556	0.055
974L (39S Bickerdike - 310P Sundance (Plant))	202L (58S Edson - 178S Cynthia)	0.051	0.051	-0.078	0.139	-0.001	0.011	0.205	0.011	0.000	0.051	0.049	0.011	0.052	0.000	0.053	0.031	0.048	0.048	0.011	0.167	0.051
974L (39S Bickerdike - 310P Sundance (Plant))	720L (347S Fox Creek - 397S Benbow)	-0.110	-0.110	0.015	0.118	0.001	-0.003	0.131	-0.004	0.000	-0.111	-0.106	-0.004	-0.112	0.000	-0.113	-0.002	-0.105	-0.105	-0.004	0.148	-0.110
974L (39S Bickerdike - 310P Sundance (Plant))	740L (58S Edson - 39S Bickerdike)	0.036	0.036	-0.043	0.138	0.000	0.005	-0.355	0.005	0.000	0.036	0.034	0.005	0.037	0.000	0.037	0.022	0.034	0.034	0.005	0.169	0.036
974L (39S	744L (228S	0.011	0.011	0.003	0.096	0.000	-0.002	0.152	-0.002	0.000	0.011	0.010	-0.002	0.011	0.000	0.011	0.006	0.010	0.010	-0.002	0.119	0.011

		Plant																			
Contingency	**Line**	*Bear Creek 1*	*Bear Creek 2*	*Brazeau Hydro*	*Cascade*	*Daishowa*	*EATL*	*Edson Gas Plant*	*Genesee 3*	*Gold Creek Facility*	*Grande Prairie EcoPower*	*H.R. Milner*	*Keephills 3*	*Northern Prairie Power Project*	*Northstone Power*	*Poplar Hill #1*	*Sundance 4*	*Valley View 1*	*Valley View 2*	*WATL*	*Weldwood*	*Weyerhauser*
Bickerdike - 310P Sundance (Plant))	T.M.P.L. Niton - 207S Pinedale)																					
974L (39S Bickerdike - 310P Sundance (Plant))	744L (228S T.M.P.L. Niton - 744AL Tap)	0.010	0.010	0.003	0.090	0.000	-0.002	0.144	-0.002	0.000	0.010	0.010	-0.002	0.010	0.000	0.010	0.006	0.010	0.010	-0.002	0.113	0.010
974L (39S Bickerdike - 310P Sundance (Plant))	744L (235S Entwistle - 744AL Tap)	0.010	0.010	0.003	0.084	0.000	-0.002	0.134	-0.002	0.000	0.010	0.009	-0.002	0.010	0.000	0.010	0.005	0.009	0.009	-0.002	0.105	0.010
974L (39S Bickerdike - 310P Sundance (Plant))	890L (58S Edson - 207S Pinedale)	0.012	0.012	0.003	0.104	0.000	-0.002	0.163	-0.002	0.000	0.012	0.011	-0.003	0.012	0.000	0.012	0.007	0.011	0.011	-0.002	0.128	0.012
974L (39S Bickerdike - 310P Sundance (Plant))	973L (39S Bickerdike - 310P Sundance (Plant))	0.055	0.055	0.061	0.616	0.000	-0.005	0.504	-0.004	0.000	0.055	0.053	-0.004	0.056	0.000	0.056	-0.036	0.053	0.053	-0.005	0.556	0.055
989L (310P Sundance (Plant) - 77S Sagitawah)	720L (347S Fox Creek - 397S Benbow)	-0.139	-0.140	0.010	0.074	0.001	-0.004	0.093	-0.005	0.000	-0.141	-0.135	-0.004	-0.143	0.000	-0.144	0.003	-0.133	-0.133	-0.005	0.107	-0.140
989L (310P Sundance (Plant) - 77S Sagitawah)	890L (58S Edson - 207S Pinedale)	0.004	0.004	-0.001	0.068	0.000	-0.002	0.131	-0.002	0.000	0.004	0.004	-0.002	0.004	0.000	0.005	0.009	0.004	0.004	-0.002	0.095	0.004